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Replicating the Perendev motor

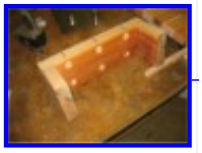
A movie clip made by Robert Calloway at www.callowayengines.com

Or download this Movie.(right click: save target as...)

2006-02-23 A flat Perendev device experiment



Repli-cation: 1 Oct.2004	Click for Roger Cote's explanation			

Repli-cation: 15 Oct.2004	Click for Mark Olson's explanation			
				

Repli-cation: 15 May 2007	Click for Thomas' explanation			
				

Here is an explanation I received by email, about the use of pot magnets in the Perendev Device:

The Perendev has movement, because the magnets on the rotor are sealed with steel. This technique makes the magnet stronger where it isn't sealed: top and bottom, but makes the magnetic fields (flux) closer. They isolate the magnetic field around the magnets.

The steel will not get attracted to the stators because the magnets on the stators are probably also sealed but the magnetic force between top of magnets (not sealed) on the rotor and those of the stators is the strongest and that is why the simulation on this site doesn't work.

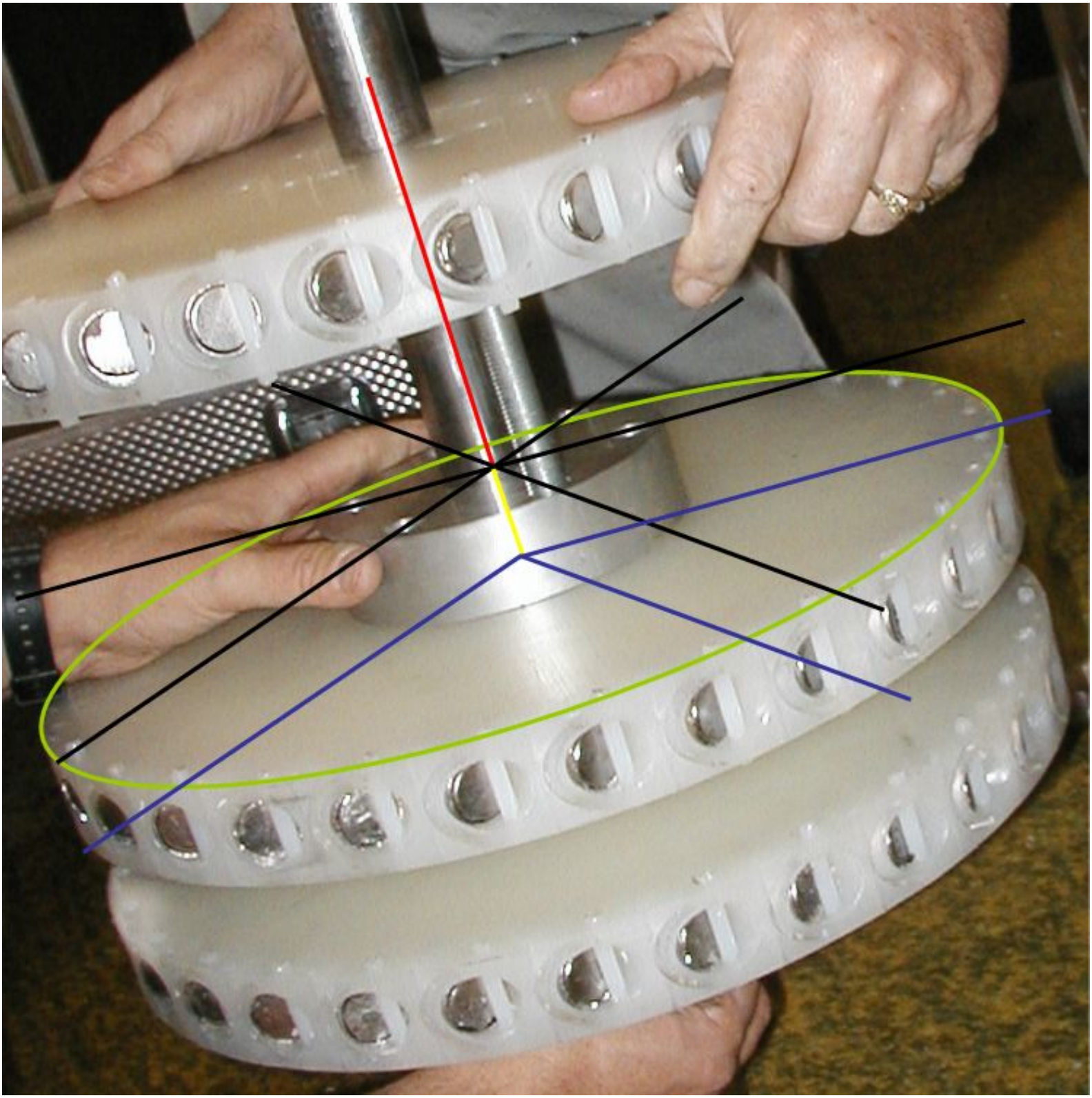
This way of isolating magnets is very known: look at pot magnets! The steel is a better guider of magnetism than the air and that is why the magnetic flux chooses to travel through the steel and you are cutting the field short!

There is contact between the steel (=external shell) and the magnets. Steel gets magnetized (attracted), it is a way of isolating that is frequently used with pot magnets. Every magnet dealer sells them!

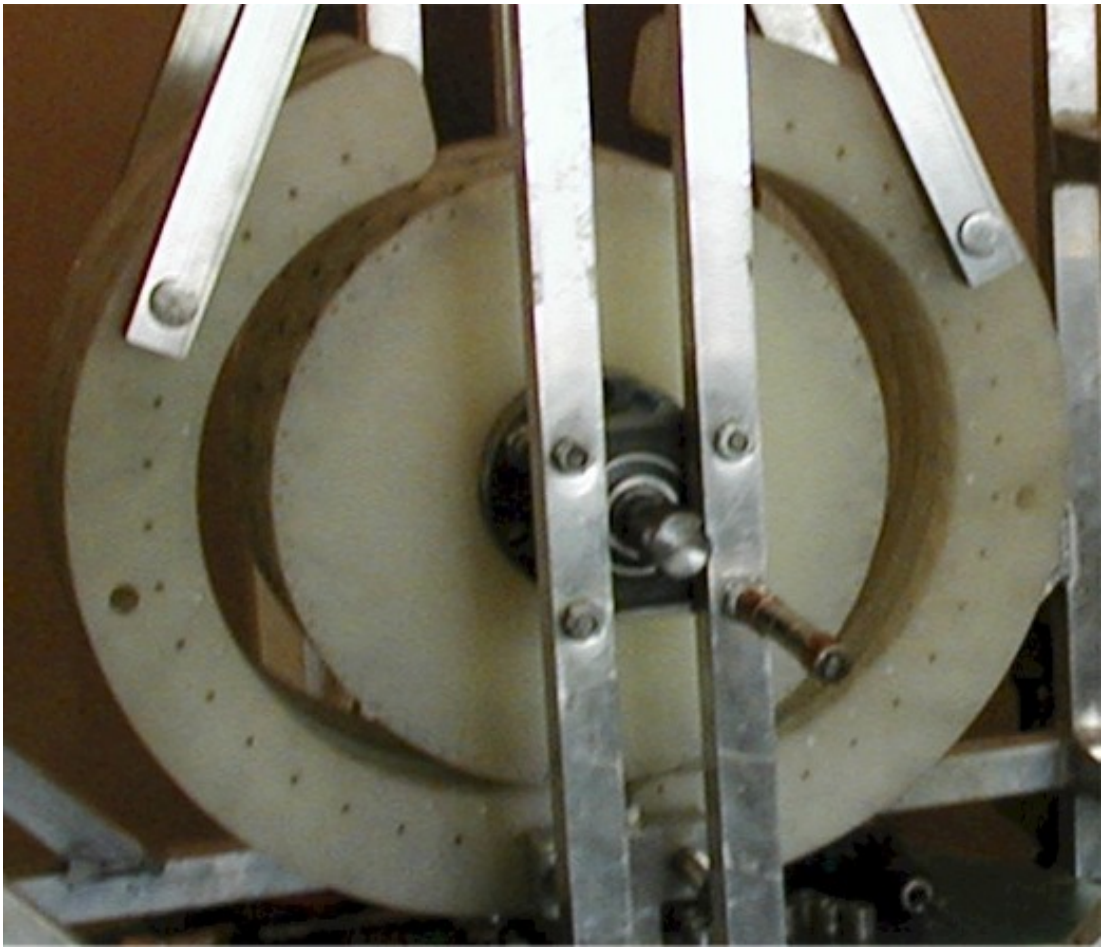
If the Perendev motor works, then it has to be with that kind of isolation;

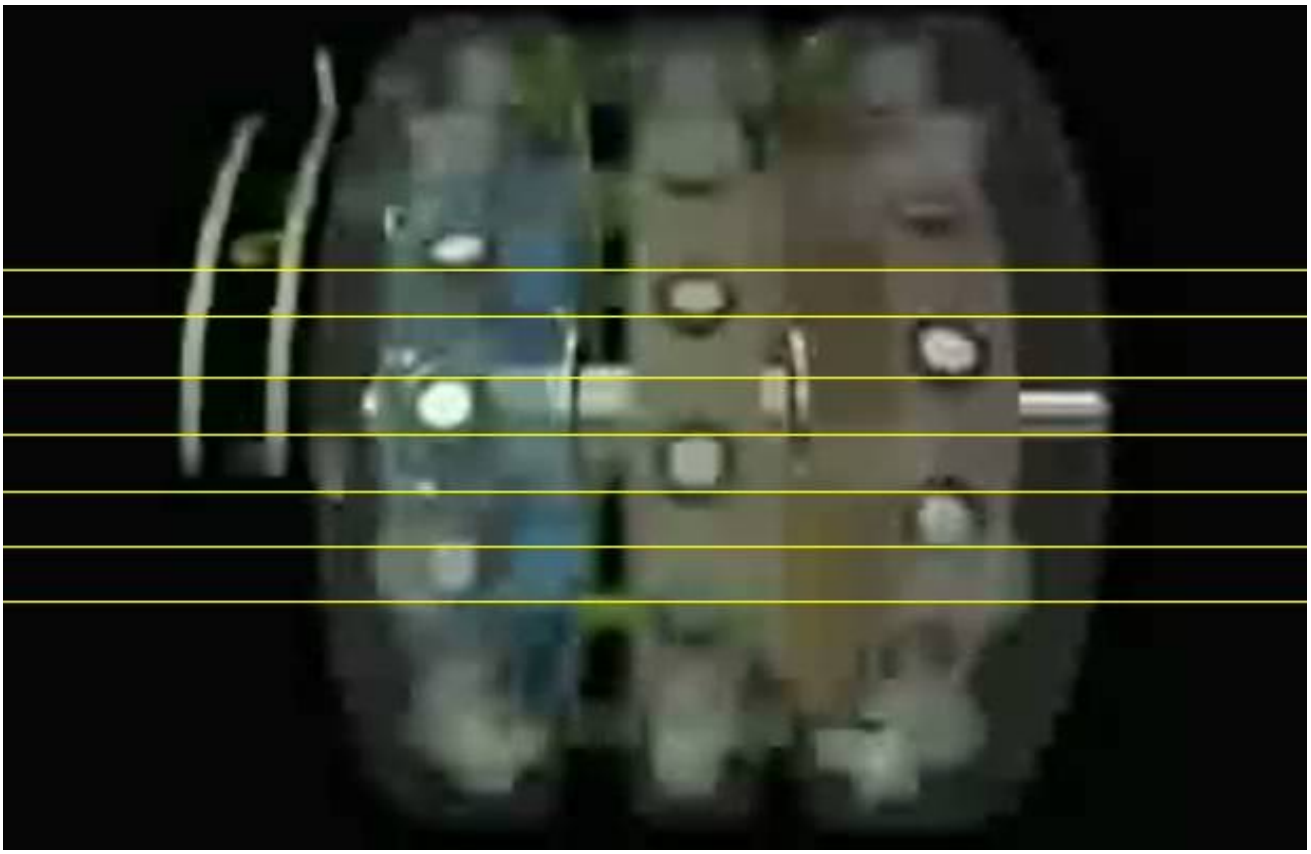
otherwise the repelling power is equal to the attracting power on the sides of the magnets!

Trying to understand the Perendev motor



Calculation number of magnets: by Tero Ranta
On top of the middle white disk there is a metallic flange that has 6 holes 60 degrees apart (there is a threaded rod in one of the holes). Now you can draw lines that go through the 6 holes (black lines). Then project the black lines downwards the same heighth (yellow) as the metallic flange and in the same direction as the shaft (red line). The projected lines are blue and the angle between them is 60 degrees. By comparing the blue lines with the outer perimeter of the disk (green) you can count that there are 5 magnet attachment nylon screws per 60° segment. Thus you have 30 magnets on the disks.

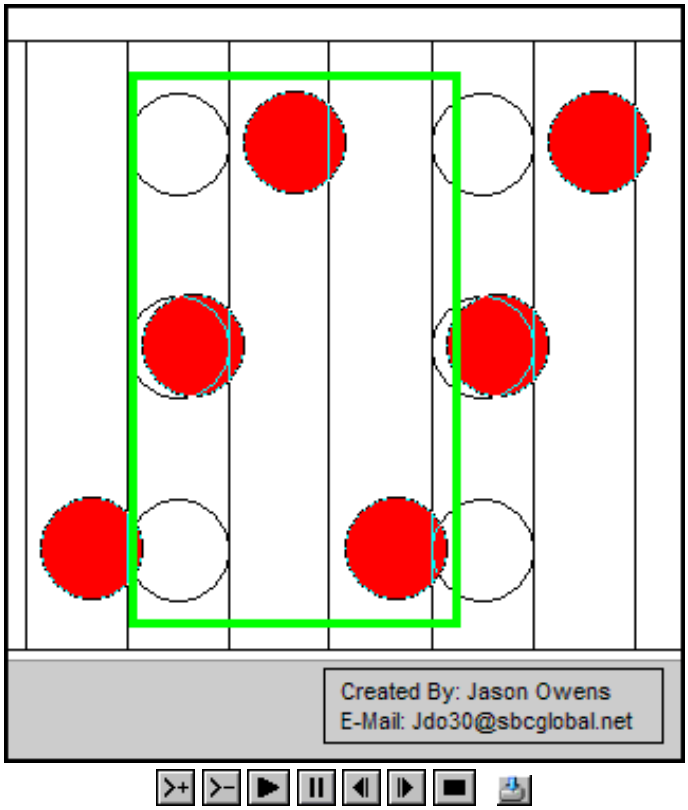




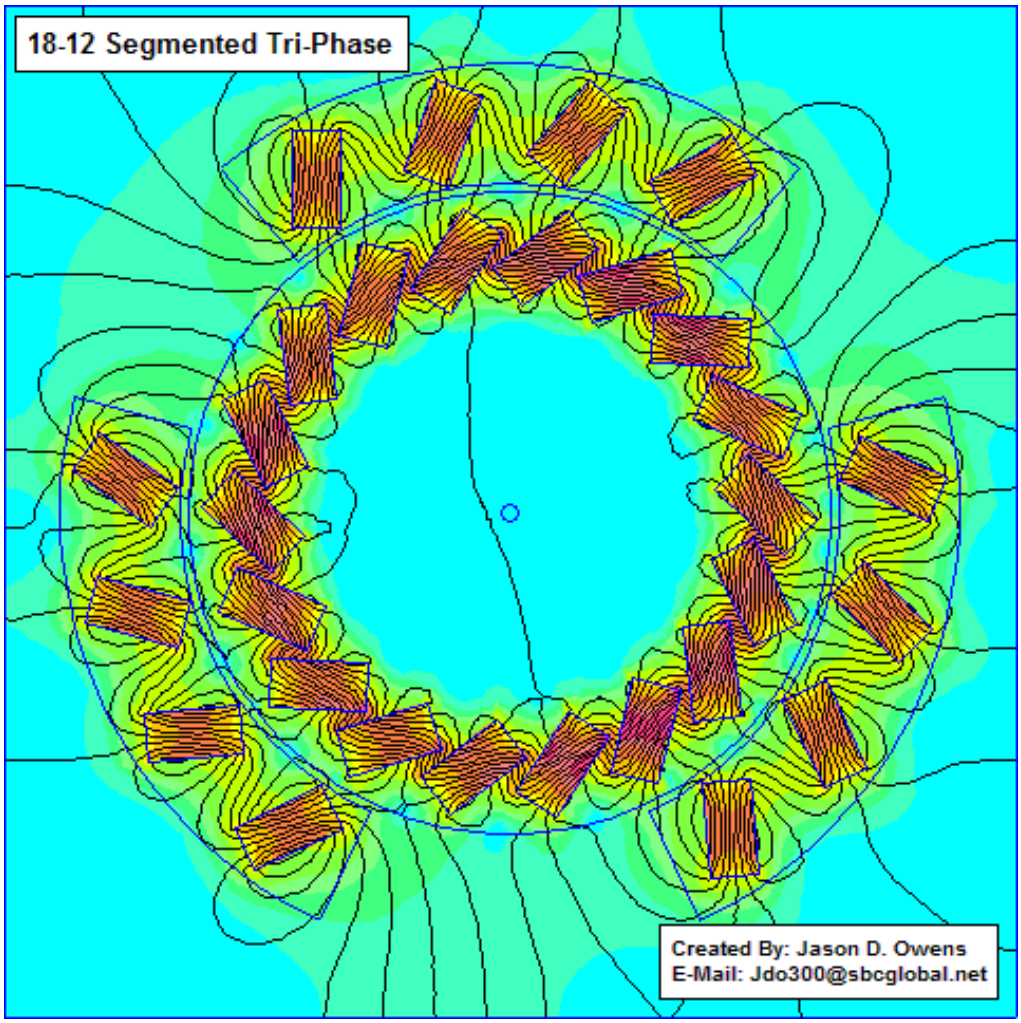
Click here to see a video of the device at www.greaterthings.com

by Jason Owens.
I have been studying the Perendev motor lately to see just how they have the offsets set up on the main wheel. I was also looking at some diagrams Dan made of the offsets and I finally figured out exactly how they did it. I took a clip from the flash video and the video of the working model and I could see just how the offsets were made by doing a cheap line test.

Dan's idea came pretty close but from my observations, the distance between the offsets is one magnet width as opposed to half the width like in the diagram. What I did next was make a simple animation that I could study to see just how they accomplished the off balanced effect in the motor:



I attached the animation to this e-mail so you can look at it but I can see clearly here how the balancing effect is happening. From this idea, I figured out a way to modify my original tri-phase designs so that these three-phase offsets can be applied. **I simply segmented the stator magnets up into three sections (to represent the offsets of the three wheels on the Perendev)** and I got this final layout:



Click here if you want to see a replication of this simulation, together with a torque calculation and results.

<<<"THIS IS NOT THE PERENDEV DEVICE">>>

This here is also an animation that I attached to the e-mail for you to look at. It basically has the same three offsets as the Perendev motor and beautifully accomplishes the unbalanced effect. As far as I can see, the magnets on two of the stator sets are always helping the third one enter a line up, then the phase shifts and two different stator sets help a third one line up again; and it's all seamless too! I know that this diagram looks like an earlier model that I made but this one appears to actually work just from looking at the simulation animation.

It appears that the motor will cog when the lines of flux are at a maximum density. Besides tracing out the magnetic lines have you done any calculations on the forces?
You can do this by differentiating the energy in the magnetic cicuit.

Georg

Hi Georg,
Unfortunately, I really don't have any means to test the amount of force that the magnets have on each other. I have Maxwell 3D magnet analysis software and I heard that can be used for force analysis but I really don't have any background in the theory and the math necessary to use it. The only calculations (if you want to call them that) that I've done was to organize the geometry of the rotors so that they are offset, but I really didn't do anything more high tech than eyeing the picture to see if it looked ok. How do you calculate the amount of force acting on each magnet exactly? Knowing this would take much of the guesswork out of my designs. I really have no idea if it will work until I can bench test it. I did manage to build a rough prototype (which I will be posting picture of soon) but it didn't work mainly because I didn't cut the pieces out exact enough for them to line up like they needed to, but I also noticed the cogging problem you mentioned. I'm still confident that the tri-phase concept works; I just need to design a configuration that will work with it. What do you think about the whole design concept in general? The main idea is to always have two magnets helping to push one magnet past the sticky spot. I'm beginning to wonder if I even need to angle the magnets on the wheel for this to work. But the angles, spacing, size of the wheel, and number of magnets are the variables I have to work with. However, it would be invaluable if I could find a way to simulate the forces that all the magnets exert on each other. If I can do that on the computer, then I wouldn't need to do so many bench tests. What do you think

---

Butch LaFonte sent the following post about the Golden Ratio to this page.

Hi Butch,
I played around a bit with the cad system last night, and here is what I came up with:
For all practical purposes you probably don't need accuracy greater than 1/1000 as it gets difficult to measure and even things like surface finish and slight eccentricity are starting to become significant factors, the transition of the ratio through Phi happens with an offset just over .508 inches.
Here is the work up:
To the nearest 1/1000 ..
Using magnets 1.000 inches in diameter with a center offset distance of .508 inches
The Crescent moon shape is 0.4852 square inches
and
the Cats eye shape is 0.3002 square inches
For a ratio of 1.61626
Going for another decimal place we see the transition happening like this:

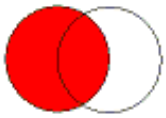
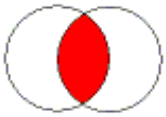
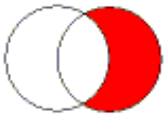
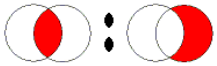
Extending the offset distance to .5081 gives
Crescent moon shape is 0.4853 square inches
and
Cats eye shape is 0.3001 square inches
For a ratio of 1.61713

Phi = 1.6180339887499...

Extending the offset distance to .5082 gives us
Crescent moon shape is 0.4854 square inches
and
Cats eye shape is 0.2999 square inches
For a ratio of 1.61887

I am sure you wouldn't remember me from years ago, but I was one of the people who joined your group about 4 years ago. I told you at that time I anticipated getting some good software and I would do some 3D work for you when I got it. Things didn't work out quite as I planned and I didn't get the software till a few months ago.
But I now have a copy of SolidWorks 2004 and it is all I had hoped for and more!
If you are interested in sharing your insights I would love to know where you are going with the Phi relationship. As I think about it, this would be very close to the region where you would get maximum attraction or repulsion in a plane 90 degrees to the magnet faces, and you may be onto something quite important here.

Area calculation for GOLDEN RATIO research

Diameter circle:	1	Inch
	0	
	0	
	0	
	0 0 0	
(Re-)calculate		

FLYING DUTCHMAN PROJECTS

Message board

Site navigator

- Meet the Minato Wheel
- Andy Motor
- Bowman PMM
- Changing field device
- Dual Piston Device
- Flux-o-matic (Lloyd Zirbes)
- Helix Rotary (Mikell device)
- KISS device (Jan P.Cack)
- Linear Motion
- Magnetic shape memory motor
- Perendev motor
- Pulse motor
- Rotor floater
- Torbay device
- Triangle Gate Experiment
- Tri-Force Gate
- Animations (new devices)
- File section E-group
- Other wheels collected

- Design your Wheel on-line
- Test scenario and results

Motivational quote

Just when you think that a person is just a backdrop for the rest of the universe, watch them and see that they laugh, they cry, they tell jokes ... they're just friends waiting to be made. *-Jeffery Borenstein*

About these pages

These pages are created to help me sorting out my experiments and their results, achieved while trying to build a device, powered by permanent magnets only. The inspiration comes from the Minato Selfrunning Bicycle wheel. I use this site to replace all the small notes, photo's and drawings in boxes. Feel free to give me feedback via email or my guestbook. Enjoy this site. Eric Vogels.

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Press book (about this research)
Site map
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Weather in space

Solar X-rays: NORMAL

Geomagnetic field: QUIET

Minato wheel e-group

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YAHOO! Groups Join Now!

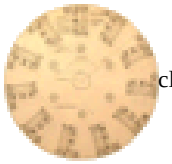
Member locations:



Special functions

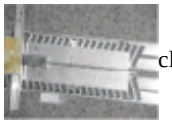
- 2007-07-20 Another SMOT device is designed and created. A nice piece of workmanship by Peter Schmalenbach from Germany.
Read more here....

- A replication log of the Jan P. Cack device is added. The replication is under construction by John Self.
Read more here....

-  click
After I received a package with blueprints, that were made by Lloyd B. Zirbes and kept in a storage for 15 years, I collected the information on this website. The pages are going to be updated with my progress in making a 3D drawing of the complete device.

- The magazine New Energy Technologies placed an article about the Bowman Permanent Magnet Motor. See the **Press book.**

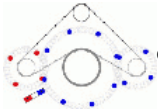


-  click
A combination of the Triangle experiment and the MagGen is posted.

- A document is added about the **Triangle Gate Experiment**, a design by R. Calloway.

- The Mikell document was updated with an instruction about how to build a **2D Mikell device**.

- An animation is posted, that shows a **Bowman Permanent Magnet Motor**

 click

- In the photobook **Latest experiment** I added a video clip from the latest experiment with a wheel with only one track but with a different magnetized stator.

- I collected all information that was availeble about the **Mikell device** and placed it in a document.

-  click
In the photobook I added a new chapter: **Minato movies**. I added some video clips with the real Minato wheel.

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The story

Click here: to read an article about this site and this research.

Klik hier: om een artikel te lezen over deze paginas en het onderzoek.

Minato wheel e-group, the most recent messages

Re: New file uploaded to minatowheel

Hi. That must be the same as lifting on end of the gate. I'm still interested how high you can let the runner rise. Thanks, Eric. ... From: out_to_learn To:

Re: New file uploaded to minatowheel

Hi All I did a little experiment today and I was wondering if this proves magnets do work, I setup my trigate and put the roller in with a plastic bottle cap

Re: New file uploaded to minatowheel

Thanks Graham. Well, that is good news. Lets see how that uphill works for izzy.... When several gates in line can lift the roller, the roller can make it on

Re: New file uploaded to minatowheel

Hi Eric Sorry I have been away, yes I have tryed it uphill and it works to a point also I have tryed dropping the roller magnet from above the entry point of

Re: New file uploaded to minatowheel

Hi, I can see what you're getting at as to leaving the gates open for a better kick out force to the runner. I am uploading another drawing of one possible

Re: New file uploaded to minatowheel

Hi. I have an input; could you try to have the runner magnet lifted during it's passage during the 4 gates? I think that it's important to be able to have the

Re: New file uploaded to minatowheel

Hello everyone, I have been able to get the runner through 4 Tri- gates, the gates being connected on the outer edges with a couple of the bar mags between

Re: New file uploaded to minatowheel

Hi Graham. Could you please place your device with the exit side higher then the entry site. How high are you able to lift the exit so tat the runner still

Re: New file uploaded to minatowheel

Hi all I just uploaded a video of the extentions I was talking about in my last post, as you will see it attracts in from further away and repels out more, I

New file uploaded to minatowheel

Hello, This email message is a notification to let you know that a file has been uploaded to the Files area of the minatowheel group. File :

Trigate

Hi All I showed you a way of increasing the attraction in on my trigate with steelballs added to it but I have a better way of increasing the attraction in by

Re: Strange "motor" with Bedini's name.

Hi Dale I just looked up the video I did 5 years ago about the magnet spring its almost the same as the one you are showing in that site but as I said it take

Re: Strange "motor" with Bedini's name.

Hi Graham, I was referring to the video: > as I have had some experience with this concept. I agree with

Re: Strange "motor" with Bedini's name.

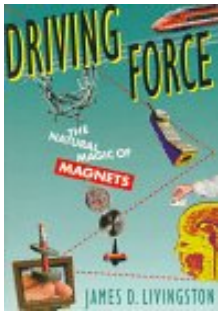
Hi Dale Yes I can follow what you wrote but I don't know where your going with it, if your talking about the spring magnet setup first its not a gate because

Re: Strange "motor" with Bedini's name.

Hi Graham, If you can picture a chain with two gears at opposite ends like a push bike chain. The problem is that if you have magnets on the chain as they go

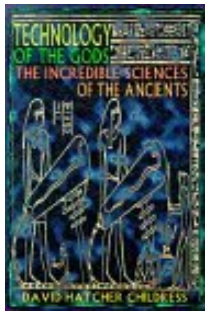


Recommended books









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Magnetic experiments
Gravity wheel

Dual Minato-Wheel Theory

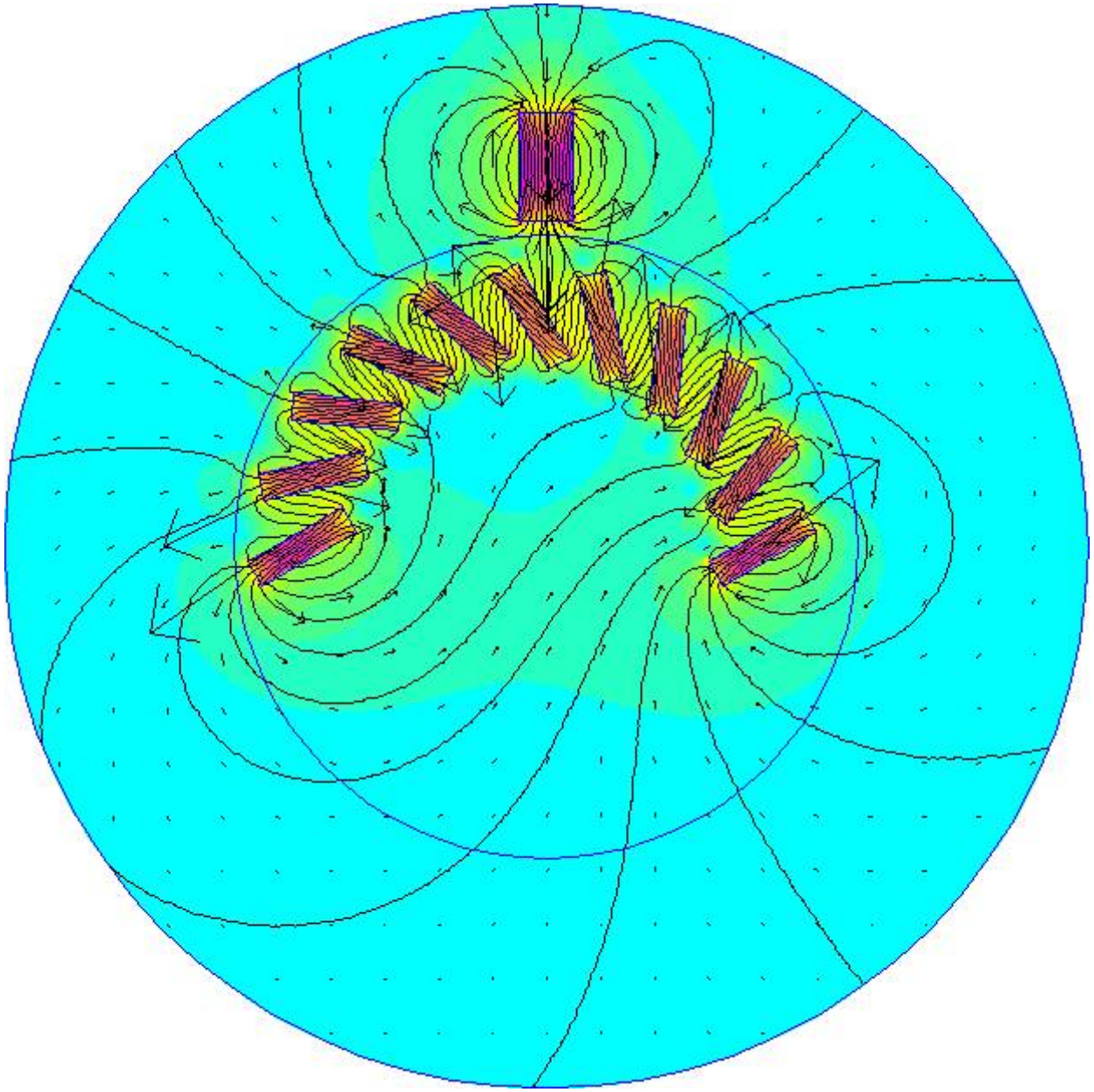
Written by: Jason Owens
September 14th 2005

Here are my thoughts about the normal Minato wheel vs. the Dual Minato wheel.

First, consider a typical flux diagram of a single minato wheel. In this example, I used 11 SmCo28 Bar magnets with the north poles oriented outward (just as in Jaro's diagram). The dimensions of the magnets are 1/4″ x 2″ x 3/8″ thick. The stator magnet is an NdFeB35 magnet with its north pole facing the wheel. The dimensions are 1″ x 2″ x 3.8″ thick.

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Here I want you to see the flux loop that I believe causes the sticky spot at the beginning of the track and the 'kick' at the end of the track. You can see that the magnetic field of all the magnets is generally flowing in a counterclockwise direction because of the vector arrows. Other evidence of the loop is the region right under the magnets where the flux is dense stretching from one end of the

track to the other (See Figure 1). Also note that the vector arrows coming out of the track magnets on the far left and right are much larger than the surrounding arrows. This shows that the field intensity is great in those regions because the track is generally behaving as one giant magnet. On the left we have the kick spot because of the large area of repulsion around the end, and on the right, we have the huge attraction sticky spot at the beginning of the track.

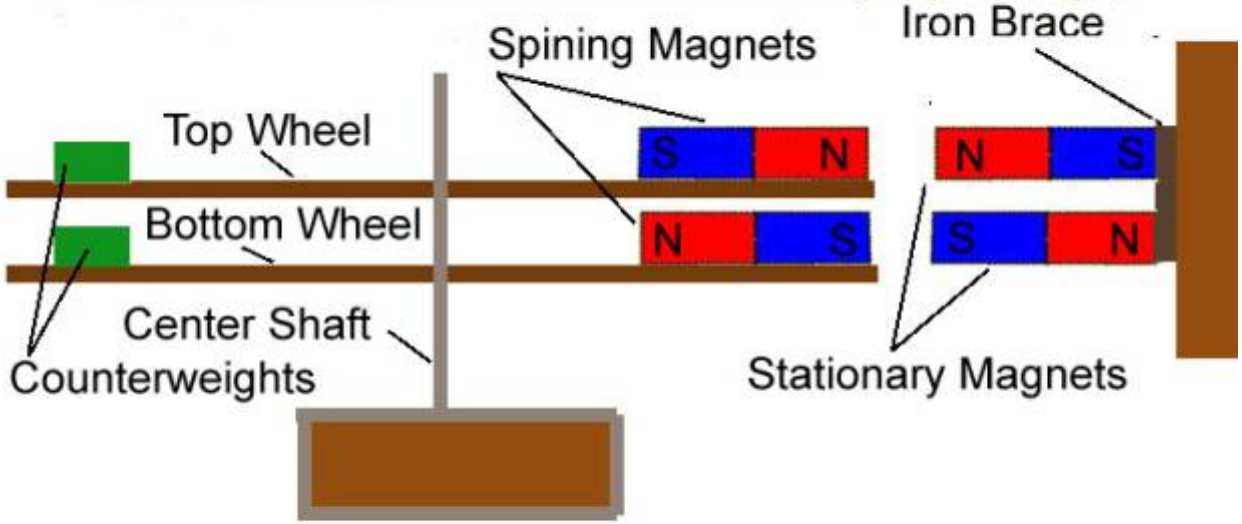
In my opinion, the key to correcting the problem is to isolate the magnetic field of each rotor magnet so that the giant flux loop will not occur. This should eliminate the sticky spots at the end (because the flux will not pool up at the ends in the first place), but the key is to do this without hindering the forces that make the wheel work. The simplest way to accomplish this would be with shielding around each magnet but placing shielding around each magnet will reduce the overall power as well.

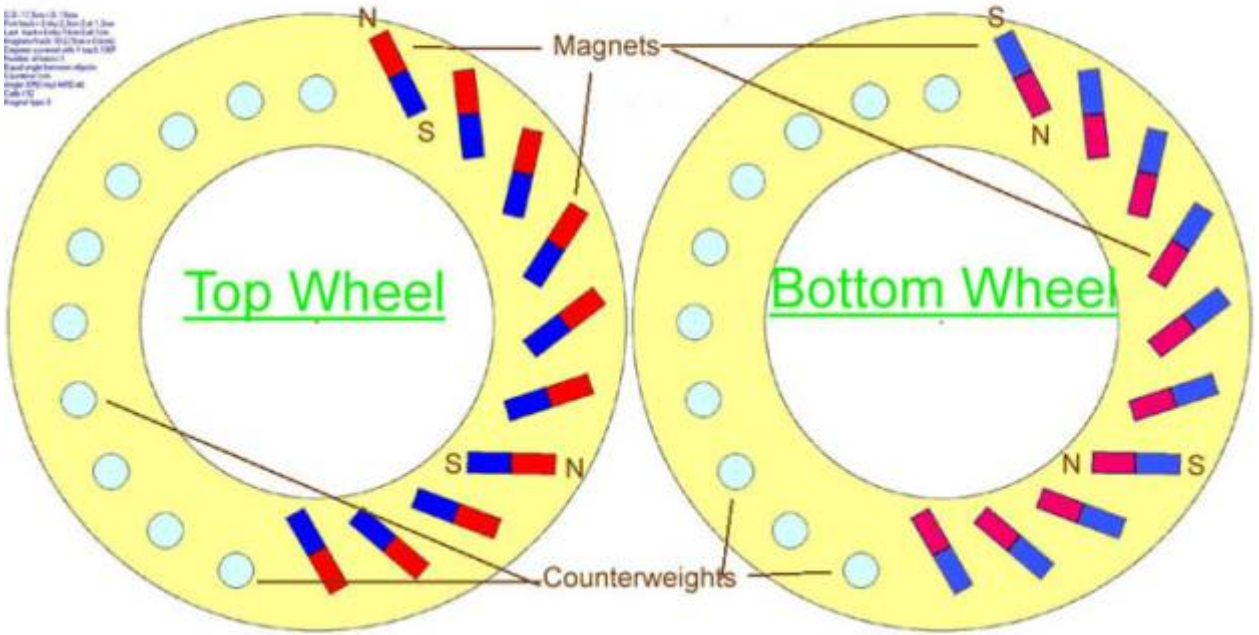
Jaro's method is another good way of accomplishing the same effect without using shielding. The idea he is after is to simply redirect the magnetic flux from each magnet from flowing from left to right to flowing from top to bottom. This will create mini closed loops between the top and bottom magnets that will isolate each magnet pare (top and bottom) from its neighboring pare.

I ran some tests in Maxwell3D to verify this idea and from what I can tell; it does appear to be happening when the magnets are placed close enough to each other vertically. However, before I continue on to my results. I should point one thing out in Jaro's diagram:

DUAL MAGNET WHEEL

(Made by Jaro for AG Group on Sept. 11, 2005)
(Was inspired by Minato Wheel, but since Minato never revealed secret of his wheel, this should be considered as my original design.)



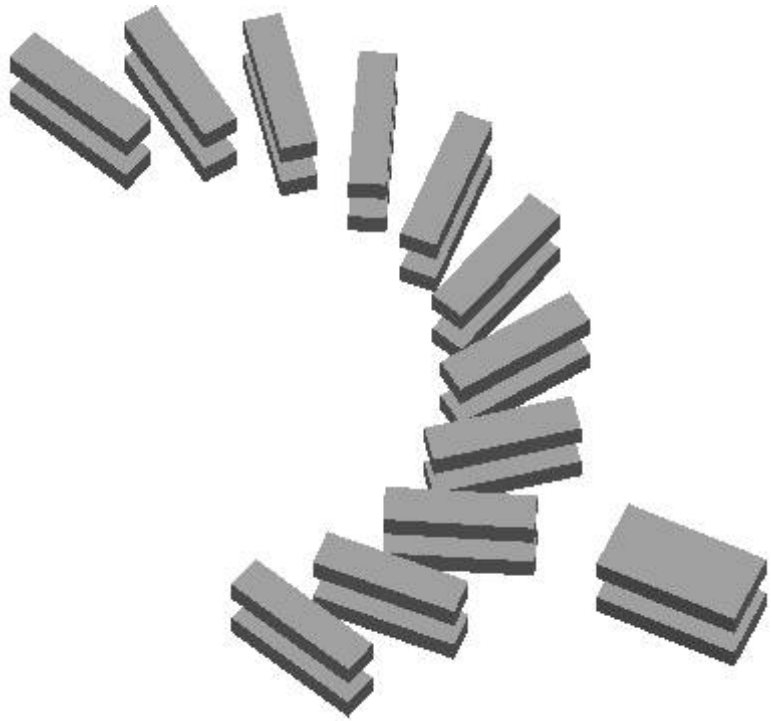


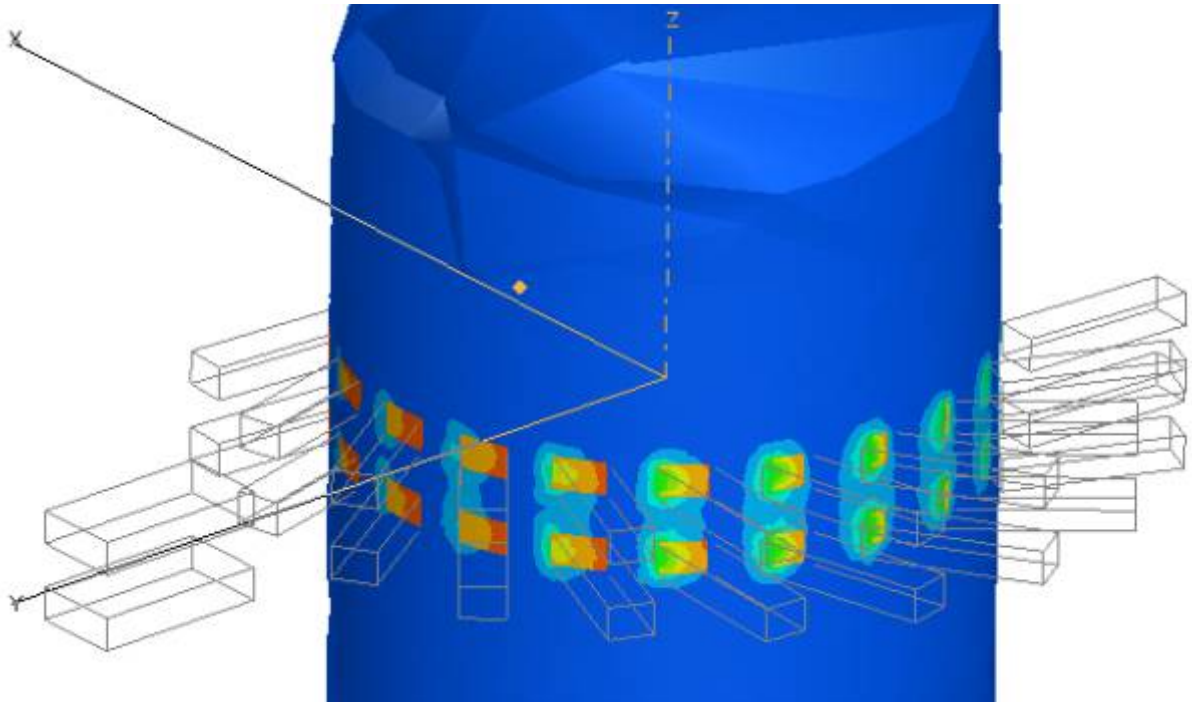
Placing a north pole stator against the left wheel will make it rotate clockwise and placing a south pole stator on the right wheel will also

make it rotate clockwise. This is an important point to understand because the mechanism that could make this work has nothing to do directly with the fact that the poles on the stator and rotor magnets are reversed on each disk. The key here is the flux loop I explained earlier.

With the wrong distance between the top and bottom row of magnets, the wheels would just behave as one large wheel with two extremely strong 'kick' and sticky spot. However, when the top and bottom disk are brought close to each other, the magnetic flux loop will begin to take effect and change the flow of the magnetic flux field. IF this does indeed occur, I hypothesize that the sticky and kick spots will be diminished or eliminated all together leaving just the force of the magnets on the tracks to propel the disks. Again, I feel the key here is the flux loop.

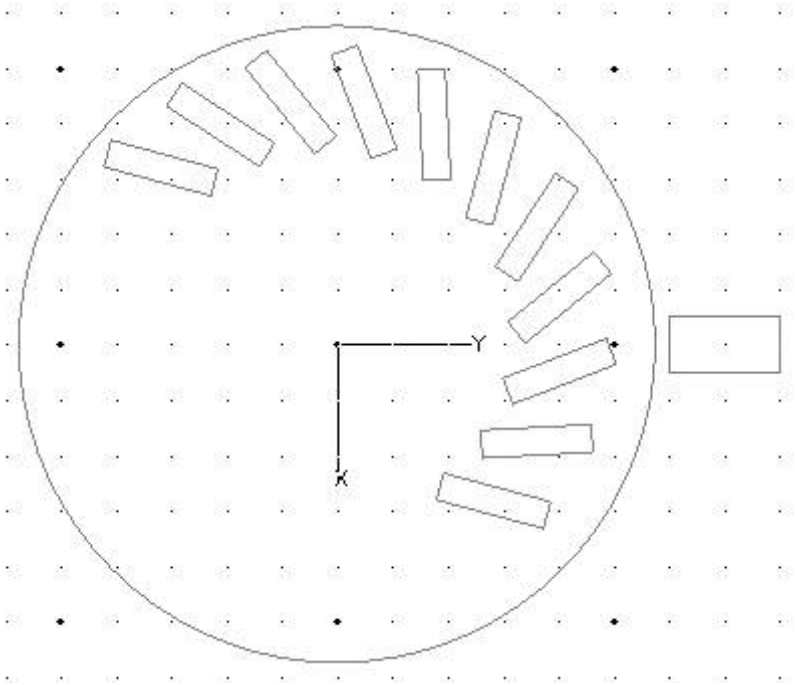
Here is a picture from my simulation in Maxwell 3D of the dual magnet Wheel:



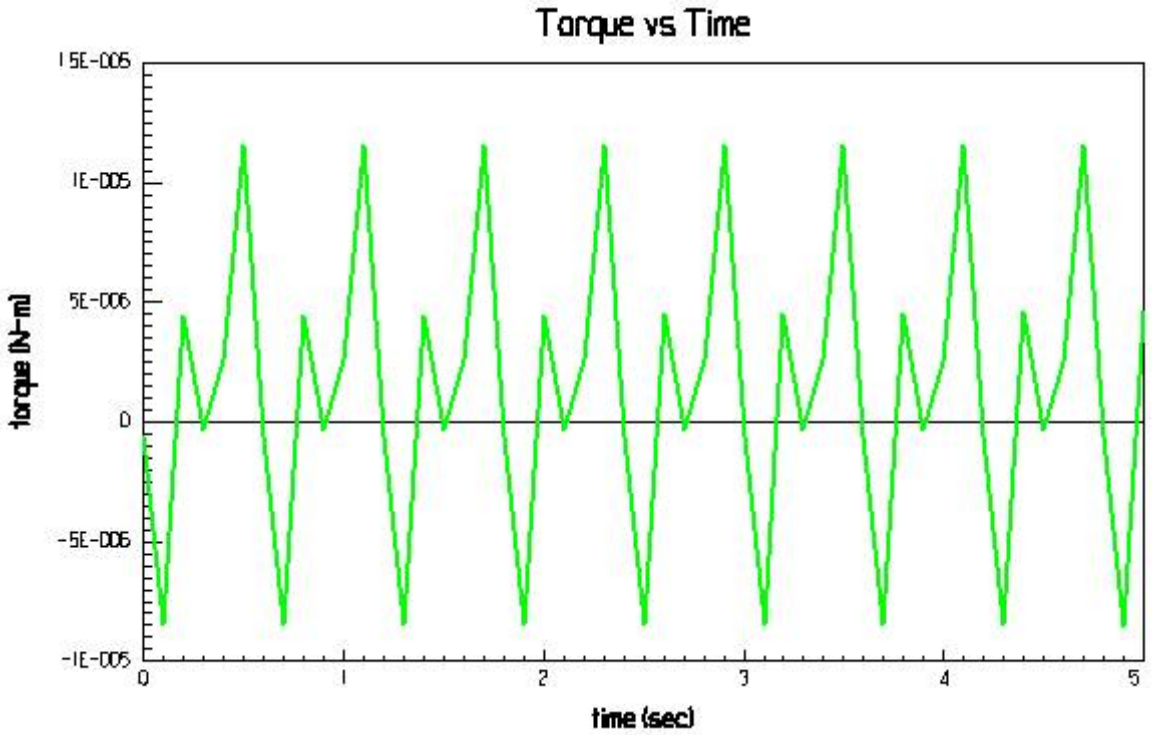


This is a 3D flux diagram showing the magnetic fields of the magnets projected onto the sides of a cylinder. This appears to support my idea about the flux loops again. However, after running some Transient tests (simulating the motor in motion), I got very promising results.

I ran two Transient tests. The first one was conducted on a simple one-disk minato wheel with a single stator magnet. I ran the test from 0 to 5 seconds with the wheel in the following starting position:

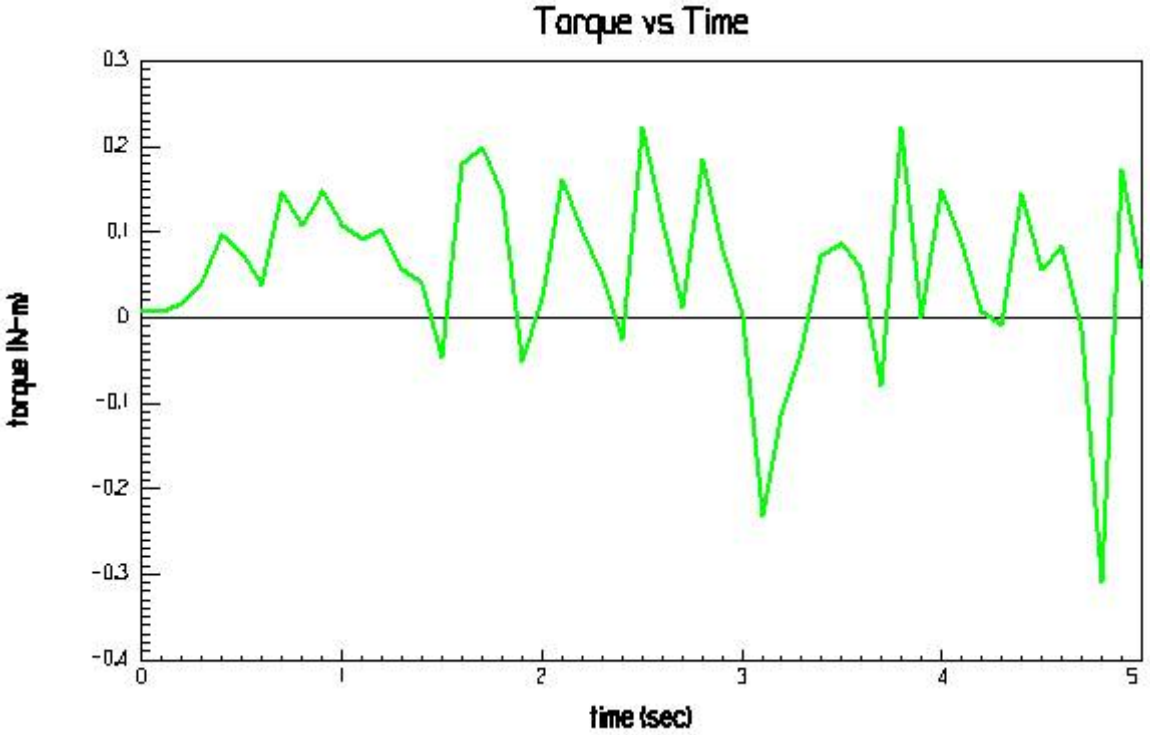


When the test was complete the results showed that the wheel didn't even move at all. So I changed the test and set the wheel to a constant velocity 100 RPM so I could see how the torque on the disk changed. Here are the results I got:

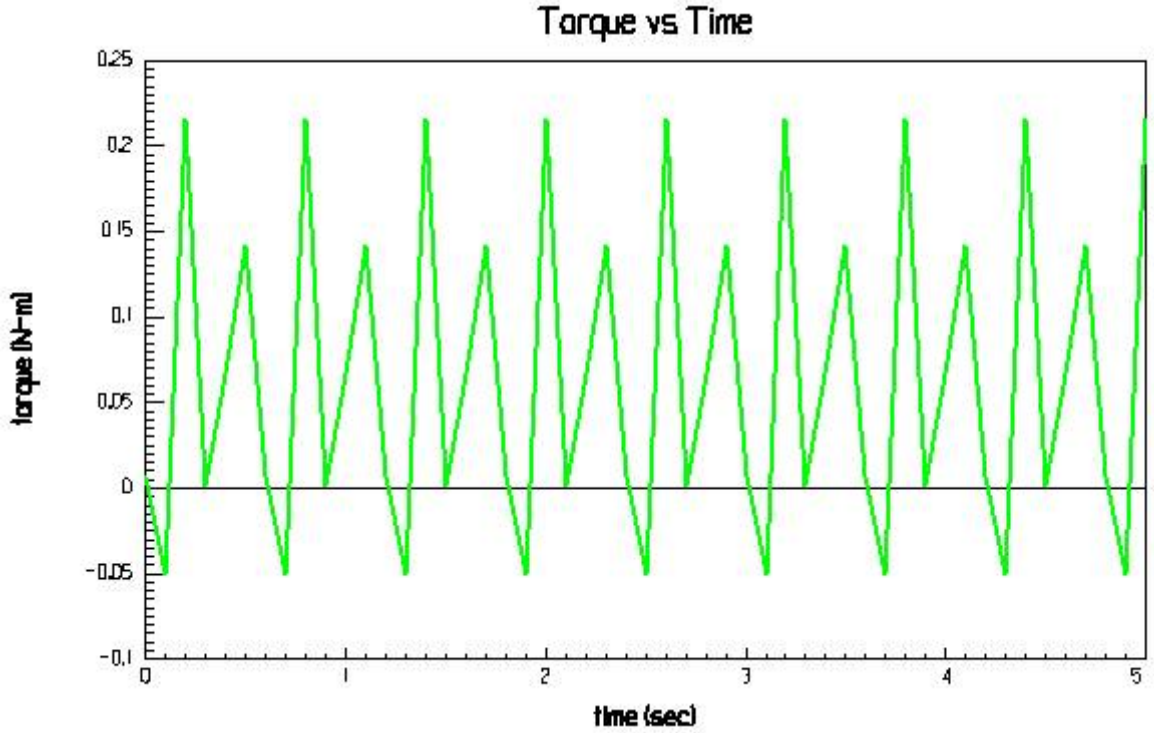


From the chart, one may observe that the positive and negative spike represent the 'kick' and sticky spots as the wheel is rotated.
The simulation may have run a little cleaner if I used a bigger stator magnet. Looking at the torque graph for the one-disk simulation, there are little sticky spots along the track showing that the stator is so small that it is being influenced by each individual magnet instead of smoothly transiting the entire track.

For the second test with the Dual Disk setup, things turned out quite differently. I used the exact same setup with the dual disk, only I didn't need to set the velocity to a constant value. When I put the disk in the same starting orientation, it self started and kept accelerating! The torque curve also looks different too:



Now, one can clearly see that the majority of the torque is on the positive side of the graph; however, since the velocity was not constant for this test, I needed to set it to 100 RPM as in the last test so I could compare the results. Here is the constant-speed torque graph:



Something is definitely going on here! The torque curve is completely shifted upward giving the wheel a net force for rotation! Now, this is just a simulation, but it certainly gives strong evidence in support of this working. Definitely worth the effort to build. The beauty of all this is that there is no shielding required!

So in conclusion, test results strongly suggest that the model will run. The critical factor will be the gap between the upper and lower disk. My recommendation is to make the gap no longer then one magnet thickness apart. On the other hand, the gap should not be too close either or the flux will completely loop and there will be no force at all to drive the wheel. Finding the 'Sweet' spot will be the key here in my opinion. If the design runs as stated, it also may be possible to put magnets all the way around the wheel since the flux loop is localized between each individual upper and lower magnet pare.

God Bless,

Jason Owens



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Tim Goymerac 1/20/2008

Curently reading your article "Some Magnet Motor Expirments". The Resultant force is undersood. The Lorentz force is not understood when you state "This forec F is perhaps due to the magnetic attraction forces being stronger between the magnetic poles of a magnet than the magnetic attraction forces at the pole outside the magnet"? Is there forces inside that I do not see? I picture a free body diagram of cylinder upright magnet including: the thrust concentric to the central axis out the flat ends, the B field perpendiculat to the C-axis represented by a cylinder surface, and the Lorentz force, which something like gravity, the attraction of two bodies? Maybe? I still do not grasp the Lorentz force.

The writing is great, it should be a college course.

Sincerely,

Tim Goymerac

eMail: (is only visible for the webmaster) no Homepage

Tim goymerac 1/18/2008

Searching for free magnetic rotation.

That is an interesting thought. There is something special with fast rotating magnetic fields. /Eric

eMail: (is only visible for the webmaster) no Homepage

Alex Strydom 1/11/2008

Wow cool website I have learnt a lot from this. Your website has helped me understand many fundamental concepts of free energy and I hope to build my working device as soon as I can source the right parts.

I hope that you are successful. /Eric

eMail: (is only visible for the webmaster) no Homepage

Willie 12/27/2007

It takes a creative imagination to invent somthing, and your website is a terrific source of inspiration.

I just hope that as a novice I will now be able to get a project off the ground without people laughing and scoffing with sinicism.

Thanks Willie.
You will get a project off the ground and earn respect for that, I'm sure. /Eric

eMail: (is only visible for the webmaster) no Homepage

Sherr 12/20/2007

Hi there
Very nice homepage!
Have you tried this configuration?
http://www.fdp.nu/photobooks/album7/minato5s.wmv

Please make contact if you want help in the engineering stuff..
sherr

Minato could just as well used his finger here to get the rotation. /Eric

eMail: (is only visible for the webmaster) no Homepage

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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Calloways Perendev

Size of current folder: 5 of 200 Mb

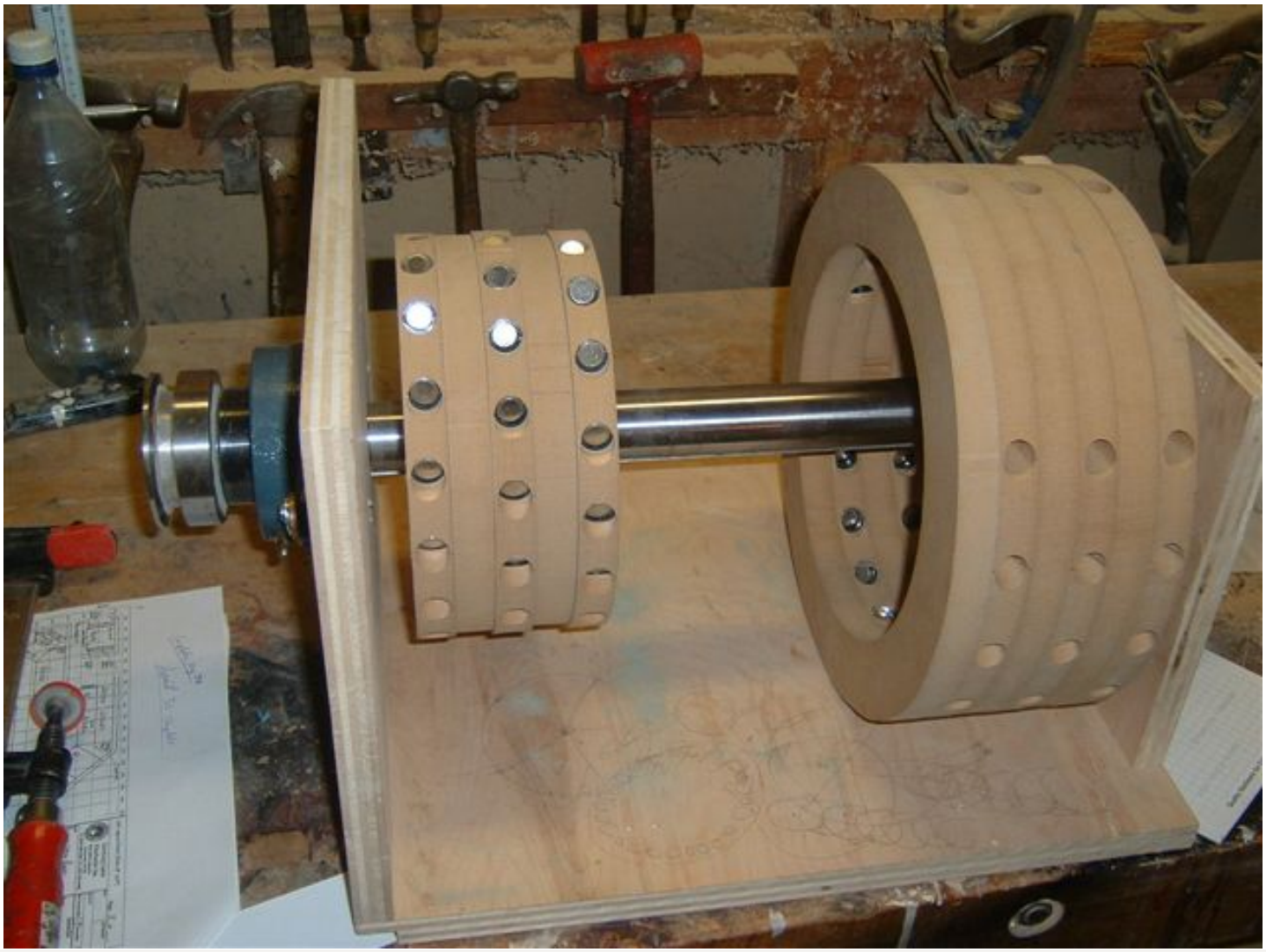
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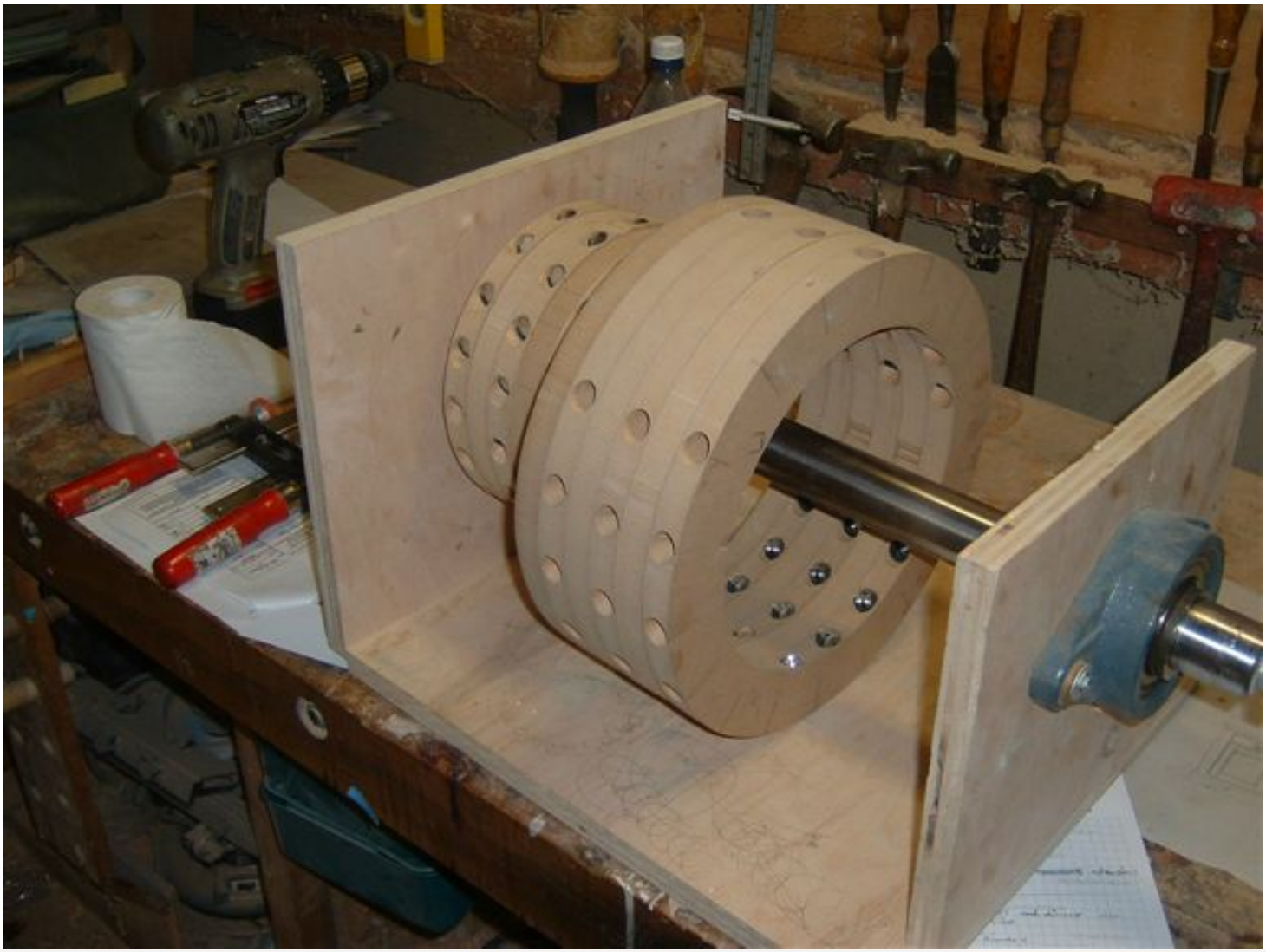
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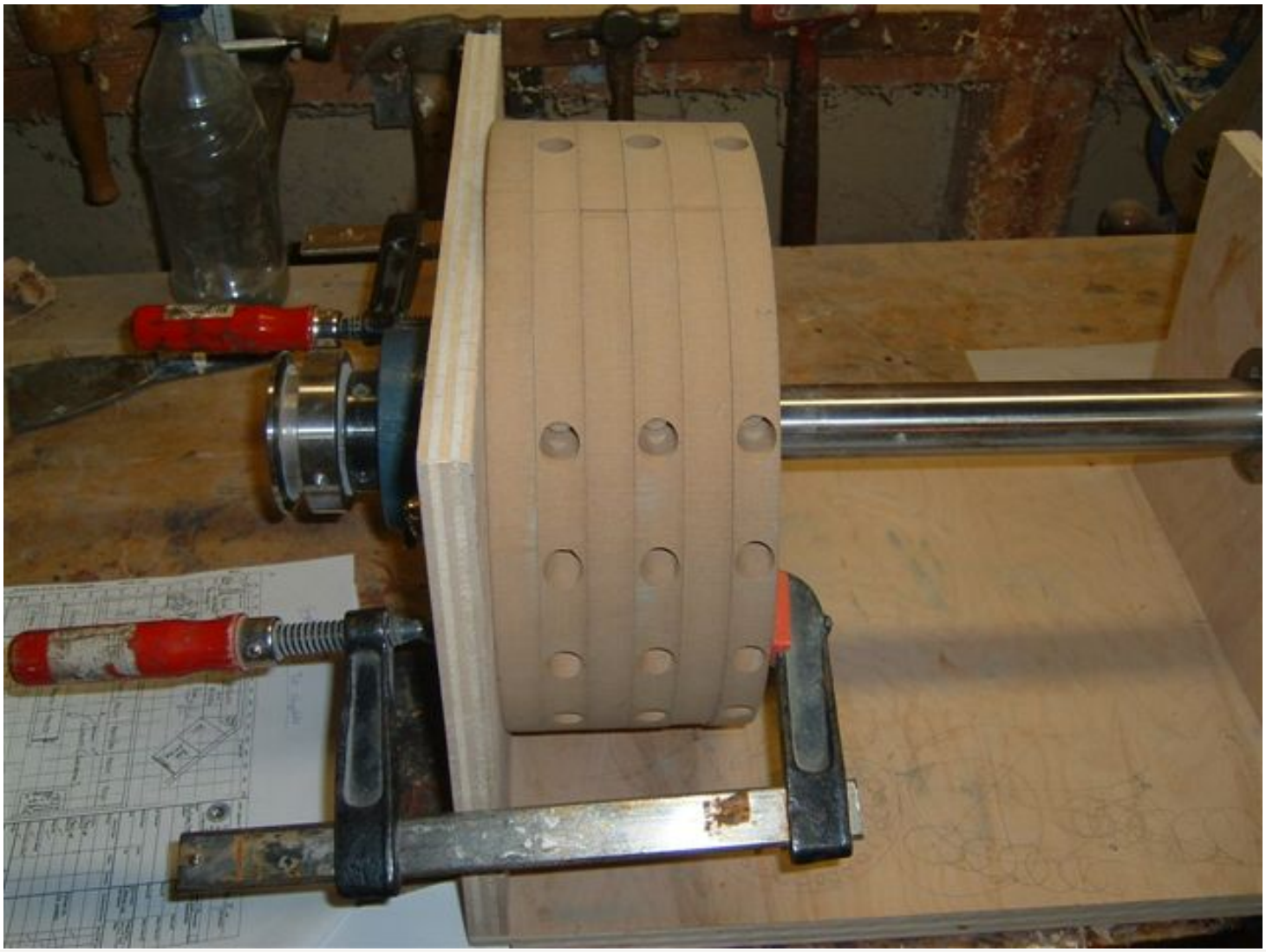
Type	Filename	YYYY-MM-DD	Size	Action
	CallVtrak2.MPG (Calloway's new *V*-track.)	2006-06-19	409 kb	
	Track.MPG (A video clip from Robert Calloways track.)	2006-04-04	603 kb	
	wayne.jpg (Wayne's board test.)	2006-04-04	11 kb	
	wayne1.AVi	2006-04-04	771 kb	
	wayne2.AVi	2006-04-04	2.74 mb	

Trying to understand the Perendev motor

Through the use of three wheels with properly spaced magnets , you create the equivalent of one wheel with continuous or overlapping magnets depending on the size and spacing of the magnets. The wheels and outer stators have different numbers of magnets to prevent locking of the magnets. In the cases of the small and large motors , the number of magnets is 30 on the wheel , 36 stators and 17 on the wheel,18 stators. This number is significant only in that it is in perfect timing with three wheels. I think different numbers of magnets would work as long as there was the proper number of wheels to achieve timing. Know you have achieved a wheel that spins freely within the stators. At this point there is equal pushing and resistance forces within the motor. To achieve propulsion the balance of pushing and resistance must be offset. This is achieved with the use of magnet shielding and angling the magnets.Their are two types of magnetic shielding, one like a sleeve around the magnet , used to focus the magnetic field and the other , a half tapered ring placed on the approaching sides of the magnets.The shielding is simply the path of least resistance and so , pulls the field down on the approaching side in turn lowering the resistance side and offsetting the balance.I believe the clearance between on coming magnets is an important factor as well .
Roger Cote







A replication by Roger Cote

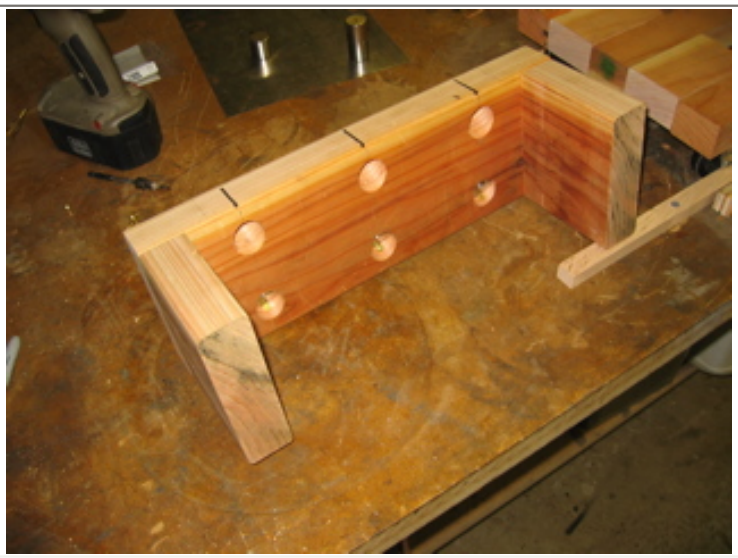
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Trying to understand the Perendev motor

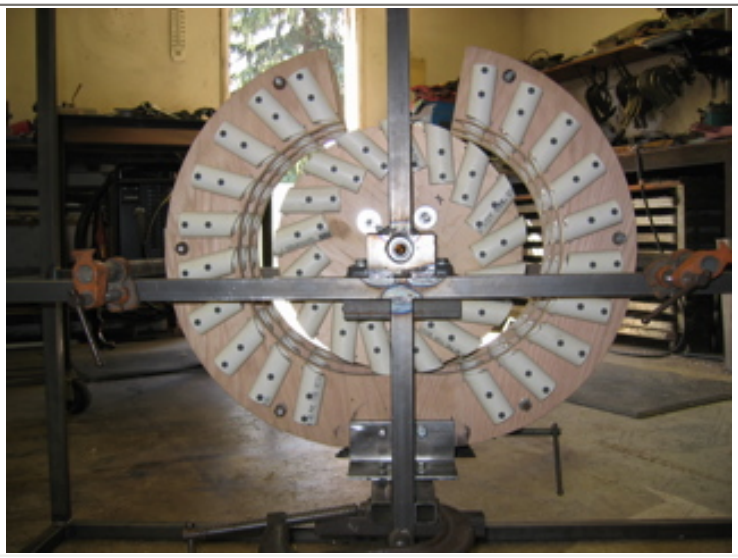
I have been doing a bunch of testing of the Perendev motor to see if I can get it to work, and so far I have not had much success.
I am going through a huge learning curve with these magnets and it is very interesting.
I have attached some photos of my work and I hope these came through with this email.
I had a brain storm and thought I'd try and build a linear motor with these 1" N48 magnets. The whole idea of the linear motor is that I thought it would be an easy way to test the Perendev idea.
Well basically the linear idea didn't work at all. I noticed a tremendous down force when all these magnets are repelling each other, which for sure impeded any linear motion.
Then I went ahead and built a second linear "trolley car". This second one had much closer spacing. This one also didn't work.
Next I decided to build a frame to test out some different size wheels and stator designs. If my photo's came through you can see what I did. My idea was to build carriers for the magnets out of PVC. These carriers can be easily removed and reinstalled in other positions. Not much luck in any movement of the rotors. I tried different offsets and overlap of the magnets.
Then on http://www.fdp.nu/perendev/ I found the close up pictures of the rotors and from the one with the guys hands in the pic I tried to figure out the size and spacing of the magnets. I agree with the fact that there are 30 magnets in the rotor and 36 in the stator. As near as I can tell the magnets are 3/4" in diameter and with a 9/16" spacing between the magnets. I think the overlap is 5/16". The thickness of the plastic rotor is 1 3/8".
I'm getting lock up no matter how I space the magnets. I've tried many different combinations of offset. I've tried removing magnets on the rotor. I've tried reversing rows of magnets so the south pole is facing a north pole on the stator. I've watched the video on the Perendev motor running at least 30 times. He claims the motor is running with out shielding. But I kind of wonder, maybe I need shielding. And if so what should I use. I've read about Mumetal, but could some regular sheetmetal work?
I feel as if I have opened twenty doors and behind every one is a brick wall. If just one of these doors at least had a little fog, at least I would know that I am going in the right direction. But as it stands now I am completely lost.
If he is using 3/4" magnets and I'm using 1', could this be a problem? My magnets are 1" x 1". My guess is that his are 3/4" x 3/4".
My magnets are angled at 30 degrees. I have not tried any different angle.
I would think that this thing is either going to work 100% or not at all. If that being the case I don't know if I am getting close or am I still a mile away from it working.
Mark Olson

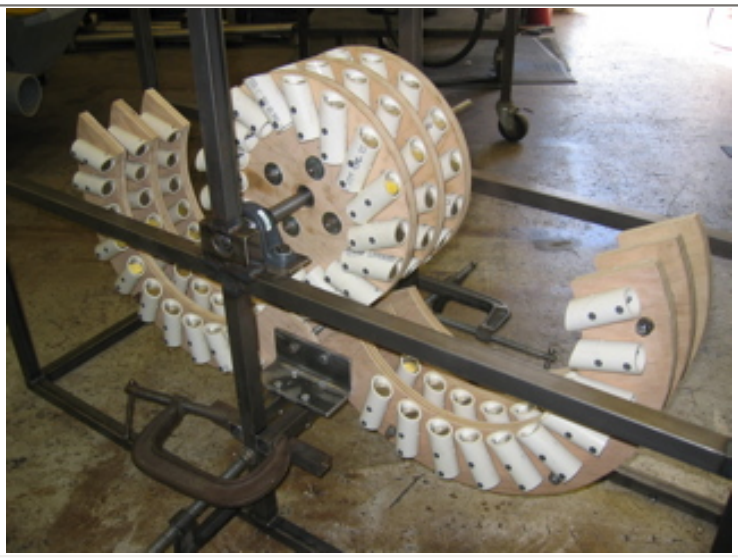


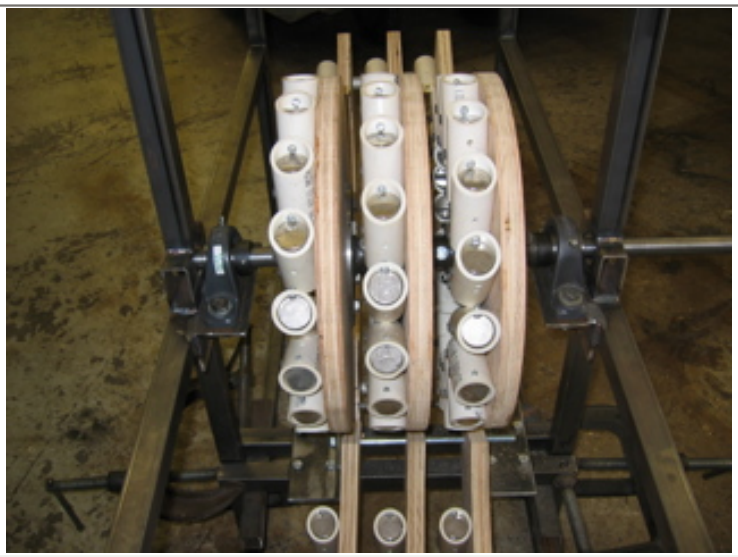


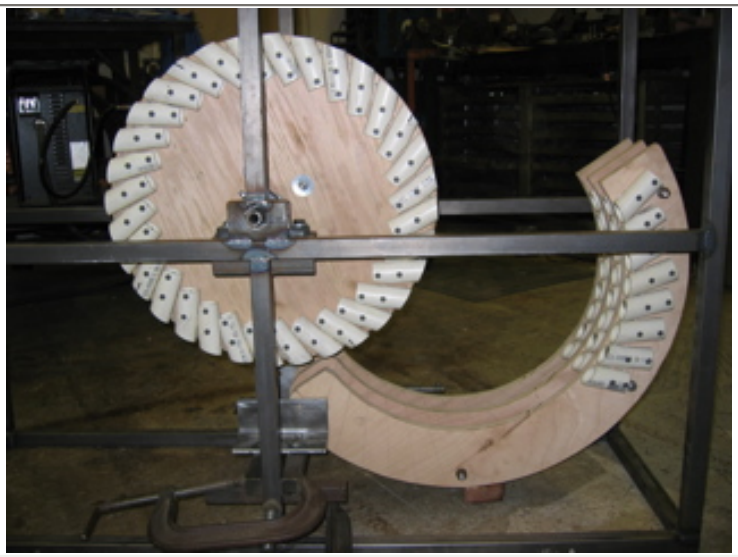












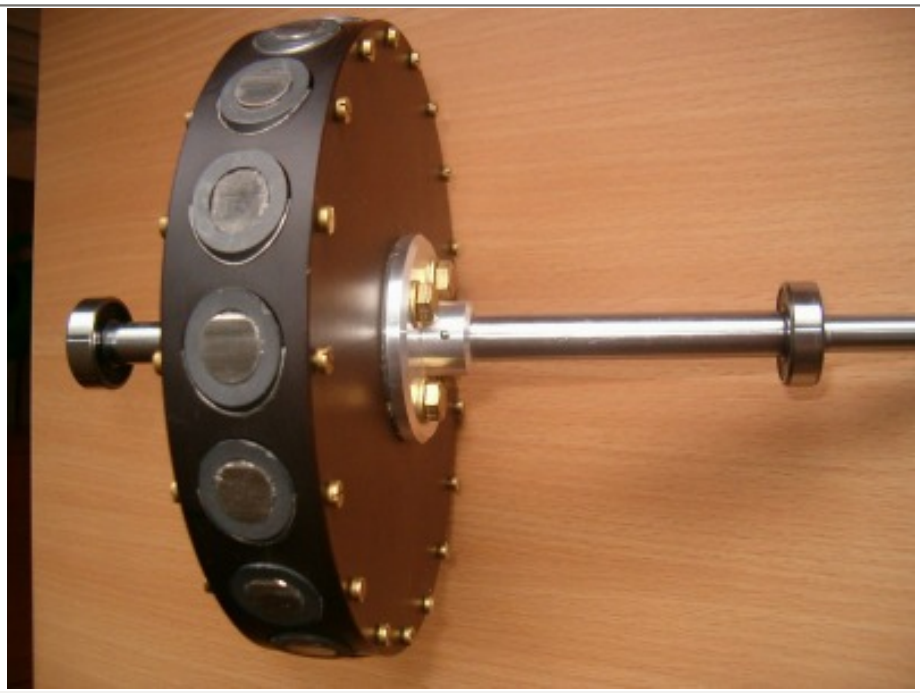
A replication by Mark Olson

Trying to understand the Perendev motor

We made a model of the Perendev according the patent.
We only used one wheel instead of three as described in patent.
The magnet position between stator and rotor is adjustable by means of three identical segments placed on stator. Neodymium magnets (Ø-10mm, h-10mm, grinding angle 30°) are placed in graphite case with plate of magnetic screening material.

Conclusion:
At best adjustment of stator segments; the rotor is moving easily, but stops after several rotations.
At worst adjustment; can move rotor very hardly. The problem seems to be in big gap between rotor magnets.

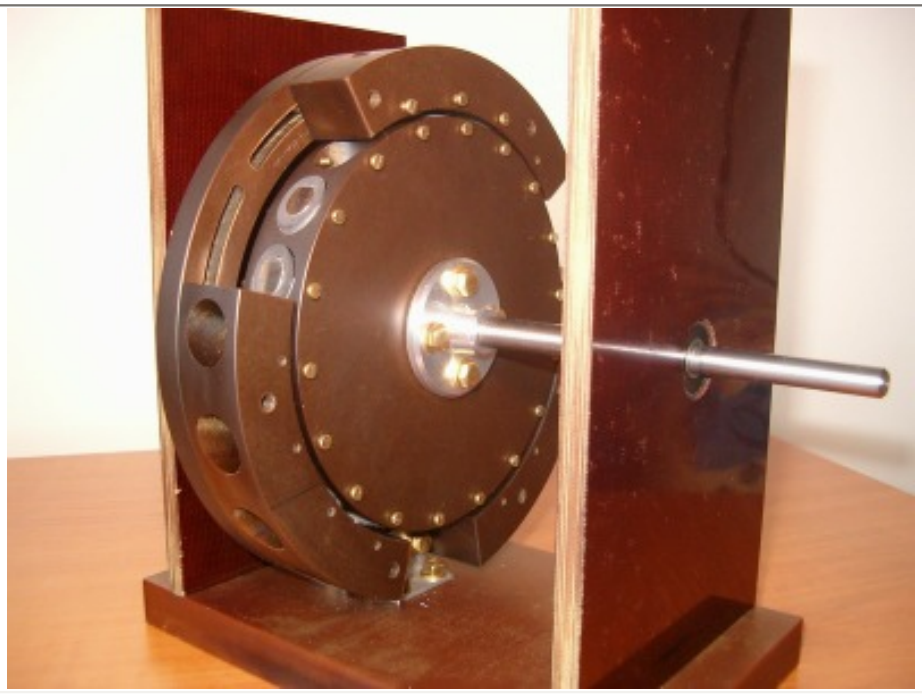
Now we are working at linear version of device.
Thomas, Slovakia.







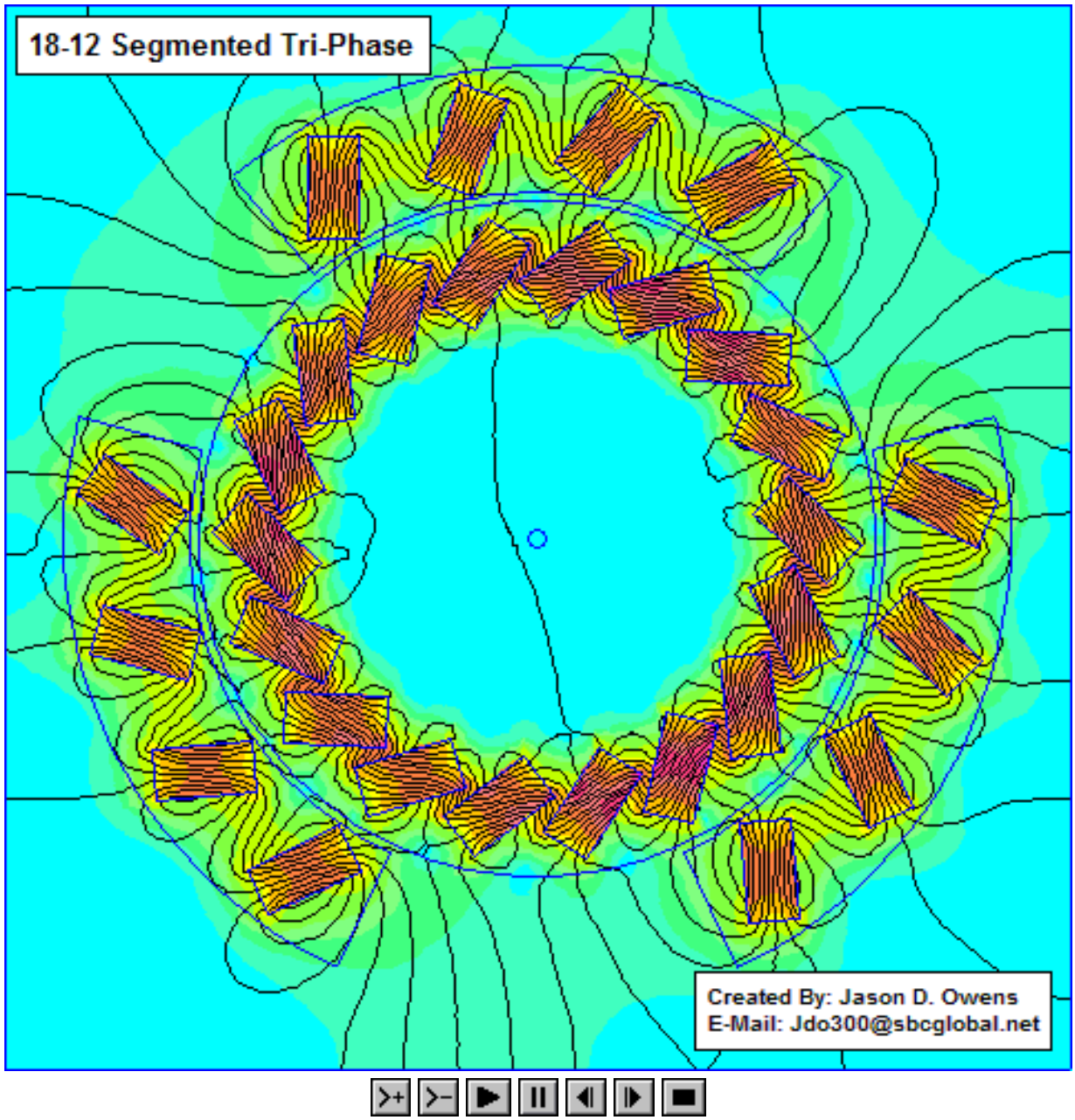




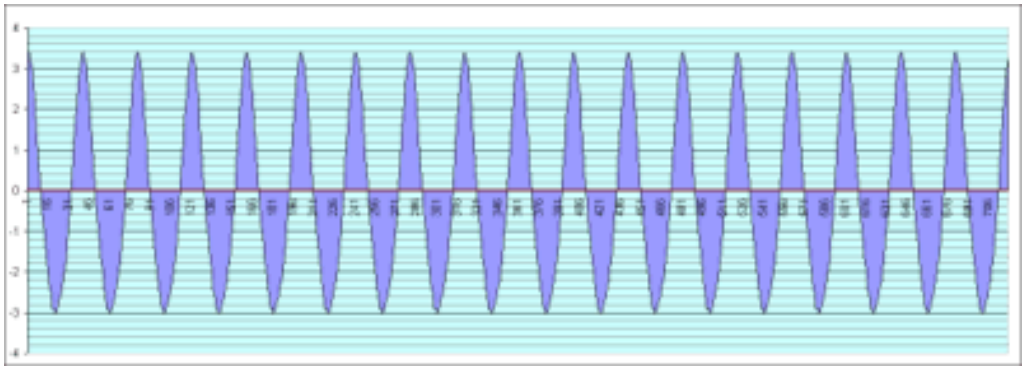


A replication by Thomas

Replicating the simulation

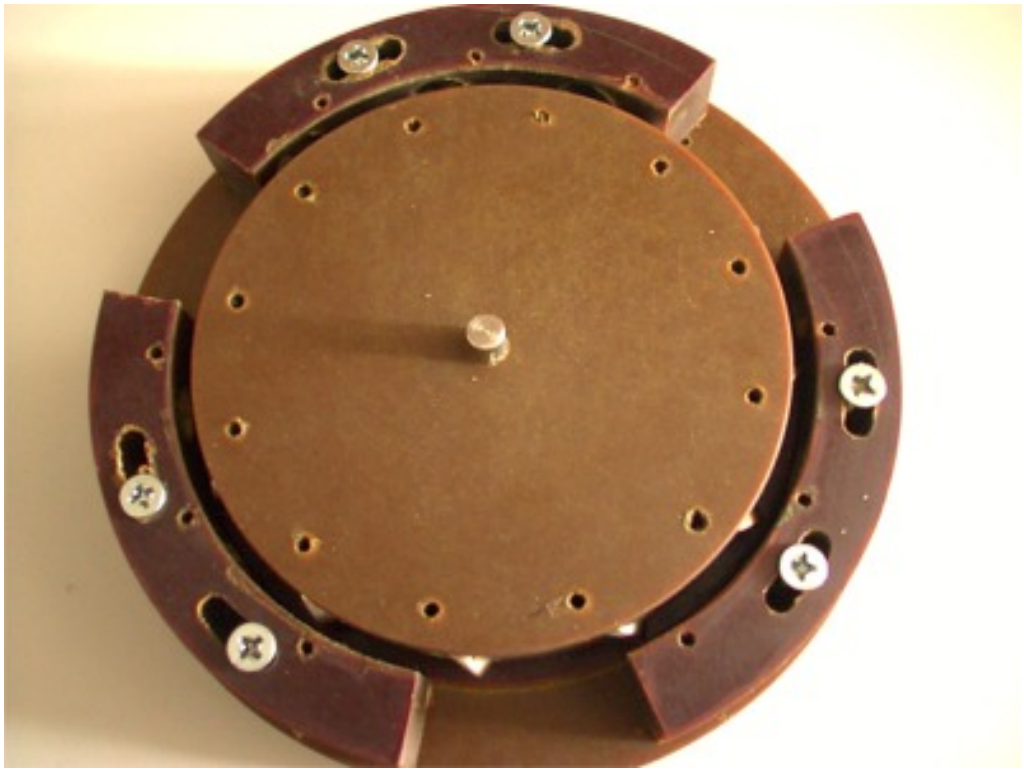


Total Positive Torque:	655,6544003799 Nm
Total Negative Torque:	-767,9481747377 Nm
Total Net Torque:	-112,2937743578 Nm



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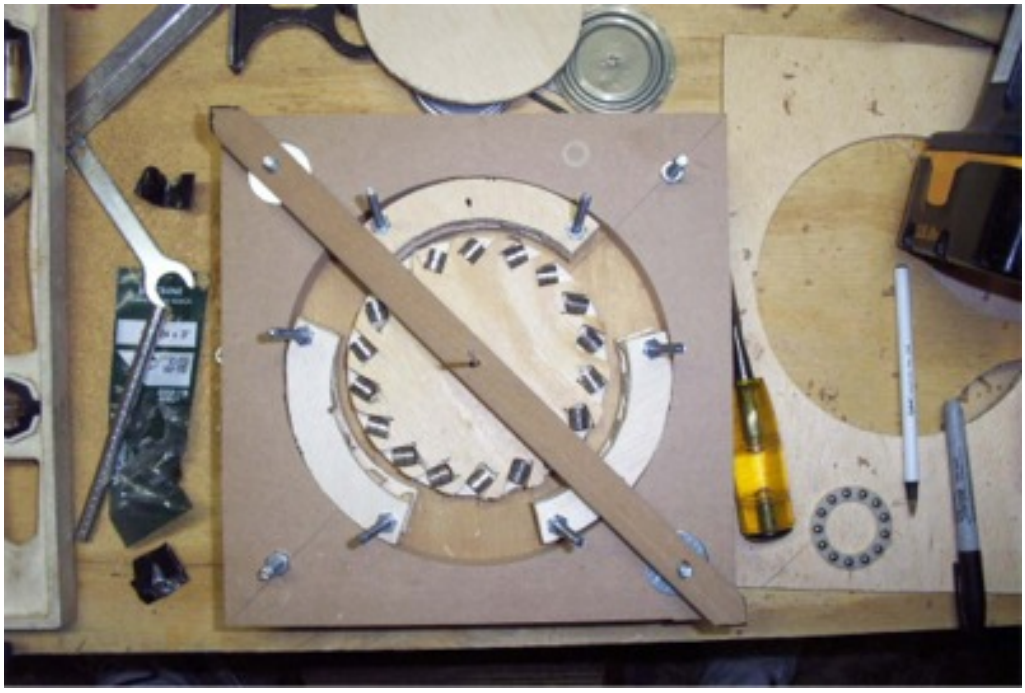
by Peer Kostal, Germany.
On the Flying Dutchman Project's internet site I found an explanation how the Perendev Motor could work. Also a simulation of a modified Perendev Motor. I have built a prototyp of this modified motor, but unfortunately it does not work. Either the tolerances are to high or the theory is not right. I have enclosed a picture of my prototype. I used 24 rotor magnets and 3 times 3 stator magnets. The group of 3 stator magnets can be moved to adjust position. Have you ever hade positive experience with this kind of motor?

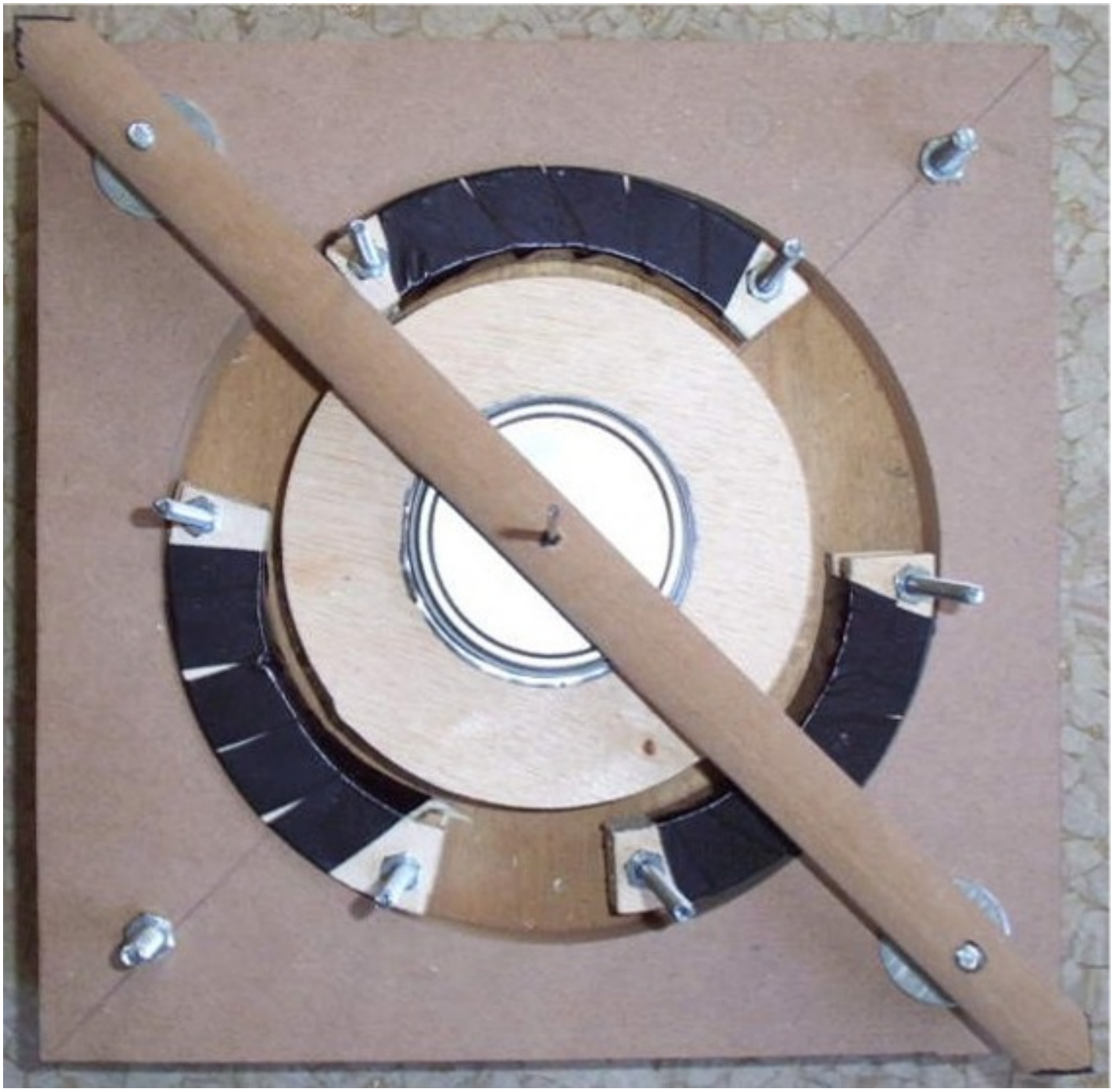


by Peer Kostal, Germany.
You may puplish the picture of the "motor" I built, but still I'm not sure if it does not work because of missing equilibrium. This may be a critical point. However, this Perendev Motor could work like the Reed Motor built by Nelson Camus (made it public in Naudin's homepage http://jnaudin.free.fr/html/qmmtr.htm). Here it is essential to reach equilibrium. Maybe I have to rebuild this motor, or I have to look for a more robust concept.

---

by Jason Owens.
I did build a prototype for that motor that didn't work as well but I always thought that it was because I didn't cut the slots for it accurately enough. I did do a torque analysis of this motor before and I should have asked you to post the results to the webpage earlier. It appears that the motor will cog because there are a lot of alternating positive and negative spikes on the graph of the torque analysis. I attached the file a few photos from the build that I did of the motor. Unfortunately in this case, the torque analysis lines up perfectly with our two replications. Could you post this information and the graph to the website so people will know what's up? I have some other, more promising designs to put up there but I want to make many simulations of them before I post the information.



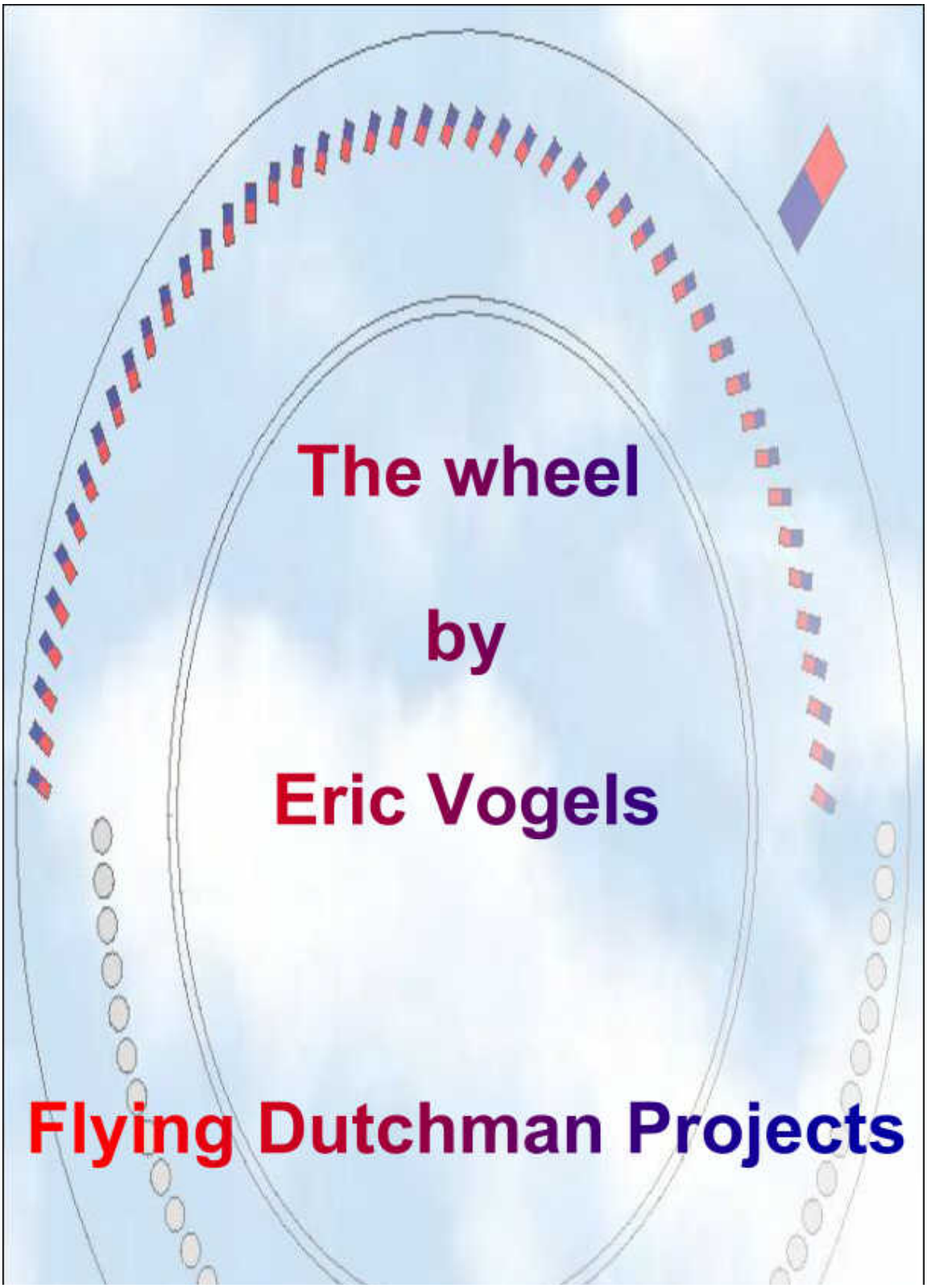


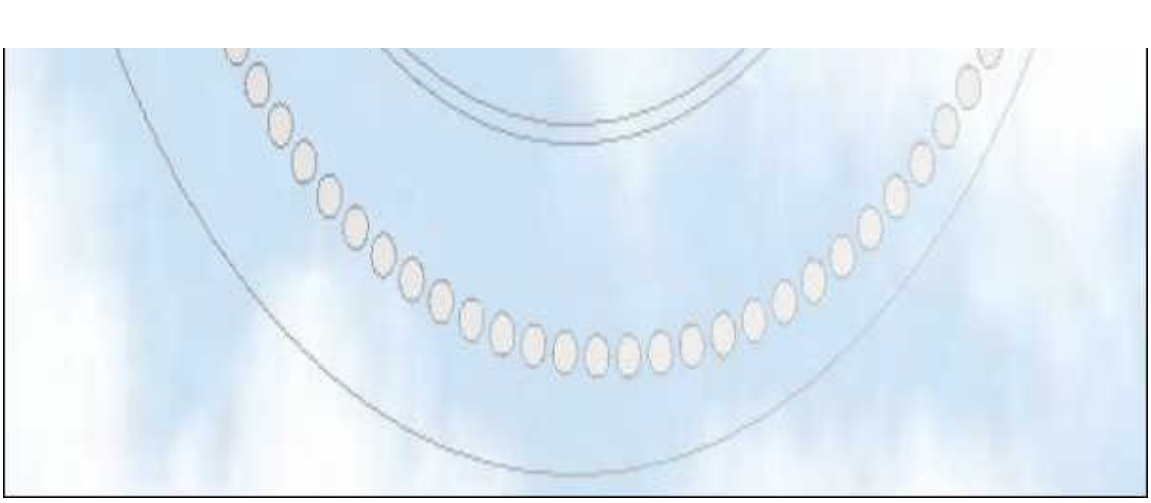
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Cover
The start: Korea, May 1997
The original wheel
First description
Keely Net
The Eye witness: Dr. Henry Curtis
Patents
Gene Mallove at Infinite Energy
STAG Group about Minato wheel
Another report
Calloways 'How To Build'
Some magnetic facts

Minato's latest





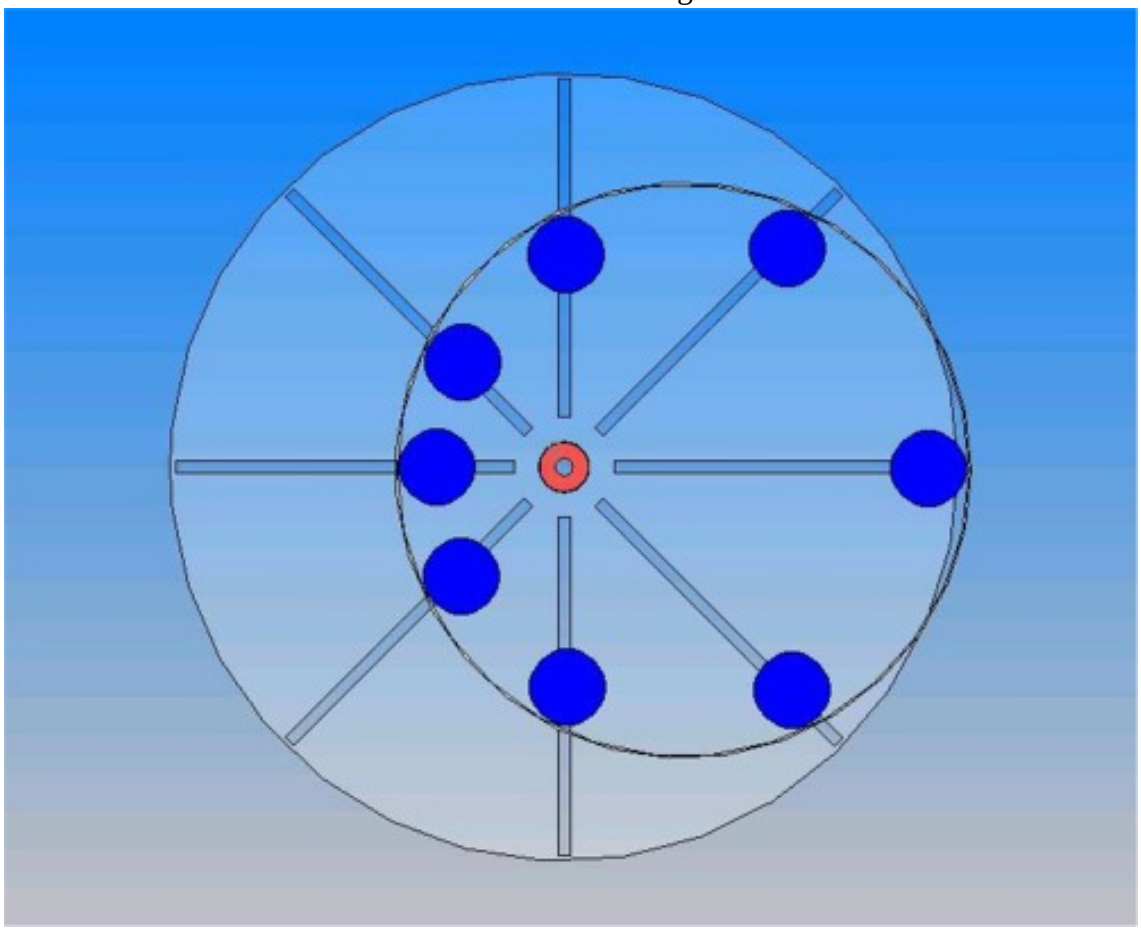
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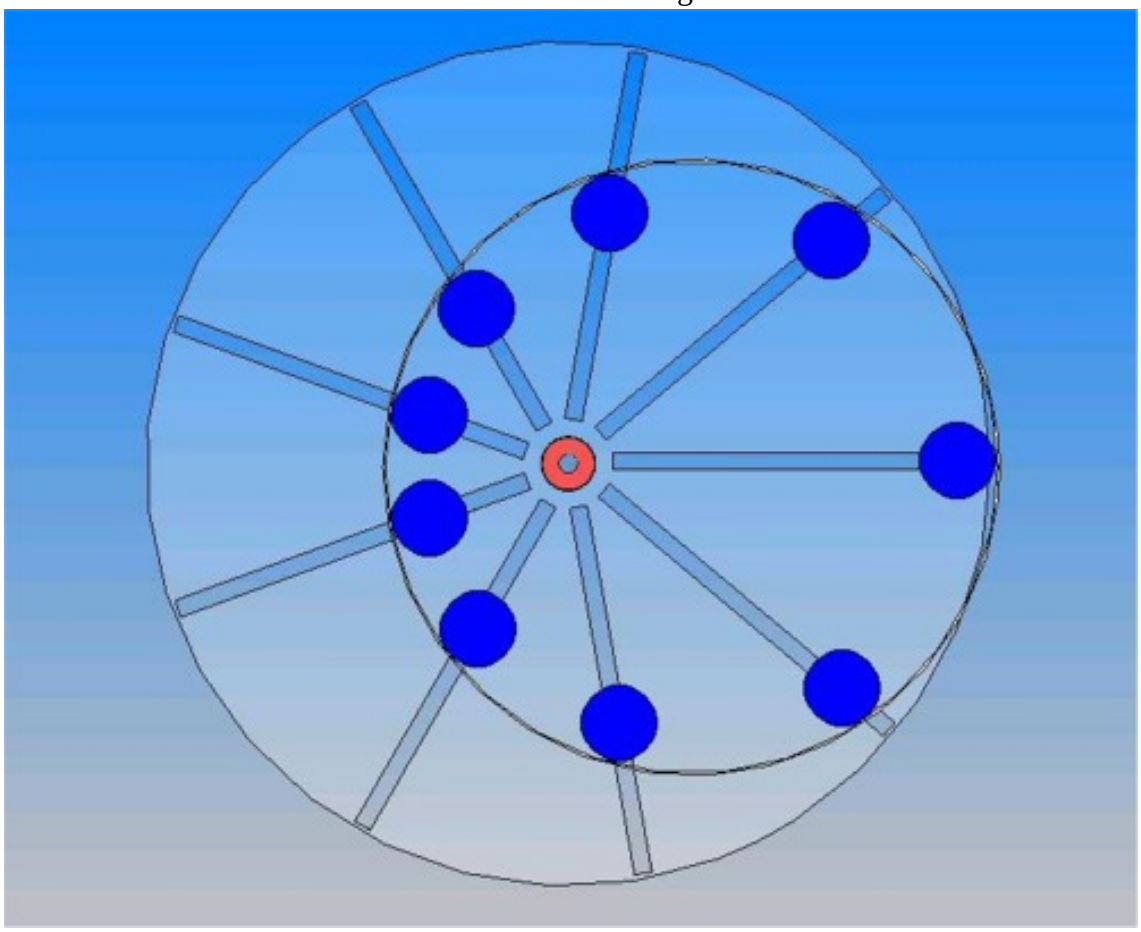
Replicating the Andy Motor

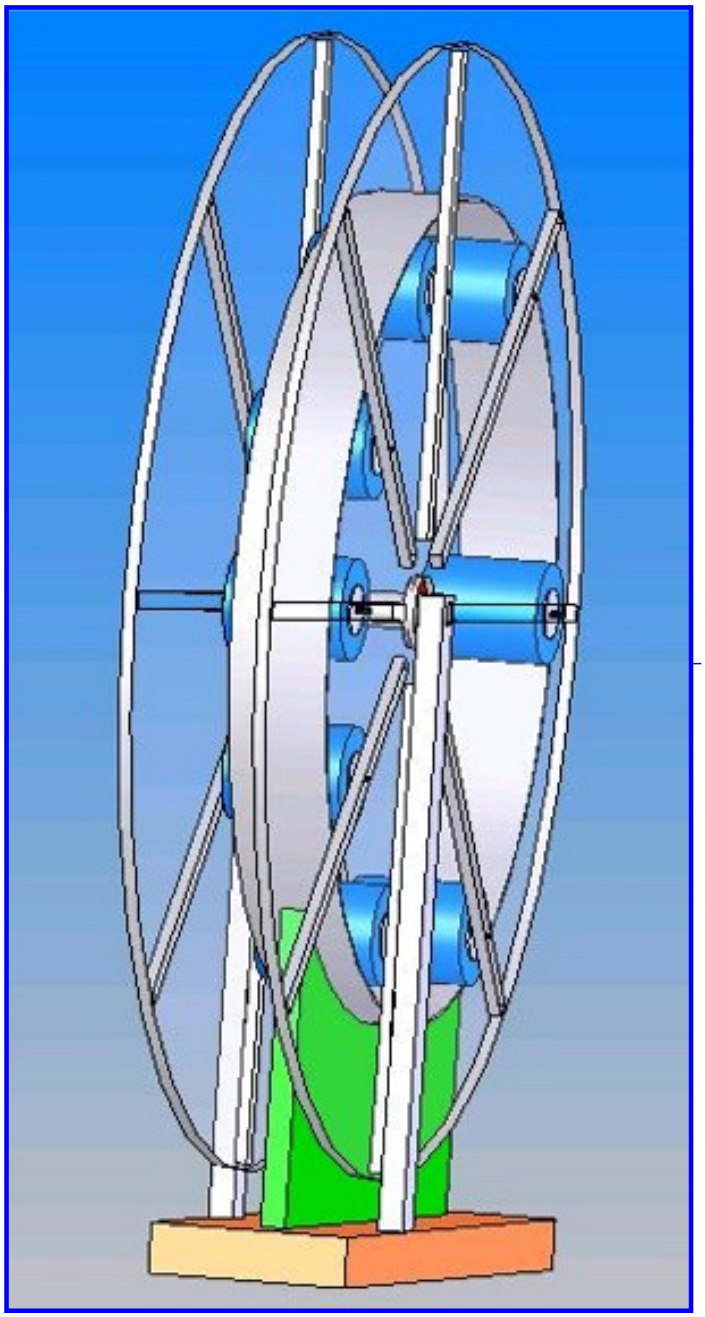
a design of Tom Ferko

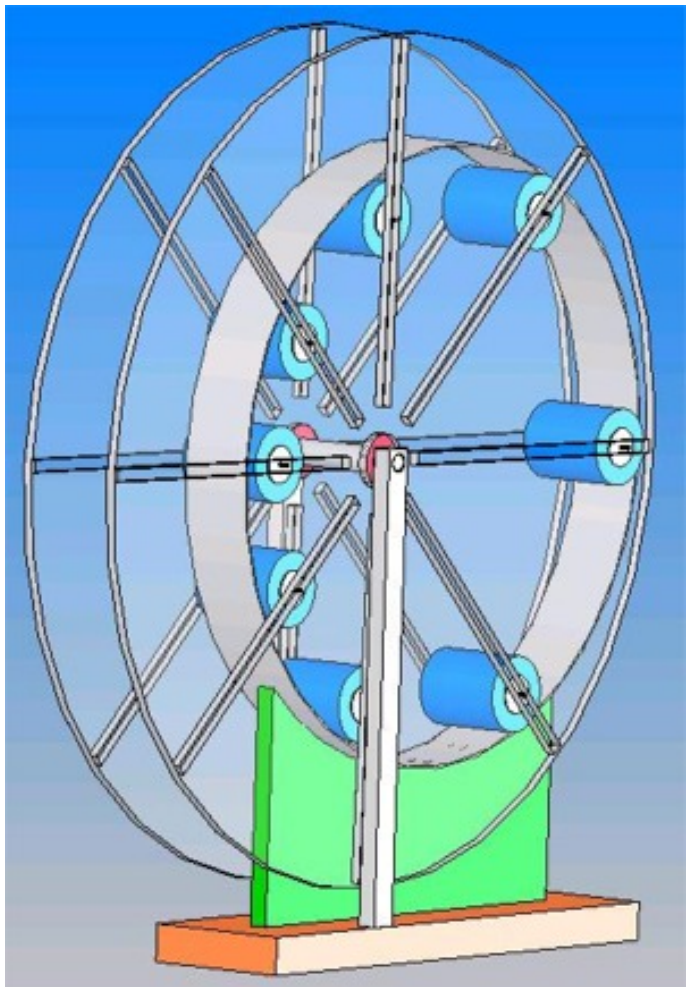
Show device with 9 magnets>

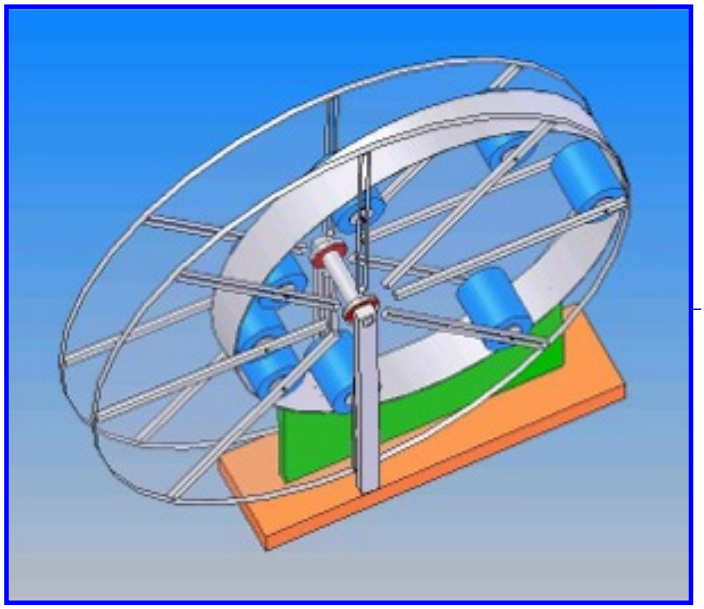


Show device with 8 magnets>









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Start

Bowman

How it works
Actuator/helper

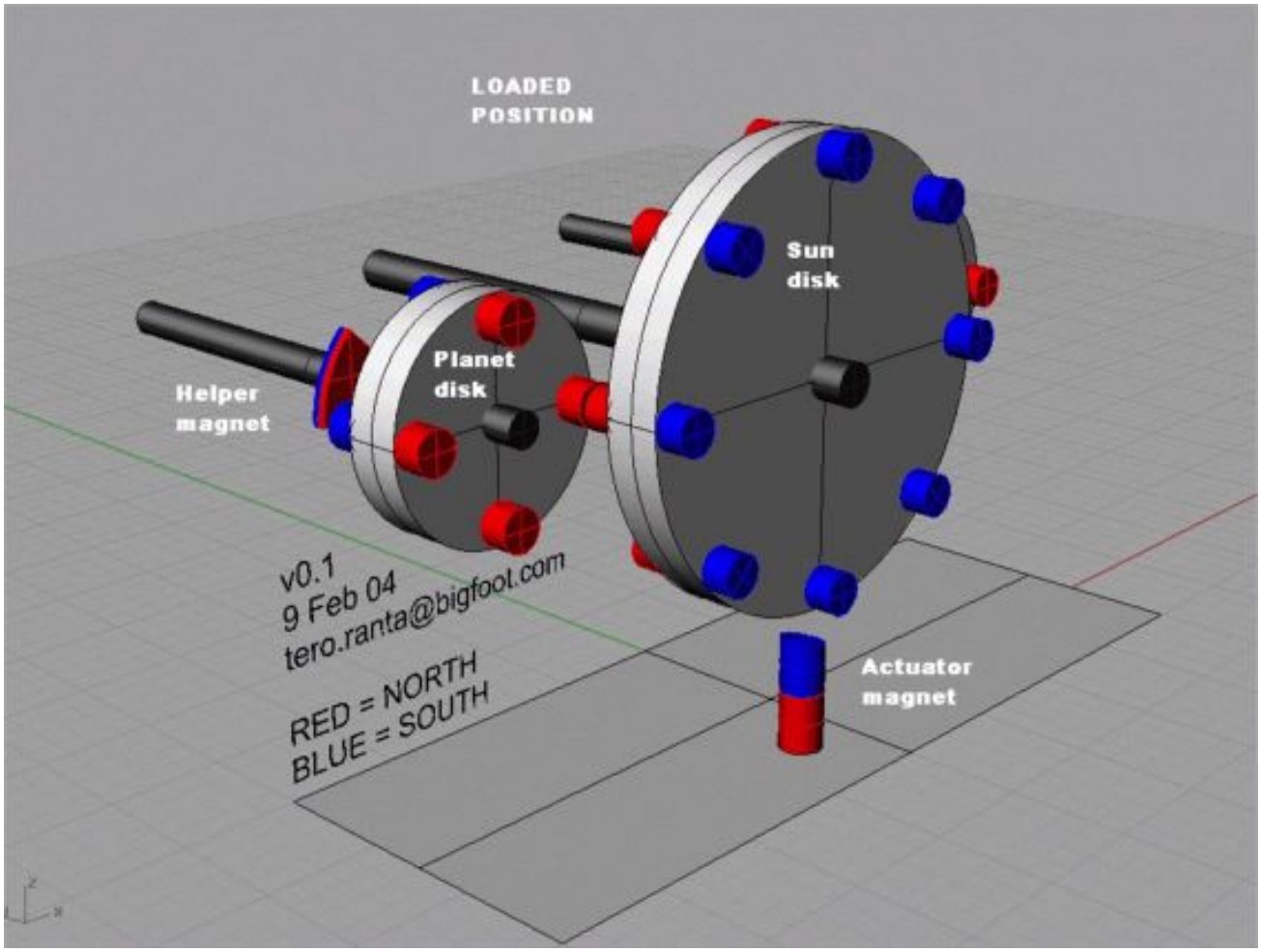
Run adjustments
Device test

Dimensions
Calculator
Simulation

Parts list
Photos/drawings
Encyclopedia
Tips & Tricks

Builder reports
Follow-up

The Bowman permanent magnet motor

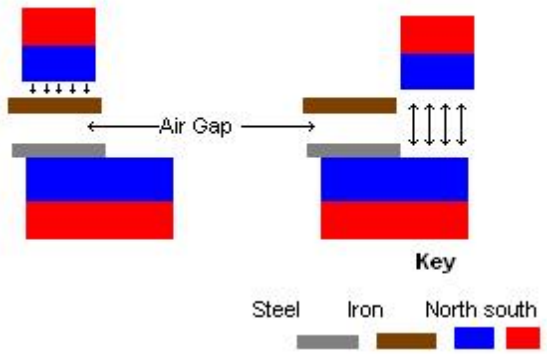


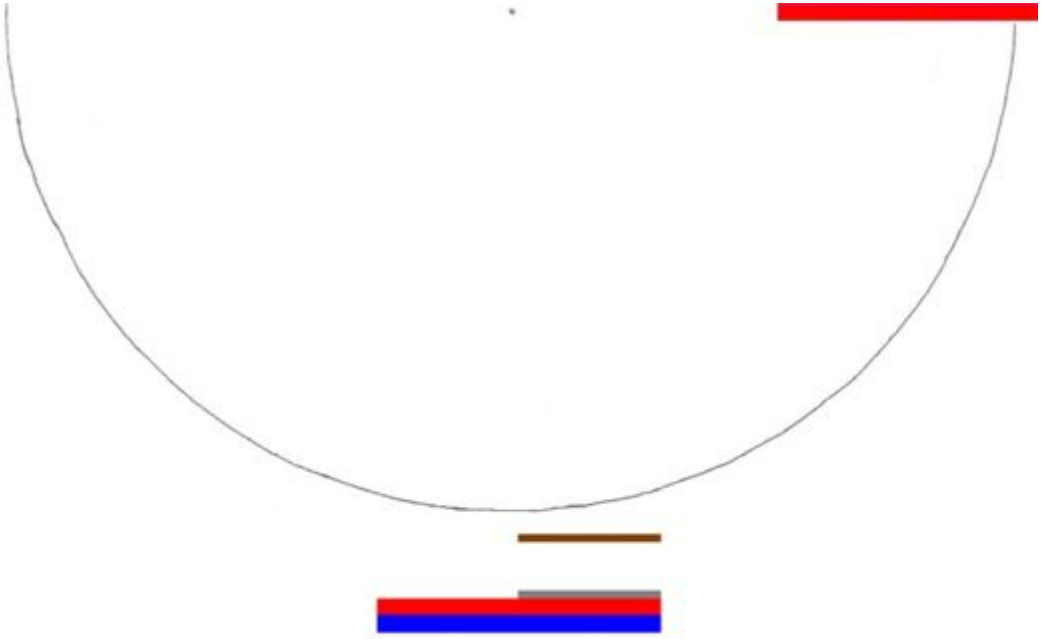
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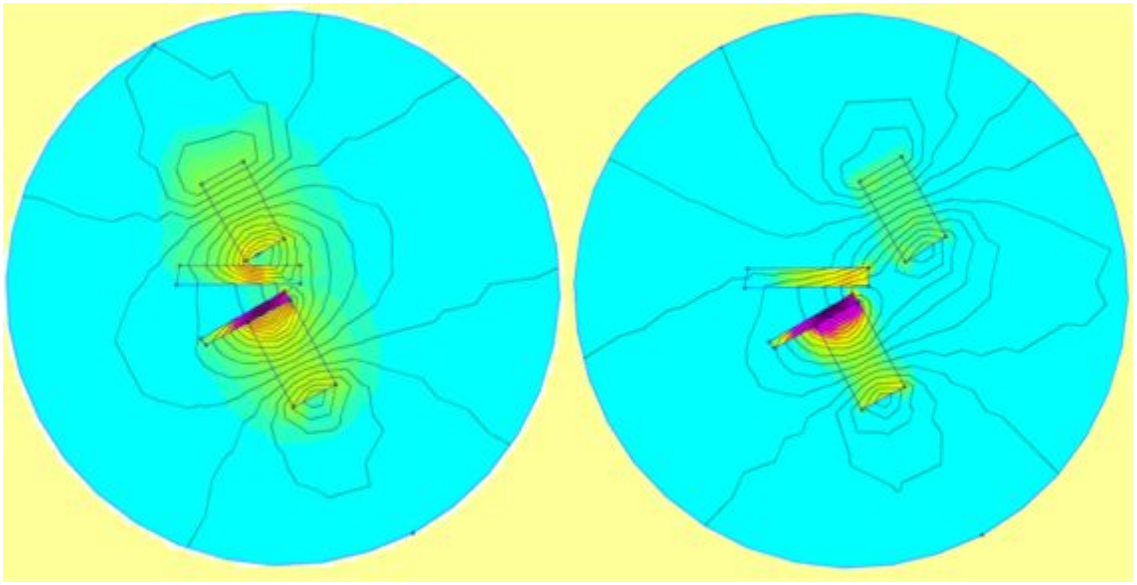
Changing Field Device

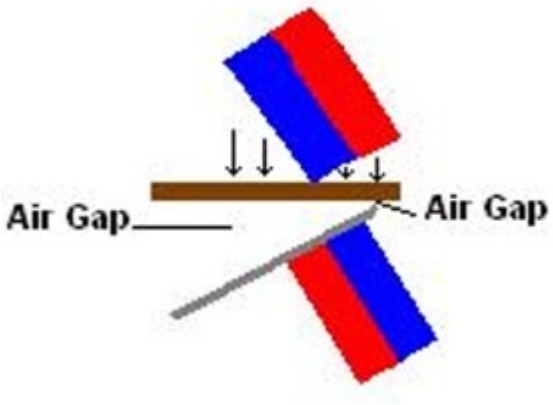
by Graham Clarke



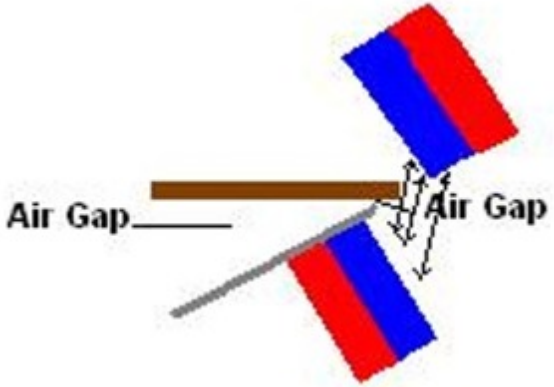




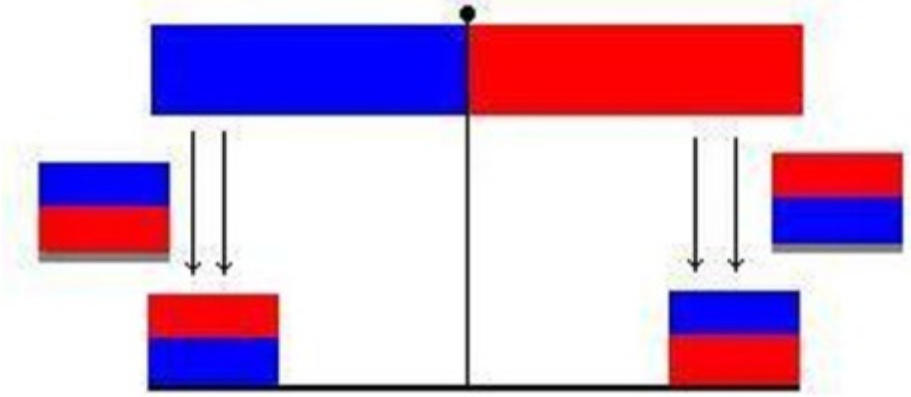




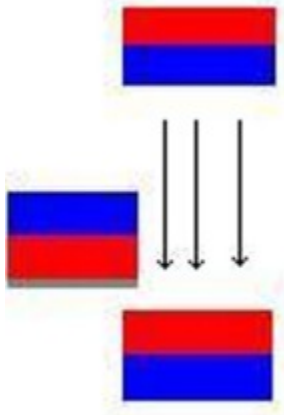
In this set-up the top magnet is attracted to the iron bar. The thin steel and the ait stops the magnets from repelling each other.



Here the magnets start to repell each other. This set-up compared with the set-up on top of this page, needs less force to change the magnets from attracting to repelling
Here the repelling is only happening when the top magnet past the iron. When the top magnet is moving, there is almost no sticky spot and any sticky spot is easely to over come with gravity.



In this set-up, the bar magnet is the rotor. The way it is placed will not let the bar magnet move because the bar magnet is attracted to the bottom magnets.
When the middle magnets are pushed into the center, the bar magnet will spin to aline it's poles to the middle magnets. Once alined, you can move the middle magnets out and the bar magnet will spin again to align with the bottom magnets.



In this set-up, the top magnet is attacted to the bottom magnet, the middle magnet has a minor effect on the top or bottom magnet.



In this set-up the middle magnet has moved past the half way point between the top and bottom magnet. Now the middle magnet has a repelling effect to both the top and bottom magnet.

Home
Magnetic research
Free Energy eBooks/Articles
Guest book

Administration

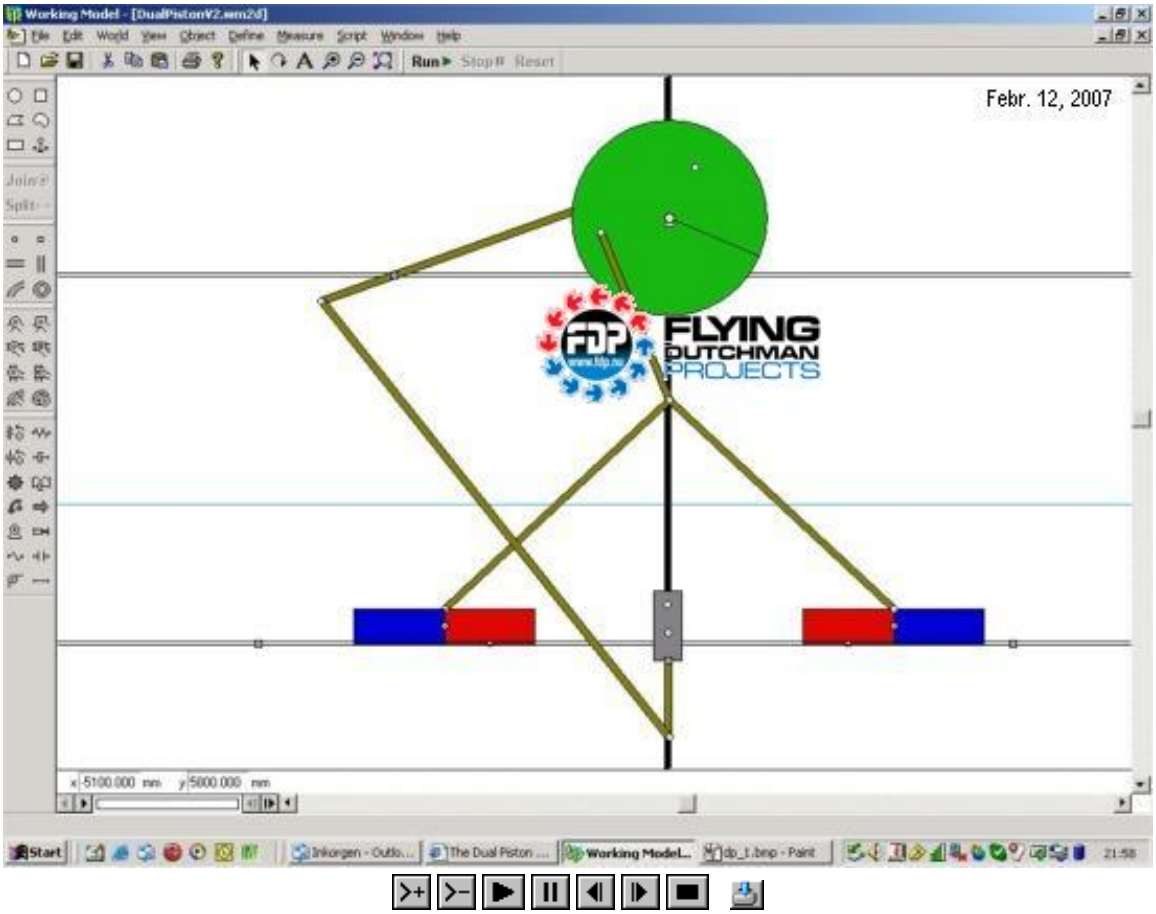
Dual Piston Device

The basic idea

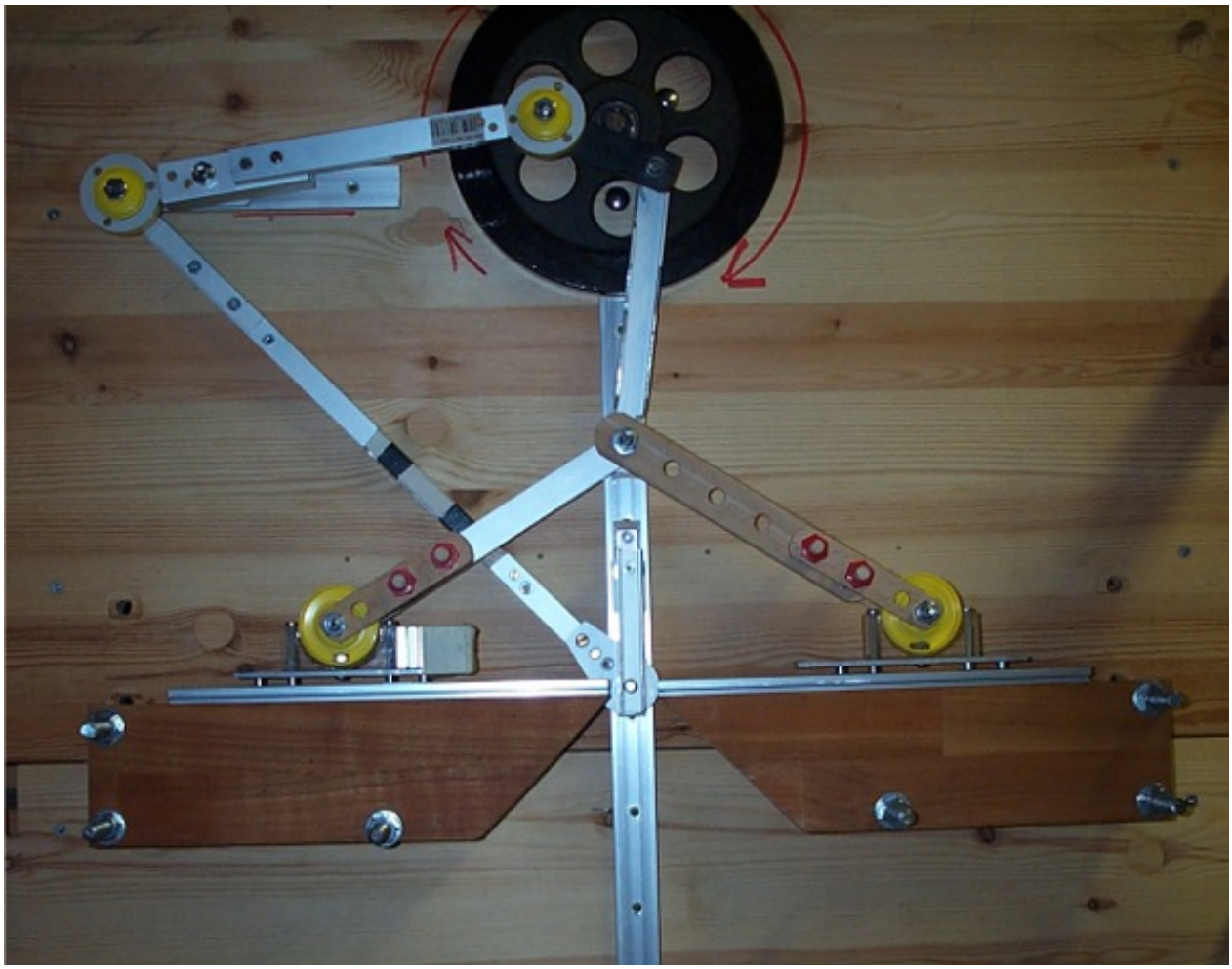


The white line in between the 2 pistons (cilinder magnet with the same pole pointing to each other) is a thin sheet of mu-metal. When the sheet is inserted, the pistons are attracted to the center. After removing the sheet, the pistons are repelling.

The simulation



Building progress 2007-04-24





A device shown at Kunstlaber Augsburg 2004
extract of the report Lab30 festival (CC), Erwan Pottier http://www.archive.org/details/ErwanPOTTIERLab30

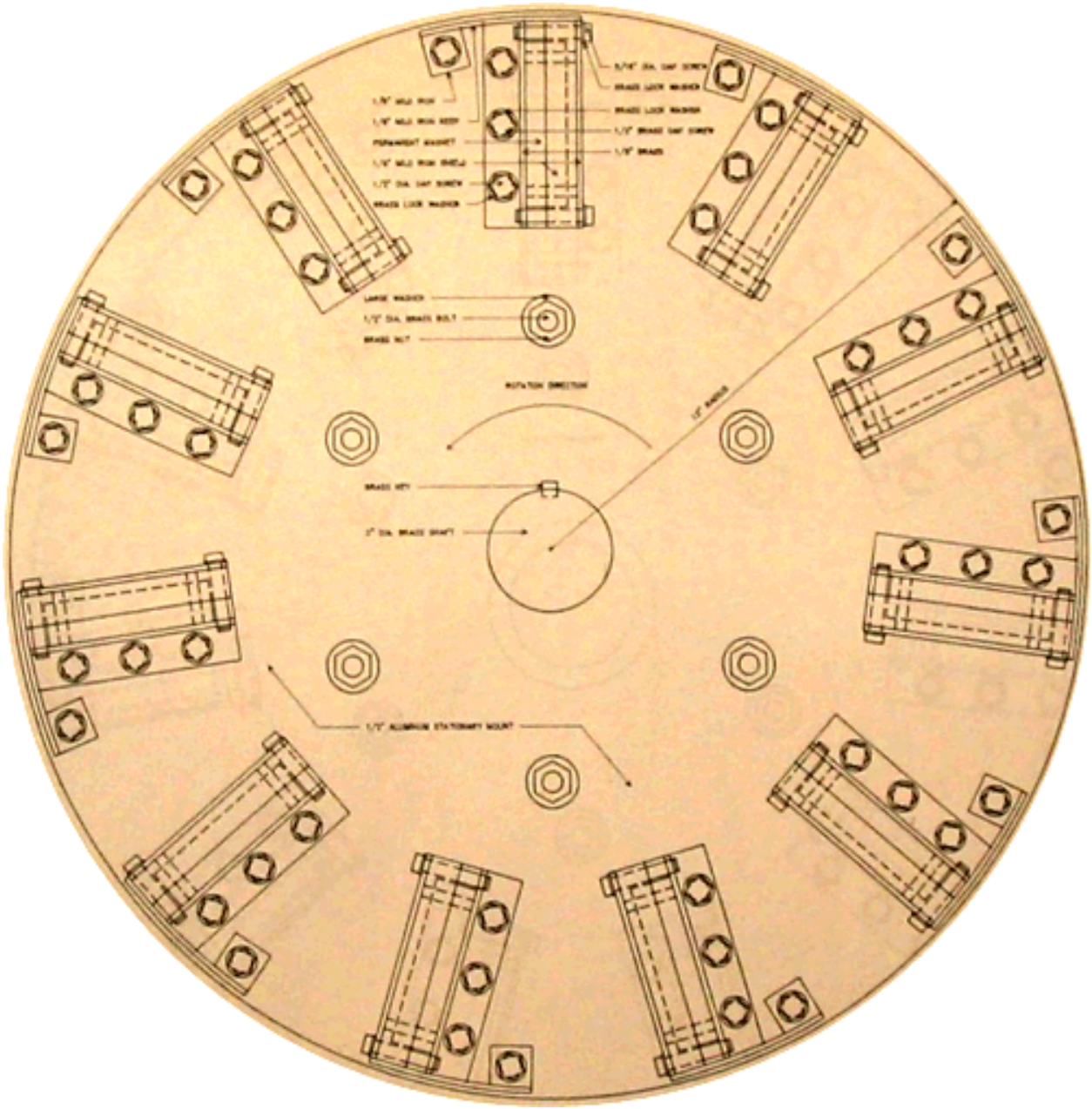
Or download this The believe machine.(right click: save target as...)

Flux-o-matic motor

Start

Lloyd B. Zirbes

Blueprints
Parts list
Assemblies



Before you read the contents of this document, that contains all information about the Mikell device that is on the Internet, please read the following message, found at http://groups.msn.com/VonBraunPhysics, as message number 356.
Eric Vogels (collector of the information).

nairda_thefirst

After having read the information in the sites you included I realize what has been going on. My brother Mikell Sr. has a son named Mikell Jr. and the "Donut Unit" that he created was from information that Mikell Sr and I were doing a time ago at work. This donut unit is Mikell jr's conception of our simple prototype that didn't work called the Helix rotary. Anyway, his son visits us at our house in the summer months and used my computer from my email address which gave some the impression that I wrote what he wrote. This is now cleared up for you. Don't try to copy his device as it doesn't work and you'll just waste your money trying. In addition to this, the Helix Rotary is a product of the US Government and can not be copied or replicated in any way. I caution you to erase any record of the device and do not share it with anyone else. As you know it doesn't work and was dreamed up by a very young boy so don't waste your time on it.

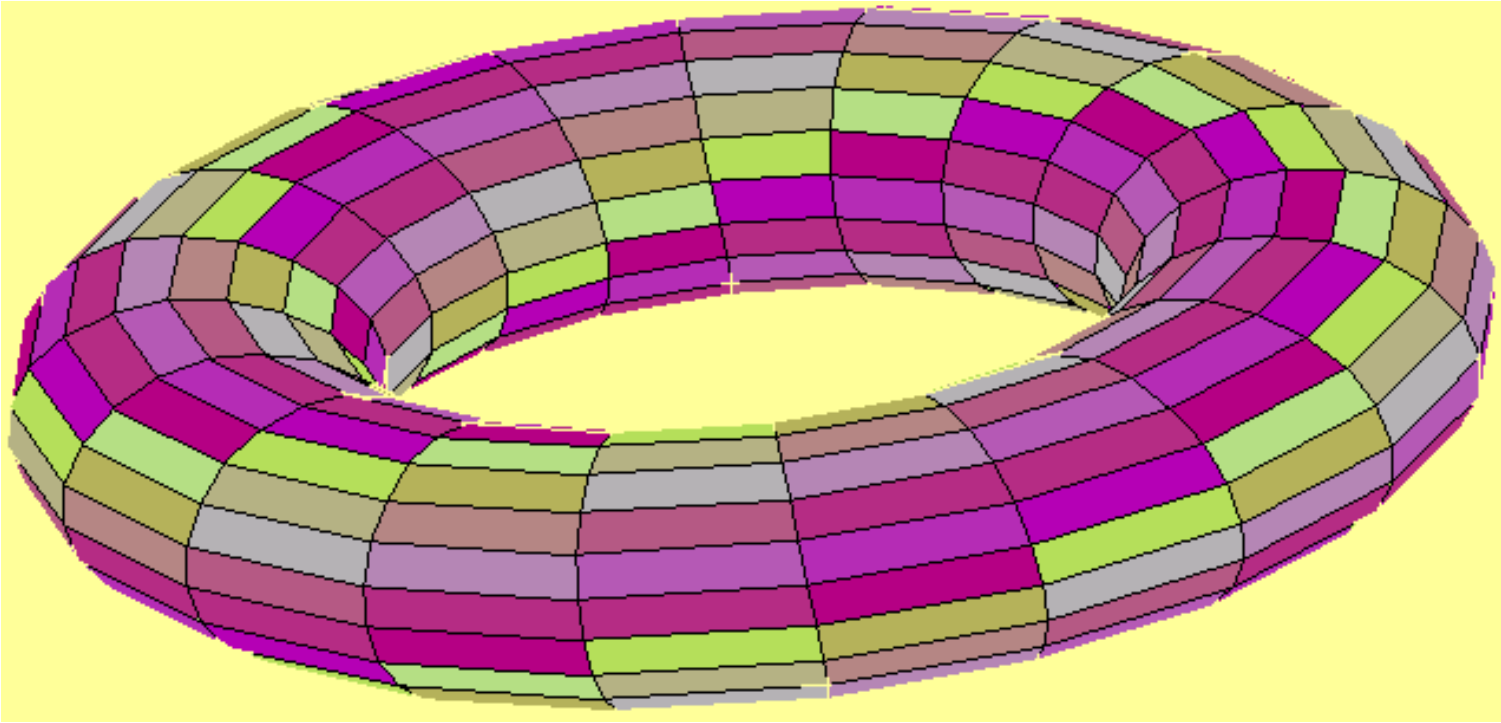
Sorry for the confussion on this matter. An objective member here named Greg knows about Mikell Senior and he can be found at http://groups.msn.com/USINGPHYSICS .

I have already contacted the owners of the other sites you included to inform them what has transpired and cautioned them as well to erase any trace of this device. Again it doesn't work and you would waste your time and effort on it.

Thank you for you cooperation.

VonBraunPhyiscs

The following definition is made from fragments in the original posting of Mikell at http://pub20.bravenet.com/forum/fetch.php?usernum=1672444533&msgid=143765&mode=&cp=
Mikell's statements are written in *green Italic* style.



Donut

Copper donut that is 41.25 inches in diameter.
The hole in the middle is 18".
This makes the diameter of the pipe the donut is made from: 41.25 - 18 = 23.25 / 2 = 11.625 inches.

Picture a winding candy cane stripe around a cylinder. Ok now bend that cylinder into a donut shape. When you look at it the stripe on the donut is one stripe spiralled around the entire donut - inside and out. It is on this spiralling stripe that the one inch by one inch neodymium magnets are glued about half an inch from one another on the entire spiralling stripe all around the copper tube i call the donut unit.



Q Is it hollow?
A ***Yes.***
Q How thick is it?
A ***A quarter of an inch thick.***

While the donut or stator magnets are 3 dimensional which allows them to taper off AND the donut magnets are not aligned in straight rows but instead in a twirling formation like a vortex or a spiral with all positive ends pointing outward. The donut looks like it has a swirling candy cane stripe on it.

Q The 36 inch donut you used had 9 inch diameter walls?
A ***Why do you think they were 9 inch diameter walls? Do you mean 9 inch diameter from outer edge to inner edge of the donut?***
The donut is a little more than three feet in diameter overall but the donut hole is smaller than you may be percieving.
The inner donut hole is 18 inches across when measured from the inner donut surface to the other inner donut surface.
This means that since the donut is 41.25 inches in diameter which means that 41.25 - 18 = 23.25 inches is the

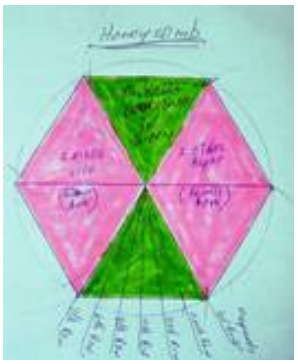
actual donut diameter of the observable surface relative to above perspective or you could say that the donut thickness is 11.625 inches if measured from the outer edge of the donut to the inner edge (inner diameter of the donut inside) of the donut with a straight ruller.
The circumference of the donut wall is thus figured like: (11.625 x 3) + 2.179/inch = 37.054 inch circumference.

Hourglass

The hourglass shape is cut from a single piece of sheet plastic very hard plastic 1/4 inch thick like plexiglas.
The plexiglas is flat and shaped like an hourglass.

Two dimensional so that it confirms to the shape of the tire in that it is wider at the outer edges like the donut is and narrow in the centre like the donut is.
Two-dimensional from end to end the hourglass is about a little over three feet.

The same as the three-dimensional donut's diameter.
Well if you took a circle and divided it into 6 halves like a honey cone and just kept the two opposite sides (eliminating the two sides to the left and the two sides to the right) you would have the exact dimensions which make up the hour glass shape.



Q And is the hour glass straight side or bowed or curved concave or convex as it radiates from the waist to the outer edge of the cones?
A *Straight and flat like my brother's head.*

Q Looking straight down at the hourglass while its in a stationary HORIZONTAL position: Is the top row (or first) row of magnet POLARITY (pointing down) negative? Ssecond row positive down, third row negative down, 4th row positive down, 5th row negative down, 6th row positive down, 7th row negative down?
A *Yes.*

Q Does all the above apply to BOTH sides of the hourglass?
A *Yes. All hourglass rows are pointing directly down at the donut.*
The hourglass magnet layout is every other row positive and negative but more important is that they are in STRAIGHT configuration

Q Looking at the waist center shaft of the hourglass-- do all seven rows of magnets start from the outside diameter and point directly to the center shaft in a V type formation on either side of the hourglass?
A *yes they are all in rows that are patterned after the actual shape of the flat hour glass form.*

Magnets 889 + 112 = 1001

Magnets all 889 of them on the donut
1 inch square neo magnet

The donut or stator has 889 neodymium magnets one inch by one inch by one inch in a swirling or spiralling formation, which means a single row only swirling around the donut in a coiled formation. In this coiled row the magnets are about 1/2 inch apart from one another tip to tip with all positive ends pointing outwards. Each pass of this coiled row is about 4 inches from row to row.



The hourglass form has 112 neodymium magnets one inch by one inch by one inch.
The hourglass form is divided into two halves from its "waist" as you put it. each half has 56. Each half has 7 rows with 8 magnets in each row about a 1/2 inch apart from one another in that row over a distance of one foot in each row measured from the outer edge inwards.
The other 9 inches from there towards the waist centre where the bearing is, is blank and empty as this inner 9 inch area is not over the donut anymore but over the donut hole. row 1 has negative ends only pointing downwards.
Row 2 has only positive ends pointing downwards.
Row 3 again negative and row 4 positive and so on.

Q Are there an equal number of positive and negative magnets on the donut ring?
A *No. On the donut ring only the North poles point outward. The hourglass has the equal amount of North poles and South poles, row by row all straight.*

Q Did you wind the magnetic stripe right to left?
A *No, actually from left to right which is why the hourglass turns clockwise relative to an observer looking down at it.*

Q Did you have about 47 complete loops around the 9 inch diameter donut walls?
A *The donut wall again is 11.625 inches in diameter.*
I.i understand that you were going according to my rough statement of "three feet".
The answer is 35.991902 loops or just say 36 roughly.)

Q About that many loops figure the 889 one inch magnets you used for construction.
A *Yes, exactly 889 magnets, but not 47 loops, it's 36.*
I think that you may have been forgetting the .5 inch space between each magnet.
Thus each 1 inch magnet accompanying a .5 inch space would be defined as a 1.5 unit of measurement.
Thus 37.054 divided by 1 unit (1.5 inches) equals 24.7 magnets per one complete revolution of the candy stripe around the donut or loop as you say and 36 loops equal 889 donut magnets.)

Q You mentioned 4 inches row to row spacing. Explain - as the math does not fit the 889 magnets you used.
A *Oh yes, it does. Between each row of magnets lies a space of 5 inches and one of those inches is occupied by a 1 by 1 by 1 inch magnet thus leaving only 4 inch spacing between each of the spiralled rows (or loops).*)

There is only one problem:
Outer diameter donut 41,25 inch
Inner diameter donut 18 inch
Wand (41,25 - 18)/2 = 11,625 inch

Circumference donut = 41,25 * 3,14 = 129,525 inch
One loop is a magnet plus a space = 1 + 4 = 5 inch
This circumference / (one loop) = 129,525 / 5 = 25 loops(?) Where does the 36 coming from?

Circumference inside donut = 18 * 3,14 = 56,52 inch
At the inside is the space between the loop 56,52 / 25 = 2,2 inch - 1 magnet = 1,2 inch

Circumference wand = 11,625 * 3,14 = 36,5025 (?) Not 37,054
One Magnet + Space in a loop = 1 + 0,5 = 1,5 inch
Magnets in one loop = 37,054 / 1,5 = 24,7 (There are no ,7 so it must be 24)

Total number of magnets = 25 * 24 = 600 ??

With 36 loops we need 36 * 24 = 864 magnets (BUT 36 * 24,7 = 889 magnets).

Where to find a donut

One way is Metal Spinning

Spinning is a process that enables the production of a great variety of rotationally symmetrical parts of widely differing materials and sizes. The process combines process flexibility, repeatability and economic manufacture. It can be thought of as pottery with metal.

Click here

to read a 15 pages Metal Spinning Tutorial.

Google
spinning metal
Google Search

MFG SHOPS

Construction info

Q What "glue or epoxy" did you use to secure the neodymium magnets onto both the copper donut and flat hourglass?

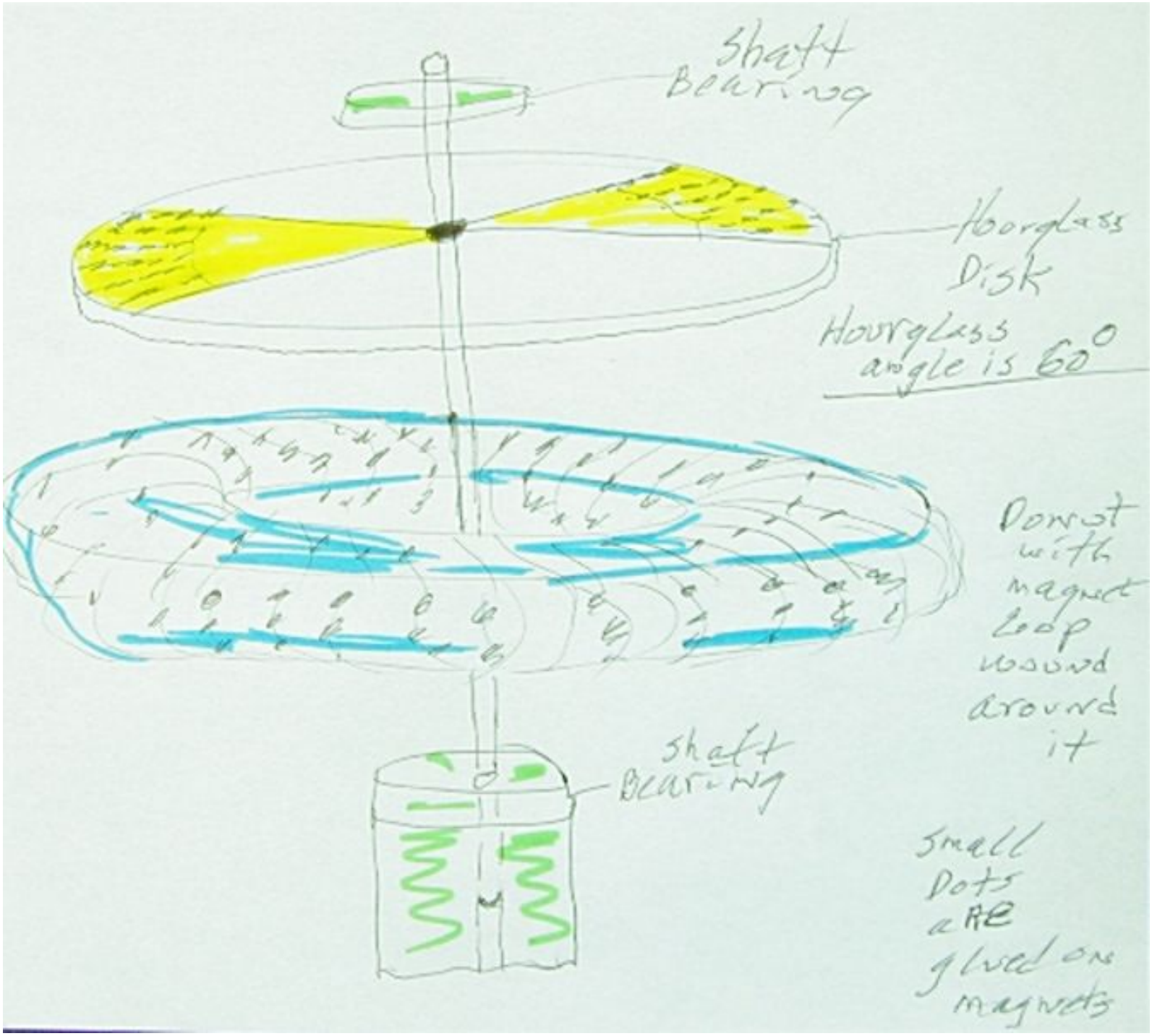
A ***Super glue.***

Q Also, you indicate that there is a gap of about one full inch between the magnets of the fixed donut ring
A ***Yes, one inch between the magnets of the hourglass magnets and the donut magnets at the donuts highest curved surface.***

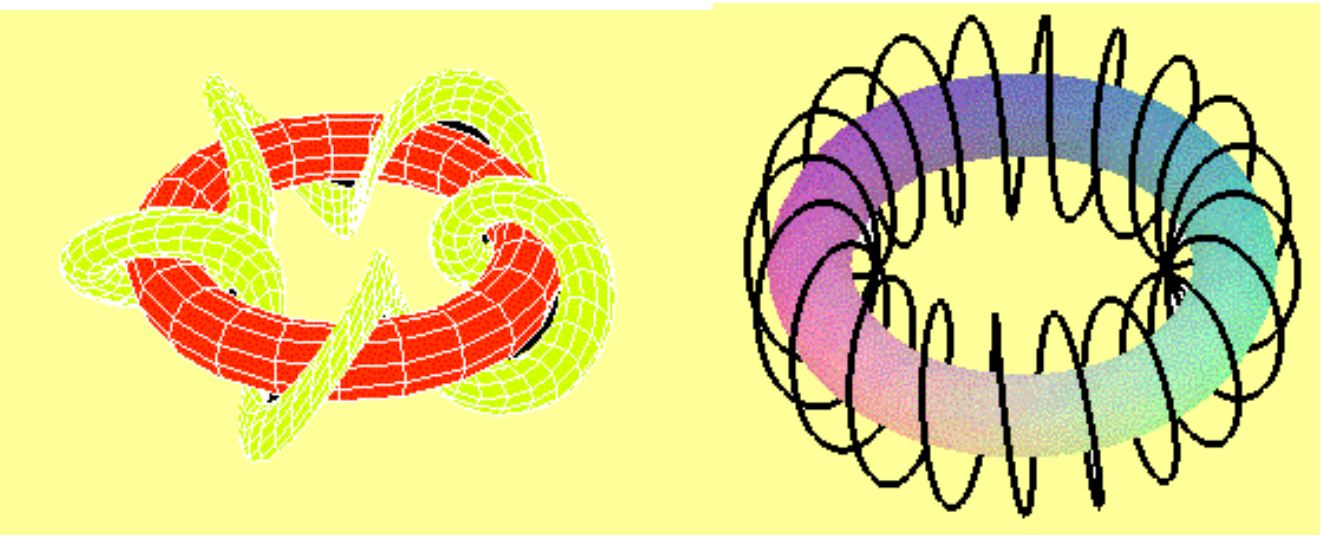
Q By the way, are you using just one bearing at center of the hour glass or is there a shaft running through the axis of the hour glass which has more than one bearing, say one in the middle (at the narrow waist), and one at each end of the hour glass (at the widest part of the conical sections)?
A ***This second unit has a one inch copper pipe for a shaft. It goes like this, the hourglass has a bearing in the middle of it which is attached to the copper shaft. That copper shaft goes down about 15 inches to a second bearing which is attached to the centre rim of the size 17" truck tire we are using as a foundation for the unit. The donut is between the tire and the hourglass. There are braces that come out of the inner edge of the donut that are fixed to the shaft where there is another bearing. The weight of the donut is supported by the tire as the donut lays directly on the tire.***

Q It would seem to be very difficult to balance the armature just by using only one bearing in the narrow middle section as any unbalancing of the ends of the armature, (due to unequal positioning of mass or unequal magnetic forces) would seem to exert very strong loads on to the middle section, kind of like an unbalanced washing machine rumbling around and going off kilter.
A ***It would seem from first thought that the configuration or arrangement of the polarity of the magnets of the donut ring magnets could be either positive or negative with the alignment in or out, since you are using alternating polarity with the donut ring, that is an unbiased outer magnetic field. But perhaps the direction of turning of the hourglass might shift clockwise or counter clockwise (depends on which axis one views the machine), but that is just speculation on my part at this time.***

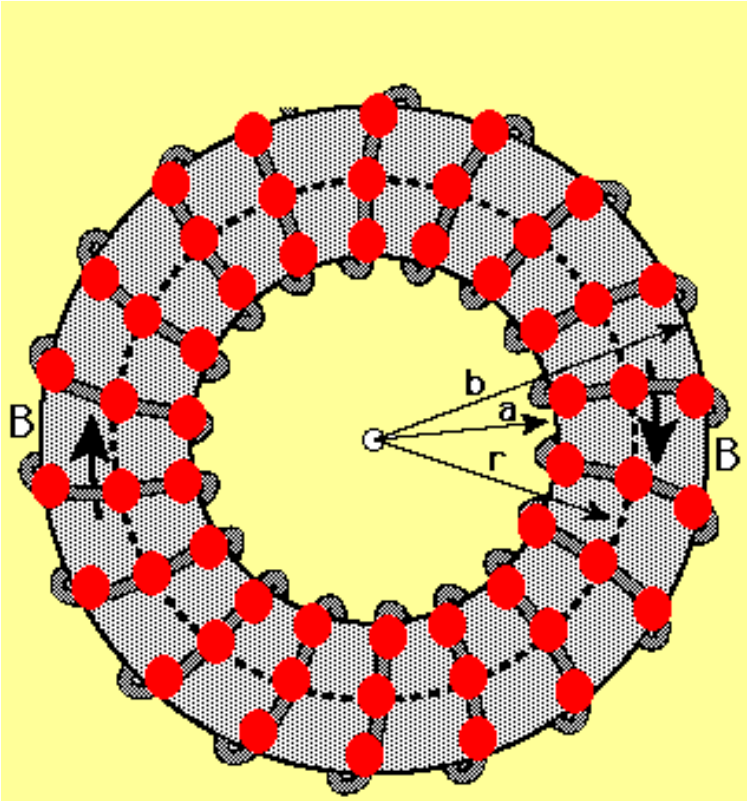
A possible shape of the device



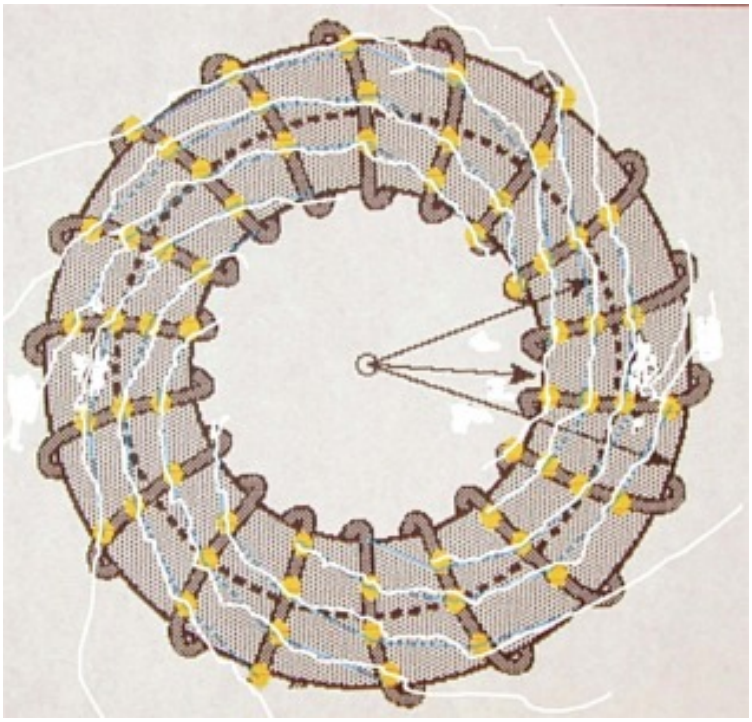
Spiral speculations



The spiral is wrapped around the donut like this.



The magnets are possibly wrapped around the donut like this.



But if we want the magnets to taper, it could look like this.
This way the magnets are pointing down into hole like a vortex.

A message from Mikell

How to make a 2 dimensional model before you go for the donut.

The story continues...
Mikell understood that we wanted a cheaper and easier to build device to do some initial tests with, before we could build a donut.
The following description is made from the emails that Mikell sent.

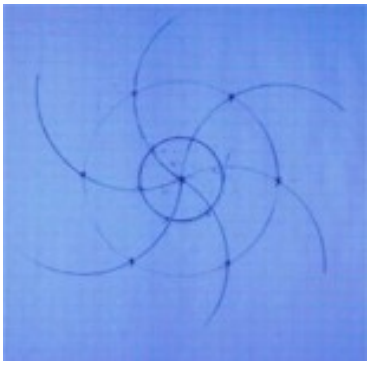
Mikell did not make the pictures and drawings. They are a collection of work and thoughts of others, which tried to understand and build the 2-dimensional galaxy model.
NONE OF THEM MANAGED TO BUILD A WORKING 2D MODEL BEFORE MIKELL STOPPED COMMUNICATING!

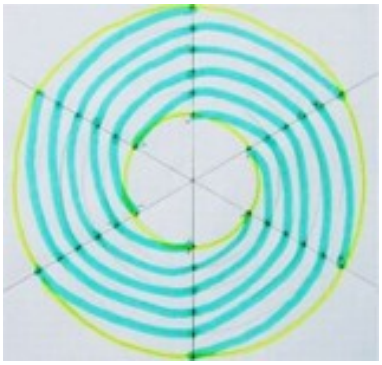
Mikell's statements are written in *green Italic* style.

I understand the problem you're having if the hourglass did not rotate.
You first need to make a small unit that I made when I made four of them to put on an old broken remote control toy 4 w d.

The remote didn't work but the truck powered itself by the turning of the starter disks.

1) Get a big paper and draw the 6 legs of a galaxy on it with each curved leg about 14 inches long spiralling inward just like a galaxy.
The spiral should be widespread and not too tight.





2) Now glue this artwork to a big piece of wood.

3) Now glue the magnetic cubes to the galaxy legs with all the negative ends glued down and a 1/2 inch gap between each magnet.









4) Find the centre of the galaxy and drill a 1/4 hole there to insert a 1/4 inch wooden dowel in the hole.
Drill a 1/4 inch hole through the centre of a gulf ball and slide the gulf ball down the dowel until the ball rests on the artwork.

5) Now get a piece of balsa wood that is flat about 24 inches long and one two inches wide and 1/4 inch thick.
Find the centre of this flat wooden bar and drill a hole in its centre.

6) Next glue more magnetic cubes to this wooden bar 1/2 inch apart from one another.
Be careful that you not glue a magnet over the centre hole. These magnets are arranged this way: two magnets with their negative ends glued to the bar followed by one with its positive end glued to the bar. Now repeat this (2 then 1 then 2 then 1 and so on) for an equal arrangement on both sides of the centre-drilled hole.







7) Now, place this wooden bar up-side-down on the wooden dowel and slide the wooden bar down the dowel until it rests on the gulf ball and release it.



Now the fun starts!
The bar will begin to spin in one direction.
Once you have done this and see the tangible success you are having you will then understand how to build a more three-dimensional donut unit that works even better.

Q Do you know if there are other working models?
A *Yes. There is one in France that I know of that has duplicated the galaxy unit and it works.*
At first it didn't because he coiled the legs of the galaxy to tightly but after I corrected him and he re-did it then it worked.

Email with instructions.

----- Original Message -----
From: mikell
To: -
Sent: Thursday, October 30, 2003 9:39 PM
Subject: Re: your working magnetic motor mentioned at http://freeenergy.greaterthings.com

I'm getting the pictures ready soon. Here is some specs i wrote to NN:
NN
hello again. i just read your other post before this one. now i will try to answer all your questions per batum:
I can understand the potential for a strong electric shock as you have a copper conductor with the donut ring being influenced by a changing complex magnetic field derived from the spinning magnets on your hour-glass.
If I understand your configuration correctly, the donut is made of copper with a ring of magnets on the inside of the ring,
No. not just the inside of the ring. picture a winding candy cane stripe around a cylinder. ok now bend that cylinder into a donut shape. when you look at it the stripe on the donut is one stripe spiralled around the entire donut - inside and out. it is on this spiralling stripe that the one inch by one inch neodymium magnets are glued about half an inch from one another on the entire spiralling stripe all around the copper tube i call the donut unit.
but I was wondering what the hour glass is made of?
the hourglass shape is cut from a single piece of sheet plastic very hard plastic 1/4 inch thick like plexiglass
Is the hour glass also copper?
no. plexaglass.
Is the hour glass solid or is the core of the conical sections hollow like a "Dunce hat" or conical bottle. If it is solid metal this thing must weigh a lot.
the plexiglass is flat and shaped like an hourglass. two demintional. why? so that it conforms to the shape of the tire in that it is wider at the outer edges like the donut is and narrow in the center like the donut is.

So the magnets on the hour glass are arrayed in alternating polarity rows (lines or rays) starting out from the narrow waist of

the hour glass out to the larger diameter outer edge of conical sections.
correct.
That is an interesting approach of having the magnets kind of wrap around the sides of the donut ring.
no, not wrapping around like in a three demensional actual hourglass shape. more simple. two demensional. but we have thaought of your idea its just that it will take alot more to build what you are thinking of. you have a good thought in mind. interesting.
I'm trying to envision the angle that is formed by the hour glass; what is the angle of the surfaces of the hour glass shape. You indicate that the hour glass is one foot nine inches in length on each side of the "waist", which is quite a long ways out from the donut ring; what is the diameter of the hour glass, that is the cone at its outermost edge?
two demensional so no cone as you now know. from end to end the hourglass is about a little over three feet. the same as the three demensional donut's diameter.
Basically, is the hour glass narrow and long or fat, relative to its rational axis length?
well if you took a cirlce and divided it into 6 halves like a honeycone and just kept the two opposite sides (eliminating the two sides to the left and the two sides to the right) you would have the exact demensions which make up the hour glass shape.
And is the hour glass straight side or bowed or curved concave or convex as it radiates from the waist to the outer edge of the cones?
staight and flat like my brother's head.

You added a significant amount of weight to what I would call the armature with your "dumb bells". Due to the obvious inertial effect, I would have anticipated that your machine would have picked up rotational speed at a slower rate, (that is, accelerated slower) due to having to put the extra mass in motion. Did you see a noticeably slower rate of acceleration after installing the weights as compared to without the weights?
Yes. it started off slower than it usually did but then was getting up to speed when the weights slung off and then it hoped around the basement until the other half fell off. then the shaft was bent and the bearing squeeked.but i fixed it.
I suspect that one could probably determine the force generated by your machine by measuring the acceleration of the turning hour glass and knowing its weight, because one could calculate the torque being applied to bring it up to speed. For ease of calculating, one would just not worry about the friction of the

bearings and friction of the ambient wind and such, as they are probably modest, if you have quality bearings and a well balanced "armature".

By the way, how do you put the machine in motion? You indicate that you have installed a friction brake to slow and stop it, having first putting your hand on it to slow it and being shocked, but does it start spinning on its own accord when the blocking force is released (the brake is released) or do you have to give it a spin by some means to get it initially started.
oh no, you dont have to help it spinn. when you release the brake all at once the flat hour glass instantly rotates and in about one or two seconds you cant even see the magnets on the hourglass any more because it is going to fast.

Lastly, to avoid shocks yet be able to come near the machine during operation, I would suggest avoid grounding yourself if you intend to come near the machine or adjust it when in motion. Try stand on glass, (a piece of wood with jars fixed to the bottom of the wood by nails through their lids is the oldest standby or stand-on) or a rubber mat will usually suffice. And wear rubber gloves and shoes. Don't touch both the armature and the fixed ring or housing at the same time, that is become the bridge. One could measure the voltage and current with a simple meter by shorting out the machine to a ground. As the old saying goes, current kills not voltage but voltage overcomes the resistance. Since it is jumping a spark a long distance through the air, the voltage must be rather high to overcome the air's resistance, but who knows what kind of current is being realized.

I understand your motive to taping on the weights but would be very careful about applying weights to the spinning part for two reasons:

1) the weights could unexpectedly come off and hit you when they reach a high speed, and
2) the weights might unbalance the "armature" and damage your bearing(s) or shaft(s).
yes the weights almost did hit my leg.

By the way, are you using just one bearing at center of the hour glass or is there a shaft running through the axis of the hour glass which has more than one bearing, say one in the middle (at the narrow waist), and one at each end of the hour glass (at the widest part of the conical sections)?
this second unit has a one inch copper pipe for a shaft. it goes like this, the hourglass has a bearing in the middle of it which is

attached to the copper shaft. that copper shaft goes down about 15 inches to a second bearing which is attached to the center rim of the size 17 truck tire we are using as a foundation for the unit. the donut is between the tire and the hourglass. there are braces that come out of the inner edge of the donut that are fixed to the shaft where there is another bearing. the weight of the donut is suported by the tire as the donut lies directly on the tire.

It would seem to be very difficult to balance the armature just by using only one bearing in the narrow middle section as any unbalancing of the ends of the armature, (due to unequal positioning of mass or unequal magnetic forces) would seem to exert very strong loads on to the middle section, kind of like an unbalanced washing machine rumbling around and going off kilter.

It would seem from first thought that the configuration or arrangement of the polarity of the magnets of the donut ring magnets could be either positive or negative with the alignment in or out, since you are using alternating polarity with the donut ring, that is an unbiased outer magnetic field. But perhaps the direction of turning of the hour glass might shift clockwise or counterclockwise (depends on which axis one views the machine), but that is just speculation on my part at this time.
nope. the magnets ALWAYS only go in one direction-clockwise. if you try to spinn the hourglass counter clockwise it will almost break your wrist! there are two things going on here i think:
1) the hourglass magnet layout is every other row positve and negative but more important is that they are in STRAIGHT configuration
2) while the donut or stator magnets are 3 demensional which allows them to taper off AND the donut magnets are not alligned in straight rows but instead in a twirling formation like a vortex or a spiral with all positive ends pointing outward.the donut looks like it has a swirling candy cane stripe on it.
3) the hourglass form is flat and two demensional while the donut is three demensional and curved in all directions with the literal overall demensions of a sphereical donut.
so you have a "drawing in of" force from the donut configuration towards the "straight" configuration of the hourglass magnets. since this swirl formation of the donut disapears behind the outer edge of the donut and then reapears in an off set direction from underneath to pick back up where it left off i believe that the hourglass is in a constant motion trying to find the path of least resistance but instead only finds an endless repeat of the angled swirle force that again tapers off behind the donut and the hourglass gets somehow cheated from making its complete round

like in from beginning to end, it instead begins with the effort of finding the end but never finds the end. a **straight** *two demensional formation over a* **spiralled** *three demensoinal formation where everythng is opposite one another even the polarity is opposite in that one is positive ends pointing out only where the other is every other row. sort of an opposite reaction within an opposite reaction. i believe that this is the majic that makes the donut work forever.*

Are there an equal number of positive and negative magnets on the donut ring?
no. on the donut ring only the positve ends point outward. no negaitves.the hourglass has the equal amount of positive and negatives, row by row all straight.

How many magnets on the donut ring and how many on the hour glass?
the hourglass form has 112 neodymium magnets one inch by one inch by one inch. the hourglass form is devided into two halves from its "waist" as you put it. each half has 56. each half has 7 rows with 8 magnets in each row about a 1/2 inch apart from one another in that row over a distance of one foot in each row measured from the outer edge inwards. the other 9 inches from there towards the waist center where the bearing is, is blank and empty as this inner 9 inch area is not over the donut anymore but over the donut hole. row 1 has negative ends only pointing downwards. row 2 has only positive ends pointing downwards. row 3 again negative and row 4 positve and so on.
the donut or stator has 889 neodymium magnets one inch by one inch by one inch in a swirling or spiraling fromation which means a single row only swirling around the donut in a coiled formation. in this coiled row the magnets are about 1/2 inch apart from one another tip to tip with all positive ends pointing outwards. each pass of this coiled row is about 4 inches from row to row.

I ask to determine if there are equal but opposing magnetic forces on the non-moving outer ring or a biased field with uneven number or force of magnets. It sounds as if the hour glass is equal but alternating.

Are the magnets aligned straight out from the center of the donut or are they tilted tangentially, clockwise or counterclockwise in any fashion?
straight out but following the natural path from a common center point so that the further out you go the more room between each row.

Are the magnets on the hour glass pointed perpendicular to the

outer surface of the hour glass's conical shape or some other arrangement of alignment perhaps towards the inner edge of the donut ring?
all hourglass rows are pointing directly down at the donut.

This is where a picture or a rough sketch are worth a thousand words, as it is very difficult to describe shapes and alignments because it depends on ones perspective, just as trying to determine whether something is rotating clockwise or counter clockwise, that all depends on from which axis end one is viewing the hour glass, but once a viewing position is agreed upon then description's can begin to have common perspective. An as you know, two persons can't occupy the same space at the same time to view something, which is why we always seem to have a difference of perspective in life. Your in your shoes and I'm in mind, so to speak.

Also, you indicate that there is a gap of about one full inch between the magnets of the fixed donut ring
yes, one inch between the magnets of the hourglass magnets and the donut magnets at the donuts highest curved survace.

You saw a pink glow, hmmm, I wonder if that was a static charge, like St. Elmo's fire or a plasma of some kind. Curious. Have you viewed it in the dark? Living in Montana, I like to view the Northern lights, rare but spectacular. And very hard to describe, one needs to just see them to understand what they look like, and no two are ever alike.
i have never seen these lights before. maybe someday i will. by dad lives on wicks lane in billings mt where he owns a a cabin house to escape the southern sun.
hope my answers helped you a little.
mikell

----- Original Message -----
From: mikell
To: -
Sent: Sunday, November 02, 2003 12:14 AM
Subject: Re: your working magnetic motor mentioned at http://freeenergy.greaterthings.com

hi again NN
ill answer all your questions now.
Hi Again, I wish to thank you for all this info you sent me. I have been personally trying to make this type of motor for years and won't give up. I am for a greener earth and the Mikell engine is

the answer. No more gasoline/oil pollution. A lot of folks tell me it just can not be done. They are wrong. I am happy for your sucess. By reading the info you sent me I have a very good idea as to its construction. I have several more questions in addition to those you already answered:

Just how and what did you use to construct the large copper donut itself?
the copper donut that is 3 feet in diameter came to me already built that way. it came from my dad's work place. they manufacture these hollow copper donuts that are then placed into a large stamping machine that crushes it into a flat seal with ridges on it and then they insert this into their scram jet engines that they are experimenting with. he had some in his truck one day and i wanted one before they staped it into a seal. since it was rejected in their quality control for errors i got to keep 8 of them.

Is it hollow?
yes.

How thick is it?
pretty thick. a quarter inch thick.

In example: Is it made from bent sections of 4 inch diameter copper pipe? 3 inch copper pipe, ect?
no. i think they are made from a thick sheet of copper and then curved into a cylindrical shape and sealed at the seam and then heated and curved with a large pipe bending machine until both cylinder ends meet and then sealed together.

What "glue or epoxy" did you use to secure the neodymium magnets onto both the copper donut and flat hourglass?
good ol fashioned super glue.

I find it very hard to get two like poles on a 1 inch square neo magnet very close to each other. How did you manage to get like poles so close and then securely mount those magnets in position without them pushing away from each other in the process?
simple. at first i had the problem of them sticking together. so i devised a simple solution. i made a wooden brace that looked like a three shelfed bookcase about 4 inches tall and a little over one inch wide. I placed this little brace onto the candystripe and then placed three magnets, one in each hole of the three shelves in the little brace, and then put glue on the bottoms of these magnets and then pressed the magnets on the candy stripe. i

waited for about 2 minuts and then removed the shelf brace. this is how i got perfect spacing between the magnets. i did this to all the magnet until finally all the magnets were on firmly. all 889 of them. I did the sam thing with the magnets on both halves of the hourglass.

In your letter you refer to a positive row and negative row. Is positive NORTH polarity and negative SOUTH polarity?
yes.

Looking staight down at the hourglass while its in in a stationary HORIZONTAL position: Is the top row (or first) row of magnet POLARITY (pointing down) negative? second row positive down, third row negative down, 4th row positive down, 5th row negative down, 6th row positive down, 7th row negative down ?
yes.

Does all the above apply to BOTH sides of the hourglass?
yes.

I am looking forward for any photos you can send me and I whenever you get the chance to answer the above questions I will greatly appreciate it. A lot of things will be clear to me then. Many Thanks

i want to suprise the people at that site with my very good photos and videos. for now ill try to send a drawing.

mikell.

----- Original Message -----
From: mikell
To: -
Sent: Monday, November 17, 2003 1:02 AM
Subject: Re: MAGNET MOTOR

i'll try to answer your questions:
>Hi Mikell, I still am working on a small scale model of you motor. You were kind enough to send me info as to its construction as well as answer a few questions I had. The below points will clear up evey thing in my mind about the construction:

>Looking at the waist center shaft of the hourglass-- do all seven rows of magnets start from the outside diameter and point directly to the center shaft in a V type formation on either side of the hourglass?

yes they are all in rows that are patterned after the actual shape of the flat hour glass form.

> The 36 inch donut you used had 9 inch diameter walls.

why do you think they were 9 inch diameter walls? do you mean 9 inch diameter from outer edge to inner edge of the donut? the donut is a little more than three feet in diamter overall but the donut hole is smaller than you may be percieving. the inner donut hole is 18 inches across when measured from the inner donut surface to the other inner donut surface. this means that since the donut is 41.25 inches in diameter which means that 41.25 - 18 = 23.25 inches is the actual donut diameter of the observable surface relative to above perspective or you could say that the donut thickness is 11.625 inches if measured from the outer edge of the donut to the inner edge (inner diameter of the donut inside) of the donut with a straight ruller. the cercumferance of the donut wall is thus figured like: (11.625 x 3) + 2.179/inch = 37.054 inch circumferance.

>Did you wind the magnetic stripe right to left?

no, actually from left to right which is why the hourglass turns clockwise relative to an observer looking down at it.

>Did you have about 47 complete loops around the 9 inch diameter donut walls?

the donut wall again is 11.625 inches in diameter. i understand that you were going according to my rough statement of "three feet". the answer is 35.991902 loops or just say 36 roughly.

About that many loops figure the 889 one inch magnets you used for construction.

yes, exactly 889 magnets but not 47 loops, its 36. i think that you may have been forgetting the .5 inch space between each magnet. thus each 1 inch magnet accompanying a .5 inch space would be defined as a 1.5 unit of measurement. thus 37.054 divided by 1 unit (1.5 inches) equals 24.7 magnets per one complete revolution of the candy stripe around the donut or loop as you say and 36 loops equal 889 donut magnets.

You mentioned 4 inches row to row spacing. Explain - as the math does not fit the 889 magnets you used.

oh yes it does. between each row of magnets lies a space of 5 inches and one of those inches is occupied by a 1 by 1 by 1 inch magnet thus leaving only 4 inch spacing between each of the spiralled rows (or loops).

I am very excited about you motor and hope to recieve E mail from you. I don't wish to construct my scaled down version of

your motor any further untill I clear up the above points in my mind
well i hope this helped you. i am not so good at explaining things like jason is.
mikell.

----- Original Message -----
From: mikell
To: -
Sent: Wednesday, November 19, 2003 12:55 AM
Subject: Re: MAGNET MOTOR

> the .14 in your pie (3.14) is figured seperately in inches at 2.179 due to a slight oblong shape in my particular copper donut, a sort of slight oval shape. the 3.14 is applied to a round circumference where as to an oval i made an itemized breakdown to reflect the difference in the donut's shape. it does seem to fit all 889 magnets evenly.
>
> mikell.

----- Original Message -----
From: mikell
To: -
Sent: Thursday, November 20, 2003 12:35 AM
Subject: Re: MAGNET MOTOR

david hamel huh? i'll research it. it sounds just like mine in some ways. cones? you know that a third prototype of our unit will use two cones? yes. one in the upper end of the donut and one in the lower end of the donut and since they will spin in opposite directions but are upside down the viewer will see that they are spinning in the same direction. we are going to take the flat hourglass and make it a three deminsional hourglass.
good idea about protections from the government. i am not as nieve about this as i first was starting out. good idea about making copies of the disks. i have heard that the cia has a gun that uses microwaves that they use to shoot someone with without that person knowing which supposedly drops that person's IQ down as far as they want it. you know maybe this country needs a revolution! i mean really because they have become nazis that cant be trusted.

tom, i am more excited about how it flies. this is now my obsession about it. me and jason are going to try to make a controlable unit using two satilite dishes fastened at their rims as a craft with the driving force at the bottom center. i am worried though about getting shocked again but he says this time it won't. we'll see. AND i told my dad i lost interest because he kept trying to make me dismantle the unit. he thinks i am no longer thinking about the unit but me and jason keep it secret and share it with the french researchers over the net. they said to be careful and keep quite so we are now. so far my friends are still gone and no one has any idea of where they are but atleast no one is calling the house anymore and no strange calls.
mikell.

----- Original Message -----
From: mikell
To: -
Sent: Friday, November 21, 2003 12:35 AM
Subject: Re: David Hamel Book and Video Info on Anti-Gravity, ET's, Space Ships, and Telepor

interesting. you actually went to the trouble to send this to me and i appreciate it. want to know what me and jason are building since you are interested in this? look at the below message that me and jason shared with another freind of ours:
Greg
In order to build the Magnetic Drum or Pulsarus type ASC, you will need money. I know that building a small experimental version of about 10 feet in diameter remote controlled model will cost you around $5,000 using all new parts. A four seater human prototype-I should cost you around $15,000 with a diameter of about 25 feet. The component part that will cost the most will be the 10,000 volt capaciters of which you'll need 80 for the Human Prototype I and 40 for the preliminary remote prototype (PRP). Each capaciter will cost about $100. The magnets will cost:
Donut magnet----------PRP = $ 500--------HPI = $ 1,200
Lid Magnet----------PRP = $ 100--------HPI = $ 2,000
Puck Magnet----------PRP = $ 1,000------HPI = $ 4,000
40/ 10,000 high volt capacitors for the PRP $ 4,000
80 10,000 high volt capacitors for the HP-I ---------- $ 8,000
Voltage Regulater-----PRP = $ 100 ----------$ 200
The body design is not shaped like a drum, it is shaped like a disk (flying saucer) The frame of this design for practical home purposes consists of an upper octagonal and lower octagonal frame. On paper, draw an octagon. Next, draw a line from one

point of the octagon to the ooposite corner of the octagon. You should have eight lines that all intersect at the center of the octagon. These lines you drew are the actual frame work. These frame lines are actually bowed upwards in the center. The lower octagonal frame is bowed downwards in its center. Now, if you place the upper one on top of the lower one it will sort of look like two satelite dishes placed together. There is an idea, if you could get two satelite dishes the same size, you would have a very cheap version of the body design. One on top the other so that it would look like a flying saucer shape (theres a specific reason for this). The 50 gallon drum would be replaced with a hollow cylindrical shaft called the **Drive Shaft** *5 feet in diameter at the center of the craft. The capacitors are fastened to the outside of the* **Drive Shaft** *while the donut magnet is fastened to the inner center third of this shaft. The upper and lower disketts are fastened together at their rim edges AND at the point where the* **Drive Shaft** *meets the center of each disk but the shaft itself never touches either disk. So the disks are now firmly attatched to each other at the edges. (a second hollow cylindrical shaft attatches to the center of both disks and the* **Drive Shaft Assembly** *is inside this hollow outer shaft, the* **Drive Shaft** *is about 5 feet in diameter and the hollow outer shaft is about 7 feet in diameter. This hollow outer shaft is called the "***Hual Shaft***" because it actually attatches both disks together at the center of the craft) You can make what ever type of opening in the lower disk and* **Haul Shaft** *for serviceing. These rough notes are to describe the rough outlay of the PRP unit.*

The ***Drive Shaft*** *Assembly:*

The ***Drive Shaft*** *assembly consists of the shaft with the 10* **outer** *capacitors attatched to it and the* **donut magnet** *(which is a sloppy version of a* **Gauss** *we'll discuss later) attatched to the inner third of the* ***Drive Shaft*** *and the lid magnet attatched to the top of the* ***Drive Shaft*** *and the puck magnet "free floating" in the center of the* ***Drive Shaft*** *once energized. The* ***Drive Shaft*** *is held to the craft by a rod that goes through the center of the* ***Drive Shaft*** *and is attatched to the Lid Magnet at the top (in the center of the Lid Magnet) and at the bottom floor of the* ***Drive Shaft.*** *This rod is called the Lift Rod and it must be very thick as it actually lifts the weight of the entire craft. Now this lift rod goes through the floor of the* ***Drive Shaft*** *and is attatched to a three way tounge and groove track. This three way track is movable and is firmly attatched to the floor of the bottom disk. There are three electric motors laying on their sides attatched to the bottom disk floor and they are electric hydraulic motors evenly spaced all pointing towards the Lift Rod. These have long rods attatched to them. These rods are attatched to the bottom*

of the Lift Rod going through the ***Drive Shaft****. They are how you control the direction of the craft. If you want to go up* and *go north, then this vector is achieved by a steering system that these motors coordinate with your manual or computer system and one of them will push its rod x % while the other two pull x % which tilts the* ***Drive Shaft*** *assembly to vector the craft up while going north. If you want to fly north at a steady altitude then you will adjust your power outlet at the appropriate power setting for level flight and steer north. It is better to incorperate a computer to do the computations and run it in to a steering wheel. To best do this in a home unit, I found that you can use simple video game joysticks or steering wheels and the software that comes with video games can be incorperated into this craft so it becomes very simple after all thanks to Genisis game company.*

The **Haul Shaft**

The **Haul Shaft** *is about 8.5 feet in diameter. There are 10 automobile batteries (950 size) attatched to the outer edge at the bottom of the* **Haul Shaft** *where the Haul Shaft attatches to the bottom disk. These batteries are evenly spaced and firmly attatched to both the floor of the bottom disk and the* **Haul Shaft.** *The Haul Shaft is the main haul that attatched the two disks (upper and lower) together. It is the main brace for all drive assemblies to be affixed to as well as all other bracing to firm up the craft. In the Human version of this craft, occupants can only be housed in the upper disk because the eddy waves created in the bottom disk can be harmful to cell tissues. These eddy waves and micro waves created in the* **Haul Shaft** *is all ported towards the bottom of this shaft. In the upper disk, human occupants are in the upper disk not the upper* **Haul Shaft.** *To be more correct in the design of this craft, the inner walls of the* **Haul Shaft** *should be lined with a copper wire mesh with electrical current flowing through it to counter these effects. Especially the bottom portion of the lower disk should have this mesh, a Farady Cage of sorts, so that any spectators in the area under the craft would not be hurt. The only item inside the* **Haul Shaft** *is the* ***Drive Shaft assembly*** *and nothing else.*

The power unit. I can supply you with a self reliant power supply, (which is the donut unit) but for your own simple experimentation puposes, you can use a gas powered generator that can be purchased from your local WallMart. You will also need an array of auto batteries to keep it simple. The PRP will use one battery for each of the 10 capacitors. Your WallMart generator should be attatched to the bottom disk floor as close to the Haul Shaft as possible for center of gravity. A large accesory fuel tank should be attatched to the opposite end of the bottom disk floor from where the generator is attatched to even out the

weight.
A general overview:
Power comes in from the generator then goes to a high voltage regulator then from there it seperates into two *main Streams:* ***SREAM ONE*** *goes to a computer controlled variable resistor and then from there it will go to all 10 batteries and then from there it will seperate into four main power supplies:* **Route One** *goes to all 10 Donut Magnet capacitors and then from there to a Gauss coiling that is wrapped around the Donut Magnet, there is where this first of four routes end.* **Route Two** *then goes to 10 capacitors attatched and evenly spaced on the outer edge of the bottom portion of the Puck Magnet and then from there to an electric coil wrapped around the bottom half of the Puck Magnet, there is where the second of four Routes end.* **Route Three** *then goes to 10 capacitors that are attatched and evenly spaced to the outer edge of the upper half of the Puck Magnet and then from there to an electric coil wrapped around the upper half of the coil of the Puck Magnet, there is where the third of four Routes end.* **Route Four** *then goes to 10 capacitors that are attached and evenly spaced to the outer edge of the Lid Magnet and then form there to an elecrtic coil wrapped around the Lid Magnet, there is where the fouth of four routes end.* ***STREAM TWO*** *goes to a computer controlled Steering Wheel and then from there it goes to the three electric hydraulic motors located at the bottom of the* ***Drive Shaft Assembly.*** *If you choose, you can have a THIRD STREAM go to dashboard gauges and exterior lighting and even life support systems.*
Now rember Greg, the Puck Magnet is the most important component in the entire craft and it MUST wiegh the same as the entire rest of the craft with the weight of the occupants in order to dislpace the kenetic energy within its mass to the mass of the craft through the Lid Magnet that is attatched to the top of the Drive Shaft. The pulse of all 40 capacitors must be timed correctly. You will get this right as you experiment with it in your garage. When you get the timing equation down for the capacitors, you will save this equation to your selected computer that will be running your system. There is also a Fail Safe System, a big red button on the dash of your Human unit that you can push and it will shut down the computer and give the drive system the command to land the craft without the assistance of the computer in a pre-designated landing protocol. This basically lines up the Drive Shaft to a Nuetral vector and gradually disapates the power in the capacitors so that the craft lands itself natrually without need of pilot control or computer control or even power because the power in the capacitors are being dissapated slowly and the batteries will handle the needs

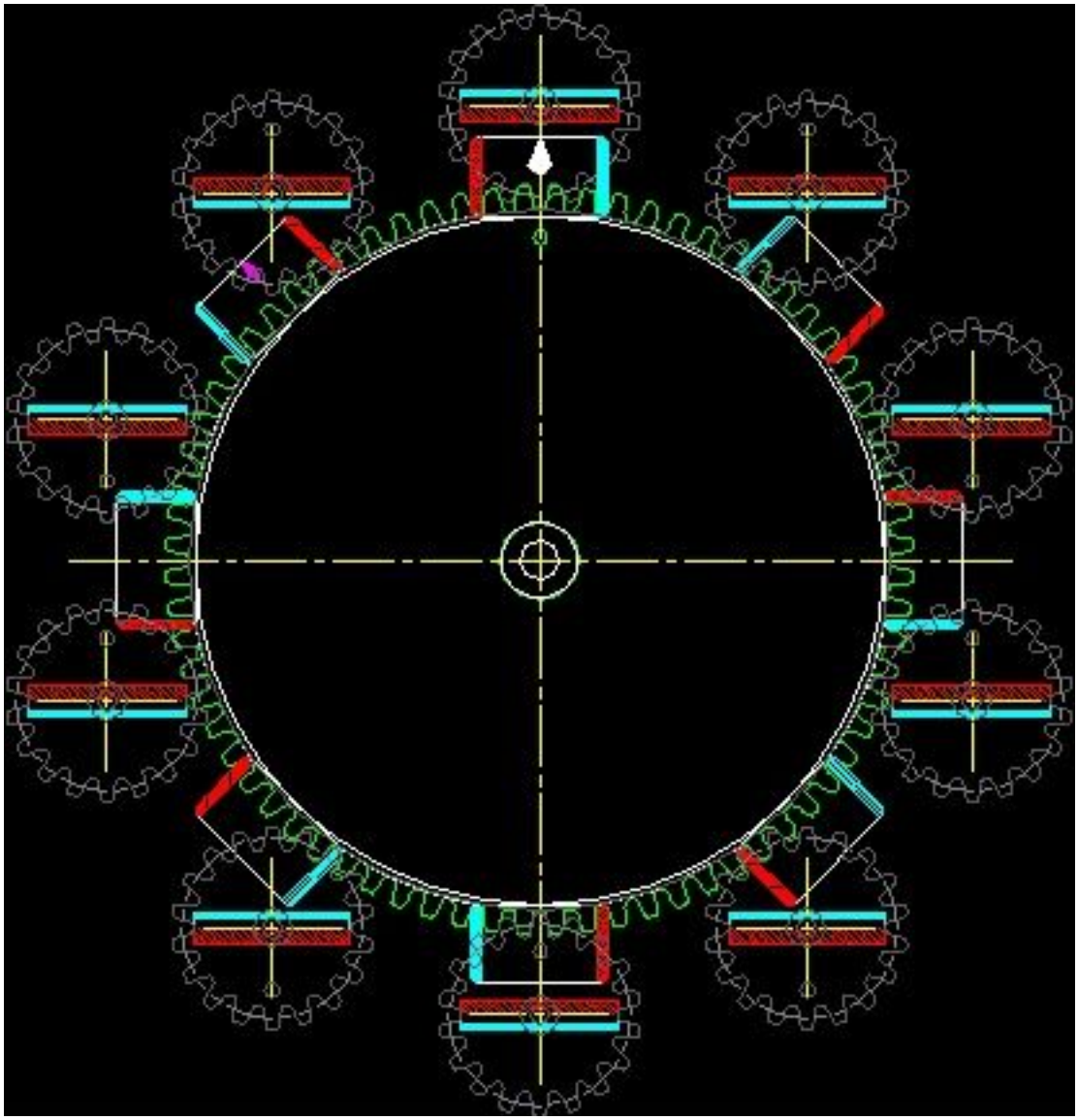
of the drive system for up to an hour. You could also think about making a pressure switch that you hold between your index finger and your thumb so that if you ever passed out for any reason this switch would be activated as you are no longer pressing on it and with the absense of pressure on it for more than 15 seconds, the craft would go into the priority landing protocol. Because of the saucer design it will be very water bouyant. Give your computer a choice between one of say 2,000 landing sites cross referenced with a good GPS system that has its seperate backup power supply that will land the craft EXACTLY where you want in an emergency. Also it is a good idea to build your steering/navigational system with GPS and a seperate Compass system in case your GPS formed problems like it being turned off at the source by tricky dicks at Military sites. (who knows). In fancier home built units you may even use statelite type compaq lap top computers with coordinate systems already developed by Pratt and Whitney and others.
This unit has some of the uniqe designs that already exist but is a far cry from a real ASC. It will outfly anything they chase you with that is for definite. Speed capabiolity is Geometric which means that this craft is a Gv craft. This means that it will fly faster than your body can handle which is why I gave you the specs that I did incorperating natural limits into it. So maybe 1,000 mph. This unit is just a drive system only. No space seperator, no counter field production for elimination of inertia, no 360 degree manuverability, no field dampeners, no anti detection, no self reliant power source and no censor devices. Just a fun ride that you can build Greg and fly either in a remote control version or an occupant version.
Does this sound nuts? Of course it does. Who cares. Build it. Just remember to mark "EXPERIMENTAL" in orange paint on the top and also get FAA inspection before maiden flight so you're legal. Mainly they are interested in the saftey of the frame and the reliability of the drive system as a hazard to ground life. (really they're snooping for ideas to give to friends, we know that)
mikell

Home
Magnetic research
Free Energy eBooks/Articles
Guest book

Administration

Animation by Alexander O. Spiridonov
([Switch] to the magnetic simulation of Nick Rasmussen)
([Switch] to the 3d animation of Nick Rasmussen)





Explanation by Jan P. Cack

A Simple Idea
I had only a mild interest in Perpetual Energy at this time. For some reason the idea planted a seed in my brain. Soon after I realized this may be possible. If you take a magnet and move another magnet towards the first, opposites attract, and then before they can touch, the first magnet rotates 180 degrees. Barely "dodging" the second magnet. After a brief energy loss, the 2 magnets are now pushing against each other, same poles repel, and the first magnet is now oriented to "affect" the next magnet in a rotating cycle. Which, obviously, is reversed polarity from second magnet. It seems to be an efficient cycle. Everything was easy to understand and common sense tells us "forces" are at work. My first drawing of this was February 11, 2005. This looked very appealing on paper. That, in itself, appeared to be no extraordinary discovery. It was a simple concept that made a pretty picture. Surely this has been observed

before. This would seem to be "common knowledge". So I began many searches about magnets, and different configurations where my idea was documented with possible results obtained. Still I was only tickling myself with the conception of Perpetual Energy. After a brief inability to find this simple principle in action, I decided to go a step farther. Why not? I have some time and the power of "AUTOcad" at my disposal. This suddenly became much more interesting!

The Pattern

The spark was set. I put together a bunch of "what if" geometry. Thank you "AUTOcad". Given the fact that a "rotor" could be built with "opposing magnets", we would need an even number of "arms". I constructed 4 in my computer. The first had 4 arms. The second had 6 the third was 8, and the last one had 10 arms. On the end of each "arm" I color coded a magnetic "area". Then proceeded to construct a ring containing my, 180-degree, rotating "stator" magnets. Starting with an equally spaced array of 4 stator magnets. Proceeding in succession until I ended with 19 stator magnets. After that the ring became too "cluttered", so I stopped. This is easily re-created with almost any drawing program. Simple enough. That did not take long. Nor was it an "event". But..after placing my geometry on top of each other, I began suddenly to realize an "opportunity". I got very excited at this point. The fire soon spread, and fast. Within the geometry I created there were several possibilities within each "rotor" created. They were removed to another drawing for further review. Was this the answer? The results were very promising with regard to the overwhelming numbers of possible candidates. So I inspected them all thoroughly searching for my "best case scenario". I was about to explode. Deciding on the "8 arm rotor" and the "10 stator ring" gave me an "object" to build upon, analyze, and SIMPLIFY. It makes a very pretty picture on paper. WOW, I still could not believe that this information was any great revelation. Just a series of patterns I constructed out of curiosity. There was still a lot of work to do. Lost interest in everything else at that point. Since I couldn't sleep or eat much I had plenty of time to play with my "new" toy. Wife getting angry now, says I am obsessing way too much. Other things demanded my attention now. But there was no stopping the frenzy in my head. If this "dream" could be true, nothing else mattered to me. Sorry Wife.

The KISS Engine Evolved

Armed with this exciting new concept, I set out to make my "stator"

magnets rotate at my control. At first this seemed way harder than it appeared. I envisioned the stator to be a Disc Magnet, not sure why? But it stuck for a short time. The exact size or shape of this magnet has far more possibilities than I can briefly list, so long as the "concept" remains the same. Rotation, at first, presented itself many obstacles. Timing was crucial. A "slip" would result in destruction of the magnets themselves. They have to be "flawlessly" rotated then "locked" into position. I assumed this would have the strongest "push/pull" that I can get. It all got very complicated very quickly. What a challenge? Faced with an overwhelming choice of options to be explored. All of them riddled with more friction and instability than I could afford. So I kept rolling this "contraption" virtually in my head. A little KISS here, a little KISS there. I was determined once this gigantic obstacle was overcome, my "Baby" would, and could, "breathe life". A little KISS here, a little KISS there. It was all I could think about. Sleep is way over rated anyway. My Son is also beginning to get angry now because I won't let him on the computer to play games. Sorry Son.

The Revelation

The whole concept became "instantly" solved. After my "revelation" the remaining system was perfect. It appears extremely stable, with the fewest moving parts imaginable. The timing, once built, can NEVER be changed. Only outside forces can alter the rotation of any moving parts. The "KISS Engine" was the most SIMPLE, the most STABLE, and by far the most MODIFIABLE mechanical system I have ever dreamt possible. Once you see the obvious superiorities, it become instantly clear. In it's most basic form all of the principles applied are taught before a child leaves Middle School. Anyone who knows what a magnet does can "understand" what makes it spin, simply with a "snapshot" of this device outlining only the placement and orientation of the magnets. A device, so simple in fact, that the design can be understood in any language with the understanding of magnets. Without adding descriptive text. If standards can be achieved, then I believe school children are capable of it's assembly in "kit" form. A "kit" that can power a small house for 400 years or so. The lack of moving parts would make any "repair" easily performed with average intelligence, and restarted without the worry of anything needing to be "retimed" or "tuned" ever in it's life. That's correct. My design may NEVER have to be changed after initial assembly. It's FLAWLESS GUARANTEED. Of course once the modifications start being applied, this "engine" will not be as simple. But the basic "design" never changes, only scaled and modified. This is the

PERFECT motor. This is my opinion and I hope you feel the same. Are you ready for my revelation? Not yet. First let me state again that this "discovery" was nothing unusual. I did not find a miracle. I did no more than anyone, using "common sense" coupled with imagination, would have eventually noticed. Really it was nothing. I do not deserve any special recognition for what has happened. There are no mysteries involved. I did no "special" research to create my KISS Engine. All I did was make a couple of "observations" and re-apply them in a creative way. Extremely focused on trying to SIMPLIFY our world. Okay, now with everything that I have told you may have already "discovered" my secret. It becomes painfully obvious after you realize what I'm talking about. Are you ready now? Can you Guess? I won't tease you anymore. Here it is. Are you sitting down?? PLANETARY GEARS...Tah Dah!!! What were you expecting...Magic? Simple...Huh. If you understand Planetary Gears, at all, you will understand everything I bragged about is possible.

Simple Solutions Produce The Best Results
The simplicity and stability inherent in this principle CANNOT be overstated. All you need is a 4:1 ratio (1 turn of "Sun" to produce 4 turns of the "Planets"). Equally space 10 Planet Gears with Permanent Magnets creating a "Hemispherical Dipole" area across the diameter (STATOR) aligned with 8 magnets equally spaced around the edge of the Sun Gear (ROTOR). This easily creates ½ rotation of the Stator or Planet every time the magnets pass. Locked into place FOR LIFE by the gear teeth on a "free spinning" assembly. What could be Better? Mechanical friction can be held to a minimum and remains a constant throughout every "phase" of rotational velocity. This can be easily calculated by anyone with a strong math background and a little time. A very good calculator comes in handy about now. To keep "outside influences" from affecting our perfect system, precautions must be made. I propose the gears be cut or molded from a "non-conducting", maybe plastic, material. This could achieve a very "cost effective" and, most importantly, SIMPLE solution. The "manufacturing process" could introduce "standard" bushings, possibly Bronze, Ceramic, or some "plastic material" that I am unaware of, to provide lubrication. If "standard dimensions" can be established, manufacturing can be widespread and very inexpensive. How SIMPLE is that??? I thought so too! The base or cage of the "model" is also "mass produced" with "non-conducting" material. I was thinking, maybe, T-6061 Alum or some form of "plastic". The "shaft's" can be of uniform size and mounted many ways. Quite possibly the entire "machine" can be "loose" enough so all the parts

can be rapidly "formed" or "molded". After "standards" are discussed this would tremendously SIMPLIFY the manufacturing process. Thereby making them as INEXPENSIVE AS POSSIBLE. After a "kit" is introduced, it would take no more ability to assemble than your last Bicycle or "some assembly required" shelf unit. Gear "A" goes into or on to point "A", Gear "B" goes into or on to point "B" and so on. This can be over in 11 steps with this design. Whew, that was tough. How much longer is this going to take you ask? Not long. Now take second "base piece", bet you wondered why you had 2, and "attach" to first "base piece". Is that all I have to do, you ask? Maybe, if the "manufacturing process" creates a "locking mechanism". If not, you may need to spend a couple of minutes "bolting" together. Am I done yet, you ask? I don't have time for this! YES !!! Your first KISS Engine is COMPLETE. Sorry you had to spend so much time on it. Theoretically, with an introduction of "standards" and outstandingly SIMPLE "manufacturing processes", Start to Finish, with the most basic design, can be accomplished in ONLY 12 STEPS. After everything is in place, PULL THE PIN. Voila!! You have a WORKING MODEL KISS Engine. You bought it "off the shelf" and assembled it yourself. Some of you may need help? So ask your Kids. This is such an easy principle I'm sure most everyone can understand it. Again I don't make myself significant in this. Everything I' ve outlined is "common knowledge" to a vast majority of people. All I did was assemble this information, in a creative and SIMPLE way, then drew a bunch of pretty pictures. I cannot prove the KISS Engine will work for sure... but I cannot disprove it either. Half the fun and all the excitement are yours to explore.

If It Is That Simple, Why Didn't You Build It? You Could Be Rich!!!! I LOVE the "possibilities" of this "Brand New" motor. I decided to name it the "KISS" Engine to constantly remind anyone who touches this, or is touched by this. 1.KEEP IT SIMPLE STUPID
2.The World doesn't have to be as complicated as "They" like to make us think.
3.One Person can make a difference if that person is creative and persistent.
4.All of us working together to obtain the same Goal can, and will, change the world.
5.Not everyone on this planet is "out for a buck".
6.Our Family's are our biggest assets. Not just "now" but also in the "Legacy" we all share of what the future will hold.
7.Even if I am, just another "crackpot" with a BIG mouth and too

little knowledge of what I am talking about. We had a good laugh, drew some pretty pictures, and sparked a huge interest in the "idea" of Perpetual Energy. Nobody got hurt. YET? This dream can be realized; all we have to do is try.
8.Sometimes you have to "KICK" people, especially the People who continue to get over-whelmingly rich by polluting and over-charging common people to a point there is nothing left for us and our children to enjoy! People who take far too much and give far too little in return need a new Perspective. All I am trying to do is buy everyone who reads this a "Brand New Pair of Boots" and get them to practice their aim. I am aiming between the legs! Some People may not think it's fair, but I didn't start this fight and I don't want it to last any longer than it has to. I call it Self Defense. Only time remains to see what, if anything, the History Books will say. But how much time do we have left? I think we should hurry.
9.Dreams do come true if we all just believe strong enough and share.

Further Speculations?
All the Variables and Application's for this type of motor are immense and start to hurt my brain when I try to comprehend them all. I will attempt to outline, briefly as possible and simply as possible, things that I have considered. Nothing has been fully tested and requires lots of well-documented Research that we can share with anybody interested.

Modifications To Primary Design
1. EXTREME SAFETY MEASURE MUST BE STRICTLY OBEYED. Don't perform any experiments without exploring ALL possible avenues of INFORMATION on the subject. I am just a HIGH SCHOOL DROPOUT. I have NO EXPERTISE IN ANYTHING related to any of the subjects I talk about. I am only making OBSERVATIONS.

Speculation, based on Cone and Pyramid Magnets lead me to believe that possibly one could create a "Magnetic Manipulator" from common metals in many various Shapes and Forms either to Focus or Re-direct the magnetic influence
The addition of an Outer Ring Gear could further stabilize this system if needed. Could also be "impregnated" with Magnets and "timed" to the Planet Gears.
A Harmonic Balancer or Governor may need to be utilized for stability and/or speed.
Don't screw up a good thing

Modifications Specifically Designed For Applications

1. EXTREME SAFETY MEASURE MUST BE STRICTLY OBEYED. Don't perform any experiments without exploring ALL possible avenues of INFORMATION on the subject. I am just a HIGH SCHOOL DROPOUT. I have NO EXPERTISE IN ANYTHING related to any of the subjects I talk about. I am only making OBSERVATIONS. If given the fact that an "electric charge" can be produced, simply, by passing a magnetic field over a coil. Then pick a Coil, pick a Magnet, Document Your Results, and share this information with anyone that is interested. If given the fact that a Magnetic Field can be produced, simply, by sending an "electrical charge" through the coil wires. Maybe, if we took the same coil and connected the coil leads together, completing the loop. Introduced it to a spinning/rotating Permanent Magnet. We could, conceivably, Create and Expend the "energy" created simultaneously. Sounds simple enough. I don' t know anything about this, and I do not have time to do proper Research to form an educated decision on if this is available or possible. It just kind of sounded cool. If this is possible, then very strong and very controlled (I Pray) Magnetic Field might be achieved. If anybody knows, or finds, anything about this share this information with anybody interested DANGER, Will Robinson, DANGER? The Torus? If I assume #1 and/or #2 can work. Then a Toroidal Coil may produce "strange" results, which appear to be very dangerous. Very Dangerous. I know very little information on this coil. A simple furnace could consist of a "Friction Wheel" attached to KISS Engine. If you now understand the motor and know that friction creates heat. A Fan Shaped Sun Gear can, very simply, move the air. Your Home Furnace would not be so complicated and expensive. If it quits working ask your kid to take a look at it for you. I am sure they could "figure it out" rather quickly. With the fact that heat can change a magnet some "shielding" would be needed, but not much else. This same principle may also apply to a Stove or OVEN.
VERY IMPORTANT! Do your own thorough research.

My Personal Conclusions
Some things I am willing to work for. Our society is constantly "improving things" by adding more "Bells and Whistles" than I like to complicate my life with. Some "luxuries" I can live without, other "luxuries" are very nice. That's why we have options, even if current manufacturers aren't willing to comply. If enough people think like you do, then maybe changes can be made. Nobody, but you, knows it how can be better until you talk about it. If not you then maybe someone you can "touch" with information you possess. What will the World become when most of the day happens through an

automatic series of events. All of the "luxuries" anyone can imagine. To make our Life's easier, we thought. This seems like a very nice place indeed. Man was able to make this happen very smoothly. Behind the realm of what "simple people" needed to know. With the passage of even more Time, we may even feel that with such a perfectly automated, so seamlessly smooth running World, we do not need as many "smart" people. What if this World becomes filled, entirely, with lazy and "simple" people? Will anyone be willing to accept personable responsibility or a global obligation for anything? This may work, for a while. This may seem to run very smoothly, behind the scenes. But what happens when something "fails" in this "perfect" system we have created for ourselves. Who will be left to "fix" it? Who will show us what to do if this happens? How will Mankind survive? As I said before, this is entirely the personal "thoughts" and "beliefs" of just one man. Trying to make things better than I found them. My opinion is important only to me. I do not intend to "offended" or "hurt" anyone. I am just one Man who "found" something, and wanted to share it. I'm sorry World. Maybe, just maybe, the next time I feel like I was at a big "Party", and those same people start laughing at me. I realize all my friends are there, with a "shiny new pair of Boots". Won't they be surprised when I turn around and yell "Let's Kick Some Ass"? I'll try to take out the "big guy" first. After that it only gets easier. I may be very, very small but I possess "infinite power". This I will always BELIEVE!!!!!!!!

Replication reports

Here is a link to the replication log of John Self

Linear Motion

with Permanent Magnets Initial Report

David A. Rutchik 9/27/2004

In previous postings, I indicated that linear motion was achievable within the confines of a permanent magnetic track. The device I put forth was designated a trimagenatron. The name derived from the magnets placed into an angled shape arrangement representing a triangle an abbreviation for generator and tron from the word cyclotron in the hope of building a circular device. Relying on memory I found that the results with my previous device were not as easy to reproduce as I had hoped.



FIG 1 NEW TRACK inner rails and assisting rails

This is my latest configuration. The track is near two feet long; the level is placed on the bed, which lies between two permanent magnet rails. The level shows how the bed inclines from right to left. (The left side approximately 3/8 inches higher) I believe that the TOMI effect provides the unbalancing influence. I replaced the aluminum spacer arrangement for the configuration show here; as seen in the assisting rails. In effect there are two sets of rails those closest to the traveler and then a set of assisting rails. Yes that is an iron piece of flat behind the magnets of the inner rails don't know that it added anything but it helps keep the magnets in proper shape. Somewhat.



FIG 2 Traveler 2 donuts al spacer between 7.5 inch dia. 2.5 lbs track end view.

Traveler is resting on top of a piece of wood to prevent scratching the file cabinet, it is not part of traveler in this design. Except for the two flat steel pieces, everything else is wood, a magnet or aluminum. The design is a quick throw together of the materials that I had lying around. Oh yes, the most important thing it will move up the incline from right to left. This is a preliminary report because I think concepts here will be useful to others. I plan to make some videos with the full report.

Update 2004-11-30

This is the video I promised of the other concept I had with a linear track,
I found it is a self starter in the track at any point. I had an idea to cause the traveler to rotate in the same spot by placing it in a larger cylinder (like a hamster cage) but so far this does not work.

wmv format 2004-30-11 Or right click and download:
RAMP_1.MWV



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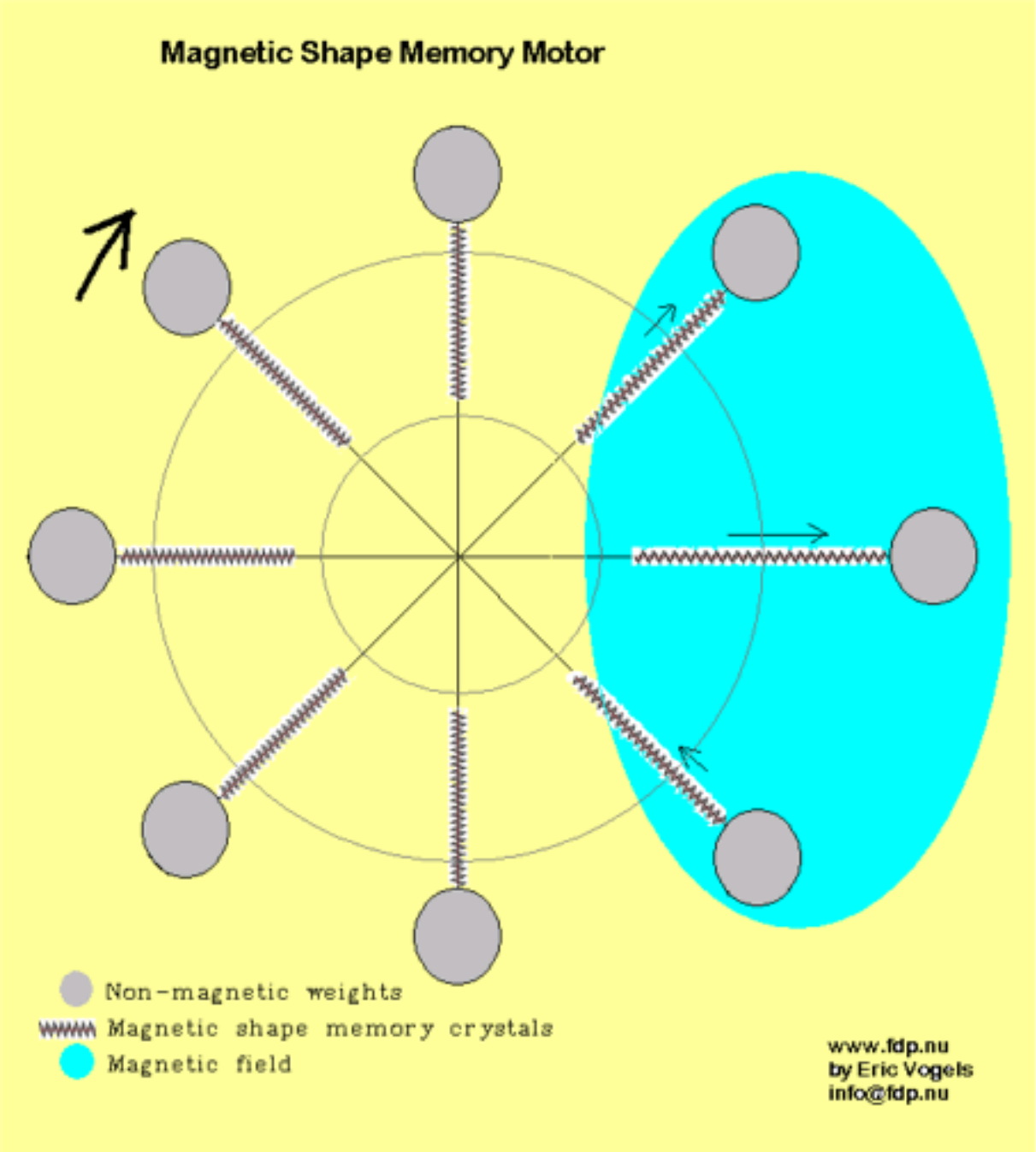
Magnetic shape memory motor

Project start: 2004-07-19

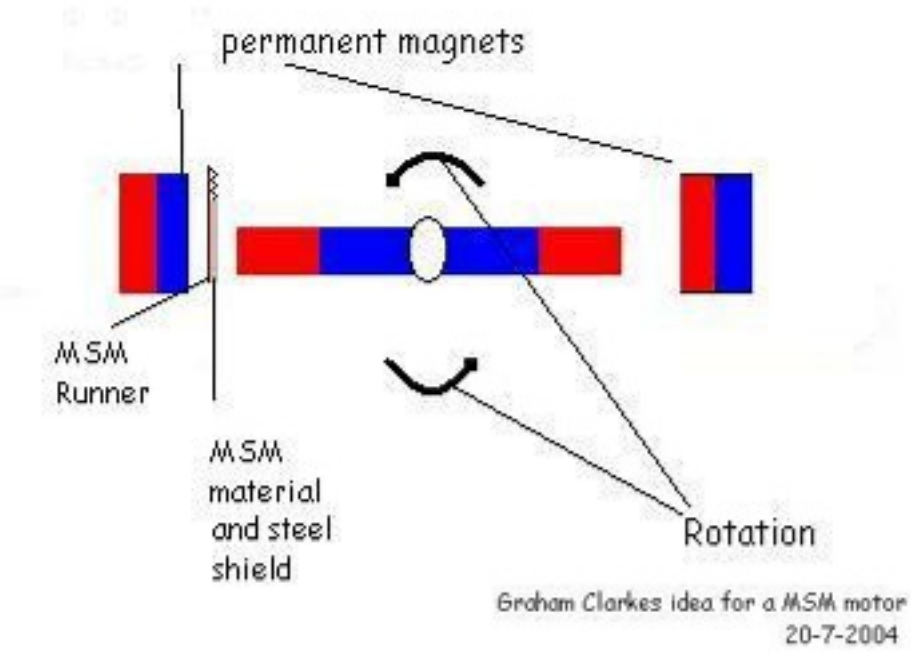
Magnetically controlled shape memory (MSM) materials are a new class of actuator and sensory materials. Dimensions of MSM materials change when a magnetic field is applied, due to reorientation of the fractions of different twin and martensite variants. Strains of up 6% are reached in Magnetis Shape Memory (MSM) materials in which changing magnetic fields causes motion of twin boundaries of the martensite microstructure. MSM materials show several types of magnetically induced deformations including axial strain, bending, shear and torsion, which allows differents kinds of actuating elements to be made. Actuating elements were produced from single crystalline Ni-Mn-Ga material. Several actuator embodiments were designed and tested. Inversely, magnetis field around the material alters when proportions of the variants are changed by mechanical loading. This effect can be utilized in sensors and in small scale power generation.

Magnetic shape-memory effects in La2-xSrxCuO4 (LSCD) crystals

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Grahams Clarkes idea for a MSM motor, 2004-07-20:



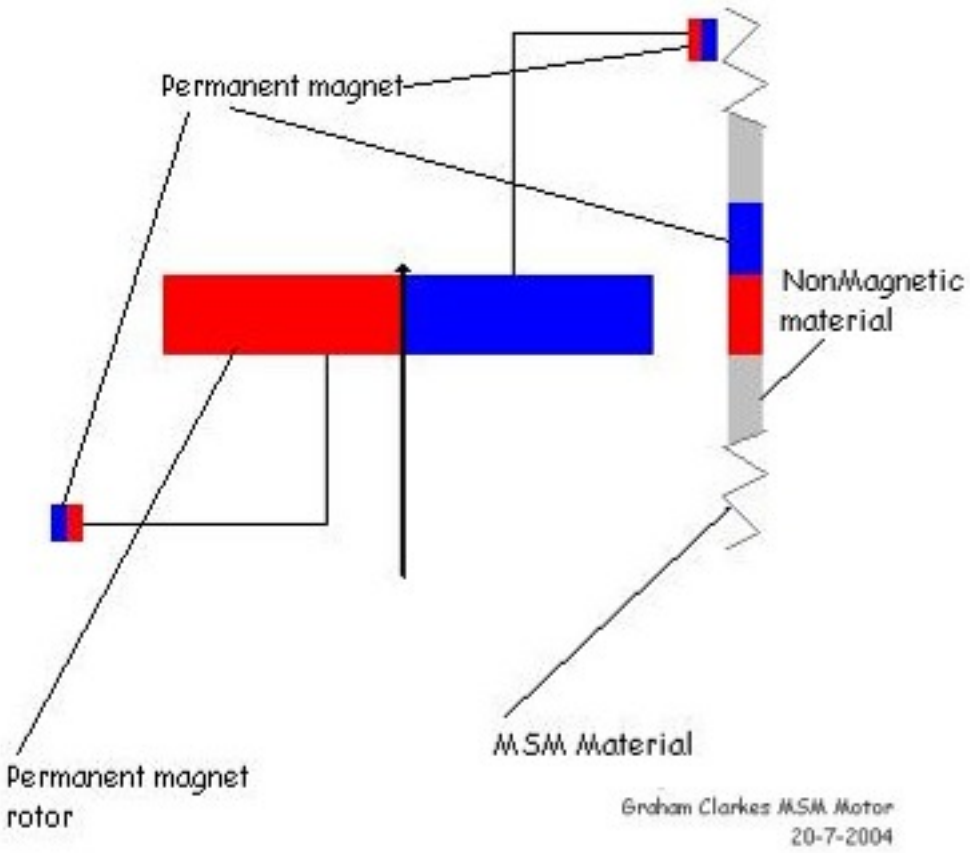
With this idea the MSM material is mounted below the rotor and stator out of their magnetic field. Hanging below the rotor are two small magnets, one one each side te comes into contact with the MSM material. When this happens the MSM will stretch, spushing a piece of steel between the rotor and stator. This unbalances the attraction and repulsion, causing the rotor to rotate half a turn. The MSM material goes back down after it leaves the magnetic field, allowing the rotor to go back to the balanced position, where the process starts again. The MSM will be a piston, pushing a piece of steel up and down between the stator and rotor, on a non magnetic runner.
Graham Clarke

I received a message from a scientist at Massachusetts Institute of Technology:

> Eric, you can't get something for nothing.
> If the springs are made of any magnetic shape memory alloy
> they will have hysteresis. That is, when the field is strong enough
> to extend the spring, the spring will NOT retract as it leaves the
> field region unless there is a bias stress (centripetal force)
> pushing it back. Unfortunately, when the spring expands, the

> centrifugal force on the mass increases, counteracting much or all of
> the centripetal bias force.
> I doubt that it would work. Also, shape memory alloys are
> not strong in tension.

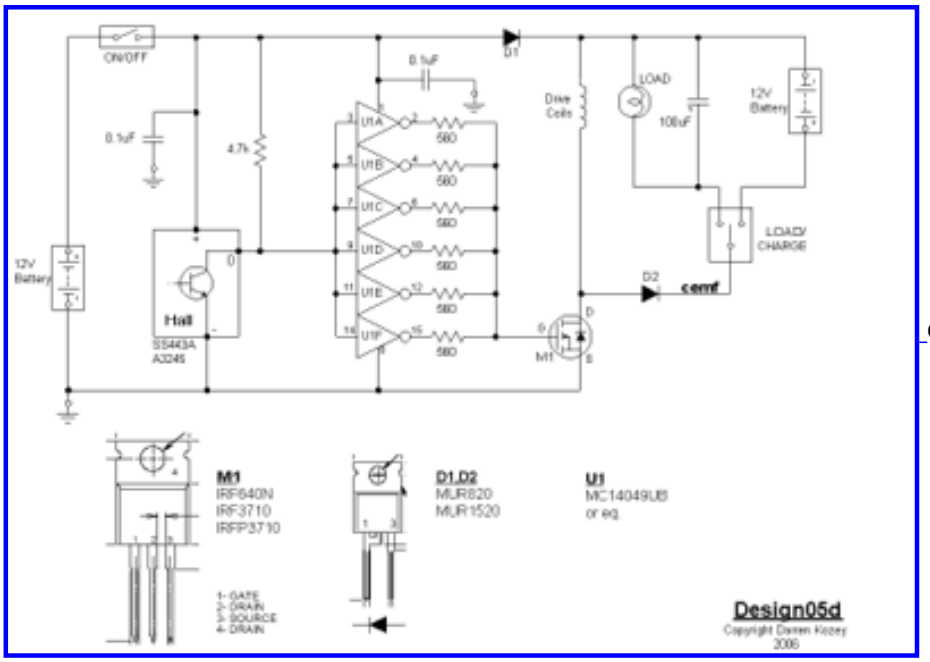
And with that information Graham Clarke came up with another idea:



MSM Motor if MSM doesn't spring back
The idea is that the rotor is repelled by the stator and the opposite site of the rotor is attracted to the stator. As it aligns with the stator, the magnet on the arm above or below the rotor, comes into contact with the MSM, making it exspand up or down, changing the field in the stator and repelling the rotor. The process will start again in the opposite direction, giving a full rotation. The MSM moves up or down, depending on what magnet arm comes into contact with it and because the material doesn't spring back, the opposite end of the rotor is attracted to the stator until the MSM reacts to the magnet on the arm.
Graham Clarkes MSM Motor, 2004-07-20


magnetic shape memory alloys
Google Search

Pulse motor



click image to enlarge

The 4049U is a CMOS device with 6 inverters in the package.
Normally, each gate is used separately and all they do is simply invert the digital signal you feed them. Input 12V, and it will output 0V. Input OV, and it will output 12V.
We need an inverter in the circuit anyway, and that task was accomplished before with the 2N3904. Using a CMOS inverter I feel has certain advantages in this application:

- It consumes nearly 0 current
- It has a much cleaner squarer output waveform
- it does not load the Hall device
- it can deliver a nice current pulse to drive the power MOSFETs.

You will notice that I am using all 6 gates in parallel, through the 560 Ohm resistors. This will boost the drive capability to the MOSFET gate. MOSFETs are very easy to drive, because they require almost no current at the input, however, if you are trying to switch them quickly, they have a relatively large capacitance associated with the input, and that requires a lot of current to charge quickly.
The 4049U should do nicely for this application, and it works well in my simulations. The huge demand for current to charge the input capacitance of the MOSFET is only required

for a very very short period of time, and therefore, the switching operation requires very little overall current. We are achieving similar benefits by using the power MOSFETs vs. the power BJTs to switch the coils.

One benefit to switching a MOSFET as quickly as possible is that it will dissipate less power because it spends less time in between the ON and OFF state.

Historical statistics...

When the drive battery was discharged, I swapped the drive battery with the charged battery and started the device.

2006-04-21 18:49:16
Consuming **0,033** Volt / Hour
12,8 v.

12,11 v.

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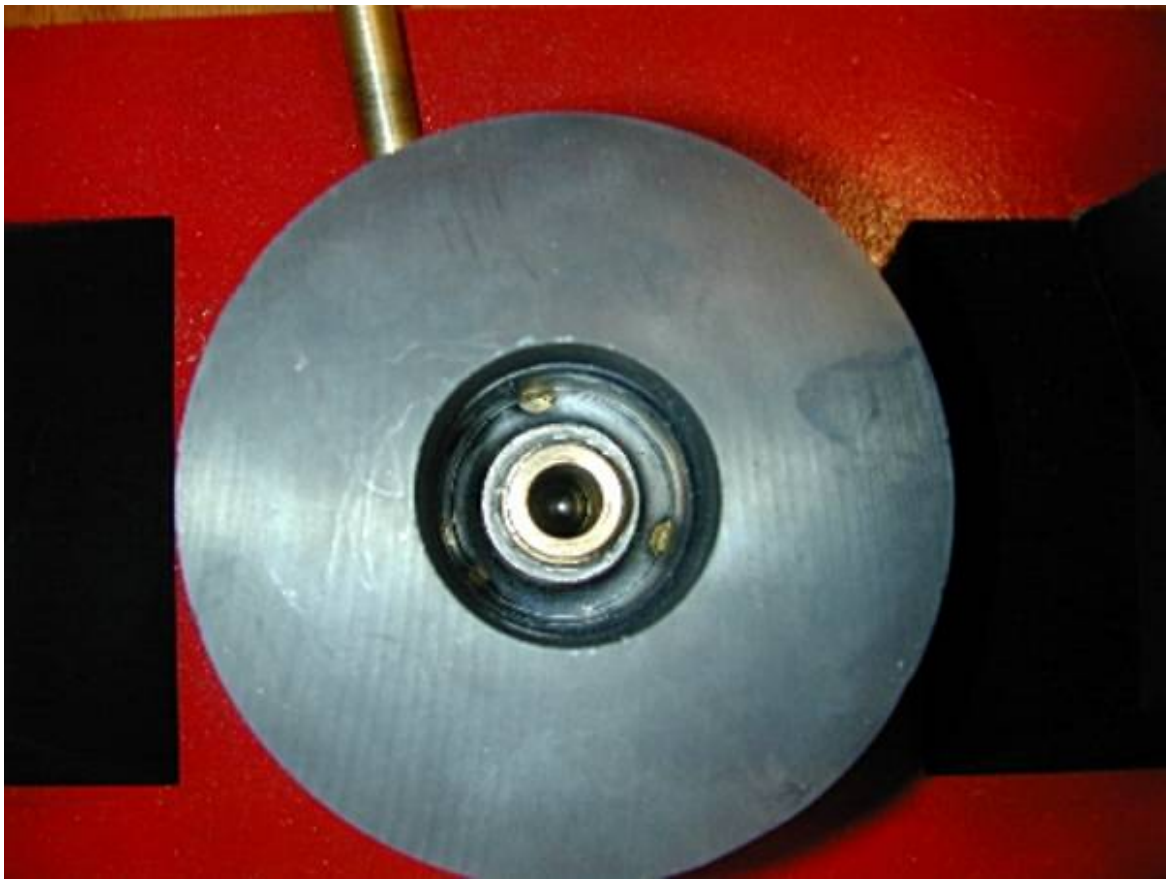
Or download this Movie.(right click: save target as...)

My project work folder

ROTOR FLOATER

By Tom Ferko (magnetman12003)

Stack as many large ring magnets together as you wish and form a cylinder with them. They are inexpensive and easily available from surplus stores.



In the exact centre of this powerful magnet cylinder place and secure a long bronze bearing to support the diameter of rotor/shaft assembly you wish to "float". You can drop a single steel ball bearing down the centre diameter of the long bronze bearing if you wish.

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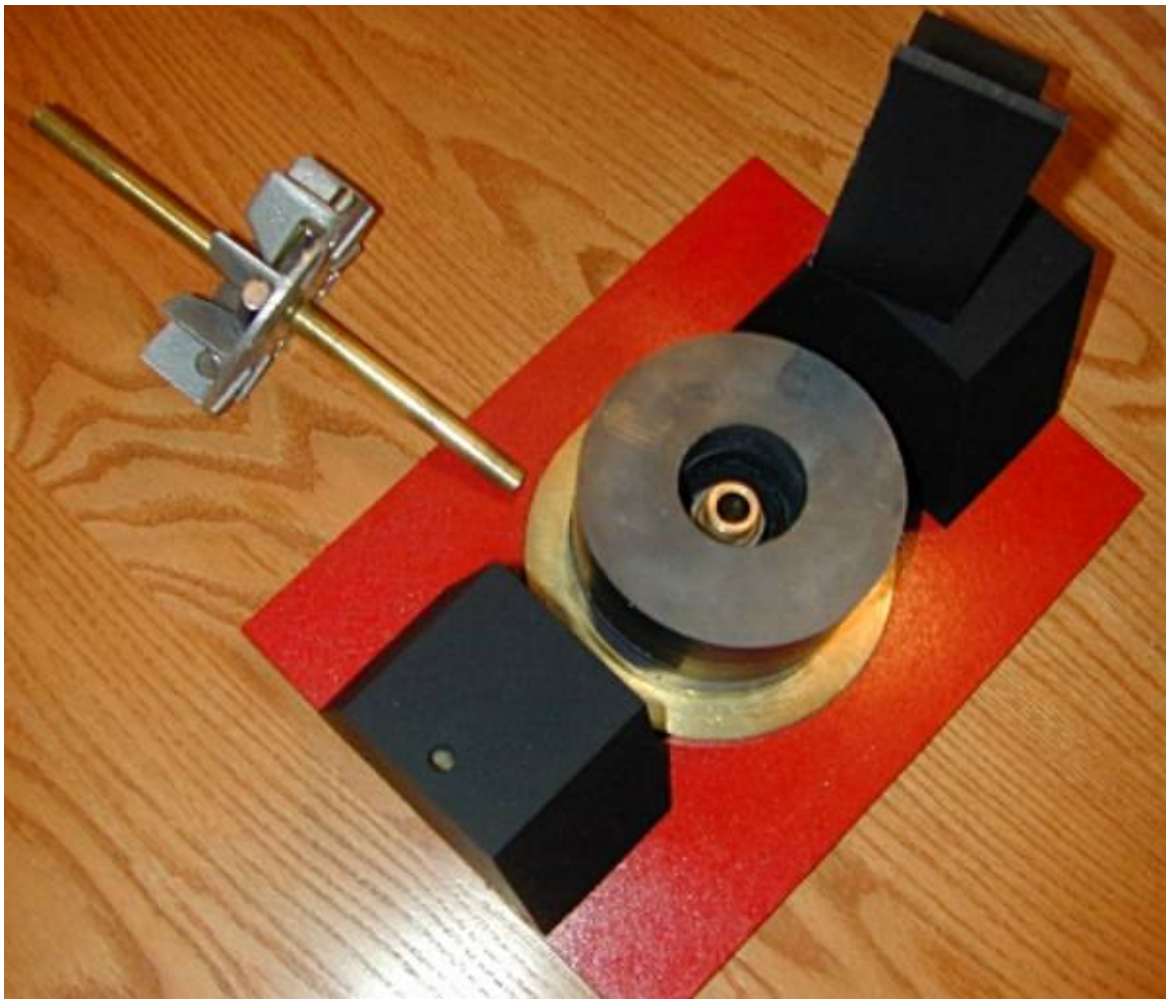
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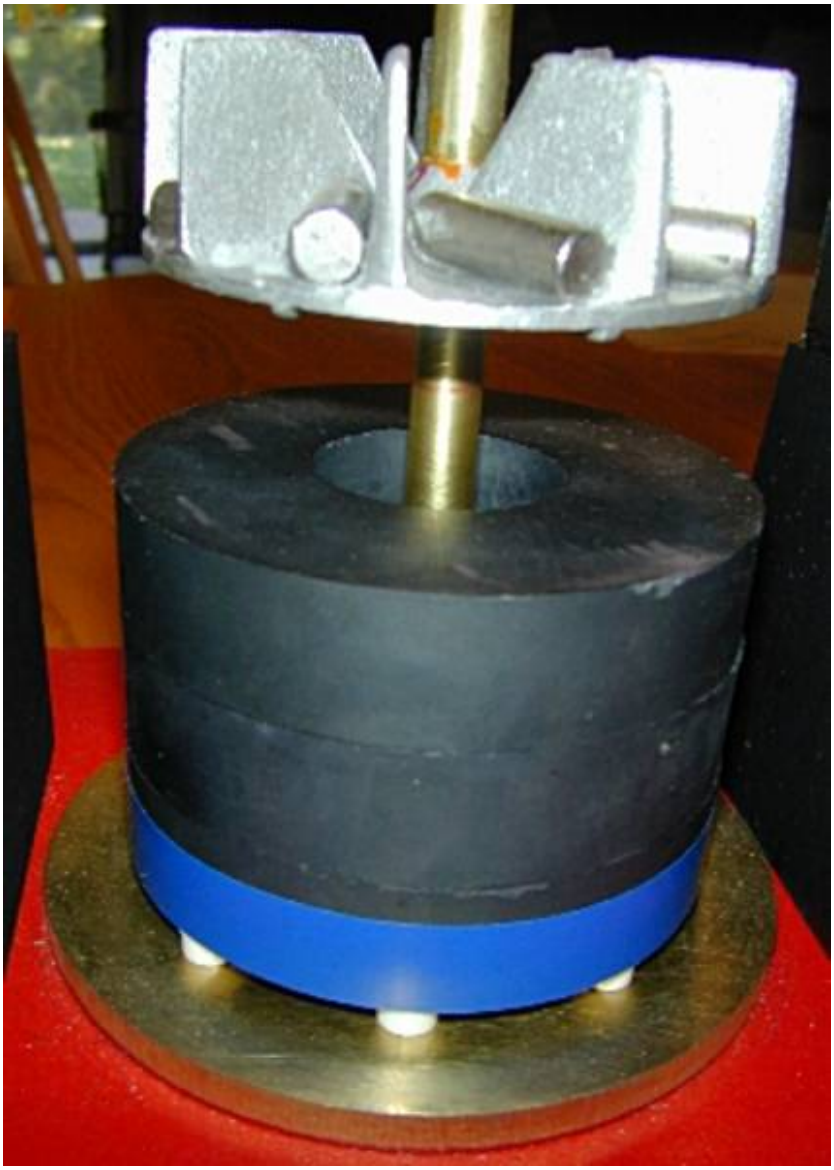


Keep in mind from now on the long bronze bearing does only one thing. It holds the rotor/shaft assembly in an upright position at rest and at slow speeds. At hi speeds a gyroscopic effect comes into play. I won't delve into that except to say it's hard to move the spinning rotor.

The rotor on the vertical shaft can be made of any material but must have "equally" spaced magnets all around its outside diameter. Those magnets MUST BE SECURED SO THEY DON'T FLY OFF WHEN THE ROTOR IS SPINNING AT HIGH SPEEDS.

All the equally spaced magnets must have the same polarities facing outboard and the same polarities facing inside.

If the rotor assembly is properly made it can be lowered down into the centre long bronze bearing support and at some point the rotor and shaft will "float". The rotor will never set on the bottom of the support long bronze bearing. If to heavy and it "bottoms out" cut some rod length off the top of the shaft to loose weight. Add heavy shaft collars to add weight to the shaft if to light.



What does all this mean? Now we have a way to construct an almost friction free rotor that does not use bearings for support at hi operational speeds. If properly constructed you can blow on this rotor and it will turn while at rest. That's how much friction there is.

2005-10-25 Quote added: Anyone who tries to patent this idea best contact me or sparks will fly. This idea is shared freely with the world and was not posted for anyone's personal enrichment. Tom.

Walter Torbay's magnetic device

"The force that is used to turn the rotor arm is the magnetism locked up in permanent magnets. Like you are able to see in the video, there are 8 magnets that face the rotor.

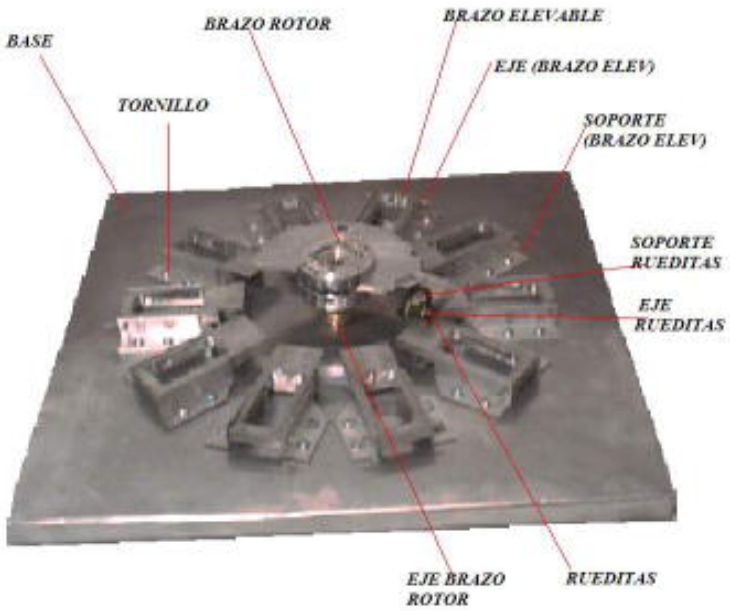
The rotor arm (the one that turns) has 4 permanent magnets with its North poles oriented towards the external elevatable stators, the elevables stators as well have in their inner end permanent magnets with their North poles oriented towards the rotor arm, this way there are the 8 magnets that are under the effect of repulsion of equal poles.

This energy is much greater than what is necessary to elevate one of the stators individually. When elevating one of the arms we create a situation where the magnetic repulsion is smaller in that zone, and this is causes the rotor arm to turn towards this zone where there is less magnetic repulsion. When reaching this position the elevated stator is released and lowered by mechanical means while the next elevatable stator is elevated. This is the way we obtain a continuous circular displacement.

Remember that scientific research has demonstrated that the permanent magnets that are under the repulsion of equal poles conserve their magnetic properties without diminishing for between approximately 5000 and 50000 years (depending on the material with which the permanent magnets are made).

With respect to the not so uniform movement of the stators (some stators rise higher then others), this is due to the fact that the cuts made in magnets aren't perfect. It is very difficult to cut them all equally (whoever has tried to cut a permanent rare earth magnet without all the necessary tools will know what I'm talking about). Even with this slight defect of imperfect cuts in magnets, it does not prevent the operation of the device.
"

PROTOTIPO EN ALUMINIO ,BRONCE ,MAGNESIO E IMANES DE NEODIMIA

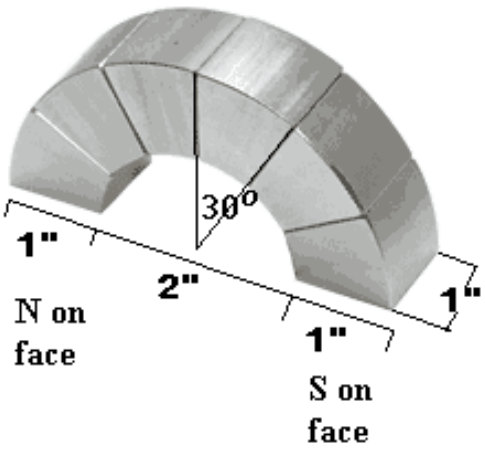


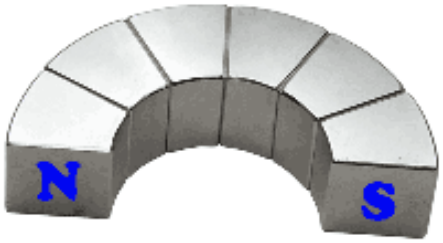
An photo of the real thing



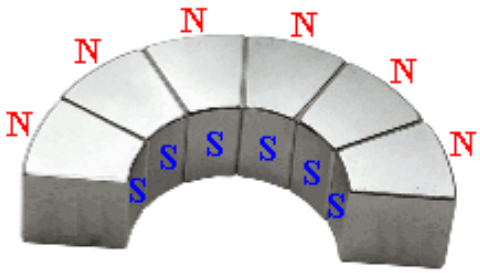


The device in 3D CAD





The rotor I used

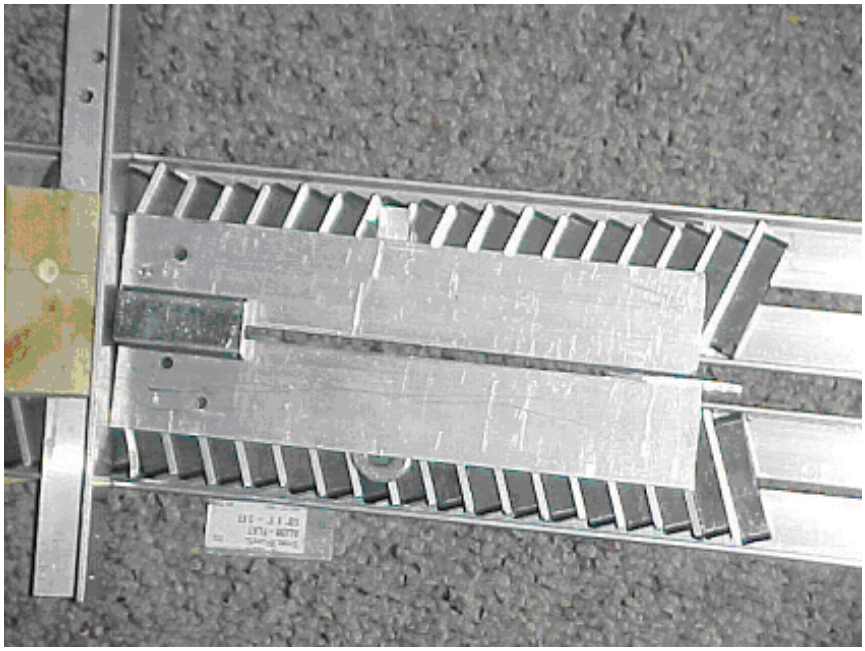


The rotor thay should be used

Update 2006-06-09

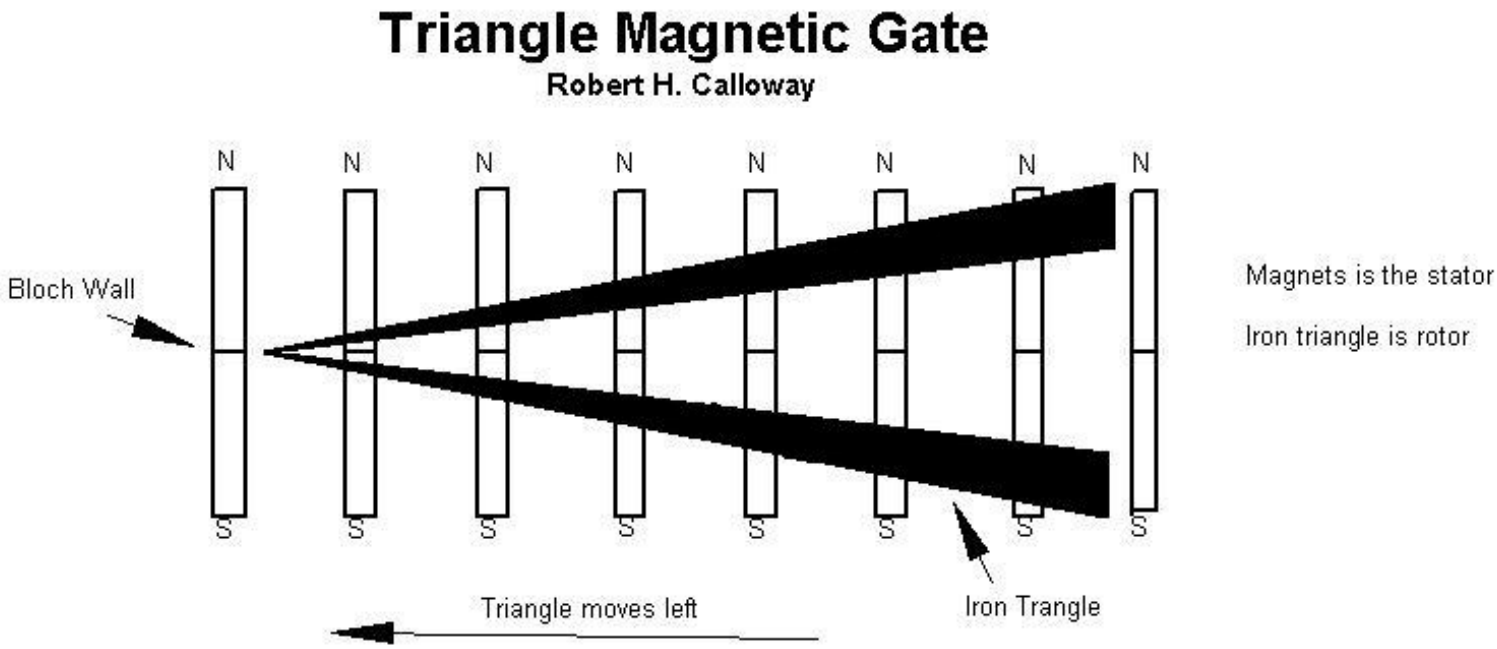
This is the video I made after I finished the model that I used for a proof of concept. I needed to build this since I decided to use a rotor magnet that is NOT used in the patented device.

Or download this Torque.wmv (right click: save target as...)



by David A. Rutchik.
The device is very similar to the Mag-Gen working on the TOMI principles outlined in those discussions about the Mag-Gen device as detailed by Phil Dunham and it also displays some of the properties of the Triangle Gate except in a reverse way. Interestingly enough though is the fact that the rails of the device are each made of individual magnets and therefore the slotting of the magnets as in the Mag Gen is not required and this may allow for a way to close the loop. Presently the track is a straight line and not very long. I have made longer tracks based on similar designs and was able to get the traveler to run the length of those tracks. Could a closed circle be achieved, if one considers that a straight line is really a circumference of a circle with an infinite radius then why not?

The complete document is at http://www.egroups.com/group/minatowheel.



Some of you might want to try this. Get some old clothes hangers (wire). Cut (6) pieces 6" long each. Bend each piece in halve until there is a 3" space between each leg of the piece. It now looks like a open end triangle or a "V". Take (3) of your Bowman magnets 3/8" X1" and stick them together making a now 3" magnet. You don't have to glue them together. There is now only one bloch wall in the combined magnets. Lay your "V" 's on the floor in a line. Place a piece of Plexiglas on top of them and place your 3" magnet at the starting "V" and see if you can get it to roll on top of the Plexiglas through all the "V" 's. The triangle "V" is a one way gate when combined with the other "V" 's. Now, if you get this simple experiment to work. Can you put the "V" 's on a wheel and get it to turn continually?
Robert

WOW it really works in the linear configuration you described! I used 15cm pieces bicycle wheel spokes bent in equilateral V configuration. My magnet was 15pcs stack of 12.6mm od x 5mm thick disc magnets. The only problem I can see with the triangle gate is that the iron probably slowly magnetizes in the long run. How would this affect the performance? The rotating hamster cage type of wheel made out of multiple triangle gates would be a nice idea (the magnet wouldn't move I assume, the wheel would rotate around it). I wonder if it would be possible to use magnets for the triangle gates instead of iron (I'm still worried about iron magnetization), might also increase the power somewhat. Thanks Robert, nice to see something work for a change, there has been quite a lot of frustration with the MXLO motor.... Tero

---

Hello Robert Here was my test is I cut small triangle about 18 gauge and mounted it under my model plastic train. then I put 1/4 rods in rows under plastic plex. I was amazed how the train moved over the rods and went to the other end. Thought about making a circle but got distracted with other things as you know. It seems the iron was gauge and regauging as it went over. Here is the triangle word again!! Wayne

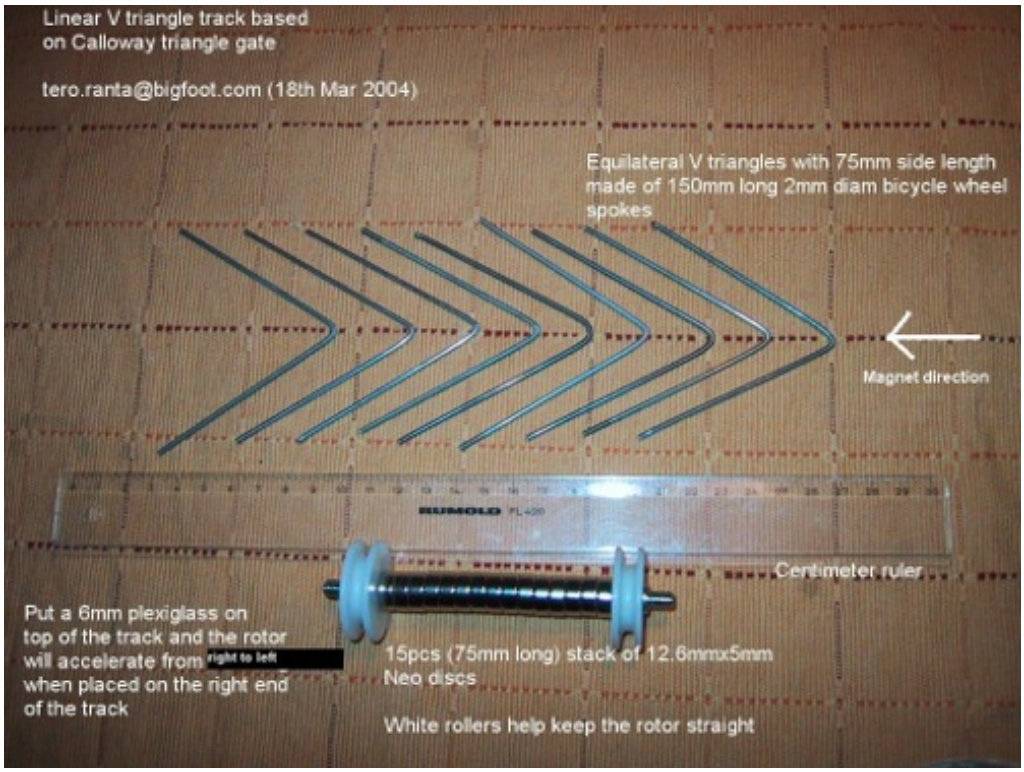
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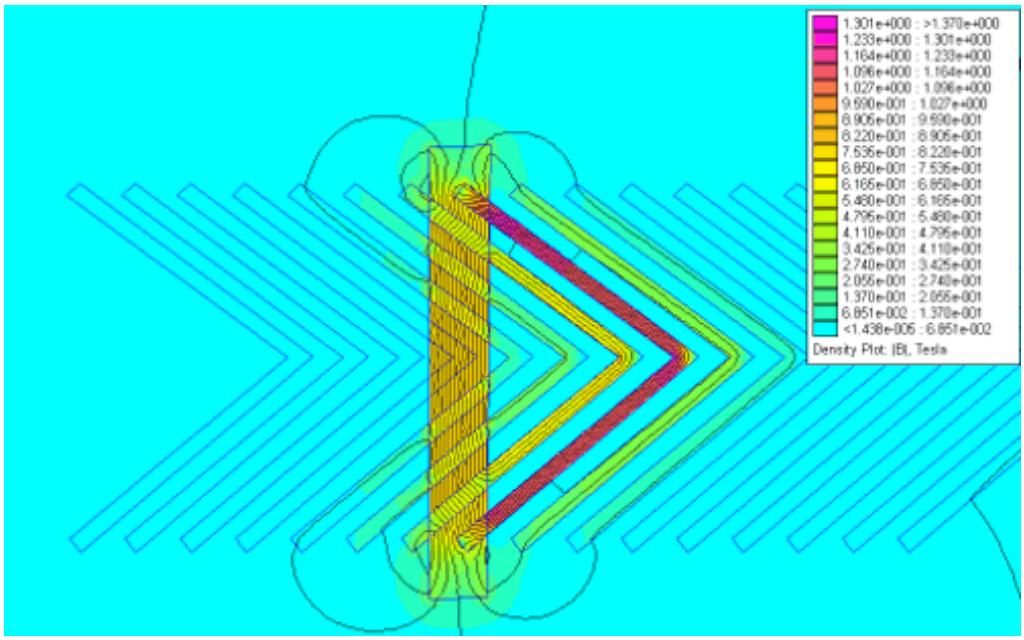
Eric, Norman, Robert and others, I placed the six triangles (equilateral V shape, 7.5cm side length) in a track configuration with 2cm distance between tips of the triangle. Looks like this: >>>>>> and the magnet travels from right to left. You can adjust the driving force at least by making the triangles closer together. Also possibly by using thicker iron wire and smaller distance between tracks and the magnet (I didn't have a suitable plexiglass piece at hand, used 6mm thick cutting board which is too short for long tracks). I also noticed that if you make the V of two separate pieces (so you don't bend it), it won't work as well (or perhaps not at all). It seems to need a magnetic connection between the sides of the triangle. I think the whole point here is the bent V shape, thanks Robert! I tried different configurations, works just fine if you start in the middle of the sequence, it goes in the right direction (doesn't even seem to have a sticky point or hesitation). I also tried angling the base, works just fine with angles up to 5degrees I'd say. Also, you don't need to give the magnet any sort of push, but it accelerates smoothly and perfectly on it's own. You just drop the magnet on the track and off it goes! Note that the track is quite sensitive to the placement of the V's (they need to be in good alignment for smooth operation). The most amazing thing is that this linear V triangle track does not seem to need regauging at all! This is really significant, as you can have as long completely flat track as you wish! This is unlike all other magnetic ramps (Adsitt, Naudin SMOT, TOMI device) that I know of. Going to be a sleepless night tonight here in cold Europe... :-) Tero

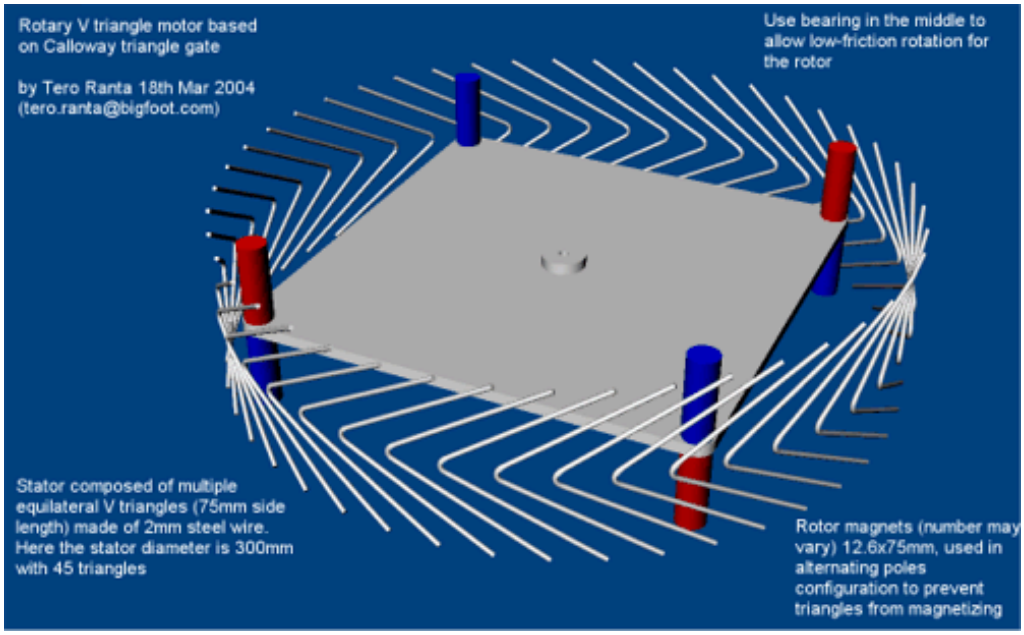
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Hi, Mine works just fine without lock-ups, I feel that I could make a 2 meter long track with no problems, but that would require 100 triangles with 20mm spacing :-) My wire is 2mm diam. My triangles have a 75mm side length. I got my bike wheel spokes in 300mm length, so just cut them in half and bent in the middle. My magnet stack is 75mm long and 12.6mm diam. I used plastic rollers at the ends to keep the rotor straight and aligned over the track. The nylon rollers (actually bearings with a short M6 bolt instead of a hole in the middle) are 32mm diam. The rollers lift the rotor 10mm above the plexiglass (not a direct contact as robert suggested) and it still works, it actually works better with the rollers as it helps to keep the rotor aligned with the track. You can reduce the gap if you use smaller rollers (I used what I had available at this late hour). I noticed that you really need to have good alignment of the triangles as well. Make sure they are all the same size and shape. The gap between triangles is 20mm. The roller will go faster and pull better if I reduce it. I took a quick picture of my experiment, may be found in Tero folder in the Files section. File name is linear_triangle_track_experiment.jpg. I would have taken a video, but my digital camera can't record video. Perhaps later. Regards, Tero

---


Linear V triangle track based
on Calloway triangle gate
tero.ranta@bigfoot.com (18th Mar 2004)
Equilateral V triangles with 75mm side length
made of 150mm long 2mm diam bicycle wheel
spokes
Magnet direction
Centimeter ruler
Put a 6mm plexiglass on
top of the track and the rotor
will accelerate from right to left
when placed on the right end
of the track
15pcs (75mm long) stack of 12.6mmx5mm
Neo discs
White rollers help keep the rotor straight


1.301e+000 : >1.370e+000
1.233e+000 : 1.301e+000
1.164e+000 : 1.233e+000
1.096e+000 : 1.164e+000
1.027e+000 : 1.096e+000
9.590e-001 : 1.027e+000
8.905e-001 : 9.590e-001
8.220e-001 : 8.905e-001
7.536e-001 : 8.220e-001
6.850e-001 : 7.536e-001
6.165e-001 : 6.850e-001
5.480e-001 : 6.165e-001
4.795e-001 : 5.480e-001
4.110e-001 : 4.795e-001
3.425e-001 : 4.110e-001
2.740e-001 : 3.425e-001
2.055e-001 : 2.740e-001
1.370e-001 : 2.055e-001
6.851e-002 : 1.370e-001
<1.438e-005 : 6.851e-002
Density Plot: |B|, Tesla



Since everyone are onto the idea of iron and someone will come up with a working magnetic motor soon I will tell you what my idea was, have you heard of the hamster generator? well my idea was instead of a hamster running on a hamster wheel to generate electricity, I was going to use a magnet as the hamster and iron rods around the wheel for the magnet to attract, having seen the triangle gate, I would say that will work even better then just iron rods around the wheel. It would work like this V iron rods around the outside of a hamster wheel as the rotor, a magnet above the wheel as the stator, on one side of the rotor a circle of button magnets like in the hamster generator and coils wire outside the button magnets, as each V rod is pulled and pushed through the magnetic slators field it moves the rotor, as the rotor moves it spins the button magnets on the side of the rotor through the coils generating electricity. For it to work the button magnets should be placed so they don't interfere with the V rods and change the magnetic field in the V rods, the only other thing I see stopping it is if the V rods don't work when they are placed in a circle like permanent magnets. Graham

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Nov. the 22th, 2005 I received a message from Dan. He suggested that I posted the following text as un update to this page.
Here it is...

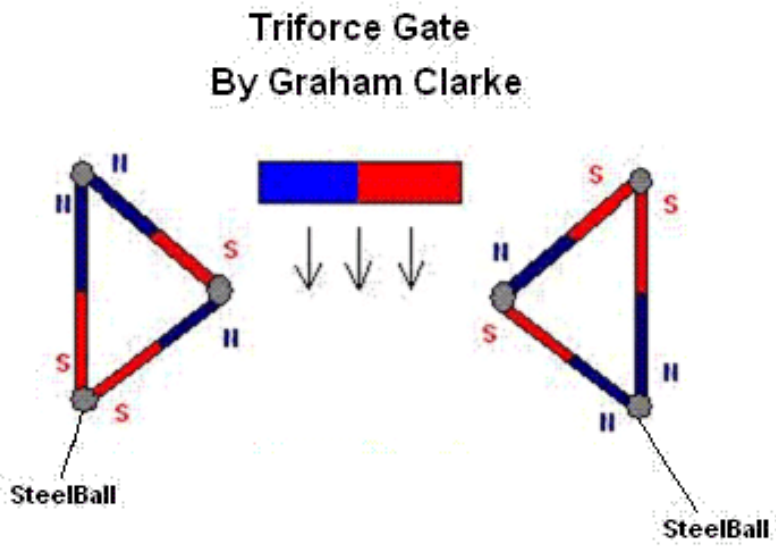
It is simple for you to duplicate the experiment from your site to confirm my findings. I experimented with the Triangle Gate, only to discover is it just a simple "magnetic ramp". All pull comes from the first triangle, and after that it just coasts. With a short track, it looks like it might work, but it will get stuck at the end. Simple proof of what I say, is to make a long track, and put the magnetic roller in the middle. It will not move. That solves that. I also made over-sized and under-sized triangles, much wider, and much narrower than the roller. Same effect. So, sadly, the "Triangle Magnetic Gate" is really a gate, and we must continue the search. If you find me in error, and that the roller is accelerated INTO, and maintains velocity OUT OF and totally AWAY FROM the gate, please contact me with the plans that work. Thanks for the work you put into keeping your site up. I shall now experiment with Graham's "Corner Gate".
Dan

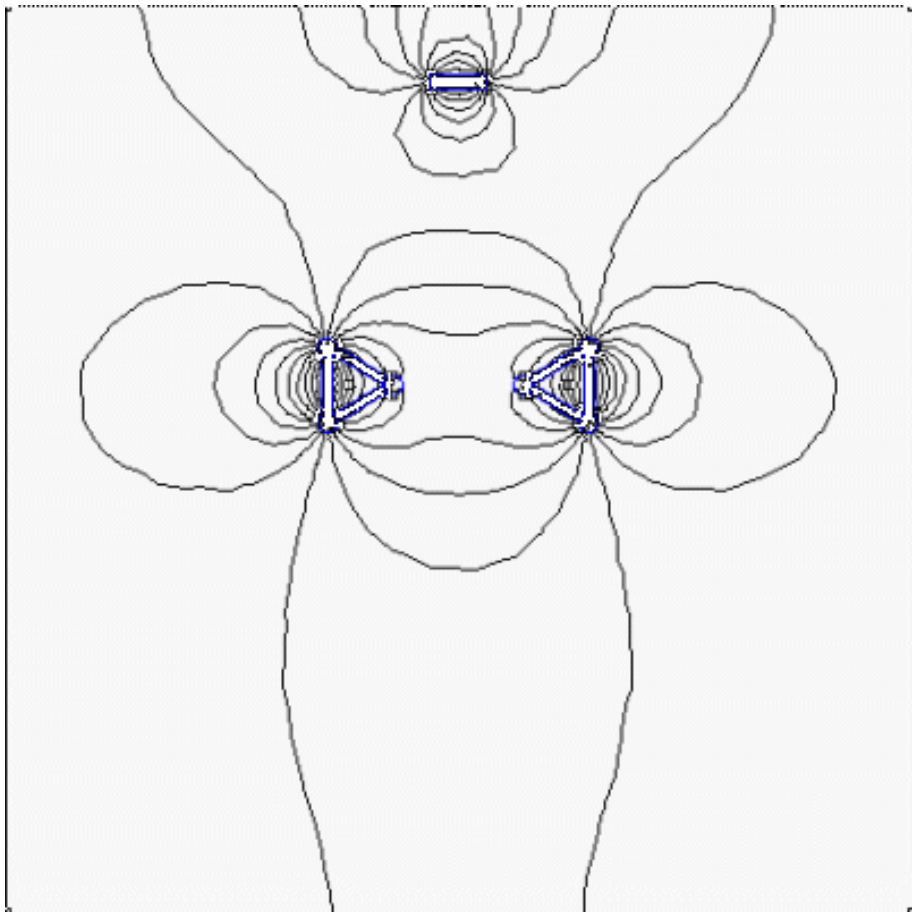
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Tri-Force Gate

a design of Graham Clarke and analyzed by Nick Rasmussen



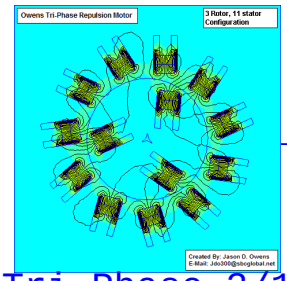


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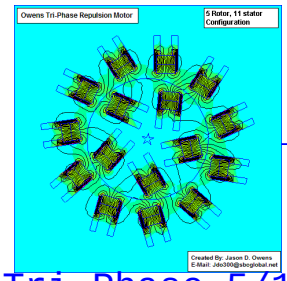
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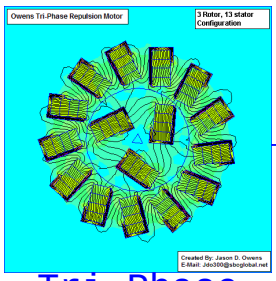
Animations



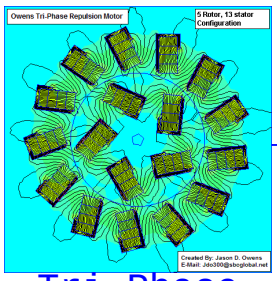
Tri-Phase 3/11 (by Jason Owens)



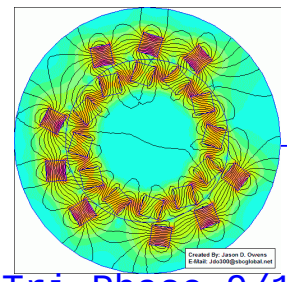
Tri-Phase 5/11 (by Jason Owens)



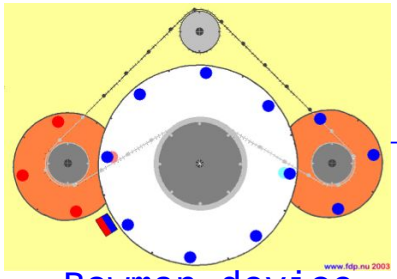
Tri-Phase 3/13 (by Jason Owens)



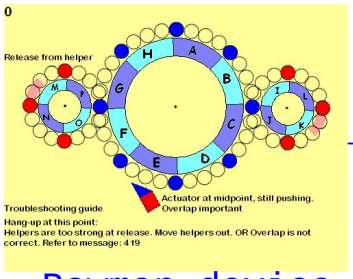
Tri-Phase 5/13 (by Jason Owens)



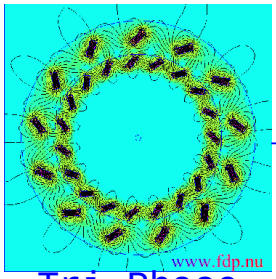
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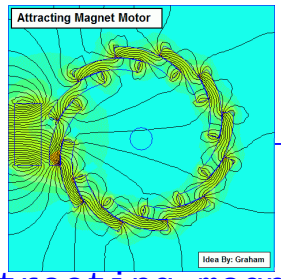
Bowman device (by Douglas Mann)



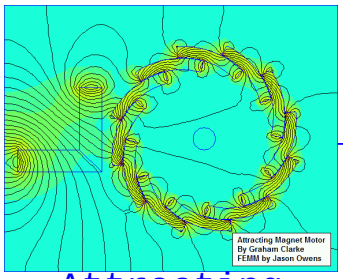
Bowman device (by Robert Calloway)



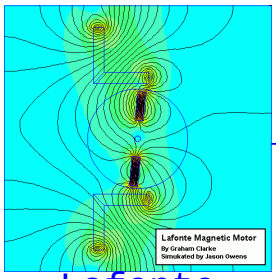
Tri-Phase 13/19 (big file) (by Eric Vogels)



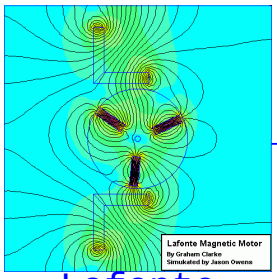
Attracting magnet motor (by Graham Clarke)



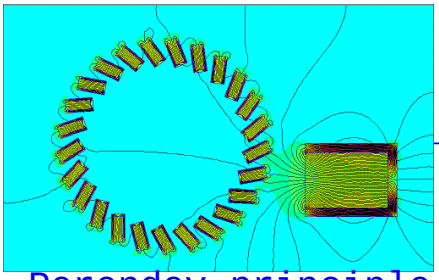
Attracting magnet motor L (by Graham Clarke)



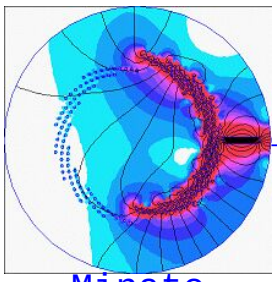
Lafonte balance motor 1 (by Graham Clarke)



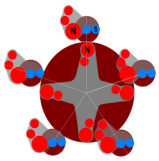
Lafonte balance motor 2 (by Graham Clarke)



Perendev principle (by Jason Owens)



Minato principle (by Eric Vogels)



1°

New Jan P. Cack design (by Marcel Thibault)



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files
Size of current folder: 135 of 200 Mb

Type	Folder Name	# files	Action
	Albert Michel Documents in French	12	
	Bill Muller Bill Muller Generator	6	
	Calloways Perendev Devices, based on Calloway's version of the Perendev	5	
	David TriMagen magnetic TOMI triangle gate - by David Rutchik	2	
	Drawings	24	
	Gates Smot Video clips of the one-way gate	25	
	Graham Clarke A collection of Graham's ideas, drawings, simulations and video clips	3	
	GrahamCF Graham's changing field	2	
	Hamel Hamel technology	1	
	Horse Shoe Devices	2	

	Magnet shapes Pictures of the magnetic field of variuos magnet shapes - by Jason Owens	13	
	Magnetic Memory Shape Motor Devices that are based on Magnetic Shape Memory materials	3	
	Minato advanced More advanced track shapes	18	
	Parallel Path The Parallel Path device	5	
	Perendev device A collection of pictures of the Perendev device	5	
	Pot magnet devices	3	
	Puls motors	4	
	Shield devices Pictures of the devices that use magnetic shielding	16	
	Shunt motor Russian Magnetic Engine	2	
	Symmetrical PMM files Jason Owens research info and diagrams for the Symmetrical Permanent Motor	4	
	Tools and equipment Information about tools, used during experiments.	2	
	Torbay Magnet motor from Argentina	10	
	Torque Analysis Results by Jason Owens	10	
	Tri-Forces	18	
	Triangle gate Video clips of the triangle gate	1	
	Unbalanced flux Analysis of using steel to unbalance flux from permanent magnets - by Terrence Staton	2	
	Uploads A collection with files that exceeded the disc size of the Yahoo group.	5	
	Zipper A collection of pictures of the ZIPPER device	2	

Files in folder: .\group\minatowheel\files				
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	flux_controller.gif	2006-04-05	25 kb	
	Garrys Pulse Circuit.gif	2006-04-05	6 kb	
	HydraulicMagMotor.jpg	2006-04-05	37 kb	
	Iron Rotor Mag Motor animation.gif	2006-04-05	435 kb	
	Iron rotor test.wmv	2006-04-05	719 kb	
	IronBlockGate.wmv	2006-04-05	1.86 mb	
	IronRotorMagMotor.jpg	2006-04-05	13 kb	
	LafonteMotor.jpg	2006-04-05	8 kb	
	magmotor.jpg	2006-04-05	50 kb	
	Magnet Shape.jpg	2006-04-05	5 kb	
	magnet.pdf	2006-04-05	619 kb	
	MagneticMotor.jpg	2006-04-05	24 kb	
	MagneticMotor.wmv	2006-04-05	251 kb	
	MagnetInTub.jpg	2006-04-05	15 kb	
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	Perendev Motor idea 1.gif	2006-04-05	2.76 mb	
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	Polarity Changing Magnet.gif	2006-04-05	56 kb	
	repelling_metal.wmv	2006-04-05	1.13 mb	
	steelballs.avi	2006-04-05	837 kb	
	TOMI Toroid.gif	2006-04-05	61 kb	
	wheels.JPG	2006-04-05	48 kb	

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Bowman
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Donald A. Kelley
Felipe Rodriguez
Graham Clarke
Howard Johnson
Joshua
Keith Impink (link)
Kohei Minato
Lennart Sandberg
Matthias Renner
Patent collection
Peregrinus
Peter
Peter Schmalenbach
Pippin Lowe
Sylvain Rochette



Rules for unconventional research

(c)1997 xWilliam Beaty

After years of observing and sometimes participating in the "fringe science" arena, I've come up with a set of rules which I try to follow. My first law of unconventional research:

First rule: If I've made a discovery which violates the laws of conventional physics, then I've almost definitely made a mistake somewhere.

Seriously! Even though I'm involved with non-mainstream science, I intentionally maintain this 'skeptic' belief for many reasons. If I let myself start *knowing* that I've found an anomaly, I will stop trying to double-check the results, stop trying to think up conventional explanations, stop trying to look for mistakes, stop looking for subtle ways I've fooled myself. I've seen how easy it is for people to talk themselves into things. I want to avoid these traps. Second, if I keep strongly suspecting an error, I will resist the temptation to let my ego get the better of me.

I know the extent and the power of my ego, and that delusions of grandeur are very easy to fall into. Therefor, in my saner moments I set up my beliefs as traps to trip up my future ego trips. Another: if I "know" that the discovery is a mistake, I will force the discovery itself to convince me otherwise. No opinions and self-delusion, just the real world demonstrating its realness. Another: if I present it to others as an earthshaking discovery, they will later tend to defend this viewpoint and not help prove out the discovery. But if I present it in terms of "find my mistake", then they might actually discover a conventional explanation I've overlooked.

Second rule: if it is a real anomaly, I might kill it.

If it's a small piece of a new field of science, then there is a *very* large chance that I won't understand what's causing it. I may accidentally extinguish it and never get it back again. I've heard laments from several inventors that they rebuilt their devices to improve them, and they never worked again. So, DON'T take apart the original invention! Don't move it to another location. Don't turn the power off and back on. Just moving your arm a bit wrong might eliminate the conditions which allowed success! Once you have it working, videotape the heck out of it, call in eyewitnesses, perform experiments, maybe even build several copies and get them working. Stay paranoid that the phenomena might vanish at any time, never to return.

Third rule: publicize it and let others help me find my mistake. Avoid SECRECY, that destroyer of new science.

This rule is a natural consequence of rule one: if I intentionally maintain a conviction that there is a mistake somewhere, wide publicity is the fastest way to get help in finding it. If instead I hide my discovery from all the greedy people who want to steal it, then I also subvert the whole process of testing by fellow researchers. If my discovery is a mistake or delusion, others may help me discover this, but if I keep it secret, I may remain deluded for decades.

I realize that this isn't quite so attractive an option outside the US. If I publicize a discovery here in the US, I have a year to decide to patent it or not. If in another country, first I'd have to decide to put my invention into the public domain, since the patent laws elsewhere do not provide the 1-year grace period. Myself, I might break secrecy anyway, because of Rule Four below. Here is an alternative, from Jerry Decker

Also, I've come to see that there is one big thing that ruins these fields of amateur research. That thing is SECRECY. Every time amateurs think they've stumbled across something important, they go silent and treat their discovery as a Big Important Secret which must be preserved at all costs from the many enemies who want to steal it. This is garbage! It is a trap which leads to paranoid megalomania. At the same time, it wrecks their discovery by burying it. True, there are often business reasons to keep back proprietary info, but the majority of "weird science" discoveries are not kept secret for this reason. They are kept secret because of shameful human psychology: because of inventors' desire for attention, because of our need to control, and because of our need to be important, to gain fame and accolades, etc. I can say such things because I too have suffered from this kind of "inventor's disease." I solved the problem by posting my inventions on internet! If a single inventor discovers something wonderful, it does no good at all for mankind, and is not really a discovery at all, it is an ego trip. Only if an inventor discovers something wonderful and then STARTS SELLING PRODUCTS, or better yet, TELLS EVERYONE THE SECRET, then does it make the world a better place.

Also see George Wiseman's NO PATENT page.

"We do not believe any group of men adequate enough or wise enough to operate without scrutiny or without criticism. We know that the only way to avoid error is to detect it, that the only way

to detect it is to be free to inquire. We know that in secrecy error undetected will flourish and subvert." - J. Robert Oppenheimer

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Fourth rule: figure out what other o/u inventors did, then do the opposite!

Inventors over and over have announced o/u discoveries, yet where are they now? What did Pons and Fleichman do wrong? Hendershot? Hubbard? There seem to be a particular set of guaranteed routes to failure. Secrecy is the biggest one. Another one is to assume that everyone wants to steal your valuable discovery. Another one is the attempt to sell the discovery to governments or giant corporations. Another is the loss of humility and pursuit of fame. Another is the assumption that scientists will automatically hail your discovery, and that businesses will vie for rights to manufacture it.

Therefore, in order to succeed, we must do some historical research, discover the guaranteed routes to failure, then avoid them.

Assume that all scientists will ridicule you. Assume that all businesses will reject you as a lunatic. Assume that governments and corporations, if they don't simply ridicule you, will force you into silence (and perhaps pay you to keep silent.) Assume that your suspicion of idea theives will push you into paranoid insanity, and that pursuit of fame will destroy both you and your discovery. Now go forth and bring light to the world. But how? I don't know. Maybe try giving away your discovery for free, then later make your fortune on your autobiography and lecture tours? See prometh.txt for some clues.

Fifth: Keep a journal. If you notice something strange, WRITE IT DOWN. If you don't, you'll invariably forget it.

Human minds are funny about anything which violates our expectations. Our minds want to maintain a coherent world, so we tend to get amnesia about things which don't fit. Amateur scientists should never stop fighting against this tendency in themselves. Avoid too much skepticism. Search for "weird" unexpected phenomena. And if ever you see some, write them down! Here's a story about my own encounter with this issue.

I was using a VandeGraaff generator to power a "Franklin's Wheel" electrostatic motor. I was working in a dusty shop, and little hairs would jump onto the brass knobs of the Franklin motor. I wiped them away, but one of the hairs simply would not leave. It was a thin gray hair about 2mm long, and even though I wiped and wiped, the same hair kept jumping back to the knob. But then I looked more closely and realized that something weird was going on. That hair was a ghost. When I viewed it against a white background, it was completely invisible. When I viewed it against a normal complicated background, it looked like a tiny fiber of transparent glass. "Very weird!" I thought to myself, "I must remember to play with it tomorrow when I have more time." Ten years later I read an article in ESJ about fiber-like air flows created by the polished knobs of a Wimshurst machine. THAT WAS IT! That "ghost hair" thing! But then I realized that it had not just slipped my mind ten years earlier. Instead my brain had edited it out. I had been trying to fit that "fiber" into my prior experience, and having no luck, it was confusing me. It was an interesting phenomena, but it was also deeply unsettling. I was going to look at it more closely, but my subconscious got there first and protected my "reality" by giving me amnesia! When I read Charles Yost's article about it in ESJ, my original memories came back, but I noticed that they had a weird "feel" to them. To me they felt like I was remembering a dream, as if the "ghost hair" event had happened to somebody else. I suspect that my brain had stored the memories in a different way than normal. I had no access to them until something broke through the amnesia, and then the "feel" of the memory was different than the "feel" of a normal conscious recollection which is accessible through usual mental association.

I suspect that this sort of thing is common in science. Somebody announces a great discovery, and many other people remember seeing clear evidence for the same thing. Is the discoverer a great genius, or was he/she simply the only one with the sense to write down an observed anomaly, and then to follow it up?

Sixth: a failed o/u device often makes a great toy.

If my amazing discovery doesn't pan out, it often was because some weird phenomena fooled me into thinking I had found something new. Therefor, the same thing will probably befuddle others and act as entertainment. If Pat Harris of the "TOMI" device had given weight to this concept, his rollercoaster device might now be in all the stores as an "impossible" science toy. And if a real anomaly gets ignored by the mainstream, designing a toy based on new science is a great way to penetrate the barriers of disbelief.

Seventh: spend all your effort making an airtight demo.

A tiny spinner which keeps turning, or better yet, a light bulb which runs for weeks, beats any number of electric cars or huge multi-kilowatt blackboxes hands down. Don't try to build a flying saucer, try instead to build a soup-can which unexplainably loses 1% of its weight, and which anyone can duplicate. If possible, make it so very simple that you could sell it as a kit to school kids. Make it so obvious that your grandmother could follow the instructions and make a successful replica. If the goal is to blow away the objections of the skeptics, then the device should clearly demonstrate the new principle in ways which cannot be explained away. Doing any more than this will just obscure the principle. And doing more than this will almost guarantee that your discovery gets ignored as being just another crackpot claim.

Eighth: beware of the "Inventors' Disease"

OK, you've developed fantastic invention. It is an important discovery. No *REALLY* important. It might change the face of mankind. But at the very least, this thing is seriously valuable, and anyone in their right mind is going to want to steal the idea so they can sell it themselves. Nobody is above suspicion. Your family is looking at you funny. Don't trust them, they probably want to market your fantastic idea, but with THEIR name on it instead of yours. Better start writing in your notebooks in code, so your spouse won't be able to steal the idea. You mention your idea to friends, but then they want to know the details! Theives! Do they think that you are stupid?! Your patent attorney wants to know what you've invented. Beware, because that's just a transparent ploy to get clues about your idea! Only the idea is important, not the marketing, manufacturing, etc. Anyone who even HEARS about the idea can just walk off and start a wildly successful business. Patent the idea? But that's ridiculous, since then everyone would KNOW about it! They could just walk in and take it, and then you'd be spending your whole life battling lawyers! Actually, your idea is so valuable and so important that mankind is not ready for it. Burn all your notes, and bury the working model in the backyard garden where only you know its location. You'll take your idea to the grave with you. That'll show 'em!

The above is the "Inventors' Disease." The full-blown version (like the above) is fairly rare, but milder cases are very common. I fell into it's thrall two times now. I was afraid to take my idea to a patent attorny, since chances are that he would steal it! In hindsight, I see that I was courting a totally monumental bloated self-image , and my whole attitude fairly dripped with egoism and titanic self-importance. Pretty disgusting. Yet pretty attractive too. Like a kind of drug.

If I come up with a really important idea in the future, I know that the whole stupid thing will begin again. What to do? How about this: acknowledge that I am a weak person, and for that reason

I will never be an inventor. If I have a seriously cool idea, it will blow my ego all out of normal proportion, and I'll start looking for bugging devices in the kitchen light fixtures. Therefor, any great ideas that I have, I'm putting them onto the internet right quick! I'll still have a year of "grace period" where I can patent them before they go irretrievably into the Public Domain. Besides, ideas are *NOT* worth all that much, and it's the 99% of perspiration, not the 1% of inspiration, that creates a successful company. And even if I never make money off of my great ideas, and if they are promptly stolen by others, at least I won't go strutting around with a hugely bloated ego, and a pitifully obvious case of the Inventor's Disease.

(Hint: I put the Hand-Drawn Holograms and "Visual Electricity" on internet, and after many years, nobody has stolen them! I suspect that it works like this: if it's not secret, and if you give it away for free, then the "predators" will become convinced that it's worthless!)

And finally, a quote for all scientists (weird ones and otherwise) to live by:

"What impressed me most was Einstein's own clear statement that he would regard his theory as untenable if it should fail certain tests... Here was an attitude utterly different from the dogmatism of Marx, Freud, Adler, and even more so that of their followers. Einstein was looking for crucial experiments whose agreement with his predictions would by no means establish his theory: while a disagreement, as he was first to stress, would show his theory to be untenable. This, I felt, was the true scientific attitude."

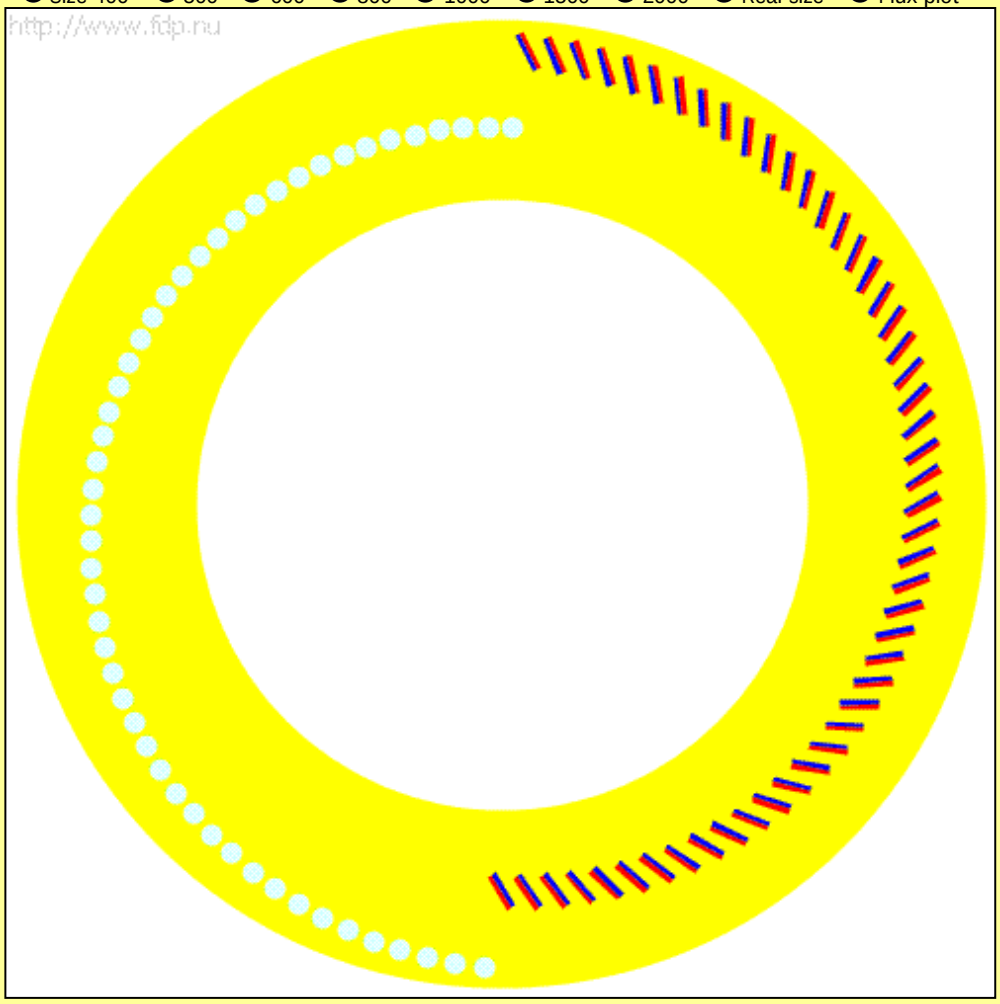
- K. Popper, CONJECTURES AND REFUTATIONS, 1963

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○ Size 400 ◉ 500 ○ 600 ○ 800 ○ 1000 ○ 1500 ○ 2000 ○ Real size ○ Flux plot

Outside diameter of the wheel		Mm
Inside diameter of the wheel		Mm
Distance Edge - Entry gate (First track)		Mm
Distance Edge - Exit gate (First track)		Mm
Distance Edge - Entry gate (Last track)		Mm
Distance Edge - Exit gate (Last track)		Mm
Diameter holes counter weights		
Number of magnets per track		
Length of a track in degrees		
Number of tracks		
Degrees covered with tracks		
10th of degrees to adjust track distance		
Magnet type		
Long side of hole for magnets		Mm
Short side of hole for magnets		Mm
Angle magnets against radius at Entry (bottom)		
Angle magnets against radius at Exit (top)		



57674

Step between objects	
Centerpoints	
Hulp lines	
Create wire frame	
Only points	
Calibration factor	
Long side stator	Mm
Short side stator	Mm
Type of stator	
Number of stators	



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CNC-conversion

Project start: 2006-09-01

Since I bought my first milling machine, I planned to convert it to a CNC mill.
For many years it were only plans, but now I finally started to buy the parts I'm going to need.

I sold my old mill and bought a new Sieg X2 Mini mill:



Specifications

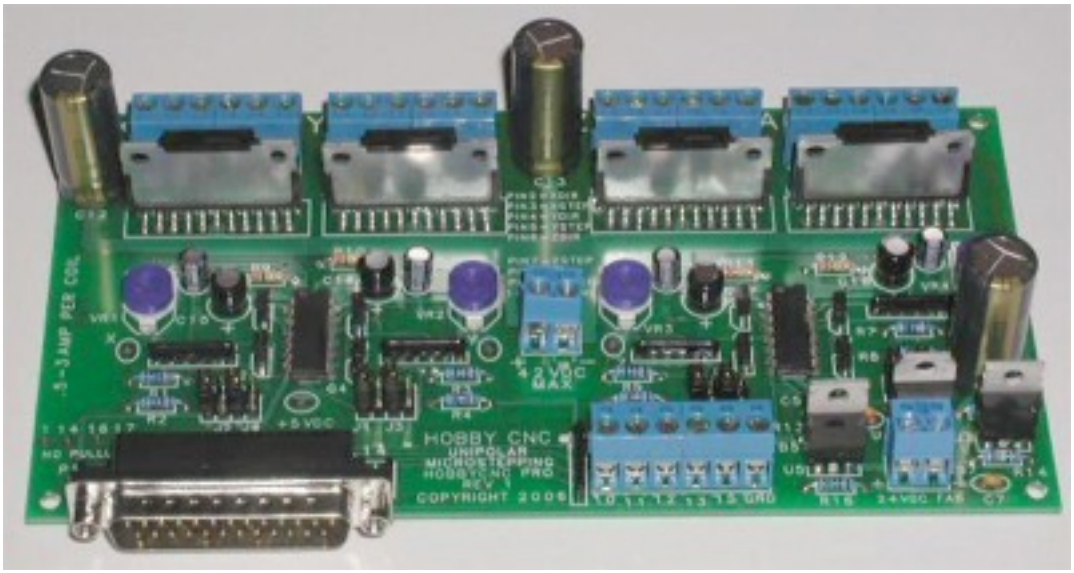
Drilling capacity		13 mm
End mill capacity		16 mm
Face mill capacity		30 mm
Headstock travel(Z)		180 mm
Cross axis(X)		100 mm
Longitudinal axis(X)		220 mm
Spindle rotary angle		-45¡ã-+45¡ã
Output power		350 W
Spindle taper		MT#3 or R8
Spindle speed	low range High range	0-1100 rpm ¡À10% 0-2500 rpm ¡À10%
T-slot		12 mm

Weight(net/gross)	50/68kg
Packing size(LxWxH)	540*500*760 mm

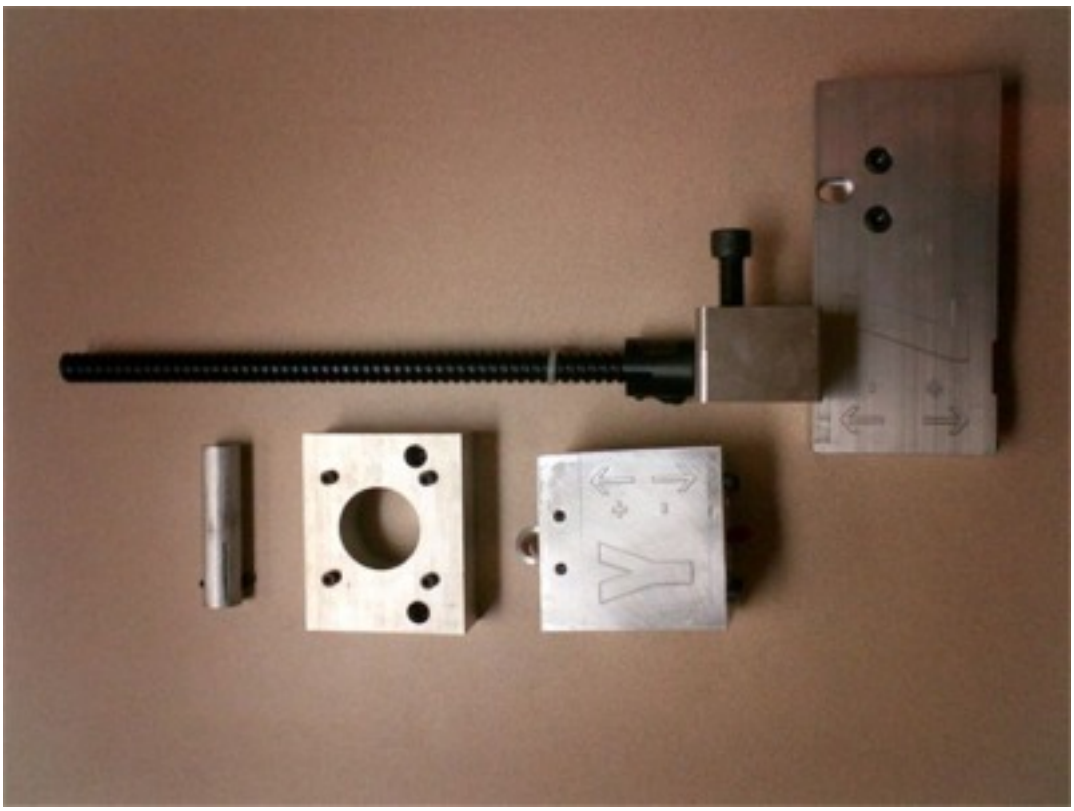
A HOBBYCNC PRO Chopper Driver Board Kit from www.hobbycnc.com, complete with Nema 23 stepper motors.

Specifications:

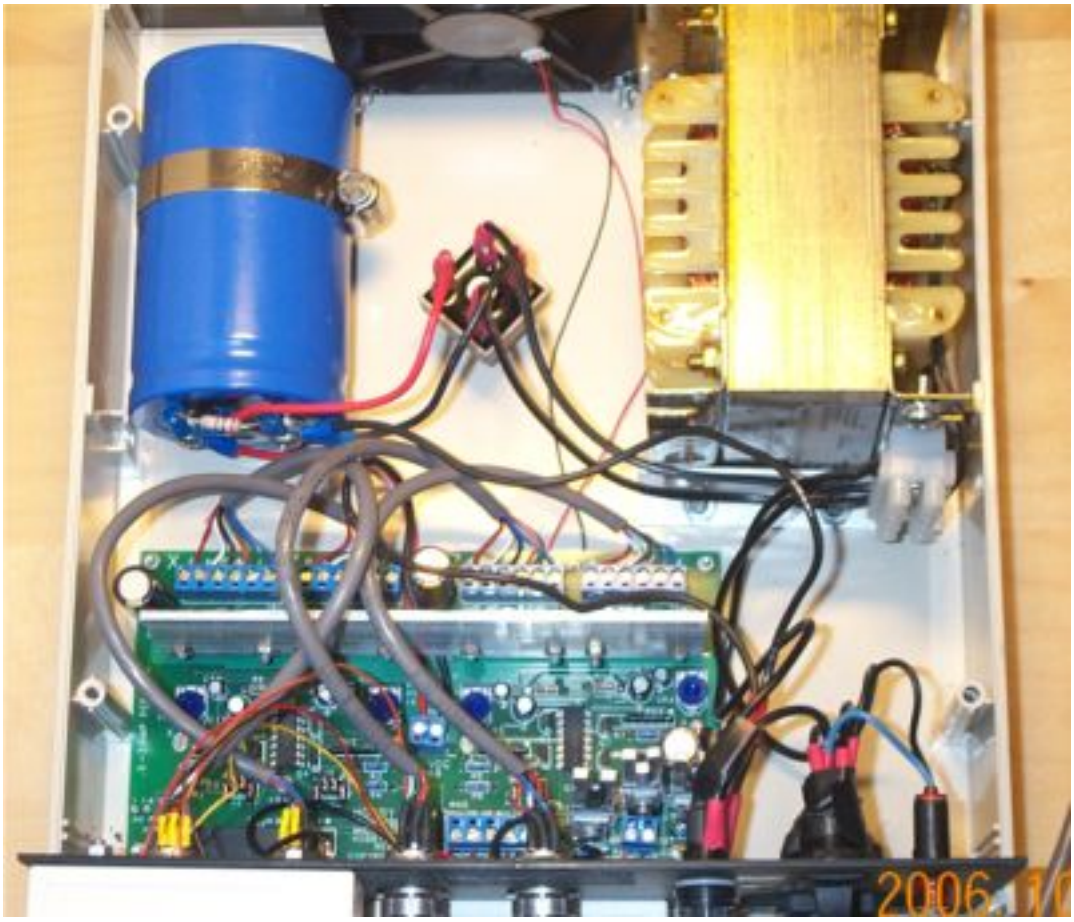
- 3 or 4 Axis Unipolar Chopper control.
- Individual OR simultaneous control of 2/4 Phase Stepper Motors.
- Accepts 5, 6, or 8 wire stepper motors only. 4 wire types are not usable.
- 42VDC maximum input voltage, 12VDC minimum input voltage. 24VDC Minimum Recommended Voltage.
- 3.0 Amps Maximum per Phase, 500ma (.5A) minimum. Each axis adjustable throughout this range.
- 1/1, 1/2, 1/4, 1/8, and 1/16 Microstepping.
- Step and Direction Control.
- **Idle Current Reduction to 50% when idle for 10 seconds. Can change this time delay.**
- **Built In Protection Circuit to help against blown chips on stepper motor short or open connections.**
- 3.7" by 6.8" double sided with top silkscreen and thru plated holes and lead free solder PCB. (RoHS compliant).
- Power On Reset.
- On board voltage regulation for 5-volt logic with 24VDC cooling fan from motor power supply.
- On board connections for home and limit switches with 10K pullup resistor provided to each. No need for a separate "break out" board.
- Minimum of components to make assembly fast and easy!
- Works with Step and Direction software such as DeskNC, TurboCNC, Mach2, etc



A kit with three NEMA23 motor mounts, thrust bearings for each axis, shaft collars, lovejoy spider motor couplings, a BALLSCREW for the Z axis, and metric cap screws. from www.cncfusion.com



2006-10-20 This is the controler box that is ready for use:



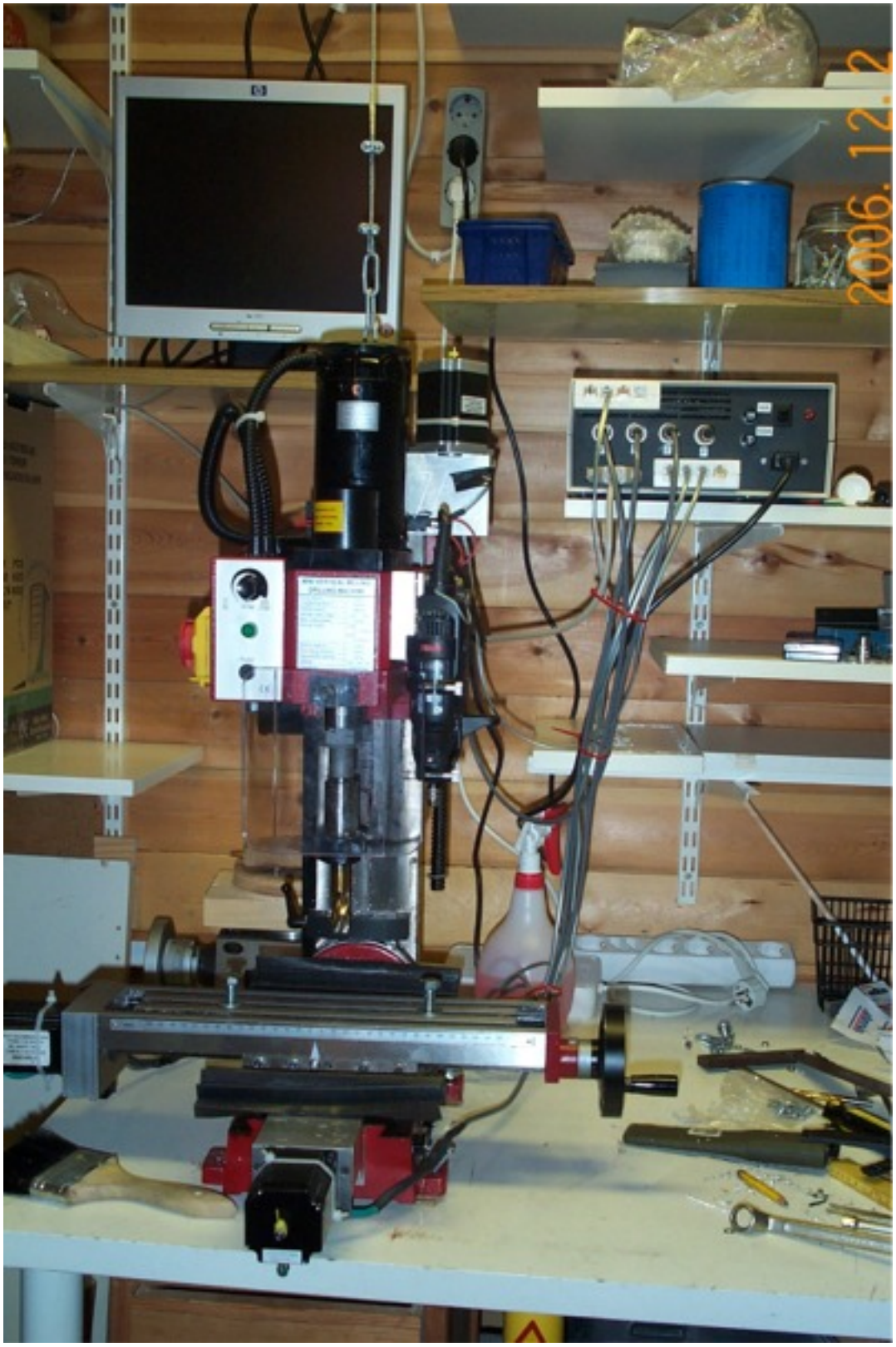


This is the mill that is going to be converted. As you see I 'borrowed' our guest room.





2006-12-02 Finally ready.
Of course there are always things that can be done better: for example I will upgrade the X and Y axis.
But for now I', happy. My first real build, was a mount for my Dremel. With it's 22000 RPM I can now mill and drill PCB-boards as well.


2006. 12. 2



cnc conversion retrofit

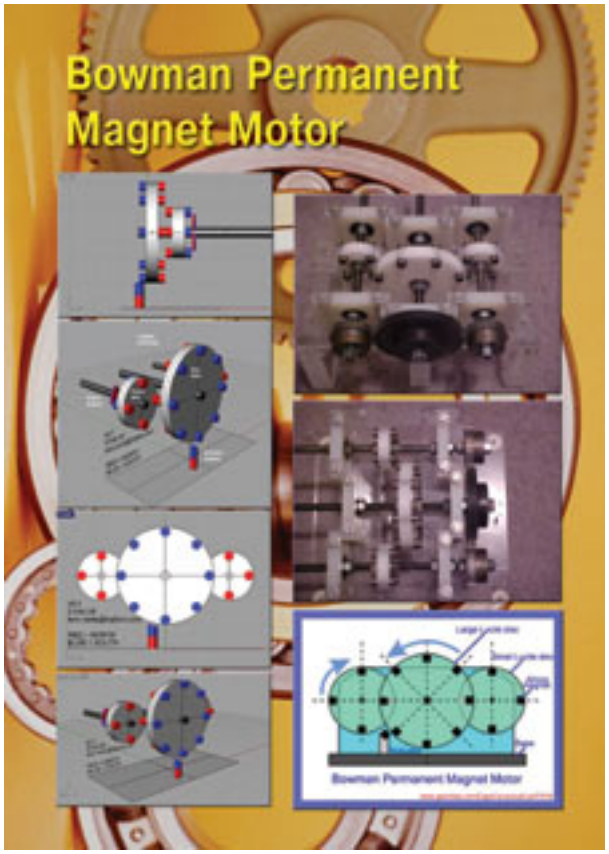
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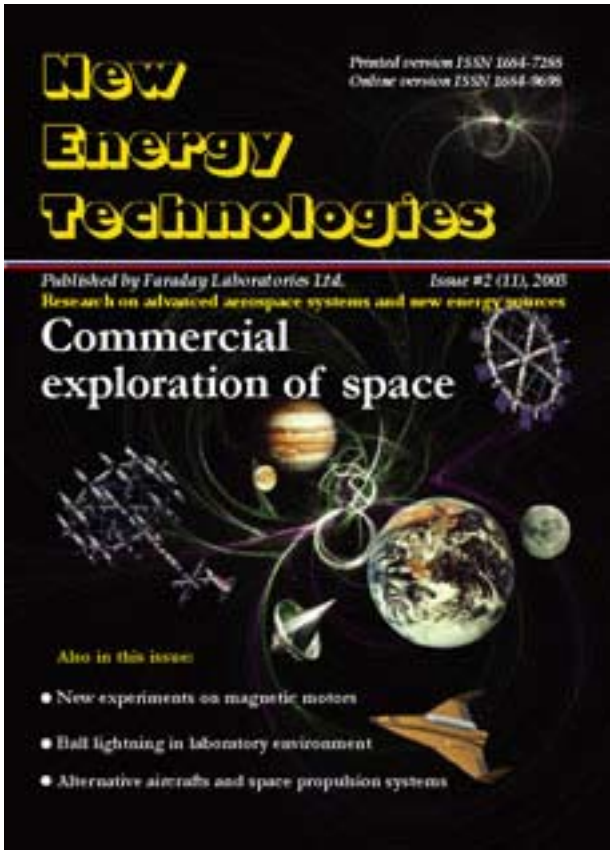
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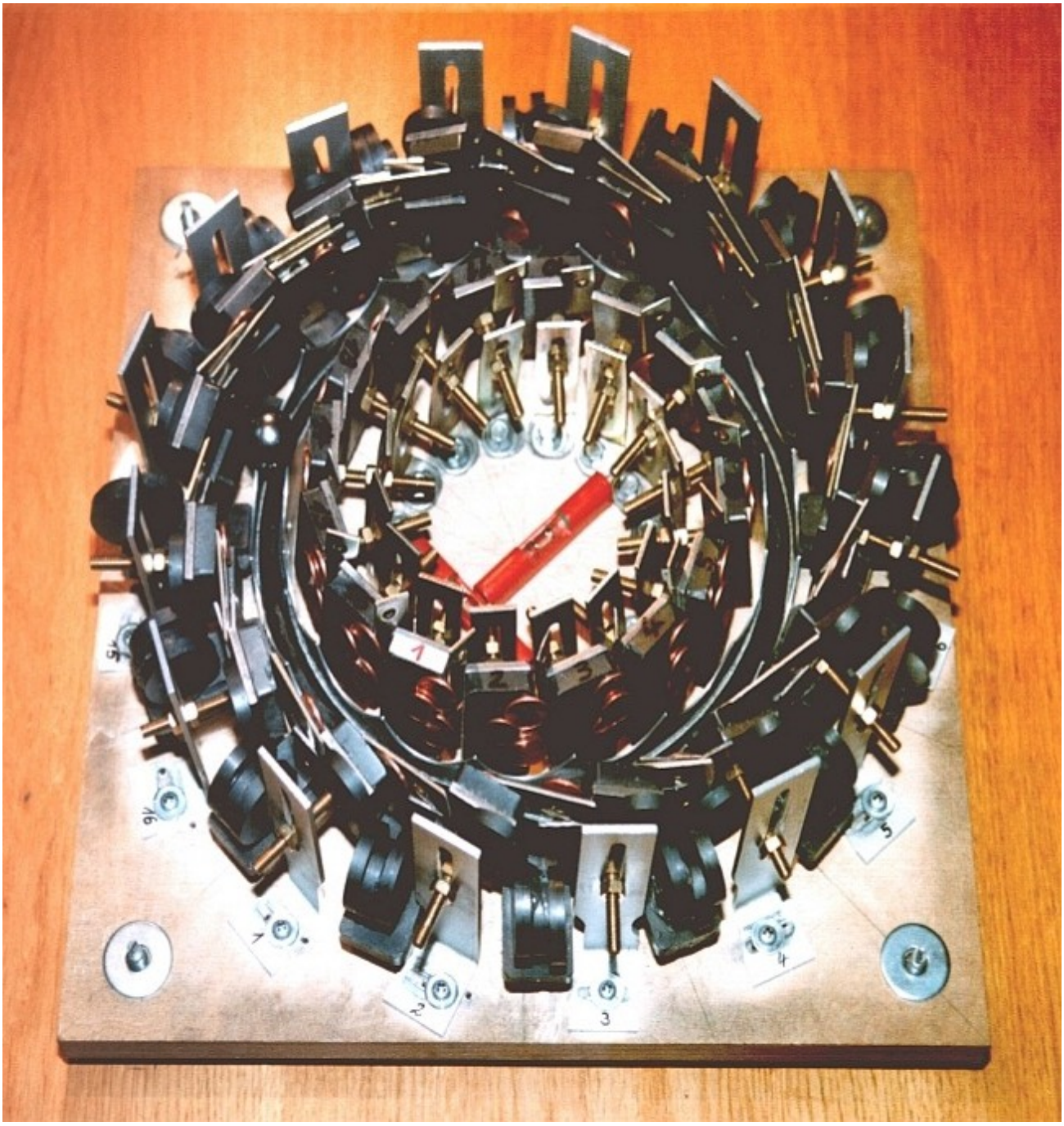
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Introduction. (by John Self.)

I read Jan Cack's description of his KISS PMM and was interested in the possibilities of his design – an elegant solution, using epicyclic sun and planet gears to remove as much of the fatal magnetic lock positions as possible, but mechanically challenging. His CAD drawings were also very helpful in establishing the most favourable number of rotors (8)and stators (10). That, and Nick Rasmussen's inspiring magnetic flux and 3D simulations convinced me that it was worth trying to make one.

It was interesting working out the design: much frantic sketching and measuring on paper, and thinking while driving to and from work. Also, making a cardboard model just to figure out the minimum gap between the sun and planet magnets so as to avoid clash, and the rough dimensions of the sun magnet holders. I've made them with a slotted hole to allow for set up.

To keep the costs down, I chose to make the sun and planet wheels out of MDF without running to the expense of cutting gear teeth – just relying on friction. Risky, I know, because there's the potential for the planets to slip out of register, but I'll mount the planet wheels against the sun with a fair amount of friction. I reasoned that it was worth taking that risk because I was trying to save costs while I overcame my scepticism and the possibility that it wouldn't work - let's face it, the odds are against me. I'm treating this as a proof principle exercise, the 'A' model. Having said all that, if the motor shows the slightest inclination to work, and even if it destroys itself in the process, it'll be worth pushing on with the 'B' model,

Progress

- I have had a local engineering firm turn some simple 'top-hat' bearings out of brass, to be used between the base plate and the sun and planet wheels. Not ball bearings, but they spin freely enough for the test.
- I have made the base plate (400 x 400mm) out of MDF and marked it out ready for drilling the sun and planet bearing holes.

- A wood turner friend has done an excellent job making the sun and planets in the required profile, and also making the sun magnet holders. The sun has 240mm diameter and the planets 60mm, maintaining Jan Cack's design ratio of 4:1.
- I now have the special order planet magnets (50 x 20 x 5mm) with the north and south poles on the faces rather than the ends, and I've also got the sun magnets
(22 x 10 x 10mm) with north and south poles traditionally on the ends.
- The design of the planet magnet fixing has caused me a bit of sweat, but now I've cracked it by using slotted pillars, and I'll use the same engineering firm to turn them out of brass too.

Pictures

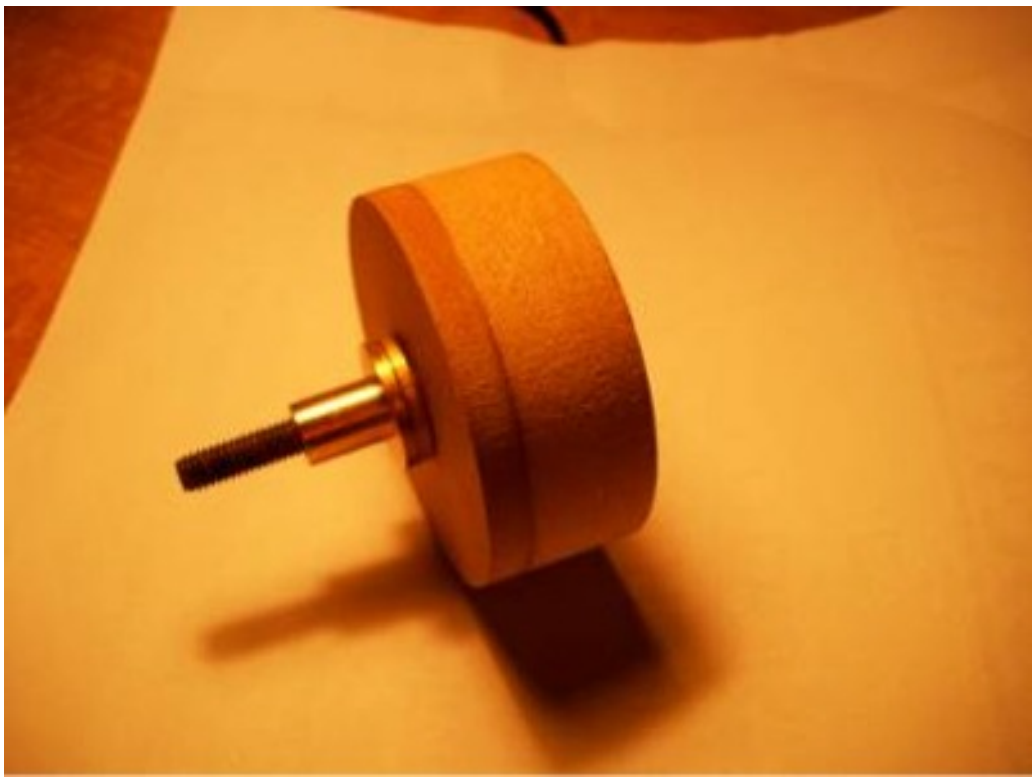
Sun and planets and holders



Bearings and fixing bolt



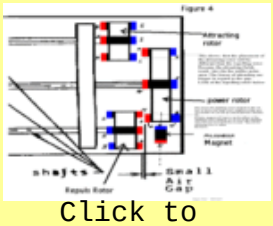
Sun wheel and bearing



Click here for the 'Jan P. Cack' main-page

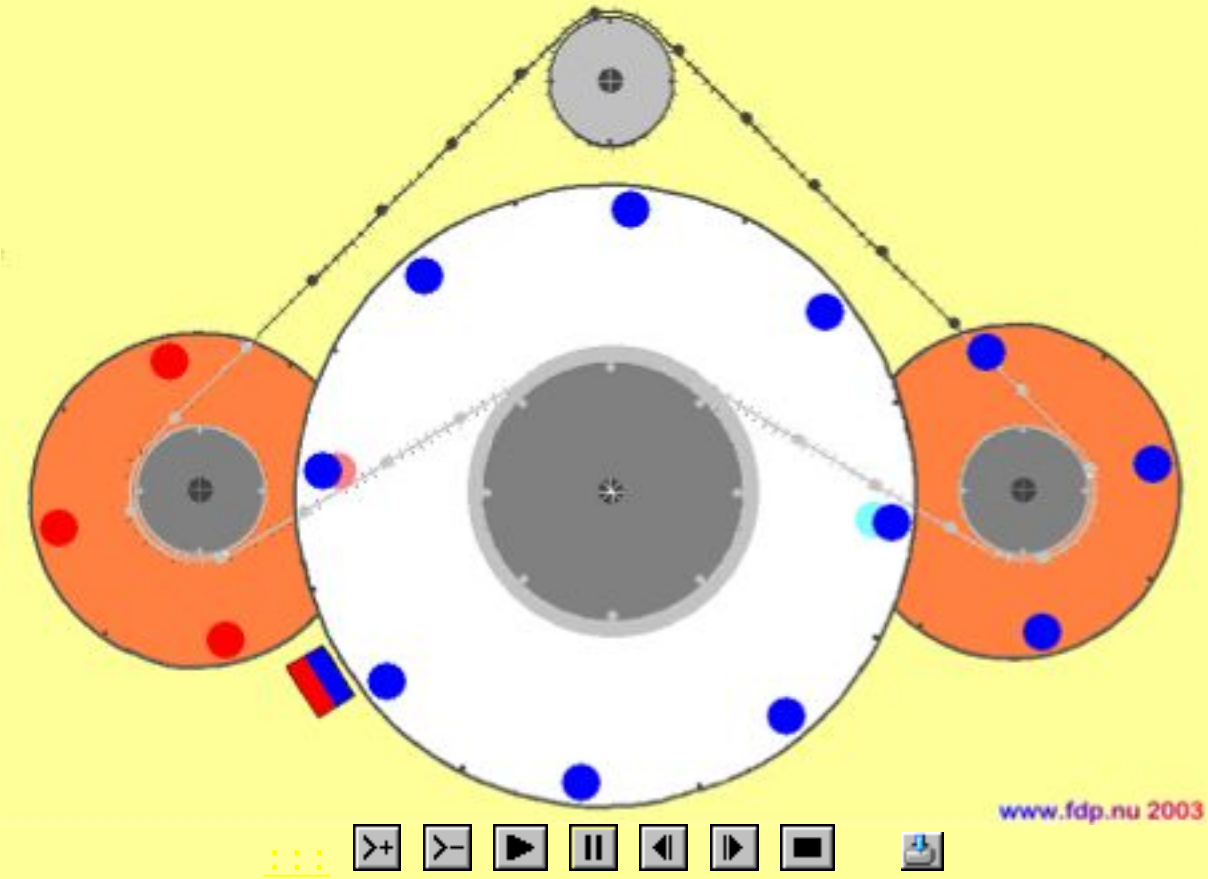
Flying Dutchman Projects

Bowman Magnetic Motor Simulation



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[Link to the Bowman Main Page]



Flying Dutchman
Projects
Eric Vogels

Flying Dutchman Projects

Minato Movies

Click on the pictures to enlarge




A video clip with Mr Minato and his wheel.
The first clip is in WMV format (1mb) and good quality.
In case your computer cannot handle WMV format, then choose the second clip: AVI, 2 MB (but less quality).







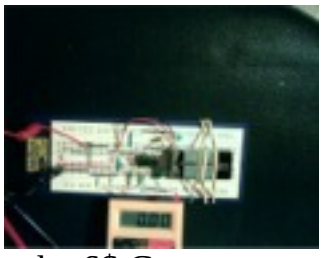
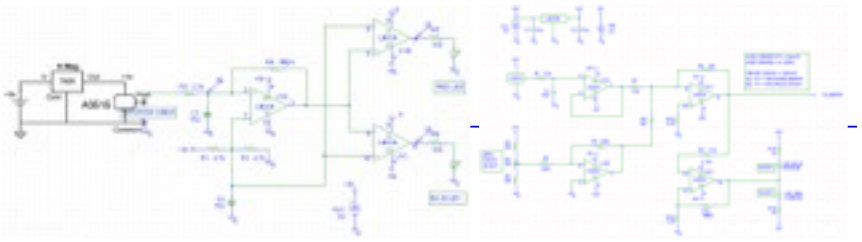
More files in WMV format. Try the first one to see if the format works for you. The sizes are

200 K **273 K** **400 K** **500 K** **90 K**



The latest experiment

Click on the pictures to enlarge

I made the 6$ Gauss meter.
With no magnet the volt meter reads 2.5 volts.
I also added a small circuit (designed by Darren Kozey) that show a Red light (at the top) for North and a Green light(at the bottom) for South.
When the red LED lights, it looks white, but my video equipment is not studio quality
The last circuit on this row is a more advanced meter. It shows gauss between 0 and 500 (north) and 0 to -500 (south). It has leds as well.



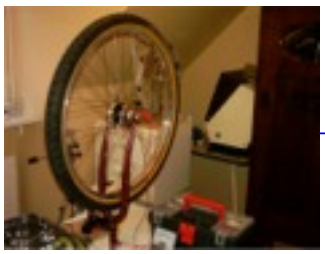
This is my latest wheel. It is as Calloway describes it. The stator is too big. It is laying with North to the left and South to the right. I will order a magnet that is only 2 cm thick.
Look at the video clip. Is this what Calloway explains as: 'it will bounce some'? In that case I'm in the right direction.
I start the wheel by moving the big magnet. To keep the wheel still when I walk from the video camera to the wheel I placed the magnet ON the styrofoam. That why I move it: no tricks.






I made my first electro magnet. I do not know the theory so that is why it is not working too well.
With a bolt mounted in a drill I made a few hundred windings with 0.180 mm copper wire.
The result is an electro magnet that only lift 100 gram but then I need contact between the magnet and the object to lift. The magnet is not getting warm at al, not even after 1 hour constant use.
The magnet must be stronger. The next one will have less windings, that makes the resistance less. I guess.

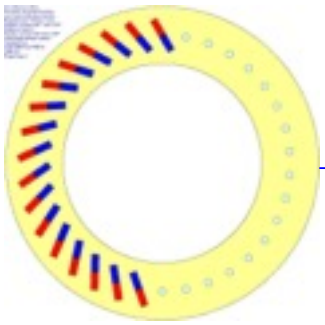
The last photo on this row shows a magnetic viewer I made. It is crescent shaped, to fit the wheel. It only works when having the wheel in horizontal position.
I will make another viewer when I receive the black sand, since the 'stickyness' of the metal parts make the viewer's reaction time rather long.





This week I received my hub dynamo and I started to do some experiments.

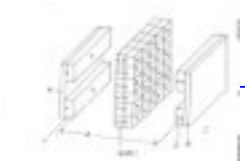
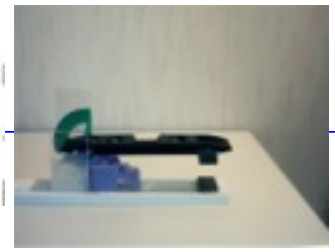
I also made 2 video clips about 2 ways of using weigths to help the wheel over the 'dead zone'. Just an idea that has to be investigated some time.





I wanted to make a 'real' Minato replica and here are the results of my first attempt.

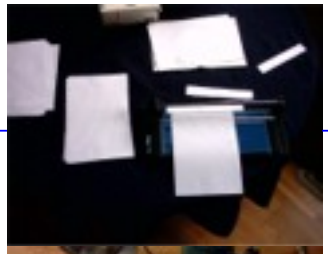
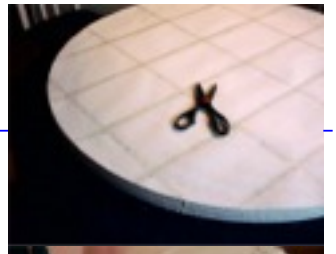
I did not exactly know how the magnets should be pointing but in this case the Northpoles are pointing to the outside.
I made a video because I wanted to show that the wheel turns in a direction that I did not expect. I really guessed on clockwise (since the repelling forces seemes to be under the centre) but it was rotating CCW. Many times during my other experiments I was surprised that a wheel was rotating in the other direction as what I thought it should do.




This is my test with the magnetic shield, made from 64 NEO cube magnets.
The drawing shows the patent.The pictures 2 and 3 show the test equipment I made so that I have my hands free for holding the shield in stead of needing 3 hands to hold everything.
The shield is made from the 64 cubes, sandwiched between two plastic plates. Otherwise the construction 'imploded' all the time and I hade to sort the magnets again and again. The north poles are red painted.
The last picture shows the test. It is not working as a shield, but as a normal iron plate that is brought between the magnets. One of the bigger magnets sucks the plate to it and that's it.
I'll be glad if someone has an idea how I can improve the shield.



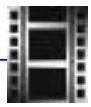
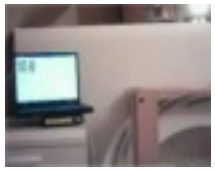



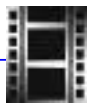




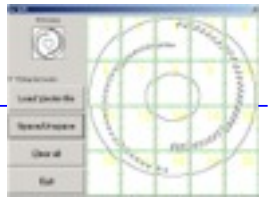

This pictures show the new tool I made for cutting the big Styrofoam wheels.
Constructing the big drawing is a bit of a job. But it's worth the job.
The 'blueprint' fits on the wheel.

The drilling of the round hole for the Counter Weigths (the small tubes with coins) in my work shop.
The vacuum cleaner is on, to suck the white dust awya. I'm drilling trough a plate otherwise the blue print tears apart by the drill.
Drilling the holes for the magnets is not a dirty job.
After drilling the blue print can be removed and the wheel is cleaned.
My new tool is used again to remove the innerring.



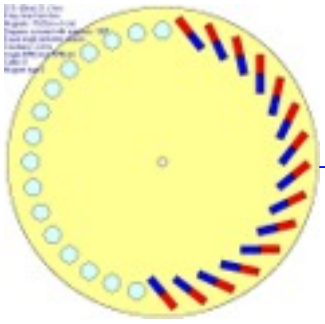
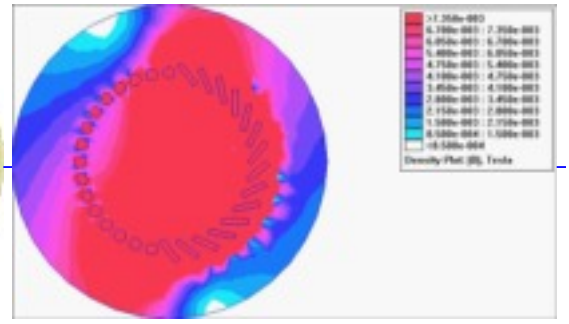

The first picture shows the wheel under construction and the video shows some results.
With the magnet pumping the speed is increasing.
The speed is displayed in RPM on the computer screen to the left side of the wheel.
The last video clip shows how well the wheel gain speed while the magnets are passing the stator. NOT perpetual yet but very promising.

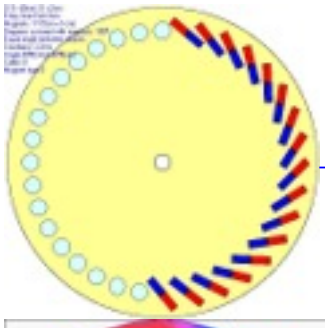
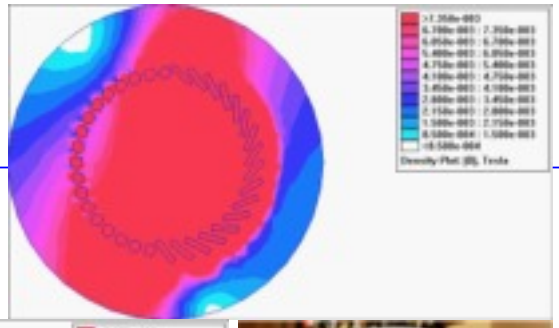
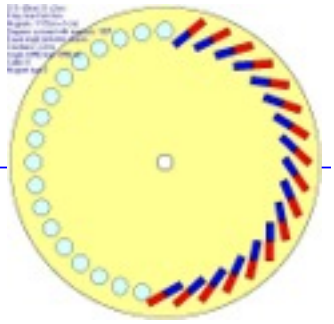
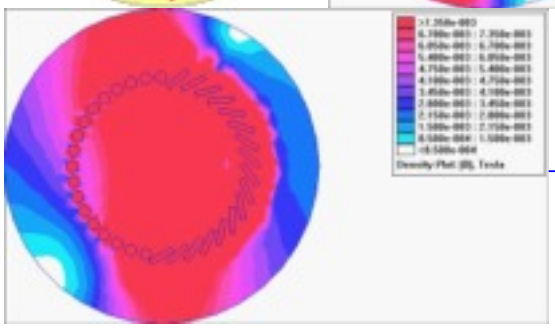
The drawing program will produce the drawing of a wheel in a scale 1:1.
The program has to devide one wheel over several files.
Here is an example how it will look in future.



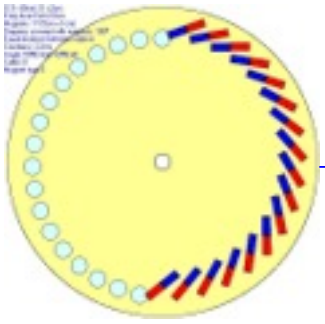
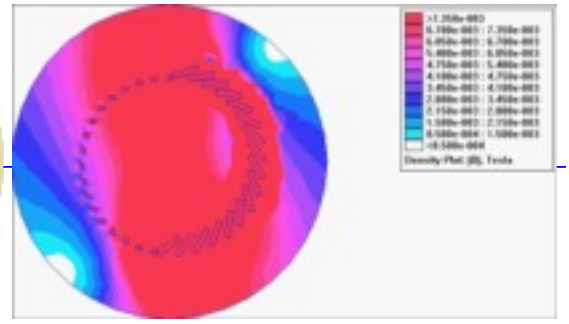

This camera (a present from my parents) is used to make the pictures for this site.

This wheel does not want to turn.


This wheel in the first 2 pictures is turning CCW. Picture 3 and 4 is the same wheel, but turning CW.
It doesn't loop but it get speed when the magnets with 60 degrees pass the stator.
Then some magnets without results and then the final kick.

Under construction

Minato movies

Click on the pictures to enlarge




A video clip with Mr Minato and his wheel.
The first clip is in WMV format (1mb) and good quality.
In case your computer cannot handle WMV format, then choose the second clip: AVI, 2 MB (but less quality).







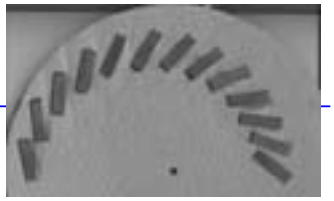
More files in WMV format. Try the first one to see if the format works for you. The sizes are
200 K **273 K** **400 K** **500 K** **90 K**



Minato wheel experiments

Click on the pictures to enlarge



Some different magnet layouts, which will be tested on the turntable.





The first picture shows the flexibel tube, filled with concrete, used as counter-weight for the magnets. The second picture shows the 'big' magnets. Then the complete wheel as Calloway desribed it. Just a little bit smaller. But is is not turning more then 300 degrees. Not with one, two or even more stator magnets. I'm will take the whole thing apart and try to mount one magnet at the time. I must try to get a movement which accelerates. I which that Calloway had made a picture of his 'working' model.




The completed wheel.
An ordinary speed clock to show if the wheel if gaining or loosing speed.





This shows how the wheel is build in a wooden frame.

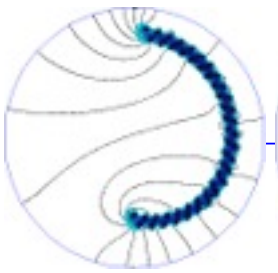
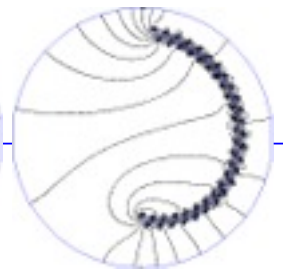







This construction will hold a magnets in the right position.
The first picture show the notes which I made after creating the geometric model.
These notes will be translated and published.
The last pictures on this line show the 'bridge' construction which will hold the magnets in the right position from each other.

Update 2002-11-10 I found out that the ultra light wheel works worse with more magnets. Perhaps this means that the big wheel has too many magnets? The next wheel will only have 32 magnets…. Stay tuned.

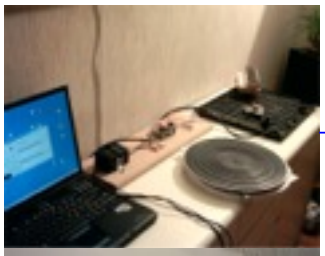
Finally I made Wheel B1, first the small 'Ultra light' version. That one showed a clear movement into the right direction.
Then the big wheel (1000 mm diameter), but that one only wants to move with the big magnet in attraction mode and then moving into the wrong direction.
So something must be wrong, but what?
Before I take this wheel apart I'll try to get a much stronger Stator Magnet.

B1   

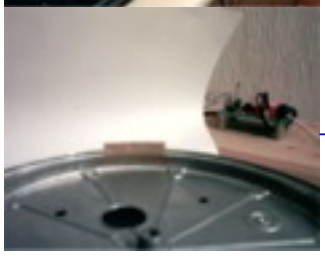
The first picture shows **B1** in Ultra Light form. Good swing, starting everywhere with the stator magnet at the size of the wheel with the magnets.
The second picture is the Wheel made of polystyrene. 100% balanced. Very light, except for the magnets and the cunterweights. But no swing.
Maybe the stator magnet needs to be stronger. That is the only difference I can think of between the small wheel and the big wheel. Or maybe that the form of the magnets has any to do with it?
In that case I can make a big wheel with neodymium disc magnets with 1 inch diameter but than I need to sell my car to be able to buy the magnets. So right now that's not an option.
The last picture shows a nice detail. This wheel is a very nice construction, fast to build, cheap and light.
I will prepare more 1000mm discs to test some more different magnet layouts.

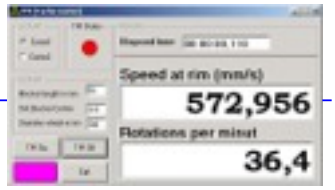
The ultra light wheel

Click on the pictures to enlarge





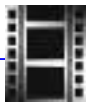




This is the complete setup of the new way of measuring the force after the kick.
The first picture shows all equipment used. The idea is based on measering the time that a photocel, mounted under the disc of the turntable, is blocked by a small piece of aluminium folie.
Since the length of the blocker is known, as well as the distance to the centre of the disc, the speed at the rim at the moment of the kick can be calculated.
Also the RPM at that moment is calculated.
I have to test if the used relay is fast enough. If it isn't I have to find an electronic replacement.
I will test all the ultra light wheels again, with this equipment.
Build-in in an old modem gives a professional result.
The last picture shows a test result on screen.







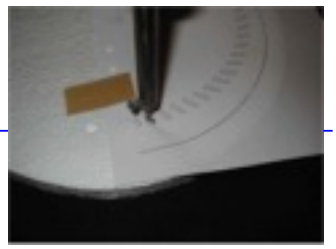



These pictures show the wheel with the magnets, the tool I use to balance the wheel, the balanced wheel on the tool and the wheel on the test turntable.

The first video clip shows the wheel when it starts and stops. The stator magnet is laying on place all the time.
To show a bit of the force I remove the stator magnet during the test on the last video clip.

Finally I found a way to test the principle of the Minato Wheel in an easy and fast way.
Earlier I made a turntable sized model with the magnets I use for my real wheel but this turned out to be the wrong way to test. Now I bought some Neodymium magnets 1/2" Diameter x 1/8" thick Disc Magnets from AmazingMagnets.com
With these magnets I can try a turntable sized wheel, with around 30 magnets and that gives a more realistic picture.



For creating test wheels I need **polystyrene**. polystyrene plates can be bought in Do It Yourself shops and mine are 15 mm thick. Then I use the round plate of my turntable as a template and a soldering iron to cut a wheel. Make a hole in the centre as well.
I also modified a soldering iron by replacing the top with a ring that is slightly smaller then a magnet. I sharpened the top.
The next step is to print a wheel with help of my program ‘Draw The Wheel’. The printed paper is temporarily fastened on the polystyrene disc with some tape. With a screwdriver I perforate the paper in the center of every magnet.
Now I push with the modified (and warm) soldering iron trough the paper for every magnet. The heat does that this job is fast and easy (but is smells: do this in a ventilated room).Look how the disc looks now. Just push the magnets on place and test the principle.
During 5 tests I already figured out some interesting facts (click on this line to see the test report):

- I was right about my present wheel and the one I planned to build: my present angle is wrong.
- More then 180 degrees with magnets is wrong.
- The angle between the magnets and the radius can be constant.

I did those observations without any measurement tools; just with feeling. This is wrong of course so I have to make some rules on How to test.
For example:

- Always test with North pointing out.
- Always use the same Stator magnet.
- Always have the stator magnet in the same position.
- Always start a rotation the same way (push the stator in place at the third magnet or so).

And do some more difficult measurements.

- How much power gives the rotation.
- How fast turns the wheel after the magnets left the exit.
- Where does the wheel stop.
- How fast does the wheel stop.

When these measurements can be done, the testing can be very serious. Then it's possible to learn a lot about magnet arrangements and finally the step to the big wheel can be safely made.
My new TODO list looks now as following:

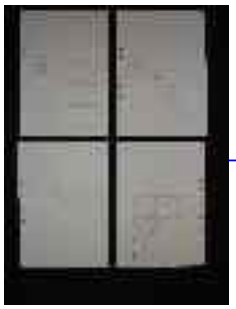
1. Have the round discs more automatically cut. This function is not neccesary but very convenient.
2. Find a way to test the wheel in vertical position. If possible use a magnetic bearing.
3. Make a tool to measure power.
4. Make a tool to measure speed.
5. Creating small counterweights.



Test model on the turntable.
And as a vertical device.



Here I show how a test is created, done and documentated.
The start is always the program 'draw the wheel' at this site. The created picture is then downloaded and opened in MS Paint.






The 4 printed pages (fit on one page should NOT be used here) are then cut and taped together.
The next step is to make the wheel out of polystyrene.





When all magnets are in position (north out) the wheel is balanced with help of some coppar nales. Balancing is done in vertical position, because that's the easiest way. Since the test are done in horizontal position, the balancing is important but not critical.





After balancing the wheel is placed on the turn table.
The used Stator magnet is composed from a number of smaller magnets.






The red line is the start position. When everything is in place, the wheel can be released.
The stator is removed when the magnets are in opposite.
Important is to count the number of rotations after the 'cick'.
After a few times running the same test and the results are more or like the same, the total number of degrees rotation can be written in the log.
Time for a new test: just change something in the magnets layout and build again.
From printing to testing will take around 30 minutes.

Multi wheel experiments

Click on the pictures to enlarge



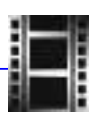






This experiment has 2 Minato-like wheels. The test is to see if the rotation of the first wheel can be completed by forces of the second wheel. The second wheel will pull the first wheel out of the 'blue zone'.
On the second picture you can see how I balance the wheel with help of some magnets on an iron disc.
On the wheels, the north-poles are facing out. I get the best results when the left big magnet points North up and the right points South up. Strange but true.
This fenomen maybe makes a 3-disc version impossible since for a balance 2 big magnets have to point North up and 2 have to point South up.
On the video clip you can see that this device is self starting (and stopping).




Here are 3 wheels mounted on the same shaft. The motion stops. Maybe due to the fact that I need

2 big magnets pointing North up and 2 big magnets pointing South up.
So 4 wheels are neccesary as explained before.
The video clip shows that the device stops, after a manual start.

Magnetic experiments

Click on the pictures to enlarge



The basic idea is also that a magnet is pushed through some gates. This photo shows an almost closed loop of gates.



Here you see the 'runner' mounted. The runner is not rotating; it just passes all the gates and will then stop (or go back). As soon as I close the loop, the runner will stop somewhere.



In the hope that mass was important I changed the device to what you see on this picture. There is the 'runner' fixed and the gates are rotating. Same results: a loop is not possible. It looks like that as soon as

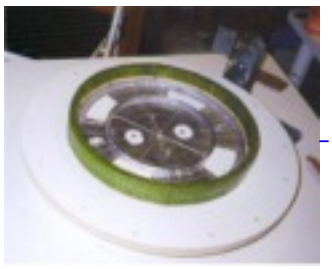
the loops closes, the 'power' is gone. This brought me to the next idea: what if the 'runner' is circling and going up at the same time? If I mount the 'runner' on a small trainwagon on a track, I maybe can pull the runner up I a spiral??? When the runner falls down on the track it maybe has enough speed to jump into the first gate again? I don't know, I'm working on a model now, but it's not easy.



On this photo you see the device I build to test the magnetic gate in vertical position. This to test the possibility to drag a 'runner' on a upgoing spiral where I told you about in an earlier email. It seemed that the vertical position is not a problem.



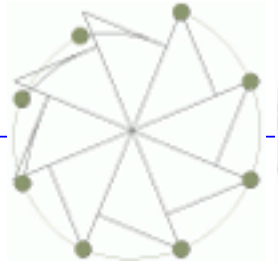
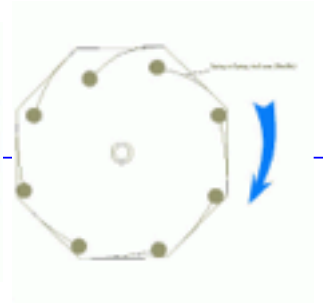
Here I have a device to check the possible length of the ramp. This is in fact an earlier experiment but since the 'spiral' is a long and climbing ramp the results are now important.



This was my Ohsako experiment. I couldn't get it running with a mounted stator. Holding the stator in my hand was better. No perpetual motion here.

The gravity wheel

Click on the pictures to enlarge

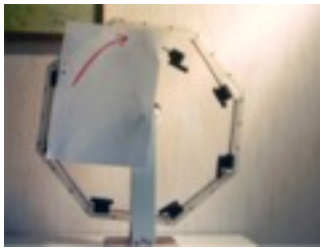




These pictures are showing what I'm trying to build.
You can read about it here.



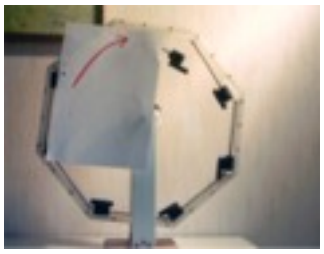

Here are some of the parts I used and the wheel under construction.



Here are the result videos. However it was my intention to build the wheel as the original I'm not really satisfied. The spring are too stiff, that resulted in weights are became a bit too heavy.

It's the 20th of June 2003 and I'm closing my workshop for nearly 2 months because of the holidays. That resulted in a too fast finishing of the wheel. But during my holiday I look for better springs and maybe better weights as well.On the first video I started the wheel clockwise, on the second counter clockwise, as the design says it has to rotate.

BUT LOOK AT THIS AMAZING TEST: I start the wheel with help of a weigth on top. When I start CCW the wheel makes more then 2 rotations.
When I start CW the wheel does not make 2 rotations. Conclusion: the spring and weights are doing something.

The "90° Rule" Theory

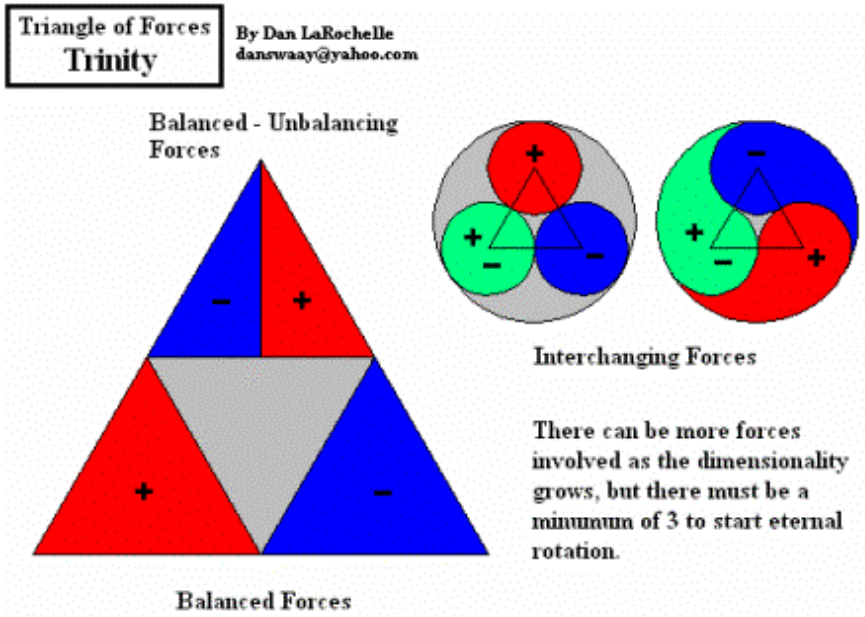
Written by: Jason Owens
Jdo300@sbcglobal.net
September 18th 2005

In this document, I will be presenting my findings with what I call the 90 degree rule. My conclusions are based on my own personal experiments and observations, as well as simulated data, patents, and information presented by Tom Bearden relevant to the subject.

The 90 degree rule is derived from a simple principle I have been using for quite some time. I call it the Tri-Force Theory and here is a diagram representation of it:

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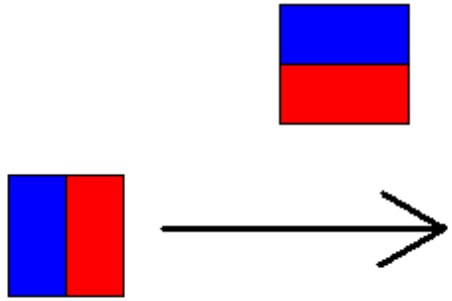
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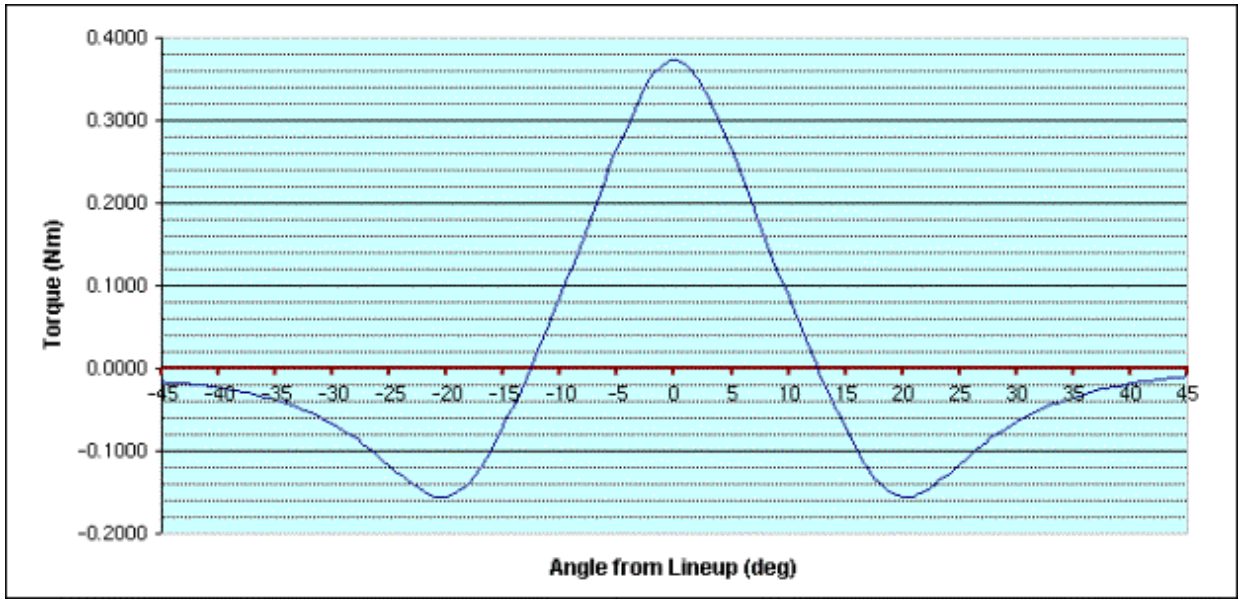
This concept is originally proposed by Dan LaRochelle and has proved to be very useful in guiding my magnet motor designs. The tri-force principle states that in order to have a functioning magnet motor, there must be a combination of attraction, repulsion, and superimposition (balancing) of forces. Now, by itself, the tri-force principle does not explain specifically how to design and engineer a specific magnet motor but it will give designers of such, constraint to follow. I have been attempting to apply this principle to my design ideas but as I've worked, and read more, I've come to realize there is really a lot more to magnets than what meets the eye.

At the time, I was trying to apply the Tri-Force principle to a new magnet motor I called the Tri-Phase motor. It was supposed to use the combination of attraction, repulsion, and balancing to accomplish my goal of a running motor. The design was based on Mike Brady's Perendev motor and my basic goal was to simplify the design. However, as I worked with the tri-phase design, I discovered what I now call the 90 degree rule.

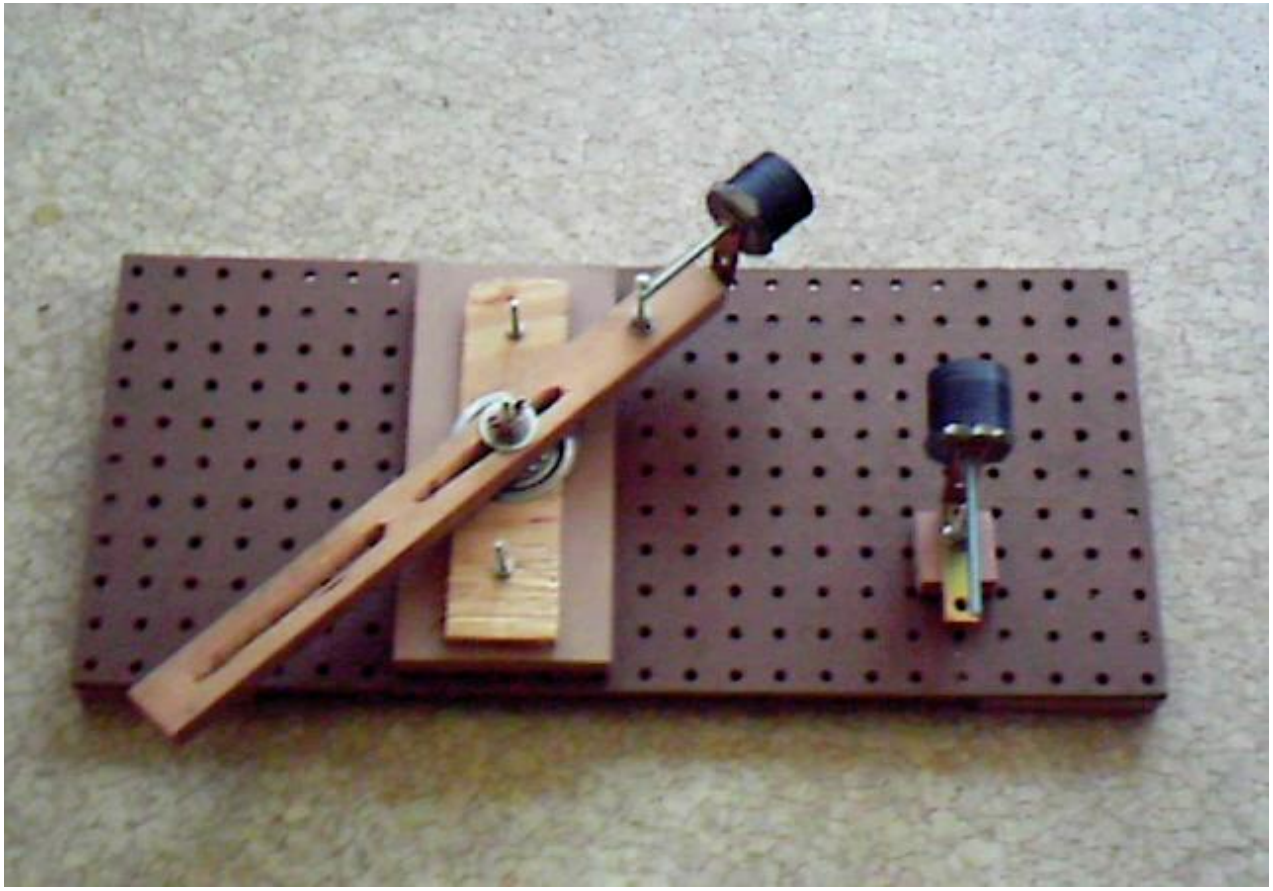
The 90 degree rule is an extension of the tri-force principle. It is what I believe to be the missing piece of the puzzle for a working magnet motor. The basic idea can be summed up using the following diagram:



Visualize the bottom magnet on a moving rotor disk and the top magnet as part of a fixed, stator assembly. As they pass each other going from left to right there is a weak repulsive force followed by a violent 'kick' that pushes the magnets past each other. I have both simulated and personally tested this principle and have proven it to work. Here is a graph I produced in the FEMM magnetic simulator of this arrangement:



And here is a picture from the lever test I performed to prove this principle:



I also made a video of the arm ramp test here (the link points to an 8 mb video clip, best thing to do (or when the clip doesn't run) is a right-click with the mouse and save the target) for those interested. I highly recommend that everyone who reads this try the test. It is an excellent way for each person to see and feel the forces that are in action.

As further evidence for the principle, I did a bit of patent searching to see if there were any similarities in various magnet motor designs. I sent some screenshots of different designs to Eric Vogels, and he uploaded them to a page where you can see here:

http://www.fdp.nu/otherwheels/patents.asp?URL=patents.asp

You may notice there are some similarities between the different designs, but the major thing I want you to see is that all of them implement the 90° rule in some form or another. You can also see similar arrangements of magnets in the Howard Johnson Motor:

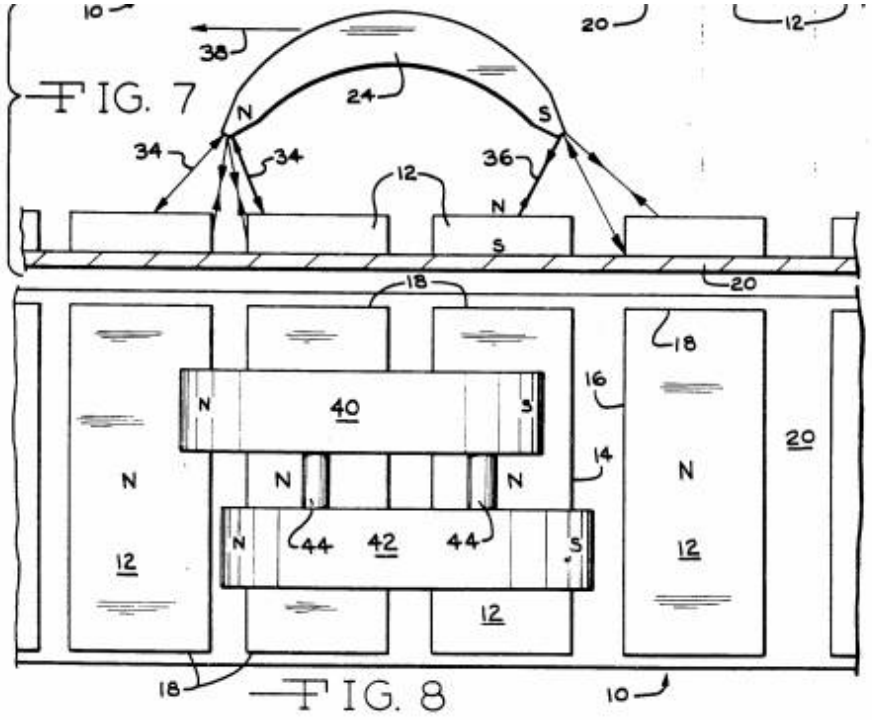
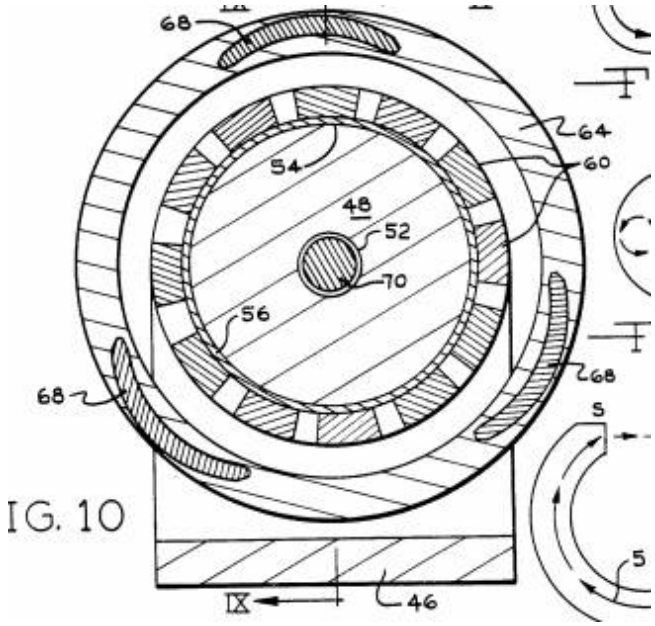


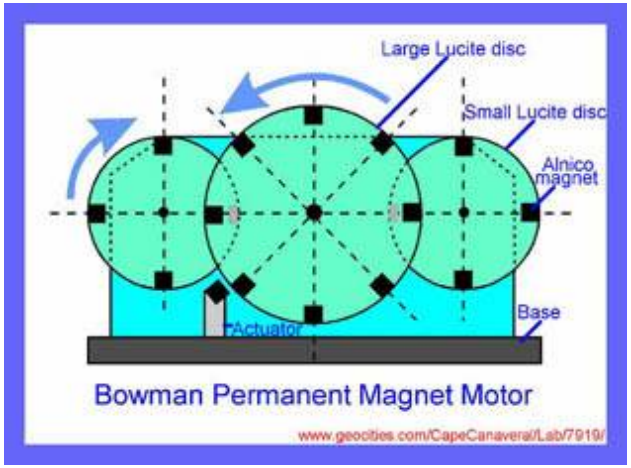
FIG. 7

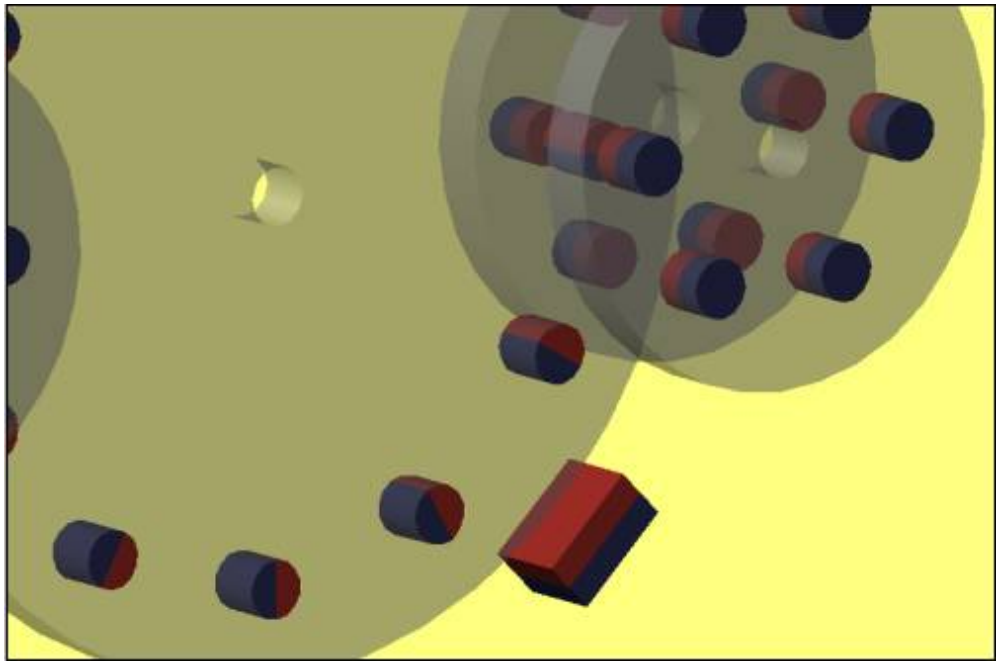
FIG. 8

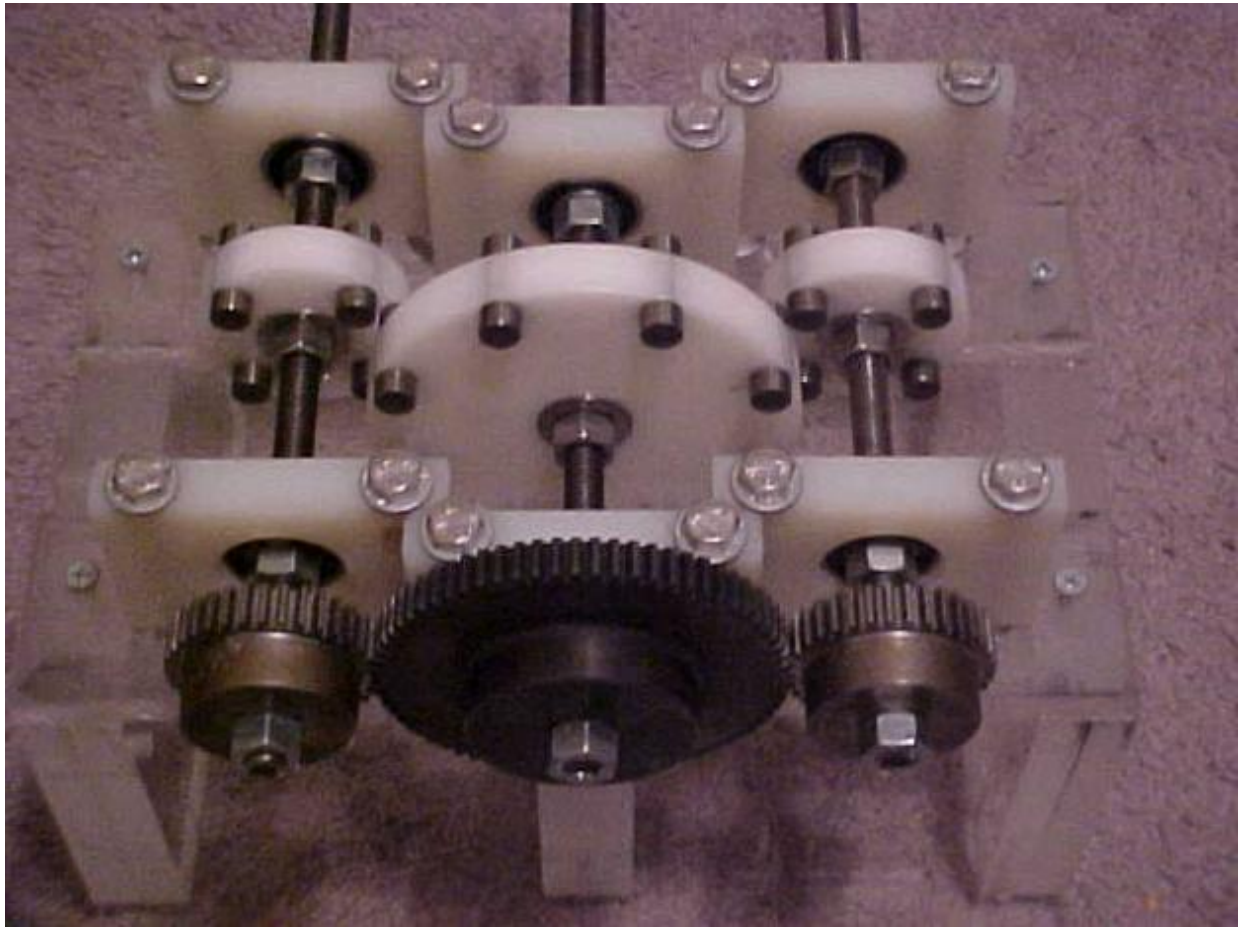


IG. 10

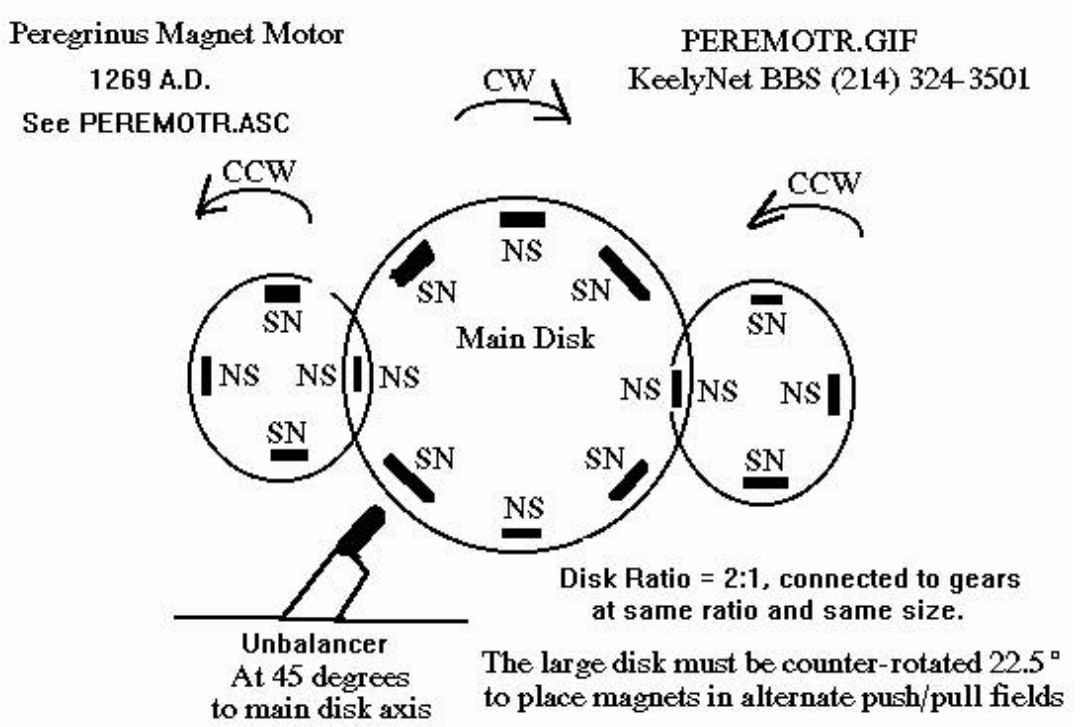
And the famous Bowman Motor--


Large Lucite disc
Small Lucite disc
Alnico magnet
Base
Actuator
Bowman Permanent Magnet Motor
www.geocities.com/CapeCanaveral/Lab/7919/



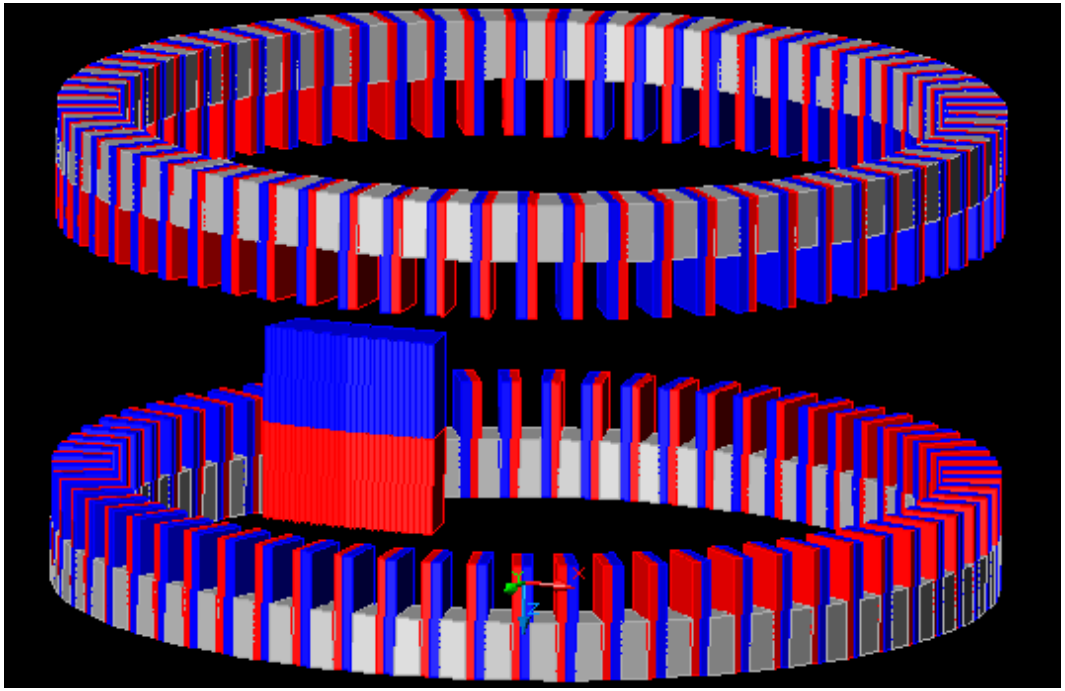


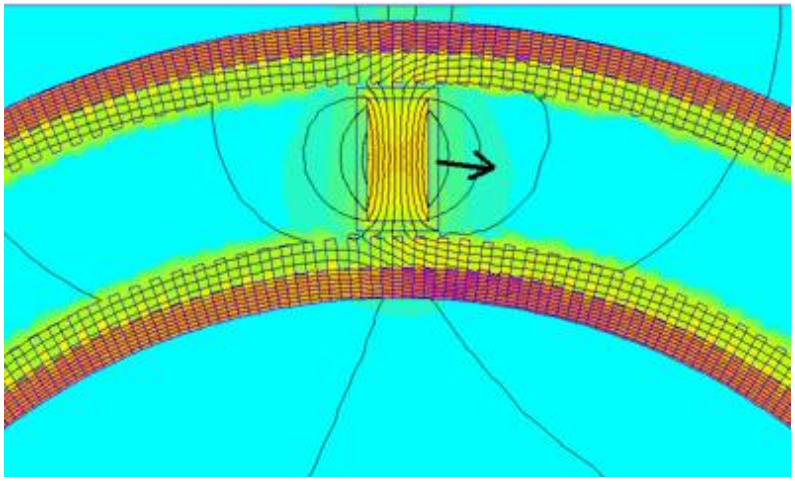
which appears to be derived from this original design invented by Peter Peregrinus way back in 1269 A.D:



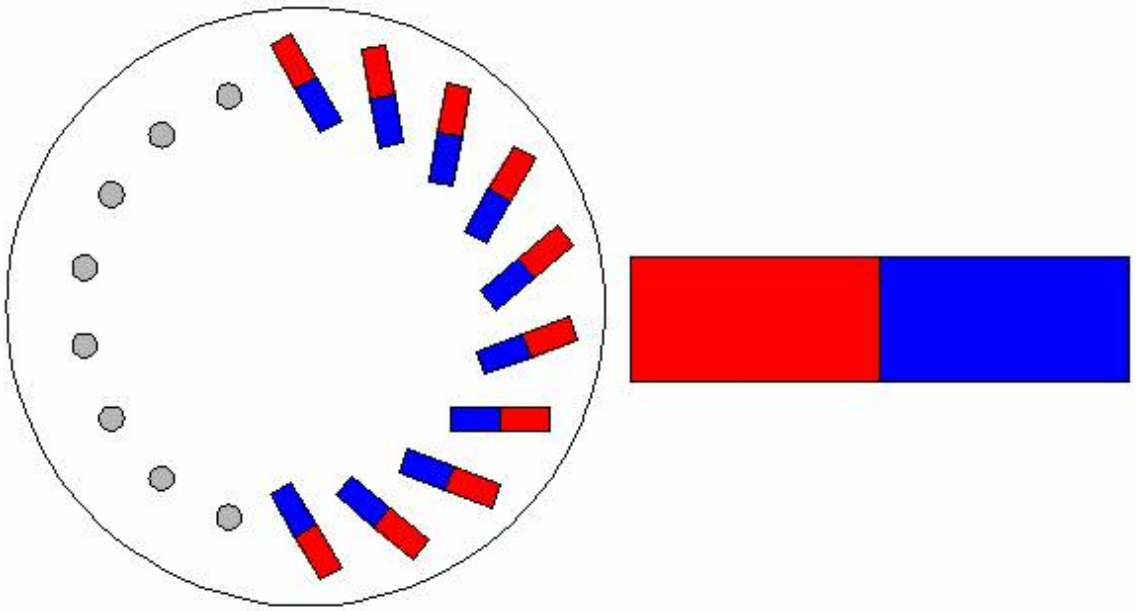
That 45 degree magnet has its North Pole facing towards the rotor disk.... Again the 90 degree rule crops up.

But I can't forget about the famous TOMI motor either, that is perhaps the most classic example of all:





If I may throw in one more example here, I'll add the Minato wheel as well:

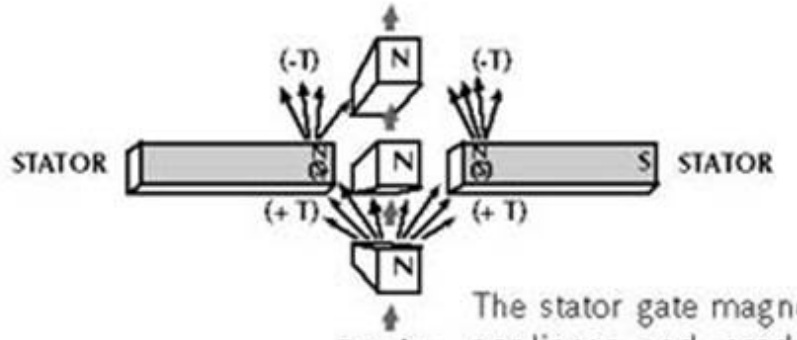






Even though in this case the effect is less obvious, the same thing is taking place... the 90 degree rule is in effect all over the place!

So after reaching these realizations, I thought I'd figure out what's really going on with these magnets. Where does that mysterious `kick' force really come from? For that answer, I turned to Tom Bearden's paper about the Multi Valued Potential Gate. Here's an excerpt:



The stator gate magnets are highly nonlinear and produce a multi-valued magnetic potential. The rotor enters and experiences a sharp "jump" in the stator's magnetic potential, and reversal of its sign. The rotor is accelerated on through the gate and out of it.

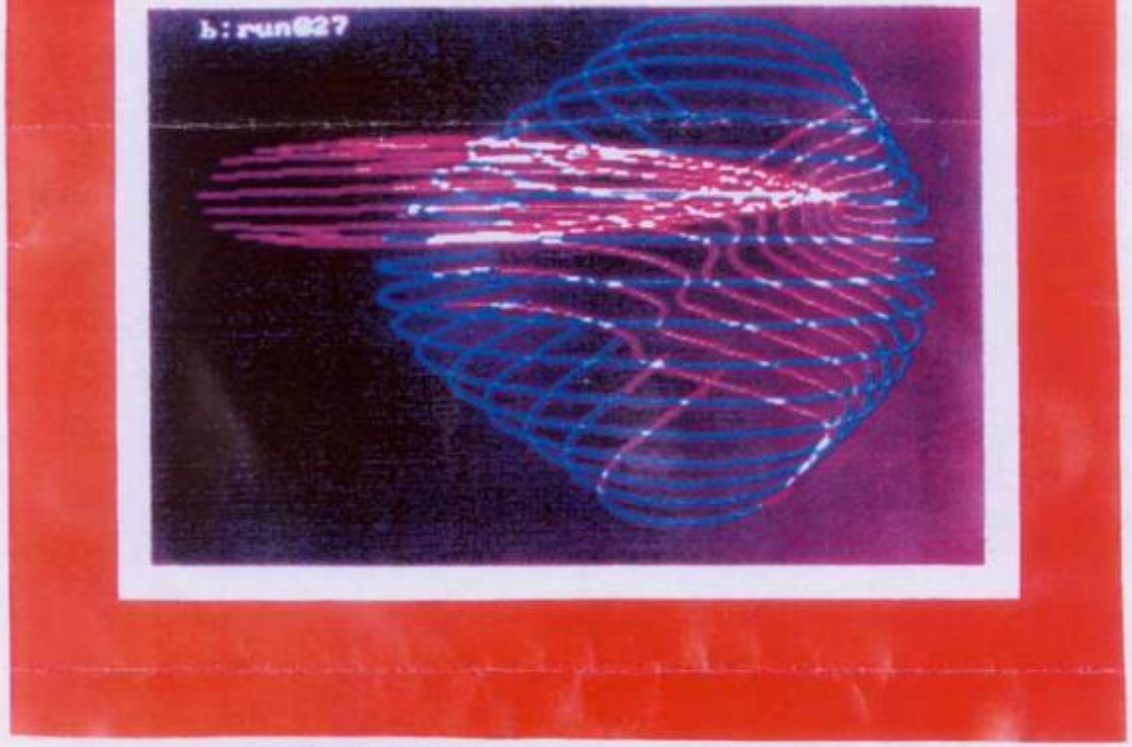
Effectively a phase conjugation (time reversal) occurs on the trailing edge. The rotor is attracted in; A-regauging occurs with change of polarity. The rotor is accelerated on out. Regauging injects free potential energy into the system, from the vacuum. Conservation of energy and the laws of physics are not violated.

Figure 5. **Concept of operation of Johnson's patented magnetic gate.** © 1995 T.E. Bearden

I also found further proof of my experiments from a recent document Howard Johnson released to the web:

DISCOVERING

Q M M E



QUANTUM MECHANICAL
MOLECULAR ENERGY

This is stimulation of high molecular energy by shaded pole electron spins that produce powerful parallel spins releasing high energy discharges when they revert to their original anti-parallel spin state.

The QMME

This is a quantum mechanical molecular energy assessment using shaded permanent magnet poles and shaped spin fields.

We have found that this is an efficient method of developing linear thrust mechanisms and we are working on circular units to do the same.

Since we cannot use classical physics to solve these problems, we have drawn on the experience of many years in mapping permanent magnet fields and their force components.

The QMME produced by shaded pole permanent magnets and curved permanent magnet spin fields is used to produce thrust units much more powerful than those simply relying upon primary magnetic fields.

The high speed peaks produced by QMME produce the first power alternative to heat engines. Heating is not a part of the cycle. No contaminating products are reformed.

These are some of the reasons that classical physics has been left behind.

For those that teach that permanent magnets are static, not dynamic, there is quite a confrontation. Our mapped pictures show the activity of an armature in a magnetic gate. All components are permanent magnets.

The ability to see the magnetic fields and to measure their forces 1200 times per second leaves little doubt as to what is happening.

It is a similar situation to Newton discovering gravity. He didn't make it work. It was already working. He just summarized the activity.

QMME is a short lived phenomenon. We can't make it last. We just record it. We can't store it. We just use it. The supply does not decrease because of usage.

Mechanical positioning of the required components seems to be all that is required from us for the microscopic effects to take place.

As the years have passed, we have gained various insights. A number of years ago we added the ability to map magnetic fields 3d. This opened up a whole new world which we, and evidently no one else had seen. This showed us how permanent magnets worked--which was quite different from the textbook concepts. It also revealed the activity of combinations of these fields. This too was a lot different then classical concepts.

Having worked with magnetic amplifiers some and with ~~permanent~~ magnetic calculators at the Burrough Co. Research, we were eager to see if we could do some similar things with permanent magnets.

One of the things we wanted to do with permanent magnets was to shade magnetic poles.

After my devotions one morning, I went over to my worktable and applied a magnetic rubber ring to the back of the square built with six-inch ceramic magnets  with the north poles on one side and the south poles on the other.

A ring of magnetic rubber was lying there  that had the north side out and the south side inside. I picked up this ring and brought it up to the south side of the rectangle. It stuck to this face.

Next I laid a track through this unit and placed one of my cars with a curved magnet in place. This curved magnet had a leading north pole.

When approached from the north side, the north pole of the rectangle attracted the leading north pole of the car from about 1/2-inch out. The car was attracted through the unit and accelerated down the track for some distance. If the car was turned around so it had a leading south pole, it would not enter the unit and if forced into it there was a strong resistance that would throw it back out. We decided to call the unit a magnetic gate for that was how it acted.

Later we used a series of half gates on the left, all south, and a similar set of half gates on the right, all north, to propel a car with the curved magnet mounted crosswise. This made the car propel itself much faster.

Continuing this thinking, we have constructed a stator of these double gates with an armature of half circle neodymium magnets. This setup is quite powerful. As the sections of the rotor pass through the gates, we get the usual accelerating effect.

When placed on a sensitive force meter that stores its functions in a computer, we were surprised to find that the accelerating force lasted only one to three hundredths of a second. We had expected a smooth curve as the magnetic fields reacted. Instead, it fired more like a gun.

Investigating these spikes, we found that the magnetic fields only set up the condition for

this situation.

The spikes we were seeing was not a direct magnetic reaction. Instead, it is an effective force between the magnetic moments of the different atoms of the magnets which is much

greater than the direct magnetic interaction. It is an indirect effect which can be explained only by quantum mechanics. It is about ten thousand times stronger than the direct magnetic interaction, and is what lines up the moments in the ferromagnetic materials. A nine- to ten-pound force is generated as each section of this armature passes through a section of the stator.

As R.P. Feynman points out, "It is not possible to understand the magnetic effects of materials in any honest way from the point of view of classical physics. Such magnetic effects are completely quantum mechanical phenomenon."

With twelve stator gate ports making a sixty in circular stator, and using only one five-inch armature port on the rotor, the 10-pound force generated per stator pole should give:

1 x 12 x 10 lbs. = 120 lbs. force per RPM

At 2600 RPMs (a regular motor speed), we should have :

2600 x 120 lbs. = 312,000 lbs. per min.

312,000 ÷ 60 = 5,020 lbs. per sec.

5020 ÷ 540 ft. lbs. = 9.72 h.p. per sec. (540 ft. lbs. per sec. is one hp)

The magnetic fields are not reduced by the repeated actions of these cycling magnetic pressures.

Both the stator and the armature are mounted on thrust bearings so they can spin in opposite directions as they attract each other. This double spinning action increases the firing frequency of the quantum mechanical exchange forces. This is something we have needed to do for some time.

So, I think you get the picture of this unit acting as a planetary gear. The third gear is replaced by magnetic forces that generate quantum mechanical exchange forces. Power may be extracted from either the stator or the rotor section. Their shafts can be in line.

PROPRIETARY MATERIAL

Howard Johnson NOV. 20, 1977

So now, it looks like there is much more going on here than just plain old attraction

and repulsion. So if one really wants to truly make a real, functioning magnet motor, it is like anything else, it will take time, patience, and a willingness to do the necessary research to gain a thorough understanding of the subject. Here is a link to another paper written by Tom Bearden, which explains in much more detail what is going on inside magnetic materials. The name of the game is exchange forces and spin effects:

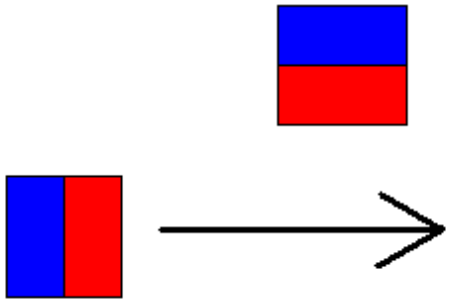
http://www.cheniere.org/correspondence/Johnson%20Motor.doc.

The most relevant information is on the first two pages of this document.

Now, for those less scientifically oriented individuals, I also offer a simple explanation for the 90 degree/multi valued potential scheme. I dub it the "Screen Door Effect." Consider the following scenario:

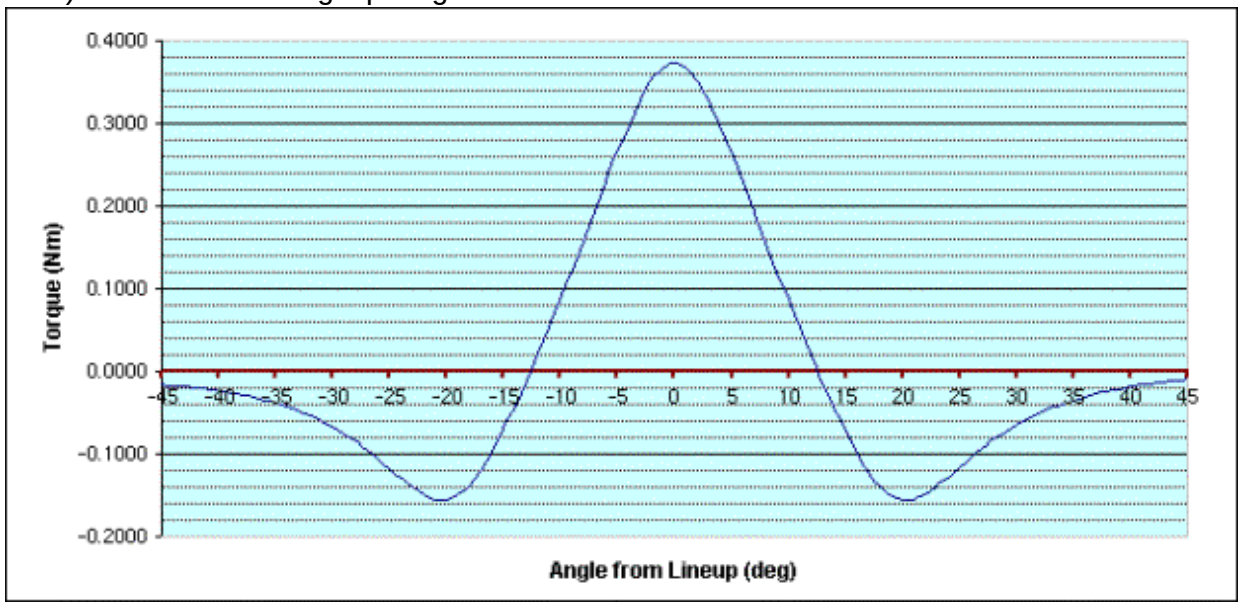
Imagine there is a spring-loaded screen door that closes every time someone pushes it open and walks through. If there is a line of people walking through this screen door (one person going through the door every 10 seconds), then as each person pushes the door open to walk through, it closes behind them for the next person to push open.

But let's say that instead of walking, this line of people started running through that door--meaning one person was passing through it every half second. Since each person is running so quickly through the door, it doesn't have a chance to close completely before the next person comes through so the people don't have to push on it as hard (or at all) to go through the doorway. This is like the repel effect we see with the magnets in the 90 degree setup:



As one rotor magnet (a person) passes the stator magnet (the screen door), there is a repel force that wants to keep it from going under the magnet (the force being a person pushing against the door). But as the magnet passes the small repel spot, there is a huge spike of repel force that accelerates the magnet through the gate followed by a small back-attraction force on the other side. In my analogy, my

description of how the screen door stays open as the people rushed through it relates to the way the incoming repel force behaves once a bunch of rotor magnets pass by it in succession. The incoming repel force that once acted against the wheel now diminishes as the rotor speed increases leaving only the big positive spike and the back attraction force (which is again much less than the large spike force). Check out the graph again:



With the proper arrangement of magnets, and considerations for the behavior of the magnetic fields, it is then a small matter to construct a running motor. The key is to understand these underlying principles.

I am still learning and experimenting with the basics of magnetics and if the reader is interested in this line of research here are my recommendations.

1. Buy some magnets and play with them. The best way to learn is from a hands-on approach. As I stated above, I encourage everyone to build the arm ramp test so they can feel the forces at work for themselves. Do not simply take my word for it.

2. Do your own research. Look around the web at some of the different models and ideas people present. User groups such as the Minatowheel Yahoo group are excellent places to bounce ideas off people and collaborate. Find out as much about what has been tested so that reinventing the wheel won't be an issue.

3. Dig into the physics behind the effects. This is where I am currently

> working. There comes a point where the serious builder needs to acquire a comprehensive understanding of the physics behind magnetic fields. This research is like anything else; you cannot advance it if you don't know what you are doing. Do your homework.

The more competent experimenters there are working on the subject, the sooner breakthroughs will happen. My goal is to educate people as I make discoveries for myself. Permanent magnet motors can and will soon be a reality. As we all know this world is ready for a change, but the only way that change will occur is through education, experimentation, and dedication.

God Bless,
Jason Owens

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2d Magnetostatic Analysis of the Permanent Magnet Unbalanced Flux Gate Design

© Terrence Staton
terrences@speakeasy.net
Sunday, June 13, 2004

Introduction

I have been working on a new gate design that I call the unbalanced flux gate. The design incorporates ideas from the minatowheel Yahoo group. I have been running many magnetostatic FEA magnetostatic parametric simulations to explore these ideas. I feel it might still be too soon to post this idea as I don't want to lead anyone down a path that will prove to be fruitless. On the other hand I might be missing something very critical in this research if I don't share it with others. In the interest of speeding the progress of this research this document will detail the research I have done thus far on this gate design. You may not distribute this document or information contained in this document without prior permission from me.

Background

I will present a quick overview of the concepts that are employed in this gate design.

• Permanent magnet gate designs are best constructed using configurations where the magnets are primarily repelling each other. Using attractive forces is very problematic due to energy required to pull attracted objects apart. For attractive configurations the equilibrium state is to remain as close as possible to the object of attraction. For repelling configurations the equilibrium state is to remain as far from the repelling object. Another force such as friction eventually counter balances the repelling force and then the magnets will remain at rest.

• Materials with a relative permeability greater than 1, ex. steel and iron, can reduce the measured B of a permanent magnet when placed between the point of measurement and a permanent magnet. The B takes the path of least resistance by traveling through the steel versus the air.

• Materials with high relative permeability can also cause two permanent magnets that would normally repel each other move toward each other when placed in between the repelling magnets.

• Materials with high relative permeability often have non-linear B-H curves. Due to their non-linear nature they reach a point where they become “saturated” with magnetic fields (B). The concept of saturation refers to the fact that that little to no new magnetic domains can be created in the material.

These are the most crucial ideas employed for the design tested in this document, but there are many other concepts which I will not mention here that make permanent magnet gate designs possible.

Simulation and Analysis Procedure

All of the simulations in this document are conducted using 2d magnetostatic analysis. The permanent magnets are simulated with Grade 40 NdFeB material. Parametric analysis is done by moving the rotor through the gate by creating 16 solutions per inch of movment. The results of the parametric solving are then exported for analysis using Matlab. In Matlab area plots as well as 2d comparison plots are created to analyze the difference of varied parameters from each gate design.

The trapezoidal integral is also calculated for each area plot to produce the total area under the entire force curve.

Initial Goals of the Project

My initial goal was to increase my understanding of how relative permeability materials greater that 1 interacted with magnetic flux from permanent magnets. Several people in the minatowheel group including myself felt using a material like steel with magnets configured to repel might prove to be useful in a permanent magnet motor design. The problem is how to use it and in what configuration should the magnets be configured. My first step was to tackle the permanent magnet configuration without using steel. I needed a configuration where a permanent rotor magnet could pass through two or more permanent stator magnets producing a repelling force on both sides of the stators. The simplest configuration that meets this requirement is to three magnets angle the direction of its poles such that they are parallel to desired direction of movement. This configuration is shown below in Figure 1 Balanced Repelling Gate Configuration.

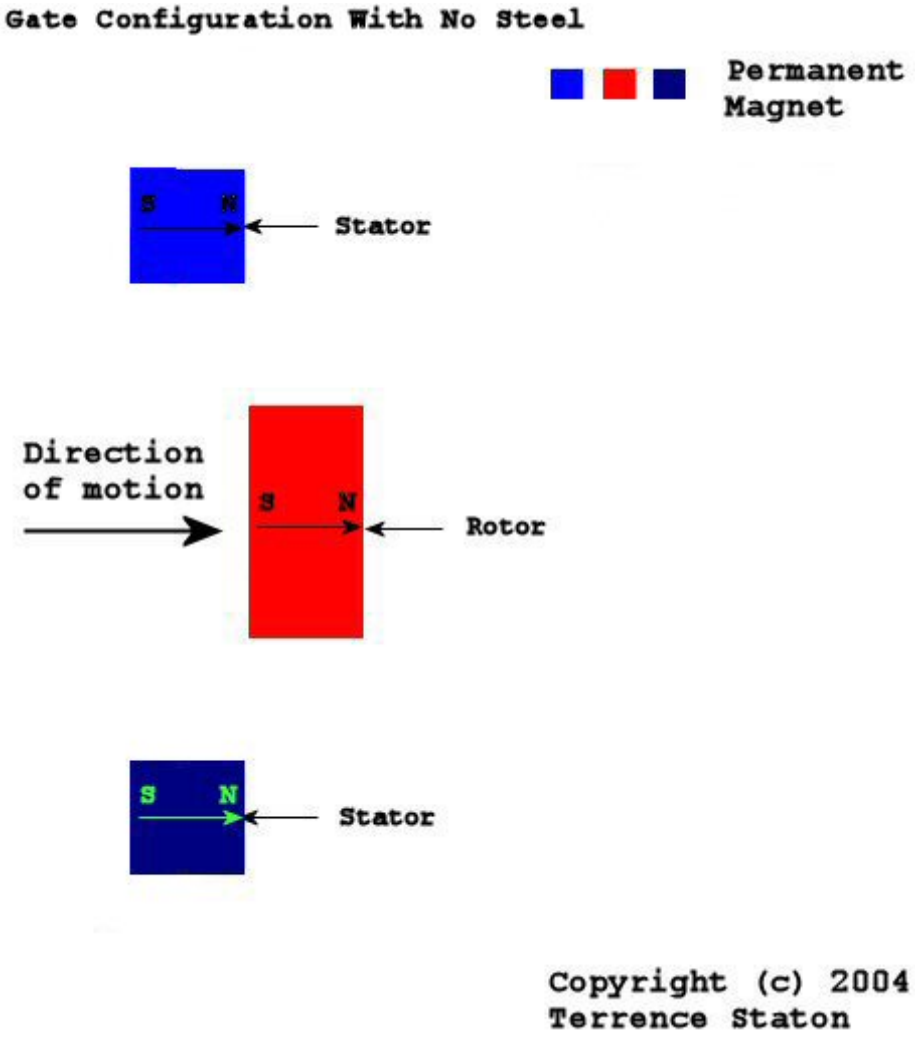


Figure 1 Balanced Repelling Gate Configuration

The force area plot of this configuration is show below in Figure 2 Force Area Plot of Repelling Gate. This area plot shows the force exerted on the rotor in direction of motion. A negative force indicates a force in opposition of the desired direction of motion. A positive force indicates a force in the desired direction of motion. For the area plot you can see that the negative forces and positive forces completely balance each other out. The trapezoidal integral on this force curve has a result of 5.5454. This is within the margin of error for the simulation. In a perfect simulation with no error and infinite number of samples one should expect a result of 0 for the trapezoidal integral.

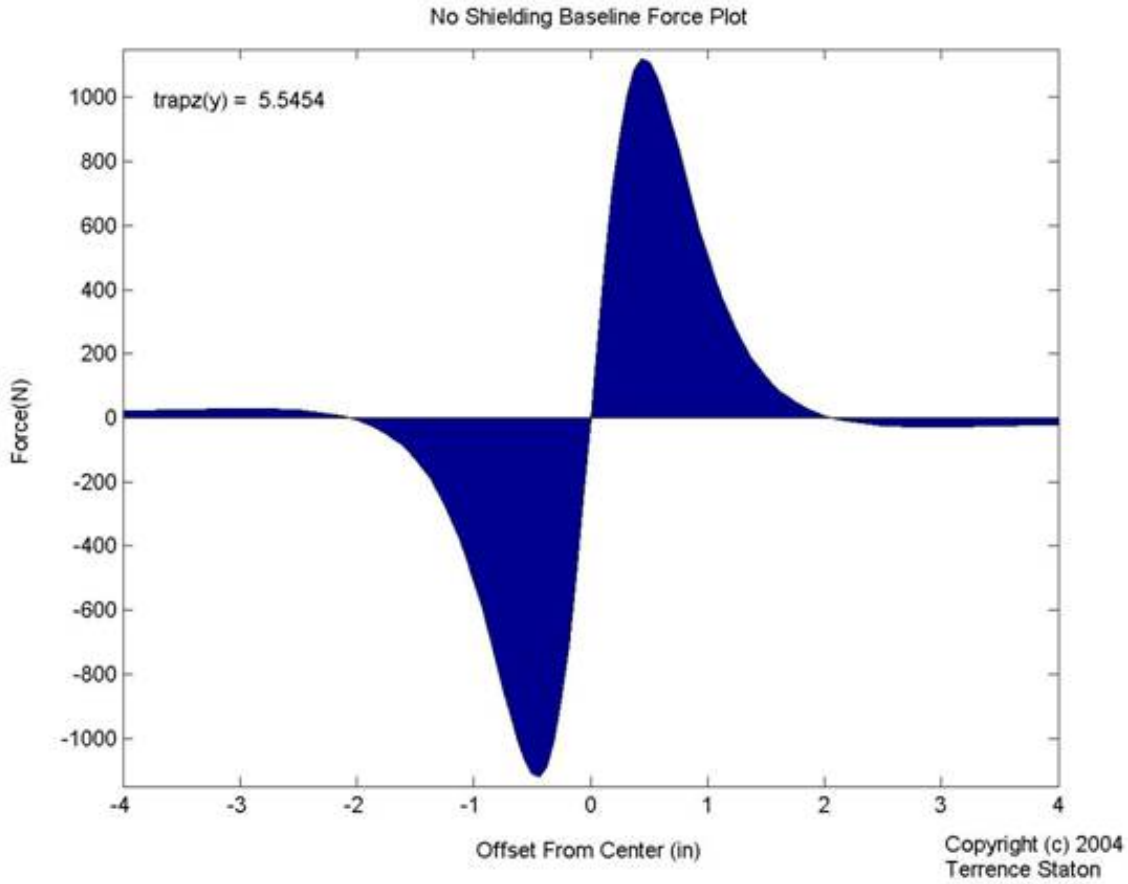


Figure 2 Force Area Plot of Repelling Gate

Now with a base configuration of magnets selected then next step was figuring out how to use steel to significantly reduce the negative force without having a major impact on the positive force. At first I didn't think I would discover any interesting results. But I eventually created the configuration shown in Figure 3 Gate7 Configuration. This configuration had interesting simulation results. The force area plot for this configuration is shown in Figure 4 Force Area Plot of Gate7.

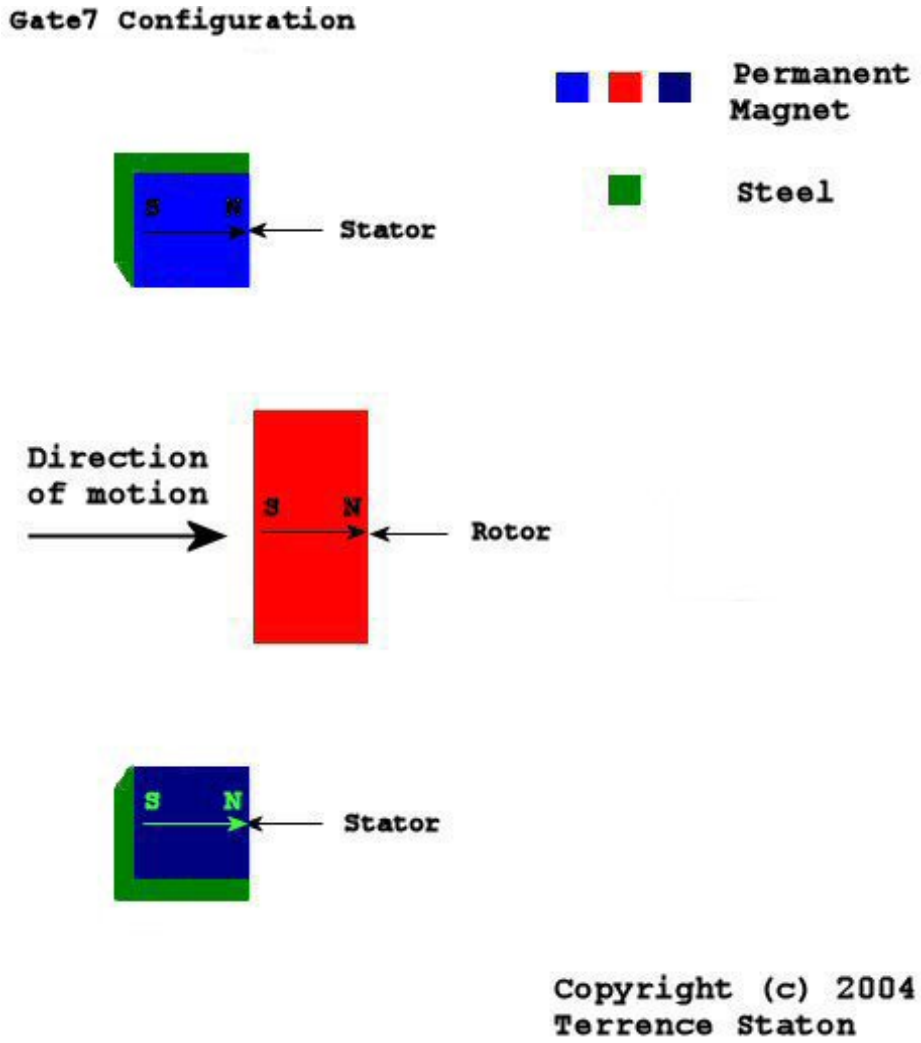


Figure 3 Gate7 Configuration

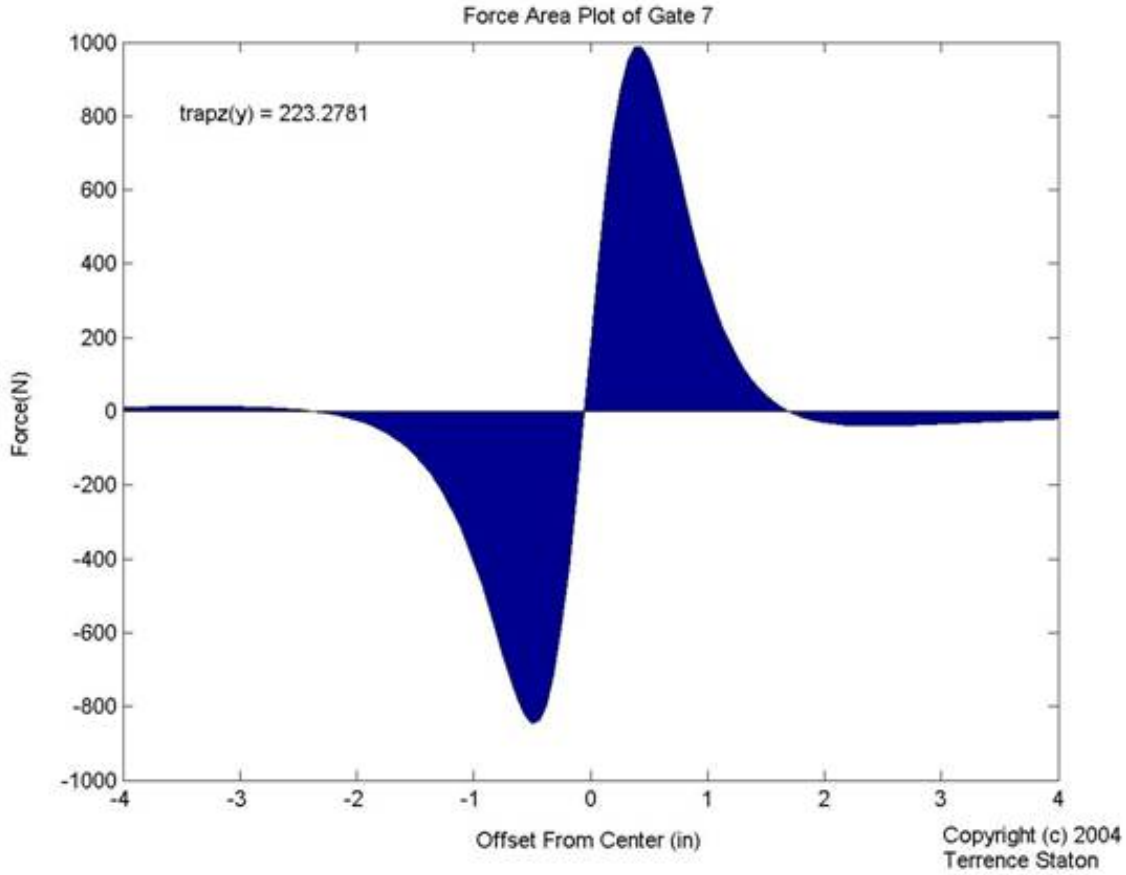


Figure 4 Force Area Plot of Gate7

Looking at the force plot you can see the desired effect of reducing the negative force with minimal effect to the positive force is present. The trapezoidal integral tells us the area above the zero axis is significantly larger than the area below. This equates to approximately 22% more force exerted in the positive direction than the negative direction.

In-depth Analysis of the Unbalanced Flux Gate

My thinking behind the design of gate 7 was to see what effect the steel would have if I used the steel as shield on the side of the stators where I wanted to reduce the magnetic flux. From earlier simulations I had learned to not use too much steel. Also the steel that was used for shielding had to be placed up against the stators. My idea was to have the magnetic field from the stators saturate the

steel. This would prevent any magnetic domains from being created in the steel that would have the steel and the rotor attract.

I began analyzing magnetic flux line plots of Gate 7 at both the positive and negative peaks. Analysis of the flux line plots lead me to a new hypothesis to which I proceeded to test. My hypothesis is that it is incorrect to think of a material with a relative permeability greater than 1 as a magnetic shield. Instead it is much more appropriate to think of them as conductors of magnetic flux. Magnetic flux will take the path of least resistance. When given the choice of traveling through air or steel, the magnetic flux will travel through the steel in increasingly higher flux densities until either no more magnetic domains can be created in the steel or the steel has already created enough domains to completely carry the magnetic flux to which it is exposed. This is precisely what the B-H curves of materials show us.

The results of testing this hypothesis lead to the creation of gate10. Gate 10 is shown in Figure 5 Gate10 Configurationand its force area plot is shown in Figure 6 Force Area Plot of Gate10.

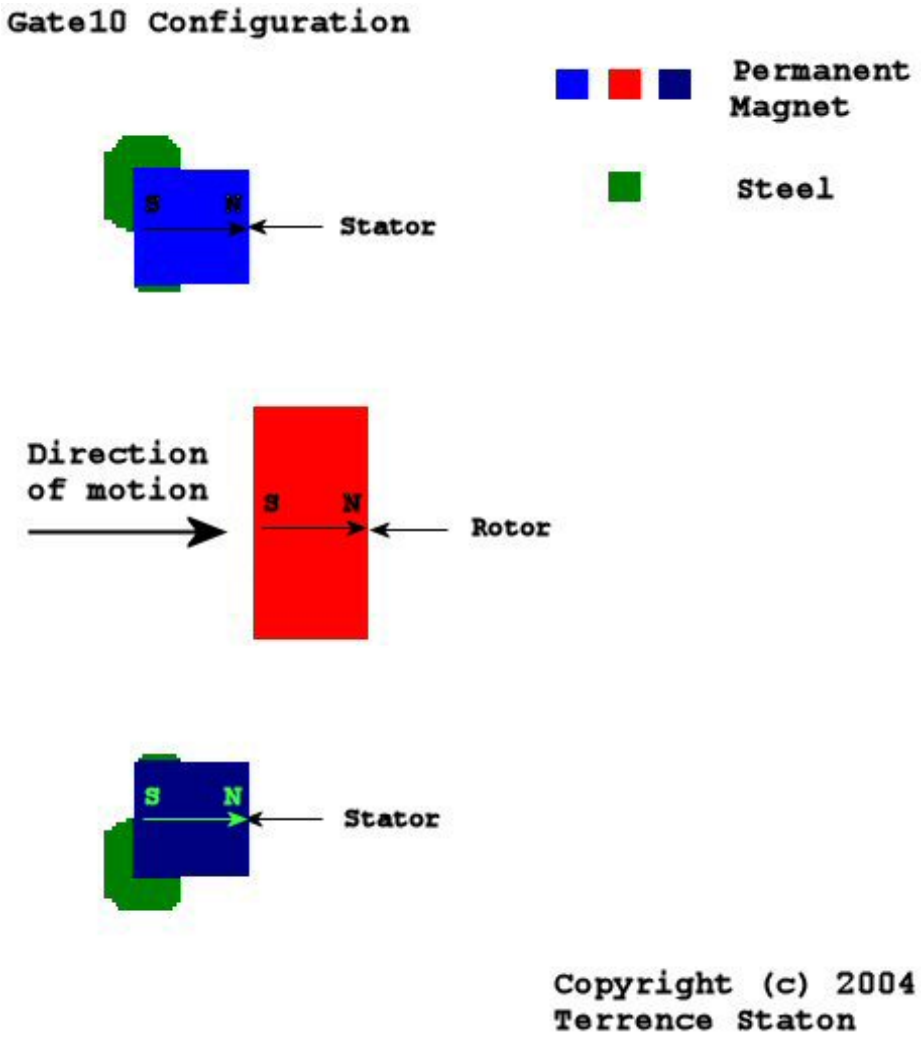


Figure 5 Gate10 Configuration

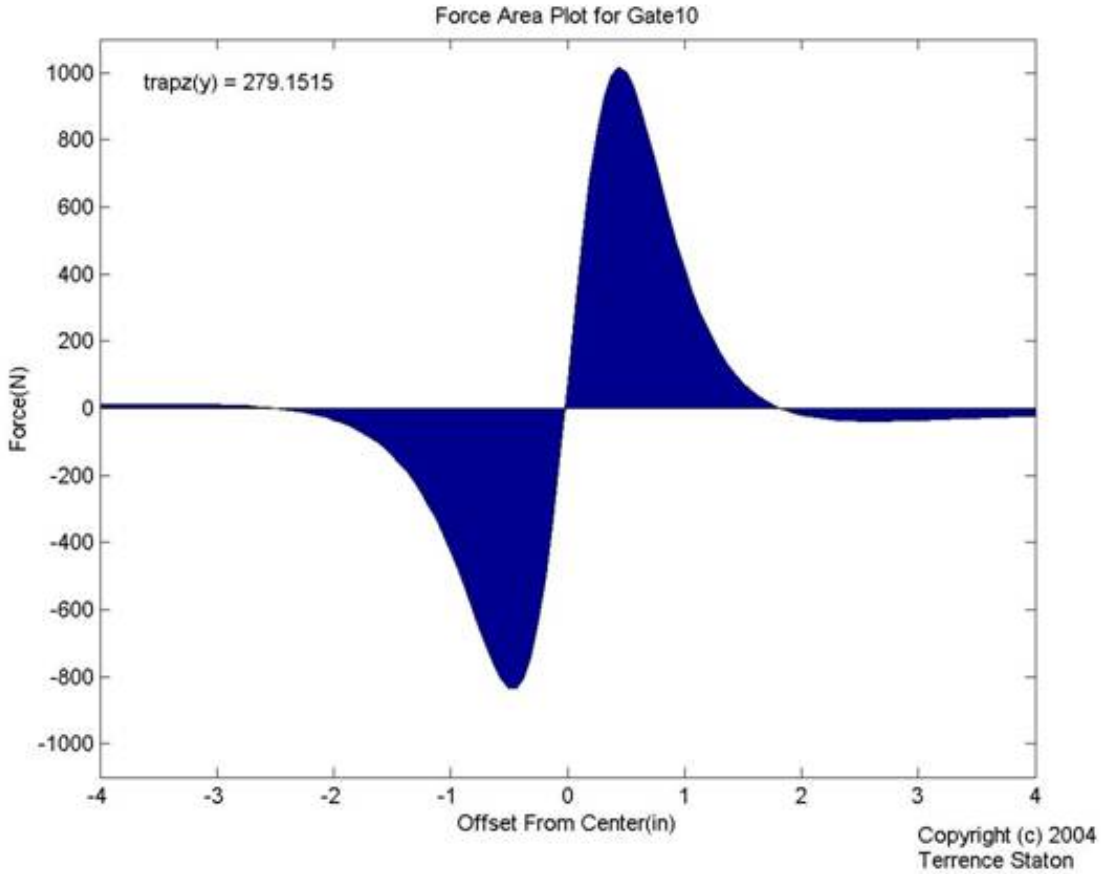


Figure 6 Force Area Plot of Gate10

The result of the gate 10 simulation gives evidence to support my hypothesis. Looking at the flux line plots of both the negative and positive force peaks I observed the following effect. The shape and position of the steel in gate10 is causing a significant part of the magnet flux moving the rotor in the –x direction to pass through the steel. In this case part of the N to S flux for the stator magnets is going through the steel. None of the N to S flux of the rotor, N rotor to S stator or N stator to S rotor flux is passing through the steel. By doing this the negative x inducing interaction of the N to S flux of the rotor and the N rotor to S stator flux with the N to S flux of the stator magnets is reduced. The size of the steel is just so that it becomes saturated with the magnetic flux from the stator magnets only. If the steel conducted any of the N to S flux of the rotor or the N rotor to S stator flux then the desired effect would be lessened or become an attractive force for the rotor.

Next I wanted to test the result of moving the stators closer together so the rotor would have a small

gap when passing between the stators. The resulting force area plot is show in Figure 7 Force Area Plot of Gate11. The trapezoid integral showed a marked decrease over gate10. I concluded that since I am trying to unbalance the repelling forces on one side of the stators versus the others then it makes little sense in reducing the size of the gap. A smaller gap is actually much more harmful due to several reasons as follows:

- The closer the rotor gets to the steel the more difficult it becomes to fine tune the shape such that saturation comes only the stator magnets.

- Effects from Lenz's Law will increase with a smaller gap.

- Reducing the gap increases the repelling force on both sides of the stators by equal amounts.

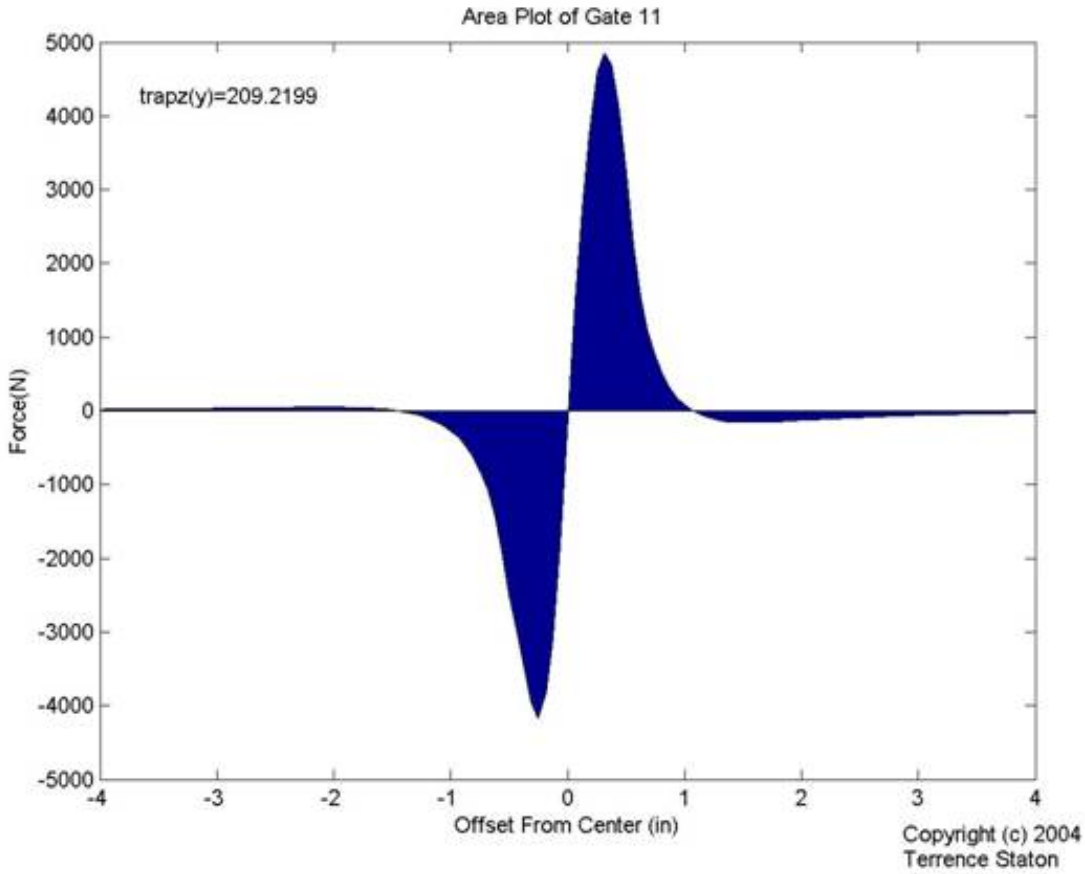


Figure 7 Force Area Plot of Gate11

I managed to improve the gate10 design even more my placing a small amount of steel on the right side of the stators. I found that using the steel to lessen the resistance of S Rotor to N Stator flux showed a larger increase on the positive force versus the increase on the negative force. The force area plot of Gate11 is shown in Figure 8 Force Area Plot of Gate. I

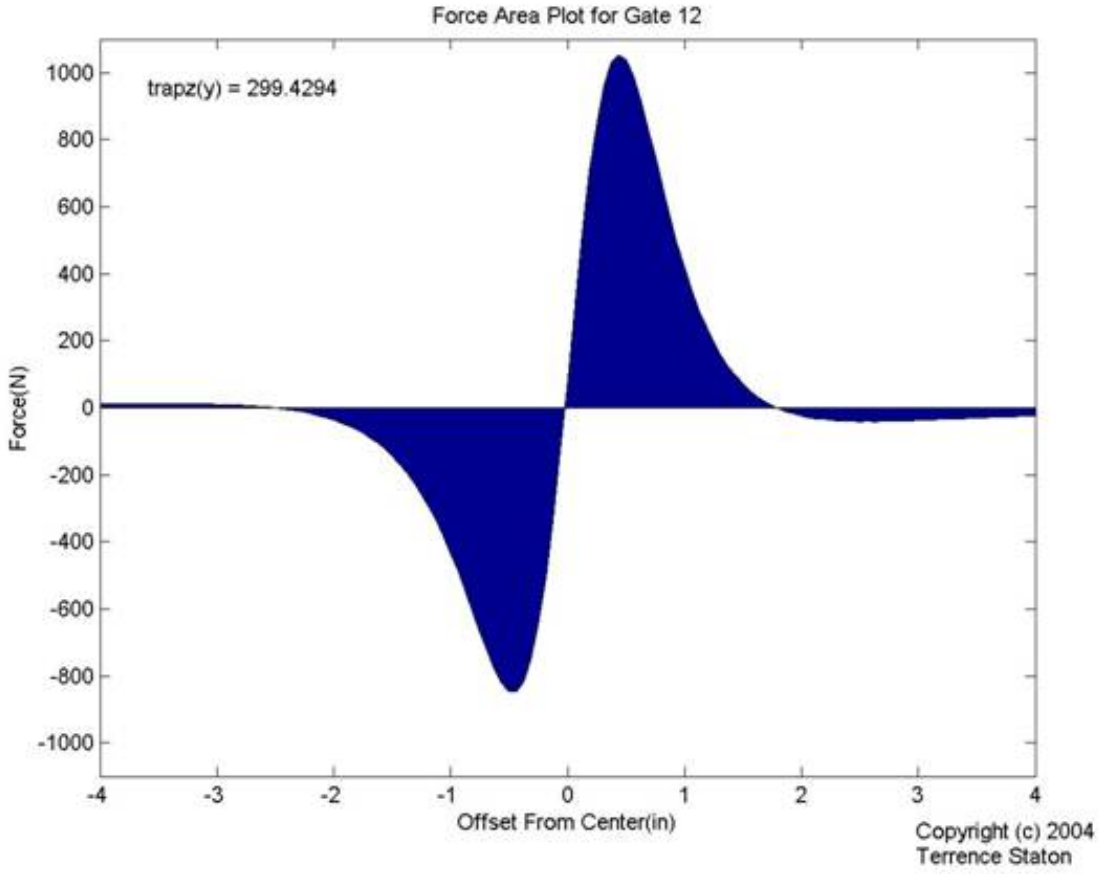


Figure 8 Force Area Plot of Gate12

To sum up how much of a difference the steel has made in the result of the magnetostatic simulations take a look at Figure 9 Force Plot of Baseline Versus Gate . This plot shows the progress the gates have made over the concepts I have investigated thus far. The shape of the steel could probably be further refined to improve the desired effect even more. However, I think this work is best left until

the gate design can be explored in 3d magnetostatic FEA.

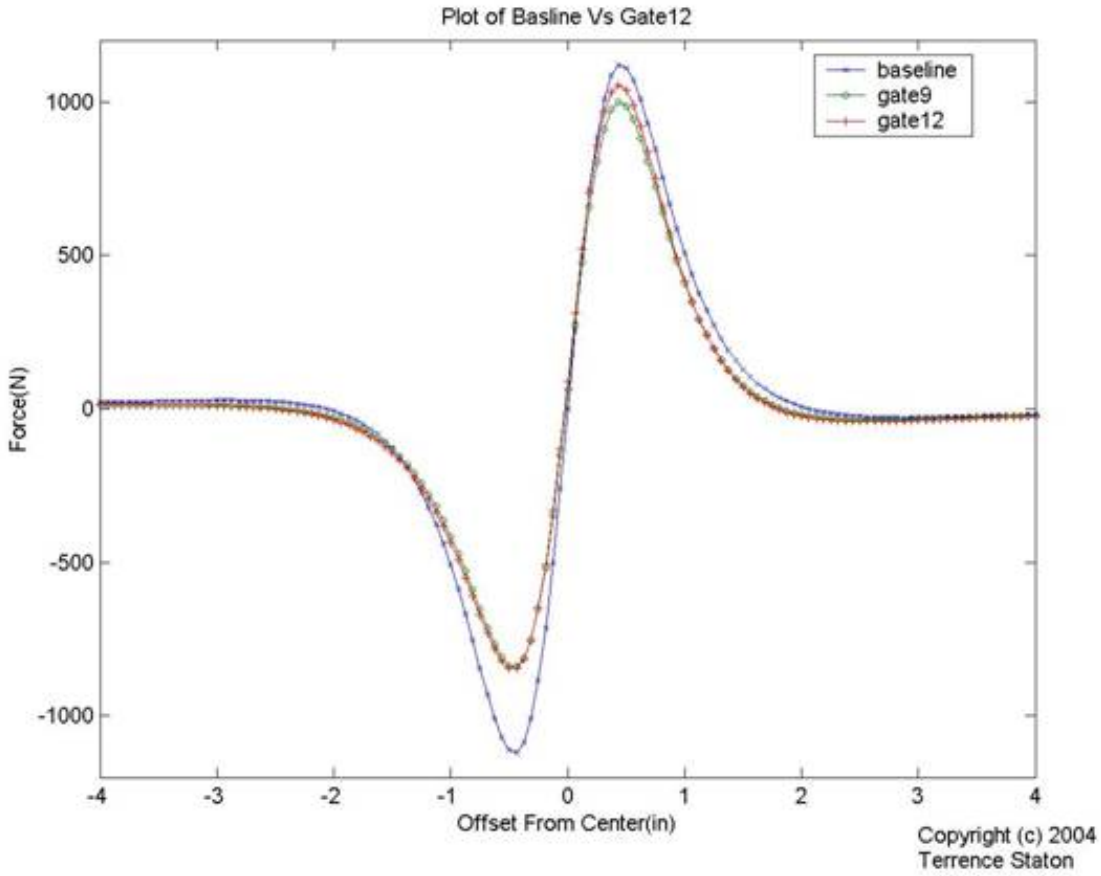


Figure 9 Force Plot of Baseline Versus Gate Configurations

Analysis of Unbalanced Flux in a Linear Track

Next I proceeded to do an analysis of the rotor passing through a series of stators in the gate10

configuration. This configuration is shown in Figure 10 Unbalanced Flux Track Configuration. The spacing of the stator pairs for this configuration was chosen to have minimal interaction of the repelling peaks of the stator pairs. The simulation results of this configuration are shown in Figure 11 Force Area Plot of the Track1 Configuration. The graph shows a very slight negative affect of the stator pairs on upon each other. Each successive positive peak is slightly lessened while each negative peak grows slightly. The trapezoidal integral clearly shows a sum total positive x force.

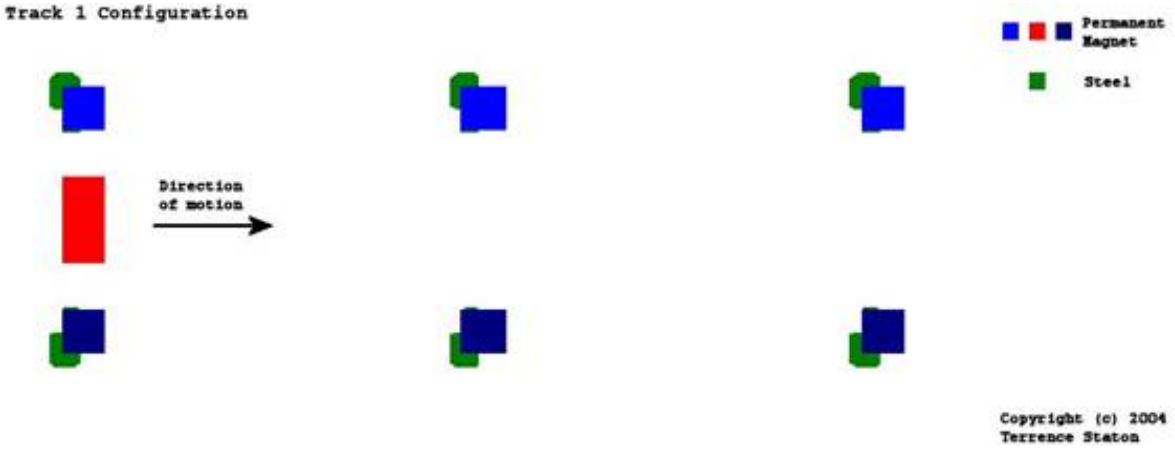


Figure 10 Unbalanced Flux Track Configuration

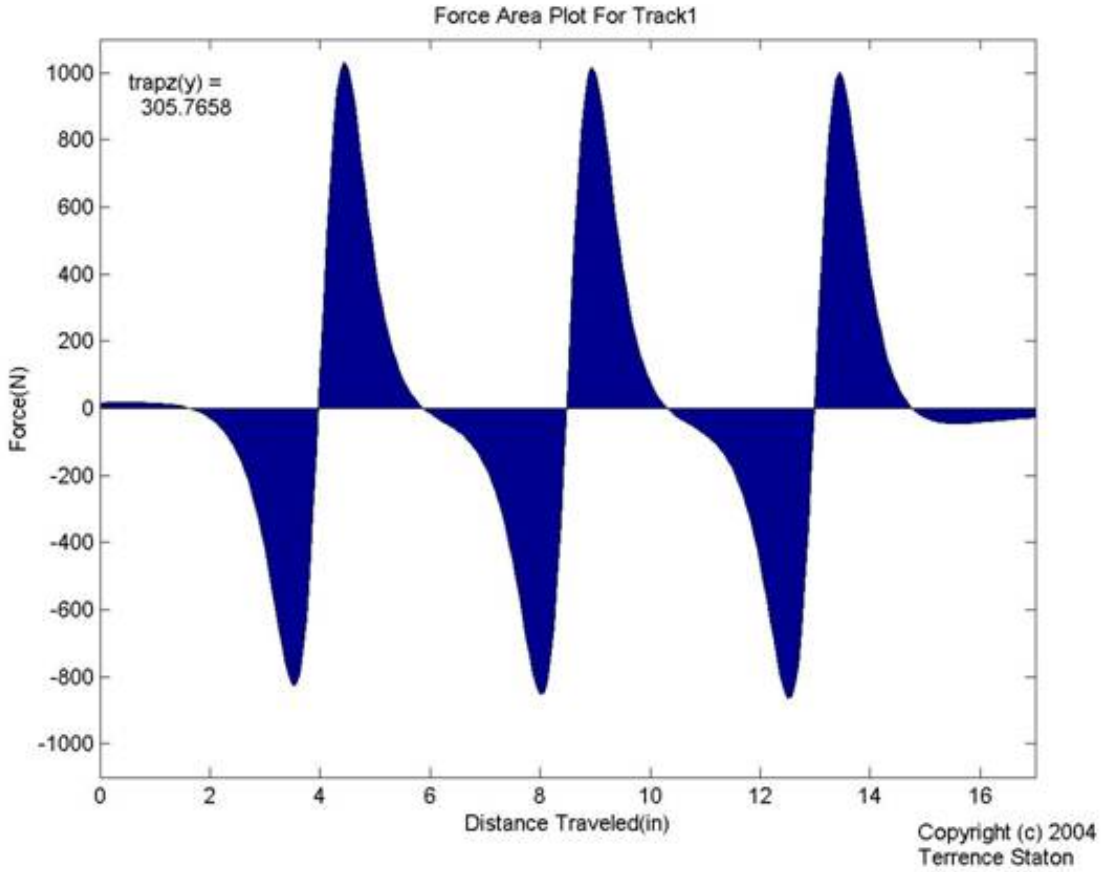


Figure 11 Force Area Plot of the Track1 Configuration

I next tested the effect of moving the stator pairs close together. The resulting force plot is shown in Figure 12 Force Area Plot of the Track2 Configuration. Here the negative influence of the stator pairs is much more noticeable. The trapezoidal integral decreased by 48.5%.

Further testing of the linear track should be done. A longer track with more stator pairs should be simulated. At the current time I do not feel this is a very high priority as the linear track serves no practical purpose other than setting a basis for study multiple stator gate interactions.

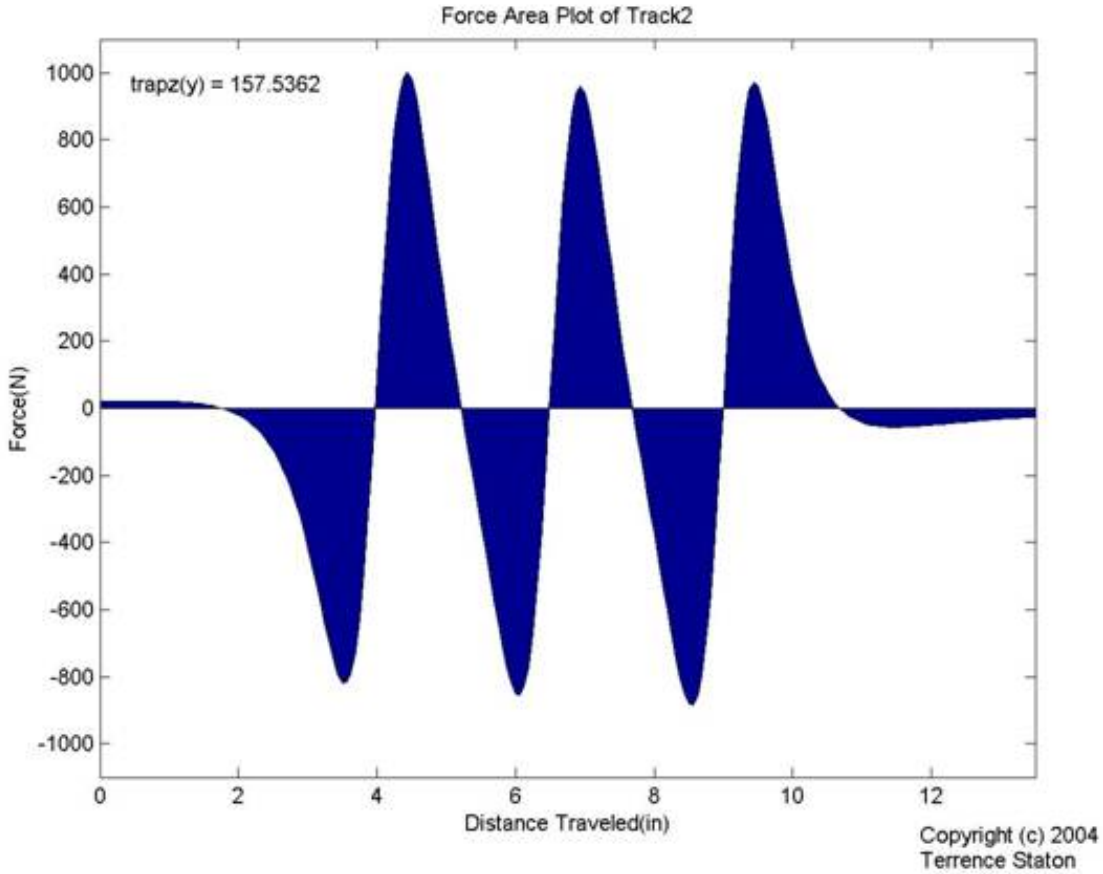


Figure 12 Force Area Plot of the Track2 Configuration

Conclusion

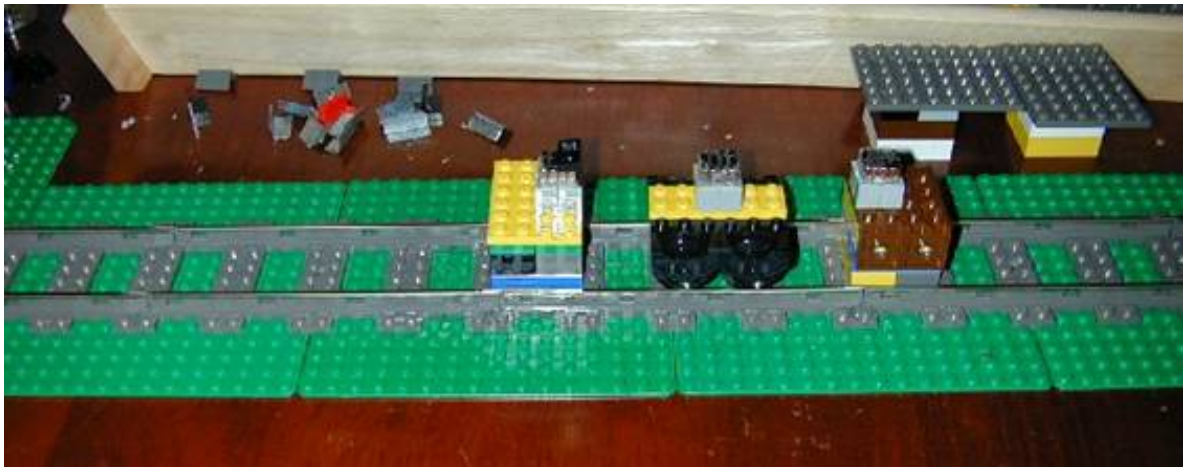
In summary I would say the gate configuration presented in this document shows much potential. Unbalancing of repelling flux forces in the manner described here might possibly be used to build a permanent magnet motor that has no electrical input. If we use LaFonte balancing with paired armatures, 4 permanent rotor magnets, in an X layout the motor should self start without the need for any electromagnets in the motor. My primary concern is computer simulation versus real world results. My secondary concern is the need for eddy current analysis to get a better idea of Lenz's Law effects. Beyond that the amount of torque that can be produced from this in a possible motor is questionable. My next step is to move to 3d modeling and magnetostatic FEA simulation. I will write a follow up document after I have completed my 3d analysis of the concepts presented in this document. If the 3d computer simulation results look promising I will have a physical prototype constructed for testing.

Please e-mail me any feedback, questions or ideas you might have. Better yet post on the minatowheel Yahoo group and share your thoughts with all of us there. Best of luck to each and every one of us out there on the quest for free energy!

Update of My Recent Testing Efforts

© Terrence Staton
terrences@speakeasy.net
Thursday June 24, 2004

Here is an update on the tests I have been doing so far. Generally while I am running computer simulations I am also conducting some experiments that I setup up with Legos. I find Legos to be sturdy and fairly precise. I can get accurate results even with small forces. I can often conduct a great many number of experiments in a single night by using them. Here are some of the tests I have conducted over the past few days.

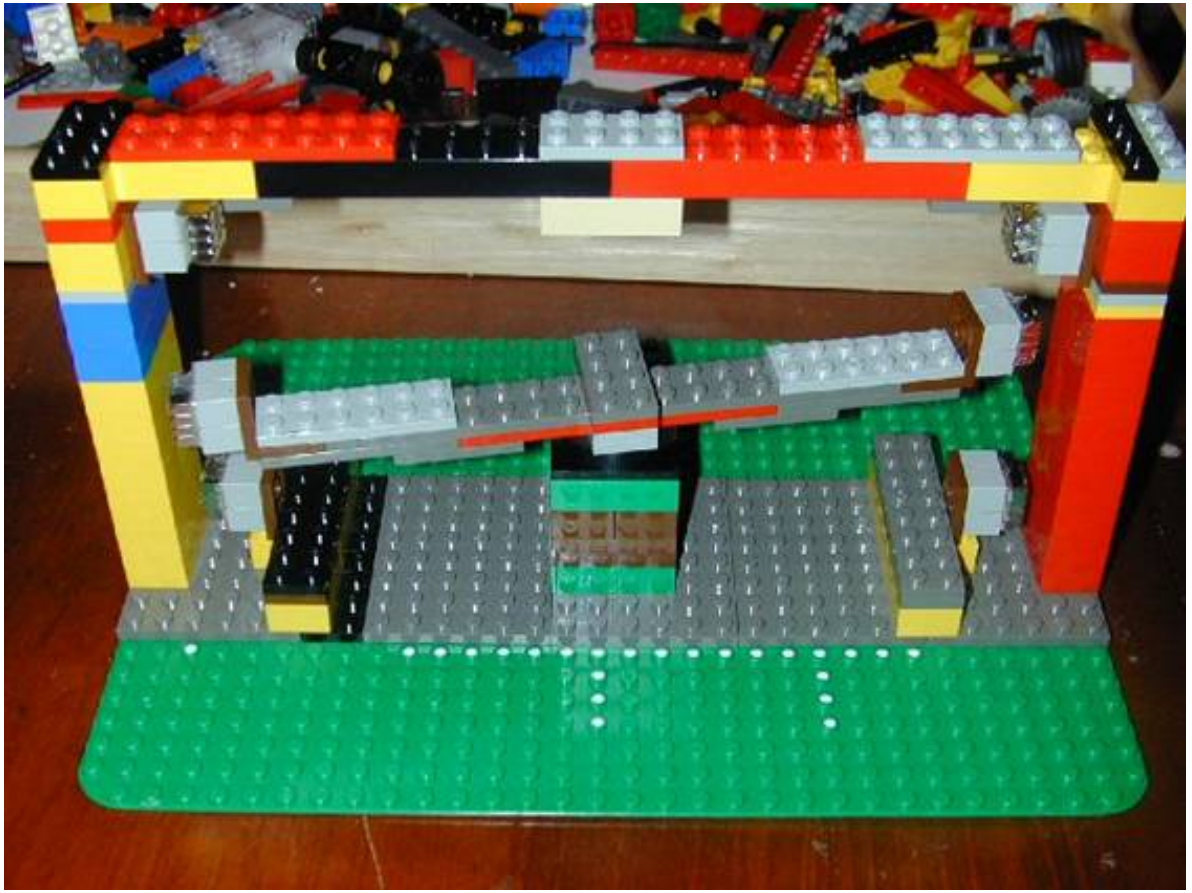


Above is a picture of the Lego train track I often use to conduct linear experiments. I put rotor magnets on cars of varying sizes depending on the test. Then I place stator magnets along the

track. This is the setup I use when I test shielding materials. Both stator magnets are repelling the rotor magnet in this picture. I put the shielding around one stator magnet and see how far the car moves towards that magnet. I found that if I didn't conduct this test before doing other tests with the shielding material I could be wasting my time as the shielding is ineffective.

Right now I don't have any shielding effective enough to conduct further shielding experiments. Either they don't absorb enough B or the shape just is not right. Since there is only so much I can do with a Dremel, I am trying to locate a local independently run machine shop so I can get a few pieces of shielding made that should work very well. The shape, size and material of the shielding will be based up some of the simulation results I have conducted thus far. I will use a CAD drawing of the parts to make sure they are accurately fabricated.

Over the past few days I have been exploring possible motor configurations. Next is a picture with one of my motor ideas.



I initial thought this configuration would be a good setup for HJ motor idea that Graham had. I noticed something a bit odd about this setup. Only the left side the stators were set up to repel. On the right side the stators were setup to attract. As can be seen here there is a sticky spot. It is possible that one of the magnets is stronger than the other causing this problem. Also it is possible that the magnets approaching in arc like this creates the sticky spot. My guess is the former. I need to build my own gauss meter to confirm this possibility.

Next I tested a more typical motor configuration.



In this configuration the stator magnets in the 7 and 1 o'clock positions are repelling. The stator magnets in the 4 and 10 o'clock positions are attracting the rotors.

I noticed the exact same sticky and repel spots in this configuration as the previous one. The sticky and repelling spots reversed depending on which rotors were facing different magnets. This leads me to believe that the magnets are indeed imbalanced. I think it is time I go ahead and get a Hal sensor and build my own gauss meter.

Well that is it for now. If anyone else has ideas on what might be going on in the above tests I would like to hear your thoughts the matter.

Thanks,

-Terrence

TOMI, et al by Evan Callicoat

I've been doing some research into PMMs based on the TOMI and similar theories, and I ran across your page. I wanted to share some information with you regarding my design, simulation, construction and experimentation with a linear PMM configuration that is incredibly simple to repeat, as well as an explanation regarding the principle involved, as I get the distinct impression that much of the material on your site (and many others) is shaky on a few points, especially concerning the non-linear flux paths of the TOMI track, triangle gate and Johnson motor.

To begin with, I think it's well known (or at least somewhat obvious) that the key to a PMM -- just as in the common electromagnetic motor (EMM) -- lies in maintaining a field imbalance between a statically mounted and dynamically mounted source of magnetic flux, such as to cause the dynamic source to move in a specified manner. In the case of the EMM, the imbalance is achieved by electromechanical commutation or alternation (of current, such as in an AC induction motor), where the properties of the mechanics and electricity are used to this effect. Our goal in a PMM is to maintain this imbalance without resorting to electricity or its properties; now proceeds that discussion.

If you take two bar magnets of equal size and strength, then you will observe they have straightforward, obvious properties. When the like polar ends are aligned opposite each other, they repel directly. When the unlike polar ends are aligned opposite, they attract directly. Furthermore, if the polar end of one magnet is directed perpendicularly to the side of the other magnet, it will experience a torque about that end, attempting to align it parallel with the other magnet. The direction of the torque depends on the polar configuration of each magnet. This torque at right angles is one half of a very important aspect to observe. The other half is that the polar end also experiences a force vector both towards the magnet side, and along it, the direction again depending on the polar configuration of each magnet. The vector component along the magnet and the torque about the end point are what we're interested in. To be complete, though, you will observe one further, obvious property; if the magnets are placed parallel but askew, such that the ends do not align, yet are still within each others' fields, each will experience a force vector both towards the other and along it, the latter opposite for each magnet to the other, such that the overall effect is to align their ends in parallel.

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Now, the parallel arrangements are stable in that they do not attempt to alter basic field alignments, but the perpendicular arrangement is unstable because of the torque, which does. This torque is summarized in the magnetic component of the Lorentz Force Law, **F** = q**v** x **B**, where F, v and B are vectors, q is a 'point charge' (a source of an electric field) and v is the velocity of q. The magnitude of the force is given by F = qvB sin t, where t is the angle (< 180 degrees) between v and B (the motion of the charge and the magnetic field). The magnetic field is considered where N and S are differentiated by + and - values for B. Furthermore, magnetic fields are also considered as varying densities of moving charges (dipole moments), constituting the 'lines of force' (flux). The part of this that we're interested in here is the corollary of the magnitude equation, which is that the force is 0 when the angle between v and B is 0 (or 180), and highest when the angle is 90. Thus, the perpendicular arrangement experiences the highest torque; the maximum instability.

The torque itself is undesirable, but the edgewise -- along the edge -- component of the force vector the 90 degree arrangement provides is the key to directed motion, as there is no material obstruction in its path, whereas the edge-on component of the force vector -- towards the edge -- will be stopped by the edge of the magnet when reached. Counteracting the torque effect can be done mechanically, but it can also be done magnetically while also increasing the force vector edgewise, and reducing it edge-on. This is accomplished by placing another bar magnet parallel to the edge one, opposite the perpendicular magnet, placing it between the two. The polarity of this third magnet is opposite the first one to which it is parallel -- together, these form a track, with the central magnet as a vehicle on that track. Both poles of the vehicle now experience equal, but opposite torques from the track magnets; they also experience equal but opposite forces edge-on towards each track magnet. Interestingly enough, however, the edgewise force is the same along each edge! This is due to the fact that the relationship of vehicle pole to edge pole direction remains the same on each side. Thus, inbetween the track magnets, the vehicle experiences constant thrust in a specific direction.

However, the situation becomes more complex at the ends of the magnet along which edge the other is moving. Without diving into too much complexity, the basic problem is that when approaching the track, the vehicle is interacting with the track poles at an angle far closer to 0 than to 90, during which time it is heavily repelled. Further, at the opposite end, after experiencing the thrust between the track, it passes from 90 towards 180, during which time it is heavily attracted back towards the track, countering the previous thrust.

Obviously, if one could build very long track magnets, then the vehicle would accelerate from just inside one end to just inside the other. As this is impractical or impossible, one can instead simply divide the track magnets into rectangular sections, magnetized across their width, connected directly together in a stack, as long as the track requires. That leaves the 'end' problem, which is not a problem, per se, for uses such as trains or railguns or other such devices which limit their operation to the inner portion of a rail-like path. It is, however, a problem for motors and other devices which 'close the loop' on a track. That's the goal of a PMM: a rotary configuration, which I will

explain more about in a moment.

The preceeding has been a detailed summary of the steps that most inventors and theorists have taken in pursuing PMMs, but around this point is where most diverge and (I feel) have great difficulty. In the case of the Johnson motor, TOMI track and the triangle gate, including the many derivatives, there's this constant theme of spacers and unmagnetized flux paths in an attempt to make the flux response non-linear, in hopes (I presume) of imbalancing the system mechanically. I believe it's fairly obvious that the 90 degree field angle is the reason behind any imbalance, and thus the core of maintaining imbalance for motion. Considering such devices, I think they get closer to the core by making the flux path non-linear than by not, but I think they approach it from the wrong idea in the first place, even though all of them must involve some aspect of maintaining a field angle $45 > x > 135$ to produce any results.

Now, I'm not attempting to discount any good ideas, designs or attempts on the part of anyone working on this unique challenge. I myself have learned a lot from the ideas and designs of others, much of which contributed to my discerning the principles involved. Instead, I commend all of them! Bravo for at least having the interest and guts to spend precious moments (sometimes an awful lot of them!) of your life on an endeavour that respectable, intelligent men say can't be done because you can see how it ought to work, in one way or another. I hope that the preceding serves as a firm foundation for a truly scientific theory of magnetic instability, as my simple-yet-obvious explanation has shown various linear applications that literally anyone can build with a handful of magnets and simple frameworks. On to the PMM...

Let me start by saying what 99% of everyone else out there says at this point: I don't have a working device which I can sell you, show you or tell you how to build. But. Let me also say that I do know how to make one work, and why most designs that ought to do not, as well as why most linear designs do not work in rotary configurations. Here follows that discussion.

Given the track described above, the first step in a rotary configuration would be, of course, to curve it. Using rectangular stator poles ('track magnets' in a PMM; hereafter 'stator poles', which comprise the 'stator'), we end up with wedge-shaped spaces on the outside of the curve, which is a flux loss and loss of efficiency in coupling. Using the same rectangles for the inner stator and the rotor ('vehicle'), we also have spaces there, another loss. Most importantly, however, it doesn't work. The most obvious difference between the linear and rotary configurations are the gaps and segmented-curve surfaces. At this point, we can insert steel wedges, curve the magnets (pineapple wedge shapes), or both, or various other elaborations. Still, it doesn't work right.

What's going on here? The linear configuration is obvious and straightforward. Are there 'end points' in our rotary setup? Not with wedges of steel or magnets. The flux path is constant; the magnetic edge 'smooth'. What else is different?

As you can see, the angle of field interaction is very, very important

for continuous instability. The crucial difference between the two configurations in these examples (and why an electromagnetic coil works when our ring does not) is that the direction of magnetization is not curved. That's it. We've curved the magnets, but left their B vectors linear, then stuck them together, coupled by air or steel or simply edge-on, but their internal flux paths are not curved such that the fields remain in a 90 degree alignment. It is extremely common to produce wedge-shaped stator magnets which are magnetized along the vector normal to the curved surface; it is not common at all (if even done? I'm not entirely sure about what use this would be industrially) to magnetize wedges such that the vector curves along with the wedge shape. Perhaps custom magnets can be ordered in this way, with the right machinery, but it's a safe bet to say that few if any PMM designers have gone this route. Johnson is one of the few I know of to order custom magnets, and I'd be willing to bet that any success on his part is only due to getting the actuators magnetized along their curvature. Another possibility is to use a very thin rectangles and/or more trapezoidal shapes with standard magnetizations to construct the stators, such that the flux paths more closely approximate a curve.

Using standard rectangles for rotor and stator, and magnetic wedges for the gaps, my simulations show approximately a 60%/40% thrust/drag ratio, pretty consistently over all points, which, while being better than 50%/50% at all points, is still vastly inferior to what the linear configuration suggests, being 100%/0% within the edge-on field. My next goal is to model and simulate the suggestion I made above, using very thin magnets with a gentler curve, to see how much more closely the results match the linear configuration.

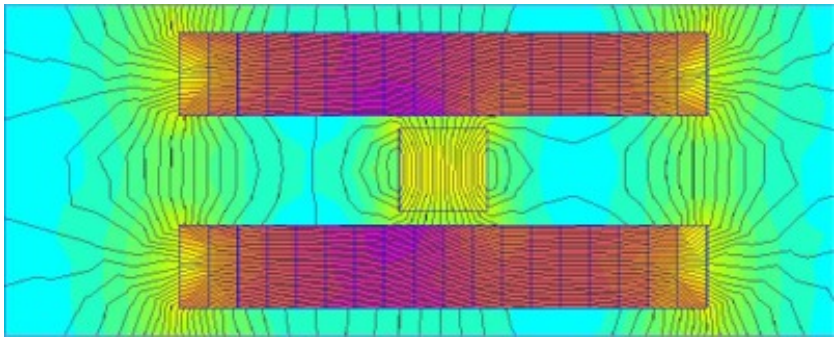
Lastly, I offer a suggestion (which I plan to construct and test) for how to build a continuous motor of the linear configuration. It is vastly inferior in many ways to the rotary configuration, if it can be achieved, but it still provides continuous motion, albeit with more wear on the parts.

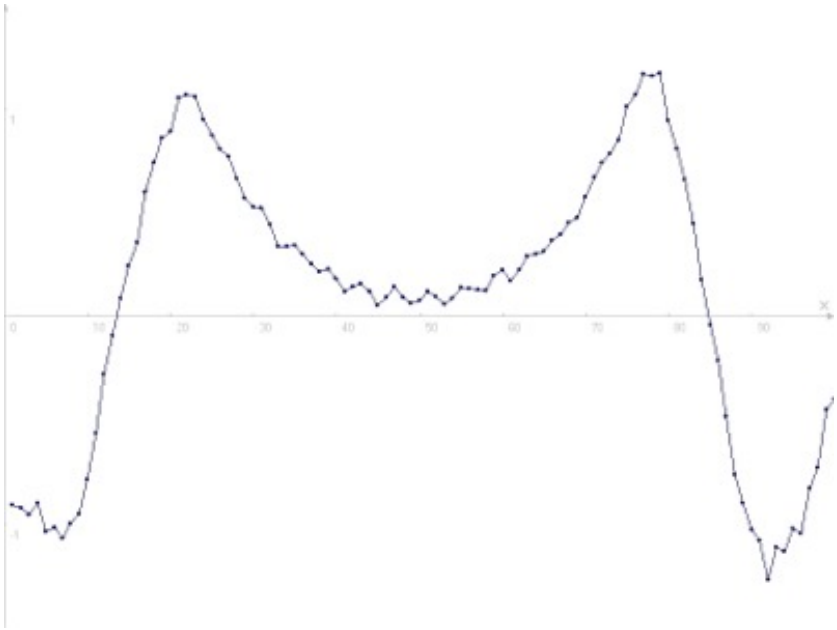
First, construct a framework with two elevated portions, with axles in each. The axles are to be mounted parallel to each other, across the framework. Support on the axles two drums or grooved wheels, for a belt (or chain, etc). On the belt, mount the track magnets with gaps between them, such that when the belt goes around the wheels, the magnets can bend away from and back towards each other without any snapping or breakage. The separation reduces the efficiency of the thrust, but low tolerances will still be sufficient. Then, mount the actuator magnet ('vehicle') below -- and above, if desired -- the belt track. The track portion which is in the actuator's field will always act like the edge of a continuous magnet, and thus the track will continuously rotate.

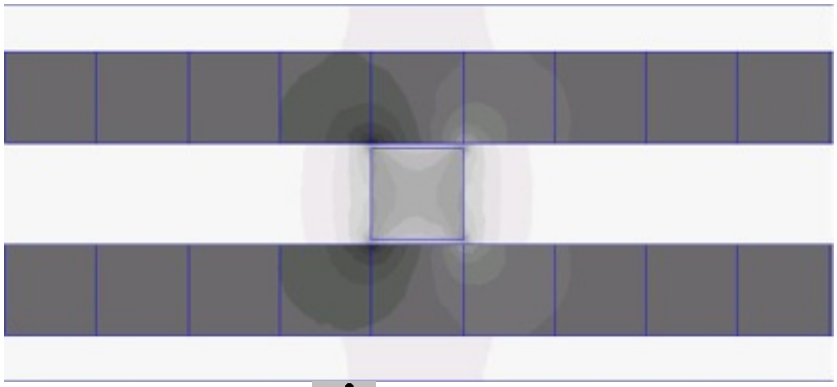
This is for you and your site, Eric. I would like for you to post it so that others may read it and gain whatever they can from it, until and perhaps in lieu of my own investigations are complete and I have constructed a device to implement the principles I've clarified.

Illustrations:
The first two files are the flux line/density map of a short track and the impulse (force profile) for that track, left to right. The next two files are the flux density map (in greyscale) with much higher resolution of

a very long track, and the FEMM file for this track. As you can easily see in the greyscale map, there is a constant, localized difference in flux density behind and in front of the center magnet, which illustrates the imbalance. Also notice that the track pole edges do not distort the fields passing through them -- therefore, this effect must occur at any point along the track and only changes at the ends.







Click here to download the FEMM file.

Evan Callicoat

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Nikola Tesla

My Inventions

[An Autobiography]

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My Inventions
by Nikola Tesla

Chapter 1: My Early Life - *The progressive development of man is vitally dependent on invention. It is the most important product of his creative brain. Its ultimate purpose is the complete mastery of mind over the material world, the harnessing of the forces of nature to human needs.*

Chapter 2 - *I shall dwell briefly on these extraordinary experiences, on account of their possible interest to students of psychology and physiology and also because this period of agony was of the greatest consequence on my mental development and subsequent labors.*

Chapter 3: How Tesla Conceived The Rotary Magnetic Field - *At the age of ten I entered the Real Gymnasium which was a new and fairly well equipped institution. In the department of physics were various models of classical scientific apparatus, electrical and mechanical. The demonstrations and experiments performed from time to time by the instructors fascinated me and were undoubtedly a powerful incentive to invention.*

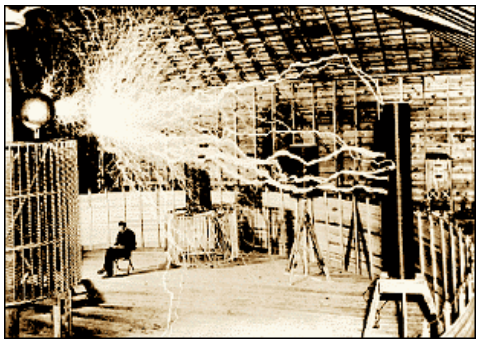
Chapter 4: The Discovery of the Tesla Coil and Transformer - *For a while I gave myself up entirely to the intense enjoyment of picturing machines and devising new forms. It was a mental state of happiness about as complete as I have ever known in life. Ideas came in an uninterrupted stream and the only difficulty I had was to hold them fast.*

Chapter 5 - *As I review the events of my past life I realize how subtle are the influences that shape our destinies. An incident of my youth may serve to illustrate.*

Chapter 6 - *No subject to which I have ever devoted myself has called for such concentration of mind, and strained to so dangerous a degree the finest fibers of my brain, as the systems of which the magnifying transmitter is the foundation.*

My Inventions

by Nikola Tesla



Chapter 1: My Early Life

The progressive development of man is vitally dependent on invention. It is the most important product of his creative brain. Its ultimate purpose is the complete mastery of mind over the material world, the harnessing of the forces of nature to human needs. This is the difficult task of the inventor who is often misunderstood and unrewarded. But he finds ample compensation in the pleasing exercises of his powers and in the knowledge of being one of that exceptionally privileged class without whom the race would have long ago perished in the bitter struggle against pitiless elements. Speaking for myself, I have already had more than my full measure of this exquisite enjoyment; so much, that for many years my life was little short of continuous rapture. I am credited with being one of the hardest workers and perhaps I am, if thought is the equivalent of labor, for I have devoted to it almost all of my waking hours. But if work is interpreted to be a definite performance in a specified time according to a rigid rule, then I may be the worst of idlers.

Every effort under compulsion demands a sacrifice of life-energy. I never paid such a price. On the contrary, I have thrived on my thoughts. In attempting to give a connected and faithful account of my activities in this story of my life, I must dwell, however reluctantly, on the impressions of my youth and the circumstances and events which have been instrumental in determining my career. Our first endeavors are purely instinctive promptings of an imagination vivid and undisciplined. As we grow older, reason asserts itself and we become more and more systematic and designing. But those early impulses, though not immediately productive, are of the greatest moment and may shape our very destinies. Indeed, I feel now that had I understood and cultivated instead of suppressing them, I would have added substantial value to my bequest to the world. But not until I had attained manhood did I realize that I was an inventor.

This was due to a number of causes. In the first place I had a brother who was gifted to an extraordinary degree; one of those rare phenomena of mentality which biological investigation has failed to explain. His premature death left my earth parents disconsolate. (I will explain my remark about my "earth parents" later.) We owned a horse which had been presented to us by a dear friend. It was a magnificent animal of Arabian breed, possessed of almost human intelligence, and was cared for and petted by the whole family, having on one occasion saved my dear father's life under remarkable circumstances.

My father had been called one winter night to perform an urgent duty and while crossing the mountains, infested by wolves, the horse became frightened and ran away, throwing him violently to the ground. It arrived home bleeding and exhausted, but after the alarm was sounded, immediately dashed off again, returning to the spot, and before the searching party were far on the way they were met by my father, who had recovered consciousness and remounted, not realizing that he had been lying in the snow for several hours. This horse was responsible for my brother's injuries from which he died. I witnessed the tragic scene and although so many years have elapsed since, my visual impression of it has lost none of its force. The recollection of his attainments made every effort of mine seem dull in comparison. Anything I did that was creditable merely caused my parents to feel their loss more keenly. So I grew up with little confidence in myself.

But I was far from being considered a stupid boy, if I am to judge from an incident of which I have still a strong remembrance. One day the Aldermen were passing through a street where I was playing with other boys. The oldest of these venerable gentlemen, a wealthy citizen, paused to give a silver piece to each of us. Coming to me, he suddenly stopped and commanded, "Look in my eyes." I met his gaze, my hand outstretched to receive the much valued coin, when to my dismay, he said, "No, not much; you can get nothing from me. You are too smart."

They used to tell a funny story about me. I had two old aunts with wrinkled faces, one of them having two teeth protruding like the tusks of an elephant, which she buried in my cheek every time she kissed me. Nothing would scare me more then the prospects of being kissed by these affectionate, unattractive relatives. It happened that while being carried in my mother's arms, they asked who was the prettier of the two. After examining their faces intently, I answered thoughtfully, pointing to one of them, "This here is not as ugly as the other."

Then again, I was intended from my very birth for the clerical profession and this thought constantly oppressed me. I longed to be an engineer, but my father was inflexible. He was the son of an officer who served in the army of the Great Napoleon and in common with his brother, professor of mathematics in a prominent institution, had received a military education; but, singularly enough, later embraced the clergy in which vocation he achieved eminence. He was a very erudite man, a veritable natural philosopher, poet and writer and his sermons were said to be as eloquent as those of Abraham a-Sancta-Clara. He had a prodigious memory and frequently recited at length from works in several languages. He often remarked playfully that if some of the classics were lost he could restore them. His style of writing was much admired. He penned sentences short and terse and full of wit and satire. The humorous remarks he made were always peculiar and characteristic. Just to illustrate, I may mention one or two instances.

Among the help, there was a cross-eyed man called Mane, employed to do work around the farm. He was chopping wood one day. As he swung the ax, my father, who stood nearby and felt very uncomfortable, cautioned him, "For God's sake, Mane, do not strike at what you are looking but at what you intend to hit."

On another occasion he was taking out for a drive a friend who carelessly permitted his costly fur coat to rub on the carriage wheel. My father reminded him of it saying, "Pull in your coat; you are ruining my tire."

He had the odd habit of talking to himself and would often carry on an animated conversation and indulge in heated argument, changing the tone of his voice. A casual listener might have sworn that several people were in the room.

Although I must trace to my mother's influence whatever inventiveness I possess, the training he gave me must have been helpful. It comprised all sorts of exercises - as, guessing one another's thoughts, discovering the defects of some form of expression, repeating long sentences or performing mental calculations. These daily lessons were intended to strengthen memory and reason, and especially to develop the critical sense, and were undoubtedly very beneficial.

My mother descended from one of the oldest families in the country and a line of inventors. Both

her father and grandfather originated numerous implements for household, agricultural and other uses. She was a truly great woman, of rare skill, courage and fortitude, who had braved the storms of life and passed through many a trying experience. When she was sixteen, a virulent pestilence swept the country. Her father was called away to administer the last sacraments to the dying and during his absence she went alone to the assistance of a neighboring family who were stricken by the dread disease. She bathed, clothed and laid out the bodies, decorating them with flowers according to the custom of the country and when her father returned he found everything ready for a Christian burial.

My mother was an inventor of the first order and would, I believe, have achieved great things had she not been so remote from modern life and its multifold opportunities. She invented and constructed all kinds of tools and devices and wove the finest designs from thread which was spun by her. She even planted the seeds, raised the plants and separated the fibers herself. She worked indefatigably, from break of day till late at night, and most of the wearing apparel and furnishings of the home were the product of her hands. When she was past sixty, her fingers were still nimble enough to tie three knots in an eyelash.

There was another and still more important reason for my late awakening. In my boyhood I suffered from a peculiar affliction due to the appearance of images, often accompanied by strong flashes of light, which marred the sight of real objects and interfered with my thoughts and action. They were pictures of things and scenes which I had really seen, never of those imagined. When a word was spoken to me the image of the object it designated would present itself vividly to my vision and sometimes I was quite unable to distinguish whether what I saw was tangible or not. This caused me great discomfort and anxiety. None of the students of psychology or physiology whom I have consulted, could ever explain satisfactorily these phenomenon. They seem to have been unique although I was probably predisposed as I know that my brother experienced a similar trouble. The theory I have formulated is that the images were the result of a reflex action from the brain on the retina under great excitation. They certainly were not hallucinations such as are produced in diseased and anguished minds, for in other respects I was normal and composed. To give an idea of my distress, suppose that I had witnessed a funeral or some such nerve-wracking spectacle. Then, inevitably, in the stillness of night, a vivid picture of the scene would thrust itself before my eyes and persist despite all my efforts to banish it. If my explanation is correct, it should be possible to project on a screen the image of any object one conceives and make it visible. Such an advance would revolutionize all human relations. I am convinced that this wonder can and will be accomplished in time to come. I may add that I have devoted much thought to the solution of the problem.

I have managed to reflect such a picture, which I have seen in my mind, to the mind of another person, in another room. To free myself of these tormenting appearances, I tried to concentrate my mind on something else I had seen, and in this way I would often obtain temporary relief; but in order to get it I had to conjure continuously new images. It was not long before I found that I had exhausted all of those at my command; my 'reel' had run out as it were, because I had seen little of the world - only objects in my home and the immediate surroundings. As I performed these mental operations for the second or third time, in order to chase the appearances from my vision, the remedy gradually lost all its force. Then I instinctively commenced to make excursions beyond the limits of the small world of which I had knowledge, and I saw new scenes. These were at first very blurred and indistinct, and would flit away when I tried to concentrate my attention upon them. They gained in strength and distinctness and finally assumed the concreteness of real things. I soon discovered that my best comfort was attained if I simply went on in my vision further and further, getting new impressions all the time, and so I began to travel; of course, in my mind. Every night, (and sometimes during the day), when alone, I would start on my journeys - see new places, cities and countries; live there, meet people and make friendships and acquaintances and, however unbelievable, it is a fact that they were just as dear to me as those in actual life, and not a bit less intense in their manifestations.

This I did constantly until I was about seventeen, when my thoughts turned seriously to invention. Then I observed to my delight that I could visualize with the greatest facility. I needed no models, drawings or experiments. I could picture them all as real in my mind. Thus I have been led unconsciously to evolve what I consider a new method of materializing inventive concepts

and ideas, which is radially opposite to the purely experimental and is in my opinion ever so much more expeditious and efficient.

The moment one constructs a device to carry into practice a crude idea, he finds himself unavoidably engrossed with the details of the apparatus. As he goes on improving and reconstructing, his force of concentration diminishes and he loses sight of the great underlying principle. Results may be obtained, but always at the sacrifice of quality. My method is different. I do not rush into actual work. When I get an idea, I start at once building it up in my imagination. I change the construction, make improvements and operate the device in my mind. It is absolutely immaterial to me whether I run my turbine in thought or test it in my shop. I even note if it is out of balance. There is no difference whatever; the results are the same. In this way I am able to rapidly develop and perfect a conception without touching anything. When I have gone so far as to embody in the invention every possible improvement I can think of and see no fault anywhere, I put into concrete form this final product of my brain. Invariably my device works as I conceived that it should, and the experiment comes out exactly as I planned it. In twenty years there has not been a single exception. Why should it be otherwise? Engineering, electrical and mechanical, is positive in results. There is scarcely a subject that cannot be examined beforehand, from the available theoretical and practical data. The carrying out into practice of a crude idea as is being generally done, is, I hold, nothing but a waste of energy, money, and time.

My early affliction had however, another compensation. The incessant mental exertion developed my powers of observation and enabled me to discover a truth of great importance. I had noted that the appearance of images was always preceded by actual vision of scenes under peculiar and generally very exceptional conditions, and I was impelled on each occasion to locate the original impulse. After a while this effort grew to be almost automatic and I gained great facility in connecting cause and effect. Soon I became aware, to my surprise, that every thought I conceived was suggested by an external impression. Not only this but all my actions were prompted in a similar way. In the course of time it became perfectly evident to me that I was merely an automation endowed with power *of movement responding to the stimuli of the sense organs and thinking and acting accordingly*. The practical result of this was the art of teleautomatics which has been so far carried out only in an imperfect manner. Its latent possibilities will, however be eventually shown. I have been years planning self-controlled automata and believe that mechanisms can be produced which will act as if possessed of reason, to a limited degree, and will create a revolution in many commercial and industrial departments. I was about twelve years of age when I first succeeded in banishing an image from my vision by willful effort, but I never had any control over the flashes of light to which I have referred. They were, perhaps, my strangest and [most] inexplicable experience. They usually occurred when I found myself in a dangerous or distressing situations or when I was greatly exhilarated. In some instances I have seen all the air around me filled with tongues of living flame. Their intensity, instead of diminishing, increased with time and seemingly attained a maximum when I was about twenty-five years old.

While in Paris in 1883, a prominent French manufacturer sent me an invitation to a shooting expedition which I accepted. I had been long confined to the factory and the fresh air had a wonderfully invigorating effect on me. On my return to the city that night, I felt a positive sensation that my brain had caught fire. I was a light as though a small sun was located in it and I passed the whole night applying cold compressions to my tortured head. Finally the flashes diminished in frequency and force but it took more than three weeks before they wholly subsided. When a second invitation was extended to me, my answer was an emphatic NO!

These luminous phenomena still manifest themselves from time to time, as when a new idea opening up possibilities strikes me, but they are no longer exciting, being of relatively small intensity. When I close my eyes I invariably observe first, a background of very dark and uniform blue, not unlike the sky on a clear but starless night. In a few seconds this field becomes animated with innumerable scintillating flakes of green, arranged in several layers and advancing towards me. Then there appears, to the right, a beautiful pattern of two systems of parallel and closely spaced lines, at right angles to one another, in all sorts of colors with yellow, green, and gold predominating. Immediately thereafter, the lines grow brighter and the whole is thickly sprinkled with dots of twinkling light. This picture moves slowly across the field of vision and in about ten seconds vanishes on the left, leaving behind a ground of rather unpleasant and inert gray

until the second phase is reached. Every time, before falling asleep, images of persons or objects flit before my view. When I see them I know I am about to lose consciousness. If they are absent and refuse to come, it means a sleepless night. To what an extent imagination played in my early life, I may illustrate by another odd experience.

Like most children, I was fond of jumping and developed an intense desire to support myself in the air. Occasionally a strong wind richly charged with oxygen blew from the mountains, rendering my body light as cork and then I would leap and float in space for a long time. It was a delightful sensation and my disappointment was keen when later I undeceived myself. During that period I contracted many strange likes, dislikes and habits, some of which I can trace to external impressions while others are unaccountable. I had a violent aversion against the earrings of women, but other ornaments, as bracelets, pleased me more or less according to design. The sight of a pearl would almost give me a fit, but I was fascinated with the glitter of crystals or objects with sharp edges and plane surfaces. I would not touch the hair of other people except, perhaps at the point of a revolver. I would get a fever by looking at a peach and if a piece of camphor was anywhere in the house it caused me the keenest discomfort. Even now I am not insensible to some of these upsetting impulses. When I drop little squares of paper in a dish filled with liquid, I always sense a peculiar and awful taste in my mouth. I counted the steps in my walks and calculated the cubical contents of soup plates, coffee cups and pieces of food, otherwise my meal was unenjoyable. All repeated acts or operations I performed had to be divisible by three and if I missed I felt impelled to do it all over again, even if it took hours. Up to the age of eight years, my character was weak and vacillating. I had neither courage or strength to form a firm resolve. My feelings came in waves and surges and variated unceasingly between extremes. My wishes were of consuming force and like the heads of the hydra, they multiplied. I was oppressed by thoughts of pain in life and death and religious fear. I was swayed by superstitious belief and lived in constant dread of the spirit of evil, of ghosts and ogres and other unholy monsters of the dark. Then all at once, there came a tremendous change which altered the course of my whole existence.

Of all things I liked books best. My father had a large library and whenever I could manage I tried to satisfy my passion for reading. He did not permit it and would fly in a rage when he caught me in the act. He hid the candles when he found that I was reading in secret. He did not want me to spoil my eyes. But I obtained tallow, made the wicking and cast the sticks into tin forms, and every night I would bush the keyhole and the cracks and read, often till dawn, when all others slept and my mother started on her arduous daily task.

On one occasion I came across a novel entitled *Aoafi*, (the son of Aba), a Serbian translation of a well known Hungarian writer, Josika. This work somehow awakened my dormant powers of will and I began to practice self-control. At first my resolutions faded like snow in April, but in a little while I conquered my weakness and felt a pleasure I never knew before - that of doing as I willed.

In the course of time this vigorous mental exercise became second to nature. At the outset my wishes had to be subdued but gradually desire and will grew to be identical. After years of such discipline I gained so complete a mastery over myself that I toyed with passions which have meant destruction to some of the strongest men. At a certain age I contracted a mania for gambling which greatly worried my parents. To sit down to a game of cards was for me the quintessence of pleasure. My father led an exemplary life and could not excuse the senseless waste of my time and money in which I indulged. I had a strong resolve, but my philosophy was bad. I would say to him, "I can stop whenever I please, but is it worth while to give up that which I would purchase with the joys of paradise?" On frequent occasions he gave vent to his anger and contempt, but my mother was different. She understood the character of men and knew that one's salvation could only be brought about through his own efforts. One afternoon, I remember, when I had lost all my money and was craving for a game, she came to me with a roll of bills and said, "Go and enjoy yourself. The sooner you lose all we possess, the better it will be. I know that you will get over it." She was right. I conquered my passion then and there and only regretted that it had not been a hundred times as strong. I not only vanquished but tore it from my heart so as not to leave even a trace of desire.

Ever since that time I have been as indifferent to any form of gambling as to picking teeth. During another period I smoked excessively, threatening to ruin my health. Then my will asserted

itself and I not only stopped but destroyed all inclination. Long ago I suffered from heart trouble until I discovered that it was due to the innocent cup of coffee I consumed every morning. I discontinued at once, though I confess it was not an easy task. In this way I checked and bridled other habits and passions, and have not only preserved my life but derived an immense amount of satisfaction from what most men would consider privation and sacrifice.

After finishing the studies at the Polytechnic Institute and University, I had a complete nervous breakdown and, while the malady lasted, I observed many phenomena, strange and unbelievable...



Chapter 2

I shall dwell briefly on these extraordinary experiences, on account of their possible interest to students of psychology and physiology and also because this period of agony was of the greatest consequence on my mental development and subsequent labors. But it is indispensable to first relate the circumstances and conditions which preceded them and in which might be found their partial explanation.

From childhood I was compelled to concentrate attention upon myself. This caused me much suffering, but to my present view, it was a blessing in disguise for it has taught me to appreciate the inestimable value of introspection in the preservation of life, as well as a means of achievement. The pressure of occupation and the incessant stream of impressions pouring into our consciousness through all the gateways of knowledge make modern existence hazardous in many ways. Most persons are so absorbed in the contemplation of the outside world that they are wholly oblivious to what is passing on within themselves. The premature death of millions is primarily traceable to this cause. Even among those who exercise care, it is a common mistake to avoid imaginary, and ignore the real dangers. And what is true of an individual also applies, more or less, to a people as a whole.

Abstinence was not always to my liking, but I find ample reward in the agreeable experiences I am now making. Just in the hope of converting some to my precepts and convictions I will recall one or two.

A short time ago I was returning to my hotel. It was a bitter cold night, the ground slippery, and no taxi to be had. Half a block behind me followed another man, evidently as anxious as myself to get under cover. Suddenly my legs went up in the air. At the same instant there was a flash in my brain. The nerves responded, the muscles contracted. I swung 180 degrees and landed on my hands. I resumed my walk as though nothing had happened when the stranger caught up with me. "How old are you?" he asked, surveying me critically.

"Oh, about fifty-nine," I replied, "What of it?"

"Well," said he, "I have seen a cat do this but never a man." About a month ago I wanted to order new eye glasses and went to an oculist who put me through the usual tests. He looked at me incredulously as I read off with ease the smallest print at considerable distance. But when I told him I was past sixty he gasped in astonishment. Friends of mine often remark that my suits fit me like gloves but they do not know that all my clothing is made to measurements which were taken nearly fifteen years ago and never changed. During this same period my weight has not varied one pound. In this connection I may tell a funny story.

One evening, in the winter of 1885, Mr. Edison, Edward H. Johnson, the President of the Edison Illuminating Company, Mr. Batchellor, Manager of the works, and myself, entered a little place opposite 65 Firth Avenue, where the offices of the company were located. Someone suggested guessing weights and I was induced to step on a scale. Edison felt me all over and said: "Tesla weighs 152 lbs. to an ounce," and he guessed it exactly. Stripped I weighed 142 pounds, and that is still my weight. I whispered to Mr. Johnson; "How is it possible that Edison could guess my weight so closely?"

"Well," he said, lowering his voice. "I will tell you confidentially, but you must not say anything. He was employed for a long time in a Chicago slaughter-house where he weighed thousands of hogs every day. That's why."

My friend, the Hon. Chauncey M. Dupew, tells of an Englishman on whom he sprung one of his original anecdotes and who listened with a puzzled expression, but a year later, laughed out loud. I will frankly confess it took me longer than that to appreciate Johnson's joke. Now, my well-being is simply the result of a careful and measured mode of living and perhaps the most astonishing thing is that three times in my youth I was rendered by illness a hopeless physical wreck and given up by physicians. *More* than this, through ignorance and lightheartedness, I got into all sorts of difficulties, dangers and scrapes from which I extricated myself as by enchantment. I was almost drowned, entombed, lost and frozen. I had hair-breadth escapes from mad dogs, hogs, and other wild animals. I passed through dreadful diseases and met with all kinds of odd mishaps and that I am whole and hearty today seems like a miracle. But as I recall these incidents to my mind I feel convinced that my preservation was not altogether accidental, but was indeed the work of divine power. An inventor's endeavor is essentially life saving. Whether he harnesses forces, improves devices, or provides new comforts and conveniences, he is adding to the safety of our existence. He is also better qualified than the average individual to protect himself in peril, for he is observant and resourceful. If I had no other evidence that I was, in a measure, possessed of such qualities, I would find it in these personal experiences. The reader will be able to judge for himself if I mention one or two instances.

On one occasion, when about fourteen years old, I wanted to scare some friends who were bathing with me. My plan was to dive under a long floating structure and slip out quietly at the other end. Swimming and diving came to me as naturally as to a duck and I was confident that I could perform the feat. Accordingly I plunged into the water and, when out of view, turned around and proceeded rapidly towards the opposite side. Thinking that I was safely beyond the structure, I rose to the surface but to my dismay struck a beam. Of course, I quickly dived and forged ahead with rapid strokes until my breath was beginning to give out. Rising for the second time, my head came again in contact with a beam. Now I was becoming desperate. However, summoning all my energy, I made a third frantic attempt but the result was the same. The torture of suppressed breathing was getting unendurable, my brain was reeling and I felt myself sinking. At that moment, when my situation seemed absolutely hopeless, I experienced one of those flashes of light and the structure above me appeared before my vision. I either discerned or guessed that there was a little space between the surface of the water and the boards resting on the beams and, with consciousness nearly gone, I floated up, pressed my mouth close to the planks and managed to inhale a little air, unfortunately mingled with a spray of water which nearly choked me. Several times I repeated this procedure as in a dream until my heart, which was racing at a terrible rate, quieted down, and I gained composure. After that I made a number of unsuccessful dives, having completely lost the sense of direction, but finally succeeded in getting out of the trap when my friends had already given me up and were fishing for my body. That bathing season was spoiled

for me through recklessness but I soon forgot the lesson and only two years later I fell into a worse predicament.

There was a large flour mill with a dam across the river near the city where I was studying at the time. As a rule the height of the water was only two or three inches above the dam and to swim to it was a sport not very dangerous in which I often indulged. One day I went alone to the river to enjoy myself as usual. When I was a short distance from the masonry, however, I was horrified to observe that the water had risen and was carrying me along swiftly. I tried to get away but it was too late. Luckily, though, I saved myself from being swept over by taking hold of the wall with both hands. The pressure against my chest was great and I was barely able to keep my head above the surface. Not a soul was in sight and my voice was lost in the roar of the fall. Slowly and gradually I became exhausted and unable to withstand the strain longer. Just as I was about to let go, to be dashed against the rocks below, I saw in a flash of light a familiar diagram illustrating the hydraulic principle that the pressure of a fluid in motion is proportionate to the area exposed and automatically I turned on my left side. As if by magic, the pressure was reduced and I found it comparatively easy in that position to resist the force of the stream. But the danger still confronted me. I knew that sooner or later I would be carried down, as it was not possible for any help to reach me in time, even if I had attracted attention. I am ambidextrous now, but then I was left-handed and had comparatively little strength in my right arm. For this reason I did not dare to turn on the other side to rest and nothing remained but to slowly push my body along the dam. I had to get away from the mill towards which my face was turned, as the current there was much swifter and deeper. It was a long and painful ordeal and I came near to failing at its very end, for I was confronted with a depression in the masonry. I managed to get over with the last ounce of my strength and fell in a swoon when I reached the bank, where I was found. I had torn virtually all the skin from my left side and it took several weeks before the fever had subsided and I was well. These are only two of many instances, but they may be sufficient to show that had it not been for the inventor's instinct, I would not have lived to tell the tale.

Interested people have often asked me how and when I began to invent. This I can only answer from my present recollection in the light of which, the first attempt I recall was rather ambitious for it involved the invention of an apparatus and a method. In the former it was anticipated, but the later was original. It happened in this way. One of my playmates had come into the possession of a hook and fishing tackle which created quite an excitement in the village, and the next morning all started out to catch frogs. I was left alone and deserted owing to a quarrel with this boy. I had never seen a real hook and pictured it as something wonderful, endowed with peculiar qualities, and was despairing not to be one of the party. Urged by necessity, I somehow got hold of a piece of soft iron wire, hammered the end to a sharp point between two stones, bent it into shape, and fastened it to a strong string. I then cut a rod, gathered some bait, and went down to the brook where there were frogs in abundance. But I could not catch any and was almost discouraged when it occurred to me dangle the empty hook in front of a frog sitting on a stump. At first he collapsed but by and by his eyes bulged out and became bloodshot, he swelled to twice his normal size and made a vicious snap at the hook. Immediately I pulled him up. I tried the same thing again and again and the method proved infallible. When my comrades, who in spite of their fine outfit had caught nothing, came to me, they were green with envy. For a long time I kept my secret and enjoyed the monopoly but finally yielded to the spirit of Christmas. Every boy could then do the same and the following summer brought disaster to the frogs.

In my next attempt, I seem to have acted under the first instinctive impulse which later dominated me - to harness the energies of nature to the service of man. I did this through the medium of May bugs, or June bugs as they are called in America, which were a veritable pest in that country and sometimes broke the branches of trees by the sheer weight of their bodies. The bushes were black with them. I would attach as many as four of them to a cross-piece, rotably arranged on a thin spindle, and transmit the motion of the same to a large disc and so derive considerable "power." These creatures were remarkably efficient, for once they were started, they had no sense to stop and continued whirling for hours and hours and the hotter it was, the harder they worked. All went well until a strange boy came to the place. He was the son of a retired officer in the Austrian army. That urchin ate May bugs alive and enjoyed them as though they were the finest blue point oysters. That disgusting sight terminated my endeavors in this promising field and I have never since been able to touch a May bug or any other insect for that matter.

After that, I believe, I undertook to take apart and assemble the clocks of my grandfather. In the former operation I was always successful, but often failed in the latter. So it came that he brought my work to a sudden halt in a manner not too delicate and it took thirty years before I tackled another clockwork again.

Shortly thereafter, I went into the manufacture of a kind of pop-gun which comprised a hollow tube, a piston, and two plugs of hemp. When firing the gun, the piston was pressed against the stomach and the tube was pushed back quickly with both hands. the air between the plugs was compressed and raised to a high temperature and one of them was expelled with a loud report. The art consisted in selecting a tube of the proper taper from the hollow stalks which were found in our garden. I did very well with that gun, but my activities interfered with the window panes in our house and met with painful discouragement.

If I remember rightly, I then took to carving swords from pieces of furniture which I could conveniently obtain. At that time I was under the sway of the Serbian national poetry and full of admiration for the feats of the heroes. I used to spend hours in mowing down my enemies in the form of cornstalks which ruined the crops and netted me several spankings from my mother. Moreover, these were not of the formal kind but the genuine article.

I had all this and more behind me before I was six years old and had passed through one year of elementary school in the village of Smiljan where my family lived. At this juncture we moved to the little city of Gospic nearby. This change of residence was like a calamity to me. It almost broke my heart to part from our pigeons, chickens and sheep, and our magnificent flock of geese which used to rise to the clouds in the morning and return from the feeding grounds at sundown in battle formation, so perfect that it would have put a squadron of the best aviators of the present day to shame. In our new house I was but a prisoner, watching the strange people I saw through my window blinds. My bashfulness was such that I would rather have faced a roaring lion than one of the city dudes who strolled about. But my hardest trial came on Sunday when I had to dress up and attend the service. There I met with an accident, the mere thought of which made my blood curdle like sour milk for years afterwards. It was my second adventure in a church. Not long before, I was entombed for a night in an old chapel on an inaccessible mountain which was visited only once a year. It was an awful experience, but this one was worse.

There was a wealthy lady in town, a good but pompous woman, who used to come to the church gorgeously painted up and attired with an enormous train and attendants. One Sunday I had just finished ringing the bell in the belfry and rushed downstairs, when this grand dame was sweeping out and I jumped on her train. It tore off with a ripping noise which sounded like a salvo of musketry fired by raw recruits. My father was livid with rage. He gave me a gentle slap on the cheek, the only corporal punishment he ever administered to me, but I almost feel it now. The embarrassment and confusion that followed are indescribable. I was practically ostracized until something else happened which redeemed me in the estimation of the community.

An enterprising young merchant had organized a fire department. A new fire engine was purchased, uniforms provided and the men drilled for service and parade. The engine was beautifully painted red and black. One afternoon, the official trial was prepared for and the machine was transported to the river. The entire population turned out to witness the great spectacle. When all the speeches and ceremonies were concluded, the command was given to pump, but not a drop of water came from the nozzle. The professors and experts tried in vain to locate the trouble. The fizzle was complete when I arrived at the scene. My knowledge of the mechanism was nil and I knew next to nothing of air pressure, but instinctively I felt for the suction hose in the water and found that it had collapsed. When I waded in the river and opened it up, the water rushed forth and not a few Sunday clothes were spoiled. Archimedes running naked through the streets of Syracuse and shouting Eureka at the top of his voice did not make a greater impression than myself. I was carried on the shoulders and was hero of the day.

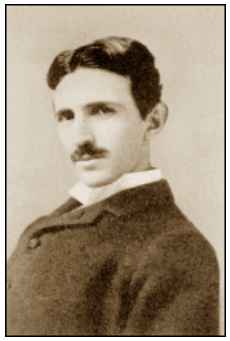
Upon settling in the city I began a four years course in the so-called Normal School preparatory to my studies at the College or Real-Gymnasium. During this period my boyish efforts and exploits as well as troubles, continued.

Among other things, I attained the unique distinction of champion crow catcher in the country. My method of procedure was extremely simple. I would go into the forest, hide in the bushes, and imitate the call of the birds. Usually I would get several answers and in a short while a crow would flutter down into the shrubbery near me. After that, all I needed to do was to throw a piece of cardboard to detract its attention, jump up and grab it before it could extricate itself from the undergrowth. In this way I would capture as many as I desired. But on one occasion something occurred which made me respect them. I had caught a fine pair of birds and was returning home with a friend. When we left the forest, thousands of crows had gathered making a frightful racket. In a few minutes they rose in pursuit and soon enveloped us. The fun lasted until all of a sudden I received a blow on the back of my head which knocked me down. Then they attacked me viciously. I was compelled to release the two birds and was glad to join my friend who had taken refuge in a cave.

In the school room there were a few mechanical models which interested me and turned my attention to water turbines. I constructed many of these and found great pleasure in operating them. How extraordinary was my life an incident may illustrate. My uncle had no use for this kind of pastime and more than once rebuked me. I was fascinated by a description of Niagara Falls I had perused, and pictured in my imagination a big wheel run by the falls. I told my uncle that I would go to America and carry out this scheme. Thirty years later I was able to see my ideas carried out at Niagara and marveled at the unfathomable mystery of the mind.

I made all kinds of other contrivances and contraptions but among those, the arbalests I produced were the best. My arrows, when short, disappeared from sight and at close range traversed a plank of pine one inch thick. Through the continuous tightening of the bows I developed a skin on my stomach much like that of a crocodile and I am often wondering whether it is due to this exercise that I am able even now to digest cobble-stones! Nor can I pass in silence my performances with the sling which would have enabled me to give a stunning exhibit at the Hippodrome. And now I will tell of one of my feats with this unique implement of war which will strain to the utmost the credulity of the reader.

I was practicing while walking with my uncle along the river. The sun was setting, the trout were playful and from time to time one would shoot up into the air, its glistening body sharply defined against a projecting rock beyond. Of course any boy might have hit a fish under these propitious conditions but I undertook a much more difficult task and I foretold to my uncle, to the minutest detail, what I intended doing. I was to hurl a stone to meet the fish, press its body against the rock, and cut it in two. It was no sooner said than done. My uncle looked at me almost scared out of his wits and exclaimed "Vade retra Satanae!" and it was a few days before he spoke to me again. Other records, however great, will be eclipsed but I feel that I could peacefully rest on my laurels for a thousand years.



Chapter 3:
How Tesla Conceived The Rotary Magnetic Field

At the age of ten I entered the Real Gymnasium which was a new and fairly well equipped institution. In the department of physics were various models of classical scientific apparatus, electrical and mechanical. The demonstrations and experiments performed from time to time by the instructors fascinated me and were undoubtedly a powerful incentive to invention. I was also passionately fond of mathematical studies and often won the professor's praise for rapid calculation. This was due to my acquired facility of visualizing the figures and performing the operation, not in the usual intuitive manner, but as in actual life. Up to a certain degree of complexity it was absolutely the same to me whether I wrote the symbols on the board or conjured them before my mental vision. But freehand drawing, to which many hours of the course were devoted, was an annoyance I could not endure. This was rather remarkable as most of the members of the family excelled in it. Perhaps my aversion was simply due to the predilection I found in undisturbed thought. Had it not been for a few exceptionally stupid boys, who could not do anything at all, my record would have been the worst.

It was a serious handicap, as under the then existing educational regime drawing being obligatory, this deficiency threatened to spoil my whole career and my father had considerable trouble in railroading me from one class to another.

In the second year at that institution I became obsessed with the idea of producing continuous motion through steady air pressure. The pump incident, of which I have been told, had set afire my youthful imagination and impressed me with the boundless possibilities of a vacuum. I grew frantic in my desire to harness this inexhaustible energy but for a long time I was groping in the dark. Finally, however, my endeavors crystallized in an invention which was to enable me to achieve what no other mortal ever attempted. Imagine a cylinder freely rotatable on two bearings and partly surrounded by a rectangular trough which fits it perfectly. The open side of the trough is enclosed by a partition so that the cylindrical segment within the enclosure divides the latter into two compartments entirely separated from each other by air-tight sliding joints. One of these compartments being sealed and once for all exhausted, the other remaining open, a perpetual rotation of the cylinder would result. At least, so I thought.

A wooden model was constructed and fitted with infinite care and when I applied the pump on one side and actually observed that there was a tendency to turning, I was delirious with joy. Mechanical flight was the one thing I wanted to accomplish although still under the discouraging recollection of a bad fall I sustained by jumping with an umbrella from the top of a building. Every day I used to transport myself through the air to distant regions but could not understand just how I managed to do it. Now I had something concrete, a flying machine with nothing more than a rotating shaft, flapping wings, and - a vacuum of unlimited power! From that time on I made my daily aerial excursions in a vehicle of comfort and luxury as might have befitted King Solomon. It took years before I understood that the atmospheric pressure acted at right angles to the surface of the cylinder and that the slight rotary effort I observed was due to a leak! Though this knowledge came gradually it gave me a painful shock.

I had hardly completed my course at the Real Gymnasium when I was prostrated with a dangerous illness or rather, a score of them, and my condition became so desperate that I was given up by physicians. During this period I was permitted to read constantly, obtaining books from the public library which had been neglected and entrusted to me for classification of the works and preparation of catalogues.

One day I was handed a few volumes of new literature unlike anything I had ever read before and so captivating as to make me utterly forget my hopeless state. They were the earlier works of Mark Twain and to them might have been due the miraculous recovery which followed. Twenty-five years later, when I met Mr. Clements and we formed a friendship between us, I told him of the experience and was amazed to see that great man of laughter burst into tears...

My studies were continued at the higher Real Gymnasium in Carlstadt, Croatia, where one of my aunts resided. She was a distinguished lady, the wife of a colonel who was an old war-horse having participated in many battles, I can never forget the three years I passed at their home. No fortress in time of war was under a more rigid discipline. I was fed like a canary bird. All the meals were of the highest quality and deliciously prepared, but short in quantity by a thousand

percent. The slices of ham cut by my aunt were like tissue paper. When the colonel would put something substantial on my plate she would snatch it away and say excitedly to him; "Be careful. Niko is very delicate."

I had a voracious appetite and suffered like Tantalus.

But I lived in an atmosphere of refinement and artistic taste quite unusual for those times and conditions. The land was low and marshy and malaria fever never left me while there despite the enormous amounts of quinine I consumed. Occasionally the river would rise and drive an army of rats into the buildings, devouring everything, even to the bundles of fierce paprika. These pests were to me a welcome diversion. I thinned their ranks by all sorts of means, which won me the unenviable distinction of rat-catcher in the community. At last, however, my course was completed, the misery ended, and I obtained the certificate of maturity which brought me to the crossroads.

During all those years my parents never wavered in their resolve to make me embrace the clergy, the mere thought of which filled me with dread. I had become intensely interested in electricity under the stimulating influence of my professor of physics, who was an ingenious man and often demonstrated the principles by apparatus of his own invention. Among these I recall a device in the shape of a freely rotatable bulb, with tinfoil coating, which was made to spin rapidly when connected to a static machine. It is impossible for me to convey an adequate idea of the intensity of feeling I experienced in witnessing his exhibitions of these mysterious phenomena. Every impression produced a thousand echoes in my mind. I wanted to know more of this wonderful force; I longed for experiment and investigation and resigned myself to the inevitable with aching heart. Just as I was making ready for the long journey home I received word that my father wished me to go on a shooting expedition. It was a strange request as he had been always strenuously opposed to this kind of sport. But a few days later I learned that the cholera was raging in that district and, taking advantage of an opportunity, I returned to Gospic in disregard to my parent's wishes. It is incredible how absolutely ignorant people were as to the causes of this scourge which visited the country in intervals of fifteen to twenty years. They thought that the deadly agents were transmitted through the air and filled it with pungent odors and smoke. In the meantime they drank infested water and died in heaps. I contracted the dreadful disease on the very day of my arrival and although surviving the crisis, I was confined to bed for nine months with scarcely any ability to move. My energy was completely exhausted and for the second time I found myself at Death's door.

In one of the sinking spells which was thought to be the last, my father rushed into the room. I still see his pallid face as he tried to cheer me in tones belying his assurance. "Perhaps," I said, "I may get well if you will let me study engineering." "You will go to the best technical institution in the world," he solemnly replied, and I knew that he meant it. A heavy weight was lifted from my mind but the relief would have come too late had it not been for a marvelous cure brought through a bitter decoction of a peculiar bean. I came to life like Lazarus to the utter amazement of everybody.

My father insisted that I spend a year in healthful physical outdoor exercise to which I reluctantly consented. For most of this term I roamed in the mountains, loaded with a hunter's outfit and a bundle of books, and this contact with nature made me stronger in body as well as in mind. I thought and planned, and conceived many ideas almost as a rule delusive. The vision was clear enough but the knowledge of principles was very limited.

In one of my inventions, I proposed to convey letters and packages across the seas, through a submarine tube, in spherical containers of sufficient strength to resist the hydraulic pressure. The pumping plant, intended to force the water through the tube, was accurately figured and designed and all other particulars carefully worked out. Only one trifling detail, of no consequence, was lightly dismissed. I assumed an arbitrary velocity of the water and, what is more, took pleasure in making it high, thus arriving at a stupendous performance supported by faultless calculations. Subsequent reflections, however, on the resistance of pipes to fluid flow induced me to make this invention public property.

Another one of my projects was to construct a ring around the equator which would, of course,

float freely and could be arrested in its spinning motion by reactionary forces, thus enabling travel at a rate of about one thousand miles an hour, impracticable by rail. The reader will smile. The plan was difficult of execution, I will admit, but not nearly so bad as that of a well known New York professor, who wanted to pump the air from the torrid to temperate zones, entirely forgetful of the fact that the Lord had provided a gigantic machine for this purpose.

Still another scheme, far more important and attractive, was to derive power from the rotational energy of terrestrial bodies. I had discovered that objects on the earth's surface owing to the diurnal rotation of the globe, are carried by the same alternately in and against the direction of translatory movement. From this results a great change in momentum which could be utilized in the simplest imaginable manner to furnish motive effort in any habitable region of the world. I cannot find words to describe my disappointment when later I realized that I was in the predicament of Archimedes, who vainly sought for a fixed point in the universe.

At the termination of my vacation I was sent to the polytechnic school in Gratz, Styria (Austria), which my father had chosen as one of the oldest and best reputed institutions. That was the moment I had eagerly awaited and I began my studies under good auspices and firmly resolved to succeed. My previous training was above average, due to my father's teaching and opportunities afforded. I had acquired the knowledge of a number of languages and waded through the books of several libraries, picking up information more or less useful. Then again, for the first time, I could choose my subjects as I liked, and free-hand drawing was to bother me no more.

I had made up my mind to give my parents a surprise, and during the whole first year I regularly started my work at three o'clock in the morning and continued until eleven at night, no Sundays or holidays excepted. As most of my fellow-students took things easily, naturally I eclipsed all records. In the course of the year I passed through nine exams and the professors thought I deserved more than the highest qualifications. Armed with their flattering certificates, I went home for a short rest, expecting triumph, and was mortified when my father made light of these hard-won honors.

That almost killed my ambition; but later, after he had died, I was pained to find a package of letters which the professors had written to him to the effect that unless he took me away from the institution I would be killed through overwork. Thereafter I devoted myself chiefly to physics, mechanics and mathematical studies, spending the hours of leisure in the libraries.

I had a veritable mania for finishing whatever I began, which often got me into difficulties. On one occasion I started to read the works of Voltaire, when I learned, to my dismay that there were close to one hundred large volumes in small print which that monster had written while drinking seventy-two cups of black coffee per diem. It had to be done, but when I laid aside that last book I was very glad, and said, "Never more!"

My first year's showing had won me the appreciation and friendship of several professors. Among these, Professor Rogner, who was teaching arithmetical subjects and geometry; Professor Poeschl, who held the chair of theoretical and experimental physics, and Dr. Alle, who taught integral calculus and specialized in differential equations. This scientist was the most brilliant lecturer to whom I ever listened. He took a special interest in my progress and would frequently remain for an hour or two in the lecture room, giving me problems to solve, in which I delighted. To him I explained a flying machine I had conceived, not an illusory invention, but one based on sound, scientific principles, which has become realizable through my turbine and will soon be given to the world. Both Professors Rogner and Poeschl were curious men. The former had peculiar ways of expressing himself and whenever he did so, there was a riot, followed by a long embarrassing pause. Professor Poeschl was a methodical and thoroughly grounded German. He had enormous feet, and hands like the paws of a bear, but all of his experiments were skillfully performed with clock-like precision and without a miss. It was in the second year of my studies that we received a Gramoe Dyname from Paris, having the horseshoe form of a laminated field magnet, and a wire wound armature with a commutator. It was connected up and various effects of the currents were shown. While Professor Poeschl was making demonstrations, running the machine was a motor, the brushes gave trouble, sparking badly, and I observed that it might be possible to operate a motor without these appliances. But he declared that

it could not be done and did me the honor of delivering a lecture on the subject, at the conclusion he remarked, "Mr. Tesla may accomplish great things, but he certainly will never do this. It would be equivalent to converting a steadily pulling force, like that of gravity into a rotary effort. It is a perpetual motion scheme, an impossible idea." But instinct is something which transcends knowledge. We have, undoubtedly, certain finer fibers that enable us to perceive truths when logical deduction, or any other willful effort of the brain, is futile.

For a time I wavered, impressed by the professor's authority, but soon became convinced I was right and undertook the task with all the fire and boundless confidence of my youth. I started by first picturing in my mind a direct-current machine, running it and following the changing flow of the currents in the armature. Then I would imagine an alternator and investigate the progresses taking place in a similar manner. Next I would visualize systems comprising motors and generators and operate them in various ways.

The images I saw were to me perfectly real and tangible. All my remaining term in Gratz was passed in intense but fruitless efforts of this kind, and I almost came to the conclusion that the problem was insolvable.

In 1880 I went to Prague, Bohemia, carrying out my father's wish to complete my education at the University there. It was in that city that I made a decided advance, which consisted in detaching the commutator from the machine and studying the phenomena in this new aspect, but still without result. In the year following there was a sudden change in my views of life.

I realized that my parents had been making too great sacrifices on my account and resolved to relieve them of the burden. The wave of the American telephone had just reached the European continent and the system was to be installed in Budapest, Hungary. It appeared an ideal opportunity, all the more as a friend of our family was at the head of the enterprise.

It was here that I suffered the complete breakdown of the nerves to which I have referred. What I experienced during the period of the illness surpasses all belief. My sight and hearing were always extraordinary. I could clearly discern objects in the distance when others saw no trace of them. Several times in my boyhood I saved the houses of our neighbors from fire by hearing the faint crackling sounds which did not disturb their sleep, and calling for help. In 1899, when I was past forty and carrying on my experiments in Colorado, I could hear very distinctly thunderclaps at a distance of 550 miles. My ear was thus over thirteen times more sensitive, yet at that time I was, so to speak, stone deaf in comparison with the acuteness of my hearing while under the nervous strain.

In Budapest I could hear the ticking of a watch with three rooms between me and the time-piece. A fly alighting on a table in the room would cause a dull thud in my ear. A carriage passing at a distance of a few miles fairly shook my whole body. The whistle of a locomotive twenty or thirty miles away made the bench or chair on which I sat, vibrate so strongly that the pain was unbearable. The ground under my feet trembled continuously. I had to support my bed on rubber cushions to get any rest at all. The roaring noises from near and far often produced the effect of spoken words which would have frightened me had I not been able to resolve them into their accumulated components. The sun rays, when periodically intercepted, would cause blows of such force on my brain that they would stun me. I had to summon all my will power to pass under a bridge or other structure, as I experienced the crushing pressure on the skull. In the dark I had the sense of a bat, and could detect the presence of an object at a distance of twelve feet by a peculiar creepy sensation on the forehead. My pulse varied from a few to two hundred and sixty beats and all the tissues of my body with twitchings and tremors, which was perhaps hardest to bear. A renowned physician who have me daily large doses of bromide of potassium, pronounced my malady unique and incurable.

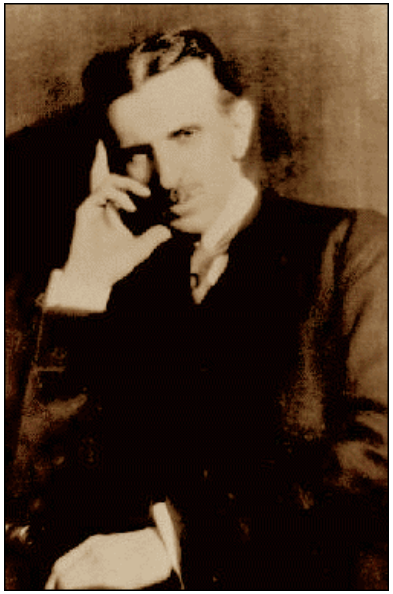
It is my eternal regret that I was not under the observation of experts in physiology and psychology at that time. I clung desperately to life, but never expected to recover. Can anyone believe that so hopeless a physical wreck could ever be transformed into a man of astonishing strength and tenacity; able to work thirty-eight years almost without a day's interruption, and find himself still strong and fresh in body and mind? Such is my case. A powerful desire to live and to continue the work and the assistance of a devoted friend, an athlete, accomplished the wonder. My

health returned and with it the vigor of mind.

In attacking the problem again, I almost regretted that the struggle was soon to end. I had so much energy to spare. When I understood the task, it was not with a resolve such as men often make. With me it was a sacred vow, a question of life and death. I knew that I would perish if I failed. Now I felt that the battle was won. Back in the deep recesses of the brain was the solution, but I could net yet give it outward expression.

One afternoon, which is ever present in my recollection, I was enjoying a walk with my friend in the City Park and reciting poetry. At that age, I knew entire books by heart, word for word. One of these was Goethe's *Faust*. The sun was just setting and reminded me of the glorious passage, "Sie ruckt und weicht, der Tag ist uberlebt, Dort eilt sie hin und fordert neues Leben. Oh, das kein Flugel mich vom Boden hebt Ihr nach und immer nach zu streben! Ein schöner Traum indessen sie entweicht, Ach, au des Geistes Flügein wird so leicht Kein korperlicher Flugel sich gesellen!" As I uttered these inspiring words the idea came like a flash of lightening and in an instant the truth was revealed. I drew with a stick on the sand, the diagram shown six years later in my address before the American Institute of Electrical Engineers, and my companion understood them perfectly. The images I saw were wonderfully sharp and clear and had the solidity of metal and stone, so much so that I told him, "See my motor here; watch me reverse it." I cannot begin to describe my emotions. Pygmalion seeing his statue come to life could not have been more deeply moved. A thousand secrets of nature which I might have stumbled upon accidentally, I would have given for that one which I had wrested from her against all odds and at the peril of my existence...

Chapter 4: The Discovery of the Tesla Coil and Transformer (The Basic Part of Every Radio and T.V.)



For a while I gave myself up entirely to the intense enjoyment of picturing machines and devising new forms. It was a mental state of happiness about as complete as I have ever known in life. Ideas came in an uninterrupted stream and the only difficulty I had was to hold them fast. The pieces of apparatus I conceived were to me absolutely real and tangible in every detail, even to the minutest marks and signs of wear. I delighted in imagining the motors constantly running, for in this way they presented to the mind's eye a fascinating sight. When natural inclination develops into a passionate desire, one advances towards his goal in seven-league boots. In less than two months I evolved virtually all the types of motors and modifications of the system which are now identified with my name, and which are used under many other names all over the world. It was, perhaps, providential that the necessities of existence commanded a temporary halt to this consuming activity of the mind.

I came to Budapest prompted by a premature report concerning the telephone enterprise and, as irony of fate willed it, I had to accept a position as draughtsman in the Central Telegraph Office of the Hungarian government at a salary which I deem it my privilege not to disclose. Fortunately, I soon won the interest of the inspector-in-chief and was thereafter employed on calculations, designs and estimates in connection with new installations, until the telephone exchange started, when I took charge of the same. The knowledge and practical experience I gained in the course of this work, was most valuable and the employment gave me ample opportunities for the exercise of

my inventive faculties. I made several improvements in the central station apparatus and perfected a telephone repeater or amplifier which was never patented or publicly described but would be creditable to me even today. In recognition of my efficient assistance the organizer of the undertaking, Mr. Puskas, upon disposing of his business in Budapest, offered me a position in Paris which I gladly accepted.

I never can forget the deep impression that magic city produced on my mind. For several days after my arrival, I roamed through the streets in utter bewilderment of the new spectacle. The attractions were many and irresistible, but, alas, the income was spent as soon as received. When Mr. Puskas asked me how I was getting along in the new sphere, I described the situation accurately in the statement that "The last twenty-nine days of the month are the toughest." I led a rather strenuous life in what would now be termed "Rooseveltian fashion." Every morning, regardless of the weather, I would go from the boulevard St-Marcel, where I resided, to a bathing house on the Seine; plunge into the water, loop the circuit twenty-seven times and then walk an hour to reach Ivry, where the company's factory was located. There I would have a wood-chopper's breakfast at half-past seven o'clock and then eagerly await the lunch hour, in the meanwhile cracking hard nuts for the manager-of-the-works, Mr. Charles Batchellor, who was an intimate friend and assistant of Edison. Here I was thrown in contact with a few Americans who fairly fell in love with my because of my proficiency in Billiards! To these men I explained my invention and one of them, Mr. D. Cunningham, foreman of the mechanical department, offered to form a stock company. The proposal seemed to me comical in the extreme. I did not have the faintest conception of what he meant, except that it was an American way of doing things. Nothing came of it, however, and during the next few months I had to travel from one place to another in France and Germany to cure the ills of the power plants.

On my return to Paris, I submitted to one of the administrators of the company, Mr. Rau, a plan for improving their dynamos and was given an opportunity. My success was complete and the delighted directors accorded me the privilege of developing automatic regulators which were much desired. Shortly after, there was some trouble with the lighting plant which had been installed at the new railroad station in Strasbourg, Alsace. The wiring was defective and on the occasion of the opening ceremonies, a large part of a wall was blown out through a short-circuit, right in the presence of old Emperor William I. The German government refused to take the plant and the French company was facing a serious loss. On account of my knowledge of the German language and past experience, I was entrusted with the difficult task of straightening out matters and early in 1883, I went to Strasbourg on that mission.

Some of the incidents in that city have left an indelible record on my memory. By a curious coincidence, a number of the men who subsequently achieved fame, lived there about that time. In later life I used to say, "There were bacteria of greatness in that old town." Others caught the disease, but I escaped!" The practical work, correspondence, and conferences with officials kept me preoccupied day and night, but as soon as I was able to manage, I undertook the construction of a simple motor in a mechanical shop opposite the railroad station, having brought with me from Paris some material for that purpose. The consummation of the experiment was, however, delayed until the summer of that year, when I finally had the satisfaction of seeing the rotation effected by alternating currents of different phase, and without sliding contacts or commutator, as I had conceived a year before. It was an exquisite pleasure but not to compare with the delirium of joy following the first revelation.

Among my new friends was the former mayor of the city, Mr. Sauzin, whom I had already, in a measure, acquainted with this and other inventions of mine and whose support I endeavored to enlist. He was sincerely devoted to me and put my project before several wealthy persons, but to my mortification, found no response. He wanted to help me in every possible way and the approach of the first of July, 1917, happens to remind me of a form of "assistance" I received from that charming man, which was not financial, but none the less appreciated. In 1870, when the Germans invaded the country, Mr. Sauzin had buried a good sized allotment of St. Estephe of 1801 and he came to the conclusion that he knew no worthier person than myself to consume that precious beverage. This, I may say, is one of the unforgettable incidents to which I have referred. My friend urged me to return to Paris as soon as possible and seek support there. This I was anxious to do, but my work and negotiations were protracted, owing to all sorts of petty obstacles

I encountered, so that at times the situation seemed hopeless. Just to give an idea of German thoroughness and "efficiency," I may mention here a rather funny experience.

An incandescent lamp of 16 c.p. was to be placed in a hallway, and upon selecting the proper location, I ordered the "monteur" to run the wires. After working for a while, he concluded that the engineer had to be consulted and this was done. The latter made several objections but ultimately agreed that the lamp should be placed two inches from the spot I had assigned, whereupon the work proceeded. Then the engineer became worried and told me that Inspector Averdeck should be notified. That important person was called, he investigated, debated, and decided that the lamp should be shifted back two inches, which was the place I had marked! It was not long, however, before Averdeck got cold feet himself and advised me that he had informed Ober-Inspector Hieronimus of the matter and that I should await his decision. It was several days before the ober-inspector was able to free himself of other pressing duties, but at last he arrived and a two hour debate followed, when he decided to move the lamp two inches further. My hopes that this was the final act, were shattered when the ober-inspector returned and said to me, "Regierungsrath Funke is particular that I would not dare to give an order for placing this lamp without his explicit approval." Accordingly, arrangements for a visit from that great man were made. We started cleaning up and polishing early in the morning, and when Funke came with his retinue he was ceremoniously received. After two hours of deliberation, he suddenly exclaimed, "I must be going!," and pointing to a place on the ceiling, he ordered me to put the lamp there. It was the exact spot which I had originally chosen! So it went day after day with variations, but I was determined to achieve, at whatever cost, and in the end my efforts were rewarded.

By the spring of 1884, all the differences were adjusted, the plant formally accepted, and I returned to Paris with pleasing anticipation. One of the administrators had promised me a liberal compensation in case I succeeded, as well as a fair consideration of the improvements I had made to their dynamos and I hoped to realize a substantial sum. There were three administrators, whom I shall designate as A, B, and C for convenience. When I called on A, he told me what B had the say. This gentleman thought that only C could decide, and the latter was quite sure that A alone had the power to act. After several laps of this *circulus viciousus*, it dawned upon me that my reward was a castle in Spain.

The utter failure of my attempts to raise capital for development was another disappointment, and when Mr. Bachelor pressed me to go to America with a view of redesigning the Edison machines, I determined to try my fortunes in the Land of Golden Promise. But the chance was nearly missed. I liquefied my modest assets, secured accommodations and found myself at the railroad station as the train was pulling out. At that moment, I discovered that my money and tickets were gone. What to do was the question. Hercules had plenty of time to deliberate, but I had to decide while running alongside the train with opposite feeling surging in my brain like condenser oscillations. Resolve, helped by dexterity, won out in the nick of time and upon passing through the usual experience, as trivial and unpleasant, I managed to embark for New York with the remnants of my belongings, some poems and articles I had written, and a package of calculations relating to solutions of an unsolvable integral and my flying machine. During the voyage I sat most of the time at the stern of the ship watching for an opportunity to save somebody from a watery grave, without the slightest thought of danger. Later, when I had absorbed some of the practical American sense, I shivered at the recollection and marveled at my former folly. The meeting with Edison was a memorable event in my life. I was amazed at this wonderful man who, without early advantages and scientific training, had accomplished so much. I had studied a dozen languages, delved in literature and art, and had spent my best years in libraries reading all sorts of stuff that fell into my hands, from Newton's *Principia* to the novels of Paul de Kock, and felt that most of my life had been squandered. But it did not take long before I recognized that it was the best thing I could have done. Within a few weeks I had won Edison's confidence, and it came about in this way.

The S.S. Oregon, the fastest passenger steamer at that time, had both of its lighting machines disabled and its sailing was delayed. As the superstructure had been built after their installation, it was impossible to remove them from the hold. The predicament was a serious one and Edison was much annoyed. In the evening I took the necessary instruments with me and went aboard the vessel where I stayed for the night. The dynamos were in bad condition, having several

short-circuits and breaks, but with the assistance of the crew, I succeeded in putting them in good shape. At five o'clock in the morning, when passing along Fifth Avenue on my way to the shop, I met Edison with Bachelor and a few others, as they were returning home to retire. "Here is our Parisian running around at night," he said. When I told him that I was coming from the Oregon and had repaired both machines, he looked at me in silence and walked away without another word. But when he had gone some distance I heard him remark, "Bachelor, this is a good man." And from that time on I had full freedom in directing the work. For nearly a year my regular hours were from 10:30 A.M. until 5 o'clock the next morning without a day's exception. Edison said to me, "I have had many hard working assistants, but you take the cake." During this period I designed twenty-four different types of standard machines with short cores and uniform pattern, which replaced the old ones. The manager had promised me fifty thousand dollars on the completion of this task, but it turned out to be a practical joke. This gave me a painful shock and I resigned my position.

Immediately thereafter, some people approached me with the proposal of forming an arc light company under my name, to which I agreed. Here finally, was an opportunity to develop the motor, but when I broached the subject to my new associates they said, "No, we want the arc lamp. We don't care for this alternating current of yours." In 1886, my system of arc lighting was perfected and adopted for factory and municipal lighting, and I was free, but with no other possession than a beautifully engraved certificate of stock of hypothetical value. Then followed a period of struggle in the new medium for which I was not fitted, but the reward came in the end, and in April, 1887, the Tesla Electric Co. was organized, providing a laboratory and facilities. The motors I built there were exactly as I had imagined them. I made no attempt to improve the design, but merely reproduced the pictures as they appeared to my vision and the operation was always as I expected.

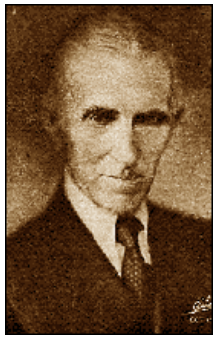
In the early part of 1888, an arrangement was made with the Westinghouse Company for the manufacture of the motors on a large scale. But great difficulties had still to be overcome. My system was based on the use of low frequency currents and the Westinghouse experts had adopted 133 cycles with the objects of securing advantages in transformation. They did not want to depart with their standard forms of apparatus and my efforts had to be concentrated upon adapting the motor to these conditions. Another necessity was to produce a motor capable of running efficiently at this frequency on two wires, which was not an easy accomplishment.

At the close of 1889, however, my services in Pittsburgh being no longer essential, I returned to New York and resumed experimental work in a Laboratory on Grand Street, where I began immediately the design of high-frequency machines. The problems of construction in this unexplored field were novel and quite peculiar, and I encountered many difficulties. I rejected the inductor type, fearing that it might not yield perfect sine waves, which were so important to resonant action. Had it not been for this, I could have saved myself a great deal of labor. Another discouraging feature of the high-frequency alternator seemed to be the inconstancy of speed which threatened to impose serious limitations to its use. I had already noted in my demonstrations before the American Institution of Electrical Engineers, that several times the tune was lost, necessitating readjustment, and did not yet foresee what I discovered long afterwards, a means of operating a machine of this kind at a speed constant to such a degree as not to vary more than a small fraction of one revolution between the extremes of load. From many other considerations, it appeared desirable to invent a simpler device for the production of electric oscillations.

In 1856, Lord Kelvin had exposed the theory of the condenser discharge, but no practical application of that important knowledge was made. I saw the possibilities and undertook the development of induction apparatus on this principle. My progress was so rapid as to enable me to exhibit at my lecture in 1891 a coil giving sparks of five inches. On that occasion I frankly told the engineers of a defect involved in the transformation by the new method, namely, the loss in the spark gap. Subsequent investigation showed that no matter what medium is employed, be it air, hydrogen, mercury vapor, oil, or a stream of electrons, the efficiency is the same. It is a law very much like the governing of the conversion of mechanical energy. We may drop a weight from a certain height vertically down, or carry it to the lower level along any devious path; it is immaterial insofar as the amount of work is concerned. Fortunately however, this drawback is

not fatal, as by proper proportioning of the resonant, circuits of an efficiency of 85 percent is attainable. Since my early announcement of the invention, it has come into universal use and wrought a revolution in many departments, but a still greater future awaits it.

When in 1900 I obtained powerful discharges of 1,000 feet and flashed a current around the globe, I was reminded of the first tiny spark I observed in my Grand Street laboratory and was thrilled by sensations akin to those I felt when I discovered the rotating magnetic field.



Chapter 5

As I review the events of my past life I realize how subtle are the influences that shape our destinies. An incident of my youth may serve to illustrate. One winter's day I managed to climb a steep mountain, in company with other boys. The snow was quite deep and a warm southerly wind made it just suitable for our purpose. We amused ourselves by throwing balls which would roll down a certain distance, gathering more or less snow, and we tried to out-do one another in this sport. Suddenly a ball was seen to go beyond the limit, swelling to enormous proportions until it became as big as a house and plunged thundering into the valley below with a force that made the ground tremble. I looked on spellbound incapable of understanding what had happened. For weeks afterward the picture of the avalanche was before my eyes and I wondered how anything so small could grow to such an immense size.

Ever since that time the magnification of feeble actions fascinated me, and when, years later, I took up the experimental study of mechanical and electrical resonance, I was keenly interested from the very start. Possibly, had it not been for that early powerful impression I might not have followed up the little spark I obtained with my coil and never developed my best invention, the true history of which I will tell.

Many technical men, very able in their special departments, but dominated by a pedantic spirit and nearsighted, have asserted that excepting the induction motor, I have given the world little of practical use. This is a grievous mistake. A new idea must not be judged by its immediate results. My alternating system of power transmission came at a psychological moment, as a long sought answer to pressing industrial questions, and although considerable resistance had to be overcome and opposing interests reconciled, as usual, the commercial introduction could not be long delayed. Now, compare this situation with that confronting my turbines, for example. One should think that so simple and beautiful an invention, possessing many features of an ideal motor, should be adopted at once and, undoubtedly, it would under similar conditions. But the prospective effect of the rotating field was not to render worthless existing machinery; on the contrary, it was to give it additional value. The system lent itself to new enterprise as well as to improvement of the old. My turbine is an advance of a character entirely different. It is a radical departure in the sense that its success would mean the abandonment of the antiquated types of prime movers on which billions of dollars have been spent. Under such circumstances, the progress must need be slow and perhaps the greatest impediment is encountered in the prejudicial opinions created in the minds of experts by organized opposition.

Only the other day, I had a disheartening experience when I met my friend and former assistant, Charles F. Scott, now professor of Electric Engineering at Yale. I had not seen him for a long time and was glad to have an opportunity for a little chat at my office. Our conversation, naturally enough, drifted onto my turbine and I became heated to a high degree. "Scott," I exclaimed, carried away by the vision of a glorious future, "My turbine will scrap all the heat engines in the world." Scott stroked his chin and looked away thoughtfully, as though making a mental calculation. "That will make quite a pile of scrap," he said, and left without another word!

These and other inventions of mine, however, were nothing more than steps forward in a certain directions. In evolving them, I simply followed the inborn instinct to improve the present devices without any special thought of our far more imperative necessities. The "Magnifying Transmitter" was the product of labors extending through years, having for their chief object, the solution of problems which are infinitely more important to mankind than mere industrial development.

If my memory serves me right, it was in November, 1890, that I performed a laboratory experiment which was one of the most extraordinary and spectacular ever recorded in the annal of Science. In investigating the behavior of high frequency currents, I had satisfied myself that an electric field of sufficient intensity could be produced in a room to light up electrodeless vacuum tubes. Accordingly, a transformer was built to test the theory and the first trial proved a marvelous success. It is difficult to appreciate what those strange phenomena meant at the time. We crave for new sensations, but soon become indifferent to them. The wonders of yesterday are today common occurrences. When my tubes were first publicly exhibited, they were viewed with amazement impossible to describe. From all parts of the world, I received urgent invitations and numerous honors and other flattering inducements were offered to me, which I declined. But in 1892 the demand became irresistible and I went to London where I delivered a lecture before the Institution of Electrical Engineers.

It has been my intention to leave immediately for Paris in compliance with a similar obligation, but Sir James Dewar insisted on my appearing before the Royal Institution. I was a man of firm resolve, but succumbed easily to the forceful arguments of the great Scotchman. He pushed me into a chair and poured out half a glass of a wonderful brown fluid which sparkled in all sorts of iridescent colors and tasted like nectar. "Now," said he, "you are sitting in Faraday's chair and you are enjoying whiskey he used to drink." (Which did not interest me very much, as I had altered my opinion concerning strong drink). The next evening I have a demonstration before the Royal Institution, at the termination of which, Lord Rayleigh addressed the audience and his generous words gave me the first start in these endeavors. I fled from London and later from Paris, to escape favors showered upon me, and journeyed to my home, where I passed through a most painful ordeal and illness.

Upon regaining my health, I began to formulate plans for the resumption of work in America. Up to that time I never realized that I possessed any particular gift of discovery, but Lord Rayleigh, whom I always considered as an ideal man of science, had said so and if that was the case, I felt that I should concentrate on some big idea.

At this time, as at many other times in the past, my thoughts turned towards my Mother's teaching. The gift of mental power comes from God, Divine Being, and if we concentrate our minds on that truth, we become in tune with this great power. My Mother had taught me to seek all truth in the Bible; therefore I devoted the next few months to the study of this work.

One day, as I was roaming the mountains, I sought shelter from an approaching storm. The sky became overhung with heavy clouds, but somehow the rain was delayed until, all of a sudden, there was a lightening flash and a few moments after, a deluge. This observation set me thinking. It was manifest that the two phenomena were closely related, as cause and effect, and a little reflection led me to the conclusion that the electrical energy involved in the precipitation of the water was inconsiderable, the function of the lightening being much like that of a sensitive trigger. Here was a stupendous possibility of achievement. If we could produce electric effects of the required quality, this whole planet and the conditions of existence on it could be transformed.

The sun raises the water of the oceans and winds drive it to distant regions where it remains in a state of most delicate balance. If it were in our power to upset it when and wherever desired, this mighty life sustaining stream could be at will controlled. We could irrigate arid deserts, create lakes and rivers, and provide motive power in unlimited amounts. This would be the most efficient way of harnessing the sun to the uses of man. The consummation depended on our ability to develop electric forces of the order of those in nature.

It seemed a hopeless undertaking, but I made up my mind to try it and immediately on my return to the United States in the summer of 1892, after a short visit to my friends in Watford, England; work was begun which was to me all the more attractive, because a means of the same kind was necessary for the successful transmission of energy without wires.

At this time I made a further careful study of the Bible, and discovered the key in Revelation. The first gratifying result was obtained in the spring of the succeeding year, when I reaching a tension of about 100,000,000 volts - one hundred million volts - with my conical coil, which I figured was the voltage of a flash of lightening. Steady progress was made until the destruction of my laboratory by fire, in 1895, as may be judged from an article by T.C. Martin which appeared in the April number of the *Century Magazine*. This calamity set me back in many ways and most of that year had to be devoted to planning and reconstruction. However, as soon as circumstances permitted, I returned to the task.

Although I knew that higher electric-motive forces were attainable with apparatus of larger dimensions, I had an instinctive perception that the object could be accomplished by the proper design of a comparatively small and compact transformer. In carrying on tests with a secondary in the form of flat spiral, as illustrated in my patents, the absence of streamers surprised me, and it was not long before I discovered that this was due to the position of the turns and their mutual action. Profiting from this observation, I resorted to the use of a high tension conductor with turns of considerable diameter, sufficiently separated to keep down the distributed capacity, while at the same time preventing undue accumulation of the charge at any point. The application of this principle enabled me to produce pressures of over 100,000,000 volts, which was about the limit obtainable without risk of accident. A photograph of my transmitter built in my laboratory at Houston Street, was published in the *Electrical Review* of November, 1898.

In order to advance further along this line, I had to go into the open, and in the spring of 1899, having completed preparations for the erection of a wireless plant, I went to Colorado where I remained for more than one year. Here I introduced other improvements and refinements which made it possible to generate currents of any tension that may be desired. Those who are interested will find some information in regard to the experiments I conducted there in my article, "The Problem of Increasing Human Energy," in the *Century Magazine* of June 1900, to which I have referred on a previous occasion.

I will be quite explicit on the subject of my magnifying transformer so that it will be clearly understood. In the first place, it is a resonant transformer, with a secondary in which the parts, charged to a high potential, are of considerable area and arranged in space along ideal enveloping surfaces of very large radii of curvature, and at proper distances from one another, thereby insuring a small electric surface density everywhere, so that no leak can occur even if the conductor is bare. It is suitable for any frequency, from a few to many thousands of cycles per second, and can be used in the production of currents of tremendous volume and moderate pressure, or of smaller amperage and immense electromotive force. The maximum electric tension is merely dependent on the curvature of the surfaces on which the charged elements are situated and the area of the latter. Judging from my past experience there is no limit to the possible voltage developed; any amount is practicable. On the other hand, currents of many thousands of amperes may be obtained in the antenna. A plant of but very moderate dimensions is required for such performances. Theoretically, a terminal of less than 90 feet in diameter is sufficient to develop an electromotive force of that magnitude, while for antenna currents of from 2,000-4,000 amperes at the usual frequencies, it need not be larger than 30 feet in diameter. In a more restricted meaning, this wireless transmitter is one in which the Hertzwave radiation is an entirely negligible quantity as compared with the whole energy, under which condition the

damping factor is extremely small and an enormous charge is stored in the elevated capacity. Such a circuit may then be excited with impulses of any kind, even of low frequency and it will yield sinusoidal and continuous oscillations like those of an alternator. Taken in the narrowest significance of the term, however, it is a resonant transformer which, besides possessing these qualities, is accurately proportioned to fit the globe and its electrical constants and properties, by virtue of which design it becomes highly efficient and effective in the wireless transmission of energy. Distance is then *absolutely eliminated, there being no diminuation in the intensity* of the transmitted impulses. It is even possible to make the actions increase with the distance from the plane, according to an exact mathematical law. This invention was one of a number comprised in my "World System" of wireless transmission which I undertook to commercialize on my return to New York in 1900.

As to the immediate purposes of my enterprise, they were clearly outlined in a technical statement of that period from which I quote, "The world system has resulted from a combination of several original discoveries made by the inventor in the course of long continued research and experimentation. It makes possible not only the instantaneous and precise wireless transmission of any kind of signals, messages or characters, to all parts of the world, but also the inter-connection of the existing telegraph, telephone, and other signal stations without any change in their present equipment. By its means, for instance, a telephone subscriber here may call up and talk to any other subscriber on the Earth. An inexpensive receiver, not bigger than a watch, will enable him to listen anywhere, on land or sea, to a speech delivered or music played in some other place, however distant."

These examples are cited merely to give an idea of the possibilities of this great scientific advance, which annihilates distance and makes that perfect natural conductor, the Earth, available for all the innumerable purposes which human ingenuity has found for a line-wire. One far-reaching result of this is that any device capable of being operated through one or more wires (at a distance obviously restricted) can likewise be actuated, without artificial conductors and with the same facility and accuracy, at distances to which there are no limits other than those imposed by the physical dimensions of the earth. Thus, not only will entirely new fields for commercial exploitation be opened up by this ideal method of transmission, but the old ones vastly extended. The World System is based on the application of the following import and inventions and discoveries:

1. The Tesla Transformer: This apparatus is in the production of electrical vibrations as revolutionary as gunpowder was in warfare. Currents many times stronger than any ever generated in the usual ways and sparks over one hundred feet long, have been produced by the inventor with an instrument of this kind.
2. The Magnifying Transmitter: This is Tesla's best invention, a peculiar transformer specially adapted to excite the earth, which is in the transmission of electrical energy when the telescope is in astronomical observation. By the use of this marvelous device, he has already set up electrical movements of greater intensity than those of lightening and passed a current, sufficient to light more than two hundred incandescent lamps, around the Earth.
3. The Tesla Wireless System: This system comprises a number of improvements and is the only means known for transmitting economically electrical energy to a distance without wires. Careful tests and measurements in connection with an experimental station of great activity, erected by the inventor in Colorado, have demonstrated that power in any desired amount can be conveyed, clear across the globe if necessary, with a loss not exceeding a few per cent.
4. The Art of Individualization: This invention of Tesla is to primitive tuning, what refined language is to unarticulated expression. It makes possible the transmission of signals or messages absolutely secret and exclusive both in the active and passive aspect, that is, non-interfering as well as non-interferable. Each signal is like an individual of unmistakable identity and there is virtually no limit to the number of stations or instruments which can be simultaneously operated without the slightest mutual disturbance.
5. The Terrestrial Stationary Waves: This wonderful discovery, popularly explained, means that the Earth is responsive to electrical vibrations of definite pitch, just as a tuning fork to certain waves of sound. These particular electrical vibrations, capable of powerfully exciting the globe, lend themselves to innumerable uses of great importance commercially and in many other respects. The first "World System" power plant can be put in operation in nine months. With

this power plant, it will be practicable to attain electrical activities up to ten million horse-power and it is designed to serve for as many technical achievements as are possible without due expense. Among these are the following:

1. The inter-connection of existing telegraph exchanges or offices all over the world;
2. The establishment of a secret and non-interferable government telegraph service;
3. The inter-connection of all present telephone exchanges or offices around the globe;
4. The universal distribution of general news by telegraph or telephone, in conjunction with the press;
5. The establishment of such a "World System" of intelligence transmission for exclusive private use;
6. The inter-connection and operation of all stock tickers of the world;
7. The establishment of a "World System" - of musical distribution, etc.;
8. The universal registration of time by cheap clocks indicating the hour with astronomical precision and requiring no attention whatever;
9. The world transmission of typed or handwritten characters, letters, checks, etc.;
10. The establishment of a universal marine service enabling the navigators of all ships to steer perfectly without compass, to determine the exact location, hour and speak; to prevent collisions and disasters, etc.;
11. The inauguration of a system of world printing on land and sea;
12. The world reproduction of photographic pictures and all kinds of drawings or records..."

I also proposed to make demonstration in the wireless transmission of power on a small scale, but sufficient to carry conviction. Besides these, I referred to other and incomparably more important applications of my discoveries which will be disclosed at some future date. A plant was built on Long Island with a tower 187 feet high, having a spherical terminal about 68 feet in diameter. These dimensions were adequate for the transmission of virtually any amount of energy. Originally, only from 200 to 300 K.W. were provided, but I intended to employ later several thousand horsepower. The transmitter was to emit a wave-complex of special characteristics and I had devised a unique method of telephonic control of any amount of energy. The tower was destroyed two years ago (1917) but my projects are being developed and another one, improved in some features, will be constructed.

On this occasion I would contradict the widely circulated report that the structure was demolished by the government, which owing to war conditions, might have created prejudice in the minds of those who may not know that the papers, which thirty years ago conferred upon me the honor of American citizenship, are always kept in a safe, while my orders, diplomas, degrees, gold medals and other distinctions are packed away in old trunks. If this report had a foundation, I would have been refunded a large sum of money which I expended in the construction of the tower. On the contrary, it was in the interest of the government to preserve it, particularly as it would have made possible, to mention just one valuable result, the location of a submarine in any part of the world. My plant, services, and all my improvements have always been at the disposal of the officials and ever since the outbreak of the European conflict, I have been working at a sacrifice on several inventions of mine relating to aerial navigation, ship propulsion and wireless transmission, which are of the greatest importance to the country. Those who are well informed know that my ideas have revolutionized the industries of the United States and I am not aware that there lives an inventor who has been, in this respect, as fortunate as myself - especially as regards the use of his improvements in the war.

I have refrained from publicly expressing myself on this subject before, as it seemed improper to dwell on personal matters while all the world was in dire trouble. I would add further, in view of various rumors which have reached me, that Mr. J. Pierpont Morgan did not interest himself with me in a business way, but in the same large spirit in which he has assisted many other pioneers. He carried out his generous promise to the letter and it would have been most unreasonable to expect from him anything more. He had the highest regard for my attainments and gave me every evidence of his complete faith in my ability to ultimately achieve what I had set out to do. I am unwilling to accord to some small-minded and jealous individuals the satisfaction of having thwarted my efforts. These men are to me nothing more than microbes of a nasty disease. My project was retarded by laws of nature. The world was not prepared for it. It was too far ahead of time, but the same laws will prevail in the end and make it a triumphal success.



Chapter 6

No subject to which I have ever devoted myself has called for such concentration of mind, and strained to so dangerous a degree the finest fibers of my brain, as the systems of which the "Magnifying Transmitter" is the foundation. I put all the intensity and vigor of youth in the development of the rotating field discoveries, but those early labors were of a different character. Although strenuous in the extreme, they did not involve that keen and exhausting discernment which had to be exercised in attacking the many problems of the wireless.

Despite my rare physical endurance at that period, the abused nerves finally rebelled and I suffered a complete collapse, just as the consummation of the long and difficult task was almost in sight. Without doubt I would have paid a greater penalty later, and very likely my career would have been prematurely terminated, had not providence equipped me with a safety device, which seemed to improve with advancing years and unfailingly comes to play when my forces are at an end. So long as it operates I am safe from danger, due to overwork, which threatens other inventors, and incidentally, I need no vacations which are indispensable to most people. When I am all but used up, I simply do as the darkies who "naturally fall asleep while white folks worry."

To venture a theory out of my sphere, the body probably accumulates little by little a definite quantity of some toxic agent and I sink into a nearly lethargic state which lasts half an hour to the minute. Upon awakening I have the sensation as though the events immediately preceding had occurred very long ago, and if I attempt to continue the interrupted train of thought I feel veritable nausea. Involuntarily, I then turn to other tasks and am surprised at the freshness of the mind and ease with which I overcome obstacles that had baffled me before. After weeks or months, my passion for the temporarily abandoned invention returns and I invariably find answers to all the vexing questions, with scarcely any effort. In this connection, I will tell of an extraordinary experience which may be of interest to students of psychology.

I had produced a striking phenomenon with my grounded transmitter and was endeavoring to ascertain its true significance in relation to the currents propagated through the earth. It seemed a hopeless undertaking, and for more than a year I worked unremittingly, but in vain. This profound study so entirely absorbed me, that I became forgetful of everything else, even of my undermined health. At last, as I was at the point of breaking down, nature applied the preservative inducing lethal sleep. Regaining my senses, I realized with consternation that I was unable to visualize scenes from my life except those of infancy, the very first ones that had entered my consciousness. Curiously enough, these appeared before my vision with startling distinctness and afforded me welcome relief. Night after night, when retiring, I would think of them, and more and more of my previous existence was revealed. The image of my mother was always the principal figure in the spectacle that slowly unfolded, and a consuming desire to see her again gradually took possession of me. This feeling grew so strong that I resolved to drop all work and satisfy my longing, but I found it too hard to break away from the laboratory, and several months elapsed during which I had succeeded in reviving all the impressions of my past life, up to the spring of 1892. In the next picture that came out of the mist of oblivion, I saw myself at the Hotel de la Paix in Paris, just coming to from one of my peculiar sleeping spells, which had been caused by prolonged exertion of the brain. Imagine the pain and distress I felt, when it

flashed upon my mind that a dispatch was handed to me at that very moment, bearing the sad news that my mother was dying. I remembered how I made the long journey home without an hour of rest and how she passed away after weeks of agony.

It was especially remarkable that during all this period of partially obliterated memory, I was fully alive to everything touching on the subject of my research. I could recall the smallest detail and the least insignificant observations in my experiments and even recite pages of text and complex mathematical formulae.

My belief is firm in a law of compensation. The true rewards are ever in proportion to the labor and sacrifices made. This is one of the reasons why I feel certain that of all my inventions, the magnifying transmitter will prove most important and valuable to future generations. I am prompted to this prediction, not so much by thoughts of the commercial and industrial revolution which it will surely bring about, but of the humanitarian consequences of the many achievements it makes possible. Considerations of mere utility weigh little in the balance against the higher benefits of civilization. We are confronted with portentous problems which can not be solved just by providing for our material existence, however abundantly. On the contrary, progress in this direction is fraught with hazards and perils not less menacing than those born from want and suffering. If we were to release the energy of atoms or discover some other way of developing cheap and unlimited power at any point on the globe, this accomplishment, instead of being a blessing, might bring disaster to mankind in giving rise to dissension and anarchy, which would ultimately result in the enthronement of the hated regime of force. The greatest good will come from technical improvements tending to unification and harmony, and my wireless transmitter is preeminently such. By its means, the human voice and likeness will be reproduced everywhere, and factories driven from thousands of miles away by waterfalls furnishing power. Aerial machines will be propelled around the earth without a stop and the sun's energy controlled to create lakes and rivers for motive purposes and transformation of arid deserts into fertile land. Its introduction for telegraphic, telephonic and similar uses will automatically cut out the static and all other interferences which at present, impose narrow limits to the application of the wireless. This is a timely topic on which a few words might not be amiss.

During the past decade a number of people have arrogantly claimed that they had succeeded in doing away with this impediment. I have carefully examined all of the arrangements described and tested most of them long before they were publicly disclosed, but the finding was uniformly negative. Recent official statement from the U.S. Navy may, perhaps, have taught some beguilable news editors how to appraise these announcements at their real worth. As a rule, the attempts are based on theories so fallacious, that whenever they come to my notice, I can not help thinking in a light vein. Quite recently a new discovery was heralded, with a deafening flourish of trumpets, but it proved another case of a mountain bringing forth a mouse. This reminds me of an exciting incident which took place a year ago, when I was conducting my experiments with currents of high frequency.

Steve Brodie had just jumped off the Brooklyn Bridge. The feat has been vulgarized since by imitators, but the first report electrified New York. I was very impressionable then and frequently spoke of the daring printer. On a hot afternoon I felt the necessity of refreshing myself and stepped into one of the popular thirty thousand institutions of this great city, where a delicious twelve per cent beverage was served, which can now be had only by making a trip to the poor and devastated countries of Europe. The attendance was large and not over-distinguished and a matter was discussed which gave me an admirable opening for the careless remark, "This is what I said when I jumped off the bridge." No sooner had I uttered these words, than I felt like the companion of Timothens in the poem of Schiller. In an instant there was pandemonium and a dozen voices cried, "It is Brodie!" I threw a quarter on the counter and bolted for the door, but the crowd was at my heels with yells, "Stop, Steeve!", which must have been misunderstood, for many persons tried to hold me up as I ran frantically for my haven of refuge. By darting around corners, I fortunately managed, through the medium of a fire escape, to reach the laboratory, where I threw off my coat, camouflaged myself as a hard-working blacksmith and started the forge. But these precautions proved unnecessary, as I had eluded my pursuers. For many years afterward, at night, when imagination turns into specters the trifling troubles of the day,

I often thought, as I tossed on the bed, what my fate would have been, had the mob caught me and found out that I was not Steve Brodie!

Now the engineer who lately gave an account before a technical body of a novel remedy against static based on a "heretofore unknown law of nature," seems to have been as reckless as myself when he contended that these disturbances propagate up and down, while those of a transmitter proceed along the earth. It would mean that a condenser as this globe, with its gaseous envelope, could be charged and discharged in a manner quite contrary to the fundamental teachings propounded in every elemental text book of physics. Such a supposition would have been condemned as erroneous, even in Franklin's time, for the facts bearing on this were then well known and the identity between atmospheric electricity and that developed by machines was fully established. Obviously, natural and artificial disturbances propagate through the earth and the air in exactly the same way, and both set up electromotive forces in the horizontal as well as vertical sense. Interference can not be overcome by any such methods as were proposed. The truth is this: In the air, the potential increases at the rate of about fifty volts per foot of elevation, owing to which there may be a difference of pressure amounting to twenty, or even forty thousand volts between the upper and lower ends of the antenna. The masses of the charged atmosphere are constantly in motion and give up electricity to the conductor, not continuously, but rather disruptively, this producing a grinding noise in a sensitive telephonic receiver. The higher the terminal and the greater the space encompassed by the wires, the more pronounced is the effect, but it must be understood that it is purely local and has little to do with the real trouble.

In 1900, while perfecting my wireless system, one form of apparatus compressed four antennae. These were carefully calibrated in the same frequency and connected in multiple with the object of magnifying the action in receiving from any direction. When I desired to ascertain the origin of the transmitted impulse, each diagonally situated pair was put in series with a primary coil energizing the detector circuit. In the former case, the sound was loud in the telephone; in the latter it ceased, as expected, the two antennae neutralizing each other, but the true statics manifested themselves in both instances and I had to devise special preventives embodying different principles. By employing receivers connected to two points of the ground, as suggested by me long ago, this trouble caused by the charged air, which is very serious in the structures as now built, is nullified and besides, the liability of all kinds of interference is reduced to about one-half because of the directional character of the circuit. This was perfectly self-evident, but came as a revelation to some simple-minded wireless folks whose experience was confined to forms of apparatus that could have been improved with an ax, and they have been disposing of the bear's skin before killing him. If it were true that strays performed such antics, it would be easy to get rid of them by receiving without aerials. But, as a matter of fact, a wire buried in the ground which, conforming to this view, should be absolutely immune, is more susceptible to certain extraneous impulses than one placed vertically in the air. To state it fairly, a slight progress has been made, but not by virtue of any particular method or device. It was achieved simply by discerning the enormous structures, which are bad enough for transmission but wholly unsuitable for reception and adopting a more appropriate type of receiver. As I have said before, to dispose of this difficulty for good, a radical change must be made in the system and the sooner this is done the better.

It would be calamitous, indeed, if at this time when the art is in its infancy and the vast majority, not excepting even experts, have no conception of its ultimate possibilities, a measure would be rushed through the legislature making it a government monopoly. This was proposed a few weeks ago by Secretary Daniels and no doubt that distinguished official has made his appeal to the Senate and House of Representatives with sincere conviction. But universal evidence unmistakably shows that the best results are always obtained in healthful commercial competition. There are, however, exceptional reasons why wireless should be given the fullest freedom of development. In the first place, it offers prospects immeasurably greater and more vital to betterment of human life than any other invention or discovery in the history of man. Then again, it must be understood that this wonderful art has been, in its entirety, evolved here and can be called "American" with more right and propriety than the telephone, the incandescent lamp or the aeroplane.

Enterprising press agents and stock jobbers have been so successful in spreading misinformation,

that even so excellent a periodical as the *Scientific American*, accords the chief credit to a foreign country. The Germans, of course, gave us the Hertz waves and the Russian, English, French and Italian experts were quick in using them for signaling purposes. It was an obvious application of the new agent and accomplished with the old classical and unimproved induction coil, scarcely anything more than another kind of heliography. The radius of transmission was very limited, the result attained of little value, and the Hertz oscillations, as a means for conveying intelligence, could have been advantageously replaced by sound waves, which I advocated in 1891. Moreover, all of these attempts were made three years after the basic principles of the wireless system, which is universally employed today, and its potent instrumentalities had been clearly described and developed in America.

No trace of those Hertzian appliances and methods remains today. We have proceeded in the very opposite direction and what has been done is the product of the brains and efforts of citizens of this country. The fundamental patents have expired and the opportunities are open to all. The chief argument of the secretary is based on interference. According to his statement, reported in the *New York Herald* of July 29th, signals from a powerful station can be intercepted in every village in the world. In view of this fact, which was demonstrated in my experiments in 1900, it would be of little use to impose restrictions in the United States.

As throwing light on this point, I may mention that only recently an odd looking gentleman called on me with the object of enlisting my services in the construction of world transmitters in some distant land. "We have no money," he said, "but carloads of solid gold, and we will give you a liberal amount." I told him that I wanted to see first what will be done with my inventions in America, and this ended the interview. But I am satisfied that some dark forces are at work, and as time goes on the maintenance of continuous communication will be rendered more difficult. The only remedy is a system immune against interruption. It has been perfected, it exists, and all that is necessary is to put it in operation.

The terrible conflict is still uppermost in the minds and perhaps the greatest importance will be attached to the magnifying transmitter as a machine for attack and defense, more particularly in connection with *telautamatics*. This invention is a logical outcome of observations begun in my boyhood and continued throughout my life. When the first results were published, the *Electrical Review* stated editorially that it would become one of the "most potent factors in the advance of civilization of mankind." The time is not distant when this prediction will be fulfilled. In 1898 and 1900, it was offered by me to the government and might have been adopted, were I one of those who would go to Alexander's shepherd when they want a favor from Alexander!

At that time I really thought that it would abolish war, because of its unlimited destructiveness and exclusion of the personal element of combat. But while I have not lost faith in its potentialities, my views have changed since. War can not be avoided until the physical cause for its recurrence is removed and this, in the last analysis, is the vast extent of the planet on which we live. Only though annihilation of distance in every respect, as the conveyance of intelligence, transport of passengers and supplies and transmission of energy will conditions be brought about some day, insuring permanency of friendly relations. What we now want most is closer contact and better understanding between individuals and communities all over the earth and the elimination of that fanatic devotion to exalted ideals of national egoism and pride, which is always prone to plunge the world into primeval barbarism and strife. No league or parliamentary act of any kind will ever prevent such a calamity. These are only new devices for putting the weak at the mercy of the strong.

I have expressed myself in this regard fourteen years ago, when a combination of a few leading governments, a sort of Holy alliance, was advocated by the late Andrew Carnegie, who may be fairly considered as the father of this idea, having given to it more publicity and impetus than anybody else prior to the efforts of the President. While it can not be denied that such aspects might be of material advantage to some less fortunate peoples, it can not attain the chief objective sought. Peace can only come as a natural consequence of universal enlightenment and merging of races, and we are still far from this blissful realization, because few indeed, will admit the reality < that God made man in His image < in which case all earth men are alike. There is in fact but one race, of many colors. Christ is but one person, yet he is of all people, so why do

some people think themselves better than some other people?

As I view the world of today, in the light of the gigantic struggle we have witnessed, I am filled with conviction that the interests of humanity would be best served if the United States remained true to its traditions, true to God whom it pretends to believe, and kept out of "entangling alliances." Situated as it is, geographically remote from the theaters of impending conflicts, without incentive to territorial aggrandizement, with inexhaustible resources and immense population thoroughly imbued with the spirit of liberty and right, this country is placed in a unique and privileged position. It is thus able to exert, independently, its colossal strength and moral force to the benefit of all, more judiciously and effectively, than as a member of a league.

I have dwelt on the circumstances of my early life and told of an affliction which compelled me to unremitting exercise of imagination and self-observation. This mental activity, at first involuntary under the pressure of illness and suffering, gradually became second nature and led me finally to recognize that I was but an automaton devoid of free will in thought and action and merely responsible to the forces of the environment. Our bodies are of such complexity of structure, the motions we perform are so numerous and involved and the external impressions on our sense organs to such a degree delicate and elusive, that it is hard for the average person to grasp this fact. Yet nothing is more convincing to the trained investigator than the mechanistic theory of life which had been, in a measure, understood and propounded by Descartes three hundred years ago. In his time many important functions of our organisms were unknown and especially with respect to the nature of light and the construction and operation of the eye, philosophers were in the dark.

In recent years the progress of scientific research in these fields has been such as to leave no room for a doubt in regard to this view on which many works have been published. One of its ablest and most eloquent exponents is, perhaps, Felix le Dantec, formerly assistant of Pasteur. Professor Jacques Loeb has performed remarkable experiments in heliotropism, clearly establishing the controlling power of light in lower forms of organisms and his latest book, *Forced Movements*, is revelatory. But while men of science accept this theory simply as any other that is recognized, to me it is a truth which I hourly demonstrate by every act and thought of mine. The consciousness of the external impression prompting me to any kind of exertion, < physical or mental, is ever present in my mind. Only on very rare occasions, when I was in a state of exceptional concentration, have I found difficulty in locating the original impulse. The by far greater number of human beings are never aware of what is passing around and within them and millions fall victims of disease and die prematurely just on this account. The commonest, every-day occurrences appear to them mysterious and inexplicable. One may feel a sudden wave of sadness and rack his brain for an explanation, when he might have noticed that it was caused by a cloud cutting off the rays of the sun. He may see the image of a friend dear to him under conditions which he construes as very peculiar, when only shortly before he has passed him in the street or seen his photograph somewhere. When he loses a collar button, he fusses and swears for an hour, being unable to visualize his previous actions and locate the object directly. Deficient observation is merely a form of ignorance and responsible for the many morbid notions and foolish ideas prevailing. There is not more than one out of every ten persons who does not believe in telepathy and other psychic manifestations, spiritualism and communion with the dead, and who would refuse to listen to willing or unwilling deceivers?

Just to illustrate how deeply rooted this tendency has become even among the clear-headed American population, I may mention a comical incident. Shortly before the war, when the exhibition of my turbines in this city elicited widespread comment in the technical papers, I anticipated that there would be a scramble among manufacturers to get hold of the invention and I had particular designs on that man from Detroit who has an uncanny faculty for accumulating millions. So confident was I, that he would turn up some day, that I declared this as certain to my secretary and assistants. Sure enough, one fine morning a body of engineers from the Ford Motor Company presented themselves with the request of discussing with me an important project. "Didn't I tell you?," I remarked triumphantly to my employees, and one of them said, "You are amazing, Mr. Tesla. Everything comes out exactly as you predict."

As soon as these hard-headed men were seated, I of course, immediately began to extol the

wonderful features of my turbine, when the spokesman interrupted me and said, "We know all about this, but we are on a special errand. We have formed a psychological society for the investigation of psychic phenomena and we want you to join us in this undertaking." I suppose these engineers never knew how near they came to being fired out of my office.

Ever since I was told by some of the greatest men of the time, leaders in science whose names are immortal, that I am possessed of an unusual mind, I bent all my thinking faculties on the solution of great problems regardless of sacrifice. For many years I endeavored to solve the enigma of death, and watched eagerly for every kind of spiritual indication. But only once in the course of my existence have I had an experience which momentarily impressed me as supernatural. It was at the time of my mother's death.

I had become completely exhausted by pain and long vigilance, and one night was carried to a building about two blocks from our home. As I lay helpless there, I thought that if my mother died while I was away from her bedside, she would surely give me a sign. Two or three months before, I was in London in company with my late friend, Sir William Crookes, when spiritualism was discussed and I was under the full sway of these thoughts. I might not have paid attention to other men, but was susceptible to his arguments as it was his epochal work on radiant matter, which I had read as a student, that made me embrace the electrical career. I reflected that the conditions for a look into the beyond were most favorable, for my mother was a woman of genius and particularly excelling in the powers of intuition. During the whole night every fiber in my brain was strained in expectancy, but nothing happened until early in the morning, when I fell in a sleep, or perhaps a swoon, and saw a cloud carrying angelic figures of marvelous beauty, one of whom gazed upon me lovingly and gradually assumed the features of my mother. The appearance slowly floated across the room and vanished, and I was awakened by an indescribably sweet song of many voices. In that instant a certitude, which no words can express, came upon me that my mother had just died. And that was true. I was unable to understand the tremendous weight of the painful knowledge I received in advance, and wrote a letter to Sir William Crookes while still under the domination of these impressions and in poor bodily health. When I recovered, I sought for a long time the external cause of this strange manifestation and, to my great relief, I succeeded after many months of fruitless effort.

I had seen the painting of a celebrated artist, representing allegorically one of the seasons in the form of a cloud with a group of angels which seemed to actually float in the air, and this had struck me forcefully. It was exactly the same that appeared in my dream, with the exception of my mother's likeness. The music came from the choir in the church nearby at the early mass of Easter morning, explaining everything satisfactorily in conformity with scientific facts.

This occurred long ago, and I have never had the faintest reason since to change my views on psychical and spiritual phenomena, for which there is no foundation. The belief in these is the natural outgrowth of intellectual development. Religious dogmas are no longer accepted in their orthodox meaning, but every individual clings to faith in a supreme power of some kind.

We all must have an ideal to govern our conduct and insure contentment, but it is immaterial whether it be one of creed, art, science, or anything else, so long as it fulfills the function of a dematerializing force. It is essential to the peaceful existence of humanity as a whole that one common conception should prevail. While I have failed to obtain any evidence in support of the contentions of psychologists and spiritualists, I have proved to my complete satisfaction the automatism of life, not only through continuous observations of individual actions, but even more conclusively through certain generalizations. these amount to a discovery which I consider of the greatest moment to human society, and on which I shall briefly dwell.

I got the first inkling of this astonishing truth when I was still a very young man, but for many years I interpreted what I noted simply as coincidences. Namely, whenever either myself or a person to whom I was attached, or a cause to which I was devoted, was hurt by others in a particular way, which might be best popularly characterized as the most unfair imaginable, I experienced a singular and undefinable pain which, for the want of a better term, I have qualified as "cosmic" and shortly thereafter, and invariably, those who had inflicted it came to grief. After many such cases I confided this to a number of friends, who had the opportunity to convince themselves of the theory

of which I have gradually formulated and which may be stated in the following few words: Our bodies are of similar construction and exposed to the same external forces. This results in likeness of response and concordance of the general activities on which all our social and other rules and laws are based. We are automata entirely controlled by the forces of the medium, being tossed about like corks on the surface of the water, but mistaking the resultant of the impulses from the outside for the free will. The movements and other actions we perform are always life preservative and though seemingly quite independent from one another, we are connected by invisible links. So long as the organism is in perfect order, it responds accurately to the agents that prompt it, but the moment that there is some derangement in any individual, his self-preservative power is impaired.

Everybody understands, of course, that if one becomes deaf, has his eyes weakened, or his limbs injured, the chances for his continued existence are lessened. But this is also true, and perhaps more so, of certain defects in the brain which drive the automaton, more or less, of that vital quality and cause it to rush into destruction. A very sensitive and observant being, with his highly developed mechanism all intact, and acting with precision in obedience to the changing conditions of the environment, is endowed with a transcending mechanical sense, enabling him to evade perils too subtle to be directly perceived. When he comes in contact with others whose controlling organs are radically faulty, that sense asserts itself and he feels the "cosmic" pain.

The truth of this has been borne out in hundreds of instances and I am inviting other students of nature to devote attention to this subject, believing that through combined systematic effort, results of incalculable value to the world will be attained. The idea of constructing an automaton, to bear out my theory, presented itself to me early, but I did not begin active work until 1895, when I started my wireless investigations. During the succeeding two or three years, a number of automatic mechanisms, to be actuated from a distance, were constructed by me and exhibited to visitors in my laboratory.

In 1896, however, I designed a complete machine capable of a multitude of operations, but the consummation of my labors was delayed until late in 1897.

This machine was illustrated and described in my article in the *Century Magazine* of June, 1900; and other periodicals of that time and when first shown in the beginning of 1898, it created a sensation such as no other invention of mine has ever produced. In November, 1898, a basic patent on the novel art was granted to me, but only after the examiner-in-chief had come to New York and witnessed the performance, for what I claimed seemed unbelievable. I remember that when later I called on an official in Washington, with a view of offering the invention to the Government, he burst out in laughter upon my telling him what I had accomplished. Nobody thought then that there was the faintest prospect of perfecting such a device. It is unfortunate that in this patent, following the advice of my attorneys, I indicated the control as being affected through the medium of a single circuit and a well-known form of detector, for the reason that I had not yet secured protection on my methods and apparatus for individualization. As a matter of fact, my boats were controlled through the joint action of several circuits and interference of every kind was excluded.

Most generally, I employed receiving circuits in the form of loops, including condensers, because the discharges of my high-tension transmitter ionized the air in the (laboratory) so that even a very small aerial would draw electricity from the surrounding atmosphere for hours.

Just to give an idea, I found, for instance, that a bulb twelve inches in diameter, highly exhausted, and with one single terminal to which a short wire was attached, would deliver well on to one thousand successive flashes before all charge of the air in the laboratory was neutralized. The loop form of receiver was not sensitive to such a disturbance and it is curious to note that it is becoming popular at this late date. In reality, it collects much less energy than the aerials or a long grounded wire, but it so happens that it does away with a number of defects inherent to the present wireless devices.

In demonstrating my invention before audiences, the visitors were requested to ask questions,

however involved, and the automaton would answer them by signs. This was considered magic at the time, but was extremely simple, for it was myself who gave the replies by means of the device.

At the same period, another larger telautomatic boat was constructed, a photograph of which was shown in the October 1919 number of the *Electrical Experimenter*. It was controlled by loops, having several turns placed in the hull, which was made entirely water-tight and capable of submergence. The apparatus was similar to that used in the first with the exception of certain special features I introduced as, for example, incandescent lamps which afforded a visible evidence of the proper functioning of the machine. These automata, controlled within the range of vision of the operator, were, however, the first and rather crude steps in the evolution of the art of Telautomatics as I had conceived it.

The next logical improvement was its application to automatic mechanisms beyond the limits of vision and at great distances from the center of control, and I have ever since advocated their employment as instruments of warfare in preference to guns. The importance of this now seems to be recognized, if I am to judge from casual announcements through the press, of achievements which are said to be extraordinary but contain no merit of novelty, whatever. In an imperfect manner it is practicable, with the existing wireless plants, to launch an aeroplane, have it follow a certain approximate course, and perform some operation at a distance of many hundreds of miles. A machine of this kind can also be mechanically controlled in several ways and I have no doubt that it may prove of some usefulness in war. But there are to my best knowledge, no instrumentalities in existence today with which such an object could be accomplished in a precise manner. I have devoted years of study to this matter and have evolved means, making such and greater wonders easily realizable.

As stated on a previous occasion, when I was a student at college I conceived a flying machine quite unlike the present ones. The underlying principle was sound, but could not be carried into practice for want of a prime-mover of sufficiently great activity. In recent years, I have successfully solved this problem and am now planning aerial machines *devoid of sustaining planes, ailerons, propellers, and other external* attachments, which will be capable of immense speeds and are very likely to furnish powerful arguments for peace in the near future. Such a machine, sustained and propelled *entirely by reaction*, is shown on one of the pages of my lectures, and is supposed to be controlled either mechanically, or by wireless energy. By installing proper plants, it will be practicable to *project a missile of this kind into the air and drop it* almost on the very spot designated, which may be thousands of miles away.

But we are not going to stop at this. Telautomats will be ultimately produced, capable of acting as if possessed of their own intelligence, and their advent will create a revolution. As early as 1898, I proposed to representatives of a large manufacturing concern the construction and public exhibition of an automobile carriage which, left to itself, would perform a great variety of operations involving something akin to judgment. But my proposal was deemed chimerical at the time and nothing came of it.

At present, many of the ablest minds are trying to devise expedients for preventing a repetition of the awful conflict which is only theoretically ended and the duration and main issues of which I have correctly predicted in an article printed in the *Sun* of December 20, 1914. The proposed League is not a remedy but, on the contrary, in the opinion of a number of competent men, may bring about results just the opposite.

It is particularly regrettable that a punitive policy was adopted in framing the terms of peace, because a few years hence, it will be possible for nations to fight without armies, ships or guns, by weapons far more terrible, to the destructive action and range of which there is virtually no limit. Any city, at a distance, whatsoever, from the enemy, can be destroyed by him and no power on earth can stop him from doing so. If we want to avert an impending calamity and a state of things which may transform the globe into an inferno, we should push the development of flying machines and wireless transmission of energy without an instant's delay and with all the power and resources of the nation.

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EXPERIMENTS

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ALTERNATE CURRENTS

OF

HIGH POTENTIAL AND HIGH FREQUENCY.

BY

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A LECTURE

DELIVERED BEFORE THE

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With a Portrait and Biographical Sketch of the Author.

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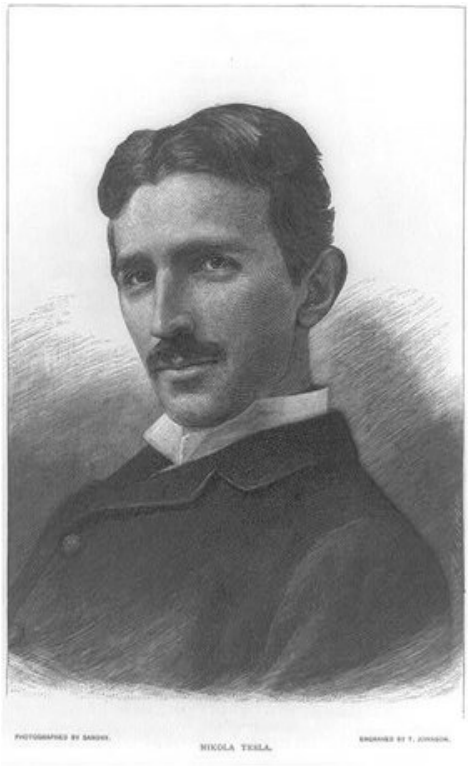
A LECTURE

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NEW YORK:
1892



Biographical Sketch of Nikola Tesla.

While a large portion of the European family has been surging westward during the last three or four hundred years, settling the vast continents of America, another, but smaller, portion has been doing frontier work in the Old World, protecting the rear by beating back the "unspeakable Turk" and reclaiming gradually the fair lands that endure the curse of Mohammedan rule. For a long time the Slav people—who, after the battle of Kosovopjolje, in which the Turks defeated the Servians, retired to the confines of the present Montenegro, Dalmatia, Herzegovina and Bosnia, and "Borderland" of Austria—knew what it was to deal, as our Western pioneers did, with foes ceaselessly fretting against their frontier; and the races of these countries, through their strenuous struggle against the armies of the Crescent, have developed notable qualities of bravery and sagacity, while maintaining a patriotism and independence unsurpassed in any other nation.

It was in this interesting border region, and from among these valiant Eastern folk, that Nikola Tesla was born in the year 1857, and the fact that he, to-day, finds himself in America and one of our foremost electricians, is striking evidence of the extraordinary attractiveness alike of electrical pursuits and of the country where electricity enjoys its widest application. Mr. Tesla's native place was Smiljan, Lika, where his father was an eloquent clergyman of the Greek Church, in which, by the way, his family is still prominently represented. His mother enjoyed great fame throughout the countryside for her skill and originality in needlework, and doubtless transmitted her ingenuity to Nikola; though it naturally took another and more masculine direction.

The boy was early put to his books, and upon his father's removal to Gospic he spent four years in the public school, and later, three years in the Real School, as it is called. His escapades were such as most quick witted boys go through, although he varied the programme on one occasion by getting imprisoned in a remote mountain chapel rarely visited for service; and on another occasion by falling headlong into a huge kettle of boiling milk, just drawn from the paternal herds. A third curious episode was that connected with his efforts to fly when, attempting to navigate the air with the aid of an old umbrella, he had, as might be expected, a very bad fall, and was laid up for six weeks.

About this period he began to take delight in arithmetic and physics. One queer notion he had was to work out everything by three or the power of three. He was now sent to an aunt at Cartstatt, Croatia, to finish his studies in what is known as the Higher Real School. It was there that, coming from the rural fastnesses, he saw a steam engine for the first time with a pleasure that he remembers to this day. At Cartstatt he was so diligent as to compress the four years' course into three, and graduated in 1873. Returning home during an epidemic of cholera, he was stricken down by the disease and suffered so seriously from the consequences that his studies were interrupted for fully two years. But the time was not wasted, for he had become passionately fond of experimenting, and as much as his means and leisure permitted devoted his energies to electrical study and investigation. Up to this period it had been his father's intention to make a priest of him, and the idea hung over the young physicist like a very sword of Damocles. Finally he prevailed upon his worthy but reluctant sire to send him to Gratz in Austria to finish his studies at the Polytechnic School, and to prepare for work as professor of mathematics and physics. At Gratz he saw and operated a Gramme machine for the first time, and was so struck with the objections to the use of commutators and brushes that he made up his mind there and then to remedy that defect in dynamo-electric machines. In the second year of his course he abandoned the intention of becoming a teacher and took up the engineering curriculum. After three years of absence he returned home, sadly, to see his father die; but, having resolved to settle down in Austria, and recognizing the value of linguistic acquirements, he went to Prague and then to Buda-Pesth with the view of mastering the languages he deemed necessary. Up to this time he had never realized the enormous sacrifices that his parents had made in promoting his education, but he now began to feel the pinch and to grow unfamiliar with the image of Francis Joseph I. There was considerable lag between his dispatches and the corresponding remittance from home; and when the mathematical expression for the value of the lag assumed the shape of an eight laid flat on its back, Mr. Tesla became a very fair example of high thinking and plain living, but he made up his mind to the struggle and determined to go through depending solely on his own resources. Not desiring the fame of a faster, he cast about for a livelihood, and through the help of friends he secured a berth as assistant in the engineering department of the government telegraphs. The salary was five dollars a week. This brought him into direct contact with practical electrical work and ideas, but it is needless to say that his means did not admit of much experimenting. By the time he had extracted several hundred thousand square and cube roots for the public benefit, the limitations, financial and otherwise, of the position had become painfully apparent, and he concluded that the best thing to do was to make a valuable invention. He proceeded at once to make inventions, but their value was visible only to the eye of faith, and they brought no grist to the mill. Just at this time the telephone made its appearance in Hungary, and the success of that great invention determined his career, hopeless as the profession had thus far seemed to him. He associated himself at once with telephonic work, and made various telephonic inventions, including an operative repeater; but it did not take him long to discover that, being so remote from the scenes of electrical activity, he was apt to spend time on aims and results already reached by others, and to lose touch. Longing for new opportunities and anxious for the development of which he felt himself possible, if once he could place himself within the genial and direct influences of the gulf streams of electrical thought, he broke away from the ties and traditions of the past, and in 1881 made his way to Paris. Arriving in that city, the ardent young Likan obtained employment as an electrical engineer with one of the largest electric lighting companies. The next year he went to Strasburg to install a plant, and on returning to Paris sought to carry out a number of ideas that had now ripened into inventions. About this time, however, the remarkable progress of America in electrical industry attracted his attention, and once again staking everything on a single throw, he crossed the Atlantic.

Mr. Tesla buckled down to work as soon as he landed on these shores, put his best thought and skill into it, and soon saw openings for his talent. In a short while a proposition was made to him to start his own company, and, accepting the terms, he at once worked up a practical system of arc lighting, as well as a potential method of dynamo regulation, which in one form is now known as the "third brush regulation." He also devised a thermo-magnetic motor and other kindred devices, about which little was published, owing to legal complications. Early in 1887 the Tesla Electric Company of New York was formed, and not long after that Mr. Tesla produced his admirable and epoch-marking motors for multiphase alternating currents, in which, going back to his ideas of long ago, he evolved machines having neither commutator nor brushes. It will be remembered that about the time that Mr. Tesla brought out his motors, and read his thoughtful paper before the American Institute of Electrical Engineers, Professor Ferraris, in Europe, published his discovery of principles analogous to those enunciated by Mr. Tesla. There is no doubt, however, that Mr. Tesla was an independent inventor of this rotary field motor, for although anticipated in dates by Ferraris, he could not have known about Ferraris' work as it had not been published. Professor Ferraris stated himself, with becoming modesty, that he did not think Tesla could have known of his (Ferraris') experiments at that time, and adds that he thinks Tesla was an independent and original inventor of this principle. With such an acknowledgment from Ferraris there can be little doubt about Tesla's originality in this matter.

Mr. Tesla's work in this field was wonderfully timely, and its worth was promptly appreciated in various quarters. The Tesla patents were acquired by the Westinghouse Electric Company, who undertook to develop his motor and to apply it to work of different kinds. Its use in mining, and its employment in printing, ventilation, etc., was described and illustrated in *The Electrical World* some years ago. The immense stimulus that the announcement of Mr. Tesla's work gave to the study of alternating current motors would, in itself, be enough to stamp him as a leader.

Mr. Tesla is only 35 years of age. He is tall and spare with a clean-cut, thin, refined face, and eyes that recall all the stories one has read of keenness of vision and phenomenal ability to see through things. He is an omnivorous reader, who never forgets; and he possesses the peculiar facility in languages that enables the least educated native of eastern Europe to talk and write in at least half a dozen tongues. A more congenial companion cannot be desired for the hours when one "pours out heart affluence in discursive talk," and when the conversation, dealing at first with things near at hand and next to us, reaches out and rises to the greater questions of life, duty and destiny.

In the year 1890 he severed his connection with the Westinghouse Company, since which time he has devoted himself entirely to the study of alternating currents of high frequencies and very high potentials, with which study he is at present engaged. No comment is necessary on his interesting achievements in this field; the famous London lecture published in this volume is a proof in itself. His first lecture on his researches in this new branch of electricity, which he may be said to have created, was delivered before the American Institute of Electrical Engineers on May 20, 1891, and remains one of the most interesting papers read before that society. It will be found reprinted in full in *The Electrical World*, July 11, 1891. Its publication excited such interest abroad that he received numerous requests from English and French electrical engineers and scientists to repeat it in those countries, the result of which has been the interesting lecture published in this volume.

The present lecture presupposes a knowledge of the former, but it may be read and understood by any one even though he has not read the earlier one. It forms a sort of continuation of the latter, and includes chiefly the results of his researches since that time.

EXPERIMENTS

WITH

Alternate Currents of High Potential

and High Frequency.

I cannot find words to express how deeply I feel the honor of addressing some of the foremost thinkers of the present time, and so many able scientific men, engineers and electricians, of the country greatest in scientific achievements.

The results which I have the honor to present before such a gathering I cannot call my own. There are among you not a few who can lay better claim than myself on any feature of merit which this work may contain. I need not mention many names which are world-known—names of those among you who are recognized as the leaders in this enchanting science; but one, at least, I must mention—a name which could not be omitted in a demonstration of this kind. It is a name associated with the most beautiful invention ever made: it is Crookes!

When I was at college, a good time ago, I read, in a translation (for then I was not familiar with your magnificent language), the description of his experiments on radiant matter. I read it only once in my life—that time—yet every detail about that charming work I can remember this day. Few are the books, let me say, which can make such an impression upon the mind of a student.

But if, on the present occasion, I mention this name as one of many your institution can boast of, it is because I have more than one reason to do so. For what I have to tell you and to show you this evening concerns, in a large measure, that same vague world which Professor Crookes has so ably explored; and, more than this, when I trace back the mental process which led me to these advances—which even by myself cannot be considered trifling, since they are so appreciated by you—I believe that their real origin, that which started me to work in this direction, and brought me to them, after a long period of constant thought, was that fascinating little book which I read many years ago.

And now that I have made a feeble effort to express my homage and acknowledge my indebtedness to him and others among you, I will make a second effort, which I hope you will not find so feeble as the first, to entertain you.

Give me leave to introduce the subject in a few words.

A short time ago I had the honor to bring before our American Institute of Electrical Engineers [A] some results then arrived at by me in a novel line of work. I need not assure you that the many evidences which I have received that English scientific men and engineers were interested in this work have been for me a great reward and encouragement. I will not dwell upon the experiments already described, except with the view of completing, or more clearly expressing, some ideas advanced by me before, and also with the view of rendering the study here presented self-contained, and my remarks on the subject of this evening's lecture consistent.

[A]

For Mr. Tesla's American lecture on this subject see THE ELECTRICAL WORLD of July 11, 1891, and for a report of his French lecture see THE ELECTRICAL WORLD of March 26, 1892.

This investigation, then, it goes without saying, deals with alternating currents, and, to be more precise, with alternating currents of high potential and high frequency. Just in how much a very high frequency is essential for the production of the results presented is a question which even with my present experience, would embarrass me to answer. Some of the experiments may be performed with low frequencies; but very high frequencies are desirable, not only on account of the many effects secured by their use, but also as a convenient means of obtaining, in the induction apparatus employed, the high potentials, which in their turn are necessary to the demonstration of most of the experiments here contemplated.

Of the various branches of electrical investigation, perhaps the most interesting and immediately the most promising is that dealing with alternating currents. The progress in this branch of applied science has been so great in recent years that it justifies the most sanguine hopes. Hardly have we become familiar with one fact, when novel experiences are met with and new avenues of research are opened. Even at this hour possibilities not dreamed of before are, by the use of these currents, partly realized. As in nature all is ebb and tide, all is wave motion, so it seems that; in all branches of industry alternating currents—electric wave motion—will have the sway.

One reason, perhaps, why this branch of science is being so rapidly developed is to be found in the interest which is attached to its experimental study. We wind a simple ring of iron with coils; we establish the connections to the generator, and with wonder and delight we note the effects of strange forces which we bring into play, which allow us to transform, to transmit and direct energy at will. We arrange the circuits properly, and we see the mass of iron and wires behave as though it were endowed with life, spinning a heavy armature, through invisible connections, with great speed and power —with the energy possibly conveyed from a great distance. We observe how the energy of an alternating current traversing the wire manifests itself—not so much in the wire as in the surrounding space —in the most surprising manner, taking the forms of heat, light, mechanical energy, and, most surprising of all, even chemical affinity. All these observations fascinate us, and fill us with an intense desire to know more about the nature of these phenomena. Each day we go to our work in the hope of discovering, —in the hope that some one, no matter who, may find a solution of one of the pending great problems,— and each succeeding day we return to our task with renewed ardor; and even if we *are* unsuccessful, our work has not been in vain, for in these strivings, in these efforts, we have found hours of untold pleasure, and we have directed our energies to the benefit of mankind.

We may take—at random, if you choose—any of the many experiments which may be performed with alternating currents; a few of which only, and by no means the most striking, form the subject of this evening's demonstration: they are all equally interesting, equally inciting to thought.

Here is a simple glass tube from which the air has been partially exhausted. I take hold of it; I bring my body in contact with a wire conveying alternating currents of high potential, and the tube in my hand is brilliantly lighted. In whatever position I may put it, wherever I may move it in space, as far as I can reach, its soft, pleasing light persists with undiminished brightness.

Here is an exhausted bulb suspended from a single wire. Standing on an insulated support. I grasp it, and a platinum button mounted in it is brought to vivid incandescence.

Here, attached to a leading wire, is another bulb, which, as I touch its metallic socket, is filled with magnificent colors of phosphorescent light.

Here still another, which by my fingers' touch casts a shadow—the Crookes shadow, of the stem inside of it.

Here, again, insulated as I stand on this platform, I bring my body in contact with one of the terminals of the secondary of this induction coil—with the end of a wire many miles long—and you see streams of light break forth from its distant end, which is set in violent vibration.

Here, once more, I attach these two plates of wire gauze to the terminals of the coil. I set them a distance apart, and I set the coil to work. You may see a small spark pass between the plates. I insert a thick plate of one of the best dielectrics between them, and instead of rendering altogether impossible, as we are used to expect, I *aid* the passage of the discharge, which, as I insert the plate, merely changes in appearance and assumes the form of luminous streams.

Is there, I ask, can there be, a more interesting study than that of alternating currents?

In all these investigations, in all these experiments, which are so very, very interesting, for many years past —ever since the greatest experimenter who lectured in this hall discovered its principle—we have had a steady companion, an appliance familiar to every one, a plaything once, a thing of momentous importance now—the induction coil. There is no dearer appliance to the electrician. From the ablest among you, I dare say, down to the inexperienced student, to your lecturer, we all have passed many delightful hours in experimenting with the induction coil. We have watched its play, and thought and pondered over the beautiful phenomena which it disclosed to our ravished eyes. So well known is this apparatus, so familiar are these phenomena to every one, that my courage nearly fails me when I think that I have ventured to address so able an audience, that I have ventured to entertain you with that same old subject. Here in reality is the same apparatus, and here are the same phenomena, only the apparatus is operated somewhat differently, the phenomena are presented in a different aspect. Some of the results we find as expected, others surprise us, but all captivate our attention, for in scientific investigation each novel result achieved may be the centre of a new departure, each novel fact learned may lead to important developments.

Usually in operating an induction coil we have set up a vibration of moderate frequency in the primary, either by means of an interrupter or break, or by the use of an alternator. Earlier English investigators, to mention only Spottiswoode and J.E.H. Gordon, have used a rapid break in connection with the coil. Our knowledge and experience of to-day enables us to see clearly why these coils under the conditions of the tests did not disclose any remarkable phenomena, and why able experimenters failed to perceive many of the curious effects which have since been observed.

In the experiments such as performed this evening, we operate the coil either from a specially constructed alternator capable of giving many thousands of reversals of current per second, or, by disruptively discharging a condenser through the primary, we set up a vibration in the secondary circuit of a frequency of many hundred thousand or millions per second, if we so desire; and in using either of these means we enter a field as yet unexplored.

It is impossible to pursue an investigation in any novel line without finally making some interesting observation or learning some useful fact. That this statement is applicable to the subject of this lecture the many curious and unexpected phenomena which we observe afford a convincing proof. By way of illustration, take for instance the most obvious phenomena, those of the discharge of the induction coil.

Here is a coil which is operated by currents vibrating with extreme rapidity, obtained by disruptively discharging a Leyden jar. It would not surprise a student were the lecturer to say that the secondary of this coil consists of a small length of comparatively stout wire; it would not surprise him were the lecturer to state that, in spite of this, the coil is capable of giving any potential which the best insulation of the turns is able to withstand: but although he may be prepared, and even be indifferent as to the anticipated result, yet the aspect of the discharge of the coil will surprise and interest him. Every one is familiar with the discharge of an ordinary coil; it need not be reproduced here. But, by way of contrast, here is a form of discharge of a coil, the primary current of which is vibrating several

hundred thousand times per second. The discharge of an ordinary coil appears as a simple line or band of light. The discharge of this coil appears in the form of powerful brushes and luminous streams issuing from all points of the two straight wires attached to the terminals of the secondary. (Fig. 1.)

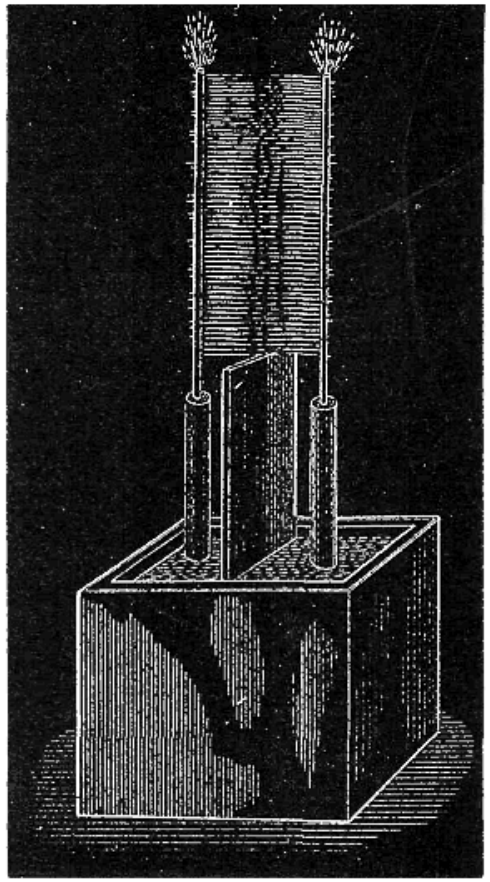


FIG. 1.—DISCHARGE BETWEEN TWO WIRES WITH FREQUENCIES OF A FEW HUNDRED THOUSAND PER SECOND.

Now compare this phenomenon which you have just witnessed with the discharge of a Holtz or Wimshurst machine—that other interesting appliance so dear to the experimenter. What a difference there is between these phenomena! And yet, had I made the necessary arrangements—which could have been made easily, were it not that they would interfere with other experiments—I could have produced with this coil sparks which, had I the coil hidden from your view and only two knobs exposed, even the keenest observer among you would find it difficult, if not impossible, to distinguish from those of an influence or friction machine. This may be done in many ways—for instance, by operating the induction coil which charges the condenser from an alternating-current machine of very low frequency, and preferably adjusting the discharge circuit so that there are no oscillations set up in it. We then obtain in the secondary circuit, if the knobs are of the required size and properly set, a more or less rapid succession of sparks of great intensity and small quantity, which possess the same brilliancy, and are accompanied by the same sharp crackling sound, as those obtained from a friction or influence machine.

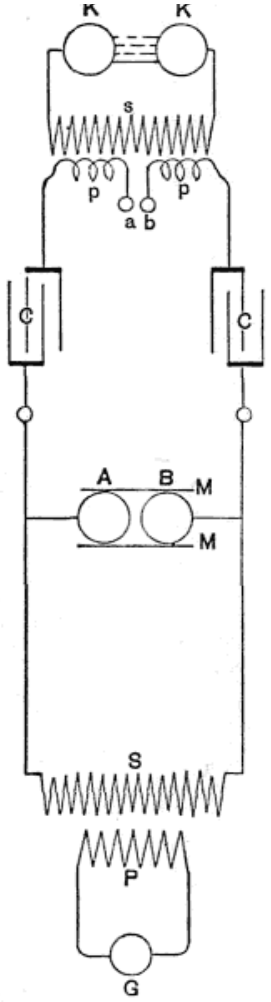


FIG. 2.—IMITATING THE SPARK OF A HOLTZ MACHINE.

Another way is to pass through two primary circuits, having a common secondary, two currents of a slightly different period, which produce in the secondary circuit sparks occurring at comparatively long intervals. But, even with the means at hand this evening, I may succeed in imitating the spark of a Holtz machine. For this purpose I establish between the terminals of the coil which charges the condenser a long, unsteady arc, which is periodically interrupted by the upward current of air produced by it. To increase the current of air I place on each side of the arc, and close to it, a large plate of mica. The condenser charged from this coil discharges into the primary circuit of a second coil through a small air gap, which is necessary to produce a sudden rush of current through the primary. The scheme of connections in the present experiment is indicated in Fig. 2.

G is an ordinarily constructed alternator, supplying the primary *P* of an induction coil, the secondary *S* of which charges the condensers or jars *C C*. The terminals of the secondary are connected to the inside coatings of the jars, the outer coatings being connected to the ends of the primary *p p* of a second induction coil. This primary *p p* has a small air gap *a b*.

The secondary *s* of this coil is provided with knobs or spheres *K K* of the proper size and set at a distance suitable for the experiment.

A long arc is established between the terminals *A B* of the first induction coil. *M M* are the mica plates.

Each time the arc is broken between *A* and *B* the jars are quickly charged and discharged through the primary *p p*, producing a snapping spark between the knobs *K K*. Upon the arc forming between *A* and *B* the potential falls, and the jars cannot be charged to such high potential as to break through the air gap *a b* until the arc is again broken by the draught.

In this manner sudden impulses, at long intervals, are produced in the primary *p p*, which in the secondary *s* give a corresponding number of impulses of great intensity. If the secondary knobs or spheres, *K K*, are of the proper size, the sparks show much resemblance to those of a Holtz machine.

But these two effects, which to the eye appear so very different, are only two of the many discharge phenomena. We only need to change the conditions of the test, and again we make other observations of interest.

When, instead of operating the induction coil as in the last two experiments, we operate it from a high frequency alternator, as in the next experiment, a systematic study of the phenomena is rendered much more easy. In such case, in varying the strength and frequency of the currents through the primary, we may observe five distinct forms of discharge, which I have described in my former paper on the subject [A] before the American Institute of Electrical Engineers, May 20, 1891.

[A]

See THE ELECTRICAL WORLD, July 11, 1891.

It would take too much time, and it would lead us too far from the subject presented this evening, to reproduce all these forms, but it seems to me desirable to show you one of them. It is a brush discharge, which is interesting in more than one respect. Viewed from a near position it resembles much a jet of gas escaping under great pressure. We know that the phenomenon is due to the agitation of the molecules near the terminal, and we anticipate that some heat must be developed by the impact of the molecules against the terminal or against each other. Indeed, we find that the brush is hot, and only a little thought leads us to the conclusion that, could we but reach sufficiently high frequencies, we could produce a brush which would give intense light and heat, and which would resemble in every particular an ordinary flame, save, perhaps, that both phenomena might not be due to the same agent —save, perhaps, that chemical affinity might not be *electrical* in its nature.

As the production of heat and light is here due to the impact of the molecules, or atoms of air, or something else besides, and, as we can augment the energy simply by raising the potential, we might, even with frequencies obtained from a dynamo machine, intensify the action to such a degree as to bring the terminal to melting heat. But with such low frequencies we would have to deal always with something of the nature of an electric current. If I approach a conducting object to the brush, a thin little spark passes, yet, even with the frequencies used this evening, the tendency to spark is not very great. So, for instance, if I hold a metallic sphere at some distance above the terminal you may see the whole space between the terminal and sphere illuminated by the streams without the spark passing; and with the much higher frequencies obtainable by the disruptive discharge of a condenser, were it not for the sudden impulses, which are comparatively few in number, sparking would not occur even at very small distances. However, with incomparably higher frequencies, which we may yet find means to produce efficiently, and provided that electric impulses of such high frequencies could be transmitted through a conductor, the electrical characteristics of the brush discharge would completely vanish—no spark would pass, no shock would be felt—yet we would still have to deal with an *electric* phenomenon, but in the broad, modern interpretation of the word. In my first paper before referred to I have pointed out the curious properties of the brush, and described the best manner of producing it, but I have thought it worth while to endeavor to express myself more clearly in regard to this phenomenon, because of its absorbing interest.

When a coil is operated with currents of very high frequency, beautiful brush effects may be produced, even if the coil be of comparatively small dimensions. The experimenter may vary them in many ways, and, if it were nothing else, they afford a pleasing sight. What adds to their interest is that they may be produced with one single terminal as well as with two—in fact, often better with one than with two.

But of all the discharge phenomena observed, the most pleasing to the eye, and the most instructive, are those observed with a coil which is operated by means of the disruptive discharge of a condenser. The power of the brushes, the abundance of the sparks, when the conditions are patiently adjusted, is often amazing. With even a very small coil, if it be so well insulated as to stand a difference of potential of several thousand volts per turn, the sparks may be so abundant that the whole coil may appear a complete mass of fire.

Curiously enough the sparks, when the terminals of the coil are set at a considerable distance, seem to dart in every possible direction as though the terminals were perfectly independent of each other. As the sparks would soon destroy the insulation it is necessary to prevent them. This is best done by immersing the coil in a good liquid insulator, such as boiled-out oil. Immersion in a liquid may be considered almost an absolute necessity for the continued and successful working of such a coil.

It is of course out of the question, in an experimental lecture, with only a few minutes at disposal for the performance of each experiment, to show these discharge phenomena to advantage, as to produce each phenomenon at its best a very careful adjustment is required. But even if imperfectly produced, as they are likely to be this evening, they are sufficiently striking to interest an intelligent audience.

Before showing some of these curious effects I must, for the sake of completeness, give a short description of the coil and other apparatus used in the experiments with the disruptive discharge this evening.

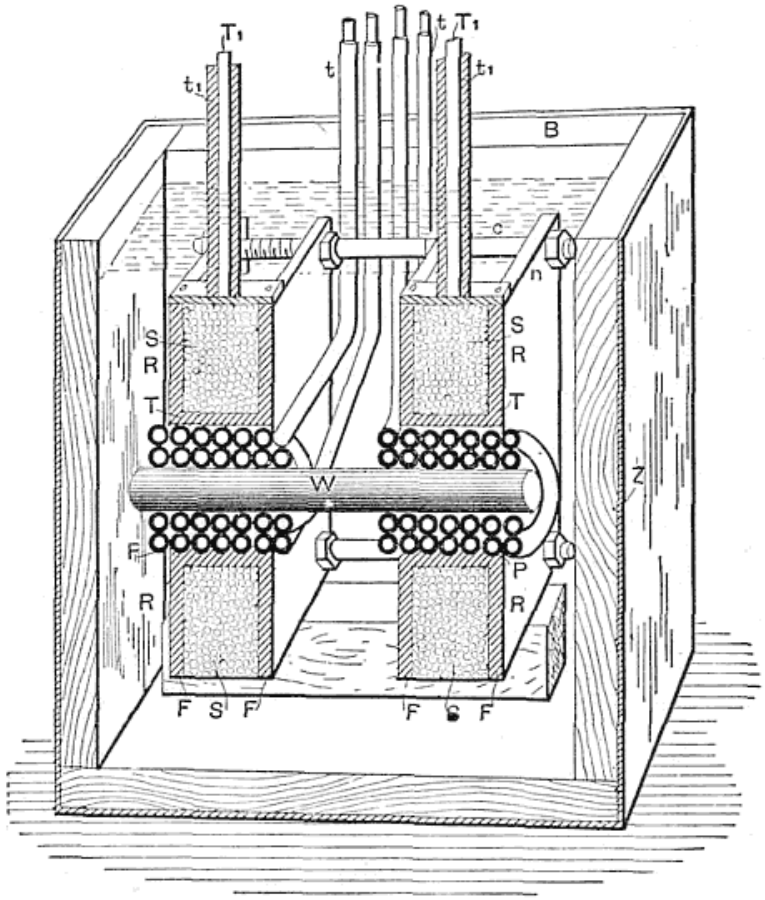


FIG. 3.—DISRUPTIVE DISCHARGE COIL.

It is contained in a box *B* (Fig. 3) of thick boards of hard wood, covered on the outside with zinc sheet *Z*, which is carefully soldered all around. It might be advisable, in a strictly scientific investigation, when accuracy is of great importance, to do away with the metal cover, as it might introduce many errors, principally on account of its complex action upon the coil, as a condenser of very small capacity and as an electrostatic and electromagnetic screen. When the coil is used for such experiments as are here contemplated, the employment of the metal cover offers some practical advantages, but these are not of sufficient importance to be dwelt upon.

The coil should be placed symmetrically to the metal cover, and the space between should, of course, not be too small, certainly not less than, say, five centimetres, but much more if possible; especially the two sides of the zinc box, which are at right angles to the axis of the coil, should be sufficiently remote from the latter, as otherwise they might impair its action and be a source of loss.

The coil consists of two spools of hard rubber *R R*, held apart at a distance of 10 centimetres by bolts *c* and nuts *n*, likewise of hard rubber. Each spool comprises a tube *T* of approximately 8 centimetres

inside diameter, and 3 millimetres thick, upon which are screwed two flanges *F F*, 24 centimetres square, the space between the flanges being about 3 centimetres. The secondary, *S S*, of the best gutta percha-covered wire, has 26 layers, 10 turns in each, giving for each half a total of 260 turns. The two halves are wound oppositely and connected in series, the connection between both being made over the primary. This disposition, besides being convenient, has the advantage that when the coil is well balanced—that is, when both of its terminals T_1 T_1 are connected to bodies or devices of equal capacity

—there is not much danger of breaking through to the primary, and the insulation between the primary and the secondary need not be thick. In using the coil it is advisable to attach to *both* terminals devices of nearly equal capacity, as, when the capacity of the terminals is not equal, sparks will be apt to pass to the primary. To avoid this, the middle point of the secondary may be connected to the primary, but this is not always practicable.

The primary *P P* is wound in two parts, and oppositely, upon a wooden spool *W*, and the four ends are led out of the oil through hard rubber tubes *t t*. The ends of the secondary T_1 T_1 are also led out of the

oil through rubber tubes t_1 t_1 of great thickness. The primary and secondary layers are insulated by

cotton cloth, the thickness of the insulation, of course, bearing some proportion to the difference of potential between the turns of the different layers. Each half of the primary has four layers, 24 turns in each, this giving a total of 96 turns. When both the parts are connected in series, this gives a ratio of conversion of about 1:2.7, and with the primaries in multiple, 1:5.4; but in operating with very rapidly alternating currents this ratio does not convey even an approximate idea of the ratio of the E.M.Fs. in the primary and secondary circuits. The coil is held in position in the oil on wooden supports, there being about 5 centimetres thickness of oil all round. Where the oil is not specially needed, the space is filled with pieces of wood, and for this purpose principally the wooden box *B* surrounding the whole is used.

The construction here shown is, of course, not the best on general principles, but I believe it is a good and convenient one for the production of effects in which an excessive potential and a very small current are needed.

In connection with the coil I use either the ordinary form of discharger or a modified form. In the former I have introduced two changes which secure some advantages, and which are obvious. If they are mentioned, it is only in the hope that some experimenter may find them of use.

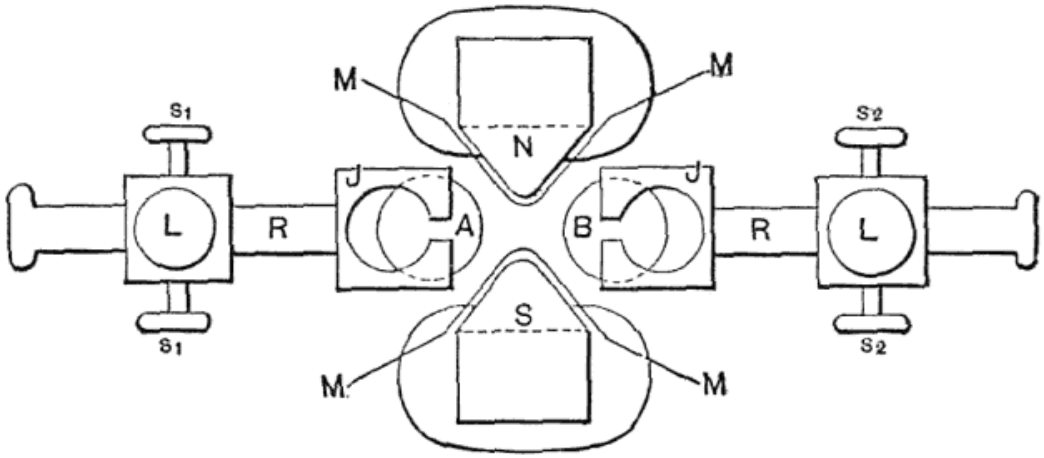


FIG. 4.—ARRANGEMENT OF IMPROVED DISCHARGER AND MAGNET.

One of the changes is that the adjustable knobs *A* and *B* (Fig. 4), of the discharger are held in jaws of brass, *J J*, by spring pressure, this allowing of turning them successively into different positions, and so doing away with the tedious process of frequent polishing up.

The other change consists in the employment of a strong electromagnet *N S*, which is placed with its axis at right angles to the line joining the knobs *A* and *B*, and produces a strong magnetic field between them. The pole pieces of the magnet are movable and properly formed so as to protrude between the brass knobs, in order to make the field as intense as possible; but to prevent the discharge from jumping to the magnet the pole pieces are protected by a layer of mica, *M M*, of sufficient thickness. s_1 s_1 and s_2 s_2 are screws for fastening the wires. On each side one of the screws is for large and the other for small wires. *L L* are screws for fixing in position the rods *R R*, which support the knobs.

In another arrangement with the magnet I take the discharge between the rounded pole pieces themselves, which in such case are insulated and preferably provided with polished brass caps.

The employment of an intense magnetic field is of advantage principally when the induction coil or transformer which charges the condenser is operated by currents of very low frequency. In such a case the number of the fundamental discharges between the knobs may be so small as to render the currents produced in the secondary unsuitable for many experiments. The intense magnetic field then serves to blow out the arc between the knobs as soon as it is formed, and the fundamental discharges occur in quicker succession.

Instead of the magnet, a draught or blast of air may be employed with some advantage. In this case the arc is preferably established between the knobs *A B*, in Fig. 2 (the knobs *a b* being generally joined, or entirely done away with), as in this disposition the arc is long and unsteady, and is easily affected by the draught.

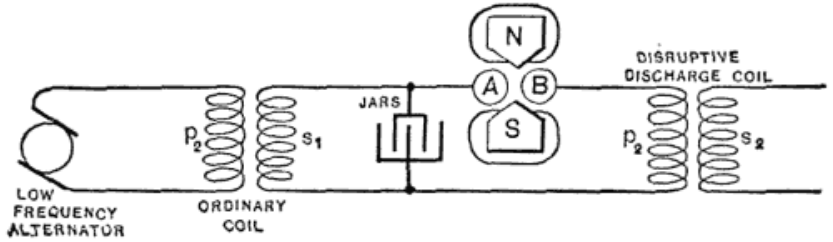


FIG. 5.—ARRANGEMENT WITH LOW-FREQUENCY ALTERNATOR AND IMPROVED DISCHARGER.

When a magnet is employed to break the arc, it is better to choose the connection indicated diagrammatically in Fig. 5, as in this case the currents forming the arc are much more powerful, and the magnetic field exercises a greater influence. The use of the magnet permits, however, of the arc being replaced by a vacuum tube, but I have encountered great difficulties in working with an exhausted tube.

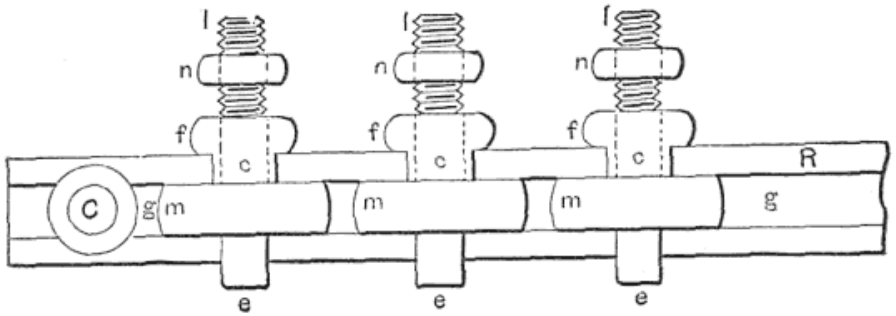


FIG. 6.—DISCHARGER WITH MULTIPLE GAPS.

The other form of discharger used in these and similar experiments is indicated in Figs. 6 and 7. It consists of a number of brass pieces *c c* (Fig. 6), each of which comprises a spherical middle portion *m* with an extension *e* below—which is merely used to fasten the piece in a lathe when polishing up the discharging surface—and a column above, which consists of a knurled flange *f* surmounted by a threaded stem *l* carrying a nut *n*, by means of which a wire is fastened to the column. The flange *f* conveniently serves for holding the brass piece when fastening the wire, and also for turning it in any position when it becomes necessary to present a fresh discharging surface. Two stout strips of hard rubber *R R*, with planed grooves *g g* (Fig. 7) to fit the middle portion of the pieces *c c*, serve to clamp the latter and hold them firmly in position by means of two bolts *C C* (of which only one is shown) passing through the ends of the strips.

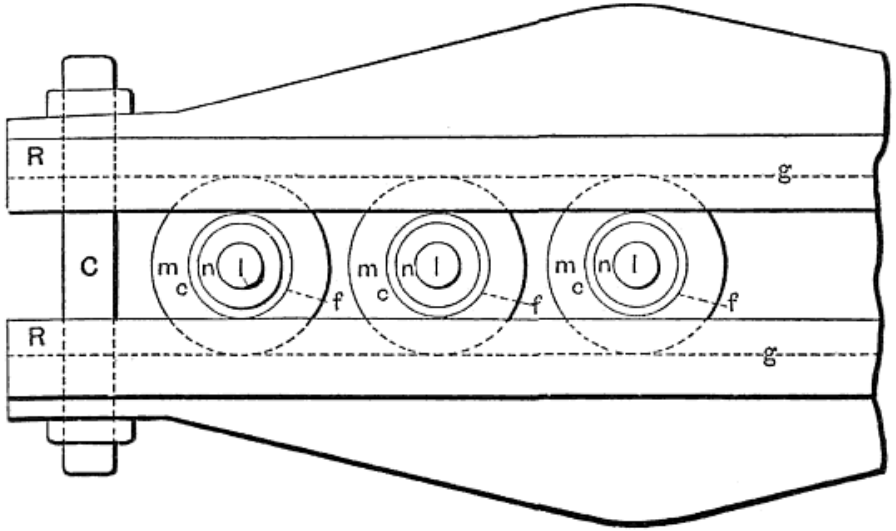


FIG. 7.—DISCHARGER WITH MULTIPLE GAPS.

In the use of this kind of discharger I have found three principal advantages over the ordinary form. First, the dielectric strength of a given total width of air space is greater when a great many small air gaps are used instead of one, which permits of working with a smaller length of air gap, and that means smaller loss and less deterioration of the metal; secondly by reason of splitting the arc up into smaller arcs, the polished surfaces are made to last much longer; and, thirdly, the apparatus affords some gauge in the experiments. I usually set the pieces by putting between them sheets of uniform thickness at a certain very small distance which is known from the experiments of Sir William Thomson to require a certain electromotive force to be bridged by the spark.

It should, of course, be remembered that the sparking distance is much diminished as the frequency is increased. By taking any number of spaces the experimenter has a rough idea of the electromotive force, and he finds it easier to repeat an experiment, as he has not the trouble of setting the knobs again and again. With this kind of discharger I have been able to maintain an oscillating motion without any spark being visible with the naked eye between the knobs, and they would not show a very appreciable rise in temperature. This form of discharge also lends itself to many arrangements of condensers and circuits which are often very convenient and time-saving. I have used it preferably in a disposition similar to that indicated in Fig. 2, when the currents forming the arc are small.

I may here mention that I have also used dischargers with single or multiple air gaps, in which the discharge surfaces were rotated with great speed. No particular advantage was, however, gained by this method, except in cases where the currents from the condenser were large and the keeping cool of the surfaces was necessary, and in cases when, the discharge not being oscillating of itself, the arc as soon as established was broken by the air current, thus starting the vibration at intervals in rapid succession. I have also used mechanical interrupters in many ways. To avoid the difficulties with frictional contacts, the preferred plan adopted was to establish the arc and rotate through it at great speed a rim of mica provided with many holes and fastened to a steel plate. It is understood, of course, that the employment of a magnet, air current, or other interrupter, produces no effect worth noticing, unless the self-induction, capacity and resistance are so related that there are oscillations set up upon each interruption.

I will now endeavor to show you some of the most note-worthy of these discharge phenomena.

I have stretched across the room two ordinary cotton covered wires, each about 7 metres in length. They are supported on insulating cords at a distance of about 30 centimetres. I attach now to each of the terminals of the coil one of the wires and set the coil in action. Upon turning the lights off in the room you see the wires strongly illuminated by the streams issuing abundantly from their whole surface in spite of the cotton covering, which may even be very thick. When the experiment is performed under good conditions, the light from the wires is sufficiently intense to allow distinguishing the objects in a room. To produce the best result it is, of course, necessary to adjust carefully the capacity of the jars, the arc between the knobs and the length of the wires. My experience is that calculation of the length of the wires leads, in such case, to no result whatever. The experimenter will do best to take the wires at the start very long, and then adjust by cutting off first long pieces, and then smaller and smaller ones as he approaches the right length.

A convenient way is to use an oil condenser of very small capacity, consisting of two small adjustable metal plates, in connection with this and similar experiments. In such case I take wires rather short and set at the beginning the condenser plates at maximum distance. If the streams for the wires increase by approach of the plates, the length of the wires is about right; if they diminish the wires are too long for that frequency and potential. When a condenser is used in connection with experiments with such a coil, it should be an oil condenser by all means, as in using an air condenser considerable energy might be wasted. The wires leading to the plates in the oil should be very thin, heavily coated with some insulating compound, and provided with a conducting covering—this preferably extending under the surface of the oil. The conducting cover should not be too near the terminals, or ends, of the wire, as a spark would be apt to jump from the wire to it. The conducting coating is used to diminish the air losses, in virtue of its action as an electrostatic screen. As to the size of the vessel containing the oil, and the size of the plates, the experimenter gains at once an idea from a rough trial. The size of the plates *in oil* is, however, calculable, as the dielectric losses are very small.

In the preceding experiment it is of considerable interest to know what relation the quantity of the light emitted bears to the frequency and potential of the electric impulses. My opinion is that the heat as well as light effects produced should be proportionate, under otherwise equal conditions of test, to the product of frequency and square of potential, but the experimental verification of the law, whatever it may be, would be exceedingly difficult. One thing is certain, at any rate, and that is, that in augmenting the potential and frequency we rapidly intensify the streams; and, though it may be very sanguine, it is surely not altogether hopeless to expect that we may succeed in producing a practical illuminant on these lines. We would then be simply using burners or flames, in which there would be no chemical process, no consumption of material, but merely a transfer of energy, and which would, in all probability emit more light and less heat than ordinary flames.

The luminous intensity of the streams is, of course, considerably increased when they are focused upon a small surface. This may be shown by the following experiment:

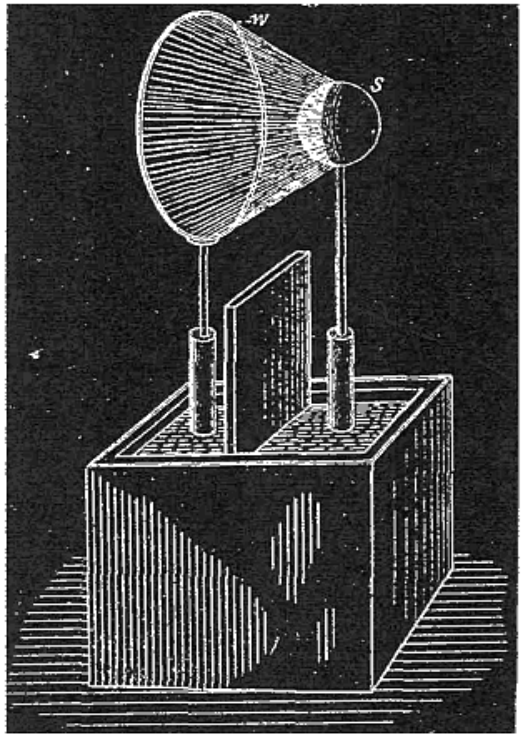


FIG. 8.—EFFECT PRODUCED BY CONCENTRATING STREAMS.

I attach to one of the terminals of the coil a wire *w* (Fig. 8), bent in a circle of about 30 centimetres in diameter, and to the other terminal I fasten a small brass sphere *s*, the surface of the wire being preferably equal to the surface of the sphere, and the centre of the latter being in a line at right angles to the plane of the wire circle and passing through its centre. When the discharge is established under proper conditions, a luminous hollow cone is formed, and in the dark one-half of the brass sphere is strongly illuminated, as shown in the cut.

By some artifice or other, it is easy to concentrate the streams upon small surfaces and to produce very strong light effects. Two thin wires may thus be rendered intensely luminous.

In order to intensify the streams the wires should be very thin and short; but as in this case their capacity would be generally too small for the coil—at least, for such a one as the present—it is necessary to augment the capacity to the required value, while, at the same time, the surface of the wires remains very small. This may be done in many ways.

Here, for instance, I have two plates, *R R*, of hard rubber (Fig. 9), upon which I have glued two very thin wires *w w*, so as to form a name. The wires may be bare or covered with the best insulation—it is immaterial for the success of the experiment. Well insulated wires, if anything, are preferable. On the back of each plate, indicated by the shaded portion, is a tinfoil coating *t t*. The plates are placed in line at a sufficient distance to prevent a spark passing from one to the other wire. The two tinfoil coatings I have joined by a conductor *C*, and the two wires I presently connect to the terminals of the coil. It is now easy, by varying the strength and frequency of the currents through the primary, to find a point at

which, the capacity of the system is best suited to the conditions, and the wires become so strongly luminous that, when the light in the room is turned off the name formed by them appears in brilliant letters.

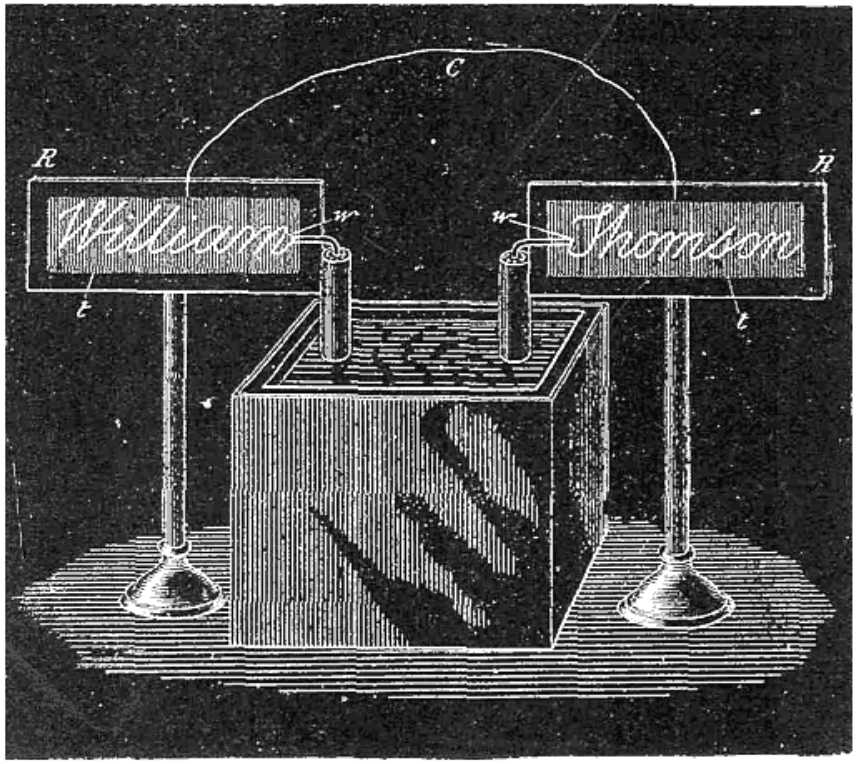


FIG. 9.—WIRES RENDERED INTENSELY LUMINOUS.

It is perhaps preferable to perform this experiment with a coil operated from an alternator of high frequency, as then, owing to the harmonic rise and fall, the streams are very uniform, though they are less abundant then when produced with such a coil as the present. This experiment, however, may be performed with low frequencies, but much less satisfactorily.

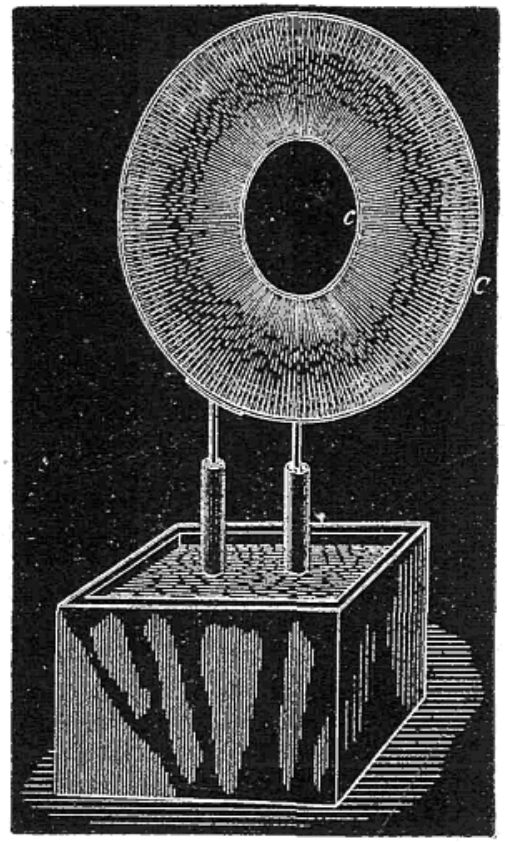


FIG. 10.—LUMINOUS DISCS.

When two wires, attached to the terminals of the coil, are set at the proper distance, the streams between them may be so intense as to produce a continuous luminous sheet. To show this phenomenon I have here two circles, *C* and *c* (Fig. 10), of rather stout wire, one being about 80 centimetres and the other 30 centimetres in diameter. To each of the terminals of the coil I attach one of the circles. The supporting wires are so bent that the circles may be placed in the same plane, coinciding as nearly as possible. When the light in the room is turned off and the coil set to work, you see the whole space between the wires uniformly filled with streams, forming a luminous disc, which could be seen from a considerable distance, such is the intensity of the streams. The outer circle could have been much larger than the present one; in fact, with this coil I have used much larger circles, and I have been able to produce a strongly luminous sheet, covering an area of more than one square metre, which is a remarkable effect with this very small coil. To avoid uncertainty, the circle has been taken smaller, and the area is now about 0.43 square metre.

The frequency of the vibration, and the quickness of succession of the sparks between the knobs, affect to a marked degree the appearance of the streams. When the frequency is very low, the air gives way in more or less the same manner, as by a steady difference of potential, and the streams consist of distinct threads, generally mingled with thin sparks, which probably correspond to the successive discharges occurring between the knobs. But when the frequency is extremely high, and the arc of the discharge produces a very *loud* but *smooth* sound—showing both that oscillation takes place and that the sparks succeed each other with great rapidity—then the luminous streams formed are perfectly

uniform. To reach this result very small coils and jars of small capacity should be used. I take two tubes of thick Bohemian glass, about 5 centimetres in diameter and 20 centimetres long. In each of the tubes I slip a primary of very thick copper wire. On the top of each tube I wind a secondary of much thinner gutta-percha covered wire. The two secondaries I connect in series, the primaries preferably in multiple arc. The tubes are then placed in a large glass vessel, at a distance of 10 to 15 centimetres from each other, on insulating supports, and the vessel is filled with boiled out oil, the oil reaching about an inch above the tubes. The free ends of the secondary are lifted out of the oil and placed parallel to each other at a distance of about 10 centimetres. The ends which are scraped should be dipped in the oil. Two four-pint jars joined in series may be used to discharge through the primary. When the necessary adjustments in the length and distance of the wires above the oil and in the arc of discharge are made, a luminous sheet is produced between the wires which is perfectly smooth and textureless, like the ordinary discharge through a moderately exhausted tube.

I have purposely dwelt upon this apparently insignificant experiment. In trials of this kind the experimenter arrives at the startling conclusion that, to pass ordinary luminous discharges through gases, no particular degree of exhaustion is needed, but that the gas may be at ordinary or even greater pressure. To accomplish this, a very high frequency is essential; a high potential is likewise required, but this is a merely incidental necessity. These experiments teach us that, in endeavoring to discover novel methods of producing light by the agitation of atoms, or molecules, of a gas, we need not limit our research to the vacuum tube, but may look forward quite seriously to the possibility of obtaining the light effects without the use of any vessel whatever, with air at ordinary pressure.

Such discharges of very high frequency, which render luminous the air at ordinary pressures, we have probably often occasion to witness in Nature. I have no doubt that if, as many believe, the aurora borealis is produced by sudden cosmic disturbances, such as eruptions at the sun's surface, which set the electrostatic charge of the earth in an extremely rapid vibration, the red glow observed is not confined to the upper rarefied strata of the air, but the discharge traverses, by reason of its very high frequency, also the dense atmosphere in the form of a *glow*, such as we ordinarily produce in a slightly exhausted tube. If the frequency were very low, or even more so, if the charge were not at all vibrating, the dense air would break down as in a lightning discharge. Indications of such breaking down of the lower dense strata of the air have been repeatedly observed at the occurrence of this marvelous phenomenon; but if it does occur, it can only be attributed to the fundamental disturbances, which are few in number, for the vibration produced by them would be far too rapid to allow a disruptive break. It is the original and irregular impulses which affect the instruments; the superimposed vibrations probably pass unnoticed.

When an ordinary low frequency discharge is passed through moderately rarefied air, the air assumes a purplish hue. If by some means or other we increase the intensity of the molecular, or atomic, vibration, the gas changes to a white color. A similar change occurs at ordinary pressures with electric impulses of very high frequency. If the molecules of the air around a wire are moderately agitated, the brush formed is reddish or violet; if the vibration is rendered sufficiently intense, the streams become white. We may accomplish this in various ways. In the experiment before shown with the two wires across the room, I have endeavored to secure the result by pushing to a high value both the frequency and potential: in the experiment with the thin wires glued on the rubber plate I have concentrated the action upon a very small surface—in other words, I have worked with a great electric density.

A most curious form of discharge is observed with such a coil when the frequency and potential are pushed to the extreme limit. To perform the experiment, every part of the coil should be heavily insulated, and only two small spheres—or, better still, two sharp-edged metal discs (*d d*, Fig. 11) of no more than a few centimetres in diameter—should be exposed to the air. The coil here used is immersed in oil, and the ends of the secondary reaching out of the oil are covered with an air-tight cover of hard rubber of great thickness. All cracks, if there are any, should be carefully stopped up, so that the brush discharge cannot form anywhere except on the small spheres or plates which are exposed to the air. In this case, since there are no large plates or other bodies of capacity attached to the terminals, the coil

is capable of an extremely rapid vibration. The potential may be raised by increasing, as far as the experimenter judges proper, the rate of change of the primary current. With a coil not widely differing from the present, it is best to connect the two primaries in multiple arc; but if the secondary should have a much greater number of turns the primaries should preferably be used in series, as otherwise the vibration might be too fast for the secondary. It occurs under these conditions that misty white streams break forth from the edges of the discs and spread out phantom-like into space.

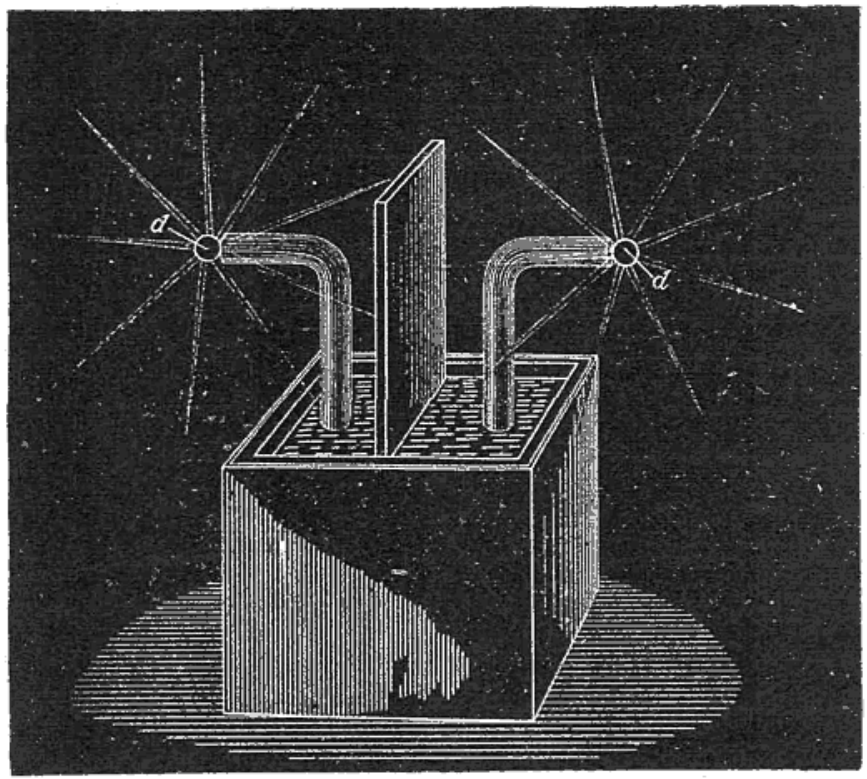


FIG. 11.—PHANTOM STREAMS.

With this coil, when fairly well produced, they are about 25 to 30 centimetres long. When the hand is held against them no sensation is produced, and a spark, causing a shock, jumps from the terminal only upon the hand being brought much nearer. If the oscillation of the primary current is rendered intermittent by some means or other, there is a corresponding throbbing of the streams, and now the hand or other conducting object may be brought in still greater proximity to the terminal without a spark being caused to jump.

Among the many beautiful phenomena which may be produced with such a coil I have here selected only those which appear to possess some features of novelty, and lead us to some conclusions of interest. One will not find it at all difficult to produce in the laboratory, by means of it, many other phenomena which appeal to the eye even more than these here shown, but present no particular feature of novelty.

Early experimenters describe the display of sparks produced by an ordinary large induction coil upon

an insulating plate separating the terminals. Quite recently Siemens performed some experiments in which fine effects were obtained, which were seen by many with interest. No doubt large coils, even if operated with currents of low frequencies, are capable of producing beautiful effects. But the largest coil ever made could not, by far, equal the magnificent display of streams and sparks obtained from such a disruptive discharge coil when properly adjusted. To give an idea, a coil such as the present one will cover easily a plate of 1 metre in diameter completely with the streams. The best way to perform such experiments is to take a very thin rubber or a glass plate and glue on one side of it a narrow ring of tinfoil of very large diameter, and on the other a circular washer, the centre of the latter coinciding with that of the ring, and the surfaces of both being preferably equal, so as to keep the coil well balanced. The washer and ring should be connected to the terminals by heavily insulated thin wires. It is easy in observing the effect of the capacity to produce a sheet of uniform streams, or a fine network of thin silvery threads, or a mass of loud brilliant sparks, which completely cover the plate.

Since I have advanced the idea of the conversion by means of the disruptive discharge, in my paper before the American Institute of Electrical Engineers at the beginning of the past year, the interest excited in it has been considerable. It affords us a means for producing any potentials by the aid of inexpensive coils operated from ordinary systems of distribution, and—what is perhaps more appreciated—it enables us to convert currents of any frequency into currents of any other lower or higher frequency. But its chief value will perhaps be found in the help which it will afford us in the investigations of the phenomena of phosphorescence, which a disruptive discharge coil is capable of exciting in innumerable cases where ordinary coils, even the largest, would utterly fail.

Considering its probable uses for many practical purposes, and its possible introduction into laboratories for scientific research, a few additional remarks as to the construction of such a coil will perhaps not be found superfluous.

It is, of course, absolutely necessary to employ in such a coil wires provided with the best insulation.

Good coils may be produced by employing wires covered with several layers of cotton, boiling the coil a long time in pure wax, and cooling under moderate pressure. The advantage of such a coil is that it can be easily handled, but it cannot probably give as satisfactory results as a coil immersed in pure oil. Besides, it seems that the presence of a large body of wax affects the coil disadvantageously, whereas this does not seem to be the case with oil. Perhaps it is because the dielectric losses in the liquid are smaller.

I have tried at first silk and cotton covered wires with oil immersion, but I have been gradually led to use gutta-percha covered wires, which proved most satisfactory. Gutta-percha insulation adds, of course, to the capacity of the coil, and this, especially if the coil be large, is a great disadvantage when extreme frequencies are desired; but on the other hand, gutta-percha will withstand much more than an equal thickness of oil, and this advantage should be secured at any price. Once the coil has been immersed, it should never be taken out of the oil for more than a few hours, else the gutta-percha will crack up and the coil will not be worth half as much as before. Gutta-percha is probably slowly attacked by the oil, but after an immersion of eight to nine months I have found no ill effects.

I have obtained in commerce two kinds of gutta-percha wire: in one the insulation sticks tightly to the metal, in the other it does not. Unless a special method is followed to expel all air, it is much safer to use the first kind. I wind the coil within an oil tank so that all interstices are filled up with the oil. Between the layers I use cloth boiled out thoroughly in oil, calculating the thickness according to the difference of potential between the turns. There seems not to be a very great difference whatever kind of oil is used; I use paraffine or linseed oil.

To exclude more perfectly the air, an excellent way to proceed, and easily practicable with small coils, is the following: Construct a box of hard wood of very thick boards which have been for a long time boiled in oil. The boards should be so joined as to safely withstand the external air pressure. The coil being placed and fastened in position within the box, the latter is closed with a strong lid, and covered with

closely fitting metal sheets, the joints of which are soldered very carefully. On the top two small holes are drilled, passing through the metal sheet and the wood, and in these holes two small glass tubes are inserted and the joints made air-tight. One of the tubes is connected to a vacuum pump, and the other with a vessel containing a sufficient quantity of boiled-out oil. The latter tube has a very small hole at the bottom, and is provided with a stopcock. When a fairly good vacuum has been obtained, the stopcock is opened and the oil slowly fed in. Proceeding in this manner, it is impossible that any big bubbles, which are the principal danger, should remain between the turns. The air is most completely excluded, probably better than by boiling out, which, however, when gutta-percha coated wires are used, is not practicable.

For the primaries I use ordinary line wire with a thick cotton coating. Strands of very thin insulated wires properly interlaced would, of course, be the best to employ for the primaries, but they are not to be had.

In an experimental coil the size of the wires is not of great importance. In the coil here used the primary is No. 12 and the secondary No. 24 Brown & Sharpe gauge wire; but the sections may be varied considerably. It would only imply different adjustments; the results aimed at would not be materially affected.

I have dwelt at some length upon the various forms of brush discharge because, in studying them, we not only observe phenomena which please our eye, but also afford us food for thought, and lead us to conclusions of practical importance. In the use of alternating currents of very high tension, too much precaution cannot be taken to prevent the brush discharge. In a main conveying such currents, in an induction coil or transformer, or in a condenser, the brush discharge is a source of great danger to the insulation. In a condenser especially the gaseous matter must be most carefully expelled, for in it the charged surfaces are near each other, and if the potentials are high, just as sure as a weight will fall if let go, so the insulation will give way if a single gaseous bubble of some size be present, whereas, if all gaseous matter were carefully excluded, the condenser would safely withstand a much higher difference of potential. A main conveying alternating currents of very high tension may be injured merely by a blow hole or small crack in the insulation, the more so as a blowhole is apt to contain gas at low pressure; and as it appears almost impossible to completely obviate such little imperfections, I am led to believe that in our future distribution of electrical energy by currents of very high tension liquid insulation will be used. The cost is a great drawback, but if we employ an oil as an insulator the distribution of electrical energy with something like 100,000 volts, and even more, become, at least with higher frequencies, so easy that they could be hardly called engineering feats. With oil insulation and alternate current motors transmissions of power can be effected with safety and upon an industrial basis at distances of as much as a thousand miles.

A peculiar property of oils, and liquid insulation in general, when subjected to rapidly changing electric stresses, is to disperse any gaseous bubbles which may be present, and diffuse them through its mass, generally long before any injurious break can occur. This feature may be easily observed with an ordinary induction coil by taking the primary out, plugging up the end of the tube upon which the secondary is wound, and filling it with some fairly transparent insulator, such as paraffine oil. A primary of a diameter something like six millimetres smaller than the inside of the tube may be inserted in the oil. When the coil is set to work one may see, looking from the top through the oil, many luminous points—air bubbles which are caught by inserting the primary, and which are rendered luminous in consequence of the violent bombardment. The occluded air, by its impact against the oil, heats it; the oil begins to circulate, carrying some of the air along with it, until the bubbles are dispersed and the luminous points disappear. In this manner, unless large bubbles are occluded in such way that circulation is rendered impossible, a damaging break is averted, the only effect being a moderate warming up of the oil. If, instead of the liquid, a solid insulation, no matter how thick, were used, a breaking through and injury of the apparatus would be inevitable.

The exclusion of gaseous matter from any apparatus in which the dielectric is subjected to more or less rapidly changing electric forces is, however, not only desirable in order to avoid a possible injury of

the apparatus, but also on account of economy. In a condenser, for instance, as long as only a solid or only a liquid dielectric is used, the loss is small; but if a gas under ordinary or small pressure be present the loss may be very great. Whatever the nature of the force acting in the dielectric may be, it seems that in a solid or liquid the molecular displacement produced by the force is small; hence the product of force and displacement is insignificant, unless the force be very great; but in a gas the displacement, and therefore this product, is considerable; the molecules are free to move, they reach high speeds, and the energy of their impact is lost in heat or otherwise. If the gas be strongly compressed, the displacement due to the force is made smaller, and the losses are reduced.

In most of the succeeding experiments I prefer, chiefly on account of the regular and positive action, to employ the alternator before referred to. This is one of the several machines constructed by me for the purposes of these investigations. It has 384 pole projections, and is capable of giving currents of a frequency of about 10,000 per second. This machine has been illustrated and briefly described in my first paper before the American Institute of Electrical Engineers, May 20, 1891, to which I have already referred. A more detailed description, sufficient to enable any engineer to build a similar machine, will be found in several electrical journals of that period.

The induction coils operated from the machine are rather small, containing from 5,000 to 15,000 turns in the secondary. They are immersed in boiled-out linseed oil, contained in wooden boxes covered with zinc sheet.

I have found it advantageous to reverse the usual position of the wires, and to wind, in these coils, the primaries on the top; this allowing the use of a much bigger primary, which, of course, reduces the danger of overheating and increases the output of the coil. I make the primary on each side at least one centimetre shorter than the secondary, to prevent the breaking through on the ends, which would surely occur unless the insulation on the top of the secondary be very thick, and this, of course, would be disadvantageous.

When the primary is made movable, which is necessary in some experiments, and many times convenient for the purposes of adjustment, I cover the secondary with wax, and turn it off in a lathe to a diameter slightly smaller than the inside of the primary coil. The latter I provide with a handle reaching out of the oil, which serves to shift it in any position along the secondary.

I will now venture to make, in regard to the general manipulation of induction coils, a few observations bearing upon points which have not been fully appreciated in earlier experiments with such coils, and are even now often overlooked.

The secondary of the coil possesses usually such a high self-induction that the current through the wire is inappreciable, and may be so even when the terminals are joined by a conductor of small resistance. If capacity is added to the terminals, the self-induction is counteracted, and a stronger current is made to flow through the secondary, though its terminals are insulated from each other. To one entirely unacquainted with the properties of alternating currents nothing will look more puzzling. This feature was illustrated in the experiment performed at the beginning with the top plates of wire gauze attached to the terminals and the rubber plate. When the plates of wire gauze were close together, and a small arc passed between them, the arc *prevented* a strong current from passing through the secondary, because it did away with the capacity on the terminals; when the rubber plate was inserted between, the capacity of the condenser formed counteracted the self-induction of the secondary, a stronger current passed now, the coil performed more work, and the discharge was by far more powerful.

The first thing, then, in operating the induction coil is to combine capacity with the secondary to overcome the self-induction. If the frequencies and potentials are very high gaseous matter should be carefully kept away from the charged surfaces. If Leyden jars are used, they should be immersed in oil, as otherwise considerable dissipation may occur if the jars are greatly strained. When high frequencies are used, it is of equal importance to combine a condenser with the primary. One may use a

condenser connected to the ends of the primary or to the terminals of the alternator, but the latter is not to be recommended, as the machine might be injured. The best way is undoubtedly to use the condenser in series with the primary and with the alternator, and to adjust its capacity so as to annul the self-induction of both the latter. The condenser should be adjustable by very small steps, and for a finer adjustment a small oil condenser with movable plates may be used conveniently.

I think it best at this juncture to bring before you a phenomenon, observed by me some time ago, which to the purely scientific investigator may perhaps appear more interesting than any of the results which I have the privilege to present to you this evening.

It may be quite properly ranked among the brush phenomena—in fact, it is a brush, formed at, or near, a single terminal in high vacuum.

In bulbs provided with a conducting terminal, though it be of aluminium, the brush has but an ephemeral existence, and cannot, unfortunately, be indefinitely preserved in its most sensitive state, even in a bulb devoid of any conducting electrode. In studying the phenomenon, by all means a bulb having no leading-in wire should be used. I have found it best to use bulbs constructed as indicated in Figs. 12 and 13.

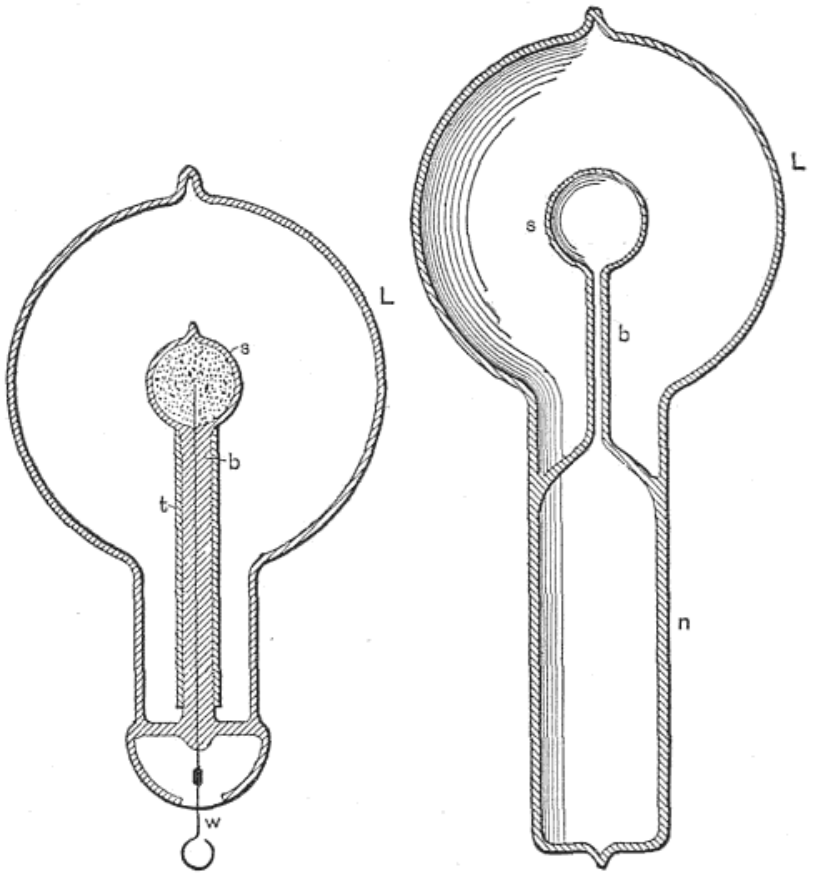


FIG. 12. FIG. 13.

BULBS FOR PRODUCING ROTATING BRUSH.

In Fig. 12 the bulb comprises an incandescent lamp globe *L*, in the neck of which is sealed a barometer tube *b*, the end of which is blown out to form a small sphere *s*. This sphere should be sealed as closely as possible in the centre of the large globe. Before sealing, a thin tube *t*, of aluminium sheet, may be slipped in the barometer tube, but it is not important to employ it.

The small hollow sphere *s* is filled with some conducting powder, and a wire *w* is cemented in the neck for the purpose of connecting the conducting powder with the generator.

The construction shown in Fig. 13 was chosen in order to remove from the brush any conducting body which might possibly affect it. The bulb consists in this case of a lamp globe *L*, which has a neck *n*, provided with a tube *b* and small sphere *s*, sealed to it, so that two entirely independent compartments are formed, as indicated in the drawing. When the bulb is in use, the neck *n* is provided with a tinfoil coating, which is connected to the generator and acts inductively upon the moderately rarefied and highly conducting gas inclosed in the neck. From there the current passes through the tube *b* into the small sphere *s* to act by induction upon the gas contained in the globe *L*.

It is of advantage to make the tube *t* very thick, the hole through it very small, and to blow the sphere *s* very thin. It is of the greatest importance that the sphere *s* be placed in the centre of the globe *L*.

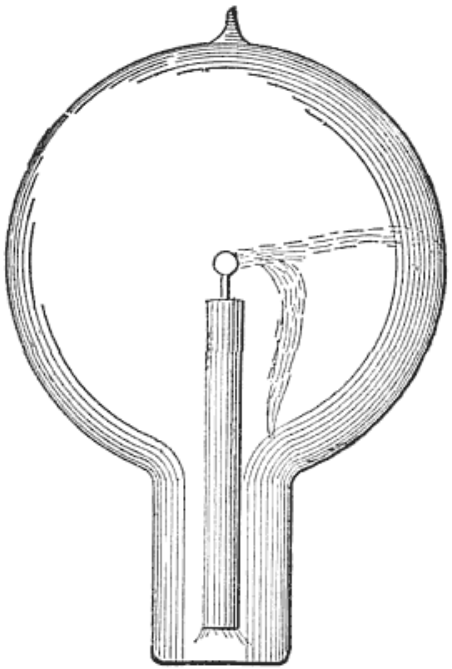


FIG. 14.—FORMS AND PHASES OF THE ROTATING BRUSH.

Figs. 14, 15 and 16 indicate different forms, or stages, of the brush. Fig. 14 shows the brush as it first appears in a bulb provided with a conducting terminal; but, as in such a bulb it very soon disappears—often after a few minutes—I will confine myself to the description of the phenomenon as seen in a bulb without conducting electrode. It is observed under the following conditions:

When the globe *L* (Figs. 12 and 13) is exhausted to a very high degree, generally the bulb is not excited upon connecting the wire *w* (Fig. 12) or the tinfoil coating of the bulb (Fig. 13) to the terminal of the induction coil. To excite it, it is usually sufficient to grasp the globe *L* with the hand. An

intense phosphorescence then spreads at first over the globe, but soon gives place to a white, misty light. Shortly afterward one may notice that the luminosity is unevenly distributed in the globe, and after passing the current for some time the bulb appears as in Fig. 15. From this stage the phenomenon will gradually pass to that indicated in Fig. 16, after some minutes, hours, days or weeks, according as the bulb is worked. Warming the bulb or increasing the potential hastens the transit.

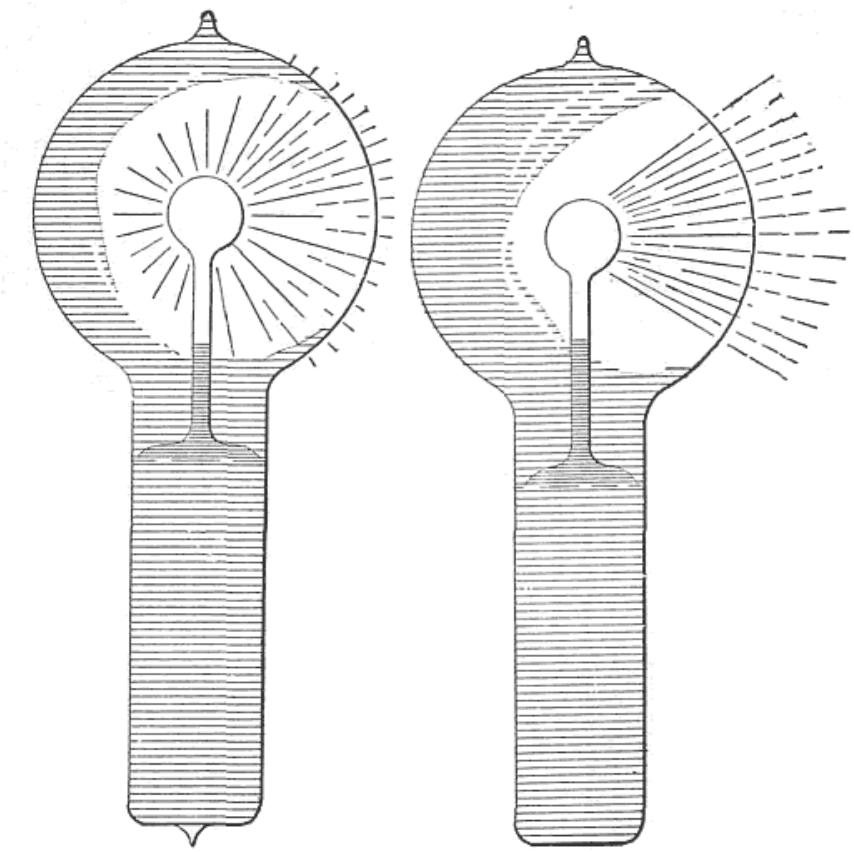


FIG. 15. FIG. 16.

FORMS AND PHASES OF THE ROTATING BRUSH.

When the brush assumes the form indicated in Fig. 16, it maybe brought to a state of extreme sensitiveness to electrostatic and magnetic influence. The bulb hanging straight down from a wire, and all objects being remote from it, the approach of the observer at a few paces from the bulb will cause the brush to fly to the opposite side, and if he walks around the bulb it will always keep on the opposite side. It may begin to spin around the terminal long before it reaches that sensitive stage. When it begins to turn around principally, but also before, it is affected by a magnet, and at a certain stage it is susceptible to magnetic influence to an astonishing degree. A small permanent magnet, with its poles at a distance of no more than two centimetres, will affect it visibly at a distance of two metres, slowing down or accelerating the rotation according to how it is held relatively to the brush. I think I have observed that at the stage when it is most sensitive to magnetic, it is not most sensitive to electrostatic, influence. My explanation is, that the electrostatic attraction between the brush and the glass of the bulb, which retards the rotation, grows much quicker than the magnetic influence when the intensity of the stream is increased.

When the bulb hangs with the globe *L* down, the rotation is always clockwise. In the southern hemisphere it would occur in the opposite direction and on the equator the brush should not turn at all. The rotation may be reversed by a magnet kept at some distance. The brush rotates best, seemingly, when it is at right angles to the lines of force of the earth. It very likely rotates, when at its maximum speed, in synchronism with the alternations, say 10,000 times a second. The rotation can be slowed down or accelerated by the approach or receding of the observer, or any conducting body, but it cannot be reversed by putting the bulb in any position. When it is in the state of the highest sensitiveness and the potential or frequency be varied the sensitiveness is rapidly diminished. Changing either of these but little will generally stop the rotation. The sensitiveness is likewise affected by the variations of temperature. To attain great sensitiveness it is necessary to have the small sphere *s* in the centre of the globe *L*, as otherwise the electrostatic action of the glass of the globe will tend to stop the rotation. The sphere *s* should be small and of uniform thickness; any dissymmetry of course has the effect to diminish the sensitiveness.

The fact that the brush rotates in a definite direction in a permanent magnetic field seems to show that in alternating currents of very high frequency the positive and negative impulses are not equal, but that one always preponderates over the other.

Of course, this rotation in one direction may be due to the action of two elements of the same current upon each other, or to the action of the field produced by one of the elements upon the other, as in a series motor, without necessarily one impulse being stronger than the other. The fact that the brush turns, as far as I could observe, in any position, would speak for this view. In such case it would turn at any point of the earth's surface. But, on the other hand, it is then hard to explain why a permanent magnet should reverse the rotation, and one must assume the preponderance of impulses of one kind.

As to the causes of the formation of the brush or stream, I think it is due to the electrostatic action of the globe and the dissymmetry of the parts. If the small bulb *s* and the globe *L* were perfect concentric spheres, and the glass throughout of the same thickness and quality, I think the brush would not form, as the tendency to pass would be equal on all sides. That the formation of the stream is due to an irregularity is apparent from the fact that it has the tendency to remain in one position, and rotation occurs most generally only when it is brought out of this position by electrostatic or magnetic influence. When in an extremely sensitive state it rests in one position, most curious experiments may be performed with it. For instance, the experimenter may, by selecting a proper position, approach the hand at a certain considerable distance to the bulb, and he may cause the brush to pass off by merely stiffening the muscles of the arm. When it begins to rotate slowly, and the hands are held at a proper distance, it is impossible to make even the slightest motion without producing a visible effect upon the brush. A metal plate connected to the other terminal of the coil affects it at a great distance, slowing down the rotation often to one turn a second.

I am firmly convinced that such a brush, when we learn how to produce it properly, will prove a valuable aid in the investigation of the nature of the forces acting in an electrostatic or magnetic field. If there is any motion which is measurable going on in the space, such a brush ought to reveal it. It is, so to speak, a beam of light, frictionless, devoid of inertia.

I think that it may find practical applications in telegraphy. With such a brush it would be possible to send dispatches across the Atlantic, for instance, with any speed, since its sensitiveness may be so great that the slightest changes will affect it. If it were possible to make the stream more intense and very narrow, its deflections could be easily photographed.

I have been interested to find whether there is a rotation of the stream itself, or whether there is simply a stress traveling around in the bulb. For this purpose I mounted a light mica fan so that its vanes were in the path of the brush. If the stream itself was rotating the fan would be spun around. I could produce no distinct rotation of the fan, although I tried the experiment repeatedly; but as the fan exerted a noticeable influence on the stream, and the apparent rotation of the latter was, in this case, never

quite satisfactory, the experiment did not appear to be conclusive.

I have been unable to produce the phenomenon with the disruptive discharge coil, although every other of these phenomena can be well produced by it—many, in fact, much better than with coils operated from an alternator.

It may be possible to produce the brush by impulses of one direction, or even by a steady potential, in which case it would be still more sensitive to magnetic influence.

In operating an induction coil with rapidly alternating currents, we realize with astonishment, for the first time, the great importance of the relation of capacity, self-induction and frequency as regards the general result. The effects of capacity are the most striking, for in these experiments, since the self-induction and frequency both are high, the critical capacity is very small, and need be but slightly varied to produce a very considerable change. The experimenter may bring his body in contact with the terminals of the secondary of the coil, or attach to one or both terminals insulated bodies of very small bulk, such as bulbs, and he may produce a considerable rise or fall of potential, and greatly affect the flow of the current through the primary. In the experiment before shown, in which a brush appears at a wire attached to one terminal, and the wire is vibrated when the experimenter brings his insulated body in contact with the other terminal of the coil, the sudden rise of potential was made evident.

I may show you the behavior of the coil in another manner which possesses a feature of some interest. I have here a little light fan of aluminium sheet, fastened to a needle and arranged to rotate freely in a metal piece screwed to one of the terminals of the coil. When the coil is set to work, the molecules of the air are rhythmically attracted and repelled. As the force with which they are repelled is greater than that with which they are attracted, it results that there is a repulsion exerted on the surfaces of the fan. If the fan were made simply of a metal sheet, the repulsion would be equal on the opposite sides, and would produce no effect. But if one of the opposing surfaces is screened, or if, generally speaking, the bombardment on this side is weakened in some way or other, there remains the repulsion exerted upon the other, and the fan is set in rotation. The screening is best effected by fastening upon one of the opposing sides of the fan insulated conducting coatings, or, if the fan is made in the shape of an ordinary propeller screw, by fastening on one side, and close to it, an insulated metal plate. The static screen may, however, be omitted, and simply a thickness of insulating material fastened to one of the sides of the fan.

To show the behavior of the coil, the fan may be placed upon the terminal and it will readily rotate when the coil is operated by currents of very high frequency. With a steady potential, of course, and even with alternating currents of very low frequency, it would not turn, because of the very slow exchange of air and, consequently, smaller bombardment; but in the latter case it might turn if the potential were excessive. With a pin wheel, quite the opposite rule holds good; it rotates best with a steady potential, and the effort is the smaller the higher the frequency. Now, it is very easy to adjust the conditions so that the potential is normally not sufficient to turn the fan, but that by connecting the other terminal of the coil with an insulated body it rises to a much greater value, so as to rotate the fan, and it is likewise possible to stop the rotation by connecting to the terminal a body of different size, thereby diminishing the potential.

Instead of using the fan in this experiment, we may use the "electric" radiometer with similar effect. But in this case it will be found that the vanes will rotate only at high exhaustion or at ordinary pressures; they will not rotate at moderate pressures, when the air is highly conducting. This curious observation was made conjointly by Professor Crookes and myself. I attribute the result to the high conductivity of the air, the molecules of which then do not act as independent carriers of electric charges, but act all together as a single conducting body. In such case, of course, if there is any repulsion at all of the molecules from the vanes, it must be very small. It is possible, however, that the result is in part due to the fact that the greater part of the discharge passes from the leading-in wire through the highly conducting gas, instead of passing off from the conducting vanes.

In trying the preceding experiment with the electric radiometer the potential should not exceed a certain limit, as then the electrostatic attraction between the vanes and the glass of the bulb may be so great as to stop the rotation.

A most curious feature of alternate currents of high frequencies and potentials is that they enable us to perform many experiments by the use of one wire only. In many respects this feature is of great interest.

In a type of alternate current motor invented by me some years ago I produced rotation by inducing, by means of a single alternating current passed through a motor circuit, in the mass or other circuits of the motor, secondary currents, which, jointly with the primary or inducing current, created a moving field of force. A simple but crude form of such a motor is obtained by winding upon an iron core a primary, and close to it a secondary coil, joining the ends of the latter and placing a freely movable metal disc within the influence of the field produced by both. The iron core is employed for obvious reasons, but it is not essential to the operation. To improve the motor, the iron core is made to encircle the armature. Again to improve, the secondary coil is made to overlap partly the primary, so that it cannot free itself from a strong inductive action of the latter, repel its lines as it may. Once more to improve, the proper difference of phase is obtained between the primary and secondary currents by a condenser, self-induction, resistance or equivalent windings.

I had discovered, however, that rotation is produced by means of a single coil and core; my explanation of the phenomenon, and leading thought in trying the experiment, being that there must be a true time lag in the magnetization of the core. I remember the pleasure I had when, in the writings of Professor Ayrton, which came later to my hand, I found the idea of the time lag advocated. Whether there is a true time lag, or whether the retardation is due to eddy currents circulating in minute paths, must remain an open question, but the fact is that a coil wound upon an iron core and traversed by an alternating current creates a moving field of force, capable of setting an armature in rotation. It is of some interest, in conjunction with the historical Arago experiment, to mention that in lag or phase motors I have produced rotation in the opposite direction to the moving field, which means that in that experiment the magnet may not rotate, or may even rotate in the opposite direction to the moving disc. Here, then, is a motor (diagrammatically illustrated in Fig. 17), comprising a coil and iron core, and a freely movable copper disc in proximity to the latter.

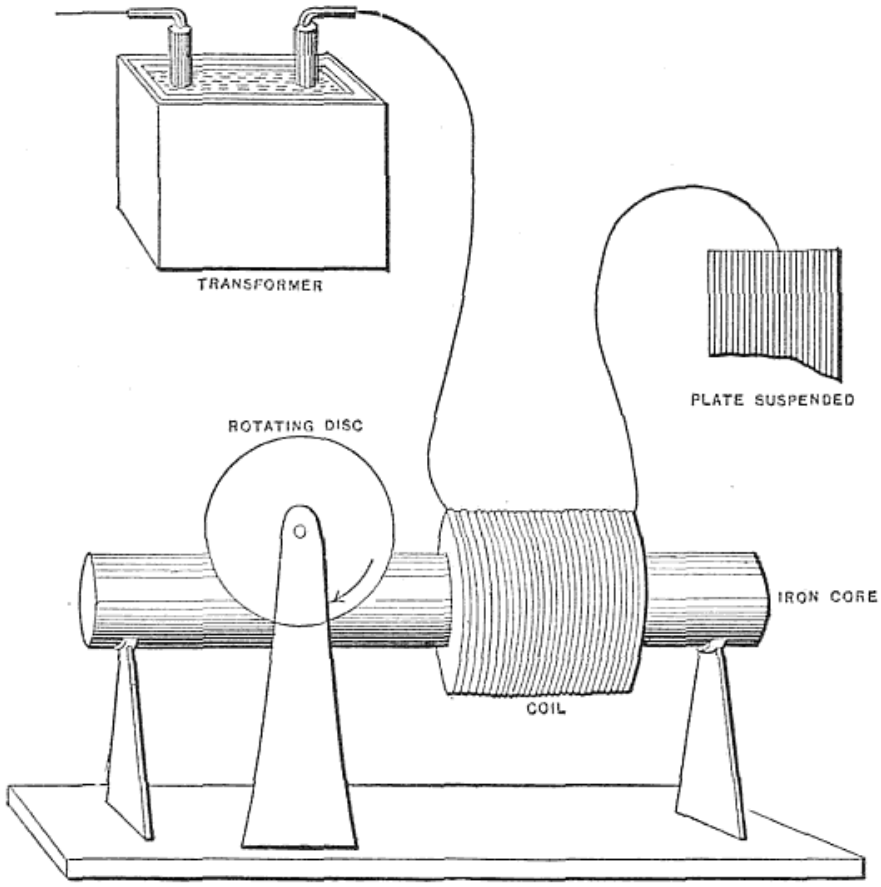


FIG. 17.—SINGLE WIRE AND "NO-WIRE" MOTOR.

To demonstrate a novel and interesting feature, I have, for a reason which I will explain, selected this type of motor. When the ends of the coil are connected to the terminals of an alternator the disc is set in rotation. But it is not this experiment, now well known, which I desire to perform. What I wish to show you is that this motor rotates with *one single* connection between it and the generator; that is to say, one terminal of the motor is connected to one terminal of the generator—in this case the secondary of a high-tension induction coil—the other terminals of motor and generator being insulated in space. To produce rotation it is generally (but not absolutely) necessary to connect the free end of the motor coil to an insulated body of some size. The experimenter's body is more than sufficient. If he touches the free terminal with an object held in the hand, a current passes through the coil and the copper disc is set in rotation. If an exhausted tube is put in series with the coil, the tube lights brilliantly, showing the passage of a strong current. Instead of the experimenter's body, a small metal sheet suspended on a cord may be used with the same result. In this case the plate acts as a condenser in series with the coil. It counteracts the self-induction of the latter and allows a strong current to pass. In such a combination, the greater the self-induction of the coil the smaller need be the plate, and this means that a lower frequency, or eventually a lower potential, is required to operate the motor. A single coil wound upon a core has a high self-induction; for this reason principally, this type of motor was chosen to perform the experiment. Were a secondary closed coil wound upon the core, it would tend to diminish the self-induction, and then it would be necessary to employ a much higher frequency and potential. Neither would be advisable, for a higher potential would endanger the insulation of the small primary

coil, and a higher frequency would result in a materially diminished torque.

It should be remarked that when such a motor with a closed secondary is used, it is not at all easy to obtain rotation with excessive frequencies, as the secondary cuts off almost completely the lines of the primary—and this, of course, the more, the higher the frequency—and allows the passage of but a minute current. In such a case, unless the secondary is closed through a condenser, it is almost essential, in order to produce rotation, to make the primary and secondary coils overlap each other more or less.

But there is an additional feature of interest about this motor, namely, it is not necessary to have even a single connection between the motor and generator, except, perhaps, through the ground: for not only is an insulated plate capable of giving off energy into space, but it is likewise capable of deriving it from an alternating electrostatic field, though in the latter case the available energy is much smaller. In this instance one of the motor terminals is connected to the insulated plate or body located within the alternating electrostatic field, and the other terminal preferably to the ground.

It is quite possible, however, that such "no-wire" motors, as they might be called, could be operated by conduction through the rarefied air at considerable distances. Alternate currents, especially of high frequencies, pass with astonishing freedom through even slightly rarefied gases. The upper strata of the air are rarefied. To reach a number of miles out into space requires the overcoming of difficulties of a merely mechanical nature. There is no doubt that with the enormous potentials obtainable by the use of high frequencies and oil insulation luminous discharges might be passed through many miles of rarefied air, and that, by thus directing the energy of many hundreds or thousands of horse-power, motors or lamps might be operated at considerable distances from stationary sources. But such schemes are mentioned merely as possibilities. We shall have no need to transmit power in this way. We shall have no need to *transmit* power at all. Ere many generations pass, our machinery will be driven by a power obtainable at any point of the universe. This idea is not novel. Men have been led to it long ago by instinct or reason. It has been expressed in many ways, and in many places, in the history of old and new. We find it in the delightful myth of Antheus, who derives power from the earth; we find it among the subtile speculations of one of your splendid mathematicians, and in many hints and statements of thinkers of the present time. Throughout space there is energy. Is this energy static or kinetic? If static our hopes are in vain; if kinetic—and this we know it is, for certain—then it is a mere question of time when men will succeed in attaching their machinery to the very wheelwork of nature. Of all, living or dead, Crookes came nearest to doing it. His radiometer will turn in the light of day and in the darkness of the night; it will turn everywhere where there is heat, and heat is everywhere. But, unfortunately, this beautiful little machine, while it goes down to posterity as the most interesting, must likewise be put on record as the most inefficient machine ever invented!

The preceding experiment is only one of many equally interesting experiments which may be performed by the use of only one wire with alternate currents of high potential and frequency. We may connect an insulated line to a source of such currents, we may pass an inappreciable current over the line, and on any point of the same we are able to obtain a heavy current, capable of fusing a thick copper wire. Or we may, by the help of some artifice, decompose a solution in any electrolytic cell by connecting only one pole of the cell to the line or source of energy. Or we may, by attaching to the line, or only bringing into its vicinity, light up an incandescent lamp, an exhausted tube, or a phosphorescent bulb.

However impracticable this plan of working may appear in many cases, it certainly seems practicable, and even recommendable, in the production of light. A perfected lamp would require but little energy, and if wires were used at all we ought to be able to supply that energy without a return wire.

It is now a fact that a body may be rendered incandescent or phosphorescent by bringing it either in single contact or merely in the vicinity of a source of electric impulses of the proper character, and that in this manner a quantity of light sufficient to afford a practical illuminant may be produced. It is, therefore, to say the least, worth while to attempt to determine the best conditions and to invent the best appliances for attaining this object.

Some experiences have already been gained in this direction, and I will dwell on them briefly, in the hope that they might prove useful.

The heating of a conducting body inclosed in a bulb, and connected to a source of rapidly alternating electric impulses, is dependent on so many things of a different nature, that it would be difficult to give a generally applicable rule under which the maximum heating occurs. As regards the size of the vessel, I have lately found that at ordinary or only slightly differing atmospheric pressures, when air is a good insulator, and hence practically the same amount of energy by a certain potential and frequency is given off from the body, whether the bulb be small or large, the body is brought to a higher temperature if inclosed in a small bulb, because of the better confinement of heat in this case.

At lower pressures, when air becomes more or less conducting, or if the air be sufficiently warmed as to become conducting, the body is rendered more intensely incandescent in a large bulb, obviously because, under otherwise equal conditions of test, more energy may be given off from the body when the bulb is large.

At very high degrees of exhaustion, when the matter in the bulb becomes "radiant," a large bulb has still an advantage, but a comparatively slight one, over the small bulb.

Finally, at excessively high degrees of exhaustion, which cannot be reached except by the employment of special means, there seems to be, beyond a certain and rather small size of vessel, no perceptible difference in the heating.

These observations were the result of a number of experiments, of which one, showing the effect of the size of the bulb at a high degree of exhaustion, may be described and shown here, as it presents a feature of interest. Three spherical bulbs of 2 inches, 3 inches and 4 inches diameter were taken, and in the centre of each was mounted an equal length of an ordinary incandescent lamp filament of uniform thickness. In each bulb the piece of filament was fastened to the leading-in wire of platinum, contained in a glass stem sealed in the bulb; care being taken, of course, to make everything as nearly alike as possible. On each glass stem in the inside of the bulb was slipped a highly polished tube made of aluminium sheet, which fitted the stem and was held on it by spring pressure. The function of this aluminium tube will be explained subsequently. In each bulb an equal length of filament protruded above the metal tube. It is sufficient to say now that under these conditions equal lengths of filament of the same thickness—in other words, bodies of equal bulk—were brought to incandescence. The three bulbs were sealed to a glass tube, which was connected to a Sprengel pump. When a high vacuum had been reached, the glass tube carrying the bulbs was sealed off. A current was then turned on successively on each bulb, and it was found that the filaments came to about the same brightness, and, if anything, the smallest bulb, which was placed midway between the two larger ones, may have been slightly brighter. This result was expected, for when either of the bulbs was connected to the coil the luminosity spread through the other two, hence the three bulbs constituted really one vessel. When all the three bulbs were connected in multiple arc to the coil, in the largest of them the filament glowed brightest, in the next smaller it was a little less bright, and in the smallest it only came to redness. The bulbs were then sealed off and separately tried. The brightness of the filaments was now such as would have been expected on the supposition that the energy given off was proportionate to the surface of the bulb, this surface in each case representing one of the coatings of a condenser. Accordingly, time was less difference between the largest and the middle sized than between the latter and the smallest bulb.

An interesting observation was made in this experiment. The three bulbs were suspended from a straight bare wire connected to a terminal of the coil, the largest bulb being placed at the end of the wire, at some distance from it the smallest bulb, and an equal distance from the latter the middle-sized one. The carbons glowed then in both the larger bulbs about as expected, but the smallest did not get its share by far. This observation led me to exchange the position of the bulbs, and I then observed that whichever of the bulbs was in the middle it was by far less bright than it was in any other position. This

mystifying result was, of course, found to be due to the electrostatic action between the bulbs. When they were placed at a considerable distance, or when they were attached to the corners of an equilateral triangle of copper wire, they glowed about in the order determined by their surfaces.

As to the shape of the vessel, it is also of some importance, especially at high degrees of exhaustion. Of all the possible constructions, it seems that a spherical globe with the refractory body mounted in its centre is the best to employ. In experience it has been demonstrated that in such a globe a refractory body of a given bulk is more easily brought to incandescence than when otherwise shaped bulbs are used. There is also an advantage in giving to the incandescent body the shape of a sphere, for self-evident reasons. In any case the body should be mounted in the centre, where the atoms rebounding from the glass collide. This object is best attained in the spherical bulb; but it is also attained in a cylindrical vessel with one or two straight filaments coinciding with its axis, and possibly also in parabolical or spherical bulbs with the refractory body or bodies placed in the focus or foci of the same; though the latter is not probable, as the electrified atoms should in all cases rebound normally from the surface they strike, unless the speed were excessive, in which case they *would* probably follow the general law of reflection. No matter what shape the vessel may have, if the exhaustion be low, a filament mounted in the globe is brought to the same degree of incandescence in all parts; but if the exhaustion be high and the bulb be spherical or pear-shaped, as usual, focal points form and the filament is heated to a higher degree at or near such points.

To illustrate the effect, I have here two small bulbs which are alike, only one is exhausted to a low and the other to a very high degree. When connected to the coil, the filament in the former glows uniformly throughout all its length; whereas in the latter, that portion of the filament which is in the centre of the bulb glows far more intensely than the rest. A curious point is that the phenomenon occurs even if two filaments are mounted in a bulb, each being connected to one terminal of the coil, and, what is still more curious, if they be very near together, provided the vacuum be very high. I noted in experiments with such bulbs that the filaments would give way usually at a certain point, and in the first trials I attributed it to a defect in the carbon. But when the phenomenon occurred many times in succession I recognized its real cause.

In order to bring a refractory body inclosed in a bulb to incandescence, it is desirable, on account of economy, that all the energy supplied to the bulb from the source should reach without loss the body to be heated; from there, and from nowhere else, it should be radiated. It is, of course, out of the question to reach this theoretical result, but it is possible by a proper construction of the illuminating device to approximate it more or less.

For many reasons, the refractory body is placed in the centre of the bulb, and it is usually supported on a glass stem containing the leading-in wire. As the potential of this wire is alternated, the rarefied gas surrounding the stem is acted upon inductively, and the glass stem is violently bombarded and heated. In this manner by far the greater portion of the energy supplied to the bulb—especially when exceedingly high frequencies are used—may be lost for the purpose contemplated. To obviate this loss, or at least to reduce it to a minimum, I usually screen the rarefied gas surrounding the stem from the inductive action of the leading-in wire by providing the stem with a tube or coating of conducting material. It seems beyond doubt that the best among metals to employ for this purpose is aluminium, on account of its many remarkable properties. Its only fault is that it is easily fusible, and, therefore, its distance from the incandescing body should be properly estimated. Usually, a thin tube, of a diameter somewhat smaller than that of the glass stem, is made of the finest aluminium sheet, and slipped on the stem. The tube is conveniently prepared by wrapping around a rod fastened in a lathe a piece of aluminium sheet of the proper size, grasping the sheet firmly with clean chamois leather or blotting paper, and spinning the rod very fast. The sheet is wound tightly around the rod, and a highly polished tube of one or three layers of the sheet is obtained. When slipped on the stem, the pressure is generally sufficient to prevent it from slipping off, but, for safety, the lower edge of the sheet may be turned inside. The upper inside corner of the sheet—that is, the one which is nearest to the refractory incandescent body—should be cut out diagonally, as it often happens that, in consequence of the intense heat, this corner turns toward the inside and comes very near to, or in contact with, the wire, or filament, supporting the refractory body.

The greater part of the energy supplied to the bulb is then used up in heating the metal tube, and the bulb is rendered useless for the purpose. The aluminium sheet should project above the glass stem more or less —one inch or so—or else, if the glass be too close to the incandescing body, it may be strongly heated and become more or less conducting, whereupon it may be ruptured, or may, by its conductivity, establish a good electrical connection between the metal tube and the leading-in wire, in which case, again, most of the energy will be lost in heating the former. Perhaps the best way is to make the top of the glass tube, for about an inch, of a much smaller diameter. To still further reduce the danger arising from the heating of the glass stem, and also with the view of preventing an electrical connection between the metal tube and the electrode, I preferably wrap the stem with several layers of thin mica, which extends at least as far as the metal tube. In some bulbs I have also used an outside insulating cover.

The preceding remarks are only made to aid the experimenter in the first trials, for the difficulties which he encounters he may soon find means to overcome in his own way.

To illustrate the effect of the screen, and the advantage of using it, I have here two bulbs of the same size, with their stems, leading-in wires and incandescent lamp filaments tied to the latter, as nearly alike as possible. The stem of one bulb is provided with an aluminium tube, the stem of the other has none. Originally the two bulbs were joined by a tube which was connected to a Sprengel pump. When a high vacuum had been reached, first the connecting tube, and then the bulbs, were sealed off; they are therefore of the same degree of exhaustion. When they are separately connected to the coil giving a certain potential, the carbon filament in the bulb provided with the aluminium screen is rendered highly incandescent, while the filament in the other bulb may, with the same potential, not even come to redness, although in reality the latter bulb takes generally more energy than the former. When they are both connected together to the terminal, the difference is even more apparent, showing the importance of the screening. The metal tube placed on the stem containing the leading-in wire performs really two distinct functions: First: it acts more or less as an electrostatic screen, thus economizing the energy supplied to the bulb; and, second, to whatever extent it may fail to act electrostatically, it acts mechanically, preventing the bombardment, and consequently intense heating and possible deterioration of the slender support of the refractory incandescent body, or of the glass stem containing the leading-in wire. I say *slender* support, for it is evident that in order to confine the heat more completely to the incandescing body its support should be very thin, so as to carry away the smallest possible amount of heat by conduction. Of all the supports used I have found an ordinary incandescent lamp filament to be the best, principally because among conductors it can withstand the highest degrees of heat.

The effectiveness of the metal tube as an electrostatic screen depends largely on the degree of exhaustion.

At excessively high degrees of exhaustion—which are reached by using great care and special means in connection with the Sprengel pump—when the matter in the globe is in the ultra-radiant state, it acts most perfectly. The shadow of the upper edge of the tube is then sharply defined upon the bulb.

At a somewhat lower degree of exhaustion, which is about the ordinary "non-striking" vacuum, and generally as long as the matter moves predominantly in straight lines, the screen still does well. In elucidation of the preceding remark it is necessary to state that what is a "non-striking" vacuum for a coil operated, as ordinarily, by impulses, or currents, of low-frequency, is not, by far, so when the coil is operated by currents of very high frequency. In such case the discharge may pass with great freedom through the rarefied gas through which a low-frequency discharge may not pass, even though the potential be much higher. At ordinary atmospheric pressures just the reverse rule holds good: the higher the frequency, the less the spark discharge is able to jump between the terminals, especially if they are knobs or spheres of some size.

Finally, at very low degrees of exhaustion, when the gas is well conducting, the metal tube not only does not act as an electrostatic screen, but even is a drawback, aiding to a considerable extent the dissipation of the energy laterally from the leading-in wire. This, of course, is to be expected. In this case, namely,

the metal tube is in good electrical connection with the leading-in wire, and most of the bombardment is directed upon the tube. As long as the electrical connection is not good, the conducting tube is always of some advantage, for although it may not greatly economize energy, still it protects the support of the refractory button, and is a means for concentrating more energy upon the same.

To whatever extent the aluminium tube performs the function of a screen, its usefulness is therefore limited to very high degrees of exhaustion when it is insulated from the electrode—that is, when the gas as a whole is non-conducting, and the molecules, or atoms, act as independent carriers of electric charges.

In addition to acting as a more or less effective screen, in the true meaning of the word, the conducting tube or coating may also act, by reason of its conductivity, as a sort of equalizer or dampener of the bombardment against the stem. To be explicit, I assume the action as follows: Suppose a rhythmical bombardment to occur against the conducting tube by reason of its imperfect action as a screen, it certainly must happen that some molecules, or atoms, strike the tube sooner than others. Those which come first in contact with it give up their superfluous charge, and the tube is electrified, the electrification instantly spreading over its surface. But this must diminish the energy lost in the bombardment for two reasons: first, the charge given up by the atoms spreads over a great area, and hence the electric density at any point is small, and the atoms are repelled with less energy than they would be if they would strike against a good insulator: secondly, as the tube is electrified by the atoms which first come in contact with it, the progress of the following atoms against the tube is more or less checked by the repulsion which the electrified tube must exert upon the similarly electrified atoms. This repulsion may perhaps be sufficient to prevent a large portion of the atoms from striking the tube, but at any rate it must diminish the energy of their impact. It is clear that when the exhaustion is very low, and the rarefied gas well conducting, neither of the above effects can occur, and, on the other hand, the fewer the atoms, with the greater freedom they move; in other words, the higher the degree of exhaustion, up to a limit, the more telling will be both the effects.

What I have just said may afford an explanation of the phenomenon observed by Prof. Crookes, namely, that a discharge through a bulb is established with much greater facility when an insulator than when a conductor is present in the same. In my opinion, the conductor acts as a dampener of the motion of the atoms in the two ways pointed out; hence, to cause a visible discharge to pass through the bulb, a much higher potential is needed if a conductor, especially of much surface, be present.

For the sake of clearness of some of the remarks before made, I must now refer to Figs. 18, 19 and 20, which illustrate various arrangements with a type of bulb most generally used.

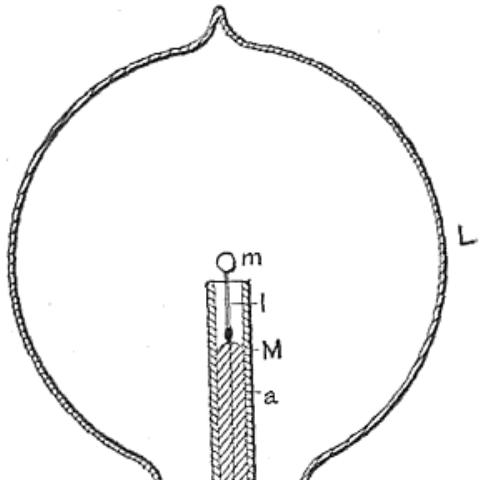


Fig. 18 is a section through a spherical bulb *L*, with the glass stem *s*, containing the leading-in wire *w*; which has a lamp filament *l* fastened to it, serving to support the refractory button *m* in the centre. *M* is a sheet of thin mica wound in several layers around

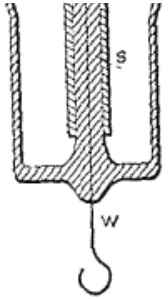


FIG. 18.—BULB WITH MICA TUBE AND ALUMINIUM SCREEN.

the stem *s*, and *a* is the aluminium tube.

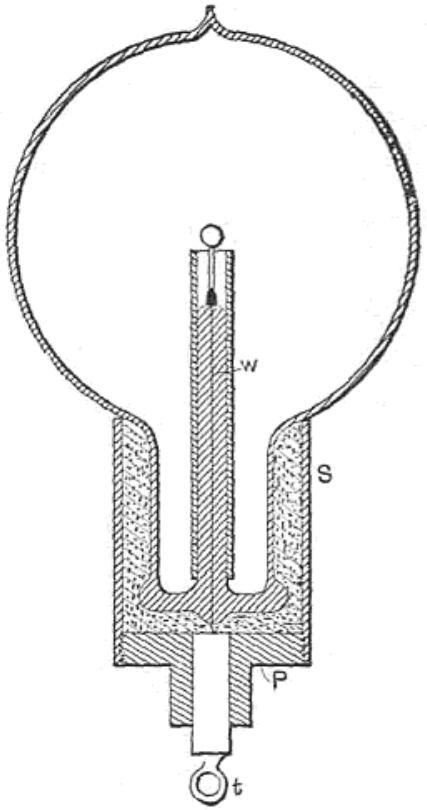


FIG. 19.—IMPROVED BULB WITH SOCKET AND SCREEN.

Fig. 19 illustrates such a bulb in a somewhat more advanced stage of perfection. A metallic tube *S* is fastened by means of some cement to the neck of the tube. In the tube is screwed a plug *P*, of insulating material, in the centre of which is fastened a metallic terminal *t*, for the connection to the leading-in wire *w*. This terminal must be well insulated from the metal tube *S*, therefore, if the cement used is conducting—and most generally it is sufficiently so—the space between the plug *P* and the neck of the bulb should be filled with some good insulating material, as mica powder.



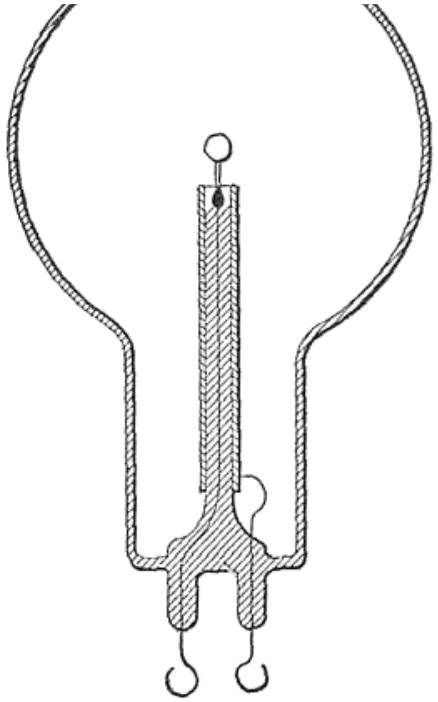
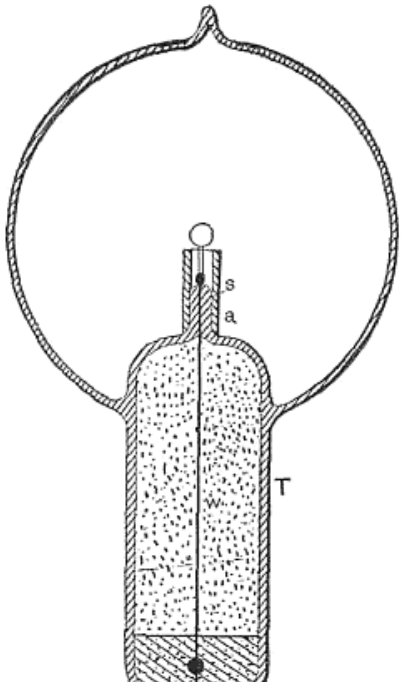


FIG. 20.—BULB FOR EXPERIMENTS WITH CONDUCTING TUBE.

Fig. 20 shows a bulb made for experimental purposes. In this bulb the aluminium tube is provided with an external connection, which serves to investigate the effect of the tube under various conditions. It is referred to chiefly to suggest a line of experiment followed.



Since the bombardment against the stem containing the leading-in wire is due to the inductive action of the latter upon the rarefied gas, it is of advantage to reduce this action as far as practicable by employing a very thin wire, surrounded by a very thick insulation of glass or other material, and by making the wire passing through the rarefied gas as short as practicable. To combine these features I employ a large tube *T* (Fig. 21), which protrudes into the bulb to some distance, and carries on the top a very short glass stem *s*, into which is sealed the leading-in wire *w*, and I protect the top of the glass stem against the heat by a small, aluminium tube *a* and a layer of mica underneath the same, as usual. The wire *w*, passing through the large tube to the outside of the bulb, should be well insulated —with a glass tube, for instance—and the space between ought to be filled out with some excellent insulator. Among many



FIG. 21.—IMPROVED BULB WITH NON-CONDUCTING BUTTON.

insulating powders I have tried, I have found that mica powder is the best to employ. If this precaution is not taken, the tube *T*, protruding into the bulb, will surely be cracked in consequence of the heating by the brushes which are apt to form in the upper part of the tube, near the exhausted globe, especially if the vacuum be excellent, and therefore the potential necessary to operate the lamp very high.

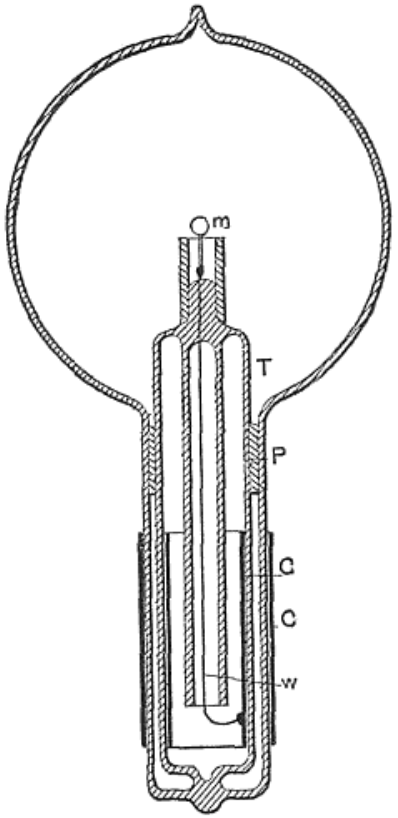


FIG. 22.—TYPE OF BULB WITHOUT LEADING-IN WIRE.

Fig. 22 illustrates a similar arrangement, with a large tube *T* protruding in to the part of the bulb containing the refractors button *m*. In this case the wire leading from the outside into the bulb is omitted, the energy required being supplied through condenser coatings *C C*. The insulating packing *P* should in this construction be tightly fitting to the glass, and rather wide, or otherwise the discharge might avoid passing through the wire *w*, which connects the inside condenser coating to the incandescent button *m*. The molecular bombardment against the glass stem in the bulb is a source of great trouble. As illustration I will cite a phenomenon only too frequently and unwillingly observed. A bulb, preferably a large one, may be taken, and a good conducting body, such as a piece of carbon, may be mounted in it upon a platinum wire sealed in the glass stem. The bulb may be exhausted to a fairly high degree, nearly to the point when phosphorescence begins to appear.

When the bulb is connected with the coil, the piece of carbon, if small, may become highly incandescent at first, but its brightness immediately diminishes, and then the discharge may break through the glass somewhere in the middle of the stem, in the form of bright sparks, in spite of the fact that the platinum wire is in good electrical connection with the rarefied gas through the piece of carbon or metal at the top. The first sparks are singularly bright, recalling those drawn from a clear surface of mercury. But, as they heat the glass rapidly, they, of course, lose their brightness, and cease when the glass at the ruptured place becomes incandescent, or generally sufficiently hot to conduct. When observed for the first time the phenomenon must appear very curious, and shows in a striking manner how

radically different alternate currents, or impulses, of high frequency behave, as compared with steady currents, or currents of low frequency. With such currents—namely, the latter—the phenomenon would of course not occur. When frequencies such as are obtained by mechanical means are used, I think that the rupture of the glass is more or less the consequence of the bombardment, which warms it up and impairs its insulating power; but with frequencies obtainable with condensers I have no doubt that the glass may give way without previous heating. Although this appears most singular at first, it is in reality what we might expect to occur. The energy supplied to the wire leading into the bulb is given off partly by direct action through the carbon button, and partly by inductive action through the glass surrounding the wire. The case is thus analogous to that in which a condenser shunted by a conductor of low resistance is connected to a source of alternating currents. As long as the frequencies are low, the conductor gets the most, and the condenser is perfectly safe: but when the frequency becomes excessive, the *rôle* of the conductor may become quite insignificant. In the latter case the difference of potential at the terminals of the condenser may become so great as to rupture the dielectric, notwithstanding the fact that the terminals are joined by a conductor of low resistance.

It is, of course, not necessary, when it is desired to produce the incandescence of a body inclosed in a bulb by means of these currents, that the body should be a conductor, for even a perfect non-conductor may be quite as readily heated. For this purpose it is sufficient to surround a conducting electrode with a non-conducting material, as, for instance, in the bulb described before in Fig. 21, in which a thin incandescent lamp filament is coated with a non-conductor, and supports a button of the same material on the top. At the start the bombardment goes on by inductive action through the non-conductor, until the same is sufficiently heated to become conducting, when the bombardment continues in the ordinary way.

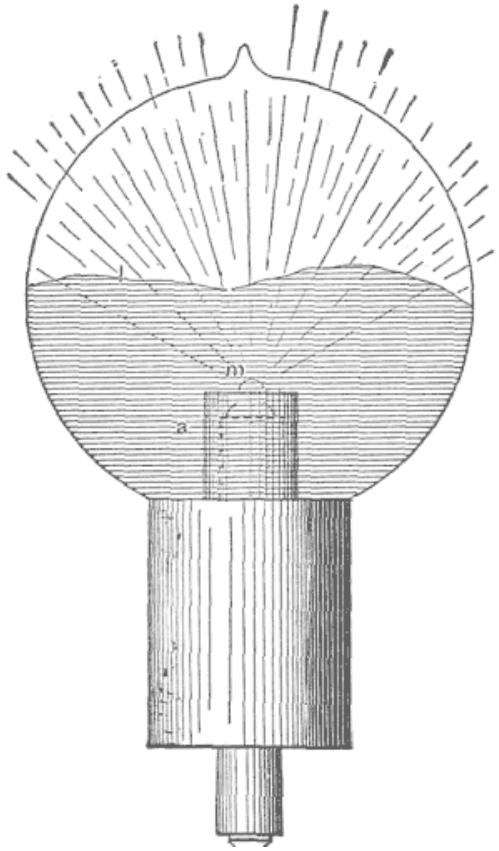




FIG. 23.—EFFECT PRODUCED BY A RUBY DROP.

A different arrangement used in some of the bulbs constructed is illustrated in Fig. 23. In this instance a non-conductor *m* is mounted in a piece of common arc light carbon so as to project some small distance above the latter. The carbon piece is connected to the leading-in wire passing through a glass stem, which is wrapped with several layers of mica. An aluminium tube *a* is employed as usual for screening. It is so arranged that it reaches very nearly as high as the carbon and only the non-conductor *m* projects a little above it. The bombardment goes at first against the upper surface of carbon, the lower parts being protected by the aluminium tube. As soon, however, as the non-conductor *m* is heated it is rendered good conducting, and then it becomes the centre of the bombardment, being most exposed to the same.

I have also constructed during these experiments many such single-wire bulbs with or without internal electrode, in which the radiant matter was projected against, or focused upon, the body to be rendered incandescent. Fig. 24 illustrates one of the bulbs used. It consists of a spherical globe *L*, provided with a long neck *n*, on the top, for increasing the action in some cases by the application of an external conducting coating. The globe *L* is blown out on the bottom into a very small bulb *b*, which serves to hold it firmly in a socket *S* of insulating material into which it is cemented. A fine lamp filament *f*, supported on a wire *w*, passes through the centre of the globe *L*. The filament is rendered incandescent in the middle portion, where the bombardment proceeding from the lower inside surface of the globe is most intense. The lower portion of the globe, as far as the socket *S* reaches, is rendered conducting, either by a tinfoil coating or otherwise, and the external electrode is connected to a terminal of the coil.

The arrangement diagrammatically indicated in Fig. 24 was found to be an inferior one when it was desired to render incandescent a filament or button supported in the centre of the globe, but it was convenient when the object was to excite phosphorescence.

In many experiments in which bodies of a different kind were mounted in the bulb as, for instance, indicated in Fig. 23, some observations of interest were made.

It was found, among other things, that in such cases, no matter where the bombardment began, just as soon as a high temperature was reached there was generally one of the bodies which seemed to take most of the bombardment upon itself, the other, or others, being thereby relieved. This quality appeared to depend principally on the point of fusion, and on the facility with which the body was "evaporated," or, generally speaking, disintegrated—meaning by the latter term not only the throwing off of atoms, but likewise of larger lumps. The observation made was in accordance with generally accepted notions. In a highly exhausted bulb electricity is carried off from the electrode by independent carriers, which are partly the atoms, or molecules, of the residual atmosphere, and partly the atoms, molecules, or lumps thrown off from the electrode. If the electrode is composed of bodies of different character, and if one of these is more easily disintegrated than the others, most of the electricity supplied is carried off from that body, which is then brought to a higher temperature than the others, and this the more, as upon an increase of the temperature the body is still more easily disintegrated.

It seems to me quite probable that a similar process takes place in the bulb even with a homogeneous electrode, and I think it to be the principal cause of the disintegration. There is bound to be some irregularity, even if the surface is highly polished, which, of course, is impossible with most of the refractory bodies employed as electrodes. Assume that a point of the electrode gets hotter, instantly most of the discharge passes through that point, and a minute patch is probably fused and evaporated. It is now possible that in consequence of the violent disintegration the spot attacked sinks in temperature, or that a counter force is created, as in an arc; at any rate, the local tearing off meets with the limitations incident to the experiment, whereupon the same process occurs on another place. To the eye

the electrode appears uniformly brilliant, but there are upon it points constantly shifting and wandering around, of a temperature far above the mean, and this materially hastens the process of deterioration. That some such thing occurs, at least when the electrode is at a lower temperature, sufficient experimental evidence can be obtained in the following manner: Exhaust a bulb to a very high degree, so that with a fairly high potential the discharge cannot pass—that is, not a *luminous* one, for a weak invisible discharge occurs always, in all probability. Now raise slowly and carefully the potential, leaving the primary current on no more than for an instant. At a certain point, two, three, or half a dozen phosphorescent spots will appear on the globe. These places of the glass are evidently more violently bombarded than others, this being due to the unevenly distributed electric density, necessitated, of course, by sharp projections, or, generally speaking, irregularities of the electrode. But the luminous patches are constantly changing in position, which is especially well observable if one manages to produce very few, and this indicates that the configuration of the electrode is rapidly changing.

From experiences of this kind I am led to infer that, in order to be most durable, the refractory button in the bulb should be in the form of a sphere with a highly polished surface. Such a small sphere could be manufactured from a diamond or some other crystal, but a better way would be to fuse, by the employment of extreme degrees of temperature, some oxide—as, for instance, zirconia—into a small drop, and then keep it in the bulb at a temperature somewhat below its point of fusion.

Interesting and useful results can no doubt be reached in the direction of extreme degrees of heat. How can such high temperatures be arrived at? How are the highest degrees of heat reached in nature? By the impact of stars, by high speeds and collisions. In a collision any rate of heat generation may be attained. In a chemical process we are limited. When oxygen and hydrogen combine, they fall, metaphorically speaking, from a definite height. We cannot go very far with a blast, nor by confining heat in a furnace, but in an exhausted bulb we can concentrate any amount of energy upon a minute button. Leaving practicability out of consideration, this, then, would be the means which, in my opinion, would enable us to reach the highest temperature. But a great difficulty when proceeding in this way is encountered, namely, in most cases the body is carried off before it can fuse and form a drop. This difficulty exists principally with an oxide such as zirconia, because it cannot be compressed in so hard a cake that it would not be carried off quickly. I endeavored repeatedly to fuse zirconia, placing it in a cup or arc light carbon as indicated in Fig. 23. It glowed with a most intense light, and the stream of the particles projected out of the carbon cup was of a vivid white: but whether it was compressed in a cake or made into a paste with carbon, it was carried off before it could be fused. The carbon cup containing the zirconia had to be mounted very low in the neck of a large bulb, as the heating of the glass by the projected particles of the oxide was so rapid that in the first trial the bulb was cracked almost in an instant when the current was turned on. The heating of the glass by the projected particles was found to be always greater when the carbon cup contained a body which was rapidly carried off—I presume because in such cases, with the same potential, higher speeds were reached, and also because, per unit of time, more matter was projected—that is, more particles would strike the glass.

The before mentioned difficulty did not exist, however, when the body mounted in the carbon cup offered great resistance to deterioration. For instance, when an oxide was first fused in an oxygen blast and then mounted in the bulb, it melted very readily into a drop.

Generally during the process of fusion magnificent light effects were noted, of which it would be difficult to give an adequate idea. Fig. 23 is intended to illustrate the effect observed with a ruby drop. At first one may see a narrow funnel of white light projected against the top of the globe, where it produces an irregularly outlined phosphorescent patch. When the point of the ruby fuses the phosphorescence becomes very powerful; but as the atoms are projected with much greater speed from the surface of the drop, soon the glass gets hot and "tired," and now only the outer edge of the patch glows. In this manner an intensely phosphorescent, sharply defined line, *l*, corresponding to the outline of the drop, is produced, which spreads slowly over the globe as the drop gets larger. When the mass begins to boil, small bubbles and cavities are formed, which cause dark colored spots to sweep across the globe. The bulb may be turned downward without fear of the drop falling off, as the mass possesses

considerable viscosity.

I may mention here another feature of some interest, which I believe to have noted in the course of these experiments, though the observations do not amount to a certitude. It *appeared* that under the molecular impact caused by the rapidly alternating potential the body was fused and maintained in that state at a lower temperature in a highly exhausted bulb than was the case at normal pressure and application of heat in the ordinary way—that is, at least, judging from the quantity of the light emitted. One of the experiments performed may be mentioned here by way of illustration. A small piece of pumice stone was stuck on a platinum wire, and first melted to it in a gas burner. The wire was next placed between two pieces of charcoal and a burner applied so as to produce an intense heat, sufficient to melt down the pumice stone into a small glass-like button. The platinum wire had to be taken of sufficient thickness to prevent its melting in the fire. While in the charcoal fire, or when held in a burner to get a better idea of the degree of heat, the button glowed with great brilliancy. The wire with the button was then mounted in a bulb, and upon exhausting the same to a high degree, the current was turned on slowly so as to prevent the cracking of the button. The button was heated to the point of fusion, and when it melted it did not, apparently, glow with the same brilliancy as before, and this would indicate a lower temperature. Leaving out of consideration the observer's possible, and even probable, error, the question is, can a body under these conditions be brought from a solid to a liquid state with evolution of *less* light?

When the potential of a body is rapidly alternated it is certain that the structure is jarred. When the potential is very high, although the vibrations may be few—say 20,000 per second—the effect upon the structure may be considerable. Suppose, for example, that a ruby is melted into a drop by a steady application of energy. When it forms a drop it will emit visible and invisible waves, which will be in a definite ratio, and to the eye the drop will appear to be of a certain brilliancy. Next, suppose we diminish to any degree we choose the energy steadily supplied, and, instead, supply energy which rises and falls according to a certain law. Now, when the drop is formed, there will be emitted from it three different kinds of vibrations—the ordinary visible, and two kinds of invisible waves: that is, the ordinary dark waves of all lengths, and, in addition, waves of a well defined character. The latter would not exist by a steady supply of the energy; still they help to jar and loosen the structure. If this really be the case, then the ruby drop will emit relatively less visible and more invisible waves than before. Thus it would seem that when a platinum wire, for instance, is fused by currents alternating with extreme rapidity, it emits at the point of fusion less light and more invisible radiation than it does when melted by a steady current, though the total energy used up in the process of fusion is the same in both cases. Or, to cite another example, a lamp filament is not capable of withstanding as long with currents of extreme frequency as it does with steady currents, assuming that it be worked at the same luminous intensity. This means that for rapidly alternating currents the filament should be shorter and thicker. The higher the frequency—that is, the greater the departure from the steady flow—the worse it would be for the filament. But if the truth of this remark were demonstrated, it would be erroneous to conclude that such a refractory button as used in these bulbs would be deteriorated quicker by currents of extremely high frequency than by steady or low frequency currents. From experience I may say that just the opposite holds good: the button withstands the bombardment better with currents of very high frequency. But this is due to the fact that a high frequency discharge passes through a rarefied gas with much greater freedom than a steady or low frequency discharge, and this will say that with the former we can work with a lower potential or with a less violent impact. As long, then, as the gas is of no consequence, a steady or low frequency current is better; but as soon as the action of the gas is desired and important, high frequencies are preferable.

In the course of these experiments a great many trials were made with all kinds of carbon buttons. Electrodes made of ordinary carbon buttons were decidedly more durable when the buttons were obtained by the application of enormous pressure. Electrodes prepared by depositing carbon in well known ways did not show up well; they blackened the globe very quickly. From many experiences I conclude that lamp filaments obtained in this manner can be advantageously used only with low potentials and low frequency currents. Some kinds of carbon withstand so well that, in order to bring them to the point

of fusion, it is necessary to employ very small buttons. In this case the observation is rendered very difficult on account of the intense heat produced. Nevertheless there can be no doubt that all kinds of carbon are fused under the molecular bombardment, but the liquid state must be one of great instability. Of all the bodies tried there were two which withstood best—diamond and carborundum. These two showed up about equally, but the latter was preferable, for many reasons. As it is more than likely that this body is not yet generally known, I will venture to call your attention to it.

It has been recently produced by Mr. E.G. Acheson, of Monongahela City, Pa., U.S.A. It is intended to replace ordinary diamond powder for polishing precious stones, etc., and I have been informed that it accomplishes this object quite successfully. I do not know why the name "carborundum" has been given to it, unless there is something in the process of its manufacture which justifies this selection. Through the kindness of the inventor, I obtained a short while ago some samples which I desired to test in regard to their qualities of phosphorescence and capability of withstanding high degrees of heat.

Carborundum can be obtained in two forms—in the form of "crystals" and of powder. The former appear to the naked eye dark colored, but are very brilliant; the latter is of nearly the same color as ordinary diamond powder, but very much finer. When viewed under a microscope the samples of crystals given to me did not appear to have any definite form, but rather resembled pieces of broken up egg coal of fine quality. The majority were opaque, but there were some which were transparent and colored. The crystals are a kind of carbon containing some impurities; they are extremely hard, and withstand for a long time even an oxygen blast. When the blast is directed against them they at first form a cake of some compactness, probably in consequence of the fusion of impurities they contain. The mass withstands for a very long time the blast without further fusion; but a slow carrying off, or burning, occurs, and, finally, a small quantity of a glass-like residue is left, which, I suppose, is melted alumina. When compressed strongly they conduct very well, but not as well as ordinary carbon. The powder, which is obtained from the crystals in some way, is practically non-conducting. It affords a magnificent polishing material for stones.

The time has been too short to make a satisfactory study of the properties of this product, but enough experience has been gained in a few weeks I have experimented upon it to say that it does possess some remarkable properties in many respects. It withstands excessively high degrees of heat, it is little deteriorated by molecular bombardment, and it does not blacken the globe as ordinary carbon does. The only difficulty which I have found in its use in connection with these experiments was to find some binding material which would resist the heat and the effect of the bombardment as successfully as carborundum itself does.

I have here a number of bulbs which I have provided with buttons of carborundum. To make such a button of carborundum crystals I proceed in the following manner: I take an ordinary lamp filament and dip its point in tar, or some other thick substance or paint which may be readily carbonized. I next pass the point of the filament through the crystals, and then hold it vertically over a hot plate. The tar softens and forms a drop on the point of the filament, the crystals adhering to the surface of the drop. By regulating the distance from the plate the tar is slowly dried out and the button becomes solid. I then once more dip the button in tar and hold it again over a plate until the tar is evaporated, leaving only a hard mass which firmly binds the crystals. When a larger button is required I repeat the process several times, and I generally also cover the filament a certain distance below the button with crystals. The button being mounted in a bulb, when a good vacuum has been reached, first a weak and then a strong discharge is passed through the bulb to carbonize the tar and expel all gases, and later it is brought to a very intense incandescence.

When the powder is used I have found it best to proceed as follows: I make a thick paint of carborundum and tar, and pass a lamp filament through the paint. Taking then most of the paint off by rubbing the filament against a piece of chamois leather, I hold it over a hot plate until the tar evaporates and the coating becomes firm. I repeat this process as many times as it is necessary to obtain a certain thickness of coating. On the point of the coated filament I form a button in the same manner.

There is no doubt that such a button—properly prepared under great pressure—of carborundum, especially of powder of the best quality, will withstand the effect of the bombardment fully as well as anything we know. The difficulty is that the binding material gives way, and the carborundum is slowly thrown off after some time. As it does not seem to blacken the globe in the least, it might be found useful for coating the filaments of ordinary incandescent lamps, and I think that it is even possible to produce thin threads or sticks of carborundum which will replace the ordinary filaments in an incandescent lamp. A carborundum coating seems to be more durable than other coatings, not only because the carborundum can withstand high degrees of heat, but also because it seems to unite with the carbon better than any other material I have tried. A coating of zirconia or any other oxide, for instance, is far more quickly destroyed. I prepared buttons of diamond dust in the same manner as of carborundum, and these came in durability nearest to those prepared of carborundum, but the binding paste gave way much more quickly in the diamond buttons: this, however, I attributed to the size and irregularity of the grains of the diamond.

It was of interest to find whether carborundum possesses the quality of phosphorescence. One is, of course, prepared to encounter two difficulties: first, as regards the rough product, the "crystals," they are good conducting, and it is a fact that conductors do not phosphoresce; second, the powder, being exceedingly fine, would not be apt to exhibit very prominently this quality, since we know that when crystals, even such as diamond or ruby, are finely powdered, they lose the property of phosphorescence to a considerable degree.

The question presents itself here, can a conductor phosphoresce? What is there in such a body as a metal, for instance, that would deprive it of the quality of phosphorescence, unless it is that property which characterizes it as a conductor? for it is a fact that most of the phosphorescent bodies lose that quality when they are sufficiently heated to become more or less conducting. Then, if a metal be in a large measure, or perhaps entirely, deprived of that property, it should be capable of phosphorescence. Therefore it is quite possible that at some extremely high frequency, when behaving practically as a non-conductor, a metal or any other conductor might exhibit the quality of phosphorescence, even though it be entirely incapable of phosphorescing under the impact of a low-frequency discharge. There is, however, another possible way how a conductor might at least *appear* to phosphoresce.

Considerable doubt still exists as to what really is phosphorescence, and as to whether the various phenomena comprised under this head are due to the same causes. Suppose that in an exhausted bulb, under the molecular impact, the surface of a piece of metal or other conductor is rendered strongly luminous, but at the same time it is found that it remains comparatively cool, would not this luminosity be called phosphorescence? Now such a result, theoretically at least, is possible, for it is a mere question of potential or speed. Assume the potential of the electrode, and consequently the speed of the projected atoms, to be sufficiently high, the surface of the metal piece against which the atoms are projected would be rendered highly incandescent, since the process of heat generation would be incomparably faster than that of radiating or conducting away from the surface of the collision. In the eye of the observer a single impact of the atoms would cause an instantaneous flash, but if the impacts were repeated with sufficient rapidity they would produce a continuous impression upon his retina. To him then the surface of the metal would appear continuously incandescent and of constant luminous intensity, while in reality the light would be either intermittent or at least changing periodically in intensity. The metal piece would rise in temperature until equilibrium was attained—that is until the energy continuously radiated would equal that intermittently supplied. But the supplied energy might under such conditions not be sufficient to bring the body to any more than a very moderate mean temperature, especially if the frequency of the atomic impacts be very low—just enough that the fluctuation of the intensity of the light emitted could not be detected by the eye. The body would now, owing to the manner in which the energy is supplied, emit a strong light, and yet be at a comparatively very low mean temperature. How could the observer call the luminosity thus produced? Even if the analysis of the light would teach him something definite, still he would probably rank it under

the phenomena of phosphorescence. It is conceivable that in such a way both conducting and non-conducting bodies may be maintained at a certain luminous intensity, but the energy required would very greatly vary with the nature and properties of the bodies.

These and some foregoing remarks of a speculative nature were made merely to bring out curious features of alternate currents or electric impulses. By their help we may cause a body to emit *more* light, while at a certain mean temperature, than it would emit if brought to that temperature by a steady supply; and, again, we may bring a body to the point of fusion, and cause it to emit *less* light than when fused by the application of energy in ordinary ways. It all depends on how we supply the energy, and what kind of vibrations we set up: in one case the vibrations are more, in the other less, adapted to affect our sense of vision.

Some effects, which I had not observed before, obtained with carborundum in the first trials, I attributed to phosphorescence, but in subsequent experiments it appeared that it was devoid of that quality. The crystals possess a noteworthy feature. In a bulb provided with a single electrode in the shape of a small circular metal disc, for instance, at a certain degree of exhaustion the electrode is covered with a milky film, which is separated by a dark space from the glow filling the bulb. When the metal disc is covered with carborundum crystals, the film is far more intense, and snow-white. This I found later to be merely an effect of the bright surface of the crystals, for when an aluminium electrode was highly polished it exhibited more or less the same phenomenon. I made a number of experiments with the samples of crystals obtained, principally because it would have been of special interest to find that they are capable of phosphorescence, on account of their being conducting. I could not produce phosphorescence distinctly, but I must remark that a decisive opinion cannot be formed until other experimenters have gone over the same ground.

The powder behaved in some experiments as though it contained alumina, but it did not exhibit with sufficient distinctness the red of the latter. Its dead color brightens considerably under the molecular impact, but I am now convinced it does not phosphoresce. Still, the tests with the powder are not conclusive, because powdered carborundum probably does not behave like a phosphorescent sulphide, for example, which could be finely powdered without impairing the phosphorescence, but rather like powdered ruby or diamond, and therefore it would be necessary, in order to make a decisive test, to obtain it in a large lump and polish up the surface.

If the carborundum proves useful in connection with these and similar experiments, its chief value will be found in the production of coatings, thin conductors, buttons, or other electrodes capable of withstanding extremely high degrees of heat.

The production of a small electrode capable of withstanding enormous temperatures I regard as of the greatest importance in the manufacture of light. It would enable us to obtain, by means of currents of very high frequencies, certainly 20 times, if not more, the quantity of light which is obtained in the present incandescent lamp by the same expenditure of energy. This estimate may appear to many exaggerated, but in reality I think it is far from being so. As this statement might be misunderstood I think it necessary to expose clearly the problem with which in this line of work we are confronted, and the manner in which, in my opinion, a solution will be arrived at.

Any one who begins a study of the problem will be apt to think that what is wanted in a lamp with an electrode is a very high degree of incandescence of the electrode. There he will be mistaken. The high incandescence of the button is a necessary evil, but what is really wanted is the high incandescence of the gas surrounding the button. In other words, the problem in such a lamp is to bring a mass of gas to the highest possible incandescence. The higher the incandescence, the quicker the mean vibration, the greater is the economy of the light production. But to maintain a mass of gas at a high degree of incandescence in a glass vessel, it will always be necessary to keep the incandescent mass away from the glass; that is, to confine it as much as possible to the central portion of the globe.

In one of the experiments this evening a brush was produced at the end of a wire. This brush was a flame, a source of heat and light. It did not emit much perceptible heat, nor did it glow with an intense light; but is it the less a flame because it does not scorch my hand? Is it the less a flame because it does not hurt my eye by its brilliancy? The problem is precisely to produce in the bulb such a flame, much smaller in size, but incomparably more powerful. Were there means at hand for producing electric impulses of a sufficiently high frequency, and for transmitting them, the bulb could be done away with, unless it were used to protect the electrode, or to economize the energy by confining the heat. But as such means are not at disposal, it becomes necessary to place the terminal in a bulb and rarefy the air in the same. This is done merely to enable the apparatus to perform the work which it is not capable of performing at ordinary air pressure. In the bulb we are able to intensify the action to any degree—so far that the brush emits a powerful light. The intensity of the light emitted depends principally on the frequency and potential of the impulses, and on the electric density of the surface of the electrode. It is of the greatest importance to employ the smallest possible button, in order to push the density very far. Under the violent impact of the molecules of the gas surrounding it, the small electrode is of course brought to an extremely high temperature, but around it is a mass of highly incandescent gas, a flame photosphere, many hundred times the volume of the electrode. With a diamond, carborundum or zirconia button the photosphere can be as much as one thousand times the volume of the button. Without much reflecting one would think that in pushing so far the incandescence of the electrode it would be instantly volatilized. But after a careful consideration he would find that, theoretically, it should not occur, and in this fact—which, however, is experimentally demonstrated—lies principally the future value of such a lamp.

At first, when the bombardment begins, most of the work is performed on the surface of the button, but when a highly conducting photosphere is formed the button is comparatively relieved. The higher the incandescence of the photosphere the more it approaches in conductivity to that of the electrode, and the more, therefore, the solid and the gas form one conducting body. The consequence is that the further is forced the incandescence the more work, comparatively, is performed on the gas, and the less on the electrode. The formation of a powerful photosphere is consequently the very means for protecting the electrode. This protection, of course, is a relative one, and it should not be thought that by pushing the incandescence higher the electrode is actually less deteriorated. Still, theoretically, with extreme frequencies, this result must be reached, but probably at a temperature too high for most of the refractory bodies known. Given, then, an electrode which can withstand to a very high limit the effect of the bombardment and outward strain, it would be safe no matter how much it is forced beyond that limit. In an incandescent lamp quite different considerations apply. There the gas is not at all concerned: the whole of the work is performed on the filament; and the life of the lamp diminishes so rapidly with the increase of the degree of incandescence that economical reasons compel us to work it at a low incandescence. But if an incandescent lamp is operated with currents of very high frequency, the action of the gas cannot be neglected, and the rules for the most economical working must be considerably modified.

In order to bring such a lamp with one or two electrodes to a great perfection, it is necessary to employ impulses of very high frequency. The high frequency secures, among others, two chief advantages, which have a most important bearing upon the economy of the light production. First, the deterioration of the electrode is reduced by reason of the fact that we employ a great many small impacts, instead of a few violent ones, which shatter quickly the structure; secondly, the formation of a large photosphere is facilitated.

In order to reduce the deterioration of the electrode to the minimum, it is desirable that the vibration be harmonic, for any suddenness hastens the process of destruction. An electrode lasts much longer when kept at incandescence by currents, or impulses, obtained from a high-frequency alternator, which rise and fall more or less harmonically, than by impulses obtained from a disruptive discharge coil. In the latter case there is no doubt that most of the damage is done by the fundamental sudden discharges.

One of the elements of loss in such a lamp is the bombardment of the globe. As the potential is very high, the molecules are projected with great speed; they strike the glass, and usually excite a

strong phosphorescence. The effect produced is very pretty, but for economical reasons it would be perhaps preferable to prevent, or at least reduce to the minimum, the bombardment against the globe, as in such case it is, as a rule, not the object to excite phosphorescence, and as some loss of energy results from the bombardment. This loss in the bulb is principally dependent on the potential of the impulses and on the electric density on the surface of the electrode. In employing very high frequencies the loss of energy by the bombardment is greatly reduced, for, first, the potential needed to perform a given amount of work is much smaller; and, secondly, by producing a highly conducting photosphere around the electrode, the same result is obtained as though the electrode were much larger, which is equivalent to a smaller electric density. But be it by the diminution of the maximum potential or of the density, the gain is effected in the same manner, namely, by avoiding violent shocks, which strain the glass much beyond its limit of elasticity. If the frequency could be brought high enough, the loss due to the imperfect elasticity of the glass would be entirely negligible. The loss due to bombardment of the globe may, however, be reduced by using two electrodes instead of one. In such case each of the electrodes may be connected to one of the terminals; or else, if it is preferable to use only one wire, one electrode may be connected to one terminal and the other to the ground or to an insulated body of some surface, as, for instance, a shade on the lamp. In the latter case, unless some judgment is used, one of the electrodes might glow more intensely than the other.

But on the whole I find it preferable when using such high frequencies to employ only one electrode and one connecting wire. I am convinced that the illuminating device of the near future will not require for its operation more than one lead, and, at any rate, it will have no leading-in wire, since the energy required can be as well transmitted through the glass. In experimental bulbs the leading-in wire is most generally used on account of convenience, as in employing condenser coatings in the manner indicated in Fig. 22, for example, there is some difficulty in fitting the parts, but these difficulties would not exist if a great many bulbs were manufactured; otherwise the energy can be conveyed through the glass as well as through a wire, and with these high frequencies the losses are very small. Such illuminating devices will necessarily involve the use of very high potentials, and this, in the eyes of practical men, might be an objectionable feature. Yet, in reality, high potentials are not objectionable —certainly not in the least as far as the safety of the devices is concerned.

There are two ways of rendering an electric appliance safe. One is to use low potentials, the other is to determine the dimensions of the apparatus so that it is safe no matter how high a potential is used. Of the two the latter seems to me the better way, for then the safety is absolute, unaffected by any possible combination of circumstances which might render even a low-potential appliance dangerous to life and property. But the practical conditions require not only the judicious determination of the dimensions of the apparatus; they likewise necessitate the employment of energy of the proper kind. It is easy, for instance, to construct a transformer capable of giving, when operated from an ordinary alternate current machine of low tension, say 50,000 volts, which might be required to light a highly exhausted phosphorescent tube, so that, in spite of the high potential, it is perfectly safe, the shock from it producing no inconvenience. Still, such a transformer would be expensive, and in itself inefficient; and, besides, what energy was obtained from it would not be economically used for the production of light. The economy demands the employment of energy in the form of extremely rapid vibrations. The problem of producing light has been likened to that of maintaining a certain high-pitch note by means of a bell. It should be said a *barely audible* note; and even these words would not express it, so wonderful is the sensitiveness of the eye. We may deliver powerful blows at long intervals, waste a good deal of energy, and still not get what we want; or we may keep up the note by delivering frequent gentle taps, and get nearer to the object sought by the expenditure of much less energy. In the production of light, as far as the illuminating device is concerned, there can be only one rule—that is, to use as high frequencies as can be obtained; but the means for the production and conveyance of impulses of such character impose, at present at least, great limitations. Once it is decided to use very high frequencies, the return wire becomes unnecessary, and all the appliances are simplified. By the use of obvious means the same result is obtained as though the return wire were used. It is sufficient for this purpose to bring in contact with the bulb, or merely in the vicinity of the same, an insulated body of some surface. The surface need, of course, be the smaller, the higher

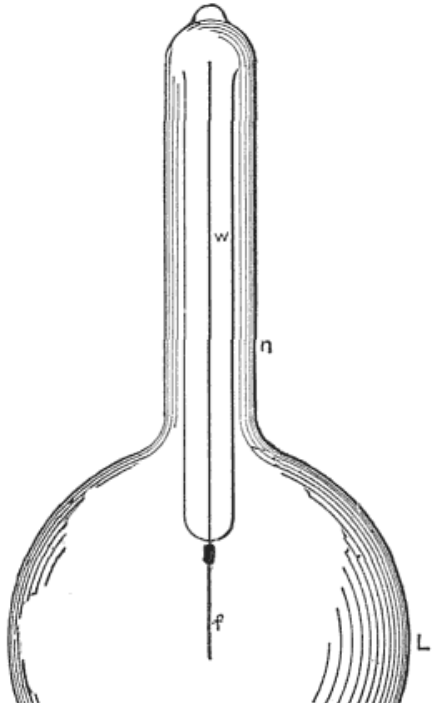
the frequency and potential used, and necessarily, also, the higher the economy of the lamp or other device.

This plan of working has been resorted to on several occasions this evening. So, for instance, when the incandescence of a button was produced by grasping the bulb with the hand, the body of the experimenter merely served to intensify the action. The bulb used was similar to that illustrated in Fig. 19, and the coil was excited to a small potential, not sufficient to bring the button to incandescence when the bulb was hanging from the wire; and incidentally, in order to perform the experiment in a more suitable manner, the button was taken so large that a perceptible time had to elapse before, upon grasping the bulb, it could be rendered incandescent. The contact with the bulb was, of course, quite unnecessary. It is easy, by using a rather large bulb with an exceedingly small electrode, to adjust the conditions so that the latter is brought to bright incandescence by the mere approach of the experimenter within a few feet of the bulb, and that the incandescence subsides upon his receding.

In another experiment, when phosphorescence was excited, a similar bulb was used. Here again, originally, the potential was not sufficient to excite phosphorescence until the action was intensified—in this case, however, to present a different feature, by touching the socket with a metallic object held in the hand. The electrode in the bulb was a carbon button so large that it could not be brought to incandescence, and thereby spoil the effect produced by phosphorescence.

Again, in another of the early experiments, a bulb was used as illustrated in Fig. 12. In this instance, by touching the bulb with one or two fingers, one or two shadows of the stem inside were projected against the glass, the touch of the finger producing the same result as the application of an external negative electrode under ordinary circumstances.

In all these experiments the action was intensified by augmenting the capacity at the end of the lead connected to the terminal. As a rule, it is not necessary to resort to such means, and would be quite unnecessary with still higher frequencies; but when it *is* desired, the bulb, or tube, can be easily adapted to the purpose.



In Fig. 24, for example, an experimental bulb *L* is shown, which is provided with a neck *n* on the top for the application of an external tinfoil coating, which may be connected to a body of larger surface.

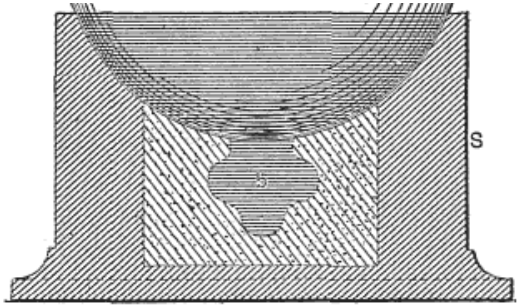


FIG. 24.—BULB WITHOUT LEADING-IN WIRE, SHOWING EFFECT OF PROJECTED MATTER.

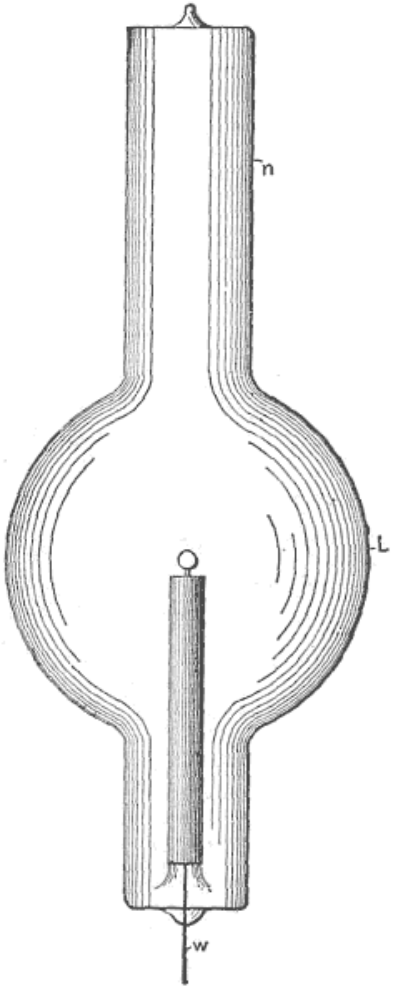


FIG. 25.—IMPROVED EXPERIMENTAL BULB.

Such a lamp as illustrated in Fig. 25 may also be lighted by connecting the tinfoil coating on the neck *n* to the terminal, and the leading-in wire *w* to an insulated plate. If the bulb stands in a socket upright, as shown in the cut, a shade of conducting material may be slipped in the neck *n*, and the action thus magnified.

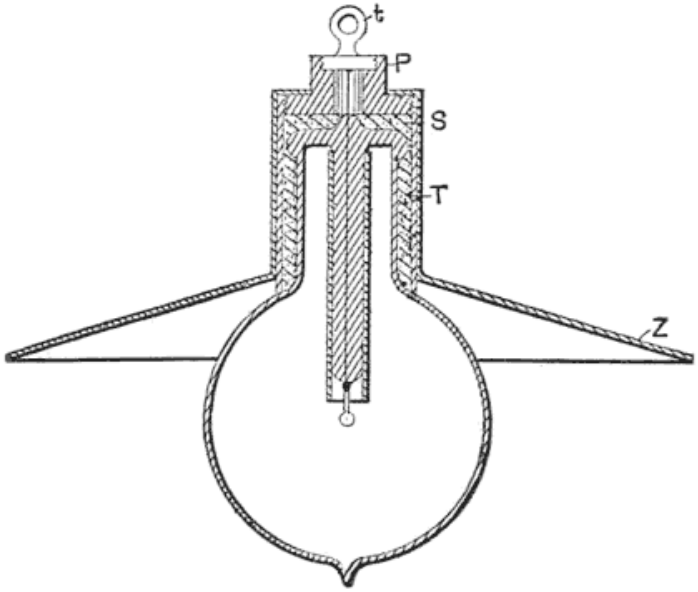


FIG. 26.—IMPROVED BULB WITH INTENSIFYING REFLECTOR.

A more perfected arrangement used in some of these bulbs is illustrated in Fig. 26. In this case the construction of the bulb is as shown and described before, when reference was made to Fig. 19. A zinc sheet *Z*, with a tubular extension *T*, is slipped over the metallic socket *S*. The bulb hangs downward from the terminal *t*, the zinc sheet *Z*, performing the double office of intensifier and reflector. The reflector is separated from the terminal *t* by an extension of the insulating plug *P*.

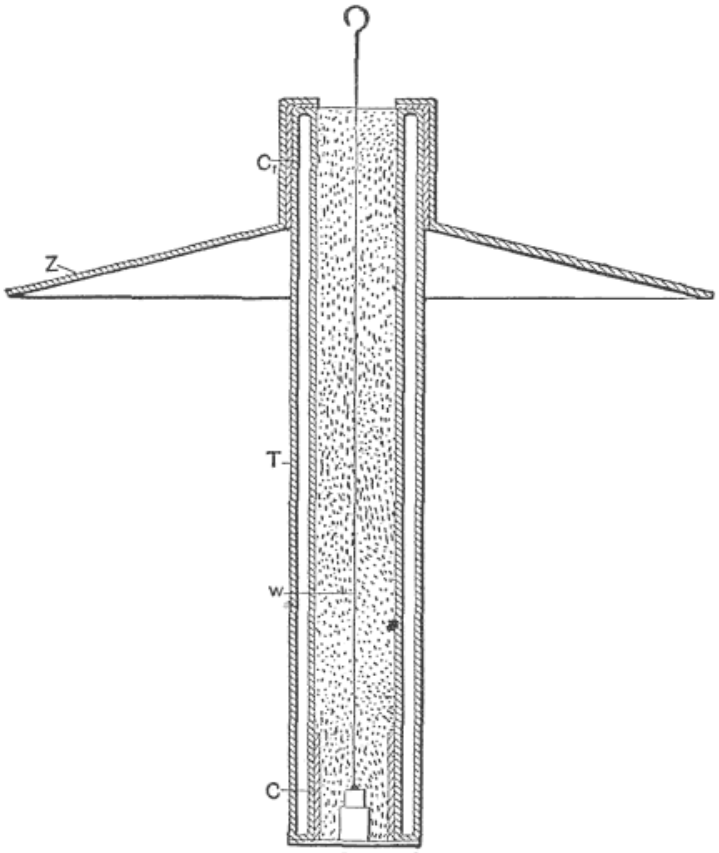


FIG. 27.—PHOSPHORESCENT TUBE WITH INTENSIFYING REFLECTOR.

A similar disposition with a phosphorescent tube is illustrated in Fig. 27. The tube *T* is prepared from two short tubes of a different diameter, which are sealed on the ends. On the lower end is placed an outside conducting coating *C*, which connects to the wire *w*. The wire has a hook on the upper end for suspension, and passes through the centre of the inside tube, which is filled with some good and tightly packed insulator. On the outside of the upper end of the tube *T* is another conducting coating C_1 upon which is slipped a metallic reflector *Z*, which should be separated by a thick insulation from the end of wire *w*.

The economical use of such a reflector or intensifier would require that all energy supplied to an air condenser should be recoverable, or, in other words, that there should not be any losses, neither in the gaseous medium nor through its action elsewhere. This is far from being so, but, fortunately, the losses may be reduced to anything desired. A few remarks are necessary on this subject, in order to make the experiences gathered in the course of these investigations perfectly clear.

Suppose a small helix with many well insulated turns, as in experiment Fig. 17, has one of its ends connected to one of the terminals of the induction coil, and the other to a metal plate, or, for the sake of simplicity, a sphere, insulated in space. When the coil is set to work, the potential of the sphere is alternated, and the small helix now behaves as though its free end were connected to the other terminal of the induction coil. If an iron rod be held within the small helix it is quickly brought to a high

temperature, indicating the passage of a strong current through the helix. How does the insulated sphere act in this case? It can be a condenser, storing and returning the energy supplied to it, or it can be a mere sink of energy, and the conditions of the experiment determine whether it is more one or the other. The sphere being charged to a high potential, it acts inductively upon the surrounding air, or whatever gaseous medium there might be. The molecules, or atoms, which are near the sphere are of course more attracted, and move through a greater distance than the farther ones. When the nearest molecules strike the sphere they are repelled, and collisions occur at all distances within the inductive action of the sphere. It is now clear that, if the potential be steady, but little loss of energy can be caused in this way, for the molecules which are nearest to the sphere, having had an additional charge imparted to them by contact, are not attracted until they have parted, if not with all, at least with most of the additional charge, which can be accomplished only after a great many collisions. From the fact that with a steady potential there is but little loss in dry air, one must come to such a conclusion. When the potential of the sphere, instead of being steady, is alternating, the conditions are entirely different. In this case a rhythmical bombardment occurs, no matter whether the molecules after coming in contact with the sphere lose the imparted charge or not; what is more, if the charge is not lost, the impacts are only the more violent. Still if the frequency of the impulses be very small, the loss caused by the impacts and collisions would not be serious unless the potential were excessive. But when extremely high frequencies and more or less high potentials are used, the loss may be very great. The total energy lost per unit of time is proportionate to the product of the number of impacts per second, or the frequency and the energy lost in each impact. But the energy of an impact must be proportionate to the square of the electric density of the sphere, since the charge imparted to the molecule is proportionate to that density. I conclude from this that the total energy lost must be proportionate to the product of the frequency and the square of the electric density; but this law needs experimental confirmation. Assuming the preceding considerations to be true, then, by rapidly alternating the potential of a body immersed in an insulating gaseous medium, any amount of energy may be dissipated into space. Most of that energy then, I believe, is not dissipated in the form of long ether waves, propagated to considerable distance, as is thought most generally, but is consumed—in the case of an insulated sphere, for example—in impact and collisional losses—that is, heat vibrations—on the surface and in the vicinity of the sphere. To reduce the dissipation it is necessary to work with a small electric density—the smaller the higher the frequency.

But since, on the assumption before made, the loss is diminished with the square of the density, and since currents of very high frequencies involve considerable waste when transmitted through conductors, it follows that, on the whole, it is better to employ one wire than two. Therefore, if motors, lamps, or devices of any kind are perfected, capable of being advantageously operated by currents of extremely high frequency, economical reasons will make it advisable to use only one wire, especially if the distances are great.

When energy is absorbed in a condenser the same behaves as though its capacity were increased. Absorption always exists more or less, but generally it is small and of no consequence as long as the frequencies are not very great. In using extremely high frequencies, and, necessarily in such case, also high potentials, the absorption—or, what is here meant more particularly by this term, the loss of energy due to the presence of a gaseous medium—is an important factor to be considered, as the energy absorbed in the air condenser may be any fraction of the supplied energy. This would seem to make it very difficult to tell from the measured or computed capacity of an air condenser its actual capacity or vibration period, especially if the condenser is of very small surface and is charged to a very high potential. As many important results are dependent upon the correctness of the estimation of the vibration period, this subject demands the most careful scrutiny of other investigators. To reduce the probable error as much as possible in experiments of the kind alluded to, it is advisable to use spheres or plates of large surface, so as to make the density exceedingly small. Otherwise, when it is practicable, an oil condenser should be used in preference. In oil or other liquid dielectrics there are seemingly no such losses as in gaseous media. It being impossible to exclude entirely the gas in condensers with solid dielectrics, such condensers should be immersed in oil, for economical reasons if nothing else; they can then be strained to the utmost and will remain cool. In Leyden jars the loss due to air is

comparatively small, as the tinfoil coatings are large, close together, and the charged surfaces not directly exposed; but when the potentials are very high, the loss may be more or less considerable at, or near, the upper edge of the foil, where the air is principally acted upon. If the jar be immersed in boiled-out oil, it will be capable of performing four times the amount of work which it can for any length of time when used in the ordinary way, and the loss will be inappreciable.

It should not be thought that the loss in heat in an air condenser is necessarily associated with the formation of *visible* streams or brushes. If a small electrode, inclosed in an unexhausted bulb, is connected to one of the terminals of the coil, streams can be seen to issue from the electrode and the air in the bulb is heated; if, instead of a small electrode, a large sphere is inclosed in the bulb, no streams are observed, still the air is heated.

Nor should it be thought that the temperature of an air condenser would give even an approximate idea of the loss in heat incurred, as in such case heat must be given off much more quickly, since there is, in addition to the ordinary radiation, a very active carrying away of heat by independent carriers going on, and since not only the apparatus, but the air at some distance from it is heated in consequence of the collisions which must occur.

Owing to this, in experiments with such a coil, a rise of temperature can be distinctly observed only when the body connected to the coil is very small. But with apparatus on a larger scale, even a body of considerable bulk would be heated, as, for instance, the body of a person; and I think that skilled physicians might make observations of utility in such experiments, which, if the apparatus were judiciously designed, would not present the slightest danger.

A question of some interest, principally to meteorologists, presents itself here. How does the earth behave? The earth is an air condenser, but is it a perfect or a very imperfect one—a mere sink of energy? There can be little doubt that to such small disturbance as might be caused in an experiment the earth behaves as an almost perfect condenser. But it might be different when its charge is set in vibration by some sudden disturbance occurring in the heavens. In such case, as before stated, probably only little of the energy of the vibrations set up would be lost into space in the form of long ether radiations, but most of the energy, I think, would spend itself in molecular impacts and collisions, and pass off into space in the form of short heat, and possibly light, waves. As both the frequency of the vibrations of the charge and the potential are in all probability excessive, the energy converted into heat may be considerable. Since the density must be unevenly distributed, either in consequence of the irregularity of the earth's surface, or on account of the condition of the atmosphere in various places, the effect produced would accordingly vary from place to place. Considerable variations in the temperature and pressure of the atmosphere may in this manner be caused at any point of the surface of the earth. The variations may be gradual or very sudden, according to the nature of the general disturbance, and may produce rain and storms, or locally modify the weather in any way.

From the remarks before made one may see what an important factor of loss the air in the neighborhood of a charged surface becomes when the electric density is great and the frequency of the impulses excessive. But the action as explained implies that the air is insulating—that is, that it is composed of independent carriers immersed in an insulating medium. This is the case only when the air is at something like ordinary or greater, or at extremely small, pressure. When the air is slightly rarefied and conducting, then true conduction losses occur also. In such case, of course, considerable energy may be dissipated into space even with a steady potential, or with impulses of low frequency, if the density is very great.

When the gas is at very low pressure, an electrode is heated more because higher speeds can be reached. If the gas around the electrode is strongly compressed, the displacements, and consequently the speeds, are very small, and the heating is insignificant. But if in such case the frequency could be sufficiently increased, the electrode would be brought to a high temperature as well as if the gas were at very low pressure; in fact, exhausting the bulb is only necessary because we cannot produce (and

possibly not convey) currents of the required frequency.

Returning to the subject of electrode lamps, it is obviously of advantage in such a lamp to confine as much as possible the heat to the electrode by preventing the circulation of the gas in the bulb. If a very small bulb be taken, it would confine the heat better than a large one, but it might not be of sufficient capacity to be operated from the coil, or, if so, the glass might get too hot. A simple way to improve in this direction is to employ a globe of the required size, but to place a small bulb, the diameter of which is properly estimated, over the refractory button contained in the globe. This arrangement is illustrated in Fig. 28.

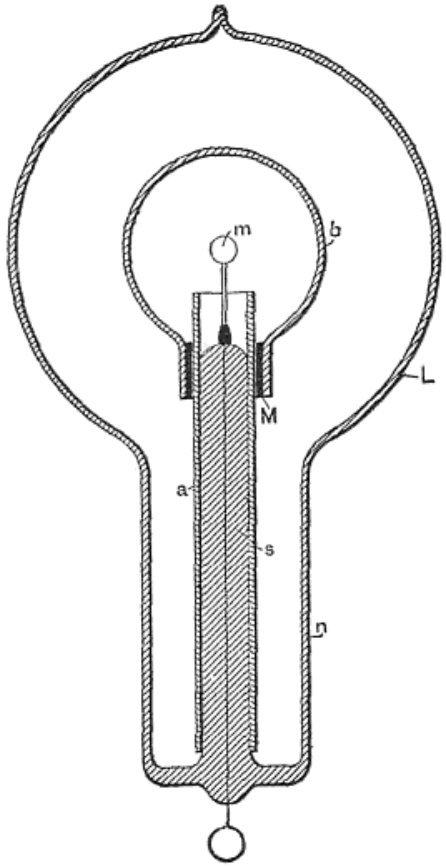


FIG. 28.—LAMP WITH AUXILIARY BULB FOR CONFINING THE ACTION TO THE CENTRE.

The globe *L* has in this case a large neck *n*, allowing the small bulb *b* to slip through. Otherwise the construction is the same as shown in Fig. 18, for example. The small bulb is conveniently supported upon the stem *s*, carrying the refractory button *m*. It is separated from the aluminium tube *a* by several layers of mica *M*, in order to prevent the cracking of the neck by the rapid heating of the aluminium tube upon a sudden turning on of the current. The inside bulb should be as small as possible when it is desired to obtain light only by incandescence of the electrode. If it is desired to produce phosphorescence, the bulb should be larger, else it would be apt to get too hot, and the phosphorescence would cease. In this arrangement usually only the small bulb shows phosphorescence, as there is practically no bombardment against the outer globe. In some of these bulbs constructed as illustrated in Fig. 28 the small tube was coated with phosphorescent paint, and beautiful effects were obtained. Instead of making the inside bulb large, in order to avoid undue heating, it answers the purpose to make the electrode *m* larger. In this case the bombardment is weakened by reason of the smaller electric density.

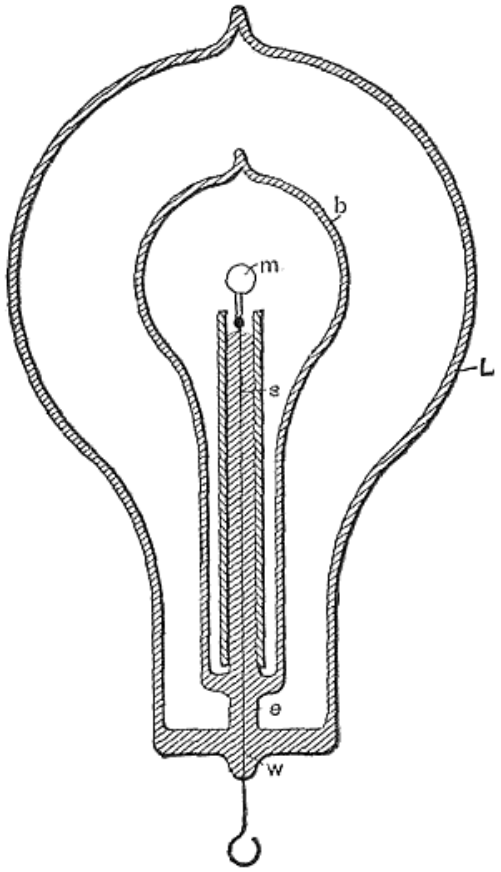


FIG. 29.—LAMP WITH INDEPENDENT AUXILIARY BULB.

Many bulbs were constructed on the plan illustrated in Fig. 29. Here a small bulb *b*, containing the refractory button *m*, upon being exhausted to a very high degree was sealed in a large globe *L*, which was then moderately exhausted and sealed off. The principal advantage of this construction was that it allowed of reaching extremely high vacua, and, at the same time use a large bulb. It was found, in the course of experiences with bulbs such as illustrated in Fig. 29, that it was well to make the stem *s* near the seal at *e* very thick, and the leading-in wire *w* thin, as it occurred sometimes that the stem at *e* was heated and the bulb was cracked. Often the outer globe *L* was exhausted only just enough to allow the discharge to pass through, and the space between the bulbs appeared crimson, producing a curious effect. In some cases, when the exhaustion in globe *L* was very low, and the air good conducting, it was found necessary, in order to bring the button *m* to high incandescence, to place, preferably on the upper part of the neck of the globe, a tinfoil coating which was connected to an insulated body, to the ground, or to the other terminal of the coil, as the highly conducting air weakened the effect somewhat, probably by being acted upon inductively from the wire *w*, where it entered the bulb at *e*. Another difficulty—which, however, is always present when the refractory button is mounted in a very small bulb—existed in the construction illustrated in Fig. 29, namely, the vacuum in the bulb *b* would be impaired in a comparatively short time.

The chief idea in the two last described constructions was to confine the heat to the central portion of the globe by preventing the exchange of air. An advantage is secured, but owing to the heating of the inside bulb and slow evaporation of the glass the vacuum is hard to maintain, even if the

construction illustrated in Fig. 28 be chosen, in which both bulbs communicate.

But by far the better way—the ideal way—would be to reach sufficiently high frequencies. The higher the frequency the slower would be the exchange of the air, and I think that a frequency may be reached at which there would be no exchange whatever of the air molecules around the terminal. We would then produce a flame in which there would be no carrying away of material, and a queer flame it would be, for it would be rigid! With such high frequencies the inertia of the particles would come into play. As the brush, or flame, would gain rigidity in virtue of the inertia of the particles, the exchange of the latter would be prevented. This would necessarily occur, for, the number of the impulses being augmented, the potential energy of each would diminish, so that finally only atomic vibrations could be set up, and the motion of translation through measurable space would cease. Thus an ordinary gas burner connected to a source of rapidly alternating potential might have its efficiency augmented to a certain limit, and this for two reasons—because of the additional vibration imparted, and because of a slowing down of the process of carrying off. But the renewal being rendered difficult, and renewal being necessary to maintain the *burner*, a continued increase of the frequency of the impulses, assuming they could be transmitted to and impressed upon the flame, would result in the "extinction" of the latter, meaning by this term only the cessation of the chemical process.

I think, however, that in the case of an electrode immersed in a fluid insulating medium, and surrounded by independent carriers of electric charges, which can be acted upon inductively, a sufficiently high frequency of the impulses would probably result in a gravitation of the gas all around toward the electrode. For this it would be only necessary to assume that the independent bodies are irregularly shaped; they would then turn toward the electrode their side of the greatest electric density, and this would be a position in which the fluid resistance to approach would be smaller than that offered to the receding.

The general opinion, I do not doubt, is that it is out of the question to reach any such frequencies as might —assuming some of the views before expressed to be true—produce any of the results which I have pointed out as mere possibilities. This may be so, but in the course of these investigations, from the observation of many phenomena I have gained the conviction that these frequencies would be much lower than one is apt to estimate at first. In a flame we set up light vibrations by causing molecules, or atoms, to collide. But what is the ratio of the frequency of the collisions and that of the vibrations set up? Certainly it must be incomparably smaller than that of the knocks of the bell and the sound vibrations, or that of the discharges and the oscillations of the condenser. We may cause the molecules of the gas to collide by the use of alternate electric impulses of high frequency, and so we may imitate the process in a flame; and from experiments with frequencies which we are now able to obtain, I think that the result is producible with impulses which are transmissible through a conductor.

In connection with thoughts of a similar nature, it appeared to me of great interest to demonstrate the rigidity of a vibrating gaseous column. Although with such low frequencies as, say 10,000 per second, which I was able to obtain without difficulty from a specially constructed alternator, the task looked discouraging at first, I made a series of experiments. The trials with air at ordinary pressure led to no result, but with air moderately rarefied I obtain what I think to be an unmistakable experimental evidence of the property sought for. As a result of this kind might lead able investigators to conclusions of importance I will describe one of the experiments performed.

It is well known that when a tube is slightly exhausted the discharge may be passed through it in the form of a thin luminous thread. When produced with currents of low frequency, obtained from a coil operated as usual, this thread is inert. If a magnet be approached to it, the part near the same is attracted or repelled, according to the direction of the lines of force of the magnet. It occurred to me that if such a thread would be produced with currents of very high frequency, it should be more or less rigid, and as it was visible it could be easily studied. Accordingly I prepared a tube about 1 inch in diameter and 1 metre long, with outside coating at each end. The tube was exhausted to a point at which by a little working the thread discharge could be obtained. It must be remarked here that the general aspect of the

tube, and the degree of exhaustion, are quite different than when ordinary low frequency currents are used. As it was found preferable to work with one terminal, the tube prepared was suspended from the end of a wire connected to the terminal, the tinfoil coating being connected to the wire, and to the lower coating sometimes a small insulated plate was attached. When the thread was formed it extended through the upper part of the tube and lost itself in the lower end. If it possessed rigidity it resembled, not exactly an elastic cord stretched tight between two supports, but a cord suspended from a height with a small weight attached at the end. When the finger or a magnet was approached to the upper end of the luminous thread, it could be brought locally out of position by electrostatic or magnetic action; and when the disturbing object was very quickly removed, an analogous result was produced, as though a suspended cord would be displaced and quickly released near the point of suspension. In doing this the luminous thread was set in vibration, and two very sharply marked nodes, and a third indistinct one, were formed. The vibration, once set up, continued for fully eight minutes, dying gradually out. The speed of the vibration often varied perceptibly, and it could be observed that the electrostatic attraction of the glass affected the vibrating thread; but it was clear that the electrostatic action was not the cause of the vibration, for the thread was most generally stationary, and could always be set in vibration by passing the finger quickly near the upper part of the tube. With a magnet the thread could be split in two and both parts vibrated. By approaching the hand to the lower coating of the tube, or insulated plate if attached, the vibration was quickened; also, as far as I could see, by raising the potential or frequency. Thus, either increasing the frequency or passing a stronger discharge of the same frequency corresponded to a tightening of the cord. I did not obtain any experimental evidence with condenser discharges. A luminous band excited in a bulb by repeated discharges of a Leyden jar must possess rigidity, and if deformed and suddenly released should vibrate. But probably the amount of vibrating matter is so small that in spite of the extreme speed the inertia cannot prominently assert itself. Besides, the observation in such a case is rendered extremely difficult on account of the fundamental vibration.

The demonstration of the fact—which still needs better experimental confirmation—that a vibrating gaseous column possesses rigidity, might greatly modify the views of thinkers. When with low frequencies and insignificant potentials indications of that property may be noted, how must a gaseous medium behave under the influence of enormous electrostatic stresses which may be active in the interstellar space, and which may alternate with inconceivable rapidity? The existence of such an electrostatic, rhythmically throbbing force—of a vibrating electrostatic field—would show a possible way how solids might have formed from the ultra-gaseous uterus, and how transverse and all kinds of vibrations may be transmitted through a gaseous medium filling all space. Then, ether might be a true fluid, devoid of rigidity, and at rest, it being merely necessary as a connecting link to enable interaction. What determines the rigidity of a body? It must be the speed and the amount of moving matter. In a gas the speed may be considerable, but the density is exceedingly small; in a liquid the speed would be likely to be small, though the density may be considerable; and in both cases the inertia resistance offered to displacement is practically *nil*. But place a gaseous (or liquid) column in an intense, rapidly alternating electrostatic field, set the particles vibrating with enormous speeds, then the inertia resistance asserts itself. A body might move with more or less freedom through the vibrating mass, but as a whole it would be rigid.

There is a subject which I must mention in connection with these experiments: it is that of high vacua. This is a subject the study of which is not only interesting, but useful, for it may lead to results of great practical importance. In commercial apparatus, such as incandescent lamps, operated from ordinary systems of distribution, a much higher vacuum than obtained at present would not secure a very great advantage. In such a case the work is performed on the filament and the gas is little concerned; the improvement, therefore, would be but trifling. But when we begin to use very high frequencies and potentials, the action of the gas becomes all important, and the degree of exhaustion materially modifies the results. As long as ordinary coils, even very large ones, were used, the study of the subject was limited, because just at a point when it became most interesting it had to be interrupted on account of the "non-striking" vacuum being reached. But presently we are able to obtain from a small disruptive discharge coil potentials much higher than even the largest coil was capable of giving, and, what

is more, we can make the potential alternate with great rapidity. Both of these results enable us now to pass a luminous discharge through almost any vacua obtainable, and the field of our investigations is greatly extended. Think we as we may, of all the possible directions to develop a practical illuminant, the line of high vacua seems to be the most promising at present. But to reach extreme vacua the appliances must be much more improved, and ultimate perfection will not be attained until we shall have discarded the mechanical and perfected an *electrical* vacuum pump. Molecules and atoms can be thrown out of a bulb under the action of an enormous potential: *this* will be the principle of the vacuum pump of the future. For the present, we must secure the best results we can with mechanical appliances. In this respect, it might not be out of the way to say a few words about the method of, and apparatus for, producing excessively high degrees of exhaustion of which I have availed myself in the course of these investigations. It is very probable that other experimenters have used similar arrangements; but as it is possible that there may be an item of interest in their description, a few remarks, which will render this investigation more complete, might be permitted.

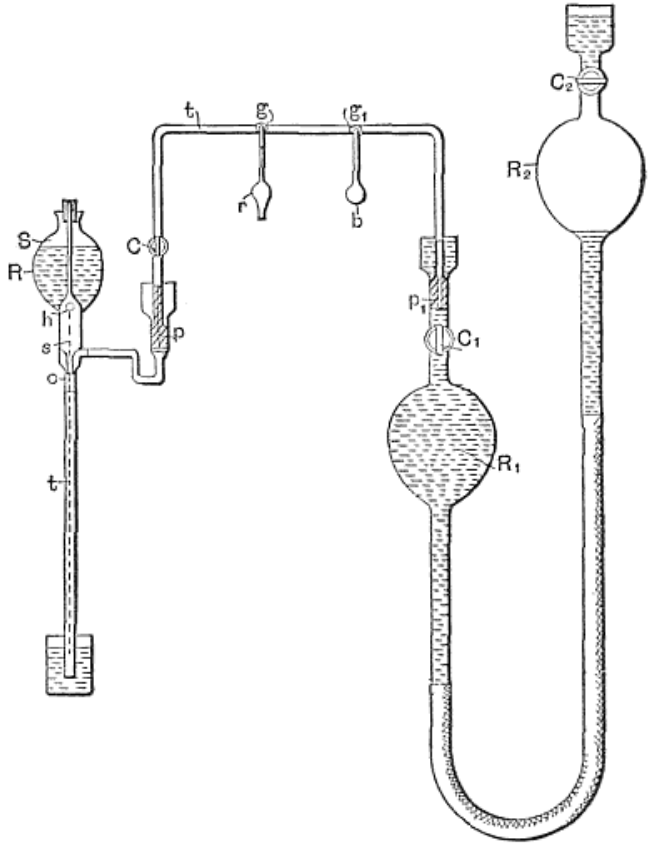


FIG. 30.—APPARATUS USED FOR OBTAINING HIGH DEGREES OF EXHAUSTION.

The apparatus is illustrated in a drawing shown in Fig. 30. *S* represents a Sprengel pump, which has been specially constructed to better suit the work required. The stop-cock which is usually employed has been omitted, and instead of it a hollow stopper *s* has been fitted in the neck of the reservoir *R*. This stopper has a small hole *h*, through which the mercury descends; the size of the outlet *o* being properly determined with respect to the section of the fall tube *t*, which is sealed to the reservoir instead

of being connected to it in the usual manner. This arrangement overcomes the imperfections and troubles which often arise from the use of the stopcock on the reservoir and the connection of the latter with the fall tube.

The pump is connected through a U-shaped tube *t* to a very large reservoir R_1. Especial care was taken in fitting the grinding surfaces of the stoppers *p* and p_1, and both of these and the mercury caps above them were made exceptionally long. After the U-shaped tube was fitted and put in place, it was heated, so as to soften and take off the strain resulting from imperfect fitting. The U-shaped tube was provided with a stopcock *C*, and two ground connections *g* and g_1—one for a small bulb *b*, usually containing caustic potash, and the other for the receiver *r*, to be exhausted.

The reservoir R_1 was connected by means of a rubber tube to a slightly larger reservoir R_2, each of the two reservoirs being provided with a stopcock C_1 and C_2, respectively. The reservoir R_1 could be raised and lowered by a wheel and rack, and the range of its motion was so determined that when it was filled with mercury and the stopcock C_2 closed, so as to form a Torricellian vacuum in it when raised, it could be lifted so high that the mercury in reservoir R_1 would stand a little above stopcock C_1; and when this stopcock was closed and the reservoir R_2 descended, so as to form a Torricellian vacuum in reservoir R_1, it could be lowered so far as to completely empty the latter, the mercury filling the reservoir R_2 up to a little above stopcock C_2.

The capacity of the pump and of the connections was taken as small as possible relatively to the volume of reservoir R_1, since, of course, the degree of exhaustion depended upon the ratio of these quantities.

With this apparatus I combined the usual means indicated by former experiments for the production of very high vacua. In most of the experiments it was convenient to use caustic potash. I may venture to say, in regard to its use, that much time is saved and a more perfect action of the pump insured by fusing and boiling the potash as soon as, or even before, the pump settles down. If this course is not followed the sticks, as ordinarily employed, may give moisture off at a certain very slow rate, and the pump may work for many hours without reaching a very high vacuum. The potash was heated either by a spirit lamp or by passing a discharge through it, or by passing a current through a wire contained in it. The advantage in the latter case was that the heating could be more rapidly repeated.

Generally the process of exhaustion was the following:—At the start, the stop-cocks *C* and C_1 being open, and all other connections closed, the reservoir R_2 was raised so far that the mercury filled the reservoir R_1 and a part of the narrow connecting U-shaped tube. When the pump was set to work, the mercury would, of course, quickly rise in the tube, and reservoir R_2 was lowered, the experimenter keeping the mercury at about the same level. The reservoir R_2 was balanced by a long spring which facilitated the operation, and the friction of the parts was generally sufficient to keep it almost in any position. When the Sprengel pump had done its work, the reservoir R_2 was further lowered and the mercury descended in R_1 and filled R_2, whereupon stopcock C_2 was closed. The air adhering to the walls of R_1 and that absorbed by the mercury was carried off, and to free the mercury of all air the reservoir R_2 was for a long time worked up and down. During this process some air, which would gather below stopcock C_2, was expelled from R_2 by lowering it far enough and opening the stopcock, closing the latter again before raising the reservoir. When all the air had been expelled from the mercury, and no air would gather in R_2 when it was lowered, the caustic potash was resorted to. The reservoir R_2

was now again raised until the mercury in R_1 stood above stopcock C_1. The caustic potash was fused and boiled, and the moisture partly carried off by the pump and partly re-absorbed; and this process of heating and cooling was repeated many times, and each time, upon the moisture being absorbed or carried off, the reservoir R_2 was for a long time raised and lowered. In this manner all the moisture was carried off from the mercury, and both the reservoirs were in proper condition to be used. The reservoir R_2 was then again raised to the top, and the pump was kept working for a long time. When the highest vacuum obtainable with the pump had been reached the potash bulb was usually wrapped with cotton which was sprinkled with ether so as to keep the potash at a very low temperature, then the reservoir R_2 was lowered, and upon reservoir R_1 being emptied the receiver r was quickly sealed up.

When a new bulb was put on, the mercury was always raised above stopcock C_1 which was closed, so as to always keep the mercury and both the reservoirs in fine condition, and the mercury was never withdrawn from R_1 except when the pump had reached the highest degree of exhaustion. It is necessary to observe this rule if it is desired to use the apparatus to advantage.

By means of this arrangement I was able to proceed very quickly, and when the apparatus was in perfect order it was possible to reach the phosphorescent stage in a small bulb in less than 15 minutes, which is certainly very quick work for a small laboratory arrangement requiring all in all about 100 pounds of mercury. With ordinary small bulbs the ratio of the capacity of the pump, receiver, and connections, and that of reservoir R was about 1-20, and the degrees of exhaustion reached were necessarily very high, though I am unable to make a precise and reliable statement how far the exhaustion was carried.

What impresses the investigator most in the course of these experiences is the behavior of gases when subjected to great rapidly alternating electrostatic stresses. But he must remain in doubt as to whether the effects observed are due wholly to the molecules, or atoms, of the gas which chemical analysis discloses to us, or whether there enters into play another medium of a gaseous nature, comprising atoms, or molecules, immersed in a fluid pervading the space. Such a medium surely must exist, and I am convinced that, for instance, even if air were absent, the surface and neighborhood of a body in space would be heated by rapidly alternating the potential of the body; but no such heating of the surface or neighborhood could occur if all free atoms were removed and only a homogeneous, incompressible, and elastic fluid—such as ether is supposed to be—would remain, for then there would be no impacts, no collisions. In such a case, as far as the body itself is concerned, only frictional losses in the inside could occur.

It is a striking fact that the discharge through a gas is established with ever increasing freedom as the frequency of the impulses is augmented. It behaves in this respect quite contrarily to a metallic conductor. In the latter the impedance enters prominently into play as the frequency is increased, but the gas acts much as a series of condensers would: the facility with which the discharge passes through seems to depend on the rate of change of potential. If it act so, then in a vacuum tube even of great length, and no matter how strong the current, self-induction could not assert itself to any appreciable degree. We have, then, as far as we can now see, in the gas a conductor which is capable of transmitting electric impulses of any frequency which we may be able to produce. Could the frequency be brought high enough, then a queer system of electric distribution, which would be likely to interest gas companies, might be realized: metal pipes filled with gas—the metal being the insulator, the gas the conductor—supplying phosphorescent bulbs, or perhaps devices as yet uninvented. It is certainly possible to take a hollow core of copper, rarefy the gas in the same, and by passing impulses of sufficiently high frequency through a circuit around it, bring the gas inside to a high degree of incandescence; but as to the nature of the forces there would be considerable uncertainty, for it would be doubtful whether with such impulses the copper core would act as a static screen. Such paradoxes and apparent impossibilities we encounter at every step in this line of work, and therein lies, to a great extent, the claim of the study.

I have here a short and wide tube which is exhausted to a high degree and covered with a substantial coating of bronze, the coating allowing barely the light to shine through. A metallic clasp, with a hook for suspending the tube, is fastened around the middle portion of the latter, the clasp being in contact with the bronze coating. I now want to light the gas inside by suspending the tube on a wire connected to the coil. Any one who would try the experiment for the first time, not having any previous experience, would probably take care to be quite alone when making the trial, for fear that he might become the joke of his assistants. Still, the bulb lights in spite of the metal coating, and the light can be distinctly perceived through the latter. A long tube covered with aluminium bronze lights when held in one hand—the other touching the terminal of the coil—quite powerfully. It might be objected that the coatings are not sufficiently conducting; still, even if they were highly resistant, they ought to screen the gas. They certainly screen it perfectly in a condition of rest, but not by far perfectly when the charge is surging in the coating. But the loss of energy which occurs within the tube, notwithstanding the screen, is occasioned principally by the presence of the gas. Were we to take a large hollow metallic sphere and fill it with a perfect incompressible fluid dielectric, there would be no loss inside of the sphere, and consequently the inside might be considered as perfectly screened, though the potential be very rapidly alternating. Even were the sphere filled with oil, the loss would be incomparably smaller than when the fluid is replaced by a gas, for in the latter case the force produces displacements; that means impact and collisions in the inside.

No matter what the pressure of the gas may be, it becomes an important factor in the heating of a conductor when the electric density is great and the frequency very high. That in the heating of conductors by lightning discharges air is an element of great importance, is almost as certain as an experimental fact. I may illustrate the action of the air by the following experiment: I take a short tube which is exhausted to a moderate degree and has a platinum wire running through the middle from one end to the other. I pass a steady or low frequency current through the wire, and it is heated uniformly in all parts. The heating here is due to conduction, or frictional losses, and the gas around the wire has—as far as we can see—no function to perform. But now let me pass sudden discharges, or a high frequency current, through the wire. Again the wire is heated, this time principally on the ends and least in the middle portion; and if the frequency of the impulses, or the rate of change, is high enough, the wire might as well be cut in the middle as not, for practically all the heating is due to the rarefied gas. Here the gas might only act as a conductor of no impedance diverting the current from the wire as the impedance of the latter is enormously increased, and merely heating the ends of the wire by reason of their resistance to the passage of the discharge. But it is not at all necessary that the gas in the tube should he conducting; it might be at an extremely low pressure, still the ends of the wire would be heated—as, however, is ascertained by experience—only the two ends would in such, case not be electrically connected through the gaseous medium. Now what with these frequencies and potentials occurs in an exhausted tube occurs in the lightning discharges at ordinary pressure. We only need remember one of the facts arrived at in the course of these investigations, namely, that to impulses of very high frequency the gas at ordinary pressure behaves much in the same manner as though it were at moderately low pressure. I think that in lightning discharges frequently wires or conducting objects are volatilized merely because air is present and that, were the conductor immersed in an insulating liquid, it would be safe, for then the energy would have to spend itself somewhere else. From the behavior of gases to sudden impulses of high potential I am led to conclude that there can be no surer way of diverting a lightning discharge than by affording it a passage through a volume of gas, if such a thing can be done in a practical manner.

There are two more features upon which I think it necessary to dwell in connection with these experiments—the "radiant state" and the "non-striking vacuum."

Any one who has studied Crookes' work must have received the impression that the "radiant state" is a property of the gas inseparably connected with an extremely high degree of exhaustion. But it should be remembered that the phenomena observed in an exhausted vessel are limited to the character and capacity of the apparatus which is made use of. I think that in a bulb a molecule, or atom, does not

precisely move in a straight line because it meets no obstacle, but because the velocity imparted to it is sufficient to propel it in a sensibly straight line. The mean free path is one thing, but the velocity—the energy associated with the moving body—is another, and under ordinary circumstances I believe that it is a mere question of potential or speed. A disruptive discharge coil, when the potential is pushed very far, excites phosphorescence and projects shadows, at comparatively low degrees of exhaustion. In a lightning discharge, matter moves in straight lines as ordinary pressure when the mean free path is exceedingly small, and frequently images of wires or other metallic objects have been produced by the particles thrown off in straight lines.

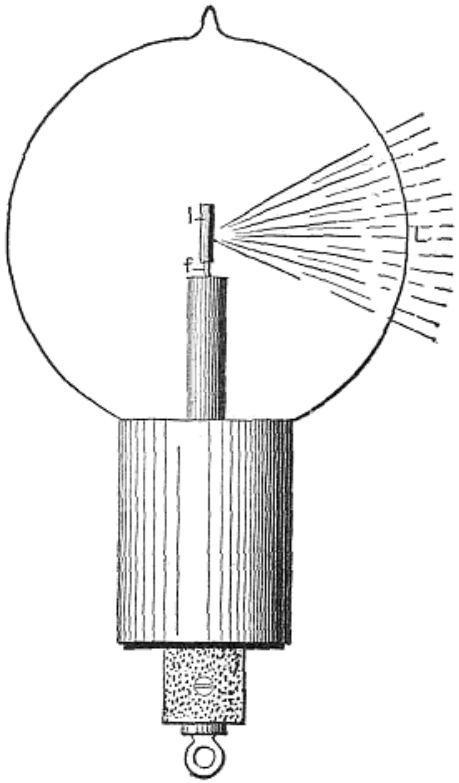


FIG. 31.—BULB SHOWING RADIANT LIME STREAM AT LOW EXHAUSTION.

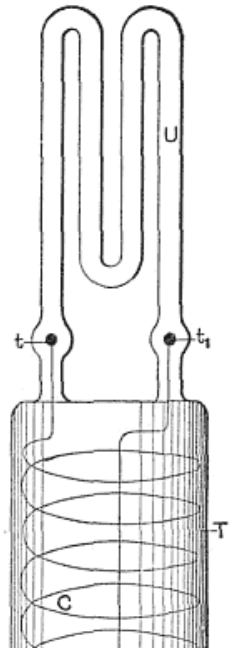
I have prepared a bulb to illustrate by an experiment the correctness of these assertions. In a globe *L* (Fig. 31) I have mounted upon a lamp filament *f* a piece of lime *l*. The lamp filament is connected with a wire which leads into the bulb, and the general construction of the latter is as indicated in Fig. 19, before described. The bulb being suspended from a wire connected to the terminal of the coil, and the latter being set to work, the lime piece *l* and the projecting parts of the filament *f* are bombarded. The degree of exhaustion is just such that with the potential the coil is capable of giving phosphorescence of the glass is produced, but disappears as soon as the vacuum is impaired. The lime containing moisture, and moisture being given off as soon as heating occurs, the phosphorescence lasts only for a few moments. When the lime has been sufficiently heated, enough moisture has been given off to impair materially the vacuum of the bulb. As the bombardment goes on, one point of the lime piece is more heated than other points, and the result is that finally practically all the discharge passes through that point which is intensely heated, and a white stream of lime particles (Fig. 31) then breaks forth from that point. This stream is composed of "radiant" matter, yet the degree of exhaustion is low. But the

particles move in straight lines because the velocity imparted to them is great, and this is due to three causes—to the great electric density, the high temperature of the small point, and the fact that the particles of the lime are easily torn and thrown off—far more easily than those of carbon. With frequencies such as we are able to obtain, the particles are bodily thrown off and projected to a considerable distance; but with sufficiently high frequencies no such thing would occur: in such case only a stress would spread or a vibration would be propagated through the bulb. It would be out of the question to reach any such frequency on the assumption that the atoms move with the speed of light; but I believe that such a thing is impossible; for this an enormous potential would be required. With potentials which we are able to obtain, even with a disruptive discharge coil, the speed must be quite insignificant.

As to the "non-striking vacuum," the point to be noted is that it can occur only with low frequency impulses, and it is necessitated by the impossibility of carrying off enough energy with such impulses in high vacuum since the few atoms which are around the terminal upon coming in contact with the same are repelled and kept at a distance for a comparatively long period of time, and not enough work can be performed to render the effect perceptible to the eye. If the difference of potential between the terminals is raised, the dielectric breaks down. But with very high frequency impulses there is no necessity for such breaking down, since any amount of work can be performed by continually agitating the atoms in the exhausted vessel, provided the frequency is high enough. It is easy to reach—even with frequencies obtained from an alternator as here used—a stage at which the discharge does not pass between two electrodes in a narrow tube, each of these being connected to one of the terminals of the coil, but it is difficult to reach a point at which a luminous discharge would not occur around each electrode.

A thought which naturally presents itself in connection with high frequency currents, is to make use of their powerful electro-dynamic inductive action to produce light effects in a sealed glass globe. The leading-in wire is one of the defects of the present incandescent lamp, and if no other improvement were made, that imperfection at least should be done away with. Following this thought, I have carried on experiments in various directions, of which some were indicated in my former paper. I may here mention one or two more lines of experiment which have been followed up.

Many bulbs were constructed as shown in Fig. 32 and Fig. 33.



In Fig. 32 a wide tube *T* was sealed to a smaller W-shaped tube *U*, of phosphorescent glass. In the tube *T* was placed a coil *C* of aluminium wire, the ends of which were provided with small spheres *t* and t_1 of aluminium, and reached into the *U* tube. The tube *T* was slipped into a socket containing a primary coil through which usually the discharges of Leyden jars were directed, and the rarefied gas in the small *U* tube was excited to strong luminosity by the high-tension currents induced in the coil *C*. When Leyden jar discharges were used to induce currents in the coil *C*, it was found necessary to pack the tube *T* tightly with insulating powder, as a discharge would occur frequently between the turns of the coil, especially when the primary was thick and the air gap, through which the jars discharged, large, and no little trouble was experienced in this way.

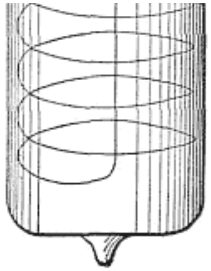


FIG. 32.—ELECTRO-DYNAMIC INDUCTION TUBE.

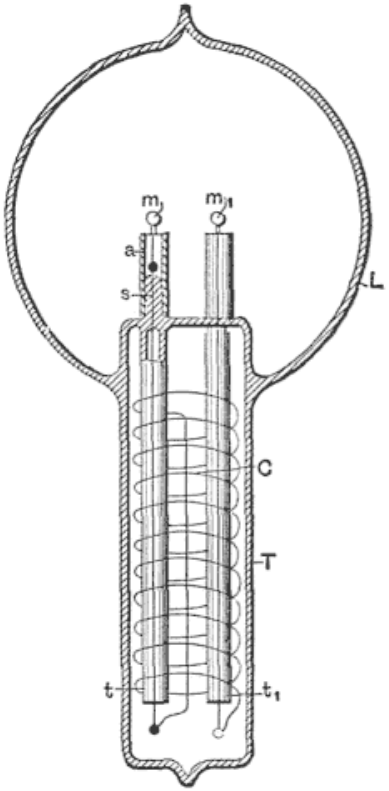


FIG. 33.—ELECTRO-DYNAMIC INDUCTION LAMP.

In Fig. 33 is illustrated another form of the bulb constructed. In this case a tube *T* is sealed to a globe *L*. The tube contains a coil *C*, the ends of which pass through two small glass tubes *t* and t_1, which are sealed to the tube *T*. Two refractory buttons *m* and m_1 are mounted on lamp filaments which are fastened to the ends of the wires passing through the glass tubes *t* and t_1. Generally in bulbs made on this plan the globe *L* communicated with the tube *T*. For this purpose the ends of the small tubes *t* and t_1 were just a trifle heated in the burner, merely to hold the wires, but not to interfere with the communication. The tube *T*, with the small tubes, wires through the same, and the refractory buttons *m* and m_1, was first prepared, and then sealed to globe *L*, whereupon the coil *C* was slipped in and the connections made to its ends. The tube was then packed with insulating powder, jamming the latter as tight as possible up to very nearly the end, then it was closed and only a small hole left through which the remainder of the powder was introduced, and finally the end of the tube was closed. Usually in bulbs constructed as shown in Fig. 33 an aluminium tube *a* was fastened to the upper end *s* of each of the tubes *t* and t_1, in order to protect that end against the heat.

The buttons *m* and m_1 could be brought to any degree of incandescence by passing the discharges of Leyden jars around the coil *C*. In such bulbs with two buttons a very curious effect is produced by the formation of the shadows of each of the two buttons.

Another line of experiment, which has been assiduously followed, was to induce by electro-dynamic induction a current or luminous discharge in an exhausted tube or bulb. This matter has

received such able treatment at the hands of Prof. J.J. Thomson that I could add but little to what he has made known, even had I made it the special subject of this lecture. Still, since experiences in this line have gradually led me to the present views and results, a few words must be devoted here to this subject.

It has occurred, no doubt, to many that as a vacuum tube is made longer the electromotive force per unit length of the tube, necessary to pass a luminous discharge through the latter, gets continually smaller; therefore, if the exhausted tube be made long enough, even with low frequencies a luminous discharge could be induced in such a tube closed upon itself. Such a tube might be placed around a ball or on a ceiling, and at once a simple appliance capable of giving considerable light would be obtained. But this would be an appliance hard to manufacture and extremely unmanageable. It would not do to make the tube up of small lengths, because there would be with ordinary frequencies considerable loss in the coatings, and besides, if coatings were used, it would be better to supply the current directly to the tube by connecting the coatings to a transformer. But even if all objections of such nature were removed, still, with low frequencies the light conversion itself would be inefficient, as I have before stated. In using extremely high frequencies the length of the secondary—in other words, the size of the vessel—can be reduced as far as desired, and the efficiency of the light conversion is increased, provided that means are invented for efficiently obtaining such high frequencies. Thus one is led, from theoretical and practical considerations, to the use of high frequencies, and this means high electromotive forces and small currents in the primary. When he works with condenser charges—and they are the only means up to the present known for reaching these extreme frequencies—he gets to electromotive forces of several thousands of volts per turn of the primary. He cannot multiply the electro-dynamic inductive effect by taking more turns in the primary, for he arrives at the conclusion that the best way is to work with one single turn—though he must sometimes depart from this rule—and he must get along with whatever inductive effect he can obtain with one turn. But before he has long experimented with the extreme frequencies required to set up in a small bulb an electromotive force of several thousands of volts he realizes the great importance of electrostatic effects, and these effects grow relatively to the electro-dynamic in significance as the frequency is increased.

Now, if anything is desirable in this case, it is to increase the frequency, and this would make it still worse for the electro-dynamic effects. On the other hand, it is easy to exalt the electrostatic action as far as one likes by taking more turns on the secondary, or combining self-induction and capacity to raise the potential. It should also be remembered that, in reducing the current to the smallest value and increasing the potential, the electric impulses of high frequency can be more easily transmitted through a conductor.

These and similar thoughts determined me to devote more attention to the electrostatic phenomena, and to endeavor to produce potentials as high as possible, and alternating as fast as they could be made to alternate. I then found that I could excite vacuum tubes at considerable distance from a conductor connected to a properly constructed coil, and that I could, by converting the oscillatory current of a condenser to a higher potential, establish electrostatic alternating fields which acted through the whole extent of a room, lighting up a tube no matter where it was held in space. I thought I recognized that I had made a step in advance, and I have persevered in this line; but I wish to say that I share with all lovers of science and progress the one and only desire—to reach a result of utility to men in any direction to which thought or experiment may lead me. I think that this departure is the right one, for I cannot see, from the observation of the phenomena which manifest themselves as the frequency is increased, what there would remain to act between two circuits conveying, for instance, impulses of several hundred millions per second, except electrostatic forces. Even with such trifling frequencies the energy would be practically all potential, and my conviction has grown strong that, to whatever kind of motion light may be due, it is produced by tremendous electrostatic stresses vibrating with extreme rapidity.

Of all these phenomena observed with currents, or electric impulses, of high frequency, the most fascinating for an audience are certainly those which are noted in an electrostatic field acting through considerable distance, and the best an unskilled lecturer can do is to begin and finish with

the exhibition of these singular effects. I take a tube in the hand and move it about, and it is lighted wherever I may hold it; throughout space the invisible forces act. But I may take another tube and it might not light, the vacuum being very high. I excite it by means of a disruptive discharge coil, and now it will light in the electrostatic field. I may put it away for a few weeks or months, still it retains the faculty of being excited. What change have I produced in the tube in the act of exciting it? If a motion imparted to the atoms, it is difficult to perceive how it can persist so long without being arrested by frictional losses; and if a strain exerted in the dielectric, such as a simple electrification would produce, it is easy to see how it may persist indefinitely, but very difficult to understand why such a condition should aid the excitation when we have to deal with potentials which are rapidly alternating.

Since I have exhibited these phenomena for the first time, I have obtained some other interesting effects. For instance, I have produced the incandescence of a button, filament, or wire enclosed in a tube. To get to this result it was necessary to economize the energy which is obtained from the field and direct most of it on the small body to be rendered incandescent. At the beginning the task appeared difficult, but the experiences gathered permitted me to reach the result easily. In Fig. 34 and Fig. 35 two such tubes are illustrated which are prepared for the occasion.

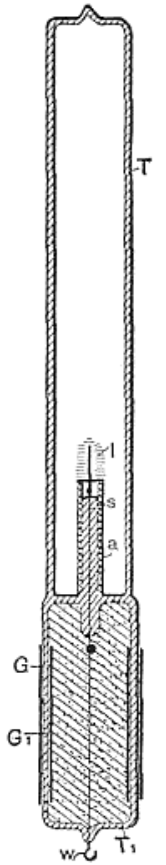


FIG. 34.—TUBE WITH FILAMENT RENDERED INCANDESCENT IN AN ELECTRO STATIC FIELD.

In Fig. 34 a short tube T_1, sealed to another long tube T, is provided with a stem s, with a platinum wire sealed in the latter. A very thin lamp filament l is fastened to this wire, and connection to the outside is made through a thin copper wire w. The tube is provided with outside and inside coatings, C and C_1 respectively, and is filled as far as the coatings reach with conducting, and the space above with insulating powder. These coatings are merely used to enable me to perform two experiments with the tube —namely, to produce the effect desired either by direct connection of the body of the experimenter or of another body to the wire w, or by acting inductively through the glass. The stem s is provided with an aluminium tube a, for purposes before explained, and only a small part of the filament reaches out of this tube. By holding the tube T_1 anywhere in the electrostatic field the filament is rendered incandescent.



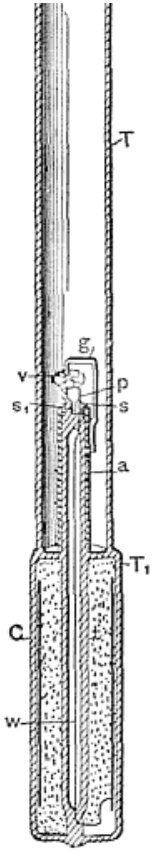


FIG. 35. — CROOKES' EXPERIMENT IN ELECTROSTATIC FIELD.

A more interesting piece of apparatus is illustrated in Fig. 35. The construction is the same as before, only instead of the lamp filament a small platinum wire *p*, sealed in a stem *s*, and bent above it in a circle, is connected to the copper wire *w*, which is joined to an inside coating *C*. A small stem s_1 is provided with a needle, on the point of which is arranged to rotate very freely a very light fan of mica *v*. To prevent the fan from falling out, a thin stem of glass *g* is bent properly and fastened to the aluminium tube. When the glass tube is held anywhere in the electrostatic field the platinum wire becomes incandescent, and the mica vanes are rotated very fast.

Intense phosphorescence may be excited in a bulb by merely connecting it to a plate within the field, and the plate need not be any larger than an ordinary lamp shade. The phosphorescence excited with these currents is incomparably more powerful than with ordinary apparatus. A small phosphorescent bulb, when attached to a wire connected to a coil, emits sufficient light to allow reading ordinary print at a distance of five to six paces. It was of interest to see how some of the phosphorescent bulbs of Professor Crookes would behave with these currents, and he has had the kindness to lend me a few for the occasion. The effects produced are magnificent, especially by the sulphide of calcium and sulphide of zinc. From the disruptive discharge coil they glow intensely merely by holding them in the hand and connecting the body to the terminal of the coil.

To whatever results investigations of this kind may lead, their chief interest lies for the present in the possibilities they offer for the production of an efficient illuminating device. In no branch of electric industry is an advance more desired than in the manufacture of light. Every thinker, when considering the barbarous methods employed, the deplorable losses incurred in our best systems of light production, must have asked himself, What is likely to be the light of the future? Is it to be an incandescent solid, as in the present lamp, or an incandescent gas, or a phosphorescent body, or something like a burner, but incomparably more efficient?

There is little chance to perfect a gas burner; not, perhaps, because human ingenuity has been bent upon that problem for centuries without a radical departure having been made—though this argument is not

devoid of force-but because in a burner the higher vibrations can never be reached except by passing through all the low ones. For how is a flame produced unless by a fall of lifted weights? Such process cannot be maintained without renewal, and renewal is repeated passing from low to high vibrations. One way only seems to be open to improve a burner, and that is by trying to reach higher degrees of incandescence. Higher incandescence is equivalent to a quicker vibration; that means more light from the same material, and that, again, means more economy. In this direction some improvements have been made, but the progress is hampered by many limitations. Discarding, then, the burner, there remain the three ways first mentioned, which are essentially electrical.

Suppose the light of the immediate future to be a solid rendered incandescent by electricity. Would it not seem that it is better to employ a small button than a frail filament? From many considerations it certainly must be concluded that a button is capable of a higher economy, assuming, of course, the difficulties connected with the operation of such a lamp to be effectively overcome. But to light such a lamp we require a high potential; and to get this economically we must use high frequencies.

Such considerations apply even more to the production of light by the incandescence of a gas, or by phosphorescence. In all cases we require high frequencies and high potentials. These thoughts occurred to me a long time ago.

Incidentally we gain, by the use of very high frequencies, many advantages, such as a higher economy in the light production, the possibility of working with one lead, the possibility of doing away with the leading-in wire, etc.

The question is, how far can we go with frequencies? Ordinary conductors rapidly lose the facility of transmitting electric impulses when the frequency is greatly increased. Assume the means for the production of impulses of very great frequency brought to the utmost perfection, every one will naturally ask how to transmit them when the necessity arises. In transmitting such impulses through conductors we must remember that we have to deal with *pressure* and *flow*, in the ordinary interpretation of these terms. Let the pressure increase to an enormous value, and let the flow correspondingly diminish, then such impulses—variations merely of pressure, as it were—can no doubt be transmitted through a wire even if their frequency be many hundreds of millions per second. It would, of course, be out of question to transmit such impulses through a wire immersed in a gaseous medium, even if the wire were provided with a thick and excellent insulation for most of the energy would be lost in molecular bombardment and consequent heating. The end of the wire connected to the source would be heated, and the remote end would receive but a trifling part of the energy supplied. The prime necessity, then, if such electric impulses are to be used, is to find means to reduce as much as possible the dissipation.

The first thought is, employ the thinnest possible wire surrounded by the thickest practicable insulation. The next thought is to employ electrostatic screens. The insulation of the wire may be covered with a thin conducting coating and the latter connected to the ground. But this would not do, as then all the energy would pass through the conducting coating to the ground and nothing would get to the end of the wire. If a ground connection is made it can only be made through a conductor offering an enormous impedance, or though a condenser of extremely small capacity. This, however, does not do away with other difficulties.

If the wave length of the impulses is much smaller than the length of the wire, then corresponding short waves will be sent up in the conducting coating, and it will be more or less the same as though the coating were directly connected to earth. It is therefore necessary to cut up the coating in sections much shorter than the wave length. Such an arrangement does not still afford a perfect screen, but it is ten thousand times better than none. I think it preferable to cut up the conducting coating in small sections, even if the current waves be much longer than the coating.

If a wire were provided with a perfect electrostatic screen, it would be the same as though all objects

were removed from it at infinite distance. The capacity would then be reduced to the capacity of the wire itself, which would be very small. It would then be possible to send over the wire current vibrations of very high frequencies at enormous distance without affecting greatly the character of the vibrations. A perfect screen is of course out of the question, but I believe that with a screen such as I have just described telephony could be rendered practicable across the Atlantic. According to my ideas, the gutta-percha covered wire should be provided with a third conducting coating subdivided in sections. On the top of this should be again placed a layer of gutta-percha and other insulation, and on the top of the whole the armor. But such cables will not be constructed, for ere long intelligence—transmitted without wires—will throb through the earth like a pulse through a living organism. The wonder is that, with the present state of knowledge and the experiences gained, no attempt is being made to disturb the electrostatic or magnetic condition of the earth, and transmit, if nothing else, intelligence.

It has been my chief aim in presenting these results to point out phenomena or features of novelty, and to advance ideas which I am hopeful will serve as starting points of new departures. It has been my chief desire this evening to entertain you with some novel experiments. Your applause, so frequently and generously accorded, has told me that I have succeeded.

In conclusion, let me thank you most heartily for your kindness and attention, and assure you that the honor I have had in addressing such a distinguished audience, the pleasure I have had in presenting these results to a gathering of so many able men—and among them also some of those in whose work for many years past I have found enlightenment and constant pleasure—I shall never forget.

Transcriber's note:	Corrected the following typesetting errors: 1) 'preceived' to 'perceived', page 16. 2) 'disharging' to 'discharging', page 30. 3) 'park' to 'spark', page 33. 4) 'pssition' to 'position', page 50. 5) 'to th opposite side' to 'to the opposite side', page 56. 6) 's resses' to 'stresses', page 147.

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Chuck 11/1/2007

I Enjoying your site. I am experimenting and making a similar device as the perendev. I'm just beginning the process and assembly of the idea. Energy is everywhere. Just trying to harness some. Best regards.

I wish you success with your experiments. /Eric

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reid smith 10/13/2007

Another thing to remember comes from you site:

The Perendev has movement, because the magnets on the rotor are sealed with steel. This technique makes the magnet stronger where it isn't sealed: top and bottom, but makes the magnetic fields (flux) closer. They isolate the magnetic field around the magnets.

This is why the Howard Johnson motor works. The difference is his magnets are concave and there is less force at the end of the magnets than there is just below the points. Also to make a negitive ion generator you have to use needles to make the ions. The points and needles act like focal points.

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reid smith 10/13/2007

I've recently started researching free energy devices and have ran across your web site. Some where on there it shows a V type movement device. The Calloway v gate device is about the same. If you look at the site you will see a video of his testing.

http://www.youtube.com/watch?v=uHffliC2whk&mode=related&search=

I can see three things that might make this device work. There is no centrefical force!! Add a flywheel. It is said that after 2000 rpm the sticky effect is reduced or cut in half.
"IMPORTANT INFO" for any device!!!!!!
SO spin to 2000+ to see if it keeps going. The third is mechanical. Add two cam like peices of plastic that act like a cam to kick the magnet out so it doesn't have to be moved. Hang the magnet by a string or cardboard.

The only thing I as for my information is to report back
to me as to what happens and if it works release it as a free working device.

The 2000 rpm idea sounds like a good thing to test. I cannot try it with my weak styrofoam wheels ofcourse. /Eric

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Seboortermari 10/8/2007

hi,
good site :) Whish you good luck!

Thank you. /Eric

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Peter Schmalenbach 7/21/2007

Hello Eric,
thank you for this valuable and nice website.

Best regards
Peter Schmalenbach, Germany

Thanks Peter.
I like your site too. /Eric

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Erich Pfister 7/14/2007

Erhm... hi.
I first found your site while looking into the perendev motor, and i am trying to replicate your experiment.
So... hi. :)

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fhoek 7/11/2007

Hoi Eric, Ik ben bezig met het Torbay concept, een variatie. Hoe ver ben jij gevorderd met jouw versie?

Groet,

F

Hi Eric, have you had any succes with your Torbay device yet?

Mijn Torbay variant ligt in de schuur op betere tijden te wachten. / Eric

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Peter Worsfold 7/3/2007

Hi Eric,
I am interested in Chuck Nichols device, maybe you could put me in touch with him.
Peter Worsfold.

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Peter Worsfold 6/25/2007

Hi Eric,
If you know of any one that has built the Bowman Permanent Magnetic
motor and could not get it to work, or have given up trying. Would you
let me know, I am interested in building one but have no tools or work
shop yet. So if any one would be interested in selling a kit or a given up project. Let me know.
Best Regards
Peter. :-)

I'll ask the Minato wheel discussion group. /Eric

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Shawn 6/24/2007

Soft iron will not become magnetized. Its what they use in basic electro magnets.

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penguin 6/19/2007

Neat model.
However I can see that i wont spin.
I found this site as I was wondering why a simpler design doesnt work.
ie with fixed magnets on the outer stator, oposing fixed magnets on a rotor.
The magnets are angled slightly.

When the magnets on the stator are filling a 360 degrees circle, there is a balance and when the stator is shorter, there will be a sticky spot. No movement. /Eric

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mike 5/16/2007

Ha die eric , zo effe wat (nederlands) ik had eeen vraagje misschien kan je hem beantwoorden ??? Tijd geleden was ik beetje aan het spitten op google naar machientjes die door middel van magneten aardig wat stroom zouden kunnen opleveren geheel zonder enig input wat ik had begrepen van dat artikel en ze zouden zelfs een fabrieklijn gaan beginnen geloof ik in europa! Maar nu is het geval dat mijn pc was gecrasht en daardoor dat linkie ben kwijtgeraakt . Misschien heb jij info over dat apparaat en weet je wat ik bedoel of andere suggesties !!! thanks mike greets from the dutch

Ik neem aan dat je niet de Perendev bedoelt? Anders heb ik geen idee. /Eric

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Troy 5/11/2007

Hello Eric
I enjoy your web sit very much, but I find some things a little confusing. One of them is the minato wheel. The picture I seen is a little different then what you have on your site. Its pole magnets are not all the same angle. There turned a little more then the previous magnet. It starts fairly close to being aligned with the radial axis then increases a little more in angle for each magnet after that, creating the spiral effect. I also noticed a diffrence on the triangle gate motor or the V motor then what is shown. It is missing its tail fin on the steel. The fin gives it a weak break point or the gate out effect. Agian I would like to say I enjoy your web site and may you and your veiwers crack the code.
Think: three or more means of complimenting accleration.

These devices are confusing. Every design is more or less a modification of another design. Therefore things can be different in different drawings. /Eric

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RENE AGUDO 4/28/2007

I GOING TO STAR BUILDING A PERENDEV MOTOR
DO YOU HAVE SOME RECOMENDATIONS
ON THE CORRECT SIZE OF THE STATORS
AND SOME GUIDES I CAN GO IN THE PROCESS
THANKS FOR ALL

No, not really. I never built this device. But on the web site are a few replications with contact information of the builders. I suggest you send them an email. /Eric

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solon williams 4/11/2007

I was shown a magnet that was cut in half each side was machined so that a copper wire was coiled inside it when put together half the wire was in the negitive and the other in the positive side of the magnet. My friend put in inline on a power cord and turn on the light, then he unplugged it and the blub kept putting out light. He said that it would only product 10 anps, if you know of a device like the one I have mention please e mail me. thank you

I never heard about a device like that. /Eric

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braik 4/1/2007

good and coole

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Richard Leschen 3/30/2007

Dear Sir,
Can you please send me the very latest you have on this web-site? I love these developments in Magnetic Science.
Cheers,

Richard Leschen

The Dual Piston Device is the latest, at the moment. /Eric

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Latif Mutlu 2/22/2007

Regarding the Dual Minato-Wheel Theory, please could you let me have the Patent Number. We are also involved on this subject.
Kind regards.

If you refer to the document "Dual Minato-Wheel Theory", there is no patent. The document however is written (and thereby copyrighted) by Jason Owens. /Eric

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Aiman 2/11/2007

intresting web page...

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AlfredMC 2/8/2007

Hello, my name is Alfred, i'm a newbie here. I really do like your forum and really interested in things you discuss here, also would like to enter your community, hope it is possible:-)
Cya around, best regards, Alfred!

Thanks. Welcome at http://tech.groups.yahoo.com/group/minatowheel/messages
/Eric

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Joseph K Zirbes 1/18/2007

Son of Lloyd B Zirbes, Have much information for you. We should chat...

That is a nice offer. However, I sent you a few private emails but without any luck. Please contact me by email eric@fdp.nu /Eric

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Ronan McDonagh 12/24/2006

I am interesting to study and make a magnet motor for free energy.

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Scott Mitchell 12/19/2006

Dunno how you post to the site but the opposing piston thing was kind of interesting except the magnet would not be strong enough to do the work with steel pistons. They would have to be steel , the normal aluminum pistons wouldnt work , Even if you just made the top of the piston steel. Also on the Jan Cack wheel. I guess the exact opposing forces of the other side of the magnet was forgotten about. Draw 2 arrows bettwen each magnet you see, each one opposite pointing. I think youll see the picture then.

The pistons (top) are in fact magnets. Same pole pointed to the shield. /Eric

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Richard Krieg 12/13/2006

Looking forward to more free energy projects.

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Peter Oceretko 11/29/2006

You've sparked a long-latent interest, dormant for some 25 years.
Circa 1979-80 I built a off-set gravity wheel.....which didn't work, of course.
This KISS Motor intrigues me. I'm going to try to get an interest sparked in my friend, compatriot & "partner in crime".
Goal is to have prototype up & running (or not) by the new year.

Good luck. Please send me an update when you have some results. / Eric

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iacob alex 10/18/2006

Hi Eric!I just "enrolled" your address on my computer..it's something different,it has some "soul touch".If we have some common visions(take a look at my web site,if you have time...)...I am here,"via" e-mail.All the Bests!/Alex

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Mark Brincat 10/4/2006

Hi, I am a 16 year old student doing a project at school where we have to innovate/ design a clean energy generator. I thought magnets are a very good idea! Can you please help me? Can i make a model which keeps on moving in a circular motion? I was thinking of a plate with magnets placed with the NORTH to the circumference. Then this plate woul be surrounded with another set of magnets. Their North would face the plate's magnets at 90 degrees. would this work? If no, can u send me a picture of your best model till now? :D

THANKS ALOT

I answered you by mail. /Eric

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Wayne Webb 9/26/2006

Outstanding work!!!

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Norm 9/24/2006

Keep trying. It took Edison 10,000 tries to make a reliable light bulb.

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Joe Mamma 9/14/2006

Why don't you have any videos of any of these devices working. It should be easy to do so for the Robert Calloway's device.

I wish I could, but none of the devices proved to be a self runner. / Eric

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ahmet r kuldemir 8/27/2006

hi eric,
isnt completed the zipper MRE?
thanks
best regards
ahmet r kuldemir
turkey

The publication of the Zipper documents gave me more problems then satisfaction. I stopped the experiments with it as well. /Eric

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Nick Kyriakoulias 8/20/2006

Free Energy is a worthy cause.

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LAos 7/31/2006

Stop wasting your time. None of these devices will never ever get to work. The physics and time will give me the reason. Sorry, this is the irony of our search for the imposible.

Well, luckely you cannot decide over my time. /Eric

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Erik Buck 7/17/2006

It appears to work equally well in either direction. Is it self-starting? If so, which direction does it perfer?

What device do you have in mind? /Eric

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Leonard Belfroy 7/9/2006

See my alternative science site. It has information on free energy, over unity devices, space travel, time travel, computer science and mathematics.

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Craig Stangland 5/31/2006

For those of you posting photos and updates, many of your postings have no dates, so it's difficult for the rest of us to deterimine how old your work is. Thanks

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Craig Stangland 5/31/2006

Finally found a website with "others" experimenting with magnets. Am interested in knowing what's happened with the triangle gate experience "squirrel cage" idea. Seems to have stopped a year or so ago.

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Albert 4/23/2006

I have done an analysis of torque of rotor and satalite wheels of the "kiss" magnet motor, I am willing to send the femm files, the lua scripts that increment the wheel for the torque calculations and the torque results if anyone is interested. could somone tell me who I should send them to?

In short, my calculations show that the wheel will not turn, the torque generated by the rotor is almost exactly balanced by the torque of the ten satalite wheels. It is of course possible that I have made mistakes in calculating the results, therefore I am willing to share my files and scripts so others can analyse what I have done.

Best regards

Albert

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Wayne Webb 4/15/2006

Great information. I have ordered neodymium magnets and are starting my own experiments and I found your site. The more you know the better you are prepared.

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Thomas H. King User 4/10/2006

If you would like information in the US about this invention, please contact me directly at 925-287-0153. We are actively seeking investors for a US start-up. Thank you.

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Thomas H. King User User 4/10/2006

I have worked with Mr. Minato and consider him a personal friend... This machine works!

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Anon 2006-03-22

US patent 6,867,514 (Fecera) seems to have passed everybody by...

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Len Hobson 2006-03-22

This is marvellous. Where can I buy a ready made Perendevco motor?

The official website for Perendev is:
http://www.perendev-power.com/
You can find investor information there. /Eric

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ahmet r kuldemir 2006-03-15

hi
perendev II wery enteresting
are you investigation to p2?
thanks
best regards
ahmetrkuldemir

If you mean the device that was shown at TeslaTech 2005 (by PES network) I would not call that a Perendev since it need handcraft to rotate. /Eric

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Heinrich Dreier 2006-03-08

Hallo
Wie komme ich an Firmen, mit denen ich in deutsch komunizieren kann? Mein englisch ist leider grottenschlecht.Wo in Deutschland kann ich mir Motoren oder andere Geräte zur FE anschauen, und ewentuell auch bei der Vermarktung helfen?
Grüße
Heinrich

Sie können mit Stefan Hartman an www.overunity.com in Verbindung treten. Er ist von Berlin und kann Ihnen möglicherweise helfen. /Eric

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Tim Goymerac 2006-03-02

Is there math info on the spirals? This site is great!

Not more math then what is needed to draw circles. /Eric

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Tony 2006-02-11

Does anyone have a link to the videos?

http://fdp.nu/photobooks/photobookindex.htm
There you find the chapter: Minato movies
/Eric

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- 2006-02-10

Finally I found the videos of the Minato wheel, and they put my mind to rest. Saved me the trouble of building something like this.

He's obviously- and I mean OBVIOUSLY- freaking DUH clue-by-4-to-the-temple obviously- making it go by pushing it with the large magnet he's holding in his hand. If he was a scientist trying to demonstrate a real effect, and not a charlatan trying to fool the credulous, he would know better. The only reason the stator is not shown attatched to a fixed bracket in any of the videos is that, if it were, the wheel would come to a stop.

Why have you even given this wheel a second thought after seeing those videos? It's a joke.

The video's are the latest addition to the Minato subject on this site. The video' s ARE the second thought. /Eric

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Pierre 2006-01-26

Hej Eric!!
Du gör ett otroligt jobb!!
Jätte bra jobbat på din sida!!
Pierre

Tack Pierre. Design är inte min starkaste sida men jag är själv också nöjd. Vi ses. /Eric

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Diego 2005-12-31

Eric:
I'm glad to see more progress and organization in your site.I have followed it for a couple of years.....I have discovered an unseen effect of the magnets: I've found the way to avoid the magnetic lock up!!! the thing is I can't find the way to apply it to a regular motor setting ,we need to think in a very different way ..... the arrangement has to be precise yet,simple just like some of the ones on your site, I don't think is imposible.....I just don't have the technical means,and I'm sure with the regular amount of work of any hobbyst an tools it could be done.....it's me I'm burned out!!!... now working togheter I'm sure we could find a solution to this ....so How can I protect it and still be able to share it so we could find a workable solution??.See??the thing in my believe has to be put out in a controllable manner for security reasons,more than anything

else,and also without profit out of it people simply will take it for granted, we know that....but I'm sure many others would find several different arrangements.....once revealed, is a combination of things that after many years I have found that work....I couldn't believe my eyes then
See??? more than 2 years ago I found this exciting principle and my hair has also been falling ever since, out of anxiety for not being able to find the right arrangement to get work out of it!!...any ideas??.Best regards

Thank you for your message. I sent a message to your private mail. /Eric.

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Troy 2005-12-30

I have a couple of curious questions relating to an all permenent magnet motor.
1.Have you ever heard of anyone talking or mentioning anything about (compounded acceleration) or (accelerated exponentionaly) or (multiable means of acceleration per a given unit or set) or (multiple units of acceleration per a given set or means) or (acceleration caused by more then one means).
2. Have you ever heard anything about two like poles attracting when they get to close. I think Howard Johnson might have hinted on this, but I'm not sure.
If you have heard anything about any one of these subjects can you please pass it on to me. Thanks Troy

I'm note sure that I have heard about your point 1, but I know that like poles are attracting when they get further away from each other. /Eric

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william hughes 2005-12-29

i agree. a bar magnet doesn't have a porth pole, neither does a compass needle. they each have one red end which points north. you are quite right. this dutchman guy is confusing the issue. good site though.

Perhaps this link will give you some insights: http://my.execpc.com/~rhoadley/magpole.htm
/Eric

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colin 2005-12-29

Your Magnet Facts page is wrong.
The earth's "north pole" is located towards the Geographical north pole (at this point in history).
The end of a compass needle which points towards this north pole is more correctly called "the north-seeking end" of the needle".

I'm afraid that I cannot agree with you. I remember doing a lot of Googling before I made my statement and I don't think the polarities changed after that. /Eric

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Wouter 2005-12-25

fijne kerstdagen en een gelukkig niewjaar.

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don fairbanks 2005-12-19

thanks for your minato video clips more people should see them especially the skeptics.

My pleasure. /Eric

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Richard 2005-12-16

Great side!Just one thing:
Are there really "free energy" devices that works?
besides wind and sun energy.
I have tried many things but i couldn't get them to work,not even the wonderfull perendevshit.

I haven't had a working device in my hands either. But the experiments show me that magnets can do work. We only have to find out how to put the working part together to one device. /Eric

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milli 2005-12-10

hoi erik,ik kreeg dit site van een collega van mij en ben zeer geintereseerd met alles wat ik hier tegen ben gekomen ,we zijn zelfsal begonnen om er eentje te bouwen ,zijn er modellen die echt werken ,groetjes murat

Veel succes met je experiment. Een 'closed loop' is nog niet bewezen maar de experimenten zullen je leren dat er heel wat krachten aanwezig zijn. /Eric.

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RADEC 2005-12-07

Bye ERIC, LOL

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RADEC 2005-12-06

Eric,
My apologies. I did not mean to ofend anyone. My point here is, lets face it NOBODY in his sane judgment should be giving away ideas. I'm pretty sure that our end goal is to make MONEY. If something looks promising why displaying to the public? I'm holding to my previous post. Publishing your stuff regardless who's the creator is, is simply stupid.

Hopefully you become rich and famous before the creation of your prototype and the patents have ruined you financially. /Eric

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RADEC 2005-12-05

Well, I saw the so called KISS motor. Also, I had read the article. My simple question is. If it is so possible, why you don't make it to work?. So stop wasting time writting about your wonderful motor. Build a proto and get a patent.

I'm my case I'm working on a motor for 5 month or so. I have testet it in some working prototypes, but I will never show my work here nor any other place. This is the stupid thing to do. I have my feet firmly palnted on the ground. If I suceed with my motor I will sell it in a powerplant making sure nobody will ever get access to it iternals.

Everybody keeps telling the world what took you a lot of headaches, the see yourself doom. Sorry world, NOT wife and Kids

You read the article but missed that this is not my wonderfull motor. I'm reporting what is available so that others can make their own conclusions and decide without pressure if they want to give it a try or not. So what is your problem exactly? /Eric.

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Nick 2005-11-25

Eric all the stuff seems unrealistic cause in case it really works why don't we see devices like this in the market??? This is good money, isn't it?

No sales means no money. You could have figured that out all by yourself. /Eric

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Nick 2005-11-20

Is it all relal?
... i would like to have one or two!... (or more) :)

The experiments and the ideas are for real but there are no devices for sale yet. /Eric

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Dijon Rios 2005-11-12

Hi Eric, I find the triangle/rail experiments interesting. I was wondering if could a set of cylindrical magnets roll from a starting V, then continue past the last V without any 'pull back' like in a SMOT? This would show the possibility for a closed loop.

Perhaps. /Eric

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John Dryden 2005-11-11

Have you check out www.fuelforless.com for their Gravity engine? Thanks for the Tesla stuff. I do not think we understand enough about magnets as yet. Think about Coral Castle!

Yes, I have seen that. Knowing what a magnet is, will probably give us the solution to free energy. /Eric

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Matthew Trovato 2005-11-10

I think you need stronger magnets to overcome the friction and weight of the device.

True. That is why I made some ultra light wheel experiments: to reduce weight and friction. The next step must be full sized wheels with neo's. /Eric

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Anthony 2005-10-26

Awesome site my friend. Keep up the good work ... someday you will find it !

Thanks. /Eric

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philip b tatro 2005-10-24

eric vogel hey remember i gave you kohie minatos info i lost his web and personal email can you send it to me ..philip ,los angeles usa

I remember you and I sent you the information. /Eric

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JIM GLINSKI 2005-10-23

HELLO MY THOUGHTS ON ALL OF THE DEVICES WOULD BE TO USE THE MAGNETIC RAIL AND A GRAVITY WHEEL TOGETHER TO KEEP THE WEIGHT PUSHED OUT TO THE RIM ALL THE TIME AND ALLWAYS OFF BALANCE THE RECYCLEING OF THE WEIGHT IS WITH THE TURNING GOING BACK TO THE CENTER AND FALLING INTO PLACE TO START ANEW AGAIN

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JAMES KELLY 2005-10-12

I AM INTERESTED IN ALL FREE POWER

Great. /Eric

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ahmet r kuldemir 2005-10-07

where is the zipper MRE?
why it is cleared this site?
do you know?
thanks
best regards
ahmet r kuldemir
turkey

I removed the zipper because defending why I published the document took more time then building the device. I have just sent you the page by email so you can see it off-line. /Eric

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Eric from Canda 2005-10-04

Eric,

I started to build a motor based on the Lloyd B. Zirbes blueprints, since it made a lot of sense (eg: the opposed N-N magnets poles are cancelled when a piece of iron is in the middle)...

I saw my rotor moved for a turn or so, and I was very excited about it... However, after taking a analytical approach, I noticed that my rotor was not well balanced, and it was all due to the gravity.

Did you get any positive results from these blueprints? (ie: prepetual movement)

Thank you,

Eric from Canada

That is very interesting. I didn't build yet but you certainly made me interested again. I'll send you a private email. /Eric

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Nicolaie N.Vlad 2005-09-26

OERSTED was right in 1820 when he said
the lines of magnetic field [he said then CONFLICTUS ELECTRICI]are spirals around conductor with el.curent.My experiments[begining in 1981] with toroidals windings give him right.Please see the two . jpeg photos that give an ideea on my experiments.
with respect,Nic.N.Vlad

I did not find the jpegs at the link. /Eric

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Önay 2005-09-25

i look ur site and see free energy applications. i curious about that why we dont use that machines alternative to petrol... if you answer me i ll be glad. thanx

onaygurgen@yahoo.com

Unfortunately none of the devices is a completed self-runner yet. /Eric

eMail: (is only visible for the webmaster) no Homepage

Eric 2005-09-23

I started to look at some alternative power source in the past weeks since the outrageous price of gas in north america...

I saw the pendev mag-motor, however there was not too much explanation.

This site is awesome, there is a lot of good info!!!

I am going to try to build my own, I am quite sure I will be back on this web site for more info.

Thanks again,

Eric from Canada

Thanks. Unfortunately there is not much Perendev information available. No replications are reported as working devices. /Eric

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RADEC 2005-09-23

Hi,
Nice site with nice ideas. Have you ever take a look of Cycclone Mag. engine. They claim a 300 hp working protoype to be installed on a car. Is saw the video but it didn't convince me. See it on www.cycclone.com

Yes, I've seen it but I cannot say that visitors are overloaded with recent updates. /Eric

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Gerdi 2005-09-20

nice side and well presented with some good information and very interessting. Please visit us also under www.shopping-round-the-world.com
yours Gerdi

Thank you. /Eric

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J.Wesley Marceaux 2005-09-09

I have been working on magnetic motors for nearly fifty years and have built many of the devices I see today. Only I was not smart enough to share my work with others. I did not even know others were working on the same thing. Many things I have discovered stey in my memory, but as I get older ,,well you know. All of these motors , well the ones I have seen ,, suffer from the same problem. they suffer from non productive wave pattern interferances. these waves tend to counter the positive effects one wishes to produce. When I was a small child I saw a man with a rubber ball make , what to me was one of the best magnetic motors I have seen to date. I could not re-create his rubberball motor but I witnessed it . Still trying to get there. Keep it simple guys. He only had six nails , a rubberball and a small magnet and a stand,, and it turned for 30 minutes before stoping.

Yes; 'keep it simple' is the key. /Eric

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john 2005-08-23

ik ben pas deze site tegen gekomen via een andere die meer met windmolens te maken had. Toch vind ik het best wel intressant wat ik hier lees. Ik ben de laatste dagen veel tegen gekomen over PMM en dergelijke. Maar dit is wel de enige site die echt experimenten laat zien en toelichtingen geeft. Daar voor al heb ik de nodige respect. Nu is bij mij ook wel de intresse gewekt en de zin om wat te experimenteren met magneten. Mijn vraag is dan ook een beetje heb je nog meer info te delen dan ik op de site tegen kom en ben je inderdaad een nederlander ?

Ja, ik ben een Nederlander. Ik stuur je een email. /Eric

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Stuart Ulrich 2005-08-09

Not bad

Thank you. /Eric

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Frank 2005-07-06

>>>>A very small detail can be the difference between working and not working. Even devices that look similar can act totally different. /Eric<<<<<

Gosh, that was a quick reply.
When i mentioned similar, i meant in concept not design. The design i have in mind is very much different to what i have seen on this site, though the site has been very informative and some of the basic ideas i have, seem to work after having seen some of the small video footage, but still need to carry out own research and make prototypes to ensure that information at hand is correct. I guess, the task at hand at the moment is deciding whether to use neo magnets, (not certain if they can be machined to shape?), or to make my own permanent magnets taking into account material properties such as permeability/hysterisis, strenghth, thermal properties, weather resistance, etc. Maybe someone can shed some light on where i can find some info.

Thanks for the quick reply.

The list with sponsored links on the start page of this web site contains some magnet manufacturers. I always adapt design to available shapes and sizes. /Eric

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Frank 2005-07-06

One finds strange things when looking up permanent magnetic DC motors on the net. I was astounded when i came across this site. I spent half the night last night conceptualizing a different design for a permanent magnetic dc motor that was self propelled. The concept i came up with last night was similar, (but not the same), to the ones of the flying dutchman projects. I spent a large portion of the day looking up permanent magnets today for a prototype, thinking that i might be onto something. Looks like someone beat me to it. C'est la vie.

A very small detail can be the difference between working and not working. Even devices that look similar can act totally different. /Eric

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B Travis Shafer 2005-06-30

I am just getting in to permanent magnetic motors.

I like the ideas here. Something to think about.

I hope you'll find information here that inspires you to continue. /Eric

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Dan Quale 2005-05-26

You appear to have made a great mistake in your replication of the perendev motor, all magnets outside are oriented with the same pole inward ,should be all red in your illustration.All outer magnets repel all the inner magnets! Certain kinds of steel (stainless for ex. are NON-magnetic) Also you might find MY designs easier to build at magnetodynamics.info and magnetodynamics.biz I will be visiting again.P.S. have you seen faraday.nu yet?

Except for a drawing, I never replicated the Perendev. The page is showing the hard work of other people. Their email addresses are published as well. There is no faraday.nu registrated. /Eric

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dark count 2005-05-24

I really love the content of this site.Its serves as a source of valuable
information in my life.I will continue to visit this websites often,and I would like
to thank you for your continual service.
http://www.flash-jokes.com

Thanks. I like your site also. /Eric

eMail: (is only visible for the webmaster) Homepage »»

Dan Quale 2005-05-19

see also www.magnetodyanmics.info check out my sites you will like my ideas.

Thanks Dan. Interesting idea. /Eric

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thomas marshall 2005-05-02

HOW CAN I BUY A BOWMAN MAGNETIC MOTORS

No idea. I haven't seen them for sale. All devices are experimental. / Eric

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Leonard Belfroy 2005-03-17

Theoretical Space Science site has some ideas on alternative science such as free energy, time travel, space travel, computer science.

The link points to an impressive collection with information.
Thanks. /Eric

eMail: (is only visible for the webmaster) Homepage »»

Bucho 2005-03-02

You have all my support !

Nick name Bucho,

Slovenia

Thank you Bucho, I need that. /Eric

eMail: (is only visible for the webmaster) no Homepage

Egon 2005-02-06

Good work mate! Your persistence and determination to keep on going and trying new approaches is very admirable. I hope you eventually succeed - you deserve to!

Thanks. /Eric

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J.C. Renaud 2005-01-28

I also do some magnetic experiments and i find your site very instructive!
J.C. Renaud
Quebec, Canada

That is nice to hear. Good luck with your experiments. /Eric

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Steve 2005-01-07

The Prendev device may be easier to duplicate using magnetic amplifiers shown in US patent # 5929732. You can DL it at www.uspto.gov.

Thanks Steve. I will bring this into the group. /Eric

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Jack R Welch 2004-12-02

Great info.Thanks jw

Thanks. /Eric

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Mirko 2004-11-10

Give a look at http://mmmgroup.altervista.org/e-magnet.html
This definitely should work!

Thanks. The TOMI idea itself will work as long as there is a start en an end to the track. The circle formed track (no start, no end) will leave the magnets in the middle without any drag. /Eric

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Pierre 2004-10-18

Tjena Eric!!
Suverän hemsida.
Pierre

Tack så mycket. Vi ses på jobbet. /Eric

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David D. Glass 2004-10-09

I am working on a device, your site has been a valuable resource for information on current overunity theory. thank you.

You're welcome. I hope that you are succesful with your device. /Eric

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Jan Bout 2004-10-03

Dag Eric, ik weet niet of het allemaal voor je gaat lukken maar ik heb het diepste respect voor je doorzettingsvermogen. Vroeger was ik ook wel in de weer met Mecano en vliegwielen, mechanica heeft me altijd aangetrokken. Eén grote hulp heb je in ieder geval: het bestaan van het Internet.
Ik wens je veel succes!

Bedankt Jan. En ik gebruik nog steeds de houten versie van Meccano voor fast prototyping. /Eric

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Franz J Ehrengruber 2004-09-10

I'm impressed by your determination. Good luck.

Franz.

Thank you. /Eric

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Free Energy from the Air 2004-07-23

With your Magnetic shape material,

If i stand on a frictionless trolley, and people throw balls (virtual atmosphere particals)
at me and i use a baseball bat to deflect them (without actually giving them enery) then i can deflect them all in the 1 direction which will push me along! The energy for my movement comes from the balls.
Well, this could be done with nano size deflectors on the surface on an object with the result that AIR particals are deflected all in the same direction and the aircraft will be pushed along!
This means an aircraft with such material could be pushed along without needing energy. The energy comes from the air particals!!

Interesting thought. Thanks. /Eric

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John Day 2004-06-02

Great work Eric. Of course Flying Dutchman would be from Holland. Go ahead and send the patent.
Thanks and if you get a chance have a good look at that wheel motor if you can. They supposedly tested it as a wind genny in the development.
Cheers,
John

Thanks. /Eric

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John 2004-05-18

Eric, what results did you obtain with your 64 NEO magnet "shield" ?
Did it work at all ?
What is the US patent no ?
Thanks, John

It was found in the European Patent Database, World Patent Number is WO 93/12574. My prototype did not show the shielding effect. /Eric

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jenny lee 2004-04-08

u heard n e thing about some sort of magnetic breakthru by a co in NH?

no details..just talk of a SKUNKWORKS project.

I've not heard about that. /Eric

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Oxygon 2004-04-01

I envy you! I love the way you have done soo much actual testing... I havent had the funds or zeal to myself... Good Luck!

Thank you. I'm glad that I found a way to create wheels for as little money as possible. /Eric

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David 2004-03-10

Really awesome! I think you are just about to catch up with me on discoveries of magnetic propolsion.

AWESOME SITE!!!!!!!!!

Thank you. /Eric

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Nairda 2004-01-21

I read the article about the "mikell" device. It seems as if "mikell" has stopped giving away information about this "infinite energy resource". If you are looking for him try http://groups.msn.com/VonBraunPhysics/ .
he is faking to be Wernher von Braun's Grandson

Thank you, for this information. /Eric.

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Roman 2004-01-17

Great site. Good Luck!

Thanks. /Eric

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Jeroen 2004-01-15

Hoi Eric, Helaas moet ik je via je Guestbook benaderen. Maar ik wacht al een tijd op een email van je. Je bood aan om een link door te geven van de gehele film van de Minato wheel. Ik vraag me af of je mijn email (2x)wel hebt ontvangen.

Hallo Jeroen.
En ik heb al twee keer teruggestuurd. Ik begrijp niet waar het blijft. Ik heb je nu de email maar nog een keer gestuurd. Het lijkt wel fout te gaan als ik 'reply' doe. Laat maar weten of je deze keer wat kreeg. Sorry voor deze gang van zaken. Je krijgt de filmen, al moet ik ze met de post versturen. /Eric.

eMail: (is only visible for the webmaster) no Homepage

Jeroen 2004-01-01

Hi Eric, leuke site. Ik ben blij met de posted Minato videos. Een opmerking over je 'real Minato replica' al je magneten staan in een andere hoek bestudeer de zwart witte foto van dichtbij het zijn vierkante magneten die vast zitten in een klem (die een maansikel vorm lijken te hebben) maar alle magneten van Minato staan in dezelfde hoek. Een tip gebruik niet een vaste aandrijf magneet maar een die de hand beweging nabootst b.v. met een veer kijk naar de Finsrud PPM om een idee op te doen. En ja ook ik ben bezig met het nabouwen van een Minato wheel. Nog een vraag is het gebruik van foam sterk genoeg om magneten van 25x25x1mm met een sterke van N25 op hun plaats te houden.

Bedankt. Ik heb de B&W als model gebruikt. Een veer reageert te laat (waait met de wind mee). Piepschuim is sterk zat, als je de magneet maar voorzichtig inbrengt, tijdens het inbrengen en uitpeuteren wordt de grootste schade aangericht aan het piepschuim. Geduld is een schone zaak. /Eric.

eMail: (is only visible for the webmaster) no Homepage

Trevor 2003-12-04

Hi Eric,
Darren has used velcro ,and he is tired
Vertically curved, was the question.
No I do not have working free running Minato, or Calloway wheel.
Do you, I am in the process of getting quotes from magnet suppliers for scaled down, custom made Nibs as per my dimentions,Minatos magnets are the same volume as a bar magnet,90mm long by 72mm wide by 15mm thick. may be you could buy them for me.
regards Trevor

Hi. Please stop using my guest book as a message board and continue the discussion in the e-group. /Eric

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Lesley Butler 2003-12-03

Hi,Eric
I am Trevor's neighbour could you help with the code for his e group as he is not getting anything from the email account he has got it may be easier to get mine.
thanking you lesley

I'll fix. /Eric

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trevor 2003-12-03

Hi,Eric
Trying to join the egroup can't get verification code not being sent to my email address.could you pass on feedback or tell me how to get code please.

I think that the problem is that you don't have a Yahoo account. But I can make you member, then you only need a Yahoo account for going into the file section. But all pictures are on my site as well. / Eric

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Trevor 2003-11-13

To Eric. Re,Minato madness and the Calloway curse. I think this is the cure. First do not mix the two,and ignore every thing writtern. Study of the photos is the key,what surfaces did the flash reflect on. Here are my findings to share with all who beleive that free energy is possible. 1.wheel is 432mm in dia,with a radius of 216mm and circumference of 1357.1712mm 2.There are 16 rare earth magnets covering 180 degrees,each magnet is in 11.25 degs. 3. Distance from pole to pole is 60 mm [rad,divided by 3.6] 4.Width is 72 mm [dia,devided by 6] 5.Thickness at nutral zone is 36 mm [dia,devided by 12] 6.Pole face is 15 mm[dia,devided by 28.8] 7.Angle of pole face to edge of wheel is 50.625 degrees 8.All north poles directed out and all south poles inward. This wheel works in my opinion for several reasons one is harmonics of measurement and is a push and pull action. Well Eric here is your first dose,I will send more medison on 15 /11/03 Regards from Whykids.

Thank you. I consider myself as a real believer. I'm looking forward for the second dose. /Eric

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Stanley 2003-10-18

please continue your search and share results with us. We also need some guideline. Do not worry. We are not alone

I will continue. But there are no real guidelines for over-unity. But we can collect as many facts as possible and hope the solution is somewhere in between. /Eric

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Gordon J Martin 2003-10-18

Hello Eric,
Good site mate!
You may be interested in looking at JP2003-092870--- looks promising.

Thanks Gordon. And thanks for the patent. /Eric

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John D 2003-08-16

Hi Eric, Great stuff you're doing. Roamer on KeelyNet had some interesting points. Have you communicated with him yet? Seems like he might be a real good resource person for you. I check your site every week for updates.
John

Thank you. Yes, I contacted Roamer and wait for his answer. /Eric

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Bill 2003-07-08

Eric,

Thank you for putting your research on the Web for all to see. I wish you success.

You're welcome, and thank you for your kind words. I truly hope that someone some day will find an energy source that saves the world. I'm not sure if it will be me but this way I can at least make a contribution. /Eric

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Wayne 2003-02-12

Eric
Great web site. I made a simple test model from a CD and glued styofoam on top. Then put some small 15mm dia magnetics and got some results. Now I going to try using 1/4" 1/4" rod rare earth magnetics and get going. I think retangle or maybe rod might be the best. Also do you get the same results vertical and horiz test? The Korean version is vertical. I hope one day we can all have free energy. I will let you know how I make out.
Thks
Wayne, Canada

Thanks. Vertical should work best because there is no force on the wheel sideways. But vertical is harder to balance. Good luck with your experiments. Please keep me informed. /Eric

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Tom 2002-12-30

Great work and great site, I enjoy checking your updated progress. I'm working on a project with simular insterests as yours but totally different design. I was just curious if you ever found somebody that sold the exciter magent with the spec of (5" long, by 2 1/2" wide, by 1/2" thick vertically curved magnet in the repulsive mode) Thanks, and good luck!

Thanks. I composed that big magnet with smaller (40x25x10mm) magnets. But your question made me think; I used a straight magnet (like Minato) and not 'vertically curved' as Calloway described. /Eric

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Terri Saaranen 2002-11-18

Good Luck on your experiment this month. It Looks good, have did you ever get a chance to change the angle on the magnet on the wooden wheels?

Thank you. I'm changing angles and number of magnets between every experiment. I need to make flux-fields visible. /Eric.

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Paul Sinkovitz 2002-09-05

We need to talk. You are on the right track. Don Adsitt is building a wheel that when complete will magnetically mirror the Earth. When placed in the magnet field of a sun ring as suggested by Christain 2002-08-10 and my model 1999-01-01 it will spin. Send link or address channel to blueridgemotors@Yahoo.com. I am open to anyone with an intrest to perfecting a no-energy input motor. I am very, very close.

I'll contact you by email. /Eric

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jayrelay 2002-08-20

I am certainly a novice at such things ..but could you please explain to me if there would be any benifit to making some of the magnets pivot on the wheel experiment. I am speaking to the ones afixed to the 3 wheels ...thank you

I cannot explain this at the moment. It must be tested first. Thanks. /Eric

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Christian 2002-08-10

Heya .. saw your page and see your delema. Have you tried atraction mode and flipping the magnet at the end for releas? as in at its most atractive point turn the magnet clockwise or counter clockwise by 90 degrees to release it. In this mode you magnaets will need to be set up not north to south but sidways as in ns to sn and when u spin the magnet it will still be atracting but on a mutch smaller scale and the momentium can push it by. This would work with 1 wheel. I am putting this here cause i didnt see an email address for you on your page.

Thanks, also for the picture you sent. I'll try it. /Eric

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Mike Silao 2002-07-16

Hello Eric, Mike here from New Zealand. I am happy to see that you are persistent. I believe that what you are missing is a ALUMINIUM PLATE slotted between the magnets which can be moved in or out. Please find out about the "REED MOTOR" on JLN and you will solve your problem. Thanks.

I will look at it. Thank you. /Eric

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Jack 2002-07-13

YOUR DESIGN IS FLAWED!!!

Probably, but when I try long enough, the right design maybe pops up. /Eric

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Bob 2002-07-13

YOU WILL FAIL!!! HAHAHAHAHA!!!

May be, but what is so funny about that? Anyway, I'm happy that you are having a good time. /Eric

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H.Vogels 2002-07-09

Je bent lekker bezig! Indrukwekkend.

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hasse & ike 2002-06-23

fin hemsida...fina bilder på sommarstugan :)

Tack. /Eric

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Grannarna Häggström 2002-05-01

Bra jobbat Eric!

Bilder på familjen vore kul att se.....

Tack. Familjebilder.... då behöver vi bara övertyga Ullis att det är kul. /Eric

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H.Vogels 2002-04-30

Hallo Eric,
Leuk om van afstand jouw werk te kunnen zien. Blijf vooral doorgaan.
Pa

Door het opzetten van deze website ben ik gedwongen om alle experimenten te beschrijven en te dokumenteren. Ik ga door. /Eric

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Don Adsitt 2002-04-30

Good job with this Eric, I appreciate your studies with the Minato Wheel, as always, there seems to be some key information that missing - I'm sure that with you preservernce you will find success!

Don

Thanks, I will continue. /Eric

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No further entries.

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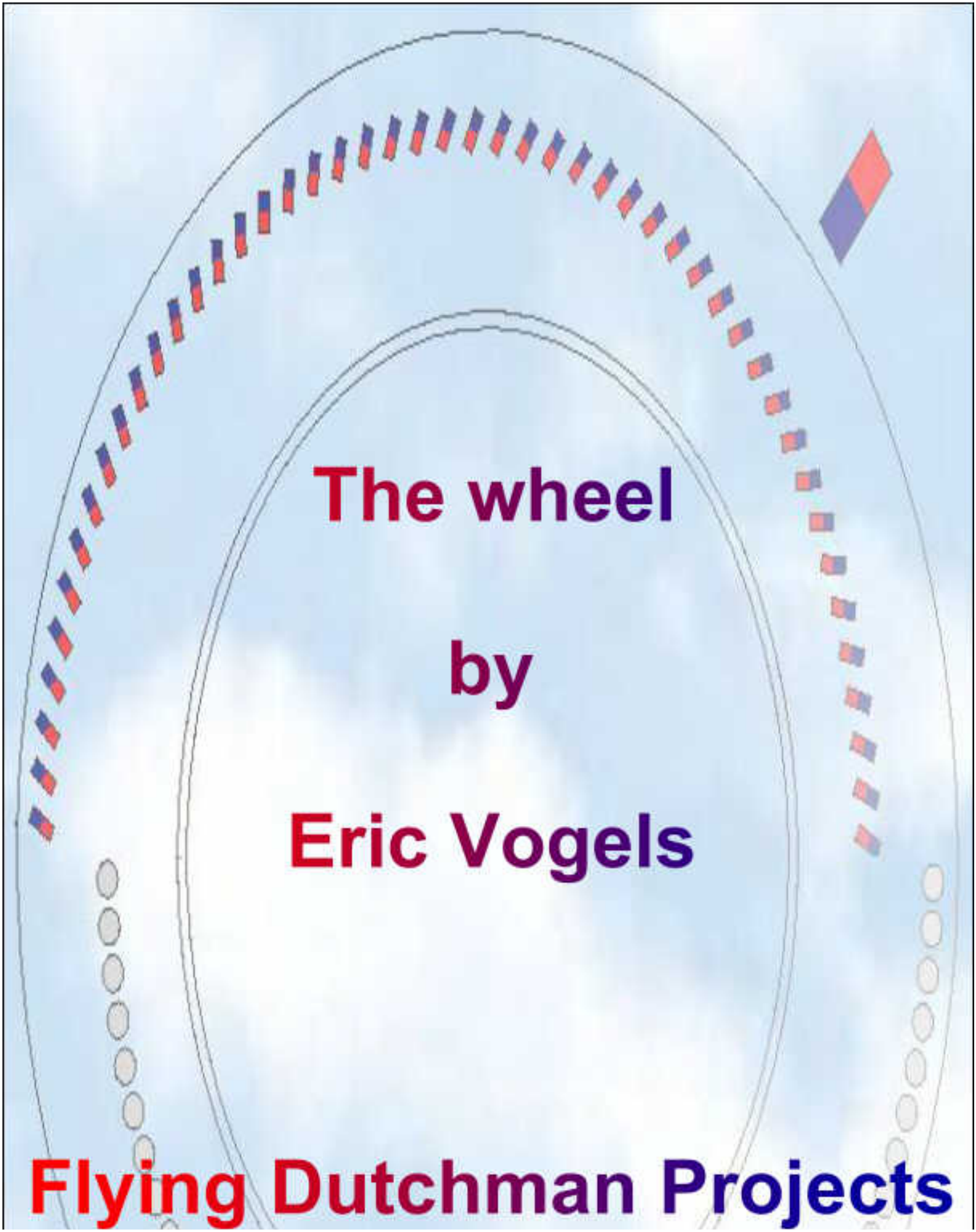
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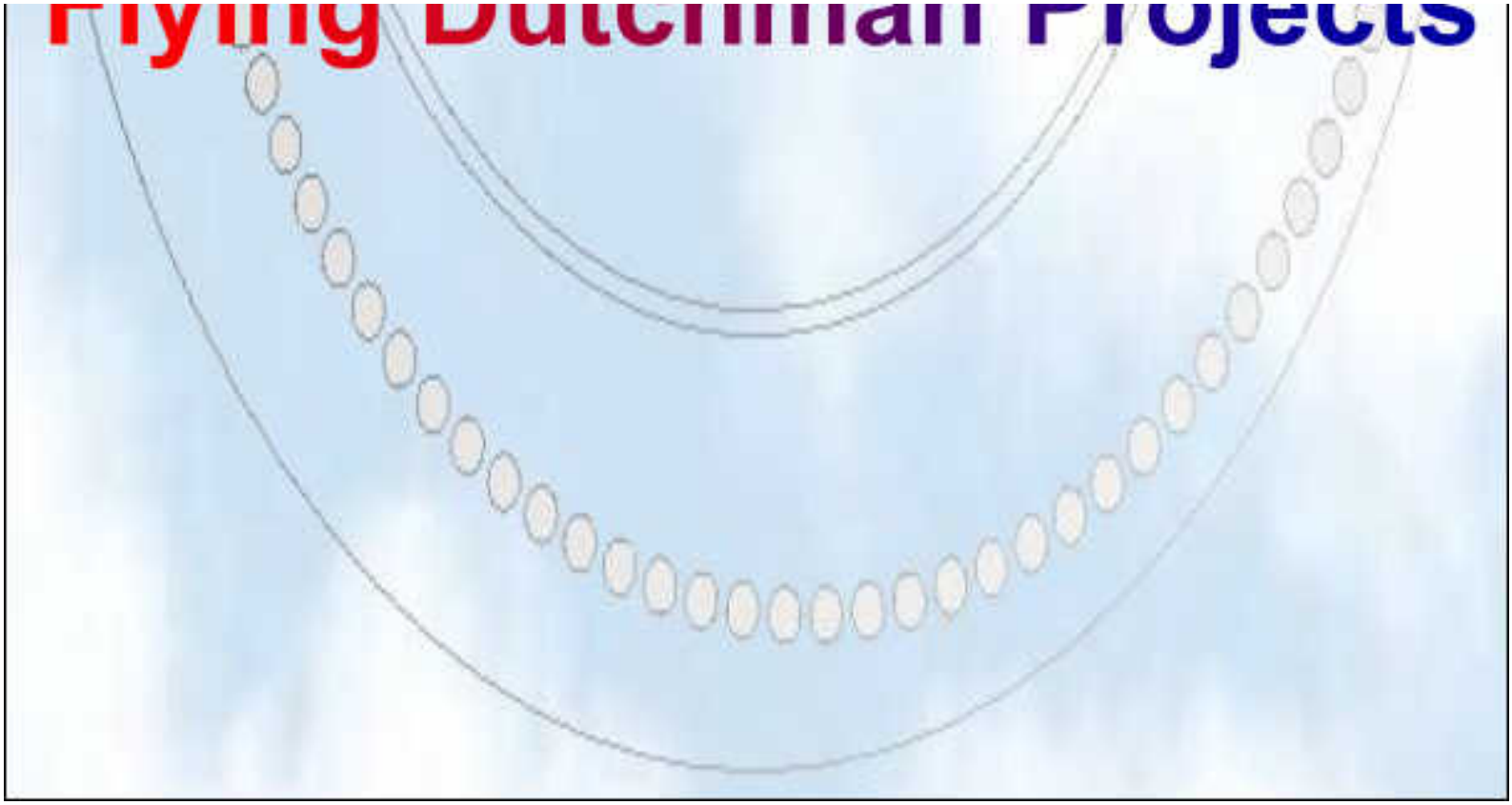
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The wheel
by
Eric Vogels
Flying Dutchman Projects

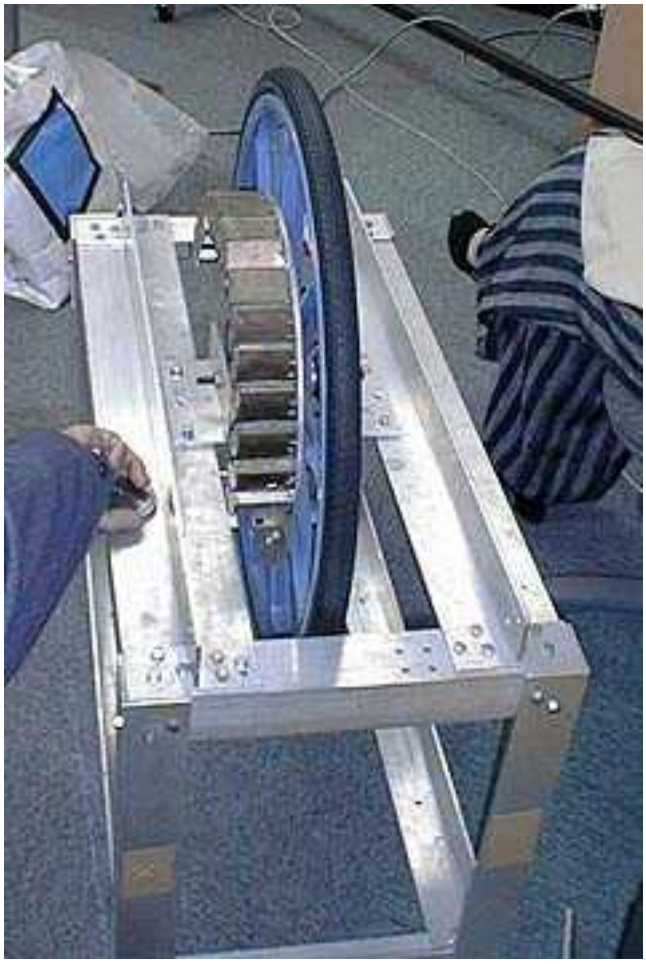

Flying Dutchman Projects

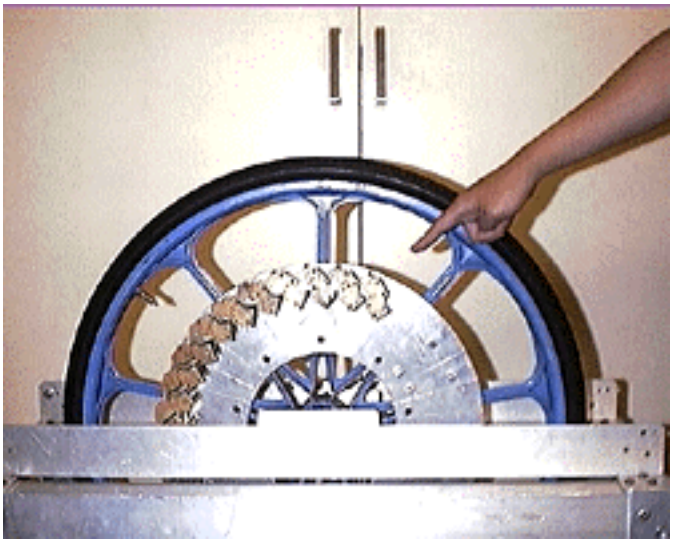
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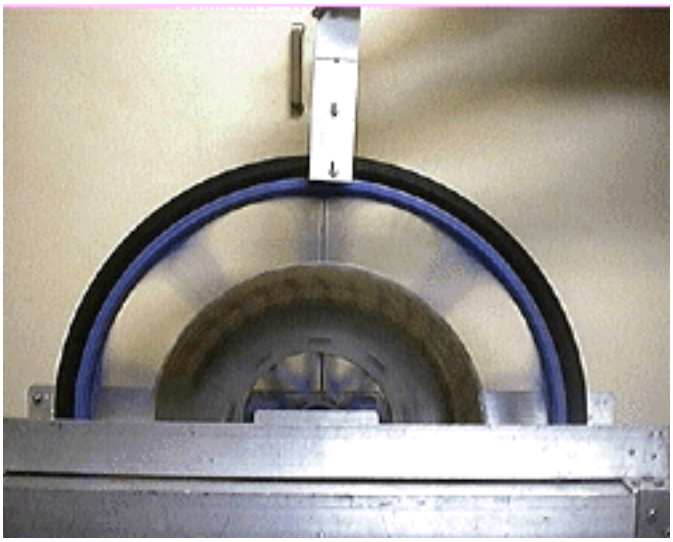
The First International New Science Symposium Program

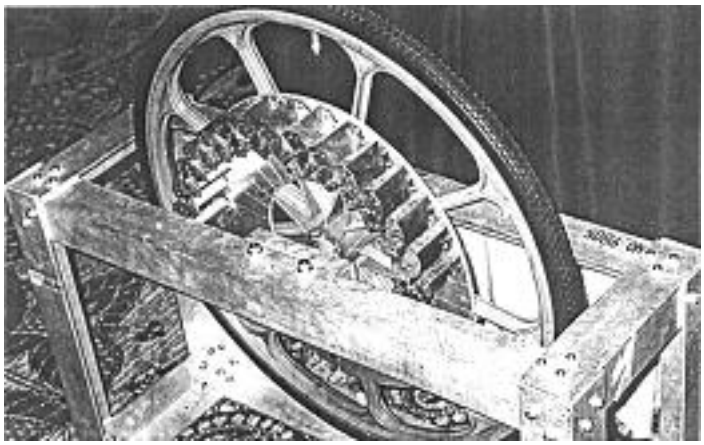
May 3
10:00-10:30 Opening speech
10:30-11:20 Dr.Shiuji Inomata "New Paradigm of Science and N-machine"
11:30-12:20 Dr.Henry Curtis "The Latest Information on the Development of Free Energy Devices"
(Lunch)
14:00-14:50 Dr.Garry Gorden "Development of Alternative Medicine"
15:00-15:50 Dr.Lee,Ui Won "Bio-magnetic field and Constitutional Medicine"
16:00-16:50 Dr.Leo Sprinkle "UFOLOGY"
17:00-17:50 Dr.Tadahiko Mizuno "Cold Fusion"
18:00-18:50 Mr.Kang,Young Gi "Messages from the Transcendental Vortex"

May 4
10:00-10:50 Dr.Bang,Keun Woong "Evolution of Science"
11:00-12:00 Ms.Barbara Marciniak "Messages from Pleidian"
(Lunch)
14:00-14:50 Mr.Kohei Minato "Science of 21st Century and Magnetism"
15:00-15:50 Dr.Oh,Ilung Kuk "Fundamentals of formation of Matter and Magnetism"
16:00-16:50 Mr.Hikaru Takatsuka "Health and Healing"
17:00-17:50 Mr.David Adair "The Latest Development of Space Technology"
18:00-19:30 Korean Folk Music Performance









Korean Magnetic Perpetual Motion Wheel - 11/18/97

I must apologize for not having all the details of this interesting device but will update the file when I get more info from the source.

In email communications with John Schnurer, I happened to mention it and he's been on me since then to send him a diagram, yet I felt like it would simply be confusing because its operation is not clear or readily apparent from the information I had.

The information that I have comes directly from long time friend Henry Curtis of Colorado. We both attended the 1997 ISNE conference in Denver and Henry was telling about this interesting machine he had seen while on a trip to the Phillipines.

He said there was a free energy conference held there and he noticed a spinning bicycle wheel that was attached to a stand that sat on a table.

The wheel was running when he first saw it, yet there did not appear to be any driving force such as a motor, belts, gears, etc..

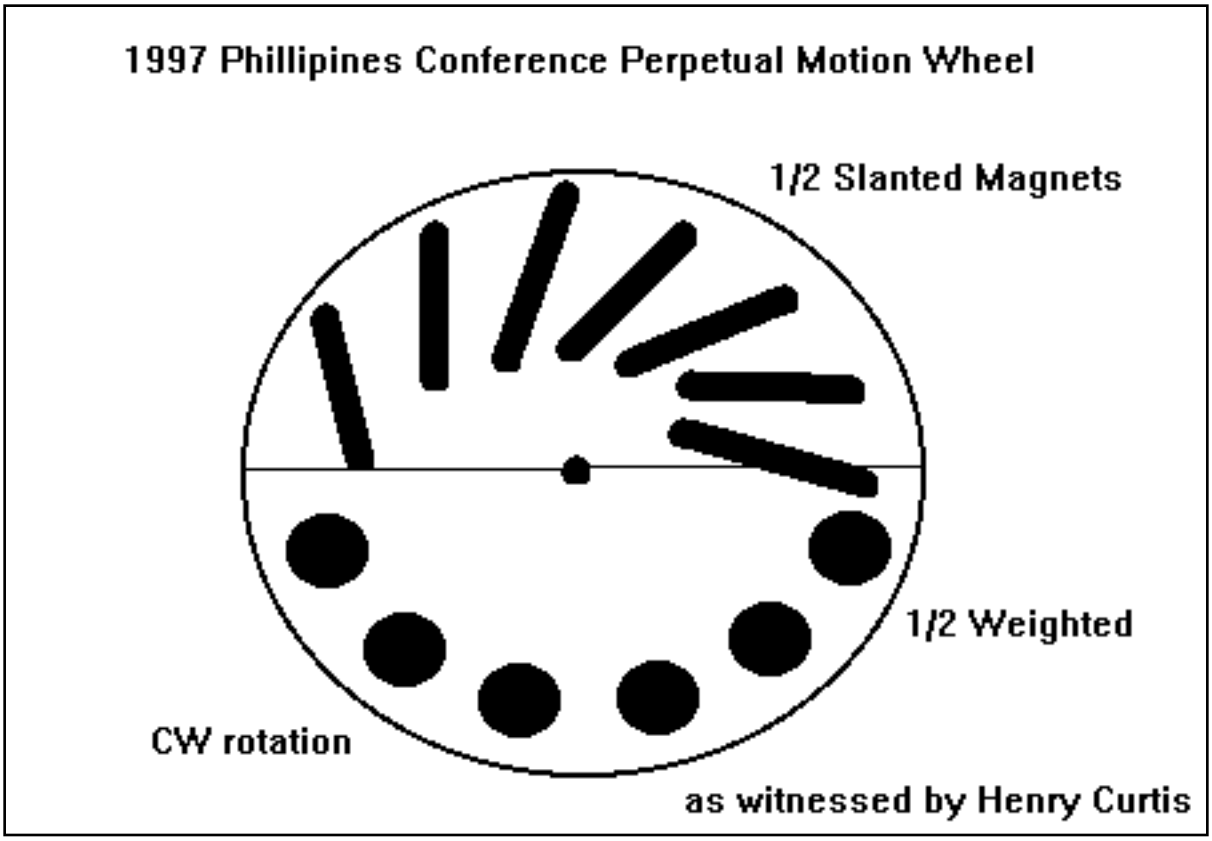
Henry said he watched it for quite awhile and it never stopped running. On expressing curiosity about the wheel, he was invited to stop it and start it up without any outside assistance.

Henry reports the wheel was brought to a complete stop, then he gave it a spin with his hand and it began moving on its own.

I am uncertain if it followed the tendency of other such devices to establish its own speed. Some devices like this can be spun up to high speed from an outside source, then will slow to a speed which is determined by the geometry and strength of the repelling or attracting forces that operate it.

Henry swears it was the neatest thing he'd ever seen and drew a crude diagram of the arrangement on my notepad. Unfortunately, we were a bit rushed and I did not achieve a complete understanding of how it operated. That is why I did not want to blow smoke about it until more detail had been received, god knows, we don't need any more of that.

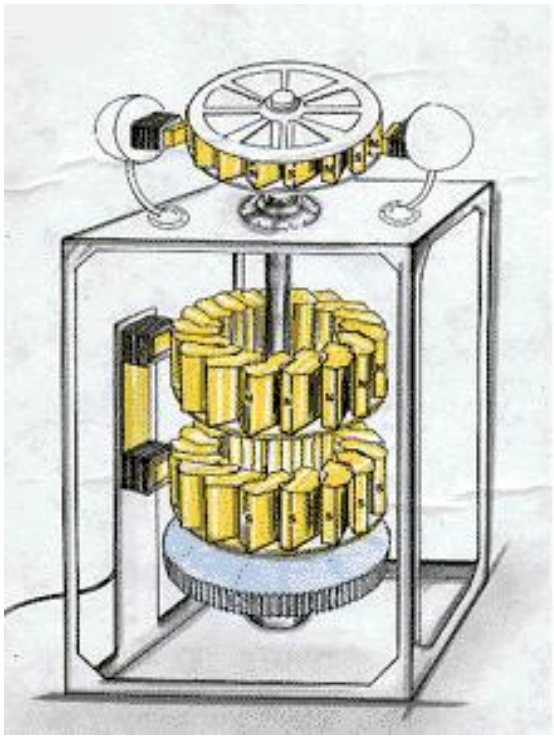
However, perhaps someone can figure it out from the limited information I do have. The following drawing shows the wheel arrangement, one half was weighted, the other half had slanted magnets. I do not know whether they are all repelling, attracting or a mix of these forces.



As you can imagine, the weight of the magnets must equal the weight of the other half of the wheel to balance out. Apparently the force of the magnetic repulsion or attaction provides the actual imbalance.

Henry also said there was a patent on this device that is dated January 14, 1997. The inventor is a Japanese man named Minatu. The spelling of this name is uncertain. I did a search on the IBM server but found nothing even remote. Henry specifically said this was a United States patent.

So, here it is. Perhaps Henry can come up with some more detail which can be used to update this file in future. Good luck....



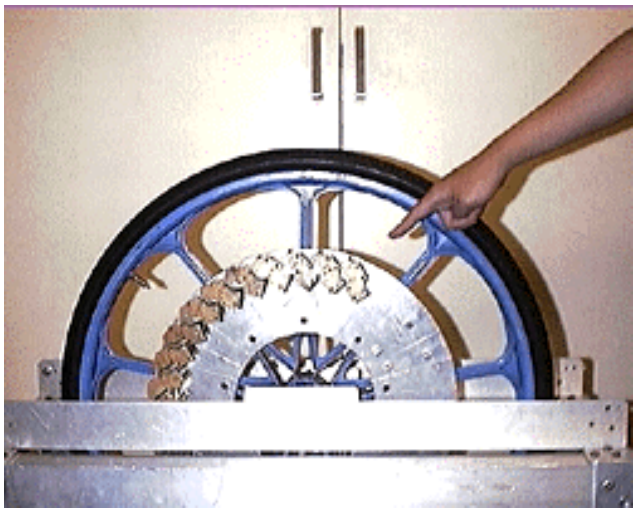
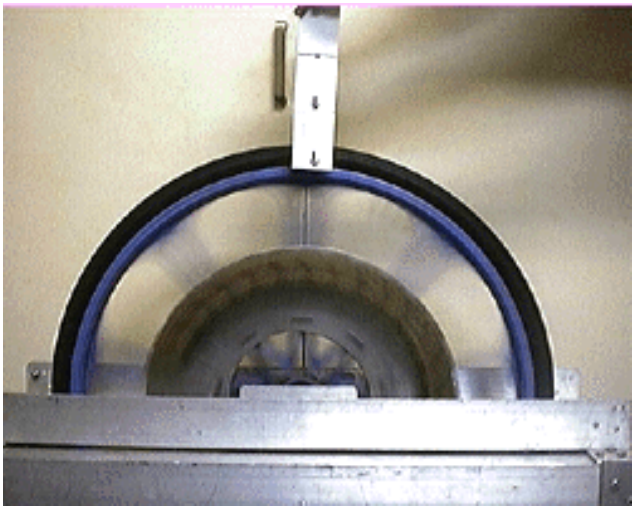
The drawing to the left shows Minatos power generator design, note the magnets have the crescent moon shape that was patented by Howard Johnson, with the idea that the magnetic flux would be focused at the tip to provide greater thrust in a smaller area.

Minato was claiming power generators that produced electricity from his self-running system and a demonstration was held in Mexico City, yet nothing has come out of any of the claims to date. He was also supposed to be building a magnet power generator system to power 30 homes in Japan as reported on CNN. We have no information to show this ever happened either.

The question with Minatos device is the same as with Howard Johnson and the Hamel Spinner, will it work with no human intervention, requiring someone to hold the exciter magnet?

Check out the Minato wheel which also used NORTH poles repelling from NORTH poles like Bedinis' tests showed were the most powerful reaction.

We were hoping for plans from Minato's people on how to build the self-running bicycle wheel that Henry Curtis reported as seeing and testing at the Korean conference, however, that hasn't happened.

**Here are two views of Minato's self-running wheel,
one stopped, the other running - driven only from the wall mounted exciter.**

An interesting quote by Henry Curtis from the Minato page above;

> **"The motor is actuated by moving the N pole of a large permanet magnet (the drive magnet) toward the wheel. As this magnet is moved toward the wheel, the wheel starts to spin. As the magnet is moved closer to the wheel it spins faster.**
>
> **The acceleration of the wheel is rapid. So rapid in fact, as to be startling. To put it another way I was very impressed. The motor works. And it works very well. In the film clip a slight pumping action of Minato's hand holding the magnet is apparent. When I braced my hand so that there was no pumping action, the motor still ran. In fact it seemed to run better.**
>
> **Pumping action by the hand held magnet IS NOT the power that drives the motor. When the drive magnet is moved away from the wheel it coasts rather quickly to a stop and comes to rest in a manner typical of any spinning bicycle wheel.**
>
> **Again when the wheel is at rest and a large magnet is moved up to the wheel it starts to spin. At no time is it necessary to touch the wheel to get it to rotate.**

From: Henry Curtis
Date: Wed, 19 Nov 1997 13:30:46 -0500 (EST)
To: Jerry Decker
Subject: Bicycle wheel correction and update

Jerry,

Again we see that communication is difficult and memories are fallable. Obviously I am remiss in not having sent this to you months ago as I intended to, but as a sage of old observed "The spirit is willing, but the flesh is slow."

During the first weekend of May, 1997, a group in Soeul, Korea headed up by Mr. Chi San Park, held The First International New Energy Conference in Seoul, Korea.

I attended this conference and gave a talk on various approcahes to free energy. It was at this conference in Seoul, Korea that I saw the bicycle wheel and had the opportunity to work with it unattended by anyone else.

The inventor is Kohei Minato, a Japanese rock musician, who reports that he has spent a million dollars out of his own pocket developing magnetic motors, because the world needs a better source of energy. He has several patents in various countries. His latest patent that I am aware of is United States Patent # 5,594,289.

His development efforts have gone in the general direction of the Adams motor which the above patent is similar to. He had a working prototype of this design at the conference and reported that it used 150 watts power input and produced 450 watts output on a sustained basis.

About a year ago CNN (in the US) had a 10 minute segment about him and his motors. In this video he is shown demonstrating two of his magnetic motors. I have a copy of this film clip that he gave to me. I will make a copy and send it to you. Unfortunately, the editors were not attuned to technical details and the pictures of the running machines show little useful detail.

The Phillipine connection that you mention is completely erroneous. It was in Korea.

The drawing on the web site is essentially correct with the following exceptions. The counter weight is a single curved piece of aluminum covering 180 degrees.

Each of the several individual magnets on the other half of the wheel are slightly asymmetric, crescent shaped and nested. They are magnetised end to end with the N poles out.

The motor is actuated by moving the N pole of a large permanet magnet (the drive magnet)

toward the wheel. As this magnet is moved toward the wheel, the wheel starts to spin. As the magnet is moved closer to the wheel it spins faster.

The acceleration of the wheel is rapid. So rapid in fact, as to be startling. To put it another way I was very impressed. The motor works. And it works very well.

In the film clip a slight pumping action of Minato's hand holding the magnet is apparent. When I braced my hand so that there was no pumping action, the motor still ran. In fact it seemed to run better. Pumping action by the hand held magnet is not the power that drives the motor.

When the drive magnet is moved away from the wheel it coasts rather quickly to a stop and comes to rest in a manner typical of any spinning bicycle wheel.

Again when the wheel is at rest and a large magnet is moved up to the wheel it starts to spin. At no time is it necessary to touch the wheel to get it to rotate.

Simply bring the N pole of a large magnet several inches from the wheel. The particular orientation of the wheel when it is at rest seems to have no effect on how well it starts to turn. Irrespective of how the wheel and the magnets on it are sitting; move the drive magnet near, it starts to spin.

Move the magnet closer it spins faster. Move the magnet further away it slows up. The wheel was mounted on a stand made of aluminum angle pieces bolted together similar to the diagram in the above mentioned patent.

The axle of the wheel was mounted parellel to the surface of the planet. I have attached a rough diagram of the wheel.

Apparently the geometry of the magnets on the wheel is very important and subtle. I have built several small models none of which have shown the free energy effects of Minato's machine.

The conference in Seoul was attended by several hundred people, most appeared to be under 40 and evenly divided between men and women. Presenters were from Korea, US, Japan, and China. Simultaneous translation was provided for all talks in the 3 day conference.

Jerry, I hope this information is useful. I may be contacted by e-mail at Henry Curtis or by phone at 303.344.1458.

THESE PATENTS DO NOT CONTAIN THE SELF-RUNNING BICYCLE WHEEL BUT SINCE SEVERAL PEOPLE THINK THEY DO, THEY ARE TAKEN INTO THIS REPORT

Gavaletz Patent (corrupted)- 4629921

Last & Newest Minato Patent - 5594289

Earlier Minato Patent - 4751486

A Japanese patent from 1997

THIS LETTER DOES NOT CONTAIN INFORMATION ABOUT THE SELF-RUNNING BICYCLE WHEEL BUT SINCE SEVERAL PEOPLE THINK IS DOES, THEY ARE TAKEN INTO THIS REPORT

Email from Gene Mallove at Infinite Energy;

Hi Folks! Here is a post from Gene Mallove on the Minato demo that is taking place in Mexico City this week, it was posted to the vortex list;

I spoke to Bob Vermillion of Tri-Cosmos Development (Los Angeles, CA 310-284-3250 or fax 310-284-3260) today, just before he left for the three-day demonstrations of the Minato magnetic motor being held in Mexico City, Mexico on July 8, 9, 10th.

Three (3) Minato Motors (MM), covered by US patents 5,594,289 (Jan 14, 1997) and (4,751,486 June 14, 1988), have been brought over from Japan. One was allegedly tested last evening by Grupo Bufete Industrial (supposedly one of the largest power generation construction companies in Mexico and South America).

The company engineers were said (by Vermillion) to have measured an output /input ratio of 4.3 / 1. The printed literature, which I received in a Fedex packet from Vermillion states that the device can put out 500 watts (maximum) with an input of 34 watts.

For those of you who wonder why the device is not self-sustaining -- oral info from Vermillion is that Minato *will* in the course of one of the demonstrations *remove the battery power supply* and let the device self-run -- presumably with a load.

The press release makes no bones about the physics-busting character of the MM: "As rotations per minute (rpm's) increase, the electromagnetic consumption of the stator decreases. This phenomenon is in direct conflict with accepted laws of physics and is achieved through the repelling magnetic fields. It operates without heat, noise, or pollution of any kind. It can be produced in size from ultra-small to very large."

It is said in the press release that applications from cell phones to laptop computers are under development. Vermillion told me of other parties who were planning to attend the demonstrations, which will be conducted both in public displays and with private party measurements. These include: ENRON, Bechtel, Tejas (a division of Shell Oil Corporation), Fluor Daniels, Kellogg Corp. .

He told me that Hal Fox of New Energy News and the Fusion Information Center will be there (I confirmed with Hal that he will be there and will give us a full report.) I considered going myself (I was invited), but I trust Hal Fox to provide a full report -- he should be back this weekend. Mr. Kohei Minato will be there -- he has already arrived, I understand. He hand carried one of the motors that was already tested yesterday.

The wealthy Japanese individual who owns Tri-Cosmos Dev. Co. is Mr. Charly Fujiki. Attendance is by invitation only, but let me here provide the Grupo Bufete numbers: (723-45-78 and Fax 723-47-18 in Mexico City). The exhibition will be in the Grupo Bufete Industrial building.

The invitation says: "Mr. Minato, the inventor, will be present to explain and demonstrate his remarkable breakthrough in technology to government and business leaders in Mexico. He will also discuss the possible use (and) application for various other industries, including a giant generator project, based on the principal mechanism being displayed."

Daily demonstrations are from 10:30 am to Noon, 4:30 to 5:30 pm and 6 to 7:30 pm. A block diagram of the motor indicates that it is about 500 kg. An arrow indicates that its 500 watt output goes to a load -- schematically indicated as an array of light bulbs. The unit is within a cube 1.2 meters on edge.

The diagram shows a solar panel(!!) providing input to the battery that powers the device - I supposes for completeness, but that is obviously silly in view of the claim. Vermillion assured me that this solar panel was not an essential part of the system.

One of the two color brochures in the package shows the Minato motor with its charactersitic coils that have their pole faces toward the perimeters of permanent magnet containing wheels that are stacked on an axle. If you look at the thing quickly, you'd think you were looking at a steam turbine.

The 1997 patent #5,594,289 states in its abstract: "On a rotor which is fixed to a rotatable rotating shaft, a plurality of permanent magnets are disposed along the direction of rotation such that the same magnetic pole type therof face outward. In the same way, balancers are disposed on the rotor for balancing rotation of this rotor.

Each of the permanent magnets is obliquely arranged with respect to the radial direction line of the rotor. At the outer periphery of the rotor, an electromagnet is disposed facing this rotor, with this electromagnet intermittently energized based on the rotation of the rotor.

According to the magnetic rotating apparatus of the present invention, rotational energy can be efficiently obtained from permanent magnets. This is made possible by minimizing as much as possible current supplied to the electromagnets, so that only a required amount of electrical energy is supplied to the electromagnets." It will be interesting, indeed, to learn what comes out of

this.

Perhaps the famous white rabbit disappearing down a hole, or maybe the birth of a revolution? We shall see.

Best wishes,

Gene

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Editor-in-Chief Infinite Energy Magazine Cold Fusion Technology, Inc.
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Fax: 603-224-5975
editor@infinite-energy.com

Response from STAG group on Minato Wheel - 12/04/97

Date: Thu, 04 Dec 1997 15:59:38 +0900
To: Jerry
From: David Heard
Subject: Re: Howdy!

Thanks for your mail regarding Minato's Rotation Aparatus. My apologies for the slight delay in replying. Yes, please feel free to put up a link to our site and the photos.

I should explain that our group is not in any way conected with Mr. Minato himself. The group STAG is run by foreign scientists who are living in Japan with the aim of distrubuting information between themselves, improving links between Japan and the UK (and elsewhere) and of course to have the odd beer or two.

We hold meetings every couple of months and invite speakers to speak on interesting or topical subjects. Mr. Minato was one of the speakers who gave a presentation at one of our meetings.

Hence the pictures.

I also heard about the Korean conference, and saw a significant report written about it in the conference proceedings (albeit in Korean!). I think it would be really good if other people did produce similar devices.

I will pass your comments on to Mr. Minato. He did have a Web page, (in Japanese) with information on it, but I haven't been able to connect to it recently.

Thanks again for your mail.

Regards,
David Heard
Vice Chairman, STAG

At 02:46 21/11/97 -0800, you wrote:

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> Hello from Texas!

>

> A friend told me he saw the bicycle wheel version at a Korean conference

> so I posted all the details at KeelyNet...one of our readers found your
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> site and informed me, so I will put up a link to your photos....
>
> Do you think there will be full details on how to build the simple
> self-running bicycle version posted so that others can duplicate
> it....this would really set it off if these things were being shown all
> over the world....
>
> I got copies of the three patents (two by Minato, one by Gavaletz) and
> have their locations posted on my page....thanks for providing the
> pictures....I don't think it go bigtime until at least a simplified
> version that self-runs has beend duplicated by many others....this will
> set the fire that will draw attention to the rest.....good luck, I and a
> lot of others will be watching....and please congratulate Mr. Minato on
> his achievement....if you would like to check out our site;
>
> http://www.keelynet.com/index0.htm
> http://www.keelynet.com/gravity/curtis.htm (the device file)
>
> seeya!
> --
> Jerry W. Decker / jdecker@keelynet.com
> http://www.keelynet.com / "From an Art to a Science"

> Voice : (214) 324-8741 / KeelyNet BBS (214) 324-3501

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**********<<<<<<<<<>>>>>>>>>**********

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Minato is going Big-Time! - 12/04/97

Date: Thu, 4 Dec 1997 20:06:24 -0800 (PST)
To: vortex-l@eskimo.com
From: Michael Randall
Subject: Minato's PPM Update

Vortexians:

Here is an update on Kohei Minato's over-unity permanent magnet inventions.

Minato is currently having manufactured, over in Japan, a large unit, (4) connected 10 foot long units, that can power 30 homes.

It is estimated to be finished by February. CNN is scheduled to report on it when ready.

Minato also has a home powering unit. Both size units are based on his USA Patent 5,594,289 that uses a battery to start and stop the unit.

The USA sales representative is Bob Vermillion and his e-mail address is:

polenetic@aol.com

No web site yet but Bob Vermillion's office is in Century City, California and he said he can answer your technical, marketing, and manufacturing questions.

He just came back from visiting Minato's lab in Japan and was impressed seeing the units working versus seeing the photo's. A power demonstration unit to is expected to arrive from Japan in January.

There currently is no USA manufacturing being done and licenses are available worldwide.

I mentioned to Bob that there is also a large interest for a permanent magnet rotor/ stator unit that is self-rotating and self-starting, like Minato's bicycle wheel design.

I also mentioned that a table top version of this, for the student or as an "executive toy," would sell quite well. He didn't know this.

If any of you do e-mail to Bob for info, mention to him about the need for a table top version of the bicycle wheel and where you got his address!

Regards, Michael Randall

Minato Demo and Update

Date: Wed, 4 Mar 1998 20:33:10 -0800 (PST)
To: freenrg-l@eskimo.com
From: Michael Randall
Subject: Minato Update 3/98
Cc: vortex-l@eskimo.com

Here is an 3/4/98 update on Kohei Minato's over-unity permanent magnet inventions from his USA sales representative's Bob Vermillion and John Kenworthy.

Mr. Minato demonstrated at the Japanese "Energy Expo '98" his large unit, (4) connected 10 foot long units that can power 30 homes, and several smaller table top units.

CNN, NHK and other TV networks took video's of his devices, and of the whole Expo, but he did not know when it was re-broadcasted. Minato's staff had their own video on for the four day event and Bob is making copies of a typical single day video coverage.

There were not any instruments connected to the large unit to measure energy input to output but his table top unit was connected and it showed 48 Watts input to 550 Watts output.

Minato's demonstration attracted a lot of public attention by the large daily crowds and also from a number of interested Japanese corporations.

Bob said he received all of your e-mail's and took them back with him to Japan and gave a copy to Mr. Minato and his staff to show the interest here in the USA and the world.

He has not replied to all of your e-mail's due to there is nothing to report about just yet and he will answer all of your e-mail's when he has at least a demonstration unit to show. They are still waiting for a table top power demonstration unit for their Los

Angeles office but the Japanese engineer's want to perfect it first.

Bob is looking forward to receiving a magnetic "bicycle wheel" unit in April and interested parties can then schedule an appointment to see the wheel spinning by itself without any energy input! :-)

Regards, Michael Randall

KEELYNET

Hello All, It is time for this to be released.

Build it for yourself and see the results.

Permanent Magnet Motor (Non_Electric) - 04/14/01
Updates are appended as of 07/11/01

courtesy of Robert H. Calloway via Henry Curtis

I have been appalled by the always present negativity that a PMM can t, and will not work. It is said that the (2) forces, north @ south will always equal, no matter what you do. Other fairy tales are that the magnets would heat up if they were doing work. I am here to tell you that this is a bunch of cock and bull. Don t believe these statements. This report is written to inform you that it can be done. Maybe after reading this you will reconsider on how to build a PPM.

First, do some research. Please see: http://www.keelynet.com/gravity/curtis.htm

Read this whole article, read everything associated with it, plus the patents.

For a look at a PPM that I built and dared anyone to build, Please see it at the energy21 website titled: Hamster Cage Motor (the entire file is appended after this article). The Hamster cage motor is not considered by me a usable design, but it proves that it can be done.

For a PPM that will do some work, we must consider the ideas of the Minato PPM. For a legitimate PPM, no electric coils or power must be considered. In the latter statements of the above url, he refers to using a coil or coils. Forget that. Build the motor to run on nothing but permanent magnets.

Purchase a 36" wheel. Set this wheel up on bearings to freewheel easily.

Purchase 50 Radio Shack part# 640_1877 magnets.



They come 10 magnets to a bag, so 5 bags will do. Glue these magnets on the outside face side of the wheel, in a fashion shown on the url.

The correct placement of these magnets will be when the wheel gates by a 5" long, by 2 1/2" wide, by 1/2" thick vertically curved magnet in the repulsive mode. The magnets will cover no more than 180 degrees of the wheel.

When gluing magnets to the wheel, start at the outside of the face of the wheel and gradually work the magnets inwards so that the latter magnets in the 180 degrees wind up 3" inward outside of the wheel on the opposite side.

FACT.. if you have done this properly the wheel will gate against the large magnet for 180 degrees. The magnets that you placed gradually in to 3" will not impair the wheel when it comes around to get back into the gate.

The wheel will quickly build a speed of about 1200 RPM. My wheel is 1" plexiglas which is heavy. A lighter wheel will be faster. The wheel also needs to be balanced after proper placement of the magnets.

Never consider a smaller wheel. Why? A smaller wheel with magnets attached causes closed flux loops with the main or primary magnet.

When testing your wheel after the magnets are glued on, the wheel must gate freely through all magnets for 180 degrees then coast back around and back into the gate which starts the whole process over again. I like my motors ccw, but one can place the magnets to run either way. One can then gang rotors on a common shaft to produce power.

With this much said, one should start by gluing the magnets all the way around the wheel 180 degrees without trying to work them inside 3". You will need practice on getting a perfect gate for the 180 degrees. A jig won t do after 6 magnets are placed. You will encounter lockups and slow downs until all the magnets are placed correctly on the wheel. It takes much patience.

With the magnets placed around the wheel along the outside, you will be able to gate out, but not be able to get back in. You can experiment with the gate by moving the large magnet out when the wheel comes back around to get in the gate. The wheel will keep turning and speed up quickly using this test method. When the wheel is setup correctly with the magnets moved in 3", the magnet can be placed in a permanet position by the

wheel in a hands off situation.

The wheel gates because of the relative size and angle of the wheel magnets versus the large size of the primary magnet. I suggest using "Quick Grab" glue wich is sold at Walgreens drug stores. It is a slow drying glue, but has a good instant bond in which a magnets position can be tested quickly. The magnet will pull off easily if in the wrong position, unless left overnight.

Keep in mind that a magnet placed wrong early in the process can effect the gate later down the line on the wheel.

NOTE! - CRITICAL TO ADJUSTING A MAGNETIC PMM - I have used metal filings in a plexiglass rectangled box just to view the various flux field effects as I placed magnets on the wheel.

This PMM has a strong rotational push and a very strong kick leaving the 180 degrees of magnets.

When ganging (2) rotors on one shaft, the rotors distance between them must be at least 30". The primary or main magnets must be placed on opposite sides of each rotor. But then..it is said that it cant be done... I have given you enough information to get busy.

Regards,

Robert H. Calloway

Update 07/11/01 - (still verifying this)

The following email was received by Robert Calloway and Henry Curtis, then forwarded to KeelyNet, we have asked for more details on the magnets, placement, RPM and possibly photos which will be appended as received.

Hey guys, this is incredible.

I was working on a design for a Perpetual Motion Device (PPM) based on magnets and I came across your site. My design was altogether different from yours, but I was searching on magnets and found your site. Well, since I had a workshop FULL of magnets, I decided to try and build a Permanent Magnet Motor for myself.

I thought it would be difficult to get the magnets aligned correctly, but it was quite simple in fact. I spent about 30 minutes tops arranging the magnets.

My design called for two thin sheets of Plexiglas cut into 36 inch circles. I mounted bearings to each, and mounted them on an axle.

I took two curved sheets of Velcro, and attached them to half of each wheel. I glued the other side of the Velcro to the sides of each magnet. This would allow for easy repositioning of the magnets. I then sandwiched the magnets between the sheets of Plexiglas, to add to the Velcro's strength in holding them in place.

I weighed the magnets, and added weights of equal weight to the other side of the wheel, to balance it.

After a few lockups and magnet repositioning, it did start to spin and spin strongly! It's pretty impressive.

Anyway, I then bought a simple 6-volt light generator for a bike at Wal-Mart and started to power all sorts of things. I want to find a small 12-volt generator, so I can power practical 12-volt items which are widely available. I'm hoping, quite soon, to be able to power most electrical items in my house from generators running off these things.

This invention is HUGE! How come you guys are not more popular?

John

Update from Robert Calloway on 07/11/01

Magnets...leave the thought of north and south behind for now.

Think flux, repelling flux against another repelling magnet. Flux can be manipulated. Flux is the wind. The flux fields between two repelling magnets does no join or intermingle.

They bulge and deform into different shapes and patterns. Building a PPM requires looking at these flux patterns. All magnets are never the same, even though they look and feel the same.

One could build a PPM and then copy it exactly, and it would not work. You MUST see the flux pattern.

I have specifically said you must view these patterns using a box with metal filings. If you build a PPM without doing this, you are very lucky. "John T" has said that he has built the PPM, and I hope that he has done so. He has also said that he has turned a 6 volt

generator with it, and I hope that he has done so.

"John T" must explain how he turned the generator with the bearings installed to the disks? That means there is no shaft to turn to drive the generator. He could conceivably turn the generator from the disks I suppose. I truly hope he did.

I am beholding to an agreement against full disclosure on this design.

Regards, Robert H. Calloway

Another explanation by Robert Calloway, on his website"

Magnet facts

What is near the Geographic North Pole, a Magnetic North or a Magnetic South?

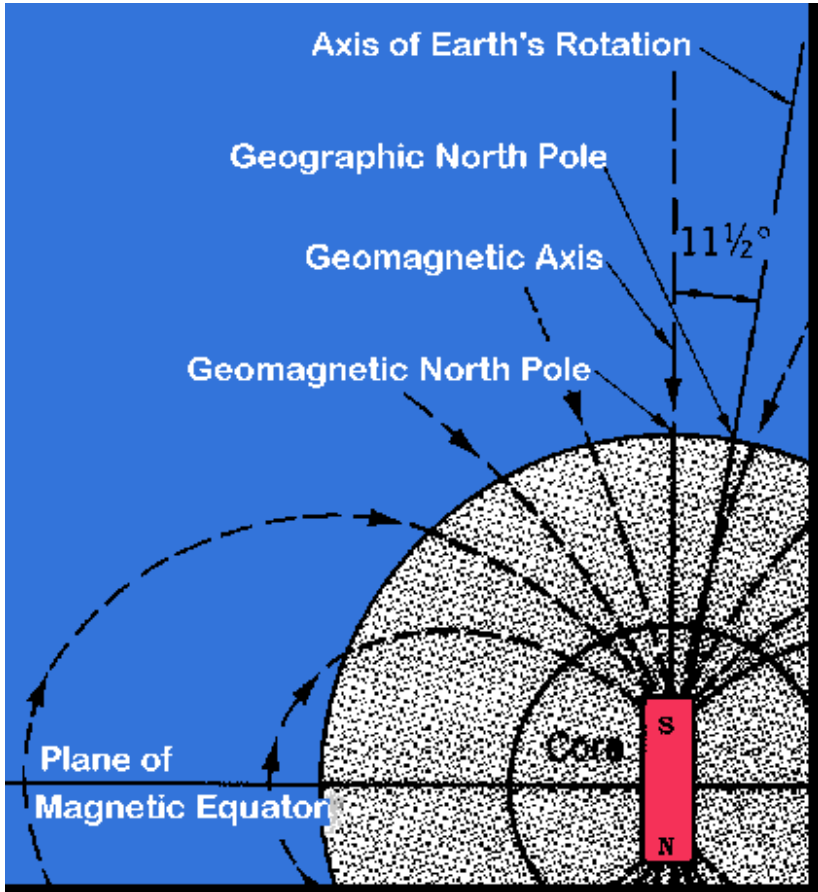
We know two things:

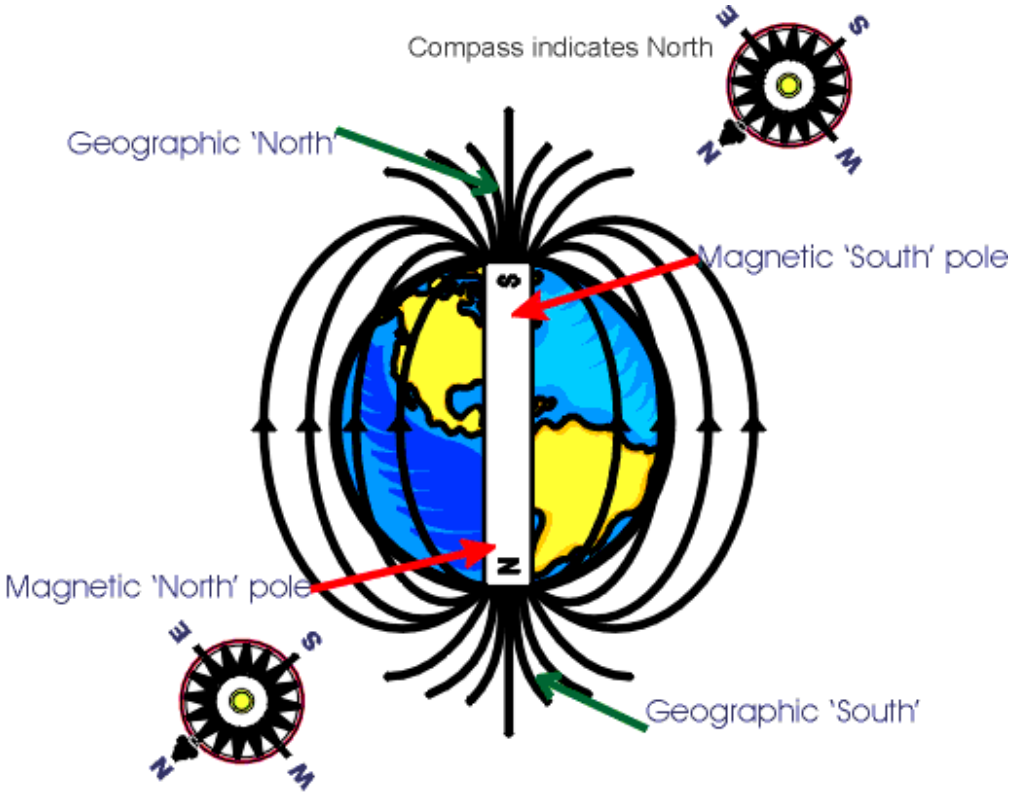
1. If we allow a bar magnet to swing freely on a string, the end that points towards the geographic north pole is called the north seeking pole of the magnet, and is labeled "N" since it is the North magnetic pole of the magnet. Its opposite end is labeled "S" for South magnetic pole. This is the convention used to determine the "N" or North end of a magnet.

2. We know that like poles repel each other and unlike poles attract each other.

Therefore:

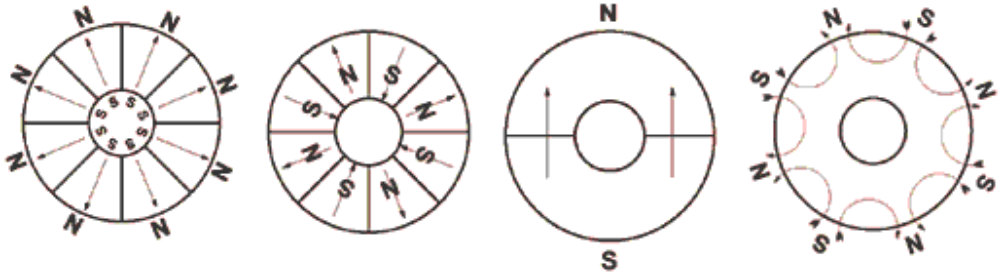
The magnetic field created by the molten core of the earth must have a magnetic South pole near the geographic north pole in order to attract the "N" end of our bar magnet and compass needles. This pole near the geographic north pole is sometimes called the geomagnetic north pole.


Axis of Earth's Rotation
Geographic North Pole
11½°
Geomagnetic Axis
Geomagnetic North Pole
Plane of
Magnetic Equator
Core
S
N



A site with a lot more information about magnets: Magnet Man

Examples on a number of common magnetizations can be found below.



From left to right: radial, radial multiple poles, diametral, lateral multiple poles

The Techno Maestro's Amazing Machine

Kohei Minato and the Japan Magnetic Fan Company

A maverick inventor's breakthrough electric motor uses permanent magnets to make power -- and has investors salivating

by John Dodd



When we first got the call from an excited colleague that he'd just seen the most amazing invention -- a magnetic motor that consumed almost no electricity -- we were so skeptical that we declined an invitation to go see it. If the technology was so good, we thought, how come they didn't have any customers yet?

We forgot about the invitation and the company until several months later, when our friend called again.

"OK," he said. "They've just sold 40,000 units to a major convenience store chain. Now will you see it?"

In Japan, no one pays for 40,000 convenience store cooling fans without being reasonably sure that they are going to work.

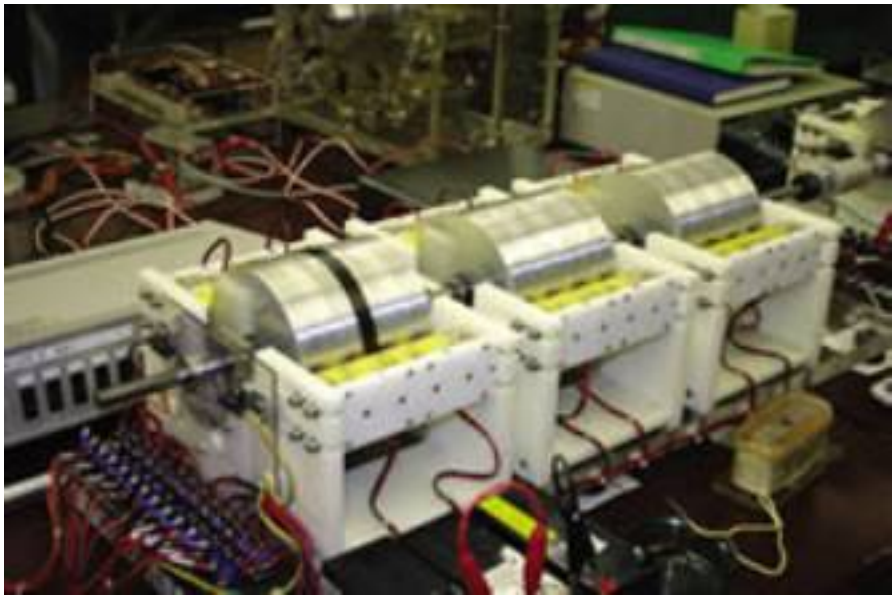
The maestro

The streets of east Shinjuku are littered with the tailings of the many small factories and workshops still located there -- hardly one's image of the headquarters of a world-class technology company. But this is where we are first greeted outside Kohei Minato's workshop by Nobue Minato, the wife of the inventor and co-director of the family firm.

The workshop itself is like a Hollywood set of an inventor's garage. Electrical machines, wires, measuring instruments and batteries are strewn everywhere. Along the diagram-covered walls are drill presses, racks of spare coils, Perspex plating and other paraphernalia. And seated in the back, head bowed in thought, is the 58-year-old techno maestro himself.

Minato is no newcomer to the limelight. In fact, he has been an entertainer for most of his life, making music and producing his daughter's singing career in the US. He posseses an oversized presence, with a booming voice and a long ponytail. In short, you can easily imagine him onstage or in a convertible cruising down the coast of California -- not hunched over a mass of wires and coils in Tokyo's cramped backstreets.

Joining us are a middle-aged banker and his entourage from Osaka and accounting and finance consultant Yukio Funai. The banker is doing a quick review for an investment, while the rest of us just want to see if Minato's magnetic motors really work. A prototype car air conditioner cooler sitting on a bench looks like it would fit into a Toyota Corolla and quickly catches our attention.



Seeing is believing

Nobue then takes us through the functions and operations of each of the machines, starting off with a simple explanation of the laws of magnetism and repulsion. She demonstrates the "Minato Wheel" by kicking a magnet-lined rotor into action with a magnetic wand.

Looking carefully at the rotor, we see that it has over 16 magnets embedded on a slant -- apparently to make Minato's machines work, the positioning and angle of the magnets is critical. After she kicks the wheel into life, it keeps spinning, proving at least that the design doesn't suffer from magnetic lockup.

She then moves us to the next device, a weighty machine connected to a tiny battery. Apparently the load on the machine is a 35kg rotor, which could easily be used in a washing machine. After she flicks the switch, the huge rotor spins at over 1,500 rpms effortlessly and silently. Meters show the power in and power out. Suddenly, a power source of 16 watt or so is driving a device that should be drawing at least 200 to 300 watts.

Nobue explains to us that this and all the other devices only use electrical power for the two electromagnetic stators at either side of each rotor, which are used to kick the rotor past its lockup point then on to the next arc of magnets. Apparently the angle and spacing of the magnets is such that once the rotor is moving, repulsion between the stators and the rotor poles keeps the rotor moving smoothly in a counterclockwise direction. Either way, it's impressive.

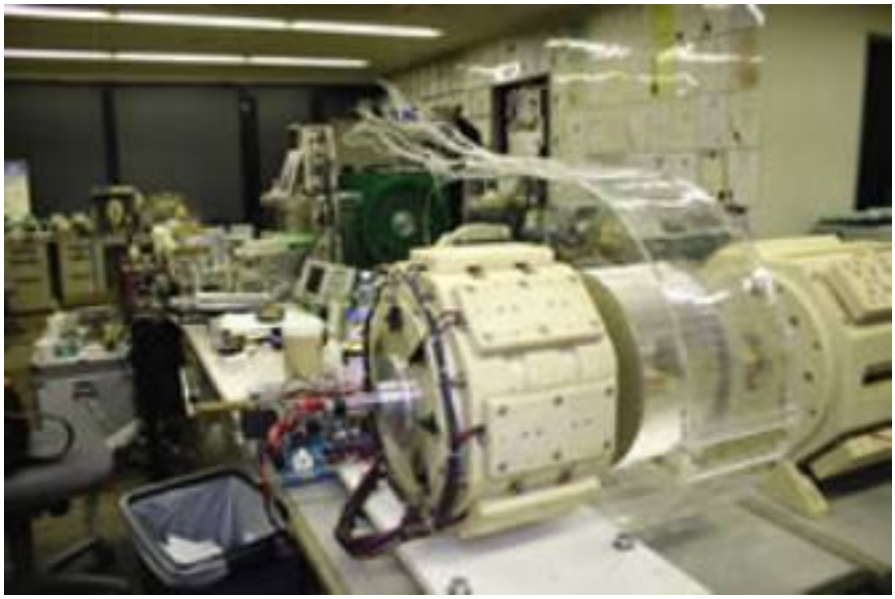
Next we move to a unit with its motor connected to a generator. What we see is striking. The meters showed an input to the stator electromagnets of approximately 1.8 volts and 150mA input, and from the generator, 9.144 volts and 192mA output. 1.8 x 0.15 x 2 = 540mW input and 9.144 x 0.192 = 1.755W out.

But according to the laws of physics, you can't get more out of a device than you put into it. We mention this to Kohei Minato while looking under the workbench to make sure there aren't any hidden wires.

Minato assures us that he hasn't transcended the laws of physics. The force supplying the unexplained extra power out is generated by the magnetic strength of the permanent magnets embedded in the rotor. "I'm simply harnessing one of the four fundamental forces of nature," he says.

Although we learned in school that magnets were always bipolar and so magnetically induced motion would

always end in a locked state of equilibrium, Minato explains that he has fine-tuned the positioning of the magnets and the timing of pulses to the stators to the point where the repulsion between the rotor and the stator (the fixed outer magnetic ring) is transitory. This creates further motion -- rather than a lockup. (See the sidebar on page 41 for a full explanation).



Real products

Nobue Minato leads us to the two devices that might convince a potential investor that this is all for real.

First, she shows us the cooling fan prototype that is being manufactured for a convenience store chain's 14,000 outlets (3 fans per outlet). The unit looks almost identical to a Mitsubishi-manufactured fan unit next to it, which is the unit currently in wide use. In a test, the airflow from both units is about the same.

The other unit is the car air conditioning prototype that caught our eye as we came in. It's a prototype for Nippon Denso, Japan's largest manufacturer of car air conditioners. The unit is remarkably compact and has the same contours and size as a conventional unit. Minato's manufacturing skills are clearly improving.



The banker and his investment

Minato has good reason to complain about Japan's social and cultural uniformity. For years, people thought of him as an oddball for playing the piano for a living, and bankers and investors have avoided him because of his habit of claiming that he'd discovered a breakthrough technology all by himself -- without any formal training.

However, the Osaka banker stands up after the lecture and announces that before he goes, he will commit \100 million to the investment pool.

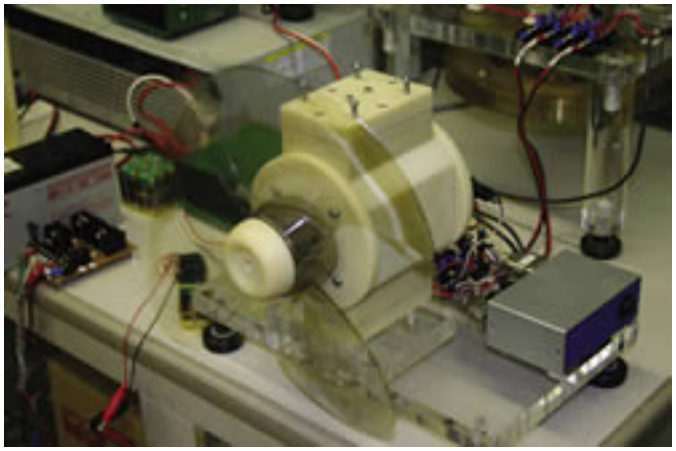
Minato turns to us and smiles. We brought him good luck, and this was his third investor in as many weeks to confirm an interest.

Bringing the tech to the table

With the audience gone, we ask Minato what he plans to do to commercialize the technology. His game plan is simple and clear, he says. He wants to retain control, and he wants to commercialize the technology in Japan first -- where he feels he can ensure that things get done right. Why doesn't he go directly to the US or China? His experiences in both countries, he suggests, have been less than successful. "The first stage is critical in terms of creating good products and refining the technology. I don't want to be busy with legal challenges and IP theft while doing that."

Still, the export and licensing of the technology are on his agenda, and Minato is talking to a variety of potential partners in other countries.

Whereas another inventor might be tempted to outsource everything to a larger corporation, part of what drives Minato is his vision of social justice and responsibility. The 40,000 motors for the convenience store chain are being produced by a group of small manufacturers in Ohta-ku and Bunkyo-ku, in the inner north of Tokyo -- which is becoming a regional rust belt. Minato is seized with the vision of reinvigorating these small workshops that until the 80s were the bedrock of Japan's manufacturing and economic miracle. Their level of expertise will ensure that the quality of the motors will be as good as those from any major company.



International prep

Despite his plan to do things domestically first, Minato is well prepared for the international markets. He is armed with both six years of living and doing business in Los Angeles in the early 90s -- and with patent protection for over 48 countries. His is hardly a provincial perspective.

His US experience came after playing the piano for a living for 15 years. He began tinkering with his invention in the mid-70s. The idea for his magnetic motor design came from a burst of inspiration while playing the piano.

But Minato decided to drop everything in 1990 to help his daughter Hiroko, who at the age of 20 decided that she wanted to be a rhythm and blues star in the US. Minato is a strong believer in family: If Hiroko was going to find fame and fortune in the US, Dad had better be there to help manage her. He suceeded in

helping Hiroko to achieve a UK dance chart number one hit in 1995.

In 1996 Minato returned to Japan and his magnetic motor project. The following year he displayed his prototypes to national power companies, government officials and others at a five-day conference in Mexico City. Interest was palpable, and Minato realized that his invention might meet a global need for energy-saving devices.

Subsequent previews and speeches in Korea and Singapore further consolidated his commitment to bringing the invention to fruition, and he was able to bring in several early-stage investors.

During the late 90s, Minato continued to refine his prototypes. He also stayed in constant contact with his lawyer, registering patents in major countries around the world. Through his experiences in the US he realized that legal protection was critical, even if it meant delaying release of the technology by a couple of years.

Ironically, by the time he'd won patents in 47 countries, the Japanese patent office turned him down on the grounds that "[the invention] couldn' t possibly work" and that somehow he was fabricating the claims.

But a few months later they were forced to recant their decision after the US patent office recognized his invention and gave him the first of two patents. As Minato notes: "How typical of Japan's small-minded bureaucrats that they needed the leadership of the US to accept that my invention was genuine."

By 2001, the Minatos had refined their motors and met enough potential investors to enter into a major international relationship, initially with a Saudi company, to be followed thereafter by companies in the US and elsewhere.

However, fate dealt the investors and Minato's business a serious blow when the World Trade Center was attacked in New York. The Saudis retreated, and Minato's plans fell back to square one.

Now Minato is once again ready to move. With the first order in the works and more orders pending successful prototypes, he has decided that investors don't have to be primary partners. He is actively accepting inquiries from corporate investors who can bring strategic advantages and corporate credibility with them. His company, Japan Magnetic Fan, will make a series of investment tie-up announcements in the first and second quarters of 2004.



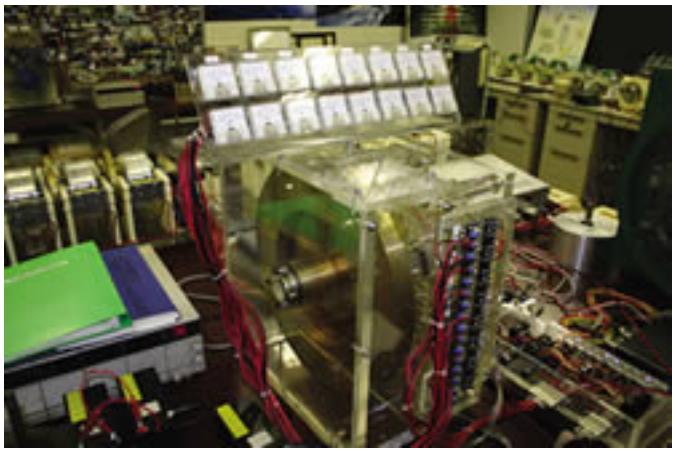
Implications

Minato's motors consume just 20 percent or less of the power of conventional motors with the same torque and horse power. They run cool to the touch and produce almost no acoustic or electrical noise. They are significantly safer and cheaper (in terms of power consumed), and they are sounder environmentally.

The implications are enormous. In the US alone, almost 55 percent of the nation's electricity is consumed by electric motors. While most factory operators buy the cheapest motors possible, they are steadily being educated by bodies like NEMA (National Electrical Manufacturers Association) that the costs of running a

motor over a typical 20-year lifespan comprise a purchase price of just 3 percent of the total, and electricity costs of 97 percent. It is not unusual for a $2,000 motor to consume $80,000 of electricity (at a price of .06 cents per kilowatt hour).

Since 1992, when efficiency legislation was put into place at the US federal level, motor efficiency has been a high priority -- and motors saving 20 percent or so on electrical bills are considered highly efficient. Minato is about to introduce a motor which saves 80 percent, putting it into an entirely new class: The $80,000 running cost will drop to just $16,000. This is a significant savings when multiplied by the millions of motors used throughout the USA and Japan -- and eventually, throughout the world.



The devices

Minato's invention and its ability to use remarkably less power and run without heat or noise make it perfect for home appliances, personal computers, cellphones (a miniature generator is in the works) and other consumer products.

The magnetic motor will be cheaper than a standard motor to make, as the rotor and stator assemblies can be set into plastic housings, due to the fact that the system creates very little heat. Further, with the motor's energy efficiency, it will be well suited for any application where a motor has limited energy to drive it. While development is still focused on replacing existing devices, Minato says that his motor has sufficient torque to power a vehicle.

With the help of magnetic propulsion, it is feasible to attach a generator to the motor and produce more electric power than was put into the device. Minato says that average efficiency on his motors is about 330 percent.

Mention of Over Unity devices in many scientific circles will draw icy skepticism. But if you can accept the idea that Minato's device is able to create motion and torque through its unique, sustainable permanent magnet propulsion system, then it makes sense that he is able to get more out of the unit than he puts in in terms of electrical power. Indeed, if the device can produce a surplus of power for longer periods, every household in the land will want one.

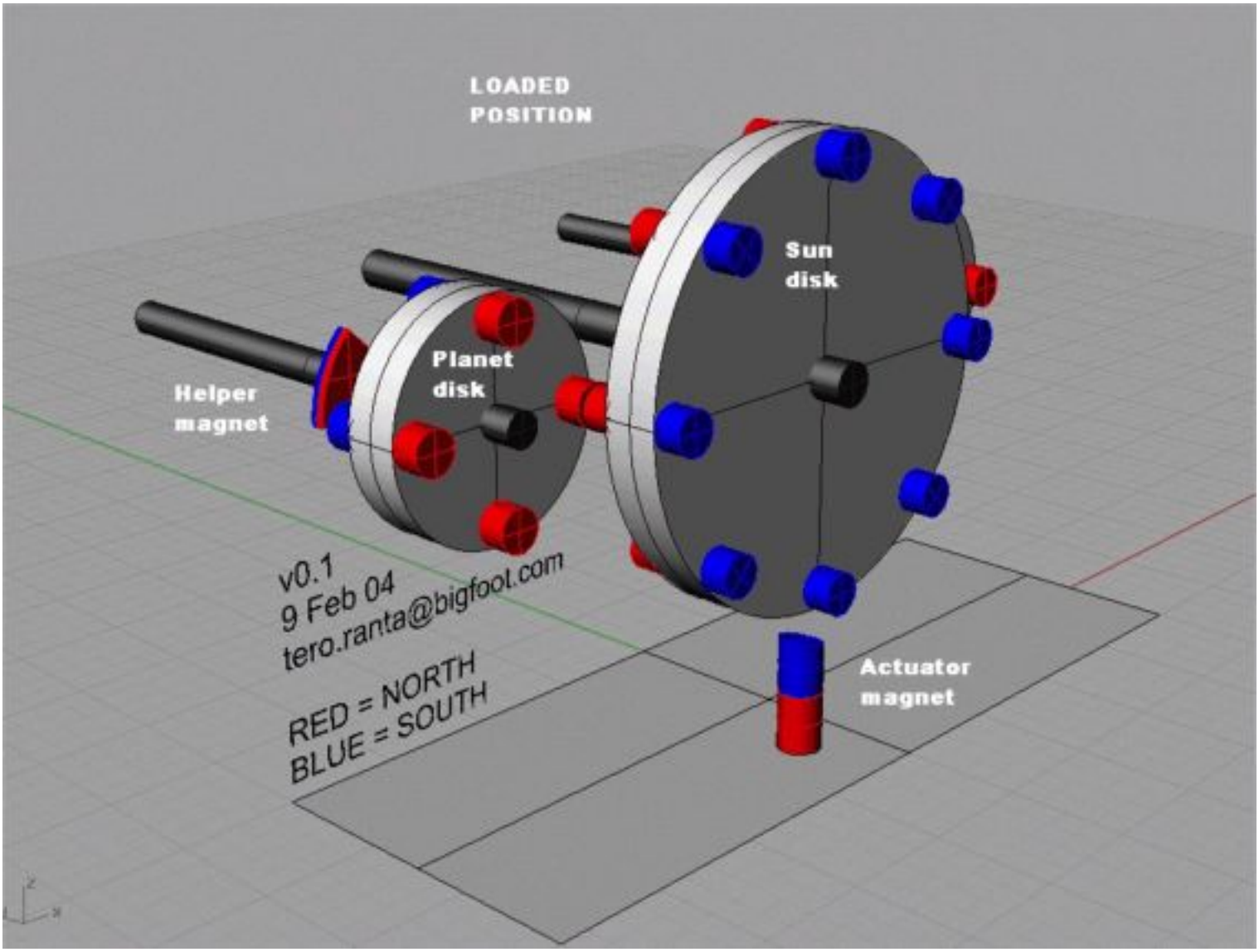
"I am not in this for the money," Minato says. "I have done well in my musical career, but I want

to make a contribution to society -- helping the backstreet manufacturers here in Japan and elsewhere. I want to reverse the trends caused by major multinationals. There is a place for corporations. But as the oil industry has taught us, energy is one area where a breakthrough invention like this cannot be trusted to large companies."

Minato was once close to making a deal with Enron. But today, he is firmly on a mission to support the small and the independent -- and to go worldwide with them and his amazing machine. "Our plan is to rally smaller companies and pool their talent, and to one day produce the technology across a wide range of fields."

Content provided by J@pan Inc. Magazine

The Bowman permanent magnet motor



The Bowman permanent magnet motor

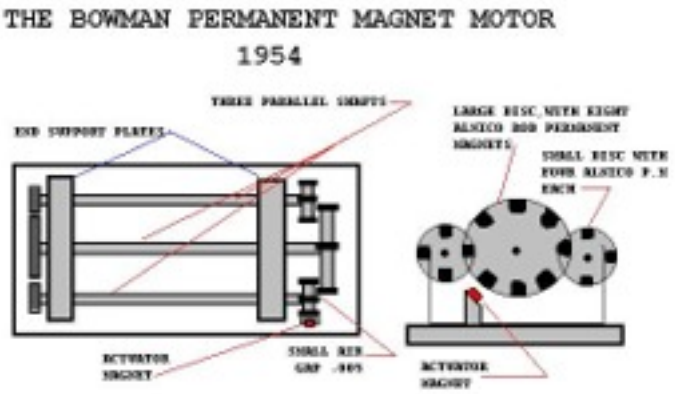
In 1954 an Electrical Engineer named Carl C. Lienau, visiting relatives in California, learns that Lee Bowman of Sherman Oaks is seeking investors for the development of his device which he keeps in a case labelled: "Behold The Energy Of The Universe"-opened the machine is an 8x10x5 inch model mounted on a ½ inch aluminium base. No compartment to hide batteries.

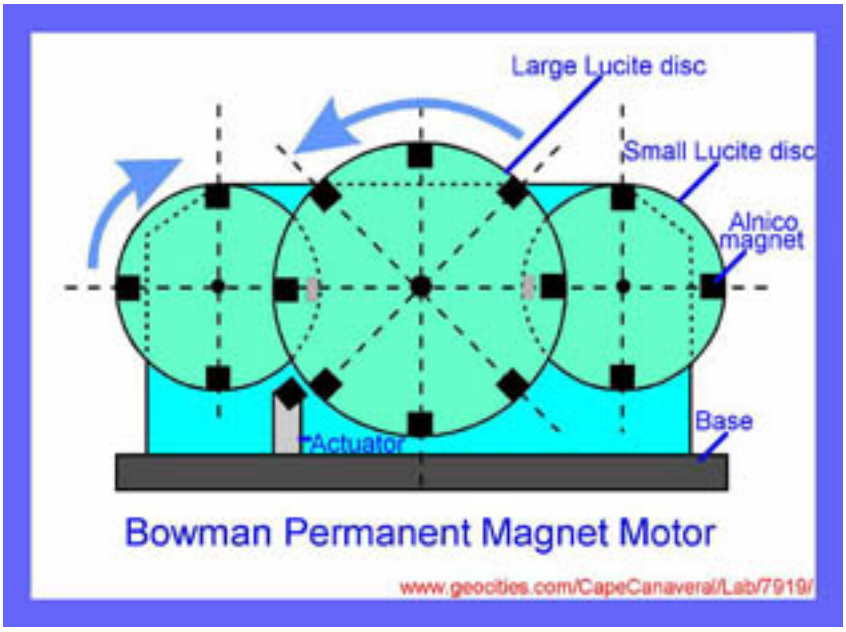
The device consists of three parallel shafts geared together so that the centre one turned in opposite direction to the two outside shafts. There was no electric motor attached to the assembly. On the centre shaft there was a 4 inch Lucite disc about ½ inch thick. At the end of the outside shafts 2 Inch Lucite discs were attached. The discs contained small Alnico magnets, eight of them spaced around the large disc, four around each of the small discs. The Alnico slugs were equally spaced. The Axis of the cylindrical slugs were parallel to the shafts. Their ends were accordingly ground so as to pass close to opposing wheels with only a minute gap. When the wheels were moved by hand the magnetic slugs passed, where so phased as to synchronise in position. Bowman had a small block of aluminium carrying a cylindrical slug magnet whose end had been positioned at an angle. He put the block into a groove in the base where its position was such as to graze the magnet pair coming up. The system then began to rotate at a speed of almost ½ revolution per second of the side shafts. The gears were so positioned that the end shafts ran at the same speed. When the block was slid into a second groove, just opposite the first the system rotated in the opposite sense.

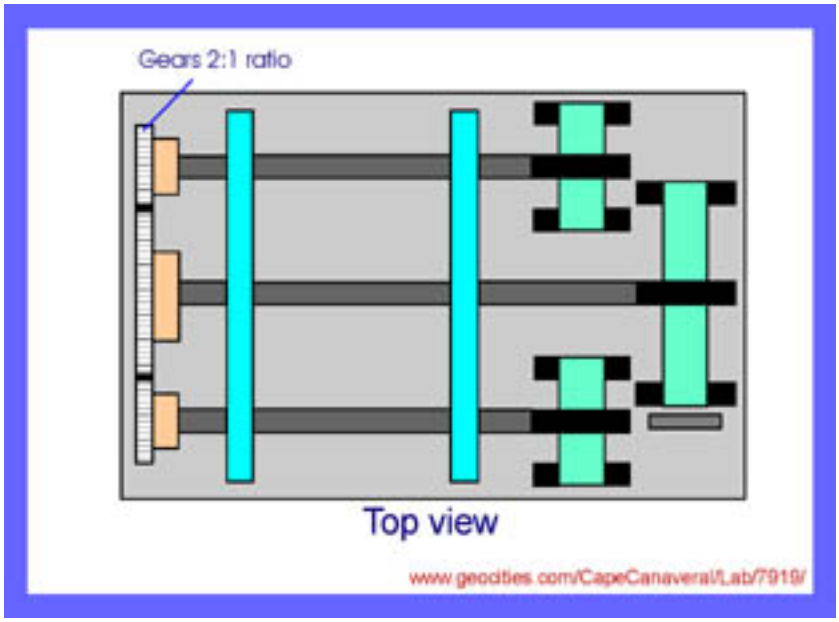
By placing a finger on the periphery of the large Lucite wheel, the friction torque made the system slow down. The energy required to stop the rotation was estimated at about 4 inch pounds. From this the mechanical output was 4 inch pounds

per ½ seconds per rotation. The machine continued to rotate at that speed for 15 minutes before Bowman terminated the operation and inspection by Mr Lienau, who was much impressed and unable to account for the phenomenon. It is understood that Bowman had applied to patent the device, but was refused because the Patent Office considered it an "unpatentable perpetual motion machine."

Bowman related that the manufacturer of his magnets had tested a set of magnets which he used for a year and found that the remanent magnetism had not measurably declined. Lienau subsequently wrote to Bowman specifying the conditions of a Pony Brake test of the machine running in mechanical and technical isolation. If the output continued for a time beyond the specified capacity of the most long - lived batteries equivalent to the 10 lbs. gross weight of the machine, the evidence would be conclusive that the machine was not fraudulent. Bowman had been in communication with competent physicists at the University of Utah. Bowman took umbrage at the implications of the letter proposing a test. Bowman was a fine machinist and had a well equipped machine shop at his home. Lienau estimated that the device required about 100 hours of work. The material costs are not significant. Bowman made his living in geophysical prospecting and exhibited an album of testimonials from clients. At the time of the demonstration Bowman was 75 years old. He decided, according to one report to have his device taken apart and after his death to have the parts buried in different locations in California.


THE BOWMAN PERMANENT MAGNET MOTOR
1954


Large Lucite disc
Small Lucite disc
Alnico magnet
Base
Actuator
Bowman Permanent Magnet Motor
www.geocities.com/CapeCanaveral/Lab/7919/


Gears 2:1 ratio
Top view
www.geocities.com/CapeCanaveral/Lab/7919/

How it works

by Robert H. Calloway

Folks, If you would print A, B, C, D, E drawings, it may help with the explanation of the engine.
As we rotate the center disk by hand clockwise, the unit continuously changes from loaded to release. This is done because all magnet poles are repelling.
Also there is a gear ratio differential continuously being changed. The ratio is 2:1 or 1:2 at all times. When the engine is turned to the loaded position and allowed to return to release position on its own, the ratio is 2:1 from the planet gears to the sun gear.
It has a lot of force built in to this release. I have mine documented in inch lbs. which I will post later.
To make the engine run we have to somehow get the disks in the loaded position for free. To do this we bring attraction into the game.
Attraction will overcome repel every time, and easily using the 2:1 gear ratio. With the engine now in release (Pic B) refer to (Pic D) . We place a attracting magnet behind each planet disk to help pull the sun disk into the loaded position at a 2:1 gear ratio. Also we place a actuator magnet in the repel mode against one of the sun disk magnets. So it is also helping to get the engine loaded using a 1:2 gear ratio. It also tends to help give the engine a sense of direction.
As the engine reaches the end of the final loaded position, this is where magnet overlap between the disks need to be adjusted correctly. This determines the time of centerpoint for release. If centerpoint is to early, it won't release properly from the attracting magnets to the planet disks. This causes a clanking of the gears as it turns, because of the harse shift in gear ratio's. If centerpoint is too late you waste valuable release force and the magnet next in line on the sun disk may not have enough power to overcome the actuator magnet.
Yes, when adjusted properly the release is so strong that it drives the next magnet in line on the sun disk right through the repelling actuator magnet. This is why Bowman had such close gaps between his alinco magnets, he was trying to make his release as strong as possible. Which increases engine speed.
With neo35 magnets we don't have to get that close. It does nothing but chase its own tail setting it up for the next magnet.

I will go through the adjustment steps of the engine in the next email. I

apologize for the poor drawings, maybe someone can draw them better.

Robert

Actuator/helper

by Robert H. Calloway

The actuator magnet and the helper magnets.

I think everyone here is getting the idea of operation and we can now do some fine tuning. If you would move the top of the right helper magnet to the right about a 1/4 of a inch. Now move the bottom of the left helper magnet out the same distance. This will allow for a smooth release into the repel or release mode. Once the helper magnets have pulled the planet disks from their locked positions, the sun disk starts to help reach the balance of center point. Plus with help from the actuator magnet.
Right before center point we need the helper magnets to ease up on their attraction and let overcenter repel take over. Moving those helper magnets out a little on the release ends will allow this to happen.
The one actuator magnet is very important, for more than what you may think or see. The angled or trapezoid end of the magnet is a gate in this design.

I have put together a easy test for you folks to try, and see for yourself that what I say is true. You will need (2) rod magnets as used in the engine. You will need one that has been ground to a angle. First let me explain. To find the exact place of the bloch wall in the rod magnet. Measure it in length and divide by two. This is the exact location of the bloch wall. Now if you were to cut the magnet completely in halve, the bloch wall would move to the center of each halve that was cut. But we are not going to cut the magnet. Take a paperclip and move it up and down the length of the magnet. You will find the bloch wall at the center of the magnet and the paper clip will not stick to it. It will move to one end or the other and travel all the way to the face of the magnet and stay there. This proves that the face is the strongest point of the magnet for repel and attraction.
Now grind a 45 degree angle on the end of the face without taking away any length of the magnet on the high side of the angle.
In other words the overall length of the magnet remains the same. Now, refind your bloch wall. Yep, its still in the same place because you didn't take away any length of the magnet except for one side of the magnet in the angle. Test again with the paper clip. At the angle the clip will go to the highest point in the angle face.
Have your sun disk in place on the engine without the planet disks

being installed.
Put your angled or trapezoid magnet under the sun disk in place. Now place a 9/16 wrench on the outside nut holding the sun disk in place. Now place a load or weight on the end of the wrench. Apply more weight until the sun disk goes through the angled magnets repelling field. Record the amount of weight that it took to do so. Now remove the angled actuator magnet and install the other magnet which is a straight cut end magnet and angle the magnet to the sun disk so that it would appear that we are doing the same thing as the angled magnet or position it any way you wish as long as the air gap is the same as the angled magnet test. Apply the wrench and the same amount of weight. The sun disk will not go through the non-angled magnet. Open the air gap up a little. Still wont go through. Add more weight until it finally goes through the non-angled magnet. Record the weight. You will need roughly about one half as much more weight on the wrench for it to get through the straight cut end magnet. The angled or trapezoid magnet acts as a lower resistance entry gate which indeed is needed for the engine to run.

Be sure you understand the helper magnets importance completely. The actuator magnet must be able to push the sun disk out of the planet disks attraction to the helper magnets into over center repel or release mode. If you think your gaps are to close between the sun disk and the planet disks don't be afraid to put more angle on the actuator magnet. But when you put more angle in the magnet you need to tilt the magnet more to the left because flux still flows straight out of the end of the magnet even though it is angled. The actuator magnet needs to be positioned so that it has the greatest amount of push on the sun disk turning it clockwise.

I also need to let you folks know that the thickness of the helper magnets is not critical. I am now trying to build adjustable helper magnets for my motor. The planet disks can be adjusted further away from them if necessary. Whatever magnets you use, if they are too strong simply back the planet disks away from them for correct adjustment.

I added a drawing (Pic E) that may help you understand how the actuator can be changed by angle.
It comes down to this: More angle, means easier gate entry. Less angle means harder gate entry. The steeper you grind the angle the more the magnet has to tilt to the left to give the greatest push on the sun disk. That push gets you out of the attraction from the helper magnets into

over center to the release mode. Then it simply starts all over agin chasing its own tail.

Robert

Run adjustments

by Robert H. Calloway

Engine run adjustments.

This may save you some time and hassle getting the engine to operate. Let me say here that the engine does indeed have some fairly wide run parameters. Install all disks on the shafts in repel position. Do not install the helper magnets at this time. Adjust the sun disk so that the gaps between it and the planet disks are about 1/4 of a inch at face to face (Pic A) . Install your actuator at a 1/32 air gap to the sun disk (Pic C) .

Now, turn one of the planet disks by hand so the sun disk is rotating clockwise. Check for any binding. Just a smooth recock or reload and release. Now hold the planet disk in the reload position (Pic A) . Now let it go, allowing the sun disk to turn clockwise.
The next magnet in line on the sun disk must go through the actuator angled magnet. If it does not, decrease the air gaps between the sun and planet disks until it does so. Record air gap measurement. Now measure torque using a torque wrench or use the 9/16 wrench method and record the weight it takes for turning the PLANET disk to get it into the reload position. Remove the sun disk. Place the helper magnets behind the planet disks, by super gluing or some other method (some thoughts here from the group).
Be sure they attract to the back side of the planet disks. (Pic D) . With the sun disk still removed, adjust the planet disks gap to the helper magnet by measuring 1/2 the weight or 1/2 the torque if you used a torque wrench.
In other words each planet disk will be pulling the measured torque when the sun disk was in place. So each planet disk needs to pull 1/2 that torque plus a little. Now...plus a little. Folks we are adjusting magnetic flux fields. All engines will be slightly different. You have to use horse sense here. If you do not have any, go find someone that does for that adjustment.
Therefore all measurements are approximant. If your planet disks are too close to the helper magnets, you will have a release problem. If they are not close enough, they will never pull the sun disk into loaded position. This is where it would be handy to have some kind of adjustabilty to the helper magnets.
Install the sun disk and adjust to the recorded air gap. If the engine tries

to run while adjusting, remove the actuator, but put it back in the same place after adjustments to the sun disk gaps.
The engine will now start turning if you are in the ball park. You can play with engine speed by increasing the actuator magnet angle.

Remember. Repel force is less at the lower part of the angle because you are closer to the bloch wall. A steeper angle means a easier entry gate. To a certain point. If you grind away to much magnet material gauss rating will drop drastically causing it not to give the required force on the sun disk to get past over center at the planet disks. So it has to played with.
But for now, just get it running. Robert

Device test

by Robert H. Calloway

To test any Bowmans that have been built, do this test. Place your actuator magnet in place like shown on Pic C. Now gently turn one of the planets disks in the direction that the actuator is trying to turn the sun disk by hand. When it reaches cocked position Pic A , release it. If this motor is going to succeed, it must go through the next magnet in line. If it doesn't, one must move the disks gaps closer together. If it still wont....the motor wont work. Robert

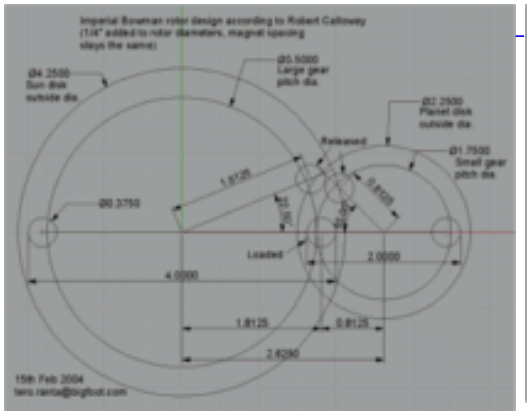


Dimensions

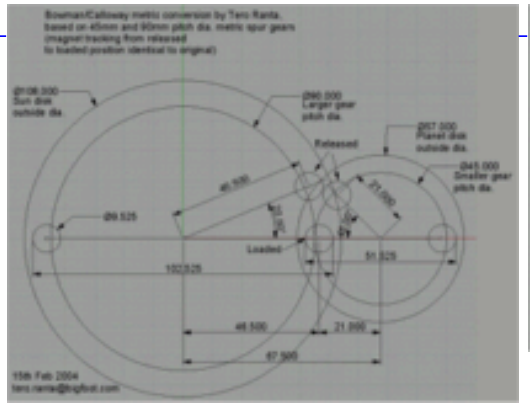


by Chris Hamm, click on the image to enlarge

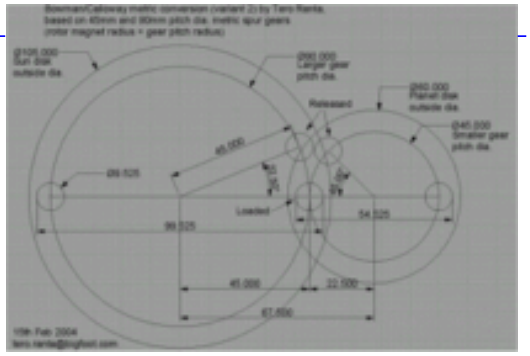
Imperial



Metric



Metric, (Gears 2:1 AND magnets 2:1)



by Tero Ranta,
click on the image to enlarge



(printer friendly versions)

Rotor dimension calculator

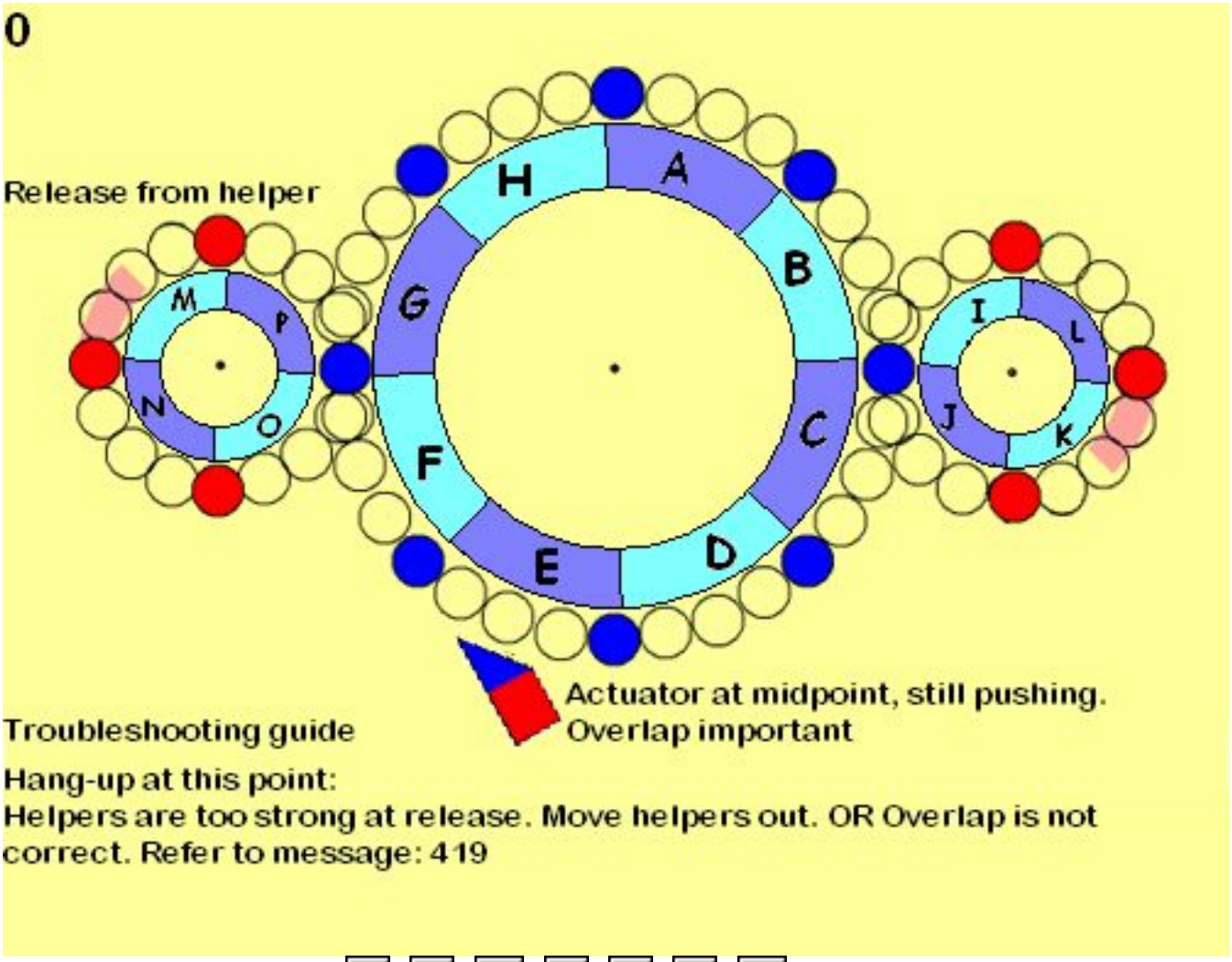
by Mark Hayton

Dimensions	In ◉	Cm ○
Pitch diameter big gear	3.5	
Pitch diameter small gears	1.75	
Gear axis spacing	5	
Rotor magnet diameter	.375	
Magnet overlap %	1	
Magnet to rotor-edge thickness	0.125	
Radius calculations		
Small rotor magnet radius	0	0
Small rotor radius	0	0
diameter	0	0
Large rotor magnet radius	0	0
Large rotor radius	0	0
diameter (constant ○)	0	0
Verification summary		
Large:Small magnet radius ratio	0	
Percent magnet overlap	0	
(Re-)calculate		

maximize normal

Bowman Magnetic Motor Simulation

Robert H. Calloway's version



Parts list for the Bowman Permanent Magnet Motor

Main list

Eric's

Main parts list

Description	Specification	Quan	Part number	Supplier
Steal gear	70 teeth, 3.500 pitch dia, 0.375 bore	1	U-GSS-1470	www.smallparts.com
Steal gear	35 teeth, 1.750 pitch dia, 0.375 bore	2	U-GSS-1435	www.smallparts.com
Rotor material	12" x 12" x 0.500" thick Delrin	1	U-SDE-0500	www.smallparts.com
Shafts	Titanium or Stainless steel non-magnetic threaded rod 3/8 coarse thread 12" long	3	316 threaded rod	www.mcmaster.com
Magnets rotors	3/8" x 1" long Neo35 rod magnets Request at the time of ordering that the picker uses a gauss meter to match a set of magnets for you.	16	ND381-35	www.magnetsource.com
Magnet actuator	3/8" x 1" long Neo35 rod magnets	1	ND381-35	www.magnetsource.com
Magnets (helpers)	1/2" long x 3/8" wide x 1/8" thick Neo, Arc shaped cut from a 1" x 1/2" x 1/8" rectangular magnet	2	NB15321-35	www.magnetsource.com
Bearings	1" OD with a 3/8" ID Bore	6		

Pillow blocks	Accepting the bearings	6		
Nuts	Stainless steel, non-magnetic. To mount all parts to the shafts	24		
Washers	Stainless steel, non-magnetic. To mount between the parts and the nuts	24		
Other material	Plexiglass or wood (no aluminun) to build a base			
Note:	Stainless steel all-thread bends easily. Do not over tighten nuts. The center wheel will be 4.000 inch dia. cut from .500in thick Delrin The (2) outer wheels will be 2.000 inch dia. cut from .500in thick Delrin			



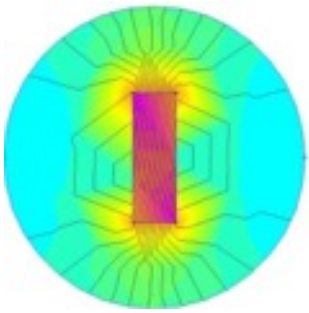
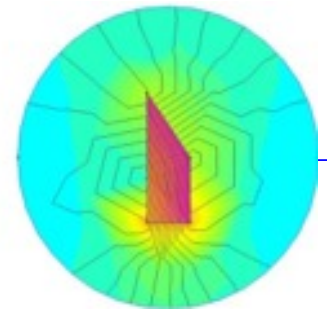
Robert Calloway's device



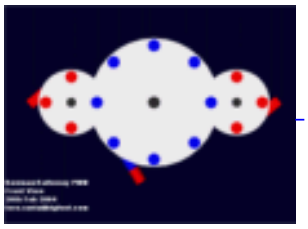
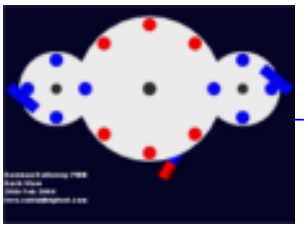
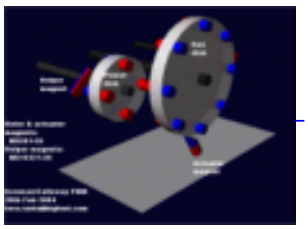
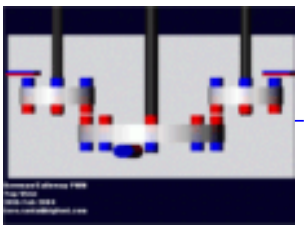
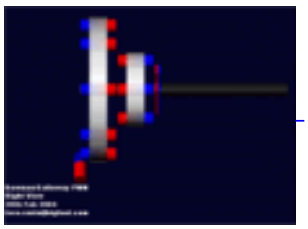


click on a picture to enlarge (before download)

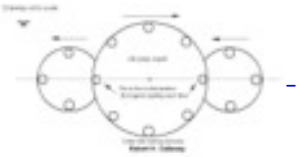
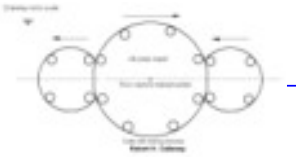
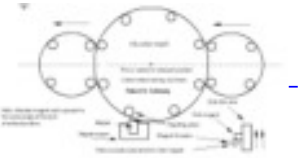
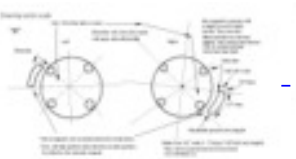
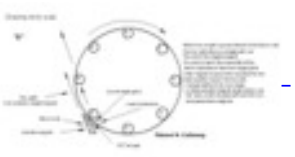
Flux density plot actuator

3d conceptualization, by Tero Ranta

Other Bowman files from CallowayMotorsGroup


A

B

C

D

E

Other wheels: Bowman





Encyclopedia

- **Gears.**
  Pitch diameter means the "effective" diameter of the gear. The outside diameter is slightly larger. You must use the pitch diameter to determine the spacing of the shafts.

  For example, assume that you have two gears, one with 90mm pitch diameter and 93mm outside diam and the other with 45mm pitch diam and 48mm outside diam. The spacing of the centers of the two parallel shafts would then be 90mm/2+45mm/2=67.5mm



Tips & tricks

- **Grinding actuator.**
  Grinding the actuator will heat up the magnet. You must avoid this because it destroys the NEO.
  A way of cooling is: Get a thick piece of aluminum. Put a small puddle of water on it. Hold warm magnet in puddle against aluminum. It will instantly suck the heat from the magnet.

- **Grinding in general.**
  - When grinding your magnets, wrap the bottom half of the magnet with aluminum foil and coil a wire around the foil to secure it on the magnet. Solid MIG/TIG Aluminum welding wire will work, or even magnet wire. You will have a big heat sink depending how much foil you use. You can even dip the end of the foil in a cold glass of water for more heat transfer, or blow cool air from a fan through it as you're grinding. Be careful it isn't too cold or the magnet may crack from the temperature difference.
  - Place a steel rod or screw driver on the end of the magnet that will be cut off so the little piece doesn't fly off and land on your skin or eye and burn a hole through

it. (Wear eye protection, duh. Wear a mask so you don't breath the poison metal dust.)
    - Place a steel plate in the vicinity of where the Neodymium dust will fly off as you are grinding to collect the magnetic dust.
    - Have a fire extinguisher or wet towel just in case the dust explodes or starts to burn.

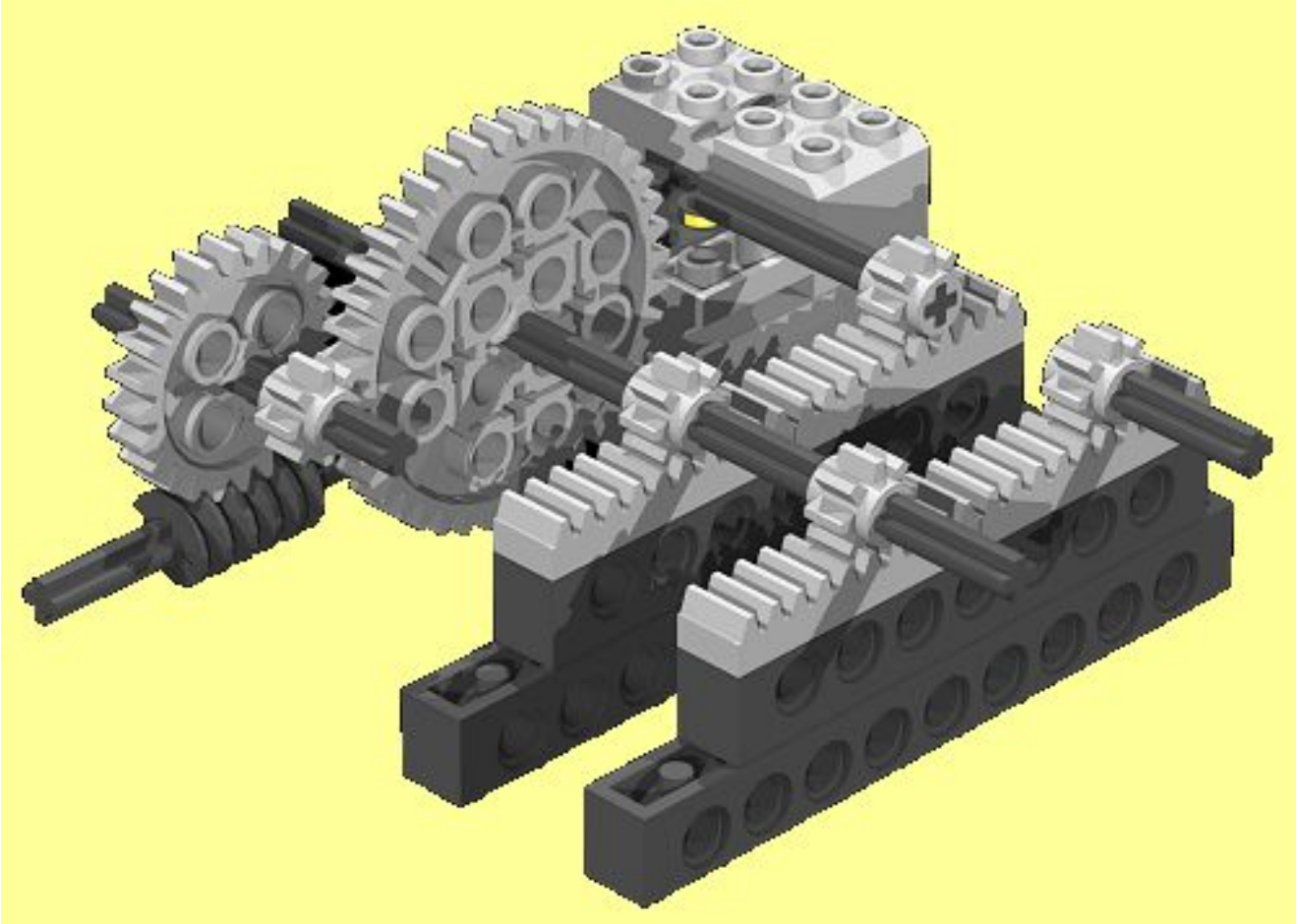
- **Mounting rotors.**
  When drilling holes in the sun and planet rotors, drill extra holes between the magnet holes on both the planet and sun rotors. This extra hole could then be used to insert a dowel rod (temporarily) to line up the sun and planet rotors while tightening the nuts on the gears.



Bowman replication log

Start

R. Calloway
J. Crawley
J. Friday
T. Goerz
R. Graff
C. Hamm
M. Hayton
T. Ranta
B. Rinon
M. Turner
S. Utne
E. Vogels



Bowman replication log

Start

J. Crawley
J. Friday
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R. Graff
C. Hamm
M. Hayton
T. Ranta
B. Rinon
M. Turner
S. Utne
E. Vogels



Lloyd B. Zirbes

Start

Lloyd B. Zirbes

Blueprints
Parts list
Assemblies

The late geomagnetic researcher Dr. Lloyd Zirbes discovered that Galileo's suppositions are complete error. He proved that Newton's law of gravity is also an error. This puts the foundation of science and technology of our world on error and lies. You can't build a world on error, or it will fall. It is unfortunate that we are the "last generation" Mat.24:34 who will "witness" the END of the WORLD.

Zirbes strongly opposed the technology utilized in the HAARP system. He wrote, 'Disruption of the Earth's magnetic field will complete damages to the planet's balance done by the government nuclear bomb blasts in the natural radiation belts above the ionosphere. Earth's magnetic field keeps the planet in balance with the moon and sun. Disrupting the field will be the last straw in sending Earth into the sun or out into space."

G=MV2: Gravity = Mass times Velocity squared - Dr. Lloyd Zirbes.

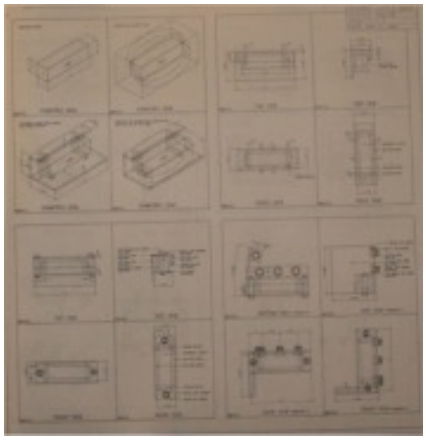
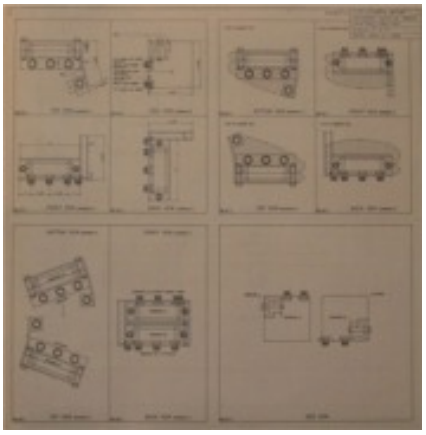
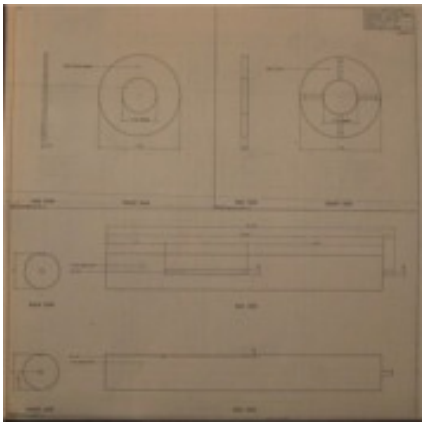
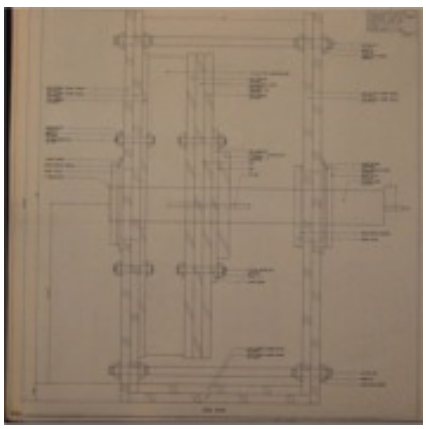
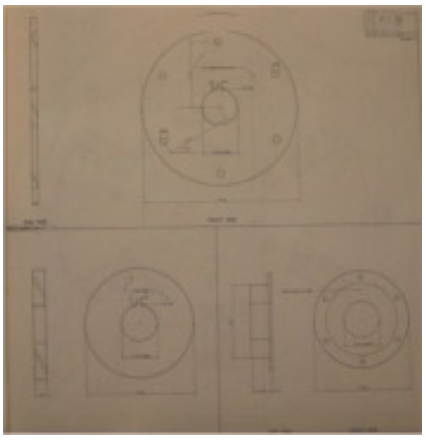
Blueprints

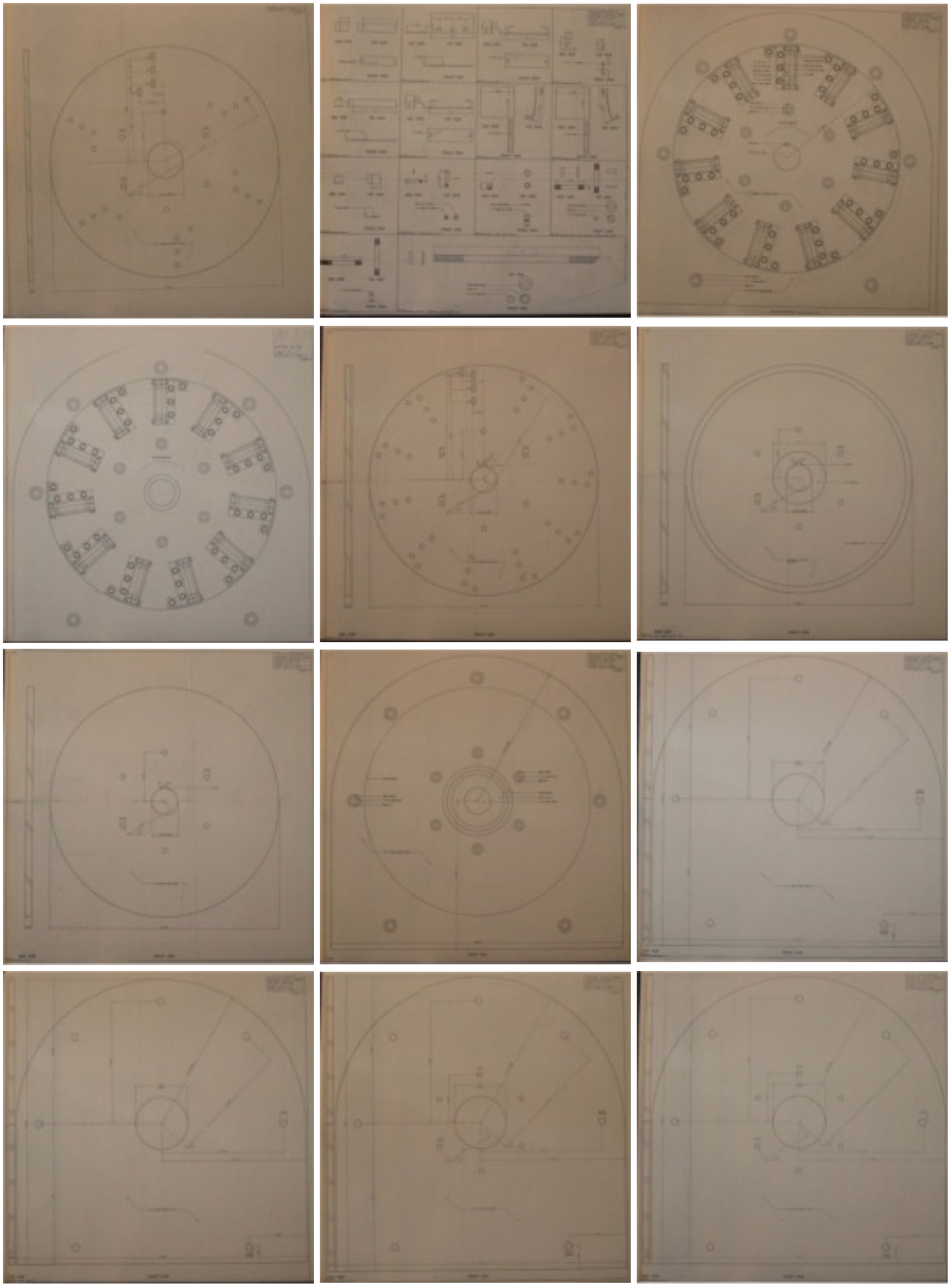
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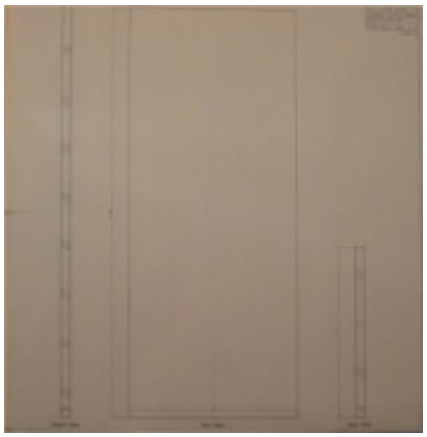
Lloyd B. Zirbes

Blueprints
Parts list
Assemblies



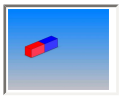
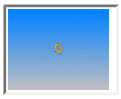
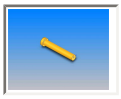
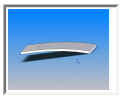
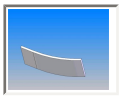
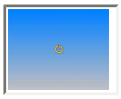
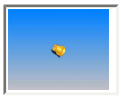


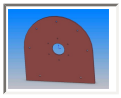
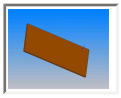
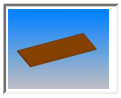
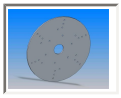
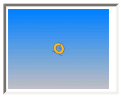
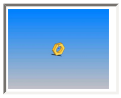
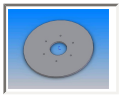
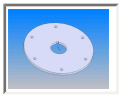
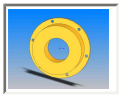
Parts list

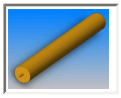
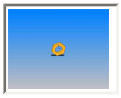
Start

Lloyd B. Zirbes

Blueprints
Parts list
Assemblies

#	Part	Description	Quant	Draw	Pict
1	M001	Permanent magnet	17	Y	
2	E002	Mild iron	17	Y	
3	E003	Mild iron	17	Y	
4	E004	Mild iron	17	Y	
5	CS005	Coppar spacer	34	Y	
6	E006	Brass	17	Y	
7	W007	Washer	34	Y	
8	S008	Screw	17	Y	
9a	K009A	Mild iron	11	Y	
9b	K009B	Mild iron	6	Y	
10	W010	Washer	68	Y	
11	S011	Screw	68	Y	

12	E012	Mild iron	17	Y	
13	PW013	Plywood	1	Y	
14	PW014	Plywood	1	Y	
15	PW015	Plywood	1	Y	
16	PW016	Plywood	1	Y	
17	PW017	Plywood	1	Y	
18	PW018	Plywood	1	Y	
19	SM019	Stator mount	1	Y	
20	B020	Bolt	6	Y	
21	W021	Washer	24	Y	
22	N022	Nut	24	Y	
23	R023	Rotor (magnet mount)	1	Y	
24	R024	Rotor (lead filling)	1	Y	
25	R025	Rotor (alu. flange)	1	Y	
26	R026	Rotor	1	Y	
27	RM027	Rotor mount	1	Y	
28	RM028	Rotor mount	1	Y	
29	B029	Bolt	6	Y	
30	FB030	Flange bearing	[2]	N	
31	SB031	Surface bearing	3	N	

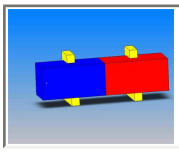
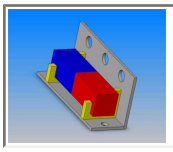
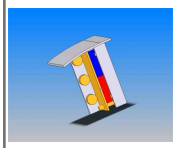
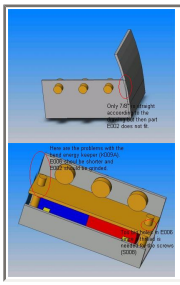
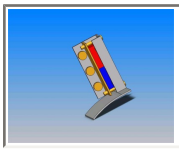
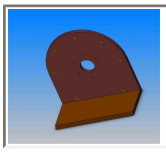
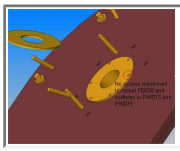
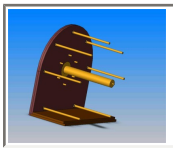
32	C032	Collar	3	Y	
33	S033	Shaft	1	Y	
34	B034	Bold	7	Y	
35	W035	Washer	14	Y	
36	N036	Nut	14	Y	

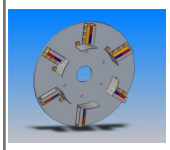
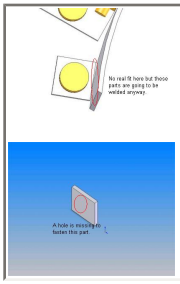
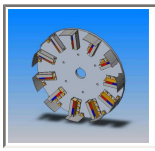
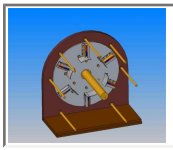
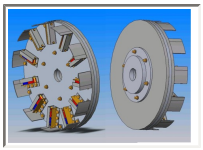
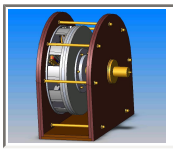
Assemblies

Start

Lloyd B. Zirbes

Blueprints
Parts list
Assemblies

#	Description	Pict	Errors
1	Magnet in spacers		
2	Lead in aluminium flange		
3	Magnet shield construction		
4	Energizer A (to rotor)		
5	Energizer B (to stator)		
6	Halv the case under construction		
7	Case with shafts		

8	Energizers on stator		
9	Rotor under construction		
10	Completed stator in case		
11	Rotor mounted on flywheel		
12	Zirbes' Flux-o-matic motor		

Metal Spinning Tutorial

PROCESS

Spinning sheet metal on the lathe is an excellent means for quickly prototyping round hollow metal forms (primarily the realm of expensive sheet metal stamping machinery). A levered force is applied uniformly to the sheet metal by rotating the metal and its intended form (mandrel) at very high rpms, thus the sheet metal is deformed evenly without any wrinkling or warble. The spinning process allows for the rapid production of multiple parts as well as quick reiteration since only the one tool (the mandrel) need be modified.

Depending on the complexity of the part being spun, spinning can be highly demanding physically. The more comfortable one gets with the process, and using one's muscles to just guide the tool and one's body to apply the force, the easier it gets (great for developing strong hands).

The final product should have a mirror sheen, or until one is more skilled with the finishing tool, small concentric annular grooves on the exterior surface. The interior surface (against the mandrel) should be as smooth as the surface of your mandrel. Metals harden as they are worked which sometimes necessitates annealing the piece partway through a spin, but often this isn't necessary and the metal hardens to a desirable stiffness as the part is spun.

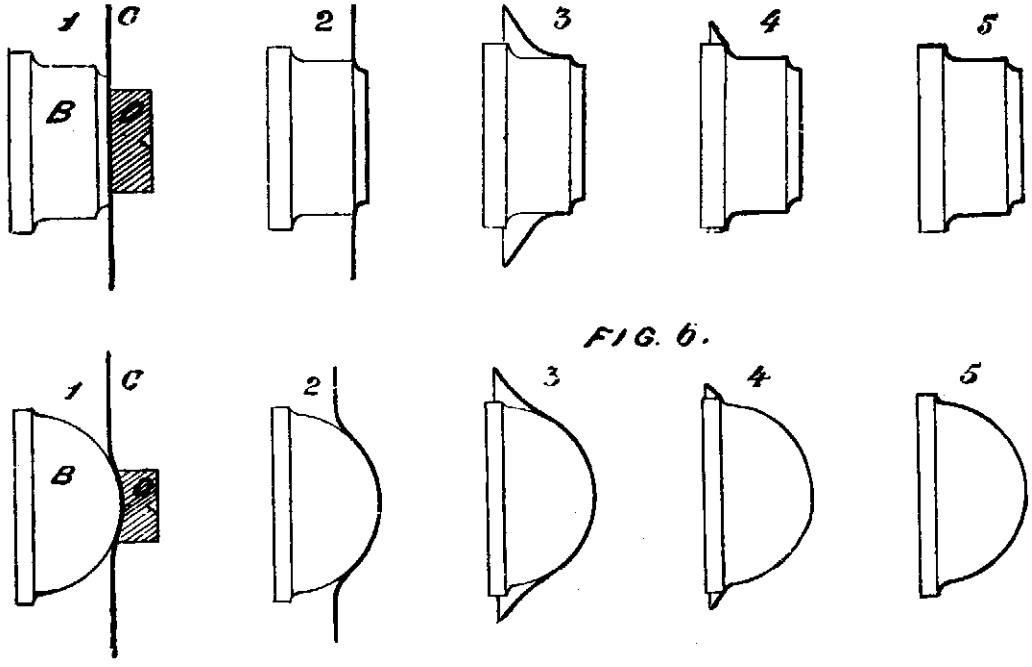


FIG. 6.

APPLICATIONS

Spinning is a great means for manufacturing low cost rapid prototypes in metal, because it requires a minimum of time and money to produce parts. An average part can be spun in five to ten (5-10) minutes once one is familiar with the process.

Smooth parabolic curves (bell form) are ideal for spinning as the metal is comfortable deforming along a parabolic curve. The venturi form of velocity stacks for racing car carburetors is a common application of the spinning technology. A solid cylinder such as a Coca-cola can be spun, but a minimum of draft angle is required to pull the part back off the form (*see mandrel section for more*). Elliptical and off-center forms can be created, but they require great care and patience.

There is also the opportunity to create concentric strengthening ribs which add dramatically to the stiffness and strength of the part. These can be formed directly (over the mandrel) or spun in the air (tricky) as the part is closed down onto the mandrel. An edge may also be folded over itself or with wire inside to create a finished, smooth edge to the part.

METALS

Almost every metal that is available in sheet form may be spun (tubing can be pinched or swaged but is usually made from harder alloys). However, a few metals are ideally suited to the art of spinning. Aluminum is fantastically elastic and easy to form so long as it has been annealed. The softer (i.e. purer, non-alloyed) the aluminum the better. Hence, 3003 is better than 5052 , and 1100-0 is the best to use especially since 3003 doesn't anodize very well. However, 5052 is the strongest work hardening aluminum, but harder to form. Try to buy the aluminum sheet annealed (1100-**0,** 3003-**0,** etc.; **not** 1100-H**32**, 6061-T**6**, etc.). **H** denotes strain hardenable aluminums and **T** denotes thermally treated aluminums. Sheet metal can be spun in thicknesses of 0.040" to 0.100" with hand tools.

Stainless steel is even more elastic (stretching before tearing) than aluminum (50%-68% elongation!) but requires significantly more force to form. The *Austenitic* range (200-300 series) of stainless steels form best, 201 and 301 having the greatest elongation. Similarly, the lower the Carbon content in mild steel the easier it is to form. Copper has excellent elongation (very formable) and doubles its tensile strength when work hardened, but if it hardens before the

part is finished then the part must be annealed to prevent shearing and cracking. Brass is a copper-zinc alloy and has similar properties to copper in its formability but brass work hardens less and requires more force. Other exotic metals may be spun: titanium, magnesium (@ 600°F), silver, gold, etc., but they require extra care and consideration.

CHART OF ALLOY COMPOSITION AND RELATIVE ELONGATION:

Generally, the greater the % elongation is the more formable the material.

Note: Recommended materials in **bold** face type.

Material	Alloy composition	% elongation for 2"
•Aluminum 1100-0	**99%Al**	**60% elongation**
•Aluminum 2014-T6	90%Al - 4.4%Cu - 1%Mg, Mn, Si	13% elongation
•Aluminum 3003-0	98%Al - 0.12%Cu - 1.2%Mn	30% elongation
•Aluminum 5052-0	97%Al - 2.5%Mg - 0.25%Cr	25% elongation
•Aluminum 6061-T6	1%Mg - 0.6%Si - 0.28%Cu, Cr	17% elongation
•Aluminum 7075-T6	90%Al - 1.6%Cu - 2.5%Mg	11% elongation
•Commercial Brass	90%Cu - 10%Zn	45% elongation
•Red Brass	80%Cu - 20%Zn	50% elongation
•Yellow Brass	**65%Cu - 35%Zn**	**64% elongation**
•Free Cutting Brass	61%Cu - 35%Zn - 3%Pb	60% elongation
•Phosphor Bronze	91%Cu - 8%Sn	65% elongation
•Manganese Bronze	89%Cu - 11%Mn	40% elongation
•Copper	**99%Cu**	**60% elongation**
•Nickel Silver (coins)	70%Cu - 5%Zn - 25%Ni	45% elongation
•Steel (low carbon)	98%Fe - 0.3%C - 1%Mn, Si, Cu	20% elongation
•Stainless Steel		
Martensitic: 400 - 500	92%Fe - 1%C - 10%Cr	10% elongation
Ferritic: 405,430,446	20%Cr - 0.2%C - 1.5%Mn	20% elongation
Austenitic: **201**,**301**	**18%Cr - 0.1%C - 8%Ni**	**68% elongation**
302,304,310,321	26%Cr - 0.03%C - 22%Ni	50% elongation
•Titanium	99%Ti	25% elongation

Al=aluminum, C=carbon, Cr=chromium,Cu=copper, Fe=Iron, Mn=manganese, Mg=magnesium, Ni=nickel, Pb=lead, Si=silicon, Sn=tin, Ti=titanium, Zn=zinc

TOOLS

There are an infinite variety of tool profiles that can be forged in mild steel for spinning the material into different shapes. A long handle provides ample leverage to work the material down the mandrel in smooth efficient strokes. The wooden butt of the tool is placed in one's armpit such that one's body weight provides the force and one's arms are free to guide the tool in a smooth and precise manner. The tool is usually about three (3) feet long with a one (1) inch diameter steel rod forged into the preferred tool point.

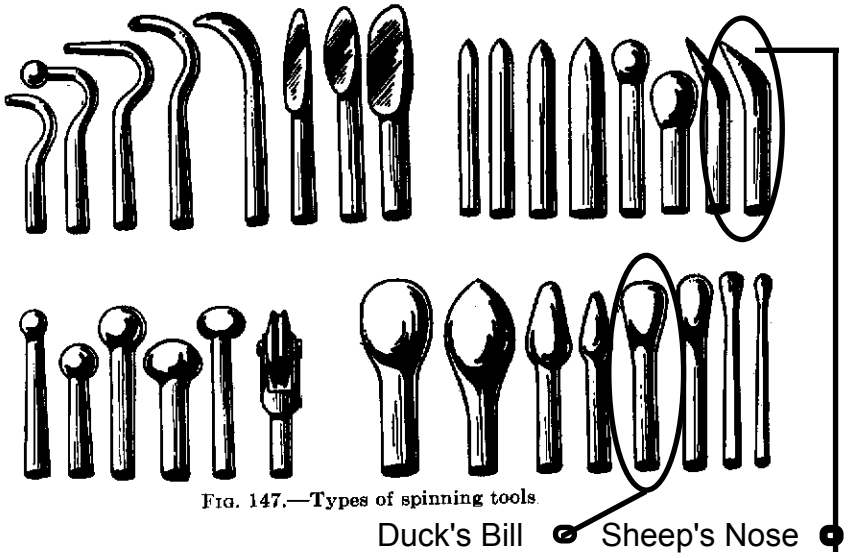


FIG. 147.—Types of spinning tools

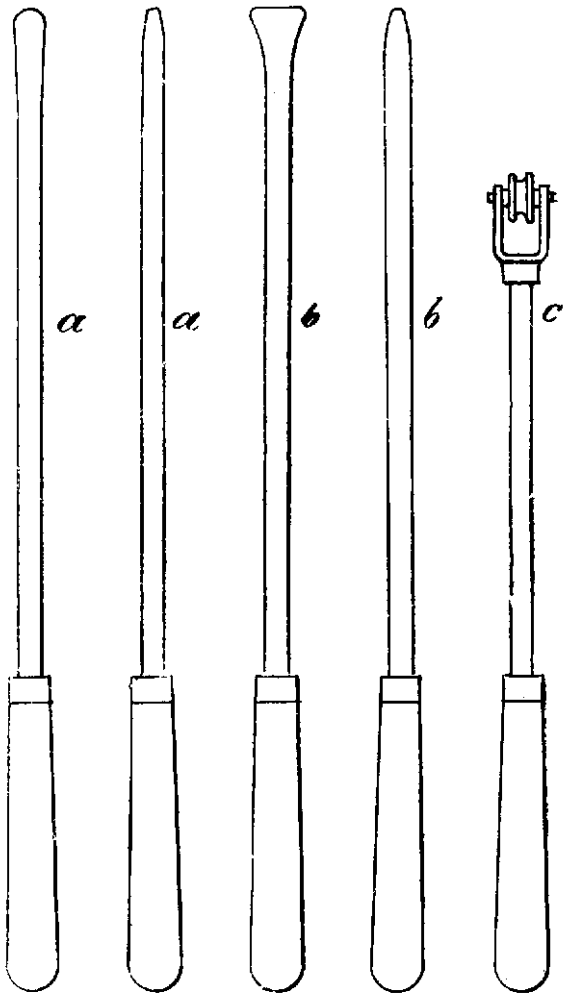
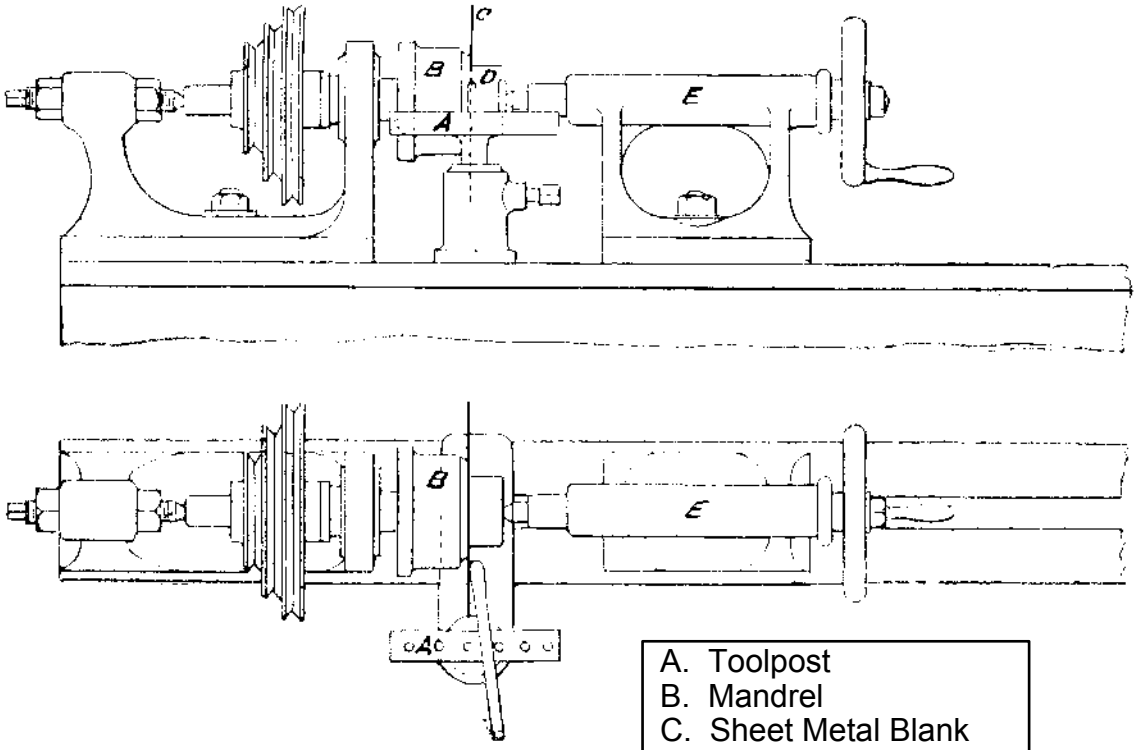


PLATE XIV.—TOOLS FOR METAL-SPINNING.

The primary tools are the *Sheep's nose* used for most of the forming, and the *Duck's bill* used for finishing (see *a & b* above) the fully formed piece. The hooked nose of the *Sheep's nose* is ideal for forming tight radii as well as having a decreasing radius that makes it easy to form the metal over a variety of curves. The *Duck's bill* has a flat side for finishing straight surfaces and a rounded side to finish curved surfaces. The tool post is essentially a rounded pin protruding from a boring bar mounted on the crossfeed such that the pin acts as a fulcrum around which the hand tool can be leveraged. The tool post is moved as the part forms down the mandrel so that a consistent lever arm is maintained.



Custom grooving or forming tools can be easily fabricated and even mounted directly to the crossfeed if it is a simple form. Spinning with the tool attached to the crossfeed limits one's ability to feel the material and form it smoothly. A compromise, for example, is swaging where a rolling tool forms the metal without a buildup of friction (i.e. bad surface finish).

Professional spinning shops typically use tools with rollers mounted on a five (5) foot long steel tube handle for forming everything (from lamp shades to pots) and a peg board mounted on the cross feed so that they can form the parts as quickly and efficiently as possible. There are also a few manufacturers that have CNC spinning lathes, but it is generally a lost art in the age of metal stamping.

Lubricant

A lubricating wax or grease is essential to a quality finish and just being able to remove your part from the mandrel. Stick wax works great although it gets lumpy sometimes. Grease doesn't lubricate as long and tends to spray all

over the place. There are some special brown spinning waxes that last longer than the others, but it is messier than the grease. Therefore, stick wax (available at ShopTools or Danmar) is a great general-purpose lubricant. However, another lubricant might be better for use under the part on the mandrel to facilitate the removal of the part from the mandrel.

Gloves are an important safety and performance-enhancing tool. A leather welding glove worn on the left or clamping hand alleviates pressure and vibration causing fatigue and numbness. It also protects the hand from the spinning part. Cotton (not nylon) gloves can be worn for comfort as well, but the leather is, obviously, preferable.

Files and sandpaper can be used for final finishing, but as one gets more proficient at spinning sanding shouldn't be necessary.

Another necessity is a grungy workshirt as any lubricant will spray one's attire with a nice Dalmatian pattern.

SAFETY

Since one is spinning at very high speeds and applying a large amount of force by hand, safety awareness is **essential**. Directly mounting the mandrel to a headstock plate (there are a couple on the lathe bench) is preferable as there are no protruding jaws to run into with the tool or one's hand. This has the added benefit of automatically centering your tool every time you mount it on the lathe (**highly recommended**). The 3-Jaw chuck is the biggest danger one will confront when spinning. If the mandrel is chucked up in the 3-Jaw then one should leave plenty of room between the 3-jaw and the finished part and exercise extreme caution when the tool is anywhere close to the 3-Jaw. The use of the 3-Jaw also prohibits turning the lathe at high rpm's for finishing (max. 1000rpm with 3-Jaw).

It is important to be aware of what state the material being spun is in, i.e. is there localized hardening, are there thin spots, likely shearing or wrinkling, etc.? Make sure the tailstock is clamped tightly as well as all the headstock bolts and tool post. Always move the tool post away from the part when sanding or filing so that it doesn't catch on anything. If the part fails (shear or extreme warpage), brake the lathe fully and stop the part with a tool before it sands a groove into the mandrel.

Wearing a glove on the left clamping hand will protect one from the sharp edge of the spinning part and absorb vibrations that cause numbness. Use one's

body weight to apply the force to the part so that the arms are free to guide the tool, otherwise one will fatigue very quickly and not be as smooth and precise (see forming section). Curl one's fingers over the tool post and away from the part. File sharp edges off of part to eliminate burr cuts, but be sure to clean all chips and debris off the mandrel or it will scratch the mandrel and damage the part.

MANDREL

The mandrel or buck is the form over which the sheet metal blank is formed. There are limits to the shapes one can spin, but, generally, the more complicated the form the greater the need for care in machining the mandrel. As mentioned in the Safety section, it is highly recommended to mount your mandrel directly to a headstock plate with at least three (3) 3/8"-16 bolts. Once bolted and centered on the lathe all subsequent machining will create a perfectly centered mandrel (every time you remount, too). If the 3-Jaw must be used with the mandrel then a centering hole in the end of the mandrel is imperative for re-centering.

The mandrel can be machined from a variety of materials, each of which has its own cost and strength attributes. Renshape and wood are the cheapest buck-making materials, with Renshape less likely to hold an edge without cracking where wood will deform after repeated spinning efforts. Wood mandrels are excellent for simple bowl and bell forms (no hard corners). Aluminum mandrels are fairly sturdy but tend to gall, especially if spinning aluminum over them; not recommended unless spinning copper or other soft metals.

Steel Mandrel

A mild steel mandrel requires extra up front machining (a carbide tool works wonders), but it yields a superior finish surprisingly easily (a file, then 120-600 sanding), holds sharp corners and subtle radii through multiple parts (up to the 100's), and stays centered. A smooth finish is essential to removing the part without damaging it. When finishing the face of the mandrel extra care should be exerted with steel so that the mandrel isn't knocked off center necessitating shimming and retorquing

(been there). A half center is a useful tool for finishing the face with the alignment help of the tailstock.

Therefore, if one is spinning a simple form and only needs a few parts, a wood or Renshape mandrel can be used. If one is attempting to spin a more difficult form and needs a greater number of parts and/or attempts, then steel is highly recommended (besides it's satisfying to machine).

It is important to design the mandrel with at least a 1° draft angle so that the part can be removed from the mandrel. Smooth curves are the most forgiving forms for spinning, but sharp corners can be accomplished as long as the material isn't stretched to quickly. The general rule for the overall proportions is for the mandrel to be shorter than it is wide, but as one gets more skilled at spinning these rules can be pushed.

Undercuts

The part can't be removed from the mandrel if there are undercuts, but if necessary parts can be spun with undercuts if the mandrel is divided into pieces that can be notched and bolted together, and most importantly unbolted without damaging the finished part.

It is advisable to leave at least 2-4" of mandrel beyond the desired finished part length (toward the headstock) so that the part can be finished cleanly and without the danger of back extrusion (the part will literally extrude toward the tail stock if it has nowhere to go forward). It is preferable to have a small dimple or otherwise non-flat face on the mandrel so that the sheet metal blank will stay centered during the spinning process when sandwiched between the mandrel and a follower in the tailstock (see lathe section).

It is possible to spin an elliptical or asymmetrical form, but it requires extreme skill and moral turpitude.

LATHE

The headstock is the driving face of the lathe and is the side to which the mandrel is mounted, preferably on a headstock mounting plate rather than a 3-Jaw chuck as emphasized in the Safety section.

The tailstock is clamped down securely with a live center pressing against a follower (usually aluminum or steel) made to reflect the shape

of the mandrel face such that the sheet metal blank is sandwiched tightly against the mandrel and can't slide out.

Spinning should be accomplished at 900-1200rpm for forming, and 1800rpm for finishing (but max. 1000rpm if using 3-Jaw chuck). The tool post should be moved to follow the form every 2-3 inches.

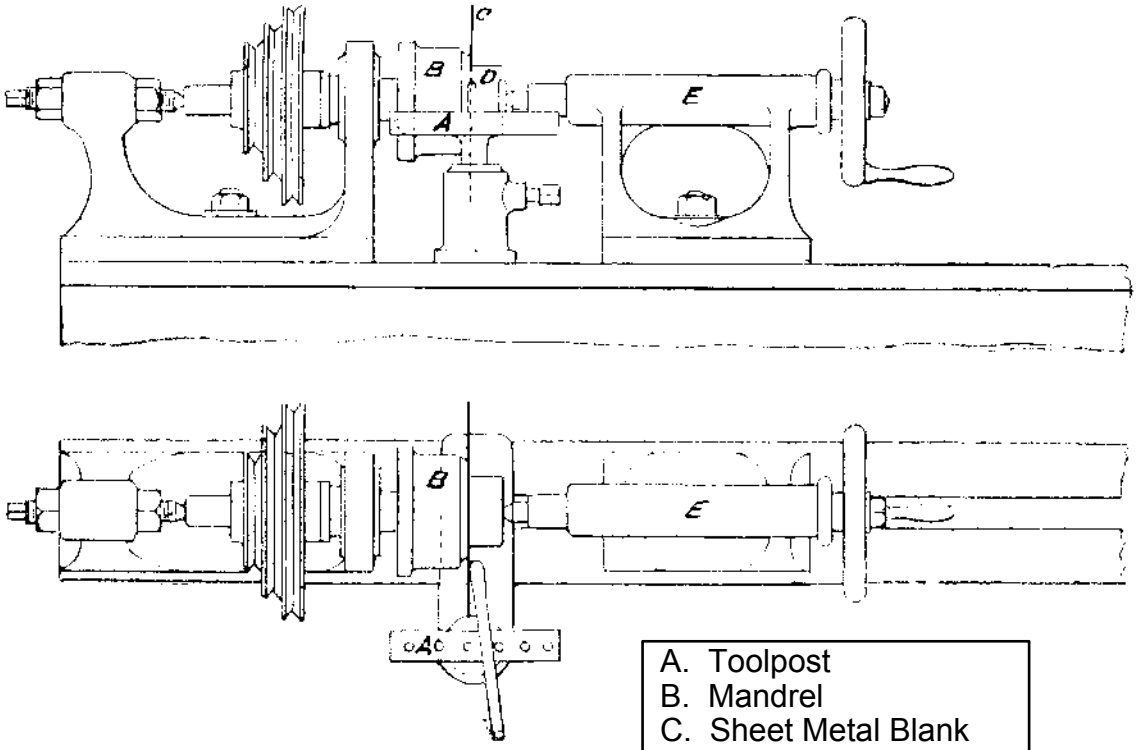
Precision centering of the mandrel is critical to final finish and the overall ease of spinning (very sore armpits from eccentric chatter).

FORMING

Forming is accomplished by working with the material, feeling its structure, its grain, its hardness, its willingness to move in the directions that you want it to. It is critical that one be sensitive to the material's willingness to move so that you can force the material down the mandrel smoothly, quickly, and most importantly, evenly. Smooth, even rowing strokes are the key to spinning good parts.

One should spin it thin and smooth, like throwing a thin wall clay pot; in fact, the process of spinning sheet metal is remarkably similar. One must push enough material down onto the mandrel without stretching or warping the remaining material so that a smooth, steady draw of the material over the mandrel is accomplished.

The sheet metal blank should be a disc approximately equal in radius to the desired part's length plus radius times 80%[D =.8(l+r)].



One's body weight and the fulcrum of the tool post are used to create a powerful lever arm that almost effortlessly moves the material down the mandrel. The effort comes in trying to direct and smooth the material. So, it is important to save one's arm and hand energy for guiding the tool and not for applying force to the part. As mentioned in the Tools section, the wooden butt of the 3-foot long spinning tool is placed in the armpit and held in place with the right hand near the middle and the left hand curled around the tool post securing the tool to the pivot or fulcrum. Once the lathe is turning, one holds the tool as described and leans slowly down and to the right while sweeping the tool smoothly across the part from inside to outside (right to left).

The hooked tip of the *Sheep's nose* tool should be placed below the follower (at 6 O'clock) for maximum force with the least amount of chatter. Initially, small orbital strokes near the center of the part (or as near to center as the follower allows) should slowly push the sheet metal blank into a flared bell shape, again moving inside to outside. Exert care because the part is not yet seated and could easily be knocked off-center.

Seating the Part

Once the blank has been flared about 1" then the part should be persuasively pushed against the mandrel so that at least the top 1/2" of the part is seated securely on the mandrel. A solid drone is discernible when there is no gap between the part and the mandrel. If seating on a mandrel with a sharp edge extra care should be taken not to overwork the edge (cracking) while still assuring a secure seating of the part.

Once the part has been seated then it is merely a matter of patience as the rest of the forming follows quite predictably. The bell curve or hyperbolic flare is the shape the material wants to take, so one allows it to go where it wants so long as there is a valley to push down onto the mandrel and a hill or bump to keep the outer edge from warping or mis-aligning when the blank is stretched down onto the mandrel. For simple bowl and bell shapes a bump isn't necessary, but for more complicated (especially more cylindrical) forms maintaining a bubble near the outer circumference of the blank is critical to prevent warping and warbling.

Forming Motion

The laying down of the material onto the mandrel is accomplished with short inside to outside moves, but the bump is smoothed from the outside back in such that the top of the bump is smoothed to the inside with several gentle strokes, then when the material (the valley) is laid down onto the mandrel the bump will flare out again.

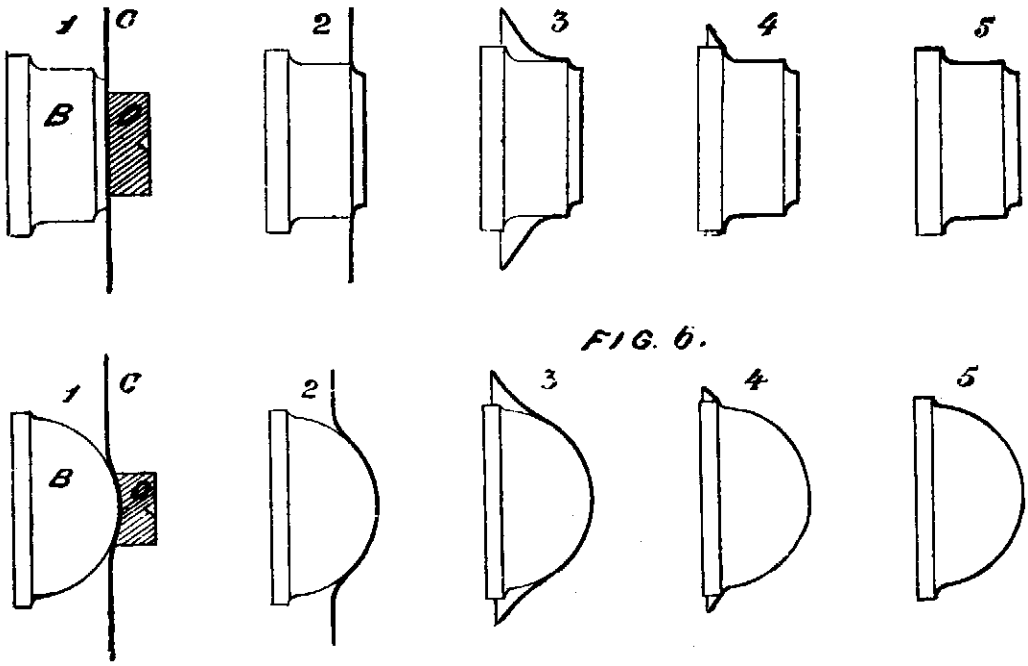


FIG. 6.

The material will get easier to move as the part is closer to completion (unless it has work hardened too much in which case it should be annealed), but patience must be exercised so that the fully formed part requires a minimum of finishing. Just keep repeating the same smooth fluid strokes from inside to outside until the part is seated and then start to move the material from the outside in, but always try to leave a bump or rib to protect against warping and over-stretching.

Flaring

Sometimes, the part will flare too much toward the tailstock when laying the part down too hard (maintaining a rib prevents this). Several cleaning swipes from inside to outside with extra force applied at the end of the stroke should form the part back to a subtle flare. Alternately, the part will sometimes fold toward the headstock in which case strong cleaning swipes from inside to outside with extra force applied in the

middle should pop the part back toward the tailstock. If not then the part may be worked from the backside, but this is not very clean.

If warbling occurs try to wipe it out with smooth **hard** strokes, but if the warbles are along the edge then a wood stick (with the spinning tools) with a slot in it can be forced over the edge of the part and twisted while steadying on the tool rest which should smooth the warbles. **Important**: keep the mandrel and part clean of any chips or debris to prevent scratching of the mandrel and damage to the part; and clean the part and **re-lubricate** when there are any signs of material build-up, especially with gall-happy aluminum.

Trimming

Remember to plan for trimming part at end; cutting tool can be mounted on tool rest, but may leave a groove in mandrel (prohibiting finishing past that point on future parts); so bandsaw and belt sander are a safe trimming option, especially if unsure of desired final length.

FINISHING

Finishing is accomplished with smooth right to left sweeps with the *Duckbill* spinning tool using the flat side for straight surfaces, and rounded side for curves and radii. The *Sheep's Nose* tool can be used for tight corners, but the duckbill is favored for most finishing. Finishing should be done at very high rpm's (1200+rpm) so that a minimum of force need be applied and very smooth fluid strokes can be used.

It is important to feel the material on a more subtle level when finishing, the hills and valleys felt during forming are now very minute and require extra sensitivity to smooth the hills into the valleys. A push and release rhythm of hills into valleys literally moves a few thousandths of material down the part so that an even, smooth finish with fine annular grooving is achieved. **Careful** of working one area too thin or overheating, which causes stress fractures.

CRAFT

Spinning is truly a lost art form in the age of deep draw metal stamping, but it is much more economical (for runs under 100,000) and yields a more perfectly finished final part (no stretch marks). It is a fantastic process to

establish an intuitive sense of materials and how can best take advantage of a material's intrinsic properties. There is a sense of quality inherent to the process of metal spinning that makes it a true craft. Developing a feel for the material with all of one's senses allows one to push the material and the spinning process to yield a perfect part effortlessly. Listening to the tool on the part; feeling the resistance of the material; learning the rhythms of spin forming; interacting with the structural transformations that are occurring as the part is formed down the mandrel are key to the art of spinning.

The magnets go all the way around the donut. It was originally done this way as we had originally planned to place an hourglass form on both sides of the donut. But when the hourglass started to turn and it worked fine that way then we never pursued the dual sided hourglass forms. Now we are working to do that. The hourglasses will probably rotate in opposite directions.

According to my logic here, the same principle should apply to a flat surface vs. a flat-sloped surface like placing magnets on the sloped surfaces of fan blades repelling a level above platform of magnets all pointing downwards at the fan blade magnets. This is worth experimenting with because it would prove, overall, the concept of my theory. If this works then i believe that a basic equation can be derived to explain other more advanced systems based on this theory. Then multi lateral formations within formations can be assembled to amplify the effect of geometrically boosted rates of acceleration of the original motion. If this all proves to be the case then I know that the US government is going to pay me a visit based on what they have done already.

Now I know the threat that I pose to corporate America. I have been studying the web and have discovered that people like myself don't stick around long after the word is out so I will share everything I have before they visit me again. There have been weird things happen to me and weird things that I discovered about my donut unit since we last posted. My unit flies AND produces electricity. I have discovered on the web a thing called the Searl disk. I have essentially recreated that effect in my unit and will be shut down because of it. My dad has already told me to disassemble my units and forget the whole thing but I will not. Jason has found a way to direct a beam of electricity like a laser from the donut unit to any target miles away. This is very important. It is a weapon and what ever the 4 inch diameter whitish blue electrical beam hits it disfigures the object sort of like as he says disrupting the object on the molecular level. I understand this. An object that flies under it's own power.

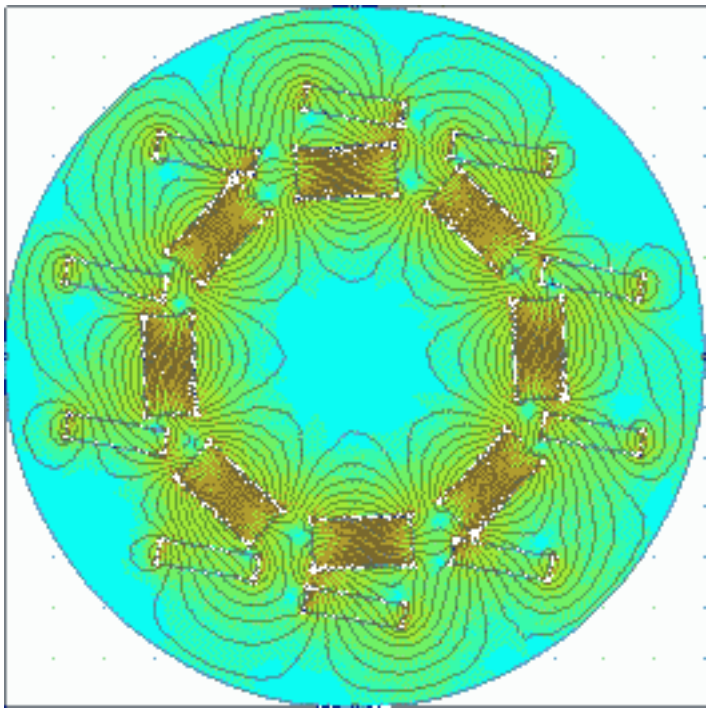
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FLYING DUTCHMAN PROJECTS

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Guest book

Administration

Magnetic simulation by Nick Rasmussen
([Switch] to the 3d animation of Nick Rasmussen)
([Switch] to the device animation of Alexander O. Spiridonov)



Explanation by Jan P. Cack

A Simple Idea

I had only a mild interest in Perpetual Energy at this time. For some reason the idea planted a seed in my brain. Soon after I realized this may be possible. If you take a magnet and move another magnet towards the first, opposites attract, and then before they can touch, the first magnet rotates 180 degrees. Barely "dodging" the second magnet. After a brief energy loss, the 2 magnets are now pushing against each other, same poles repel, and the first magnet is now oriented to "affect" the next magnet in a rotating cycle. Which, obviously, is reversed polarity from second magnet. It seems to be an efficient cycle. Everything was easy to understand and common sense tells us "forces" are at work. My first drawing of this was February 11, 2005. This looked very appealing on paper. That, in itself, appeared to be no extraordinary discovery. It was a simple concept that made a pretty picture. Surely this has been observed before. This would seem to be "common knowledge". So I began many searches about magnets, and different configurations where my idea was documented with possible results obtained. Still I was only tickling myself with the conception of Perpetual Energy. After a brief inability to find this simple principle in action, I decided to go a step farther. Why not? I have some time and the power of "AUTOcad" at my disposal. This suddenly became much more interesting!

The Pattern

The spark was set. I put together a bunch of "what if" geometry. Thank you "AUTOcad". Given the fact that a "rotor" could be built with "opposing magnets", we would need an even number of "arms". I constructed 4 in my computer. The first had 4 arms. The second had 6 the third was 8, and the last one had 10 arms. On the end of each "arm" I color coded a magnetic "area". Then proceeded to construct a ring containing my, 180-degree, rotating "stator" magnets. Starting with an equally spaced array of 4 stator magnets. Proceeding in succession until I ended with 19 stator magnets. After that the ring became too "cluttered", so I stopped. This is easily re-created with almost any drawing program. Simple enough. That did not take long. Nor was it an "event". But..after placing my geometry on top of each other, I began suddenly to realize an "opportunity". I got very excited at this point. The fire soon spread, and fast. Within the geometry I created there were several possibilities within each "rotor" created. They were removed to another drawing for further review. Was this the answer? The results were very promising with regard to the overwhelming numbers of possible candidates. So I inspected them all thoroughly searching for my "best case scenario".

I was about to explode. Deciding on the "8 arm rotor" and the "10 stator ring" gave me an "object" to build upon, analyze, and SIMPLIFY. It makes a very pretty picture on paper. WOW, I still could not believe that this information was any great revelation. Just a series of patterns I constructed out of curiosity. There was still a lot of work to do. Lost interest in everything else at that point. Since I couldn't sleep or eat much I had plenty of time to play with my "new" toy. Wife getting angry now, says I am obsessing way too much. Other things demanded my attention now. But there was no stopping the frenzy in my head. If this "dream" could be true, nothing else mattered to me. Sorry Wife.

The KISS Engine Evolved

Armed with this exciting new concept, I set out to make my "stator" magnets rotate at my control. At first this seemed way harder than it appeared. I envisioned the stator to be a Disc Magnet, not sure why? But it stuck for a short time. The exact size or shape of this magnet has far more possibilities than I can briefly list, so long as the "concept" remains the same. Rotation, at first, presented itself many obstacles. Timing was crucial. A "slip" would result in destruction of the magnets themselves. They have to be "flawlessly" rotated then "locked" into position. I assumed this would have the strongest "push/pull" that I can get. It all got very complicated very quickly. What a challenge? Faced with an overwhelming choice of options to be explored. All of them riddled with more friction and instability than I could afford. So I kept rolling this "contraption" virtually in my head. A little KISS here, a little KISS there. I was determined once this gigantic obstacle was overcome, my "Baby" would, and could, "breathe life". A little KISS here, a little KISS there. It was all I could think about. Sleep is way over rated anyway. My Son is also beginning to get angry now because I won't let him on the computer to play games. Sorry Son.

The Revelation

The whole concept became "instantly" solved. After my "revelation" the remaining system was perfect. It appears extremely stable, with the fewest moving parts imaginable. The timing, once built, can NEVER be changed. Only outside forces can alter the rotation of any moving parts. The "KISS Engine" was the most SIMPLE, the most STABLE, and by far the most MODIFIABLE mechanical system I have ever dreamt possible. Once you see the obvious superiorities, it become instantly clear. In it's most basic form all of the principles applied are taught before a child leaves Middle School. Anyone who

knows what a magnet does can "understand" what makes it spin, simply with a "snapshot" of this device outlining only the placement and orientation of the magnets. A device, so simple in fact, that the design can be understood in any language with the understanding of magnets. Without adding descriptive text. If standards can be achieved, then I believe school children are capable of it's assembly in "kit" form. A "kit" that can power a small house for 400 years or so. The lack of moving parts would make any "repair" easily performed with average intelligence, and restarted without the worry of anything needing to be "retimed" or "tuned" ever in it's life. That's correct. My design may NEVER have to be changed after initial assembly. It's FLAWLESS GUARANTEED. Of course once the modifications start being applied, this "engine" will not be as simple. But the basic "design" never changes, only scaled and modified. This is the PERFECT motor. This is my opinion and I hope you feel the same. Are you ready for my revelation? Not yet. First let me state again that this "discovery" was nothing unusual. I did not find a miracle. I did no more than anyone, using "common sense" coupled with imagination, would have eventually noticed. Really it was nothing. I do not deserve any special recognition for what has happened. There are no mysteries involved. I did no "special" research to create my KISS Engine. All I did was make a couple of "observations" and re-apply them in a creative way. Extremely focused on trying to SIMPLIFY our world. Okay, now with everything that I have told you may have already "discovered" my secret. It becomes painfully obvious after you realize what I'm talking about. Are you ready now? Can you Guess? I won't tease you anymore. Here it is. Are you sitting down?? PLANETARY GEARS...Tah Dah!!! What were you expecting...Magic? Simple...Huh. If you understand Planetary Gears, at all, you will understand everything I bragged about is possible.

Simple Solutions Produce The Best Results

The simplicity and stability inherent in this principle CANNOT be overstated. All you need is a 4:1 ratio (1 turn of "Sun" to produce 4 turns of the "Planets"). Equally space 10 Planet Gears with Permanent Magnets creating a "Hemispherical Dipole" area across the diameter (STATOR) aligned with 8 magnets equally spaced around the edge of the Sun Gear (ROTOR). This easily creates ½ rotation of the Stator or Planet every time the magnets pass. Locked into place FOR LIFE by the gear teeth on a "free spinning" assembly. What could be Better? Mechanical friction can be held to a minimum and remains a constant throughout every "phase" of rotational velocity. This can be easily calculated by anyone with a strong math background and a little time. A very good calculator comes in handy about now. To

keep "outside influences" from affecting our perfect system, precautions must be made. I propose the gears be cut or molded from a "non-conducting", maybe plastic, material. This could achieve a very "cost effective" and, most importantly, SIMPLE solution. The "manufacturing process" could introduce "standard" bushings, possibly Bronze, Ceramic, or some "plastic material" that I am unaware of, to provide lubrication. If "standard dimensions" can be established, manufacturing can be widespread and very inexpensive. How SIMPLE is that??? I thought so too! The base or cage of the "model" is also "mass produced" with "non-conducting" material. I was thinking, maybe, T-6061 Alum or some form of "plastic". The "shaft's" can be of uniform size and mounted many ways. Quite possibly the entire "machine" can be "loose" enough so all the parts can be rapidly "formed" or "molded". After "standards" are discussed this would tremendously SIMPLIFY the manufacturing process. Thereby making them as INEXPENSIVE AS POSSIBLE. After a "kit" is introduced, it would take no more ability to assemble than your last Bicycle or "some assembly required" shelf unit. Gear "A" goes into or on to point "A", Gear "B" goes into or on to point "B" and so on. This can be over in 11 steps with this design. Whew, that was tough. How much longer is this going to take you ask? Not long. Now take second "base piece", bet you wondered why you had 2, and "attach" to first "base piece". Is that all I have to do, you ask? Maybe, if the "manufacturing process" creates a "locking mechanism". If not, you may need to spend a couple of minutes "bolting" together. Am I done yet, you ask? I don't have time for this! YES !!! Your first KISS Engine is COMPLETE. Sorry you had to spend so much time on it. Theoretically, with an introduction of "standards" and outstandingly SIMPLE "manufacturing processes", Start to Finish, with the most basic design, can be accomplished in ONLY 12 STEPS. After everything is in place, PULL THE PIN. Voila!! You have a WORKING MODEL KISS Engine. You bought it "off the shelf" and assembled it yourself. Some of you may need help? So ask your Kids. This is such an easy principle I'm sure most everyone can understand it. Again I don't make myself significant in this. Everything I' ve outlined is "common knowledge" to a vast majority of people. All I did was assemble this information, in a creative and SIMPLE way, then drew a bunch of pretty pictures. I cannot prove the KISS Engine will work for sure... but I cannot disprove it either. Half the fun and all the excitement are yours to explore.

If It Is That Simple, Why Didn't You Build It? You Could Be Rich!!!! I LOVE the "possibilities" of this "Brand New" motor. I decided to

name it the "KISS" Engine to constantly remind anyone who touches this, or is touched by this. 1.KEEP IT SIMPLE STUPID
2.The World doesn't have to be as complicated as "They" like to make us think.
3.One Person can make a difference if that person is creative and persistent.
4.All of us working together to obtain the same Goal can, and will, change the world.
5.Not everyone on this planet is "out for a buck".
6.Our Family's are our biggest assets. Not just "now" but also in the "Legacy" we all share of what the future will hold.
7.Even if I am, just another "crackpot" with a BIG mouth and too little knowledge of what I am talking about. We had a good laugh, drew some pretty pictures, and sparked a huge interest in the "idea" of Perpetual Energy. Nobody got hurt. YET? This dream can be realized; all we have to do is try.
8.Sometimes you have to "KICK" people, especially the People who continue to get over-whelmingly rich by polluting and over-charging common people to a point there is nothing left for us and our children to enjoy! People who take far too much and give far too little in return need a new Perspective. All I am trying to do is buy everyone who reads this a "Brand New Pair of Boots" and get them to practice their aim. I am aiming between the legs! Some People may not think it's fair, but I didn't start this fight and I don't want it to last any longer than it has to. I call it Self Defense. Only time remains to see what, if anything, the History Books will say. But how much time do we have left? I think we should hurry.
9.Dreams do come true if we all just believe strong enough and share.

Further Speculations?
All the Variables and Application's for this type of motor are immense and start to hurt my brain when I try to comprehend them all. I will attempt to outline, briefly as possible and simply as possible, things that I have considered. Nothing has been fully tested and requires lots of well-documented Research that we can share with anybody interested.

Modifications To Primary Design
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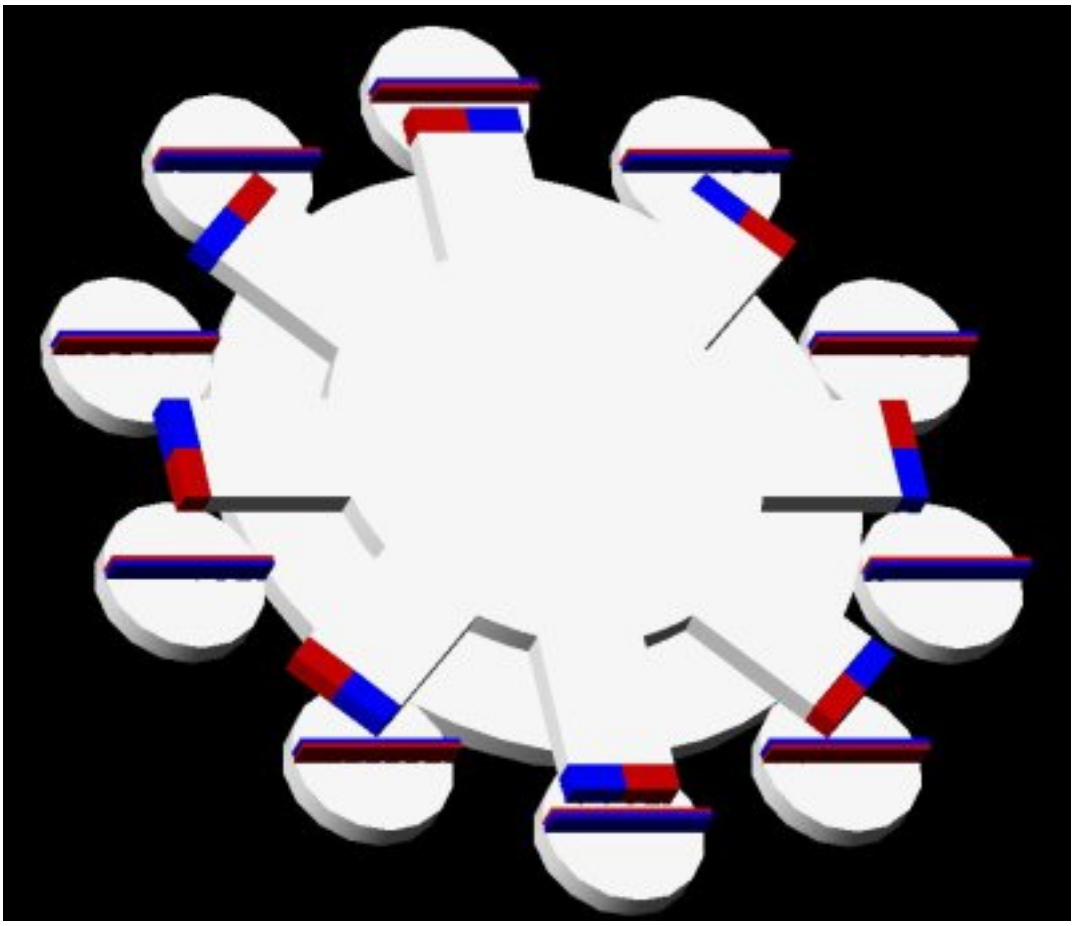
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3d animation by Nick Rasmussen
([Switch] to the device animation of Alexander O. Spiridonov)
([Switch] to the magnetic simulation of Nick Rasmussen)



Explanation by Jan P. Cack

A Simple Idea

I had only a mild interest in Perpetual Energy at this time. For some reason the idea planted a seed in my brain. Soon after I realized this may be possible. If you take a magnet and move another magnet towards the first, opposites attract, and then before they can touch, the first magnet rotates 180 degrees. Barely "dodging" the second magnet. After a brief energy loss, the 2 magnets are now pushing against each other, same poles repel, and the first magnet is now oriented to "affect" the next magnet in a rotating cycle. Which, obviously, is reversed polarity from second magnet. It seems to be an efficient cycle. Everything was easy to understand and common sense tells us "forces" are at work. My first drawing of this was February 11, 2005. This looked very appealing on paper. That, in itself, appeared to be no extraordinary discovery. It was a simple concept that made a pretty picture. Surely this has been observed before. This would seem to be "common knowledge". So I began many searches about magnets, and different configurations where my idea was documented with possible results obtained. Still I was only tickling myself with the conception of Perpetual Energy. After a brief inability to find this simple principle in action, I decided to go a step farther. Why not? I have some time and the power of "AUTOcad" at my disposal. This suddenly became much more interesting!

The Pattern

The spark was set. I put together a bunch of "what if" geometry. Thank you "AUTOcad". Given the fact that a "rotor" could be built with "opposing magnets", we would need an even number of "arms". I constructed 4 in my computer. The first had 4 arms. The second had 6 the third was 8, and the last one had 10 arms. On the end of each "arm" I color coded a magnetic "area". Then proceeded to construct a ring containing my, 180-degree, rotating "stator" magnets. Starting with an equally spaced array of 4 stator magnets. Proceeding in succession until I ended with 19 stator magnets. After that the ring became too "cluttered", so I stopped. This is easily re-created with almost any drawing program. Simple enough. That did not take long. Nor was it an "event". But..after placing my geometry on top of each other, I began suddenly to realize an "opportunity". I got very excited at this point. The fire soon spread, and fast. Within the geometry I created there were several possibilities within each "rotor" created. They were removed to another drawing for further review. Was this the answer? The results were very promising with regard to the overwhelming numbers of possible candidates. So I inspected them all thoroughly searching for my "best case scenario".

I was about to explode. Deciding on the "8 arm rotor" and the "10 stator ring" gave me an "object" to build upon, analyze, and SIMPLIFY. It makes a very pretty picture on paper. WOW, I still could not believe that this information was any great revelation. Just a series of patterns I constructed out of curiosity. There was still a lot of work to do. Lost interest in everything else at that point. Since I couldn't sleep or eat much I had plenty of time to play with my "new" toy. Wife getting angry now, says I am obsessing way too much. Other things demanded my attention now. But there was no stopping the frenzy in my head. If this "dream" could be true, nothing else mattered to me. Sorry Wife.

The KISS Engine Evolved

Armed with this exciting new concept, I set out to make my "stator" magnets rotate at my control. At first this seemed way harder than it appeared. I envisioned the stator to be a Disc Magnet, not sure why? But it stuck for a short time. The exact size or shape of this magnet has far more possibilities than I can briefly list, so long as the "concept" remains the same. Rotation, at first, presented itself many obstacles. Timing was crucial. A "slip" would result in destruction of the magnets themselves. They have to be "flawlessly" rotated then "locked" into position. I assumed this would have the strongest "push/pull" that I can get. It all got very complicated very quickly. What a challenge? Faced with an overwhelming choice of options to be explored. All of them riddled with more friction and instability than I could afford. So I kept rolling this "contraption" virtually in my head. A little KISS here, a little KISS there. I was determined once this gigantic obstacle was overcome, my "Baby" would, and could, "breathe life". A little KISS here, a little KISS there. It was all I could think about. Sleep is way over rated anyway. My Son is also beginning to get angry now because I won't let him on the computer to play games. Sorry Son.

The Revelation

The whole concept became "instantly" solved. After my "revelation" the remaining system was perfect. It appears extremely stable, with the fewest moving parts imaginable. The timing, once built, can NEVER be changed. Only outside forces can alter the rotation of any moving parts. The "KISS Engine" was the most SIMPLE, the most STABLE, and by far the most MODIFIABLE mechanical system I have ever dreamt possible. Once you see the obvious superiorities, it become instantly clear. In it's most basic form all of the principles applied are taught before a child leaves Middle School. Anyone who

knows what a magnet does can "understand" what makes it spin, simply with a "snapshot" of this device outlining only the placement and orientation of the magnets. A device, so simple in fact, that the design can be understood in any language with the understanding of magnets. Without adding descriptive text. If standards can be achieved, then I believe school children are capable of it's assembly in "kit" form. A "kit" that can power a small house for 400 years or so. The lack of moving parts would make any "repair" easily performed with average intelligence, and restarted without the worry of anything needing to be "retimed" or "tuned" ever in it's life. That's correct. My design may NEVER have to be changed after initial assembly. It's FLAWLESS GUARANTEED. Of course once the modifications start being applied, this "engine" will not be as simple. But the basic "design" never changes, only scaled and modified. This is the PERFECT motor. This is my opinion and I hope you feel the same. Are you ready for my revelation? Not yet. First let me state again that this "discovery" was nothing unusual. I did not find a miracle. I did no more than anyone, using "common sense" coupled with imagination, would have eventually noticed. Really it was nothing. I do not deserve any special recognition for what has happened. There are no mysteries involved. I did no "special" research to create my KISS Engine. All I did was make a couple of "observations" and re-apply them in a creative way. Extremely focused on trying to SIMPLIFY our world. Okay, now with everything that I have told you may have already "discovered" my secret. It becomes painfully obvious after you realize what I'm talking about. Are you ready now? Can you Guess? I won't tease you anymore. Here it is. Are you sitting down?? PLANETARY GEARS...Tah Dah!!! What were you expecting...Magic? Simple...Huh. If you understand Planetary Gears, at all, you will understand everything I bragged about is possible.

Simple Solutions Produce The Best Results

The simplicity and stability inherent in this principle CANNOT be overstated. All you need is a 4:1 ratio (1 turn of "Sun" to produce 4 turns of the "Planets"). Equally space 10 Planet Gears with Permanent Magnets creating a "Hemispherical Dipole" area across the diameter (STATOR) aligned with 8 magnets equally spaced around the edge of the Sun Gear (ROTOR). This easily creates ½ rotation of the Stator or Planet every time the magnets pass. Locked into place FOR LIFE by the gear teeth on a "free spinning" assembly. What could be Better? Mechanical friction can be held to a minimum and remains a constant throughout every "phase" of rotational velocity. This can be easily calculated by anyone with a strong math background and a little time. A very good calculator comes in handy about now. To

keep "outside influences" from affecting our perfect system, precautions must be made. I propose the gears be cut or molded from a "non-conducting", maybe plastic, material. This could achieve a very "cost effective" and, most importantly, SIMPLE solution. The "manufacturing process" could introduce "standard" bushings, possibly Bronze, Ceramic, or some "plastic material" that I am unaware of, to provide lubrication. If "standard dimensions" can be established, manufacturing can be widespread and very inexpensive. How SIMPLE is that??? I thought so too! The base or cage of the "model" is also "mass produced" with "non-conducting" material. I was thinking, maybe, T-6061 Alum or some form of "plastic". The "shaft's" can be of uniform size and mounted many ways. Quite possibly the entire "machine" can be "loose" enough so all the parts can be rapidly "formed" or "molded". After "standards" are discussed this would tremendously SIMPLIFY the manufacturing process. Thereby making them as INEXPENSIVE AS POSSIBLE. After a "kit" is introduced, it would take no more ability to assemble than your last Bicycle or "some assembly required" shelf unit. Gear "A" goes into or on to point "A", Gear "B" goes into or on to point "B" and so on. This can be over in 11 steps with this design. Whew, that was tough. How much longer is this going to take you ask? Not long. Now take second "base piece", bet you wondered why you had 2, and "attach" to first "base piece". Is that all I have to do, you ask? Maybe, if the "manufacturing process" creates a "locking mechanism". If not, you may need to spend a couple of minutes "bolting" together. Am I done yet, you ask? I don't have time for this! YES !!! Your first KISS Engine is COMPLETE. Sorry you had to spend so much time on it. Theoretically, with an introduction of "standards" and outstandingly SIMPLE "manufacturing processes", Start to Finish, with the most basic design, can be accomplished in ONLY 12 STEPS. After everything is in place, PULL THE PIN. Voila!! You have a WORKING MODEL KISS Engine. You bought it "off the shelf" and assembled it yourself. Some of you may need help? So ask your Kids. This is such an easy principle I'm sure most everyone can understand it. Again I don't make myself significant in this. Everything I' ve outlined is "common knowledge" to a vast majority of people. All I did was assemble this information, in a creative and SIMPLE way, then drew a bunch of pretty pictures. I cannot prove the KISS Engine will work for sure... but I cannot disprove it either. Half the fun and all the excitement are yours to explore.

If It Is That Simple, Why Didn't You Build It? You Could Be Rich!!!! I LOVE the "possibilities" of this "Brand New" motor. I decided to

name it the "KISS" Engine to constantly remind anyone who touches this, or is touched by this. 1.KEEP IT SIMPLE STUPID
2.The World doesn't have to be as complicated as "They" like to make us think.
3.One Person can make a difference if that person is creative and persistent.
4.All of us working together to obtain the same Goal can, and will, change the world.
5.Not everyone on this planet is "out for a buck".
6.Our Family's are our biggest assets. Not just "now" but also in the "Legacy" we all share of what the future will hold.
7.Even if I am, just another "crackpot" with a BIG mouth and too little knowledge of what I am talking about. We had a good laugh, drew some pretty pictures, and sparked a huge interest in the "idea" of Perpetual Energy. Nobody got hurt. YET? This dream can be realized; all we have to do is try.
8.Sometimes you have to "KICK" people, especially the People who continue to get over-whelmingly rich by polluting and over-charging common people to a point there is nothing left for us and our children to enjoy! People who take far too much and give far too little in return need a new Perspective. All I am trying to do is buy everyone who reads this a "Brand New Pair of Boots" and get them to practice their aim. I am aiming between the legs! Some People may not think it's fair, but I didn't start this fight and I don't want it to last any longer than it has to. I call it Self Defense. Only time remains to see what, if anything, the History Books will say. But how much time do we have left? I think we should hurry.
9.Dreams do come true if we all just believe strong enough and share.

Further Speculations?
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Replication reports

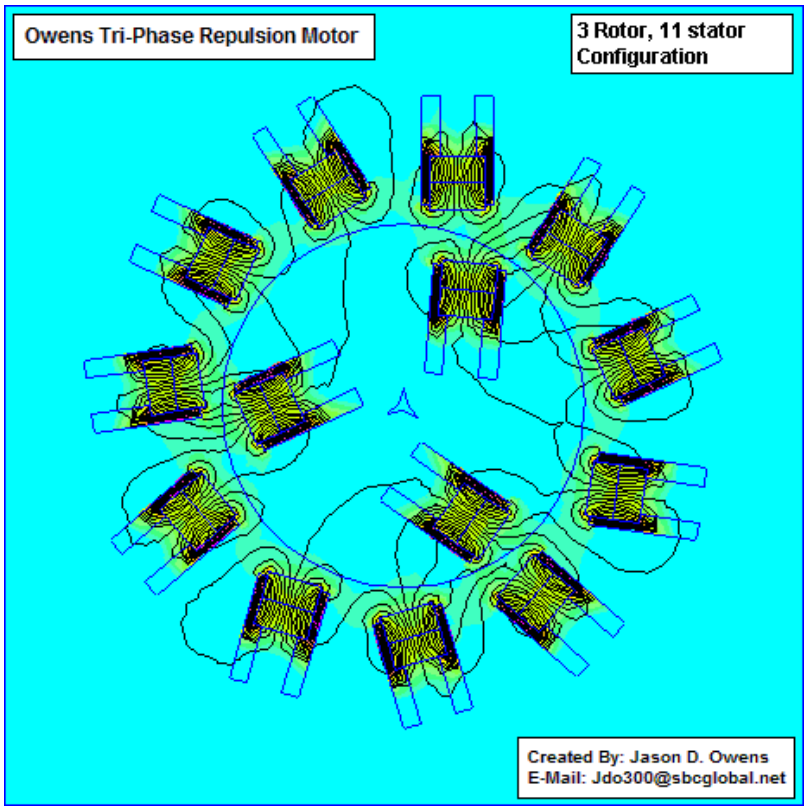
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Coil size calculator	The parts	The pulse motor	The oscilloscope	The scope results	The Lab camera
	The circuit	The pulse motor RPM		Manual rotation results	
				Design03 results	
				Design03 cEMF	
				Design03 Repelling coils	

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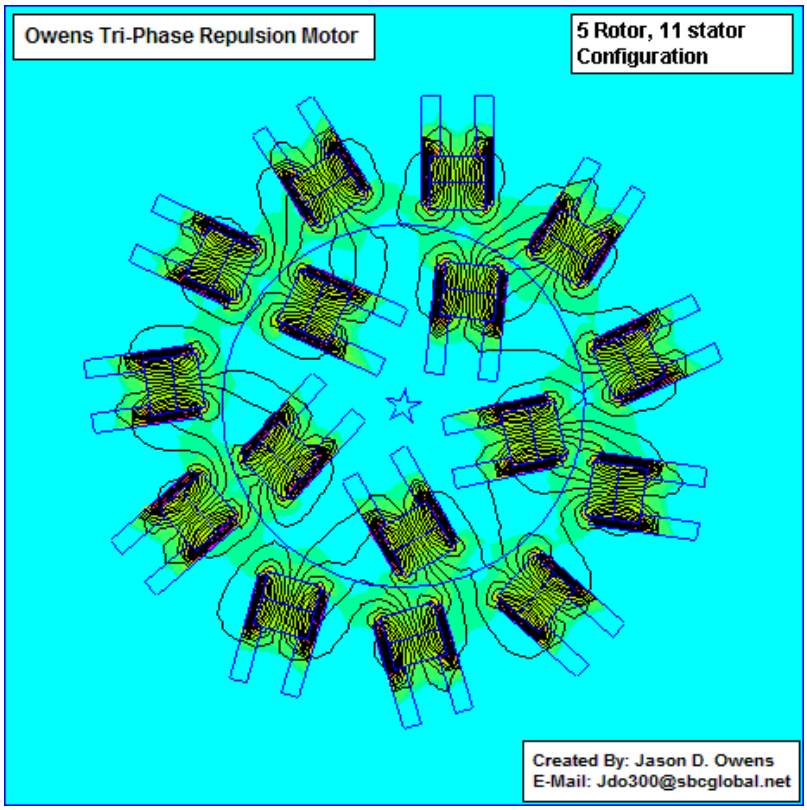
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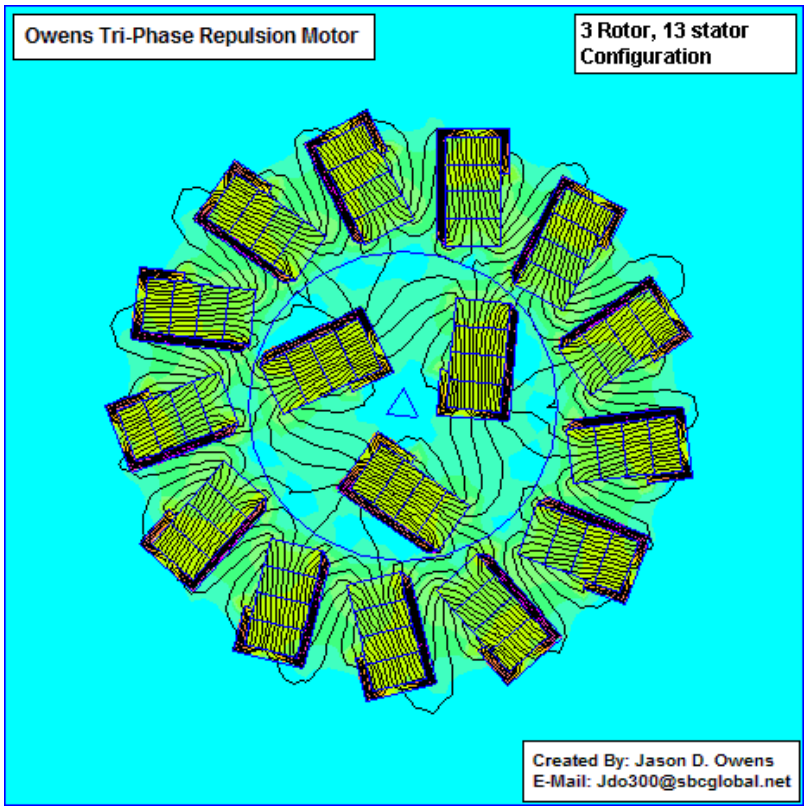
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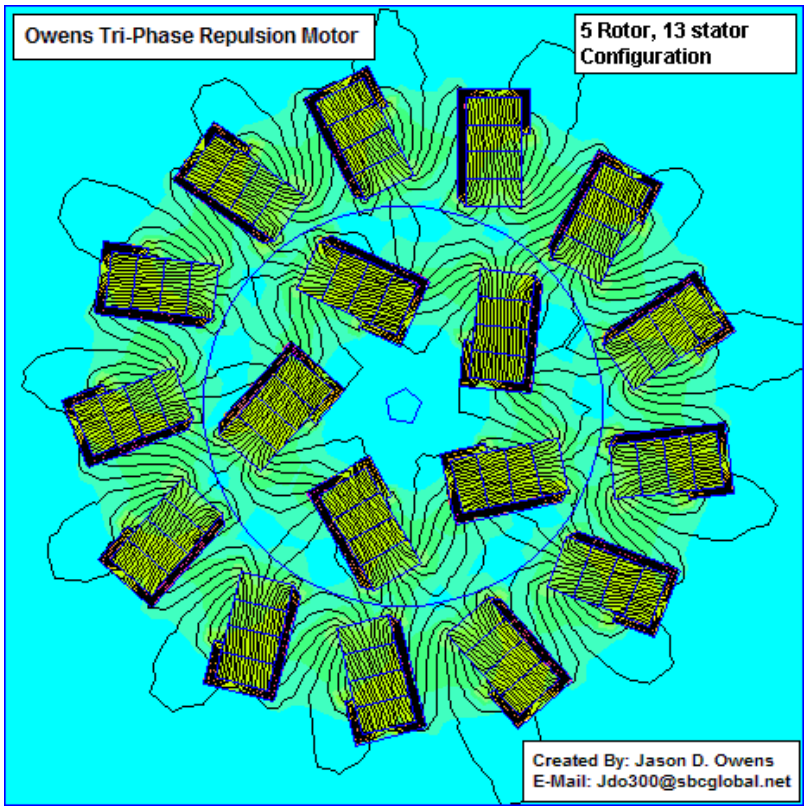
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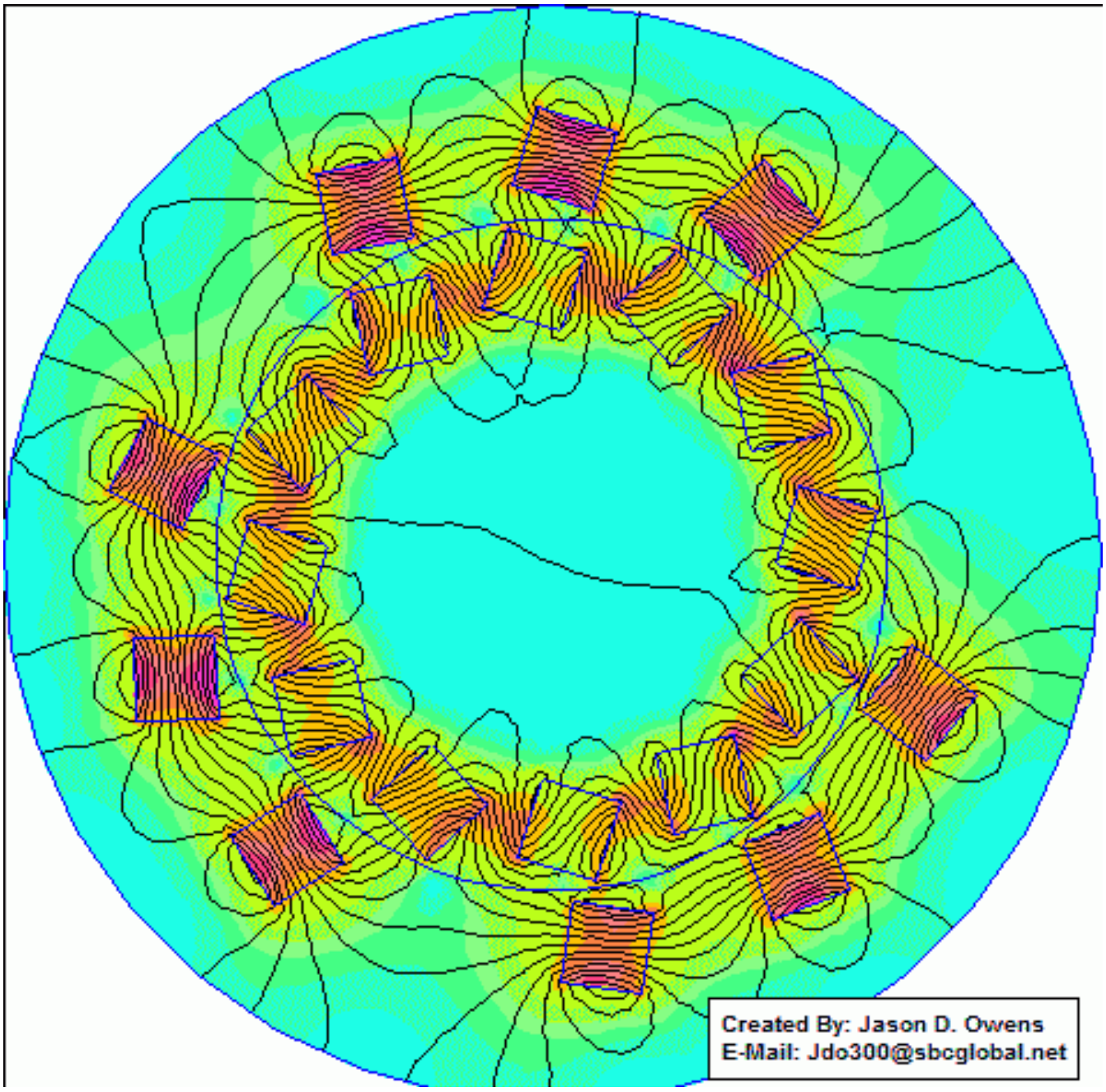
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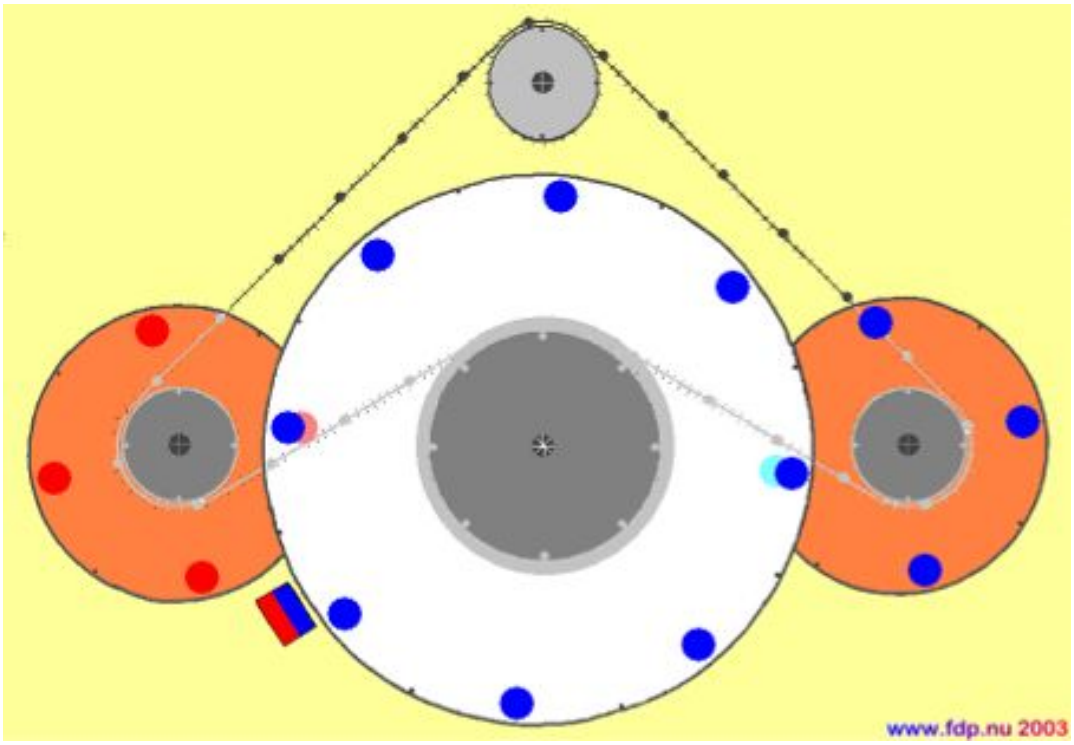



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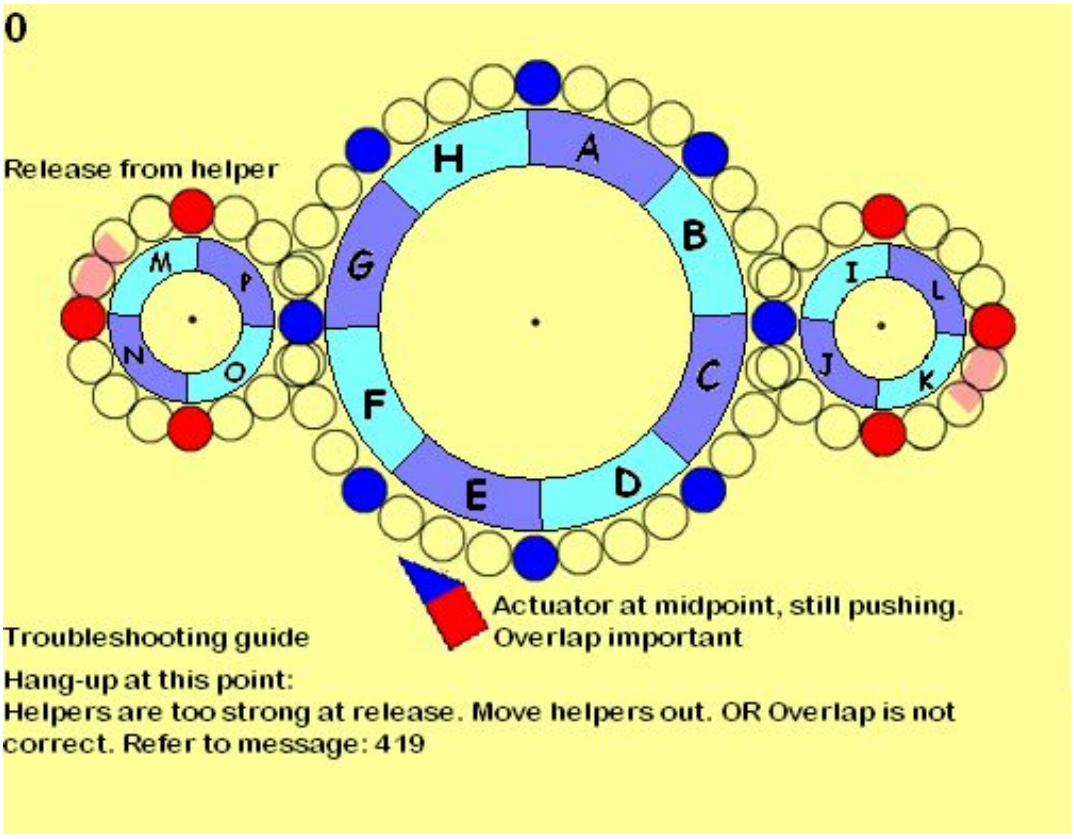
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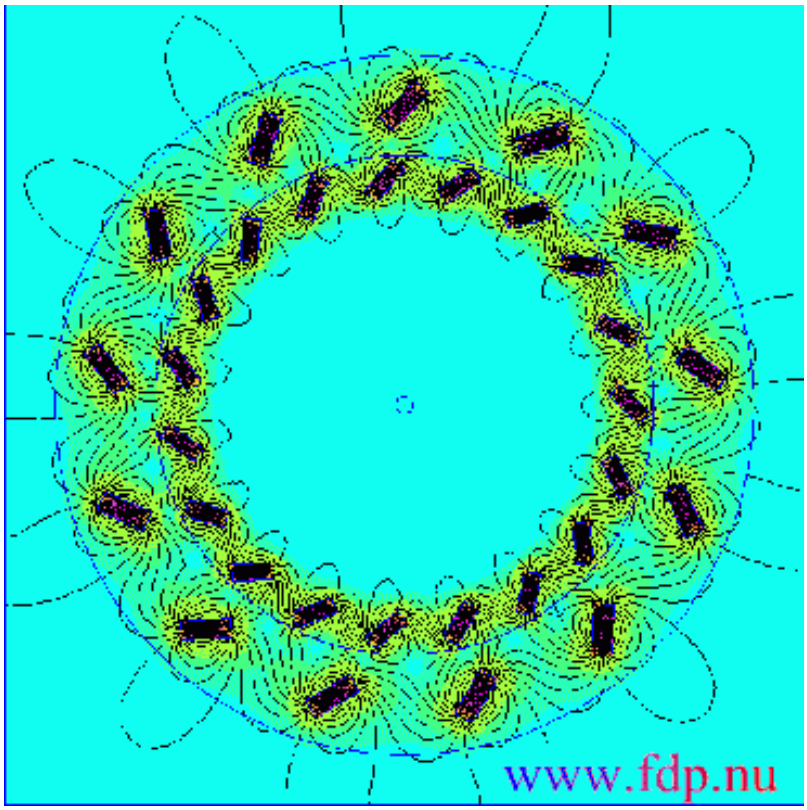
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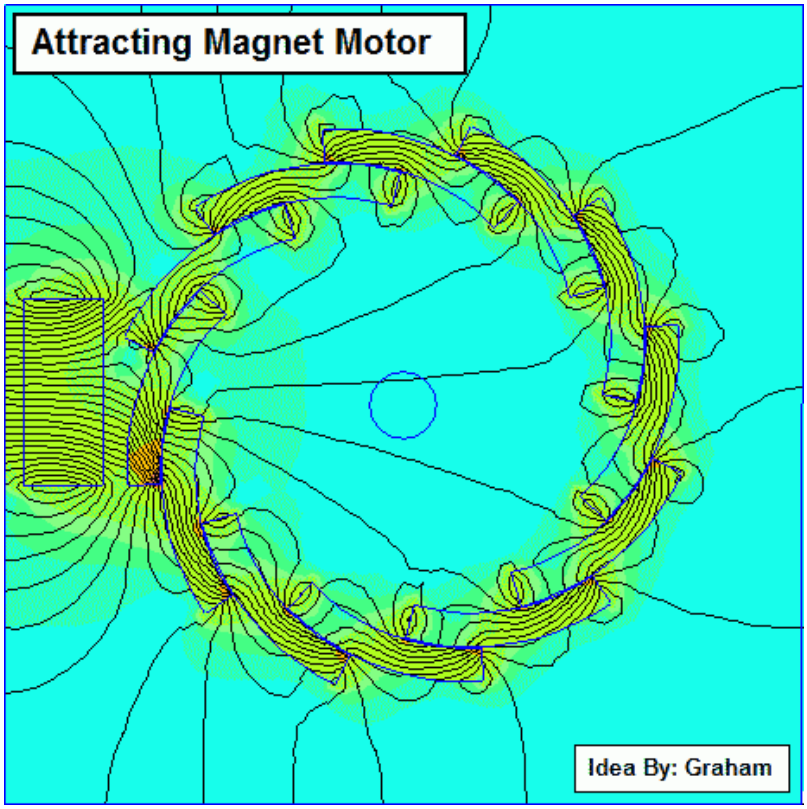
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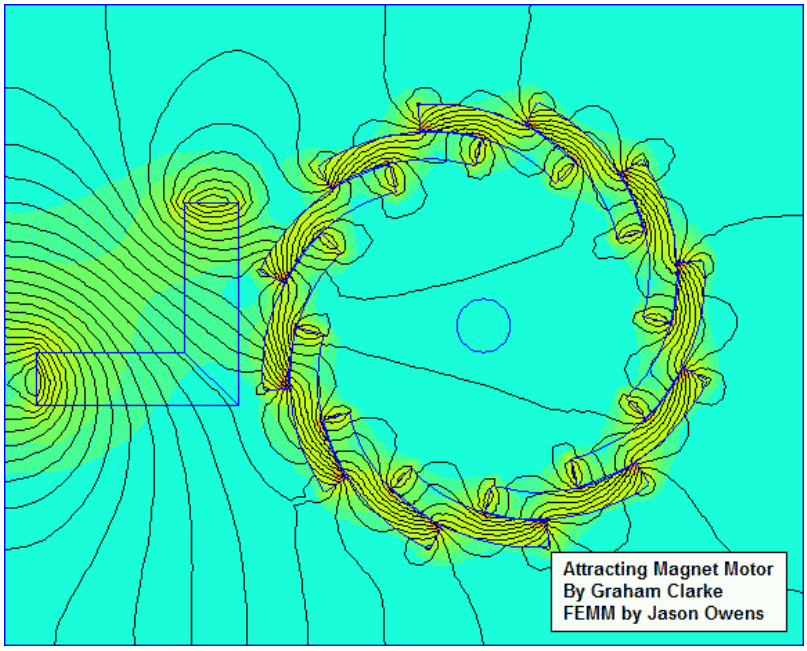
Attracting magnet motor



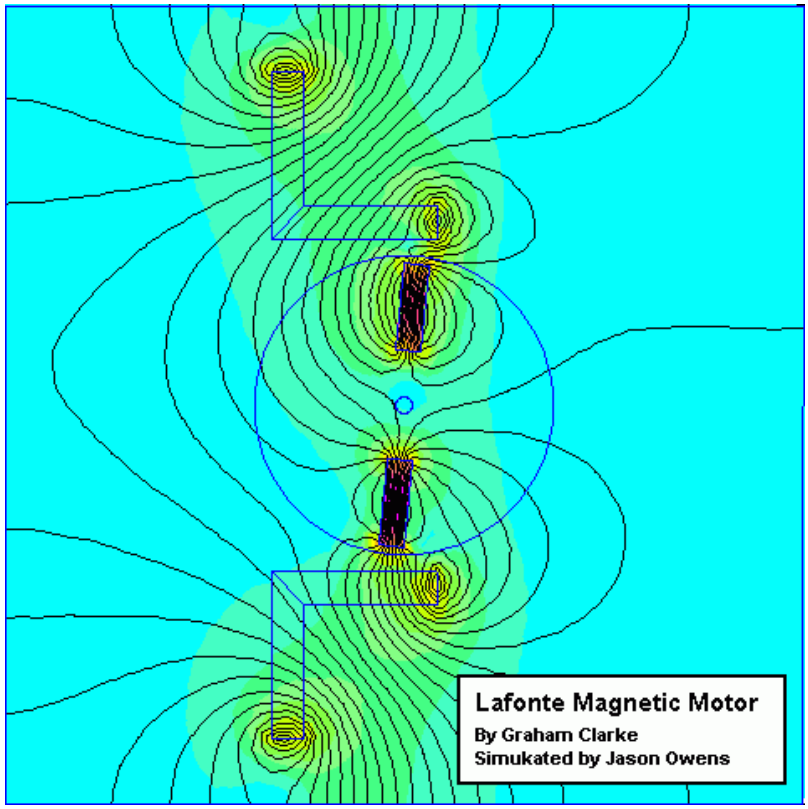
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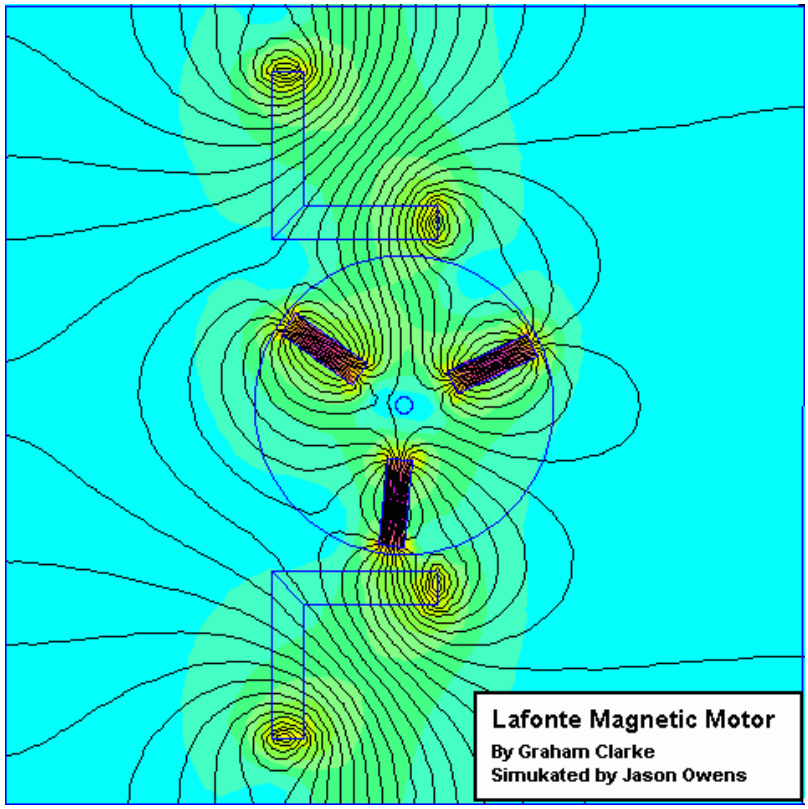
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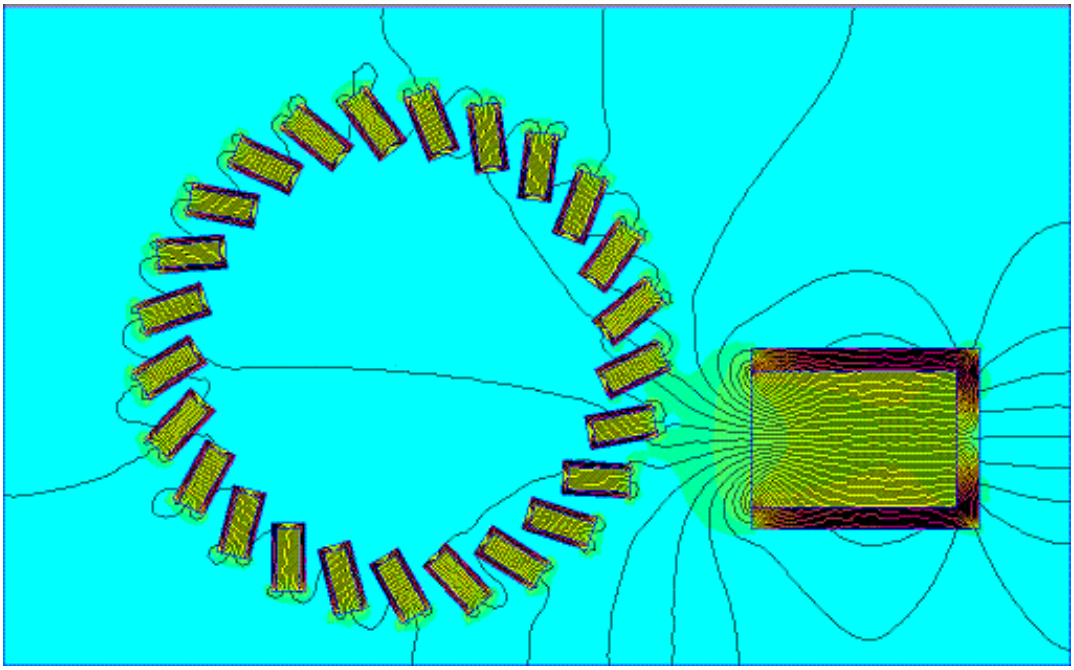
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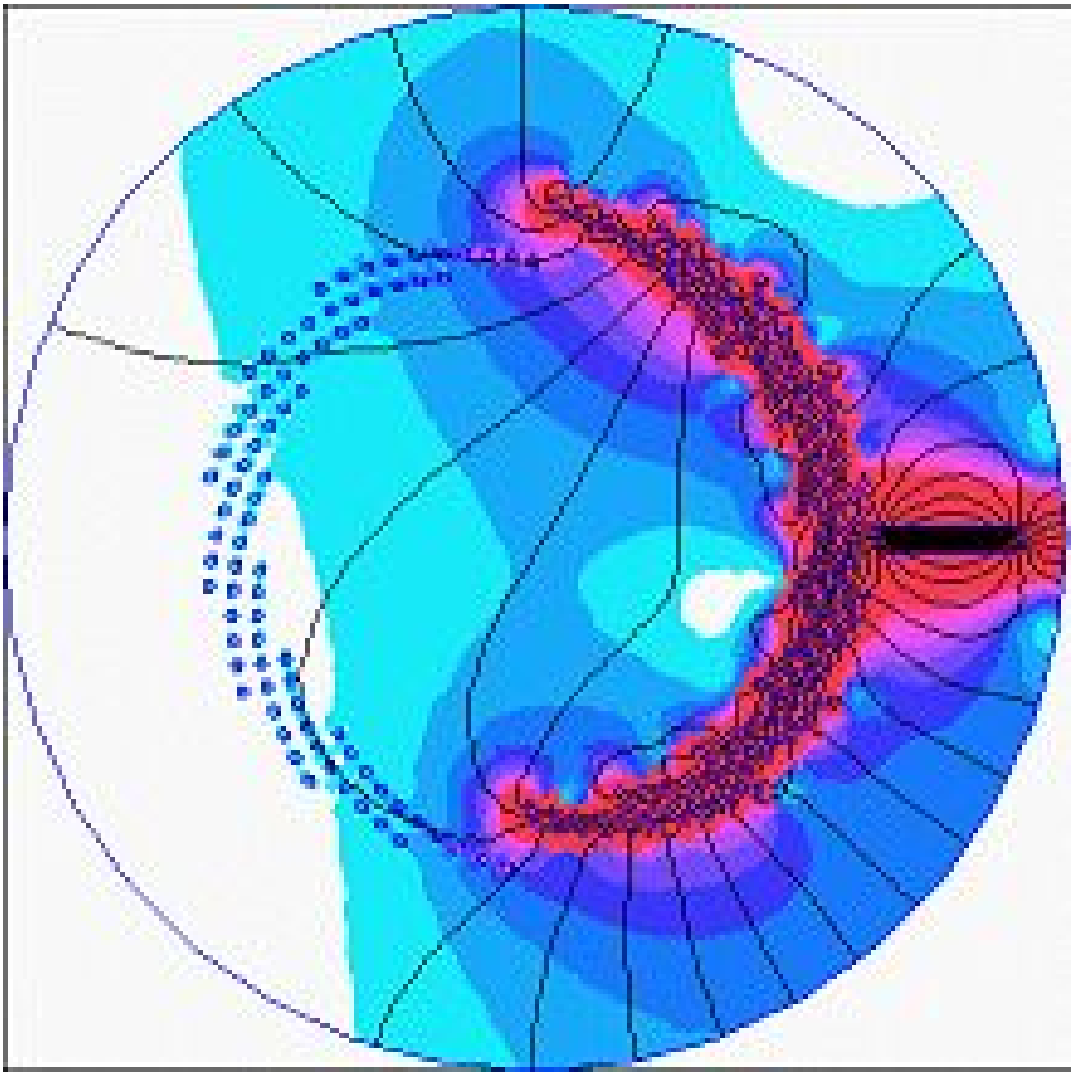
Perendev principle animation



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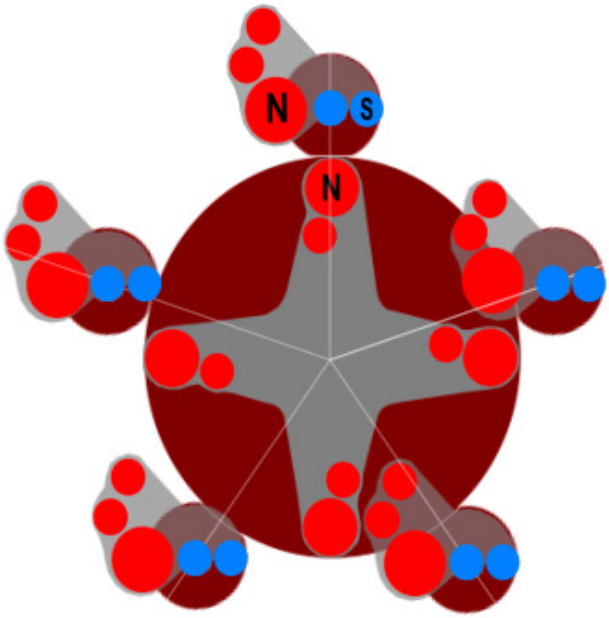
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Minato principle animation



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New design for Jan P.Cack device



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Sub-folders in folder: .\group\minatowheel\files\Albert Michel
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Albert Michel

Type	Filename	YYYY-MM-DD	Size	Action
	brevetmichel 01.pdf	2006-04-04	20 kb	
	brevetmichel 02.pdf	2006-04-04	9 kb	
	brevetmichel 03.pdf	2006-04-04	36 kb	
	brevetmichel 04.pdf	2006-04-04	37 kb	
	brevetmichel 05.pdf	2006-04-04	37 kb	
	brevetmichel 06.pdf	2006-04-04	27 kb	
	brevetmichel 07.pdf	2006-04-04	36 kb	
	brevetmichel 08.pdf	2006-04-04	14 kb	
	brevetmichel 09.pdf	2006-04-04	26 kb	
	brevetmichel 10.pdf	2006-04-04	17 kb	
	InEnglish-by-Altavista.txt	2006-04-04	8 kb	
	motmagnmichel.jpg	2006-04-04	49 kb	



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Sub-folders in folder: .\group\minatowheel\files\Bill Muller
Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Bill Muller

Type	Filename	YYYY-MM-DD	Size	Action
	Large-Muller HFG 2.JPG	2006-04-04	264 kb	
	Large-Muller HFG 3.jpg	2006-04-04	358 kb	
	Large-Muller HFG.JPG	2006-04-04	299 kb	
	Muller HFG 2.JPG	2006-04-04	192 kb	
	Muller HFG 3.jpg	2006-04-04	180 kb	
	Muller HFG.JPG	2006-04-04	147 kb	



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Sub-folders in folder: .\group\minatowheel\files\David TriMagen
Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\David TriMagen

Type	Filename	YYYY-MM-DD	Size	Action
	TGMG.doc	2006-04-04	145 kb	
	trimagenatron.doc	2006-04-04	494 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Drawings
Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Drawings

Type	Filename	YYYY-MM-DD	Size	Action
	Magnet attracting to Iron.gif	2006-04-04	28 kb	
	Minato wheel + Metal strips.gif	2006-04-04	24 kb	
	Minato Wheel 3.FEM	2006-04-04	11 kb	
	Minato Wheel with Iron strip.gif	2006-04-04	5 kb	
	Minato Wheel.FEM	2006-04-04	20 kb	
	minato2d.jpg	2006-04-04	32 kb	
	MinIronShort.gif	2006-04-04	37 kb	
	S Shaped Minato Wheel.gif	2006-04-04	35 kb	
	Segmented Iron Wheel 1.gif	2006-04-04	22 kb	
	Segmented Iron Wheel 2.gif	2006-04-05	32 kb	
	Segmented Iron Wheel 3.gif	2006-04-05	21 kb	
	Segmented Iron Wheel 4.gif	2006-04-05	27 kb	
	Segmented Iron Wheel 5 (bismuth comparisons).gif	2006-04-05	54 kb	

	Segmented Iron Wheel 5 -bismuth comparisons-.gif	2006-04-05	54 kb	
	Segmented Minato Wheel (With Bismuth).FEM	2006-04-05	13 kb	
	Segmented Minato Wheel -With Bismuth-.FEM	2006-04-05	13 kb	
	Segmented Minato Wheel.FEM	2006-04-05	13 kb	
	Shielded Magnet 1.gif	2006-04-05	46 kb	
	Shielded Magnet 2.gif	2006-04-05	17 kb	
	Shielded Magnet 3.gif	2006-04-05	13 kb	
	unbalanced flux wheel.jpg	2006-04-05	61 kb	
	unbalanced fluxline.jpg	2006-04-05	78 kb	
	__hr_final+motor+design+3.jpg	2006-04-04	46 kb	
	__hr_minato+revealed+maybe.jpg	2006-04-04	44 kb	



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Sub-folders in folder: .\group\minatowheel\files\Gates Smot
Size of current folder: 4 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Gates Smot

Type	Filename	YYYY-MM-DD	Size	Action
	04215330_2.pdf	2006-04-05	482 kb	
	AnotherFrontview.jpg	2006-04-05	25 kb	
	AnotherTopview.jpg	2006-04-05	23 kb	
	Anotherviewofdonutmagnets.jpg	2006-04-05	22 kb	
	backview.jpg	2006-04-05	25 kb	
	DonutMagnets.jpg	2006-04-05	23 kb	
	Frontview.jpg	2006-04-05	25 kb	
	Lafonte One-way gate.gif	2006-04-05	9 kb	
	Linear gate animation.gif	2006-04-05	1.1 mb	
	oneway2.wmv	2006-04-05	544 kb	
	oneway3.wmv	2006-04-05	876 kb	
	OnewayGate2.jpg	2006-04-05	10 kb	
	onewaymagneticgate.wmv	2006-04-05	798 kb	
	swinging+smot+-+basic+principle.jpg	2006-04-05	10 kb	

topview.jpg	2006-04-05	25 kb	
Track #1.gif	2006-04-05	31 kb	
Track #2.gif	2006-04-05	20 kb	
Track #3.gif	2006-04-05	47 kb	
Track #4.gif	2006-04-05	16 kb	
Track #5.gif	2006-04-05	16 kb	
Track 1.gif	2006-04-05	31 kb	
Track 2.gif	2006-04-05	20 kb	
Track 3.gif	2006-04-05	47 kb	
Track 4.gif	2006-04-05	16 kb	
Track 5.gif	2006-04-05	16 kb	



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Sub-folders in folder: .\group\minatowheel\files\Graham Clarke
Size of current folder: 16 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	
	Corner Gate Graham's Corner Gate	20	
	Gem motor Gem Motor - by Graham CLarke	2	
	Ideas A collection of Graham's ideas, drawings, simulations and video clips	9	

Files in folder: .\group\minatowheel\files\Graham Clarke

Type	Filename	YYYY-MM-DD	Size	Action
	No files			



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\GrahamCF
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\GrahamCF

Type	Filename	YYYY-MM-DD	Size	Action
	Changingfields.jpg	2006-04-05	74 kb	
	Fields.jpg	2006-04-05	7 kb	



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Sub-folders in folder: .\group\minatowheel\files\Hamel
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Hamel

Type	Filename	YYYY-MM-DD	Size	Action
	hamel_spinner.avi	2006-04-05	253 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Horse Shoe Devices

Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Horse Shoe Devices

Type	Filename	YYYY-MM-DD	Size	Action
	Arc-magnet.JPG	2006-04-05	7 kb	
	hsm1.JPG	2006-04-05	19 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Magnet shapes
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Magnet shapes

Type	Filename	YYYY-MM-DD	Size	Action
	CresAndSmallAttr.jpg	2006-04-05	71 kb	
	crescent.jpg	2006-04-05	71 kb	
	Shape1.gif	2006-04-05	74 kb	
	Shape10.gif	2006-04-05	15 kb	
	Shape11.gif	2006-04-05	14 kb	
	Shape2.gif	2006-04-05	20 kb	
	Shape3.gif	2006-04-05	18 kb	
	Shape4.gif	2006-04-05	39 kb	
	Shape5.gif	2006-04-05	15 kb	
	Shape6.gif	2006-04-05	14 kb	
	Shape7.gif	2006-04-05	12 kb	
	Shape8.gif	2006-04-05	15 kb	
	Shape9.gif	2006-04-05	15 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Magnetic Memory Shape Motor

Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Magnetic Memory Shape Motor

Type	Filename	YYYY-MM-DD	Size	Action
	GrahamsMSMMotor.jpg	2006-04-05	18 kb	
	GrahamsMSMmotor2.jpg	2006-04-05	21 kb	
	msmm.gif	2006-04-05	27 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Minato advanced
Size of current folder: 4 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Minato advanced

Type	Filename	YYYY-MM-DD	Size	Action
	Coil-attract.avi	2006-04-05	156 kb	
	Coil-repel.avi	2006-04-05	348 kb	
	Dual Minato wheel Theory.pdf	2006-04-05	313 kb	
	Dual Minato Wheel v1 movie.avi	2006-04-05	872 kb	
	Dual Minato Wheel v1 side movie.avi	2006-04-05	995 kb	
	Dual Minato Wheel v1 studio.jpg	2006-04-05	231 kb	
	DualMagnetRotor3.jpg	2006-04-05	19 kb	
	DualWheelProto1a.jpg	2006-04-05	104 kb	
	DualWheelProto1b.jpg	2006-04-05	52 kb	
	dual_magnet_wheel.jpg	2006-04-05	148 kb	
	HPIM0517.JPG	2006-04-05	76 kb	
	minato_wheel2_by_Jaro_AGGroup.jpg	2006-04-05	132 kb	
	S Shaped Minato Wheel.gif	2006-04-05	35 kb	

	unbalanced flux wheel.jpg	2006-04-05	61 kb	
	unbalanced fluxline.jpg	2006-04-05	78 kb	
	zipper_dual_magnet_motor.jpg	2006-04-05	38 kb	
	__hr_final+motor+design+3.jpg	2006-04-05	46 kb	
	__hr_minato+revealed+(maybe).jpg	2006-04-05	44 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Parallel Path
Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Parallel Path

Type	Filename	YYYY-MM-DD	Size	Action
	Parallel Path Transformer.bmp	2006-04-05	350 kb	
	ParPath1.jpg	2006-04-05	99 kb	
	ParPath2.jpg	2006-04-05	97 kb	
	SimpleFluxSwitching+Demo.jpg	2006-04-05	40 kb	
	TwoDisc.jpg	2006-04-05	104 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Perendev device
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Perendev device

Type	Filename	YYYY-MM-DD	Size	Action
	5929732.jpg	2006-04-05	121 kb	
	image001.jpg	2006-04-05	19 kb	
	motor_side.jpg	2006-04-05	58 kb	
	perendev rotor.jpg	2006-04-05	143 kb	
	perendev_rotor_2.jpg	2006-04-05	92 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Pot magnet devices

Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Pot magnet devices

Type	Filename	YYYY-MM-DD	Size	Action
	IM000278.jpg	2006-04-05	273 kb	
	IM000279.jpg	2006-04-05	269 kb	
	IM000280.jpg	2006-04-05	279 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Puls motors
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Puls motors

Type	Filename	YYYY-MM-DD	Size	Action
	Electromagnet Coil.jpg	2006-04-05	92 kb	
	Garry's Pulse Circuit.gif	2006-04-05	6 kb	
	Garrys Pulse Circuit.gif	2006-04-05	6 kb	
	InductionMagneticMotor.jpg	2006-04-05	54 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Shield devices
Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Shield devices

Type	Filename	YYYY-MM-DD	Size	Action
	2-stroke+fsm+basic+principle.jpg	2006-04-05	9 kb	
	Attracting magnetic motor.jpg	2006-04-05	24 kb	
	AttractingMagnetMotorFlux.jpg	2006-04-05	33 kb	
	Ding.jpg	2006-04-05	15 kb	
	EasyMagneticChangingField.jpg	2006-04-05	27 kb	
	HJ Sim For Graham.pdf	2006-04-05	106 kb	
	HJ Sim2 For Graham.pdf	2006-04-05	89 kb	
	HJ_Stator_Sim.gif	2006-04-05	37 kb	
	How Graham thinks the Johnson Motor works.jpg	2006-04-05	53 kb	
	Lafonte-Iron Motor.gif	2006-04-05	223 kb	
	LoudspeakerShield.gif	2006-04-05	6 kb	
	Magnet Directions.gif	2006-04-05	4 kb	
	Minato Spiral track motor.gif	2006-04-05	25 kb	
	motor+4+basic.jpg	2006-04-05	10 kb	

	motor+5+basic.jpg	2006-04-05	12 kb	
	Repelling Shield.jpg	2006-04-05	30 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Shunt motor
Size of current folder: 9 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Shunt motor

Type	Filename	YYYY-MM-DD	Size	Action
	MagMotor.AVI (Dan Beeson's shunt motor)	2006-08-25	3.23 mb	
	Russian Magnetic engine. doc (Translated from Russian)	2006-08-25	5.62 mb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Symmetrical PMM files

Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Symmetrical PMM files

Type	Filename	YYYY-MM-DD	Size	Action
	Bevel Magnets 1.gif	2006-04-05	20 kb	
	Magnet Comparison.gif	2006-04-05	33 kb	
	Magnet Wheel.gif	2006-04-05	148 kb	
	Perminant Magnet Motor.gif	2006-04-05	10 kb	



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Sub-folders in folder: .\group\minatowheel\files\Tools and equipment
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Tools and equipment

Type	Filename	YYYY-MM-DD	Size	Action
	force.gif	2006-04-05	14 kb	
	gaussplus.gif	2006-04-05	36 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Torbay
Size of current folder: 58 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	
	Gears	21	

Files in folder: .\group\minatowheel\files\Torbay

Type	Filename	YYYY-MM-DD	Size	Action
	2933a-15.vmc	2007-12-21	12 kb	
	new3.jpg	2006-04-08	51 kb	
	no_wedge.JPG	2006-04-08	81 kb	
	prototipo.jpg	2006-04-08	19 kb	
	prototipo_en_corte.jpg	2006-04-08	32 kb	
	Tao-Torbay11.avi	2006-04-08	167 kb	
	Tao-Torbay11.gif	2006-04-08	308 kb	
	Tao-Torbay22.avi	2006-04-08	166 kb	
	Tao-Torbay22.gif	2006-04-08	248 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Torque Analysis Results

Size of current folder: 1 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Torque Analysis Results

Type	Filename	YYYY-MM-DD	Size	Action
	19-23 Attraction Tri-phase Data.xls	2006-04-05	91 kb	
	3-13 Iron Tri-Phase Data.xls	2006-04-05	115 kb	
	Diagram 7 Data.xls	2006-04-05	83 kb	
	Four Arm Ramp Data.xls	2006-04-05	74 kb	
	Iron Circle Motor Data.xls	2006-04-05	67 kb	
	TOMI Closed Loop 1 Data.xls	2006-04-05	49 kb	
	TOMI Closed Loop 2 Data.xls	2006-04-05	96 kb	
	Torque Data2.xls	2006-04-05	90 kb	
	Tri-Force Motor Data.xls	2006-04-05	370 kb	
	Wheel Data.xls	2006-04-05	45 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Tri-Forces
Size of current folder: 3 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Tri-Forces

Type	Filename	YYYY-MM-DD	Size	Action
	EV-tri-phase-1.jpg	2006-04-05	72 kb	
	EV-tri-phase-2.jpg	2006-04-05	93 kb	
	ev-tri-phase-mod1.AVI	2006-04-05	624 kb	
	ev-tri-phase-mod2.AVI	2006-04-05	551 kb	
	ev-tri-phase-promo.AVI	2006-04-05	136 kb	
	ev-tri-phase-proto.AVI	2006-04-05	456 kb	
	ev-tri-phase.avi	2006-04-05	68 kb	
	Tri-Force Motor.gif	2006-04-05	295 kb	
	Tri-Forces #3.png	2006-04-05	33 kb	
	Tri-Forces #4.gif	2006-04-05	93 kb	
	Tri-Forces #5.gif	2006-04-05	24 kb	
	Tri-Forces-3.png	2006-04-05	33 kb	
	Tri-Forces-4.gif	2006-04-05	93 kb	
	Tri-Forces-5.gif	2006-04-05	24 kb	

	tri-forces.png	2006-04-05	17 kb	
	tri-forces2.png	2006-04-05	45 kb	
	Tri-Phase Motor Construction Idea.gif	2006-04-05	49 kb	
	Tri-Phase_Motor_Construction_Idea.gif	2006-04-05	49 kb	



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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Triangle gate
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	

Files in folder: .\group\minatowheel\files\Triangle gate

Type	Filename	YYYY-MM-DD	Size	Action
	MVC-001V.MPG	2006-04-05	351 kb	



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Sub-folders in folder: .\group\minatowheel\files\Unbalanced flux
Size of current folder: 1 of 200 Mb

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Files in folder: .\group\minatowheel\files\Unbalanced flux

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	Tests Update 06-24-03.pdf	2006-04-05	268 kb	
	Unbalanced Flux.pdf	2006-04-05	630 kb	



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Sub-folders in folder: .\group\minatowheel\files\Uploads
Size of current folder: 15 of 200 Mb

Type	Folder Name	# files	Action
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Files in folder: .\group\minatowheel\files\Uploads

Type	Filename	YYYY-MM-DD	Size	Action
	DualPistonPulse.MPG (Peter's dual piston Pulse motor)	2007-02-11	2.68 mb	
	Largerotor.MPG (Jason Beamish: I have made these up to 5' long.)	2006-11-02	1.16 mb	
	Norotor.MPG (Jason Beamish: The small rotor (or no rotor) I could not make it exit completely and on to the next. Rais the magnet up a bit and it will every time.)	2006-11-02	2.63 mb	
	pistonengine1.MPG (Peter's piston engine)	2006-11-02	1.59 mb	
	rotor_using_gate.MPG (Jason Beamish: This was one of my first rotors. After the vidio, I made some more adjustments and got a few more turns with it.)	2006-11-02	6.84 mb	



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Sub-folders in folder: .\group\minatowheel\files\Zipper
Size of current folder: 0 of 200 Mb

Type	Folder Name	# files	Action
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Files in folder: .\group\minatowheel\files\Zipper

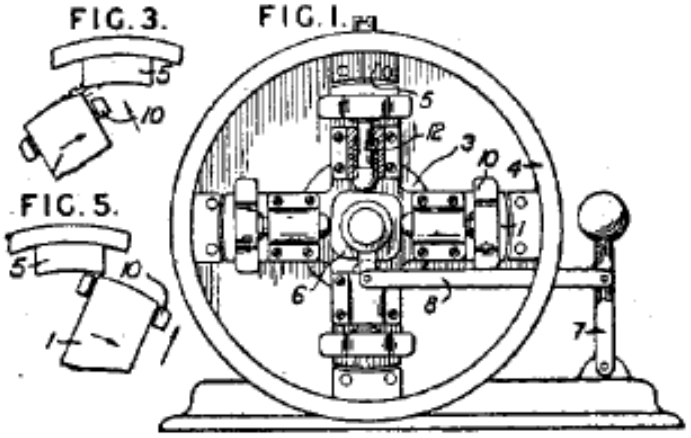
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	img001.jpg	2006-04-05	120 kb	
	img002.jpg	2006-04-05	121 kb	

http://www.fdp.nu/shared/files/changing%20field.wmv

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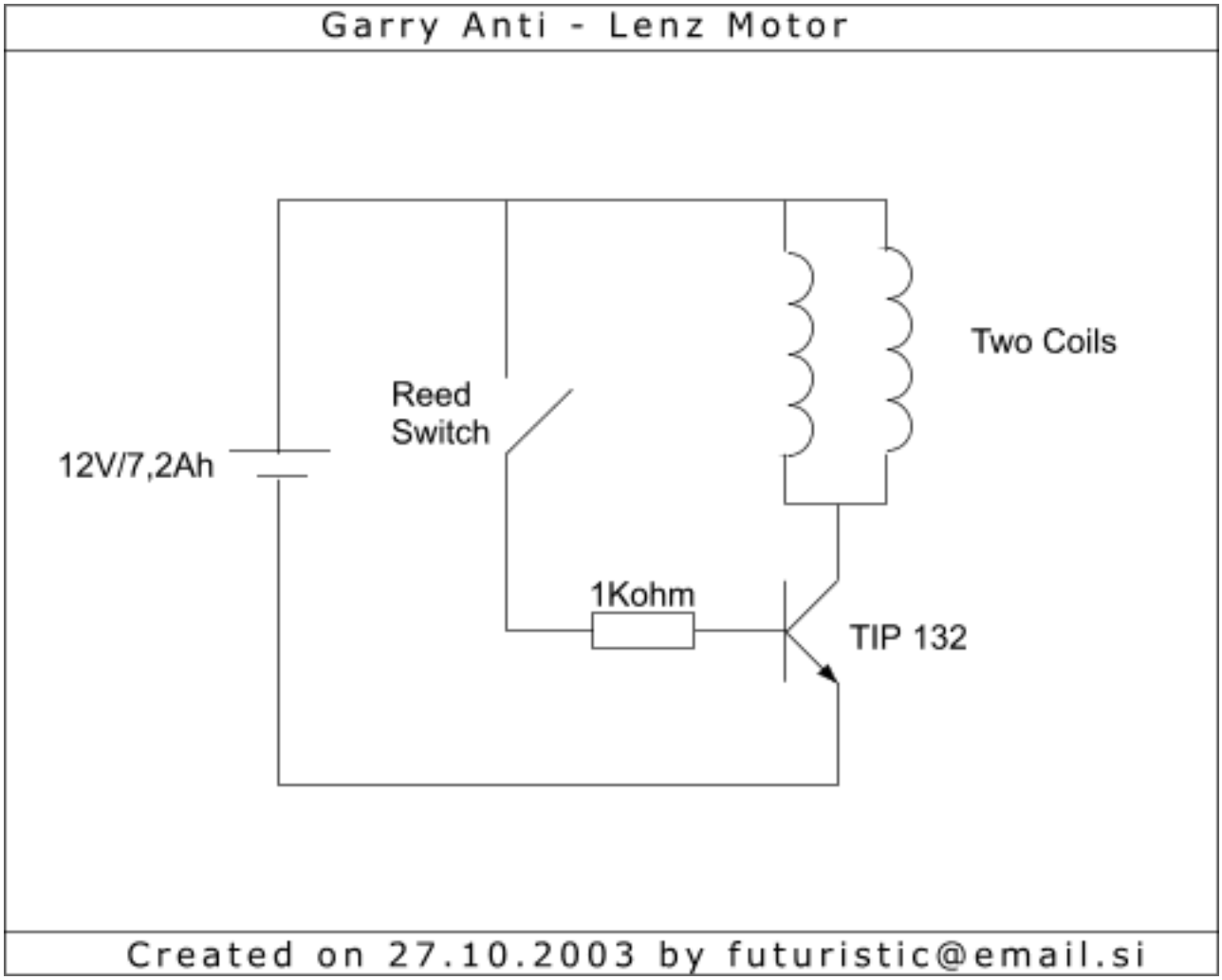
Abstract of **GB552558**

552,558. Motors. HITCHCOCK, S. I. July 9, 1941, No. 8665. [Class 35] A permanent magnet ot a permanent magnet motor has a "flux controller" consisting of a soft iron sleeve surrounding the pole pieces 1 of the magnet, or a plurality of soft iron bars 10 disposed on opposite sides of the pole pieces, and means, such as a cam 6 acting on spring loaded plungers 12, for periodically moving the flux controller lengthwise of the pole pieces into a position in which it lies flush with the end faces thereof, for the purpose of diverting the whole or a substantial proportion of the magnetic flux which would normally pass between the moving and stationary pole pieces when oppo- sitely arranged, into the soft iron ports of the controller. In the form shown a cylindrical per- manent magnet 3 has a four pole laminated pole piece 1 at each end, the whole rotating within a stator 4 having pole pieces 5. The angular position of cams 6, one at each end, are adjusted simul- taneously by lever 7 and link 8. While a pole piece 1 is approaching or opposite a pole piece 5 the bars 10 are retracted, as shown in Fig. 3. As soon as the pole pieces are about to separate, the bars 10 rise flush with the surface of pole piece 1, as shown in Fig. 5, and weaken the attraction between the poles. Sufficient momen- tum is thus left to the rotor to enable it to get into the field of attraction of the next stator pole. If permanent magnets are employed in both stator and rotor, there will be two sets of flux controllers. Such motors will not be self- starting or capable of perpetual motion. If either the stator or the rotor is an electromagnet, the motor can be started and maintained by inter- mittently energizing the windings ; the other mem- ber will then be a permanent magnet provided with a flux controller. The controllers may be moved electrically by windings energized separ- ately or by a motor winding. To facilitate move- ment, a ball race or copper sheaths may be interposed between the flux controllers and the surfaces of the pole pieces. The Provisional Specification describes also an application to lift- ing magnets, the flux controller being movable by a Bowden wire or trip mechanism. The controller may be an insert in one of the poles.



http://www.fdp.nu/shared/files/flux_controller.gif

Select All Close window


Garry Anti - Lenz Motor
Two Coils
Reed
Switch
12V/7,2Ah
1Kohm
TIP 132
Created on 27.10.2003 by futuristic@email.si

http://www.fdp.nu/shared/files/Garrys%20Pulse%20Circuit.gif

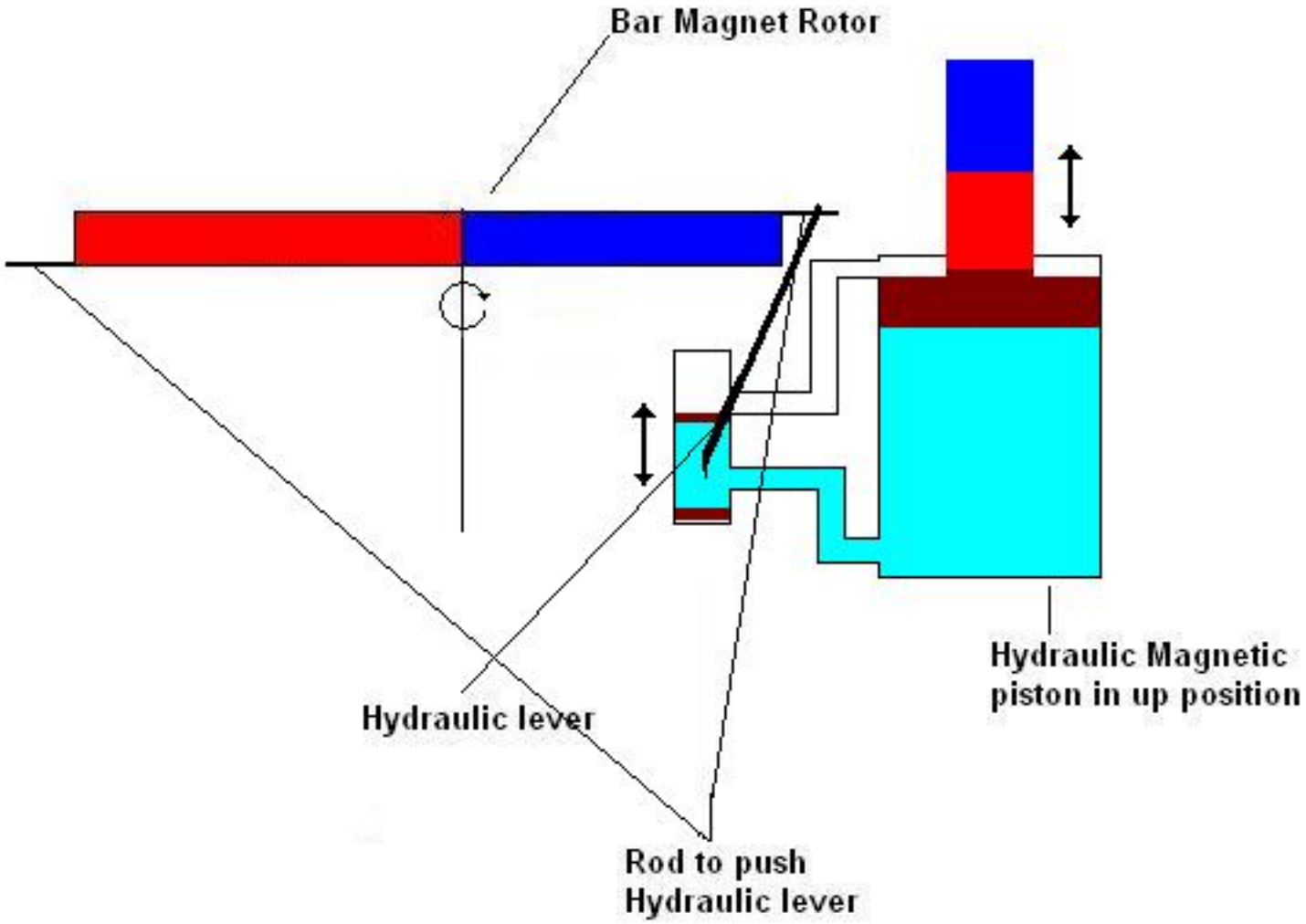
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Hydraulic Magnetic Motor

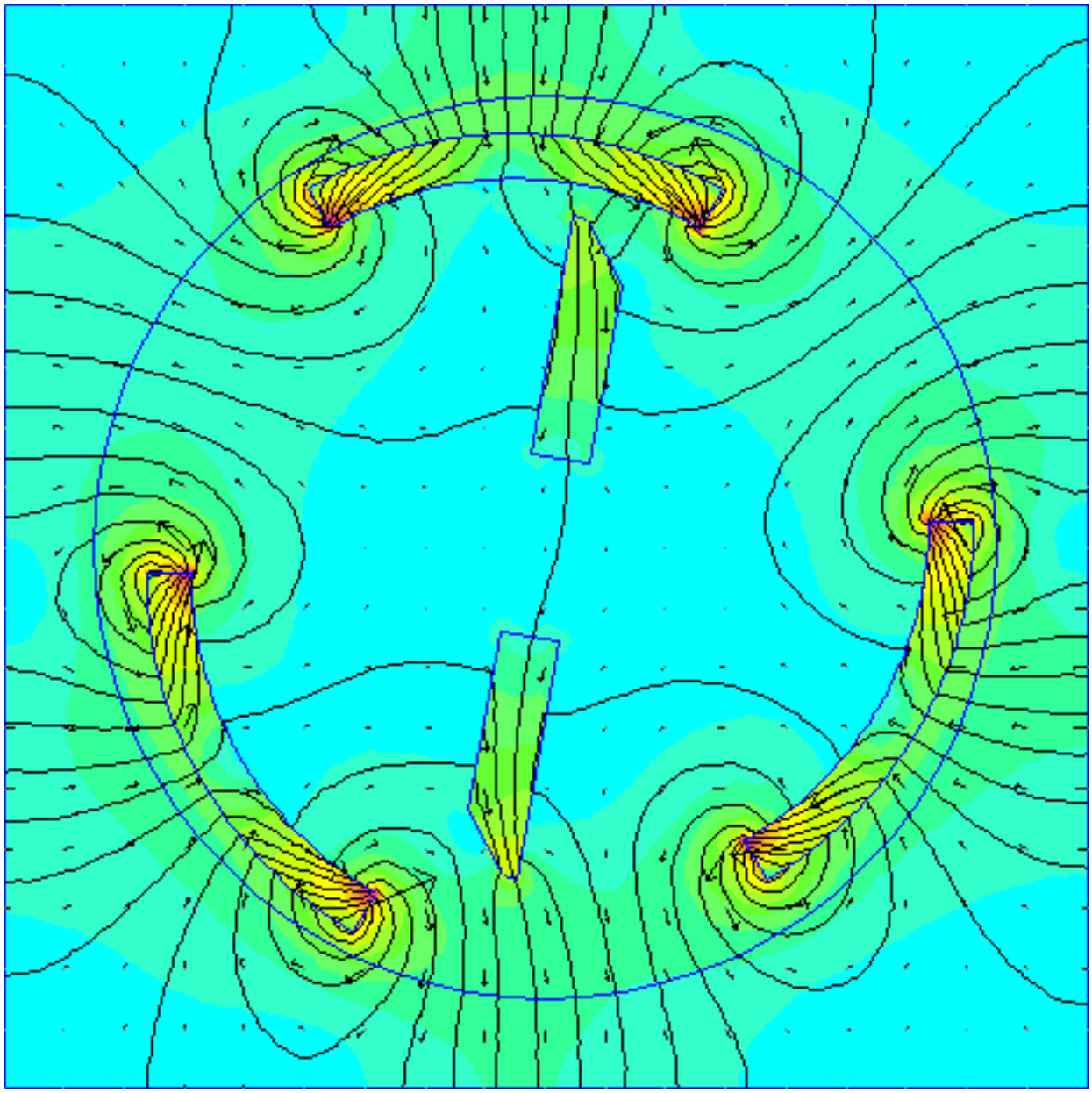
By Graham Clarke

The hydraulic lever is pushed by the rods on the top and the bottom of the bar magnet when it is attracted to the hydraulic piston, this moves the valve across making the hydraulic piston go up or down and repelling the bar magnet around



http://www.fdp.nu/shared/files/HydraulicMagMotor.jpg

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http://www.fdp.nu/shared/files/Iron%20Rotor%20Mag%20Motor%20animation.gif

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http://www.fdp.nu/shared/files/Iron%20rotor%20test.wmv

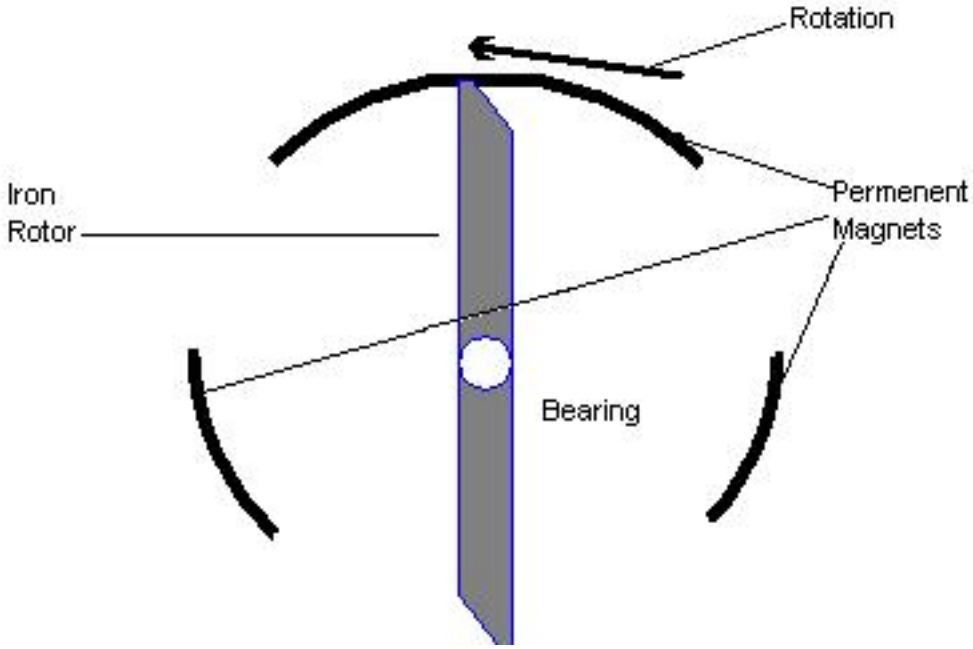
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Iron Rotor magnetic motor

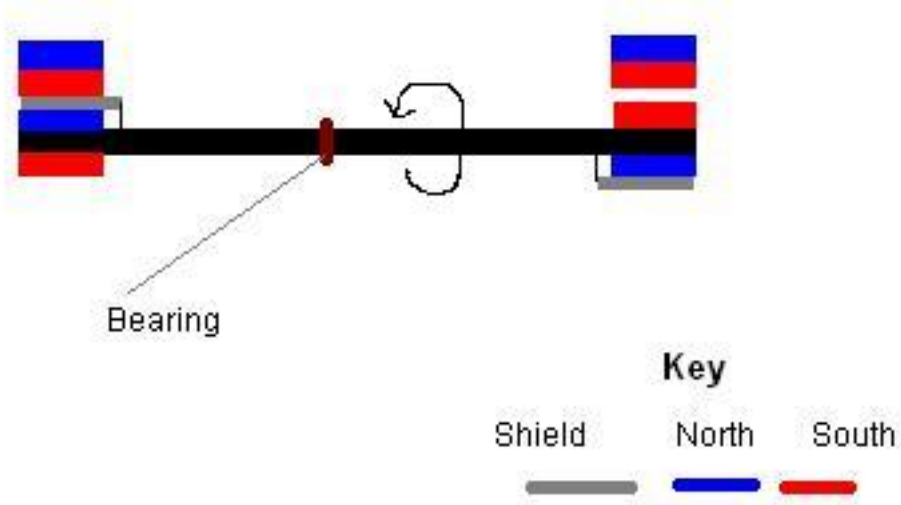
By Graham Clarke



http://www.fdp.nu/shared/files/IronRotorMagMotor.jpg

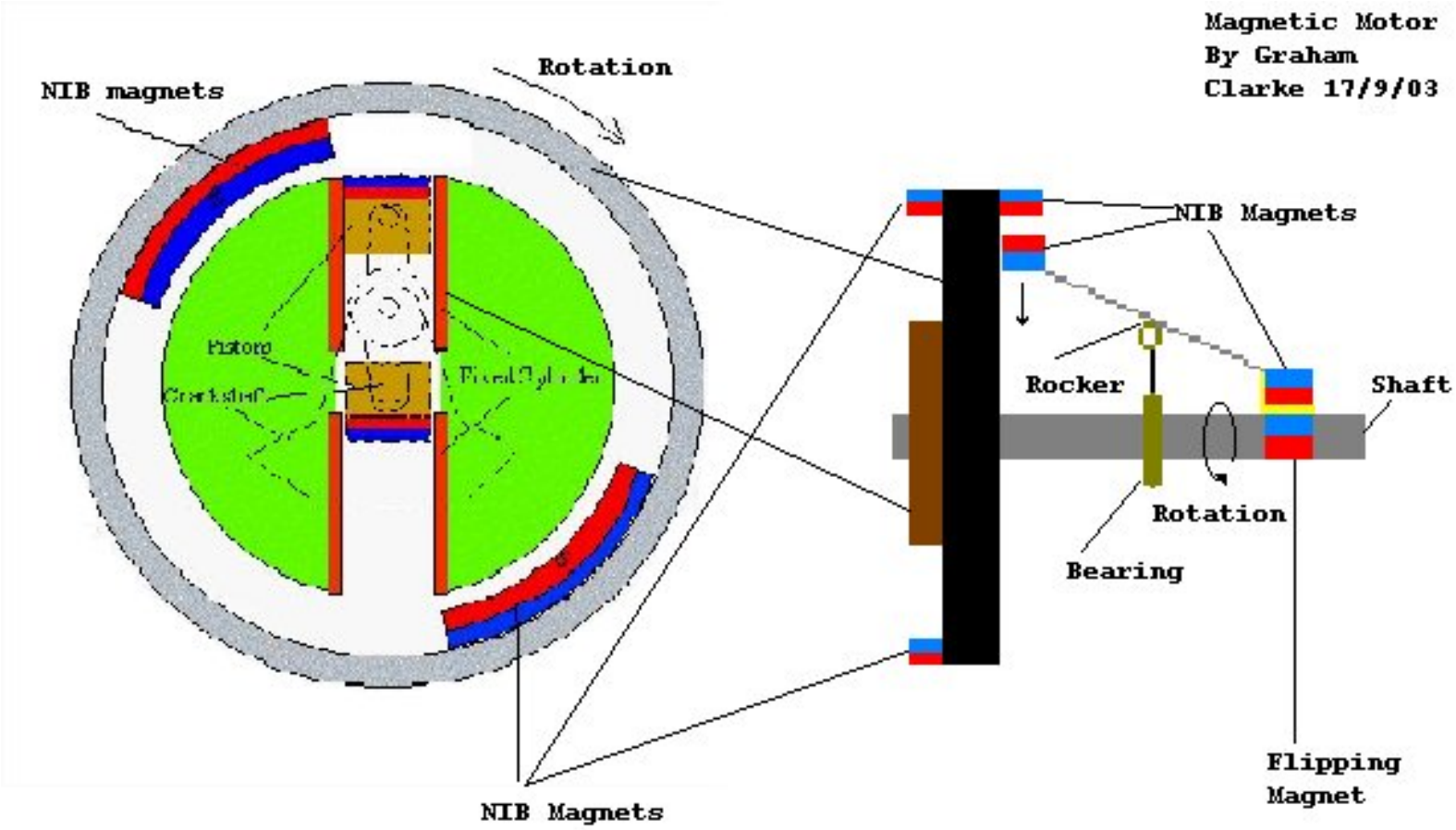
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My Lafonte Motor



http://www.fdp.nu/shared/files/LafonteMotor.jpg

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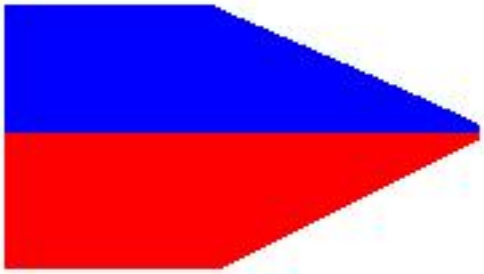
Front view

Side view

http://www.fdp.nu/shared/files/magmotor.jpg

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magnet shape

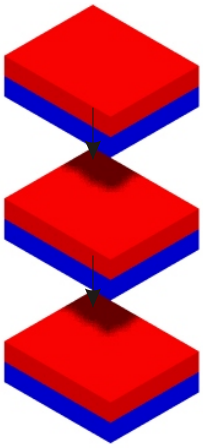


http://www.fdp.nu/shared/files/Magnet%20Shape.jpg

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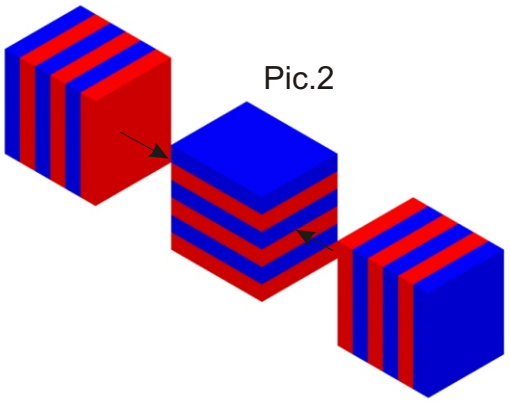
Magnetic Shielding Concept

Pic.1
12x10x4mm Jaycar magnets



This concept is derived from the Halbach magnetic array (http://www.matchrockets.com/ether/halbach.html),which uses 5 cube magnets in a particular configuration.
I discovered that an array of 3 magnets can achieve the same effect. For the building of this array, I used small magnets from Jaycar which are easy to come by and are cheap. I started off by making 12x12x10 magnets, consisting of 3 Jaycar magnets glued together as in Pic.1. They will of course resemble the same properties as one magnet with just one north and south once put together.

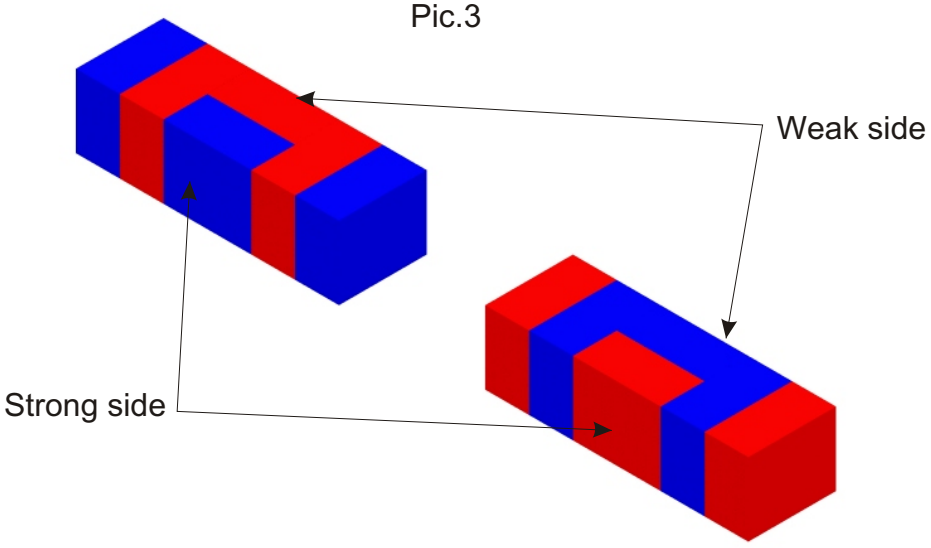
Pic.2 shows how the magnets are glued together to make the triple arrays.



Pic.2

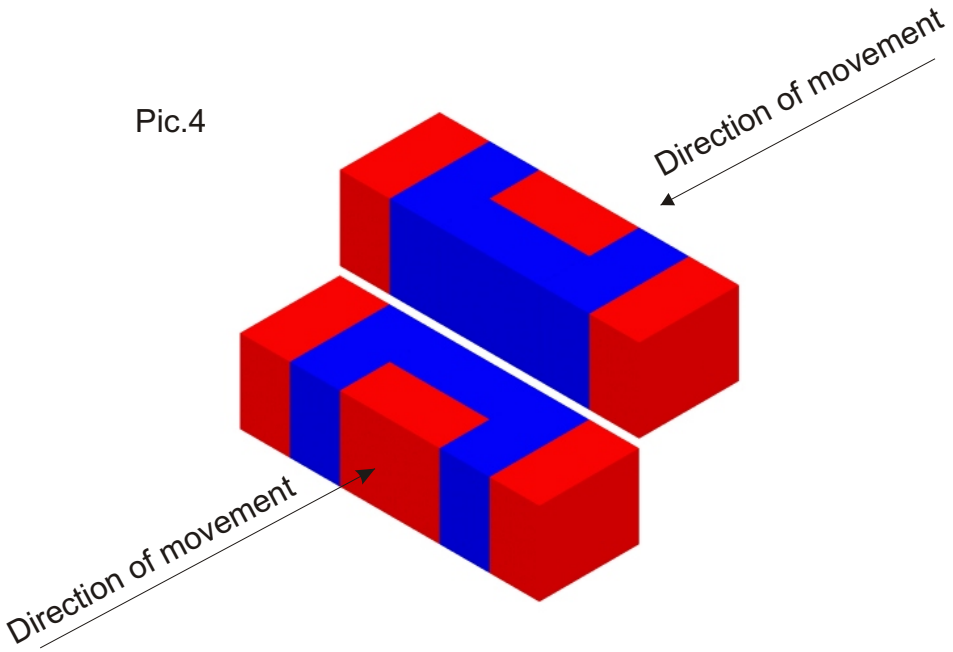
Pic.3,the arrays can be put together in two different ways resulting in either a strong north or south. The weak (augmented side) is at least 10 times weaker. Arrays of the opposite types always attract each other no matter which faces are put together.

Pic.3

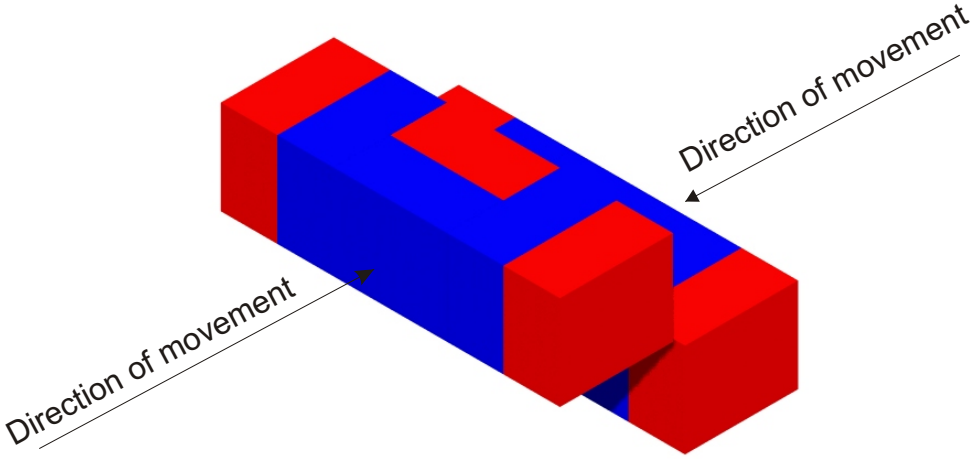


If two arrays of the same polarity Re moved towards each other as in Pic.4 in order to slide on top of one another, there is very little repulsion. If they are moved towards each other from the other direction as in Pic.5 a strong repulsive force becomes evident. This is as close to magnetic shielding as I have seen so far. The weak side of one of the arrays shows neither repulsion or attraction to either pole of another magnet that is brought close to it.

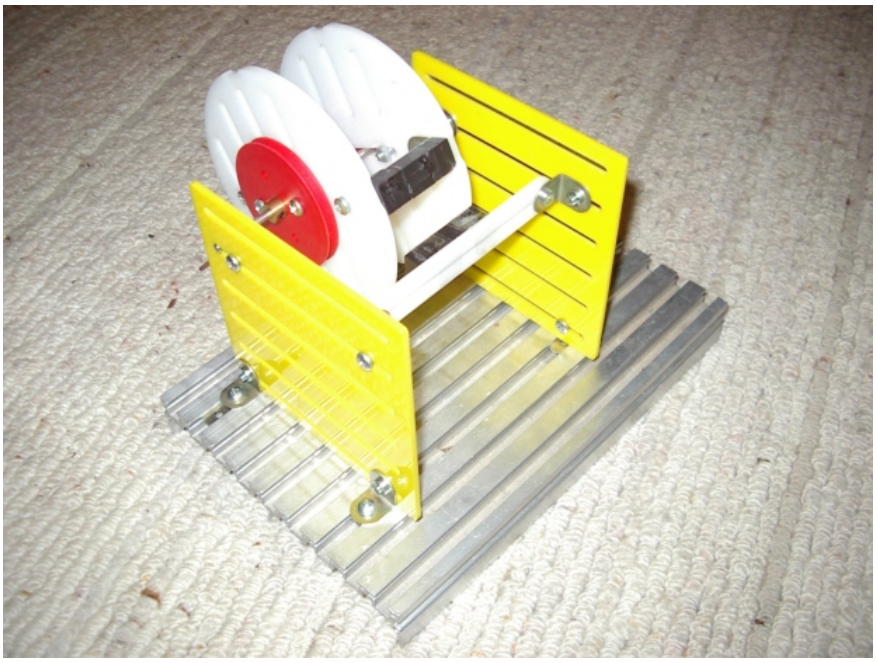
Pic.4

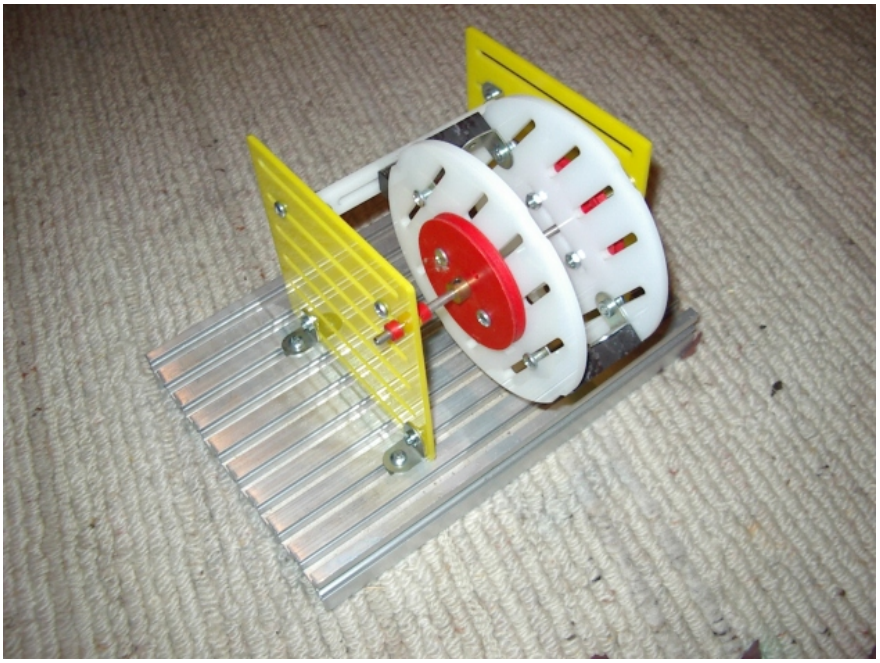


Pic.5



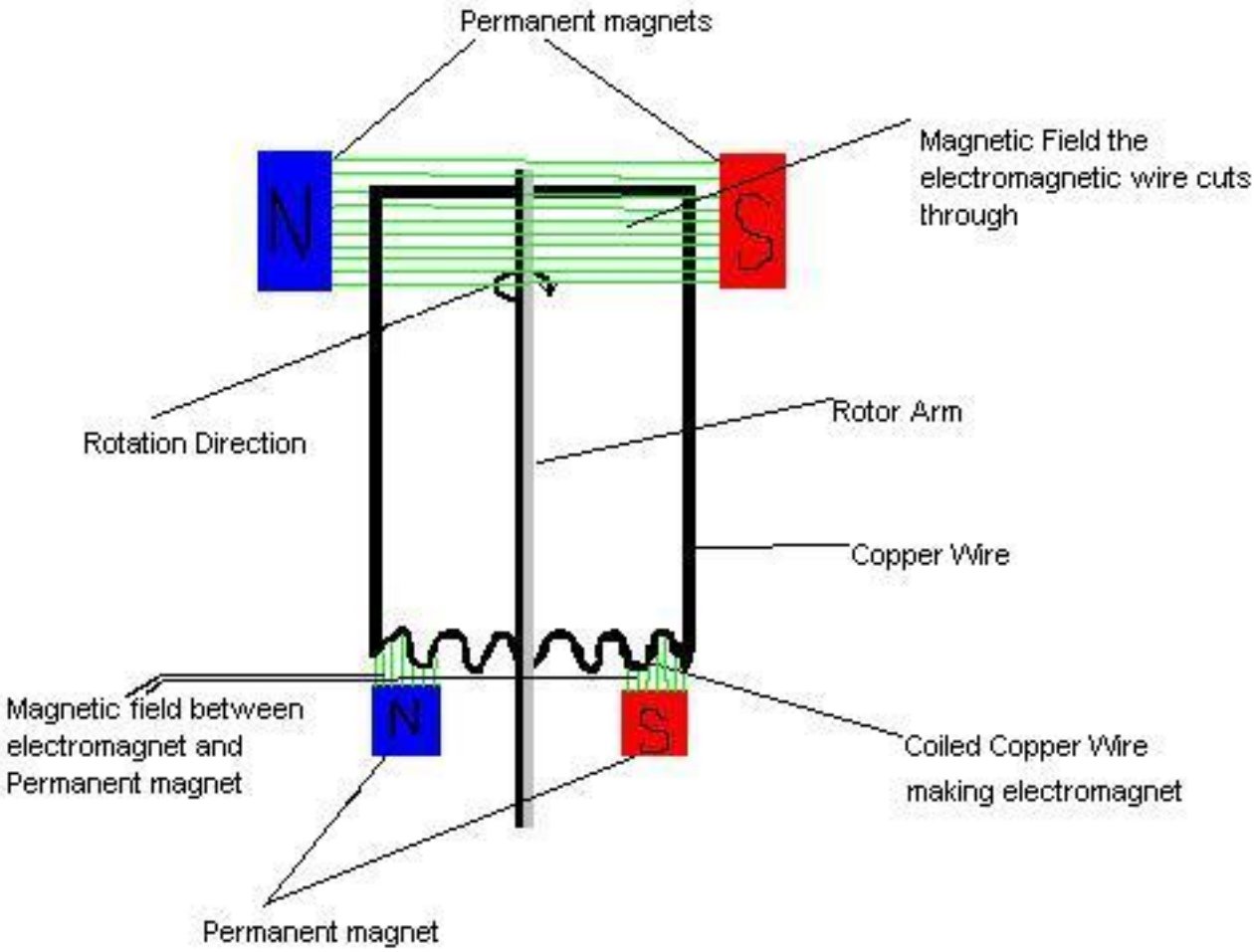
Since this type of magnetic array exhibits exactly the properties of Tom Bearden's proposed design, it was now time to build a working model in order to try the concept in practice. Unfortunately there is absolutely now difference whether the rotor is turned one way or another. In other words it does not work.





http://www.fdp.nu/shared/files/magnet.pdf

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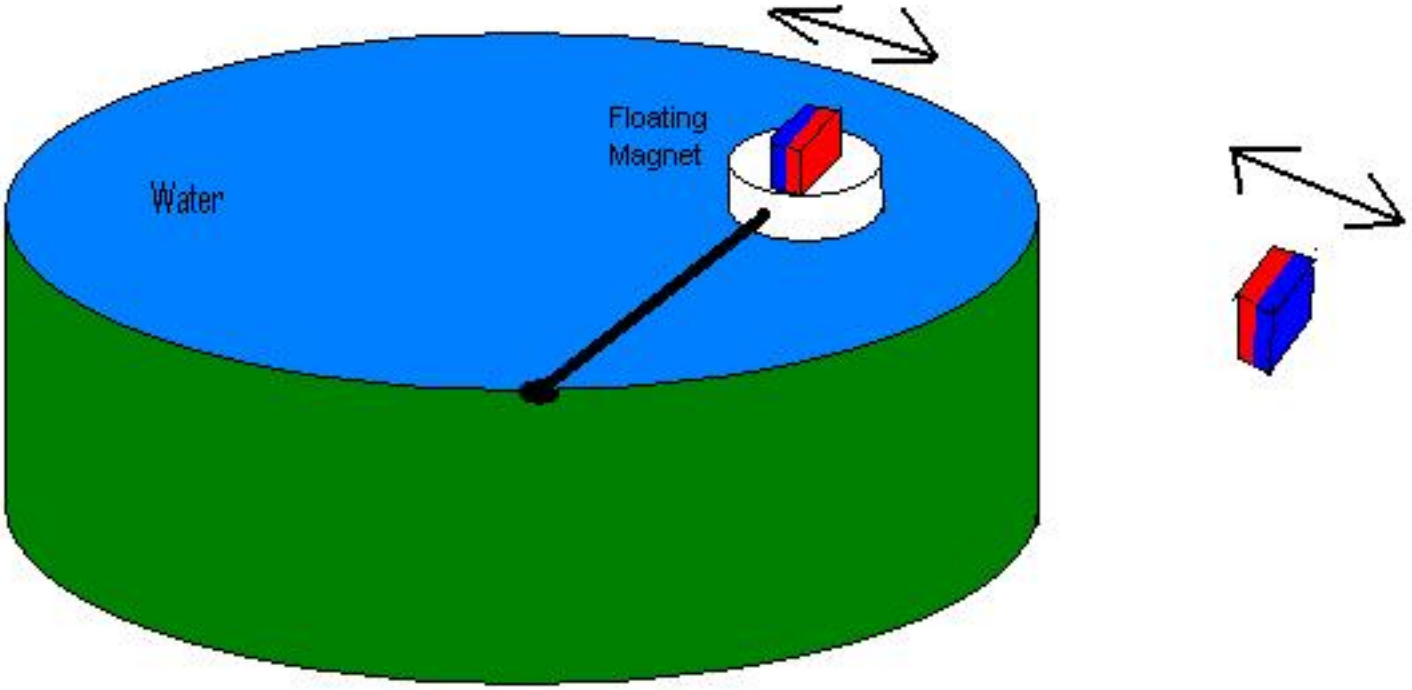

Permanent magnets
Magnetic Field the electromagnetic wire cuts through
N
S
Rotation Direction
Rotor Arm
Copper Wire
Magnetic field between electromagnet and Permanent magnet
N
S
Coiled Copper Wire making electromagnet
Permanent magnet

http://www.fdp.nu/shared/files/MagneticMotor.jpg

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http://www.fdp.nu/shared/files/MagneticMotor.wmv

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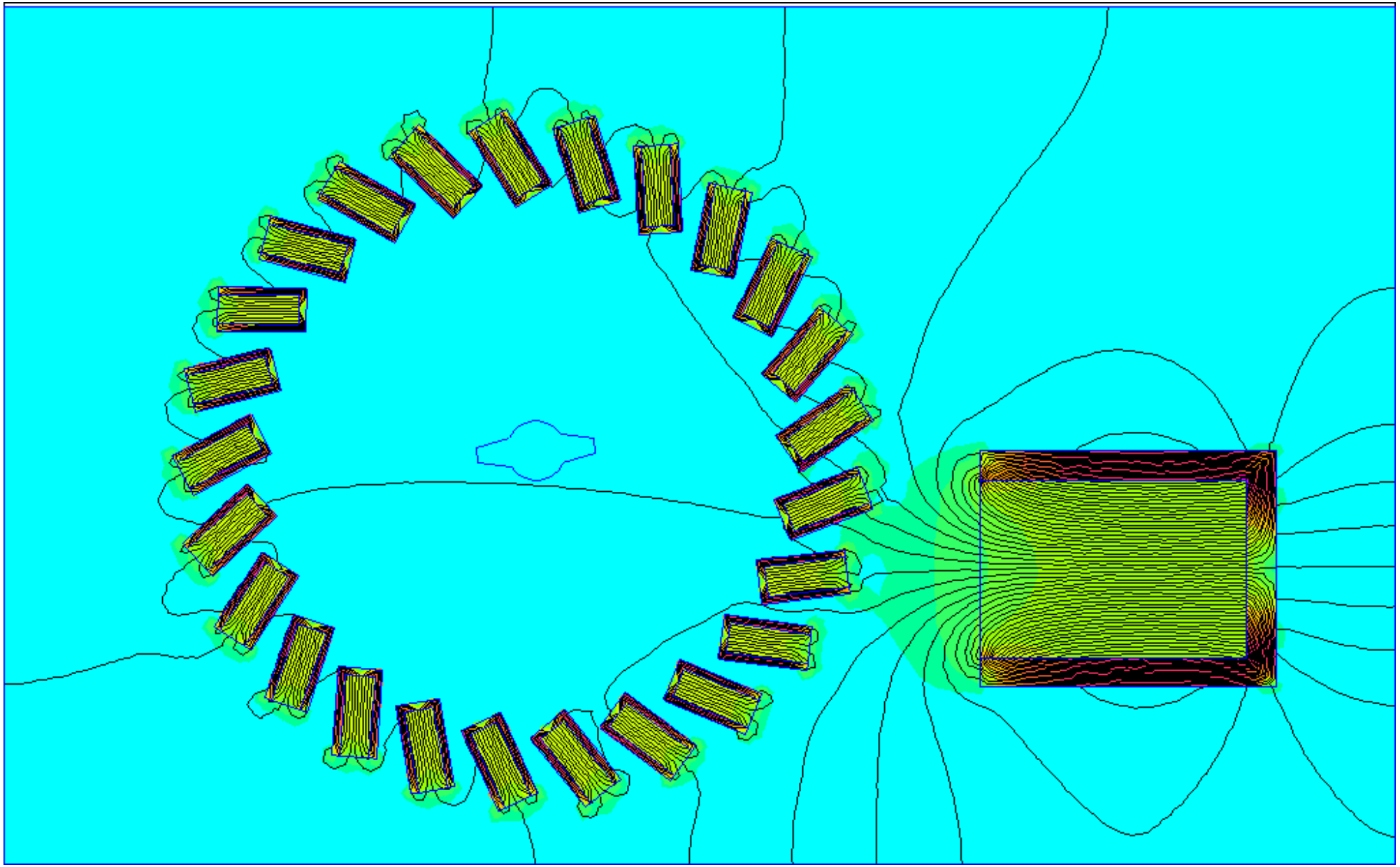

Floating
Magnet
Water

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http://www.fdp.nu/shared/files/Perendev%20Motor%

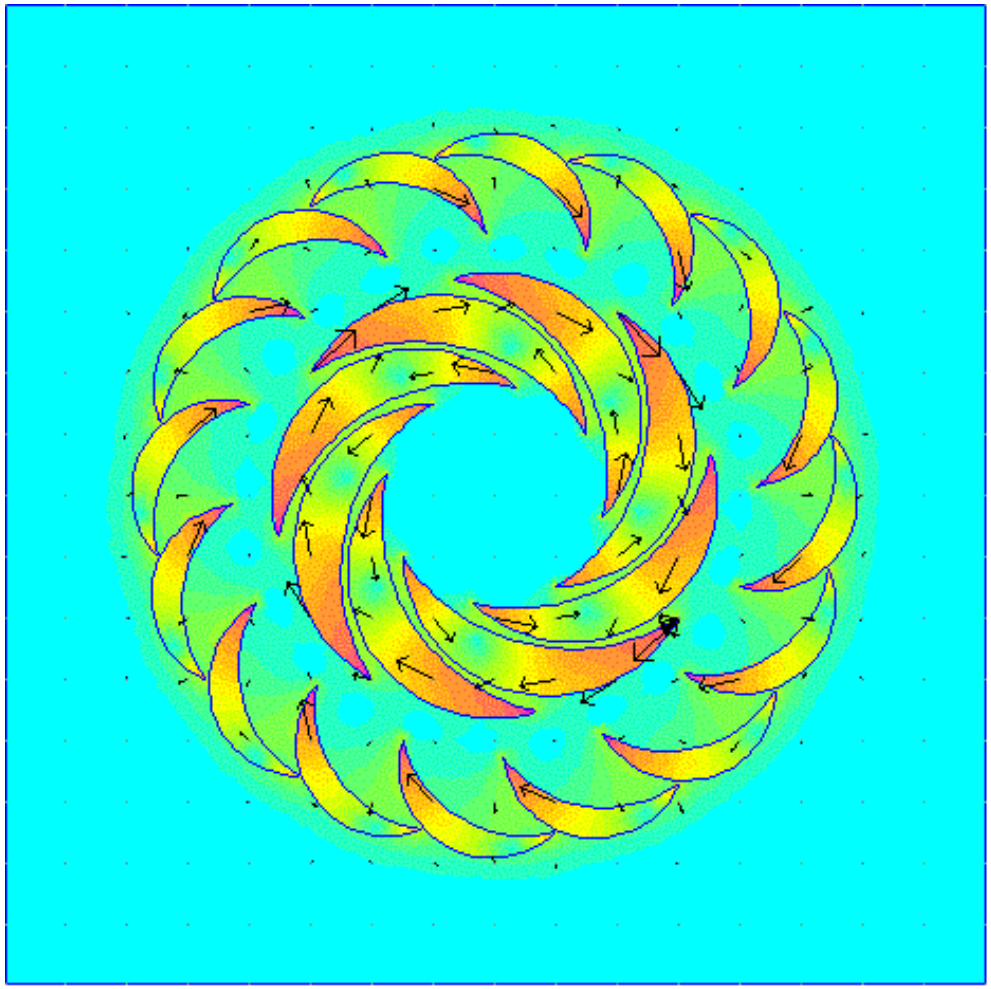
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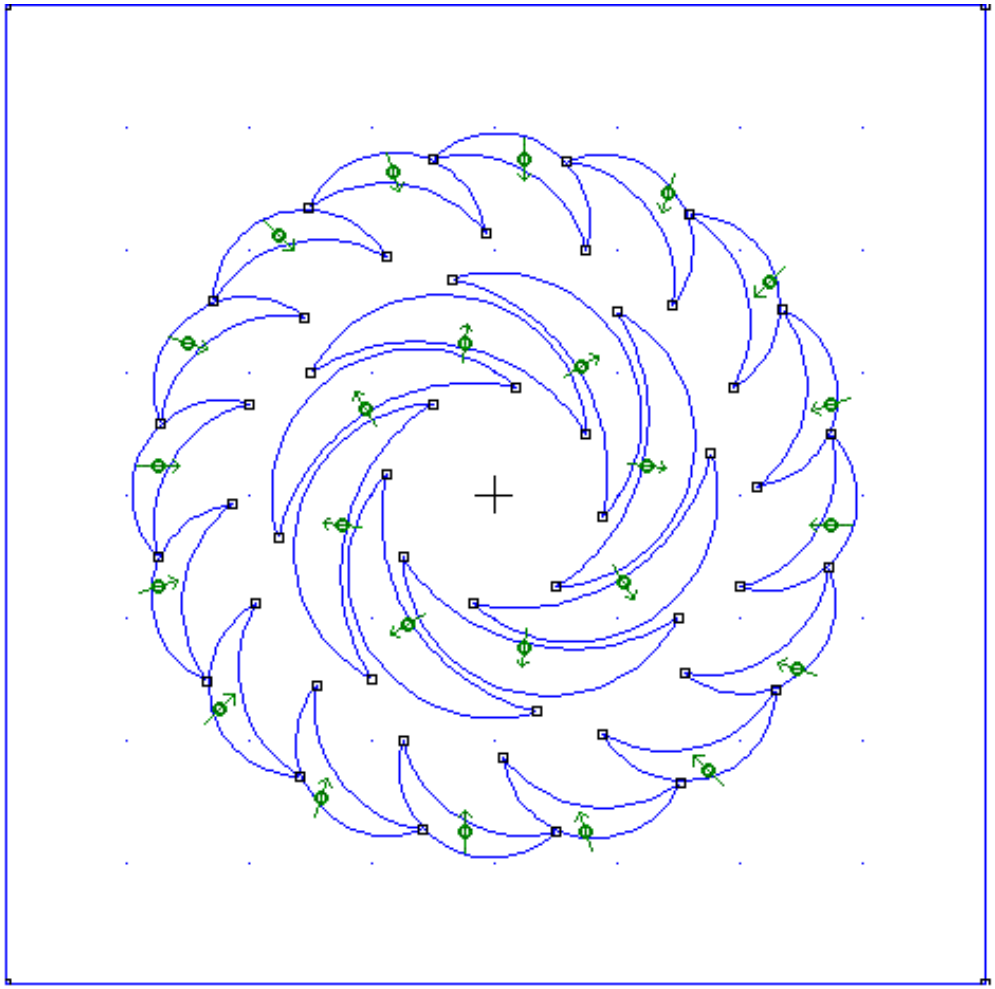


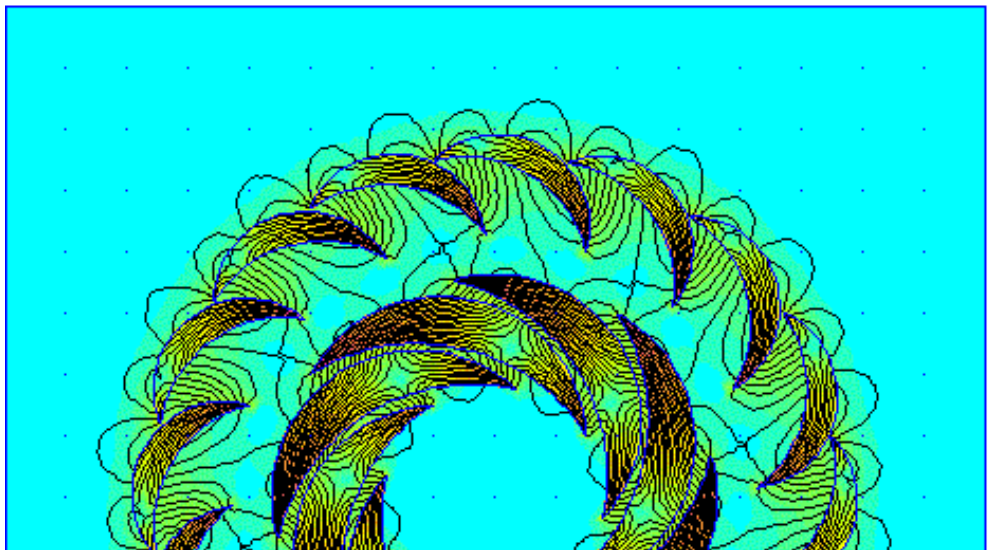
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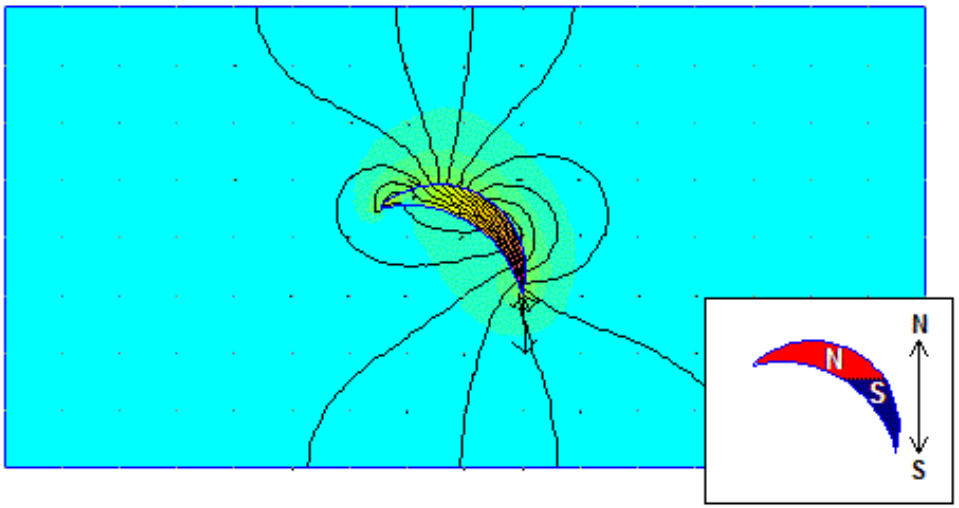
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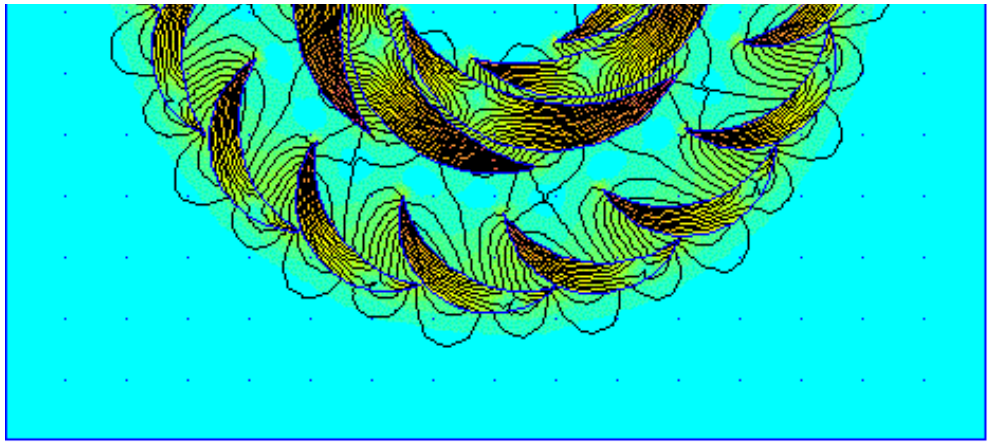
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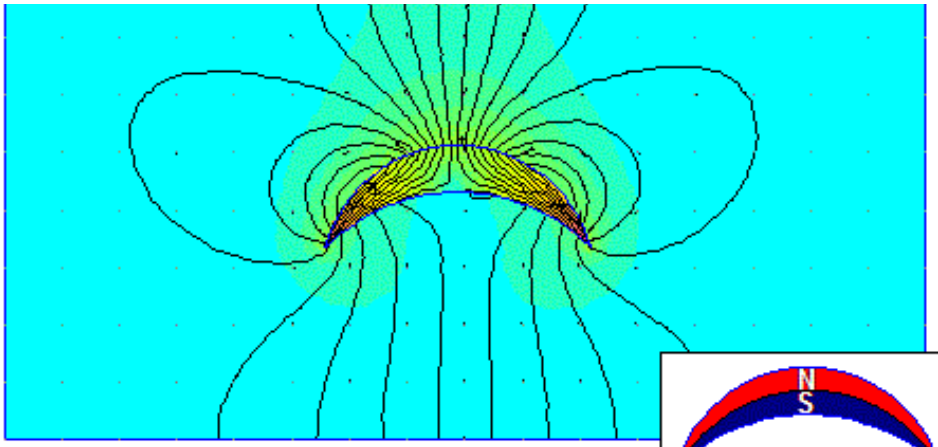


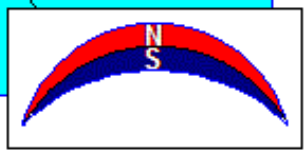





N
N
S
S



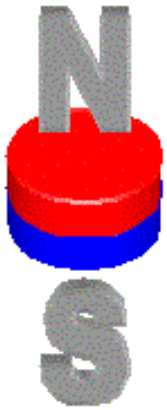



N
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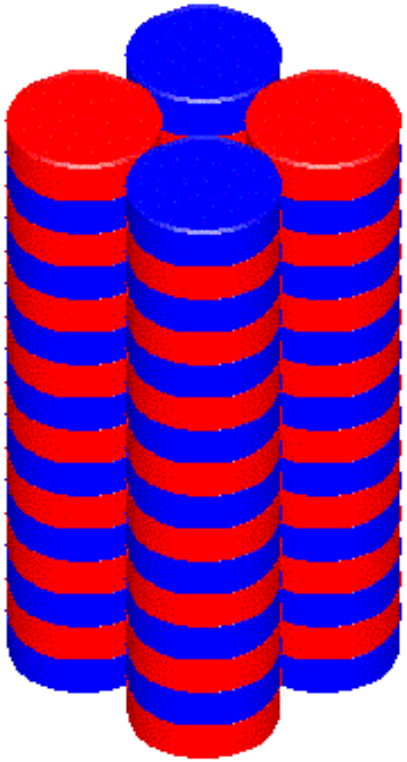
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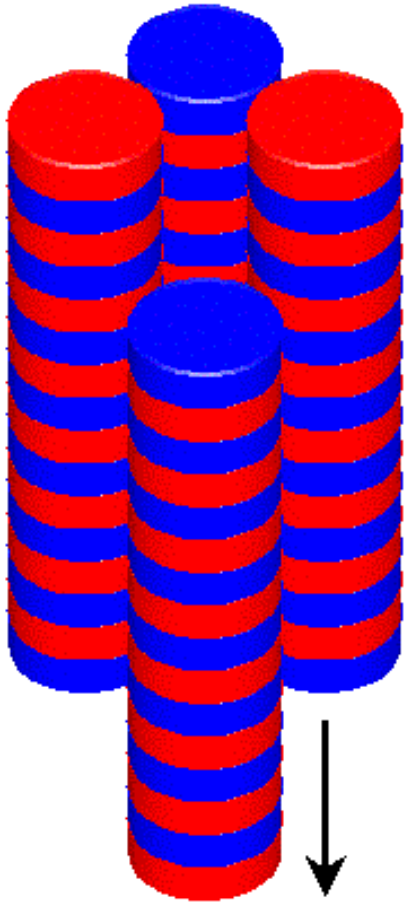
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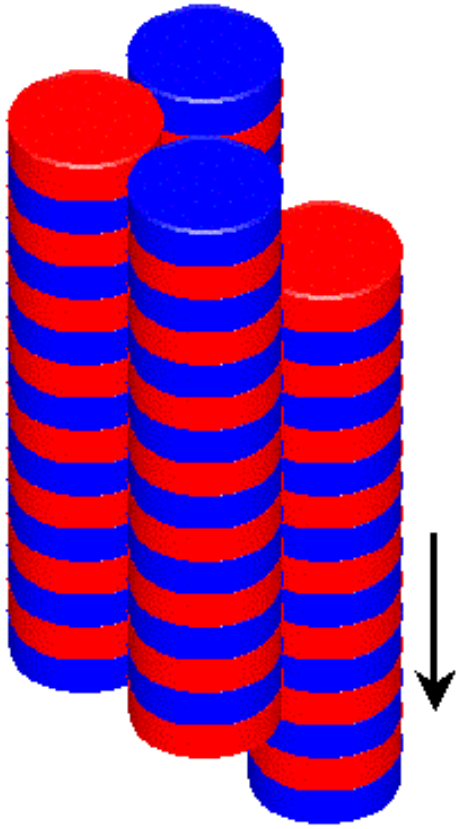
Magnet in Equilibrium

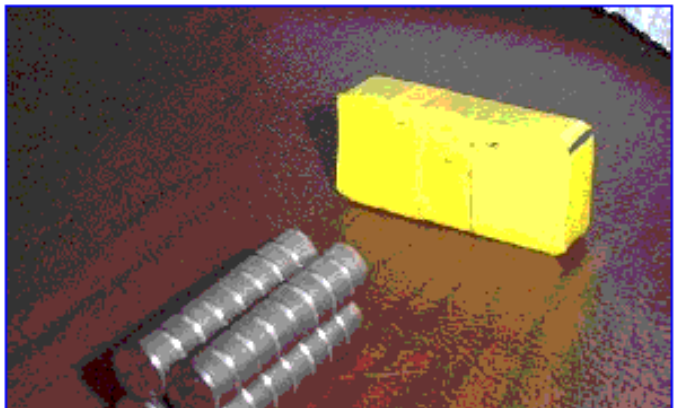


Magnet with greater North Pole influence

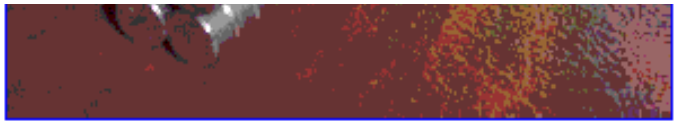


Magnet with greater South Pole influence





This is the initial setup I used when I discovered that the group of magnets behaved in this way. All I did was pull back one of the four stacks and the big yellow magnet would be either attracted to the magnet, or repelled and knocked over.



By Jason Owens
Jdo300@sbcglobal.net

http://www.fdp.nu/shared/files/Polarity%20Changing%
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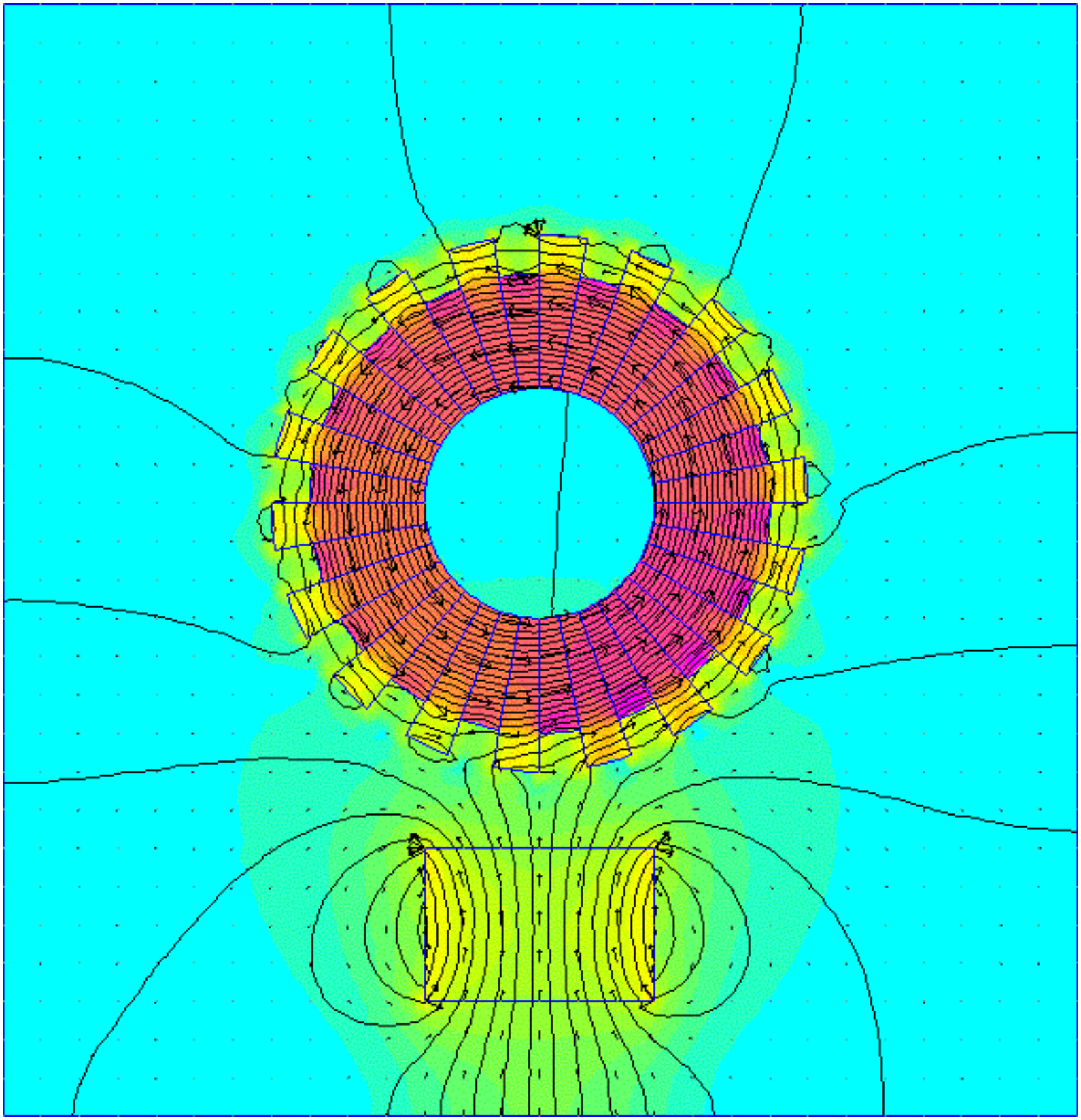
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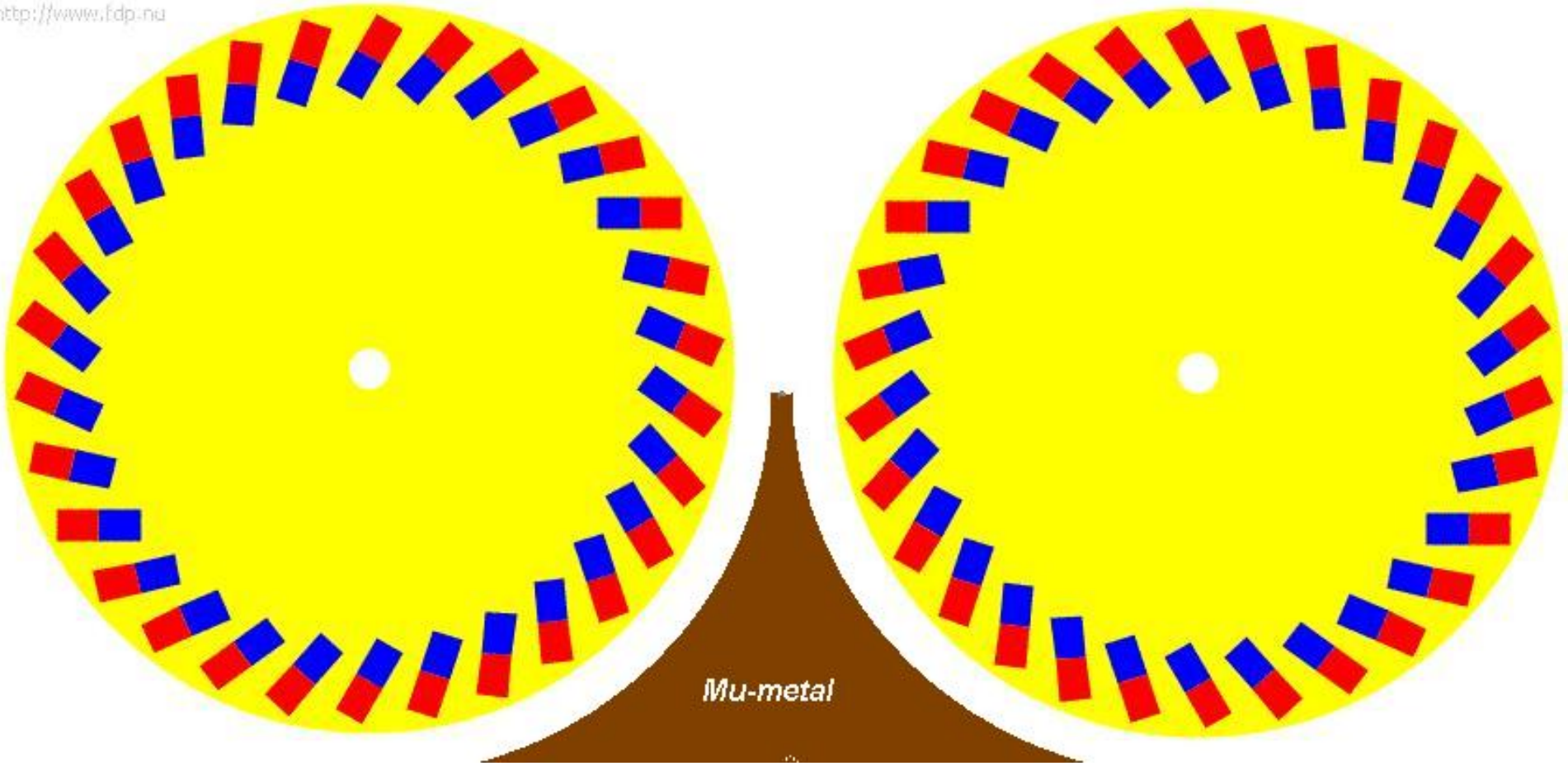
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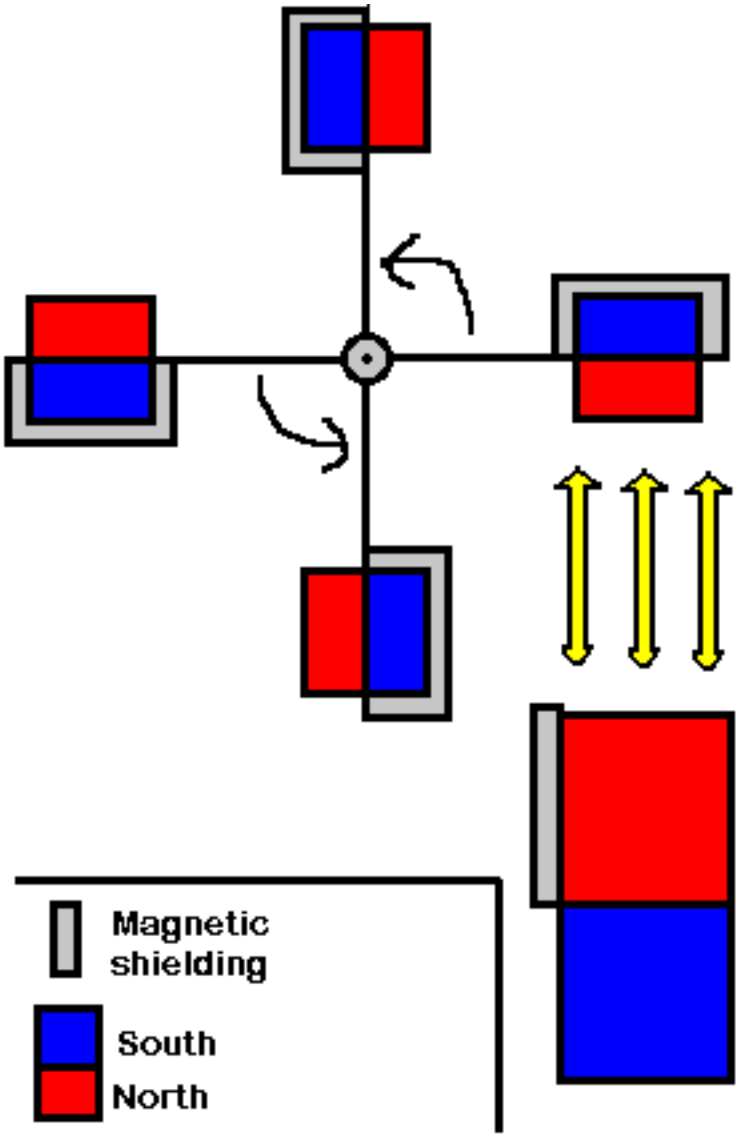

http://www.fdp.nu
Mu-metal

http://www.fdp.nu/shared/files/wheels.JPG

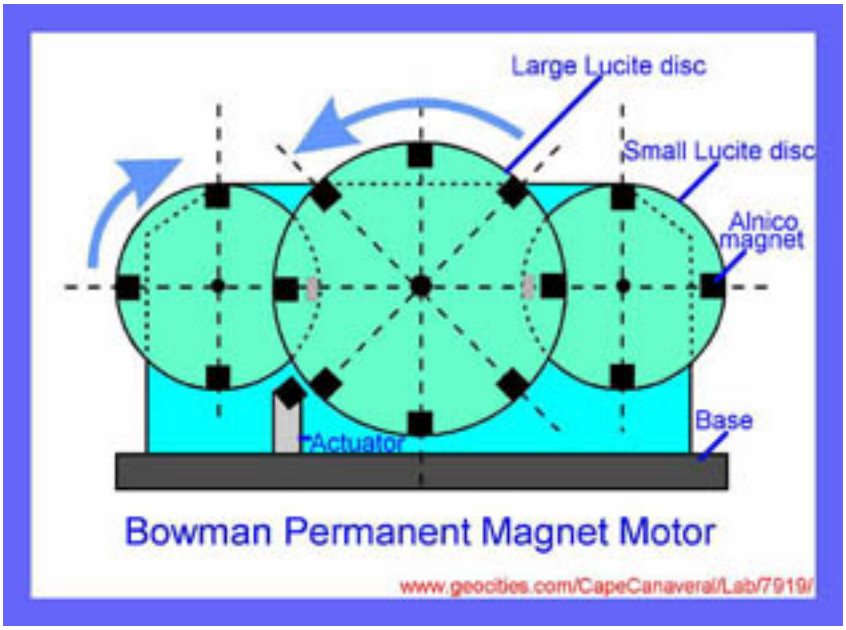
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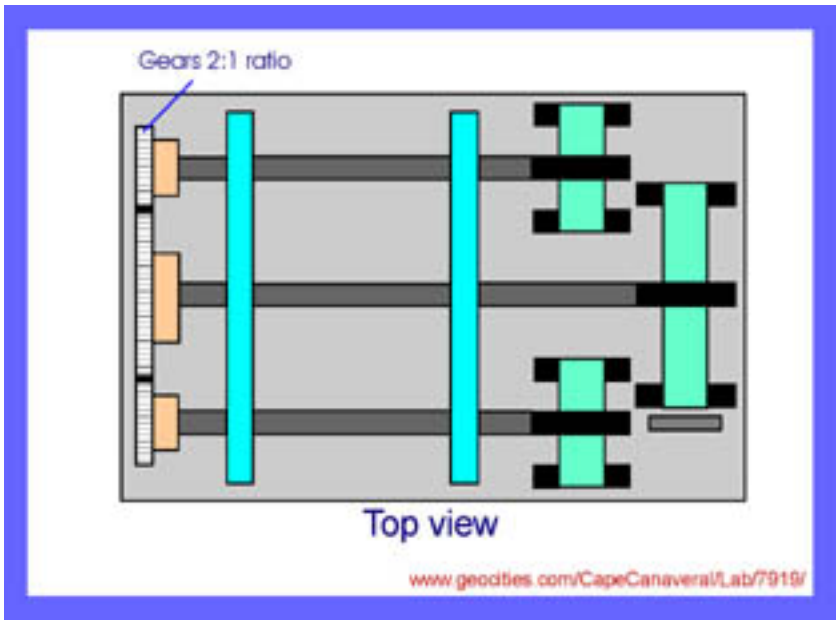
Bartosz Majda's

magnetic motor



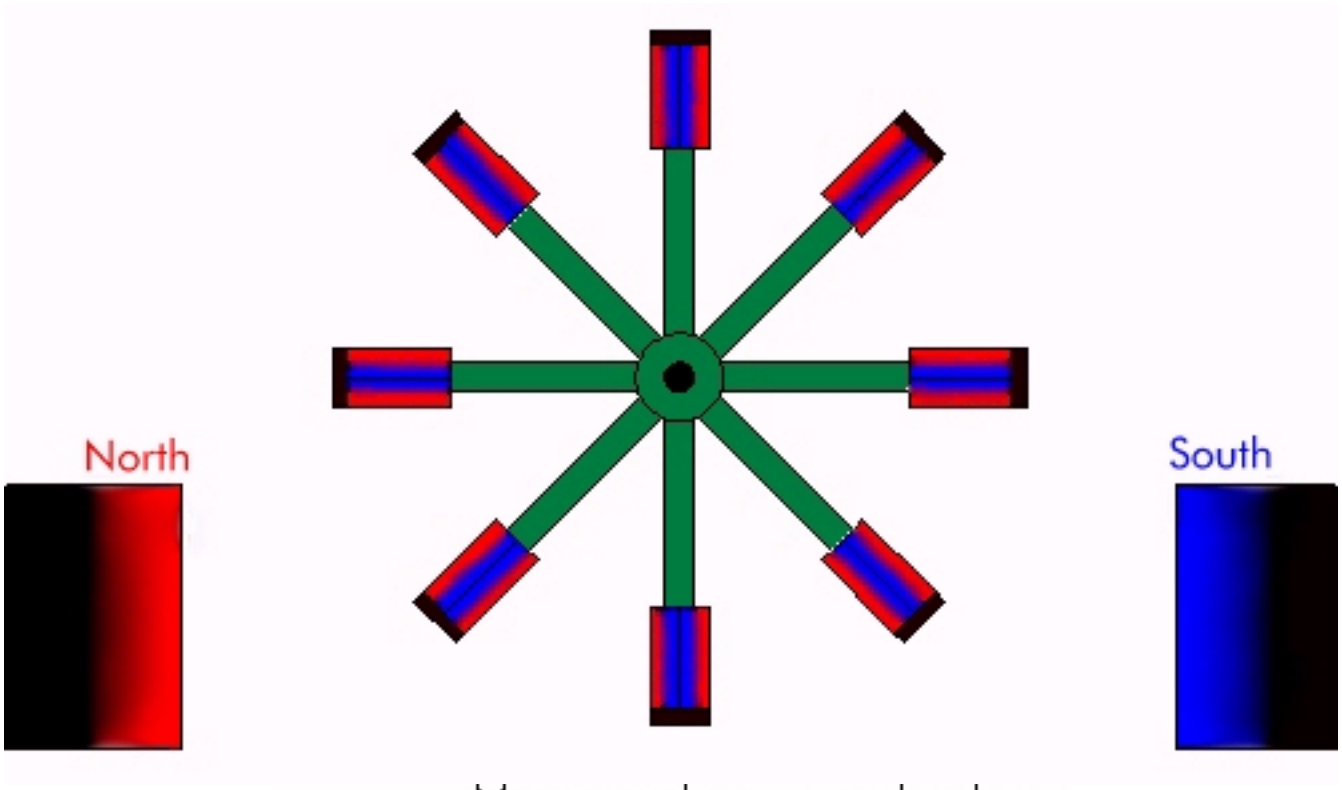
The Bowman permanent magnet motor

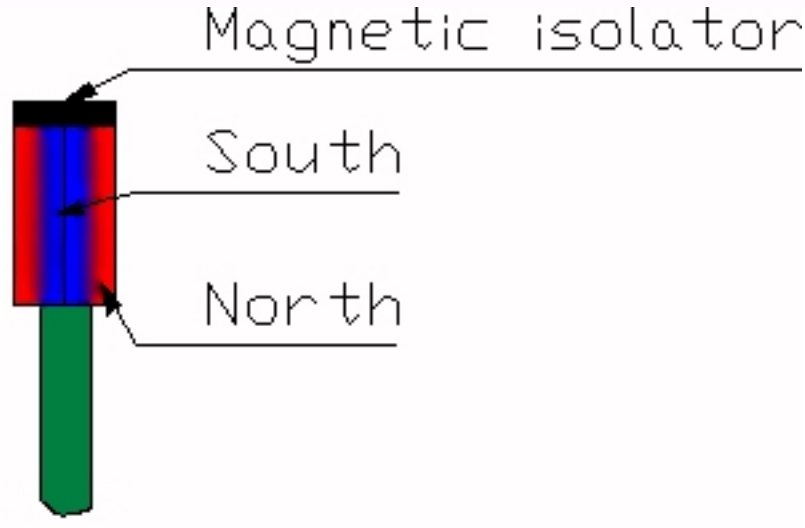




Cirila Mocnik's

magnetic motor

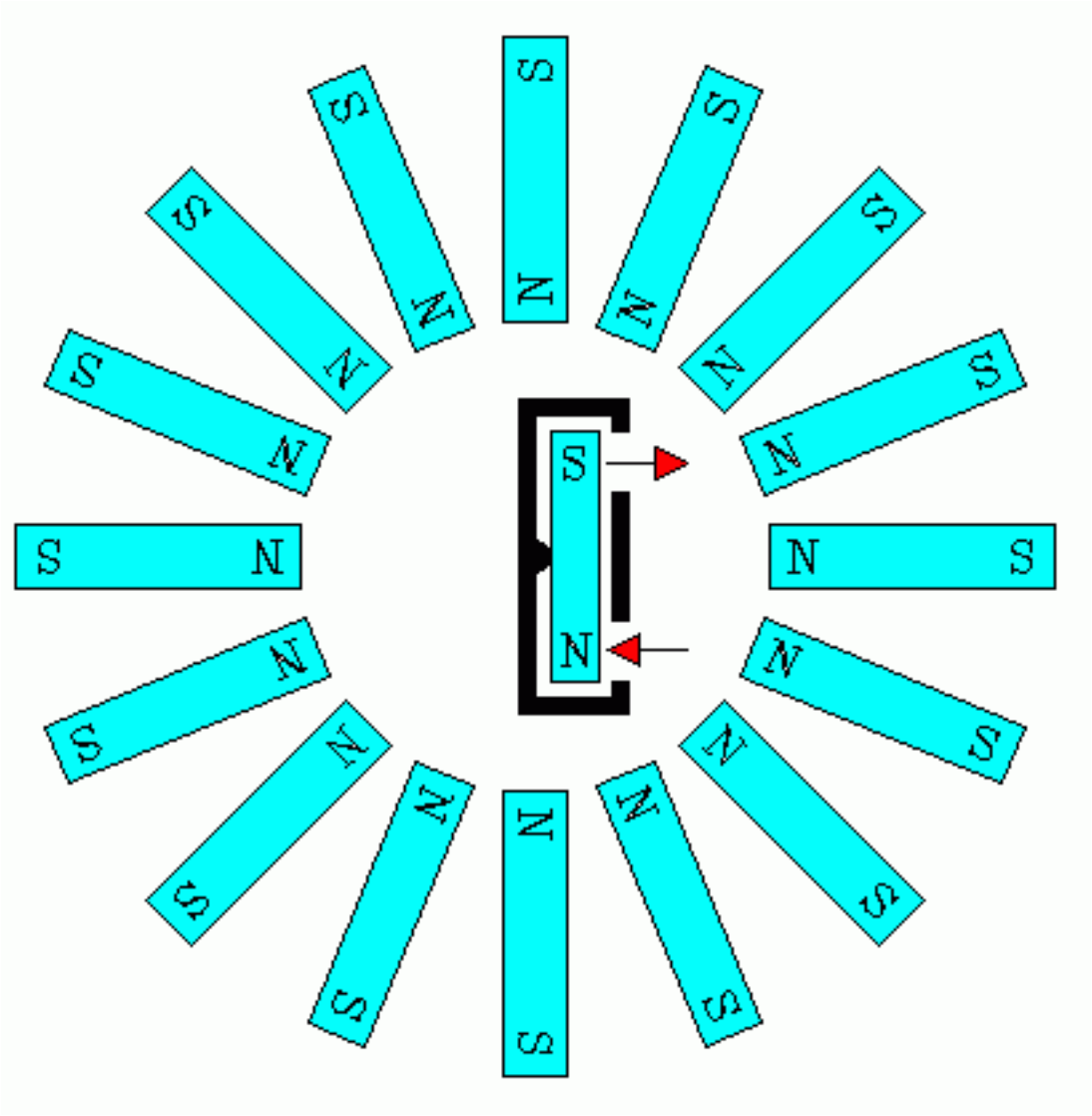


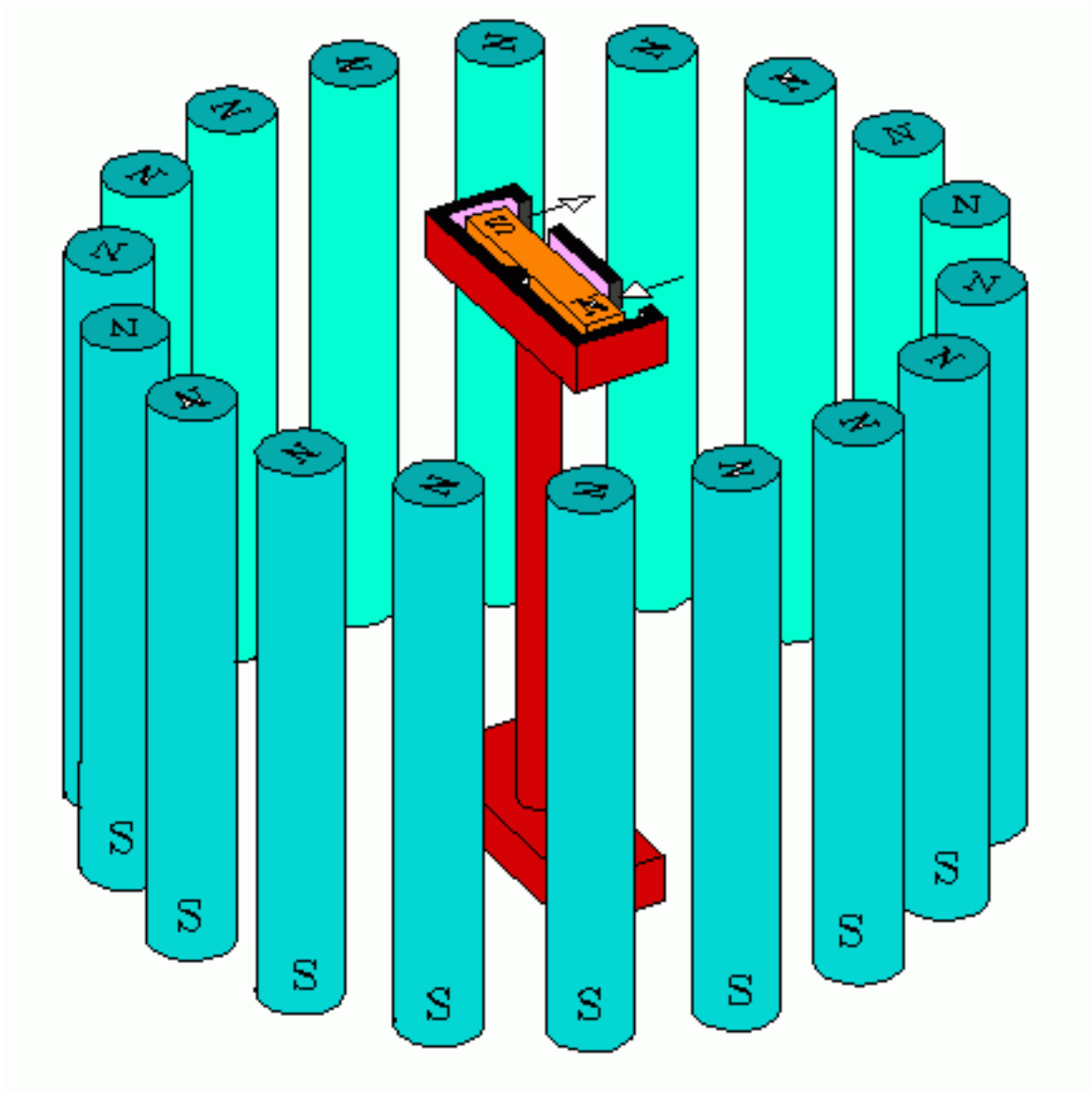


Chris Cheng's

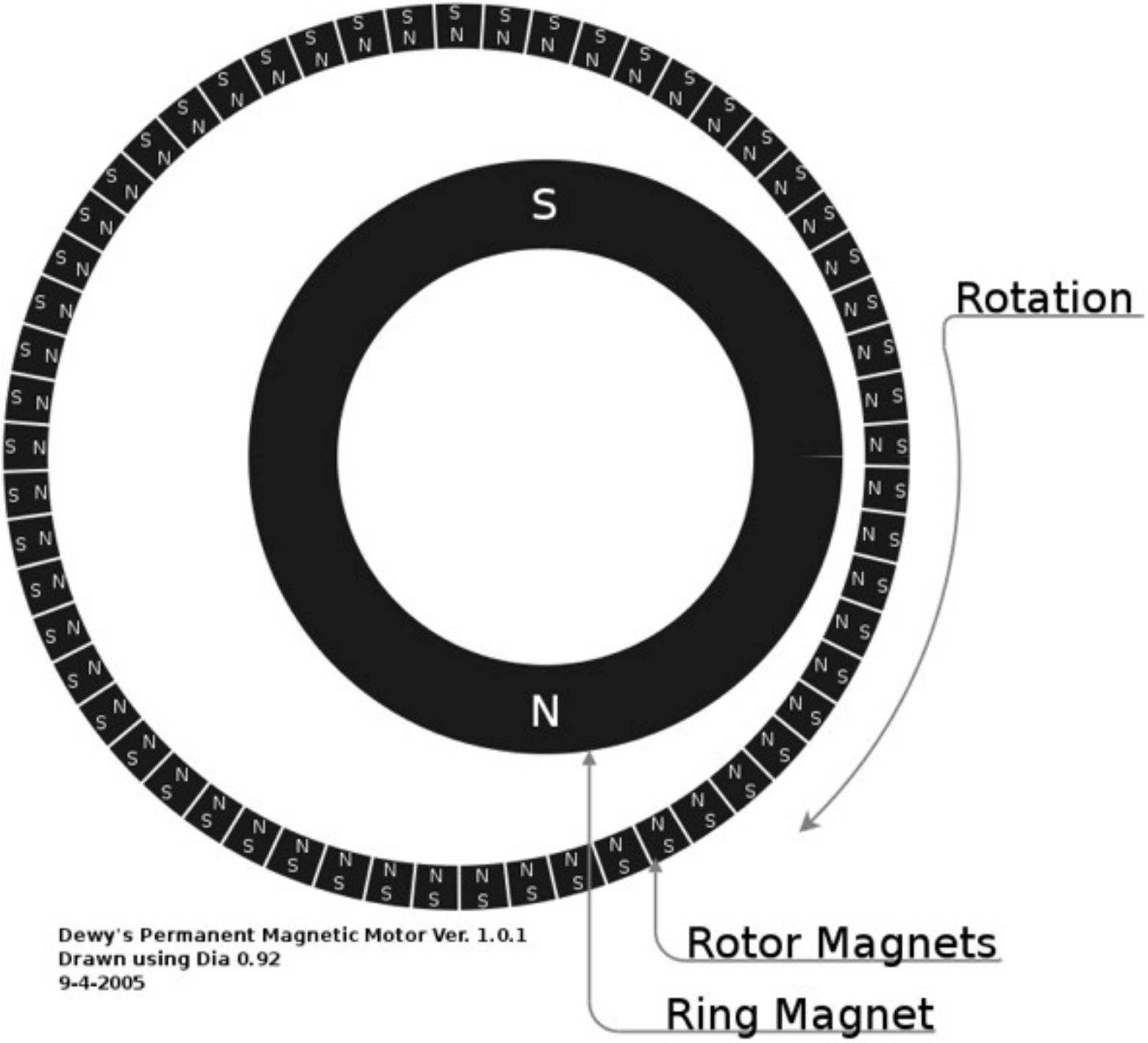
magnetic motor

Design by Donald Simanek from an idea by Chris Cheng




N
S

Dewy's Permanent Magnetic Motor Ver. 1.0.1



Donald A. Kelley

Magnetic Wheel Drive

U.S. Patent Dec. 18, 1979 Sheet 1 of 2 4,179,633

FIG. 1

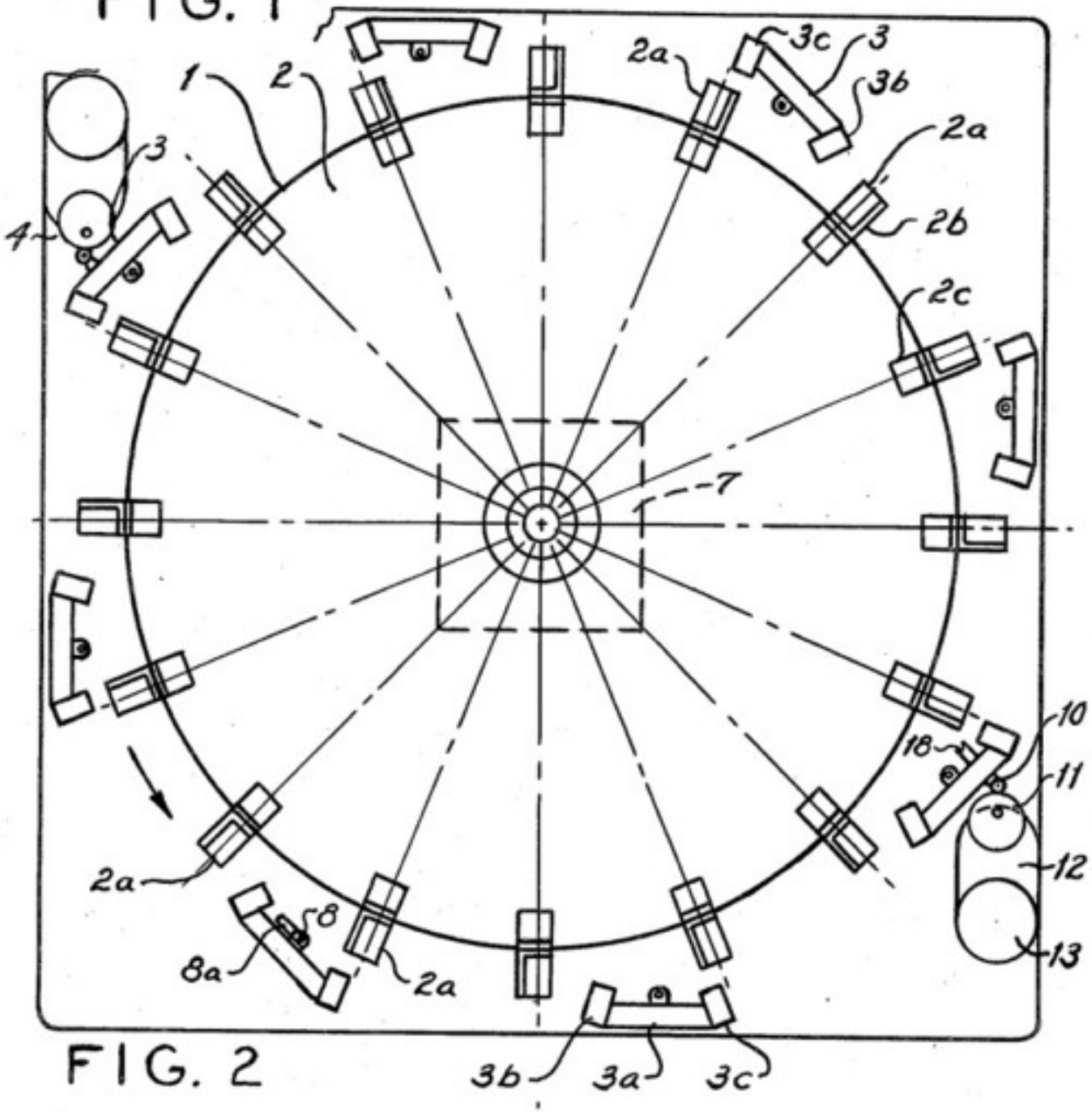
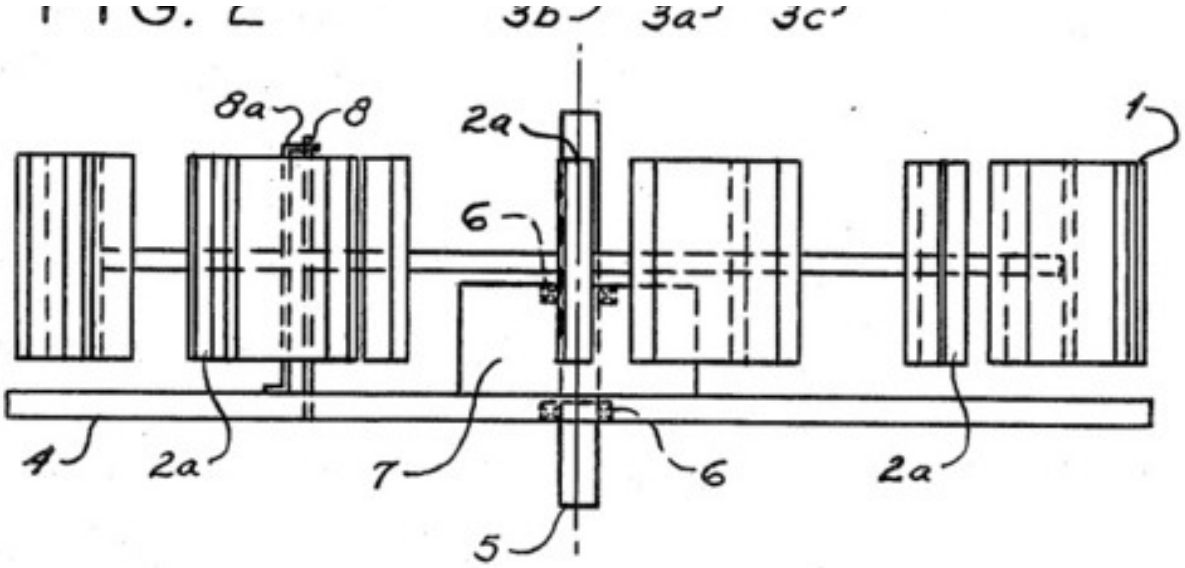
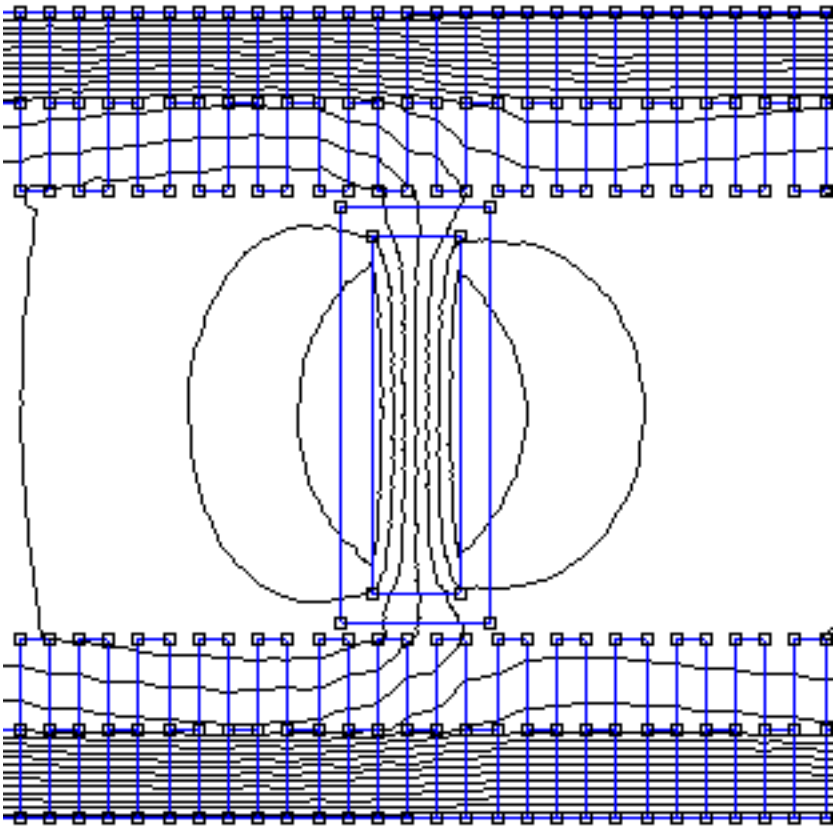


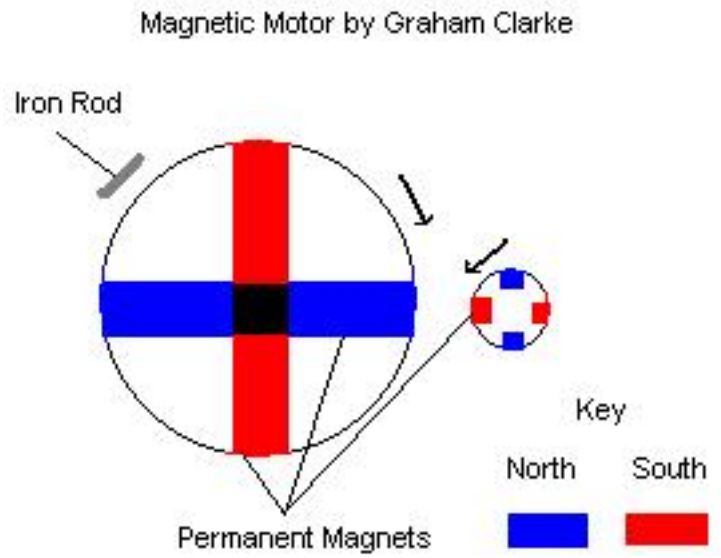
FIG. 2


FIG. 2
3b
3a
3c
8a
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2a
1
6
4
2a
7
6
2a
5

Felipe Rodriguez

magnetic motor

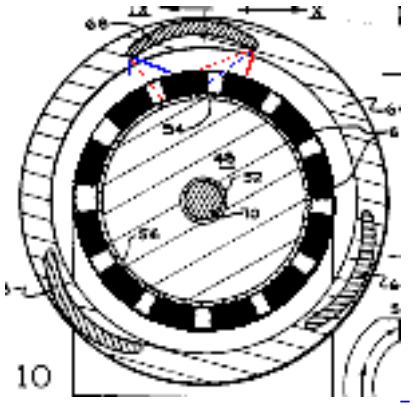




I had a thought on a geared magnetic motor based on the Bowman motor. This is a basic pic with out the gears just to give an idea of what I am talking about. The Idea is the big disk is atracted to the small disk as they come close the gear turns turning the small disk, as it turns the next magnet on the small disk is the opposite pole as the last magnet on the small disk and it starts to push the big disk away at the same time pulling the next magnet on the big disk towards it as that is the opposite pole as the last magnet on the big disk. Now there is a sticky point (go figure hahaha) This is overcome by the iron rod on the opposite side of the big disk,the sticky point is when the big disk dosn't want to let go of the small disk to be repelled, to over come this the iron rod atracts the big disk pulling it through that spot. Graham

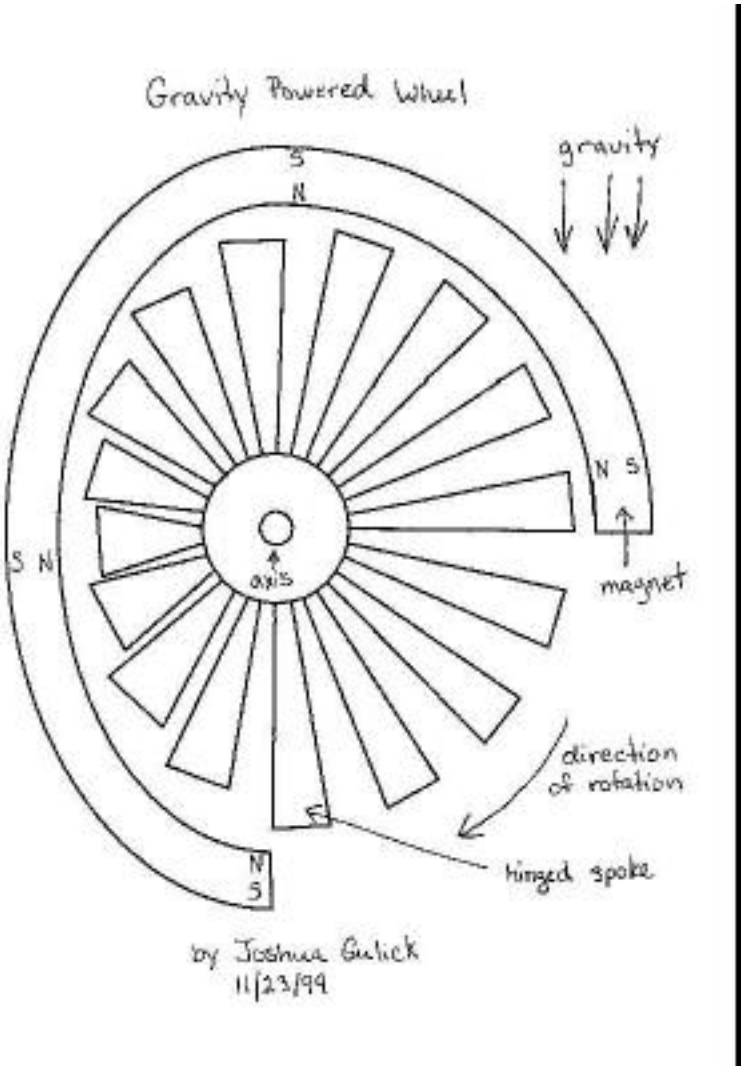
Howard Johnson

magnetic motor



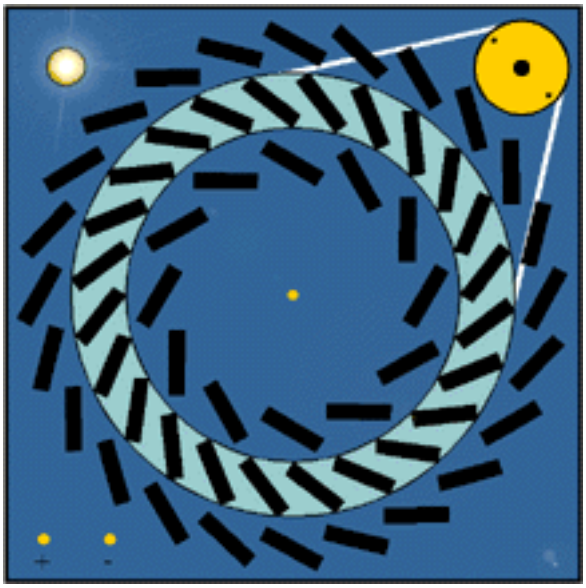
The Gravity Powered Wheel

by Joshua



Keith Impink's

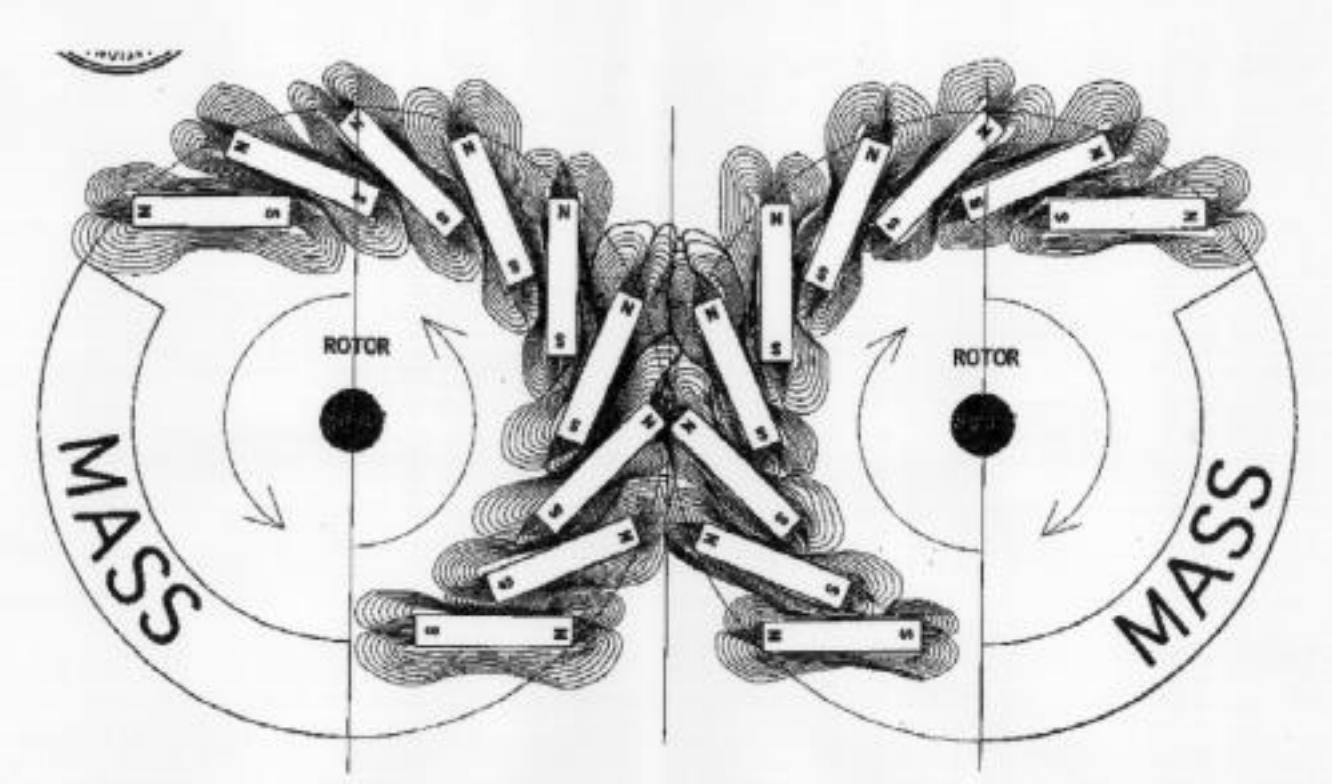
magnetic motor



(This picture is on: http://www.impink.com/assets/images/composite_invention.gif

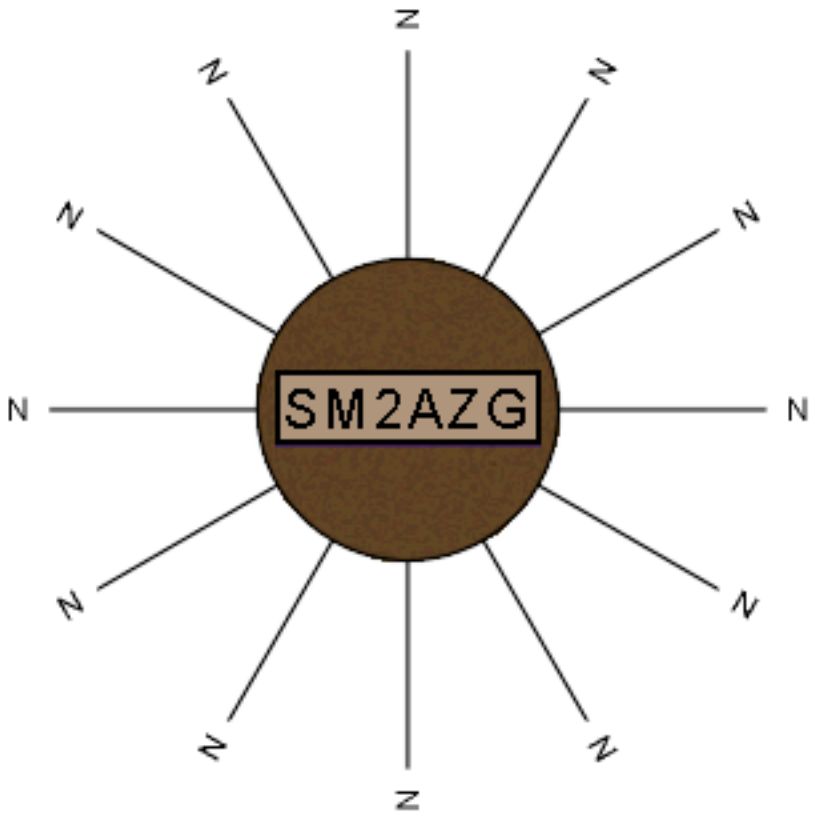
Kohei Minato

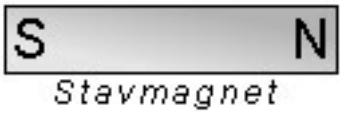
2 rotor magnet motor



Lennarts

Evighets-maskin

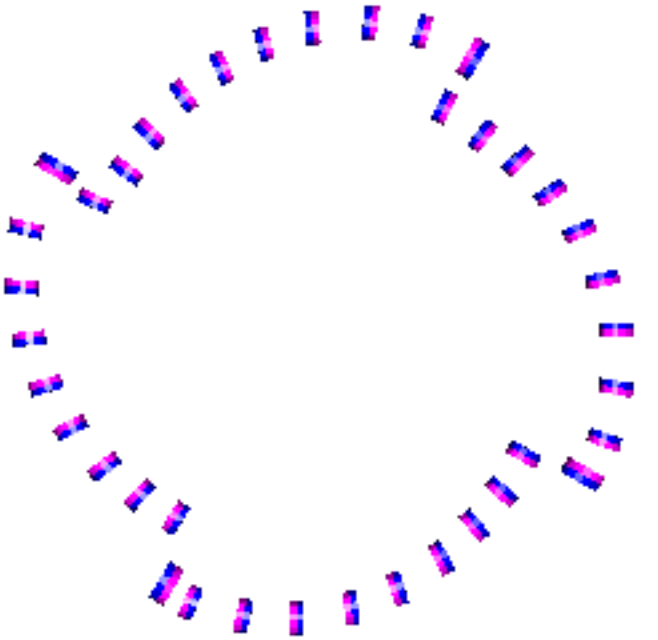




Stavmagnet

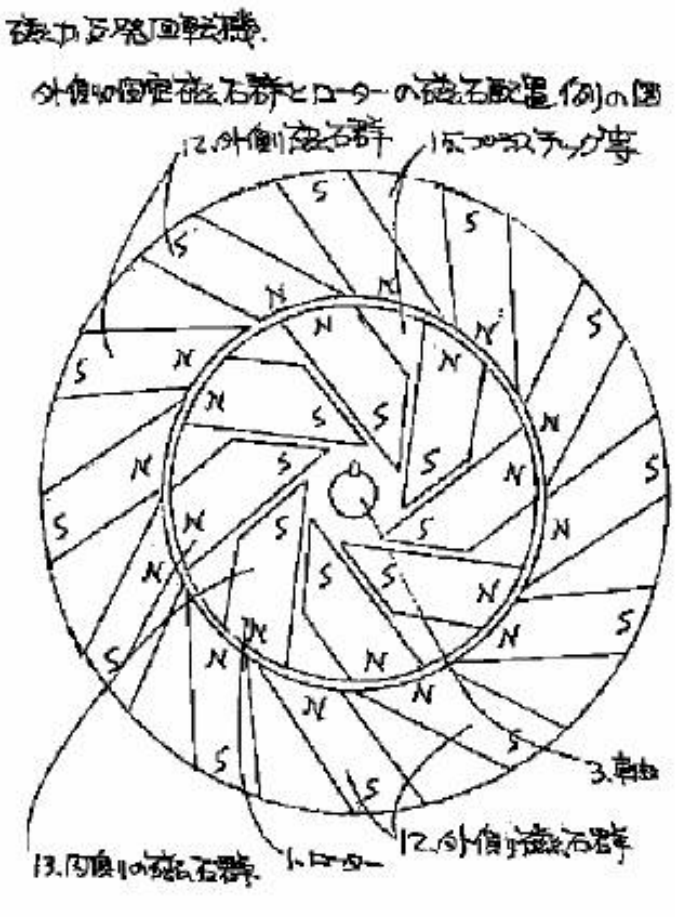
Matthias Renner's

magnetic motor

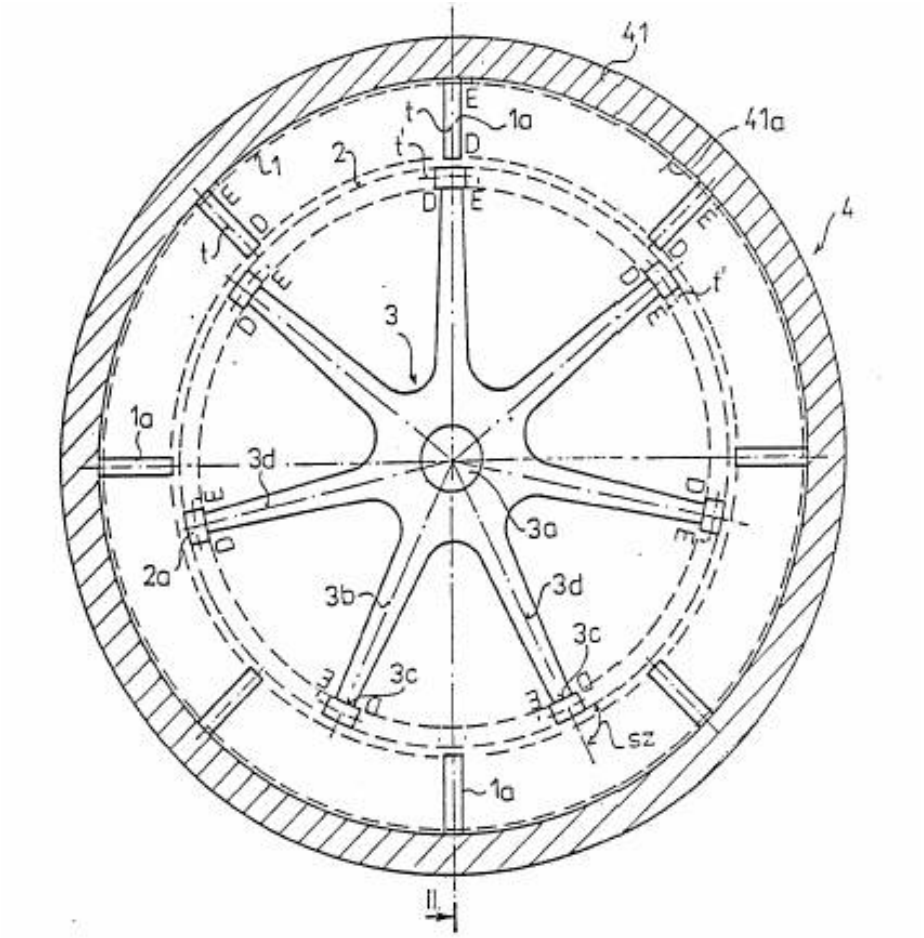


click on the picture to see how it works

A collection with patents.



Patent # JP11168873



Patent # WO9602083

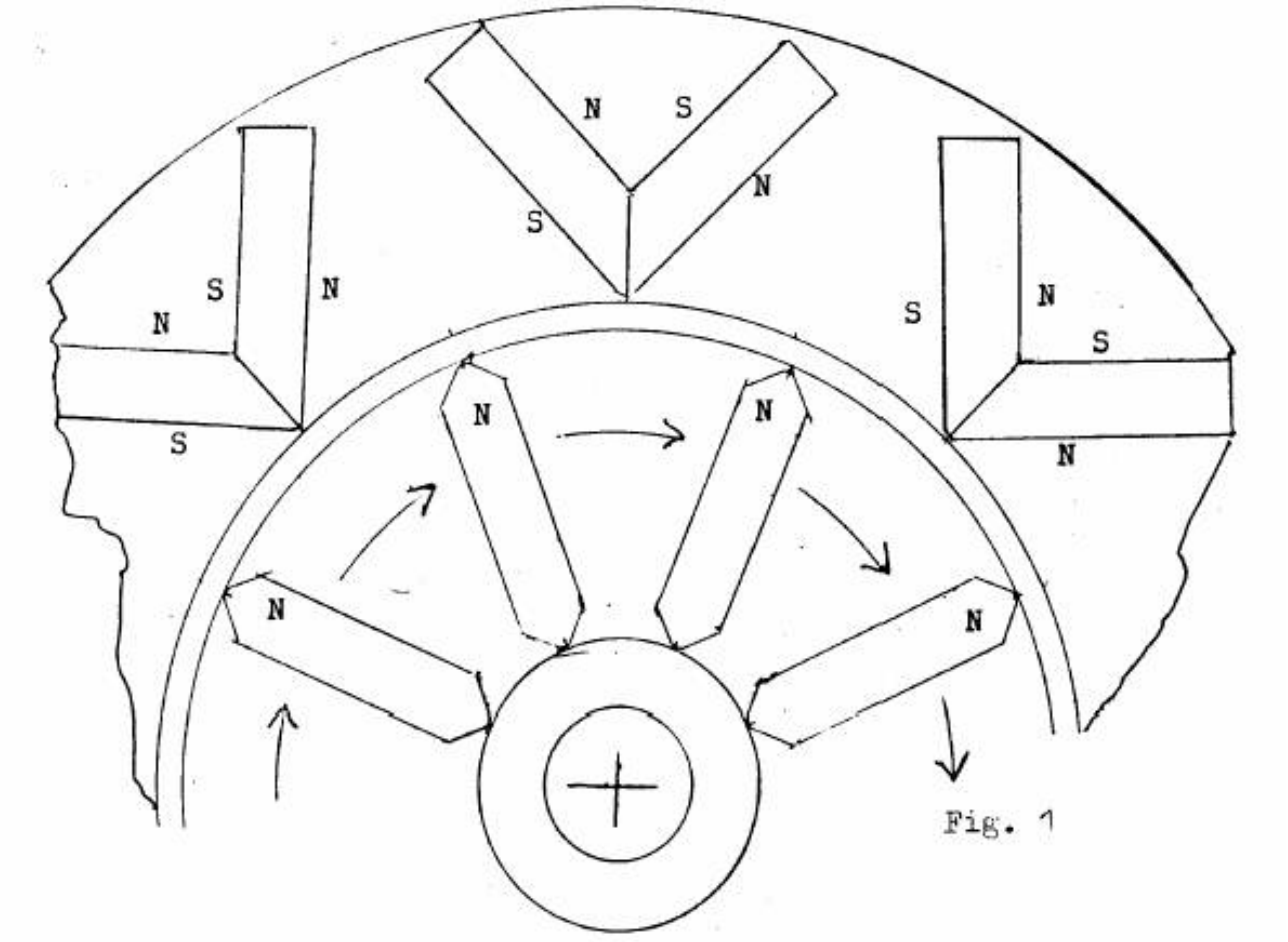
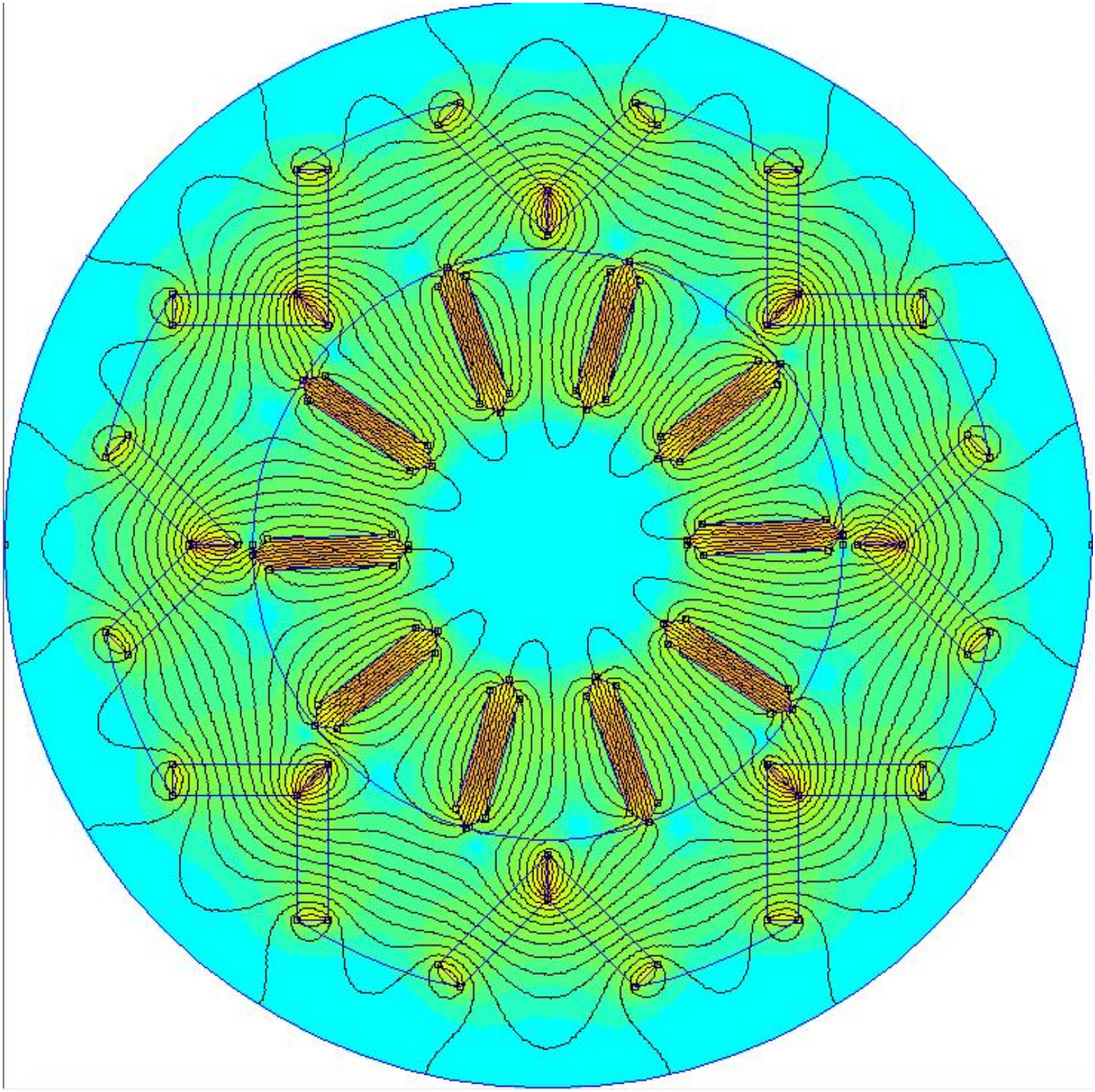
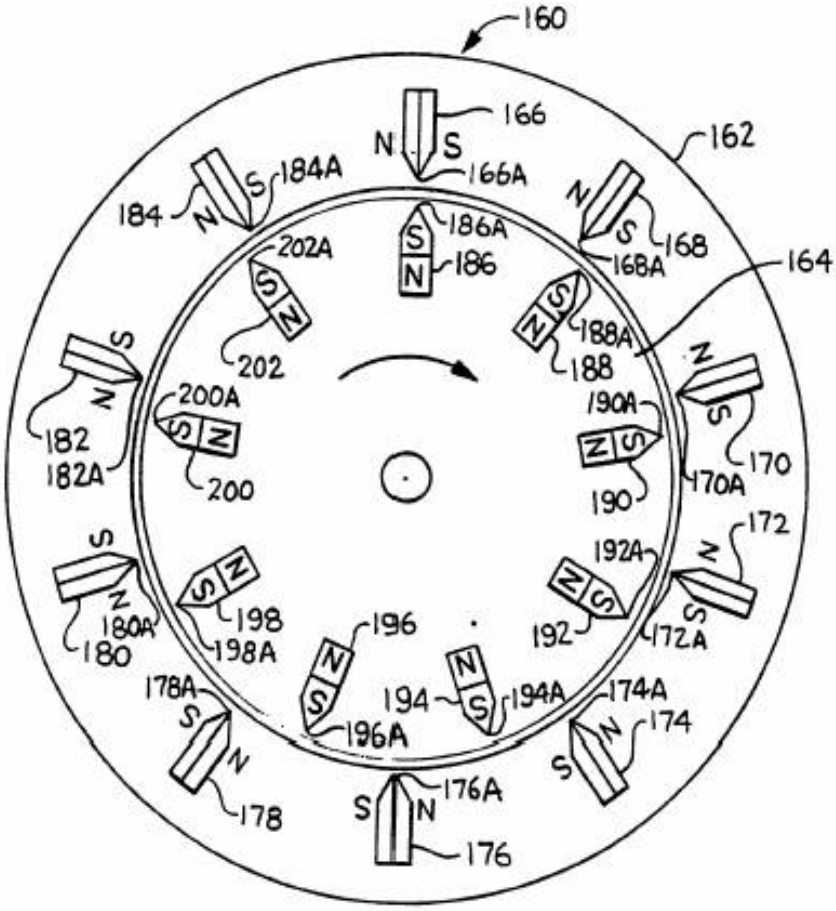
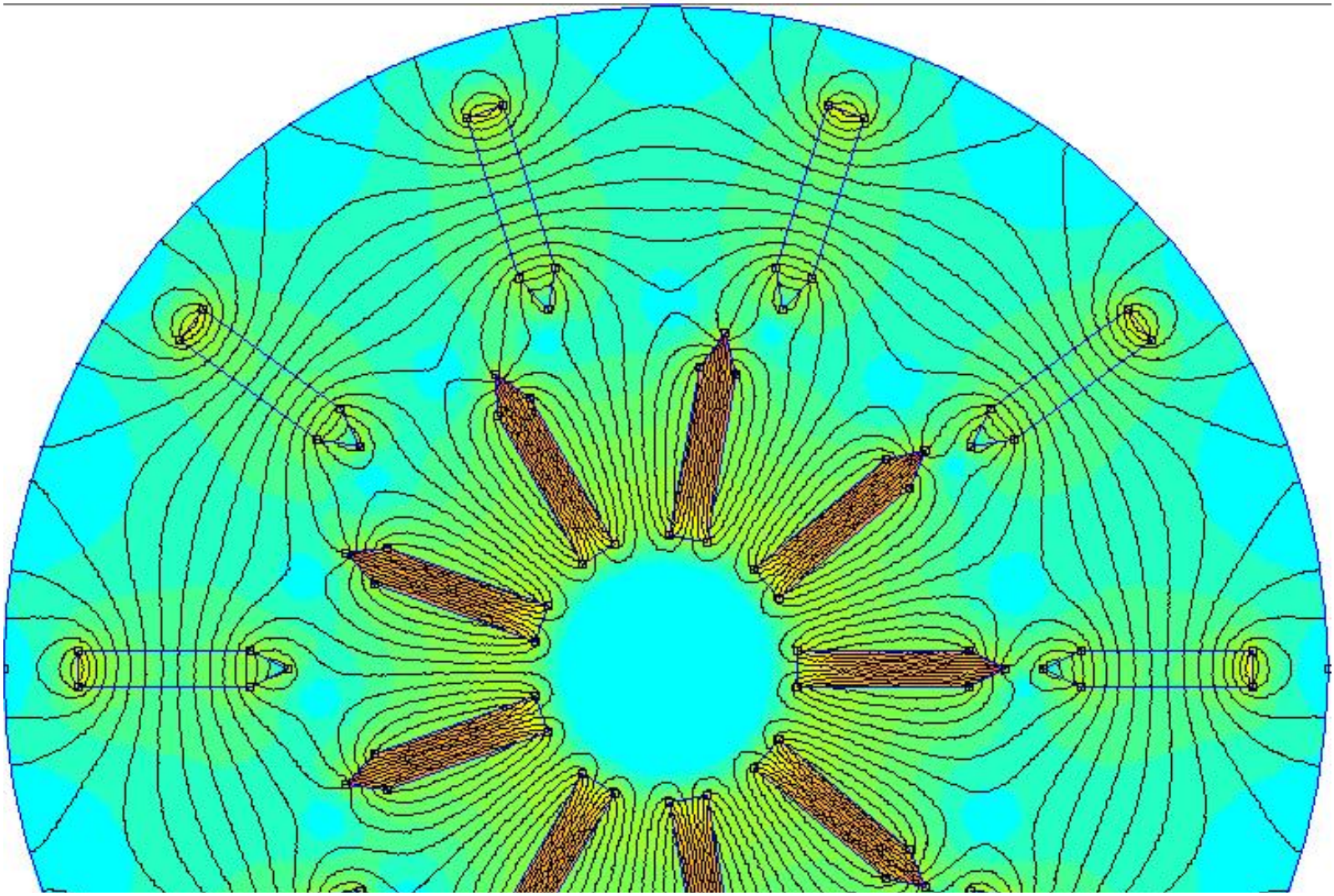


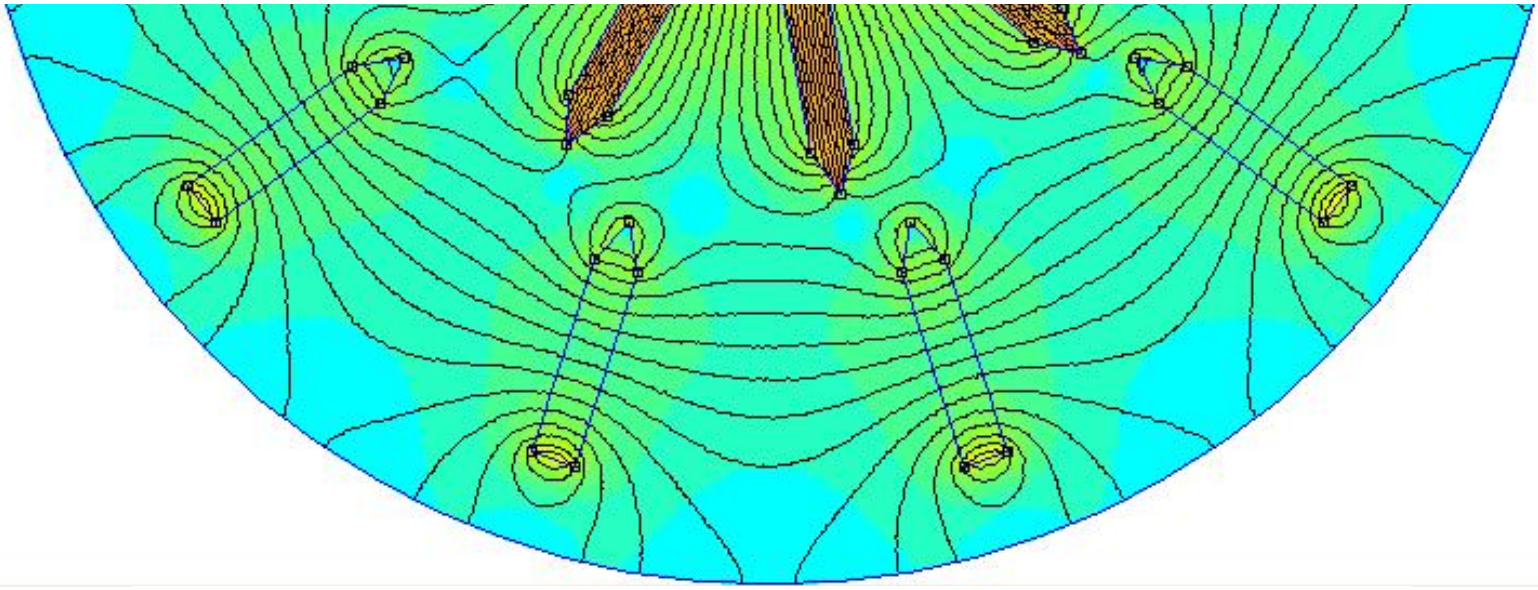
Fig. 1

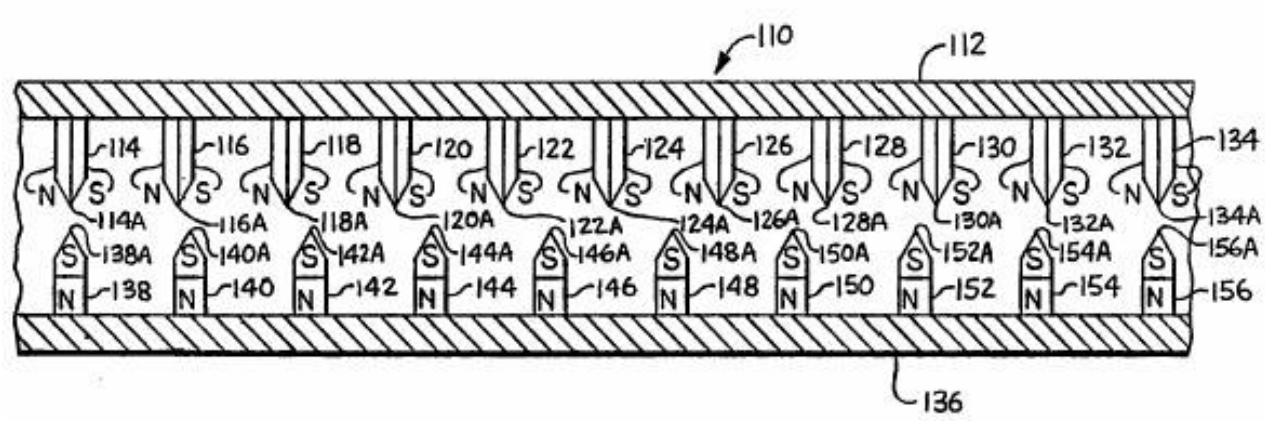
Patent # DE3916204




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Patent # WO9222123

On The Magnet, AD 1269

By Peter Peregrinus

CHAPTER III

THE ART OF MAKING A WHEEL OF PERPETUAL MOTION

IN this chapter I will make known to you the construction of a wheel which in a remarkable manner moves continuously. I have seen many persons vainly busy themselves and even becoming exhausted with much labor in their endeavors to invent such a wheel. But these invariably failed to notice that by means of the virtue or power of the lodestone all difficulty can be overcome. For the construction of such a wheel, take a silver capsule like that of a concave mirror, and worked on the outside with fine carving and perforations, not only for the sake of beauty, but also for the purpose of diminishing its weight. You should manage also that the eye of the unskilled may not perceive what is cunningly placed inside. Within let there be

iron nails or teeth of equal weight fastened to the periphery of the wheel in a slanting direction, close to one another so that their distance apart may not be more than the thickness of a bean or a pea; the wheel itself must be of uniform weight throughout. Fasten the middle of the axis about which the wheel revolves so that the said axis may always remain immovable. Add thereto a silver bar, and at its extremity affix a lodestone placed between two capsules and prepared in the following way: When it has been rounded and its poles marked as said before, let it be shaped like an egg; leaving the poles untouched, file down the intervening parts so that thus flattened and occupying less space, it may not touch the sides of the capsules when the wheel revolves. Thus prepared, let it be attached to the silver rod just as a precious stone is placed in a ring; let the north pole be then turned towards the teeth or cogs of the wheel somewhat slantingly so that the virtue of the stone may not flow diametrically into the iron teeth, but at a certain angle; consequently when one of the

teeth comes near the north pole and owing to the impetus of the wheel passes it, it then approaches the south pole from which it is rather driven away than attracted, as is evident from the law given in a preceding chapter. Therefore such a tooth would be constantly attracted and con-

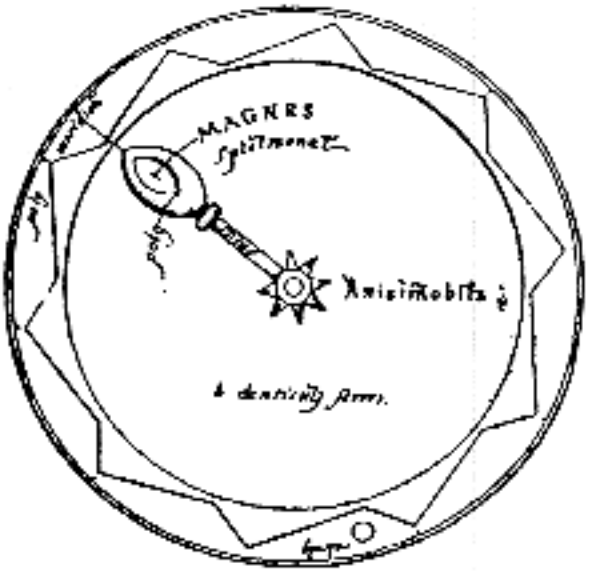


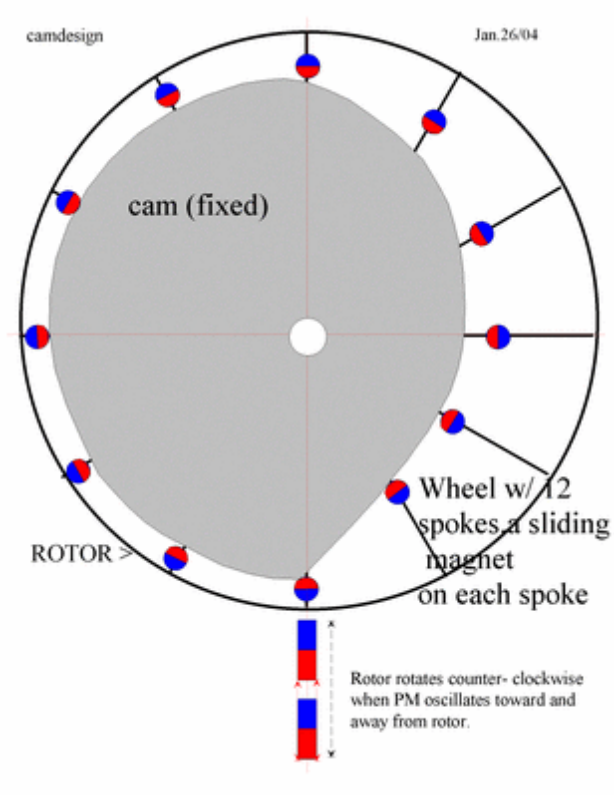
FIG. 4.—PERPETUAL MOTION WHEEL

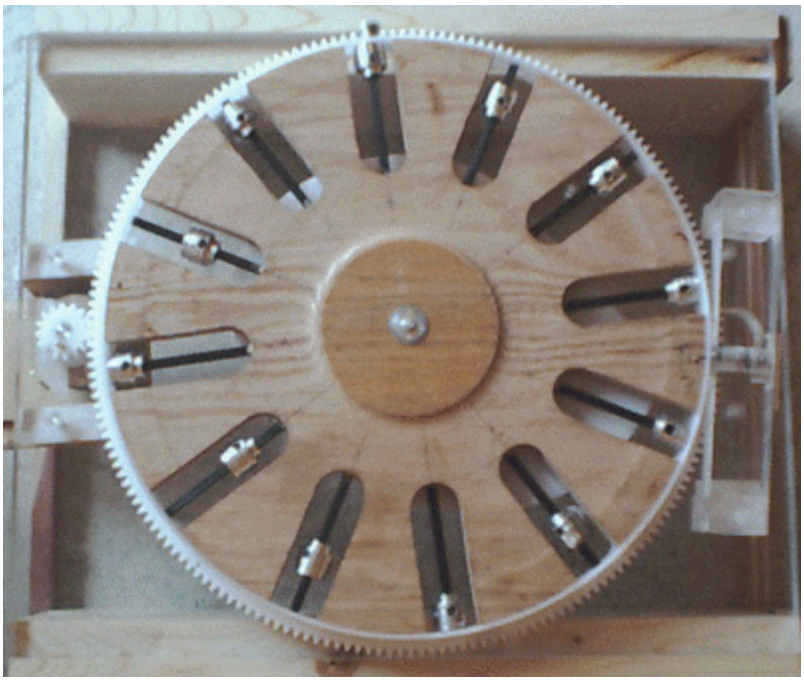
stantly repelled. In order that the wheel may do its work more speedily, place within the box a small rounded weight made of brass or silver of such a size that it may be caught between each pair of teeth; consequently as the movement of

the wheel is continuous in one direction, so the fall of the weight will be continuous in the other. Being caught between the teeth of a wheel which is continuously revolving, it seeks the centre of the earth in virtue of its own weight, thereby aiding the motion of the teeth and preventing them from coming to rest in a direct line with the lodestone. Let the places between the teeth be suitably hollowed out so that they may easily catch the body in its fall, as shown in the diagram above. (Fig. 4.)

Farewell: finished in camp at the siege of Lucera on the eighth day of August, Anno Domini MCCLXIX.

Reference : " The letter of Petrus Peregrinus ' ON THE MAGNET, AD.D. 1269 ', translated by Brother Arnold, M.Sc. Principal of La Salle Institute, Troy with Introductory notice by Brother Potamian, D.Sc, professor of Physics in Manhattan College, New York "


camdesign
Jan.26/04
cam (fixed)
Wheel w/ 12 spokes a sliding magnet on each spoke
ROTOR >
Rotor rotates counter- clockwise when PM oscillates toward and away from rotor.



actuator1

Top

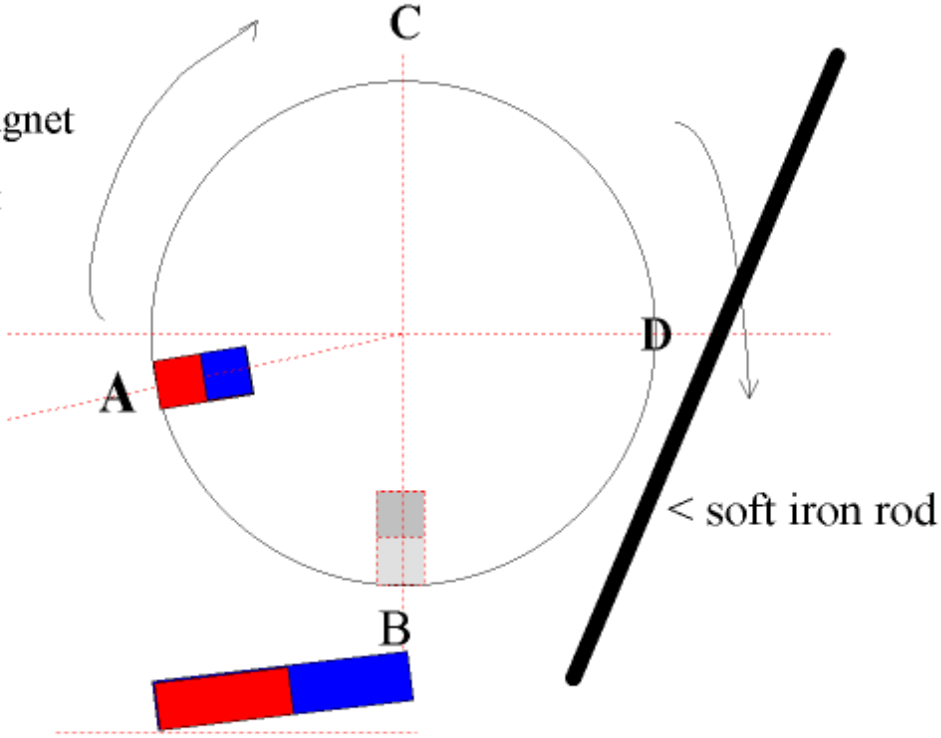
< D = 2 inchs >

A-B=293 degrees

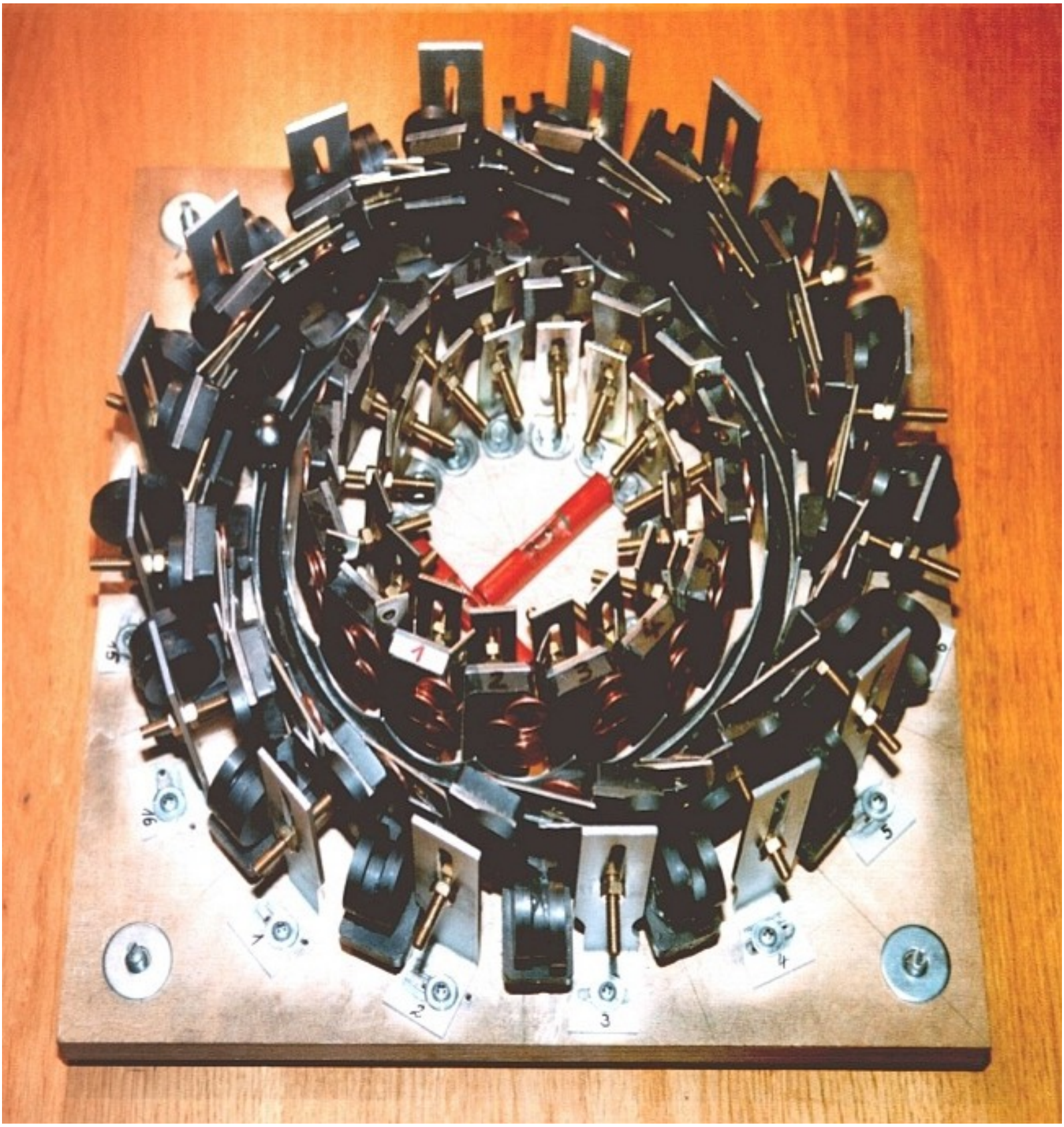
A-C: magnets repel

C-D: iron attracts magnet

D-B: magnets attract

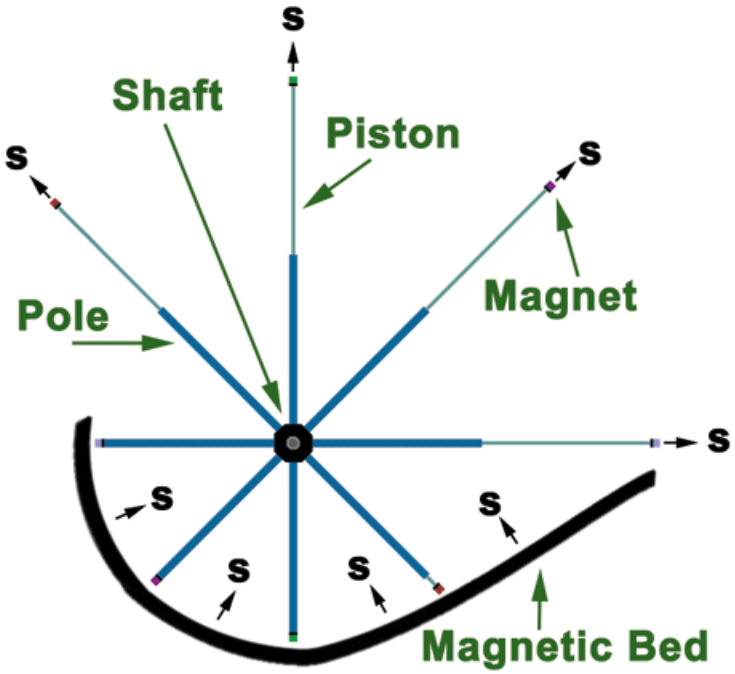


Peter Schmalenbach



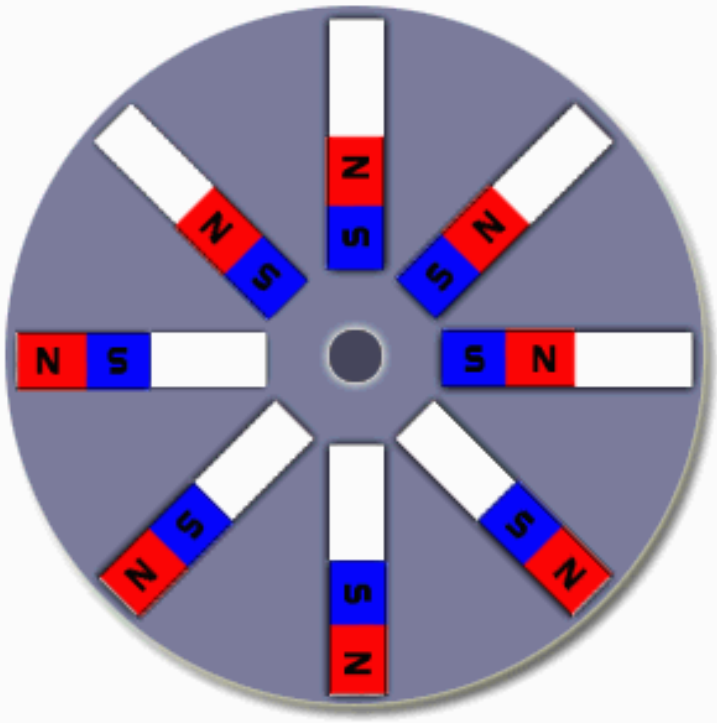
Pippin Lowe

Axletree Dynamo

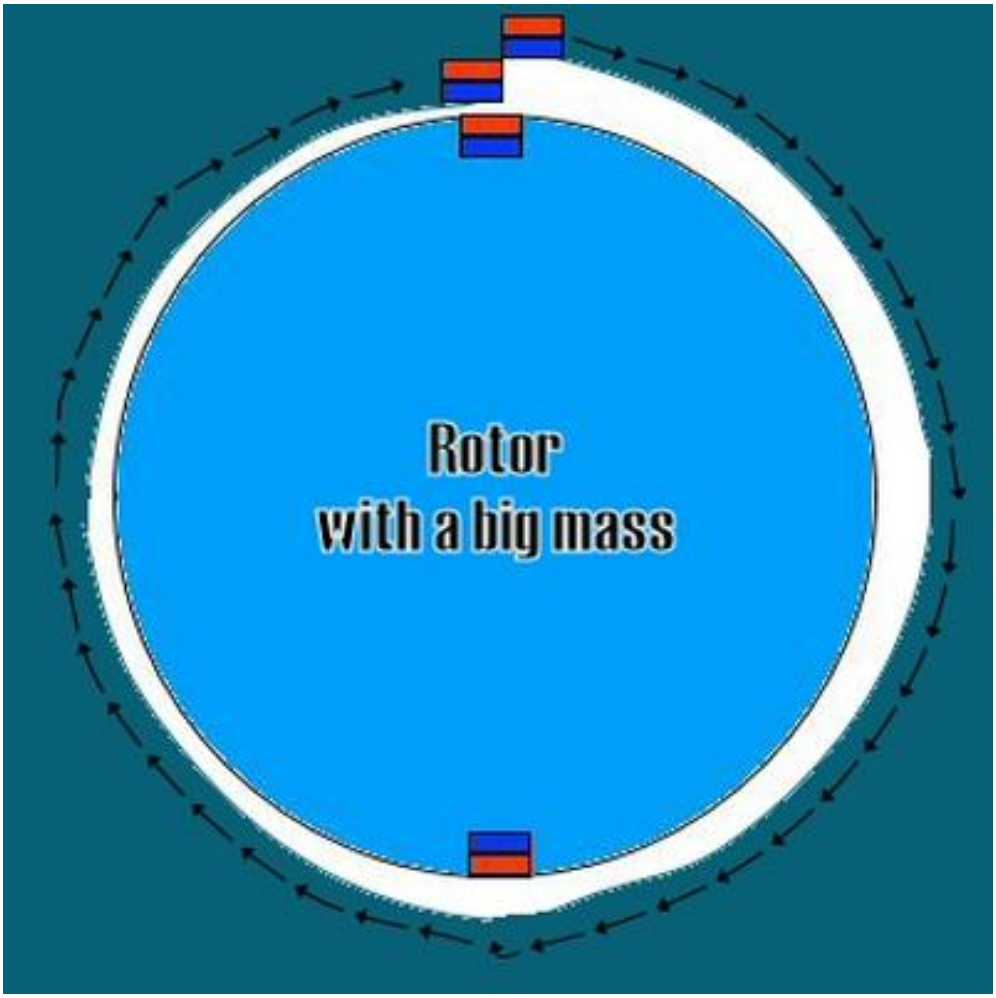


click on the picture to see it work

ROCHETTE'S MAGNET-GRAVITY WHEEL






Rotor
with a big mass

< < <BACK

Scenario for the upcoming tests and results with the Ultra Light Wheel.

🔴 = *no link available* 🟢 = *link is available)*

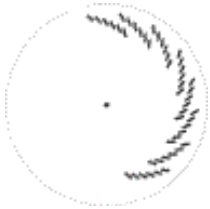
ID	Outside diameter	Distance entry to rim	Distance exit to rim	Diameter holes	Number of magnets	Degrees covered	Equal angle/ steps (distance)	Long side magnets	Short Side magnets	Angle magnets at entry	Angle magnets at exit	Drawing wheel	Drawing flux density	Lua script	Result video	Video force	**Force Rating (in turns)**	**Speed at rim mm/s**	**Rpm**
1	300 mm	50 mm	30 mm	5 mm	30	180	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🟢	🟢	**5.0**		
2	300 mm	50 mm	15 mm	5 mm	30	180	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🟢	🟢	**5.7**	**300**	**19**
3	300 mm	50 mm	15 mm	5 mm	30	180	step	13 mm	3 mm	30	30	🟢	🟢	🟢	🟢	🟢	**0.1**		
4	300 mm	50 mm	15 mm	5 mm	25	180	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🟢	🟢	**0.2**		
5	300 mm	50 mm	15 mm	5 mm	35	180	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🟢	🟢	**5.9**	**331**	**21**
6	300 mm	50 mm	15 mm	5 mm	30	180	angle	13 mm	3 mm	30	40	🟢	🟢	🟢	🟢	🟢	**0.1**		
7	300 mm	50 mm	15 mm	5 mm	30	180	angle	13 mm	3 mm	30	20	🟢	🟢	🟢	🟢	🟢	**4.7**		
8	300 mm	50 mm	10 mm	5 mm	35	180	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🔴	🔴	?		
9	300 mm	50 mm	15 mm	5 mm	15	90	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🟢	🟢	**5.7**		
10	300 mm	80 mm	15 mm	5 mm	15	90	angle	13 mm	3 mm	30	30	🟢	🟢	🟢	🔴	🔴	**0**		
11	300 mm	35 mm	15 mm	5 mm	7	45	angle	13 mm	3 mm	30	35	🟢	🟢	🔴	🔴	🔴		**349**	**22**
12	Same as ID 11, but 2 times placed on one wheel. 14 magnets. Look at the drawing											🟢	🔴	🔴	🔴	🔴		**363**	**23**
13	300 mm	40 mm	10 mm	5 mm	9	45	angle	13 mm	3 mm	30	40	🟢	🔴	🔴	🔴	🔴		**419**	**27**
14	300 mm	40 mm	10 mm	5 mm	8	45	angle	13 mm	3 mm	30	40	🟢	🔴	🔴	🔴	🔴		**401**	**25**
15	300 mm	40 mm	5 mm	5 mm	9	45	angle	13 mm	3 mm	30	40	🟢	🔴	🔴	🔴	🔴		**440**	**28**
16	300 mm	40 mm	5 mm	5 mm	9	45	angle	13 mm	3 mm	15	40	🟢	🔴	🔴	🔴	🔴		**440-**	**28-**
17	A mix of ID 13 + 14 + 15 + 16, unbalanced. Look at the drawing (it's a photo)											🟢	🔴	🔴	🔴	🔴		**496**	**32**
18	A mix of 4 times ID 16, unbalanced. Look at the drawing (it's a photo)											🟢	🔴	🔴	🔴	🔴		**610**	**39**
19	A mix of 4 times ID 16 with an extra magnet parallel to the rim. Look at the drawing (it's a photo)											🟢	🔴	🔴	🔴	🔴		**630**	**40**
20	300 mm	40 mm	5 mm	5 mm	8	45	angle	13 mm	3 mm	10	60	🟢	🔴	🔴	🔴	🔴		**393**	**25**
21	A mix of 7 times ID 16, BALANCED. Look at the drawing (it's a photo)											🟢	🔴	🔴	🟢	🔴	**14.5**		

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Scenario for the upcoming tests and results with the Big Wheel.

(All sizes are in mm = no link available = link is available)

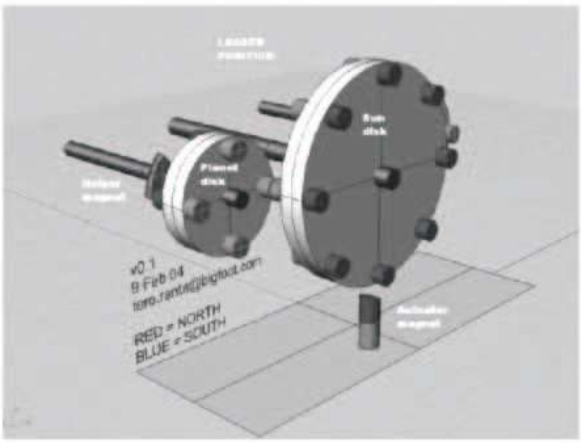
		Single track info							Multi track info				Magnet info		Cw	Result graphics				
ID	Outside diameter	Dist. entry to rim	Dist. exit to rim	Number of magnets	Degrees covered	Equal angle/ steps (dist.)	Angle magnets at entry	Angle magnets at exit	Nbr of Tracks	Degrees overlap	Last dist. entry to rim	Last dist. exit to rim	Long side magnets	Short Side magnets	Diam. holes count. w.	Drawing wheel	Drawing flux density	Lua script	Result video	Video force
1	1000	80	25	10	37	angle	10	50	7	23,83	80	25	25	10	22	● ●	●	●	●	●
2	1000	140	60	7	47	angle	15	45	7	25	110	15	40	10	22	● ●	●	●	●	●
3	1000	100	20	12	45	angle	30	40	7	22,5	100	20	25	10	22	● ●	●	●	●	●
4	1000	100	10	14	50	angle	30	40	7	21,68	100	10	25	10	22	●	●	●	●	●



The Bowman permanent magnet motor

Eric Vogels
http://www.fdp.nu
info@fdp.nu

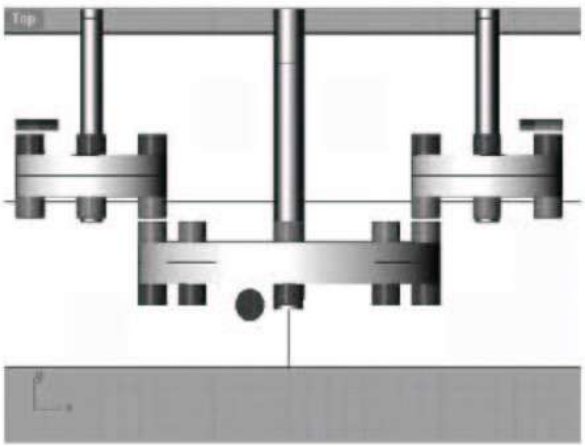
In 1954 an Electrical Engineer named Carl C. Lienau, visiting relatives in California, learns that Lee Bowman of Sherman Oaks is seeking investors for the development of his device which he keeps in a case labeled: "Behold The Energy Of The Universe"-opened the machine is an 8x10x5 inch model mounted on a 1/2 inch aluminium base. No compartment to hide batteries.



The device consists of three parallel shafts geared together so that the centre one turned in opposite direction to the two outside shafts. There was no electric motor attached to the assembly. On the centre shaft there was a 4 inch Lucite disc about 1/2 inches thick. At the end of the outside shafts 2 Inch Lucite discs were attached. The discs contained small Alnico magnets, eight of them spaced around the large disc, four around each of the small discs. The Alnico slugs were equally spaced. The Axis of the cylindrical slugs was parallel to the shafts. Their ends were accordingly ground so as to pass close to opposing wheels with only a minute gap. When the wheels were moved by hand the magnetic slugs passed, where so phased as to synchronize in position. Bowman had a small block of aluminium carrying a cylindrical slug magnet whose end had been positioned at an angle. He put the block into a groove in the base where its position was such as to graze the magnet pair coming up. The system then began to rotate at a speed of almost 1/2 revolution per second of the side shafts. The gears were so positioned that the end shafts ran at the same speed. When the block was slid into a second groove, just opposite the first the system rotated in the opposite sense.

By placing a finger on the periphery of the large Lucite wheel, the friction torque made the system slow down. The energy required to stop the rotation was estimated at about 4 inch pounds. From this the mechanical output was 4 inch pounds per 1/2 seconds per rotation. The machine continued to rotate at that speed for 15 minutes before Bowman terminated the operation and inspection by Mr Lienau, who was much impressed and unable to account for the phenomenon. It is understood that Bowman had applied to patent the device, but was refused because the Patent Office considered it an "unpatentable perpetual motion machine."

Bowman related that the manufacturer of his magnets had tested a set of magnets which he used for a year and found that the remanent magnetism had not measurably declined.



had a small block of aluminium carrying a cylindrical slug magnet whose end had been

Lienau subsequently wrote to Bowman specifying the conditions of a Pony Brake test of the machine running in mechanical and technical isolation. If the output continued for a time beyond the specified capacity of the most long - lived batteries equivalent to the 10 lbs. gross weight of the machine, the evidence would be conclusive that the machine was not fraudulent. Bowman had been in communication with competent physicists at the University of Utah. Bowman took umbrage at the implications of the letter proposing a test. Bowman was a fine machinist and had a well equipped machine shop at his home. Lienau estimated that the device required about 100 hours of work. The material costs are not significant. Bowman made his living in geophysical prospecting and exhibited an album of testimonials from clients. At the time of the demonstration Bowman was 75 years old. He decided, according to one report to have his device taken apart and after his death to have the parts buried in different locations in California.

How it works

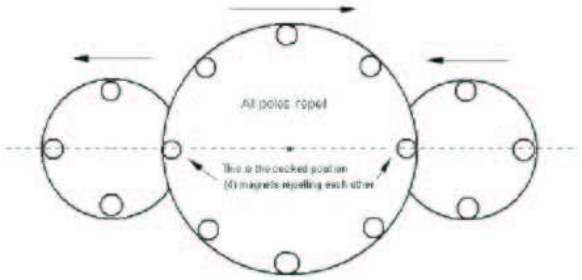


Fig. A

As we rotate the center disk by hand clockwise, the unit continuously changes from loaded to release. This is done because all magnet poles are repelling.



It has a lot of force built in to this release. I have mine documented in inch lbs. which I will post later.

To make the engine run we have to somehow get the disks in the loaded position for free. To do this we bring attraction into the game. Attraction will overcome repel every time, and easily using the 2:1 gear ratio. With the engine now in release (Fig.B) refer to (Fig.D) . We place an attracting magnet behind each planet disk to help pull the sun disk into the loaded position at a 2:1 gear ratio. Also we place an actuator magnet in the repel mode against one of the sun disk magnets. So it is also helping to get the engine loaded using a 1:2 gear ratio. It also tends to help give the engine a sense of direction.

As the engine reaches the end of the final loaded position, this is where magnet overlap between the disks need to be adjusted correctly. This determines the time of centerpoint for release. If centerpoint is too early, it won't release properly from the attracting magnets to the planet disks. This causes a clanking of the gears as it turns, because of the shift in gear ratio's. If centerpoint is too late you waste valuable release force and the magnet next in line on the sun disk may not have enough power to overcome the actuator magnet.

Yes, when adjusted properly the release is so strong that it drives the next magnet in line on the sun disk right through the repelling

are repelling.

Also there is a gear ratio differential continuously being changed. The ratio is 2:1 or 1:2 at all times. When the engine is turned to the loaded position and allowed to return to release position on its own, the ratio is 2:1 from the planet gears to the sun gear.

the sun disk right through the repelling actuator magnet. This is why Bowman had such close gaps between his alinco magnets, he was trying to make his release as strong as possible. Which increases engine speed. With neo35 magnets we don't have to get that close. It does nothing but chase its own tail setting it up for the next magnet.

The actuator magnet and the helper magnets

I think everyone here is getting the idea of operation and we can now do some fine tuning. Move the top of the right helper magnet to the right about a 1/4 of an inch. Now move the bottom of the left helper magnet out the same distance. This will allow for a smooth release into the repel or release mode. Once the helper magnets have pulled the planet disks from their locked positions, the sun disk starts to help reach the balance of center point. Plus with help from the actuator magnet.

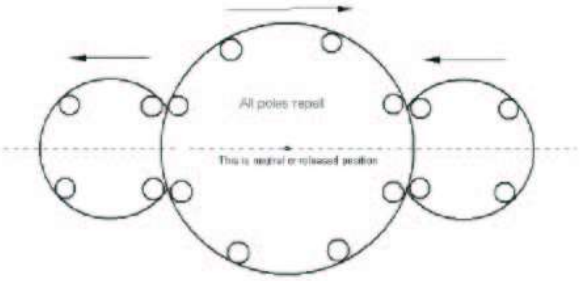


Fig. B

Right before center point we need the helper magnets to ease up on their attraction and let overcenter repel take over. Moving those helper magnets out a little on the release ends will allow this to happen.

The one actuator magnet is very important, for more than what you may think or see. The angled or trapezoid end of the magnet is a gate in this design.

I have put together an easy test to try and see

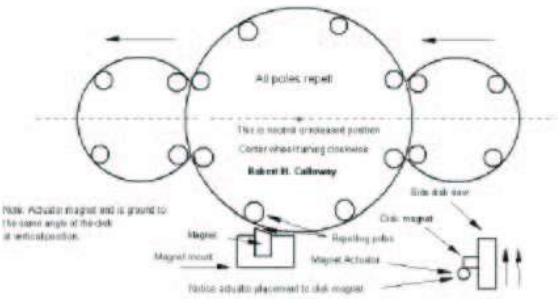


Fig.C

stick to it. It will move to one end or the other and travel all the way to the face of the magnet and stay there. This proves that the face is the strongest point of the magnet for repel and attraction.

Now grind a 45 degree angle on the end of the face without taking away any length of the magnet on the high side of the angle.

In other words the overall length of the magnet remains the same. Now, re-find your Bloch wall. Its still in the same place because you didn't take away any length of the magnet except for one side of the magnet in the angle. Test again with the paper clip. At the angle the clip will go to the highest point in the angle face.

Have your sun disk in place on the engine without the planet disks being installed.

Put your angled or trapezoid magnet under the sun disk in place.

Now place a 9/16 wrench on the outside nut holding the sun disk in place. Now place a load or weight on the end of the wrench. Apply more weight until the sun disk goes through the

I have put together an easy test to try and see that what I say is true. You will need 2 rod magnets as used in the engine. You will need one that has been ground to an angle. First let me explain. To find the exact place of the Bloch wall in the rod magnet. Measure it in length and divide by two. This is the exact location of the Bloch wall. Now if you were to cut the magnet completely in halve, the Bloch wall would move to the center of each halve that was cut. But we are not going to cut the magnet. Take a paperclip and move it up and down the length of the magnet. You will find the Bloch wall at the center of the magnet and the paper clip will not

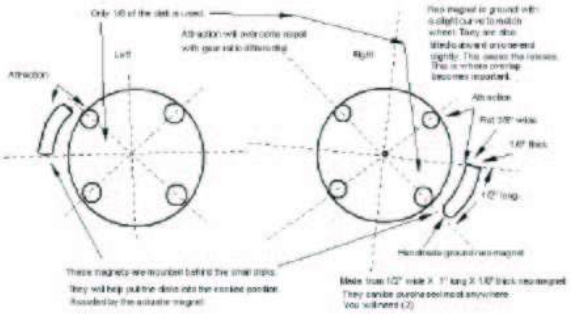


Fig. D

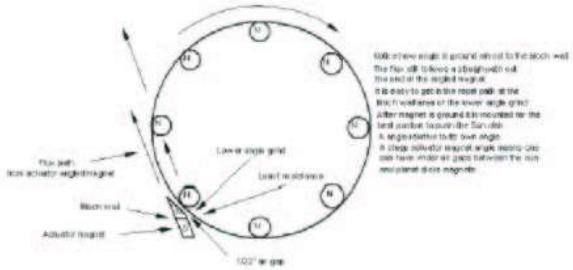


Fig. E

amount of weight that it took to do so. Now remove the angled actuator magnet and install the other magnet which is a straight cut end magnet and angle the magnet to the sun disk so that it would appear that we are doing the same thing as the angled magnet or position it any way you wish as long as the air gap is the same as the angled magnet test. Apply the wrench and the same amount of weight. The sun disk will not go through the non-angled magnet. Open the air gap up a little. Still does not go through. Add more weight until it finally goes through the non-angled magnet. Record the weight. You will need roughly about one half as much more weight on the wrench for it to get through the straight cut end magnet. The angled or trapezoid magnet acts as a lower resistance entry gate which indeed is needed for the engine to run.

or weight on the end of the wrench. Apply more weight until the sun disk goes through the angled magnets repelling field. Record the

you use, if they are too strong simply back the planet disks away from them for correct adjustment.

I added a drawing (Fig. E) that may help you understand how the actuator can be changed by angle.

It comes down to this: More angle, means easier gate entry. Less angle means harder gate entry. The steeper you grind the angle the more the magnet has to tilt to the left to give the greatest push on the sun disk. That push gets you out of the attraction from the helper magnets into over center to the release mode. Then it simply starts all over again chasing its own tail.

Engine run adjustments

This may save you some time and hassle getting the engine to operate.

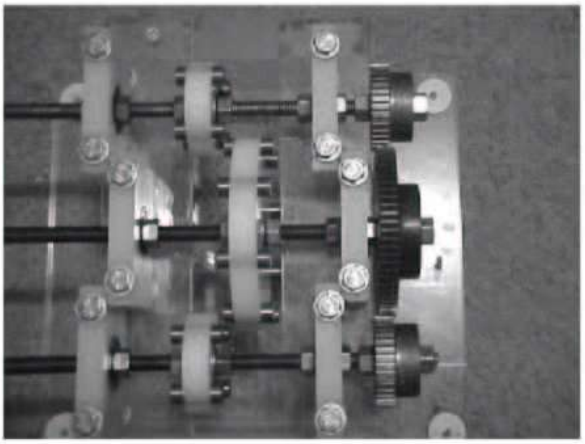
Let me say here that the engine does indeed have some fairly wide run parameters. Install all disks on the shafts in repel position. Do not install the helper magnets at this time. Adjust the sun disk so that the gaps between it and the planet disks are about 1/4 of a inch at face to face (Fig. A). Install your actuator at a 1/32 air gap to the sun disk (Fig. C).

to run.

Be sure you understand the helper magnets importance completely. The actuator magnet must be able to push the sun disk out of the planet disks attraction to the helper magnets into over center repel or release mode. If you think your gaps are to close between the sun disk and the planet disks don't be afraid to put more angle on the actuator magnet. But when you put more angle in the magnet you need to tilt the magnet more to the left because flux still flows straight out of the end of the magnet even though it is angled. The actuator magnet needs to be positioned so that it has the greatest amount of push on the sun disk turning it clockwise.

I also need you to know that the thickness of the helper magnets is not critical. I am now trying to build adjustable helper magnets for my motor. The planet disks can be adjusted further away from them if necessary. Whatever magnets

gap to the sun disk (Fig. C).



Now, turn one of the planet disks by hand so the sun disk is rotating clockwise. Check for any binding. Just a smooth re-cock or reload and release. Now hold the planet disk in the reload position (Fig. A). Now let it go allowing the sun disk to turn clockwise.

The next magnet in line on the sun disk must go through the actuator angled magnet. If it does not, decrease the air gaps between the sun and planet disks until it does so. Record air gap measurement. Now measure torque using a torque wrench or use the 9/16 wrench method and record the weight it takes for turning the PLANET disk to get it into the reload position. Remove the sun disk. Place the helper magnets behind the planet disks, by super gluing or some other method (some thoughts here from the group).

Be sure they attract to the back side of the planet disks (Fig. D). With the sun disk still removed, adjust the planet disks gap to the helper magnet by measuring 1/2 the weight or 1/2 the torque if you used a torque wrench. In other words each planet disk will be pulling the measured torque when the sun disk was in place. So each planet disk needs to pull 1/2 that torque plus a little. Now... plus a little. We are adjusting magnetic flux fields. All engines will be slightly different. You have to use horse sense here. If you do not have any, go find someone that does

Device test

To test any Bowmans that have been built, do this test. Place your actuator magnet in place like shown on Fig. C. Now gently turn one of the planets disks in the direction that the actuator is trying to turn the sun disk by hand. When it reaches cocked position Fig. A, release it. If this motor is going to succeed, it must go through the next magnet in line. If it doesn't, one must move the disks gaps closer together. If it still does not....the motor will not work at all.

Encyclopedia: Gears

Pitch diameter means the "effective" diameter of the gear. The outside diameter is slightly larger. You must use the pitch diameter to determine the spacing of the shafts. For example, assume that you have two gears, one with 90mm pitch diameter and 93mm outside diam and the other with 45mm pitch diam and 48mm outside diam. The spacing of the centers of the two parallel shafts would then be 90mm/

you do not have any, go find someone that does for that adjustment.

Therefore all measurements are approximant. If your planet disks are too close to the helper magnets, you will have a release problem. If they are not close enough, they will never pull the sun disk into loaded position. This is where it would be handy to have some kind of adjustability to the helper magnets.

Install the sun disk and adjust to the recorded air gap. If the engine tries to run while adjusting, remove the actuator, but put it back in the same place after adjustments to the sun disk gaps.

The engine will now start turning if you are in the ball park. You can play with engine speed by increasing the actuator magnet angle.

Remember. Repel force is less at the lower part of the angle because you are closer to the Bloch wall. A steeper angle means easier entry gate. To a certain point. If you grind away to much magnet material gauss rating will drop drastically causing it not to give the required force on the sun disk to get past over center at the planet disks. So it has to be played with. But for now, just get it running.

of the two parallel shafts would then be 90mm/2+45mm/2=67.5mm

Tips & tricks

Grinding the actuator will heat up the magnet. You must avoid this because it destroys the NEO.

A way of cooling is: Get a thick piece of aluminum. Put a small puddle of water on it. Hold warm magnet in puddle against aluminum. It will instantly suck the heat from the magnet.

When grinding your magnets, wrap the bottom half of the magnet with aluminum foil and coil a wire around the foil to secure it on the magnet. Solid MIG/TIG Aluminum welding wire will work, or even magnet wire. You will have a big heat sink depending how much foil you use. You can even dip the end of the foil in a cold glass of water for more heat transfer, or blow cool air from a fan through it as you're grinding. Be careful it isn't too cold or the magnet may crack from the temperature difference.

Place a steel rod or screw driver on the end of the magnet that will be cut off so the little piece

doesn't fly off and land on your skin or eye and burn a hole through it. Wear eye protection. Wear a mask so you don't breathe the poison metal dust.

Place a steel plate in the vicinity of where the Neodymium dust will fly off as you are grinding to collect the magnetic dust.

Have a fire extinguisher or wet towel just in case the dust explodes or starts to burn.

When drilling holes in the sun and planet rotors, drill extra holes between the magnet holes on both the planet and sun rotors. This extra hole could then be used to insert a dowel rod (temporarily) to line up the sun and planet rotors while tightening the nuts on the gears.

Perfect Energy Source

Minato wheel. Experiments in Sweden



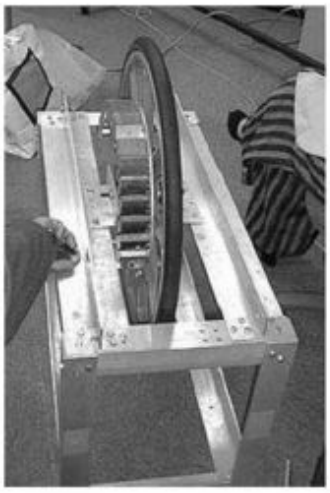
Eric Vogels, Sweden

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http://fdp.hemsida.net

The self-running bicycle wheel was shown to the public at the First International New Science Symposium in 1997, held in Korea. The inventor of the wheel, Mr. Kohei Minato, was a speaker during the symposium. On www.keelynet.com you can find the quote of an eye-witness:

"The motor is actuated by moving the N pole of a large permanent magnet (the drive magnet) toward the wheel. As this magnet is moved toward the wheel, the wheel starts to spin. As the magnet is moved closer to the wheel it spins faster.

The acceleration of the wheel is rapid. So rapid in fact, as to be startling. To put it another way I was very impressed. The motor works. And it works very well. In the film clip (see http://fdp.hemsida.net) a slight pumping action of Minato's hand holding the magnet is apparent. When I braced my hand so that there was no pumping action, the motor still ran. In fact it seemed to run better.



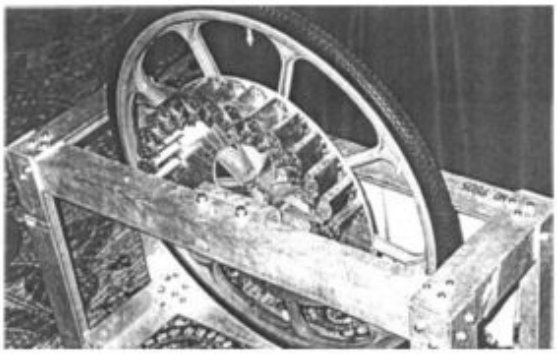


Fig. 2

Pumping action by the hand held magnet **is not** the power that drives the motor. When the drive magnet is moved away from the wheel it coasts rather quickly to a stop and comes to rest in a manner typical of any spinning bicycle wheel. Again when the wheel is at rest and a large magnet is moved up to the wheel it starts to spin. At no time it is necessary to touch the wheel to get it rotating."

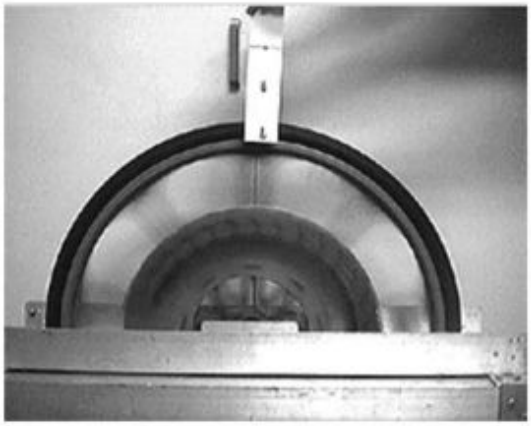


Fig. 3

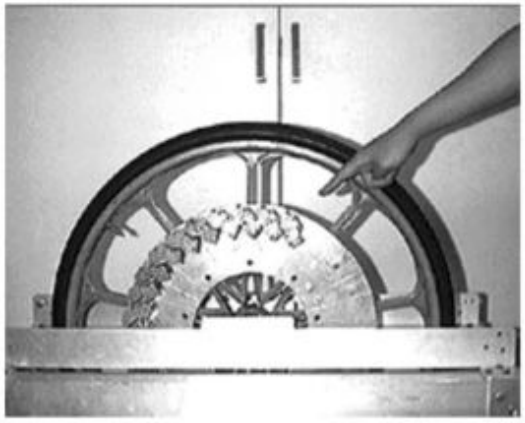


Fig. 1

Fig. 4

Since the symposium in 1997 and the first publications in the Internet several people have tried to replicate the wheel, as it seemed to be a **perfect energy source for the future**. Some claims are made that replication was successful but no proof in the form of pictures or video clips are given.

Because I have a great interest in magnets and free energy and the fact that I did a lot of experiments to find a device that could be rotated only by means of permanent magnets, I decided to try to replicate the wheel by myself.

This journey started by searching on the Internet and collecting all the material that was available. A good way to sort all the found material was building my own website at http://fdp.hemsida.net where all my findings are presented.

One of the devices I build was made from a 'how to build a Minato wheel'-manual that I found on the Internet.

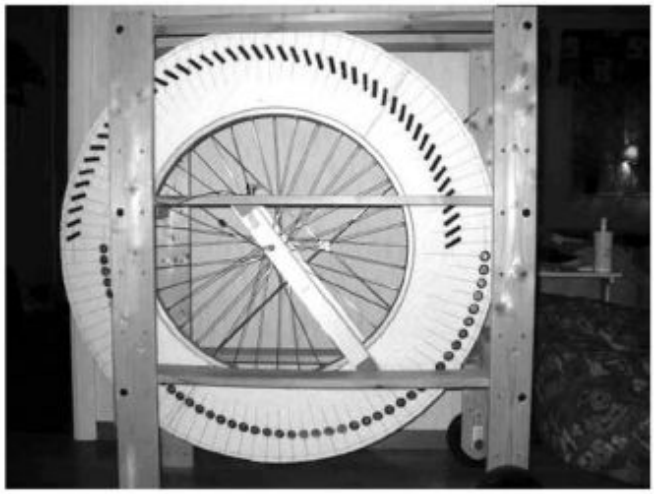


Fig. 5

Unfortunately this wheel did not show any movement at all. I mounted the magnets at several angles and distances from the rim without achieving any positive results. Since the size of the wheel (1 meter diameter) was not very practical to handle and since the results were negative I searched for an easier way for testing. I found that the use of Styrofoam, an old turntable and Neodymium disc magnets kept the whole project within the edges of my kitchen table. I developed a computer program to help me design wheels, since I want to be able to replicate my own wheel, in case

I made a test scenario and the results for every test were posted on the web site.

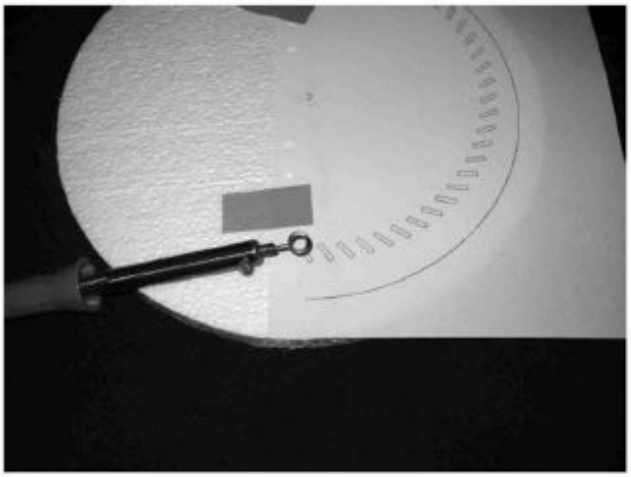


Fig. 6

I searched for the 'perfect' angle, number of magnets and position. The set-up with the strongest thrust was used as the base for the other experiment. By this time I realized that I was not really trying to rebuild the Minato wheel but that I wanted **a rotating device, powered by permanent magnets.**

When for the first time I decided to split a track of magnets that covered 180 degrees of the wheel in a number of smaller tracks, **the results became much better**.

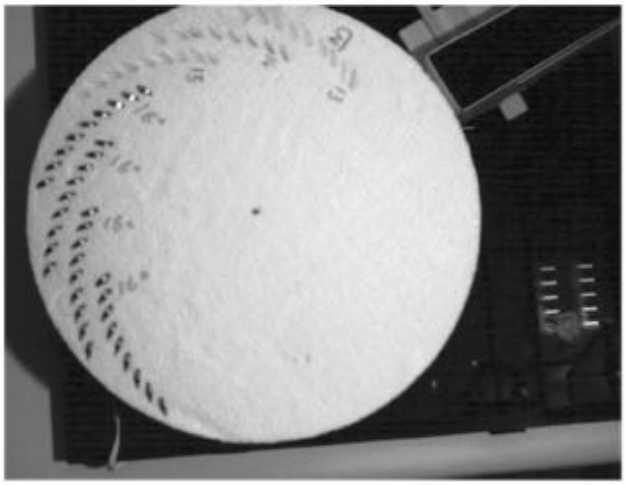


Fig. 7

By using this way of placing the magnets, every track differs a little bit from the next track, depending on its place on the wheel. The angle of the magnets influences on the thrust that is given by the stator

computer program to help me design wheels, since I want to be able to replicate my own wheel, in case I find a model that works. I do not believe in an engine that works after several weeks of tuning and that fails to function as soon as one magnet is replaced. Individual tuning is okay to optimise a working design but if a design does not show the potential to rotate by itself it's a flawed design.

After optimising the way to build the small wheels, I could design and make a wheel in 30 minutes.

place on the wheel. The angle of the magnets influences on the thrust that is given by the stator magnet, depending on the speed that the track is entering the magnetic field of the stator. In other words: the track at the beginning of the wheel, with magnets covered side of the wheel, gives less thrust than the track at the end. This is important since a track with a lot of thrust has a big 'sticky spot' that should pass the stator. This 'sticky spot' stops the wheel during its rotation just before the first track enters the magnetic field of the stator.

During the last experiments the stator magnet changed place and pushed against the magnetic fields of the tracks from above. Simply because more thrust was developed by this way. The next wheel will have the tracks mounted on a different level. It means that the first track will have a bigger distance to the stator magnet than the last track. This should make the sticky spot weaker and the final 'kick off' stronger. The final wheel will be mounted vertically, like the Minato Wheel.

Thanks to the invention of the Neodymium magnet in 1983, magnets became much more powerful while the size and length decreased. Before 1983 a lot of the experiments could not be done since the size of the magnets made the positioning of several magnets in tracks like this was impossible. It is my personal believes that the strength of these magnets will lead to results that are impossible according to the physical law books, because these magnets did not exist when those books were written.

Until the moment I write this I have not found the perfect energy source yet but by exploitation all the material and findings on my web site I hope that more people get interested and will help searching for a great energy device that will not pollute the air which our children and grand children have to breath.

Совершенный источник энергии

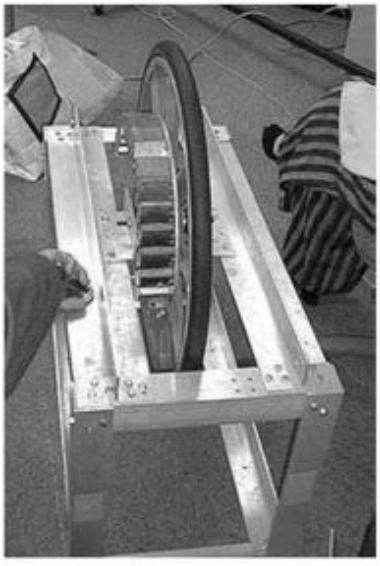
Колесо Минато. Опыты в Швеции.



Эрик Вогелс, Швеция
E-mail: fdb@hemsida.net
http://fdp.hemsida.net

На первом Международном симпозиуме новой науки, проходившем в 1997 году в Корее, публике было продемонстрировано самовращающееся велосипедное колесо (см. цветные фото на обложке). На Интернет сайте http://www.keelynet.com можно найти следующее высказывание одного из очевидцев:

«Мотор запускается, когда полюс N большого постоянного магнита (магнита, задающего движение) приближается к колесу. Колесо начинает вращаться, как только к нему подносят магнит. Чем ближе магнит к колесу, тем быстрее происходит вращение. Затем вращение колеса резко ускоряется. Тот факт, что колесо работает и работает очень успешно, просто потрясает! Видеоклип (см. http://fdp.hemsida.net) демонстрирует, как Минато при помощи магнита в руке с легкостью толкает устройство. Когда я вытянул руку таким образом, чтобы толкающего действия не было, мотор продолжал вращаться. В действительности казалось, что он начал работать еще лучше.



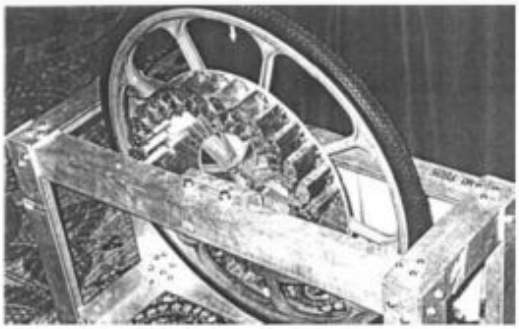


Рис.2

Толкающее действие, производимое рукой, в которой находится магнит, **не является** той силой, которая приводит в движение мотор. Когда магнит, задающий движение, убирают от колеса, последнее продолжает вращаться по инерции до тех пор, пока не остановится, подобно обычному велосипедному колесу. И наоборот, находящееся в состоянии покоя колесо начинает вращаться, когда над ним помещают большой магнит. Таким образом, для того чтобы колесо крутилось, нет необходимости его трогать».

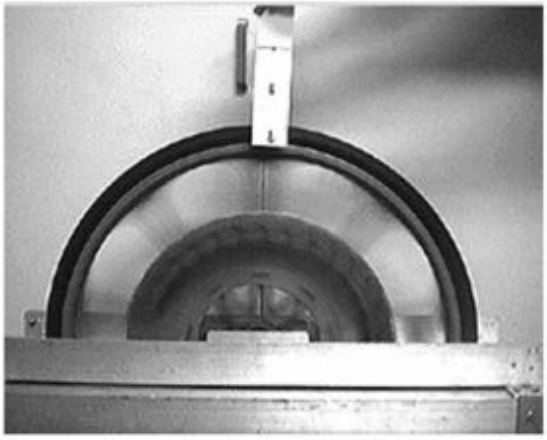


Рис.3

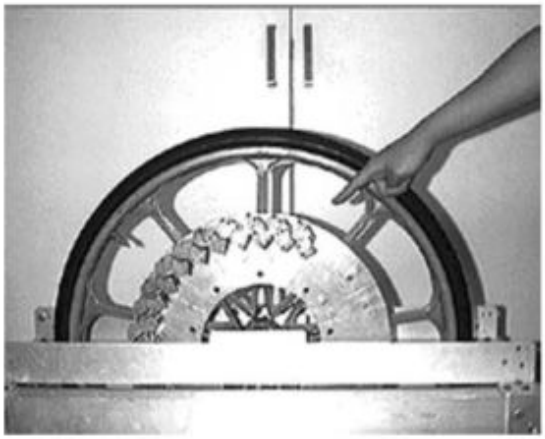




Рис.1



Рис.4

После проведения симпозиума 1997 года и появления в сети Интернет первых публикаций предпринимались попытки создать подобное колесо, которое представляется **совершенным источником энергии будущего**. Сделано несколько заявлений о том, что попытки воспроизвести устройство увенчались успехом, однако, доказательств этому нет ни в виде фотографий, ни в виде видеоклипов.

Интересуясь магнитами и свободной энергией, я провел множество экспериментов в поисках устройства, которое могло бы вращаться только при помощи силы постоянных магнитов. Я решил попытаться воспроизвести колесо Минато самостоятельно.

Это исследование началось с поисков в сети Интернет и со сбора всей доступной информации. Создание моего собственного сайта http://fdp.hemsida.net послужило отличным способом сортировки собранного материала. На этом сайте представлено все то, что удалось найти.

Одно из устройств, построенных мной, было создано на основе найденной в сети Интернет инструкции «Как построить колесо Минато».

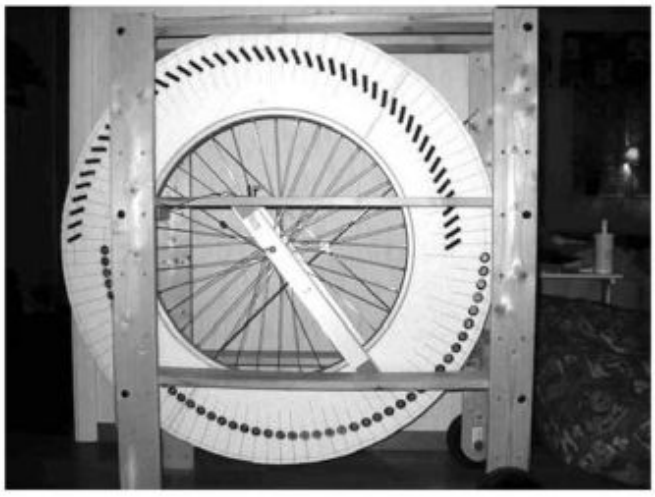


Рис.5

К сожалению, это колесо вообще не двигалось. Я поднимал магнит над ободом колеса под разными углами и на разную высоту, но не достиг никаких положительных результатов. Так как величина колеса (диаметр 1 метр) была не очень удобной, а также вследствие того, что результаты эксперимента были отрицательными, я попытался найти более простой способ проверки. Использование пенопласта, старой вращающейся платформы и дисковых магнитов из неодимия позволило создать установку, которая умещалась на моем кухонном столе. Для разработки дизайна колеса

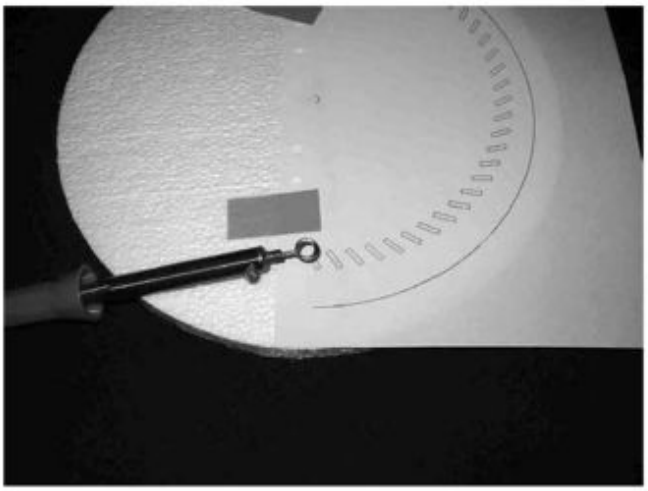
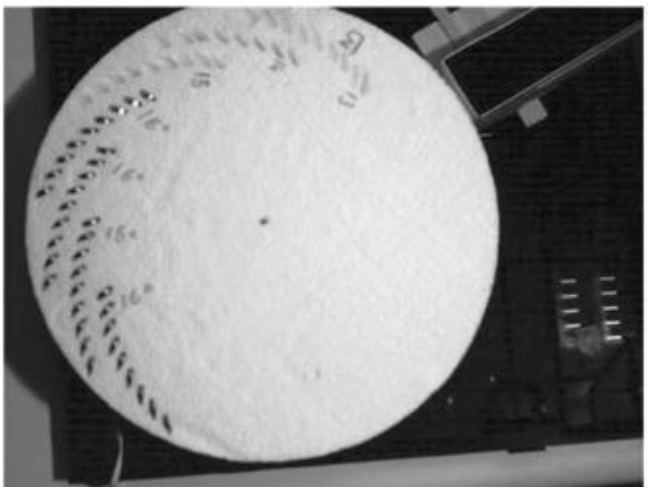


Рис. 6

После того как способ построения маленьких колес был отработан, на создание самого колеса потребовалось всего полчаса. Я разработал сценарий проведения экспериментов, а результаты каждого теста были опубликованы на Интернет сайте.

Я занимался поисками наиболее подходящего угла между магнитом и двигателем, оптимального количества магнитов и их расположения. К этому времени я пришел к выводу, что создание колеса Минато уже не является целью моих экспериментов, вместо этого я хотел бы сконструировать **вращающееся устройство, которое может работать на постоянных магнитах.**

Я попытался расщепить дорожку магнитов, которая покрывает половину колеса, на множество маленьких дорожек — **результаты эксперимента были намного улучшены.**



неодимия позволило создать установку, которая умещалась на моем кухонном столе. Для разработки дизайна колеса мной была создана компьютерная программа, которая могла бы помочь мне в поисках функционирующей модели для создания моего собственного колеса. Мне не внушают доверия двигатели, которые работают после нескольких недель настройки и перестают функционировать, как только заменяют один из магнитов. Использование индивидуальной настройки возможно для оптимизации работы модели, но если модель не демонстрирует способности самостоятельно вращаться, значит, ее можно считать неудачной.

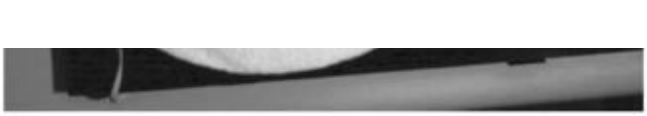


Рис.7

При таком положении магнитов действие каждой дорожки немного отличается от действия следующей в зависимости от ее расположения на колесе. В зависимости от скорости, с которой дорожка входит в магнитное поле статора, угол между магнитами влияет на тягу,

вырабатываемую статорным магнитом. Другими словами, дорожка магнитов, расположенная в начале колеса, способствует возникновению меньшей тяги, чем дорожка, расположенная на конце. Это важно, так как дорожка с сильной тягой имеет большую «область притяжения», которая должна проходить по статору. Эта «область притяжения» останавливает вращение колеса до того, как первая дорожка снова входит в магнитное поле статора.

Во время последних экспериментов положение статорного магнита менялось. Находясь сверху, он отталкивал магнитные поля дорожек. В этом случае вырабатывалось больше тяги, вследствие чего и происходил такой эффект. Дорожки следующего колеса будут располагаться на другом уровне, а именно: первая дорожка будет находиться на большем расстоянии от статорного магнита, чем последняя . Благодаря этому «область притяжения» становится слабее, а последний «толчок» — сильнее. В конце концов, колесо будет вертикальным, наподобие колеса Минато.

Благодаря тому, что в 1983 году был изобретен магнит из неодимия, магниты стали намного мощнее, причем их размер уменьшился. До 1983 года множество экспериментальных идей не могло быть реализовано, так как размер магнитов не позволял расположить несколько магнитов на дорожке. Я думаю, что сила этих магнитов будет способствовать получению таких результатов, которые с точки зрения книжных законов физики являются невозможными. Это может быть объяснено тем, что во время написания этих книг, подобных магнитов не существовало.

До сих пор не был найден совершенный источник энергии, однако размещение на моем Web-сайте информации обо всех собранных материалах и открытиях позволяет надеяться, что большее число людей заинтересуются этой проблемой и смогут оказать помощь в поисках идеального энергетического устройства, не загрязняющего воздух, которым будут дышать наши дети и внуки.



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Tim Goymerac 1/20/2008

Curently reading your article "Some Magnet Motor Expirments". The Resultant force is undersood. The Lorentz force is not understood when you state "This forec F is perhaps due to the magnetic attraction forces being stronger between the magnetic poles of a magnet than the magnetic attraction forces at the pole outside the magnet"? Is there forces inside that I do not see? I picture a free body diagram of cylinder upright magnet including: the thrust concentric to the central axis out the flat ends, the B field perpendiculat to the C-axis represented by a cylinder surface, and the Lorentz force, which something like gravity, the attraction of two bodies? Maybe? I still do not grasp the Lorentz force.

The writing is great, it should be a college course.

Sincerely,

Tim Goymerac

eMail: (is only visible for the webmaster) no Homepage

Tim goymerac 1/18/2008

Searching for free magnetic rotation.

That is an interesting thought. There is something special with fast rotating magnetic fields. /Eric

eMail: (is only visible for the webmaster) no Homepage

Alex Strydom 1/11/2008

Wow cool website I have learnt a lot from this. Your website has helped me understand many fundamental concepts of free energy and I hope to build my working device as soon as I can source the right parts.

I hope that you are successful. /Eric

eMail: (is only visible for the webmaster) no Homepage

Willie 12/27/2007

It takes a creative imagination to invent somthing, and your website is a terrific source of inspiration.

I just hope that as a novice I will now be able to get a project off the ground without people laughing and scoffing with sinicism.

Thanks Willie.
You will get a project off the ground and earn respect for that, I'm sure. /Eric

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Sherr 12/20/2007

Hi there
Very nice homepage!
Have you tried this configuration?
http://www.fdp.nu/photobooks/album7/minato5s.wmv

Please make contact if you want help in the engineering stuff..
sherr

Minato could just as well used his finger here to get the rotation. /Eric

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Page 1 of 27 : << 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 >>

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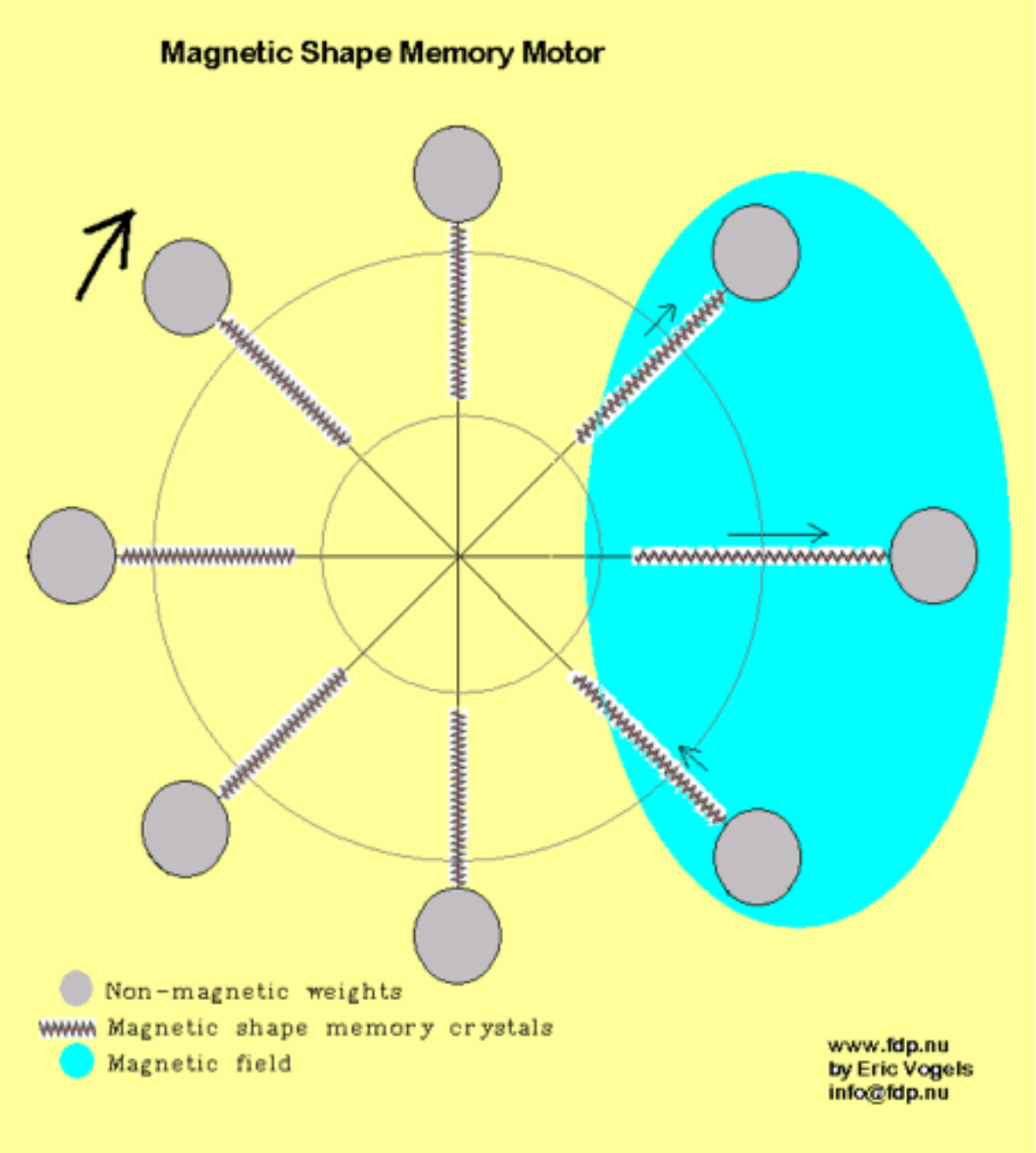
Magnetic shape memory motor

Project start: 2004-07-19

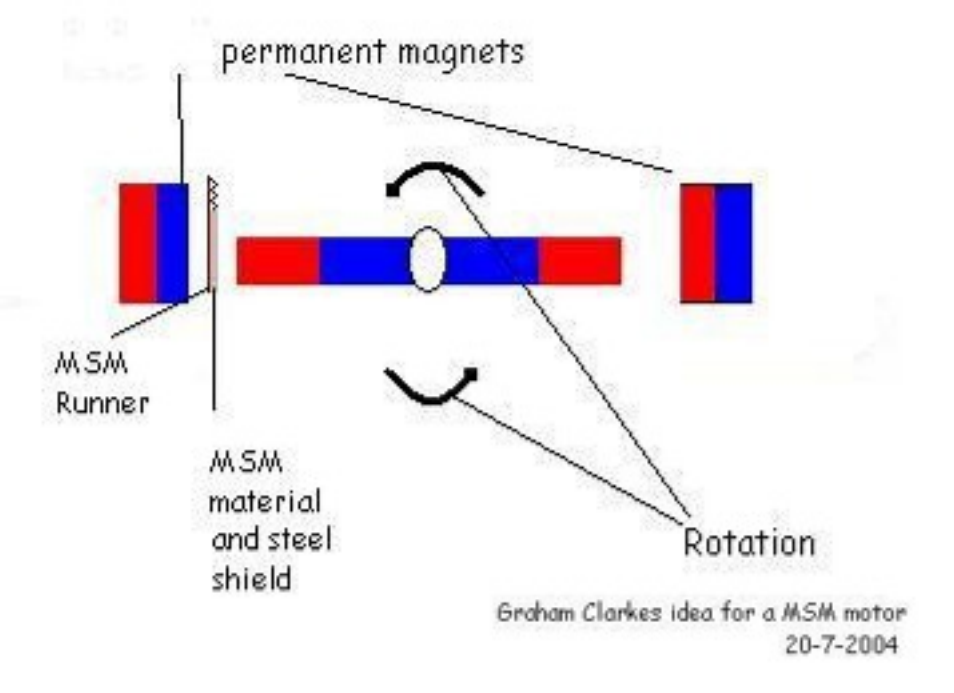
Magnetically controlled shape memory (MSM) materials are a new class of actuator and sensory materials. Dimensions of MSM materials change when a magnetic field is applied, due to reorientation of the fractions of different twin and martensite variants. Strains of up 6% are reached in Magnetis Shape Memory (MSM) materials in which changing magnetic fields causes motion of twin boundaries of the martensite microstructure. MSM materials show several types of magnetically induced deformations including axial strain, bending, shear and torsion, which allows differents kinds of actuating elements to be made. Actuating elements were produced from single crystalline Ni-Mn-Ga material. Several actuator embodiments were designed and tested. Inversely, magnetis field around the material alters when proportions of the variants are changed by mechanical loading. This effect can be utilized in sensors and in small scale power generation.

Magnetic shape-memory effects in La2-xSrxCuO4 (LSCD) crystals

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Grahams Clarkes idea for a MSM motor, 2004-07-20:



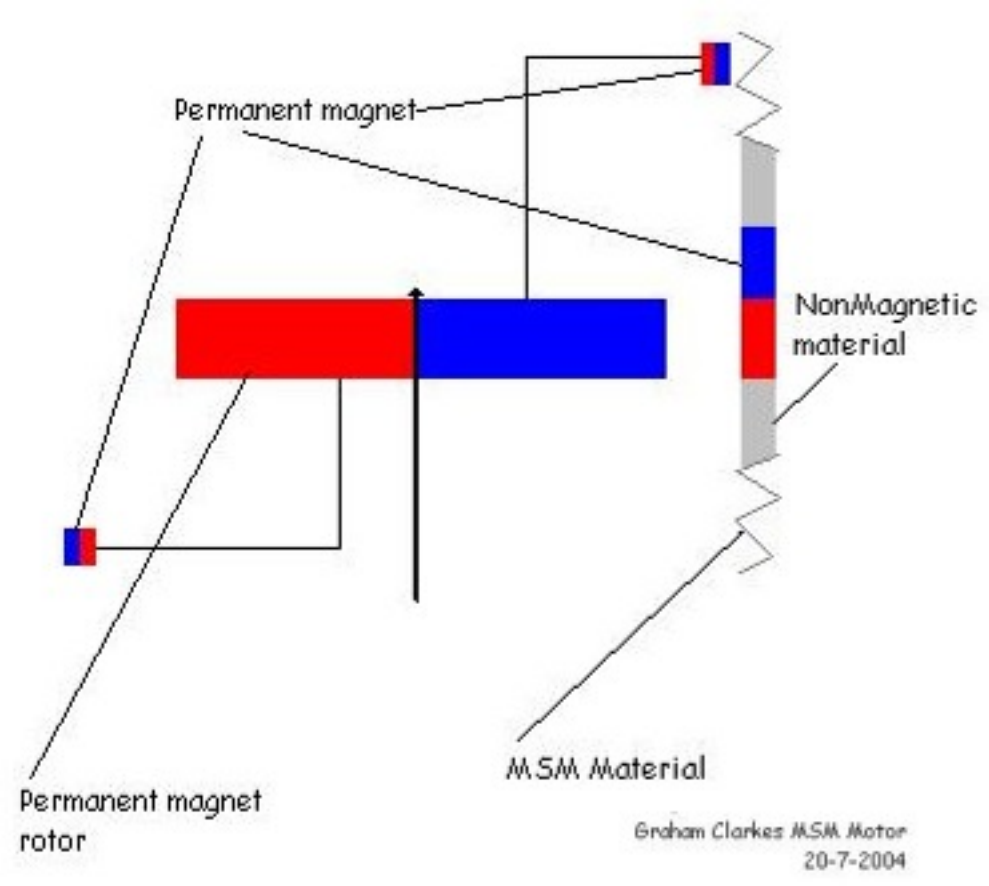
With this idea the MSM material is mounted below the rotor and stator out of their magnetic field. Hanging below the rotor are two small magnets, one one each side te comes into contact with the MSM material. When this happens the MSM will stretch, spushing a piece of steel between the rotor and stator. This unbalances the attraction and repulsion, causing the rotor to rotate half a turn. The MSM material goes back down after it leaves the magnetic field, allowing the rotor to go back to the balanced position, where the process starts again. The MSM will be a piston, pushing a piece of steel up and down between the stator and rotor, on a non magnetic runner.
Graham Clarke

I received a message from a scientist at Massachusetts Institute of Technology:

> Eric, you can't get something for nothing.
> If the springs are made of any magnetic shape memory alloy
> they will have hysteresis. That is, when the field is strong enough
> to extend the spring, the spring will NOT retract as it leaves the
> field region unless there is a bias stress (centripetal force)
> pushing it back. Unfortunately, when the spring expands, the

> centrifugal force on the mass increases, counteracting much or all of
> the centripetal bias force.
> I doubt that it would work. Also, shape memory alloys are
> not strong in tension.

And with that information Graham Clarke came up with another idea:



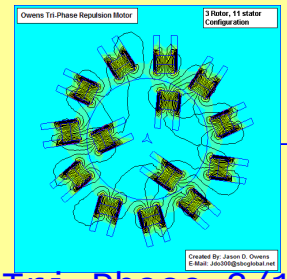
MSM Motor if MSM doesn't spring back
The idea is that the rotor is repelled by the stator and the opposite site of the rotor is attracted to the stator. As it aligns with the stator, the magnet on the arm above or below the rotor, comes into contact with the MSM, making it exspand up or down, changing the field in the stator and repelling the rotor. The process will start again in the opposite direction, giving a full rotation. The MSM moves up or down, depending on what magnet arm comes into contact with it and because the material doesn't spring back, the opposite end of the rotor is attracted to the stator until the MSM reacts to the magnet on the arm.
Graham Clarkes MSM Motor, 2004-07-20



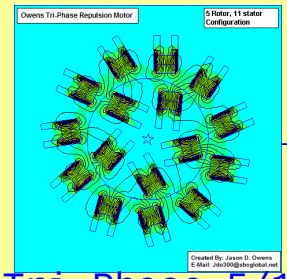
magnetic shape memory alloys

Google Search

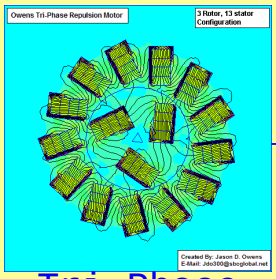
Animations



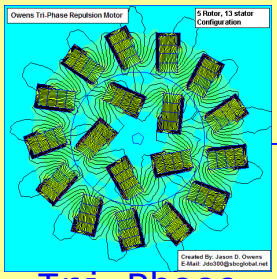
Tri-Phase 3/11 (by Jason Owens)



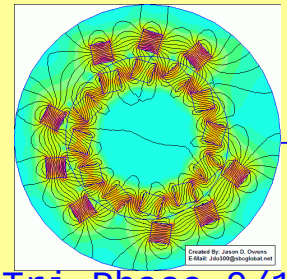
Tri-Phase 5/11 (by Jason Owens)



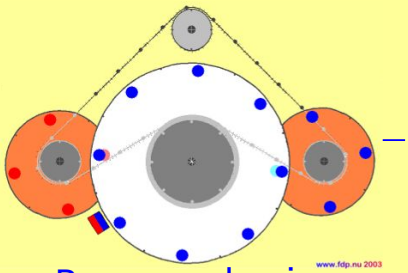
Tri-Phase 3/13 (by Jason Owens)



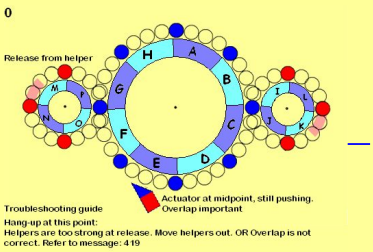
Tri-Phase 5/13 (by Jason Owens)



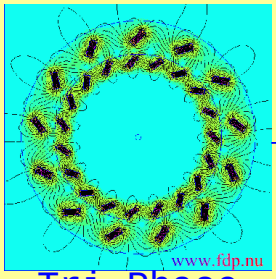
Tri-Phase 9/12 (by Jason Owens)



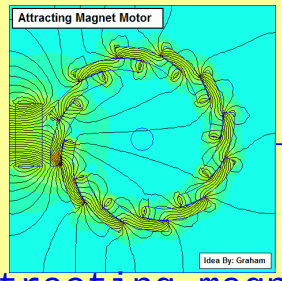
Bowman device (by Douglas Mann)



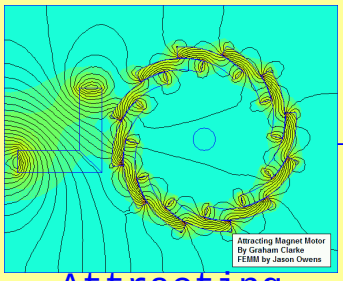
Bowman device (by Robert Calloway)



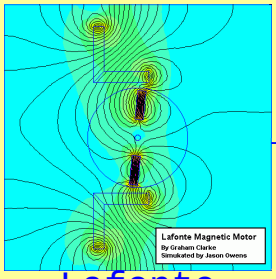
Tri-Phase 13/19 (big file) (by Eric Vogels)



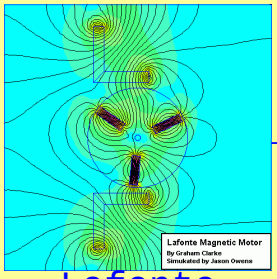
Attracting magnet motor (by Graham Clarke)



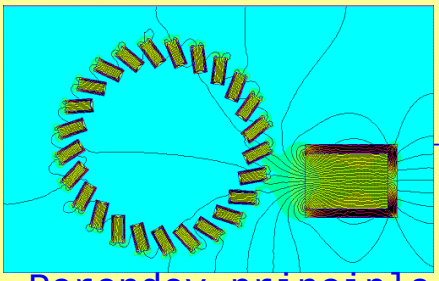
Attracting magnet motor L (by Graham Clarke)



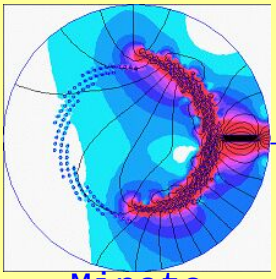
Lafonte balance motor 1 (by Graham Clarke)



Lafonte balance motor 2 (by Graham Clarke)



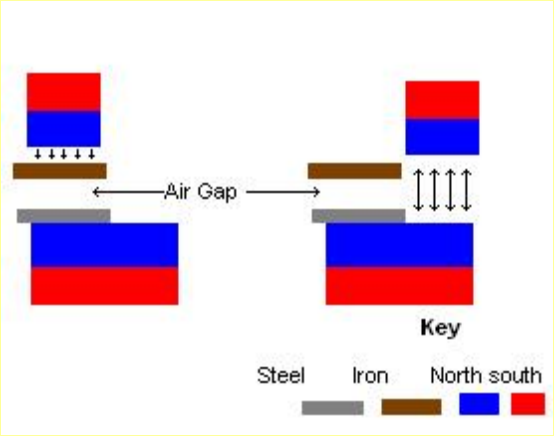
Perendev principle (by Jason Owens)

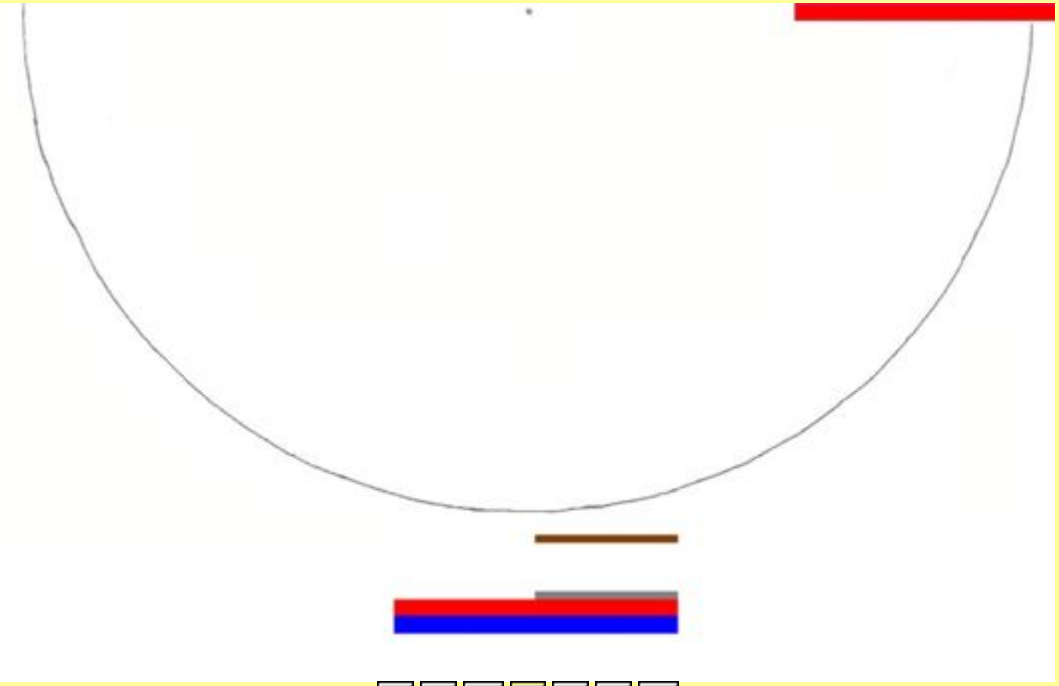


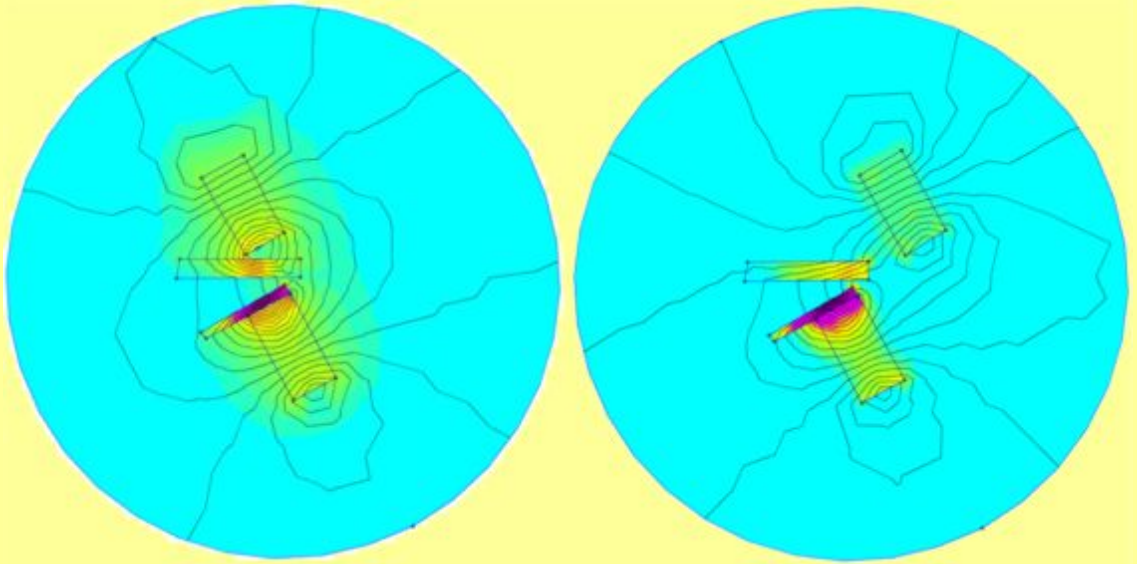
Minato principle (by Eric Vogels)

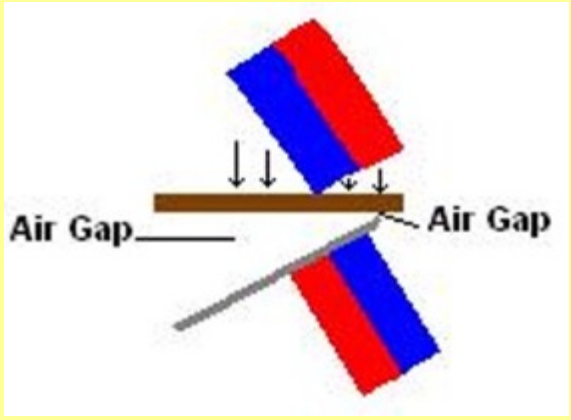
Changing Field Device

by Graham Clarke

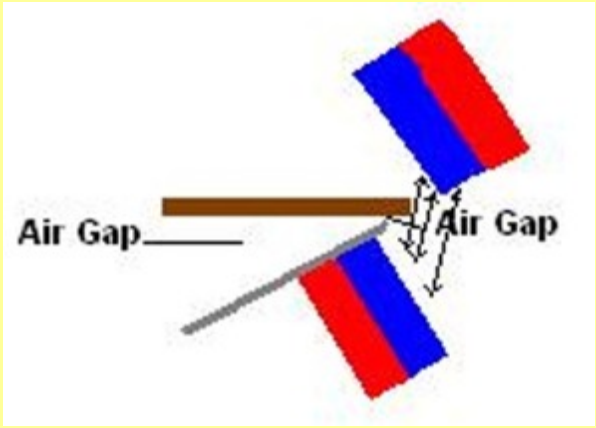




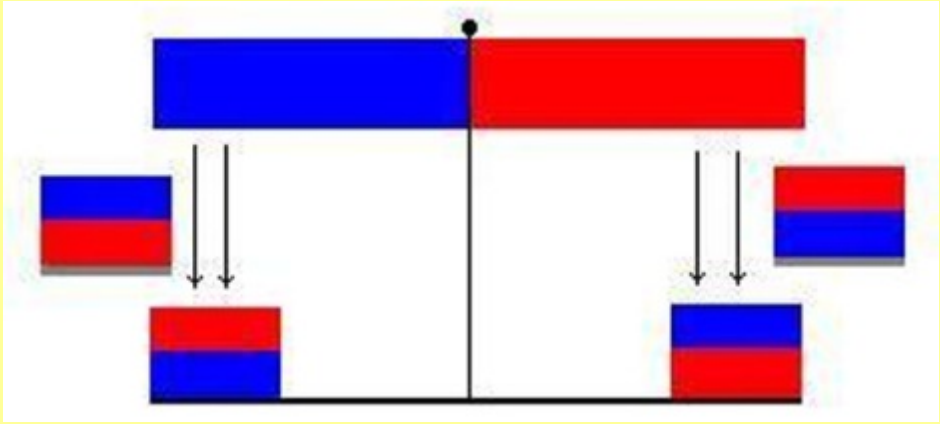




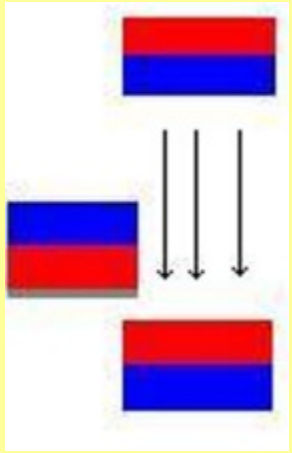
In this set-up the top magnet is attracted to the iron bar. The thin steel and the ait stops the magnets from repelling each other.



Here the magnets start to repell each other. This set-up compared with the set-up on top of this page, needs less force to change the magnets from attracting to repelling
Here the repelling is only happening when the top magnet past the iron. When the top magnet is moving, there is almost no sticky spot and any sticky spot is easely to over come with gravity.



In this set-up, the bar magnet is the rotor. The way it is placed will not let the bar magnet move because the bar magnet is attracted to the bottom magnets.
When the middle magnets are pushed into the center, the bar magnet will spin to aline it's poles to the middle magnets. Once alined, you can move the middle magnets out and the bar magnet will spin again to align with the bottom magnets.



In this set-up, the top magnet is attacted to the bottom magnet, the middle magnet has a minor effect on the top or bottom magnet.



In this set-up the middle magnet has moved past the half way point between the top and bottom magnet. Now the middle magnet has a repelling effect to both the top and bottom magnet.



Rules for unconventional research

(c)1997 William Beaty

After years of observing and sometimes participating in the "fringe science" arena, I've come up with a set of rules which I try to follow. My first law of unconventional research:

First rule: If I've made a discovery which violates the laws of conventional physics, then I've almost definitely made a mistake somewhere.

Seriously! Even though I'm involved with non-mainstream science, I intentionally maintain this 'skeptic' belief for many reasons. If I let myself start *knowing* that I've found an anomaly, I will stop trying to double-check the results, stop trying to think up conventional explanations, stop trying to look for mistakes, stop looking for subtle ways I've fooled myself. I've seen how easy it is for people to talk themselves into things. I want to avoid these traps. Second, if I keep strongly suspecting an error, I will resist the temptation to let my ego get the better of me. I know the extent and the power of my ego, and that delusions of grandeur are very easy to fall into. Therefor, in my saner moments I set up my beliefs as

traps to trip up my future ego trips. Another: if I "know" that the discovery is a mistake, I will force the discovery itself to convince me otherwise. No opinions and self-delusion, just the real world demonstrating its realness. Another: if I present it to others as an earthshaking discovery, they will later tend to defend this viewpoint and not help prove out the discovery. But if I present it in terms of "find my mistake", then they might actually discover a conventional explanation I've overlooked.

Second rule: if it is a real anomaly, I might kill it.

If it's a small piece of a new field of science, then there is a *very* large chance that I won't understand what's causing it. I may accidentally extinguish it and never get it back again. I've heard laments from several inventors that they rebuilt their devices to improve them, and they never worked again. So, DON'T take apart the original invention! Don't move it to another location. Don't turn the power off and back on. Just moving your arm a bit wrong might eliminate the conditions which allowed success! Once you have it working, videotape the heck out of it, call in eyewitnesses, perform experiments, maybe even build several copies and get them working. Stay paranoid that the phenomena might vanish at any time, never to return.

Third rule: publicize it and let others help me find my mistake. Avoid SECRECY, that destroyer of new science.

This rule is a natural consequence of rule one: if I intentionally maintain a conviction that there is a mistake somewhere, wide publicity is the fastest way to get help in finding it. If instead I hide my discovery from all the greedy people who want to steal it, then I also subvert the whole process of testing by fellow researchers. If my discovery is a mistake or delusion, others may help me discover this, but if I keep it secret, I may remain deluded for decades.

I realize that this isn't quite so attractive an option outside the US. If I publicize a discovery here in the US, I have a year to decide to patent it or not. If in another country, first I'd have to decide to put my invention into the public domain, since the patent laws elsewhere do not provide the 1-year grace period. Myself, I might break secrecy anyway, because of Rule Four below. Here is an alternative, from Jerry Decker

Also, I've come to see that there is one big thing that ruins these fields of amateur research. That thing is SECRECY. Every time amateurs think they've stumbled across something important, they go silent and treat their discovery as a Big Important Secret which must be preserved at all costs from the many enemies who want to steal it. This is garbage! It is a trap which leads to paranoid megalomania. At the same time, it wrecks their discovery by burying it. True, there are often business reasons to keep back proprietary info, but the majority of "weird science" discoveries are not kept secret for this reason. They are kept secret because of shameful human psychology: because of inventors' desire for attention, because of our need to control, and because of our need to be important, to gain fame and accolades, etc. I can say such things because I too have suffered from this kind of "inventor's disease." I solved the problem by posting my inventions on internet! If a single inventor discovers something wonderful, it does no good at all for mankind, and is not really a discovery at all, it is an ego trip. Only if an inventor

discovers something wonderful and then STARTS SELLING PRODUCTS, or better yet, TELLS EVERYONE THE SECRET, then does it make the world a better place.

Also see George Wiseman's NO PATENT page.

"We do not believe any group of men adequate enough or wise enough to operate without scrutiny or without criticism. We know that the only way to avoid error is to detect it, that the only way to detect it is to be free to inquire. We know that in secrecy error undetected will flourish and subvert." - J. Robert Oppenheimer

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Fourth rule: figure out what other o/u inventors did, then do the opposite!

Inventors over and over have announced o/u discoveries, yet where are they now? What did Pons and Fleichman do wrong? Hendershot? Hubbard? There seem to be a particular set of guaranteed routes to failure. Secrecy is the biggest one. Another one is to assume that everyone wants to steal your valuable discovery. Another one is the attempt to sell the discovery to governments or giant corporations. Another is the loss of humility and pursuit of fame. Another is the assumption that scientists will automatically hail your discovery, and that businesses will vie for rights to manufacture it.

Therefore, in order to succeed, we must do some historical research, discover the guaranteed routes to failure, then avoid them.

Assume that all scientists will ridicule you. Assume that all businesses will reject you as a lunatic. Assume that governments and corporations, if they don't simply ridicule you, will force you into silence (and perhaps pay you to keep silent.) Assume that your suspicion of idea theives will push you into paranoid insanity, and that pursuit of fame will destroy both you and your discovery. Now go forth and bring light to the world. But how? I don't know. Maybe try giving away your discovery for free, then later make your fortune on your autobiography and lecture tours? See prometh.txt for some clues.

Fifth: Keep a journal. If you notice something strange, WRITE IT DOWN. If you don't, you'll invariably forget it.

Human minds are funny about anything which violates our expectations. Our minds want to maintain a coherent world, so we tend to get amnesia about things which don't fit. Amateur scientists should never stop fighting against this tendency in themselves. Avoid too much skepticism. Search for "weird" unexpected phenomena. And if ever you see some, write them down! Here's a story about my own encounter with this issue.

I was using a VandeGraaff generator to power a "Franklin's Wheel" electrostatic motor. I was working in a dusty shop, and little hairs would jump onto the brass knobs of the Franklin motor. I wiped them away,

but one of the hairs simply would not leave. It was a thin gray hair about 2mm long, and even though I wiped and wiped, the same hair kept jumping back to the knob. But then I looked more closely and realized that something weird was going on. That hair was a ghost. When I viewed it against a white background, it was completely invisible. When I viewed it against a normal complicated background, it looked like a tiny fiber of transparent glass. "Very weird!" I thought to myself, "I must remember to play with it tomorrow when I have more time." Ten years later I read an article in ESJ about fiber-like air flows created by the polished knobs of a Wimshurst machine. THAT WAS IT! That "ghost hair" thing! But then I realized that it had not just slipped my mind ten years earlier. Instead my brain had edited it out. I had been trying to fit that "fiber" into my prior experience, and having no luck, it was confusing me. It was an interesting phenomena, but it was also deeply unsettling. I was going to look at it more closely, but my subconscious got there first and protected my "reality" by giving me amnesia! When I read Charles Yost's article about it in ESJ, my original memories came back, but I noticed that they had a weird "feel" to them. To me they felt like I was remembering a dream, as if the "ghost hair" event had happened to somebody else. I suspect that my brain had stored the memories in a different way than normal. I had no access to them until something broke through the amnesia, and then the "feel" of the memory was different than the "feel" of a normal conscious recollection which is accessible through usual mental association.

I suspect that this sort of thing is common in science. Somebody announces a great discovery, and many other people remember seeing clear evidence for the same thing. Is the discoverer a great genius, or was he/she simply the only one with the sense to write down an observed anomaly, and then to follow it up?

Sixth: a failed o/u device often makes a great toy.

If my amazing discovery doesn't pan out, it often was because some weird phenomena fooled me into thinking I had found something new. Therefor, the same thing will probably befuddle others and act as entertainment. If Pat Harris of the "TOMI" device had given weight to this concept, his rollercoaster device might now be in all the stores as an "impossible" science toy. And if a real anomaly gets ignored by the mainstream, designing a toy based on new science is a great way to penetrate the barriers of disbelief.

Seventh: spend all your effort making an airtight demo.

A tiny spinner which keeps turning, or better yet, a light bulb which runs for weeks, beats any number of electric cars or huge multi-kilowatt blackboxes hands down. Don't try to build a flying saucer, try instead to build a soup-can which unexplainably loses 1% of its weight, and which anyone can duplicate. If possible, make it so very simple that you could sell it as a kit to school kids. Make it so obvious that your grandmother could follow the instructions and make a successful replica. If the goal is to blow away the objections of the skeptics, then the device should clearly demonstrate the new principle in ways which cannot be explained away. Doing any more than this will just obscure the principle. And doing more than this will almost guarantee that your discovery gets ignored as being just another crackpot claim.

Eighth: beware of the "Inventors' Disease"

OK, you've developed fantastic invention. It is an important discovery. No *REALLY* important. It might change the face of mankind. But at the very least, this thing is seriously valuable, and anyone in their right mind is going to want to steal the idea so they can sell it themselves. Nobody is above suspicion. Your family is looking at you funny. Don't trust them, they probably want to market your fantastic idea, but with THEIR name on it instead of yours. Better start writing in your notebooks in code, so your spouse won't be able to steal the idea. You mention your idea to friends, but then they want to know the details! Theives! Do they think that you are stupid?! Your patent attorney wants to know what you've invented. Beware, because that's just a transparent ploy to get clues about your idea! Only the idea is important, not the marketing, manufacturing, etc. Anyone who even HEARS about the idea can just walk off and start a wildly successful business. Patent the idea? But that's ridiculous, since then everyone would KNOW about it! They could just walk in and take it, and then you'd be spending your whole life battling lawyers! Actually, your idea is so valuable and so important that mankind is not ready for it. Burn all your notes, and bury the working model in the backyard garden where only you know its location. You'll take your idea to the grave with you. That'll show 'em!

The above is the "Inventors' Disease." The full-blown version (like the above) is fairly rare, but milder cases are very common. I fell into it's thrall two times now. I was afraid to take my idea to a patent attorny, since chances are that he would steal it! In hindsight, I see that I was courting a totally monumental bloated self-image , and my whole attitude fairly dripped with egoism and titanic self-importance. Pretty disgusting. Yet pretty attractive too. Like a kind of drug.

If I come up with a really important idea in the future, I know that the whole stupid thing will begin again. What to do? How about this: acknowledge that I am a weak person, and for that reason I will never be an inventor. If I have a seriously cool idea, it will blow my ego all out of normal proportion, and I'll start looking for bugging devices in the kitchen light fixtures. Therefor, any great ideas that I have, I'm putting them onto the internet right quick! I'll still have a year of "grace period" where I can patent them before they go irretrievably into the Public Domain. Besides, ideas are *NOT* worth all that much, and it's the 99% of perspiration, not the 1% of inspiration, that creates a successful company. And even if I never make money off of my great ideas, and if they are promptly stolen by others, at least I won't go strutting around with a hugely bloated ego, and a pitifully obvious case of the Inventor's Disease.

(Hint: I put the Hand-Drawn Holograms and "Visual Electricity" on internet, and after many years, nobody has stolen them! I suspect that it works like this: if it's not secret, and if you give it away for free, then the "predators" will become convinced that it's worthless!)

And finally, a quote for all scientists (weird ones and otherwise) to live by:

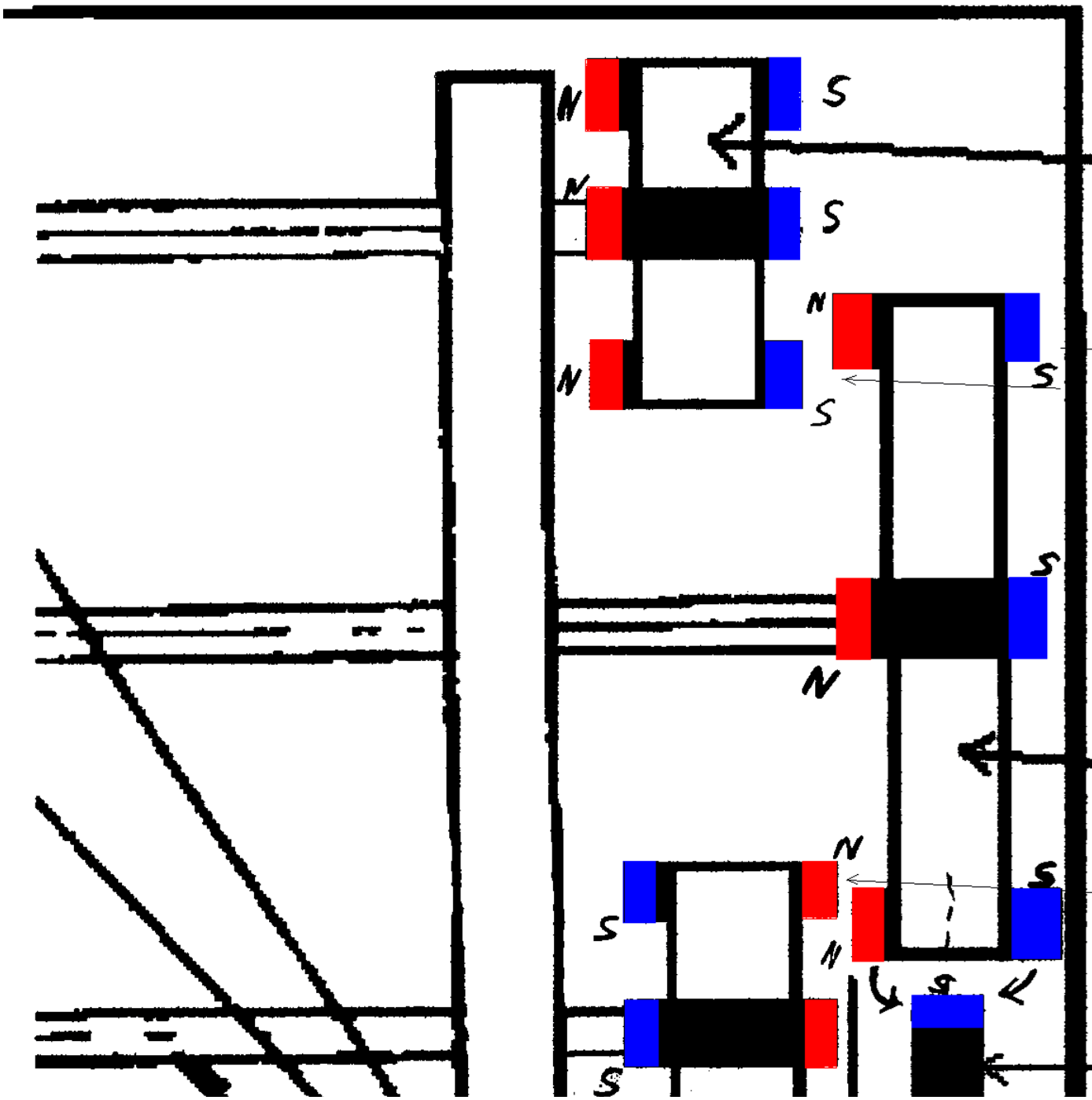
"What impressed me most was Einstein's own clear statement that he would regard his theory as untenable if it should fail certain tests... Here was an attitude utterly different from the dogmatism of Marx, Freud, Adler, and even more so that of their followers. Einstein was looking for crucial experiments whose agreement with his predictions would by no means establish his theory: while a disagreement, as he was first to stress, would show his theory to be untenable. This, I felt, was the true

scientific attitude."

- K. Popper, CONJECTURES AND REFUTATIONS, 1963

Created by Bill Beaty. Mail him at: billb@eskimo.com.

Figure 4



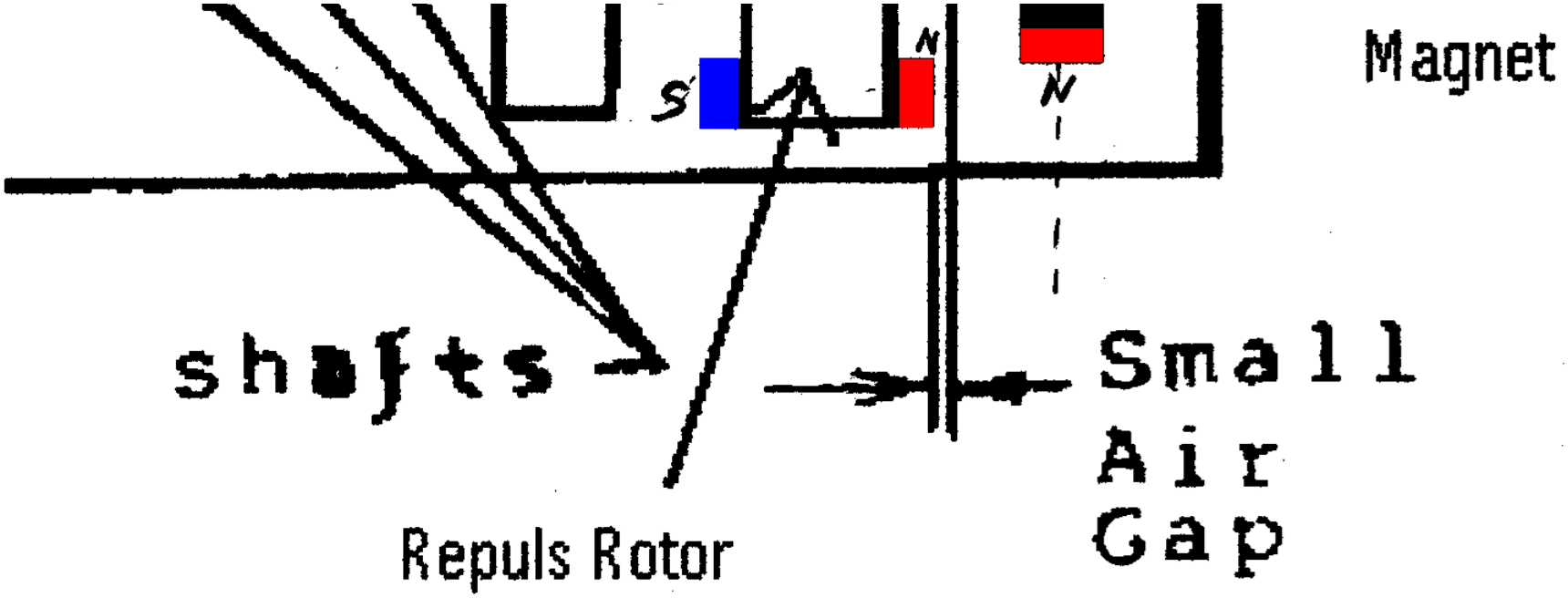
Attracting rotor

This shows that the placement of the attracting rotor will be differant than the repelling rotor. Because the attracting fields reach into the the unlike poles area. The forces of attracting are bigger in regard to the gap. Look at the repelling rotor below

power rotor

This shows the repelling rotor's magnets in the 1/2 face to face to the large rotor's magnets as they pass one another.We can not go munch past this. Because the actuator magnet will start to see the effects of the repelling rotor's magnets. So as we set the repelling rotor for max force with this in mind. Then set the attracting rotor to offset this force.

Actuator



Douglas A Mann 08/30/2003

Turntable model test with Neodymium magnets

ID	Diam mm	Entry mm	Exit mm	# magn.	Degrees on wheel	Size Length		Width	Entry Angle	Exit Angle	Results with repelling magnets	Rating
1	121	20	7	15	180	13	x	3	-30	-60	Turns into the wrong direction	--
2	121	20	7	15	180	13	x	3	30	60	Speeding up into the right direction (towards Exit gate)	++
3	121	20	7	15	180	13	x	3	30	30	Speeding up into the right direction, but lower speed.	+
4	121	20	7	12	180	13	x	3	30	60	Right direction but very, very weak. No kick.	-
5	121	20	7	17	180	13	x	3	30	60	Magnets too close together to test.	-
6	121	20	7	15	230	13	x	3	30	60	Rotating slowly into the right direction (towards Exit gate)	+
7	298	30	10	30	180	13	x	3	30	30	Good swing in right direction	+++
8												
9												
10												

< RPMM >
Repulsive Permanent Magnet Motor

The RPMM is a powerful motor once built. The technique involved requires extreme patience. If one is not completely serious or gives up easily on a project, this one is not for you. It is said that magnets will heat up and lose their gauss rating if one could be built in the repulsive mode. They have never built one.. how do they know? Speculative thinking doesn't provide the truth. Cheap Radio Shack magnets do over time lose their gauss rating, but they are cheap and excellent to experiment with to build a motor, then buy the expensive ones to finish the motor. A motor built with high-grade magnets in the repulsive mode will last for years. If they only lasted for 5 years, how much work have you acquired from them? I have (2) motors built in the repulsive mode and one of them has been running for 1 and a half years. The other was built at a later date and is still running. Plus.. they DO NOT heat up… this is a myth. I do not expect the reader to believe me. I have had plenty of emails that confirm this. I just delete them and keep moving forward, they never hear back from me again. But there are a few that will be willing to try, and those are the ones that will get help. I ask for nothing but a good strong effort for those that believe that it can be done. First we must build a balanced wheel of at least 36" in diameter. Make it as light as possible with good bearings. 36" is the easiest motor to begin with. Smaller wheels can be used, but until all the flux variations are understood, this is where you need to be. To build this design you must understand WHAT you are trying to achieve. The wheel is balanced, but the magnetic flux or forces must be unbalanced in one direction of the wheel when a primary magnet is brought in a close proximity to the wheel. PLEASE RE-READ THAT. Flux is static, so the wheel must be magnetically unbalanced so that it can never remain in one place when a primary magnet is in its region. The trick is getting it to do so in ONE direction only. One must place the magnets in a angled position mounted around the wheel for 180 degrees. This whole configuration must be cocked to one side of the wheel. When one looks at the wheel one side of the magnets are in toward the centre 3". When you have achieved this, placing the primary magnet next to the wheel will cause it to rock one direction and then the other. Build a Plexiglas box about 15" long and about 4" wide. Put some metal filings in the box and hold it about and around the wheel. Your flux field must form a perfect arc for 180 degrees. If not, reposition your magnets. Not around the wheel... but the magnets. When this is done, test with the primary magnet, it will bounce some. Now place a magnet behind the row of 180 degree magnets and get the wheel to move in the direction of the 3" inset to the closest magnets on the wheel. The magnets you will place at various locations behind the row of 180 degree magnets will determine the fixed direction of the wheel without bouncing back and forth. You will get the wheel to be unbalanced magnetically in one direction. Still using your Plexiglas box to make sure the magnetic arc is not destroyed in the process. Magnetic viewing material will not do here. You HAVE to see the extension of the flux fields. This design is very hard to explain in the building of it. It is a very complicated trial and error build. But to see it work is worth all the effort put into it. Give it a try.

Robert H. Calloway

Main parts list

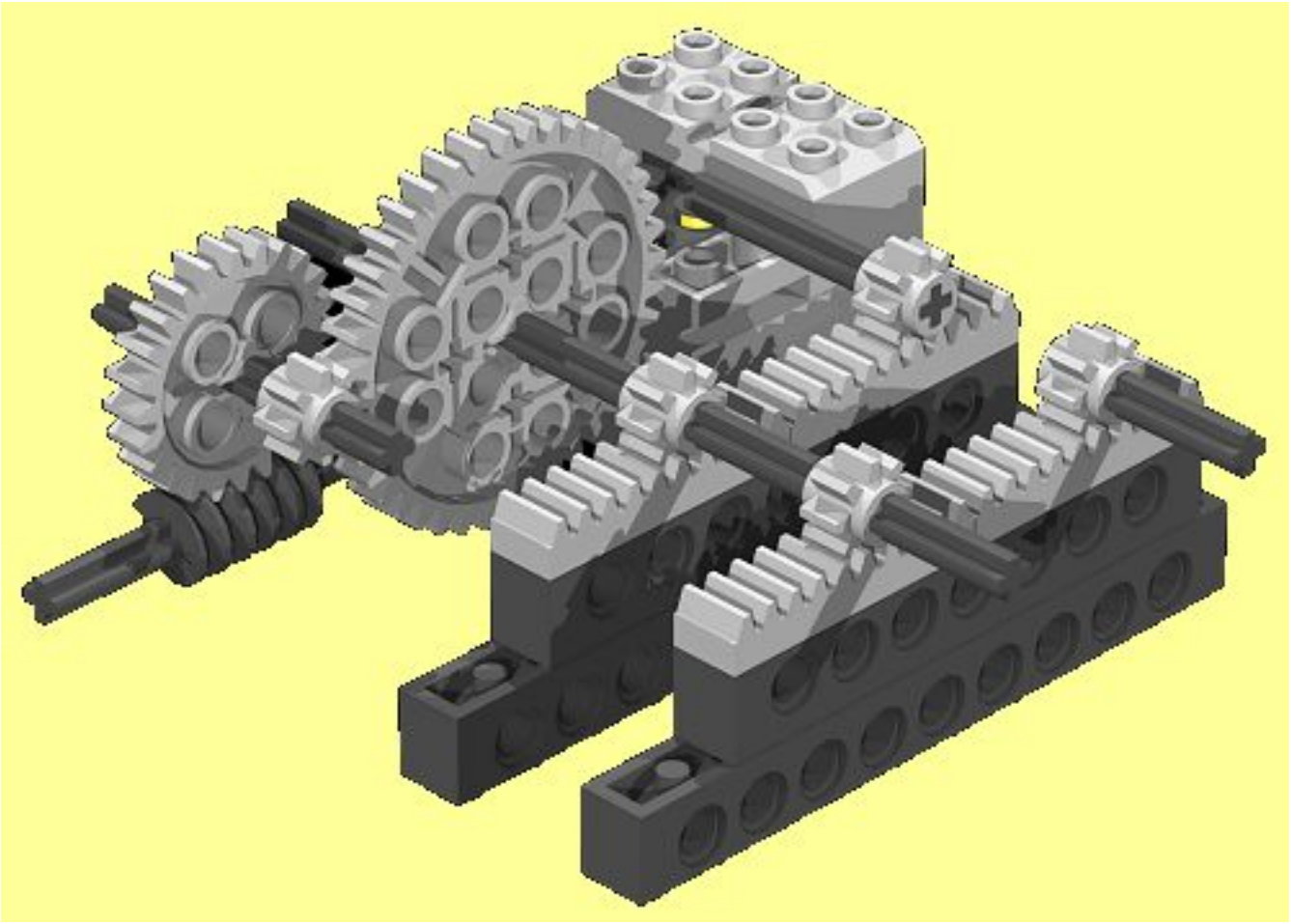
Description	Specification	Quan	Part number	Supplier
Steal gear	70 teeth, 3.500 pitch dia, 0.375 bore	1	U-GSS-1470	www.smallparts.com
Steal gear	35 teeth, 1.750 pitch dia, 0.375 bore	2	U-GSS-1435	www.smallparts.com
Rotor material	12" x 12" x 0.500" thick Delrin	1	U-SDE-0500	www.smallparts.com
Shafts	Titanium or Stainless steel non-magnetic threaded rod 3/8 coarse thread 12" long	3	316 threaded rod	www.mcmaster.com
Magnets rotors	3/8" x 1" long Neo35 rod magnets Request at the time of ordering that the picker uses a gauss meter to match a set of magnets for you.	16	ND381-35	www.magnetsource.com
Magnet actuator	3/8" x 1" long Neo35 rod magnets	1	ND381-35	www.magnetsource.com
Magnets (helpers)	1/2" long x 3/8" wide x 1/8" thick Neo, Arc shaped cut from a 1" x 1/2" x 1/8" rectangular magnet	2	NB15321-35	www.magnetsource.com
Bearings	1" OD with a 3/8" ID Bore	6		
Pillow blocks	Accepting the bearings	6		
Nuts	Stainless steel, non-magnetic. To mount all parts to the shafts	24		
Washers	Stainless steel, non-magnetic. To mount between the parts and the nuts	24		

Other material	Plexiglass or wood (no aluminun) to build a base			
Note:	Stainless steel all-thread bends easily. Do not over tighten nuts. The center wheel will be 4.000 inch dia. cut from .500in thick Delrin The (2) outer wheels will be 2.000 inch dia. cut from .500in thick Delrin			



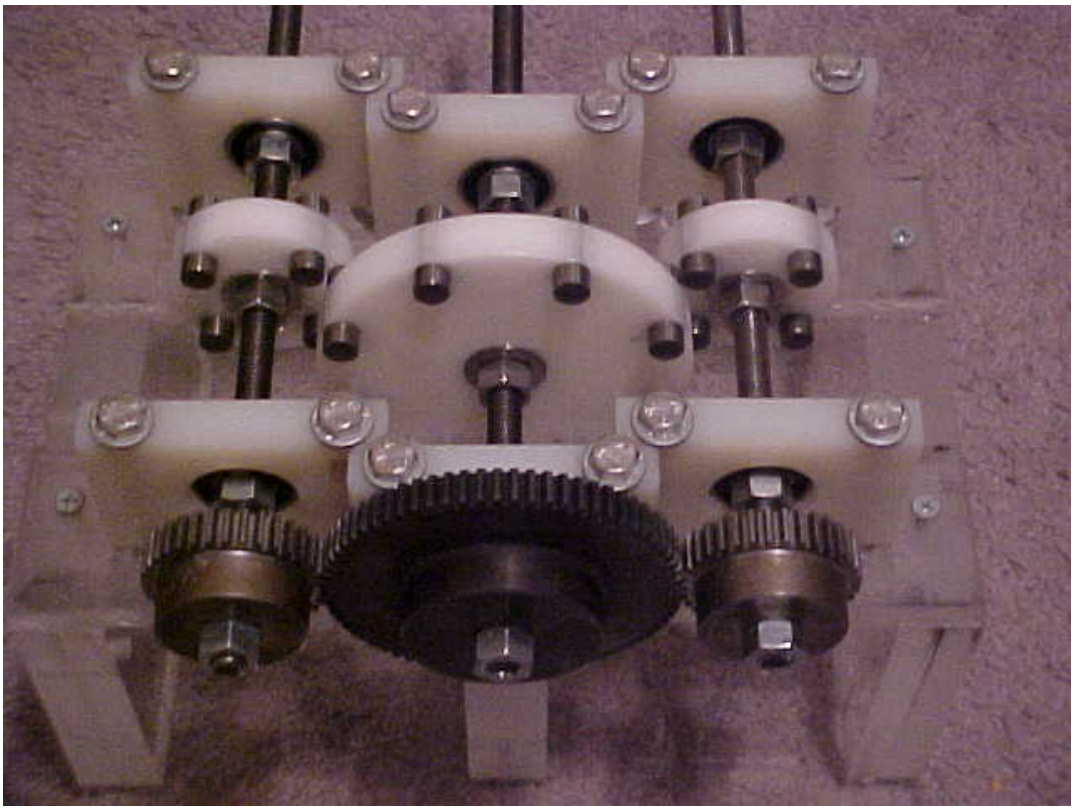
Parts list Eric Vogels

Description	Part no.	Quan	Supplier	$mat	$oth	$tot
Steal gear Big	10090-S09	1	www.mekanex.se	55.31	0	55.31
Steal gear Small	10045-S08	2	www.mekanex.se	43.56	37.16	80.72
Rotor material	Delrin, 12"x12"x0,5"	1		19.50	24.60	44.10
Shafts	19.340	3	www.biltema.se	12.08	0	12.08
Magnets rotors	ND381-35	16	www.magnetsource.com	56.00	35.50	91.50
Magnet actuator	ND381-35	1	www.magnetsource.com	3.50	0	3.50
Magnets (helpers)	NB15321-35	2	www.magnetsource.com	5.00	0	5.00
Bearings	109-927	6	www.rsonline.se	63.92	10.14	74.06
Nuts	19.129	36	www.biltema.se	15.48	0	15.48
Washers	19.133	36	www.biltema.se	4.38	0	4.38
Bolts	19.393	12	www.biltema.se	14.16	0	14.16
Other material						
TOTALS				292.89	107.40	400.29

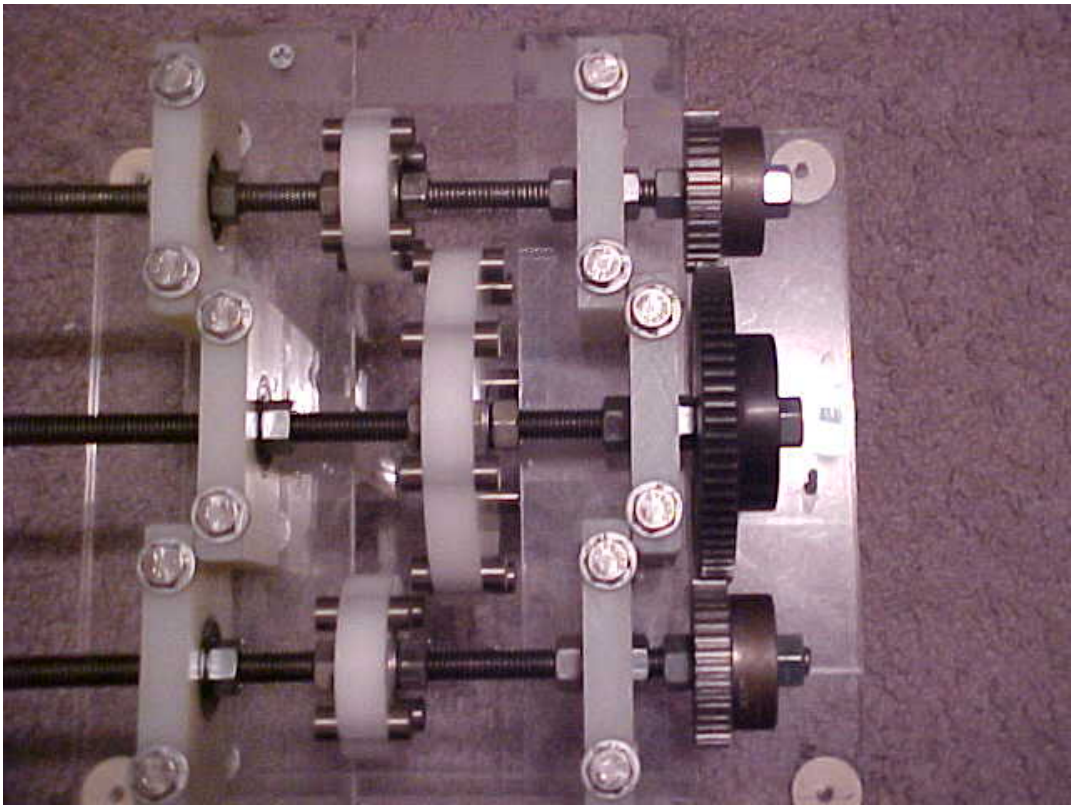


Robert Calloway

front/top view



Top view



Jason Crawley

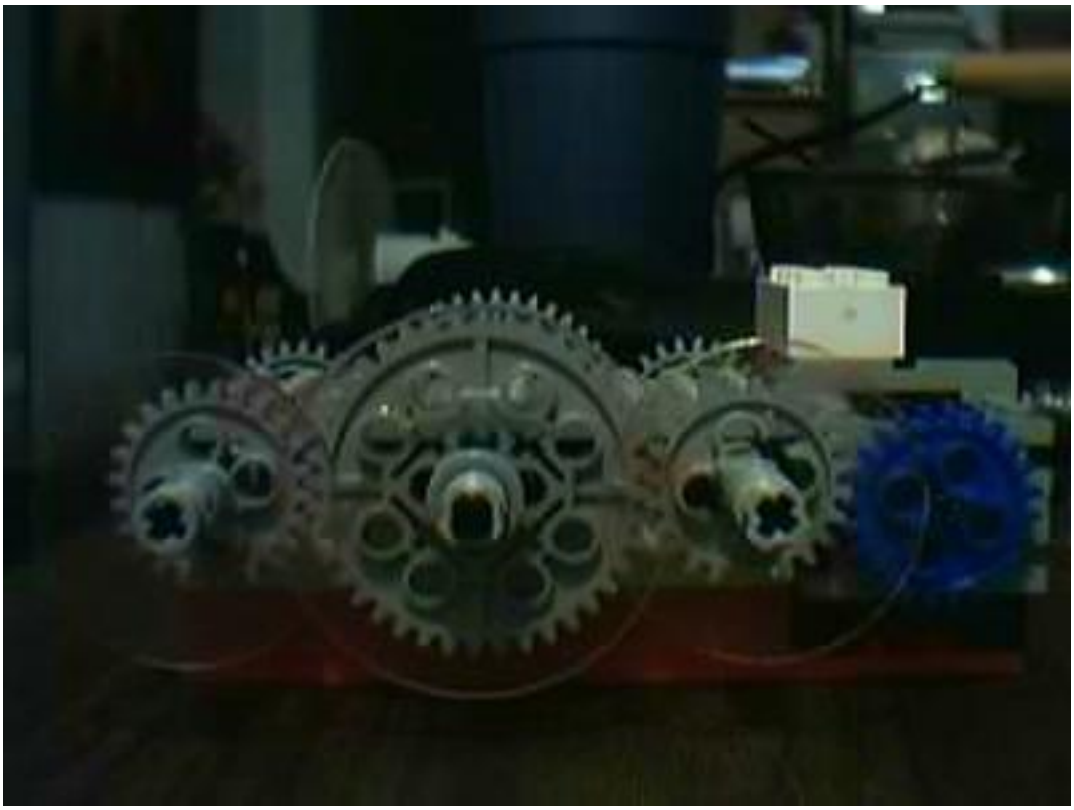
Top view



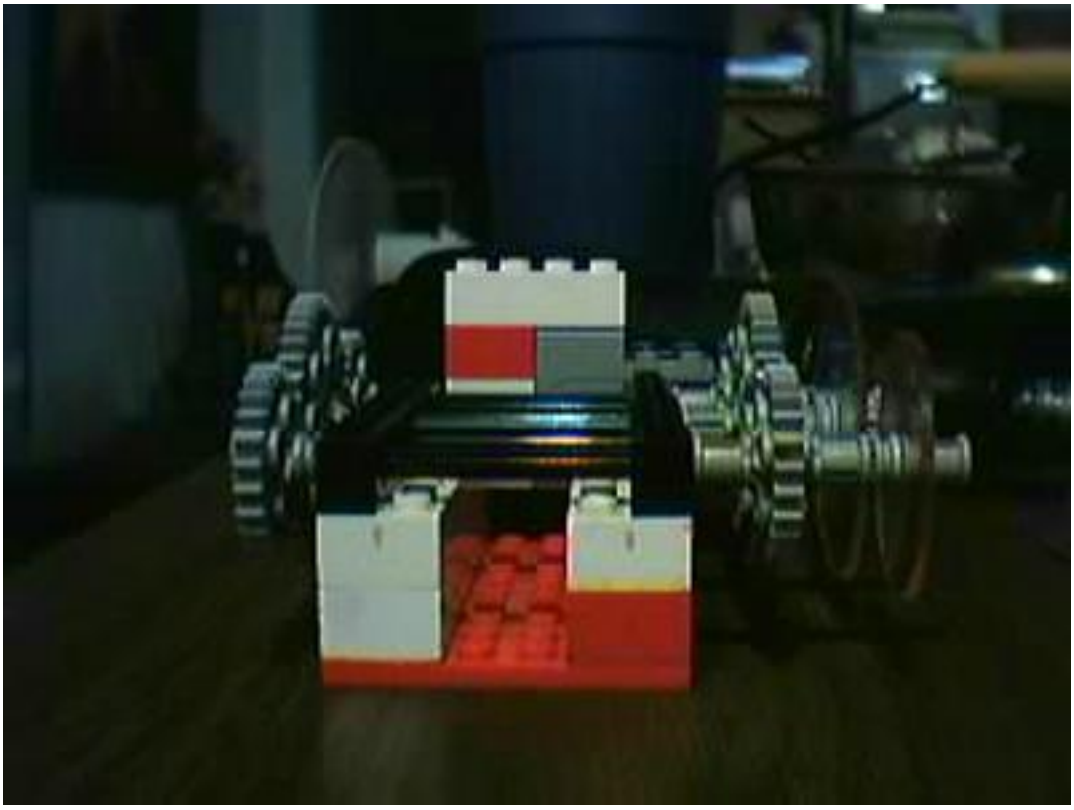
Front



Front close-up

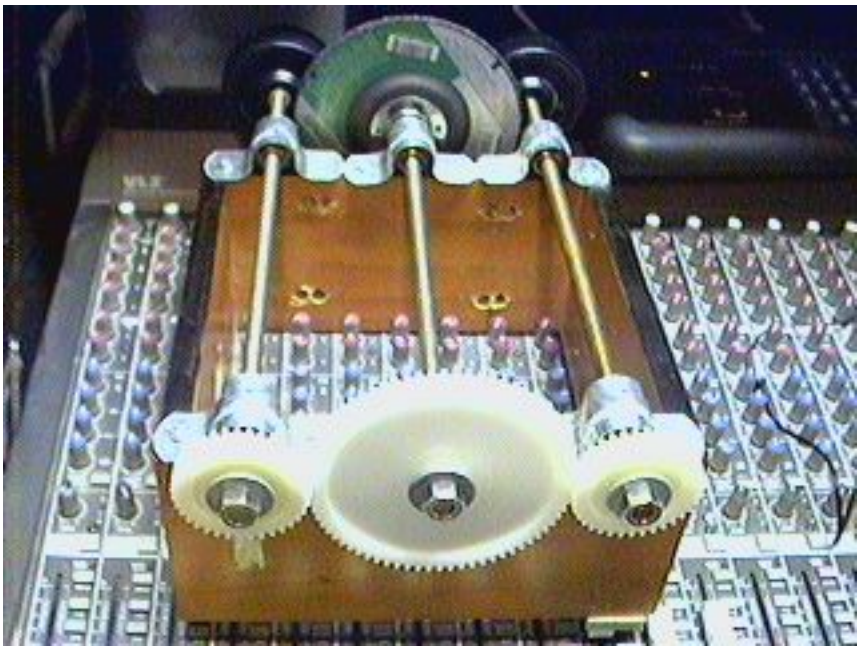


Side

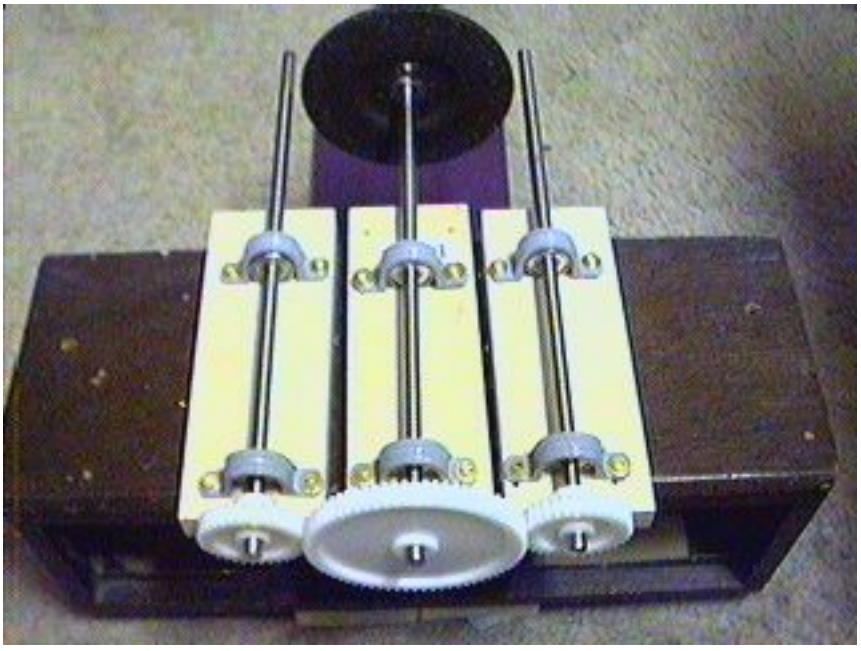


Joe Friday

Rear view



Top view



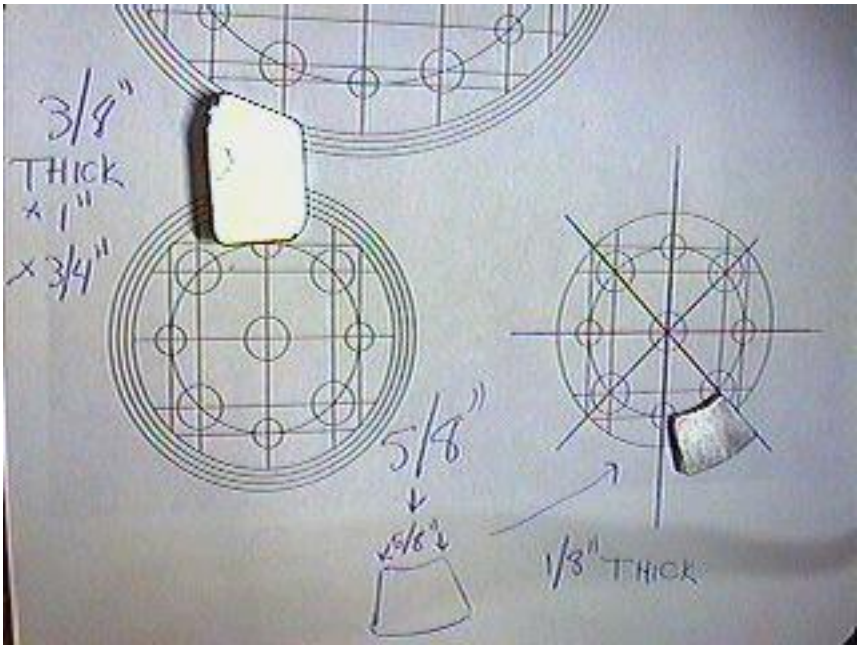
Alignment



4.5" sun rotor ($3.00 grinding disk)



helpers


3/8"
THICK
x 1"
x 3/4"
5/8"
5/8"
1/3" THICK

Thomas Goerz (VaporWings)

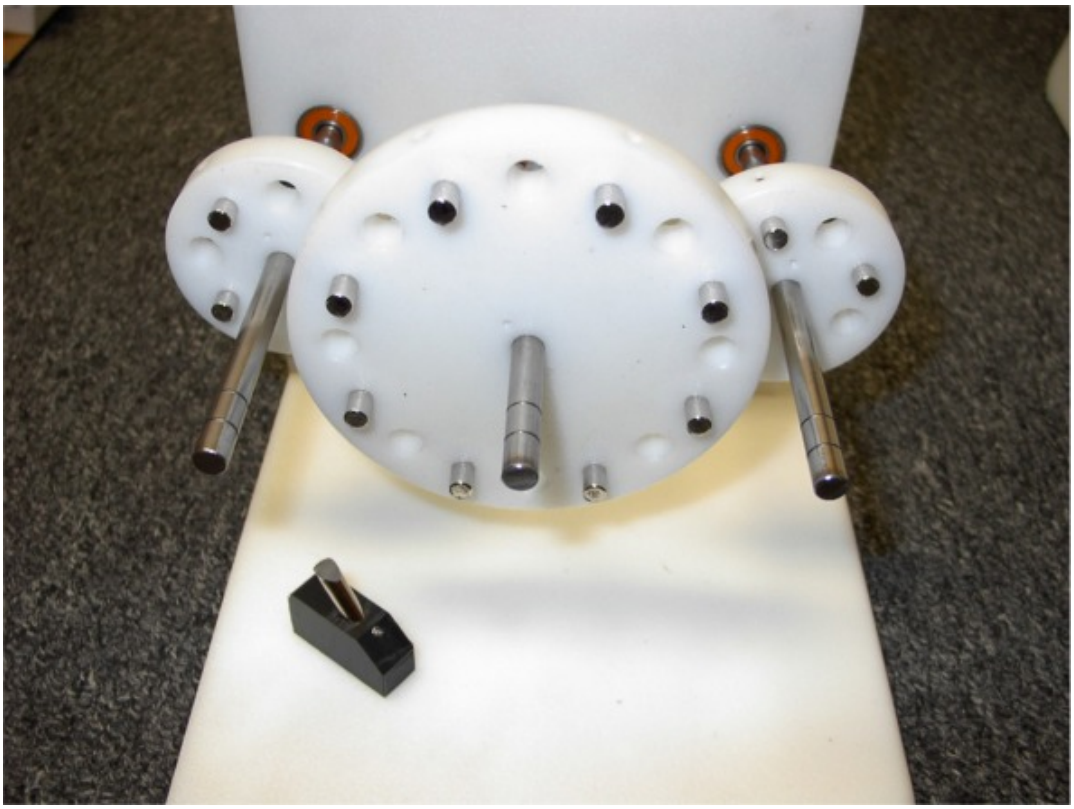
Roller skate bearings



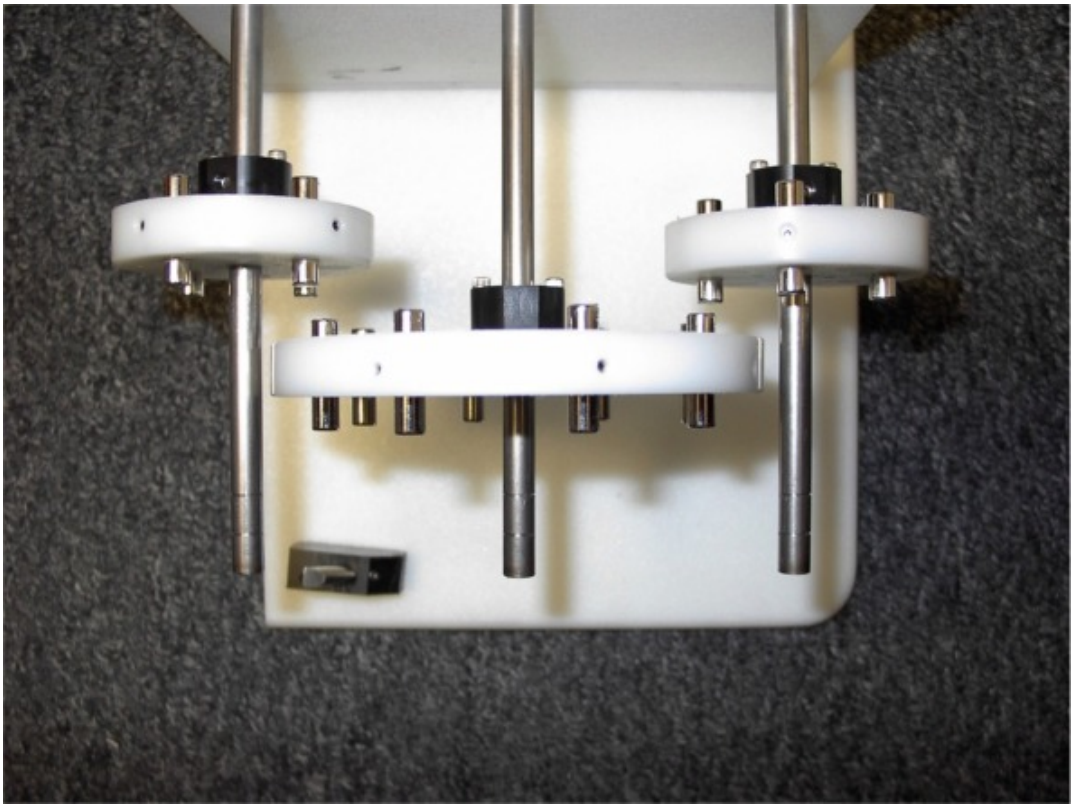
Cutting board



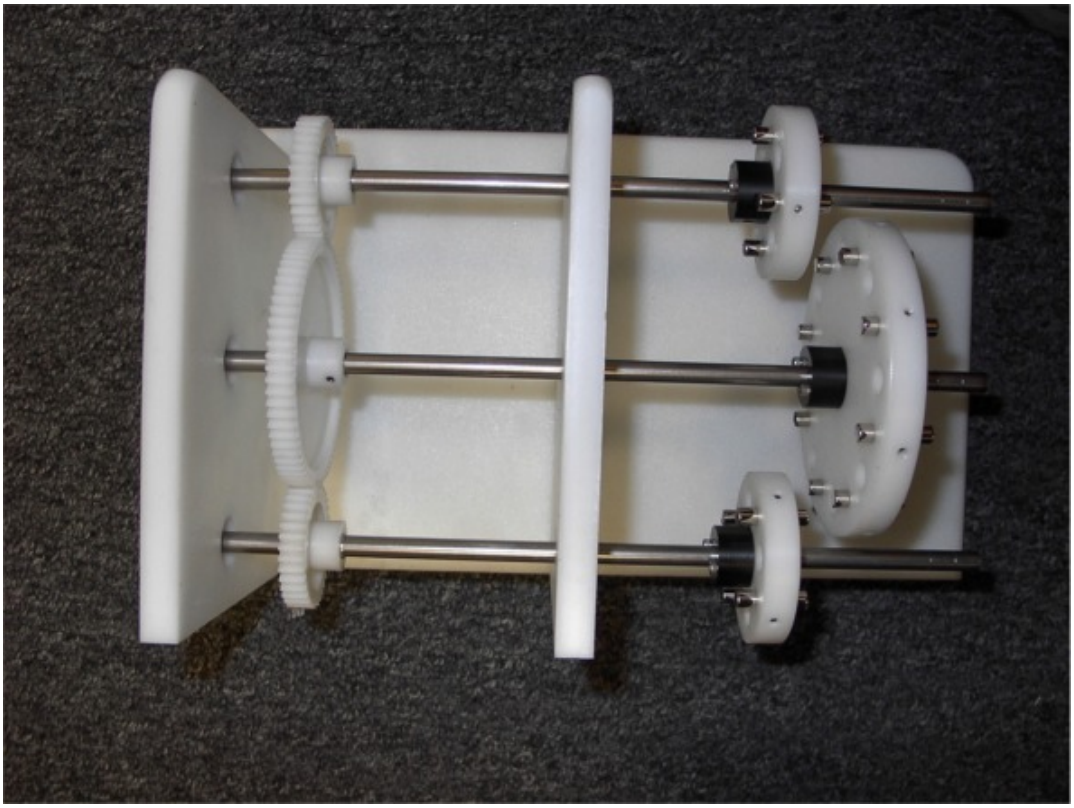
Front view



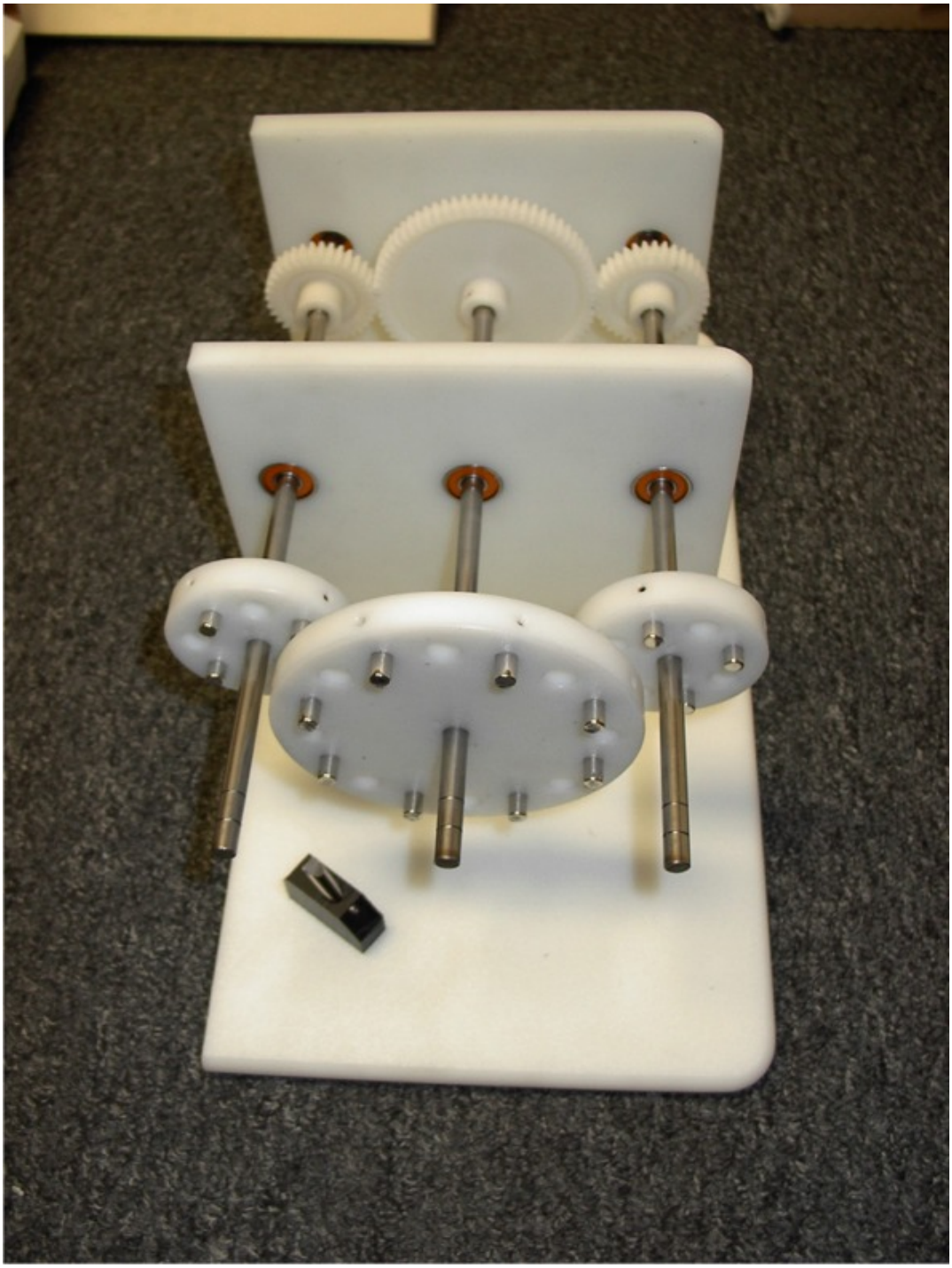
Top view rotors



Top view



Top view angled



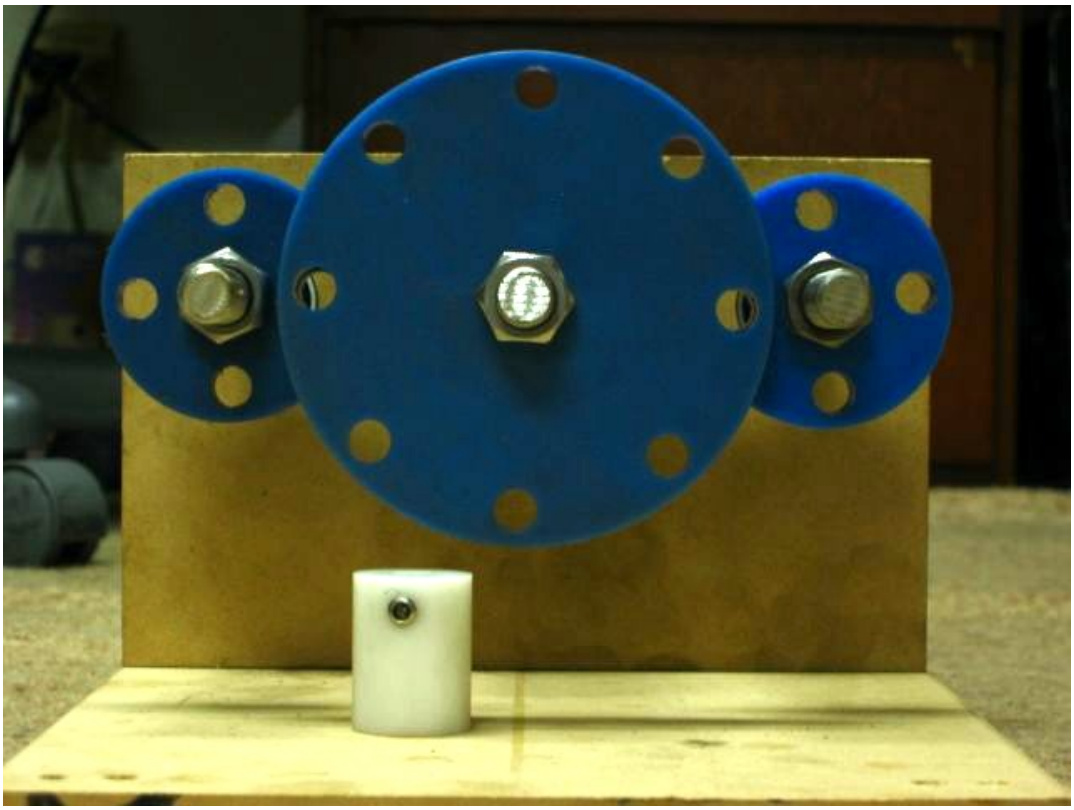
Rodney Graff

The start

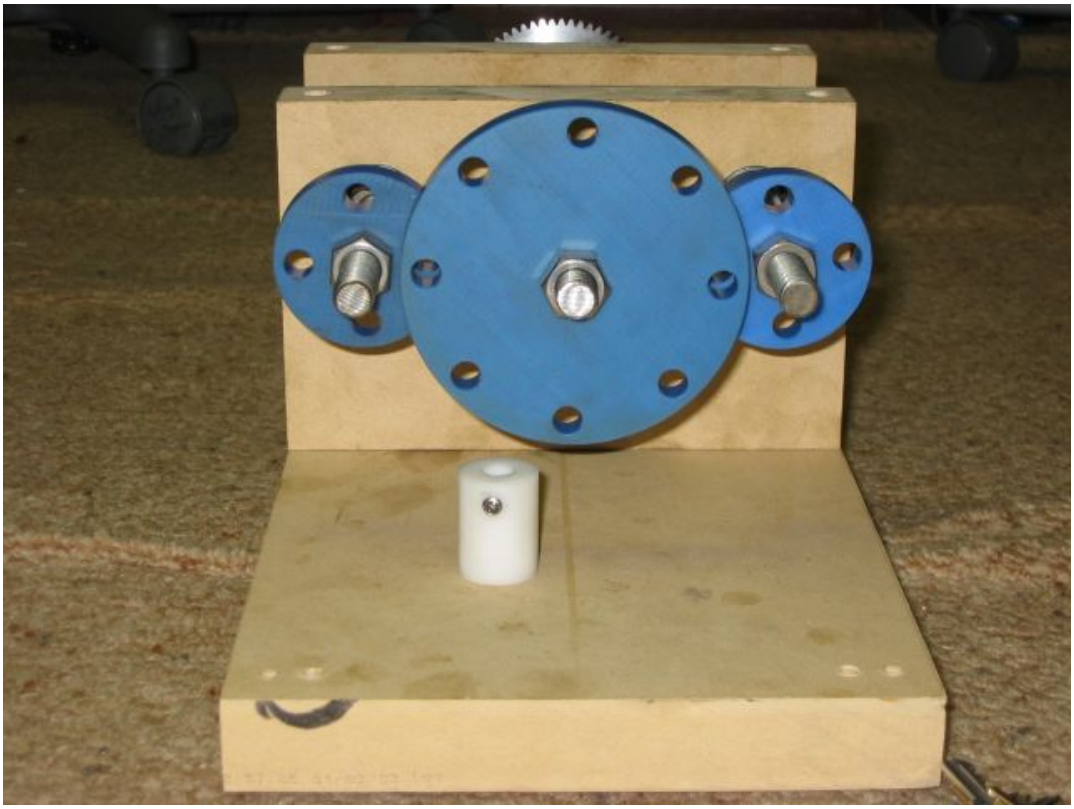


Chris Hamm

front view



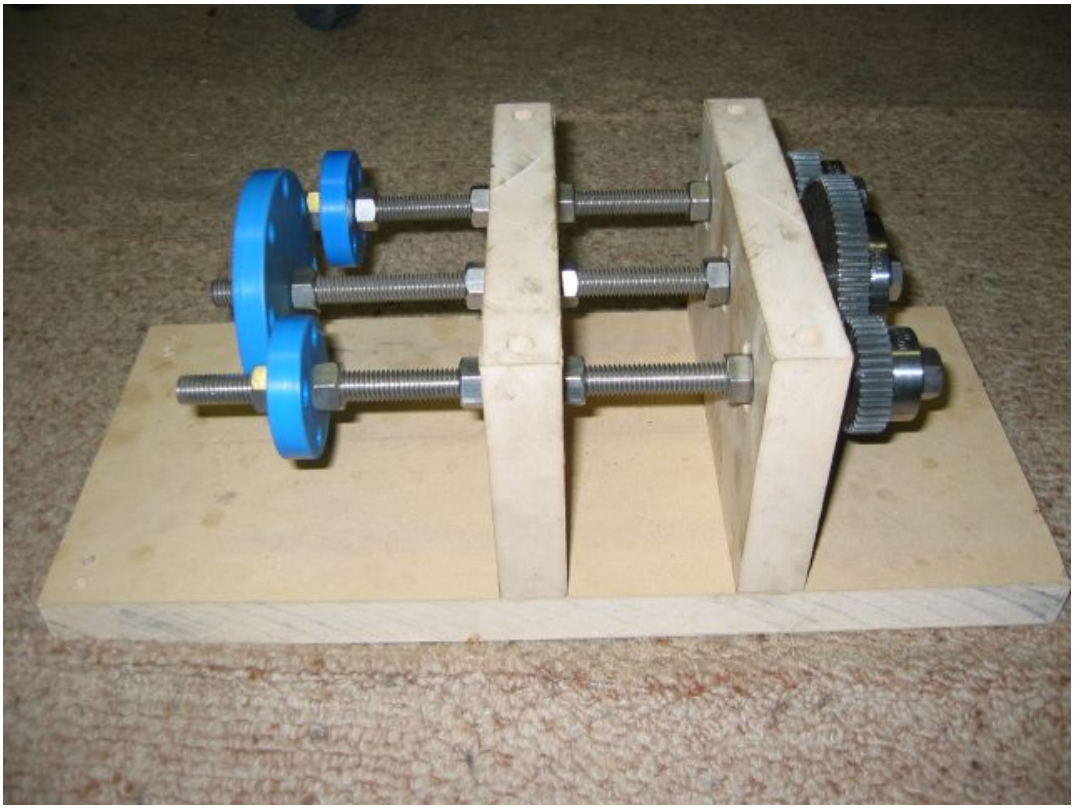
Front view with actuator holder



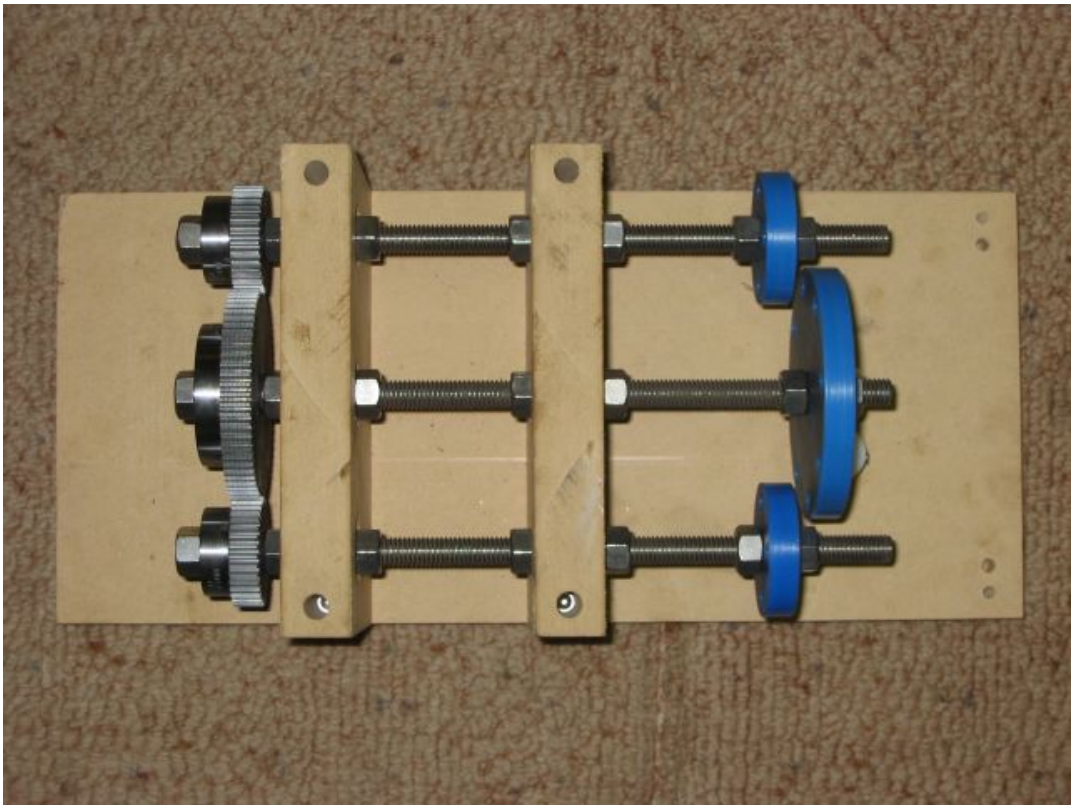
Gear side



Side view



Top view

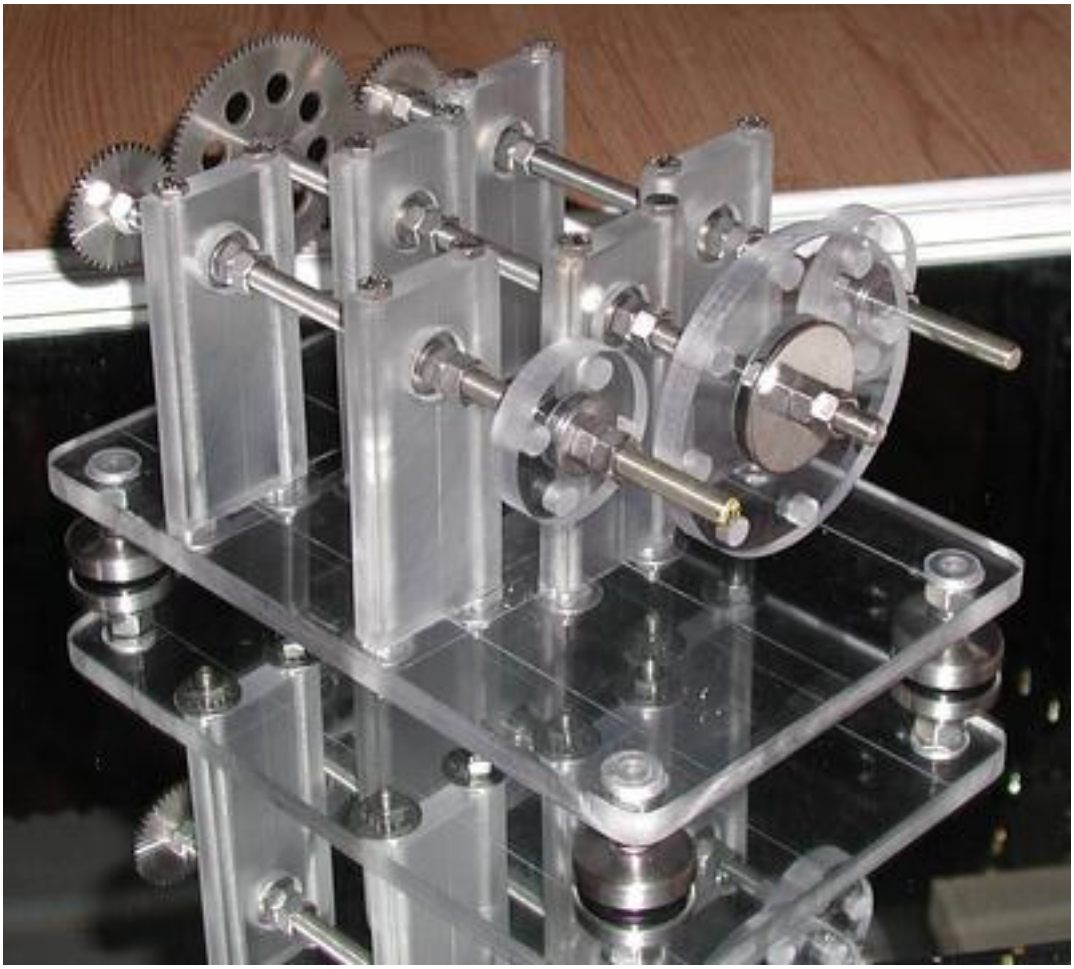


Mark Hayton

View one

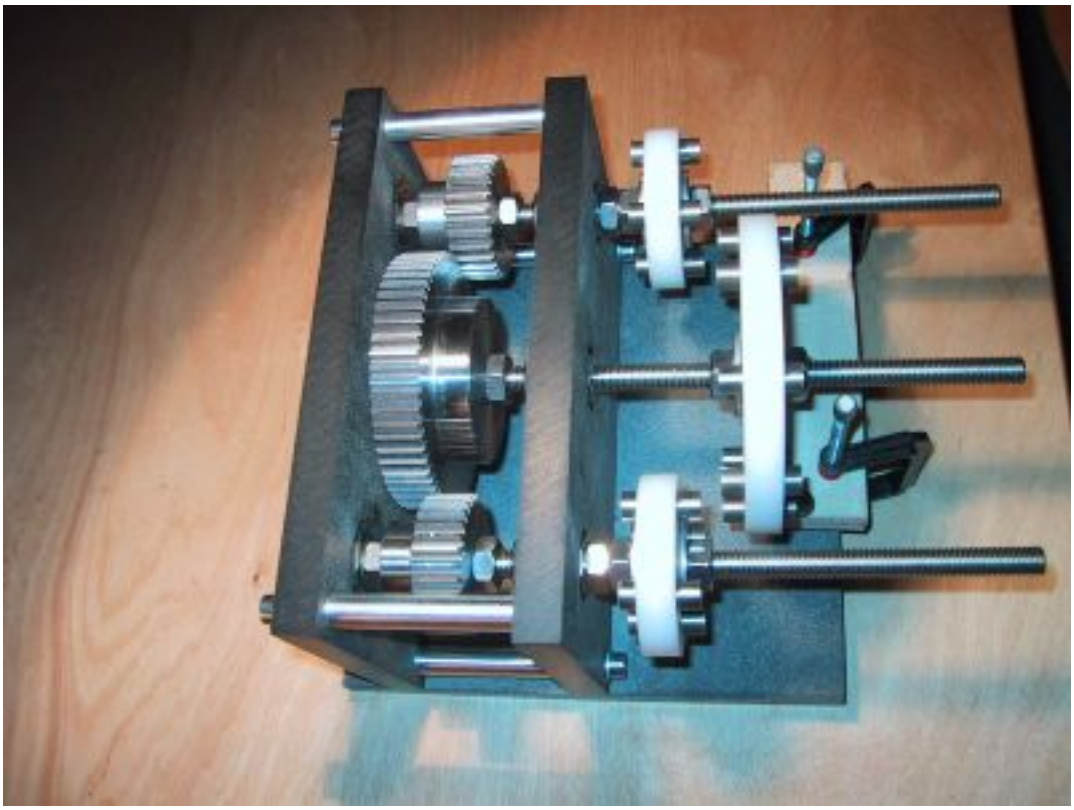


View with rotors

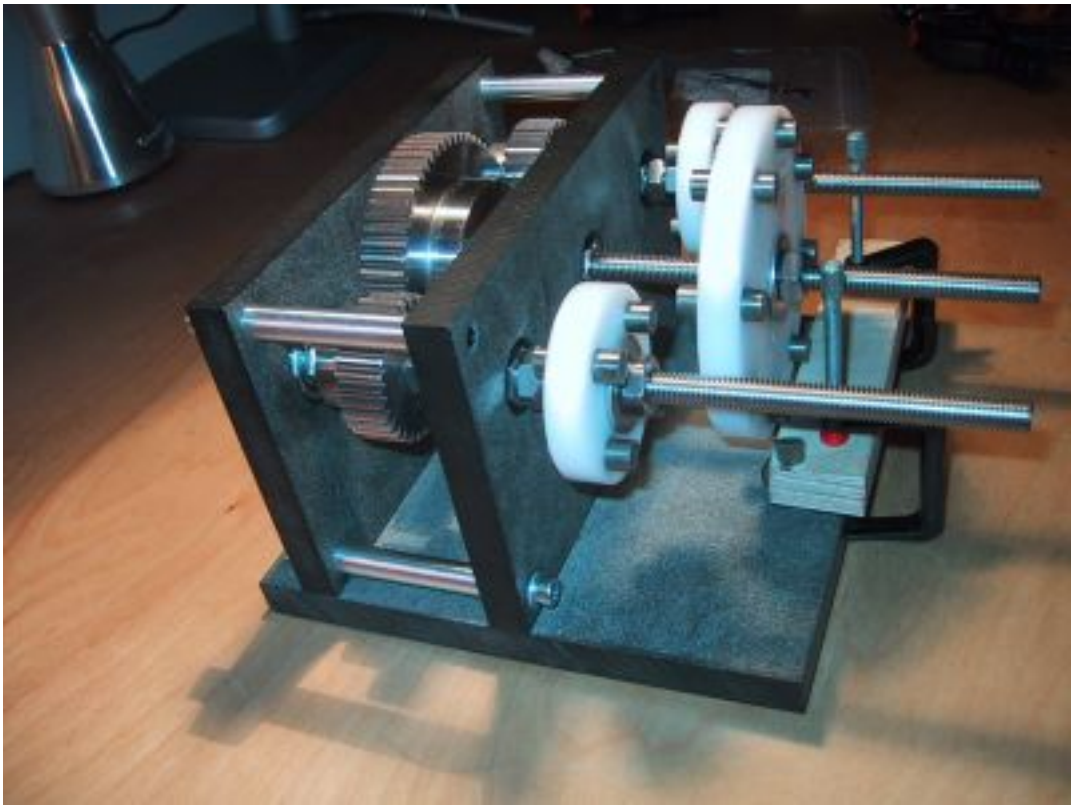


Tero Ranta

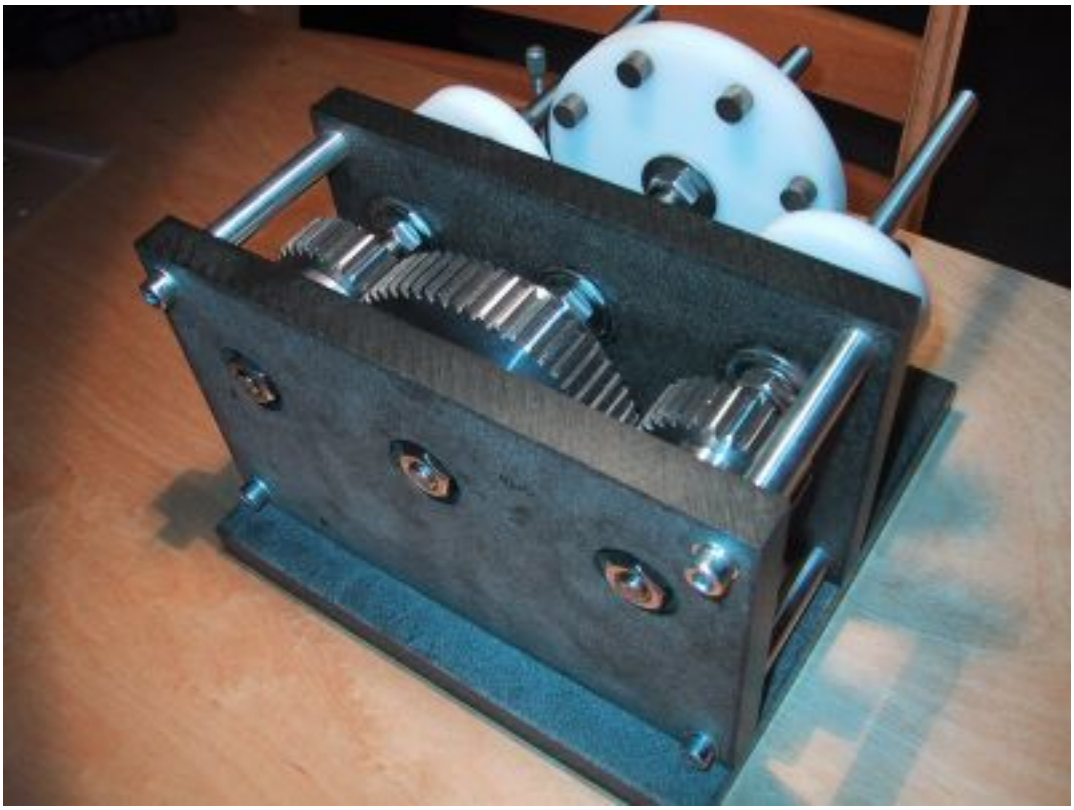
Top view



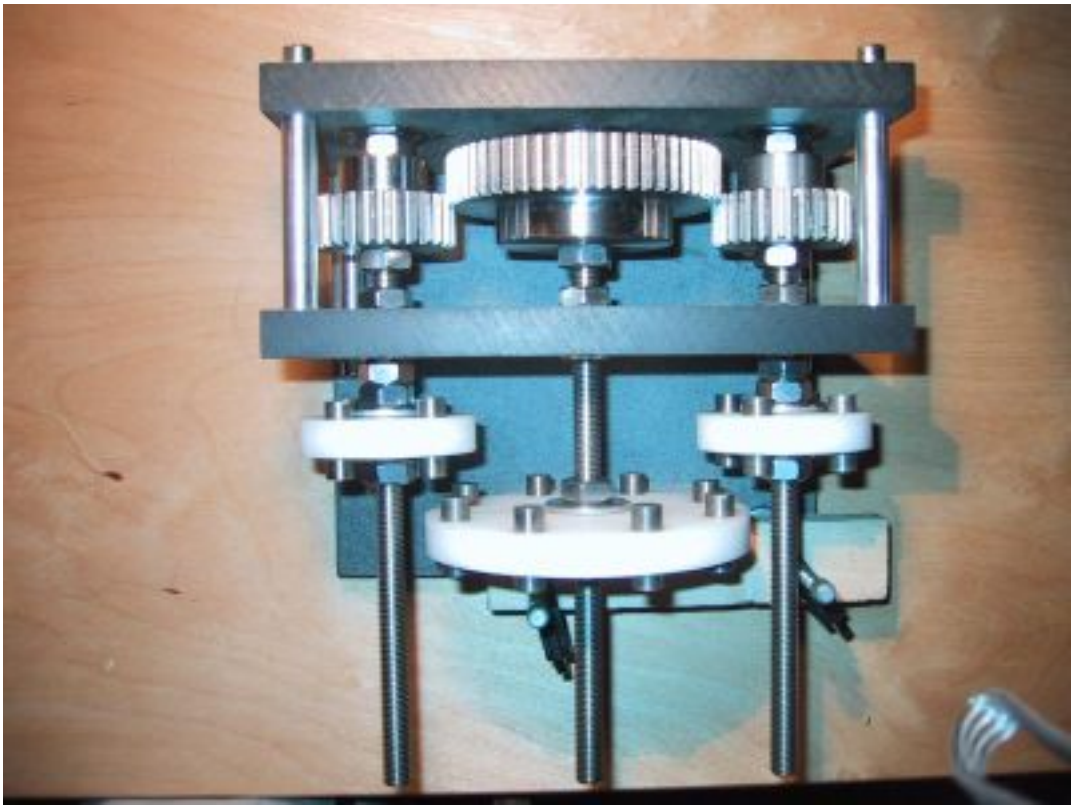
Top front view



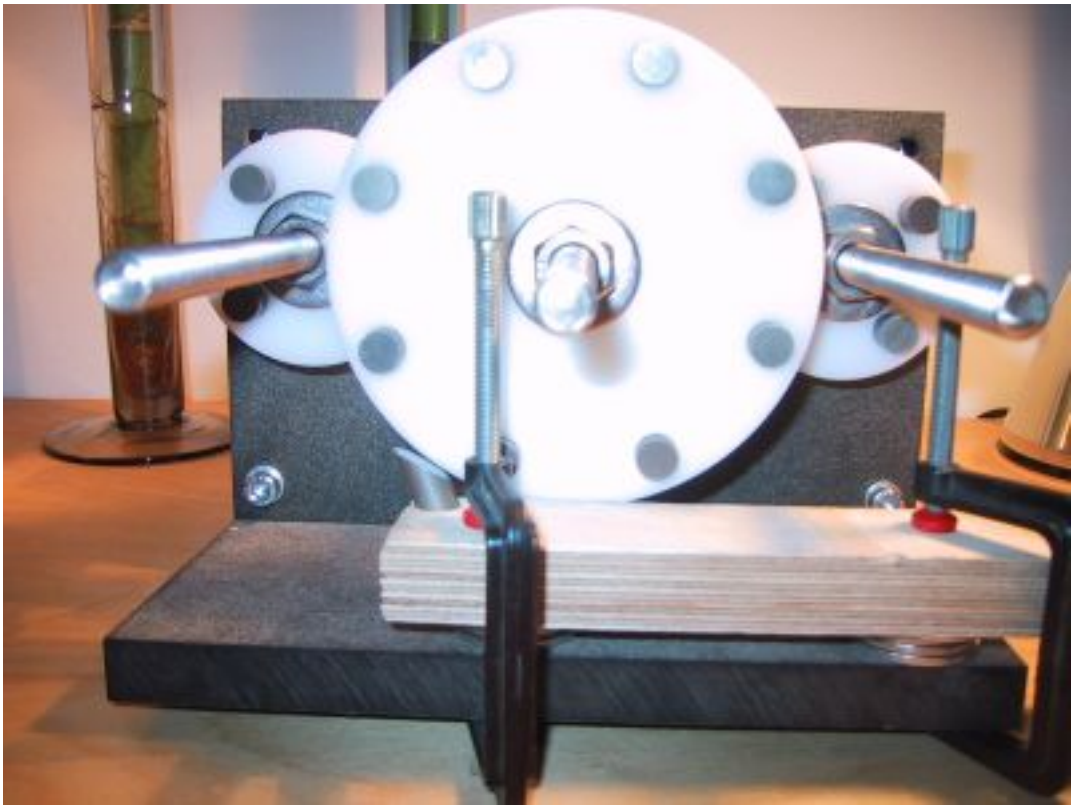
Top read view



Top

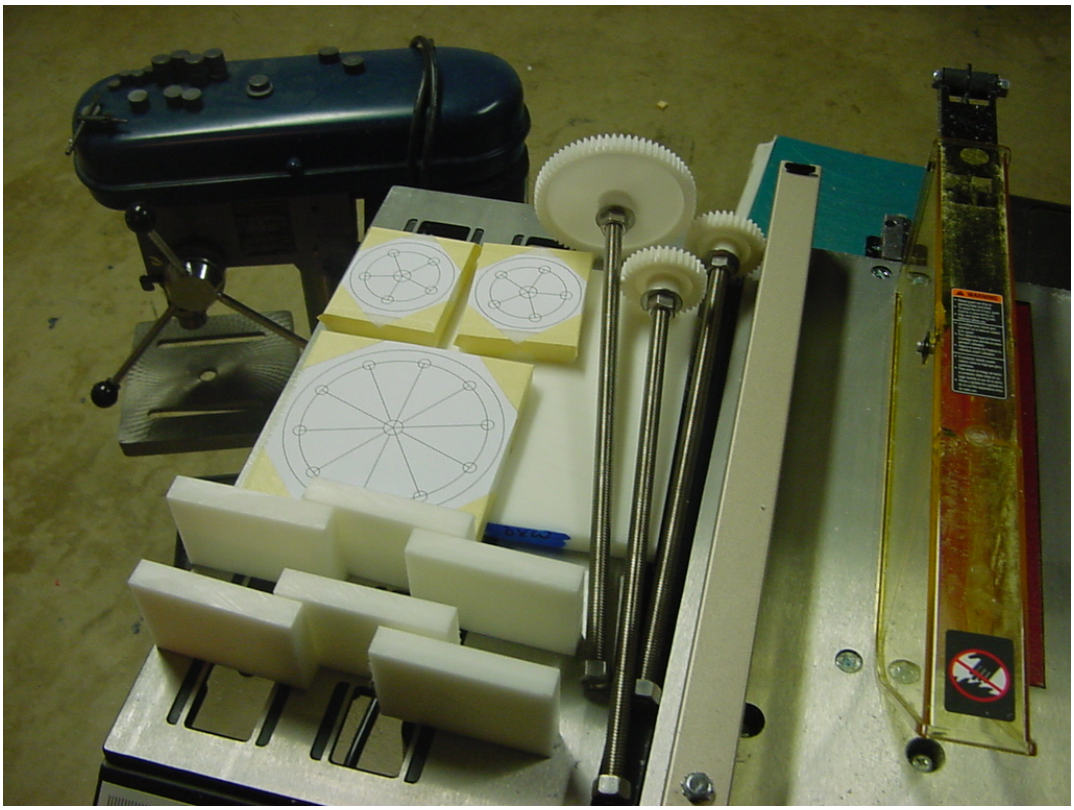


Front view with actuator

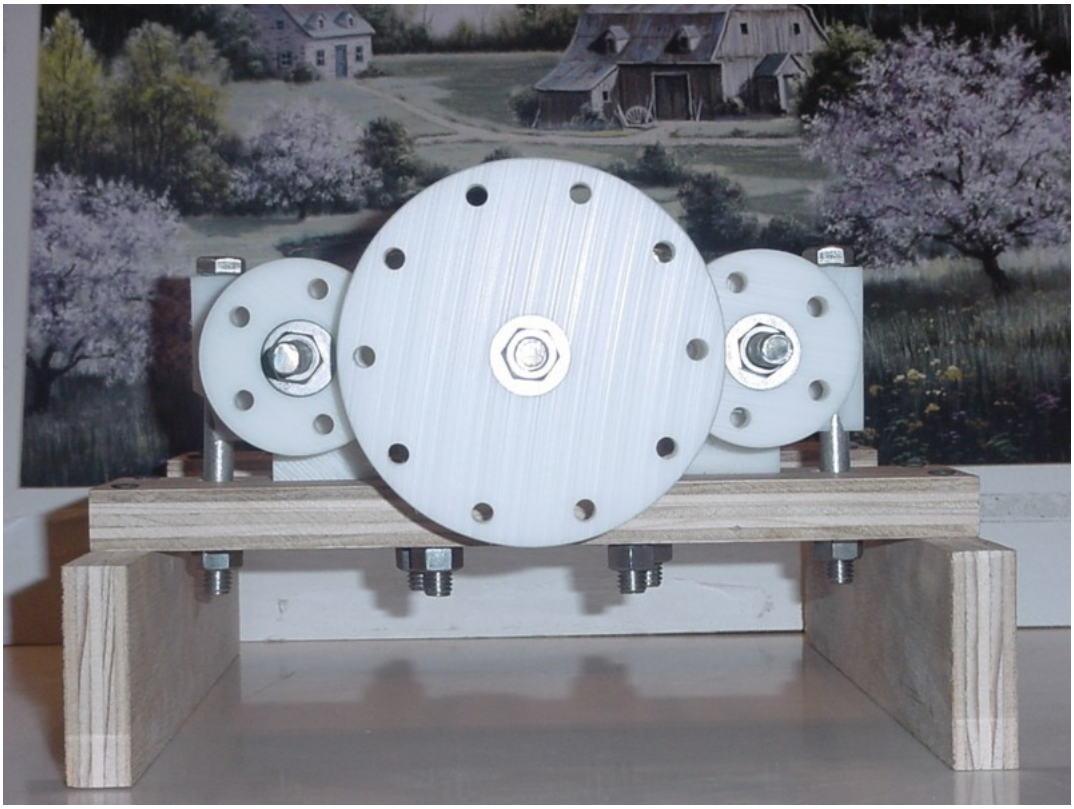


Brian Rinon

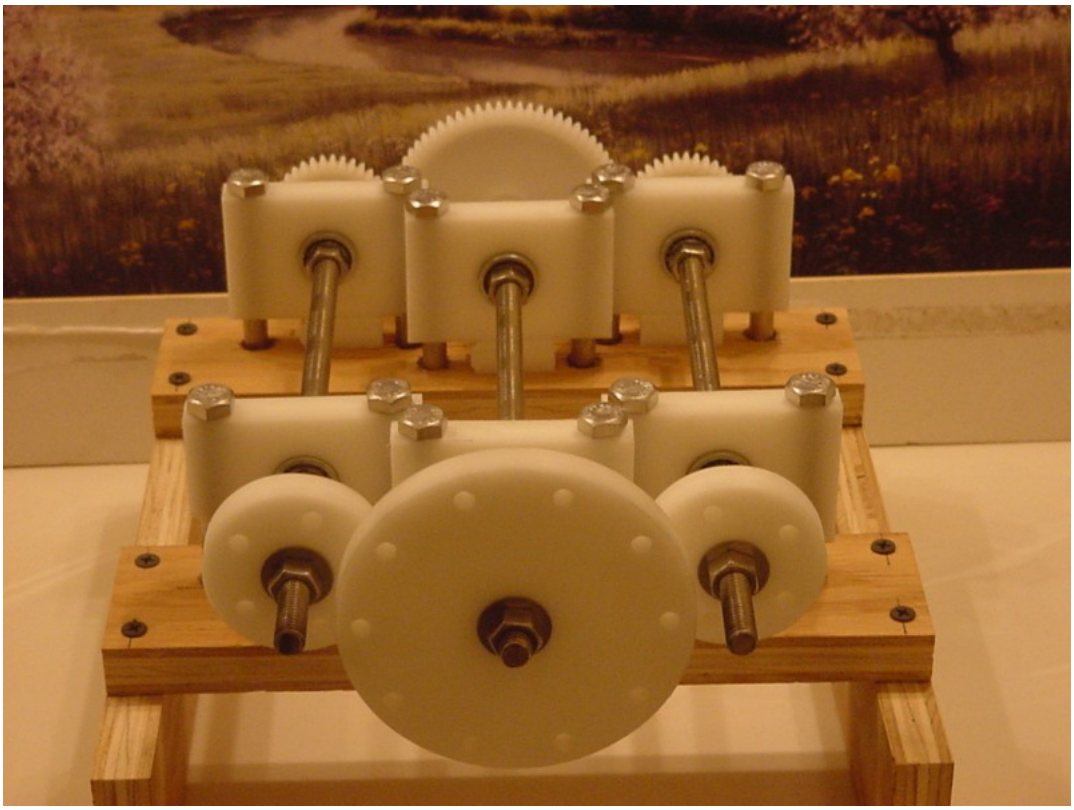
The start



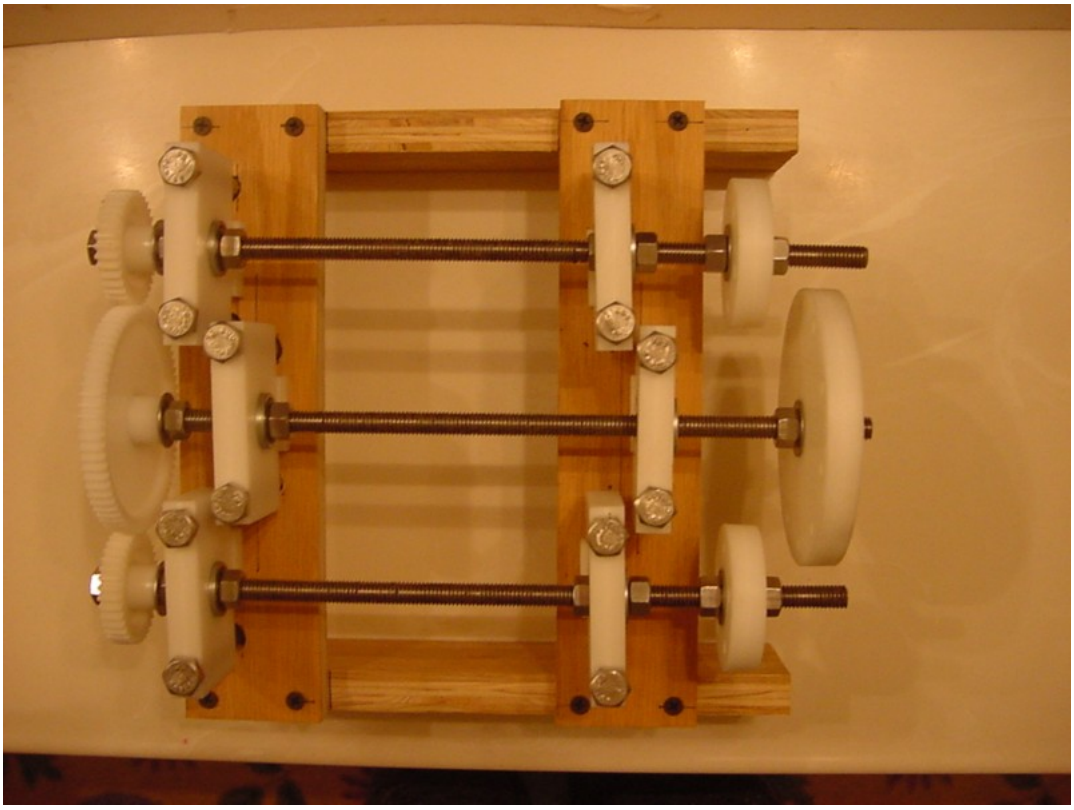
Front view



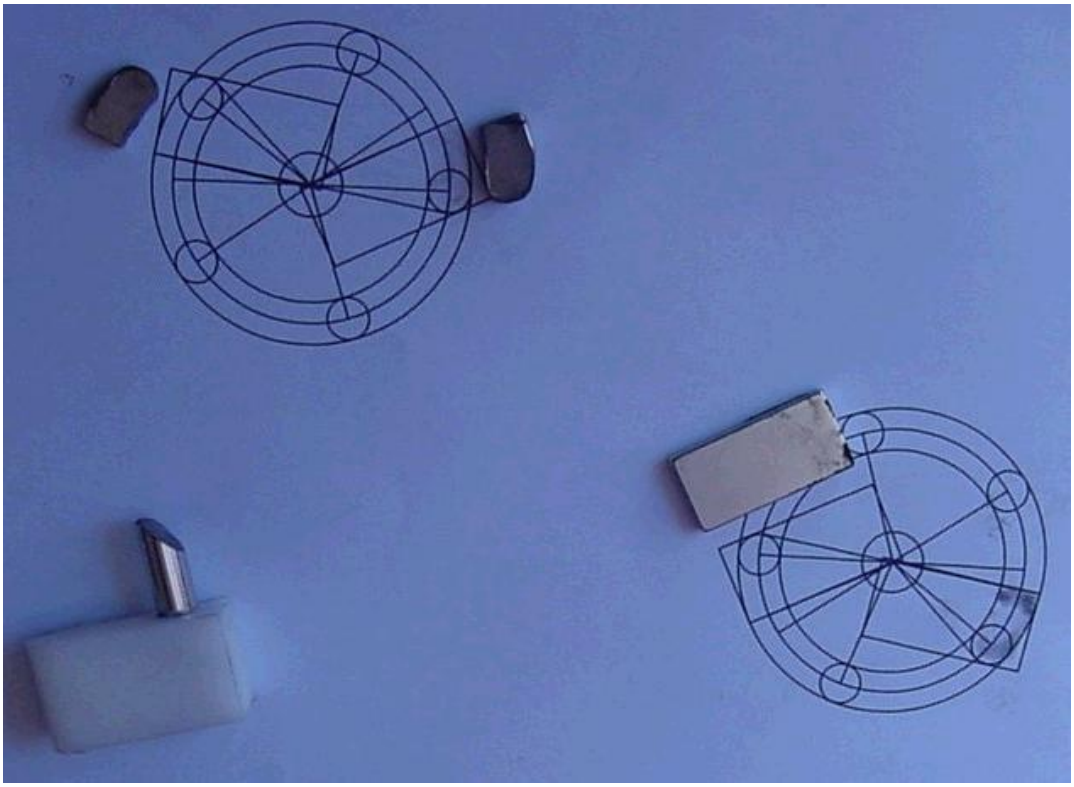
Front view angled



Top view



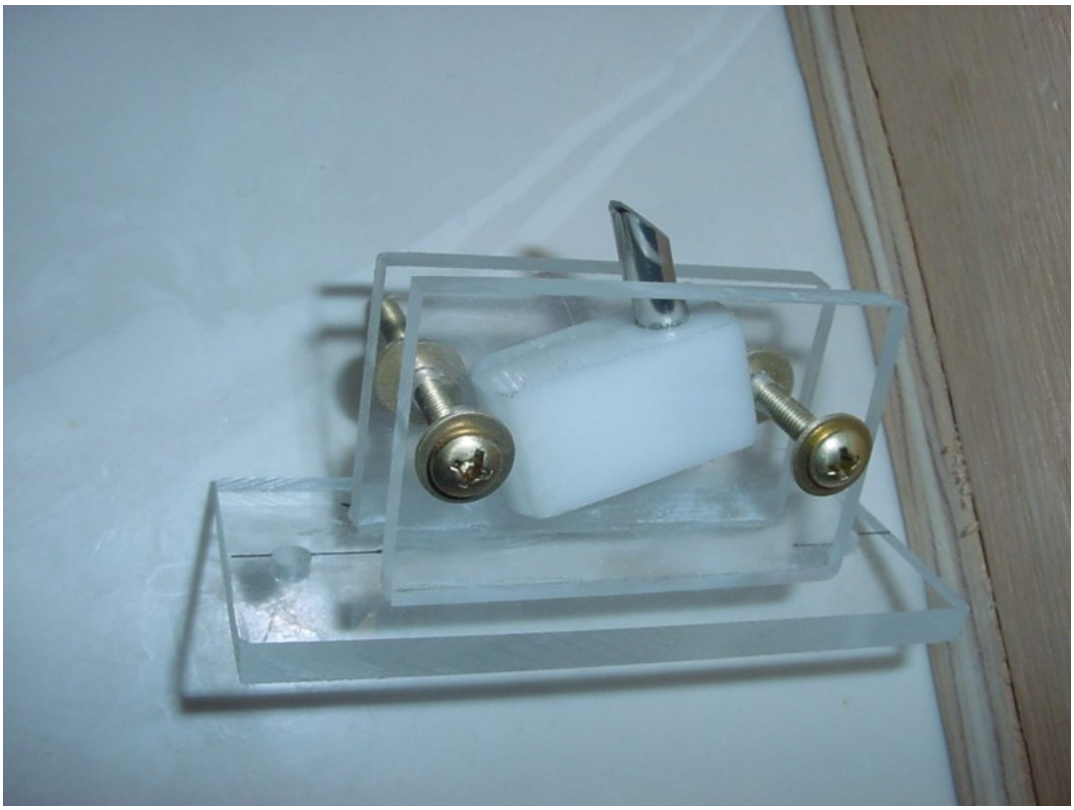
Actuator and helpers



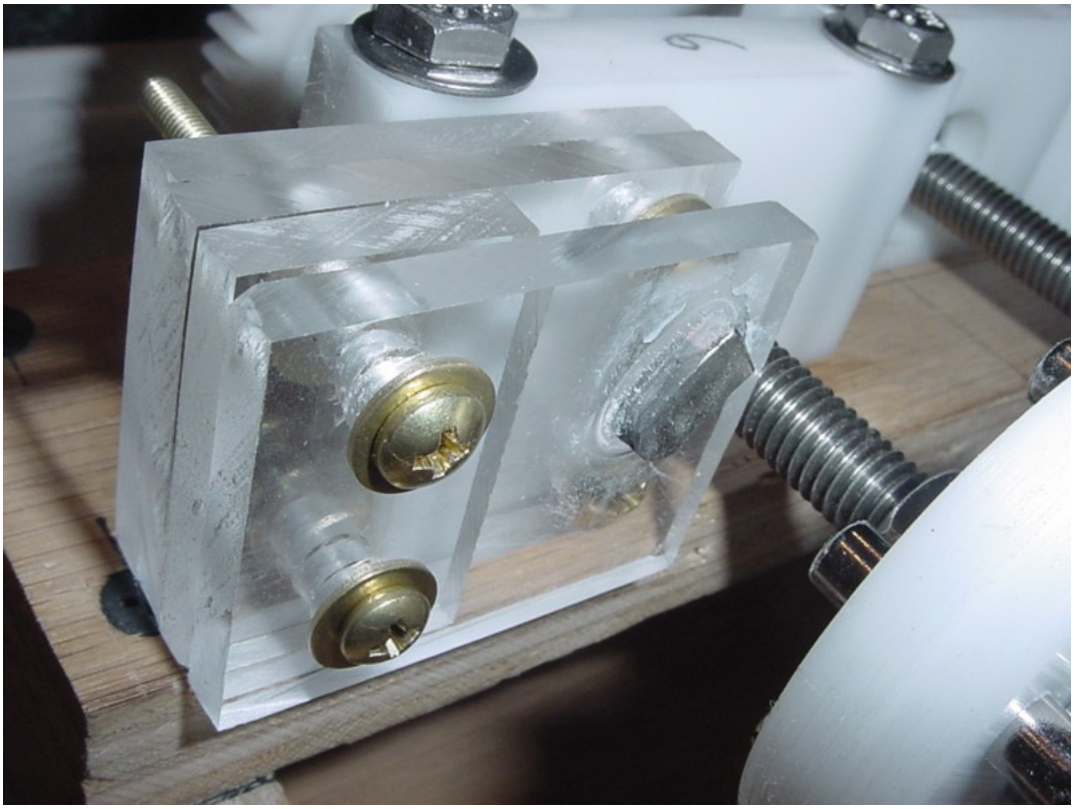
It really helps to wrap foil around the magnet as heat sink. The end of the helper magnets that was not wrapped with foil demagnetized to less than ceramic strength. This is with my high speed cut-off wheel. With a slower grinder it may not get as hot.

I used my hand belt sander to make the curves in the helper and also to smooth down the actuator magnet face, since there is a round part and a flat part on the belt sander.

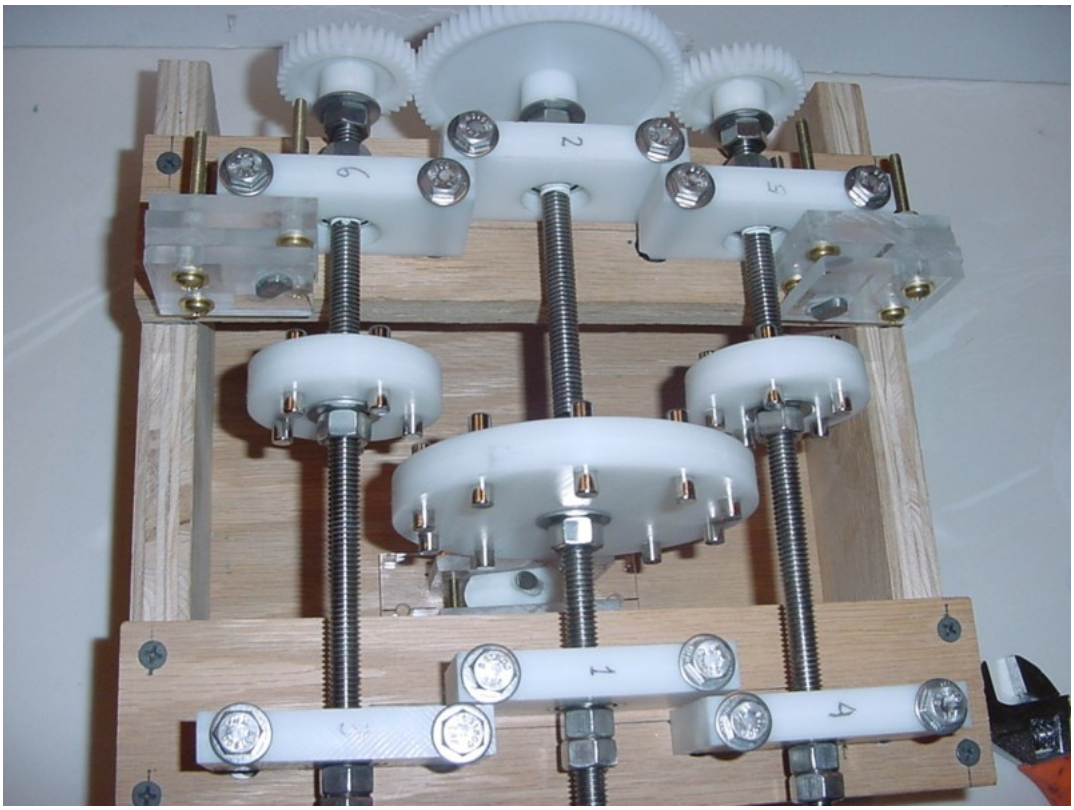
Actuator



Left helper

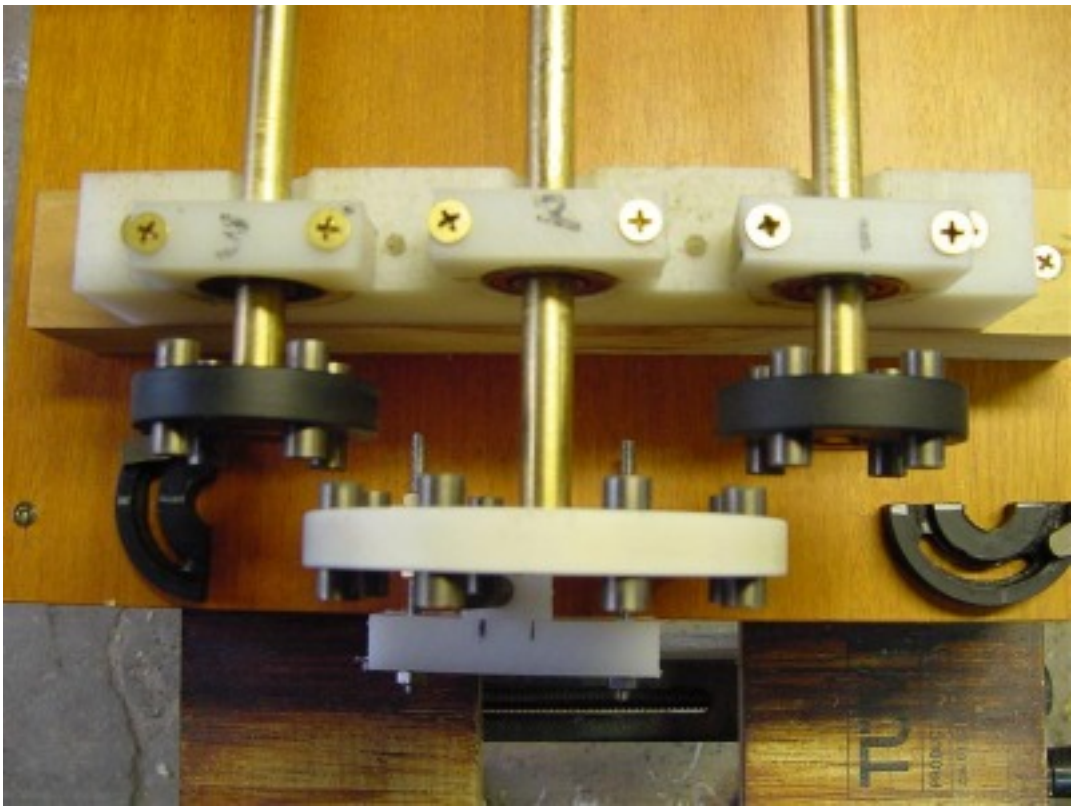


Top view actuator and helpers

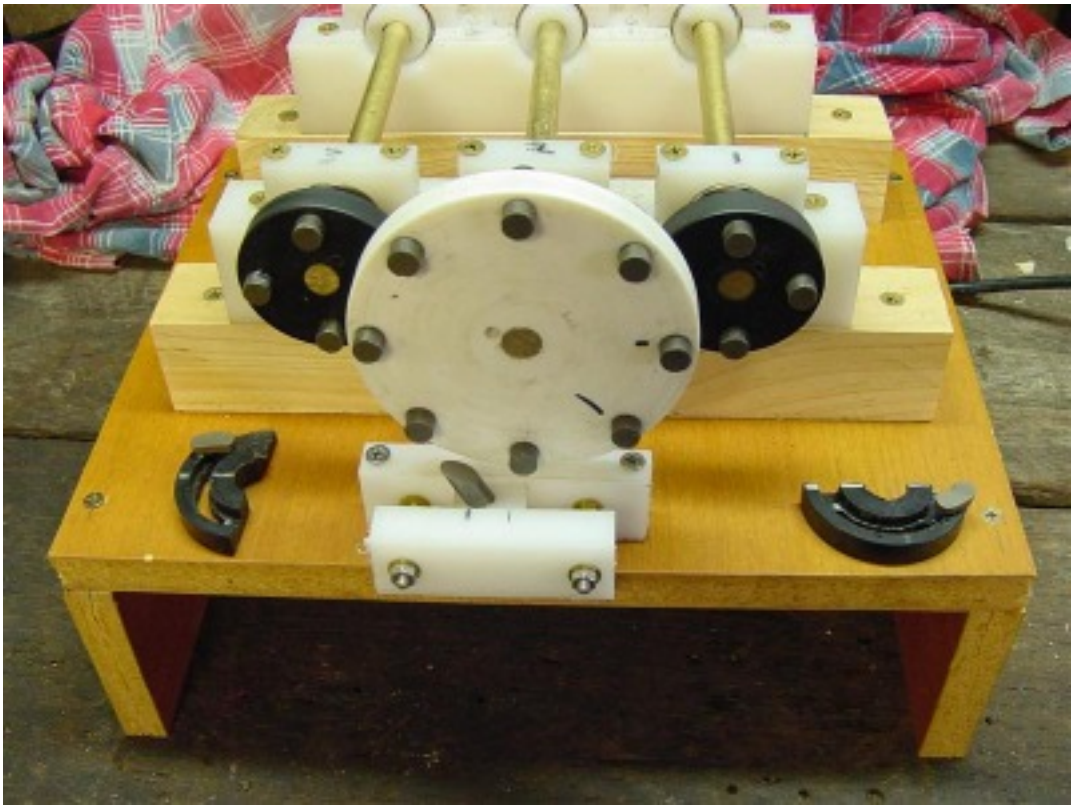


Mark Turner

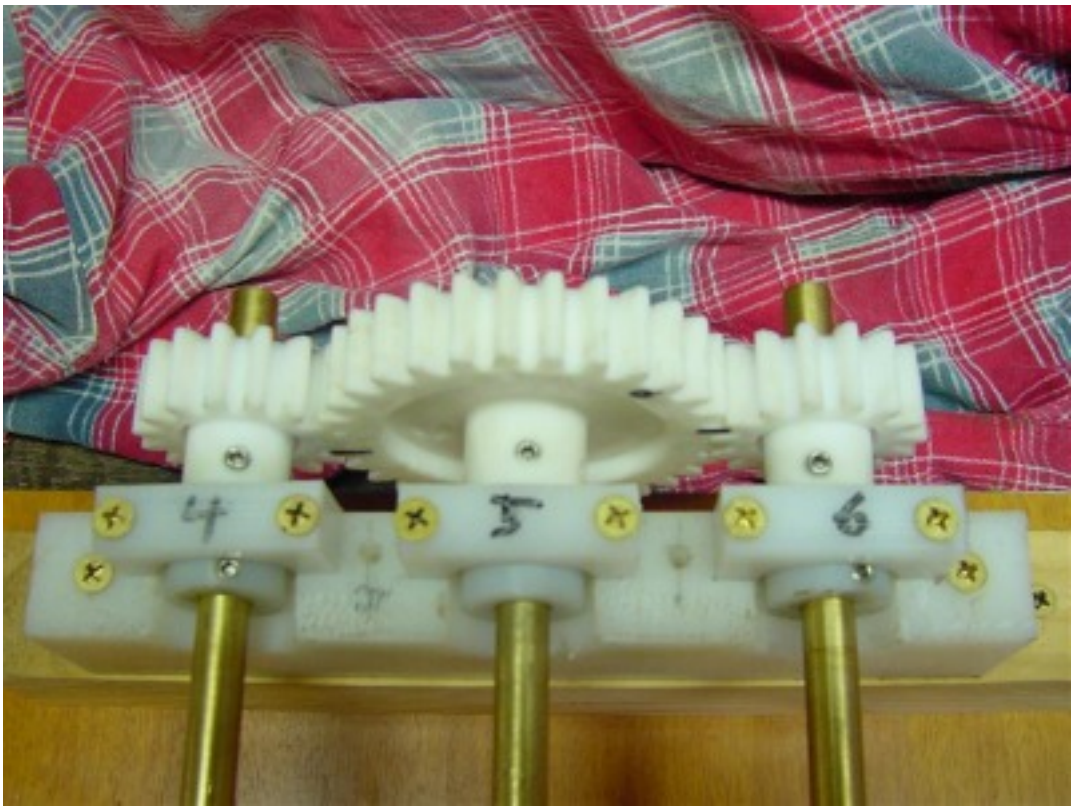
Top view



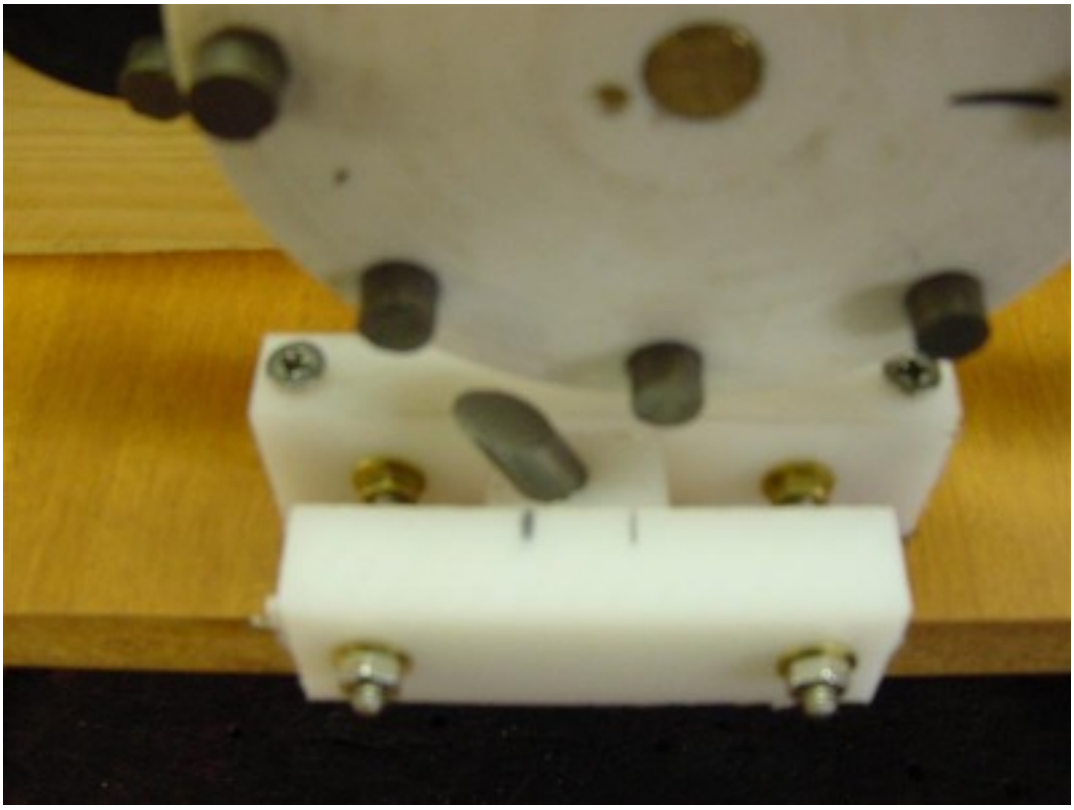
Front



Top gears

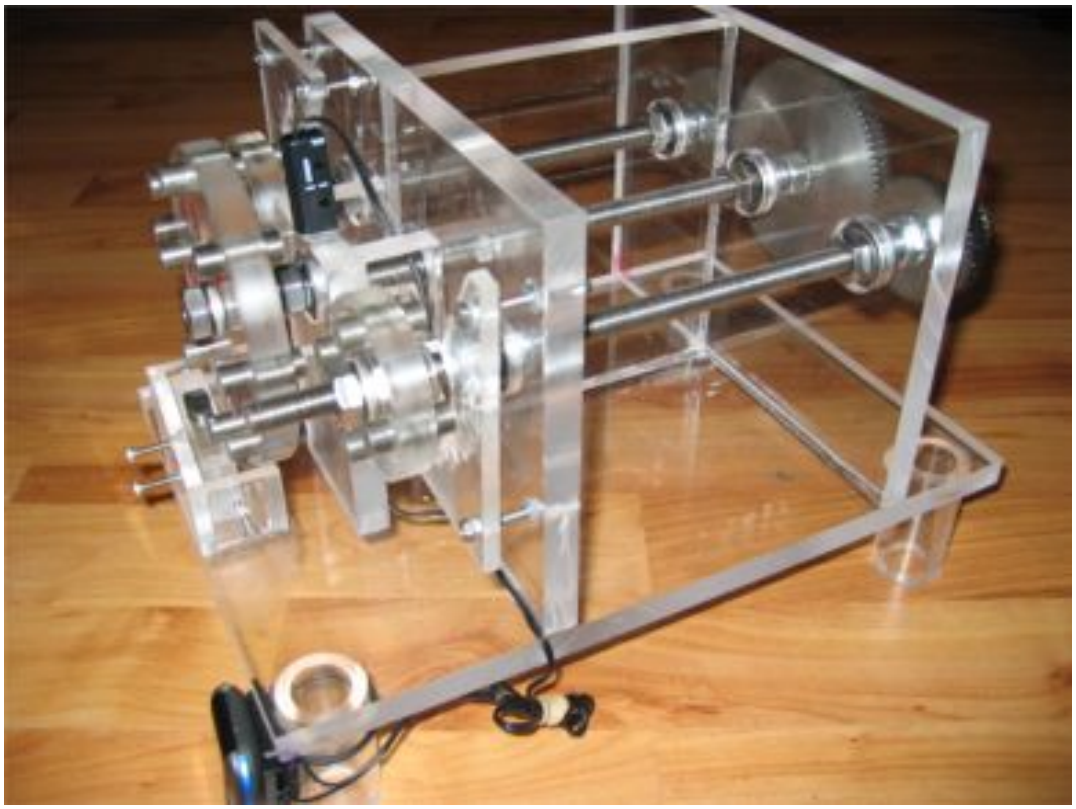


Actuator

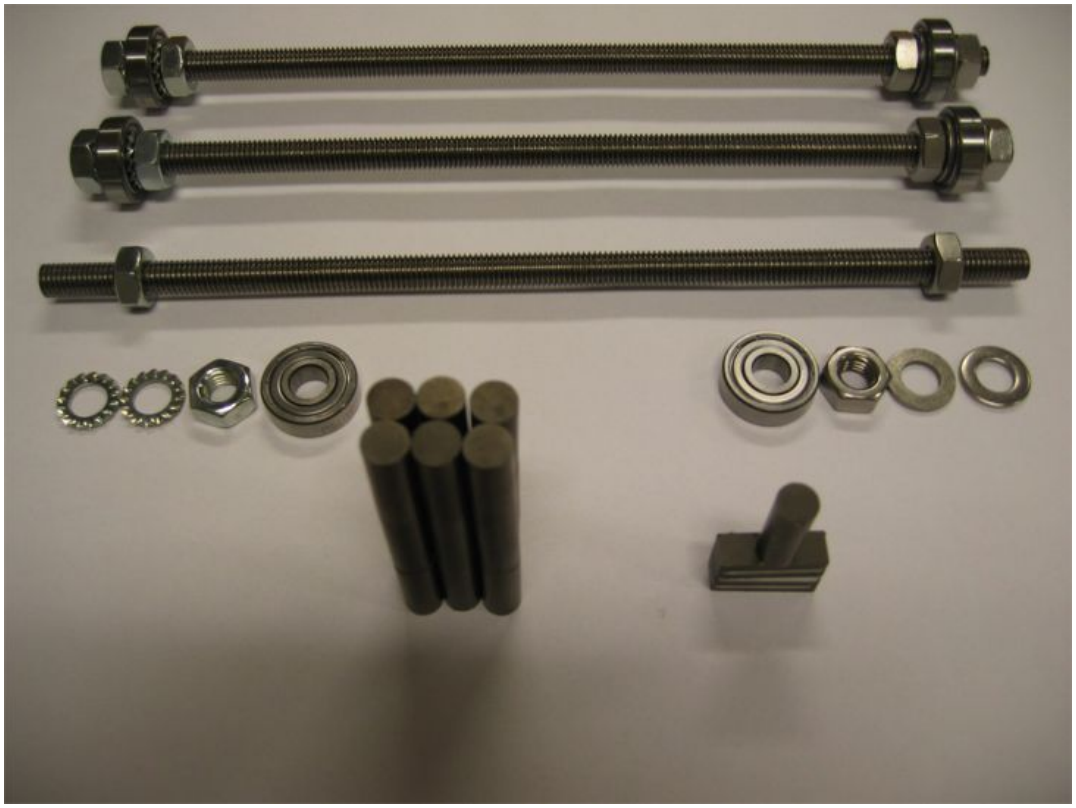


Svein Utne

The Bowman Permanent Magnet Motor



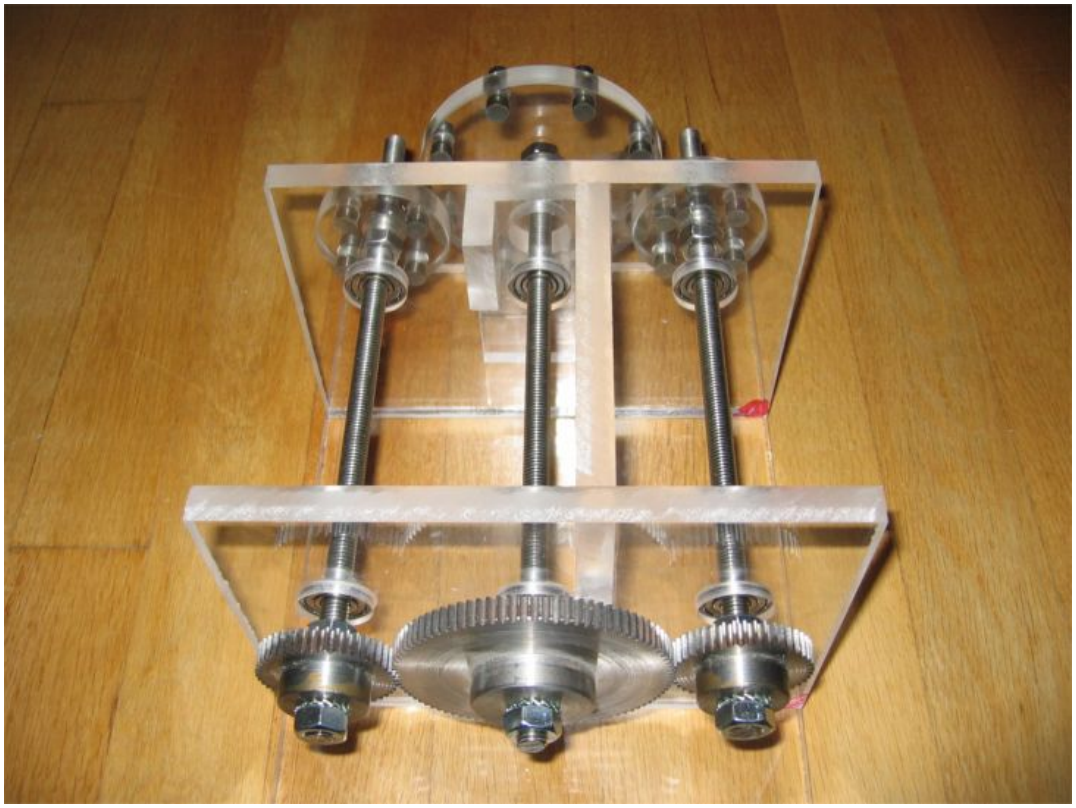
The start



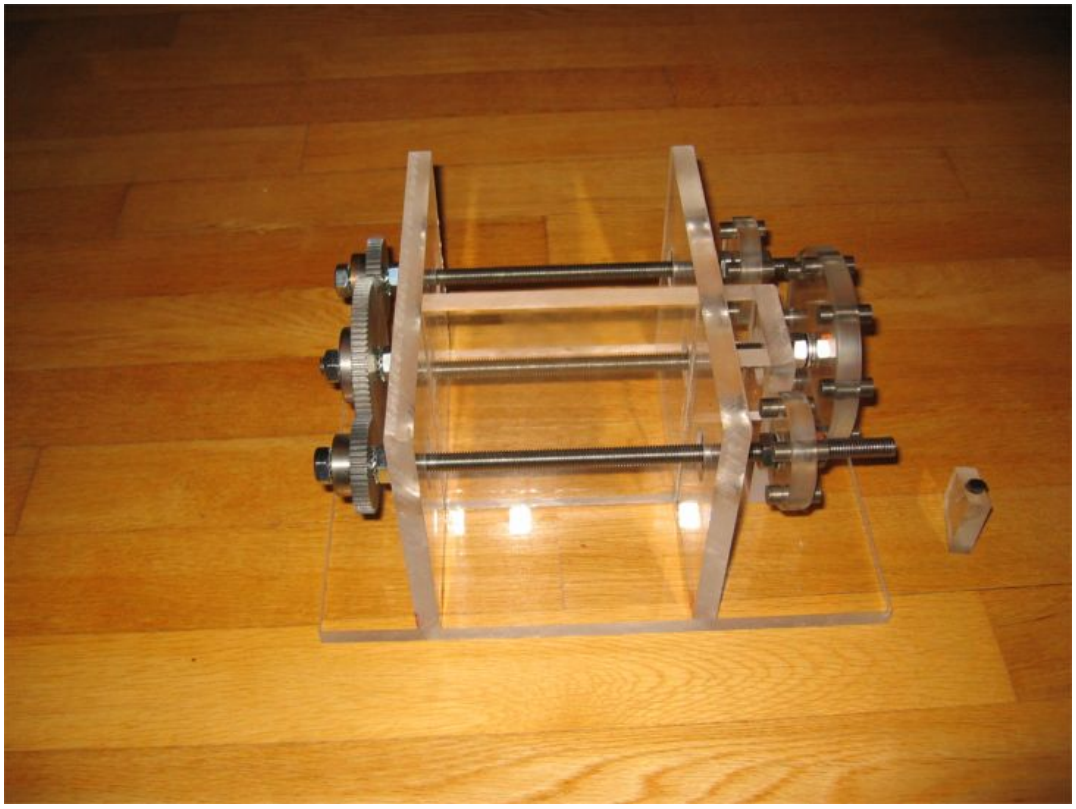
Front view



Top view



Side view



Front view



Top view



Magnet adjustment tool



Magnet adjustment tool



Low torque gauge



In parts



Cocked position



Lock up



Planet wheel/helpers



Planet wheel



Helper magnets



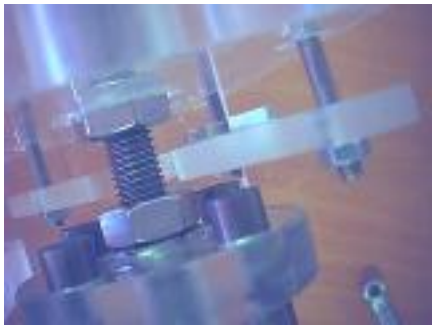
Close up



Helpers



Helpers



Eric Vogels

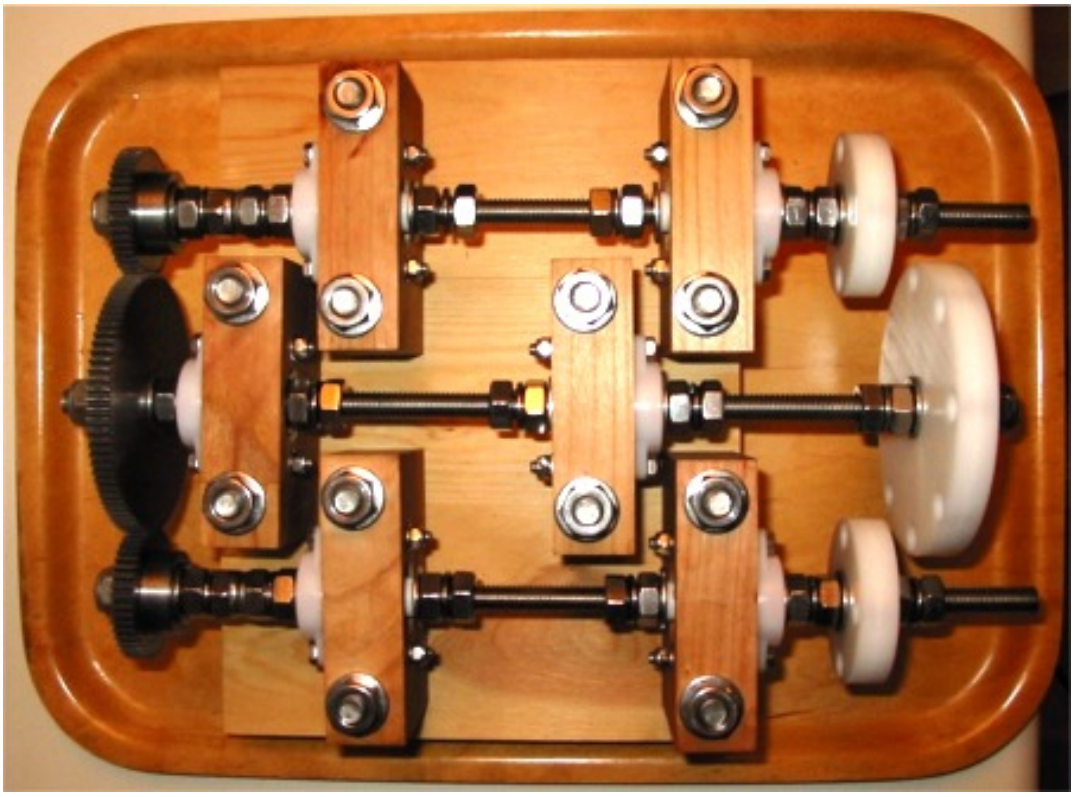
Front view



Top front view



Top view





Thomas Goerz (VaporWings)

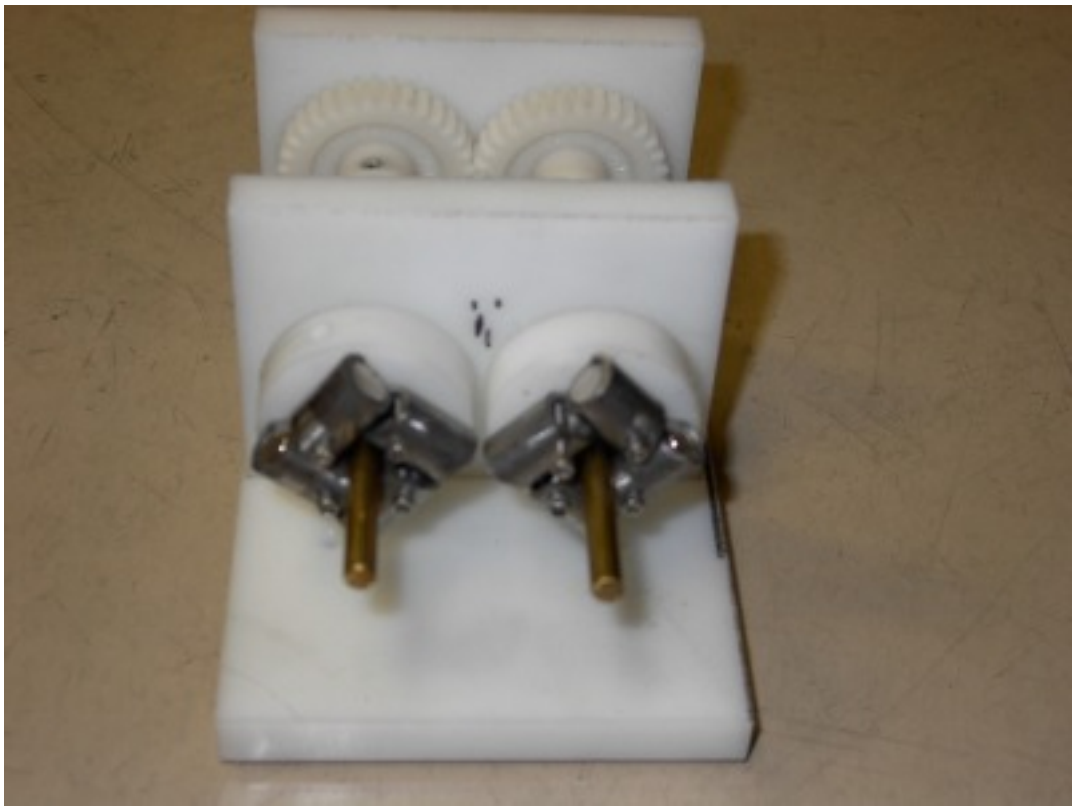
I played with my replication for a few weeks with any free time that I had.
An hour or two here and there. Suspect I put in 20-30 hours of playing.
Bottom line... No go.. Really hard to replicate. Not saying it would not work
but it is NOT an easy to replicate.. guaranteed to work design. No way..
What I think I understand from all of this is that all of the magnets have to
be the very same strength in order to come close to working. I could get mine
to come close to 3/4 rotation but it would always lock up. I could move the
magnets to other locations and it would change lockup locations. This confirmed
to me that my magnets were not the same strength and I did not want to
spend more money on a design that might work with a lot of tweaking (years ?)
and would not be easily duplicated. Along the way I have discovered a few things
along the way that may help my next attempt to succeed once I get more time
and money. The biggest I feel is this and I will share it with you to play around with.

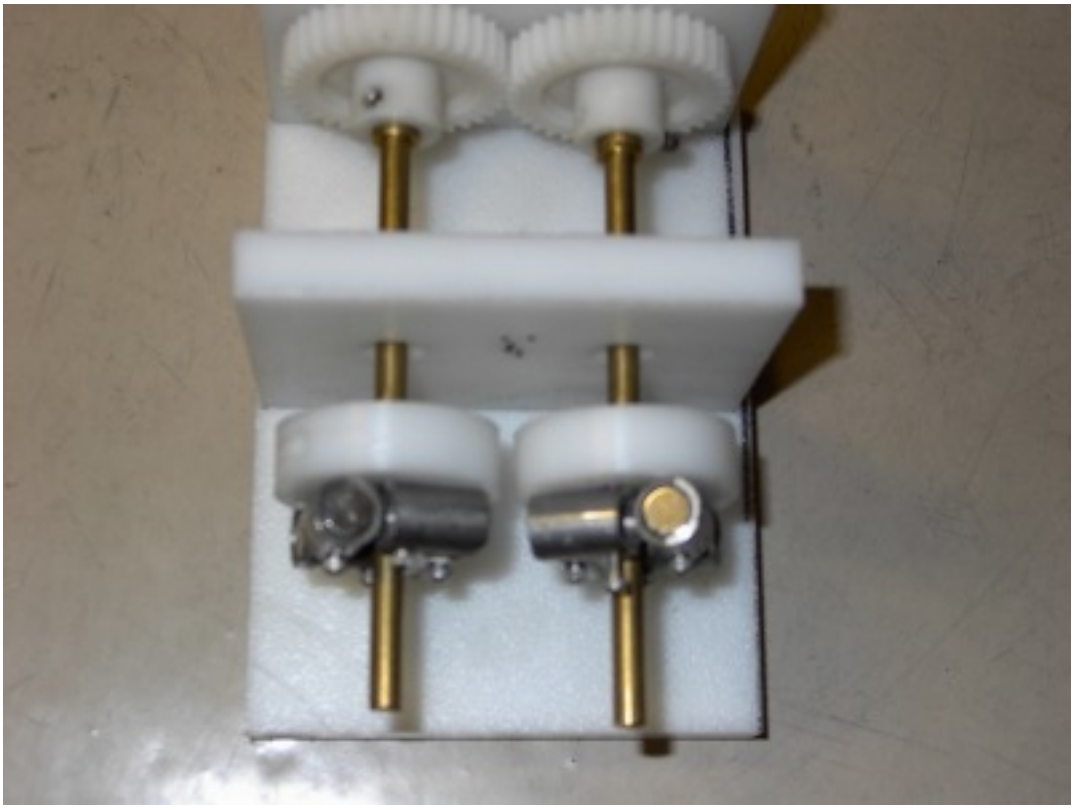
1) one way to overcome the magnet strength and level the playing field is by
magnetic shielding. This does not have to be mu-metal but just plain cheap steel
from the hardware store. What I did was to get some steel (not stainless) tubing from the
local Ace Hardware store that was bigger in outside diameter than the outside diameter
of my cylinder magnets. I then bored out the tubing so that my cylinder magnet
would slide inside the steel tube. Do this for two cylinder magnets. Have the front
face of the magnets just about 1/16 inch below the lip of the steel tube. It will look
a little like the front of a watch battery. Now place the faces (repelling) toward
each other like a "\ /" with the repel faces toward the bottom of the "\ /".
Slowly move the "\ /" upwards to the "--- ---" position. See how the tubing shields
the magnets from seeing each other until they are close to "--- ---" position.
Now try the same effect without the shielding and see how difficult it is to even
get the magnets to the "--- ---" location. Now based upon this observation I threw
together (I really did throw it together) a simple design that was like the Calloway-
Bowan design. It has it current drawback of NOT WORKING but it wants to work to
some degree. The upper spacing arc is a major drawback.
I really need real bearings (not plastic sleeve) and larger magnets (like 1+ inches)
but I think you get the idea of what I was trying for. I am not asking for replication
but you can at least try the shielding idea and see what you think. Maybe a
computer simulation program first to see if this idea can be scaled up to work
using larger magnets. Not sure how you would model the shielding.
I was using the small plastic gears (2.5 in) of the Calloway-Bowman motor
design and the 3/8" x 3/8" magnets that I had gotten for that attempt. Attached is
some pictures of what I was trying to create. I think it has more promise and
is easier to duplicate than the Calloway-Boman design. Give it a view and some

feedback. I think that this idea has some possibilities but I have always been an optimist ;).
Post the pictures if you want. Enjoy..

Have a great day.
Tom G :)







Rodney Graff

I never went anywhere after that picture, which doesn't appear to be working for some reason anyway.

I started pursuing other avenues after nobody was able to provide any actual EVIDENCE of a working Bowman device such as a video. And I just lost
interest after spending the money on the materials, some of which are still available for a discount price to anybody interested.

I am looking into other possibilities such as the Helix Rotary
(http://www.fdp.nu/mikelldevice/thedevice.asp)

And the new information about the magnetic wheel at Coral castle is turning out to be EXTREMELY interesting and promising, in fact there has just been an UPDATE at that page found here:

http://www.coralcastlecode.com/index.html

The project page is loaded with graphics instead of thumbnail links so be patient.

AND this new information probably has applications to ALL the flying Dutchman projects...

Rodney Brian. Seeking freedom, truth and happiness.

Chris Hamm

Hi Eric I had to quite because it was taking to much of my time. I have a busy life and playing with free energy stuff is just a hobby when I have time.
I still believe it works but every thing need to be just perfect to work.
Which would mean not much power output. One day I will get back to it.
There is a company that is claiming that they are doing testing on a magnet motor/generator here in Canada. I have not seen it so this is just hear say.
They are claiming mid Nov. for production but I am holding my breath on this one. When I see it I will let you know.

Chris Hamm

Eric Vogels

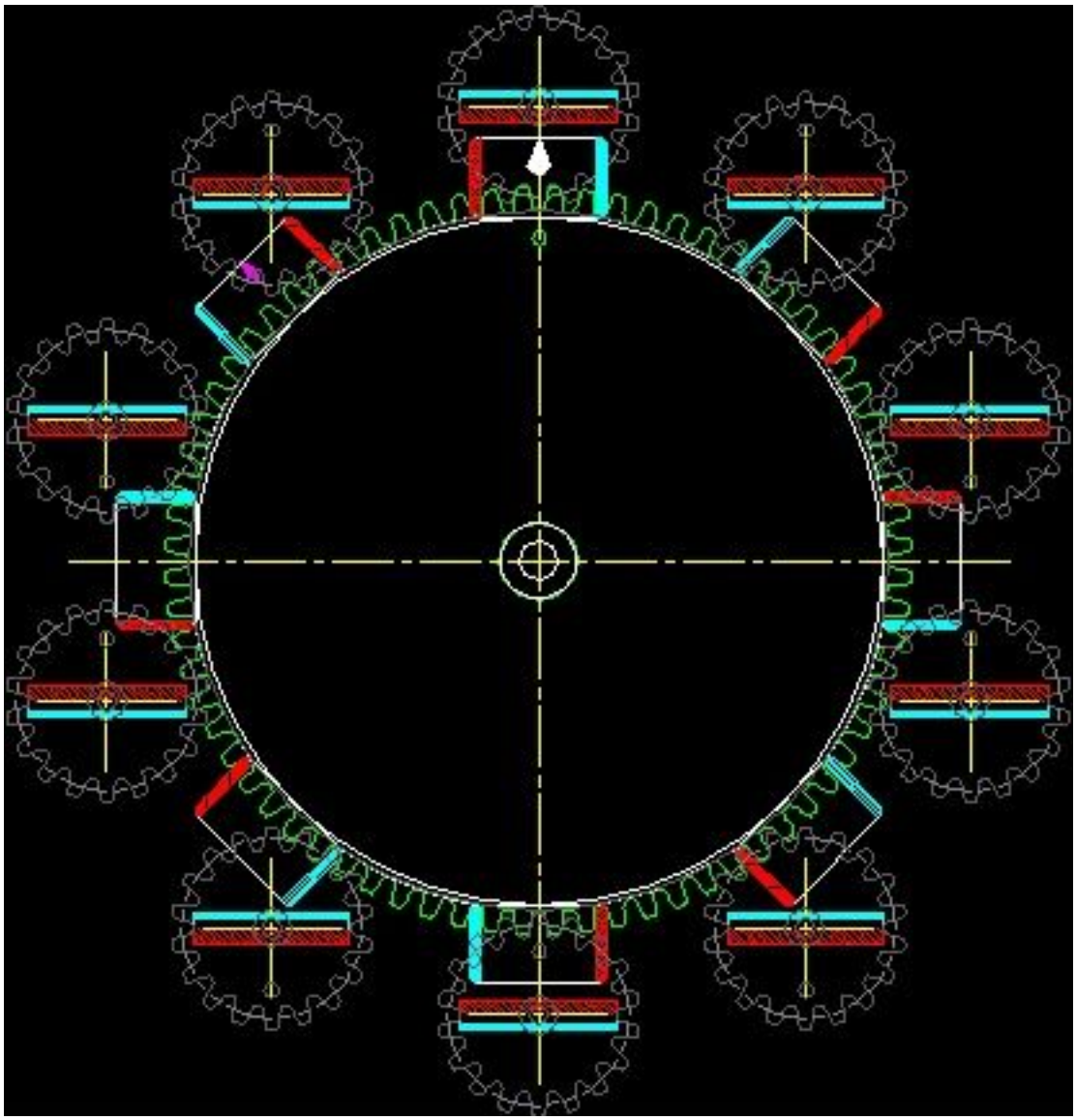
I was not successful with the replication.
I had most problems to get the shafts aligned, and the fact that the magnets had different strength didn't make it easier.
I gave up but I'm convinced that I will try again when I have a workshop with better tools.
Eric

FLYING DUTCHMAN PROJECTS

Home
Magnetic research
Free Energy eBooks/Articles
Guest book

Administration

Animation by Alexander O. Spiridonov
([Switch] to the magnetic simulation of Nick Rasmussen)
([Switch] to the 3d animation of Nick Rasmussen)



Explanation by Jan P. Cack

A Simple Idea

I had only a mild interest in Perpetual Energy at this time. For some reason the idea planted a seed in my brain. Soon after I realized this may be possible. If you take a magnet and move another magnet towards the first, opposites attract, and then before they can touch, the first magnet rotates 180 degrees. Barely "dodging" the second magnet. After a brief energy loss, the 2 magnets are now pushing against each other, same poles repel, and the first magnet is now oriented to "affect" the next magnet in a rotating cycle. Which, obviously, is reversed polarity from second magnet. It seems to be an efficient cycle. Everything was easy to understand and common sense tells us "forces" are at work. My first drawing of this was February 11, 2005. This looked very appealing on paper. That, in itself, appeared to be no extraordinary discovery. It was a simple concept that made a pretty picture. Surely this has been observed before. This would seem to be "common knowledge". So I began many searches about magnets, and different configurations where my idea was documented with possible results obtained. Still I was only tickling myself with the conception of Perpetual Energy. After a brief inability to find this simple principle in action, I decided to go a step farther. Why not? I have some time and the power of "AUTOcad" at my disposal. This suddenly became much more interesting!

The Pattern

The spark was set. I put together a bunch of "what if" geometry. Thank you "AUTOcad". Given the fact that a "rotor" could be built with "opposing magnets", we would need an even number of "arms". I constructed 4 in my computer. The first had 4 arms. The second had 6 the third was 8, and the last one had 10 arms. On the end of each "arm" I color coded a magnetic "area". Then proceeded to construct a ring containing my, 180-degree, rotating "stator" magnets. Starting with an equally spaced array of 4 stator magnets. Proceeding in succession until I ended with 19 stator magnets. After that the ring became too "cluttered", so I stopped. This is easily re-created with almost any drawing program. Simple enough. That did not take long. Nor was it an "event". But..after placing my geometry on top of each other, I began suddenly to realize an "opportunity". I got very excited at this point. The fire soon spread, and fast. Within the geometry I created there were several possibilities within each "rotor" created. They were removed to another drawing for further review. Was this the answer? The results were very promising with

regard to the overwhelming numbers of possible candidates. So I inspected them all thoroughly searching for my "best case scenario". I was about to explode. Deciding on the "8 arm rotor" and the "10 stator ring" gave me an "object" to build upon, analyze, and SIMPLIFY. It makes a very pretty picture on paper. WOW, I still could not believe that this information was any great revelation. Just a series of patterns I constructed out of curiosity. There was still a lot of work to do. Lost interest in everything else at that point. Since I couldn't sleep or eat much I had plenty of time to play with my "new" toy. Wife getting angry now, says I am obsessing way too much. Other things demanded my attention now. But there was no stopping the frenzy in my head. If this "dream" could be true, nothing else mattered to me. Sorry Wife.

The KISS Engine Evolved

Armed with this exciting new concept, I set out to make my "stator" magnets rotate at my control. At first this seemed way harder than it appeared. I envisioned the stator to be a Disc Magnet, not sure why? But it stuck for a short time. The exact size or shape of this magnet has far more possibilities than I can briefly list, so long as the "concept" remains the same. Rotation, at first, presented itself many obstacles. Timing was crucial. A "slip" would result in destruction of the magnets themselves. They have to be "flawlessly" rotated then "locked" into position. I assumed this would have the strongest "push/pull" that I can get. It all got very complicated very quickly. What a challenge? Faced with an overwhelming choice of options to be explored. All of them riddled with more friction and instability than I could afford. So I kept rolling this "contraption" virtually in my head. A little KISS here, a little KISS there. I was determined once this gigantic obstacle was overcome, my "Baby" would, and could, "breathe life". A little KISS here, a little KISS there. It was all I could think about. Sleep is way over rated anyway. My Son is also beginning to get angry now because I won't let him on the computer to play games. Sorry Son.

The Revelation

The whole concept became "instantly" solved. After my "revelation" the remaining system was perfect. It appears extremely stable, with the fewest moving parts imaginable. The timing, once built, can NEVER be changed. Only outside forces can alter the rotation of any moving parts. The "KISS Engine" was the most SIMPLE, the most STABLE, and by far the most MODIFIABLE mechanical system I have ever dreamt possible. Once you see the obvious superiorities, it become

instantly clear. In it's most basic form all of the principles applied are taught before a child leaves Middle School. Anyone who knows what a magnet does can "understand" what makes it spin, simply with a "snapshot" of this device outlining only the placement and orientation of the magnets. A device, so simple in fact, that the design can be understood in any language with the understanding of magnets. Without adding descriptive text. If standards can be achieved, then I believe school children are capable of it's assembly in "kit" form. A "kit" that can power a small house for 400 years or so. The lack of moving parts would make any "repair" easily performed with average intelligence, and restarted without the worry of anything needing to be "retimed" or "tuned" ever in it's life. That's correct. My design may NEVER have to be changed after initial assembly. It's FLAWLESS GUARANTEED. Of course once the modifications start being applied, this "engine" will not be as simple. But the basic "design" never changes, only scaled and modified. This is the PERFECT motor. This is my opinion and I hope you feel the same. Are you ready for my revelation? Not yet. First let me state again that this "discovery" was nothing unusual. I did not find a miracle. I did no more than anyone, using "common sense" coupled with imagination, would have eventually noticed. Really it was nothing. I do not deserve any special recognition for what has happened. There are no mysteries involved. I did no "special" research to create my KISS Engine. All I did was make a couple of "observations" and re-apply them in a creative way. Extremely focused on trying to SIMPLIFY our world. Okay, now with everything that I have told you may have already "discovered" my secret. It becomes painfully obvious after you realize what I'm talking about. Are you ready now? Can you Guess? I won't tease you anymore. Here it is. Are you sitting down?? PLANETARY GEARS...Tah Dah!!! What were you expecting...Magic? Simple...Huh. If you understand Planetary Gears, at all, you will understand everything I bragged about is possible.

Simple Solutions Produce The Best Results
The simplicity and stability inherent in this principle CANNOT be overstated. All you need is a 4:1 ratio (1 turn of "Sun" to produce 4 turns of the "Planets"). Equally space 10 Planet Gears with Permanent Magnets creating a "Hemispherical Dipole" area across the diameter (STATOR) aligned with 8 magnets equally spaced around the edge of the Sun Gear (ROTOR). This easily creates ½ rotation of the Stator or Planet every time the magnets pass. Locked into place FOR LIFE by the gear teeth on a "free spinning" assembly. What could be Better? Mechanical friction can be held to a minimum and remains a constant throughout every "phase" of rotational velocity. This can

be easily calculated by anyone with a strong math background and a little time. A very good calculator comes in handy about now. To keep "outside influences" from affecting our perfect system, precautions must be made. I propose the gears be cut or molded from a "non-conducting", maybe plastic, material. This could achieve a very "cost effective" and, most importantly, SIMPLE solution. The "manufacturing process" could introduce "standard" bushings, possibly Bronze, Ceramic, or some "plastic material" that I am unaware of, to provide lubrication. If "standard dimensions" can be established, manufacturing can be widespread and very inexpensive. How SIMPLE is that??? I thought so too! The base or cage of the "model" is also "mass produced" with "non-conducting" material. I was thinking, maybe, T-6061 Alum or some form of "plastic". The "shaft's" can be of uniform size and mounted many ways. Quite possibly the entire "machine" can be "loose" enough so all the parts can be rapidly "formed" or "molded". After "standards" are discussed this would tremendously SIMPLIFY the manufacturing process. Thereby making them as INEXPENSIVE AS POSSIBLE. After a "kit" is introduced, it would take no more ability to assemble than your last Bicycle or "some assembly required" shelf unit. Gear "A" goes into or on to point "A", Gear "B" goes into or on to point "B" and so on. This can be over in 11 steps with this design. Whew, that was tough. How much longer is this going to take you ask? Not long. Now take second "base piece", bet you wondered why you had 2, and "attach" to first "base piece". Is that all I have to do, you ask? Maybe, if the "manufacturing process" creates a "locking mechanism". If not, you may need to spend a couple of minutes "bolting" together. Am I done yet, you ask? I don't have time for this! YES !!! Your first KISS Engine is COMPLETE. Sorry you had to spend so much time on it. Theoretically, with an introduction of "standards" and outstandingly SIMPLE "manufacturing processes", Start to Finish, with the most basic design, can be accomplished in ONLY 12 STEPS. After everything is in place, PULL THE PIN. Voila!! You have a WORKING MODEL KISS Engine. You bought it "off the shelf" and assembled it yourself. Some of you may need help? So ask your Kids. This is such an easy principle I'm sure most everyone can understand it. Again I don't make myself significant in this. Everything I' ve outlined is "common knowledge" to a vast majority of people. All I did was assemble this information, in a creative and SIMPLE way, then drew a bunch of pretty pictures. I cannot prove the KISS Engine will work for sure... but I cannot disprove it either. Half the fun and all the excitement are yours to explore.

If It Is That Simple, Why Didn't You Build It? You Could Be Rich!!!! I LOVE the "possibilities" of this "Brand New" motor. I decided to name it the "KISS" Engine to constantly remind anyone who touches this, or is touched by this. 1.KEEP IT SIMPLE STUPID
2.The World doesn't have to be as complicated as "They" like to make us think.
3.One Person can make a difference if that person is creative and persistent.
4.All of us working together to obtain the same Goal can, and will, change the world.
5.Not everyone on this planet is "out for a buck".
6.Our Family's are our biggest assets. Not just "now" but also in the "Legacy" we all share of what the future will hold.
7.Even if I am, just another "crackpot" with a BIG mouth and too little knowledge of what I am talking about. We had a good laugh, drew some pretty pictures, and sparked a huge interest in the "idea" of Perpetual Energy. Nobody got hurt. YET? This dream can be realized; all we have to do is try.
8.Sometimes you have to "KICK" people, especially the People who continue to get over-whelmingly rich by polluting and over-charging common people to a point there is nothing left for us and our children to enjoy! People who take far too much and give far too little in return need a new Perspective. All I am trying to do is buy everyone who reads this a "Brand New Pair of Boots" and get them to practice their aim. I am aiming between the legs! Some People may not think it's fair, but I didn't start this fight and I don't want it to last any longer than it has to. I call it Self Defense. Only time remains to see what, if anything, the History Books will say. But how much time do we have left? I think we should hurry.
9.Dreams do come true if we all just believe strong enough and share.

Further Speculations?
All the Variables and Application's for this type of motor are immense and start to hurt my brain when I try to comprehend them all. I will attempt to outline, briefly as possible and simply as possible, things that I have considered. Nothing has been fully tested and requires lots of well-documented Research that we can share with anybody interested.

Modifications To Primary Design
1. EXTREME SAFETY MEASURE MUST BE STRICTLY OBEYED. Don't perform any experiments without exploring ALL possible avenues of INFORMATION on the subject. I am just a HIGH SCHOOL DROPOUT. I have NO EXPERTISE IN ANYTHING related to any of the subjects I talk about. I am only

making OBSERVATIONS.

Speculation, based on Cone and Pyramid Magnets lead me to believe that possibly one could create a "Magnetic Manipulator" from common metals in many various Shapes and Forms either to Focus or Re-direct the magnetic influence
The addition of an Outer Ring Gear could further stabilize this system if needed. Could also be "impregnated" with Magnets and "timed" to the Planet Gears.
A Harmonic Balancer or Governor may need to be utilized for stability and/or speed.
Don't screw up a good thing

Modifications Specifically Designed For Applications
1. EXTREME SAFETY MEASURE MUST BE STRICTLY OBEYED. Don't perform any experiments without exploring ALL possible avenues of INFORMATION on the subject. I am just a HIGH SCHOOL DROPOUT. I have NO EXPERTISE IN ANYTHING related to any of the subjects I talk about. I am only making OBSERVATIONS. If given the fact that an "electric charge" can be produced, simply, by passing a magnetic field over a coil. Then pick a Coil, pick a Magnet, Document Your Results, and share this information with anyone that is interested. If given the fact that a Magnetic Field can be produced, simply, by sending an "electrical charge" through the coil wires. Maybe, if we took the same coil and connected the coil leads together, completing the loop. Introduced it to a spinning/rotating Permanent Magnet. We could, conceivably, Create and Expend the "energy" created simultaneously. Sounds simple enough. I don' t know anything about this, and I do not have time to do proper Research to form an educated decision on if this is available or possible. It just kind of sounded cool. If this is possible, then very strong and very controlled (I Pray) Magnetic Field might be achieved. If anybody knows, or finds, anything about this share this information with anybody interested DANGER, Will Robinson, DANGER? The Torus? If I assume #1 and/or #2 can work. Then a Toroidal Coil may produce "strange" results, which appear to be very dangerous. Very Dangerous. I know very little information on this coil. A simple furnace could consist of a "Friction Wheel" attached to KISS Engine. If you now understand the motor and know that friction creates heat. A Fan Shaped Sun Gear can, very simply, move the air. Your Home Furnace would not be so complicated and expensive. If it quits working ask your kid to take a look at it for you. I am sure they could "figure it out" rather quickly. With the fact that heat can change a magnet some "shielding" would be needed, but not much else. This same principle may also apply to a Stove or

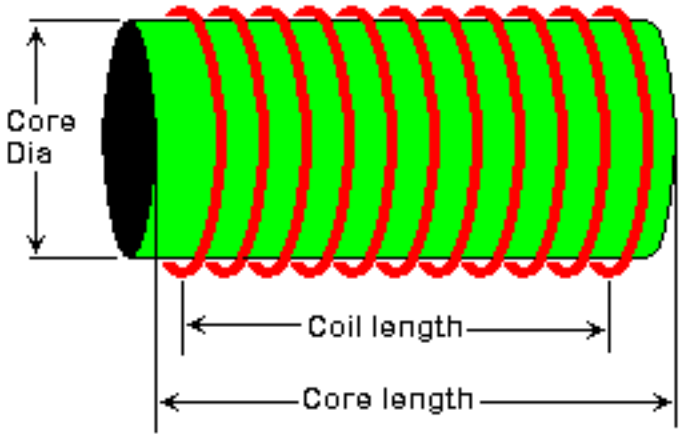
OVEN.
VERY IMPORTANT! Do your own thorough research.

My Personal Conclusions
Some things I am willing to work for. Our society is constantly "improving things" by adding more "Bells and Whistles" than I like to complicate my life with. Some "luxuries" I can live without, other "luxuries" are very nice. That's why we have options, even if current manufacturers aren't willing to comply. If enough people think like you do, then maybe changes can be made. Nobody, but you, knows it how can be better until you talk about it. If not you then maybe someone you can "touch" with information you possess. What will the World become when most of the day happens through an automatic series of events. All of the "luxuries" anyone can imagine. To make our Life's easier, we thought. This seems like a very nice place indeed. Man was able to make this happen very smoothly. Behind the realm of what "simple people" needed to know. With the passage of even more Time, we may even feel that with such a perfectly automated, so seamlessly smooth running World, we do not need as many "smart" people. What if this World becomes filled, entirely, with lazy and "simple" people? Will anyone be willing to accept personable responsibility or a global obligation for anything? This may work, for a while. This may seem to run very smoothly, behind the scenes. But what happens when something "fails" in this "perfect" system we have created for ourselves. Who will be left to "fix" it? Who will show us what to do if this happens? How will Mankind survive? As I said before, this is entirely the personal "thoughts" and "beliefs" of just one man. Trying to make things better than I found them. My opinion is important only to me. I do not intend to "offended" or "hurt" anyone. I am just one Man who "found" something, and wanted to share it. I'm sorry World. Maybe, just maybe, the next time I feel like I was at a big "Party", and those same people start laughing at me. I realize all my friends are there, with a "shiny new pair of Boots". Won't they be surprised when I turn around and yell "Let's Kick Some Ass"? I'll try to take out the "big guy" first. After that it only gets easier. I may be very, very small but I possess "infinite power". This I will always BELIEVE!!!!!!!!

Replication reports

Here is a link to the replication log of John Self

Coil Diameter Calculator



Core diameter in mm: 15

Core length in mm: 100

Coil length in mm: 70

Wire diameter in mm: 1

Wire length in meter: 60

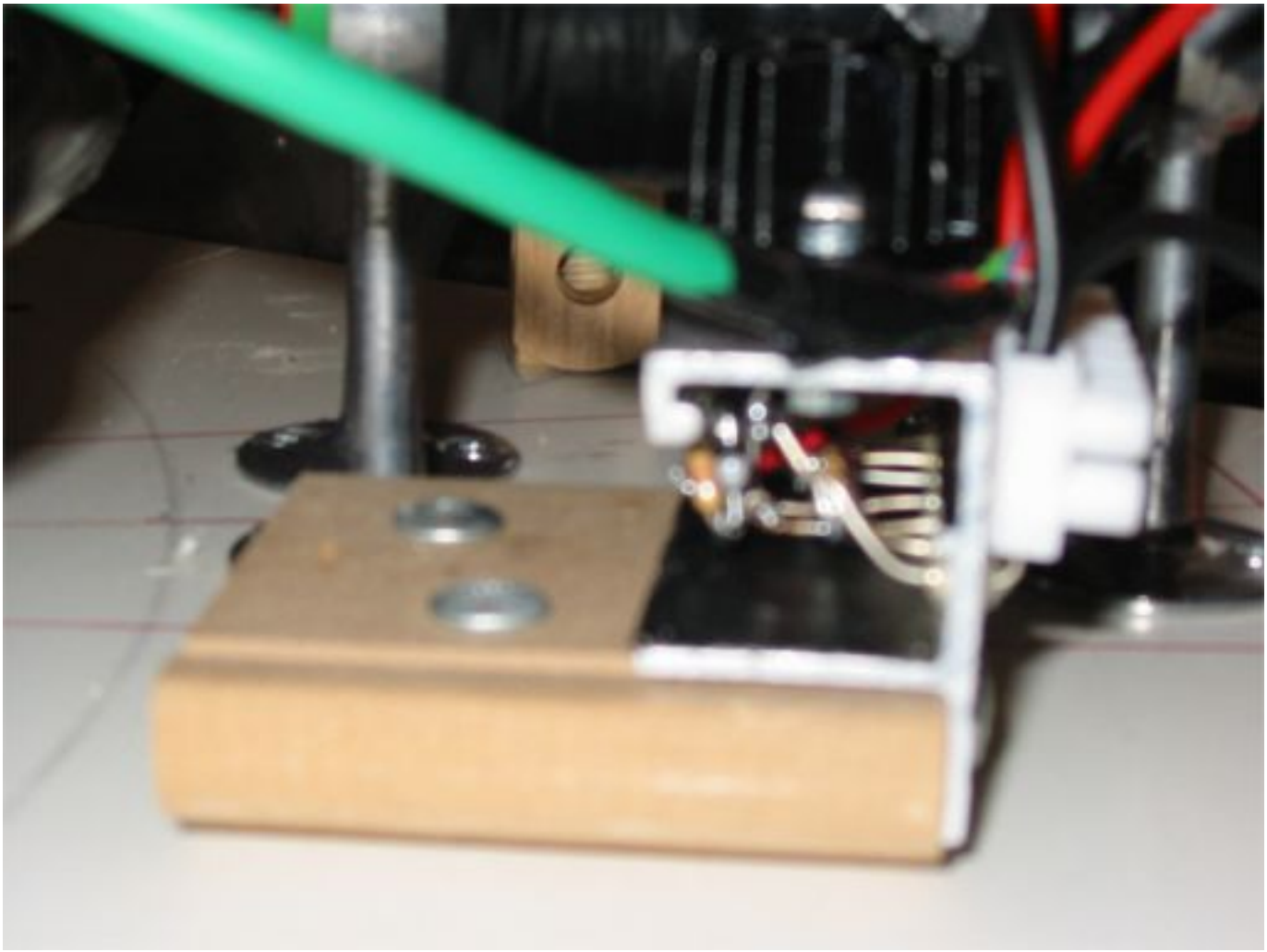
Init form Calculate



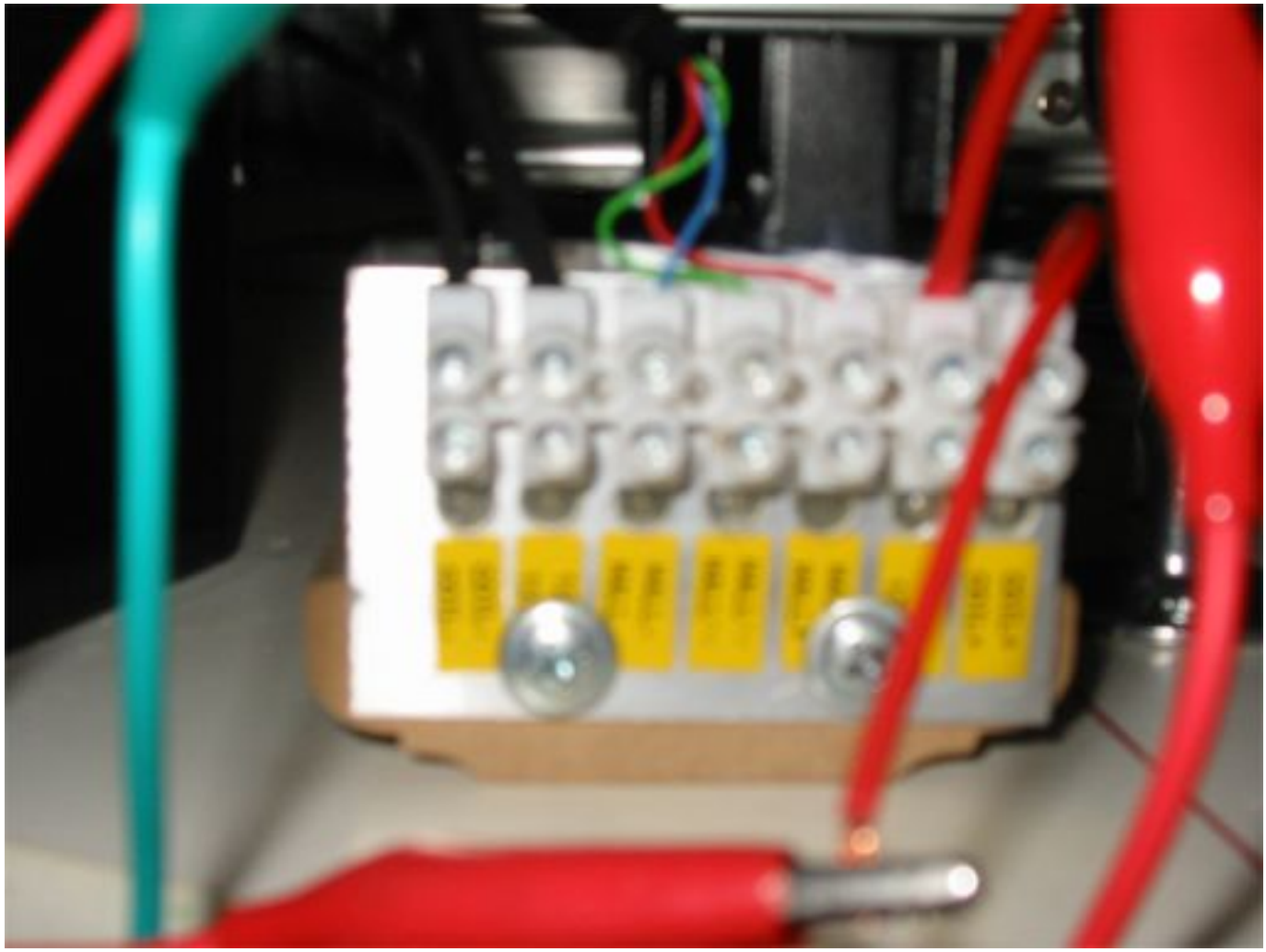
My Cores



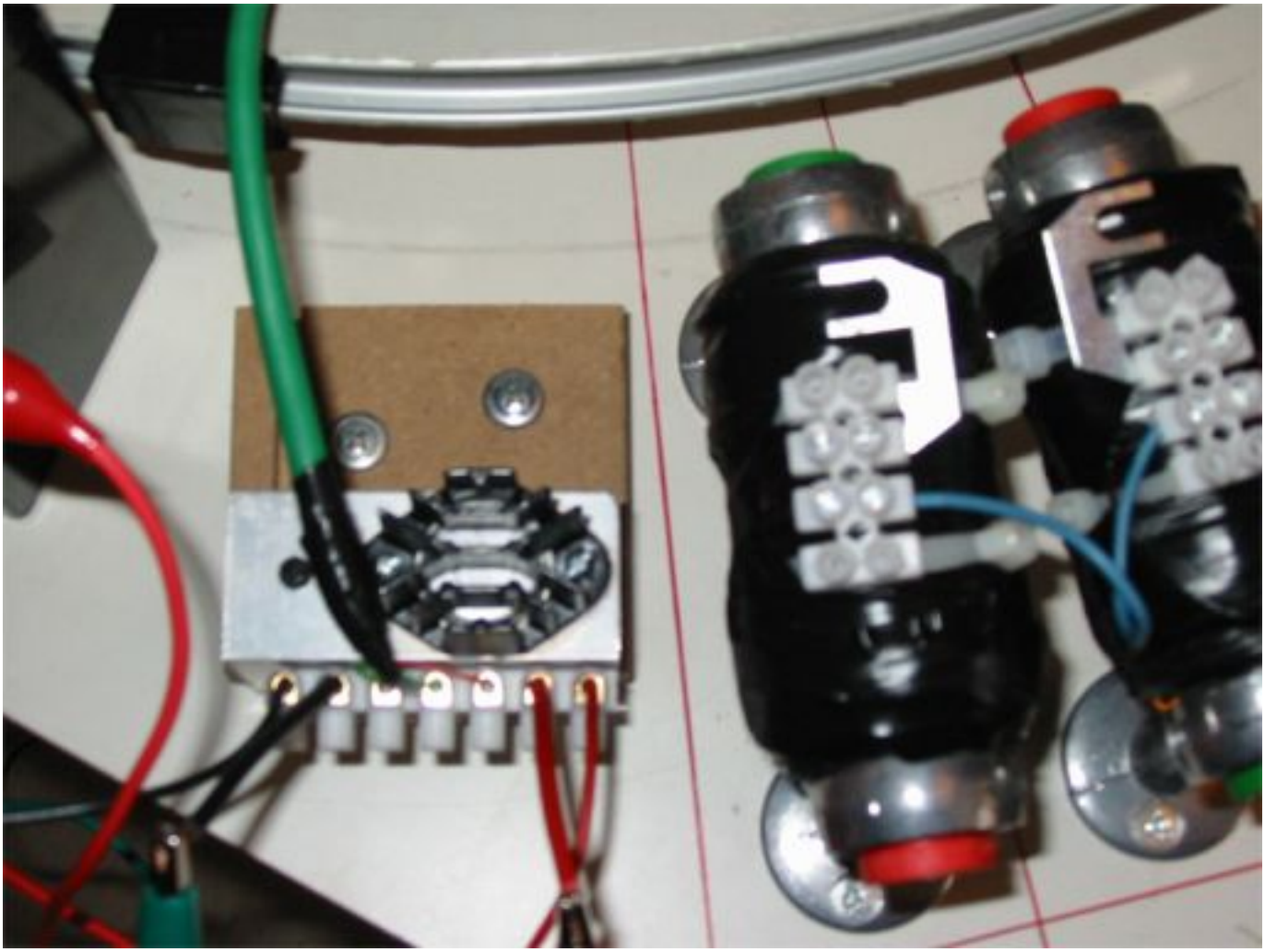
My Coil



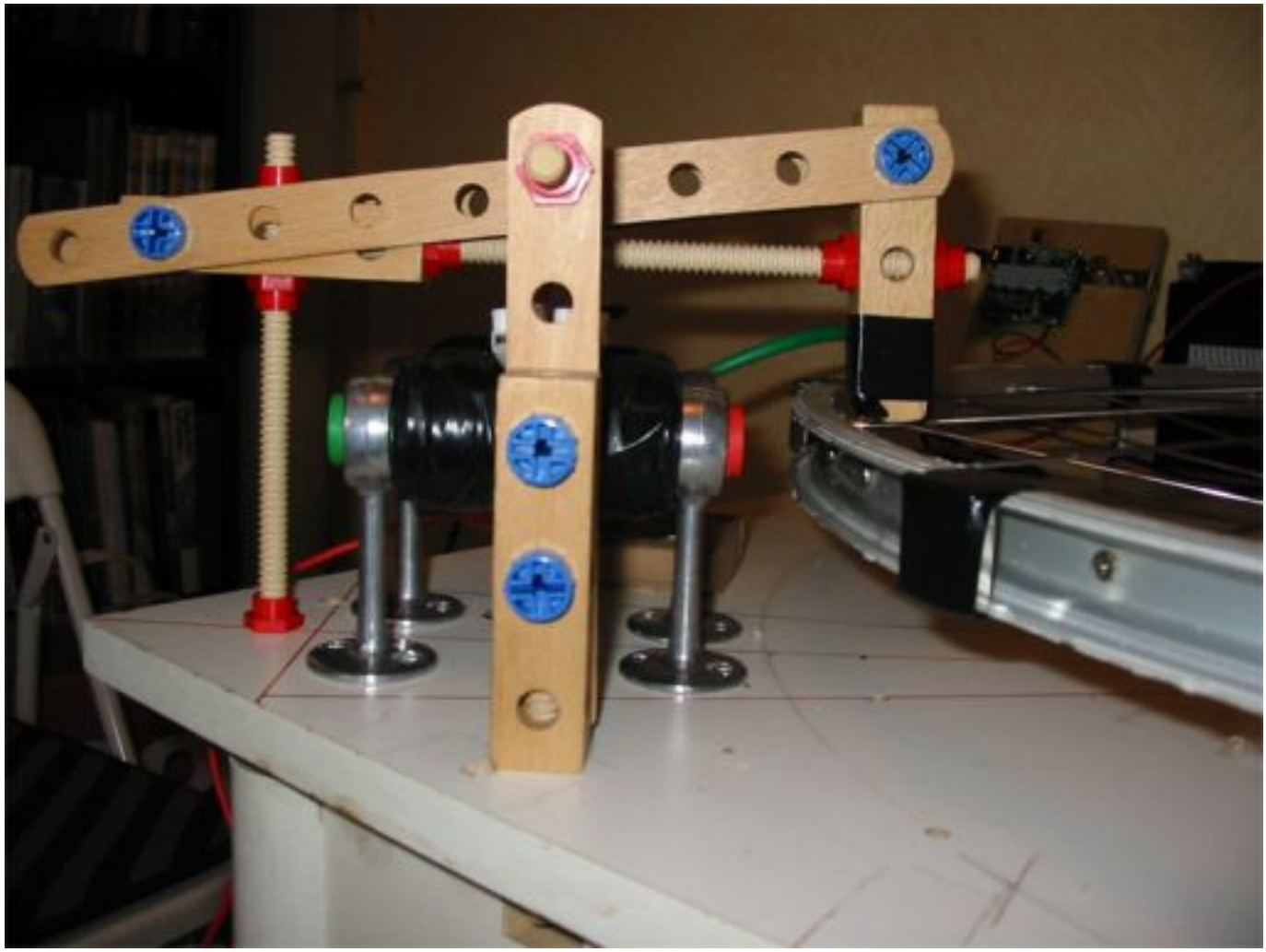
The air cooled controller



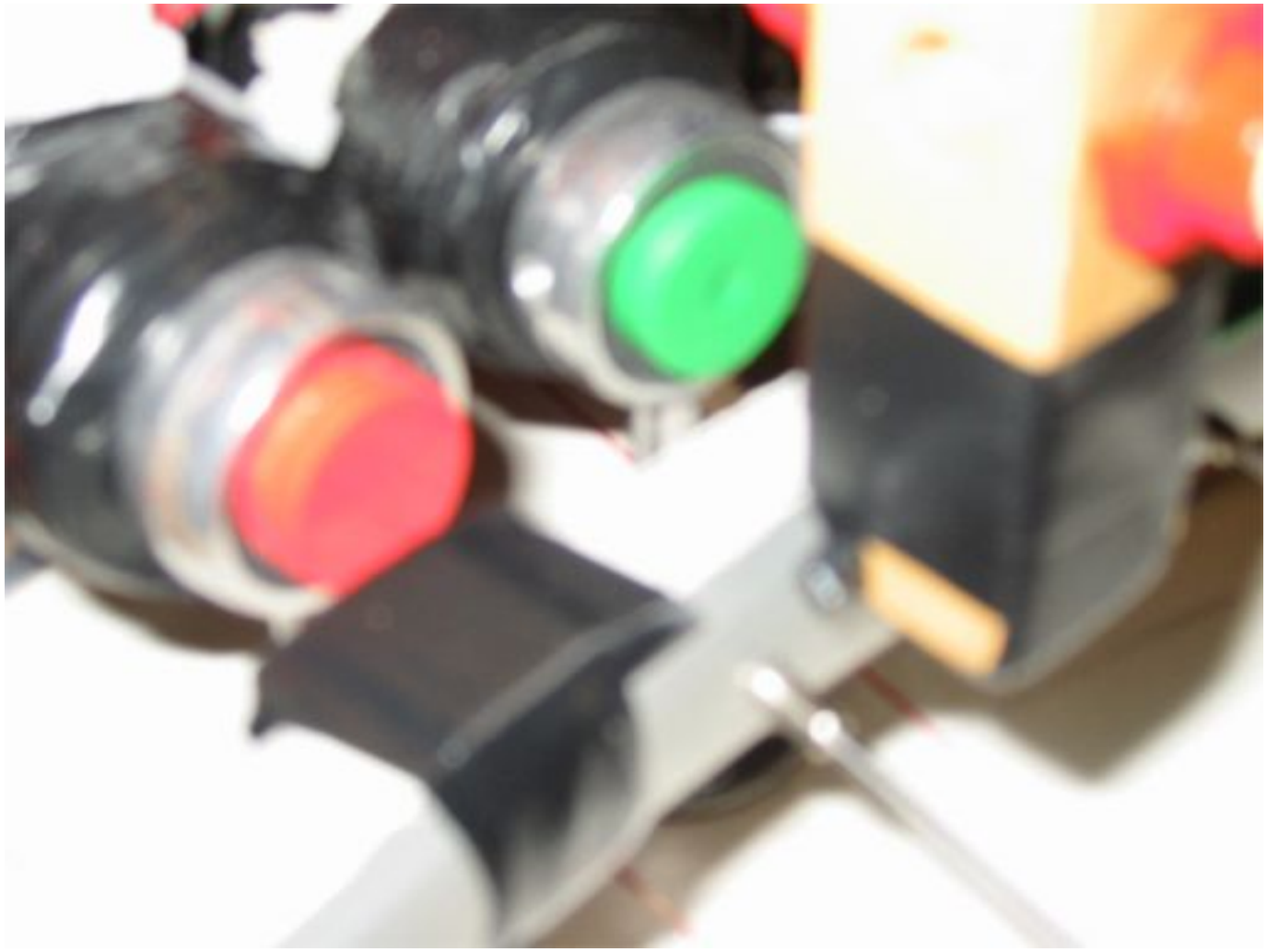
The controller



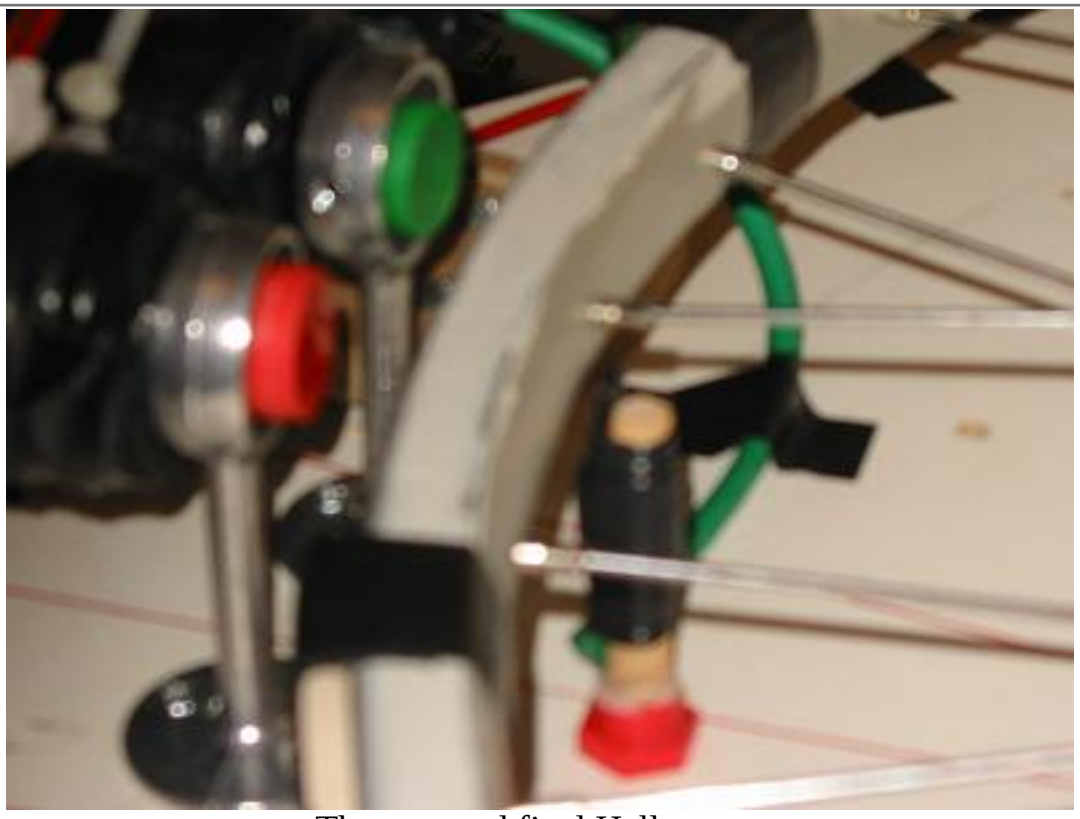
The controller and coils



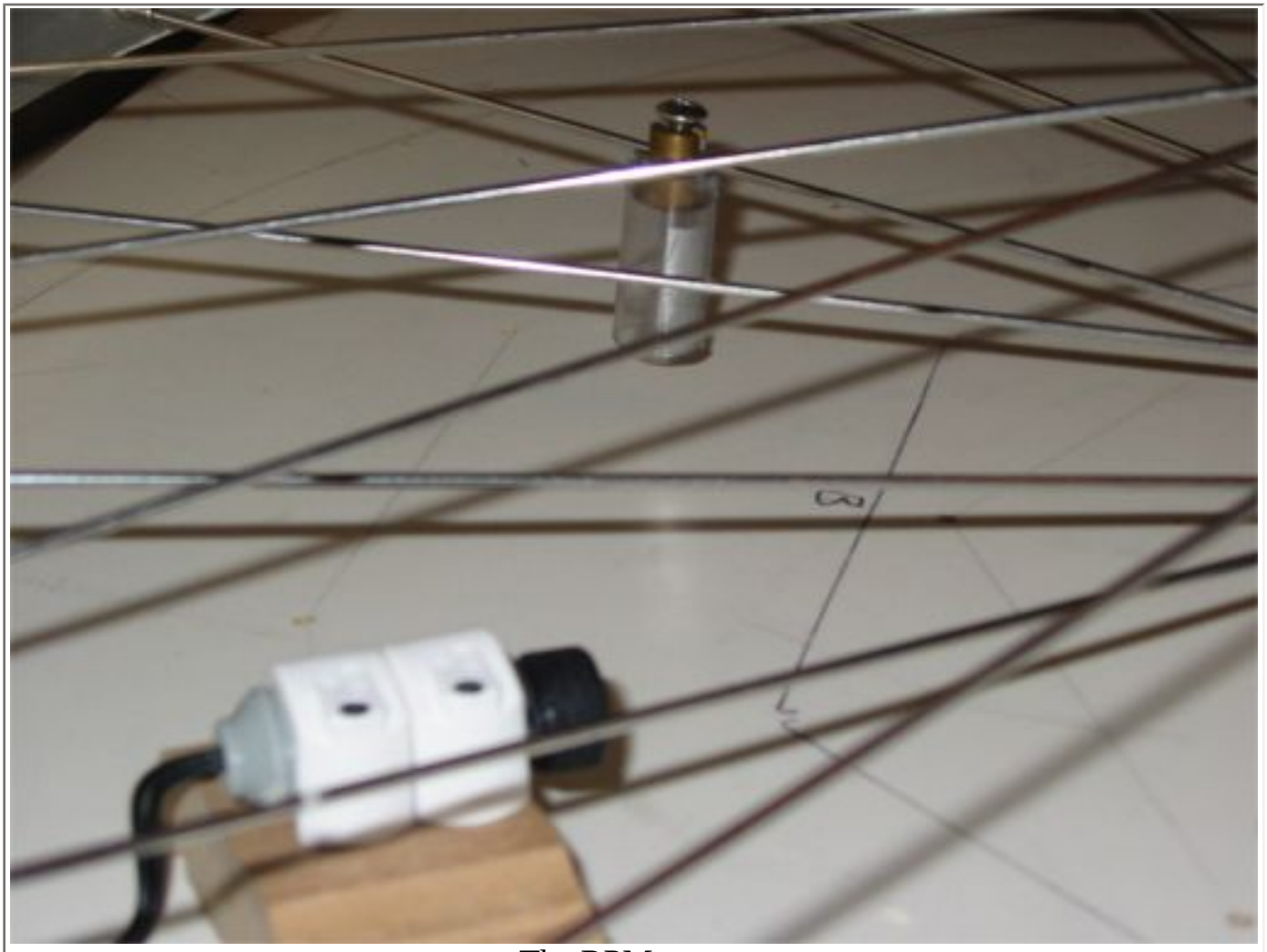
The Hall adjuster



The Hall position



The new and final Hall mount

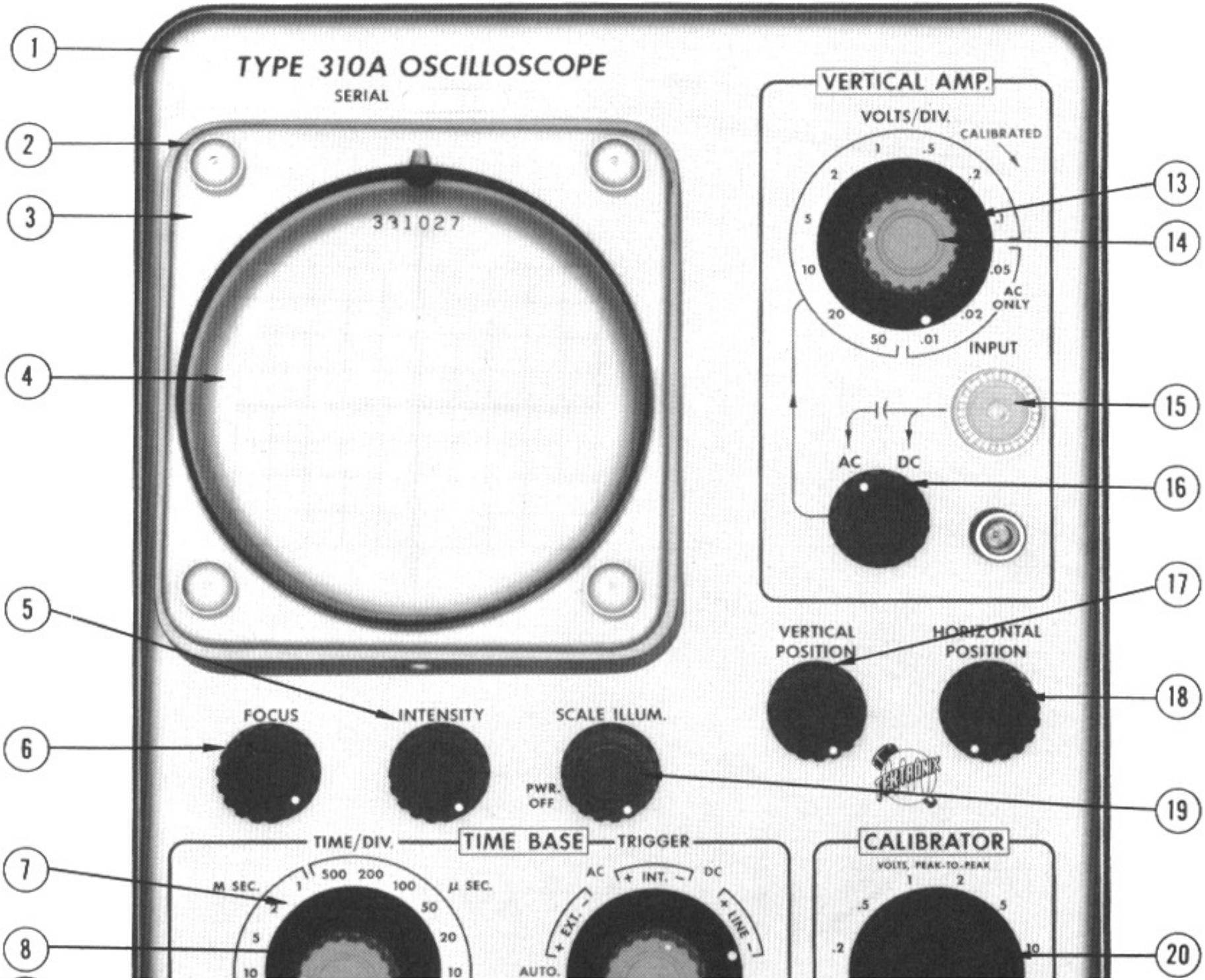


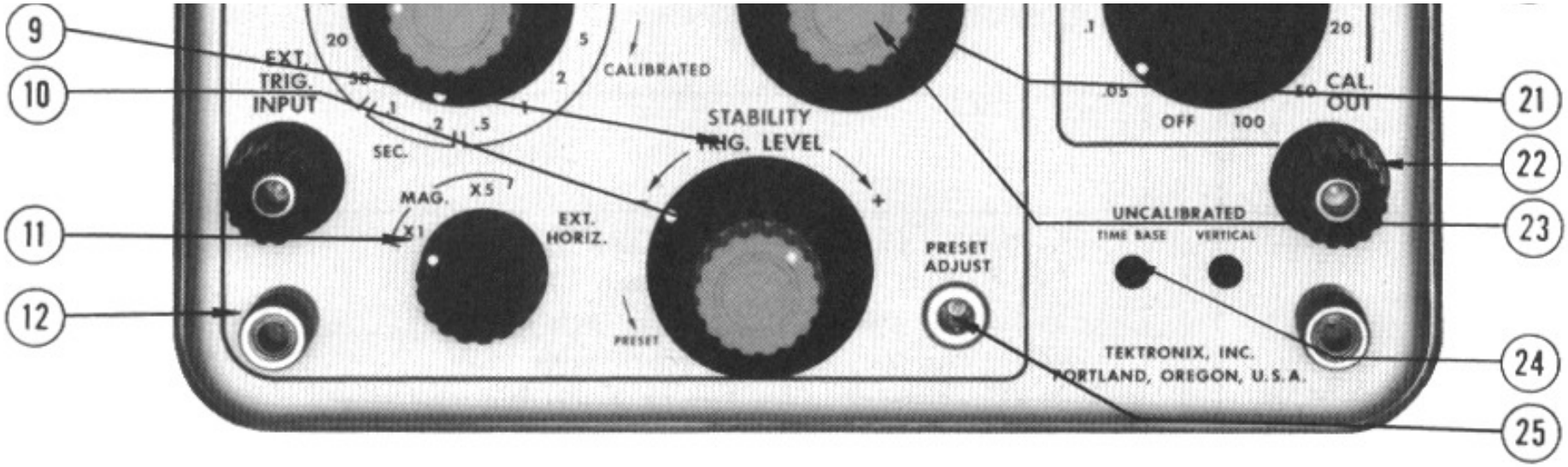
The RPM sensor

The on/off switch



Or download this Movie.(right click: save target as...)


1
TYPE 310A OSCILLOSCOPE
SERIAL
331027
2
3
4
5
6
7
8
VERTICAL AMP.
VOLTS/DIV.
CALIBRATED
1
.5
.2
.1
.05
.02
.01
2
5
10
20
50
AC ONLY
INPUT
AC
DC
13
14
15
16
17
18
19
20
VERTICAL POSITION
HORIZONTAL POSITION
FOCUS
INTENSITY
SCALE ILLUM.
PWR. OFF
TIME/DIV.
TIME BASE
TRIGGER
M SEC.
μ SEC.
500
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1
AC
+ INT. −
DC
+ EXT. −
+ LINE −
AUTO.
CALIBRATOR
VOLTS, PEAK-TO-PEAK
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EXT.
TRIG.
INPUT
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.5
CALIBRATED
STABILITY
TRIG. LEVEL
MAG.
X5
X1
EXT.
HORIZ.
PRESET
PRESET
ADJUST
.1
20
.05
50
CAL.
OUT
OFF
100
UNCALIBRATED
TIME BASE
VERTICAL
TEKTRONIX, INC.
PORTLAND, OREGON, U.S.A.

Base 2N3904 **0.2 Volt/Div** **5mSec Time/Div** **Mag 1x**	**Base TIP35C** **0.2 Volt/Div** **5mSec Time/Div** **Mag 1x**	**Collector TIP35C** **20 Volt/Div** **5mSec Time/Div** **Mag 1x**
		
Or download this Base2n3904_3.(right click: save target as...)	Or download this BaseTIP35C_3.(right click: save target as...)	Or download this CollectorTIP35C_3.(right click: save target as...)

LabCam 1 **LabCam 2**

Loading....

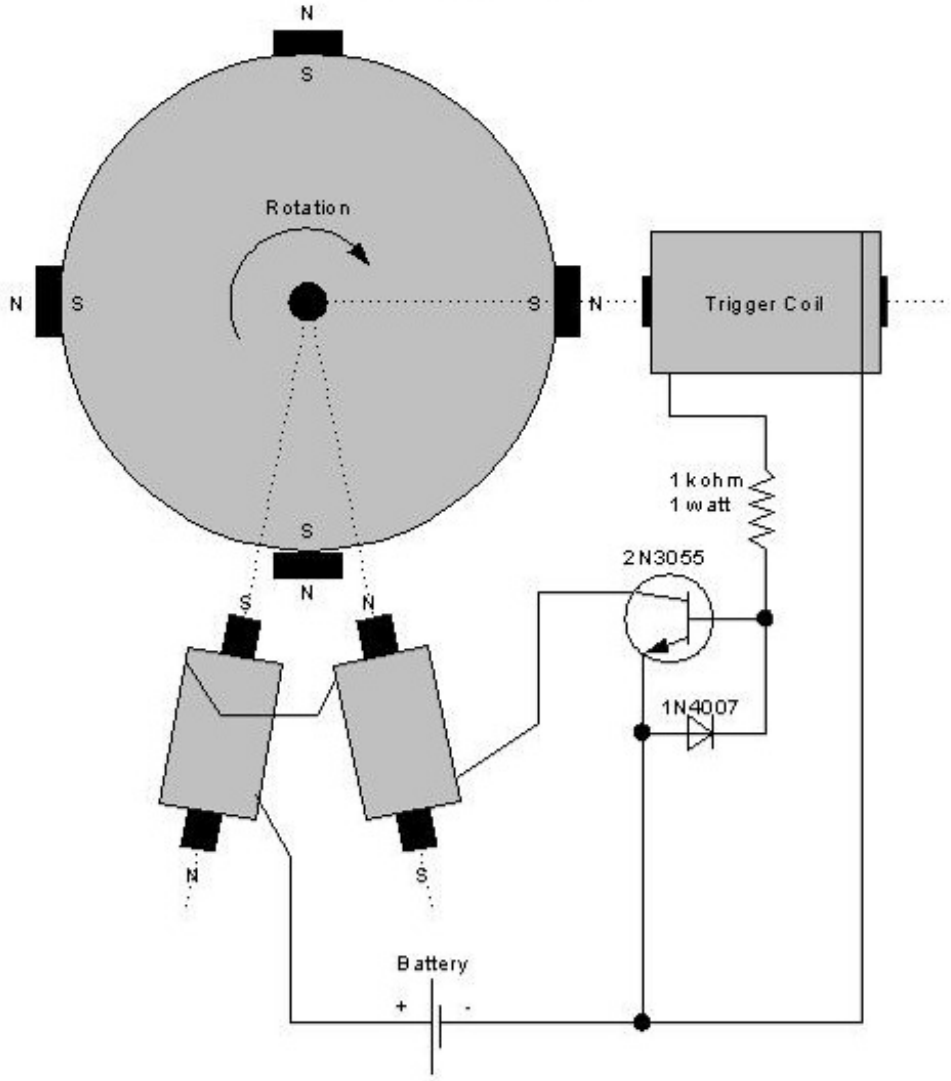
Loading....

Measurements:

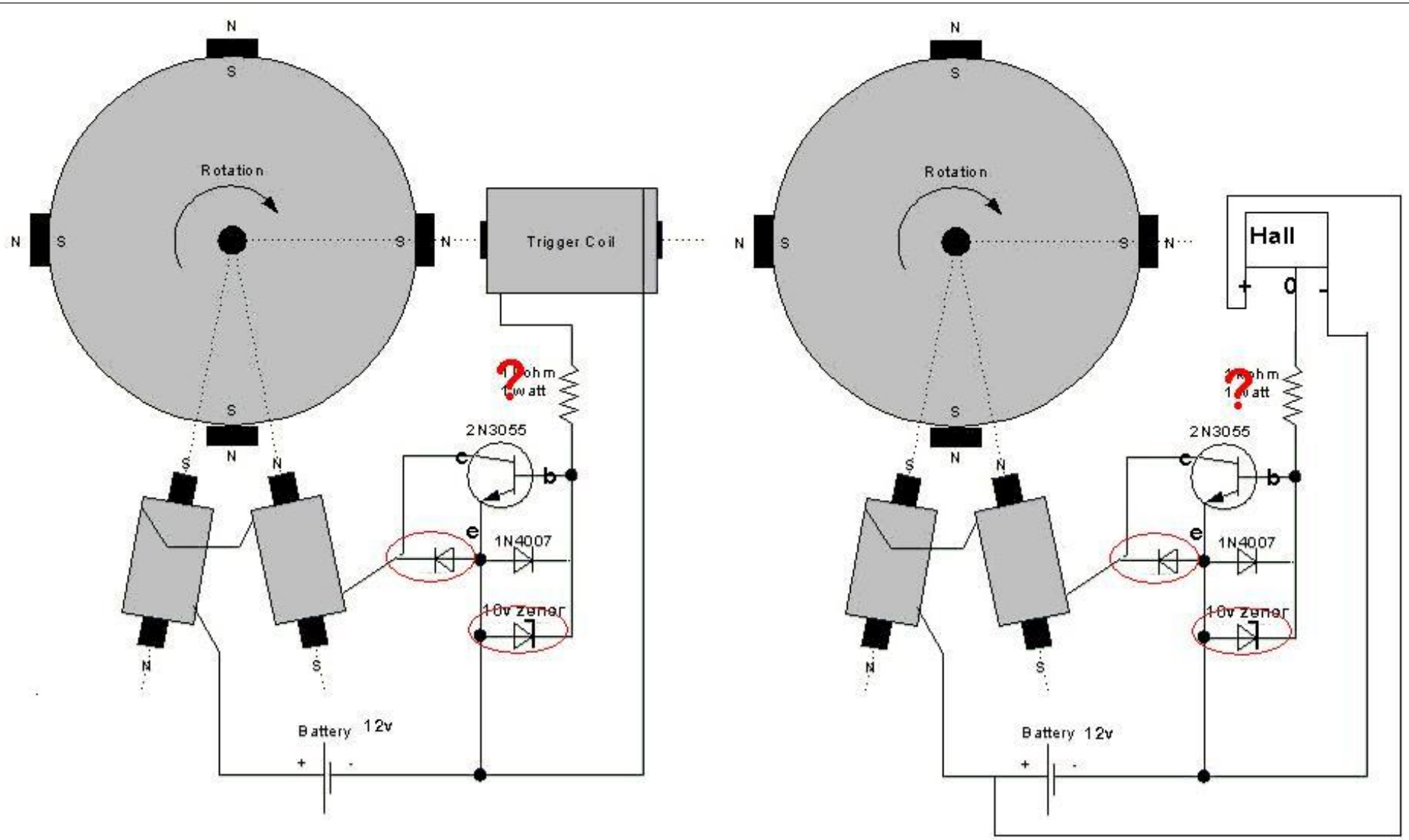
Loading....

Show measurement log

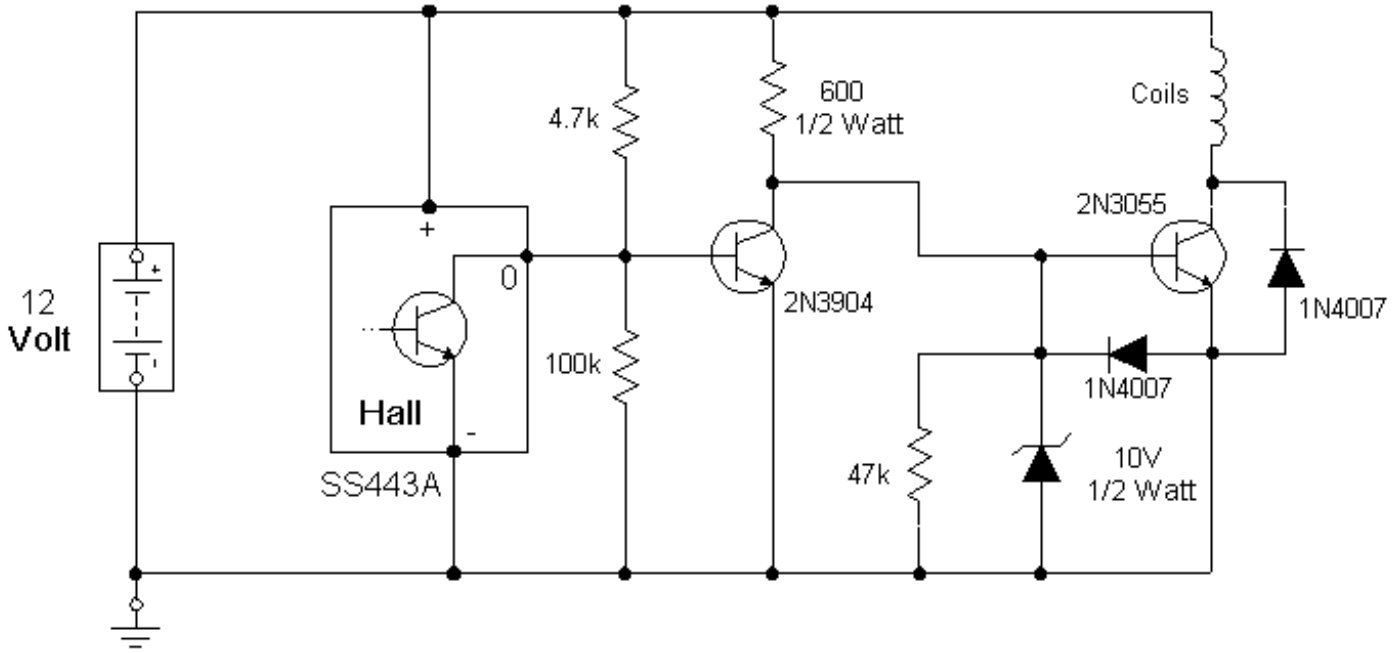
Update every 5 seconds (In case of a lot of loading, change to more seconds per update.)



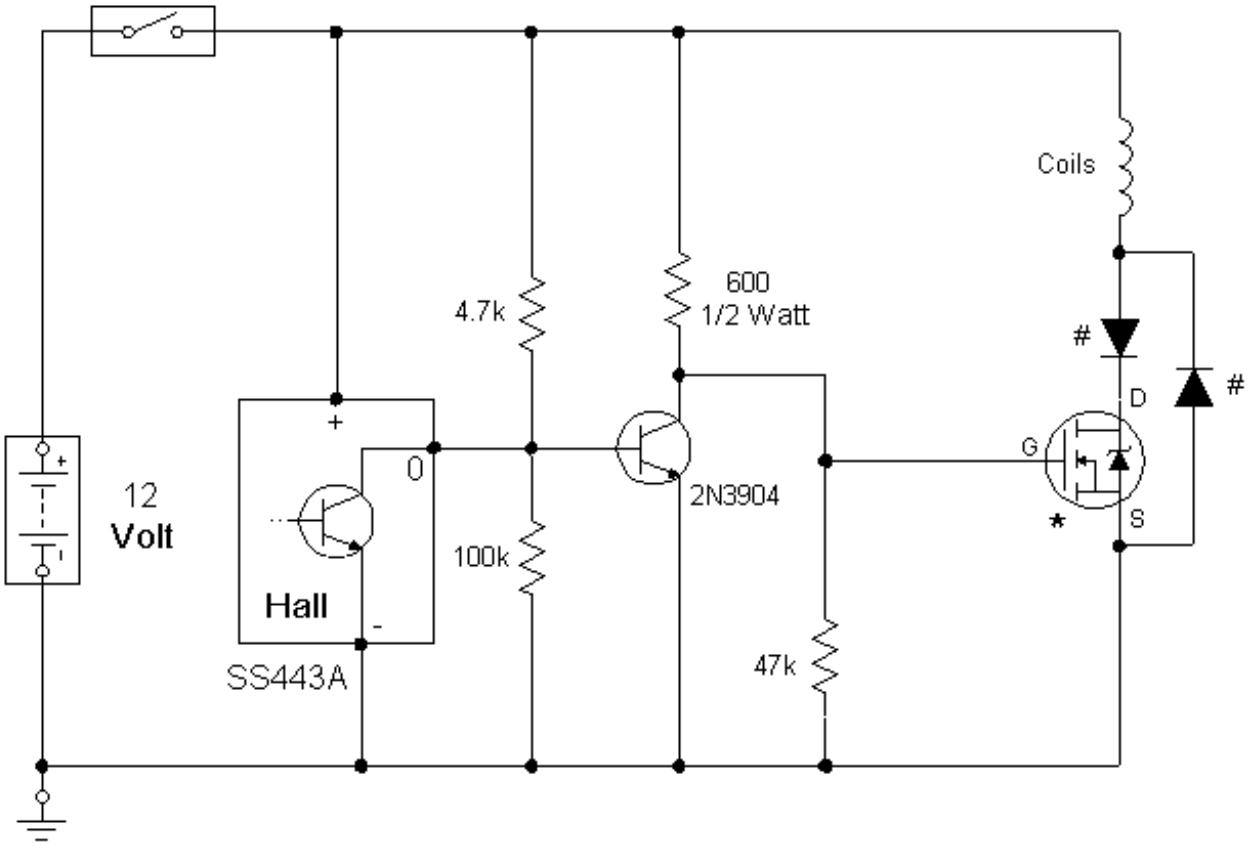
The first setup



First circuit design



The present controller



The new controller



Or download this Movie.(right click: save target as...)

Manual rotation **Base 2N3904** **0.5 Volt/Div** **5mSec Time/Div** **Mag 1x**	**Manual rotation** **Base TIP35C** **0.5 Volt/Div** **5mSec Time/Div** **Mag 1x**	**Manual rotation** **Collector TIP35C** **1 Volt/Div** **5mSec Time/Div** **Mag 1x**
		
Or download this Base2n3904ManualRot.(right click: save target as...)	Or download this BaseTIP35CmanualRot.(right click: save target as...)	Or download this CollectorTIP35CManualRot. (right click: save target as...)

Manual rotation **Hot side drive coils** **1 Volt/Div** **5mSec Time/Div** **Mag 1x**



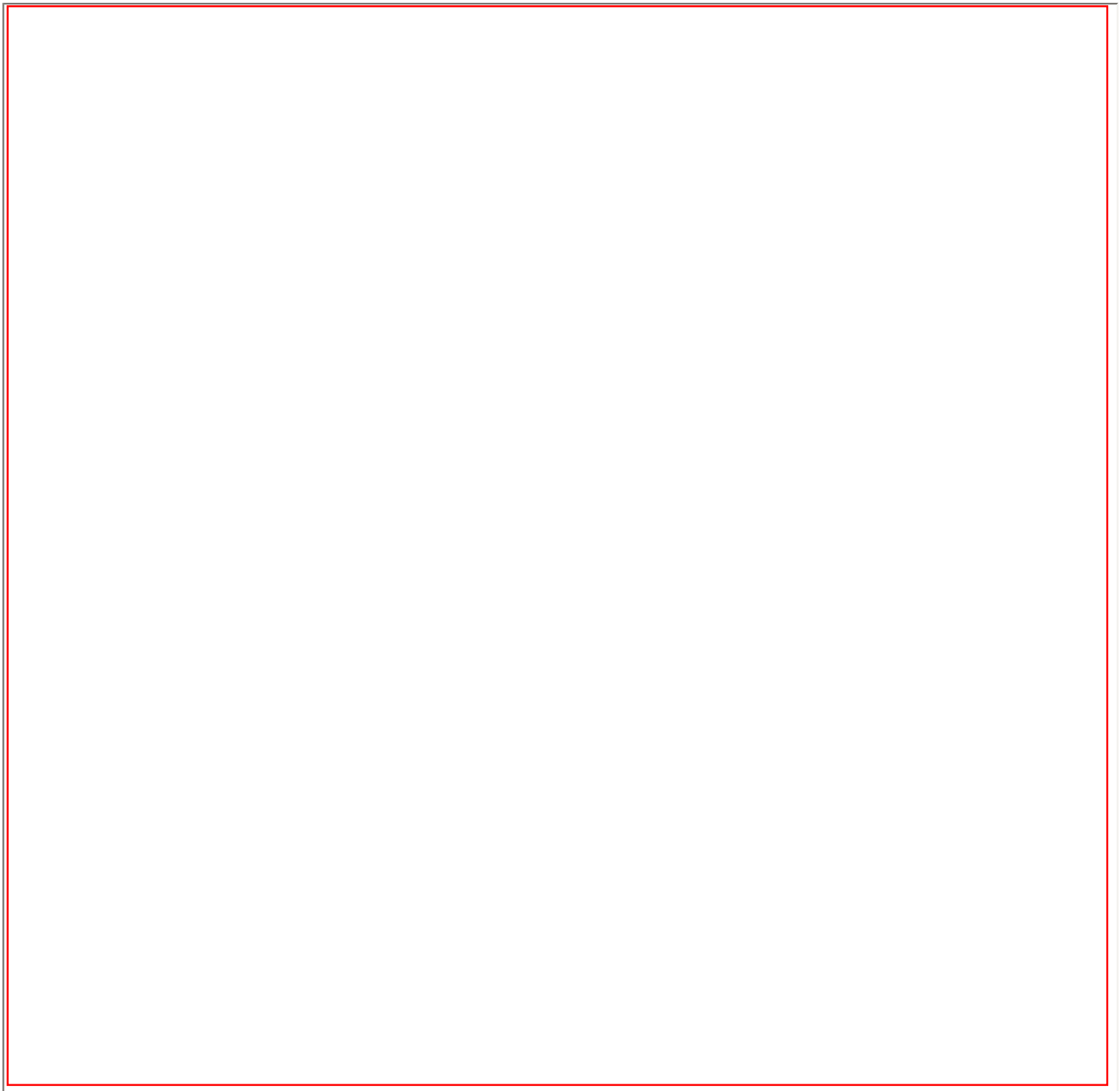
Or download this HotSideDriveCoilsManualRot.
(right click: save target as...)

Back EMF on EXT output
50 Volt/Div
5mSec Time/Div
Mag 1x



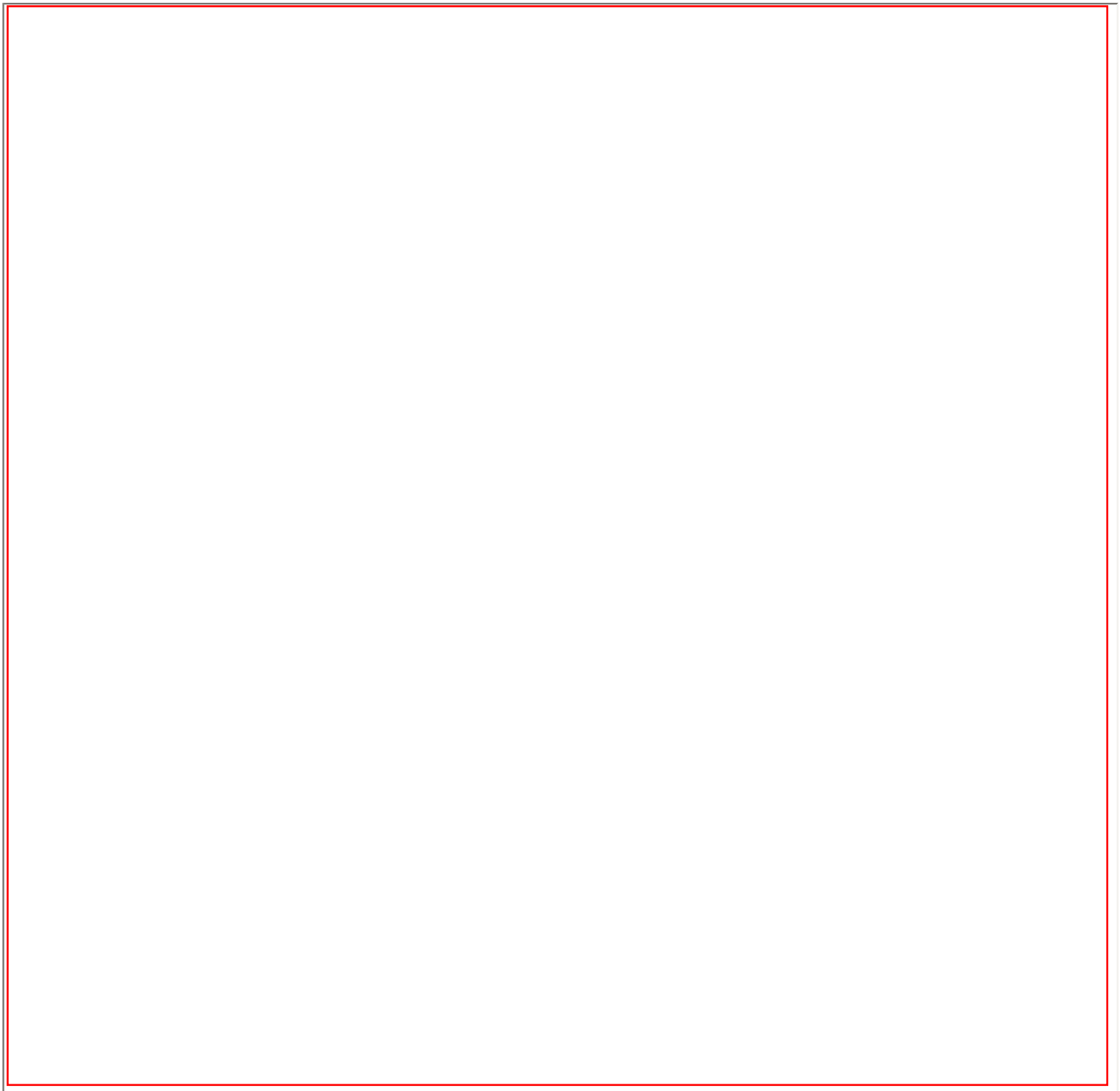
Or download this cEMF Ext.(right click: save target as...)

Back EMF on EXT output
10 Volt/Div
10mSec Time/Div
Mag 1x



Or download this MycEMF.(right click: save target as...)

Back EMF on EXT output
50 Volt/Div
5mSec Time/Div
Mag 1x



Or download this MyRepellingCoilsEmf.(right click: save target as...)

ROYAUME DE BELGIQUE

MINISTERE DES AFFAIRES ECONOMIQUES

BREVET D'INVENTION

N° 815.710

Classif. International : H 02 k

Mis en lecture le : 16-9-1974

Le Ministre des Affaires Economiques,

Vu la loi du 24 mai 1854 sur les brevets d'invention ;

Vu le procès-verbal dressé le 29 mai 1974 *à* 14 h.25

au greffe du Gouvernement provincial de Liège;

ARRÊTE :

Article 1. — *Il est délivré à* Mr. Albert MICHEL,
33, avenue des Ormes, 4040 Mery/Tilff,

repr. par l'Office de Brevets E. Dellicour à Liège,

un brevet d'invention pour : Moteur rotatif.

Article 2. — *Ce brevet lui est délivré sans examen préalable, à ses risques et périls, sans garantie soit de la réalité, de la nouveauté ou du mérite de l'invention, soit de l'exactitude de la description, et sans préjudice du droit des tiers.*

Au présent arrêté demeurera joint un des doubles de la spécification de l'invention (mémoire descriptif et éventuellement dessins) signés par l'intéressé et déposés à l'appui de sa demande de brevet.

Bruxelles, le 14 juin 1974

PAR DELEGATION SPECIALE
Le Directeur général

R. RAUX

http://www.fdp.nu/shared/files/Albert%20Michel//brevetmichel%2001.pdf

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Mémoire descriptif déposé à l'appui d'une demande de

B R E V E T d' I N V E N T I O N

au nom de:

Albert M I C H E L

pour:

"Moteur rotatif"

La présente invention est relative à un moteur rotatif, dont le fonctionnement est basé sur la propriété qu'ont les aimants de s'attirer ou de se repousser et consiste à utiliser l'énergie des aimants pour la trans-

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former en un mouvement rotatif.

Pour réaliser un moteur rotatif de ce type dans lequel les efforts traction et poussée sont conjugués, il a paru avantageux suivant l'invention de créer un moteur rotatif caractérisé en ce que le bloc moteur est réalisé en une matière isolante électriquement, telle que l'aluminium ou une matière plastique, et en ce que sont disposés radialement de manière régulièrement espacée d'une part dans le rotor ou dans l'enveloppe ou stator un certain nombre de barreaux aimantés dont le pôle de même nom fait saillie dans la chambre du moteur et, d'autre part respectivement dans l'enveloppe ou stator ou dans le rotor des aimants en fer à cheval, dont le nombre diffère d'au moins une unité du nombre de barreaux aimantés de l'autre élément et qui sont placés de telle manière que leurs pôles de nom contraire se suivent dans le sens de rotation du moteur.

Suivant l'invention pour éviter les temps morts, il a paru encore avantageux de prévoir la suppression du champ magnétique par une isolation amovible entre un aimant en fer à cheval et un barreau, lorsque la rotation du rotor les amène l'un en face de l'autre.

Pour mieux faire comprendre l'invention, celle-ci est décrite ci-après avec plus de détails sur la base des dessins schématiques annexés, à titre d'exemple uniquement, montrant en:

Figure 1 une coupe au travers d'un moteur rotatif, réalisé suivant l'invention;

Figure 2 une demi-coupe suivant la ligne II-II de figure 1, et

Figure 3 une vue de profil du moteur, montrant le mécanisme de déplacement des isolants.

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Comme on le voit aux dessins, un moteur rotatif conforme à l'invention est constitué d'une enveloppe ou ctator 1, en aluminium par exemple, et d'un rotor 2, également en aluminium, susceptible de tourner avec son arbre 3 dans la chambre 4 de l'enveloppe.

Dans le rotor sont montés radialement des barreaux aimantés 5, ici au nombre de quatre, dont le pôle de même nom, soit le pôle positif, fait saillie hors du rotor. Ces barreaux sont espacés dans le rotor de manière uniforme.

Dans des logements appropriés 6 de l'enveloppe 1 sont également montés radialement et espacés de manière uniforme des aimants en fer à cheval 7, ici au nombre de trois. Ces logements 6 s'ouvrent dans la chambre 4 de l'enveloppe et les aimants 7 sont montés dans leurs logements de manière réglable en hauteur, de façon à faire plus ou moins saillie dans ladite chambre.

Le principe de fonctionnement du moteur est très simple. Les extrémités des barreaux 5 de pôle positif sont attirées par la branche de pôle contraire la plus voisine d'un aimant en fer à cheval 7 et repoussées par la branche de même pôle la plus voisine d'un autre aimant en fer à cheval 7. De ce fait, les efforts, traction et poussées, sont conjugués et les extrémités des barreaux 5 entraînent avec elles en rotation le rotor 2 et l'arbre de commande 3.

Pour augmenter la puissance, on peut augmenter la force magnétique en amenant les aimants en fer à cheval 7 à faire saillie de manière plus prononcée dans la chambre 4. A cet effet peut être prévu un mécanisme approprié (non représenté) agissant sur les tiges supports 8 desdits

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aimants.

Pour éviter les temps morts dans la rotation du rotor 2, l'invention prévoit que le nombre des barreaux aimantés et le nombre des aimants en fer à cheval diffèrent d'au moins une unité, de telle façon qu'à aucun moment tous les barreaux et tous les aimants en fer à cheval ne soient en face l'un de l'autre. Grâce à cette caractéristique, lorsqu'un des barreaux est en face d'un aimant en fer à cheval, les autres barreaux continuent à subir les efforts conjugués de traction et poussée.

Pour empêcher que le rotor ne marque quand même un temps d'arrêt, il est prévu encore suivant l'invention de supprimer le champ magnétique entre un aimant en fer à cheval et un barreau aimanté, lorsque la rotation du rotor les amène l'un en face de l'autre, grâce à une isolation amovible. A cet effet, une garniture en isolant 9 est montée de manière à pouvoir coulisser devant les deux pôles des aimants en fer à cheval 7 et le déplacement de cet isolant est commandé par l'arbre de rotor 3.

Sur l'arbre de rotor 3 est monté de chaque côté en dehors du bloc moteur un disque à cames 10, pourvu d'autant de cames 11 qu'il y a de barreaux aimantés 5, cames qui sont placées en correspondance avec lesdits barreaux. Les isolants 9 sont montés dans une glissière 12 de l'enveloppe sur l'extrémité d'un bras double pivotant 13, dont l'autre extrémité est traversée par une tige 14 portant à chaque bout une roulette 15, qui est en contact avec le disque à cames correspondant. On se rend compte aisément qu'au moment où un barreau aimanté 5 s'approche d'un aimant en fer à cheval 7, les cames correspondantes 11 soulèvent les roulettes 15 et font pivoter le bras 13,

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c'est-à-dire font coulisser l'isolant 9 pour l'amener devant les pôles de l'aimant en fer à cheval (voir l'isolant 9, dans le haut du dessin en figure 1). Ce barreau 5 n'est donc plus sous l'influence du champ magnétique tandis que les autres barreaux 5 restent sous l'influence des autres aimants en fer à cheval 7, dont les isolants 9 sont en position de retrait.

L'invention prévoit encore de munir les aimants en fer à cheval d'un petit isolant permanent 16 placé à l'intérieur des branches de l'aimant contre la branche de pôle de nom contraire à celui des barreaux aimantés, pour supprimer de manière encore plus efficace l'attraction entre la branche appropriée de l'aimant en fer à cheval et le barreau, lorsqu'ils sont face à face.

Pour augmenter la puissance du moteur on peut disposer sur un rotor relativement long plusieurs barreaux alignés ou prévoir plusieurs rotors sur un même axe et de manière correspondante plusieurs aimants en fer à cheval alignés dans l'enveloppe.

Bien entendu, on ne sortirait pas du domaine de l'invention en apportant au moteur rotatif décrit ci-dessus et représenté aux dessins annexés l'une ou l'autre modification purement constructive.

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REVENDICATIONS

1. Moteur de type rotatif, dont le fonctionnement est basé sur la propriété qu'ont les aimants de s'attirer ou de se repousser, caractérisé en ce que le bloc moteur est réalisé en une matière isolante électriquement, telle que l'aluminium, ou une matière plastique, et en ce que sont disposés radialement de manière régulièrement espacée d'une part dans le rotor ou dans l'enveloppe ou stator un certain nombre de barreaux aimantés dont le pôle de même nom fait saillie dans la chambre du moteur et d'autre part respectivement dans l'enveloppe ou stator ou dans le rotor des aimants en fer à cheval, dont le nombre diffère d'au moins une unité du nombre de barreaux aimantés de l'autre élément et qui sont placés de telle manière que leurs pôles de nom contraire se suivent dans le sens de rotation du moteur.

2. Moteur rotatif suivant la revendication 1, caractérisé en ce que la suppression du champ magnétique est prévue entre un aimant en fer à cheval et un barreau, lorsque la rotation du rotor les amène l'un en face de l'autre.

3. Moteur rotatif suivant la revendication 2, caractérisé en ce qu'une garniture isolante amovible est prévue pour chaque aimant en fer à cheval ou chaque barreau aimanté monté dans l'enveloppe et en ce que le déplacement de cette garniture isolante est commandé à partir de l'arbre du rotor.

4. Moteur rotatif suivant les revendications 2 et 3, caractérisé en ce que la commande des garnitures isolantes est réalisée par un disque à cames monté sur l'arbre du rotor, chaque came correspondant à un barreau aimanté ou à un aimant en fer à cheval monté dans le rotor et étant

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destinée à actionner un bras de commande du coulissement de la garniture.

5. Moteur rotatif suivant l'une quelconque des revendications 1 à 4, caractérisé en ce qu'à l'intérieur des branches des aimants en fer à cheval et contre la branche disposée en avant dans le sens de rotation du rotor est montée une petite garniture isolante.

6. Moteur rotatif, dont le fonctionnement est basé sur la propriété qu'ont les aimants de s'attirer ou de se repousser, tel que décrit ci-dessus et représenté aux dessins annexés.

Liège, le 29 mai 1974.

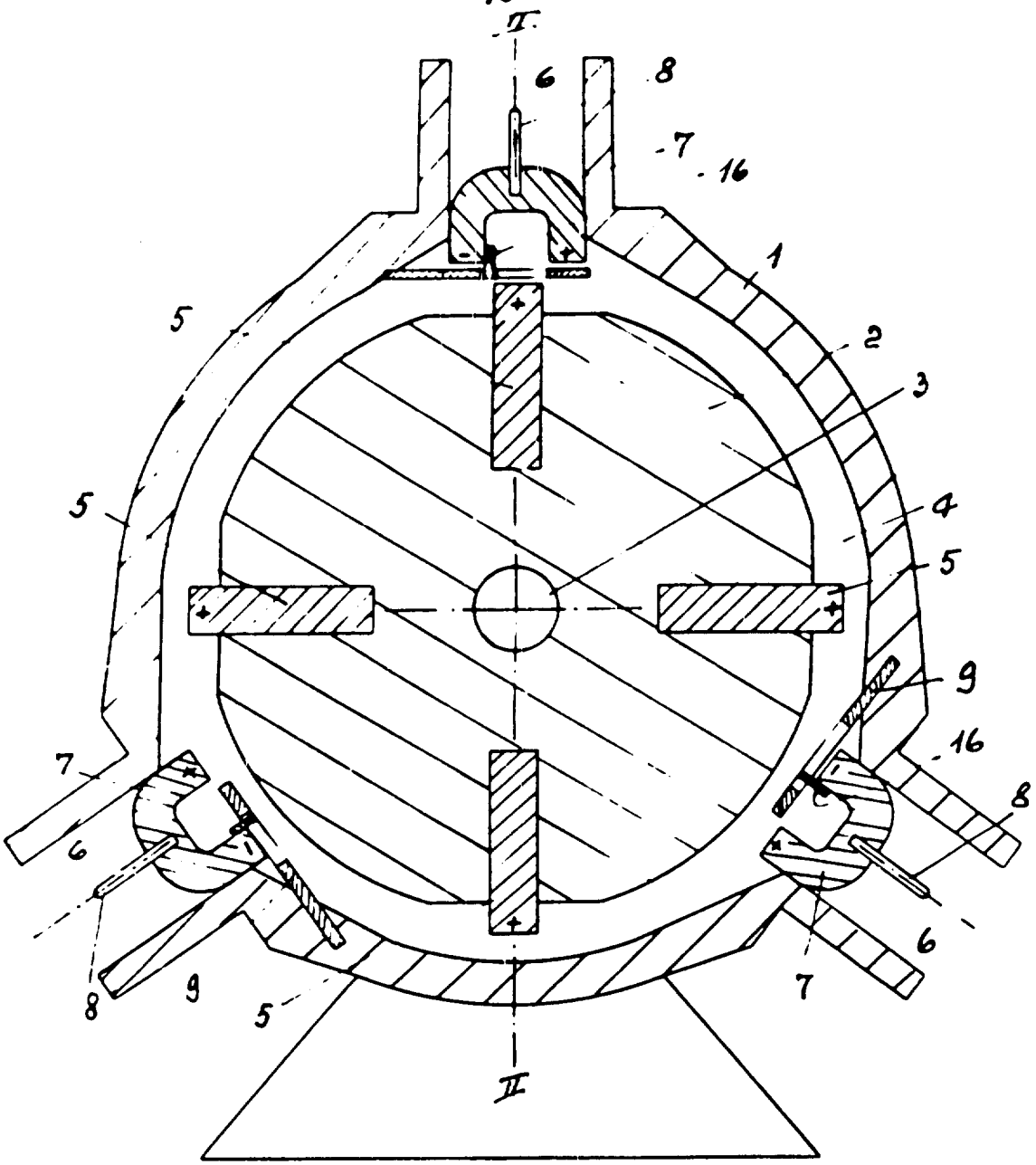
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Fig. 1



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Fig. 3

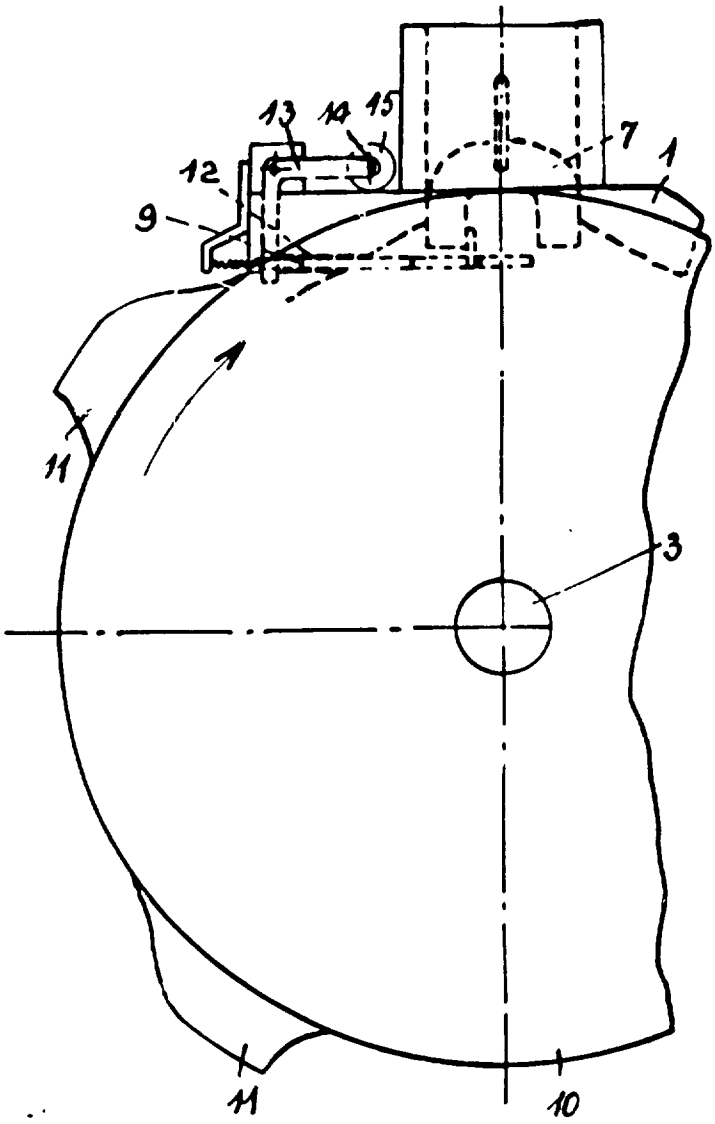
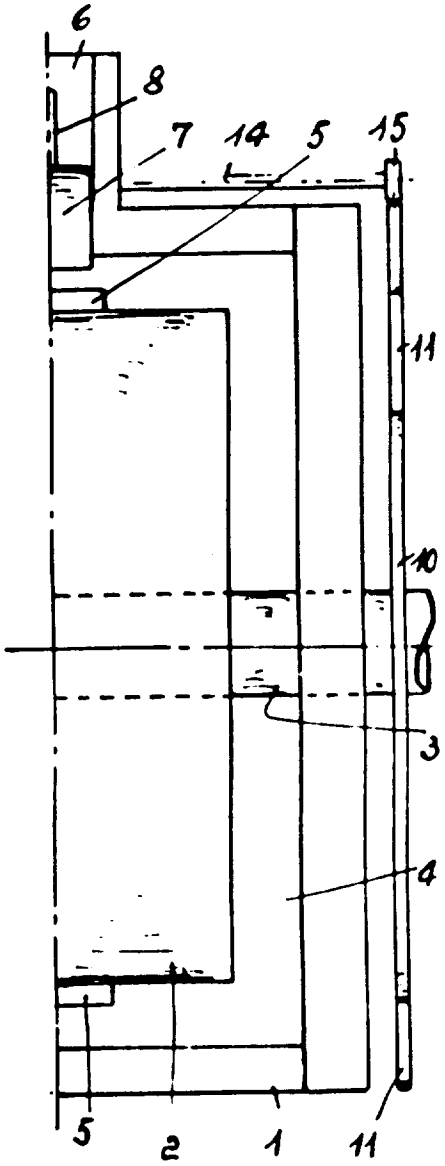


Fig. 2



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PATENT No 815.710
Dated: 16-9-1974

The Minister for the Economic affairs,
Considering the official report May 29, 1974

Article 1. - It is delivered to Mr. Albert MICHEL
repr. by the Office of Patents E Dellicour in Liege,
a patent for : Rotary engine.

Article 2. This patent is delivered to him without prior examination for risk and danger,
without guarantee is reality, innovation or merit of the invention, follows exactitude of description, and without damage of the right of thirds.

Brussels, June 14, 1974
BY SPECIAL DELEGATION
R.RAUX

" Rotary engine " -

The present invention relates to a rotary engine, whose operation is based on the property that have the magnets to attract each other one to push back itself and consists in using the energy of loving to transform it into a rotary movement.
To produce a rotary engine of this type in which the efforts traction and thorough are combined, it appeared advantageous according to the invention to create a rotary engine characterized in that the driving block is made out of an insulating matter electrically, such as aluminium or a plastic and in what are radially laid out in a way regularly spaced on the one hand in the rotor or the envelope or stator a certain number of bar magnets whose of the same pole name makes covered in the room of the engine and, on the other hand respectively in the envelope or stater or the rotor of the horseshoe magnets, of which the number differs number of bar magnets of the other element and which are placed in such a way that their poles of contrary name are followed in the direction of rotation of the engine.
According to the invention to avoid the idle periods, it has still advantageous puru to envisage the removal of the magnetic field by a removable insulation between an iron magnet á horse and a bar, when the rotation of the rotor brings them one opposite the other *
For better rendering comprehensible the invention, this one is described hereafter with more details on the basis of draws diagrammatic annexed, by way of example only, showing one:
Figure 1 a cut through rota-tif engine, produced according to the invention,
Figure 2 a half-section according to line II-II of figure 1, and
Figure 3 a sight of profile of the engine, showing the mechanism of displacement of insulators.

As one sees it with the drawings, a rotary engine conforms á the invention consists of an envelope or stator 1, out of aluminium for example, and of a rotor 2, also out of aluminium, likely to turn with its tree 3 in room 4 of the envelope.
In the rotor bar-reaux magnetized 5 are assembled radially, here four, whose of the same pole name, is the positive pole, fact covered out of the rotor. These bars are spaced in the rotor in manner uni-forme.
In suitable residences 6 of envelope 1 are also gone up radially and spaced in a uniform way of the horseshoe magnets 7, here three. These residences 6 open in room 4 of the envelope and magnets 7 are assembled in their loge-ments in an adjustable way in height, in order to make more or less covered in the aforementioned room.
The principle of operation of the engine is very simple. The ends of bars 5 of positive pole are attracted by the branch of contrary pole closest to a horseshoe magnet 7 and are pushed back by the of the same branch pole closest to another horseshoe magnet 7. So the efforts, traction and pitched, are combined and the ends of bars 5 actuate with them in rotation rotor 2 and the driving shaft 3. -
To increase the power, one can increase the magnetic force by leading the iron magnets á horse 7 á to make covered will handle more marked in room 4. To this end can be envisaged a suitable mechanism (not represented) acting on the stems supported 8 of the aforesaid magnets.
To avoid the idle periods in the rotation of rotor 2, the invention provides that the number of the bar magnets and numbers it horseshoe magnets differ from at least a unit, in such way that at any time all the horseshoe bars and

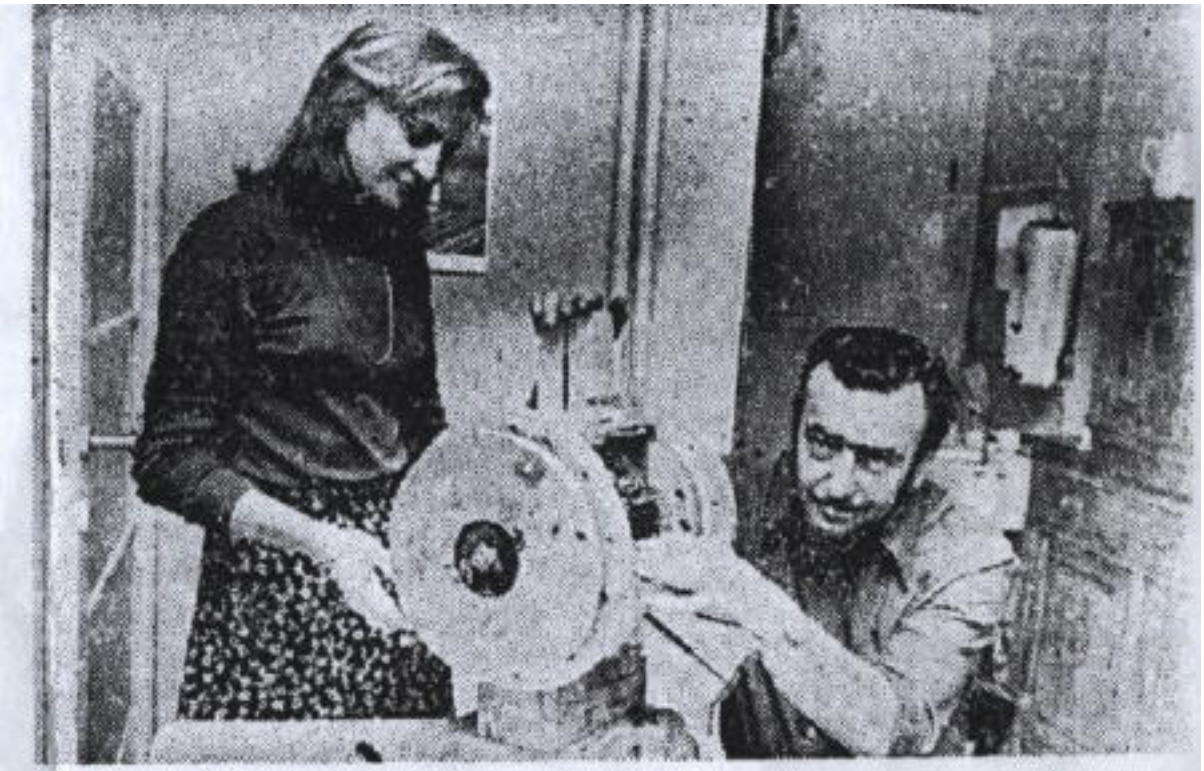
all magnets are not opposite one the other "Thanks to this caractéris-tique, when one of the bars is opposite an iron magnet á horse, other bars continue to undergo the combined efforts of traction and pushed.
For empocher that the rotor does not mark a downtime nevertheless, it is still envisaged according to the invention to remove the magnetic field between an iron magnet á horse and a bar magnet, when the rotation of the rotor brings them one opposite the other, thanks to a removable insulation. To this end, a trimming by insulating 9 is assembled so as to be able to slide in front of the two magnetic poles out of iron á horse 7 and the displacement of this insulator is ordered by the runner shaft 3.
On the runner shaft 3 is gone up of each with dimensions outside the driving block a disc with cams 10, equipped with as many cams 11 than there are bar magnets 5, cams which are placed are correspondence with the aforementioned bars. Insulators 9 are assembled in a slide 12 of the envelope on the end of a double arm swivelling 13, whose other end is crossed by a stem 14 bearing with each end a caster 15, which is in contact with the corresponding disc with cams.
One realizes easily that at the time or a bar magnet 5 approaches a horseshoe magnet 7, the corresponding cams 11 raises casters 15 and makes swivel arm 13, i.e. make slide insulator 9 to bring it in front of the poles of aioant out of horseshoe (see insulator 9, in the top of the drawing of figure 1). This bar 5 is not thus any more under the influence of the magnetic field while other bars 5 remain under the influence of the others magnetized out of horseshoe 7, whose insulators 9 are in position of withdrawal.
The invention still envisages to provide the horseshoe magnets with a small permanent insulator 16 placed inside the branches of the magnet against the branch of pole of contrary name to that of the bar magnets, to remove in a way even more effective attraction between the suitable branch of the iron magnet á horse and the bar, when they are face to face.
To increase the engine output one can lay out on a relatively long rotor several aligned bars or envisage several rotors on the same axis and in a corresponding way several magnets out of horseshoe aligned in the envelope,
Of course, one would not leave the field of the invention while bringing to the rotary engine describes above and represented with the annexed drawings one or the other constructive modification purging.

REVENDlCATIONS

1. Engine of the rotary type, whose operation is based on the property that have the magnets to attract each other or to be pushed back, characterized in that the driving block is made out of an insulating matter electrically, such as aluminium, or a plastic, and in what are radially laid out in a way regularly spaced on the one hand in the rotor or the envelope or stator a certain number of bar magnets whose of the same pole name makes covered in the room of the engine and on the other hand respectively in the envelope or stator or the rotor of the horseshoe magnets, of which the number differs from at least one bar magnets of the other element and which are placed in such a way that their poles of contrary name are followed in the direction of rotation of the engine.
2. Rotary engine following the claim L, carac-terized in what the removal of the magnetic field is provided between a horseshoe magnet and a bar, lors-que the rotation of the rotor brings them one opposite the other.
3. Rotary engine following claim 2, carac-terized in what a removable insulating trimming is provided for each ai-manté bar or horseshoe magnet each assembled in the envelope and be that the displacement of this insulating trimming is ordered starting from the tree of the rotor.
4. Rotary engine following the claims 2 and 3, characterized in that the commando of the insulating trimmings is carried out by a disc with cams assembled on the tree of the rotor, each cam corresponding á a bar magnet or to an iron magnet á horse assembled in the rotor and being intended to actuate an arm of ordering of the sliding motion of the trimming.
5. Rotary engine following any of claims 1 to 4, characterized in that inside the branches of the horseshoe magnets and branch laid out ahead in the direction of rotation of the rotor is assembled a small insulating trimming.
6. Engine rotary, whose operation is based on the property that have the magnets to attract each other or to be pushed back, as described above and represented with the annexed des-sins

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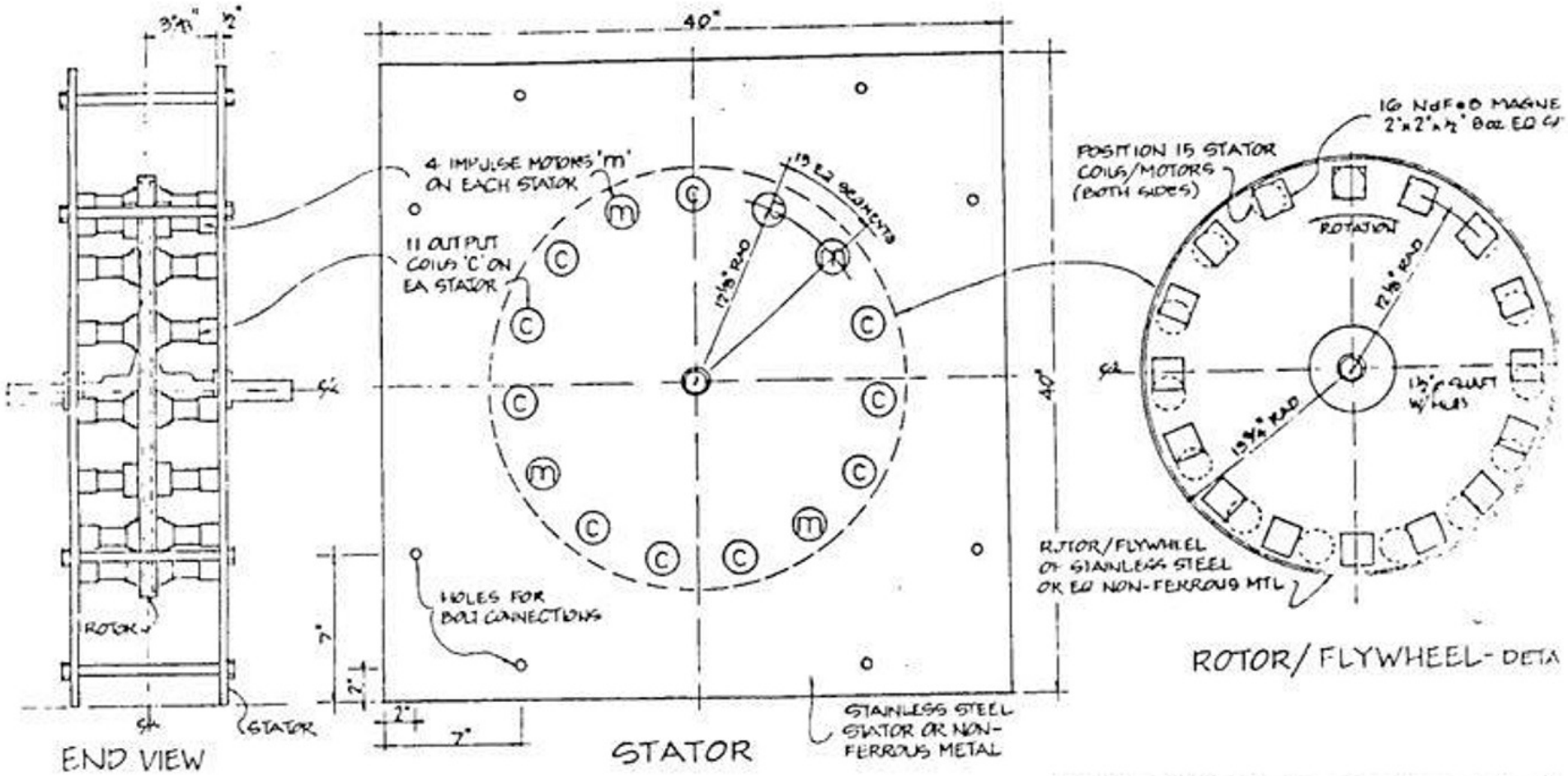


M. et Mme Michel présentent leur moteur. (Photo Robyns

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HIGH FREQUENCY UNI-POLAR MOTOR ALT

SCALE NONE	APPROVED BY W. Muller	DRAWN BY
DATE 20 JAN '87		REVISED

FRAN TECHNOLOGIES CORP. PENTICTON B.C.

FRONT & SIDE ELEV & ROTOR ELEV | DRAWING ? of ?

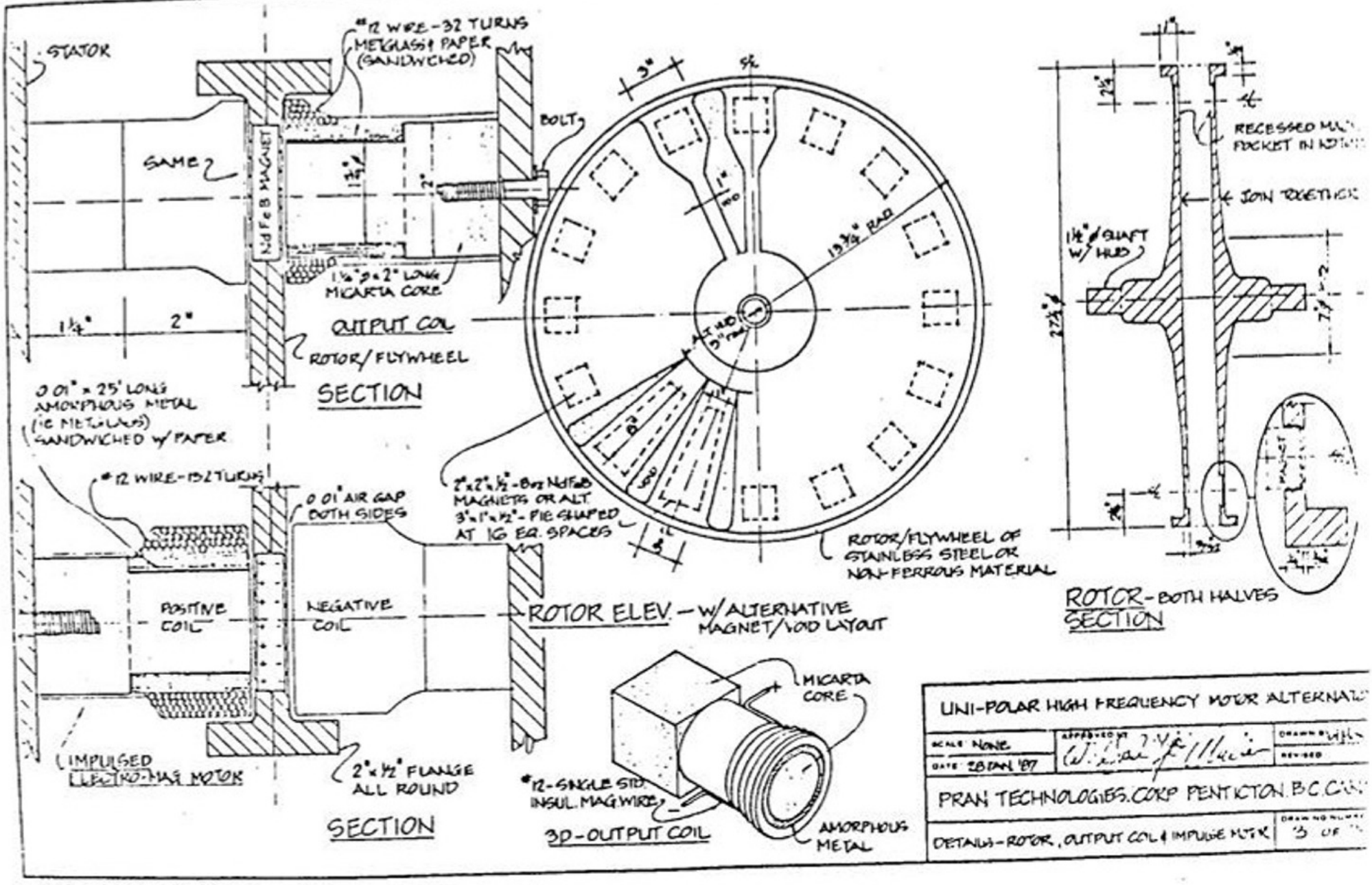
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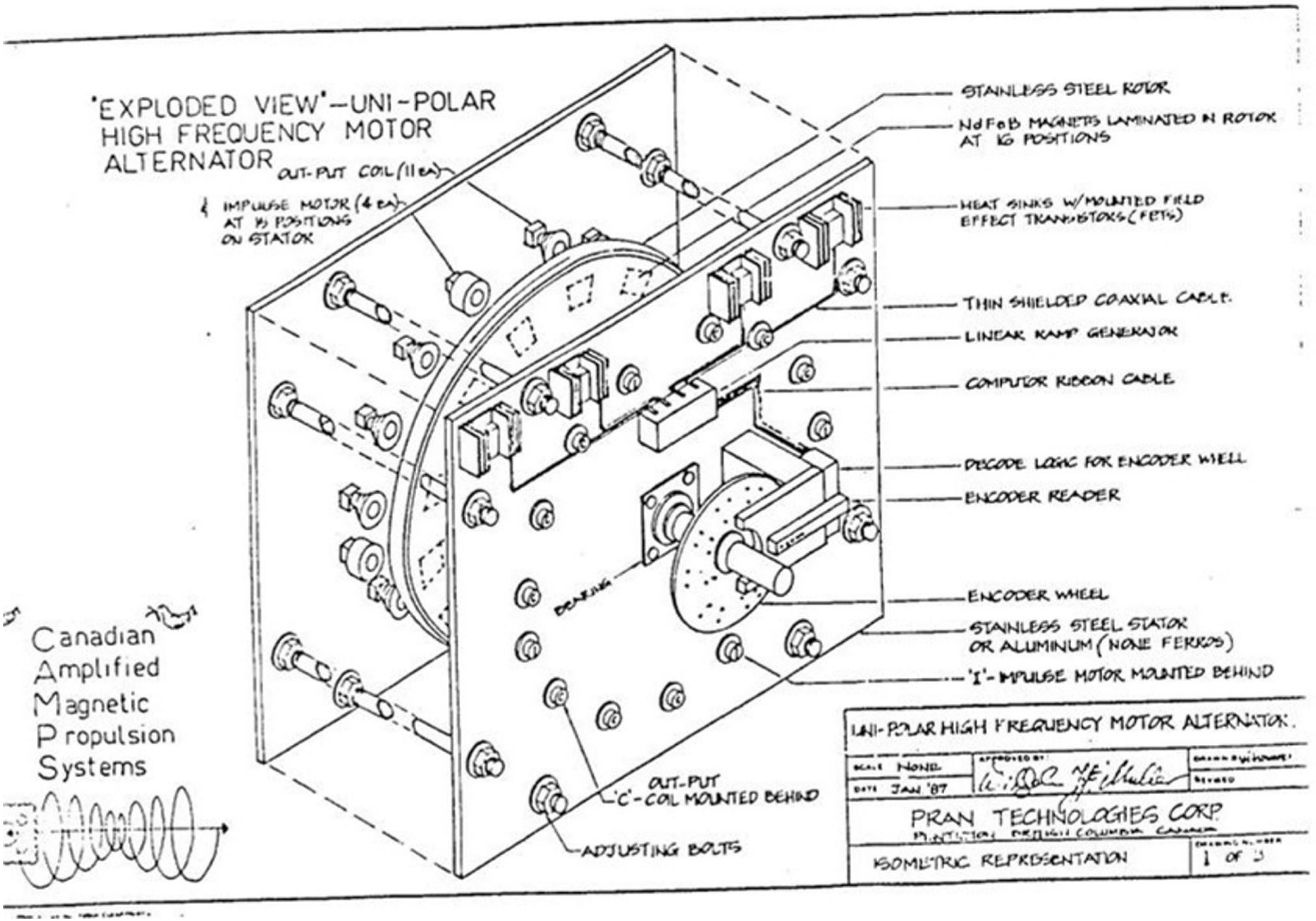
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DATE: 28 JAN '87	DRAWN: Bill
PRAN TECHNOLOGIES. CORP PENTICTON. B.C. CAN	
DETAILS - ROTOR, OUTPUT COIL & IMPULSE MOTOR	DRAWING NO. SHEET 3 OF

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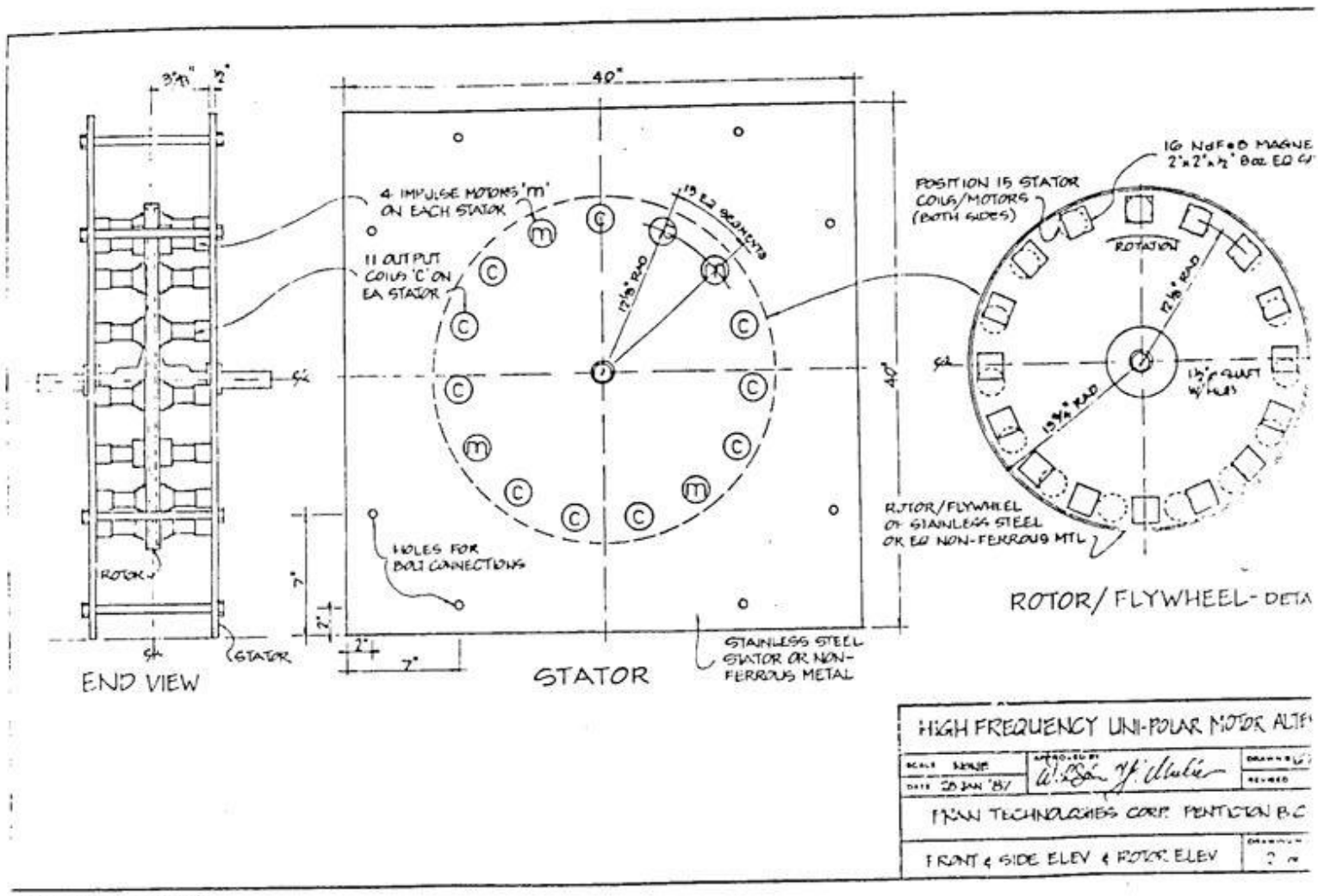
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'EXPLODED VIEW'—UNI-POLAR HIGH FREQUENCY MOTOR ALTERNATOR
OUT-PUT COIL (11 EA)
IMPULSE MOTOR (4 EA) AT 90 POSITIONS ON STATOR
STAINLESS STEEL ROTOR
NdFeB MAGNETS LAMINATED IN ROTOR AT 16 POSITIONS
HEAT SINKS W/MOUNTED FIELD EFFECT TRANSISTORS (FETS)
THIN SHIELDED COAXIAL CABLE
LINEAR RAMP GENERATOR
COMPUTER RIBBON CABLE
DECODE LOGIC FOR ENCODER WHEEL
ENCODER READER
BEARING
ENCODER WHEEL
STAINLESS STEEL STATOR OR ALUMINUM (NONE FERROS)
'I'-IMPULSE MOTOR MOUNTED BEHIND
'C'-OUT-PUT COIL MOUNTED BEHIND
ADJUSTING BOLTS
Canadian Amplified Magnetic Propulsion Systems
UNI-POLAR HIGH FREQUENCY MOTOR ALTERNATOR.
SCALE NONE
DATE JAN '87
APPROVED BY
DRAWN BY
REVISED
PRAN TECHNOLOGIES CORP.
MANUFACTURING DESIGN & CONSULTING ENGINEERS
ISOMETRIC REPRESENTATION
DRAWING NUMBER 1 OF 3

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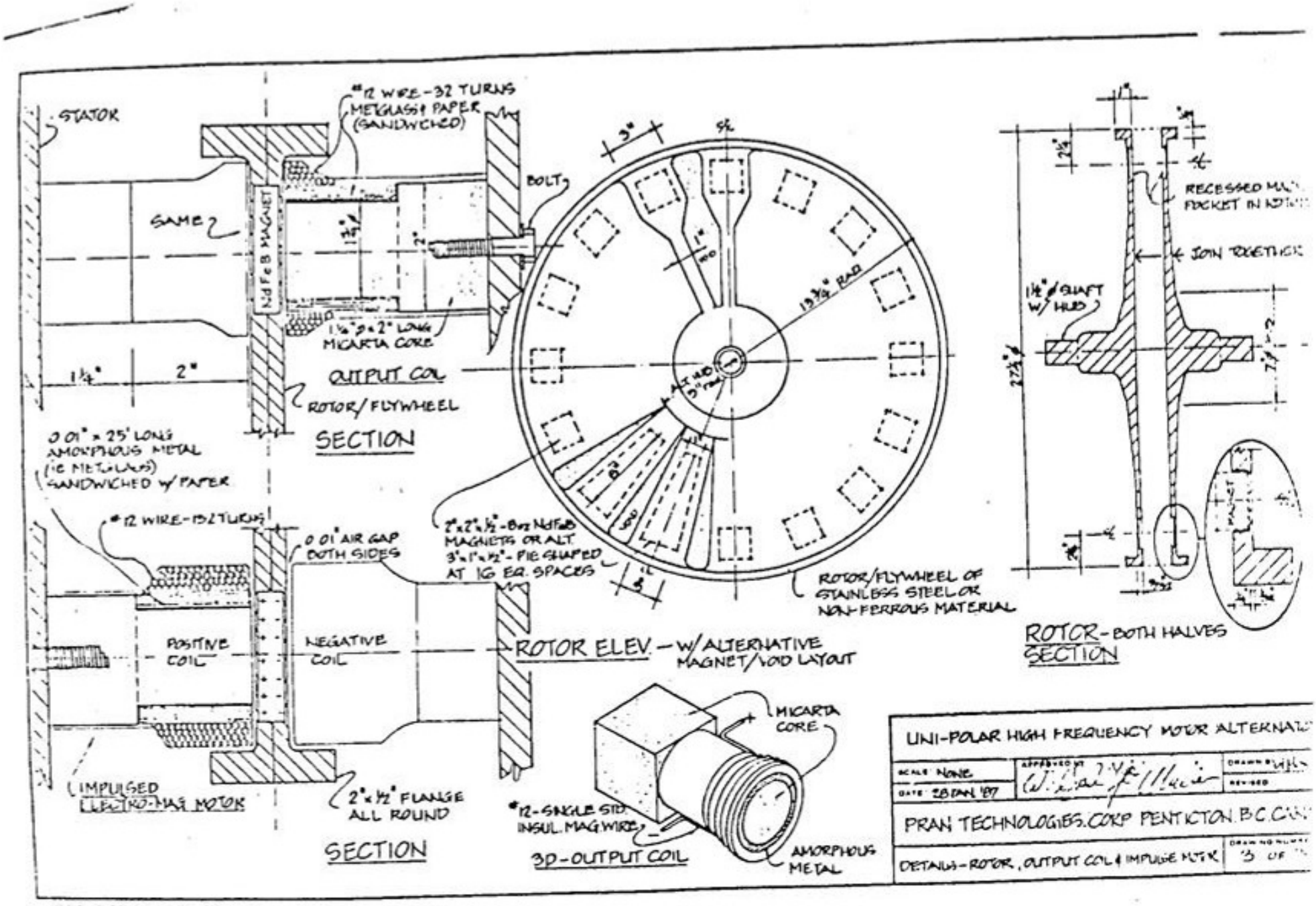
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40"
4 IMPULSE MOTORS 'm' ON EACH STATOR
11 OUTPUT COILS 'C' ON EA STATOR
HOLES FOR BOLT CONNECTIONS
STAINLESS STEEL STATOR OR NON-FERROUS METAL
STATOR
ROTOR
STATOR
END VIEW
POSITION 15 STATOR COILS/MOTORS (BOTH SIDES)
ROTATION
ROTOR/FLYWHEEL OF STAINLESS STEEL OR EQ NON-FERROUS MTL
ROTOR/ FLYWHEEL- DETA
HIGH FREQUENCY UNI-POLAR MOTOR ALT
FRONT & SIDE ELEV & ROTOR ELEV

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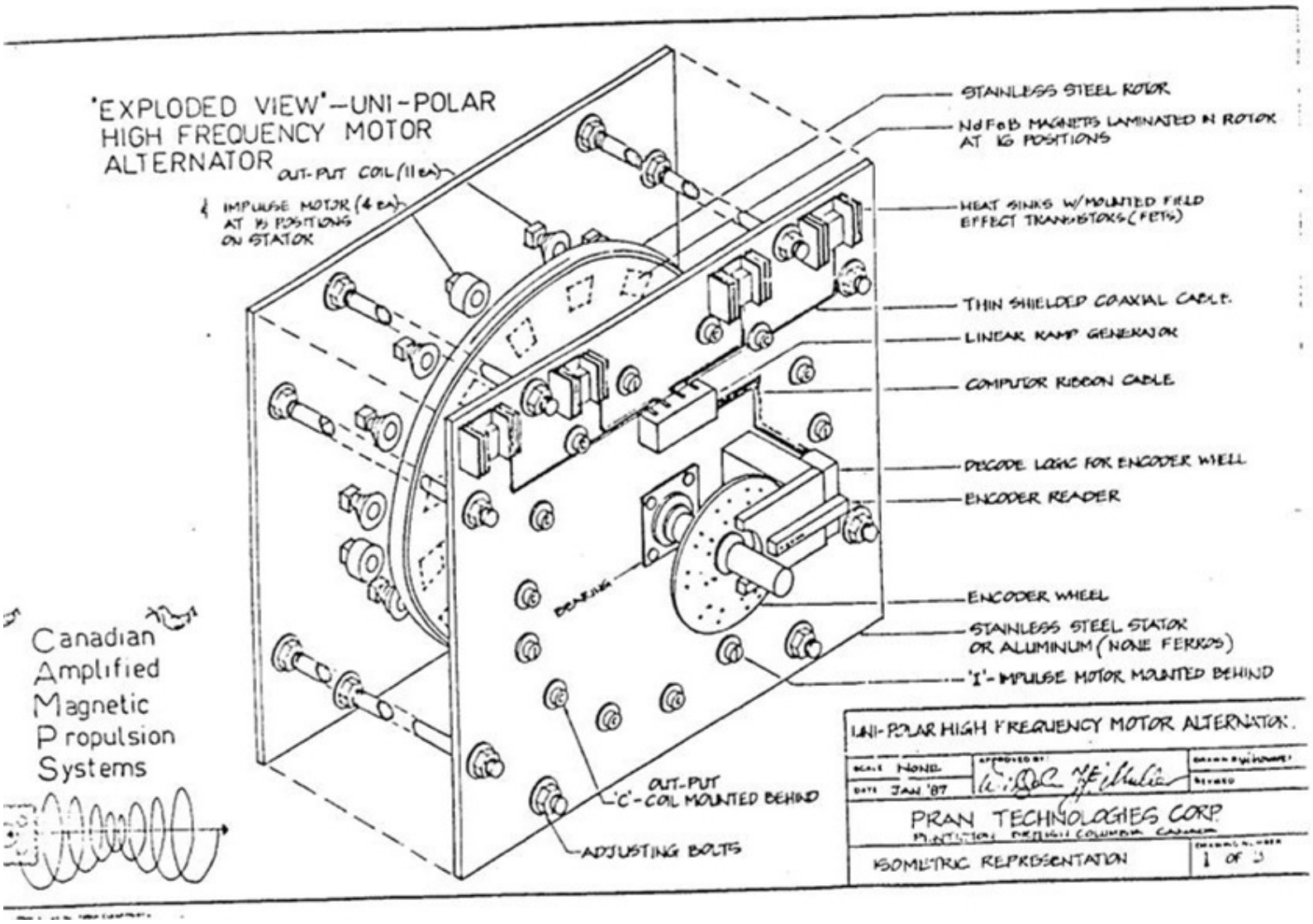
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STATOR
#12 WIRE - 32 TURNS
MEYLASS PAPER
(SANDWICHED)
BOLT
SAME
N d F e B MAGNET
1½" x 2" LONG
MICARTA CORE
1¼"
2"
OUTPUT COIL
ROTOR/FLYWHEEL
SECTION
0.01" x 25' LONG
AMORPHOUS METAL
(IC METGLAS)
SANDWICHED W/ PAPER
#12 WIRE - 132 TURNS
0.01" AIR GAP
BOTH SIDES
POSITIVE
COIL
NEGATIVE
COIL
IMPULSED
ELECTRO-MAG MOTOR
2" x ½" FLANGE
ALL ROUND
SECTION
2" x 2" x ½" - B½ NdFeB
MAGNETS OR ALT.
3" x 1" x ½" - PIE SHAPED
AT 16 EQ. SPACES
ROTOR ELEV. - W/ ALTERNATIVE
MAGNET/VOID LAYOUT
ROTOR/FLYWHEEL OF
STAINLESS STEEL OR
NON-FERROUS MATERIAL
#12 - SINGLE SID.
INSUL. MAG WIRE
MICARTA
CORE
AMORPHOUS
METAL
3D - OUTPUT COIL
RECESSED
POCKET IN
JOIN TOGETHER
1½" SHAFT
W/ HUB
ROTOR - BOTH HALVES
SECTION
UNI-POLAR HIGH FREQUENCY MOTOR ALTERNATOR
SCALE NONE
DATE 28 JAN '87
PRAN TECHNOLOGIES CORP PENTICTON B.C.
DETAILS - ROTOR, OUTPUT COIL & IMPULSE MOTOR
3 OF

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'EXPLODED VIEW'—UNI-POLAR HIGH FREQUENCY MOTOR ALTERNATOR
OUT-PUT COIL (11 ea)
IMPULSE MOTOR (4 ea) AT 90 POSITIONS ON STATOR
STAINLESS STEEL ROTOR
NdFeB MAGNETS LAMINATED IN ROTOR AT 16 POSITIONS
HEAT SINKS W/MOUNTED FIELD EFFECT TRANSISTORS (FETS)
THIN SHIELDED COAXIAL CABLE
LINEAR RAMP GENERATOR
COMPUTER RIBBON CABLE
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UNI-POLAR HIGH FREQUENCY MOTOR ALTERNATOR
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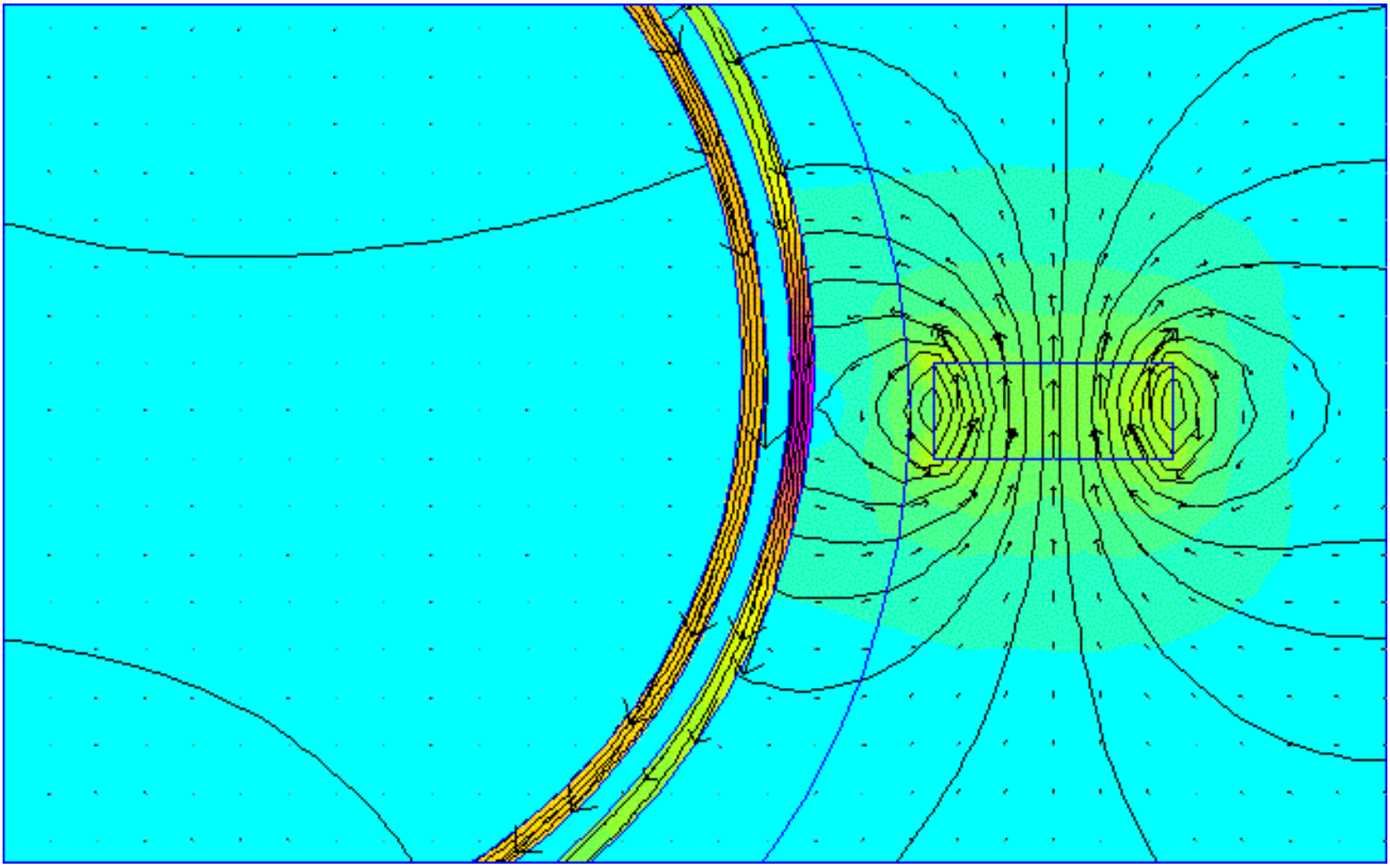
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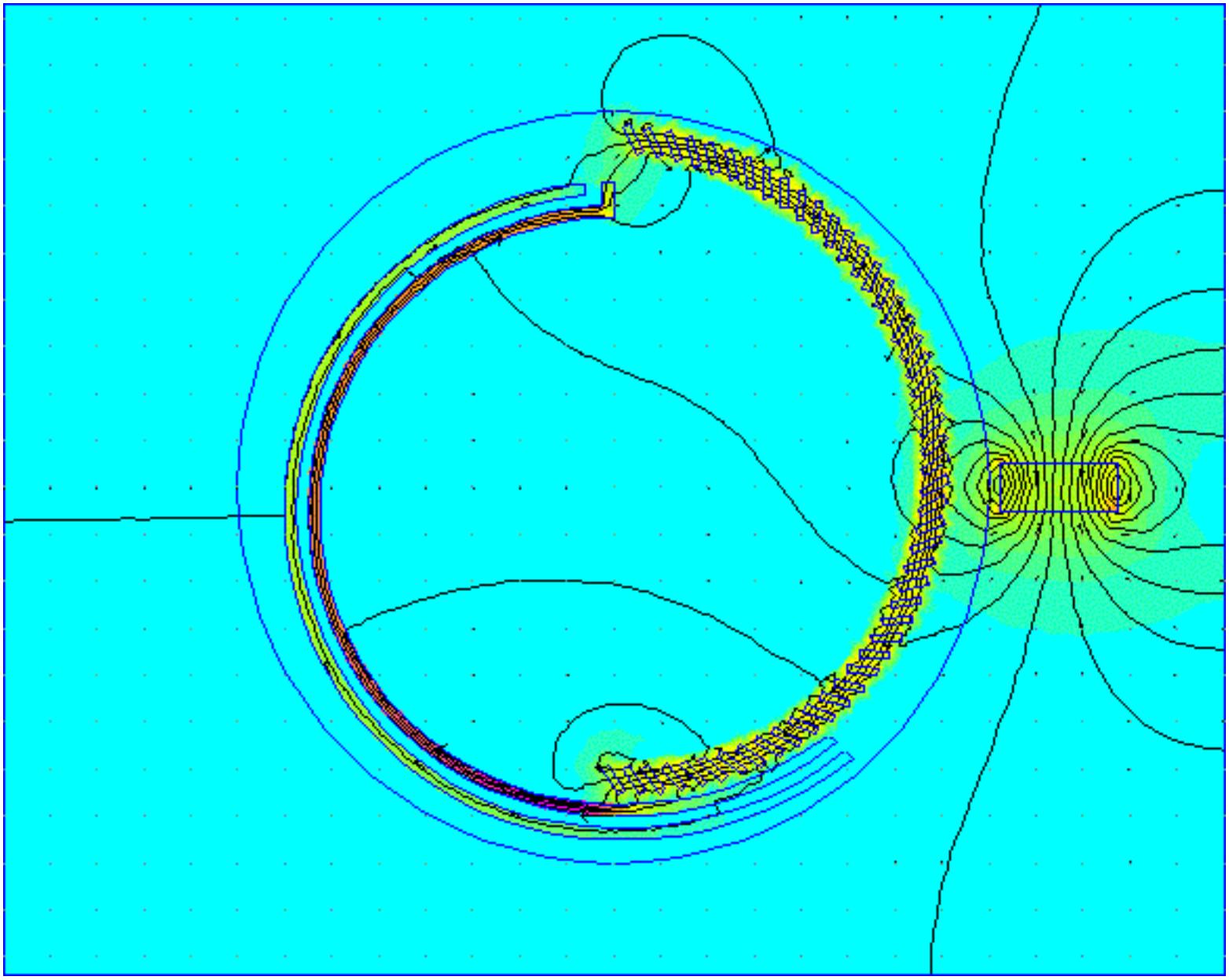
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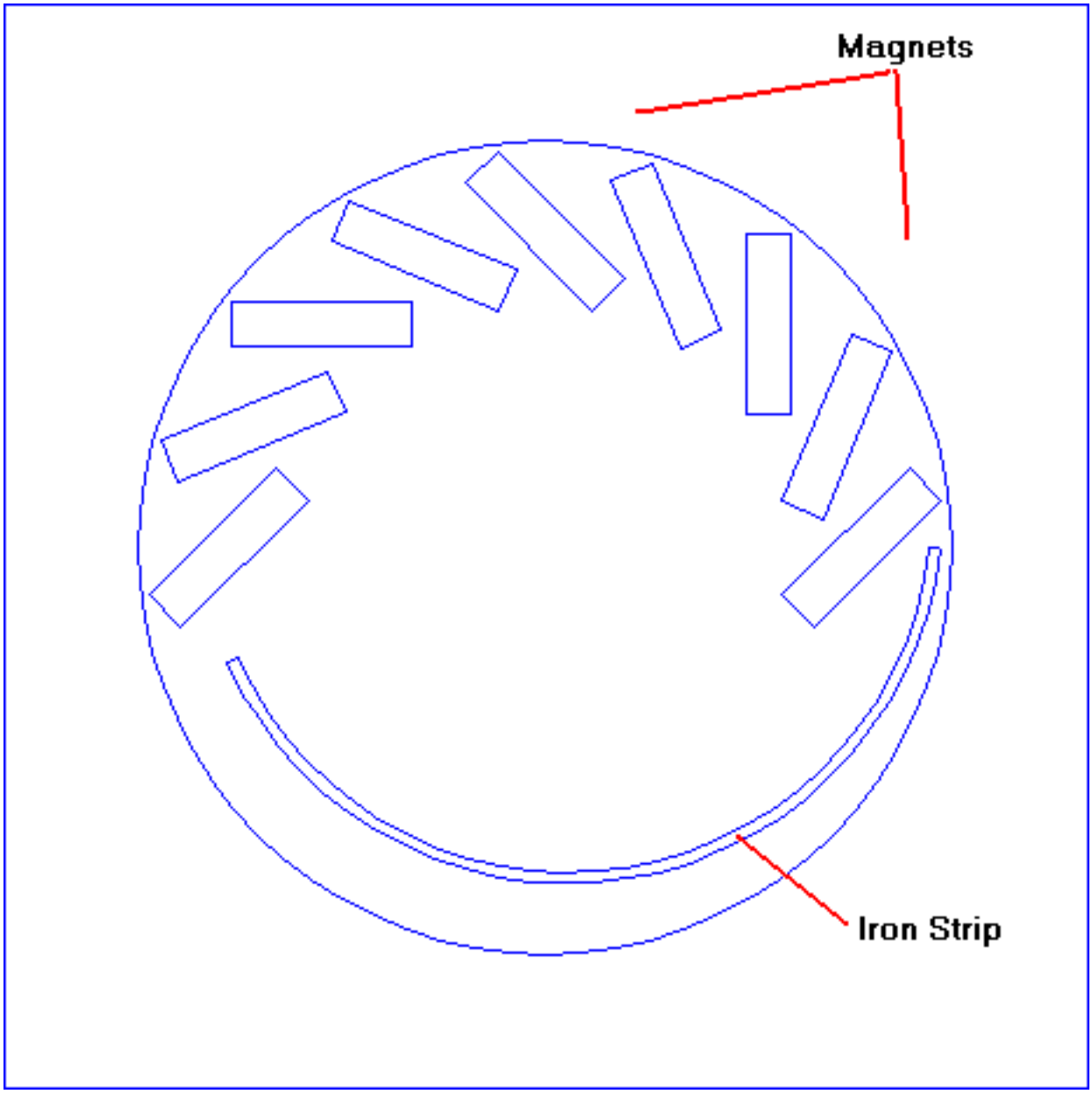
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Magnets
Iron Strip

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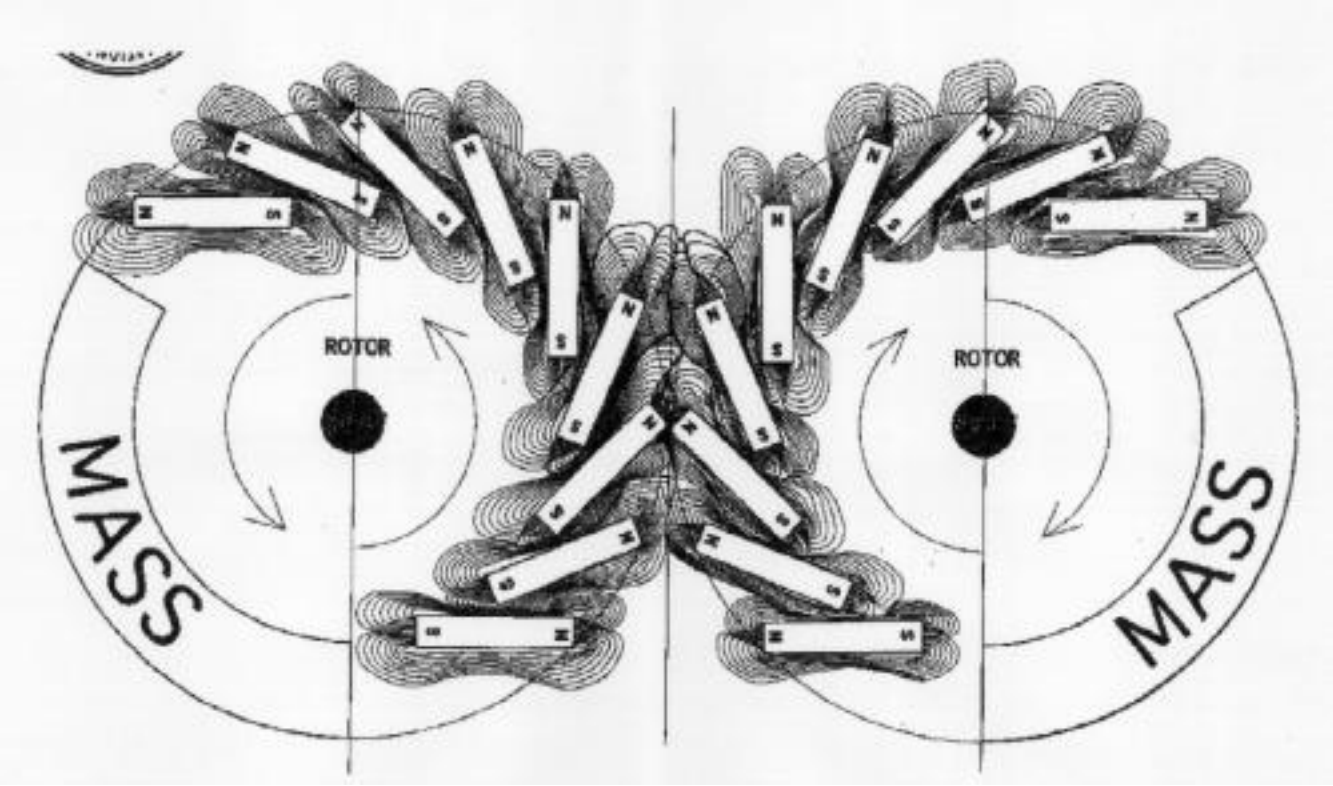
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ROTOR
ROTOR
MASS
MASS

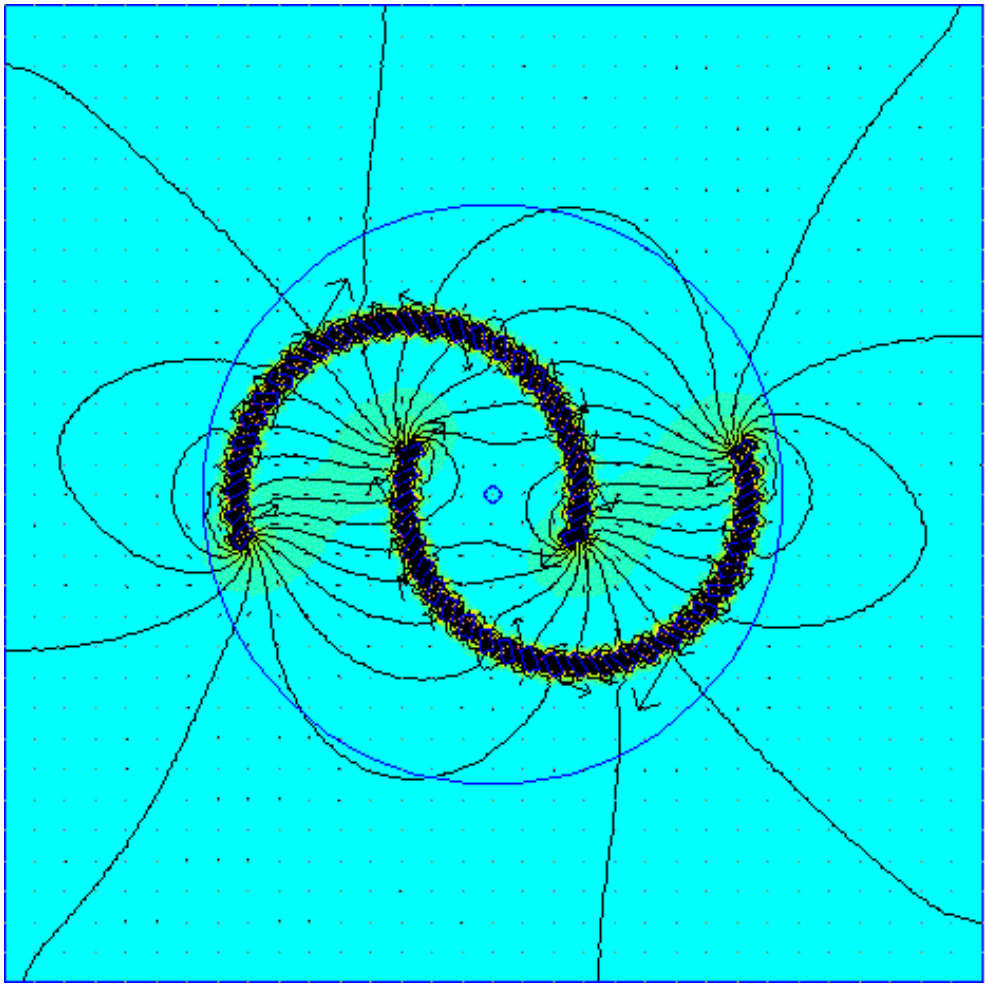
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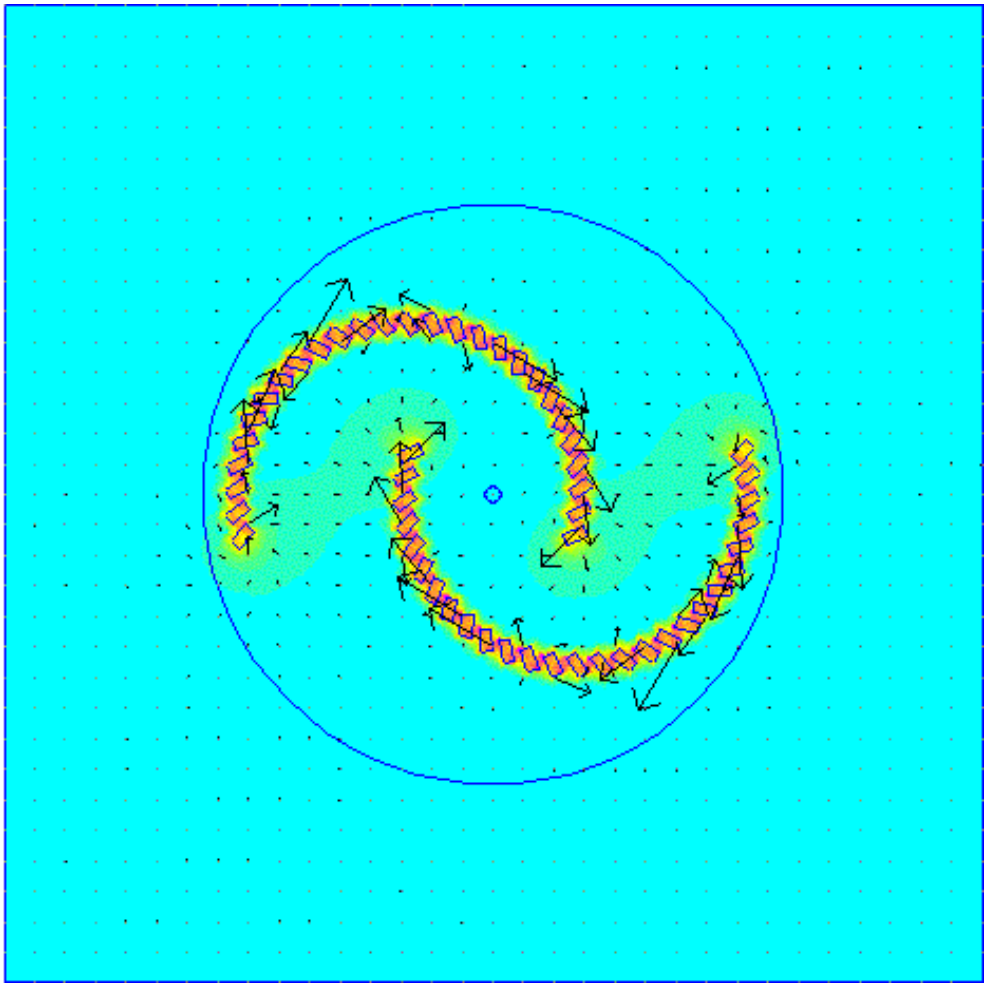
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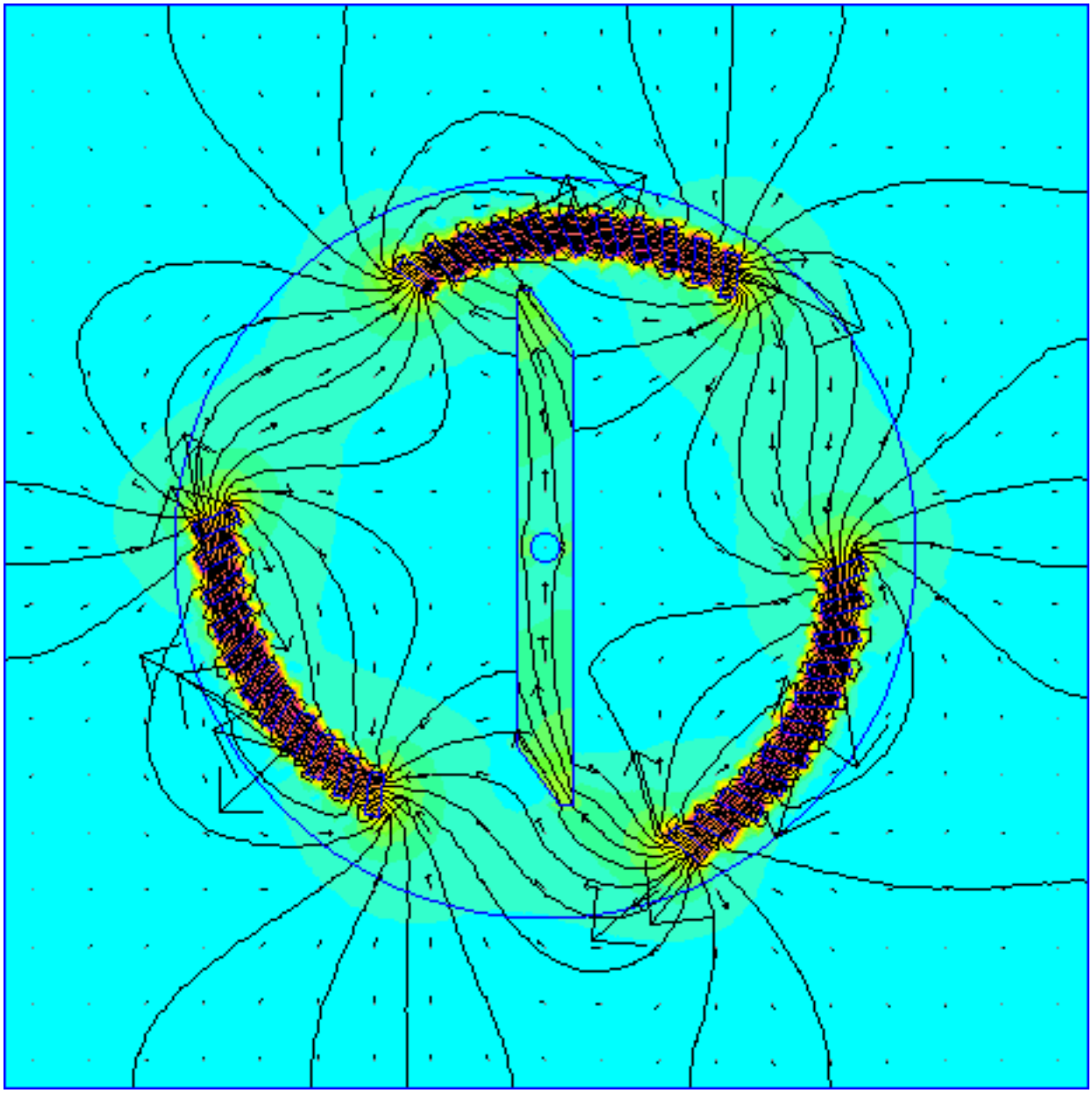




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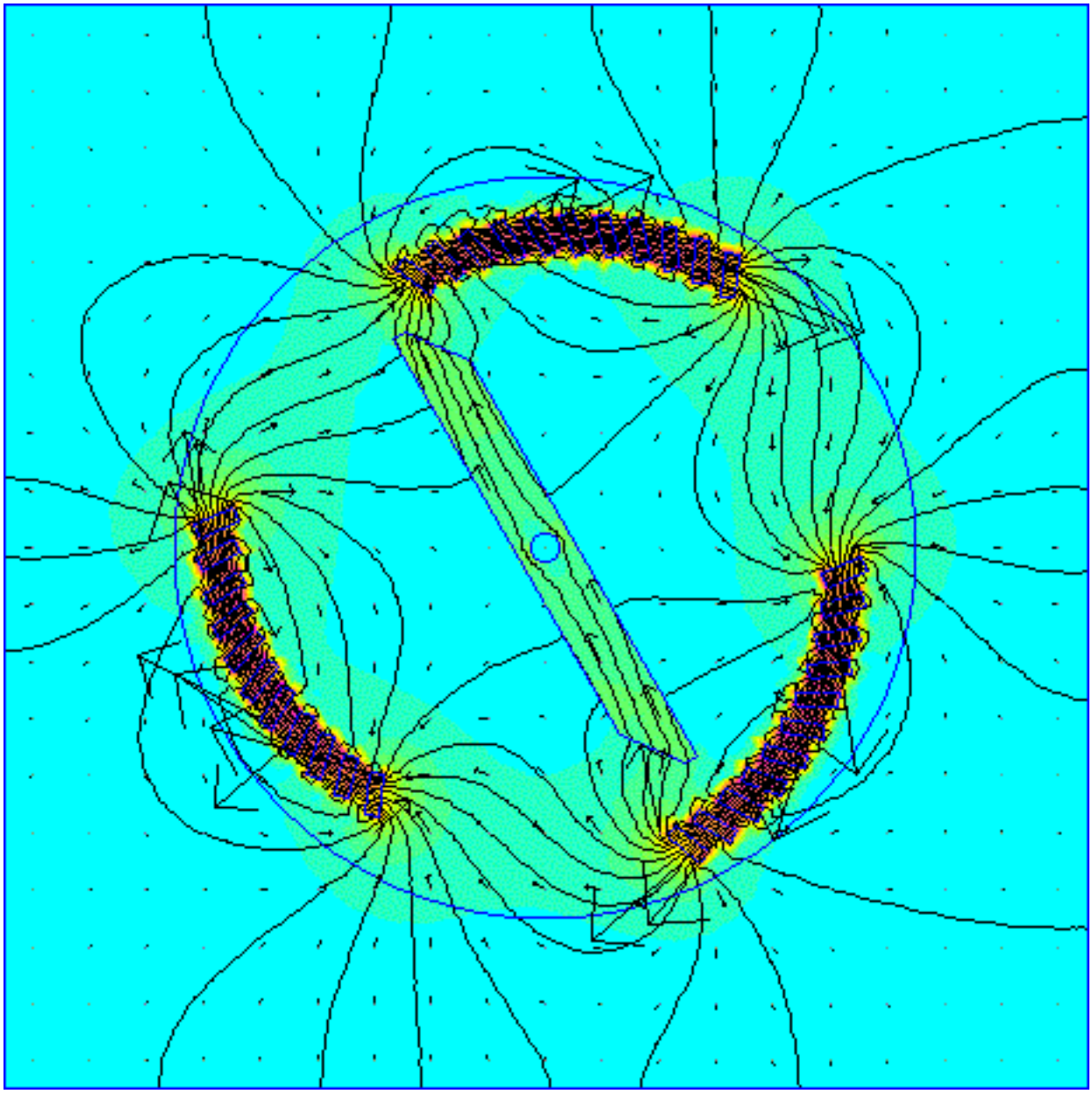
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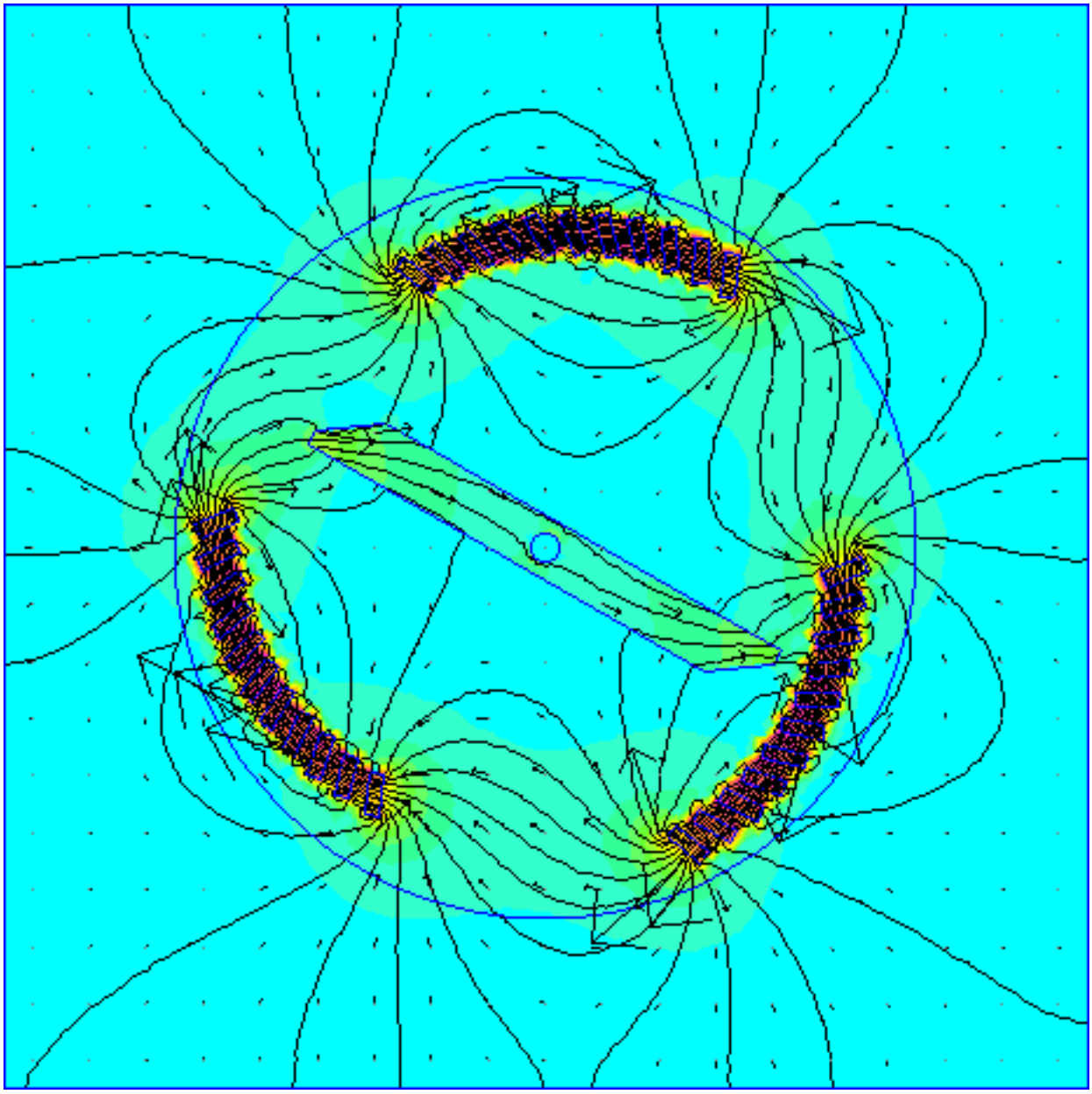
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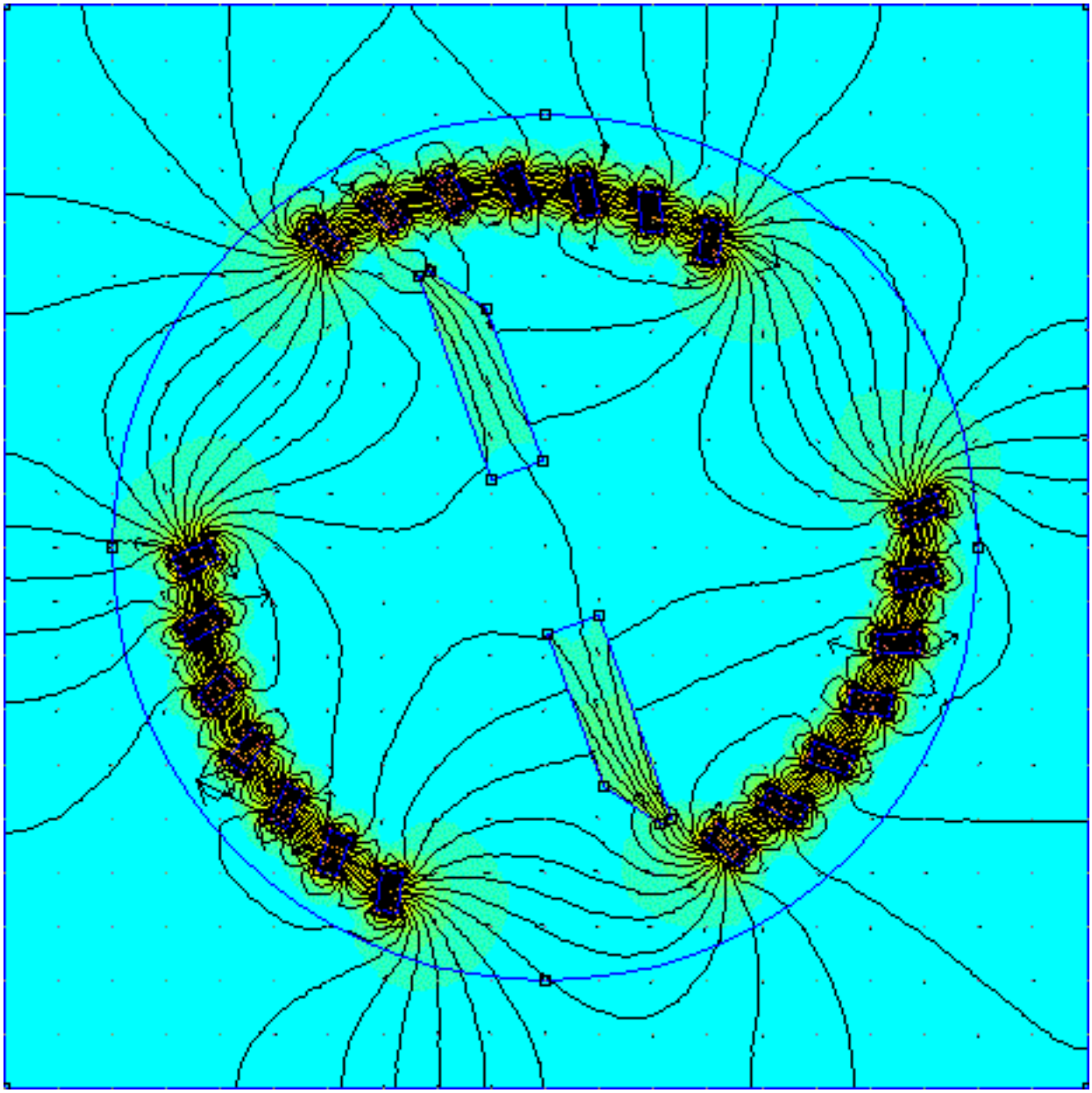
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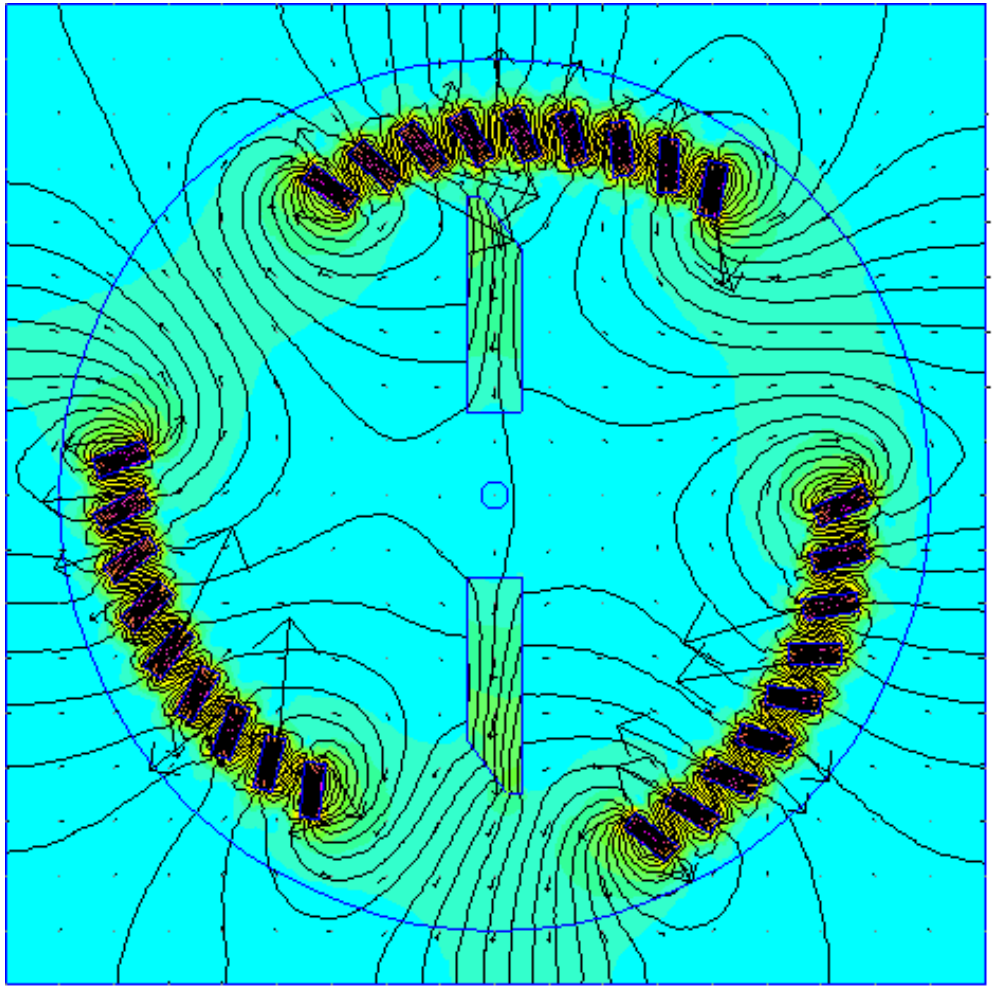
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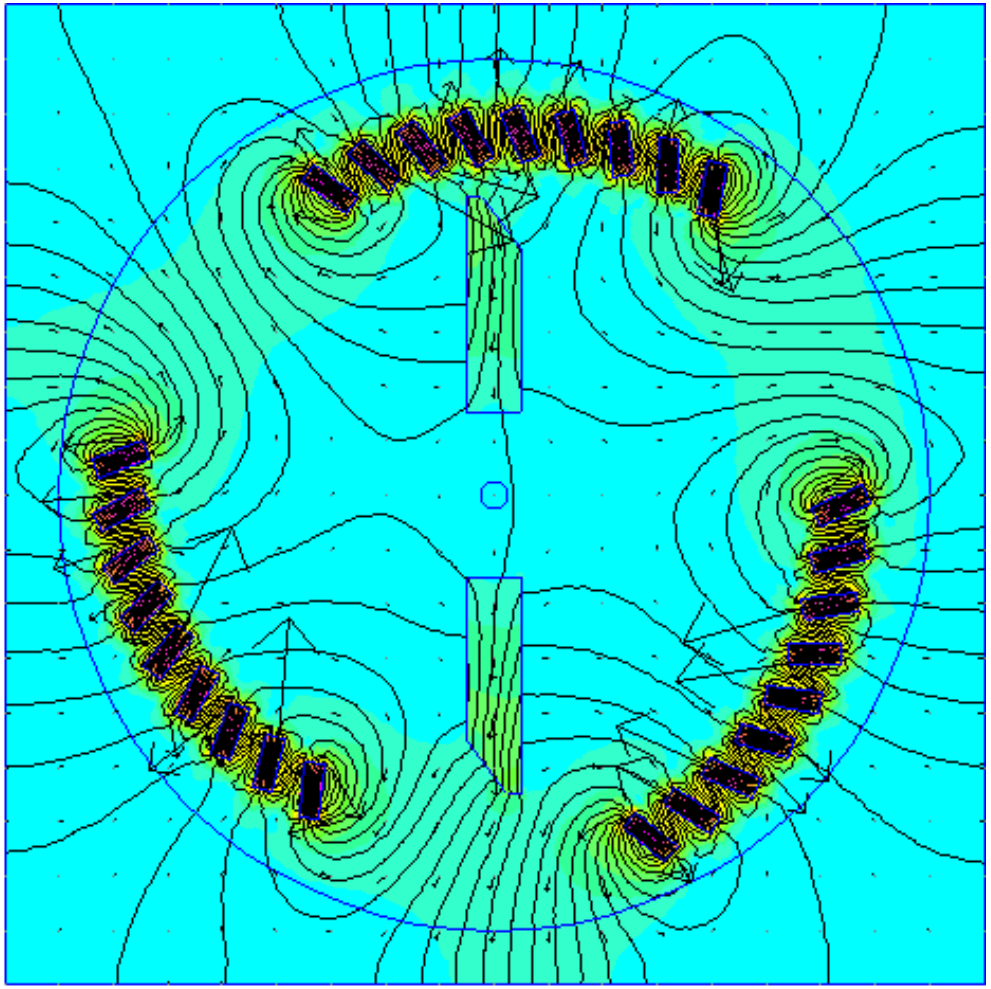
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Wheel without Bismuth



Wheel with Bismuth

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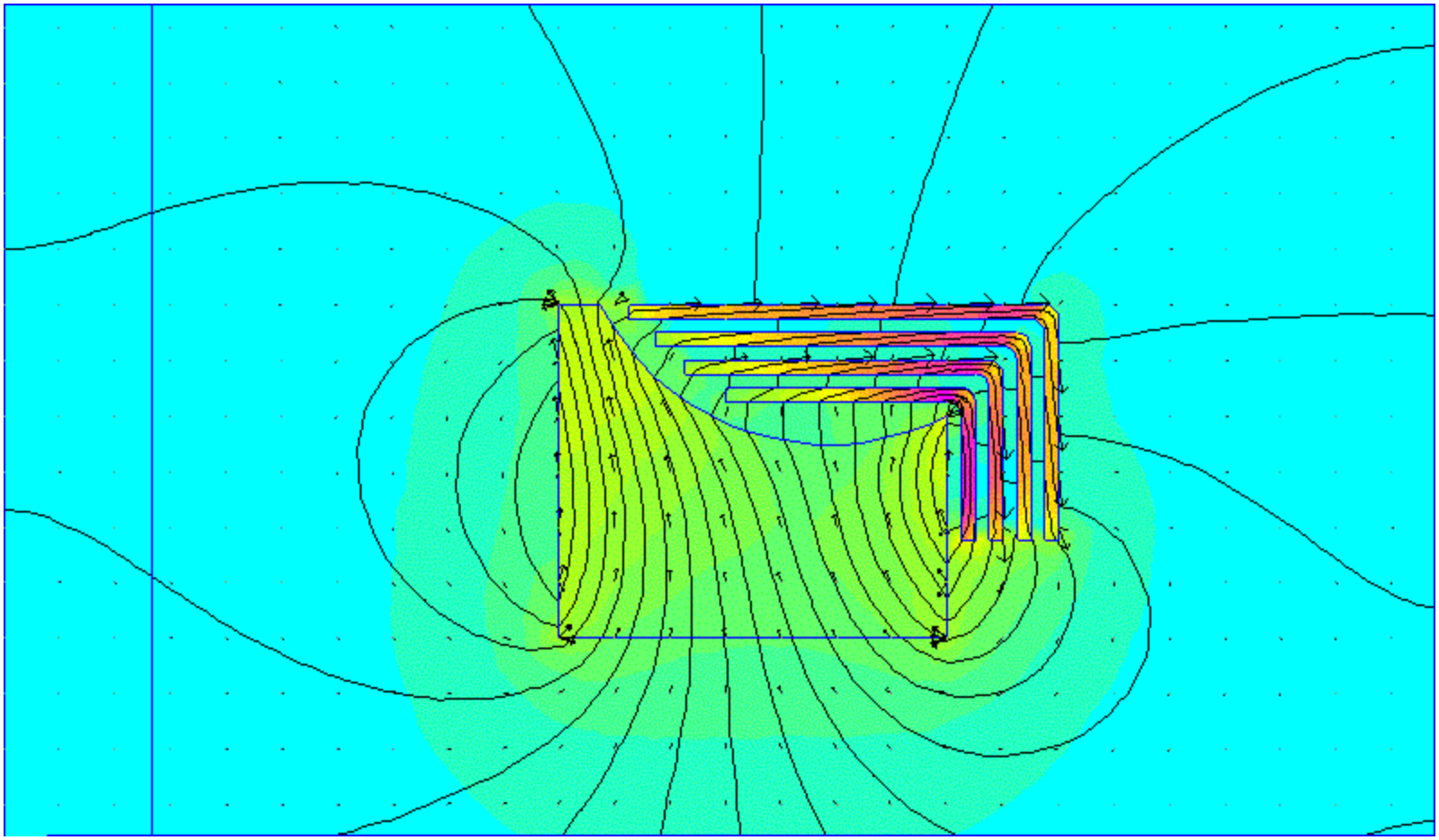
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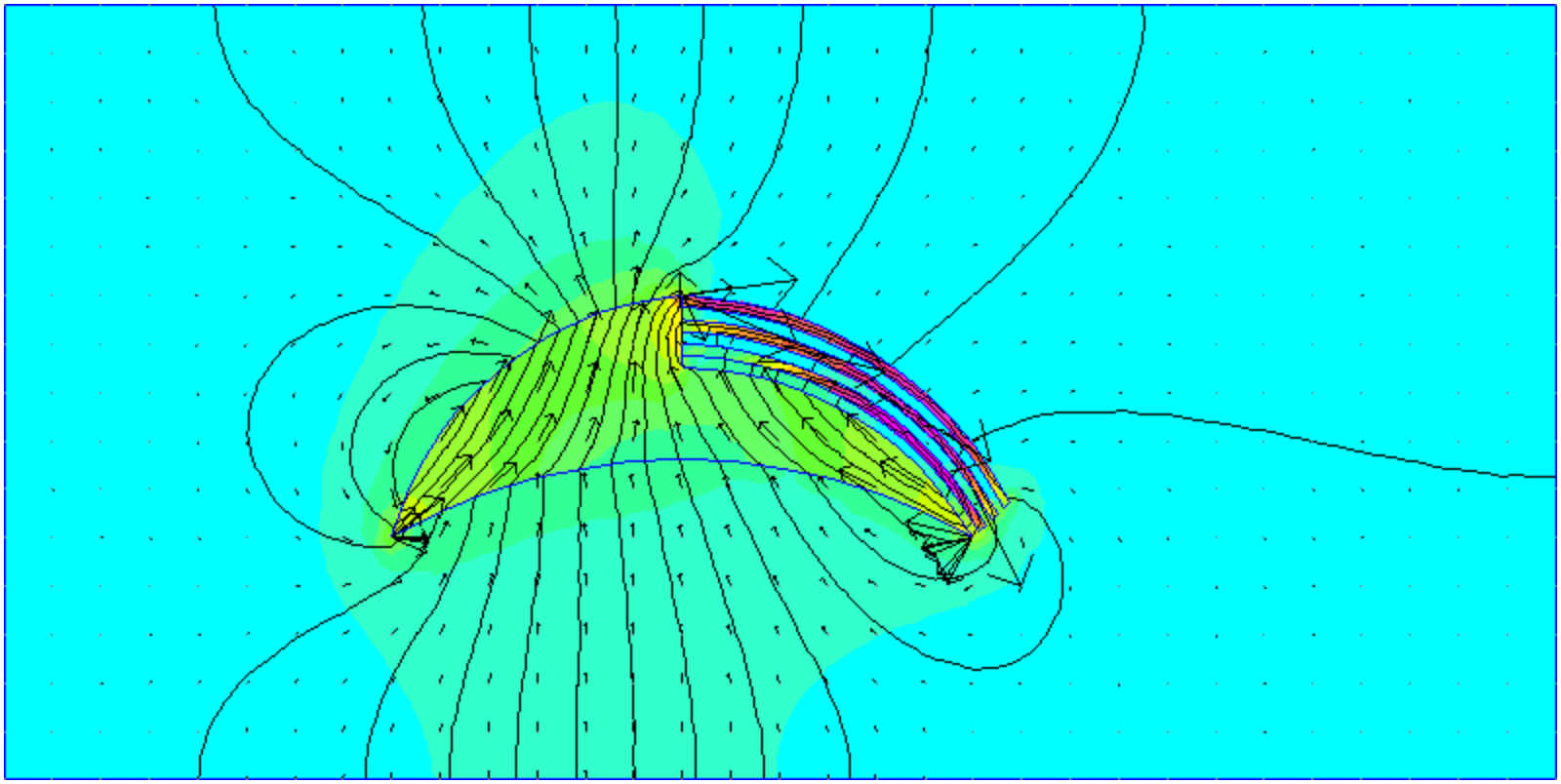
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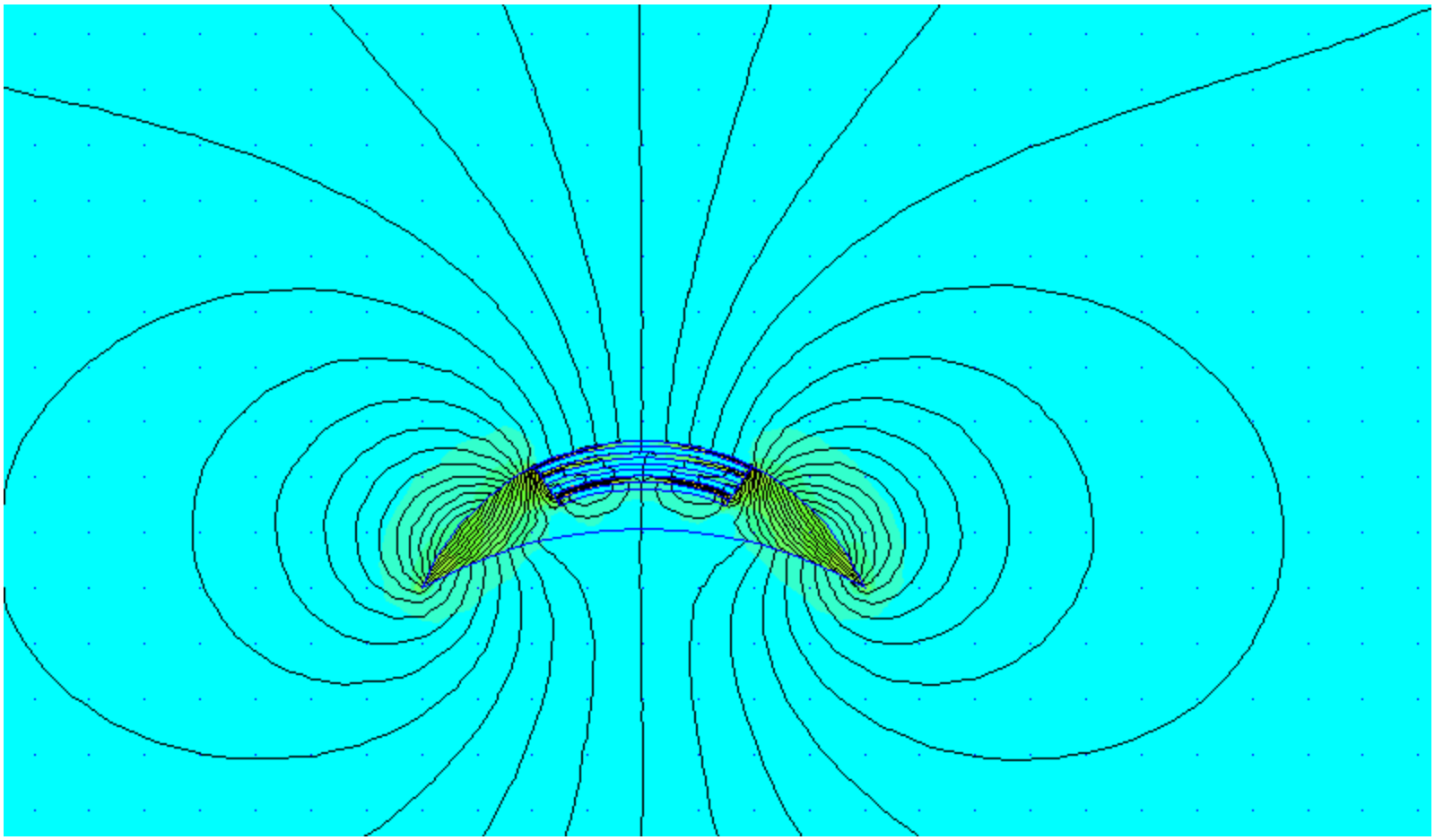
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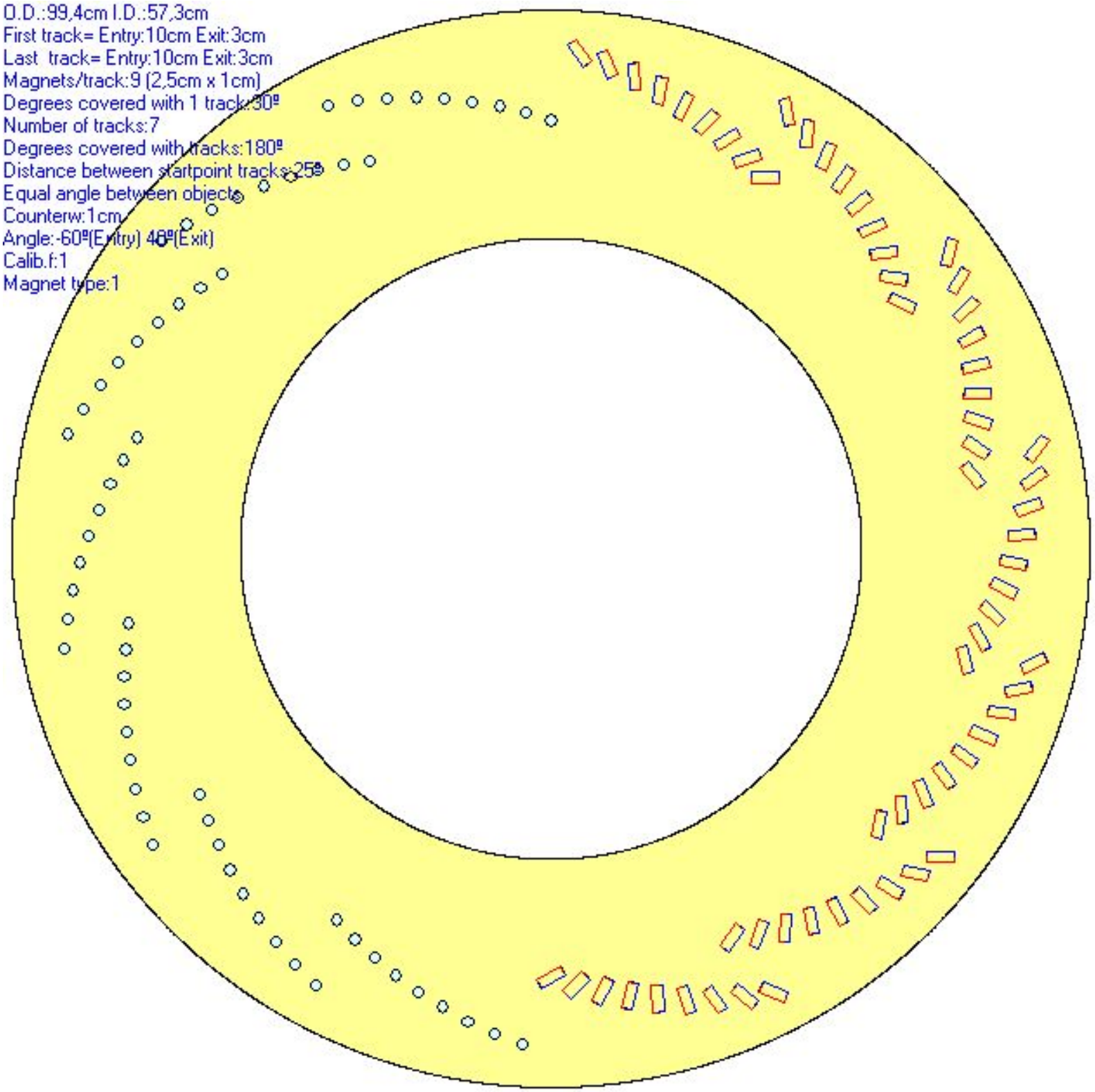
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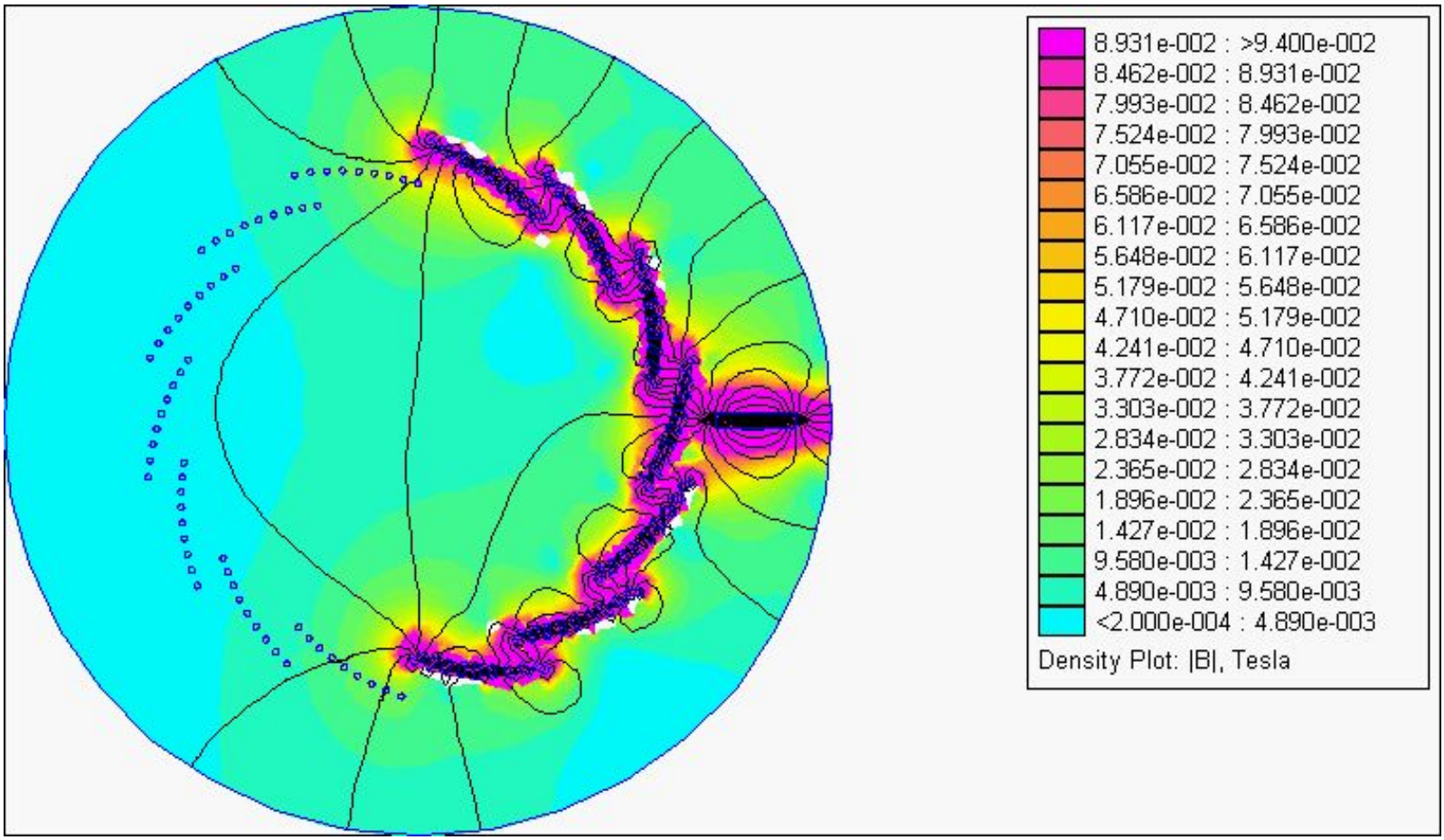
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O.D.:99,4cm I.D.:57,3cm
First track= Entry:10cm Exit:3cm
Last track= Entry:10cm Exit:3cm
Magnets/track:9 (2,5cm x 1cm)
Degrees covered with 1 track:30º
Number of tracks:7
Degrees covered with tracks:180º
Distance between startpoint tracks:25º
Equal angle between objects
Counterw:1cm
Angle:-60º(Entry) 48º(Exit)
Calib.f:1
Magnet type:1

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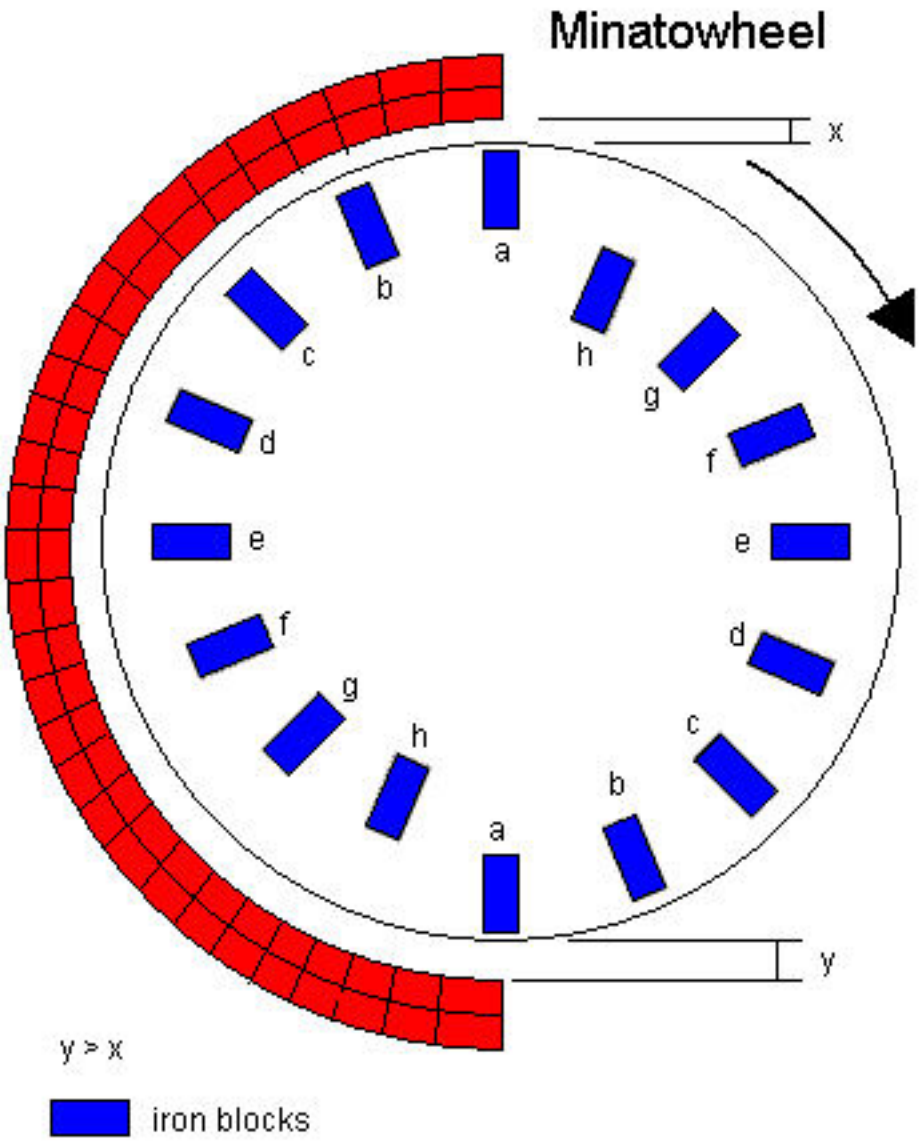
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8.462e-002 : 8.931e-002
7.993e-002 : 8.462e-002
7.524e-002 : 7.993e-002
7.055e-002 : 7.524e-002
6.586e-002 : 7.055e-002
6.117e-002 : 6.586e-002
5.648e-002 : 6.117e-002
5.179e-002 : 5.648e-002
4.710e-002 : 5.179e-002
4.241e-002 : 4.710e-002
3.772e-002 : 4.241e-002
3.303e-002 : 3.772e-002
2.834e-002 : 3.303e-002
2.365e-002 : 2.834e-002
1.896e-002 : 2.365e-002
1.427e-002 : 1.896e-002
9.580e-003 : 1.427e-002
4.890e-003 : 9.580e-003
<2.000e-004 : 4.890e-003
Density Plot: |B|, Tesla

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20fluxline.jpg

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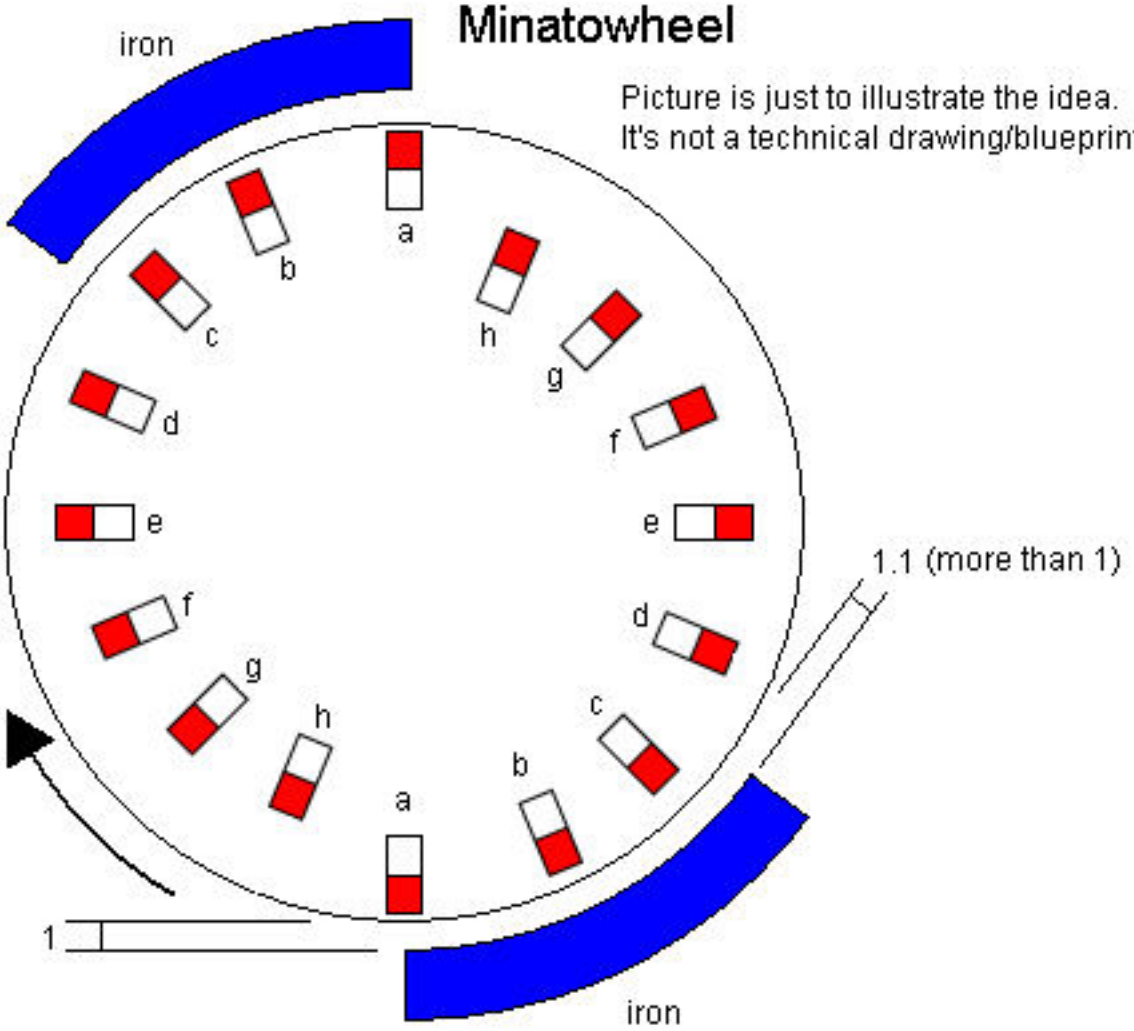
G.N.C.Harteveld

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+design+3.jpg

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Minatowheel

Picture is just to illustrate the idea.
It's not a technical drawing/blueprint.



pulling strength on iron	Pulling strength in kg (just an example)
b+c > a	a = 1
c+d > b	b =0.9
d+e > c	c =0.8
e+f > d	d =0.7
f +g > e	e =0.6
g+h > f	f =0.5
h >g	g =0.3
	h =0.4

G.N.C.Harteveld

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310-12 SR
FIP8502 XR 4,215,330

United States Patent [19]

Hartman

[11] **4,215,330**

[45] **Jul. 29, 1980**

[54] **PERMANENT MAGNET PROPULSION SYSTEM**

[75] Inventor: **Emil T. Hartman,** Detroit, Mich.

[73] Assignees: **Ethel Hartman,** Richmond, Ind.; **Charles Helin, Estate of,** Detroit, Mich. ; Detroit Bank and Trust Company, executor, part interest to each

[21] Appl. No.: **862,344**

[22] Filed: **Dec. 20, 1977**

[51] **Int. Cl.**[2] **H01F 7/02**

[52] **U.S. Cl.** **335/306;** 310/12

[58] **Field of Search** 310/12–14, 310/15; 198/619, 381; 335/302, 306

[56] **References Cited**

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3,263,796	8/1966	Parke	310/12 X
4,074,153	2/1978	Baker	310/12

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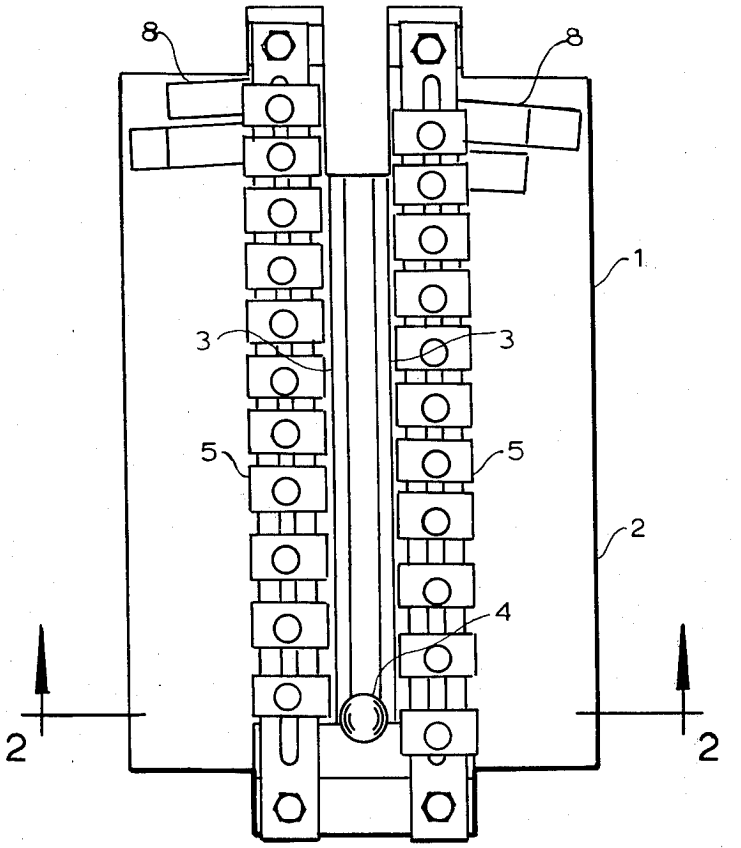
Angrist, "Perpetual Motion Machines," *Scientific American,* vol. 218, p. 119 (1968).

Primary Examiner—Donovan F. Duggan
Attorney, Agent, or Firm—Alex Rhodes

[57] **ABSTRACT**

A permanent magnet propulsion system wherein a steel ball is propelled up an inclined plane between two rows of permanent bar magnets, said magnets being in spaced relationship with all north seeking poles of one of the said rows facing in substantially the same direction and with all south seeking poles in the other row facing in substantially the same but opposite direction to the first of said rows. The magnetic axes of each of the magnets of the first said row are in staggered relationship to the axes of opposing magnets of the second said row. The magnetic field acting on the ball is configured whereby the ball after reaching the top of the inclined plane is able to drop from the said plane out of the field. A pair of parallel tracks positioned between the spaced rows of magnets guide the ball and a clamping means orient and retain the magnets.

15 Claims, 8 Drawing Figures



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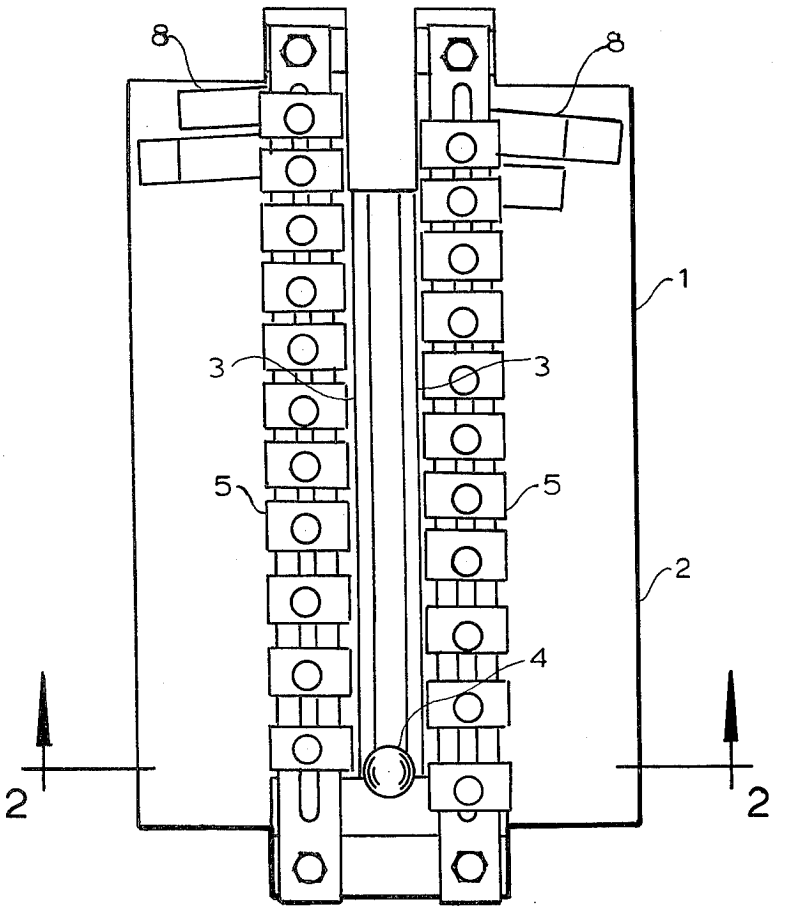


Fig.1

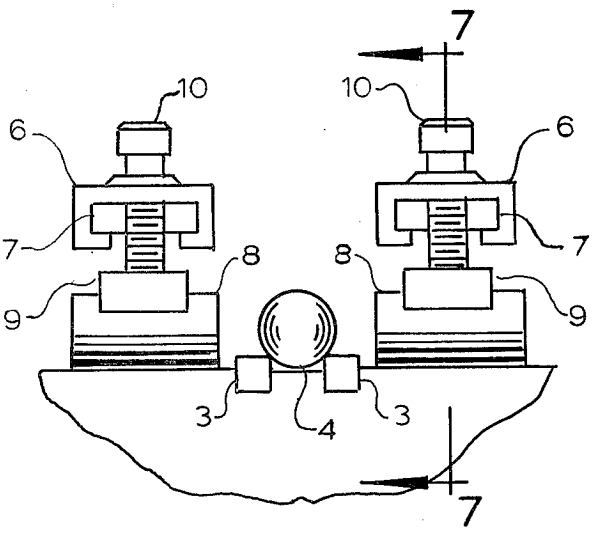


Fig.2

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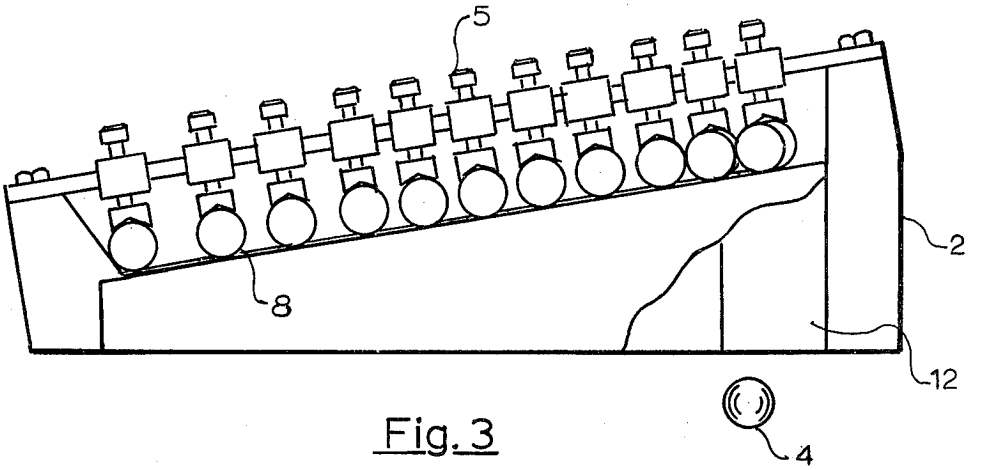


Fig. 3

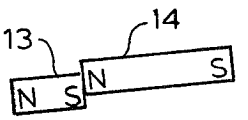


Fig. 6

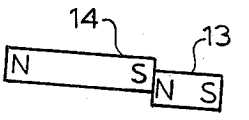


Fig. 5

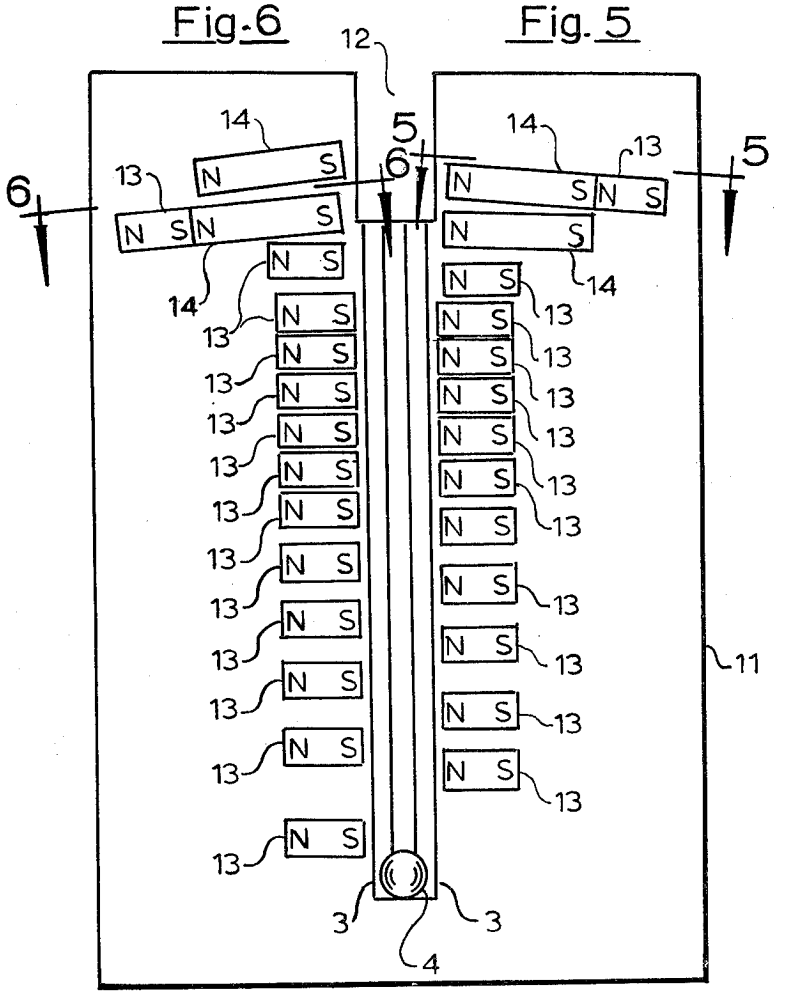


Fig. 4

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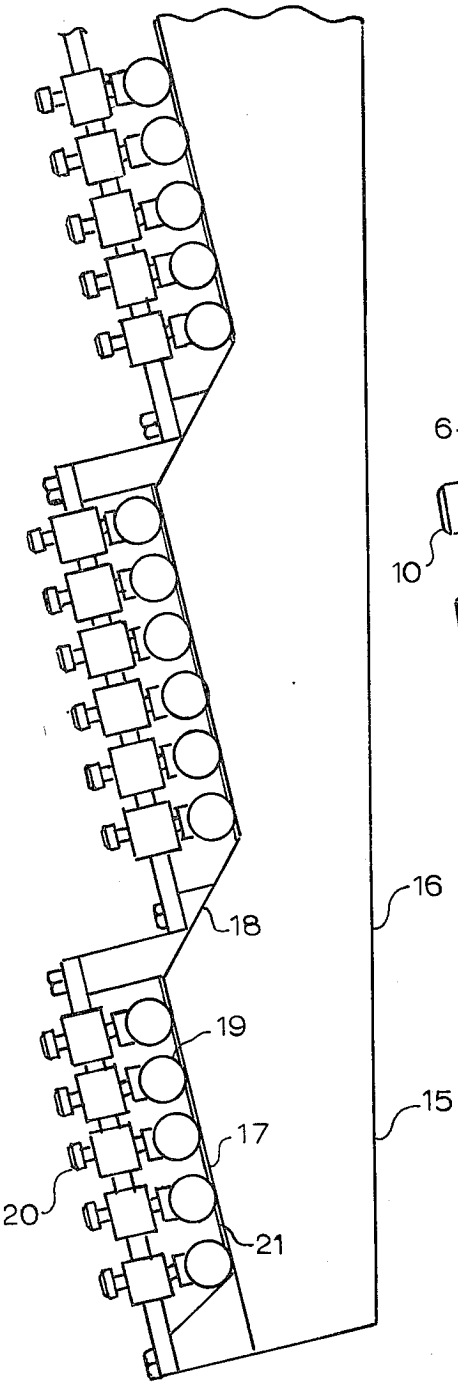


Fig. 8

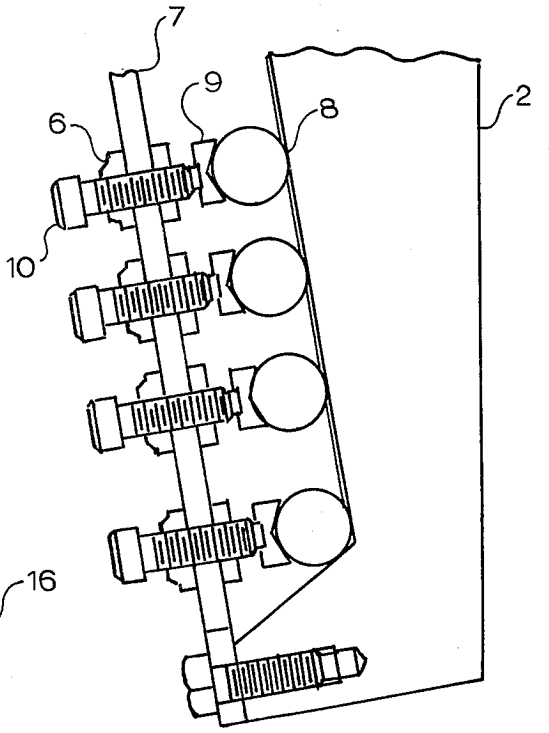


Fig. 7

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PERMANENT MAGNET PROPULSION SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to a new and novel device for propelling a steel ball upward along an inclined plane by the magnetic forces of an ordered arrangement of permanent magnets. It is intended that such a device could be used as a novelty or as a prime mover in conveyor systems, transportation systems, control systems and the like. It is obvious that this type of a system is pollution free and does not require complex supporting systems such as electrical distribution and control systems. It is also obvious that the present invention can be safely used in highly inflammable and explosive environments.

It is an object of the present invention to provide a simple, low cost means of propulsion which can replace other means of propulsion requiring complex mechanical, electrical and hydraulic arrangements driven by engines, electric motors and the like.

It is another object of the present invention to provide a device with high entertainment value for a novelty.

It is still a further object of the present invention to propel a steel ball upward along an inclined plane by the magnetic forces of permanent bar magnets and then without means other than gravity cause the ball to drop from the end of the plane entirely out of the magnetic field.

The foregoing objectives and features, along with additional objectives, features, advantages, and benefits of the invention, become more apparent in the ensuing description and accompanying drawings which disclose the invention in detail. A preferred embodiment is disclosed in accordance with the best mode presently contemplated in carrying out the invention. The subject matter in which an exclusive property is claimed is set forth in each of the numbered claims at the conclusion of the description and such subject matter is considered patentable over the prior art of which the applicant is aware, as set forth in the following Prior Art Statement.

PRIOR ART STATEMENT

A novelty search performed in connection with the present invention developed the following U.S. Pat. Nos. 868,316; 214,297; 2,875,695; 3,167,168; 3,263,796; 2,901,914; 3,788,447.

U.S. Pat. No. 868,316 discloses a mechanical movement wherein a novel combination of mechanical parts is employed to drive a plurality of balls for the purposes of providing a display, opening and closing of electric circuits, and the like.

U.S. Pat. No. 2,214,297 discloses an electromagnetic gun wherein magnetic particles are propelled at high volicities for shaping and cutting metal, stone or the like, by impact.

U.S. Pat. No. 2,875,693 discloses a hydraulic pump wherein a rotating magnetic field produces the movement of magnetic spheres enclosed within spiral tubing.

U.S. Pat. No. 3,167,168 discloses an electromagnetic conveyor wherein metal objects are transported by magnetic forces produced by electromagnets.

U.S. Pat. No. 3,263,796 discloses a magnetic conveyor wherein one embodiment comprises a permanent magnet having pole pieces which extend along the guideway such that the field intensity of the magnetic field produced by the magnet varies from a minimum value at the first position to a maximum value adjacent to the second position. The magnetic field is used for transferring cylindrical articles formed from magnetically susceptible material. At the end of the conveyor a discharge means is provided for disengaging the articles from the magnetic field.

U.S. Pat. No. 2,901,914 discloses a remote control device wherein a plurality of metallic balls contained in a tube are used for the transmission of motion and power.

U.S. Pat. No. 3,788,447 discloses a conveyor which is driven by a linear electromagnetic device.

This Prior Art Statement is furnished in compliance with applicant's duty of disclosure as defined in the Patent and Trademark Office Rules for patent cases.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of one embodiment of the present magnetic propulsion system illustrating some of the principal features of the invention.

FIG. **2** is a cross-sectional view, taken along line **2—2** of FIG. **1**, illustrating the positioning of a steel ball on a pair of tracks between a row o permanent magnets on either side of the said track.

FIG. **3** is an end view showing a plurality of permanent magnets mounted on an inclined surface with a section broken out of said view to illustrate a ball dropping from the said inclined plane out of the magnetic field.

FIG. **4** is a plan view drawn to one-half scale of an actual model which was constructed to demonstrate the operability of the present invention.

FIG. **5** is a cross-sectional view, taken along line **5—5** of FIG. **4**, illustrating the spatial relationship between a pair of magnets of FIG. **4**.

FIG. **6** is a cross-sectional view, taken along line **6—6** of FIG. **4**, illustrating the spatial relationship between a second pair of magnets of FIG. **4**.

FIG. **7** is a cross-sectional view, taken along line **7—7** of FIG. **2**, illustrating some features of the means for clamping the magnets to the base structure of the present invention.

FIG. **8** is a side view illustrating a further alternative embodiment of the present permanent magnet propulsion system wherein a series of upward and downward sloping inclines are provided.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the accompanying drawings, in FIG. **1** is shown in plan view the preferred embodiment **1** of the present invention. A ball **4** constructed from some ferro-magnetic material is positioned centrally upon the upper surface of a base structure **2**. The material of which the ball **4** is constructed may be either an iron alloy or some other ferro-magnetic material capable of being acted upon by a magnetic field. The ball **4** is guided and supported by a pair of parallel tracks **3**. The manner of locating and supporting the ball **4** is best illustrated in FIG. **2** wherein the tracks **3** are shown having a square section retained by the base structure **2**.

On either side of ball **4**, spaced outwardly from each of the tracks **3** is a row of permanent magnets **8**. The magnets **8** are so arranged that in one of the said rows all north seeking poles point towards the corresponding adjacent track **3** while in the other said row all of the south seeking poles point towards the corresponding

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adjacent track 3. The ordered arrangement of permanent magnets increases the intensity of the magnetic field in an upward direction along the inclined base structure.

With reference to FIG. 4, a half scale plan view of a model which is constructed in accordance with the present invention whereby a one-half inch diameter steel ball 4 was propelled upward along an inclined surface by the magnetic field of an ordered arrangement of permanent magnets 13 and 14. Upon reaching the top of the inclined surface the ball 4 dropped vertically through a notch 12 in the base structure 11 entirely out of the magnetic field without being acted upon by any additional force other than the force of gravity.

In the model illustrated in FIG. 4 tracks 3 were constructed from one-quarter inch square aluminum spaced approximately one-quarter inch apart. Optionally some other type of para-magnetic material could have been used for tracks 3 provided the influence of the material was a minimum. The top surface of base structure 11 onto which tracks 3 were mounted was inclined at an angle of 4°7′ with respect to a horizontal plane. Magnets 13 and 14 were one-half inch diameter Alnico permanent magnets of one and two inch lengths, respectively.

It should be noted in FIG. 4 that magnets 13 and 14 are so arranged that their magnetic axes are generally perpendicular to tracks 3, however, at the upper end of base structure 11 adjacent to notch 12 the magnetic axes are slightly oblique to tracks 3. Furthermore, the magnetic axes of magnets 13 and 14 in one of the said rows are in staggered relationship to the magnetic axes of magnets 13 and 14 of the other said row. In addition, the spacing between some of the magnetic axes of adjacent magnets 13 and 14 decreases in the direction of the movement of ball 4.

In order to achieve the result whereby ball 4, after reaching the end of the incline on base structure 11 would drop vertically from the said incline and escape out of the magnetic field, it was necessary to space magnets 13 and 14 farther away from tracks 3 in the vicinity of notch 12 and to also provide the combination of magnets 13 and 14, shown in FIG. 4, in the vicinity of the said notch 12. As noted in FIGS. 5 and 6, magnets 13, positioned at the outboard ends of magnets 14, were displaced vertically upward.

Associated with each of the permanent magnets, prior to their use with the other magnets, is a magnetic field whose lines of force extend from the north to south poles thereof. When the magnets and ball are brought together, in the novel arrangement heretofore described, the mutual actions of the fields of the separate magnets and the induced field of the ferro-magnetic ball is such as to produce a complex field which causes the ball to be propelled up the inclined plane between the tracks and to drop from the end thereof.

It is obvious that what I have shown in FIG. 4, which produced the new and novel results whereby a ferro-magnetic ball was propelled upward along an inclined plane and caused to drop vertically from the said plane, is an ordered arrangement of permanent magnets 13 and 14 in combination with a pair of tracks 3. It is also obvious that drawing from the features disclosed, other embodiments can be constructed. For example, a ferro-magnetic ball can be propelled along a pair of parallel tracks on a horizontal surface using an arrangement of magnets, all of the same length, by varying their positions. Furthermore, different size magnets can be used in substitution of decreasing the spacing between the magnetic axes of adjacent magnets or increasing the distance of the magnets from the tracks 3.

A means 5 for clamping and positioning each of the magnets 8 of FIG. 1 is illustrated in FIGS. 2 and 7 wherein a clamping force is exerted upon each of said magnets 8 by an inverted V-block 9. Directly above the V-block 9 is an adjusting screw 10, said screw 10 engaging a circular depression on the top side of V-block 9. Adjusting screw 10 is threadably engaged with a slideable member 6 wherein said member 6 contains a T-slot for engaging member 6 with a guide bar 7. Guide bar 7 incorporates a central slot through which the body of adjusting screw 10 extends to allow the said screw 10 to engage the V-block 9. Guide bar 7 is affixed at its ends to base structure 2. So that clamping means 5 may not influence the magnetic field of the magnets 8, V-block 9, adjusting screws 10, slideable members 6 and guide bar 7 must be constructed from para-magnetic materials such as aluminum.

In FIG. 8 is illustrated a further alternative embodiment 15 of the present invention wherein the top surface of a base structure 16 comprises a plurality of pairs of an upward sloping surface 17 followed by a downward sloping surface 18. On each of the upward sloping surfaces 17, in accordance with the previously disclosed features of the present invention is mounted a pair of parallel tracks 21, a row of permanent magnets 19 positioned outboard of and adjacent to said tracks 21 and a clamping means 20 for retaining and positioning said magnets 19. A model of this alternative embodiment 15 was constructed whereby a one-half inch steel ball was consecutively propelled up each of the upward sloping surfaces 17 and caused to move down each of the downward sloping surfaces 18.

In summary, the present invention provides a new and novel device for propelling a ball constructed from a ferro-magnetic material upward along an inclined plane by the magnetic forces of an ordered arrangement of permanent magnets. It is apparent from the accompanying figures and specifications what has been achieved is a device which could be used as a novelty or as a prime mover in conveyor systems, transportation systems, control systems and the like. It is still further apparent that this type of system is pollution free and does not require complex supporting systems such as electrical distribution and control systems. It is also apparent that the present invention can be safely used in highly inflammable and explosive environments.

What I claim as new is:

1. A propulsion system wherein an ordered arrangement of permanent magnets provides the propulsion force comprising: a base structure; a pair of tracks mounted on top of said base structure, said tracks being in spaced parallel relationship to each other; a first row of permanent magnets mounted on top of said base structure, directly outboard from and adjacent to one of said tracks, with all of the north seeking poles of said row of magnets pointed towards said tracks and all of the south seeking poles pointed away from said track; a second row of permanent magnets mounted on top of said base structure, directly outboard from and adjacent to the other of said tracks, with all of the south seeking poles of said second row of magnets pointed towards said other track and all of the north seeking poles pointed away from the other said track; at least one ball positioned between and supported by said tracks, said ball being constructed from a ferro-magnetic material whereby the magnetic field of said first and second row

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of magnets propels said ball along said tracks; and a clamping means for positioning and retaining each of the magnets of said first and second rows onto said base structure.

2. A permanent magnet propulsion system according to claim 1 wherein the top surface of said base structure is substantially horizontal.

3. A permanent magnet propulsion system according to claim 1 wherein the top surface of said base structure is inclined.

4. A permanent magnet propulsion system according to claim 1 wherein said magnets are positioned such that the distance some of said magnets are mounted outboard from said tracks increases in the direction of ball movement whereby said ball after being propelled to the top of the inclined plane may descend vertically out of the magnetic field of said magnets.

5. A permanent magnet propulsion system according to claim 1 wherein said magnets are arranged such that the magnetic axes of the magnets of one of said rows are in staggered relationship to the magnetic axes of the magnets of the other of said rows.

6. A permanent magnet propulsion system according to claim 1 wherein more than one ferro-magnetic ball positioned between and supported by said tracks is propelled by the magnetic field of said first and second rows of magnets.

7. A permanent magnet propulsion system according to claim 1 wherein the spacing between the magnetic axes of adjacent magnets in either of said rows decreases in the direction of movement of said ball whereby the magnetic field acting on said ball increases in the direction of said movement.

8. A permanent magnet propulsion system according to claim 1 wherein the size of the magnets in either of said rows increases in the direction of movement of said ball whereby the magnetic field acting on said ball increases in the direction of said movement.

9. A permanent magnet propulsion system according to claim 1 wherein said magnets are arranged such that all of the magnetic axes of said magnets are perpendicular to said tracks.

10. A permanent magnet propulsion system according to claim 1 wherein said magnets are arranged such that some of the magnetic axes of said magnets are perpendicular to said tracks and the remainder of the magnetic axes of said magnets are oblique to said tracks.

11. A permanent magnet propulsion system according to claim 1 wherein said clamping means comprises: a guide bar mounted onto said base structure, aligned with and positioned directly above each of said rows of magnets and having a vertical slot extending through the center of said bar; a plurality of slideable members retained by each of said guide bars, each of said slideable members corresponding to one of said magnets and having a T-slot for engaging said guide bars; a plurality of adusting screws, each of said screws being in threaded engagement by one of said slideable members and extending through the slot of one of said guide bars; and a plurality of V-blocks, each of said blocks having an inverted V-notch engaging one of said magnets and a circular depression on the top side thereof engaging one of said adjusting screws whereby a clamping force is exerted upon said magnet for positioning and retaining said magnet onto said base structure.

12. In a permanent magnet propulsion system the combination of: a pair of spaced parallel tracks; and a row of permanent magnets mounted directly outboard from each of said tracks with all north seeking poles of the magnets of one of said rows being adjacent to one of said tracks and all south seeking poles of the magnets of the other of said tracks being adjacent to the other of said tracks.

13. In a permanent magnet propulsion system the combination as set forth in claim 12 wherein the magnetic axes of the magnets in one of said rows are in staggered relationship to the magnetic axes of the magnets in the other of said rows.

14. In a permanent magnet propulsion system the combination as set forth in claim 12 wherein said magnets are arranged such that in the direction of propulsion the distance from some magnets to the adjacent track corresponding thereto increases.

15. A propulsion system wherein an ordered arrangement of permanent magnets provides the propulsion force comprising: a base structure having a top surface, said surface having a plurality of pairs of an upward sloping surface followed by a downward sloping surface; a pair of tracks mounted on top of said base structure, said tracks being in spaced parallel relationship to each other in alignment with each upward sloping surface and each downward sloping surface; a first row of permanent magnets mounted on each upward sloping surface of said base structure, directly outboard from and adjacent to one of said tracks, with all north seeking poles of the magnets of said row pointed towards said track and all of the south seeking poles pointed away from said track, said magnets being arranged such that their magnetic axes are substantially perpendicular to said track, the spacing between said axes decreases in the direction of propulsion and the distance from some of said magnets to said adjacent track increases in the direction of propulsion; a second row of permanent magnets mounted on each upward sloping surface of said base structure, directly outboard from and adjacent to the other of said tracks, with all south seeking poles of said second row pointed towards said other track and all of the north seeking poles pointed away from said other track, the magnets of said second row arranged such that their magnetic axes are substantially perpendicular to said other track in staggered relationship to the magnetic axes of said first row with the spacing between said axes decreasing in the direction of propulsion and the distance of some magnets to the adjacent track increasing in the direction of propulsion at least one ball positioned between and supported by said tracks, said ball being constructed from a ferro-magnetic material whereby the magnetic fields of said magnets propels said ball along each of said upward sloping surfaces whereupon said ball descends along the following downward sloping surface; and a clamping means for positioning and retaining said magnets onto said base structure.

* * * * *

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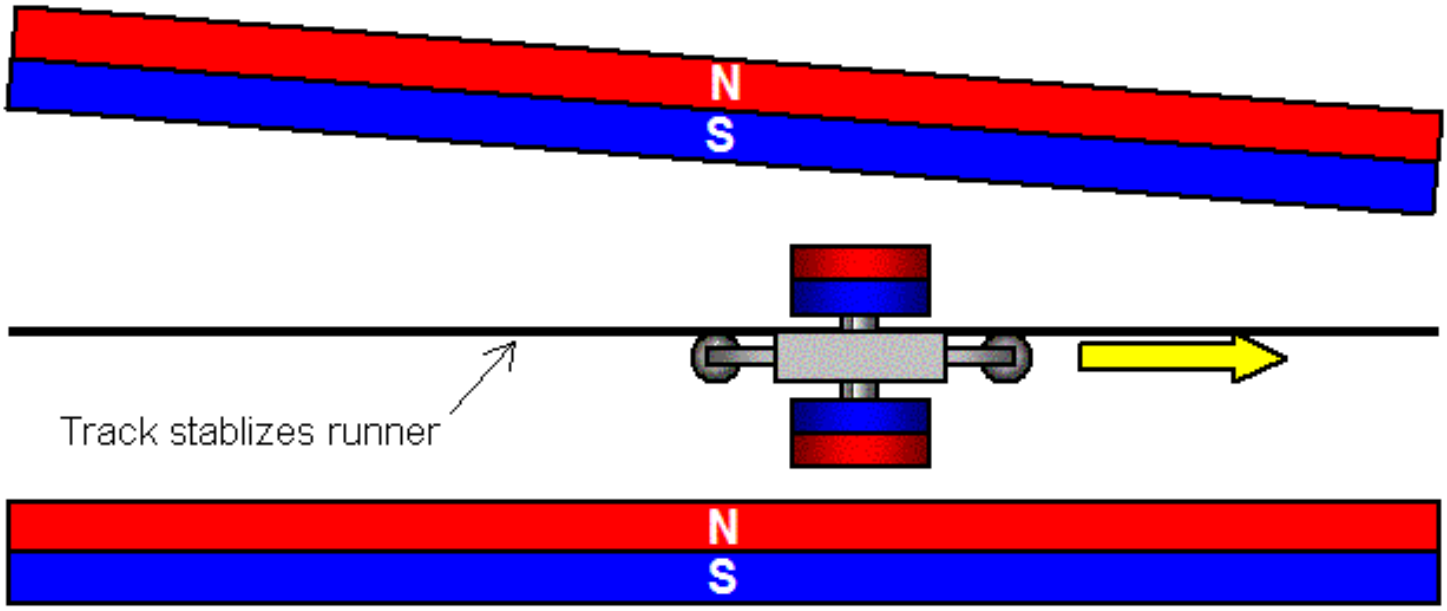
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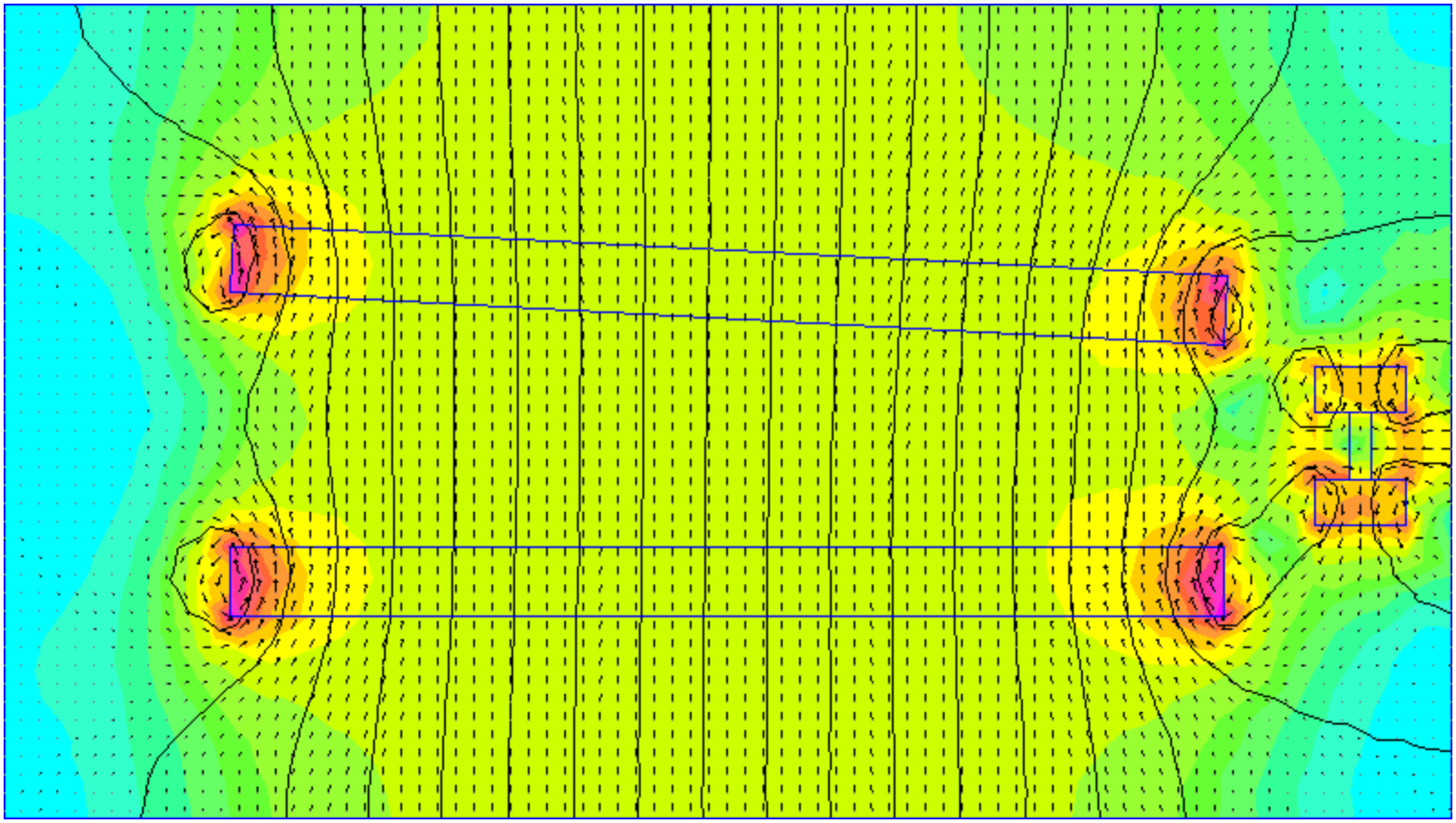
Lafonte balancer one-way gate

Created by Jason Owens
Jdo300@sbcglobal.net

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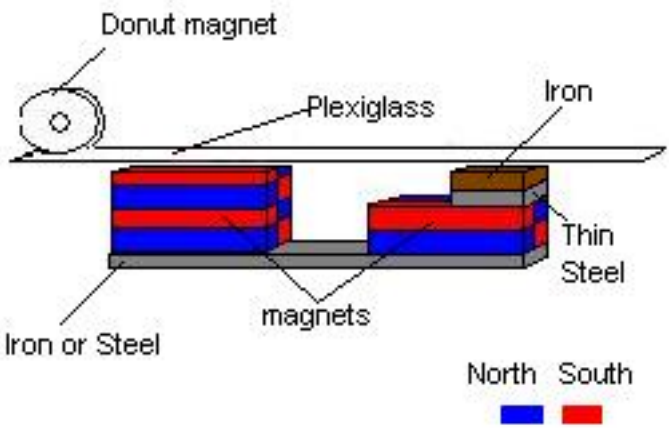
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Graham's Oneway magnetic gate



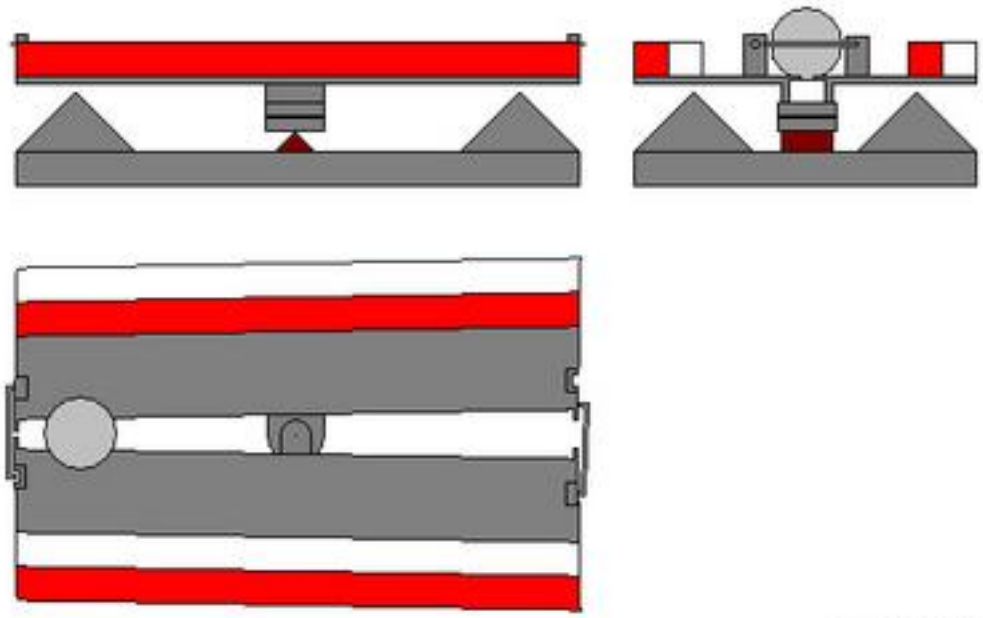
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G.N.C Harteveld

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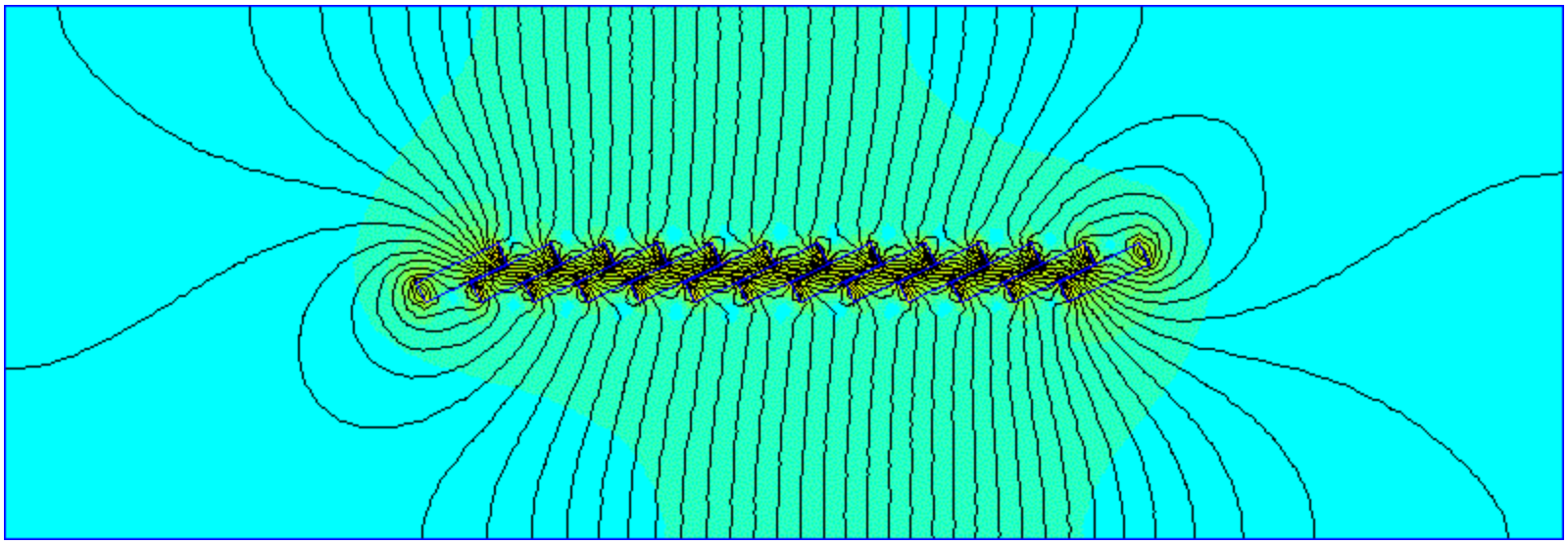


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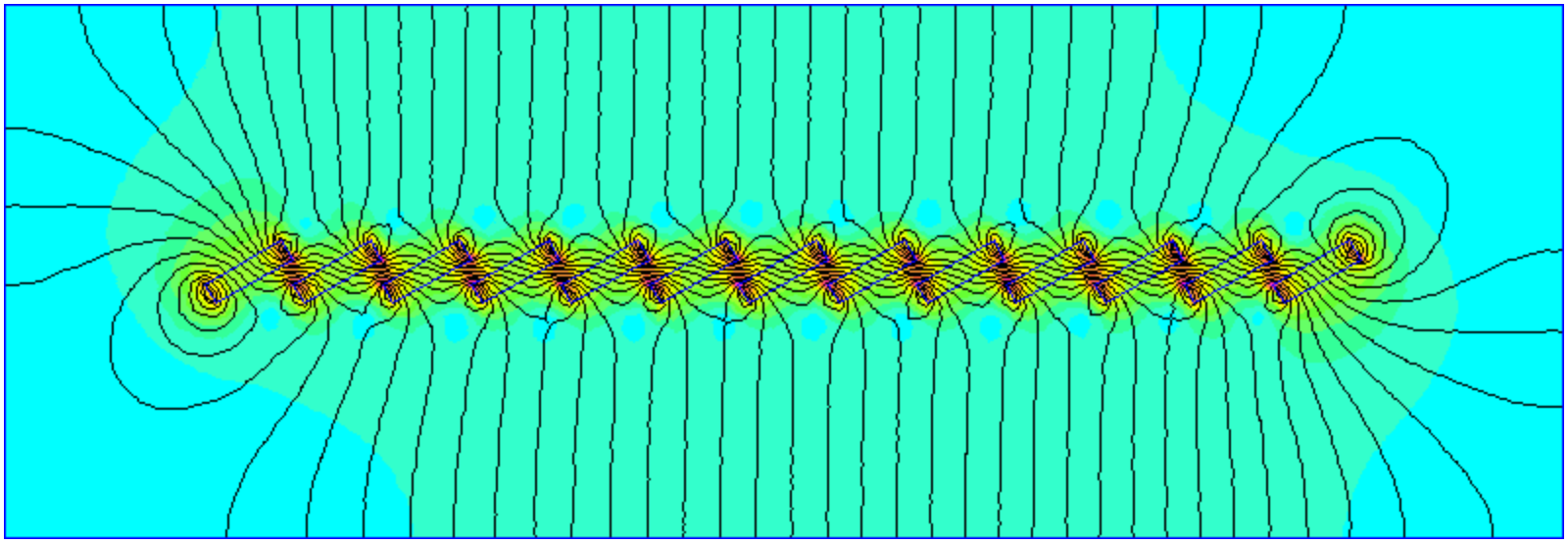
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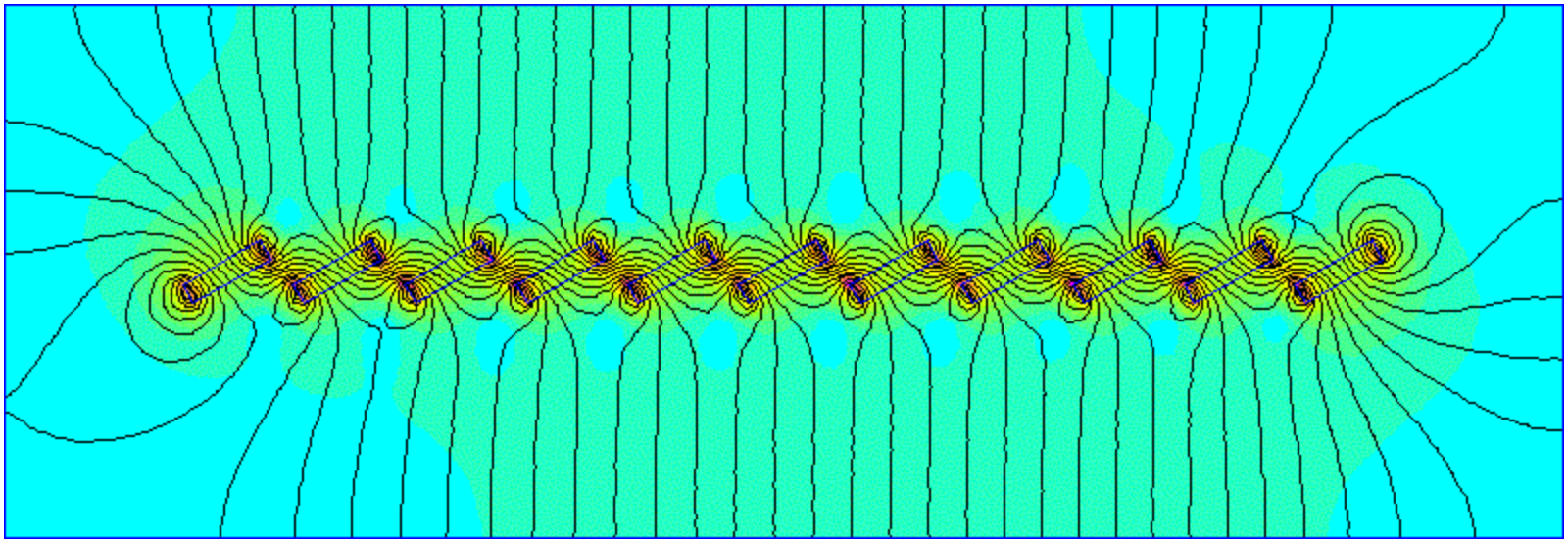
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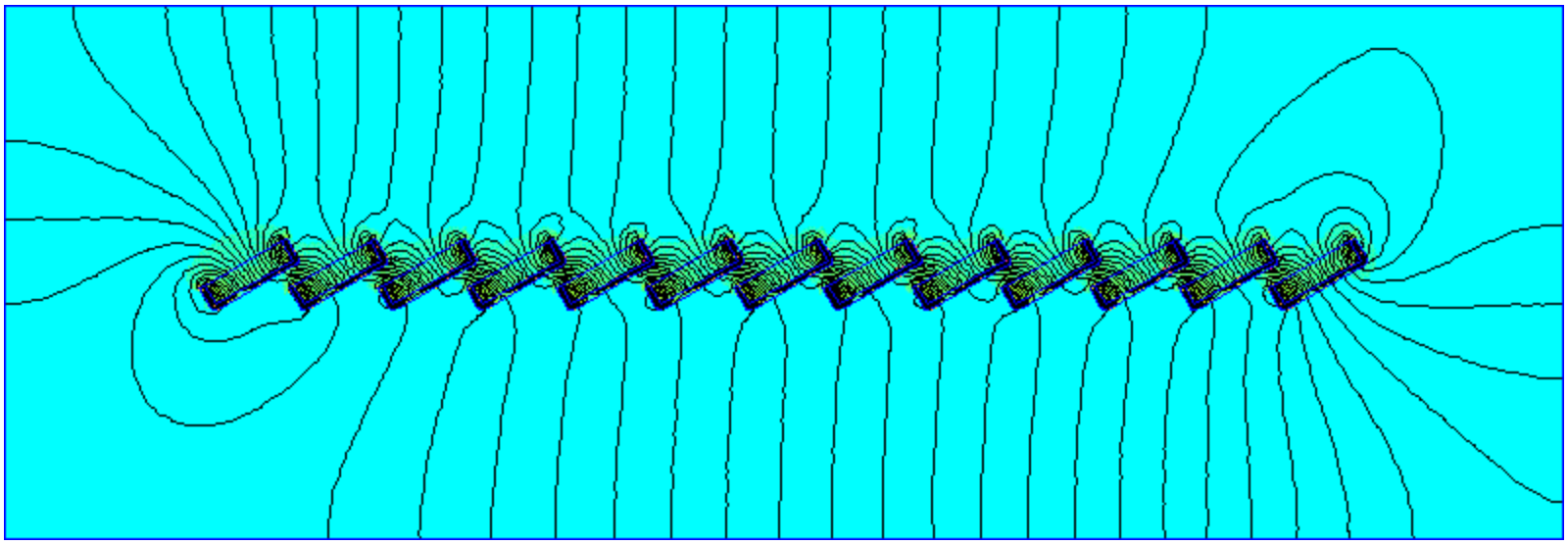
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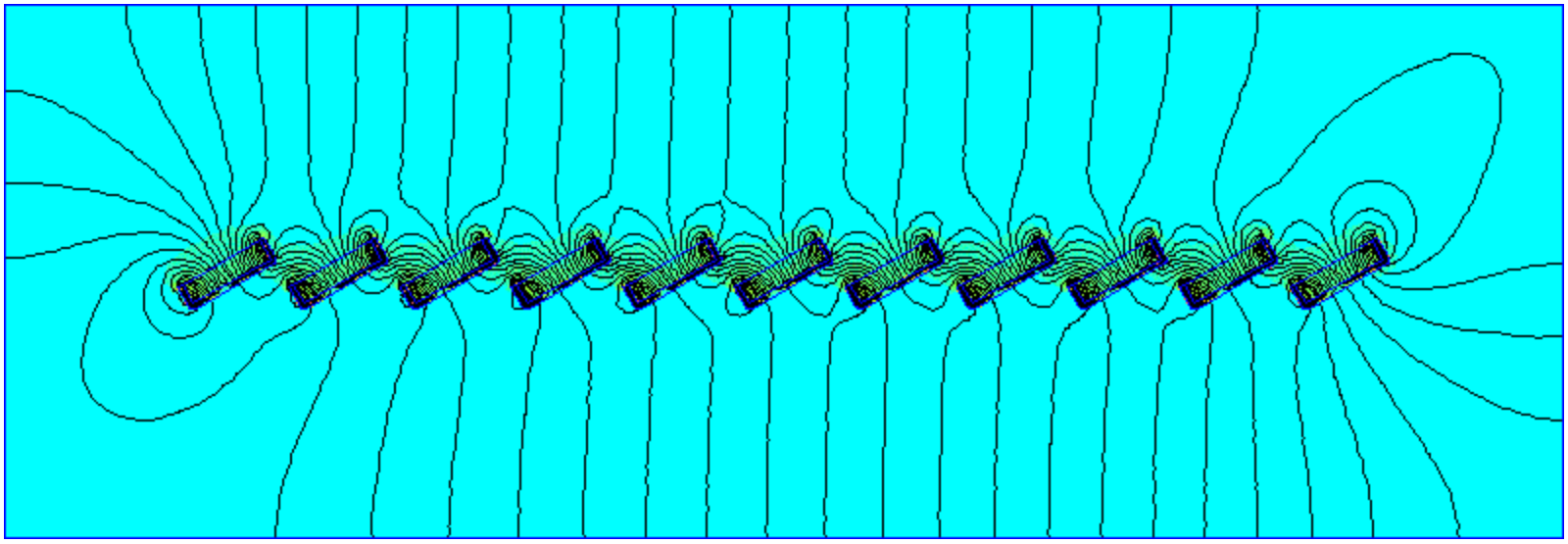
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Sub-folders in folder: .\group\minatowheel\files\Graham Clarke\Corner Gate

Size of current folder: 9 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	3	
	Devices with the corner gate Some devices that use the Cornet Gate as propulsion	4	

Files in folder: .\group\minatowheel\files\Graham Clarke\Corner Gate

Type	Filename	YYYY-MM-DD	Size	Action
	AlmostBalancedRotor.wmv (Rotor going up hill through corner gate)	2006-04-05	202 kb	
	AngledRotorinRepel.jpg (Better rotor effect)	2006-04-05	38 kb	
	ArrowHeadGate.jpg (Wooden model of corner gate upgrade)	2006-04-05	34 kb	
	ClarkeMotor.jpg (A PMM idea with the Clark Gate. By Graham.)	2006-04-05	25 kb	
	CornerGate.jpg (How the corner gate works)	2006-04-05	62 kb	
	CornerGate2.WMV	2006-04-05	420 kb	
	CornerGateEric.avi (All NEO's, bar is off-center.)	2006-04-05	542 kb	

	CornerGateSetup.jpg (How to setup the corner gate)	**2006-04-05**	**33 kb**	
	Flux Density 1 Grahams Corner Gate.jpg	**2006-04-05**	**150 kb**	
	Flux Density 2 Grahams Corner Gate.jpg	**2006-04-05**	**152 kb**	
	Flux Density 3 Grahams Corner Gate.jpg	**2006-04-05**	**151 kb**	
	Graham Gate 1.png	**2006-04-05**	**33 kb**	
	Graham Gate 2.png	**2006-04-05**	**10 kb**	
	GrahamsCornerGate.wmv (Cornet gate using a bar magnet rotor)	**2006-04-05**	**331 kb**	
	RotorAtThreeOclock.WMV	**2006-04-05**	**325 kb**	
	SettingUpCornerGate .wmv (Corner gate setup video)	**2006-04-05**	**859 kb**	
	ThreeCornerGates.WMV	**2006-04-05**	**320 kb**	
	TwoCornerGates.WMV	**2006-04-05**	**454 kb**	
	With&WithoutNeoMagnet.WMV	**2006-04-05**	**612 kb**	



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Size of current folder: 1 of 200 Mb

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Files in folder: .\group\minatowheel\files\Graham Clarke\Gem motor

Type	Filename	YYYY-MM-DD	Size	Action
	AboveGemMotor.WMV (A video of the 'one pulse electromagnetic motor')	2007-05-06	651 kb	
	gem.txt (Explanation of the GEM motor)	2007-05-06	1 kb	



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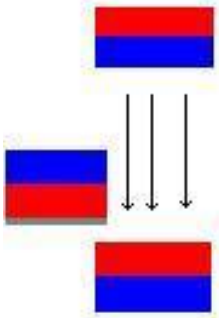
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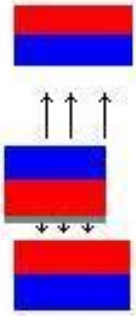
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	Balance_Magnet_Motor_3.gif	2006-04-05	685 kb	
	Balance_Magnet_Motor_4.gif	2006-04-05	482 kb	
	BasicOfBearingMotor.wmv	2006-04-05	826 kb	
	Changingfields.jpg	2006-04-05	74 kb	
	Fields.jpg	2006-04-05	7 kb	
	Grahams_Atom_Motor.avi	2006-04-05	2.52 mb	
	HowHydaulicsWouldWork.WMV	2006-04-05	531 kb	
	MovingSensor.WMV	2006-04-05	415 kb	

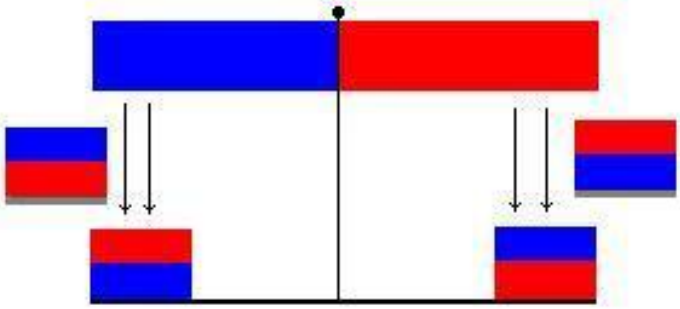
Graham Clarkes Changing magnetic fields



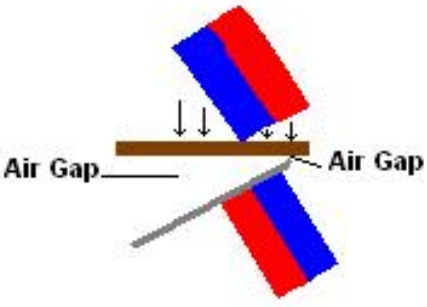
In this the top magnet is atracted to the bottom magnet, the middle magnet has no afect on the top or bottom magnets atraction



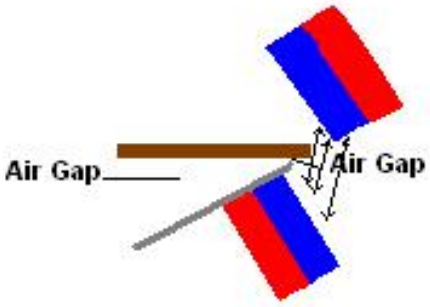
In this the middle magnet has been moved past the halfway point between the top and bottom magnets, now the middle magnet has an afect of making the top and bottom magnets repel from it



In this the bar magnet is the rotor as it is set now it will not move because the bar magnet is atracted to the bottom magnets, if you push the middle magnets in then the bar magnet will spin to aline its poles with the middle magnets, once alined you can pull the middle magnets out and the rotor will spin again to aline with the bottom magnets.



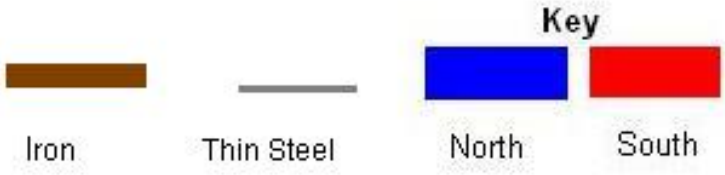
Here the magnet is atracted to the iron bar the thin steel and the air gap stops the magnets repelling



Here the magnets start to repel each other, I find this a lot better then the top because there is less force needed to change the

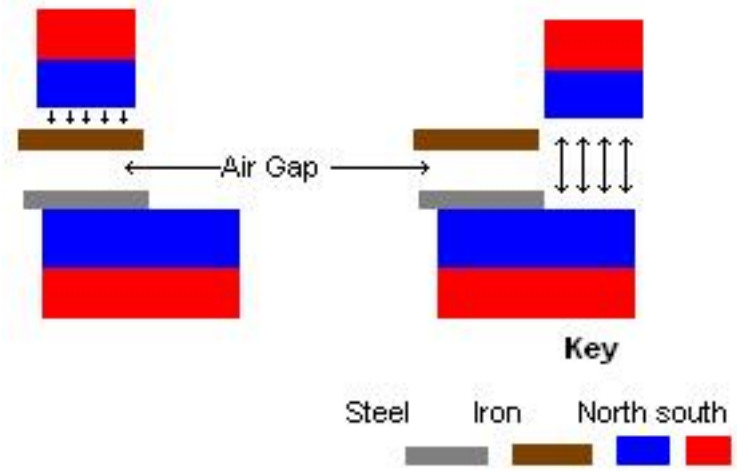
iron bar the thin steel and the air gap stops the magnets repelling each other

find this a lot better then the top because there is less force needed to change the magnet from atracting to repelling, with this the repelling only happens when the magnet is past the iron, when one magnet is moving there is next to no sticking point and any sticking point is easily over come with gravity



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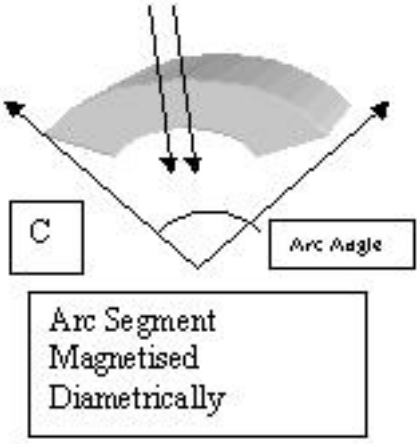

Air Gap
Key
Steel
Iron
North south

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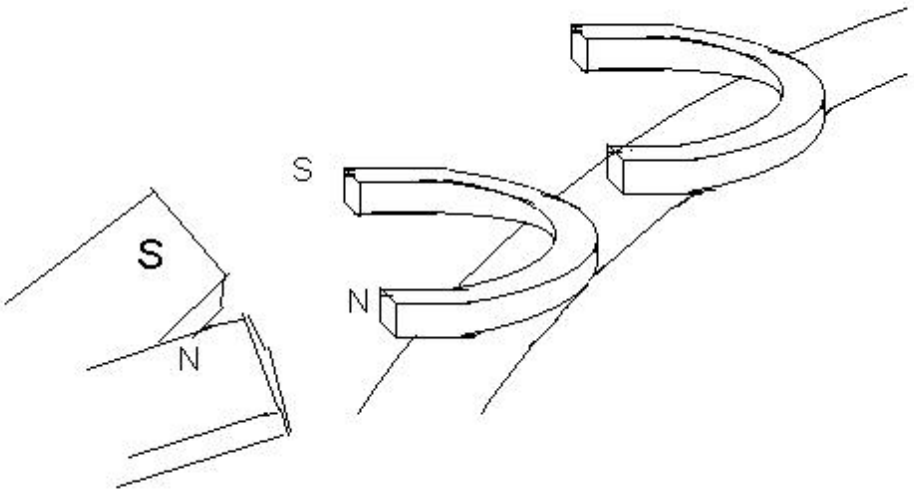
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C
Arc Angle
Arc Segment
Magnetised
Diametrically

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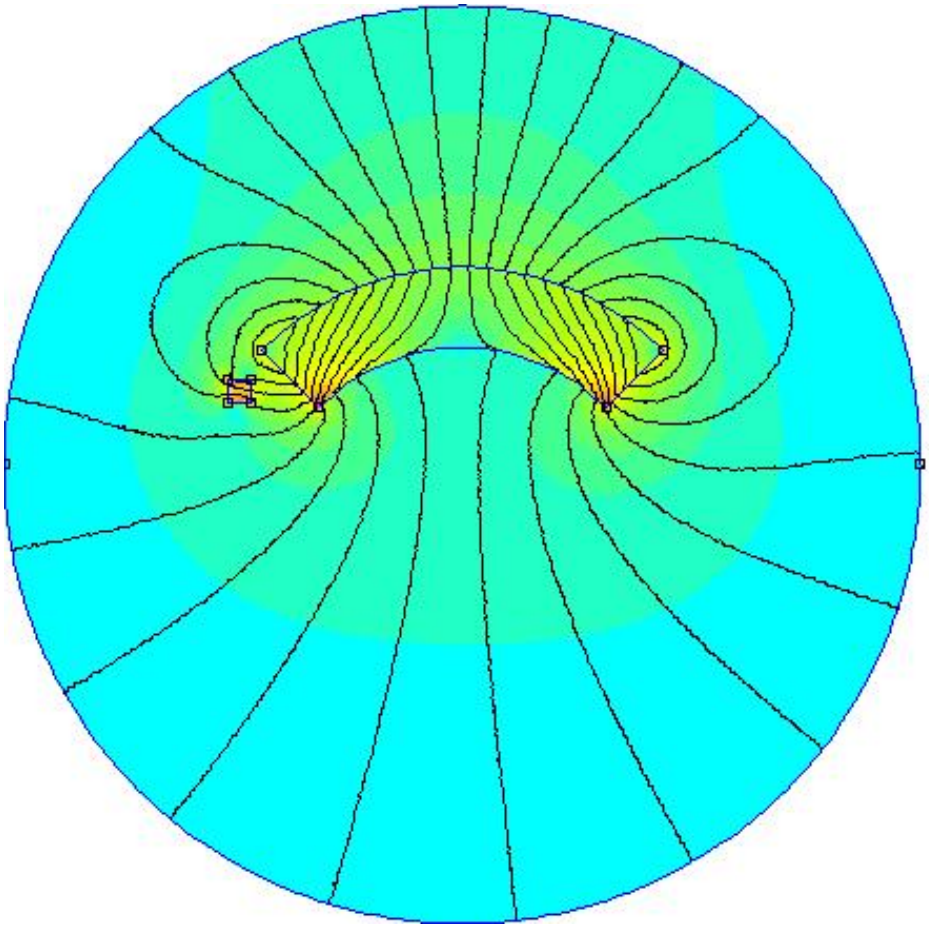
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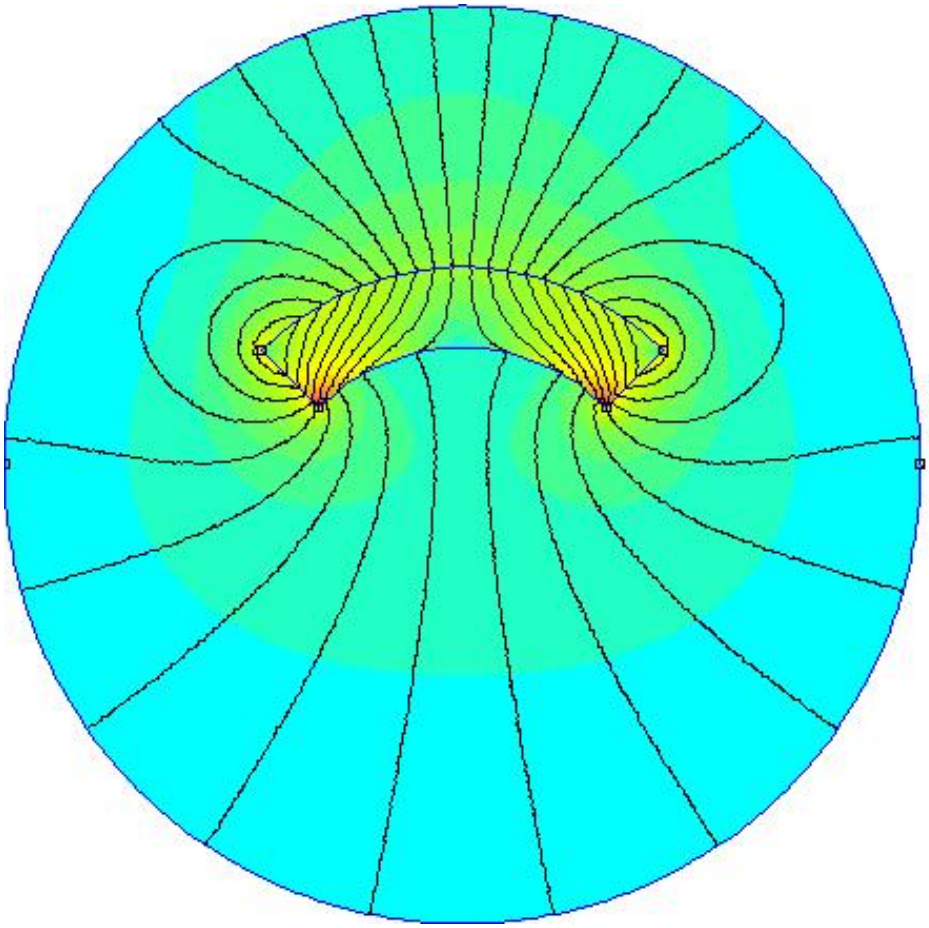


1.257e+000	>1.323e+000
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9.923e-001	1.058e+000
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Density Plot: |B|, Tesla

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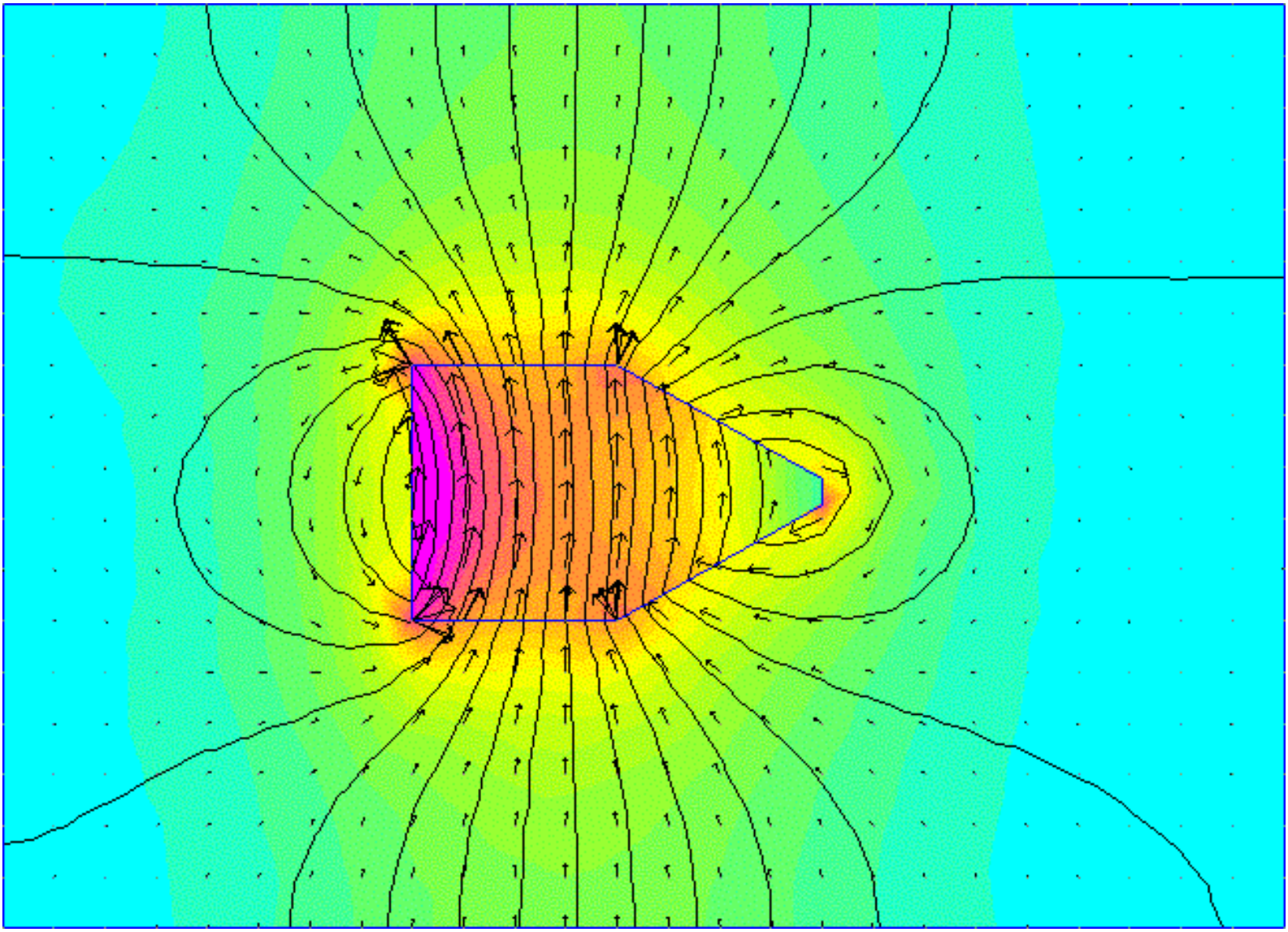
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7.879e-001	8.485e-001
7.273e-001	7.879e-001
6.667e-001	7.273e-001
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Density Plot: |B|, Tesla

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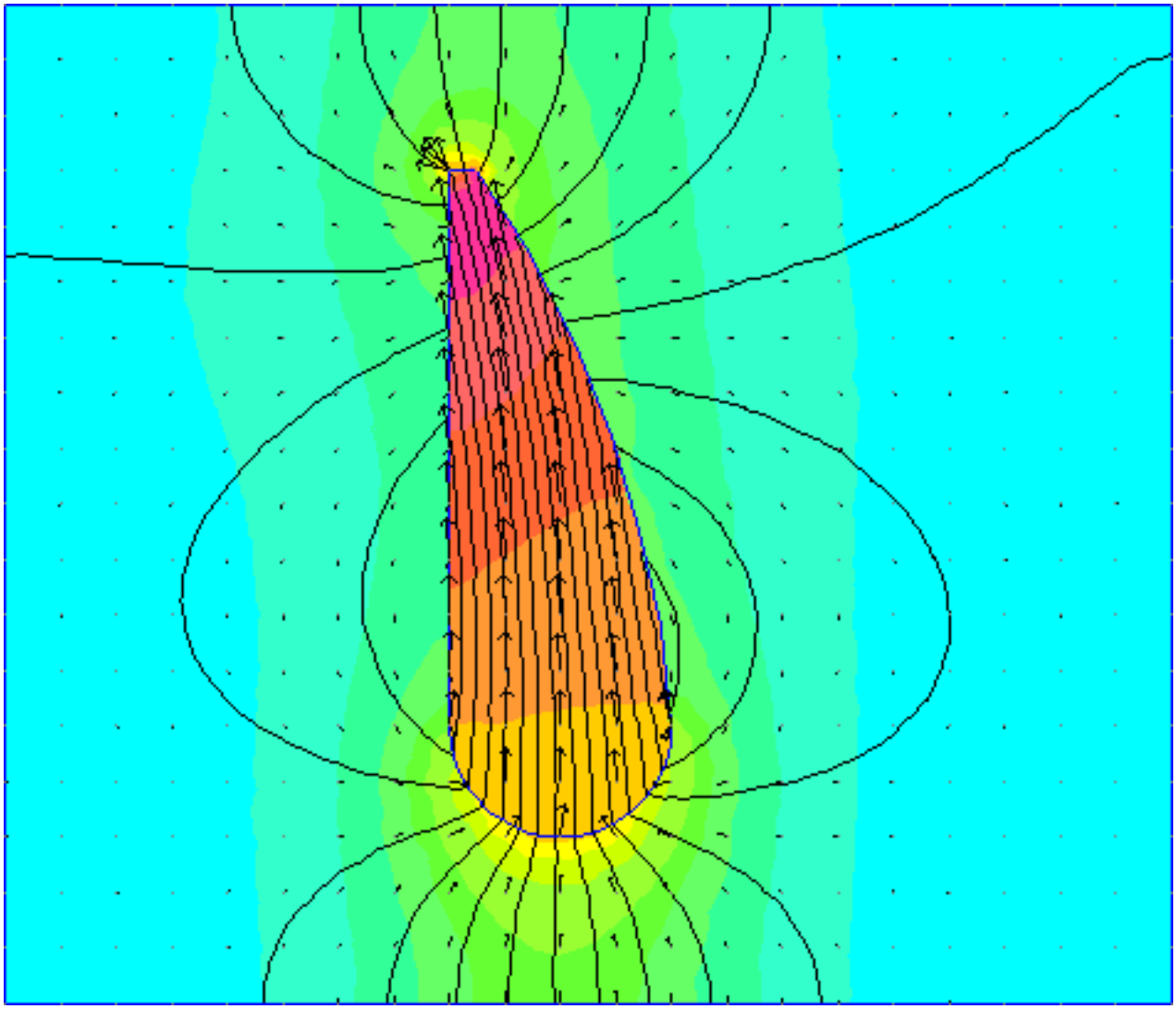
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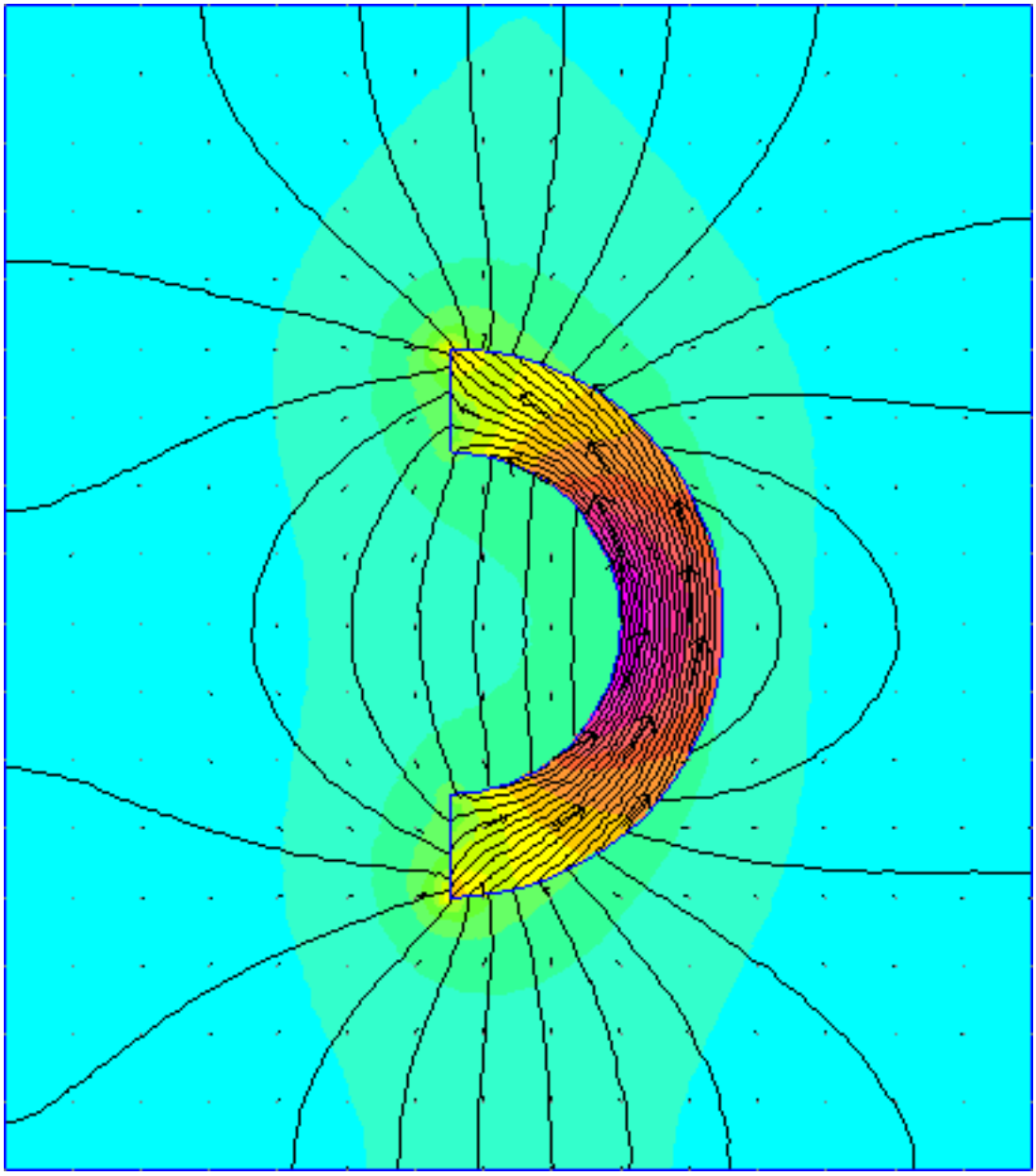
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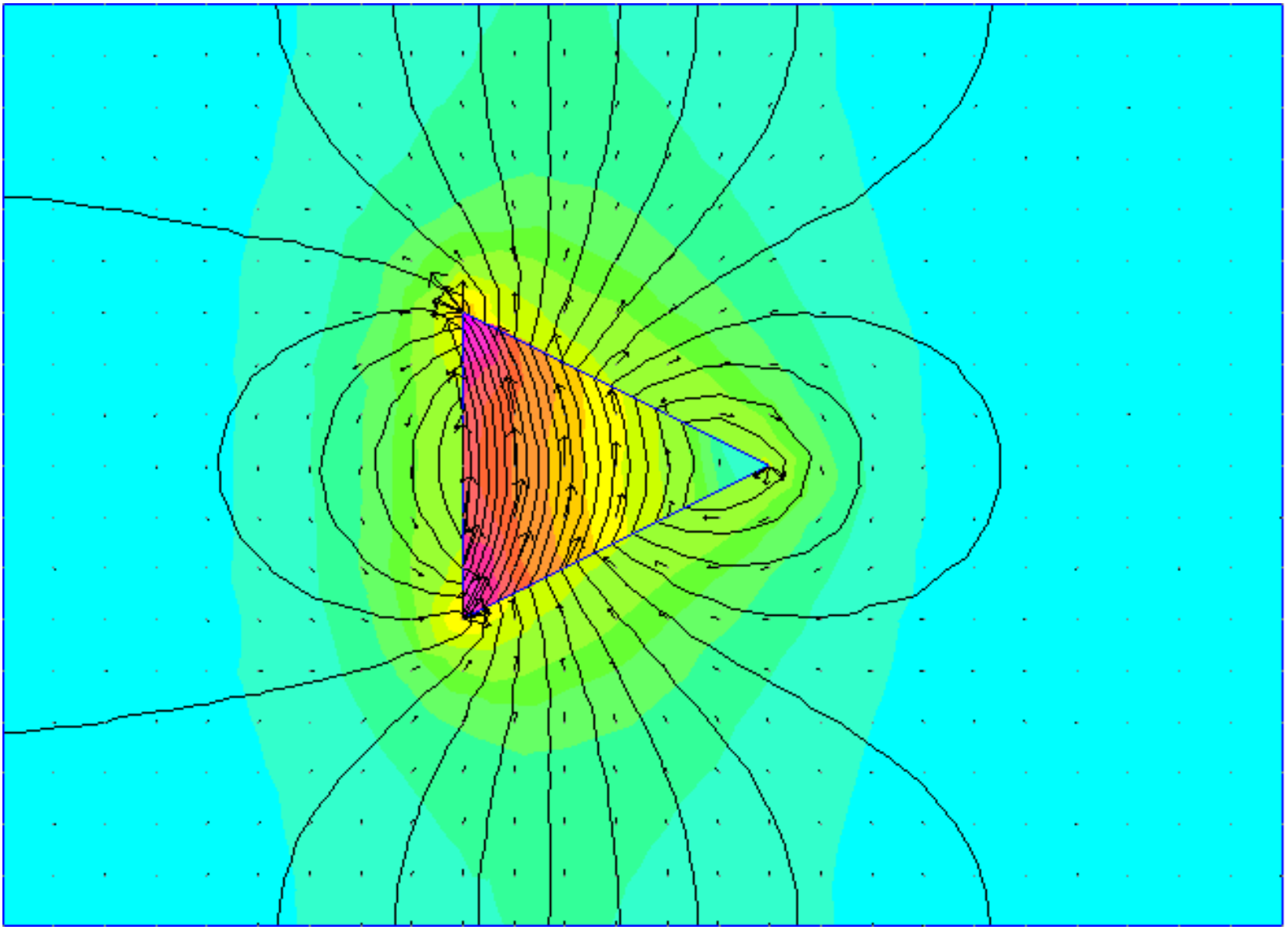
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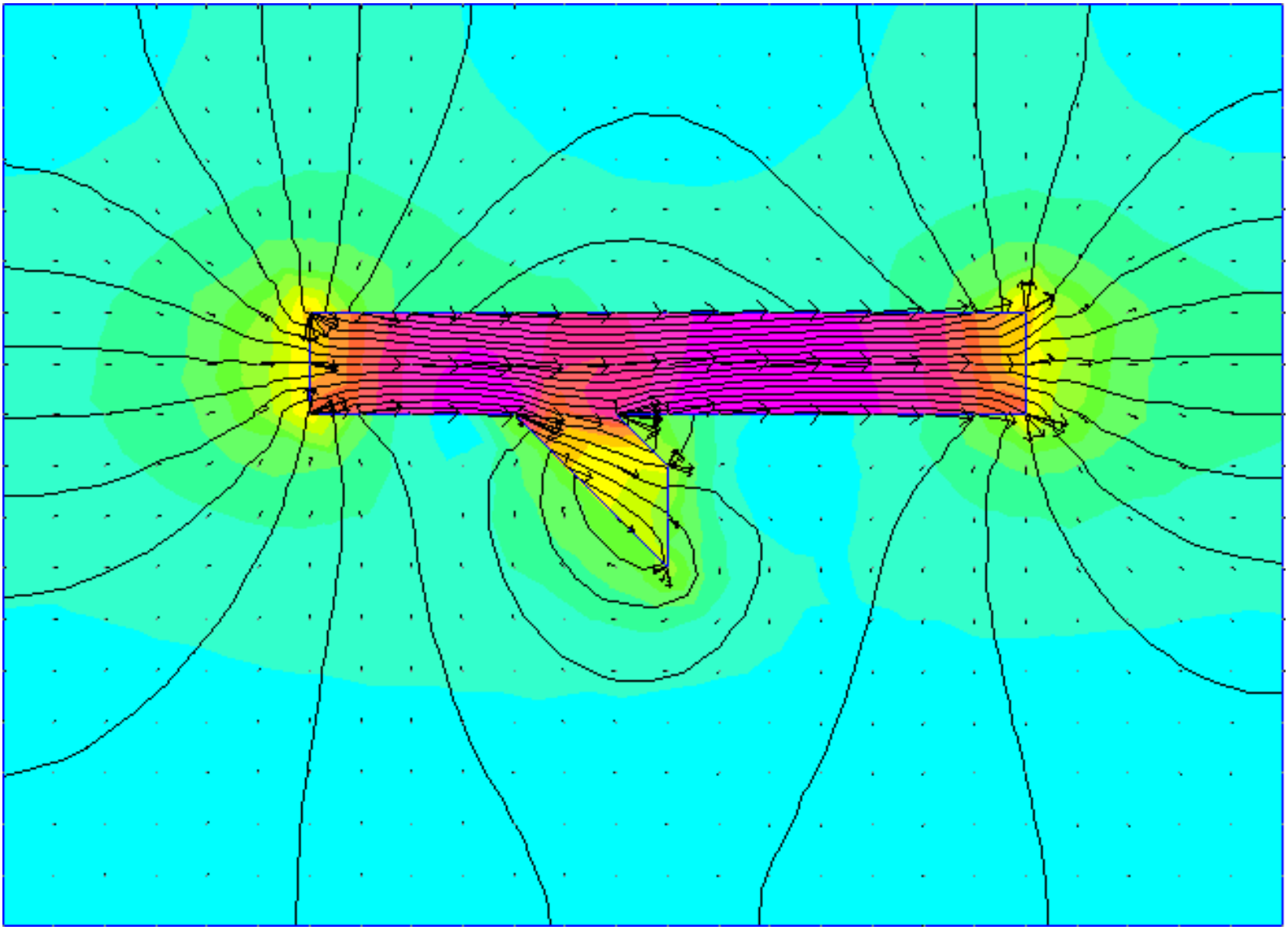
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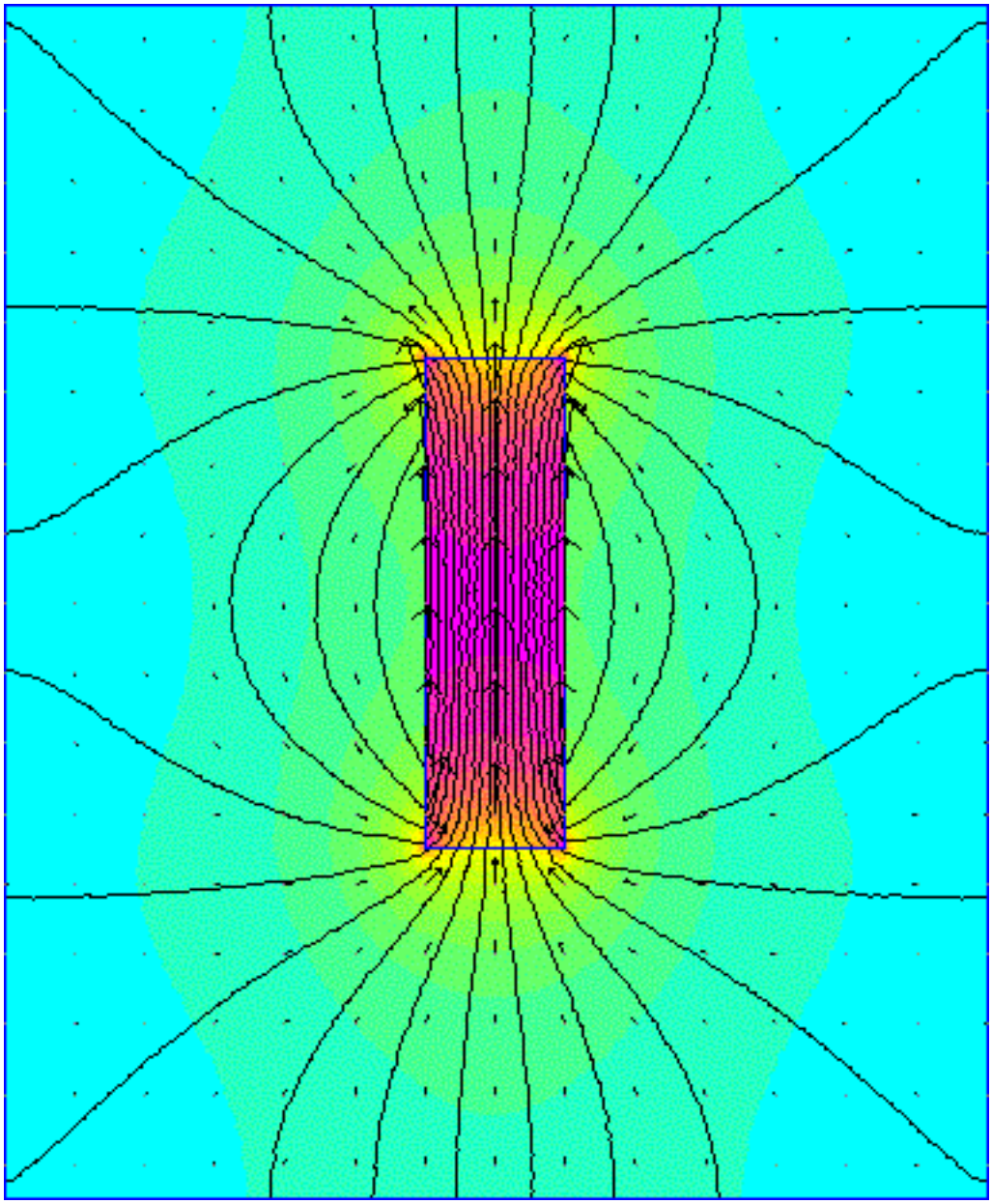
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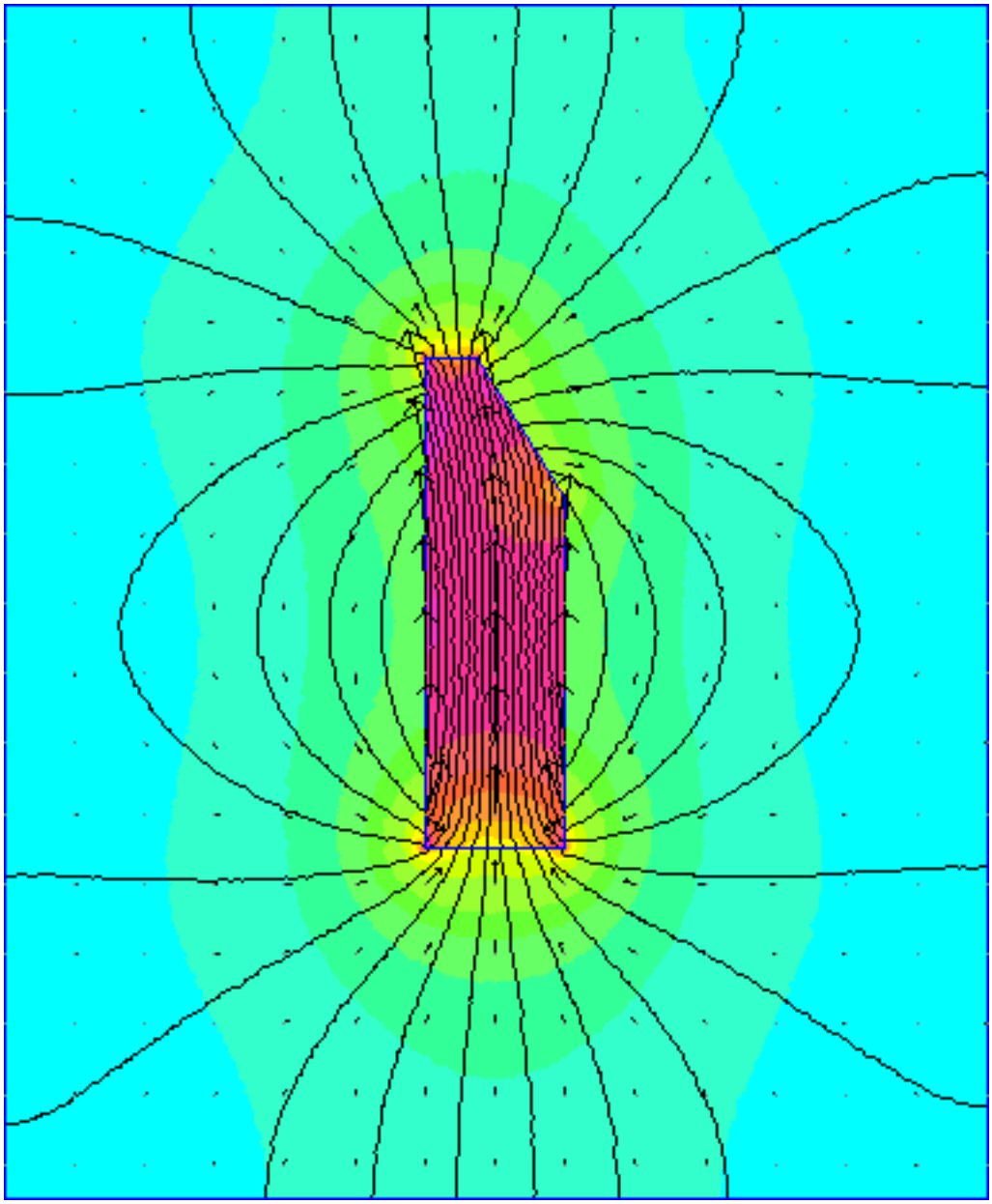
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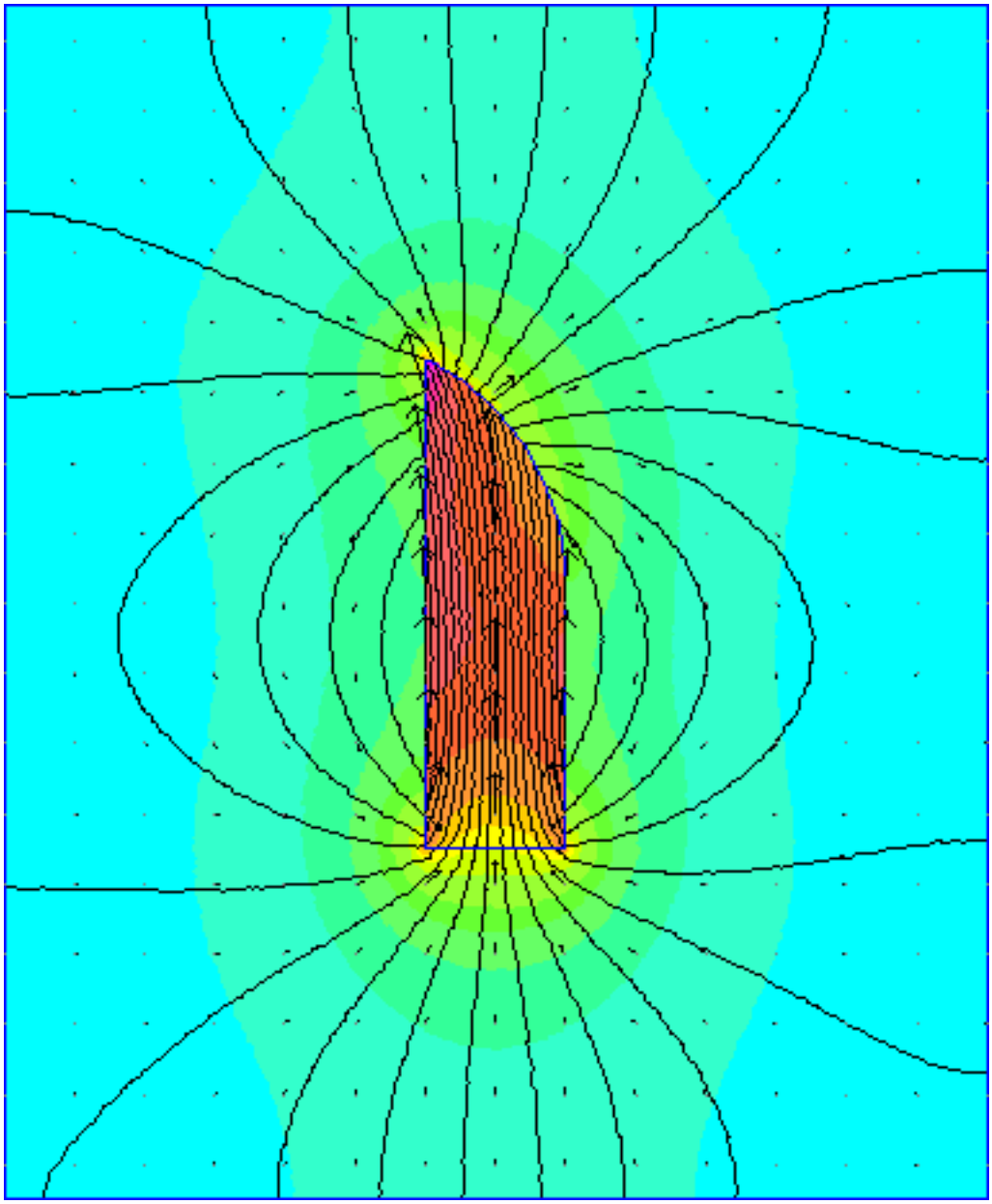
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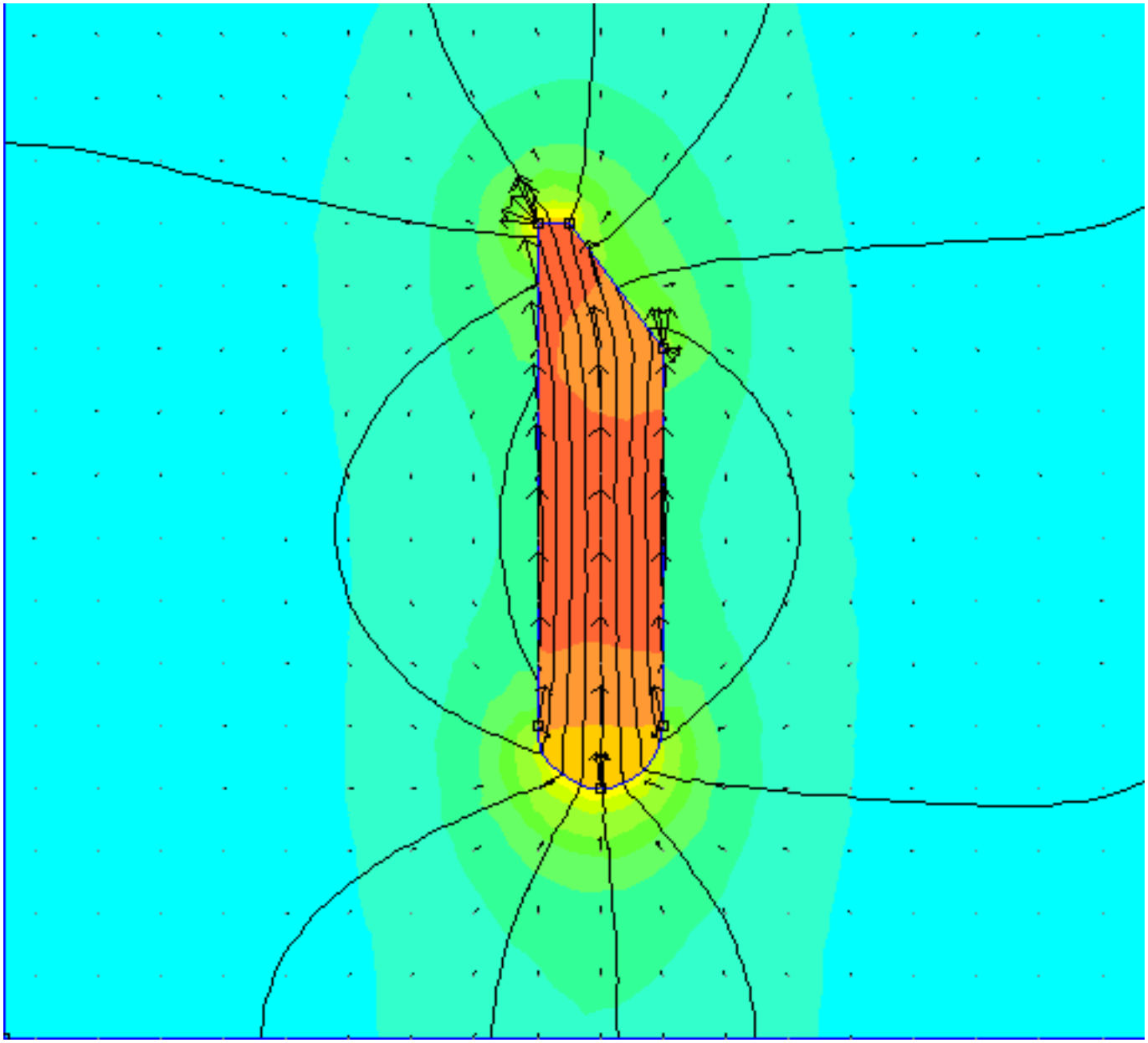
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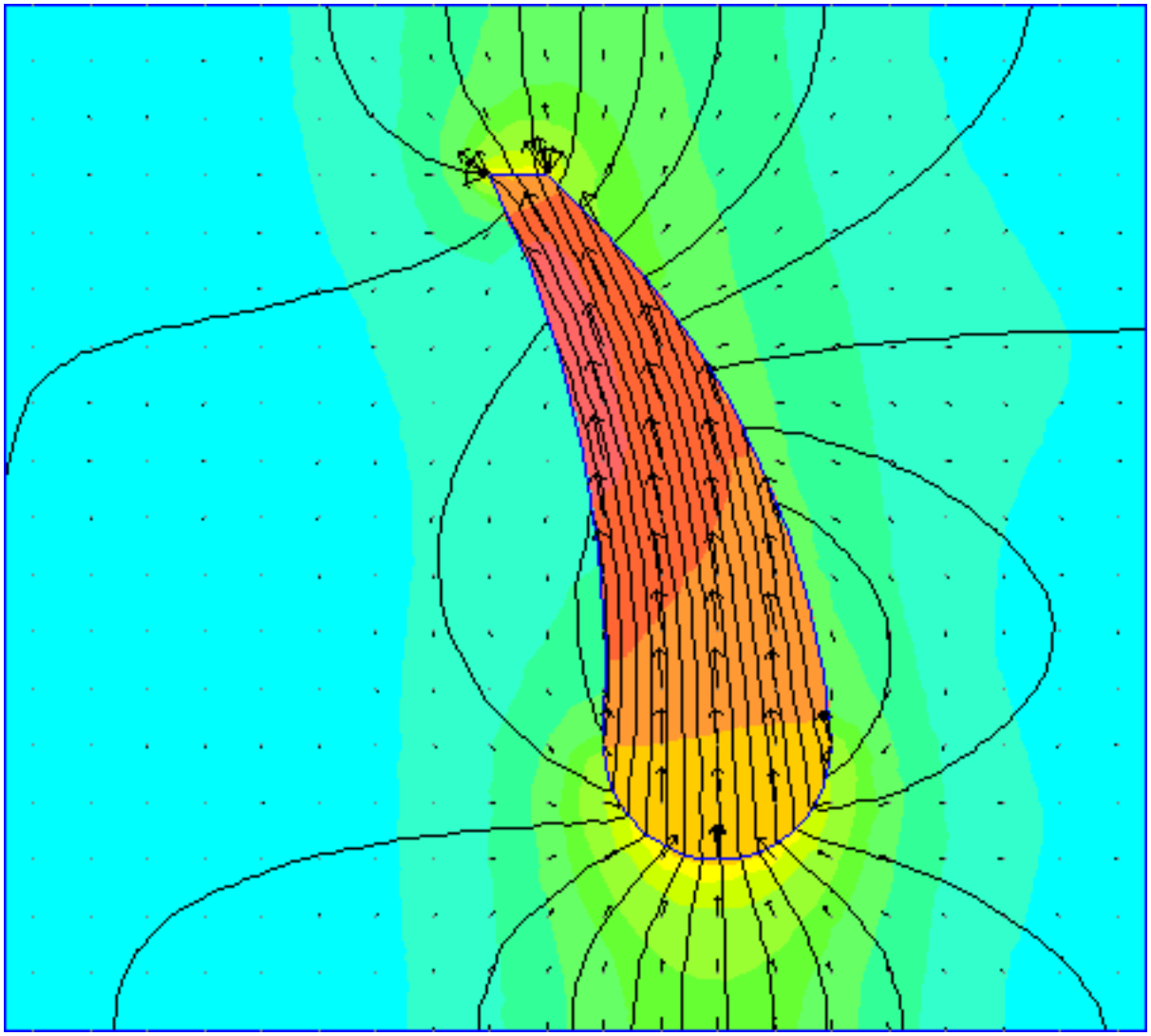
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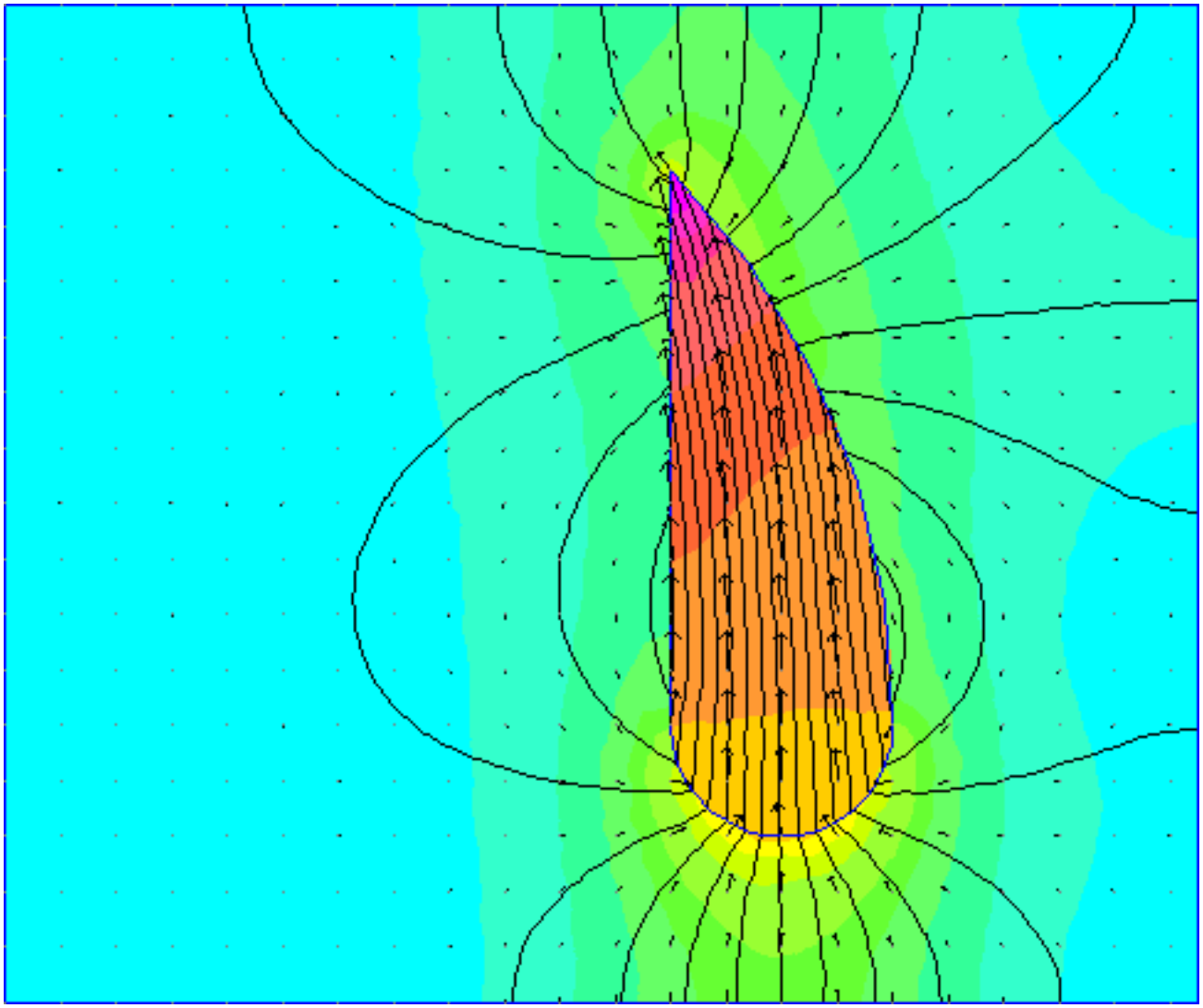
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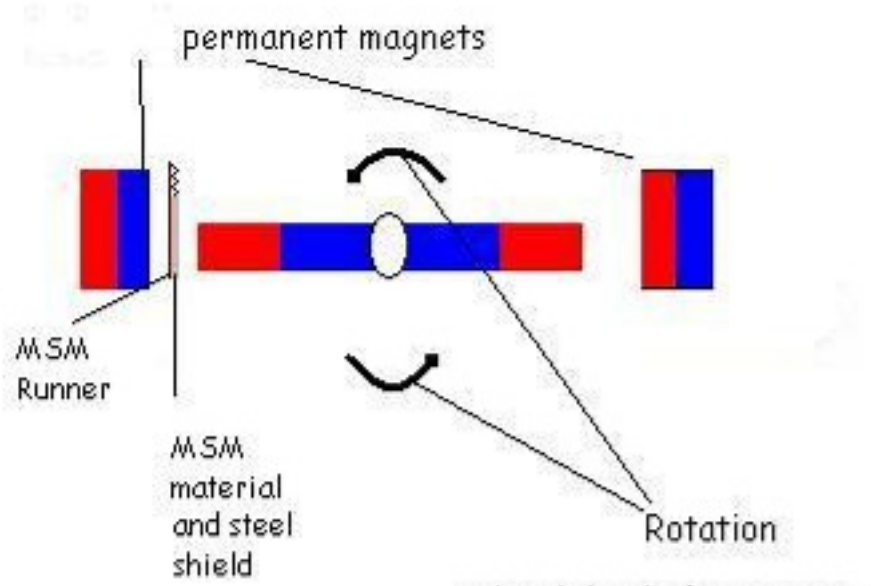
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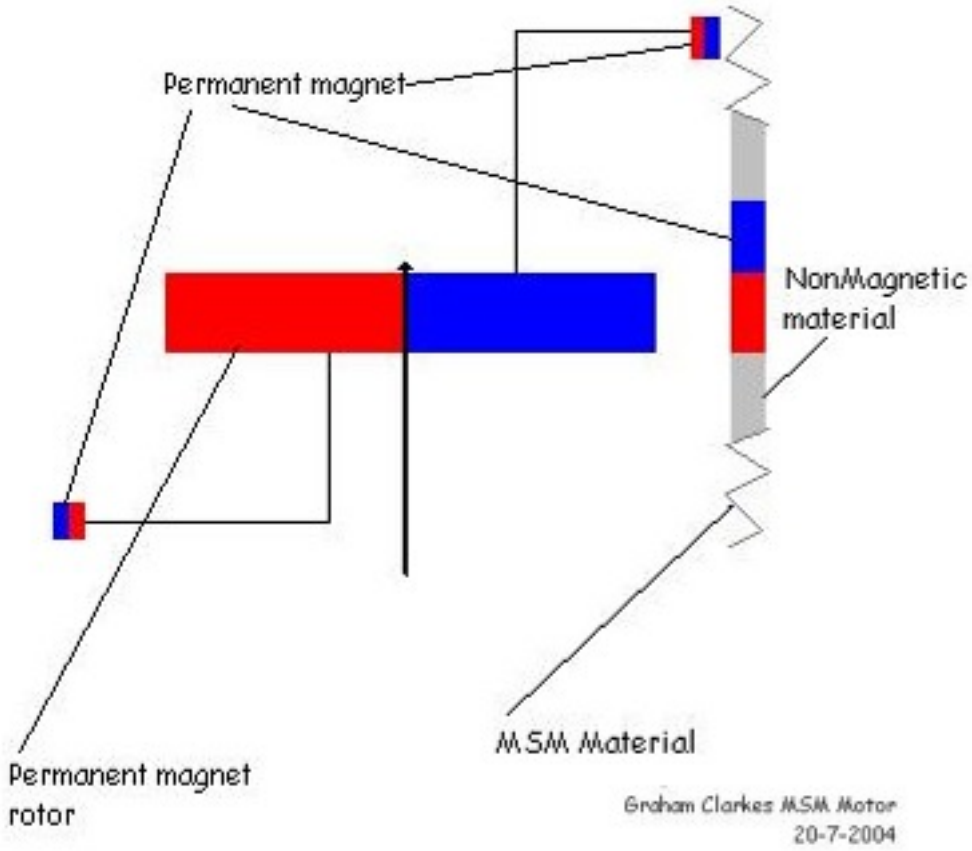
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Graham Clarkes idea for a MSM motor
20-7-2004

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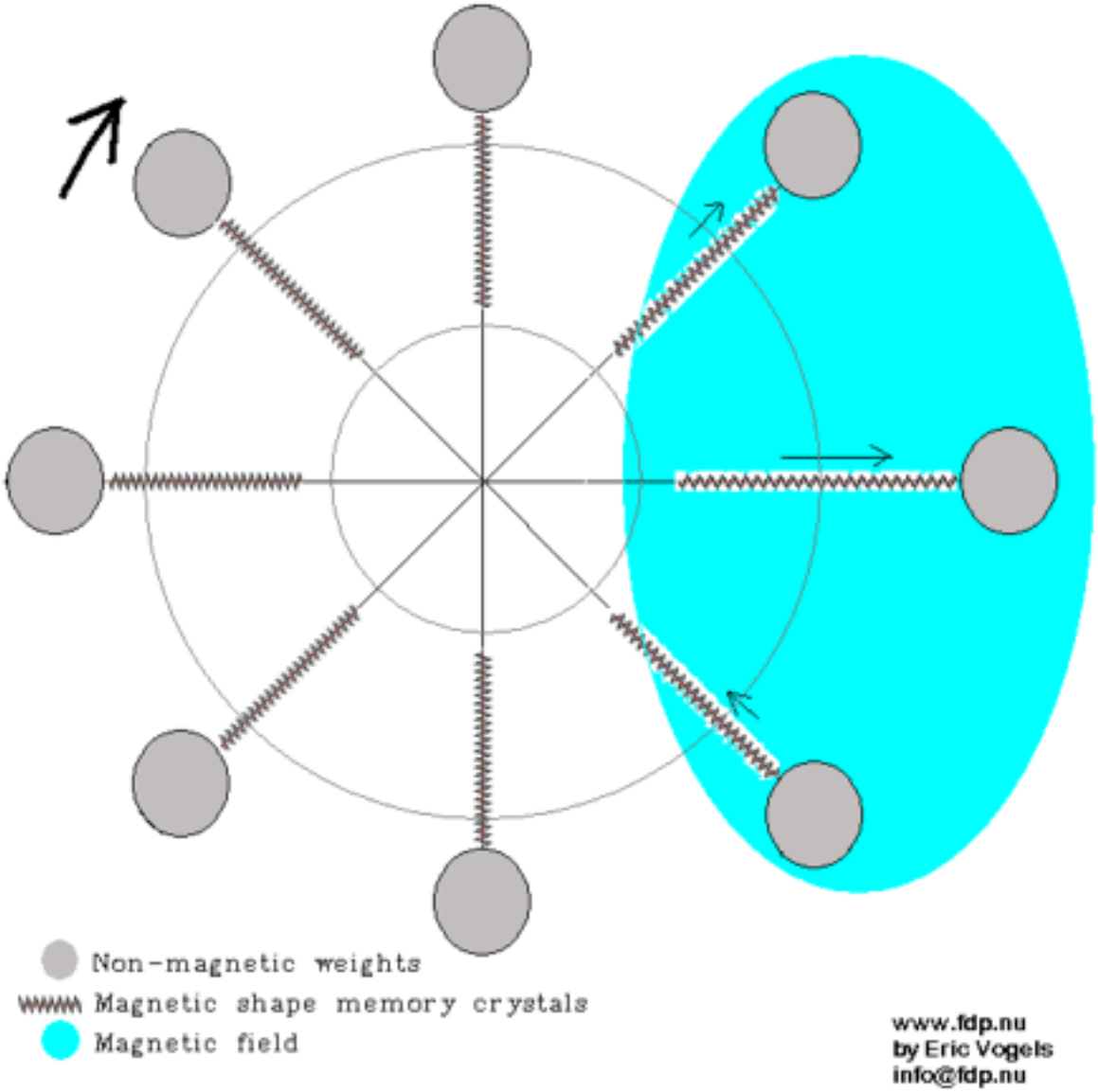

Permanent magnet
NonMagnetic material
MSM Material
Permanent magnet rotor
Graham Clarkes MSM Motor
20-7-2004

http://www.fdp.nu/shared/files/Magnetic%20Memory%20Shape%20Motor//GrahamsMSMmotor2.jpg

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Magnetic Shape Memory Motor



www.fdp.nu
by Eric Vogels
info@fdp.nu

http://www.fdp.nu/shared/files/Magnetic%20Memory%20Shape%20Motor//msmm.gif

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20advanced//Coil-attract.avi

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http://www.fdp.nu/shared/files/Minato%
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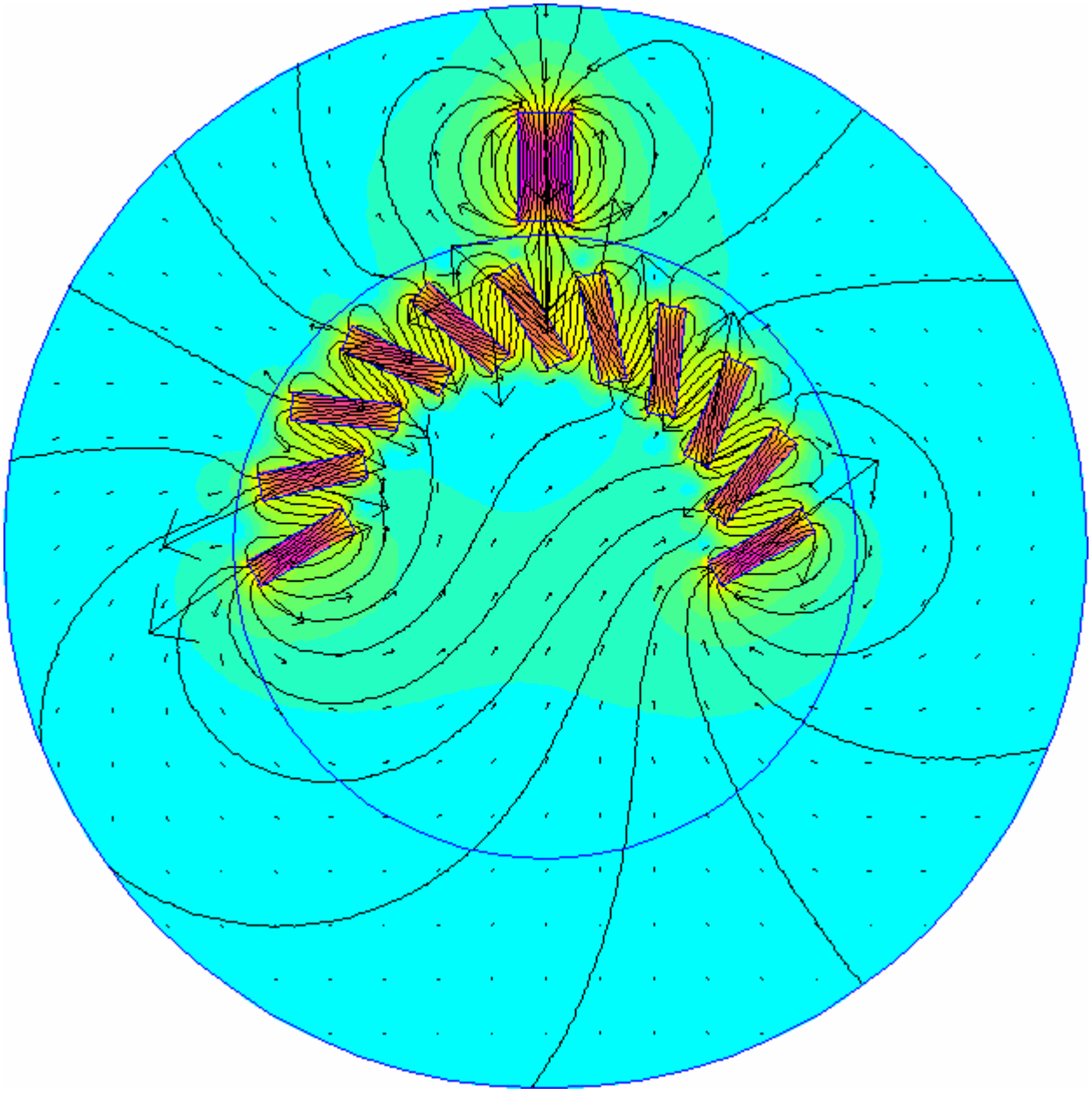
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Dual Minato-Wheel Theory

Written by: Jason Owens
September 14th 2005

Here are my thoughts about the normal Minato wheel vs. the Dual Minato wheel.

First, consider a typical flux diagram of a single minato wheel. In this example, I used 11 SmCo28 Bar magnets with the north poles oriented outward (just as in Jaro's diagram). The dimensions of the magnets are 1/4" x 2" x 3/8" thick. The stator magnet is an NdFeB35 magnet with its north pole facing the wheel. The dimensions are 1" x 2" x 3.8" thick.

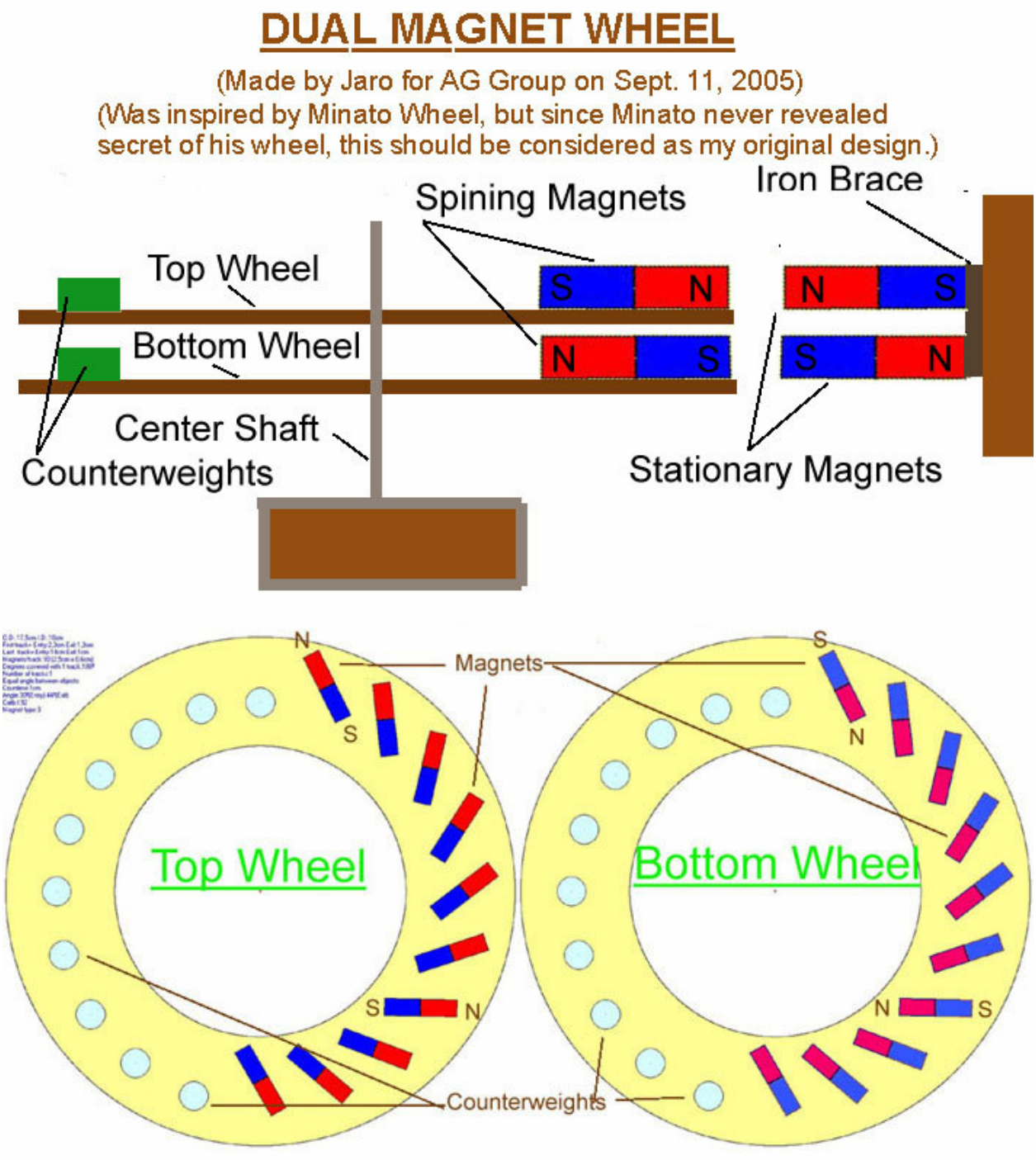


Here I want you to see the flux loop that I believe causes the sticky spot at the beginning of the track and the 'kick' at the end of the track. You can see that the magnetic field of all the magnets is generally flowing in a counterclockwise direction because of the vector arrows. Other evidence of the loop is the region right under the magnets where the flux is dense stretching from one end of the track to the other (See Figure 1). Also note that the vector arrows coming out of the track magnets on the far left and right are much larger than the surrounding arrows. This shows that the field intensity is great in those regions because the track is generally behaving as one giant magnet. On the left we have the kick spot because of the large area of repulsion around the end, and on the right, we have the huge attraction sticky spot at the beginning of the track.

In my opinion, the key to correcting the problem is to isolate the magnetic field of each rotor magnet so that the giant flux loop will not occur. This should eliminate the sticky spots at the end (because the flux will not pool up at the ends in the first place), but the key is to do this without hindering the forces that make the wheel work. The simplest way to accomplish this would be with shielding around each magnet but placing shielding around each magnet will reduce the overall power as well.

Jaro's method is another good way of accomplishing the same effect without using shielding. The idea he is after is to simply redirect the magnetic flux from each magnet from flowing from left to right to flowing from top to bottom. This will create mini closed loops between the top and bottom magnets that will isolate each magnet pare (top and bottom) from its neighboring pare.

I ran some tests in Maxwell3D to verify this idea and from what I can tell; it does appear to be happening when the magnets are placed close enough to each other vertically. However, before I continue on to my results. I should point one thing out in Jaro's diagram:

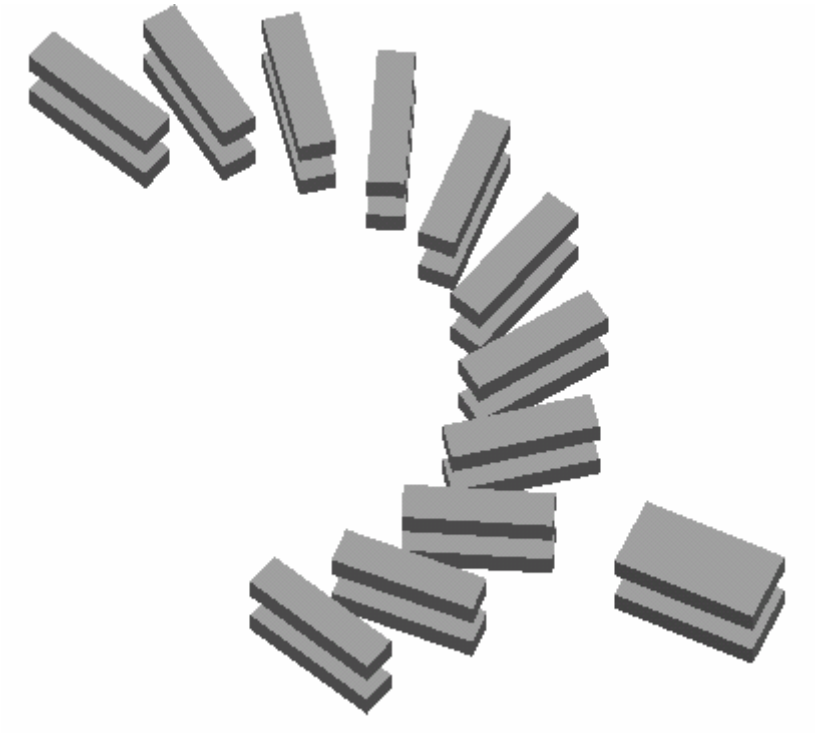


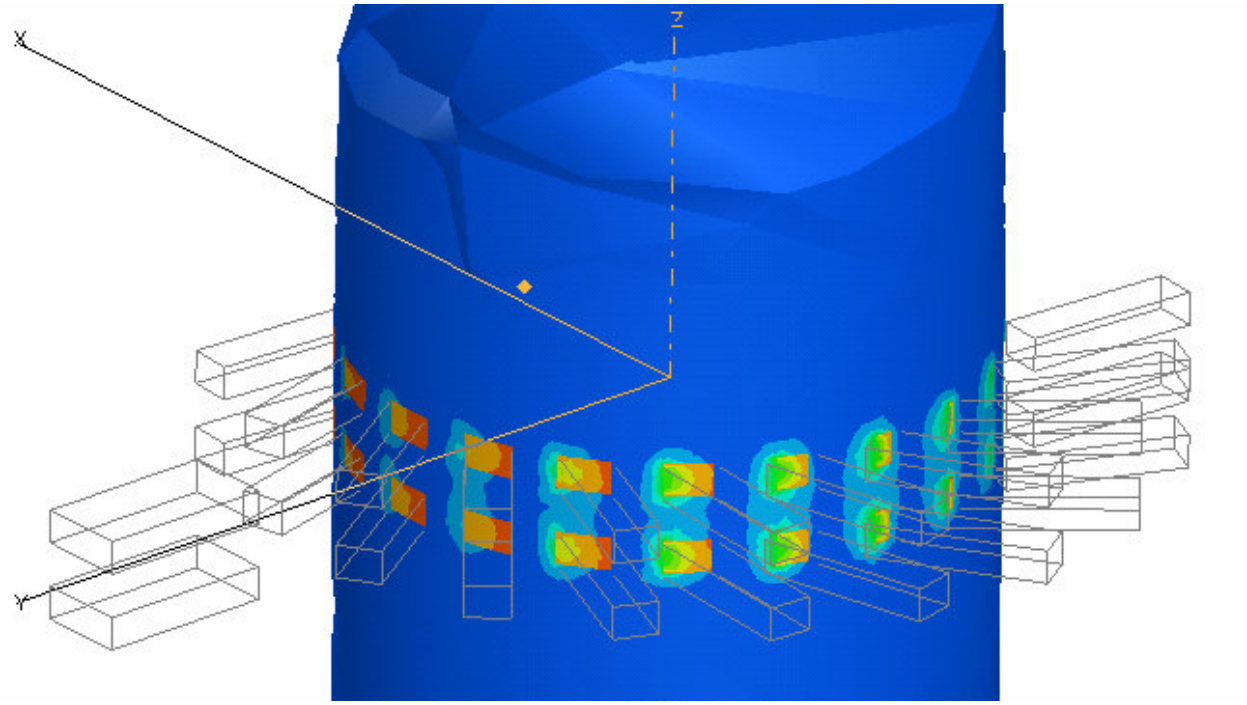
Placing a north pole stator against the left wheel will make it rotate clockwise and placing a south pole stator on the right wheel will also make it rotate clockwise. This is an important point to understand because the mechanism that could make this work has nothing to do directly with the fact that the poles on the stator and rotor magnets are reversed on each disk. The key here is the flux loop I explained earlier.

With the wrong distance between the top and bottom row of magnets, the wheels would just behave as one large wheel with

two extremely strong ‘kick’ and sticky spot. However, when the top and bottom disk are brought close to each other, the magnetic flux loop will begin to take effect and change the flow of the magnetic flux field. IF this does indeed occur, I hypothesize that the sticky and kick spots will be diminished or eliminated all together leaving just the force of the magnets on the tracks to propel the disks. Again, I feel the key here is the flux loop.

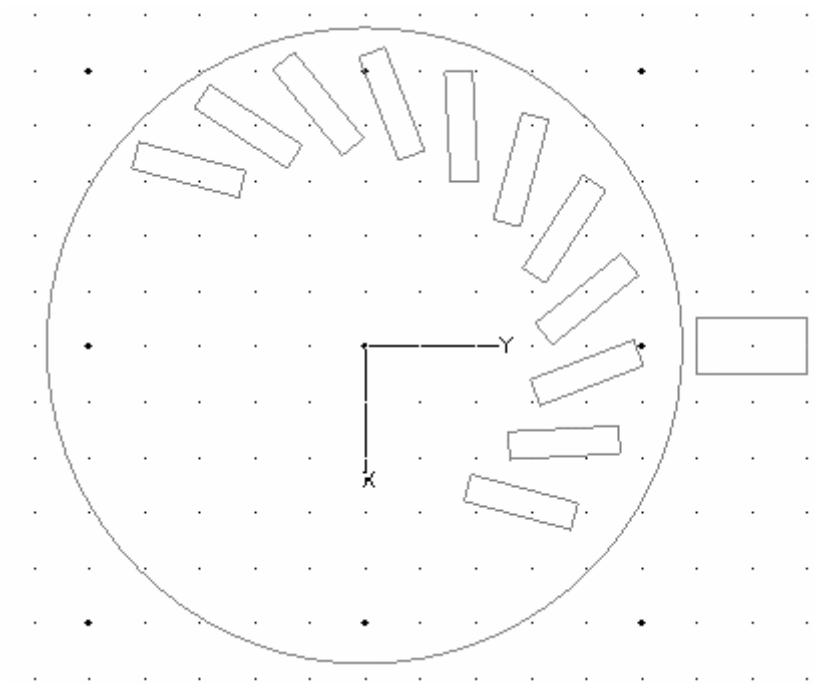
Here is a picture from my simulation in Maxwell 3D of the dual magnet Wheel:



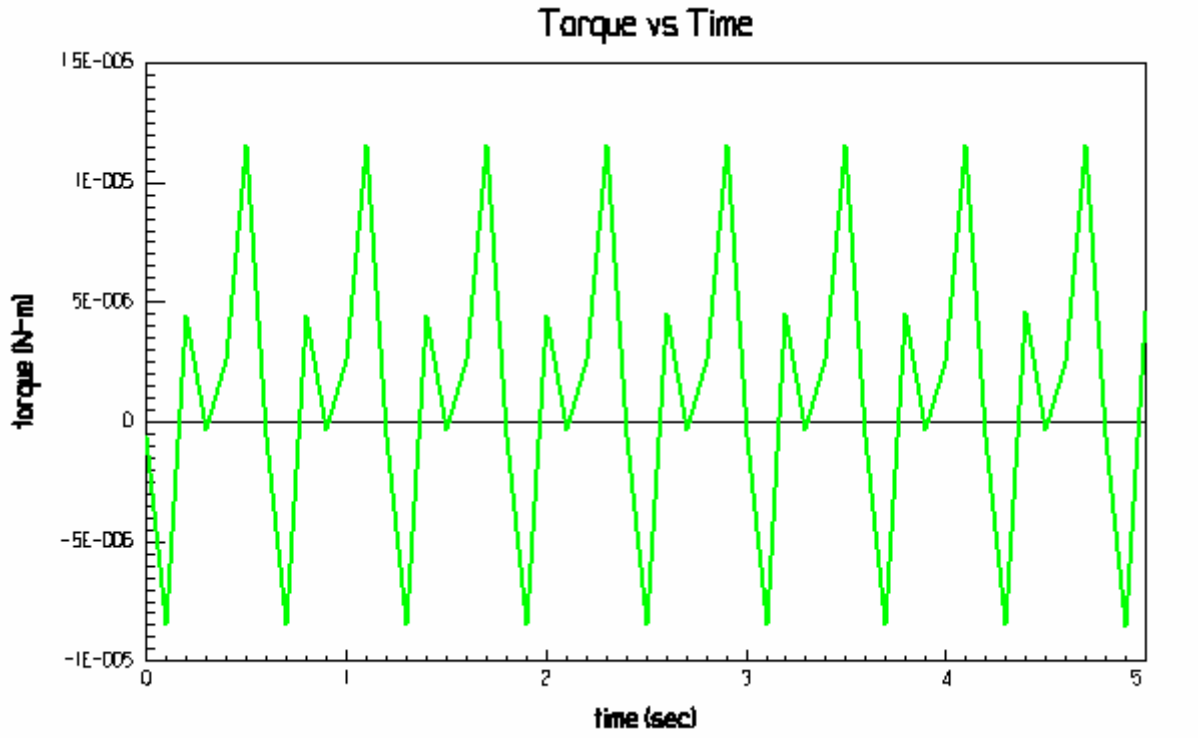


This is a 3D flux diagram showing the magnetic fields of the magnets projected onto the sides of a cylinder. This appears to support my idea about the flux loops again. However, after running some Transient tests (simulating the motor in motion), I got very promising results.

I ran two Transient tests. The first one was conducted on a simple one-disk minato wheel with a single stator magnet. I ran the test from 0 to 5 seconds with the wheel in the following starting position:

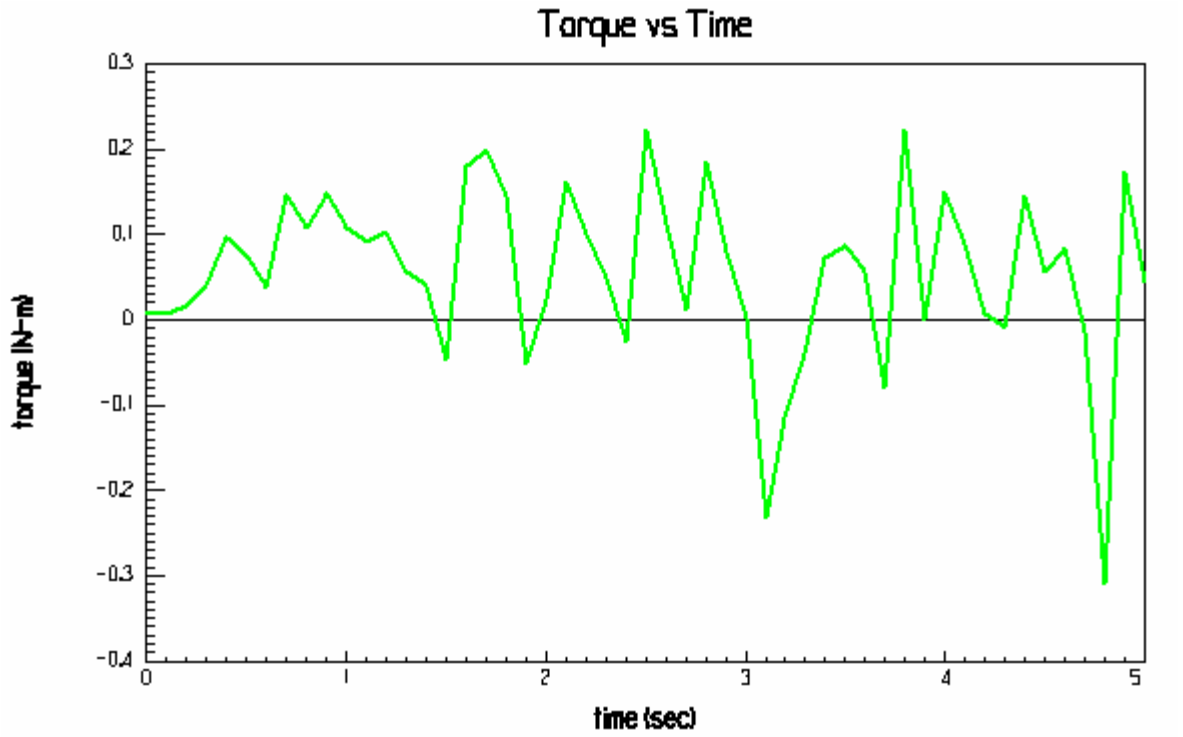


When the test was complete the results showed that the wheel didn't even move at all. So I changed the test and set the wheel to a constant velocity 100 RPM so I could see how the torque on the disk changed. Here are the results I got:

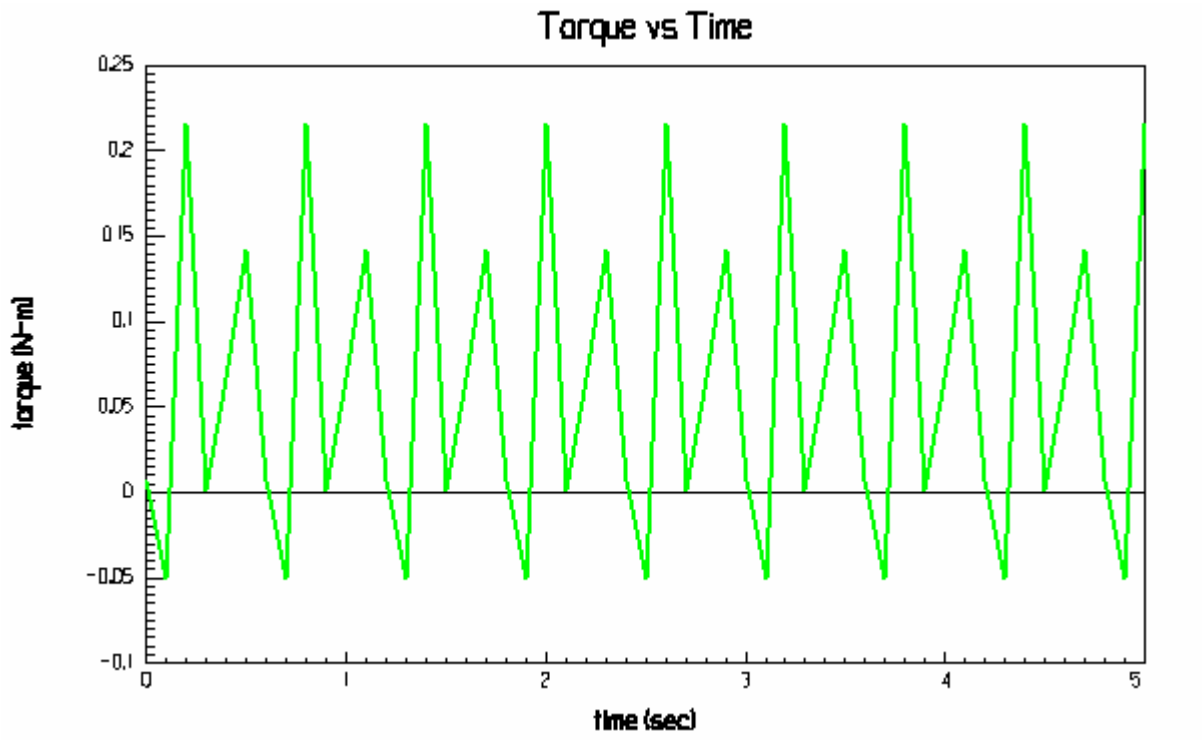


From the chart, one may observe that the positive and negative spike represent the 'kick' and sticky spots as the wheel is rotated.

For the second test with the Dual Disk setup, things turned out quite differently. I used the exact same setup with the dual disk, only I didn't need to set the velocity to a constant value. When I put the disk in the same starting orientation, it self started and kept accelerating! The torque curve also looks different too:



Now, one can clearly see that the majority of the torque is on the positive side of the graph; however, since the velocity was not constant for this test, I needed to set it to 100 RPM as in the last test so I could compare the results. Here is the constant-speed torque graph:



Something is definitely going on here! The torque curve is completely shifted upward giving the wheel a net force for rotation! Now, this is just a simulation, but it certainly gives strong evidence in support of this working. Definitely worth the effort to build. The beauty of all this is that there is no shielding required!

So in conclusion, test results strongly suggest that the model will run. The critical factor will be the gap between the upper and lower disk. My recommendation is to make the gap no longer then one magnet thickness apart. On the other hand, the gap should not be too close either or the flux will completely loop and there will be no force at all to drive the wheel. Finding the 'Sweet' spot will be the key here in my opinion. If the design runs as stated, it also may be possible to put magnets all the way around the wheel since the flux loop is localized between each individual upper and lower magnet pare.

God Bless,
Jason Owens

http://www.fdp.nu/shared/files/Minato%20advanced//Dual%20Minato%20wheel%20Theory.pdf

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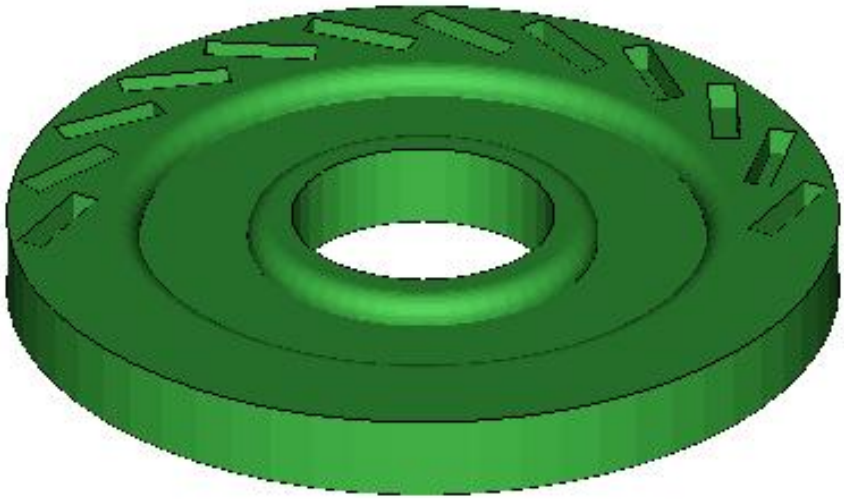


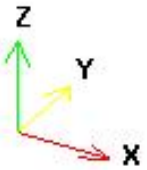


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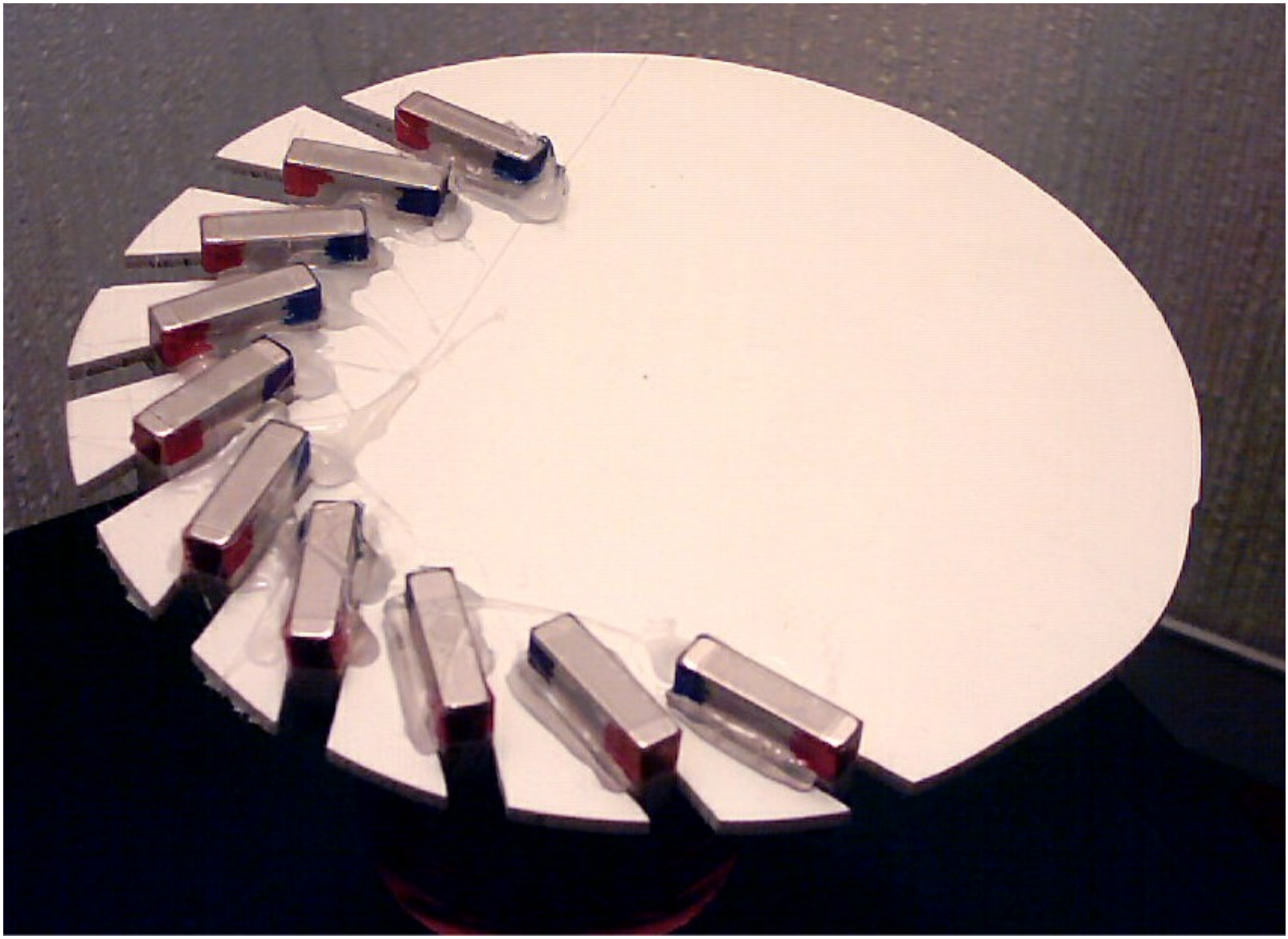
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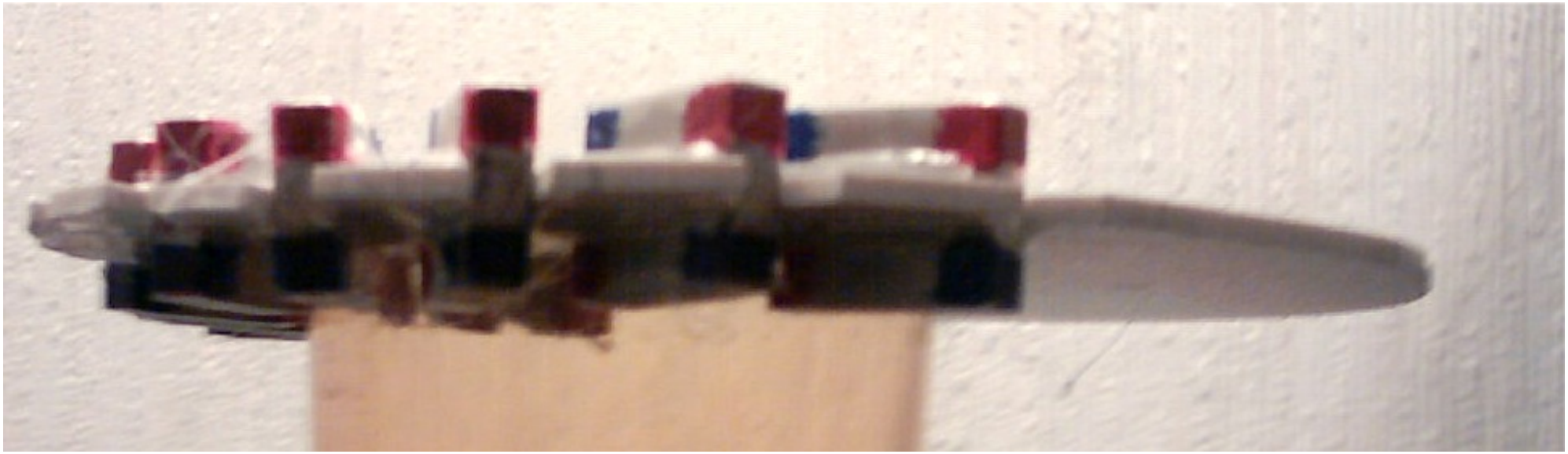
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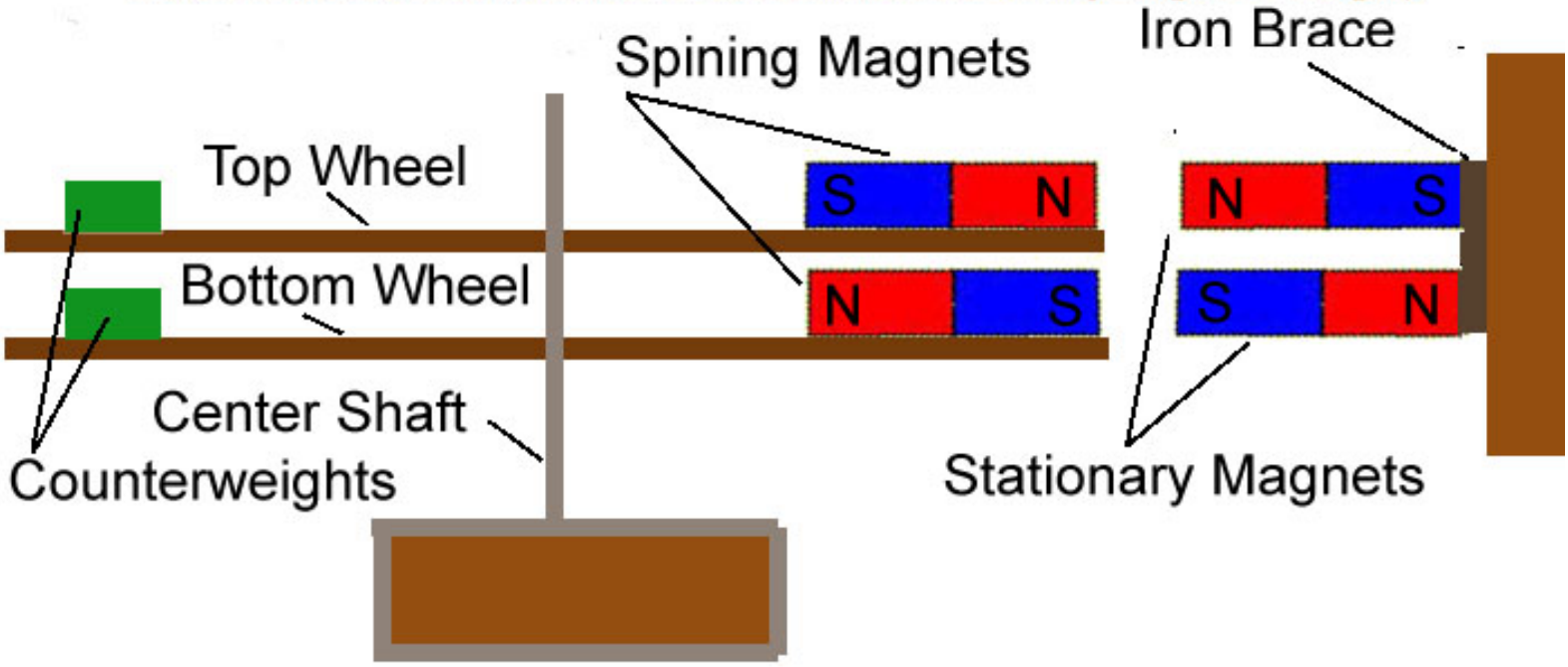


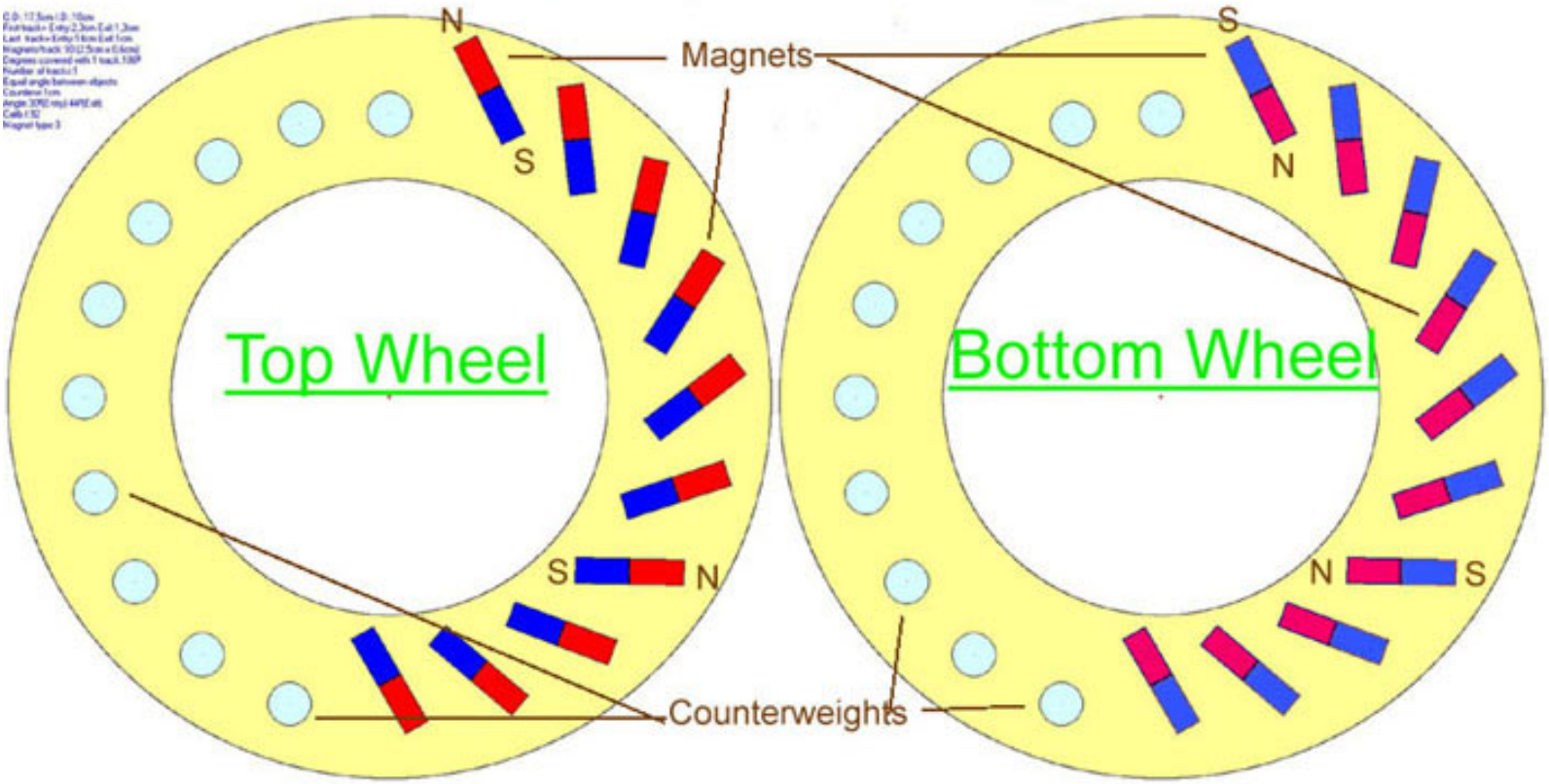
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DUAL MAGNET WHEEL

(Made by Jaro for AG Group on Sept. 11, 2005)
(Was inspired by Minato Wheel, but since Minato never revealed secret of his wheel, this should be considered as my original design.)





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DURACELL
10/11/2005

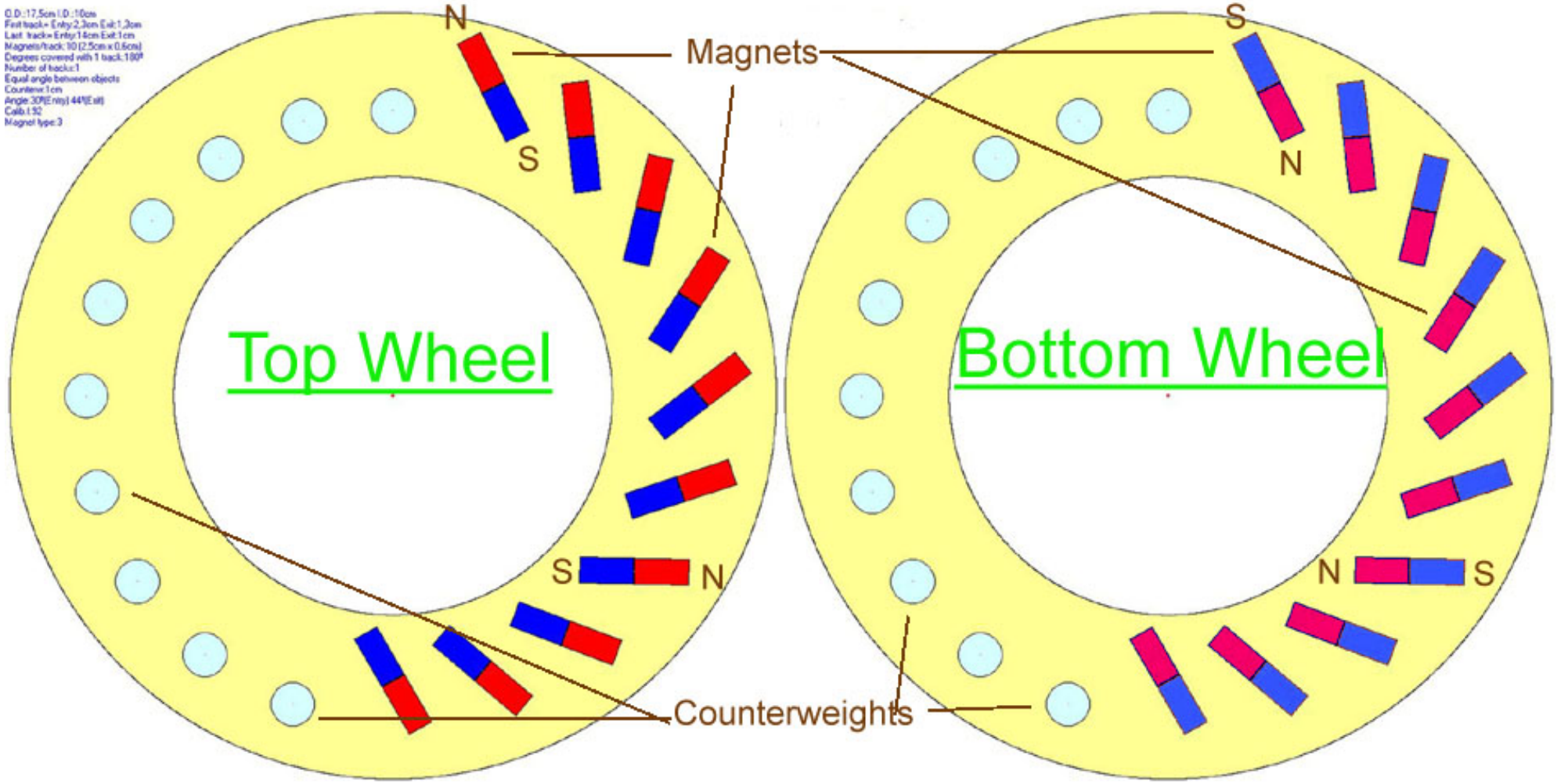
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MINATO WHEEL Using TWO Layers

(Made by Jaro for AG Group)



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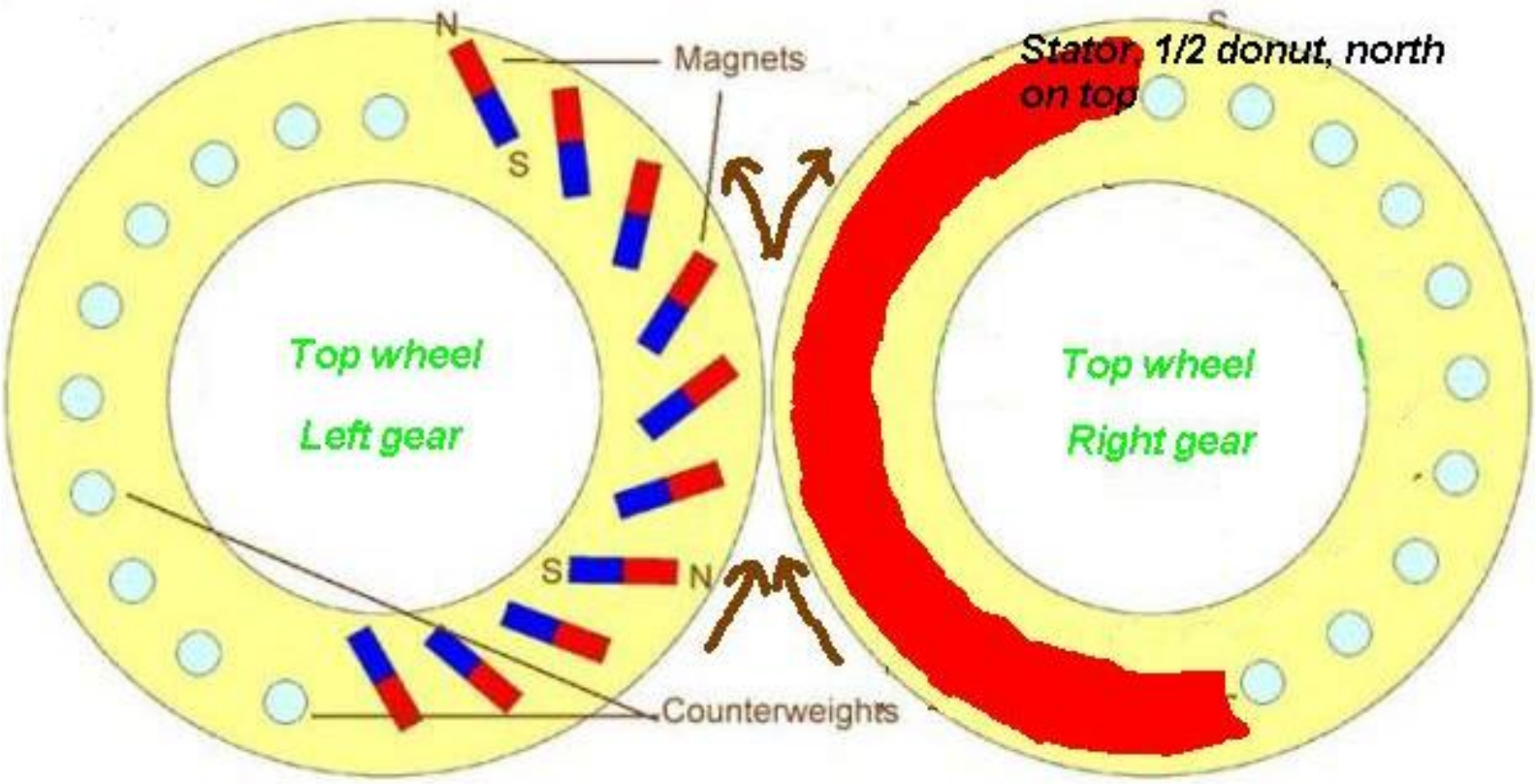
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Zipper + Dual Magnet Motor



21 sep 2005

www.fdp.nu

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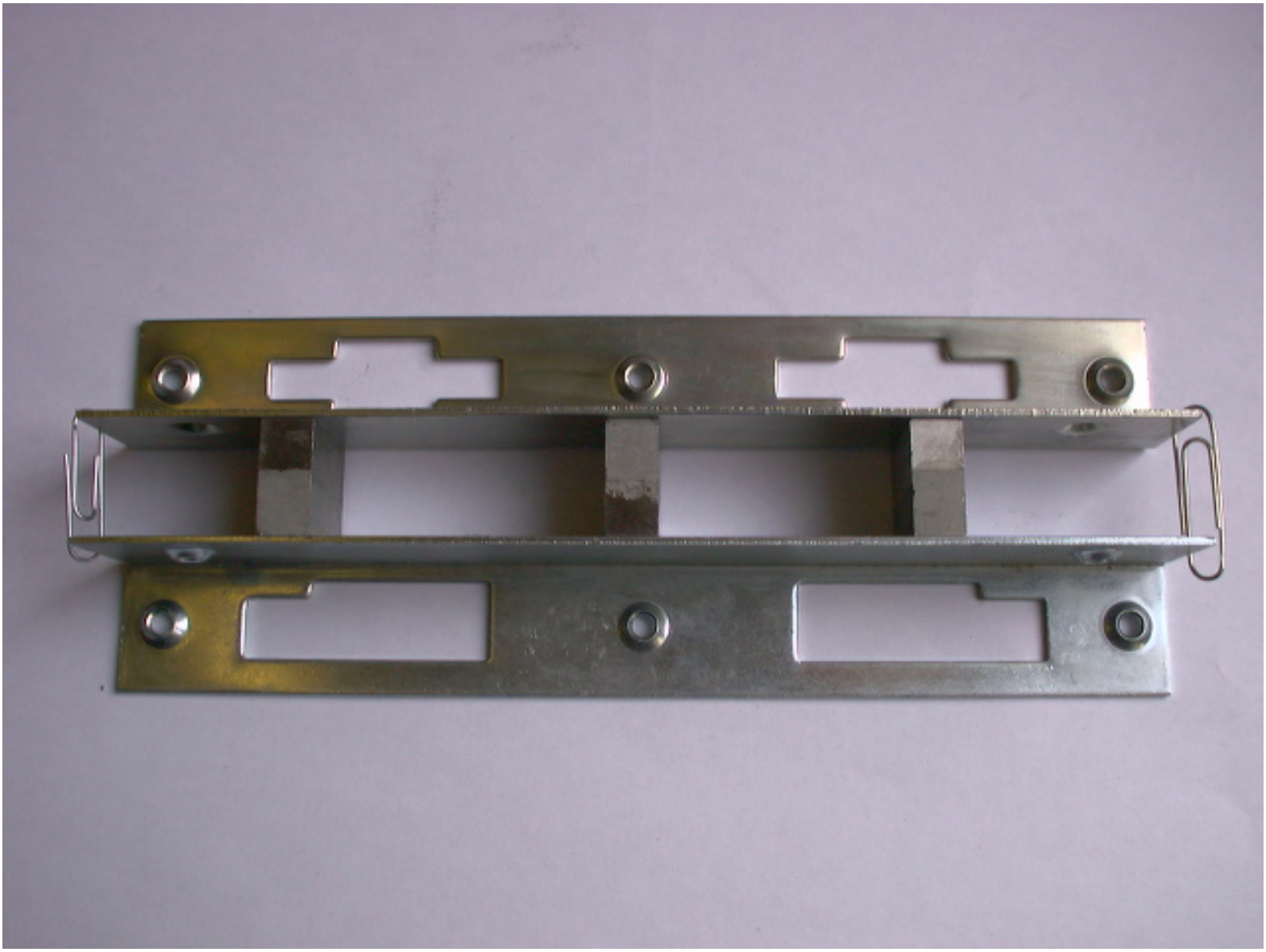
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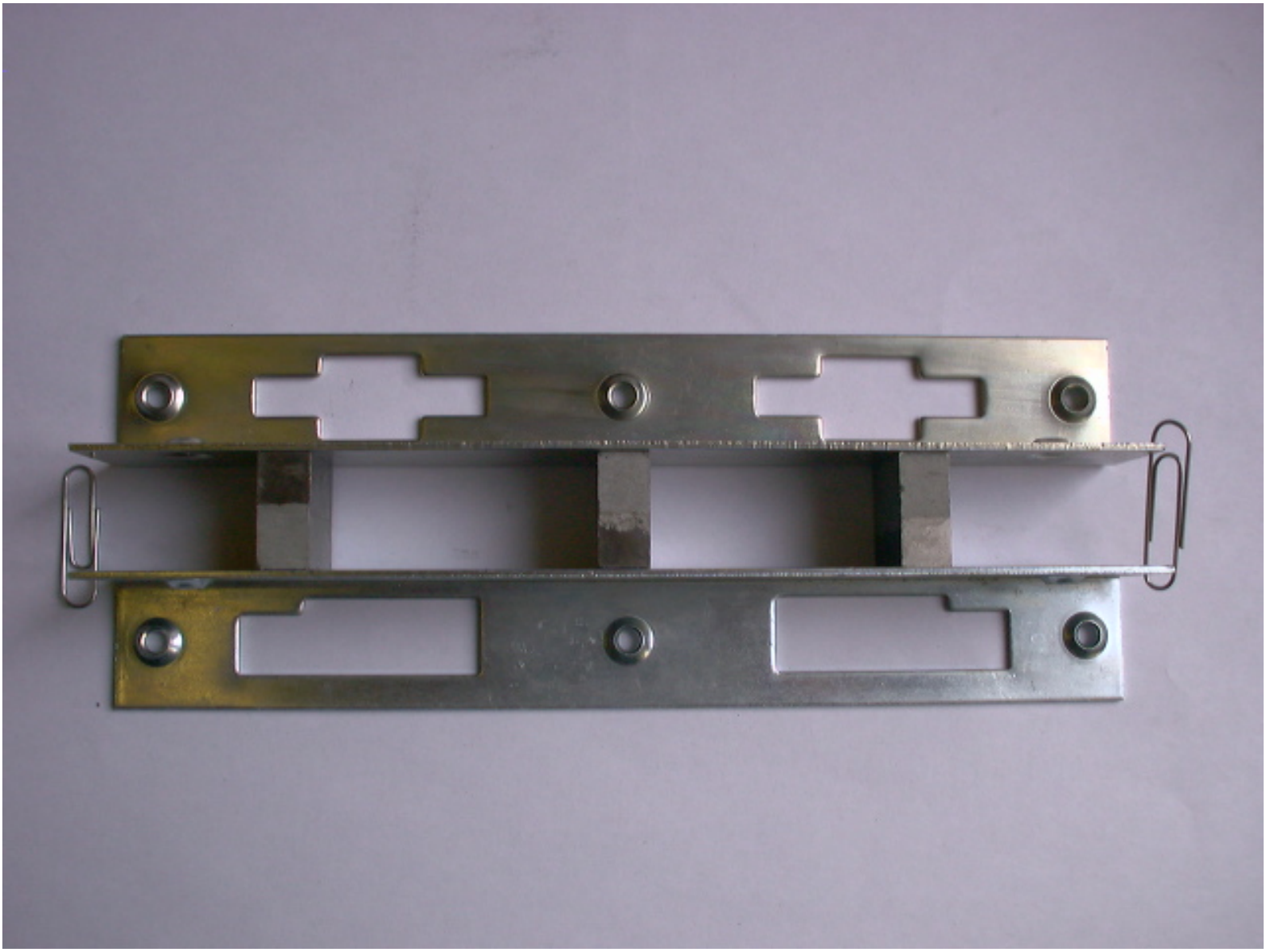
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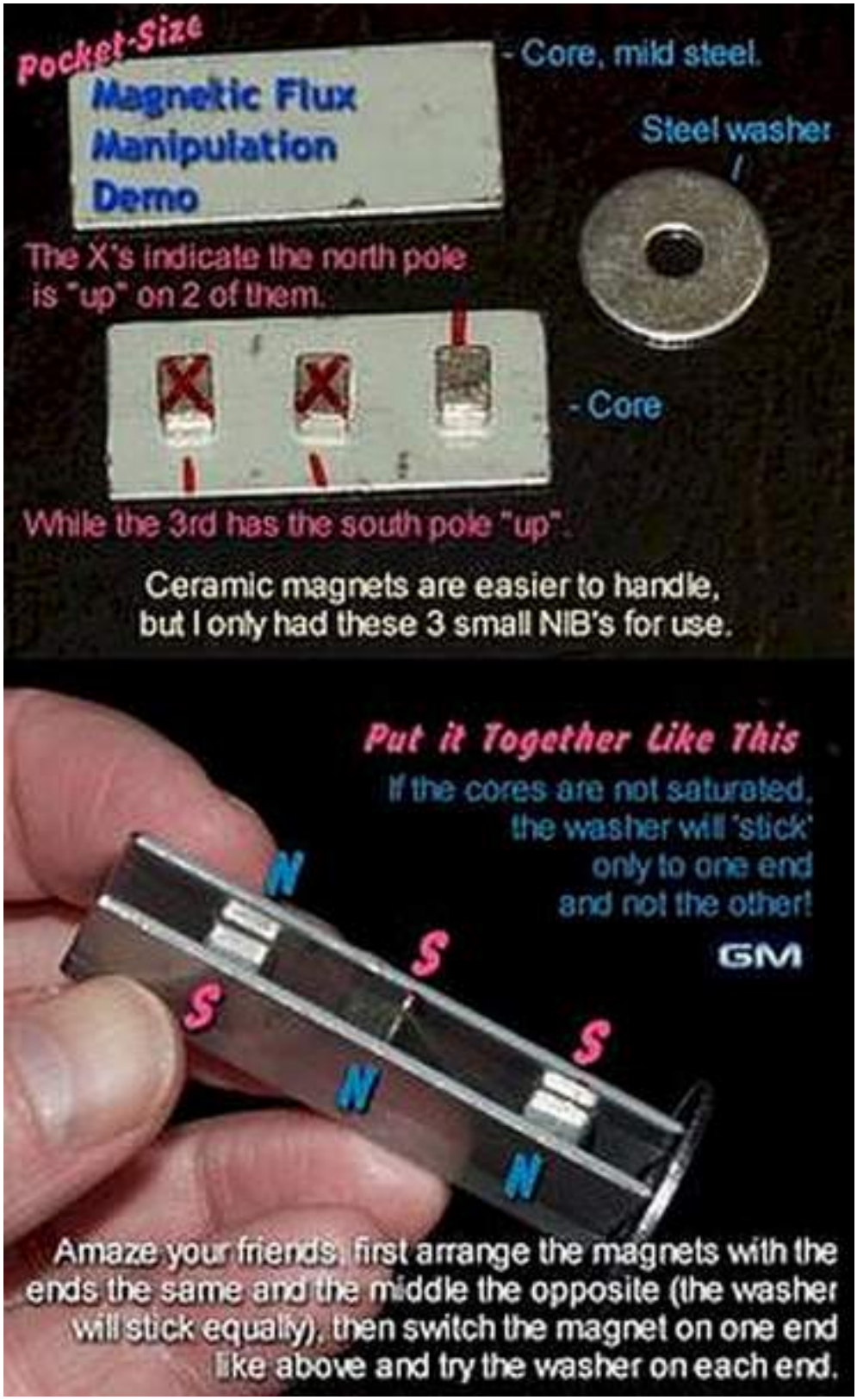
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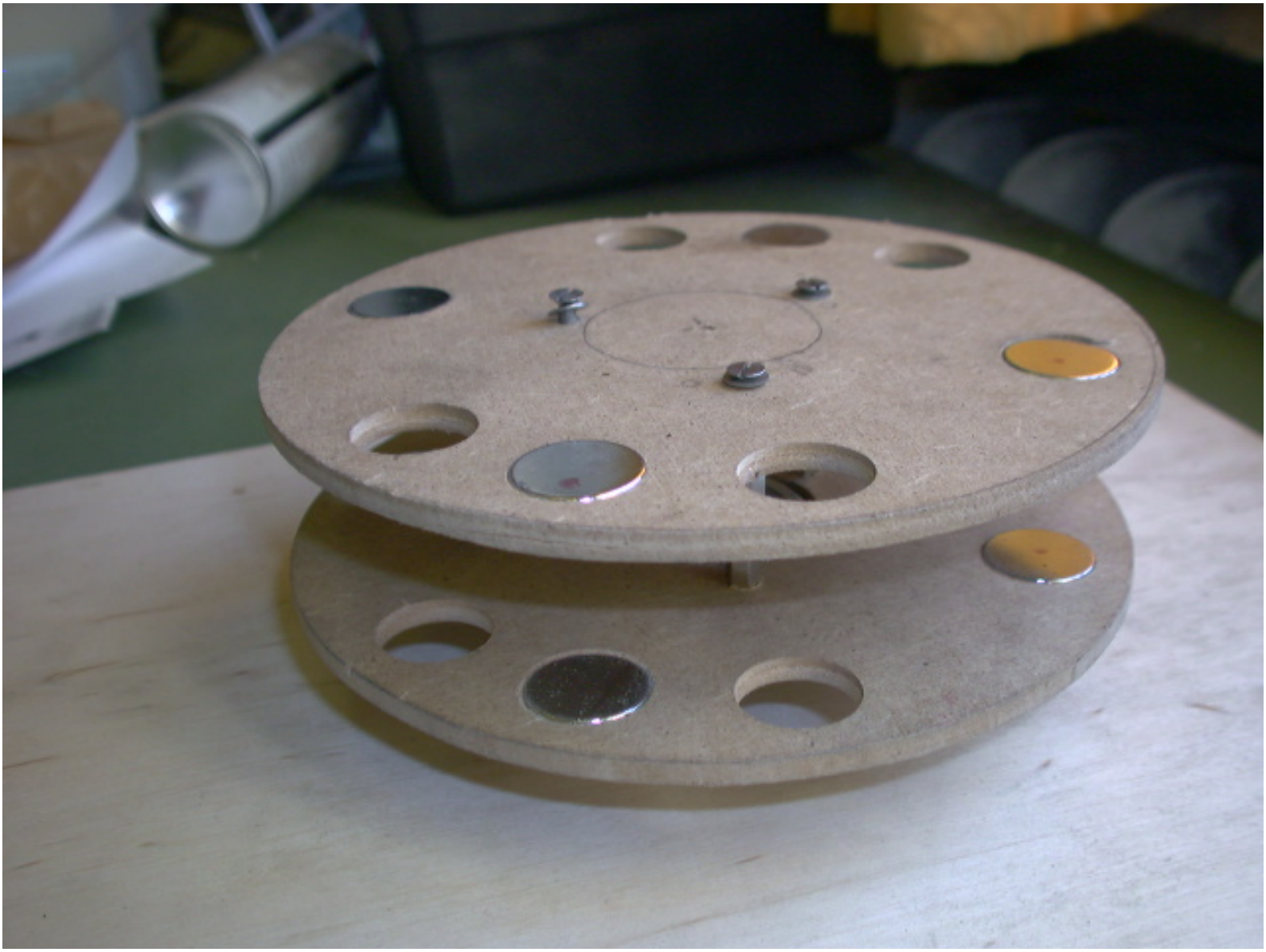
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Pocket-Size
Magnetic Flux
Manipulation
Demo
- Core, mild steel.
Steel washer
The X's indicate the north pole
is "up" on 2 of them.
X
X
- Core
While the 3rd has the south pole "up".
Ceramic magnets are easier to handle,
but I only had these 3 small NIB's for use.
Put it Together Like This
If the cores are not saturated,
the washer will 'stick'
only to one end
and not the other!
GM
N
S
S
S
N
N
Amaze your friends, first arrange the magnets with the
ends the same and the middle the opposite (the washer
will stick equally), then switch the magnet on one end
like above and try the washer on each end.

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20Path//SimpleFluxSwitching+Demo.jpg

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US005929732A

United States Patent [19]

Bushman

[11] **Patent Number: 5,929,732**

[45] **Date of Patent: Jul. 27, 1999**

[54] **APPARATUS AND METHOD FOR AMPLIFYING A MAGNETIC BEAM**

[75] Inventor: **Boyd B. Bushman**, Lewisville, Tex.

[73] Assignee: **Lockheed Martin Corporation**, Fort Worth, Tex.

[21] Appl. No.: **08/842,850**

[22] Filed: **Apr. 17, 1997**

[51] **Int. Cl.**[6] **H01F 7/02**

[52] **U.S. Cl.** **335/306**; 315/5.35; 335/210

[58] **Field of Search** 335/210, 302–306; 310/90.5; 315/5.35; 324/318–320

[56] **References Cited**

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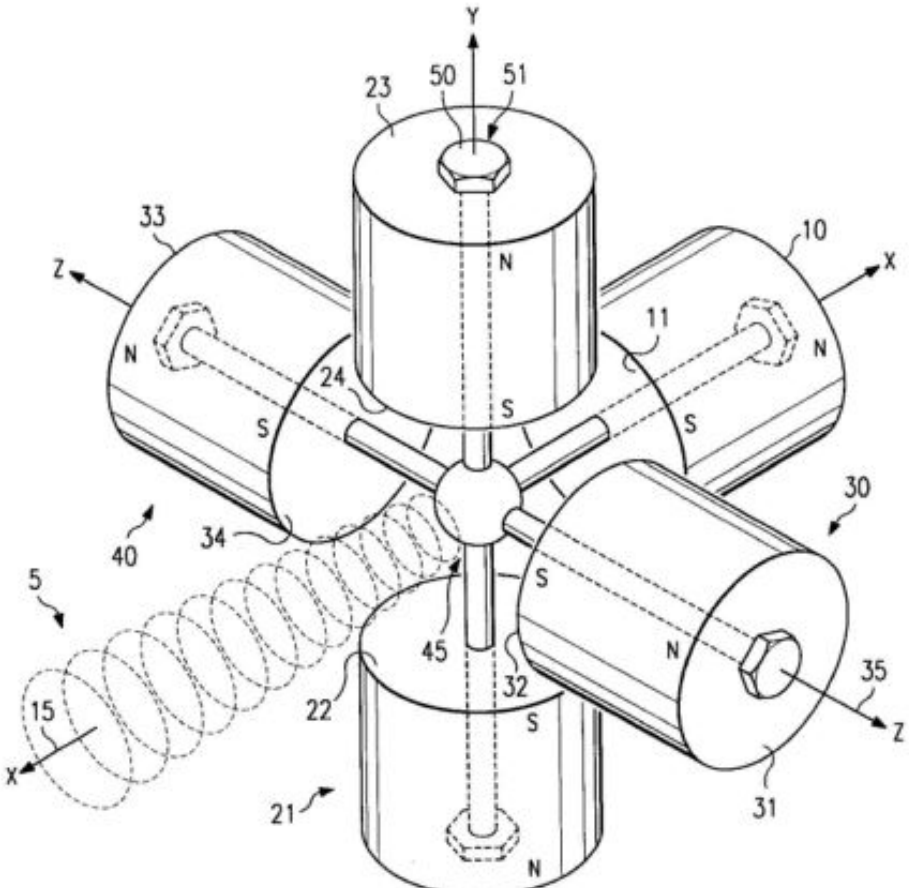
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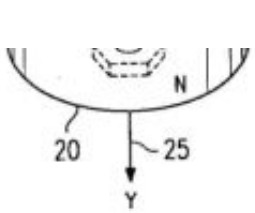
Primary Examiner—Michael L. Gellner
Assistant Examiner—Raymond Barrera
Attorney, Agent, or Firm—Baker & Botts, L.L.P.

[57] **ABSTRACT**

An apparatus and method for creating a magnetic beam wherein a focusing magnet assembly **(45)** is comprised of a first opposing magnet pair **(20)** and a second opposing magnet pair **(30)** disposed in a focusing plane, each magnet of the respective opposing magnet pairs having a like pole directed towards the geometric center of the focusing magnet assembly **(45)** to form an alignment path, two like magnetic beams extending from the alignment path on each side of the focusing magnet assembly **(45)**, each beam being generally perpendicular to the focusing plane. A like pole of an unopposed magnet **(10)** can be directed down the alignment path from one side of the focusing magnet assembly **(45)** to produce a single magnetic beam extending generally perpendicular from the focusing magnet assembly opposite unopposed magnet **(10)**. This beam is a magnetic monopole which emits pulses, levitates, degausses, stops electronics and separates materials.

18 Claims, 3 Drawing Sheets

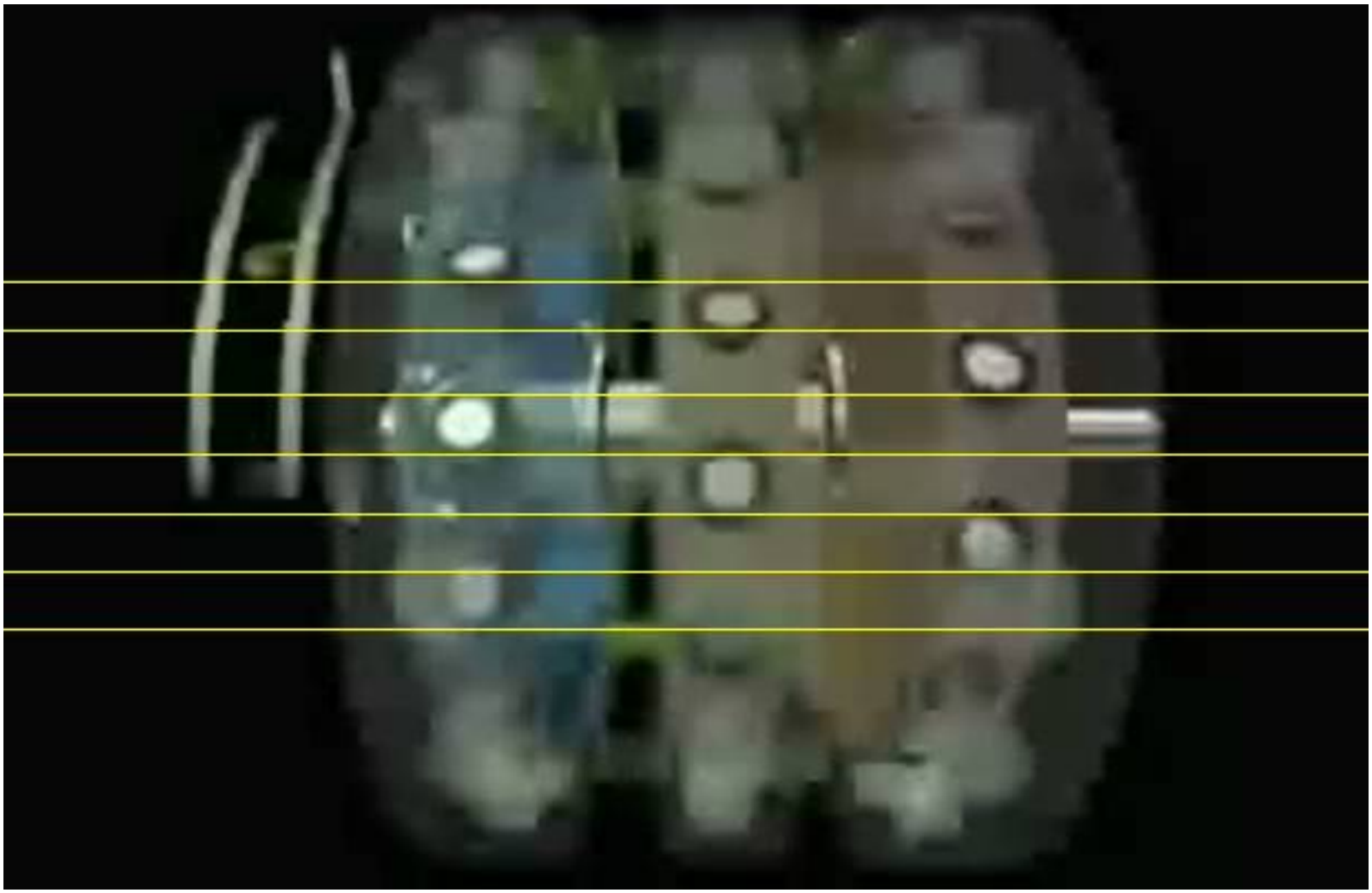



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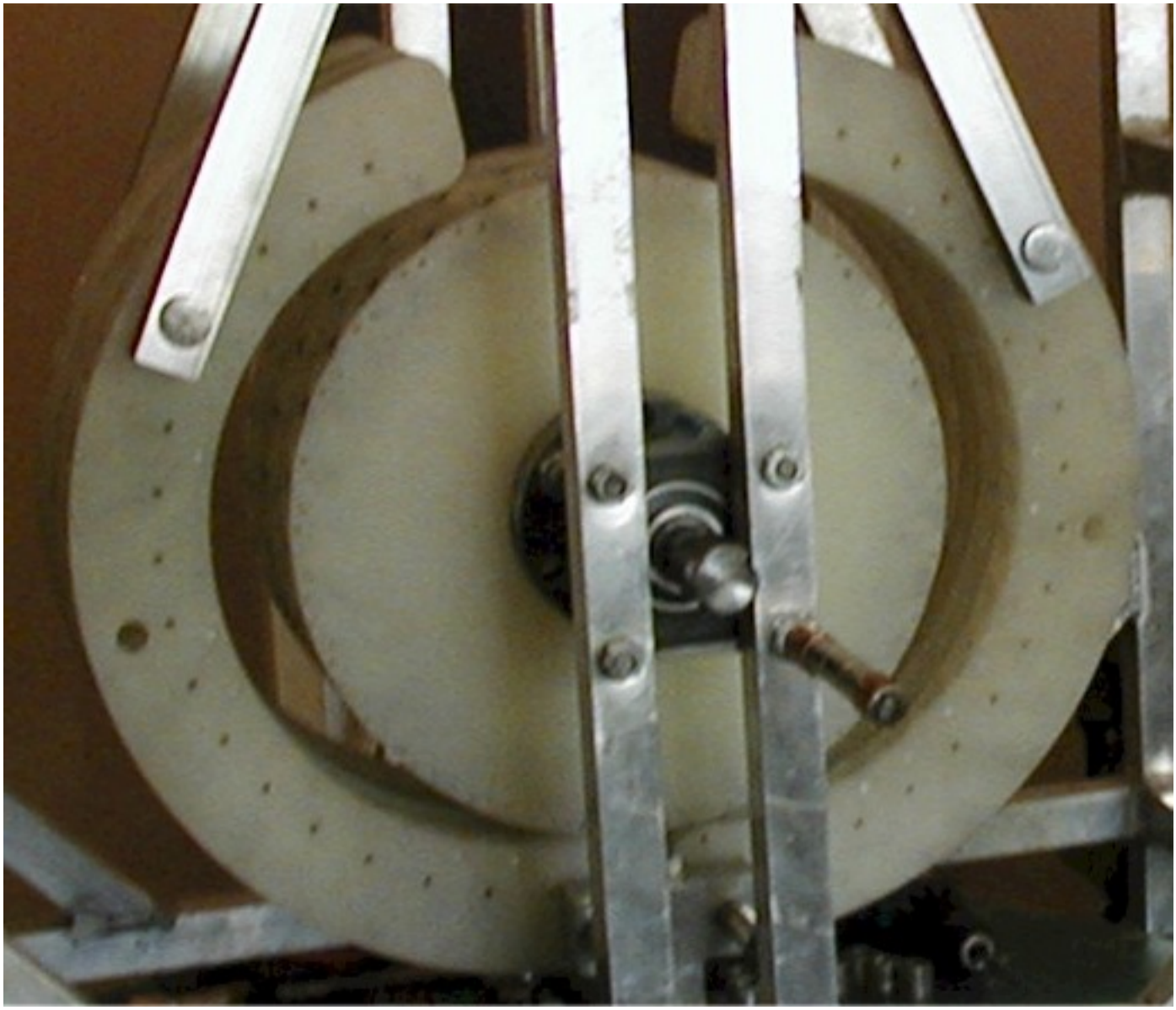
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20device//motor_side.jpg

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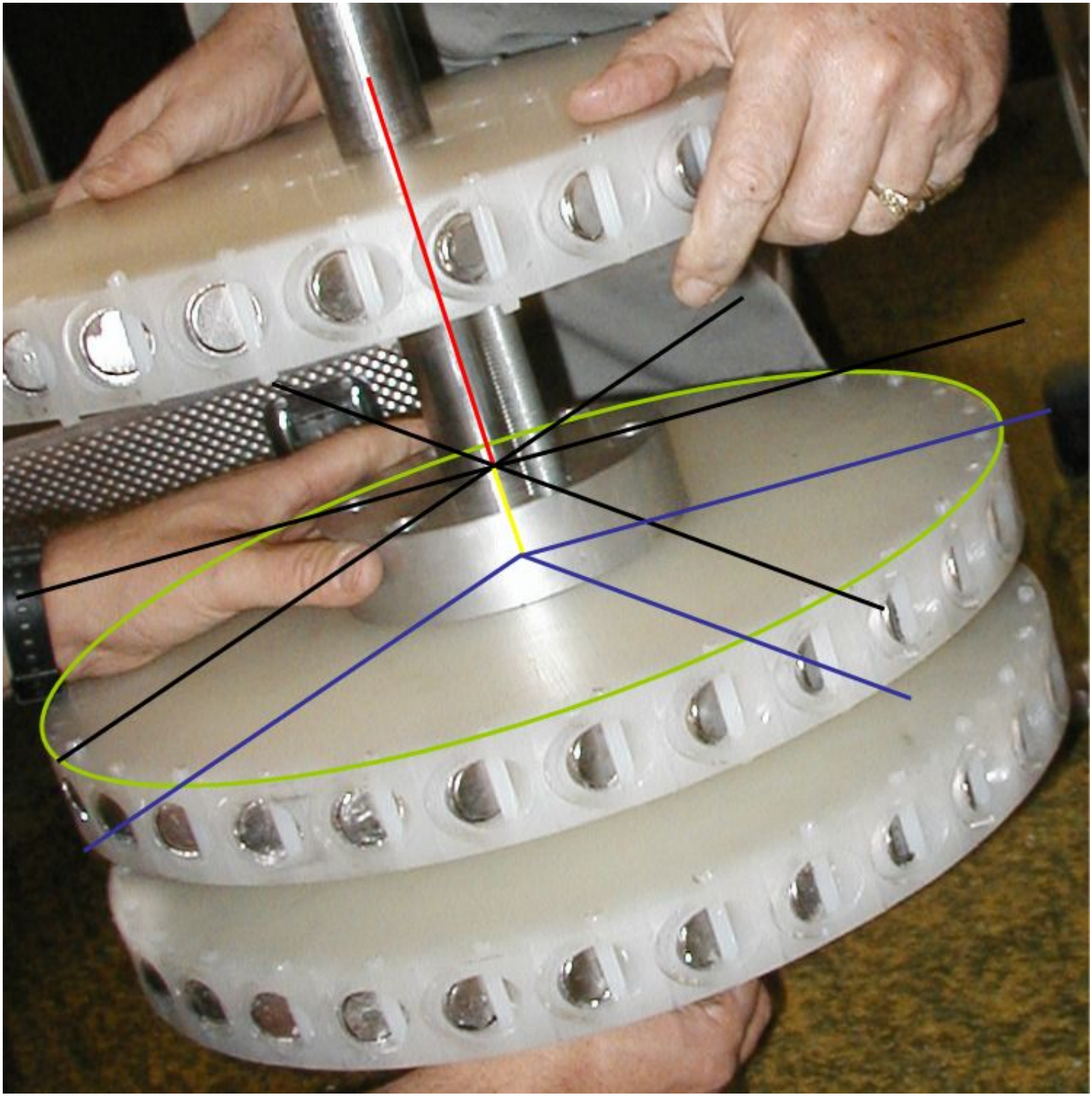
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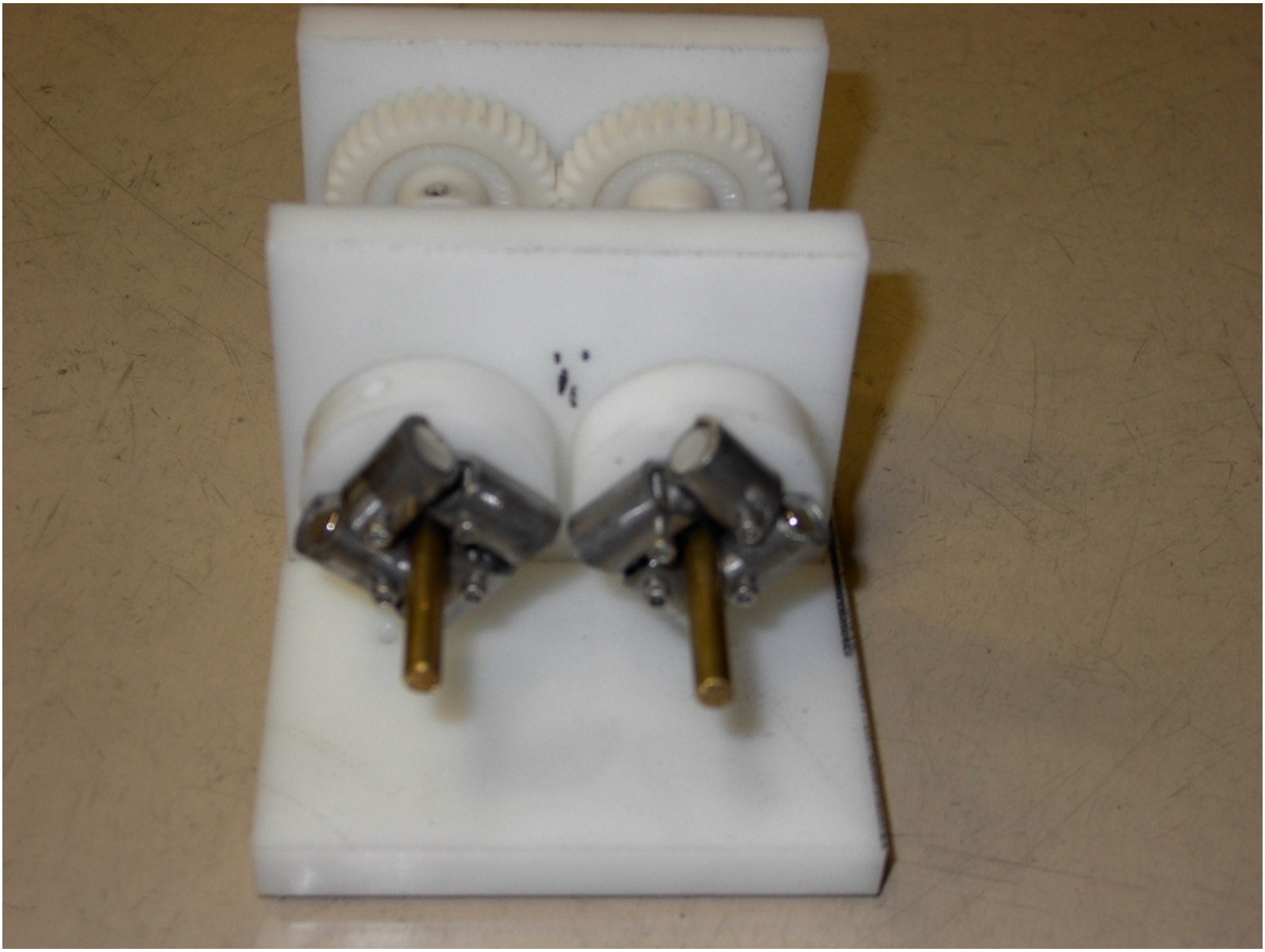
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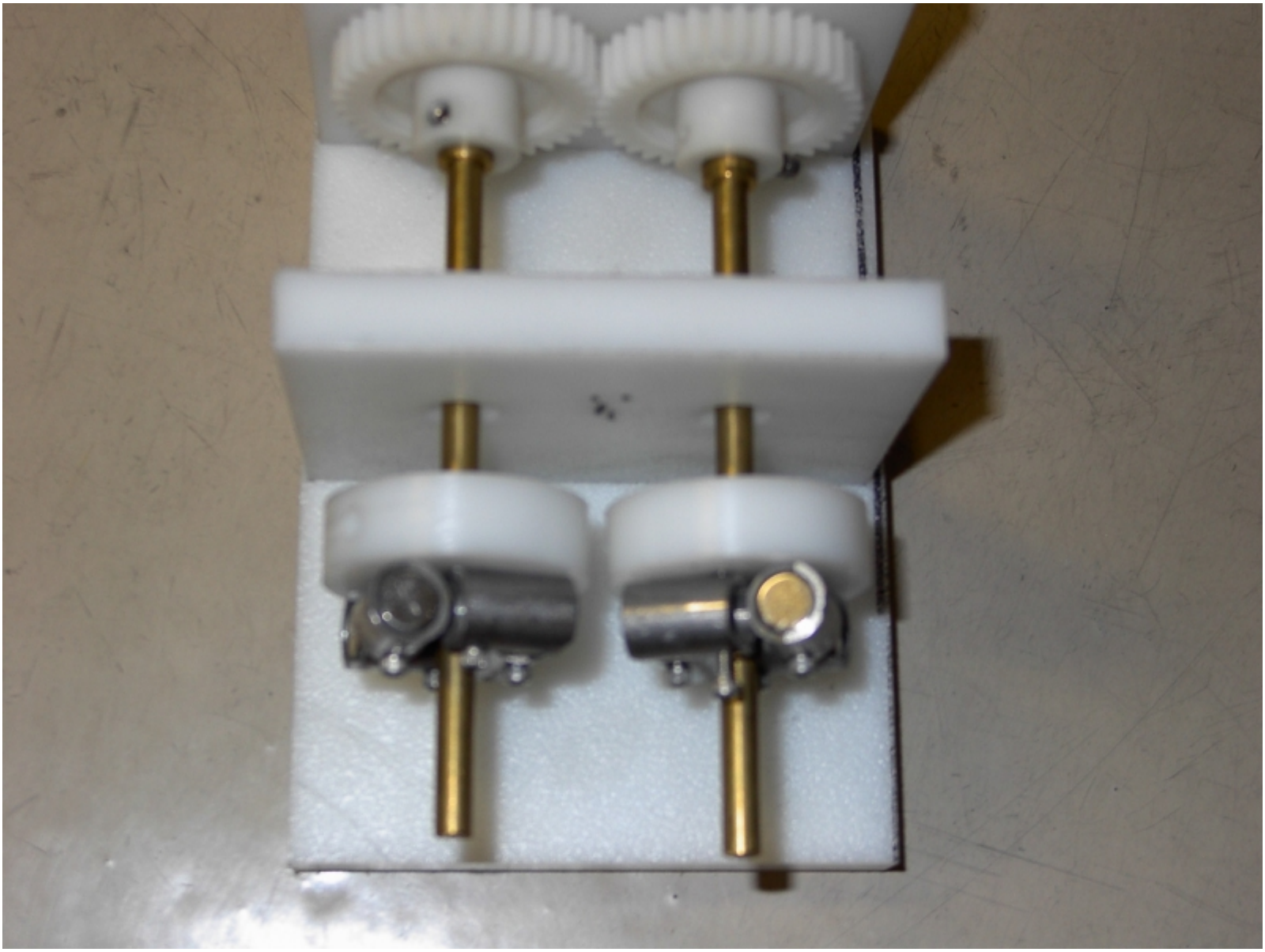
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http://www.fdp.nu/shared/files/Pot%20magnet%
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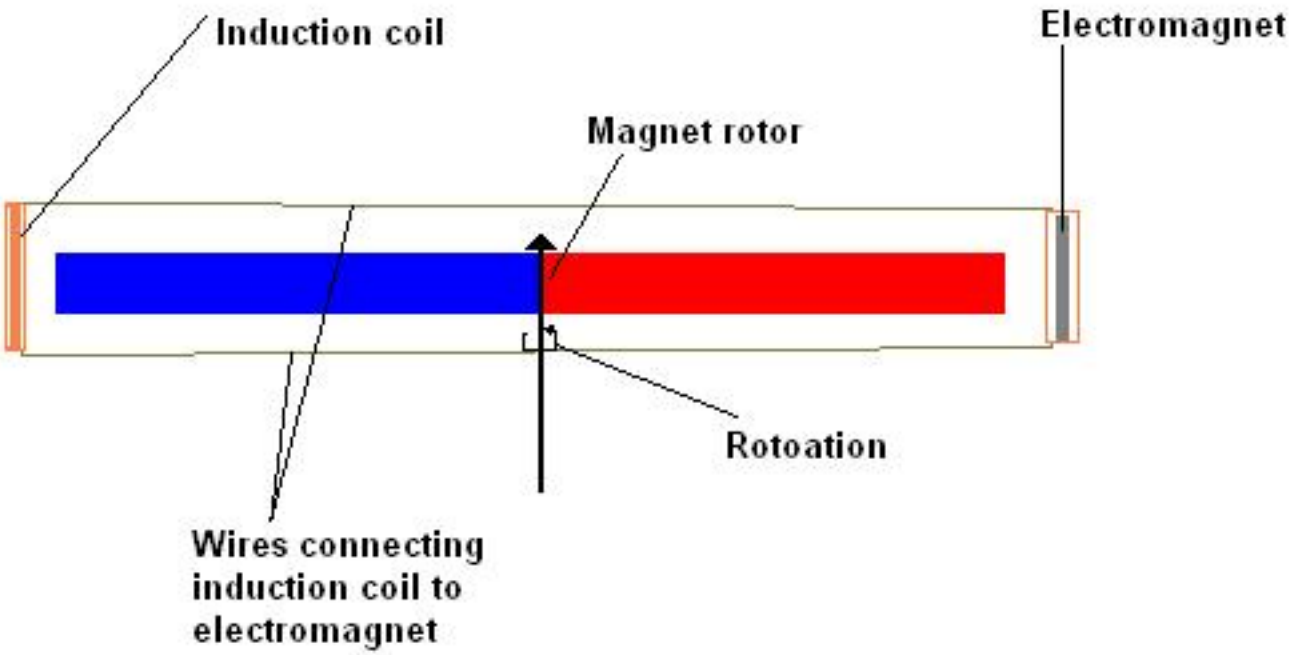
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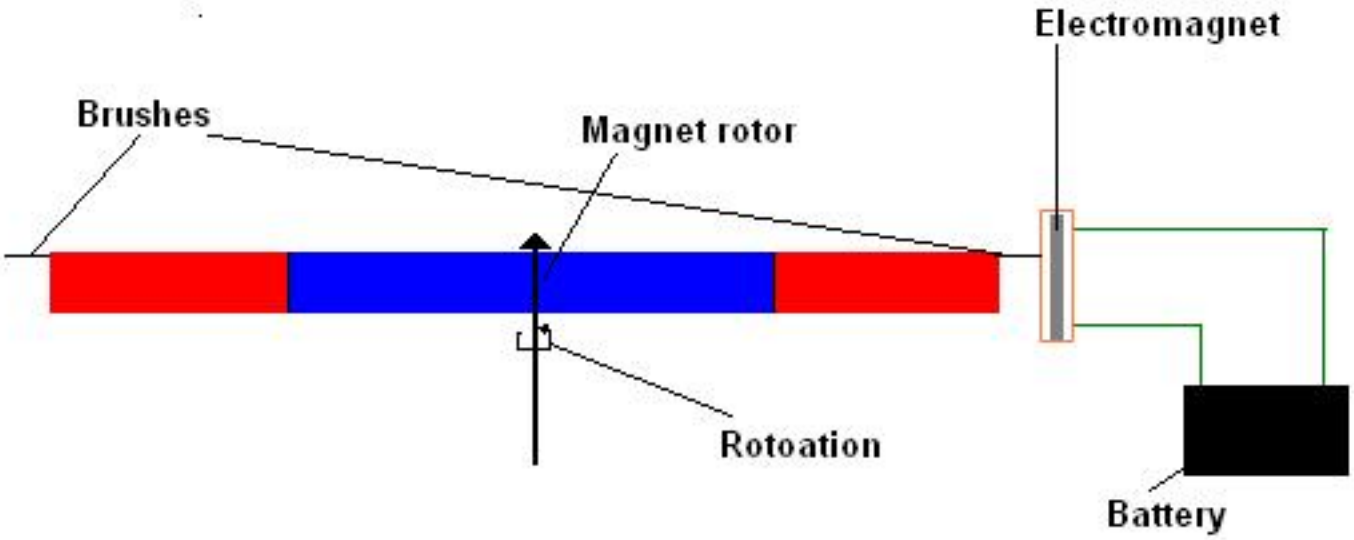
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Induction and pulse magnetic Motors



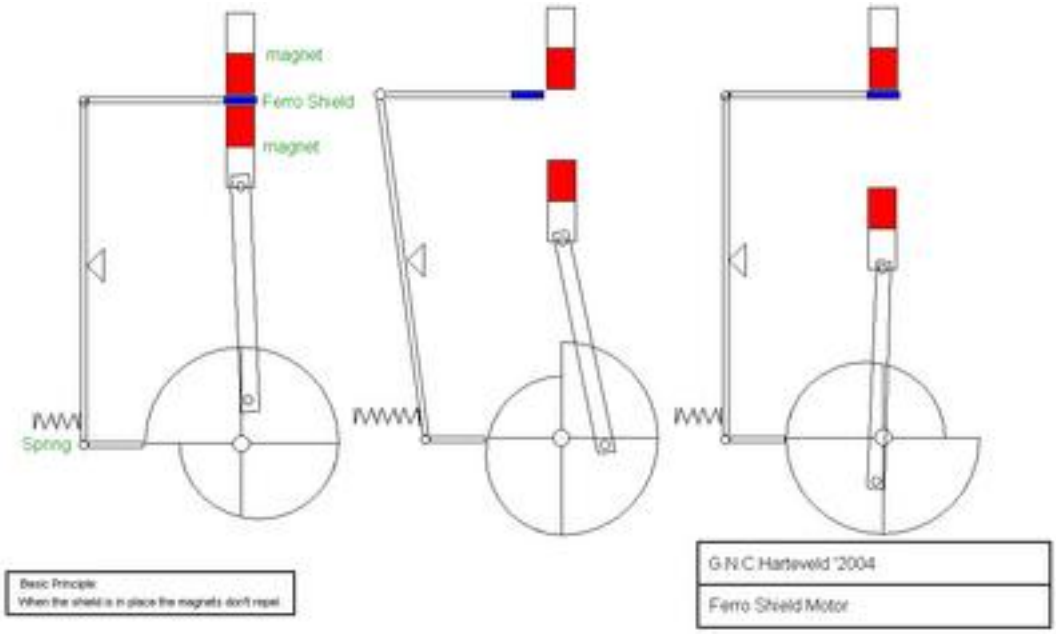
Idea is the magnet spins past the induction coil sending current through to the electromagnet, the electromagnet is set so it will be the same pole as the rotor magnet making the rotor repel and spin half a turn. Thats the induction motor



Idea is the rotor is the same pole as the electromagnet when the rotor spins the brushes connect the battery turning the electromagnet on making it repel the rotor magnet half a turn. I think this could be a Over Unit

http://www.fdp.nu/shared/files/Puls%
20motors//InductionMagneticMotor.jpg

Select All Close window


magnet
Ferro Shield
magnet
Spring
Basic Principle
When the shield is in place the magnets don't repel
G.N.C Hartsveld '2004
Ferro Shield Motor

Save URL

http://www.fdp.nu/shared/files/Shield%20devices//2-stroke+fsm+basic+principle.jpg

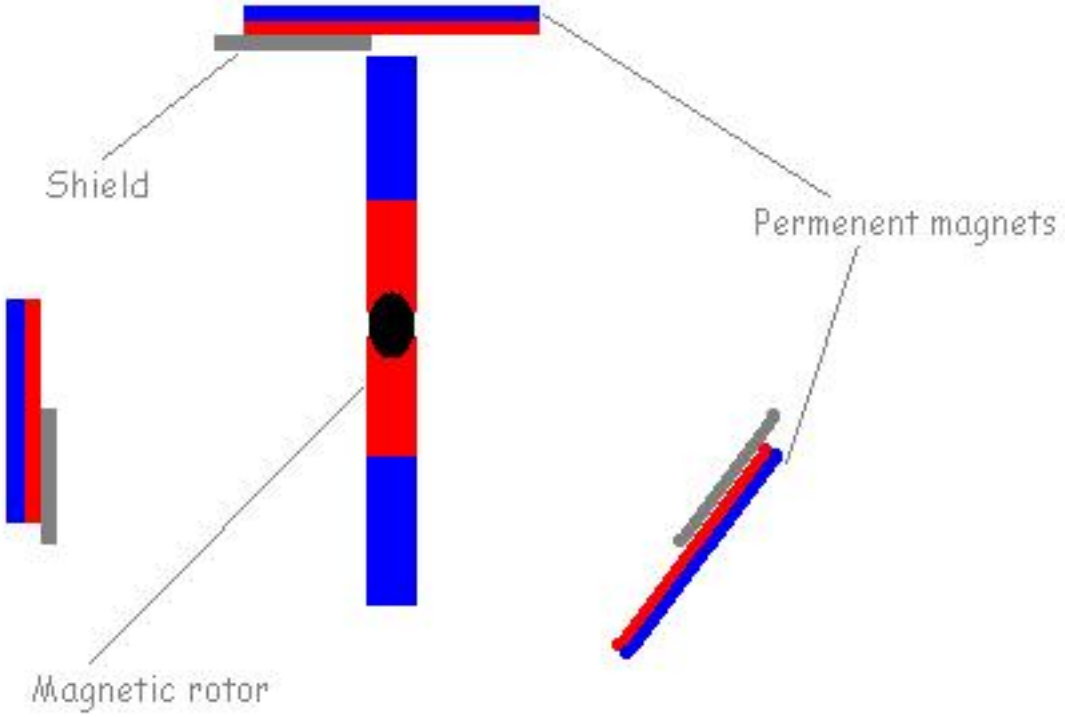
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Attracting Magnetic Motor

This is a rough drawing the angles maybe a little out but it shows how the motor should work.

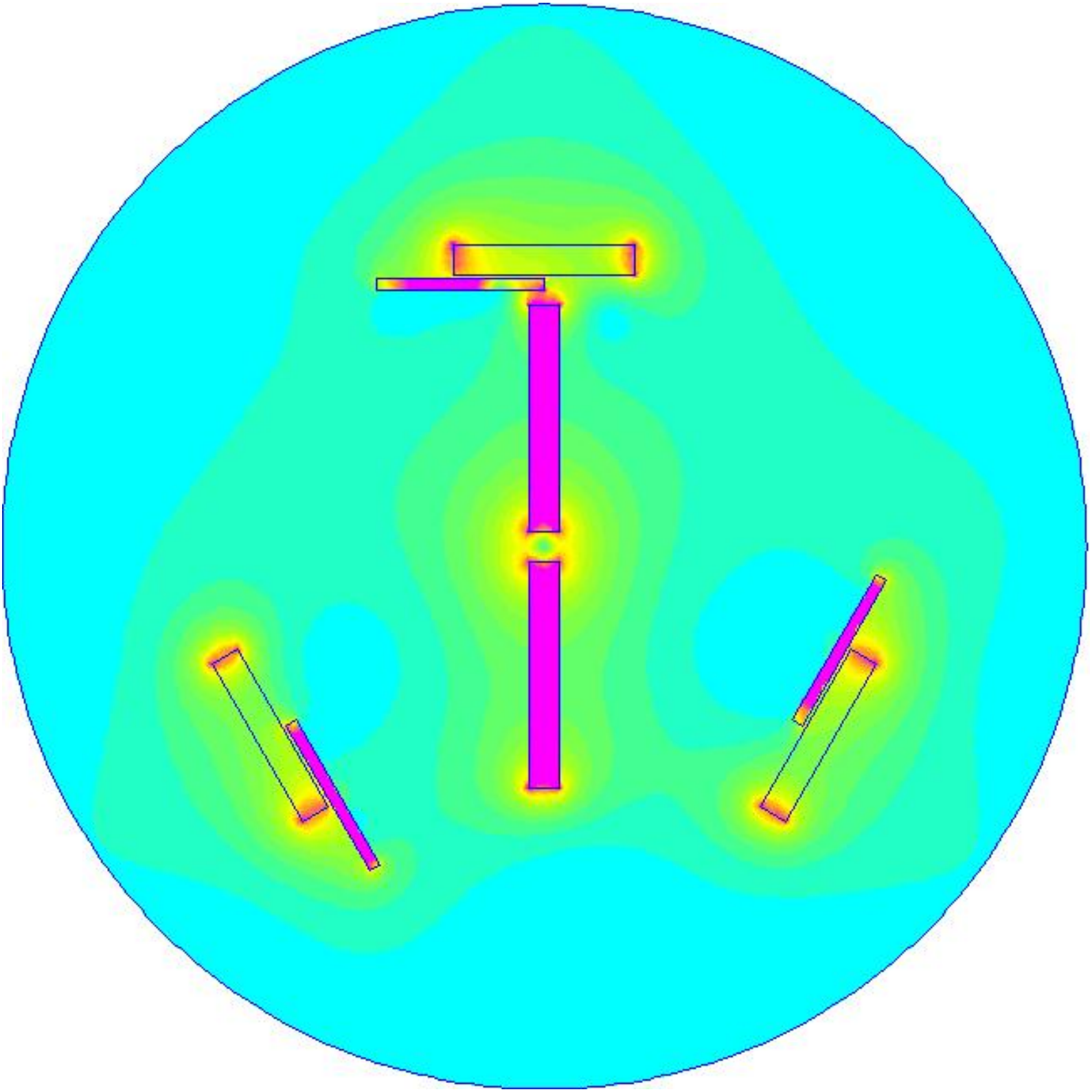
By Graham Clarke



The idea is when the rotor comes out of the slator magnet it is attracted by the slator magnet opposite because the shield is not making the slator opposite weaker the rotor should leave the shielded slator magnet easier.

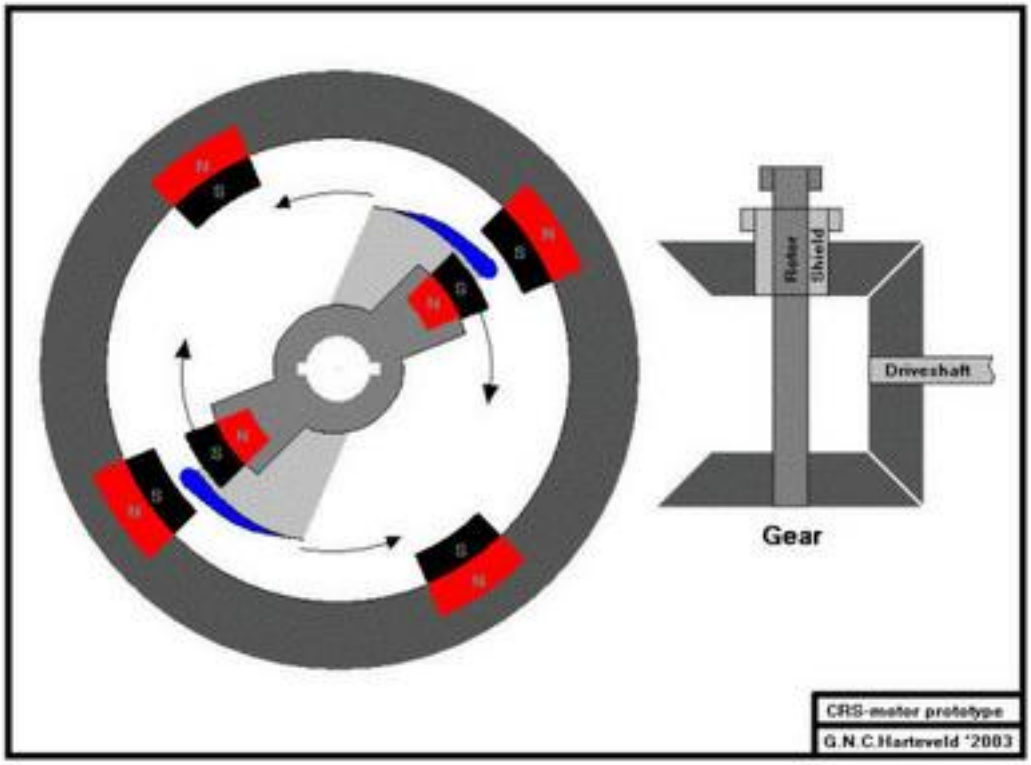
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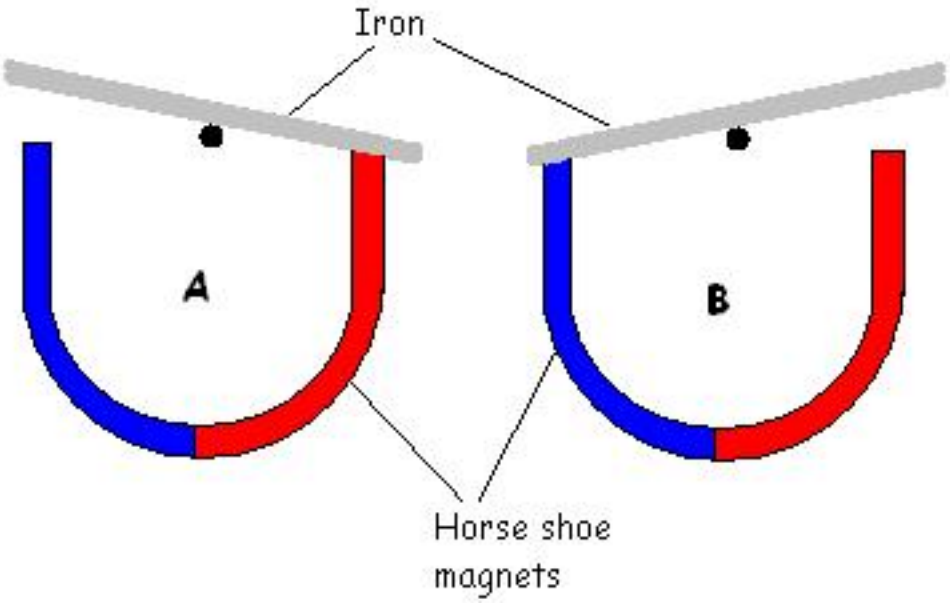
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Rotor
Shield
Driveshaft
Gear
CRS-motor prototype
G.N.C.Harteveld '2003

http://www.fdp.nu/shared/files/Shield%20devices//Ding.jpg

Select All Close window

Easy magnetic field change



Blue is north pole red is south pole, the iron in A is on the red so the iron will be a weaker south pole magnet then you push the iron down and the rocker changes the iron to B so now its touching the north pole making the iron a weaker north pole magnet.

http://www.fdp.nu/shared/files/Shield%
20devices//EasyMagneticChangingField.jpg

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2d Magnetostatic Analysis of Graham's Howard Johnson Motor Idea

© Terrence Staton
terrences@speakeasy.net
Sunday, June 19, 2004

Introduction

Graham came up with a good idea on how the Howard Johnson motor might work. I put together a simulation to test his idea out to see if it had any potential. This brief document contains the results and my conclusions for the simulation I have conducted.

Simulation and Analysis Procedure

The simulation in this document is conducted using 2d magnetostatic analysis. The permanent magnets are simulated with Grade 40 NdFeB material. Parametric analysis is done by moving the rotor through the gate by creating 16 solutions per inch of movement. The results of the parametric solving are then exported for analysis using Matlab. In Matlab an area plot is generated. The trapezoidal integral is calculated for the area plot to produce the total area under the entire force curve.

The following figure shows the track that was simulated. The stator magnets are in blue and the permanent magnets are in red. The arrows inside each magnet show the magnetic orientation of the magnet. A small amount of steal (in green) was placed around the stator magnets as Graham specified. All magnets are 1" X ½". The gap between each stator is 3.25". The gap between the rotors is 3.25" as well. The smallest gap between the stators and the rotors is ½".

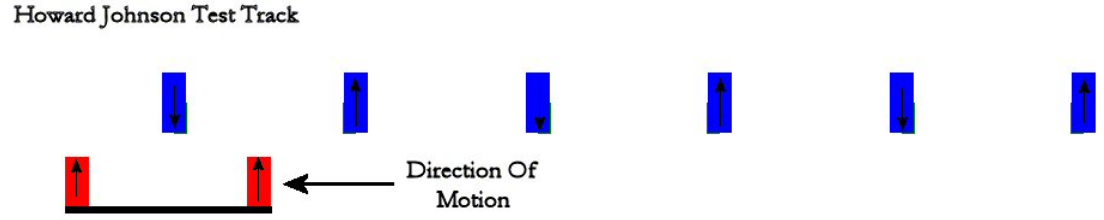


Figure 1 Test track for Graham's Idea

Simulation Result

The next figure shows the simulation result from the track. I culled some data from the far ends of the graph to make the result more clear.

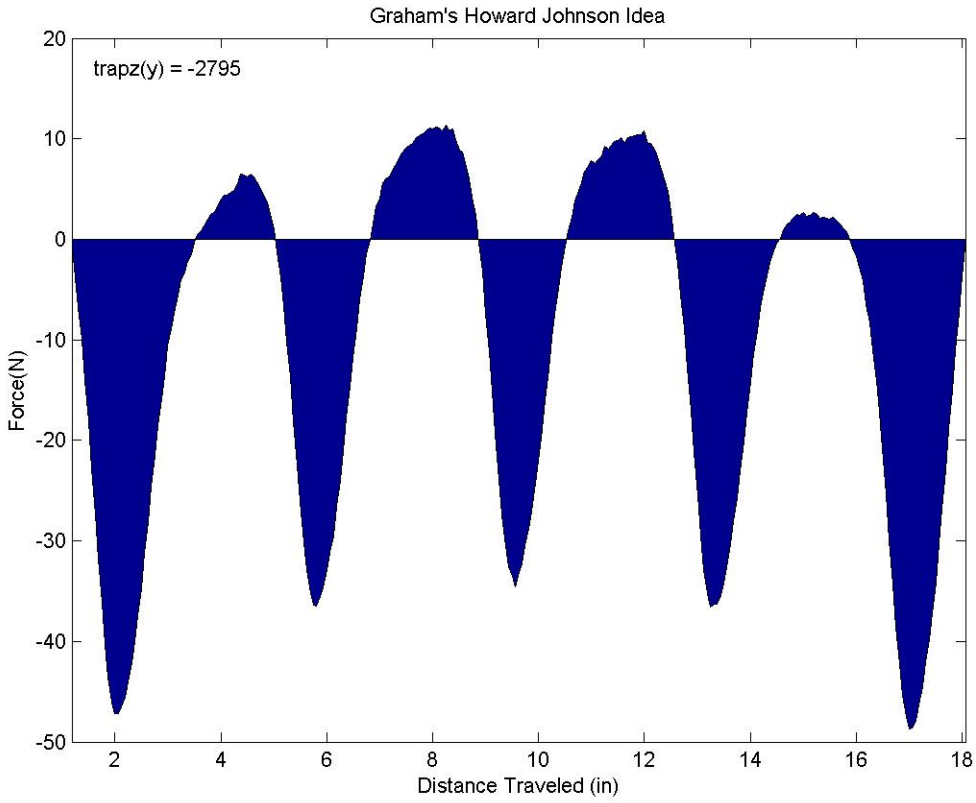


Figure 2 Simulation Result

Conclusion

Graham's idea shows potential. In the above graph the positive force represent a net attraction and the negative forces represent a net repulsion. The graph clear shows there is much more repelling force over the length of the track than attracting forces. Once the rotors get an initial start they should accelerate for the length of the track. I believe the track might be self starting even in the central parts of the track as well.

More analysis should be conducted for this configuration. The shape of the steel should be explored to enhance the effect this configuration exhibits. Other factors that should be tested are magnet shapes, gap between rotors and the stators, gap between the stator pairs and the rotor pair. A longer track should also be tested to see the effects. We should also explore ideas of how this concept can be implemented into a motor.

http://www.fdp.nu/shared/files/Shield%20devices//HJ%20Sim%20For%20Graham.pdf

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Further 2d Magnetostatic Analysis of Graham's Howard Johnson Motor Idea

© Terrence Staton
terrences@speakeasy.net
Sunday, June 20, 2004

Introduction

Graham wanted to test another idea for the Howard Johnson configuration. I put together a simulation to test this configuration. This brief document contains the results and my conclusions for the simulation I have conducted.

Simulation and Analysis Procedure

The simulation in this document is conducted using 2d magnetostatic analysis. The permanent magnets are simulated with Grade 40 NdFeB material. Parametric analysis is done by moving the rotor through the gate by creating 16 solutions per inch of movement. The results of the parametric solving are then exported for analysis using Matlab. In Matlab an area plot is generated. The trapezoidal integral is calculated for the area plot to produce the total area under the entire force curve.

The following figure shows the track that was simulated. The stator magnets are in blue and the rotor magnets are in red. The arrows inside each magnet show the magnetic orientation of the magnet. A small amount of steal (in green) was placed around the stator magnets as Graham specified. All magnets are 1" X ½". The gap between each stator is 3.25". The gap between the rotors is 3.25" as well. The smallest gap between the stators and the rotors is ½".

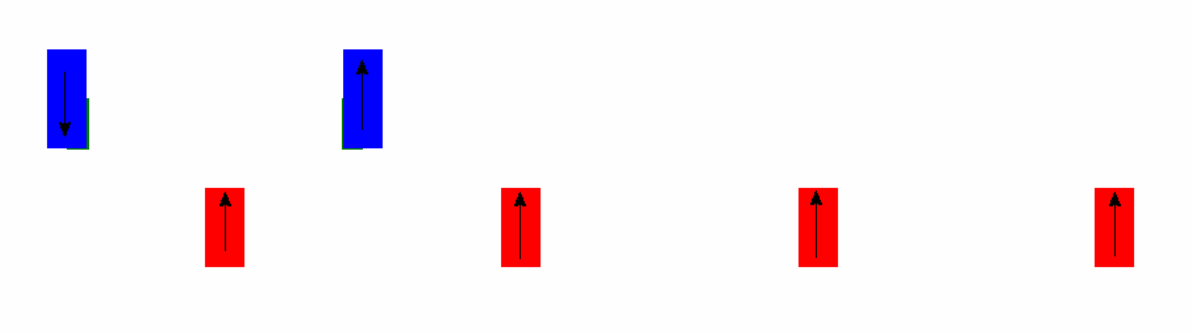


Figure 1 Test track for Graham's Second Idea

Simulation Result

The next figure shows the simulation result from the track. I culled some data from the far ends of the graph to make the result more clear.

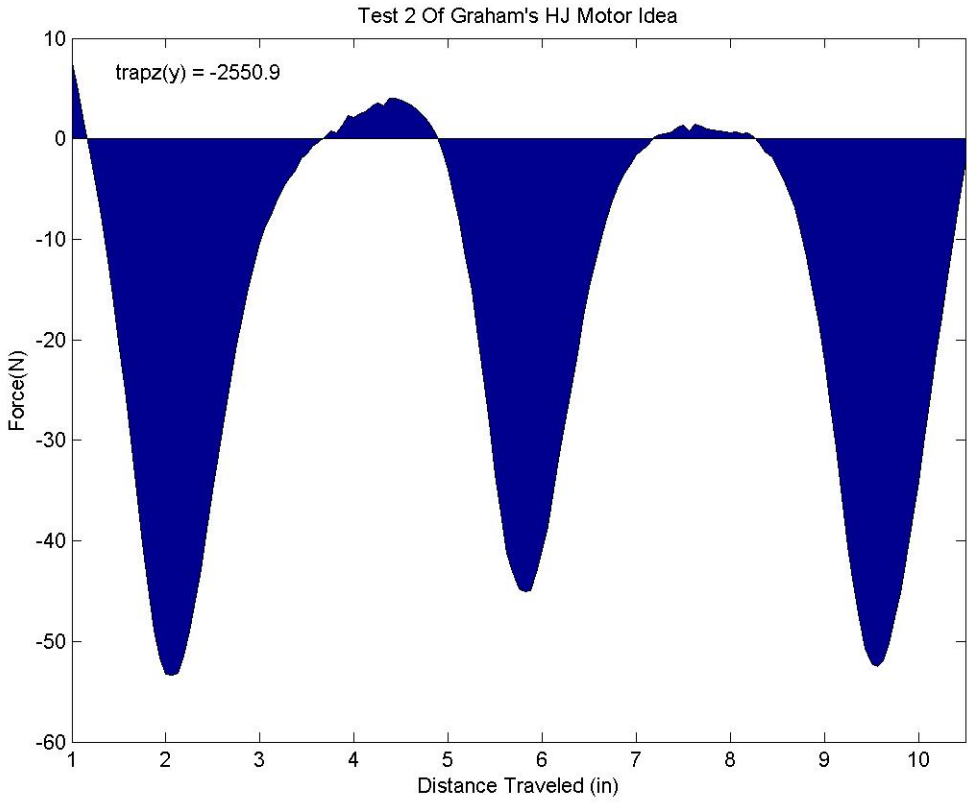


Figure 2 Simulation Result

Conclusion

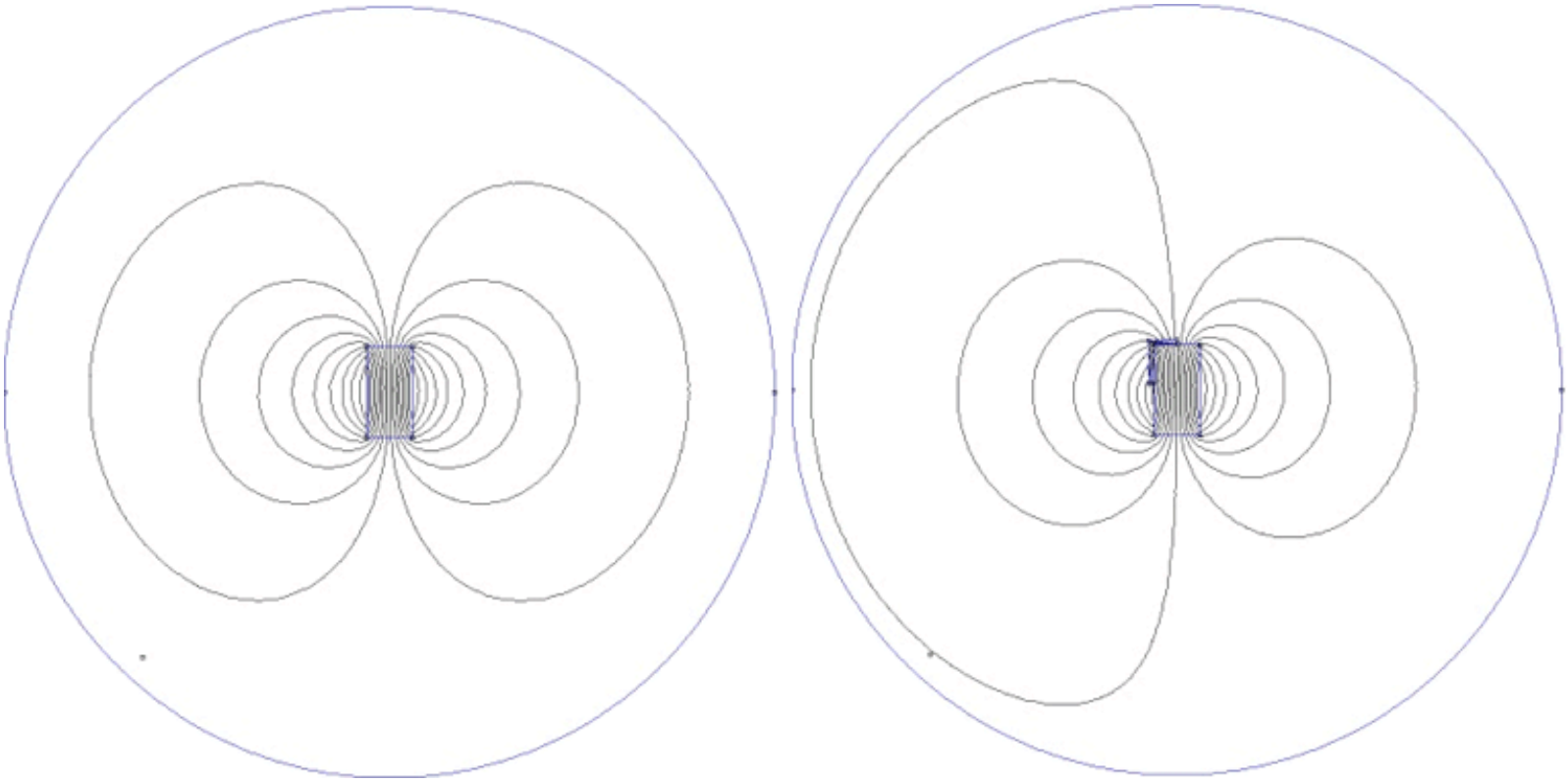
The second track shows the same effects as the first track. The idea of using many rotors with one stator pair should prove useful to several reasons. First a magnetic motor can be built from this idea much easier. Second this idea will employ less magnets overall making any motor designs on the concept more economical to build. Third it should be much easier to solve eddy current problems with this approach.

I have more ideas I want to test for this configuration. I think it is possible to mirror another stator pair below the rotors to both enhance the effect and balance out the forces on the y axis enabling high RPM in some potential motor designs. Also I believe the steel shielding can be shaped differently to significantly enhance the effect as well. I will be conducting further simulations to test out these ideas.

http://www.fdp.nu/shared/files/Shield%20devices//HJ%20Sim2%20For%20Graham.pdf

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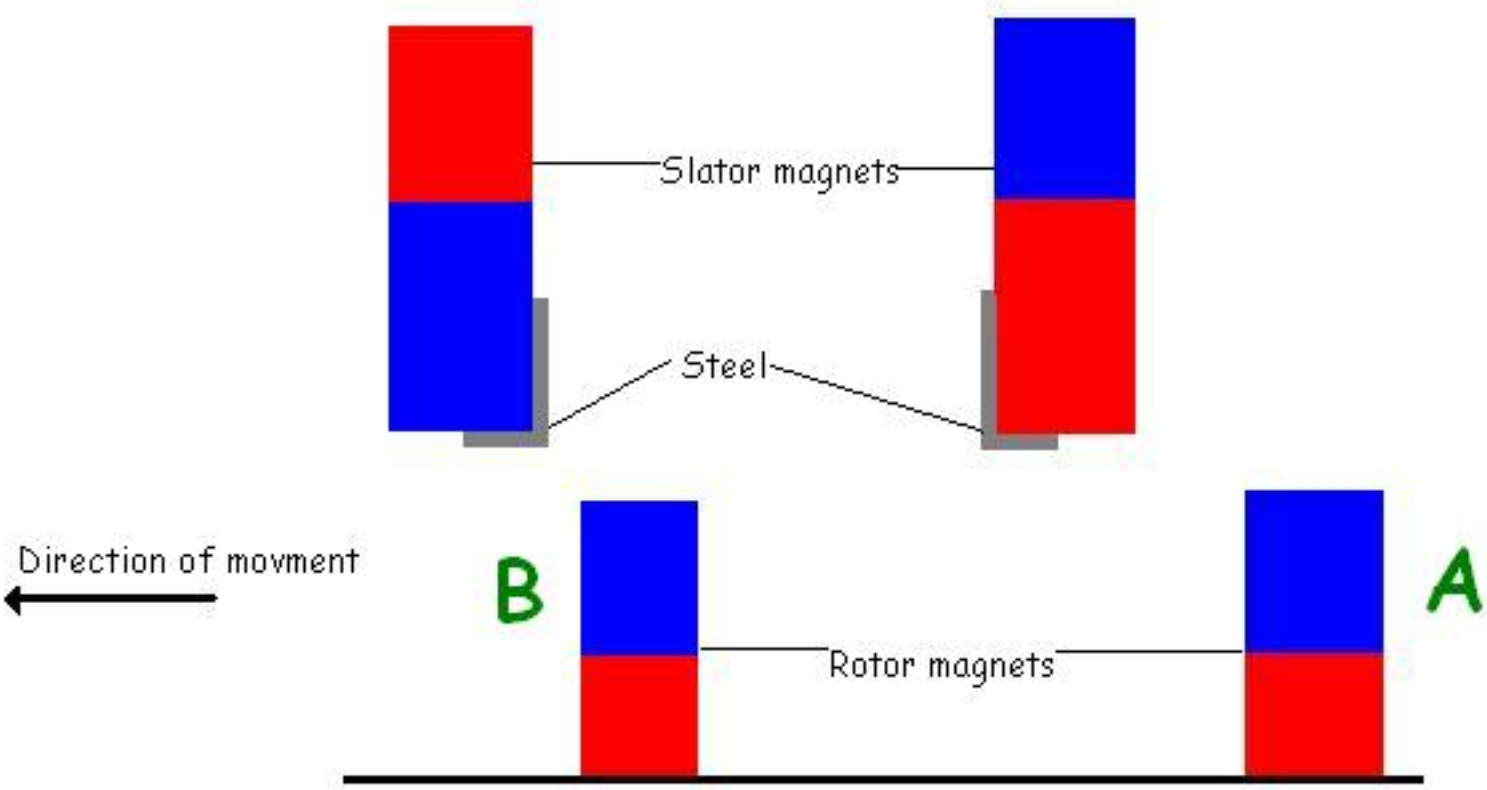
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How I think the Johnson Motor works

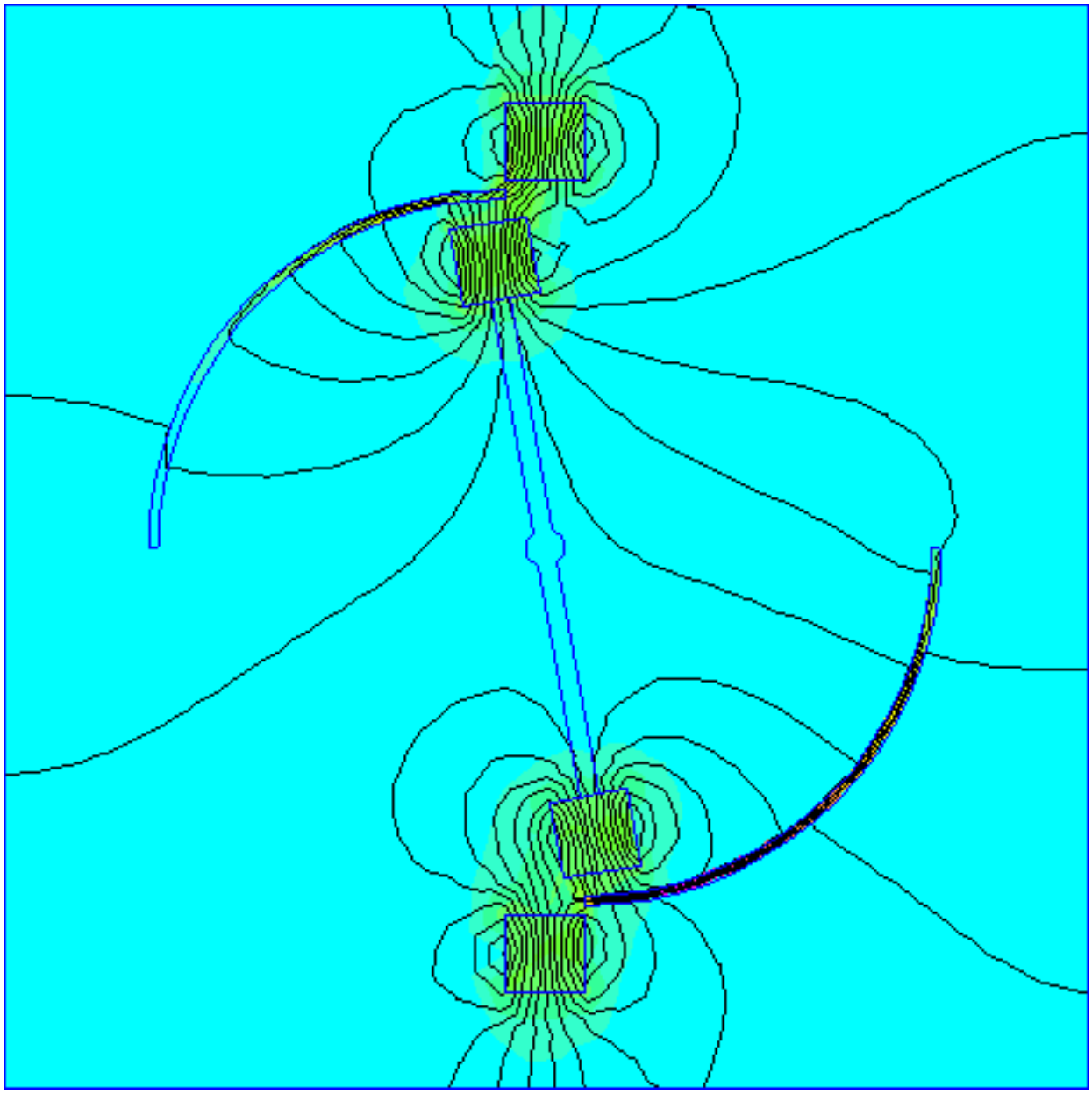


I have the steel there to cut down the magnetic flux but at the same time have the magnets still hold there properties, so the steel on the repelling magnet will still repel and the steel on the attracting magnet will still attract, giving the slator magnets stronger and weaker halves.
As A is attracted to the slator it pushes B because B is weaker through its slator, when B reaches the end of the steel it repels pulling A because now A is weaker through its magnetic slator and then the next magnet in the chain is attracted by the slator making the process repeat. The gap between the rotor magnets must be just right and there must be no magnetic flux joining the slator magnets in the middle. By Graham Clarke

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20Graham%20thinks%20the%20Johnson%20Motor%

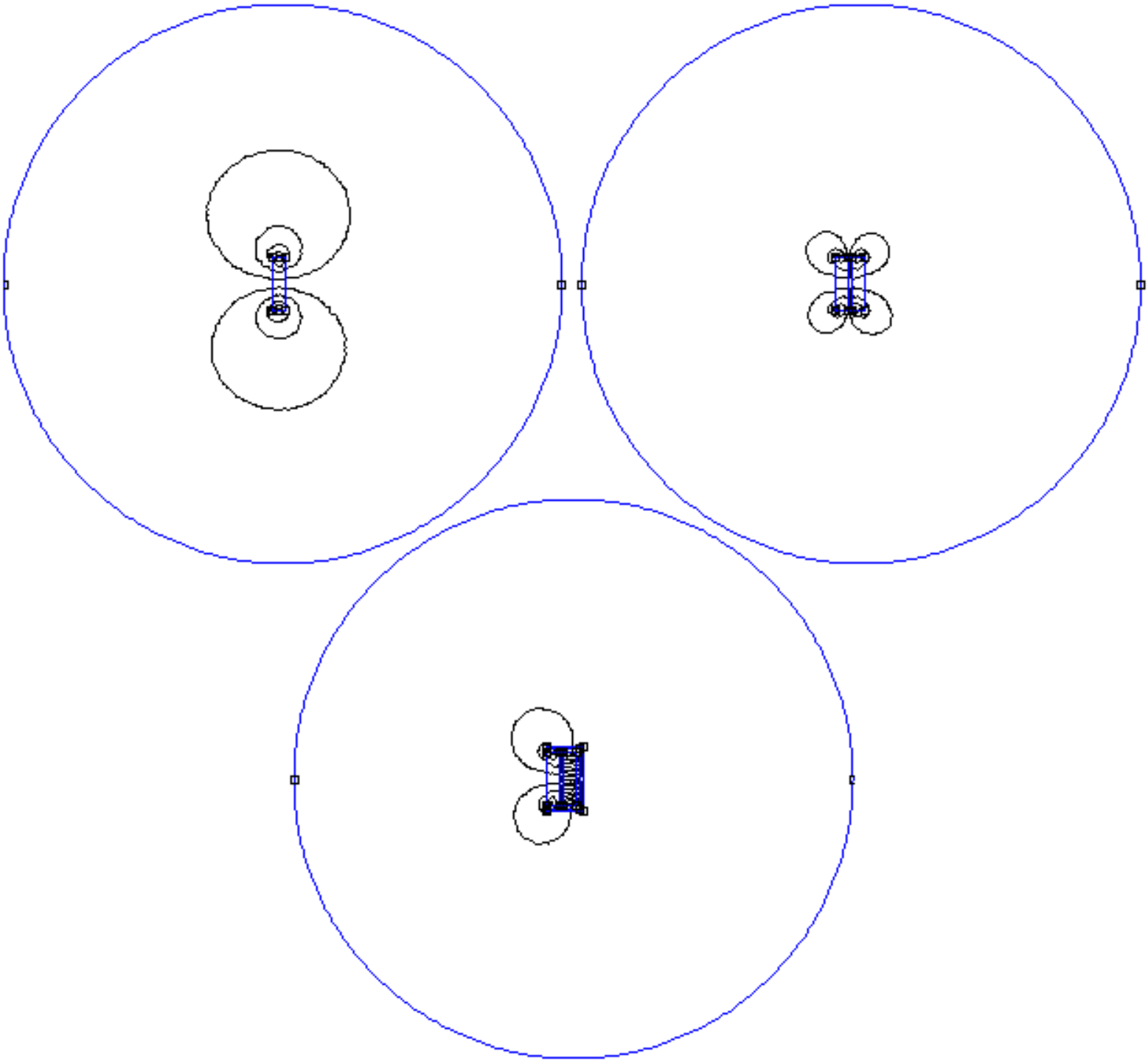
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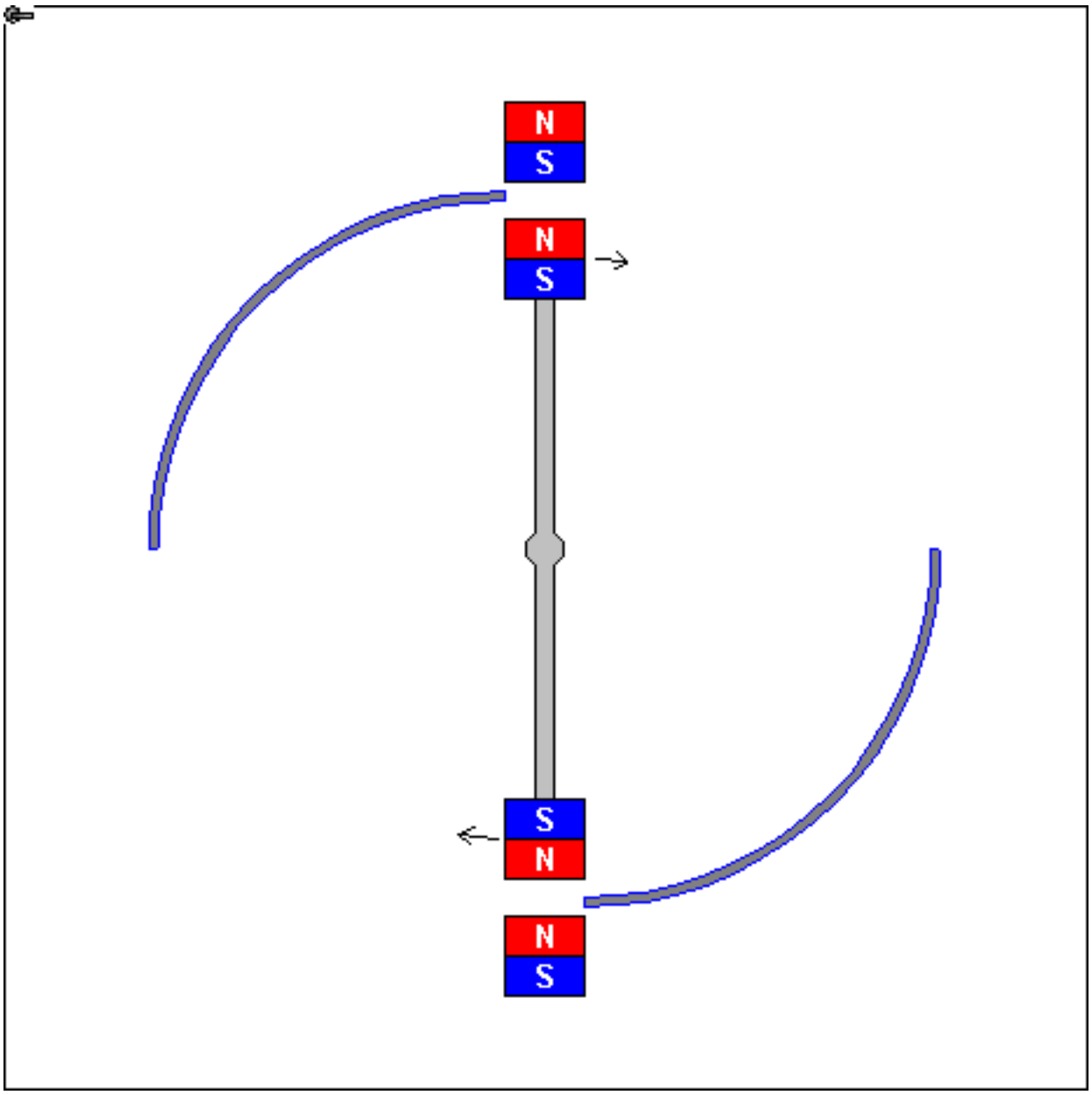


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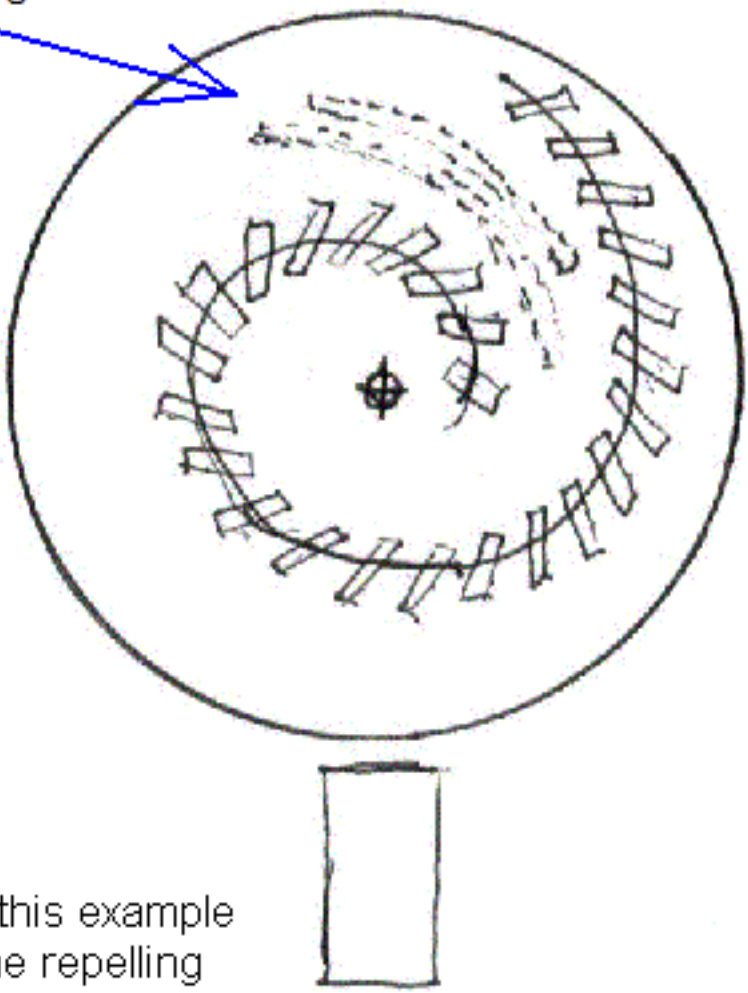

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http://www.fdp.nu/shared/files/Shield%20devices//Magnet%20Directions.gif

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Possible shielding if necessary



The polarity and lean direction of the magnets are irrelevant in this example. The illustration is meant to show the spiral shape of the track.

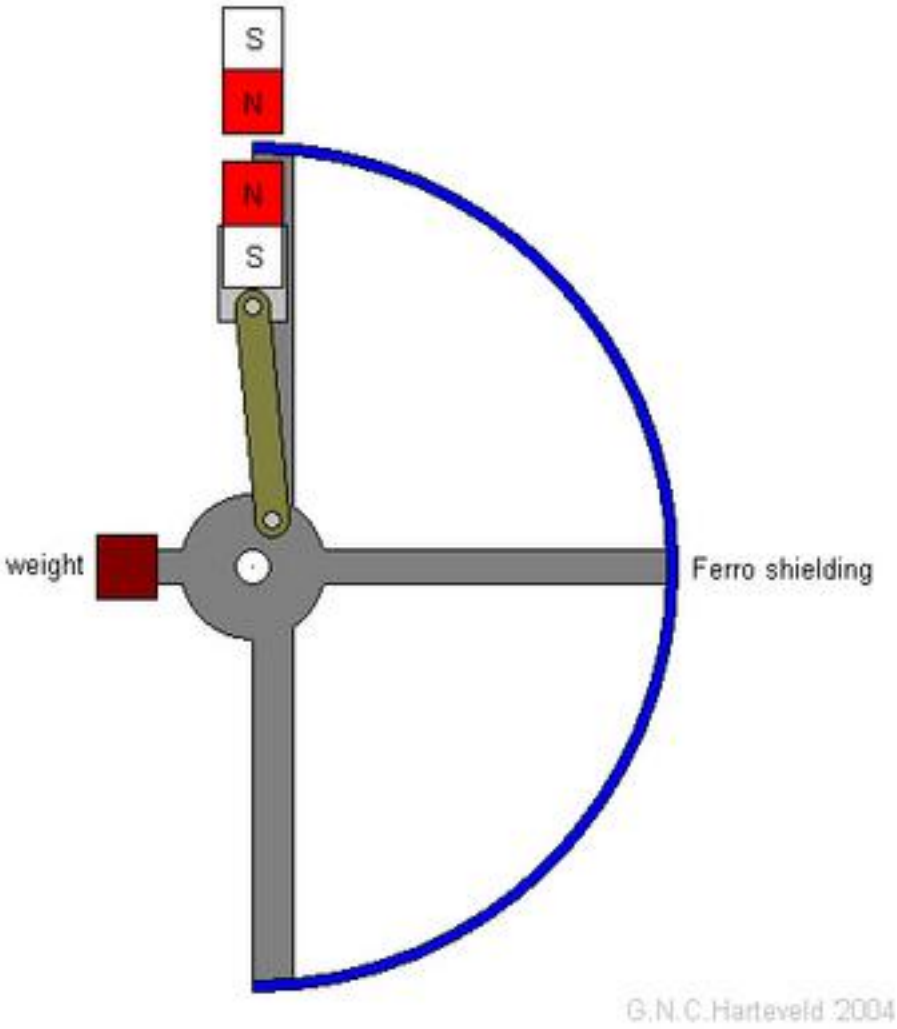
The purpose of this example is to eliminate the repelling force at the beginning of the track on the rotor magnet.

By Jason Owens
Jdo300@sbcglobal.net

http://www.fdp.nu/shared/files/Shield%20devices//Minato%20Spiral%20track%20motor.gif

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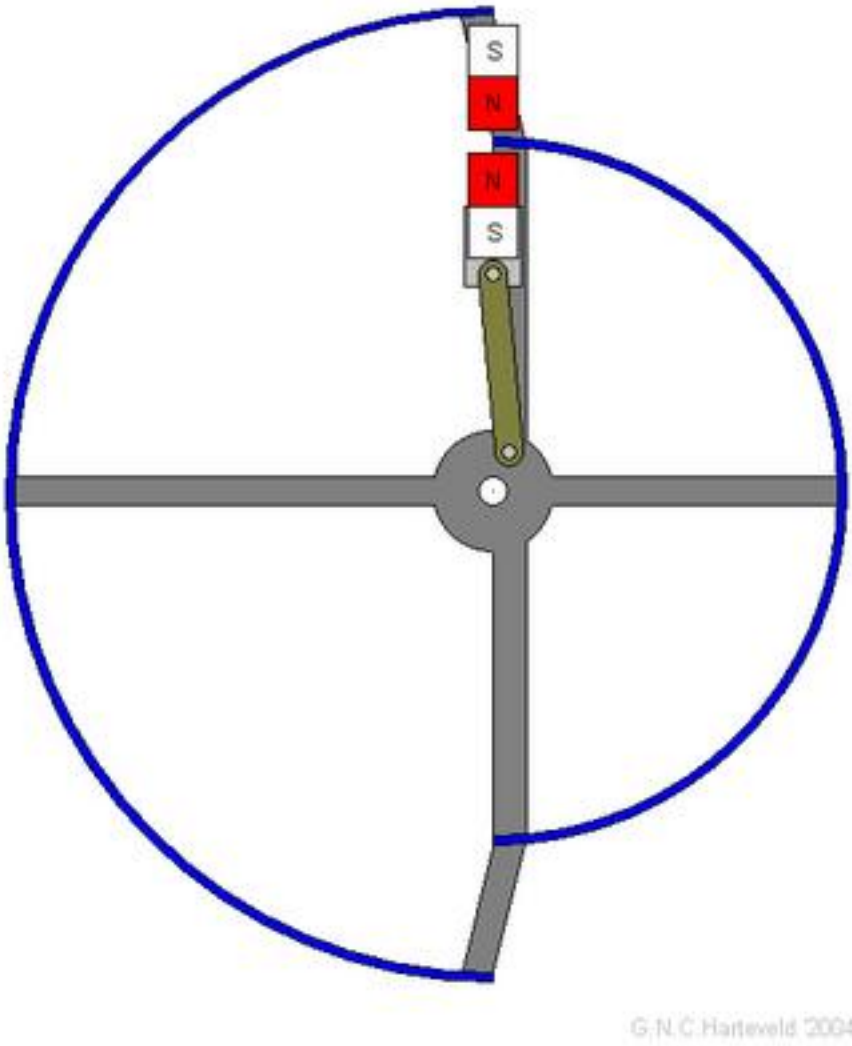
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S
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weight
Ferro shielding
G.N.C.Harteveld 2004

http://www.fdp.nu/shared/files/Shield%20devices//motor+4
+basic.jpg

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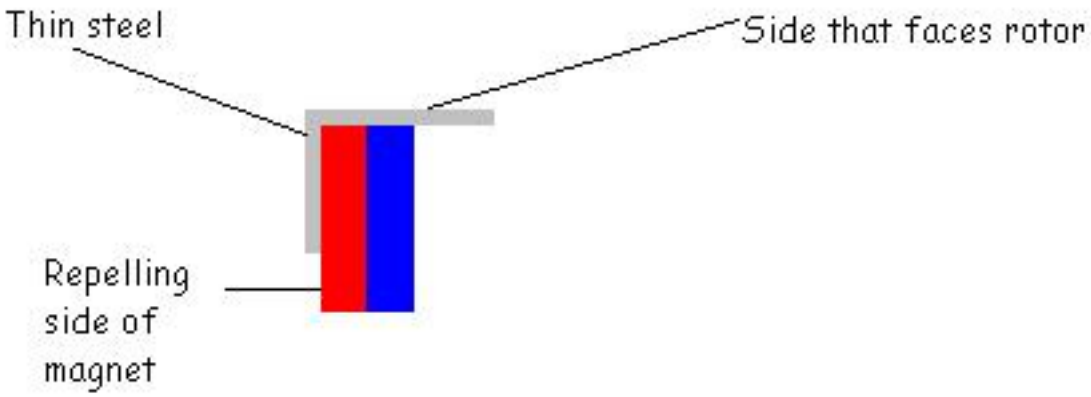

S
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N
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G.N.C Harteveld '2004

http://www.fdp.nu/shared/files/Shield%20devices//motor+5
+basic.jpg

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Repelling Shield



With this setup you get a kick, what ever side you put the side piece of steel on will cause the top steel to have that magnetic force, so if you put the side steel on the blue the top steel will be what ever the blues pole is and the same for the red. If the rotor is the red pole then to repel the rotor you put the side steel on the red but if you want to attract that rotor then you put the side steel on the blue.

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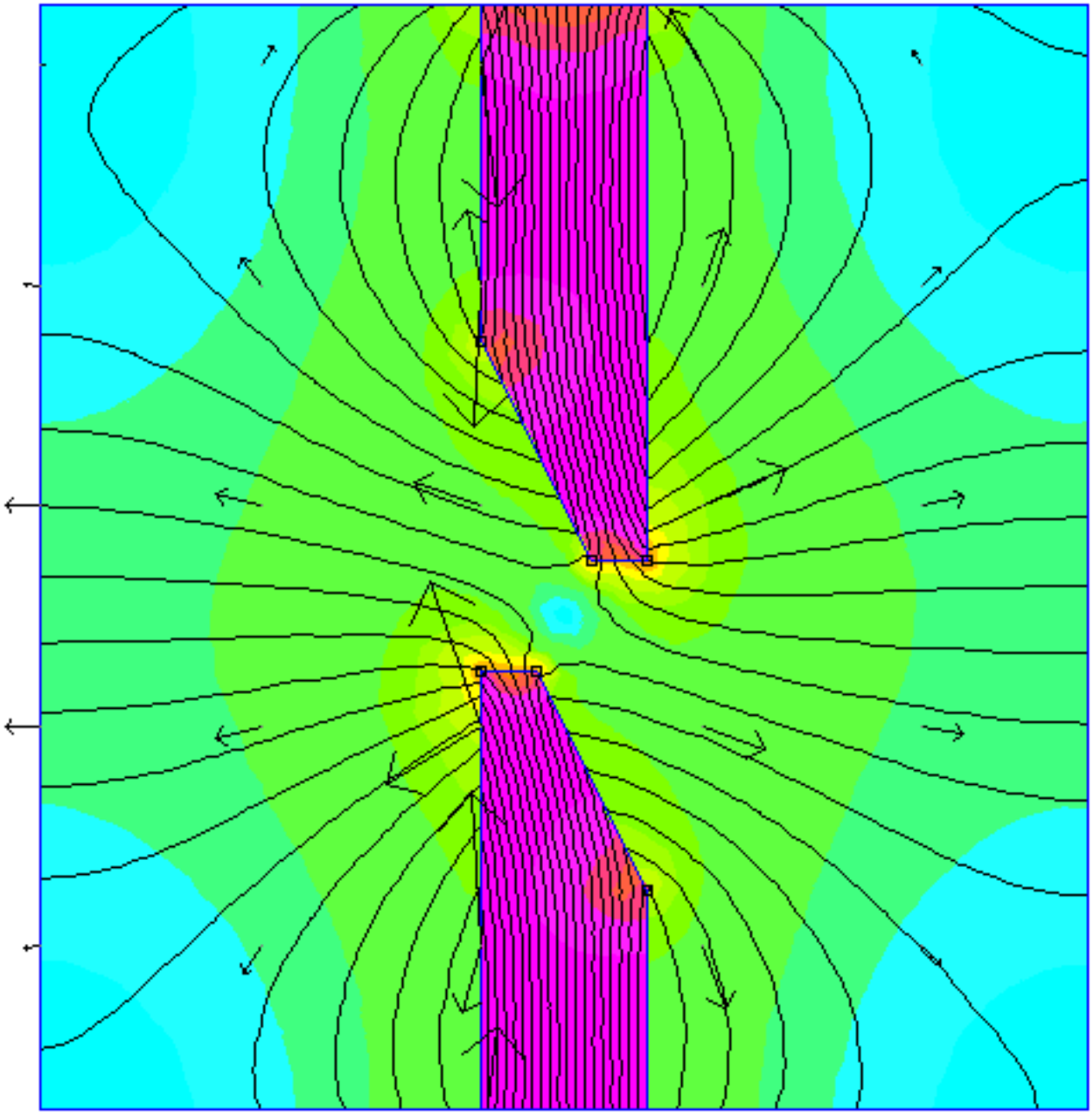
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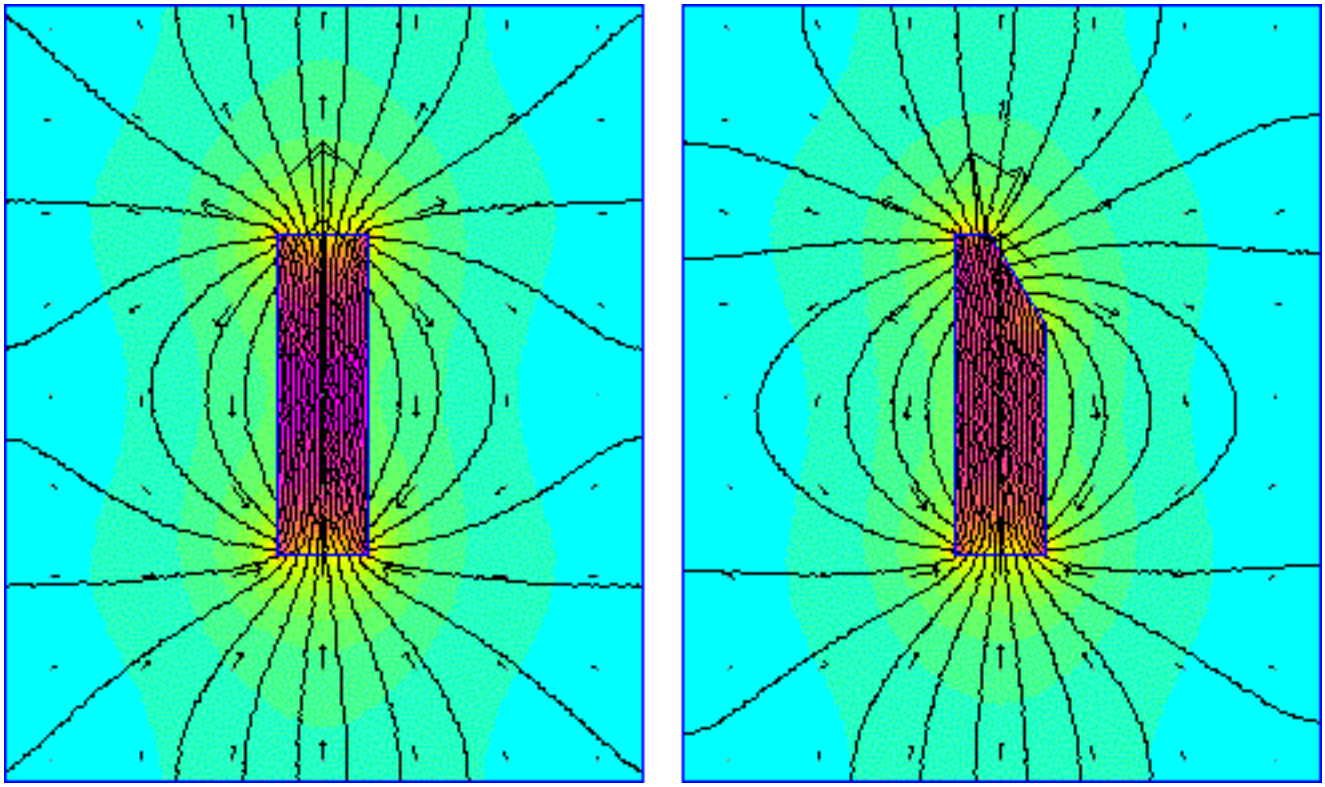
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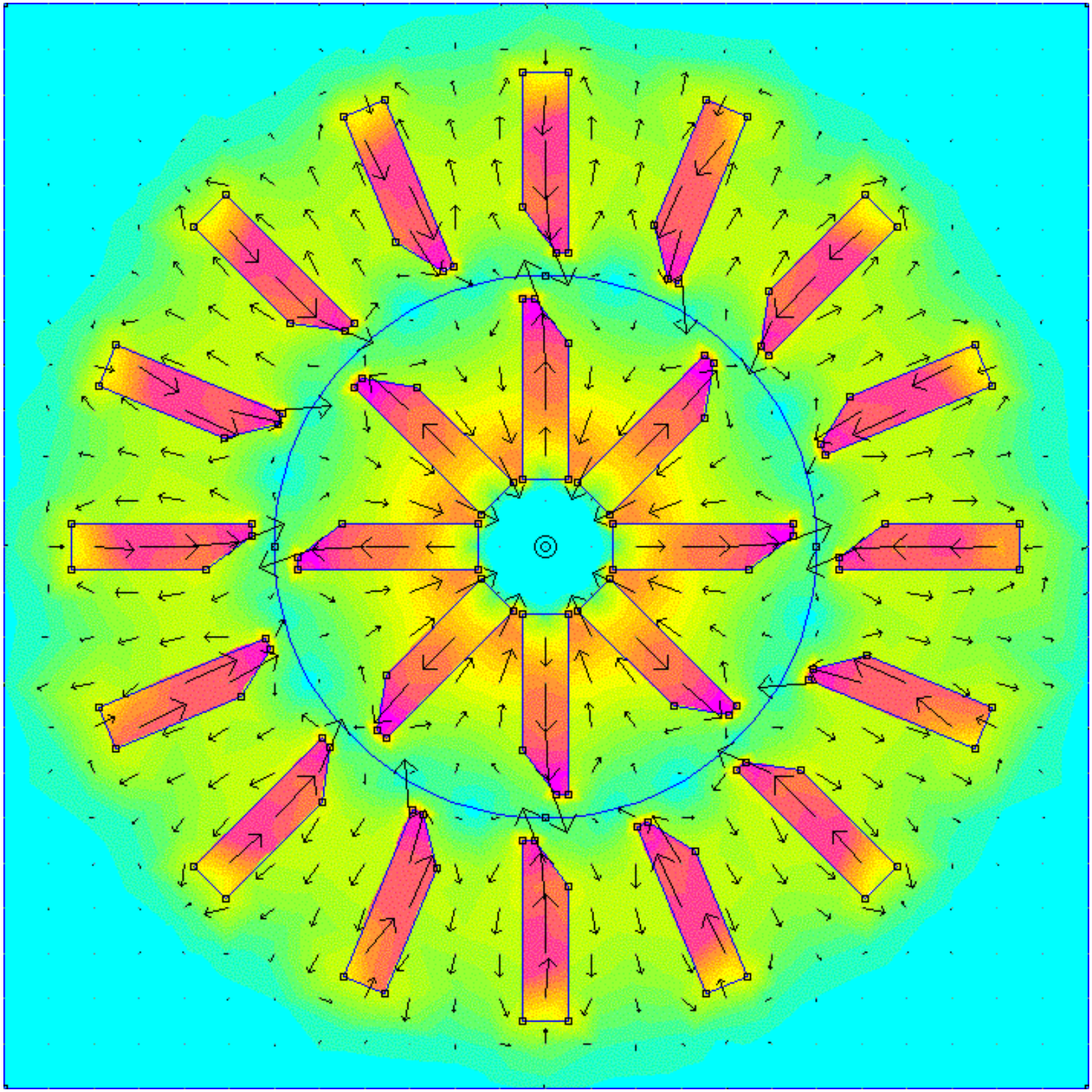
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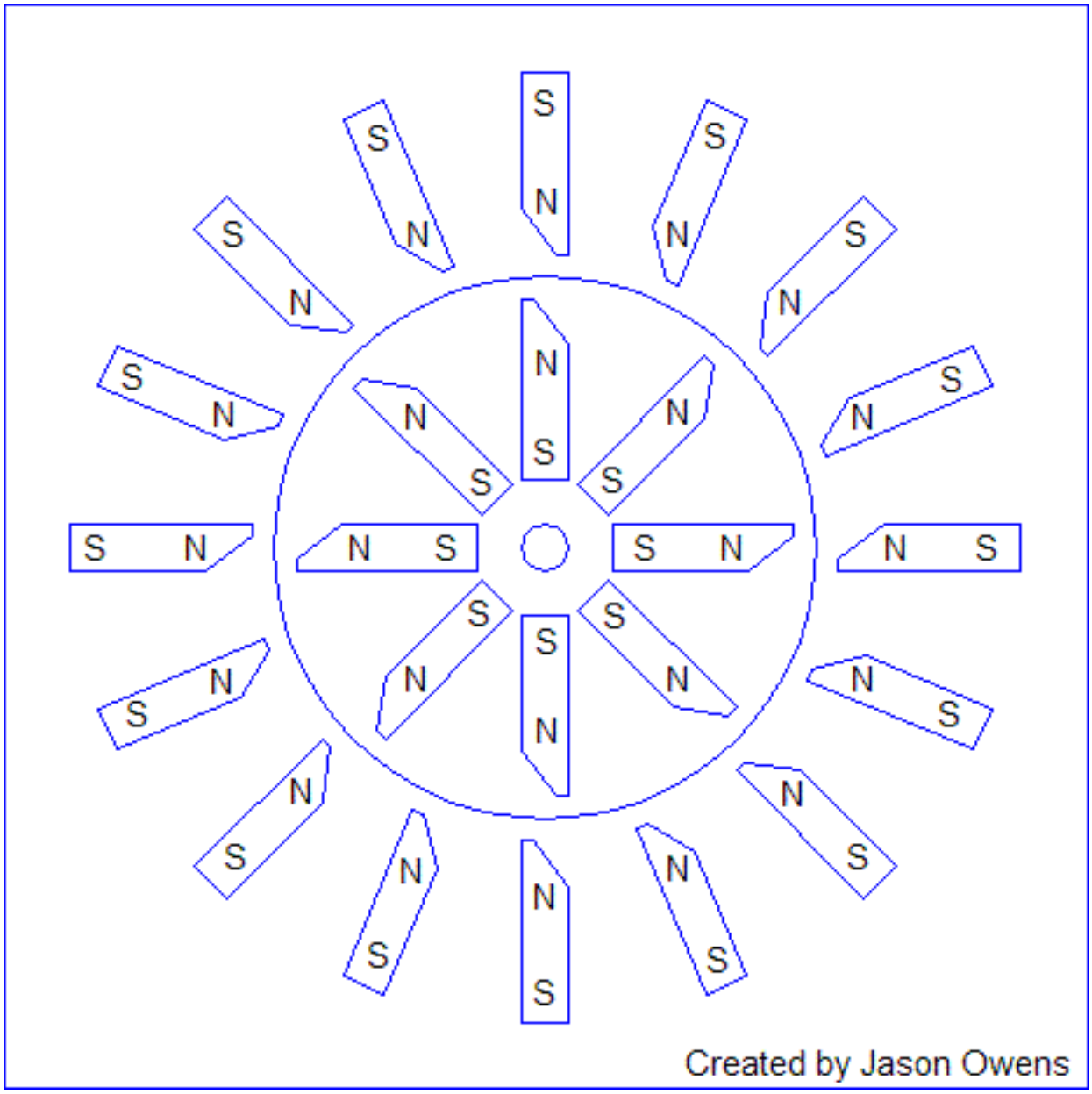
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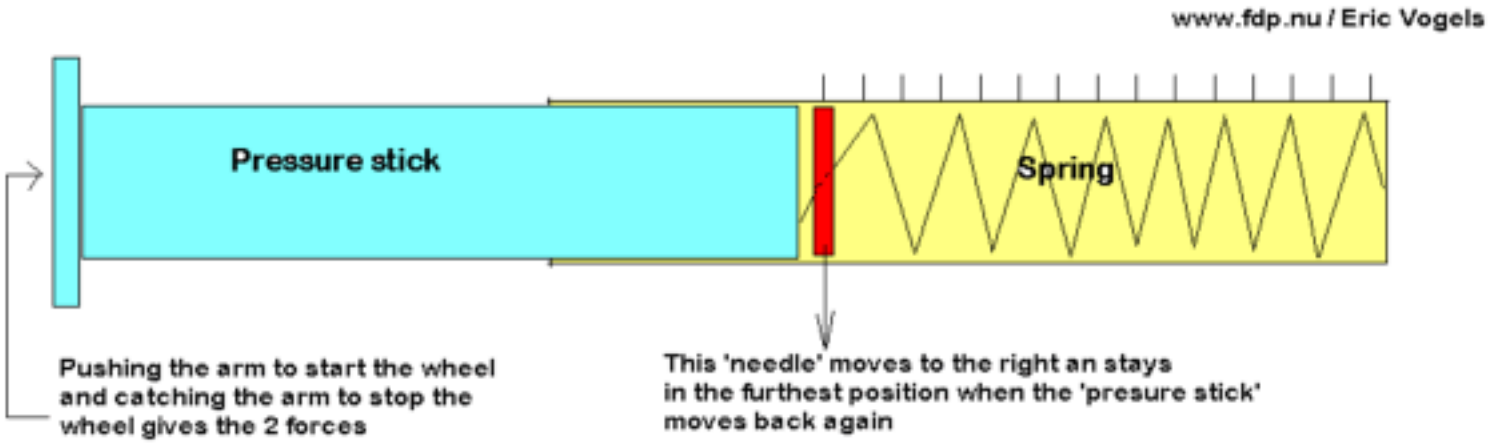
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Created by Jason Owens

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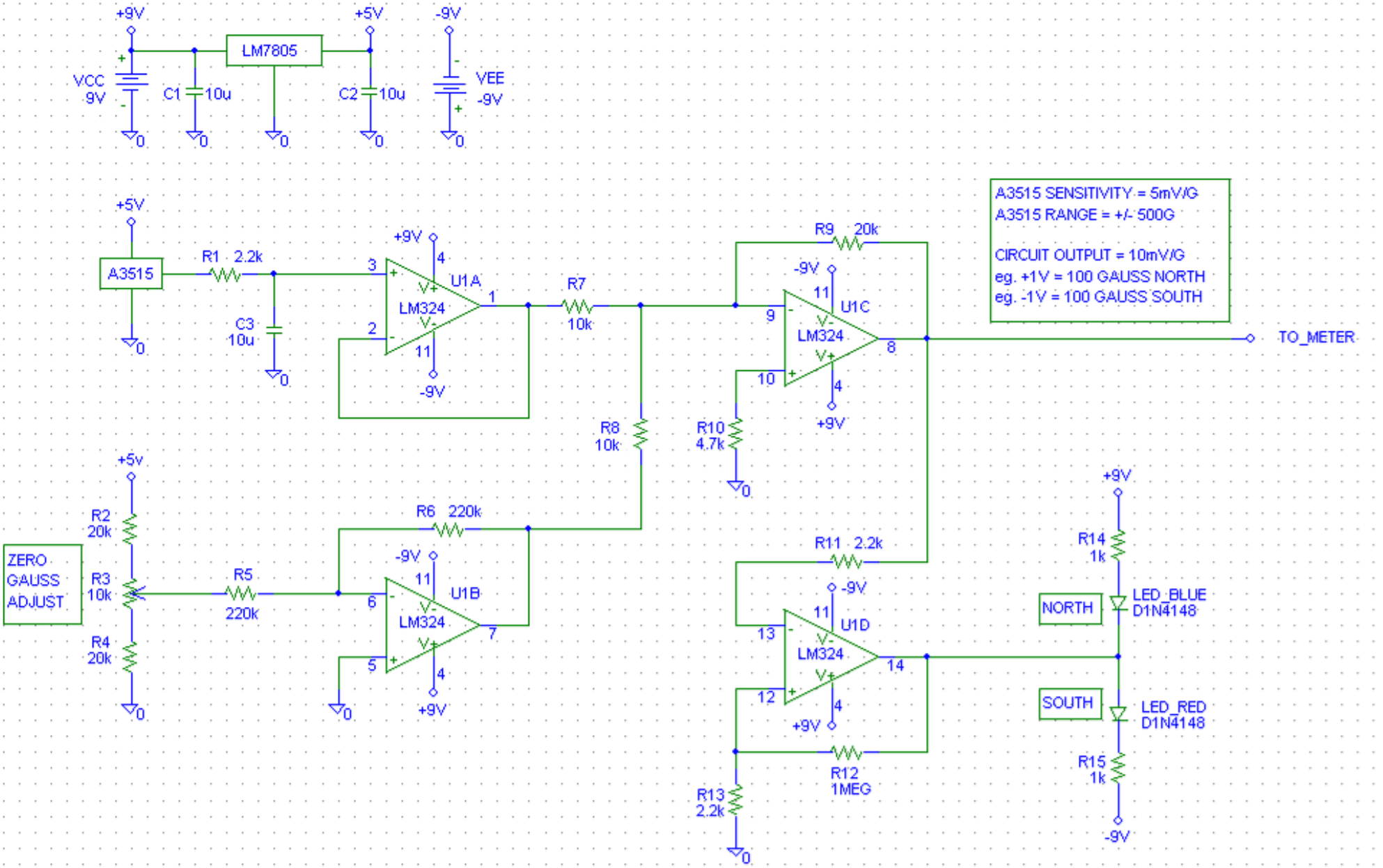
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www.fdp.nu / Eric Vogels
Pressure stick
Spring
Pushing the arm to start the wheel and catching the arm to stop the wheel gives the 2 forces
This 'needle' moves to the right an stays in the furthest position when the 'presure stick' moves back again

http://www.fdp.nu/shared/files/Tools%20and%
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+9V
LM7805
+5V
-9V
VCC
9V
C1
10u
C2
10u
VEE
-9V
A3515
R1 2.2k
C3
10u
U1A
LM324
R7
10k
R8
10k
R9 20k
U1C
R10
4.7k
A3515 SENSITIVITY = 5mV/G
A3515 RANGE = +/- 500G
CIRCUIT OUTPUT = 10mV/G
eg. +1V = 100 GAUSS NORTH
eg. -1V = 100 GAUSS SOUTH
TO_METER
ZERO
GAUSS
ADJUST
R2
20k
R3
10k
R4
20k
R5
220k
R6 220k
U1B
R11 2.2k
U1D
R12
1MEG
R13
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1k
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NORTH
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LED_BLUE
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LED_RED
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- Guest book
-
- Administration

In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

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Size of current folder: 57 of 200 Mb

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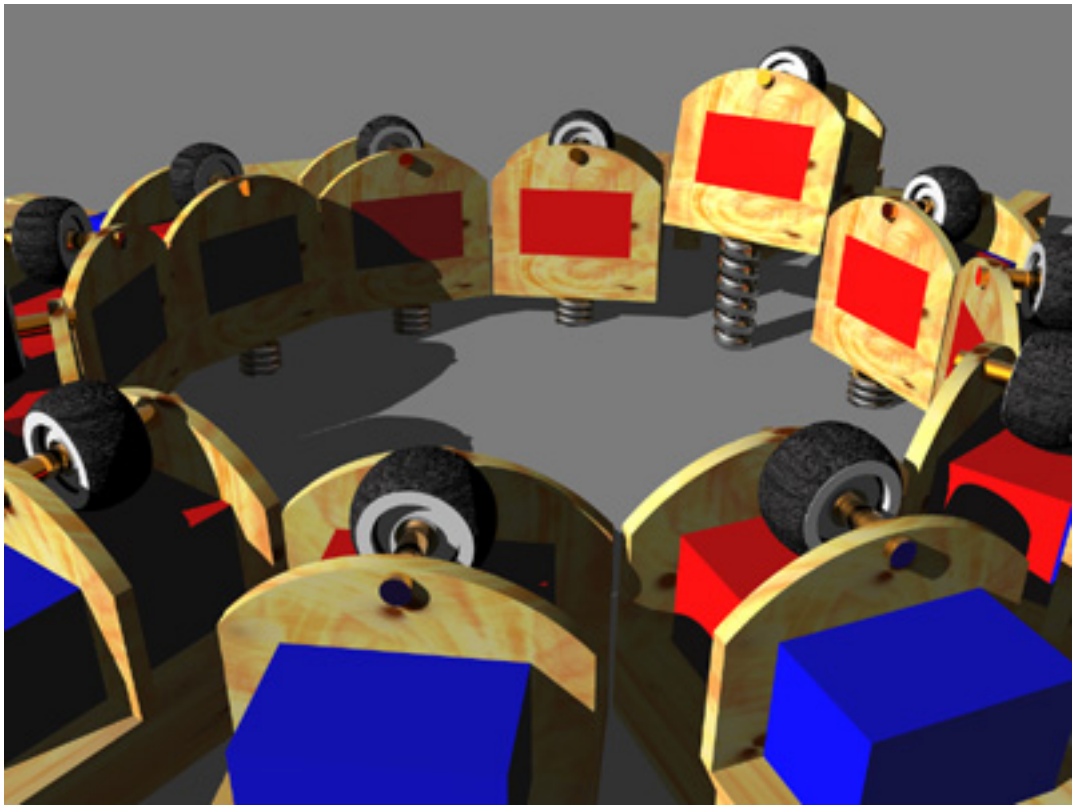
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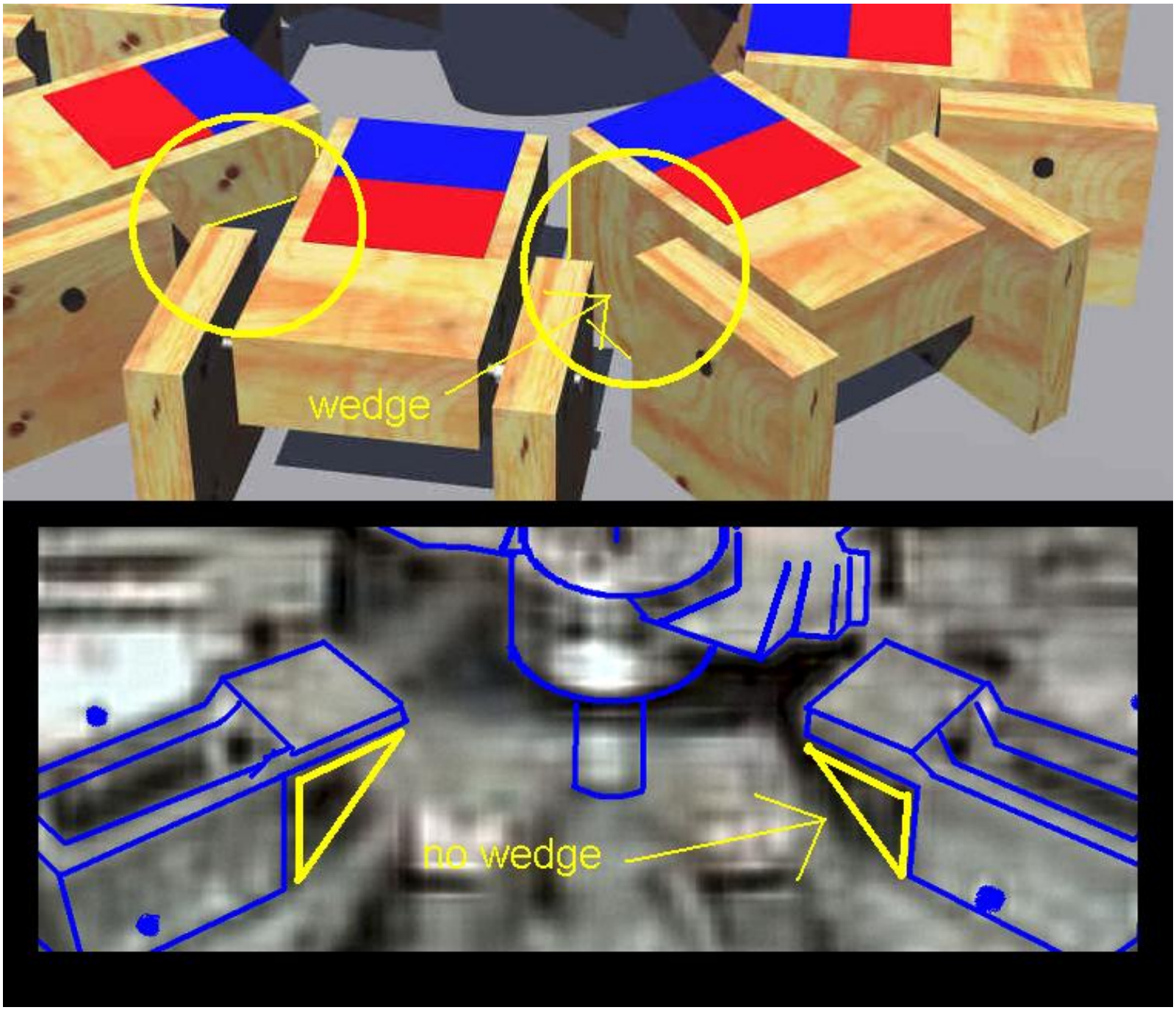
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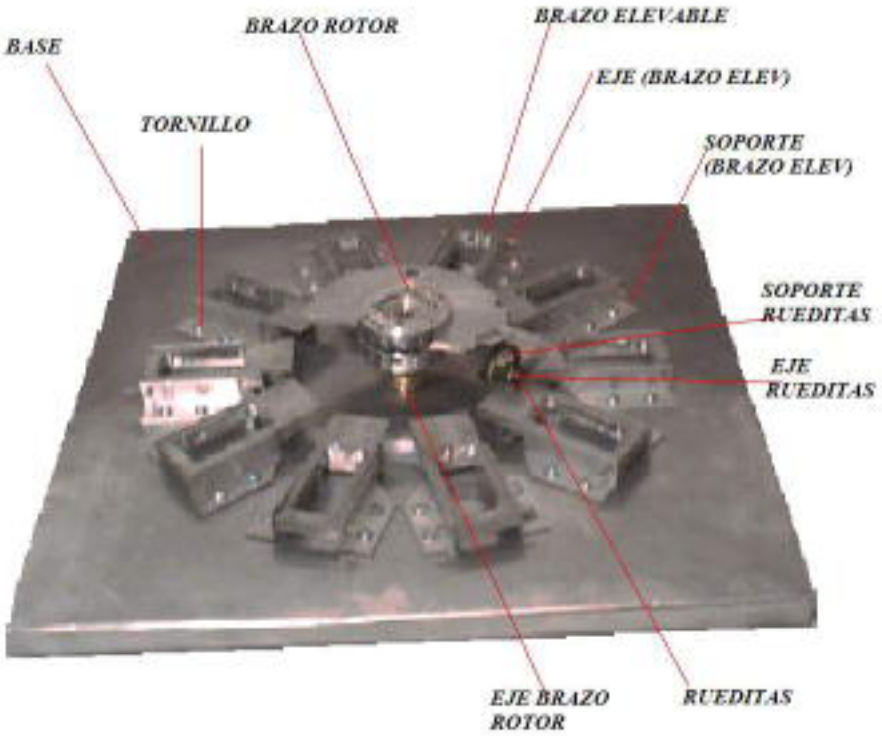
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wedge
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PROTOTIPO EN ALUMINIO ,BRONCE ,MAGNESIO E IMANES DE NEODIMIA



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SIST. DE DESCENSO CONTROLADO
SIST.DE ELEVACION POR RUEDAS
TAPA
BRAZO ROTOR
EJE BRAZO ROTOR
RULEMANES
RAMPA ELEVADORA DEL BR. ELEV
BRAZO ELEVABLE
EJE BRAZO ELEV.
BASE
IMAN BRAZO ELEVABLE
IMAN BRAZO ROTOR

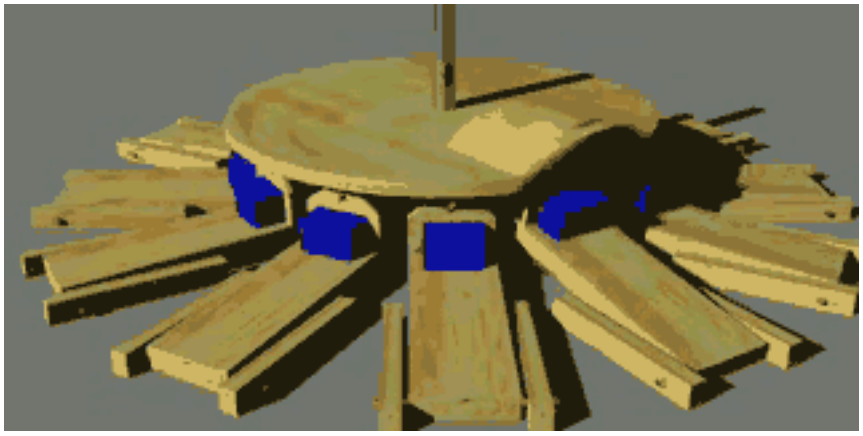
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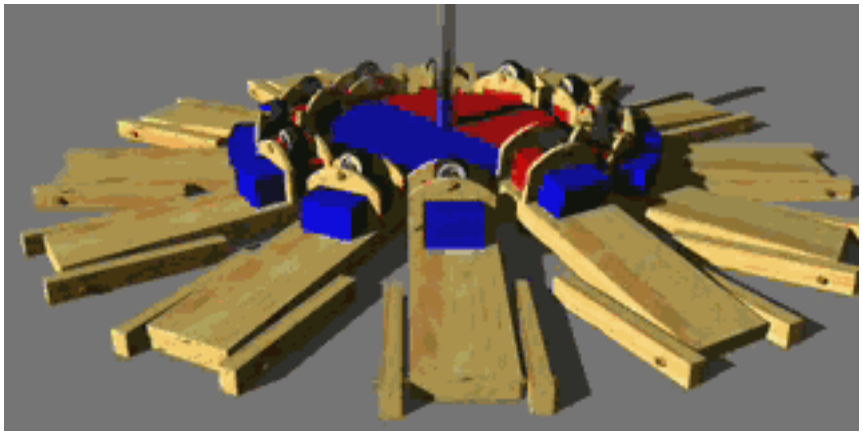


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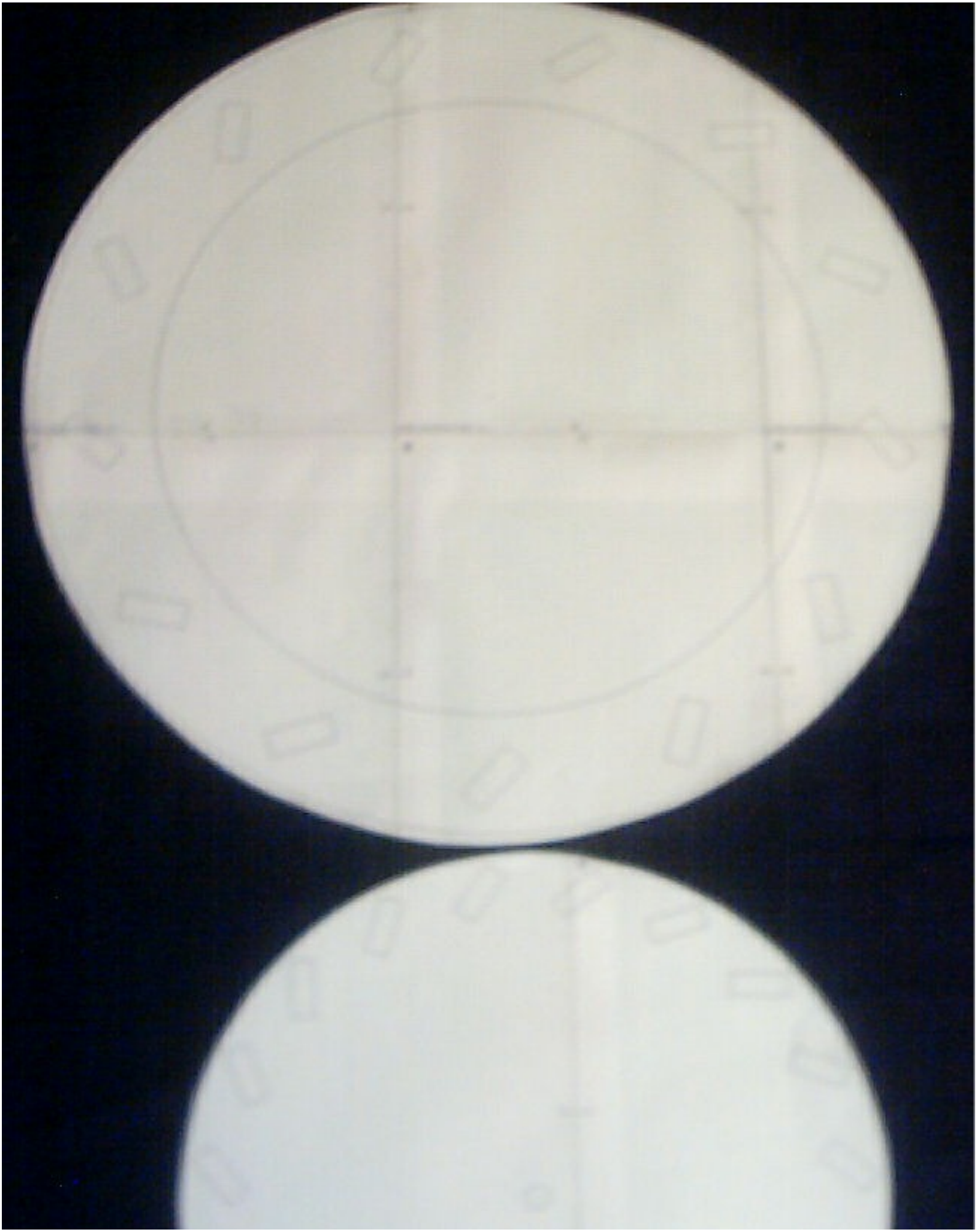
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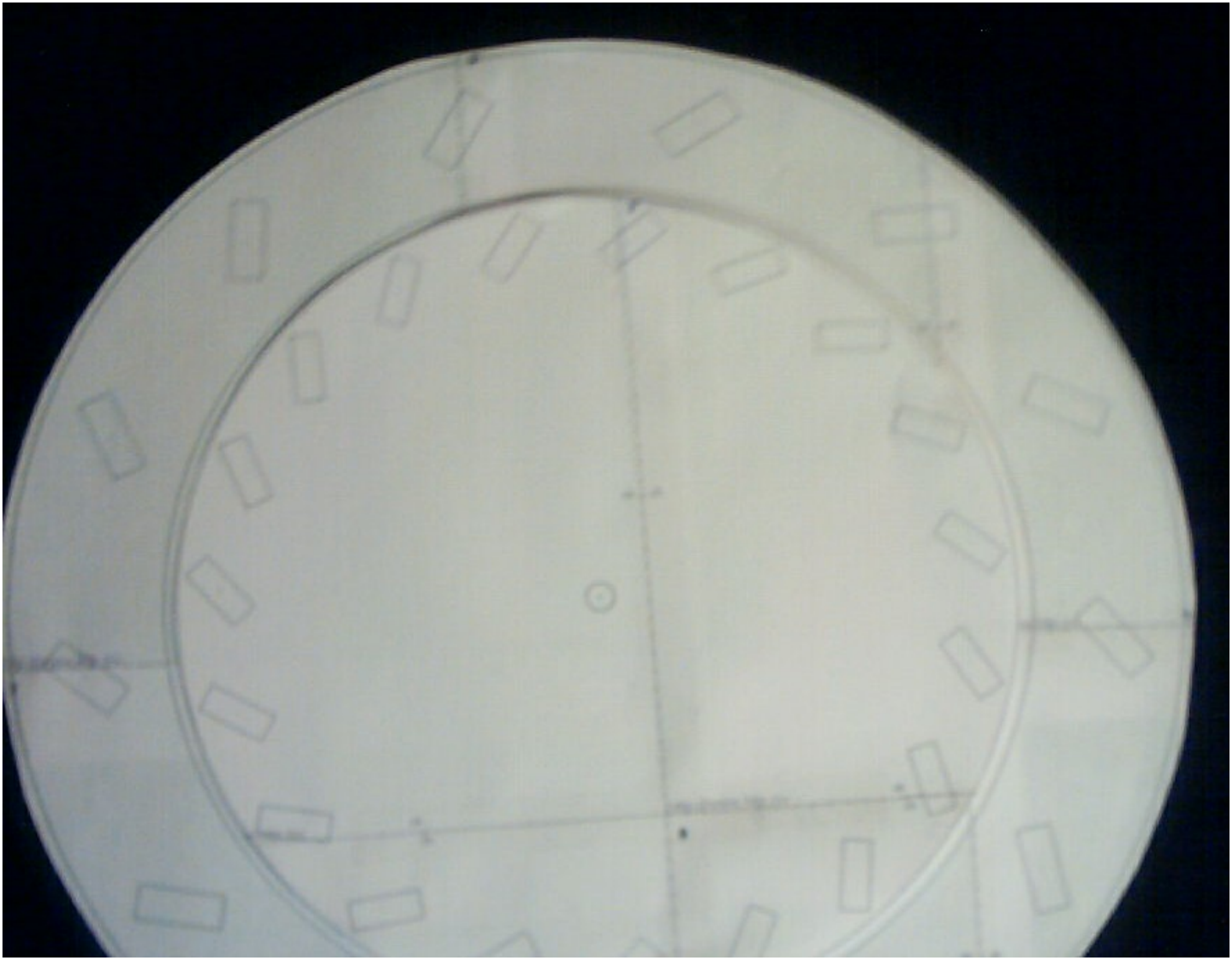
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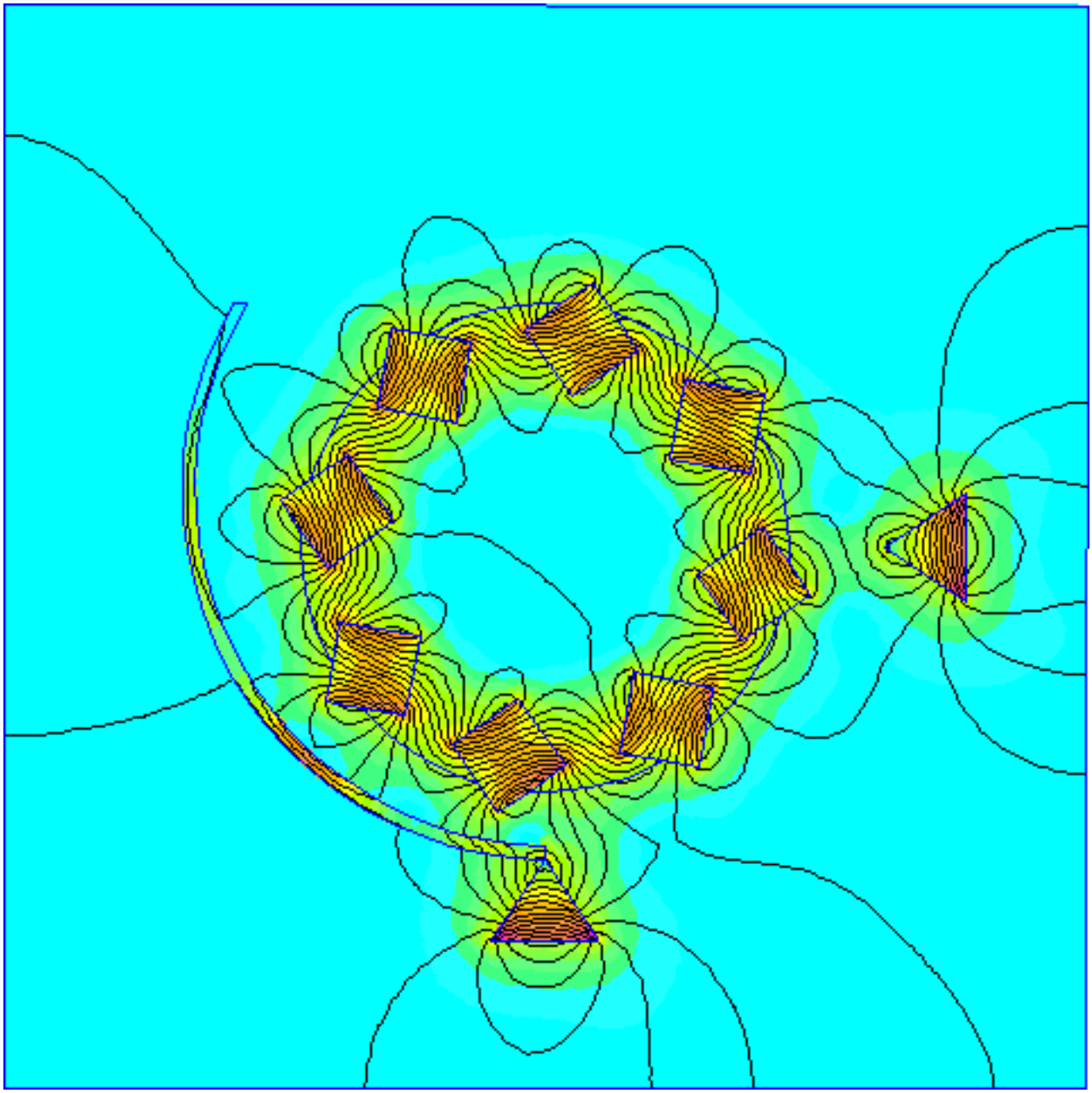
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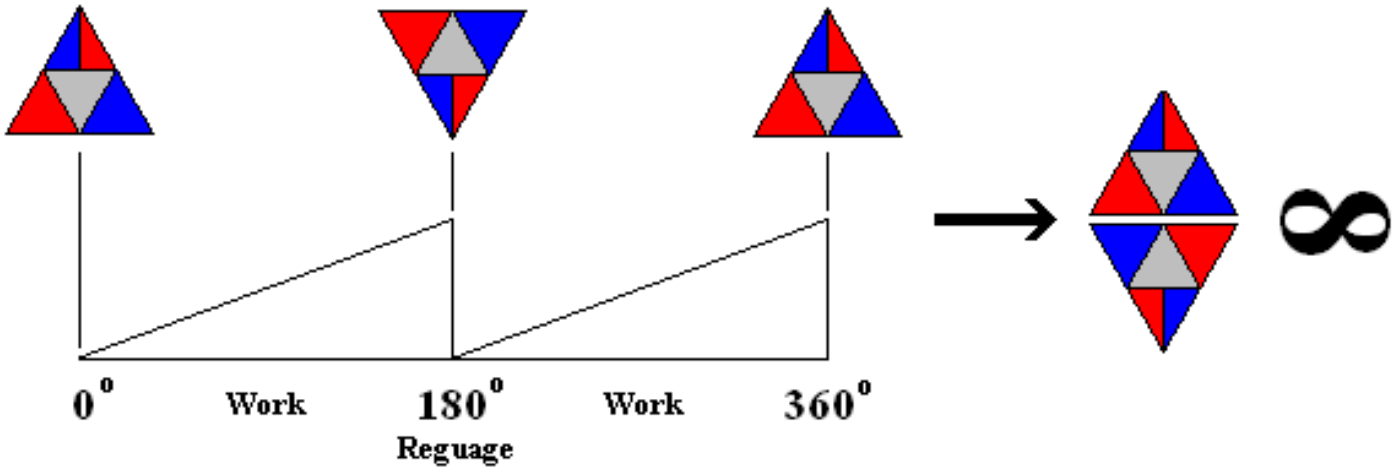
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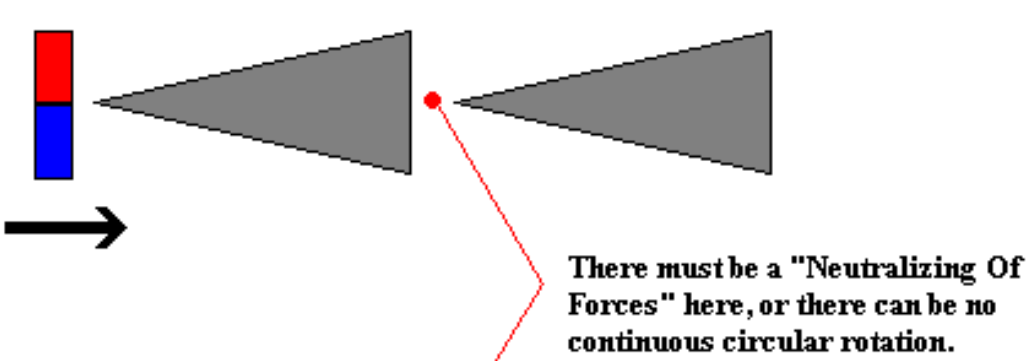
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Triangle of Forces Trinity [Part 3]

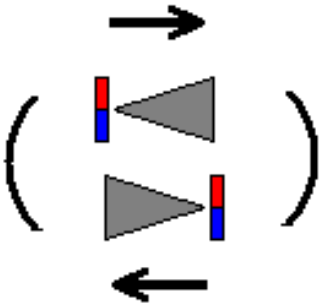
By Dan LaRochelle
danswaay@yahoo.com

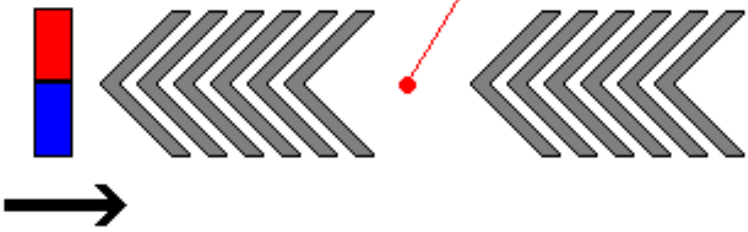
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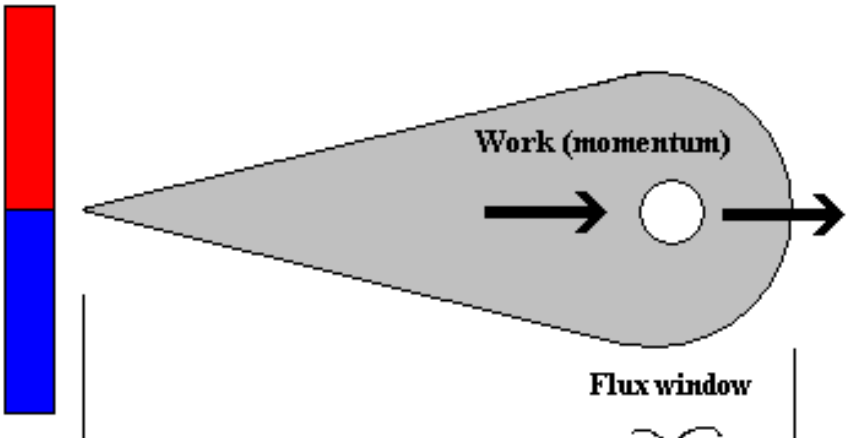
There must be a "Neutralizing Of Forces" here, or there can be no continuous circular rotation.





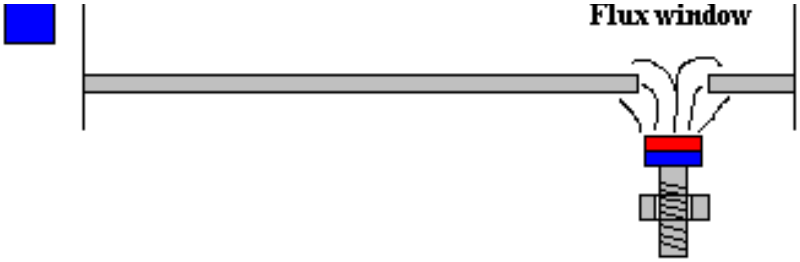
Magnetic Attraction Gates

The use of momentum produced during the "work phase" will allow the magnetic parts to enter into a "neutralizing phase" as the triangle of forces move in transition. The best way to achieve the neutralizing is an equal and opposite arrangement of forces 180 degrees apart as in the neutral balance lever arrangement.





By using momentum and a neutralizing or weakening force together, a true opposite and equal balance of forces would not have to be achieved for a "roll away"



balance of forces would not have to be achieved for a "roll away" action to occur.

Adjustable neutralizing magnet

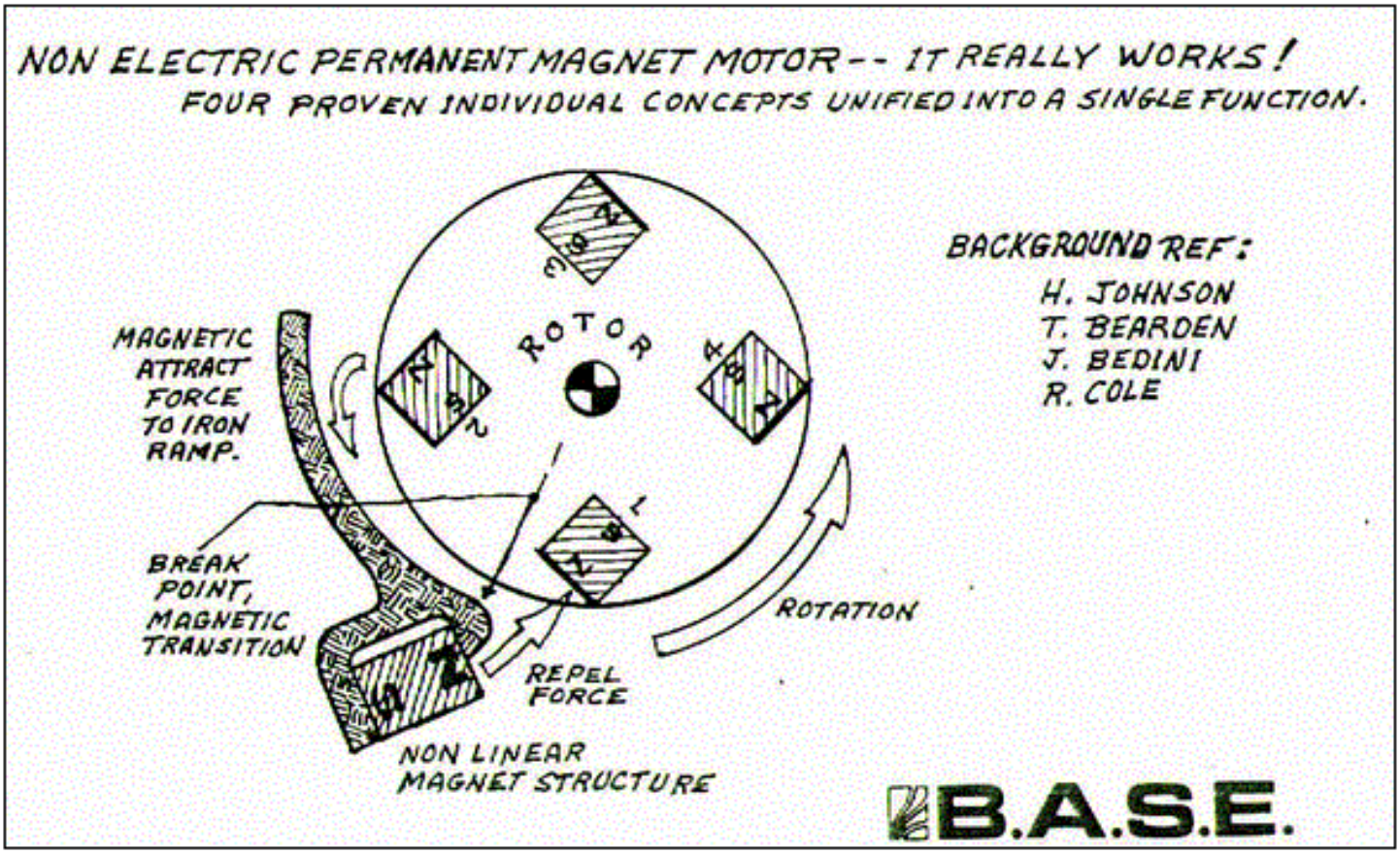
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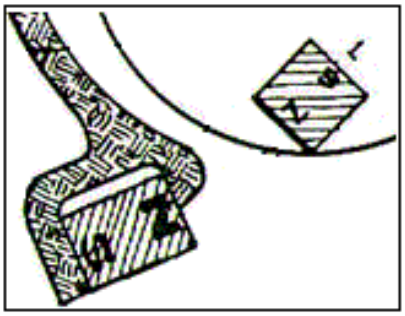
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Triangle of Forces
Trinity [Part 4]

By Dan LaRochelle
danswaay@yahoo.com

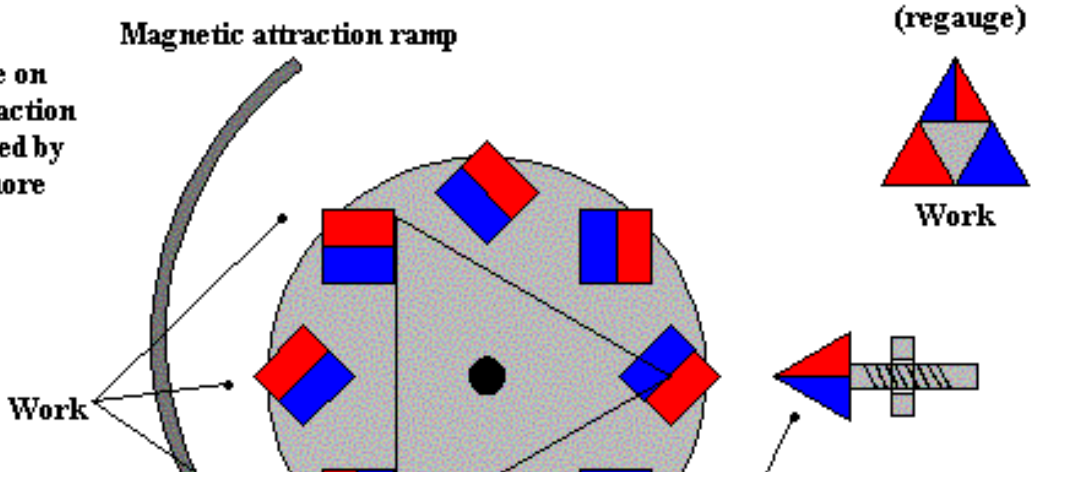
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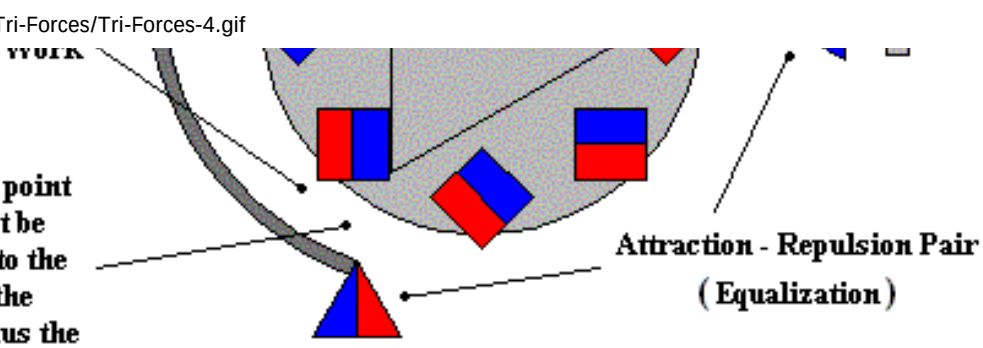




This type of "gate release configuration" is very problematic. The permeable iron accommodates the rotor magnet's field and thus attraction still occurs even with the repulsion magnet being present. What is needed is a "sharp edge" neutral zone as in a triangular shaped magnet with a north pole on one side of the point and a south pole on the other side.

The work being done on by the magnetic attraction ramp can be increased by a longer ramp and more magnets.





This is the "sticky" point that the magnet must be "pulled past" and into the repulsion region of the repelling magnet, thus the need for the "attraction - repulsion pair" of opposite polarities.

Attraction - Repulsion Pair

(Equalization)

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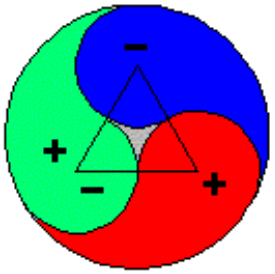
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Triangle of Forces
Four Arm Ramp

By Dan LaRochelle
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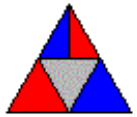
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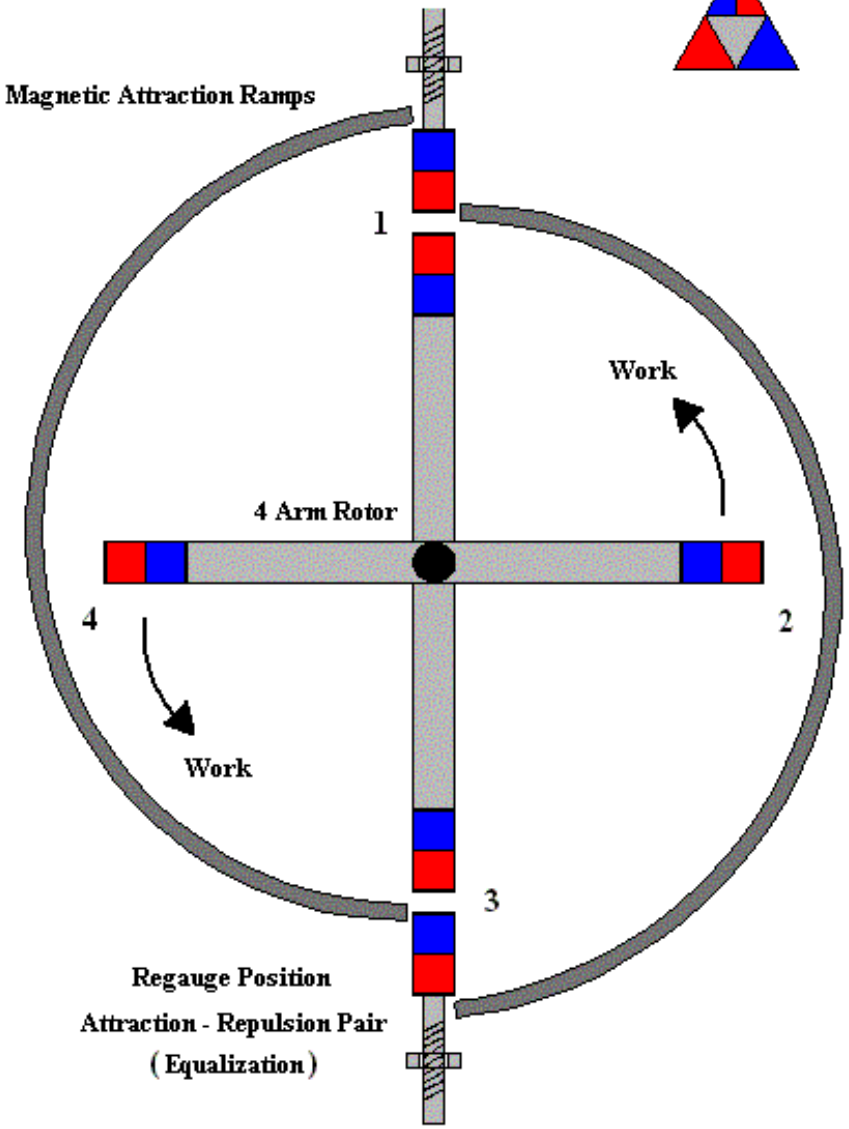
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Circular Tri-Force

Numbered positions 1 & 3 are the transition of forces and are represented in the green third of the circular tri-force diagram. Positions 2 & 4 are each separately represented in the blue and red thirds of the circular tri-force diagram. Even though positions 2 & 4 are not being influenced by another magnet, the presents of permeable iron represents an opposite polarity, thus attraction occurs and is repressed correctly in the circular tri-force diagram.





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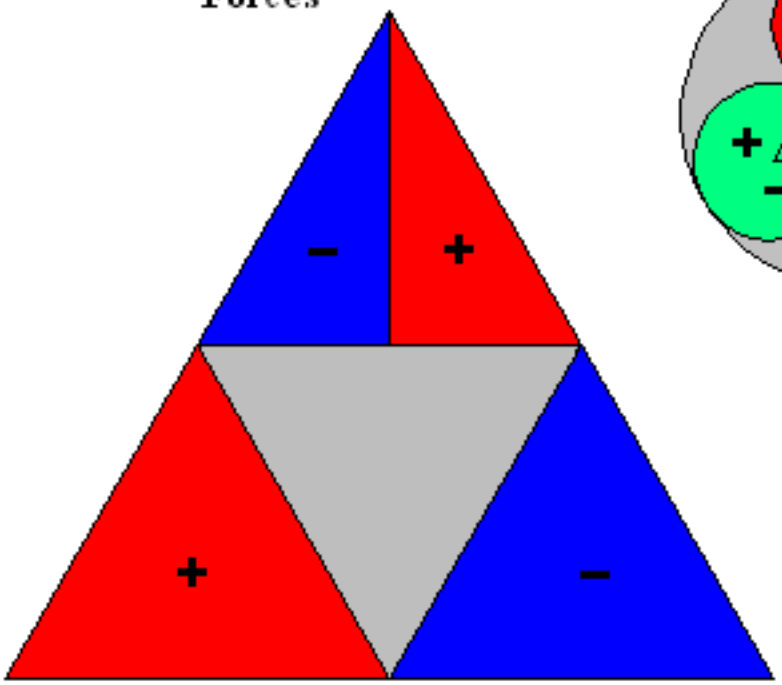
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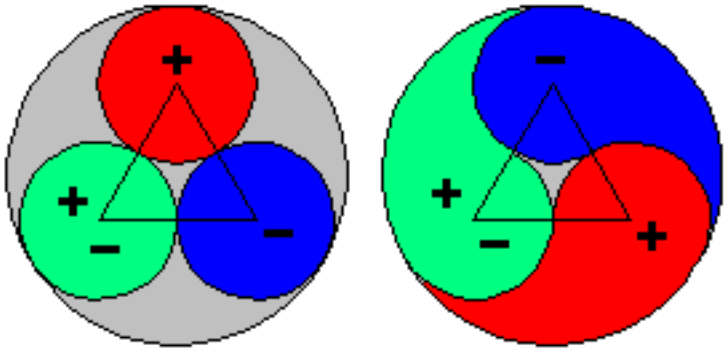
Triangle of Forces
Trinity

By Dan LaRochelle
danswaay@yahoo.com

Balanced - Unbalancing Forces



Balanced Forces



Interchanging Forces

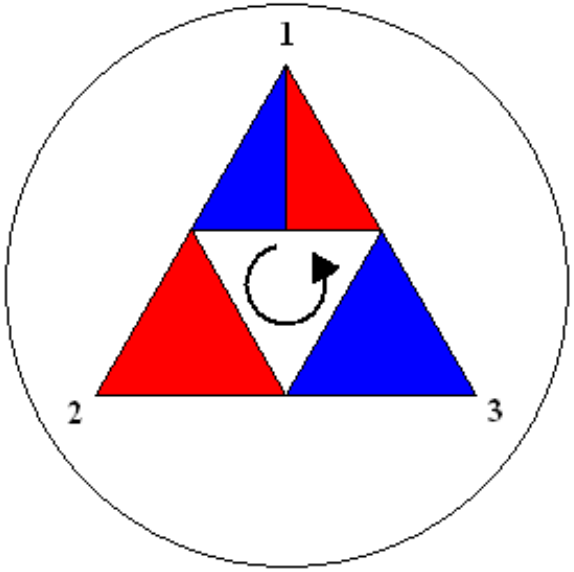
There can be more forces involved as the dimensionality grows, but there must be a minumun of 3 to start eternal rotation.

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Triangle of Forces
Trinity [Part 2]

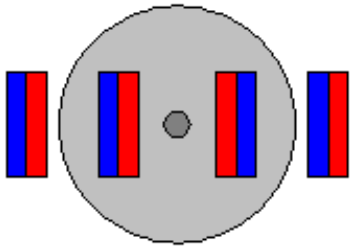
By Dan LaRochelle
danswaay@yahoo.com



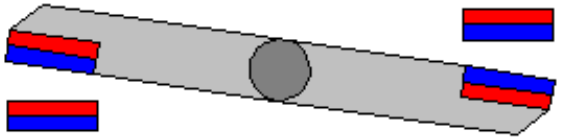
Position #1 can either help or hinder the forces of 2 or 3 but not both at the same time. 2 and 3 at this position are at their most potent and should nullify each other leaving position #1 to keep the forces of 2 and 3 transitioning. #1 at this position keeps the forces of 2 and 3 moving in the never ending interplay of forces as 1 becomes 2 and 2 becomes 3 and 3 becomes 1.

The various configurations on the right are just a few of the numerous ways many have tried to achieve the impossible - that being useful work from a magnetic "free energy" machine. Unfortunately, all of these configurations are incomplete and only use two of the three parts to the triangle of forces. The use of a magnetic material such iron is a very good way of diverting, gating, shielding or changing magnetic polarities in a mechanical configuration.

"Closing the loop" is an impossibility with out the



Equilibrium Wheel

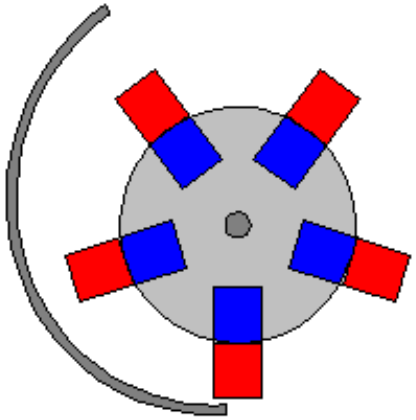


Equilibrium Lever

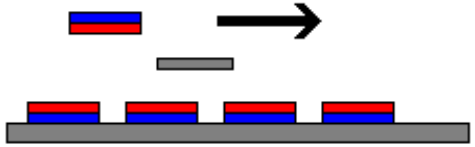




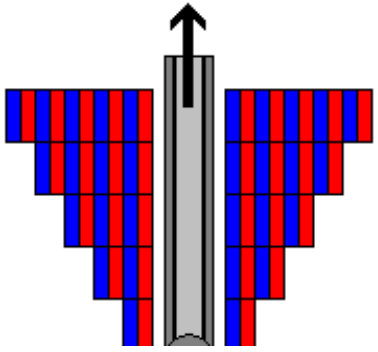
Magnetic Attraction Gates

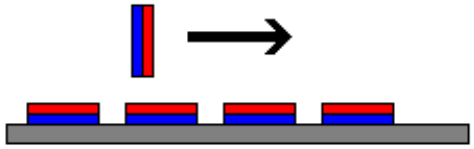


Magnetic Attraction Ramp



Field Shaping (Shadowing)





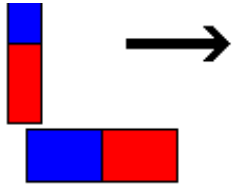
Right Angle Flux Ramp



full use of the triangle of forces. There must be a EQUAL plarity change so that the forces can regauge and continue the work cycle!



Flux Gradient



Attraction / Repulsion Combination

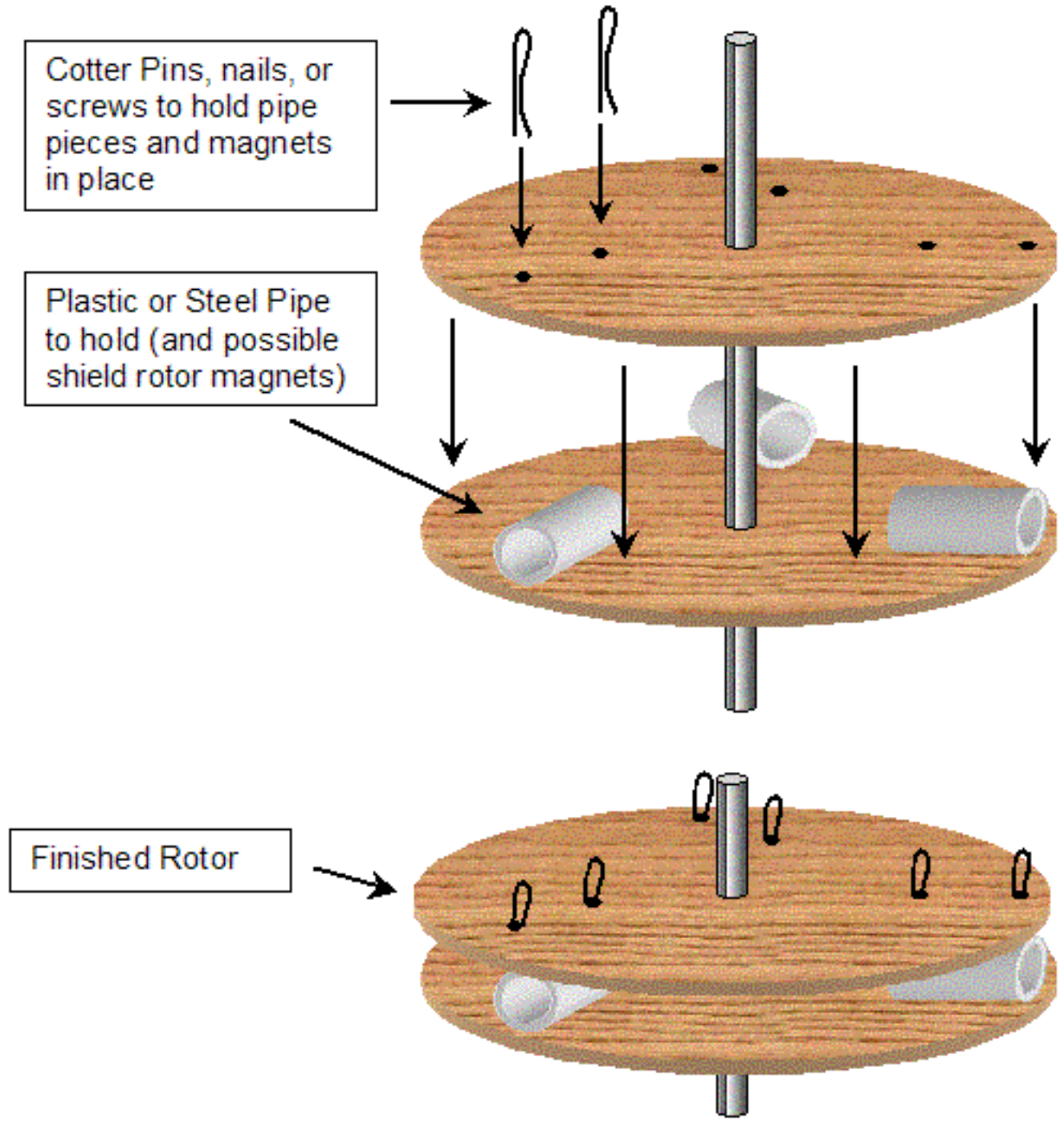
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Tri-Phase Motor Rotor Construction Idea

By Jason Owens
Jdo300@sbcglobal.net



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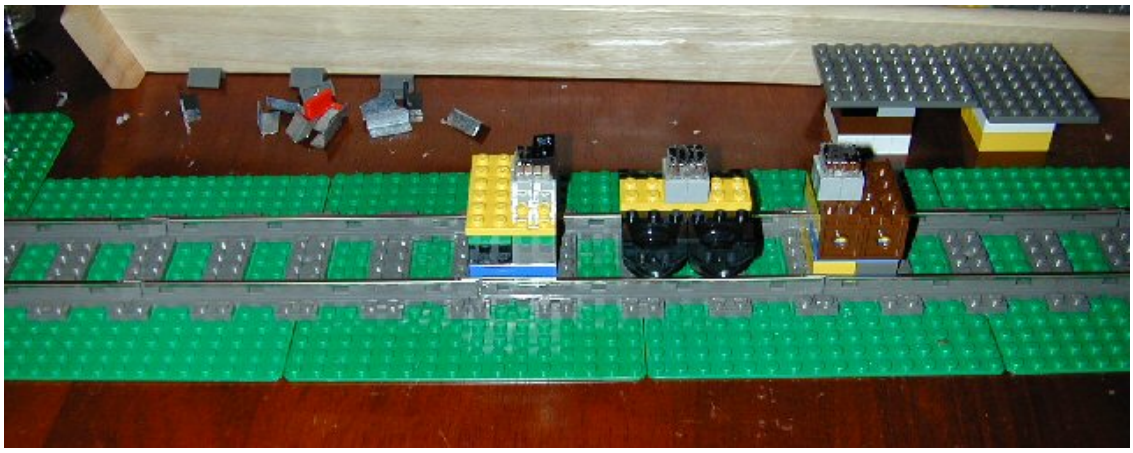
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Update of My Recent Testing Efforts

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terrences@speakeasy.net
Thursday June 24, 2004

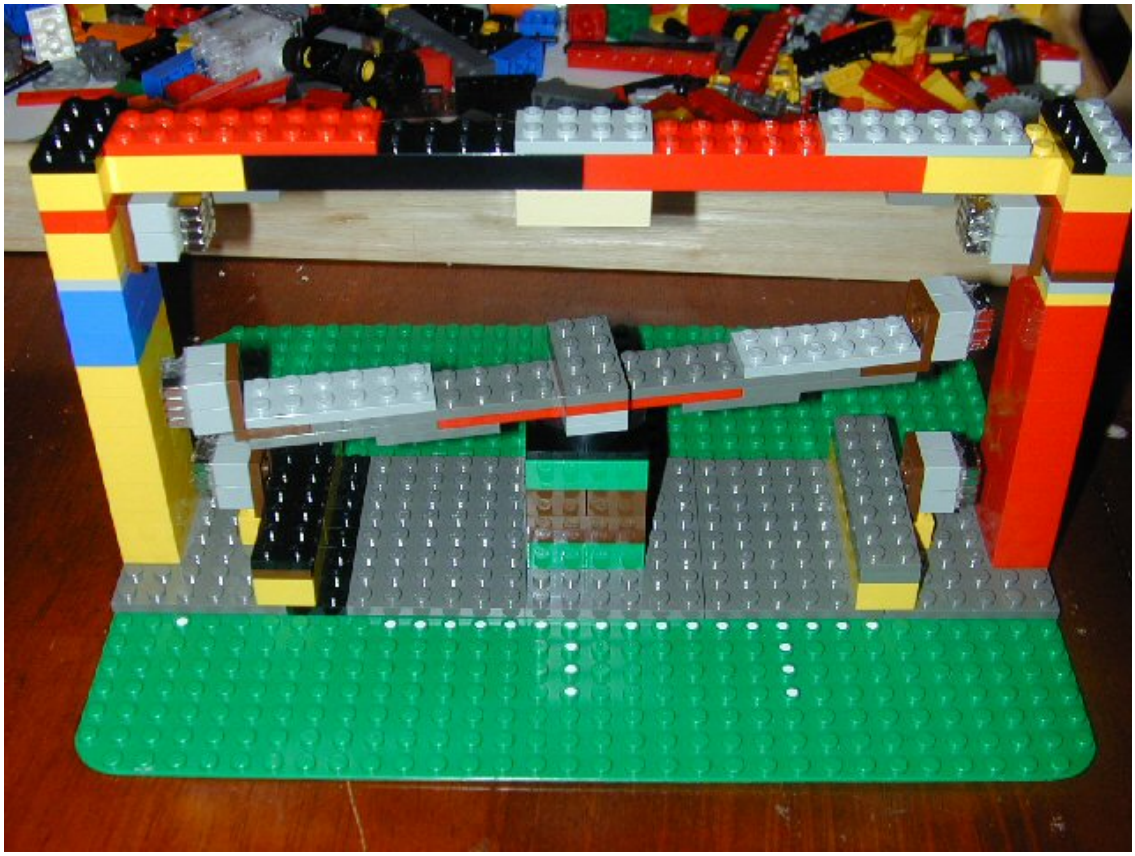
Here is an update on the tests I have been doing so far. Generally while I am running computer simulations I am also conducting some experiments that I setup up with Legos. I find Legos to be sturdy and fairly precise. I can get accurate results even with small forces. I can often conduct a great many number of experiments in a single night by using them. Here are some of the tests I have conducted over the past few days.



Above is a picture of the Lego train track I often use to conduct linear experiments. I put rotor magnets on cars of varying sizes depending on the test. Then I place stator magnets along the track. This is the setup I use when I test shielding materials. Both stator magnets are repelling the rotor magnet in this picture. I put the shielding around one stator magnet and see how far the car moves towards that magnet. I found that if I didn't conduct this test before doing other tests with the shielding material I could be wasting my time as the shielding is ineffective.

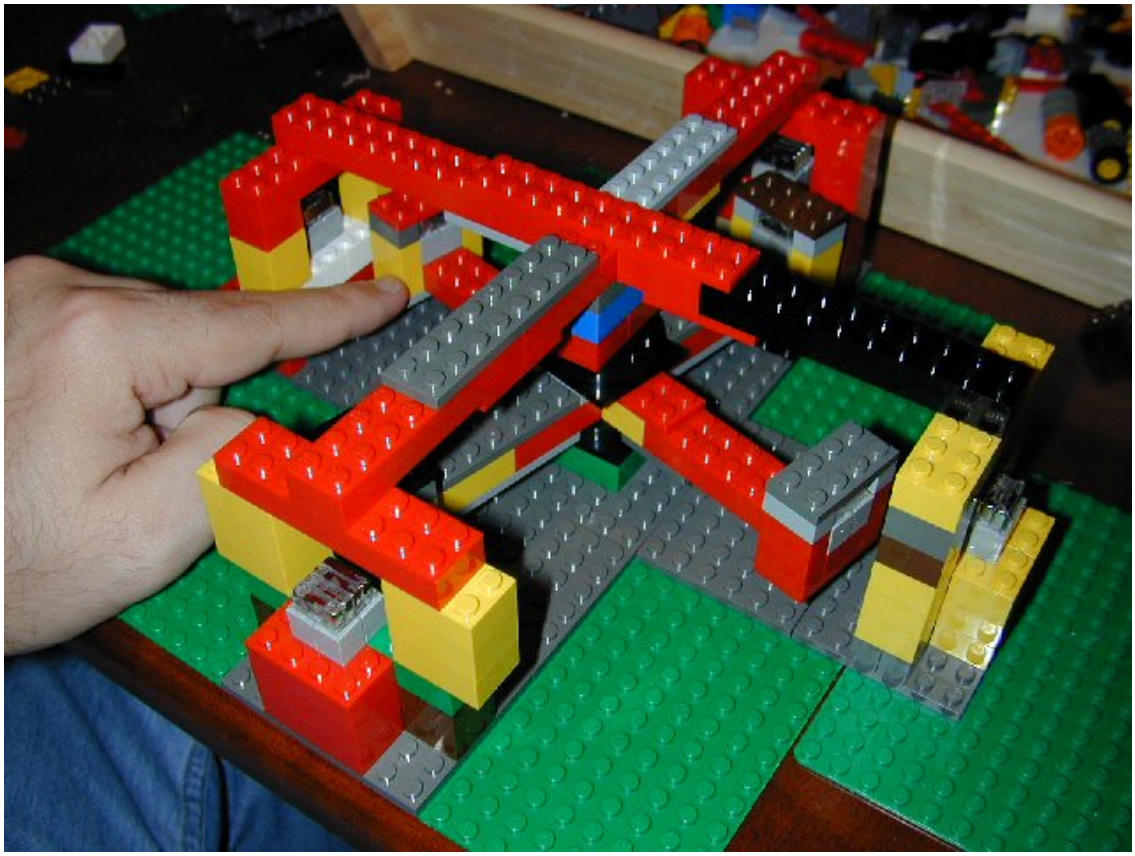
Right now I don't have any shielding effective enough to conduct further shielding experiments. Either they don't absorb enough B or the shape just is not right. Since there is only so much I can do with a Dremel, I am trying to locate a local independently run machine shop so I can get a few pieces of shielding made that should work very well. The shape, size and material of the shielding will be based up some of the simulation results I have conducted thus far. I will use a CAD drawing of the parts to make sure they are accurately fabricated.

Over the past few days I have been exploring possible motor configurations. Next is a picture with one of my motor ideas.



I initial thought this configuration would be a good setup for HJ motor idea that Graham had. I noticed something a bit odd about this setup. Only the left side the stators were set up to repel. On the right side the stators were setup to attract. As can be seen here there is a sticky spot. It is possible that one of the magnets is stronger than the other causing this problem. Also it is possible that the magnets approaching in arc like this creates the sticky spot. My guess is the former. I need to build my own gauss meter to confirm this possibility.

Next I tested a more typical motor configuration.



In this configuration the stator magnets in the 7 and 1 o'clock positions are repelling. The stator magnets in the 4 and 10 o'clock positions are attracting the rotors.

I noticed the exact same sticky and repel spots in this configuration as the previous one. The sticky and repelling spots reversed depending on which rotors were facing different magnets. This leads me to believe that the magnets are indeed imbalanced. I think it is time I go ahead and get a Hal sensor and build my own gauss meter.

Well that is it for now. If anyone else has ideas on what might be going on in the above tests I would like to hear your thoughts the matter.

Thanks,
-Terrence

http://www.fdp.nu/shared/files/Unbalanced%20flux//Tests%
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2d Magnetostatic Analysis of the Permanent Magnet Unbalanced Flux Gate Design

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terrences@speakeasy.net
Sunday, June 13, 2004

Introduction

I have been working on a new gate design that I call the unbalanced flux gate. The design incorporates ideas from the minatowheel Yahoo group. I have been running many magnetostatic FEA magnetostatic parametric simulations to explore these ideas. I feel it might still be too soon to post this idea as I don't want to lead anyone down a path that will prove to be fruitless. On the other hand I might be missing something very critical in this research if I don't share it with others. In the interest of speeding the progress of this research this document will detail the research I have done thus far on this gate design. You may not distribute this document or information contained in this document without prior permission from me.

Background

I will present a quick overview of the concepts that are employed in this gate design.

- Permanent magnet gate designs are best constructed using configurations where the magnets are primarily repelling each other. Using attractive forces is very problematic due to energy required to pull attracted objects apart. For attractive configurations the equilibrium state is to remain as close as possible to the object of attraction. For repelling configurations the equilibrium state is to remain as far from the repelling object. Another force such as friction eventually counter balances the repelling force and then the magnets will remain at rest.
- Materials with a relative permeability greater than 1, ex. steel and iron, can reduce the measured B of a permanent magnet when placed between the point of measurement and a permanent magnet. The B takes the path of least resistance by traveling through the steel versus the air.
- Materials with high relative permeability can also cause two permanent magnets that would normally repel each other move toward each other when placed in between the repelling magnets.
- Materials with high relative permeability often have non-linear B-H curves. Due to their non-linear nature they reach a point where they become "saturated" with magnetic fields (B). The concept of saturation refers to the fact that that little to no new magnetic domains can be created in the material.

These are the most crucial ideas employed for the design tested in this document, but there are many other concepts which I will not mention here that make permanent magnet gate designs possible.

Simulation and Analysis Procedure

All of the simulations in this document are conducted using 2d magnetostatic analysis. The permanent magnets are simulated with Grade 40 NdFeB material. Parametric analysis is done by moving the rotor through the gate by creating 16 solutions per inch of movment. The results of the parametric solving are then exported for analysis using Matlab. In Matlab area plots as well as 2d comparison plots are created to analyze the

difference of varied parameters from each gate design. The trapezoidal integral is also calculated for each area plot to produce the total area under the entire force curve.

Initial Goals of the Project

My initial goal was to increase my understanding of how relative permeability materials greater that 1 interacted with magnetic flux from permanent magnets. Several people in the minatowheel group including myself felt using a material like steel with magnets configured to repel might prove to be useful in a permanent magnet motor design. The problem is how to use it and in what configuration should the magnets be configured. My first step was to tackle the permanent magnet configuration without using steel. I needed a configuration where a permanent rotor magnet could pass through two or more permanent stator magnets producing a repelling force on both sides of the stators. The simplest configuration that meets this requirement is to three magnets angle the direction of its poles such that they are parallel to desired direction of movement. This configuration is shown below in Figure 1 Balanced Repelling Gate Configuration.

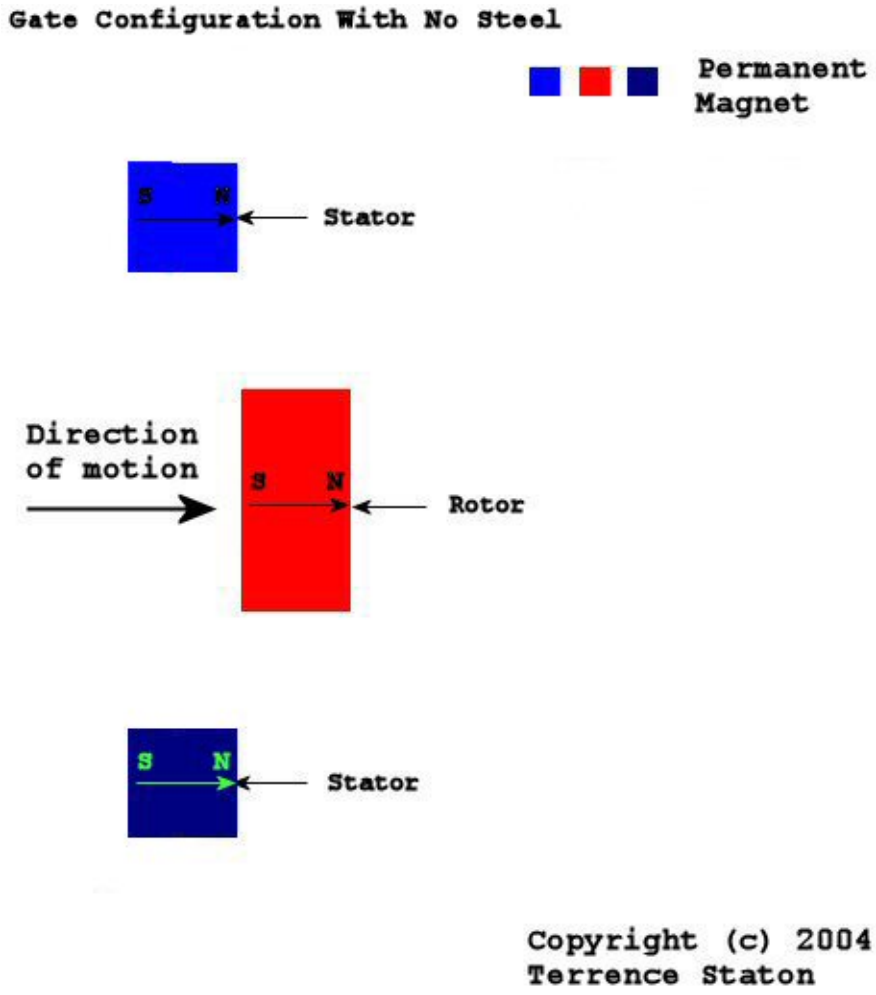


Figure 1 Balanced Repelling Gate Configuration

The force area plot of this configuration is show below in Figure 2 Force Area Plot of Repelling Gate. This area plot shows the force exerted on the rotor in direction of motion. A negative force indicates a force in opposition of the desired direction of motion. A positive force indicates a force in the desired direction of motion. For the area plot you can see that the negative forces and positive forces completely balance each other out. The trapezoidal integral on this force curve has a result of 5.5454. This is within the margin of error for the simulation. In a perfect simulation with no error and infinite number of samples one should expect a result of 0 for the trapezoidal integral.

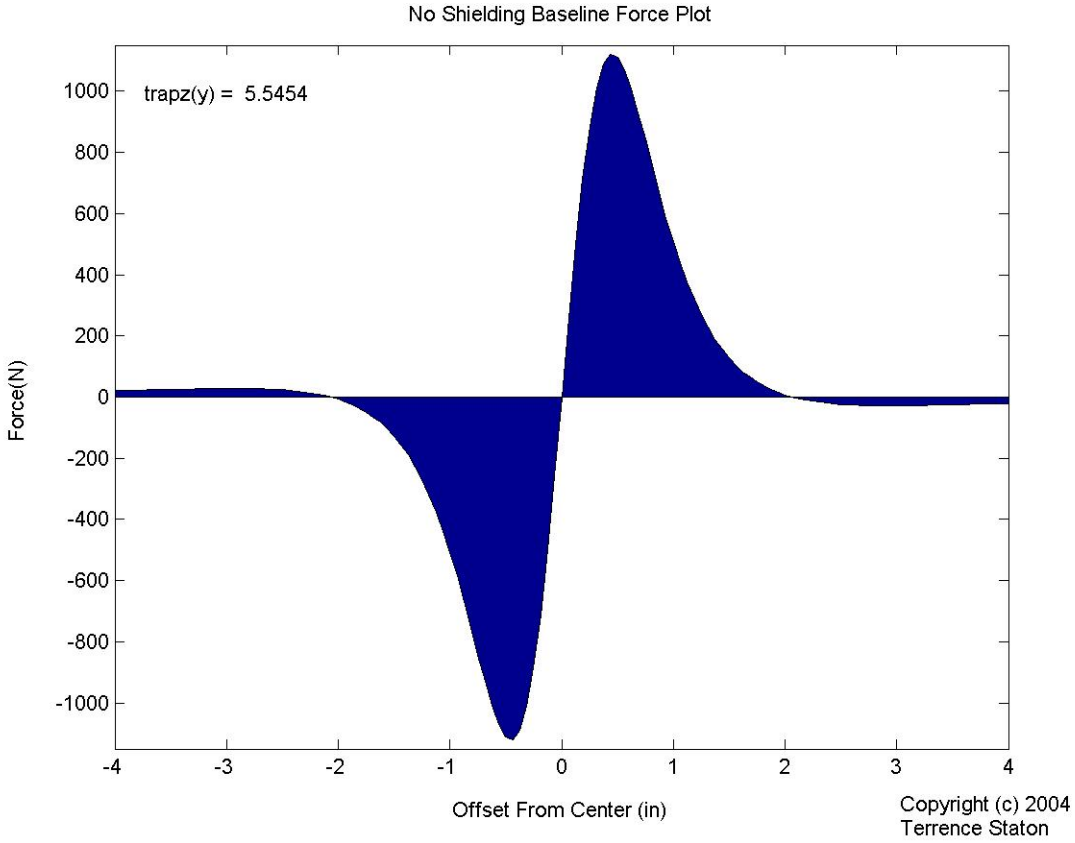


Figure 2 Force Area Plot of Repelling Gate

Now with a base configuration of magnets selected then next step was figuring out how to use steel to significantly reduce the negative force without having a major impact on the positive force. At first I didn't think I would discover any interesting results. But I eventually created the configuration shown in Figure 3 Gate7 Configuration. This configuration had interesting simulation results. The force area plot for this configuration is shown in Figure 4 Force Area Plot of Gate7.

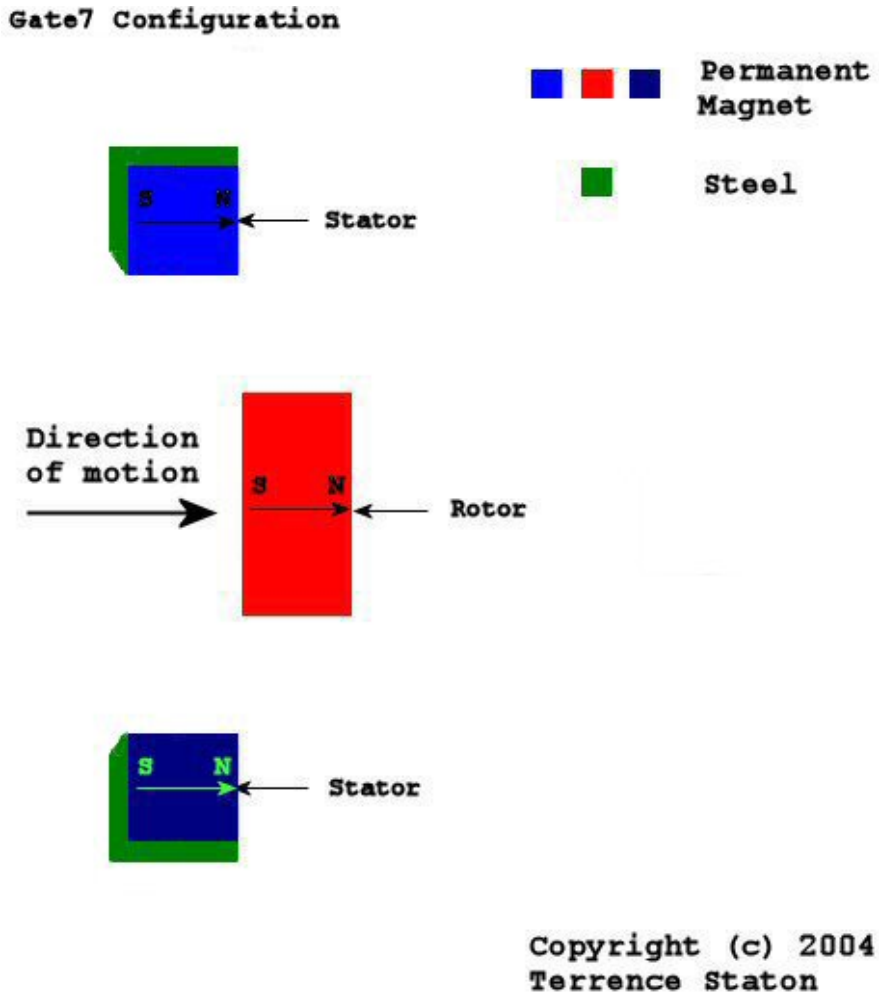


Figure 3 Gate7 Configuration

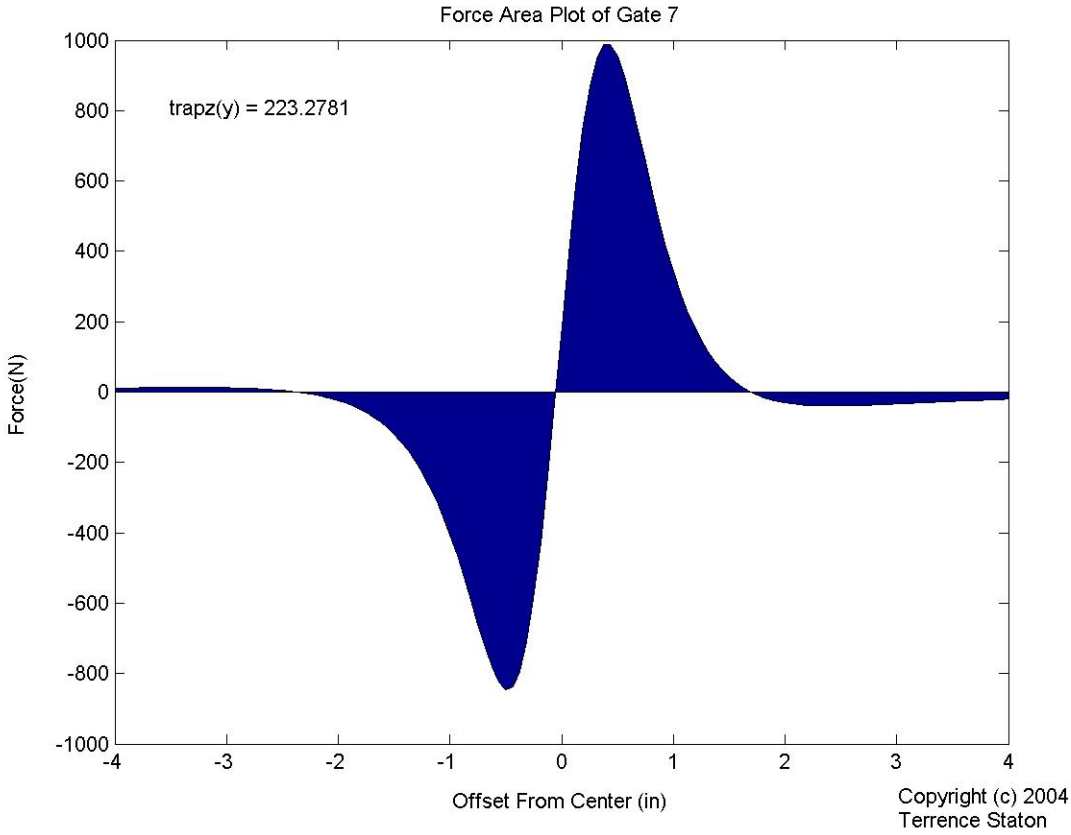


Figure 4 Force Area Plot of Gate7

Looking at the force plot you can see the desired effect of reducing the negative force with minimal effect to the positive force is present. The trapezoidal integral tells us the area above the zero axis is significantly larger than the area below. This equates to approximately 22% more force exerted in the positive direction than the negative direction.

In-depth Analysis of the Unbalanced Flux Gate

My thinking behind the design of gate 7 was to see what effect the steel would have if I used the steel as shield on the side of the stators where I wanted to reduce the magnetic flux. From earlier simulations I had learned to not use too much steel. Also the steel that was used for shielding had to be placed up against the stators. My idea was to have the magnetic field from the stators saturate the steel. This would prevent any magnetic domains from being created in the steel that would have the steel and the rotor attract.

I began analyzing magnetic flux line plots of Gate 7 at both the positive and negative peaks. Analysis of the flux line plots lead me to a new hypothesis to which I proceeded to test. My hypothesis is that it is incorrect to think of a material with a relative permeability greater than 1 as a magnetic shield. Instead it is much more appropriate to think of them as conductors of magnetic flux. Magnetic flux will take the path of least resistance. When given the choice of traveling through air or steel, the magnetic flux

will travel through the steel in increasingly higher flux densities until either no more magnetic domains can be created in the steel or the steel has already created enough domains to completely carry the magnetic flux to which it is exposed. This is precisely what the B-H curves of materials show us.

The results of testing this hypothesis lead to the creation of gate10. Gate 10 is shown in Figure 5 Gate10 Configurationand its force area plot is shown in Figure 6 Force Area Plot of Gate10.

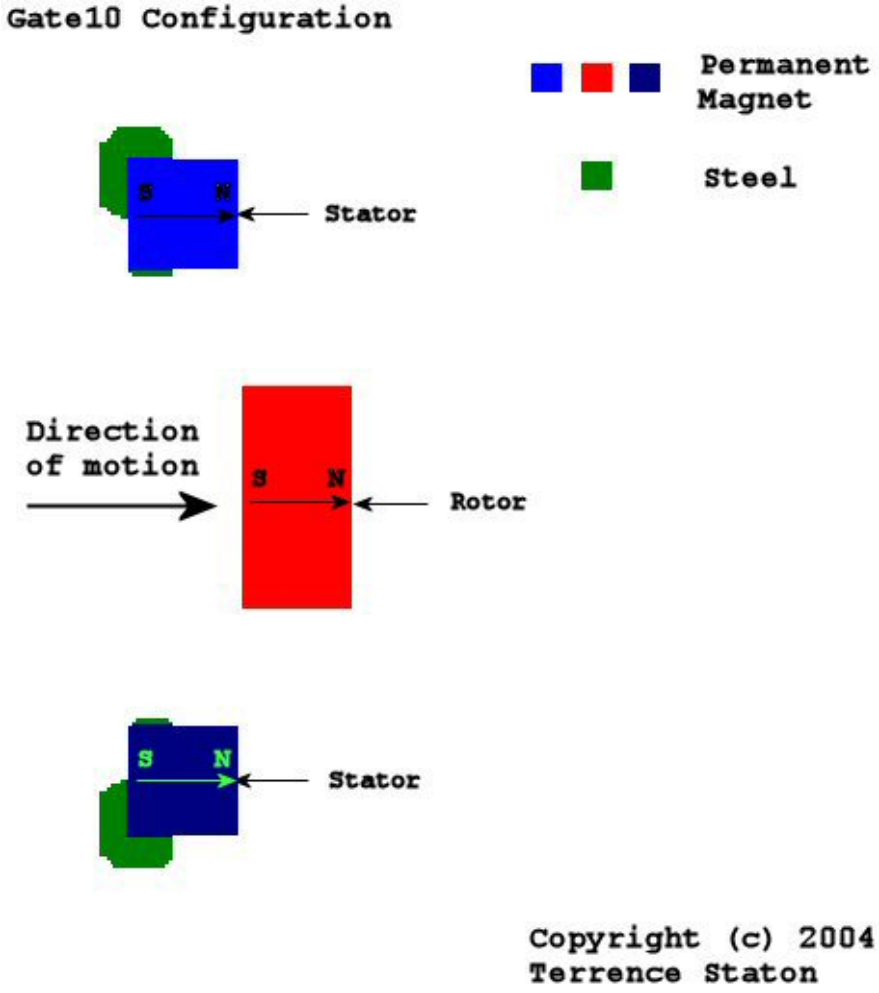


Figure 5 Gate10 Configuration

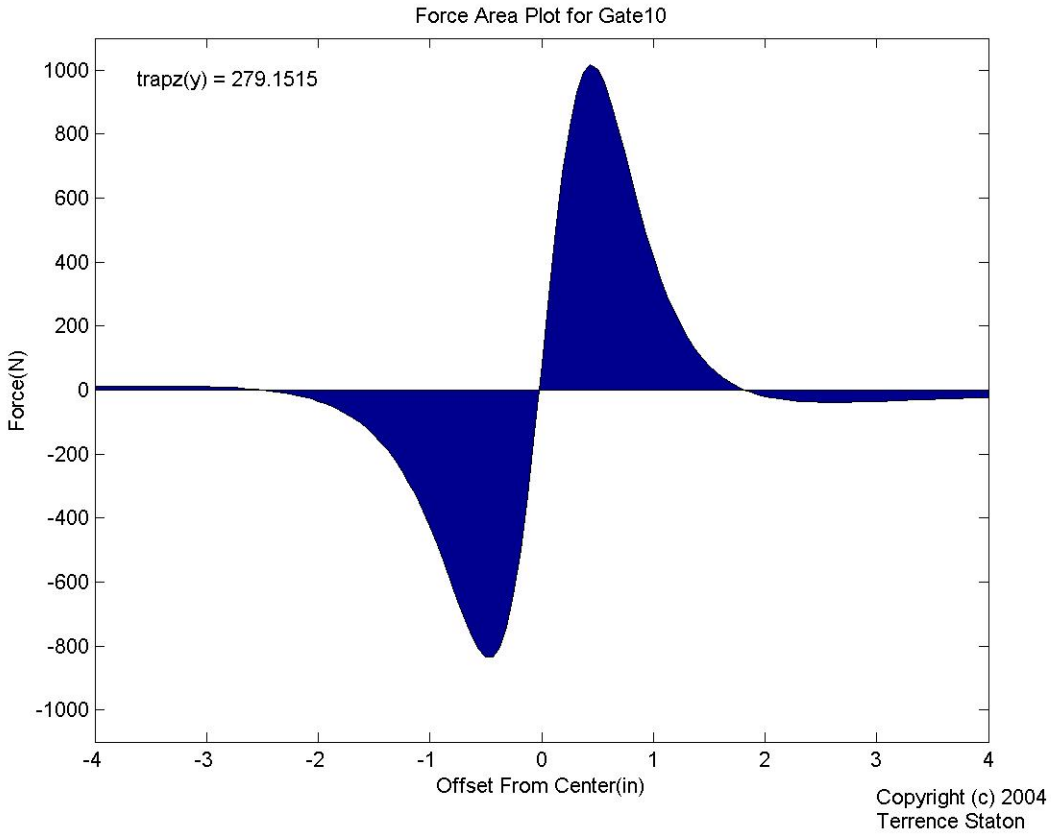


Figure 6 Force Area Plot of Gate10

The result of the gate 10 simulation gives evidence to support my hypothesis. Looking at the flux line plots of both the negative and positive force peaks I observed the following effect. The shape and position of the steel in gate10 is causing a significant part of the magnet flux moving the rotor in the –x direction to pass through the steel. In this case part of the N to S flux for the stator magnets is going through the steel. None of the N to S flux of the rotor, N rotor to S stator or N stator to S rotor flux is passing through the steel. By doing this the negative x inducing interaction of the N to S flux of the rotor and the N rotor to S stator flux with the N to S flux of the stator magnets is reduced. The size of the steel is just so that it becomes saturated with the magnetic flux from the stator magnets only. If the steel conducted any of the N to S flux of the rotor or the N rotor to S stator flux then the desired effect would be lessened or become an attractive force for the rotor.

Next I wanted to test the result of moving the stators closer together so the rotor would have a small gap when passing between the stators. The resulting force area plot is show in Figure 7 Force Area Plot of Gate11. The trapezoid integral showed a marked decrease over gate10. I concluded that since I am trying to unbalance the repelling forces on one side of the stators versus the others then it makes little sense in reducing the size of the gap. A smaller gap is actually much more harmful due to several reasons as follows:

- The closer the rotor gets to the steel the more difficult it becomes to fine tune the shape such that saturation comes only the stator magnets.
- Effects from Lenz's Law will increase with a smaller gap.
- Reducing the gap increases the repelling force on both sides of the stators by equal amounts.

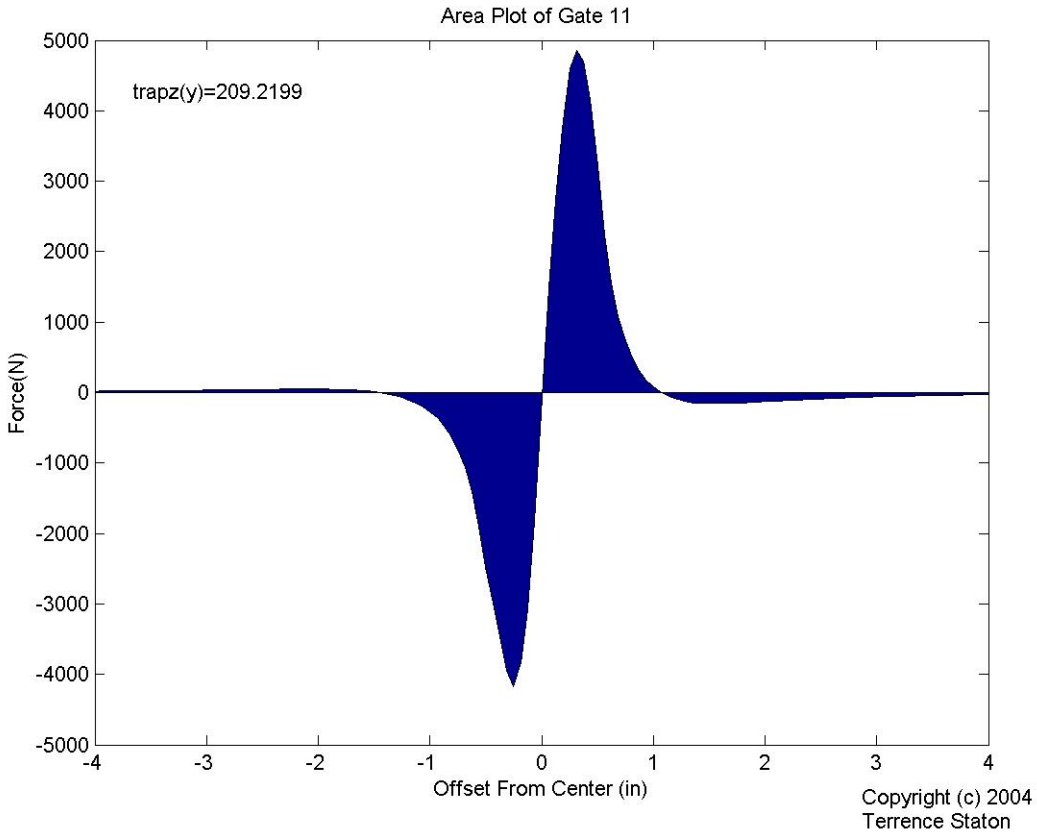


Figure 7 Force Area Plot of Gate11

I managed to improve the gate10 design even more my placing a small amount of steel on the right side of the stators. I found that using the steel to lessen the resistance of S Rotor to N Stator flux showed a larger increase on the positive force versus the increase on the negative force. The force area plot of Gate11 is shown in Figure 8 Force Area Plot of Gate. I

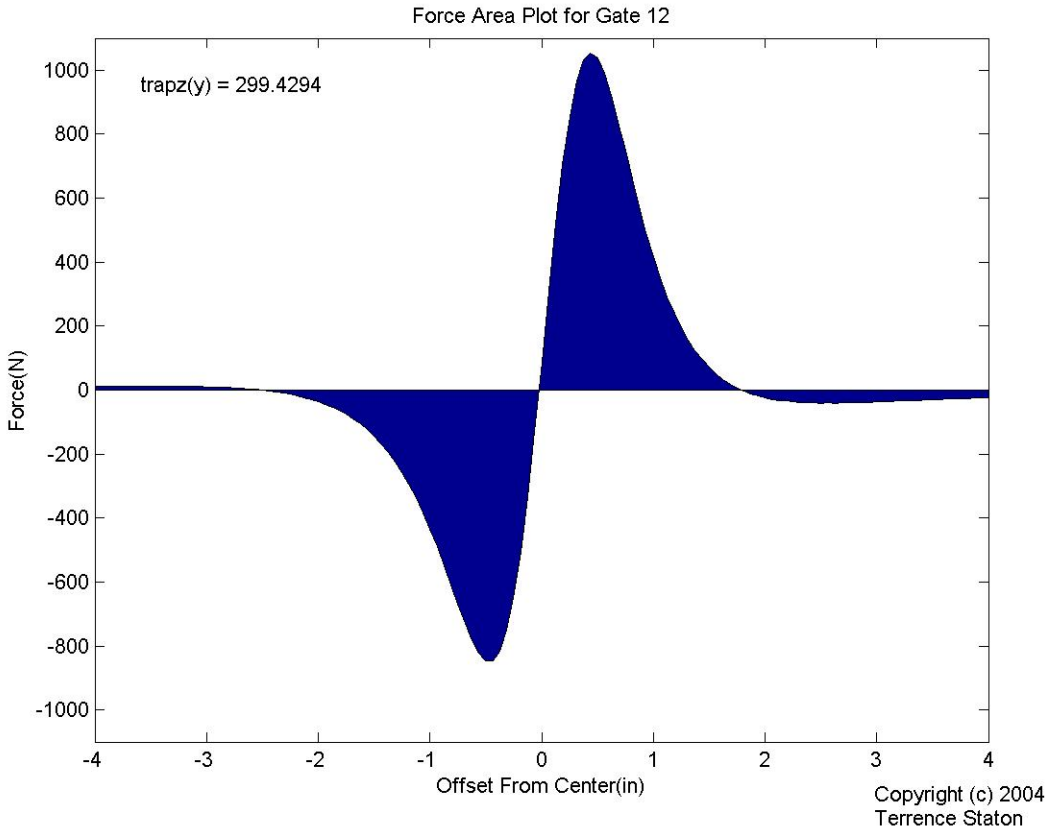


Figure 8 Force Area Plot of Gate12

To sum up how much of a difference the steel has made in the result of the magnetostatic simulations take a look at Figure 9 Force Plot of Baseline Versus Gate . This plot shows the progress the gates have made over the concepts I have investigated thus far. The shape of the steel could probably be further refined to improve the desired effect even more. However, I think this work is best left until the gate design can be explored in 3d magnetostatic FEA.

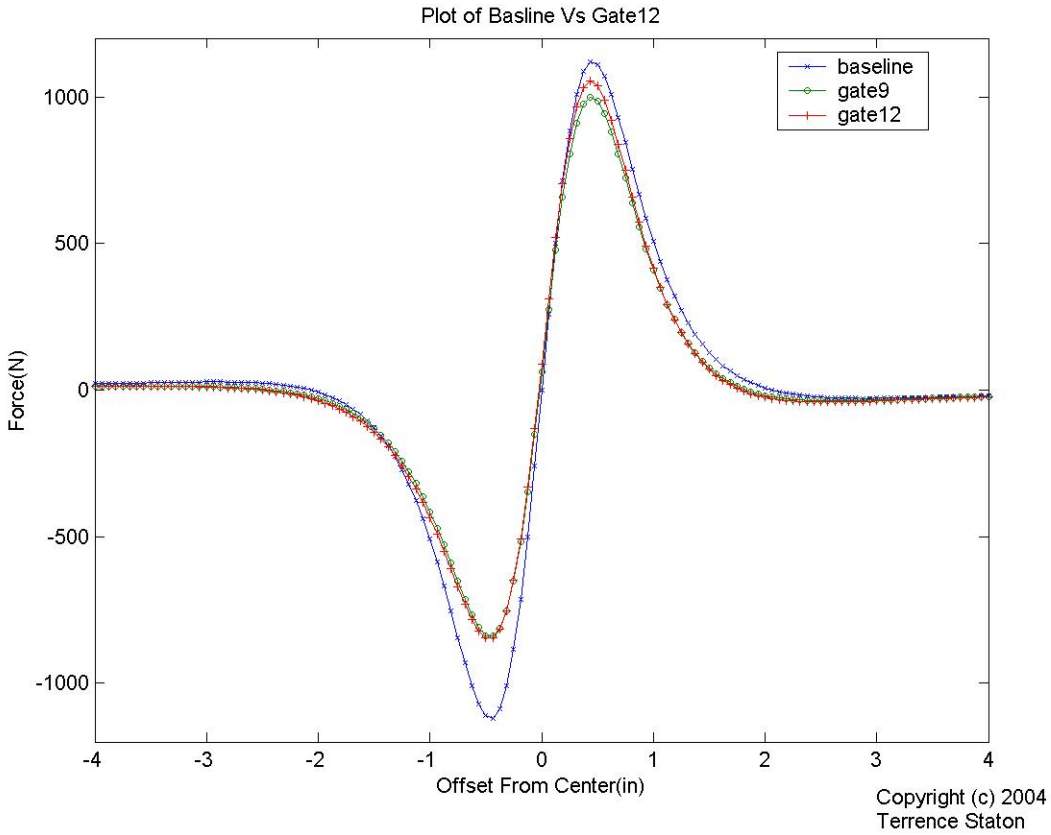


Figure 9 Force Plot of Baseline Versus Gate Configurations

Analysis of Unbalanced Flux in a Linear Track

Next I proceeded to do an analysis of the rotor passing through a series of stators in the gate10 configuration. This configuration is shown in Figure 10 Unbalanced Flux Track Configuration. The spacing of the stator pairs for this configuration was chosen to have minimal interaction of the repelling peaks of the stator pairs. The simulation results of this configuration are shown in Figure 11 Force Area Plot of the Track1 Configuration. The graph shows a very slight negative affect of the stator pairs on upon each other. Each successive positive peak is slightly lessened while each negative peak grows slightly. The trapezoidal integral clearly shows a sum total positive x force.

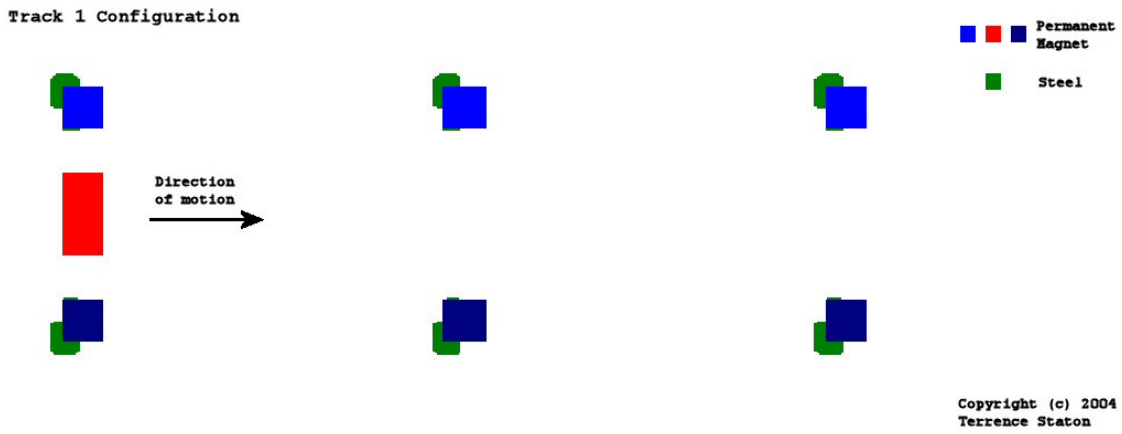


Figure 10 Unbalanced Flux Track Configuration

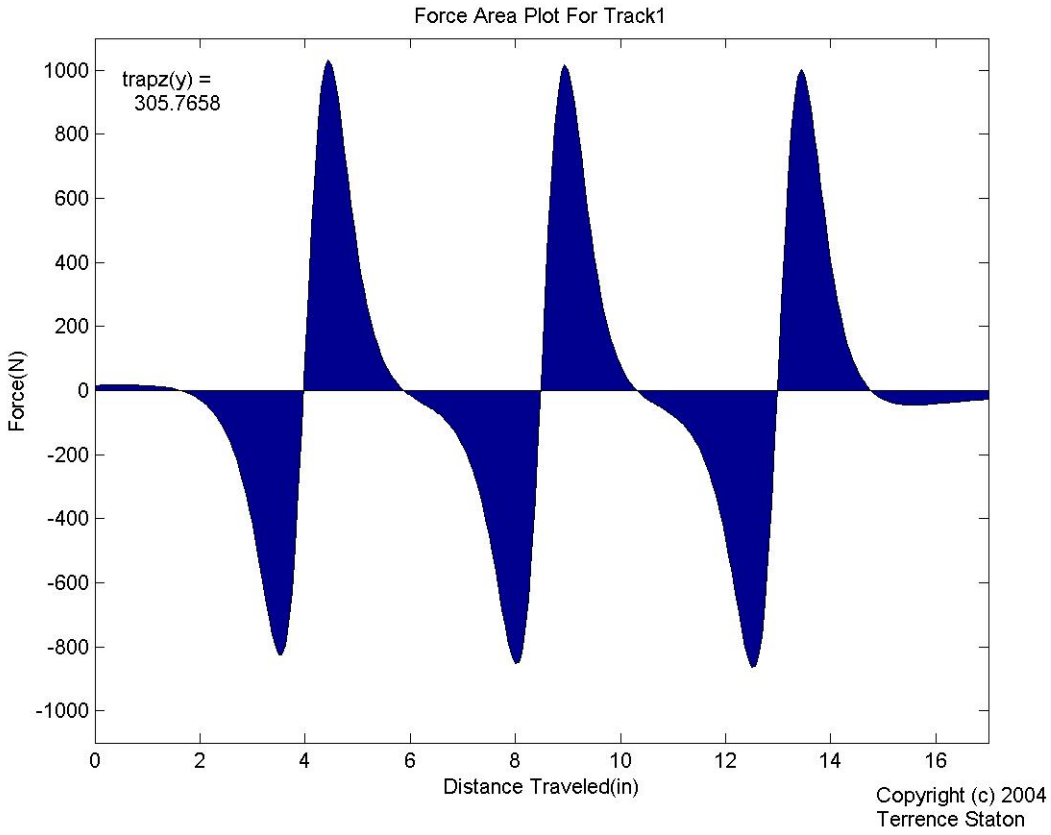


Figure 11 Force Area Plot of the Track1 Configuration

I next tested the effect of moving the stator pairs close together. The resulting force plot is shown in Figure 12 Force Area Plot of the Track2 Configuration. Here the negative influence of the stator pairs is much more noticeable. The trapezoidal integral decreased by 48.5%.

Further testing of the linear track should be done. A longer track with more stator pairs should be simulated. At the current time I do not feel this is a very high priority as the

linear track serves no practical purpose other than setting a basis for study multiple stator gate interactions.

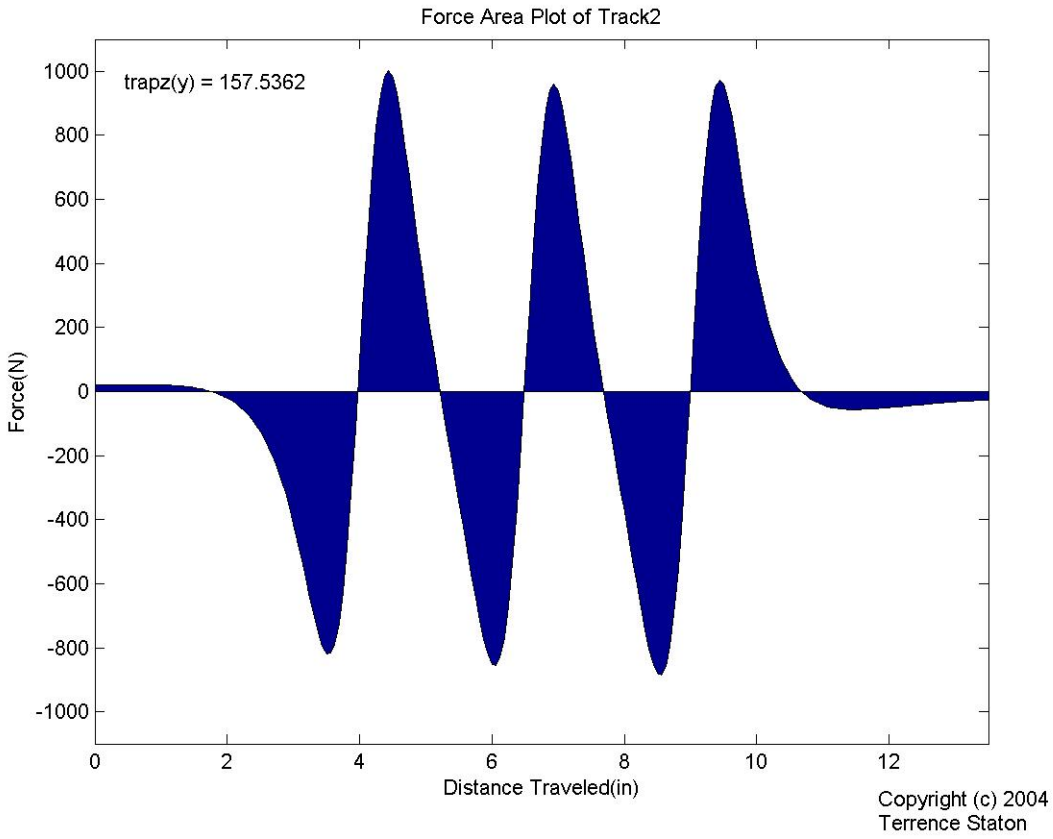


Figure 12 Force Area Plot of the Track2 Configuration

Conclusion

In summary I would say the gate configuration presented in this document shows much potential. Unbalancing of repelling flux forces in the manner described here might possibly be used to build a permanent magnet motor that has no electrical input. If we use LaFonte balancing with paired armatures, 4 permanent rotor magnets, in an X layout the motor should self start without the need for any electromagnets in the motor. My primary concern is computer simulation versus real world results. My secondary concern is the need for eddy current analysis to get a better idea of Lenz's Law effects. Beyond that the amount of torque that can be produced from this in a possible motor is questionable. My next step is to move to 3d modeling and magnetostatic FEA simulation. I will write a follow up document after I have completed my 3d analysis of the concepts presented in this document. If the 3d computer simulation results look promising I will have a physical prototype constructed for testing.

Please e-mail me any feedback, questions or ideas you might have. Better yet post on the minatowheel Yahoo group and share your thoughts with all of us there. Best of luck to each and every one of us out there on the quest for free energy!

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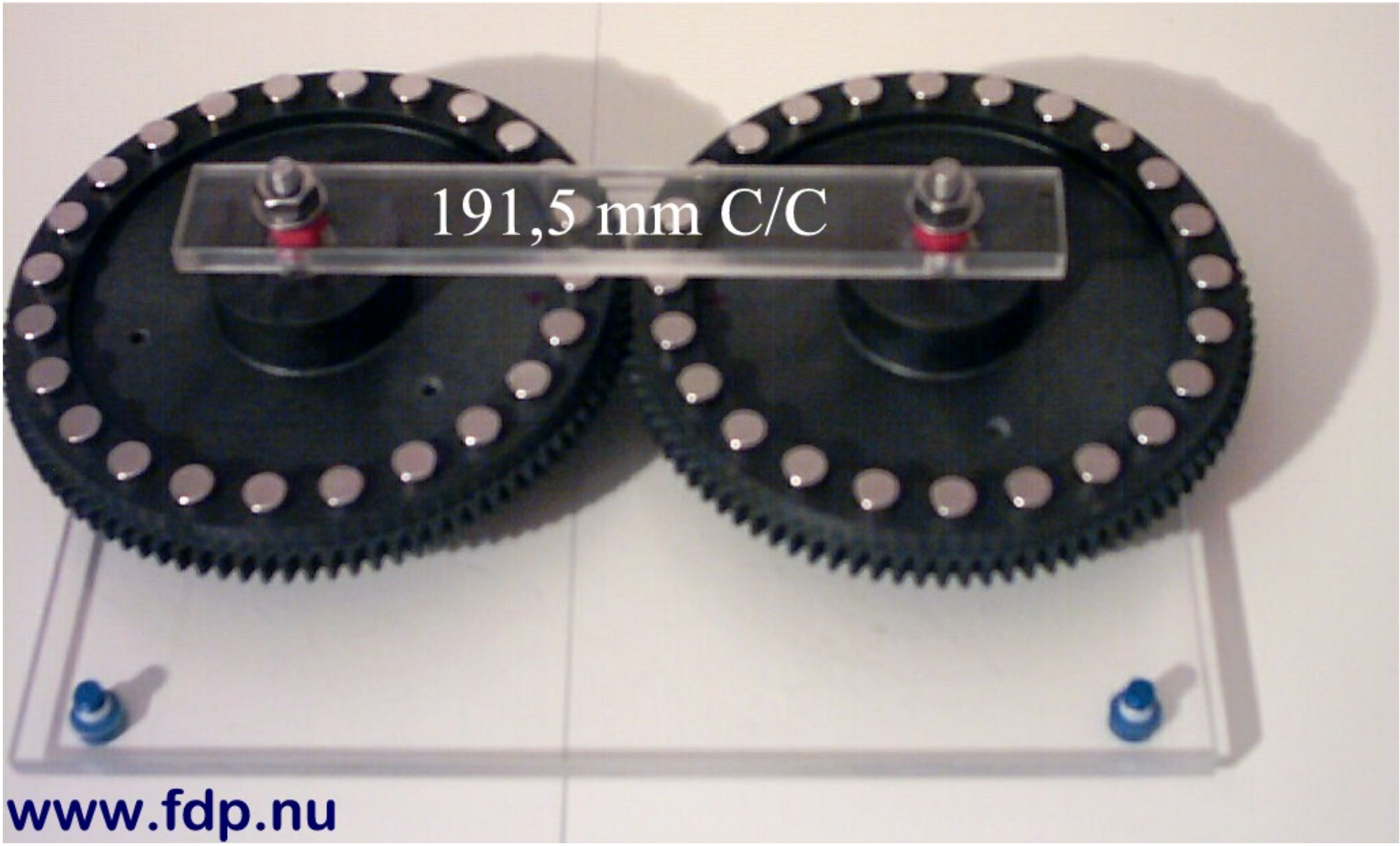
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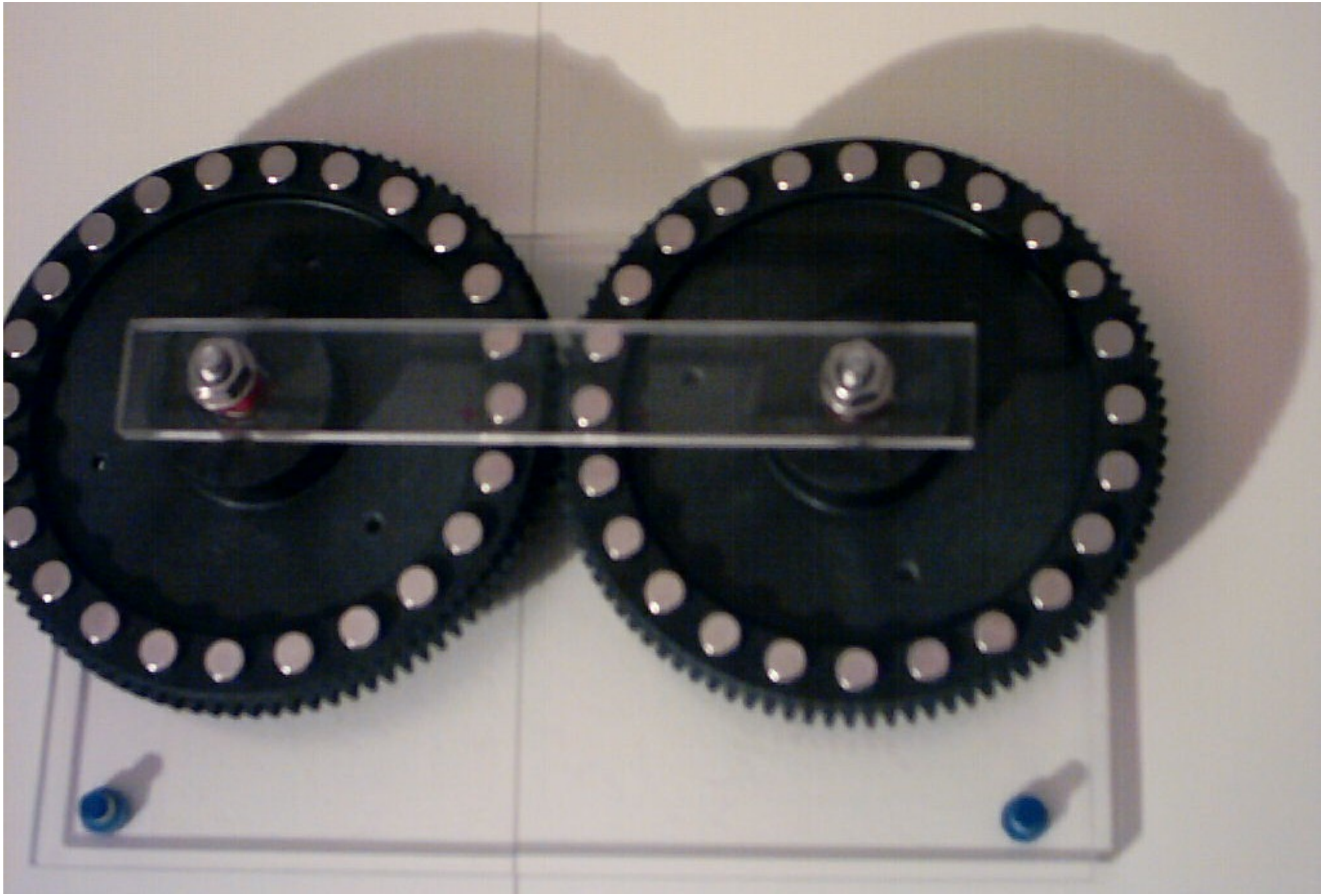
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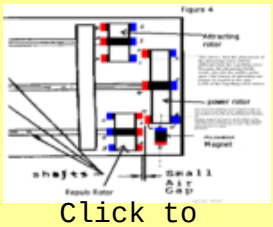
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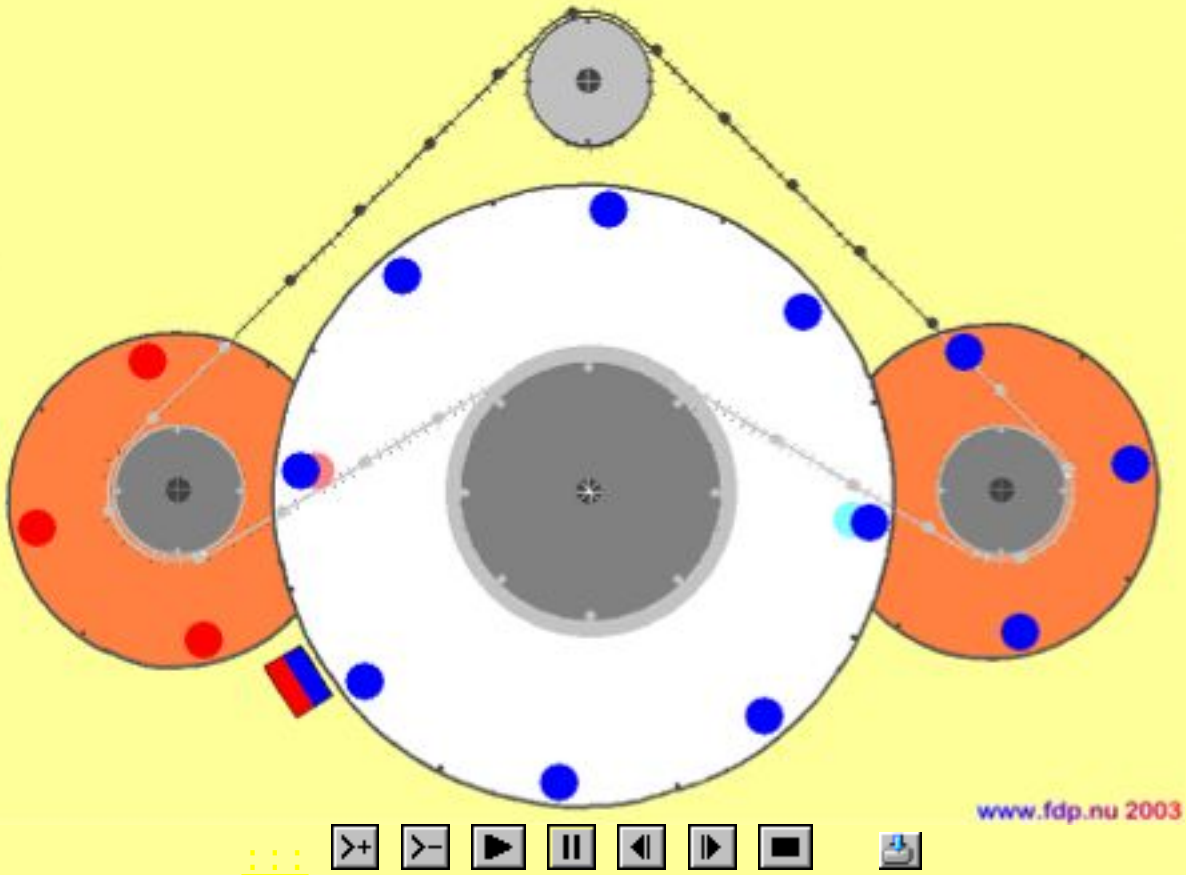
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Bowman Magnetic Motor Simulation



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Chuck 11/1/2007

I Enjoying your site. I am experimenting and making a similar device as the perendev. I'm just beginning the process and assembly of the idea. Energy is everywhere. Just trying to harness some. Best regards.

I wish you success with your experiments. /Eric

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reid smith 10/13/2007

Another thing to remember comes from you site:

The Perendev has movement, because the magnets on the rotor are sealed with steel. This technique makes the magnet stronger where it isn't sealed: top and bottom, but makes the magnetic fields (flux) closer. They isolate the magnetic field around the magnets.

This is why the Howard Johnson motor works. The difference is his magnets are concave and there is less force at the end of the magnets than there is just below the points. Also to make a negitive ion generator you have to use needles to make the ions. The points and needles act like focal points.

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reid smith 10/13/2007

I've recently started researching free energy devices and have ran across your web site. Some where on there it shows a V type movement device. The Calloway v gate device is about the same. If you look at the site you will see a video of his testing.

http://www.youtube.com/watch?v=uHffliC2whk&mode=related&search=

I can see three things that might make this device work. There is no centrefical force!! Add a flywheel. It is said that after 2000 rpm the sticky effect is reduced or cut in half.
"IMPORTANT INFO" for any device!!!!!!
SO spin to 2000+ to see if it keeps going. The third is mechanical. Add two cam like peices of plastic that act like a cam to kick the magnet out so it doesn't have to be moved. Hang the magnet by a string or cardboard.

The only thing I as for my information is to report back
to me as to what happens and if it works release it as a free working device.

The 2000 rpm idea sounds like a good thing to test. I cannot try it with my weak styrofoam wheels ofcourse. /Eric

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Seboortermari 10/8/2007

hi,
good site :) Whish you good luck!

Thank you. /Eric

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Peter Schmalenbach 7/21/2007

Hello Eric,
thank you for this valuable and nice website.

Best regards
Peter Schmalenbach, Germany

Thanks Peter.
I like your site too. /Eric

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Erich Pfister 7/14/2007

Erhm... hi.
I first found your site while looking into the perendev motor, and i am trying to replicate your experiment.
So... hi. :)

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fhoek 7/11/2007

Hoi Eric, Ik ben bezig met het Torbay concept, een variatie. Hoe ver ben jij gevorderd met jouw versie?

Groet,

F

Hi Eric, have you had any succes with your Torbay device yet?

Mijn Torbay variant ligt in de schuur op betere tijden te wachten. / Eric

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Peter Worsfold 7/3/2007

Hi Eric,
I am interested in Chuck Nichols device, maybe you could put me in touch with him.
Peter Worsfold.

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Peter Worsfold 6/25/2007

Hi Eric,
If you know of any one that has built the Bowman Permanent Magnetic
motor and could not get it to work, or have given up trying. Would you
let me know, I am interested in building one but have no tools or work
shop yet. So if any one would be interested in selling a kit or a given up project. Let me know.
Best Regards
Peter. :-)

I'll ask the Minato wheel discussion group. /Eric

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Shawn 6/24/2007

Soft iron will not become magnetized. Its what they use in basic electro magnets.

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penguin 6/19/2007

Neat model.
However I can see that i wont spin.
I found this site as I was wondering why a simpler design doesnt work.
ie with fixed magnets on the outer stator, oposing fixed magnets on a rotor.
The magnets are angled slightly.

When the magnets on the stator are filling a 360 degrees circle, there is a balance and when the stator is shorter, there will be a sticky spot. No movement. /Eric

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mike 5/16/2007

Ha die eric , zo effe wat (nederlands) ik had eeen vraagje misschien kan je hem beantwoorden ??? Tijd geleden was ik beetje aan het spitten op google naar machientjes die door middel van magneten aardig wat stroom zouden kunnen opleveren geheel zonder enig input wat ik had begrepen van dat artikel en ze zouden zelfs een fabrieklijn gaan beginnen geloof ik in europa! Maar nu is het geval dat mijn pc was gecrasht en daardoor dat linkie ben kwijtgeraakt . Misschien heb jij info over dat apparaat en weet je wat ik bedoel of andere suggesties !!! thanks mike greets from the dutch

Ik neem aan dat je niet de Perendev bedoelt? Anders heb ik geen idee. /Eric

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Troy 5/11/2007

Hello Eric
I enjoy your web sit very much, but I find some things a little confusing. One of them is the minato wheel. The picture I seen is a little different then what you have on your site. Its pole magnets are not all the same angle. There turned a little more then the previous magnet. It starts fairly close to being aligned with the radial axis then increases a little more in angle for each magnet after that, creating the spiral effect. I also noticed a diffrence on the triangle gate motor or the V motor then what is shown. It is missing its tail fin on the steel. The fin gives it a weak break point or the gate out effect. Agian I would like to say I enjoy your web site and may you and your veiwers crack the code.
Think: three or more means of complimenting accleration.

These devices are confusing. Every design is more or less a modification of another design. Therefore things can be different in different drawings. /Eric

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RENE AGUDO 4/28/2007

I GOING TO STAR BUILDING A PERENDEV MOTOR
DO YOU HAVE SOME RECOMENDATIONS
ON THE CORRECT SIZE OF THE STATORS
AND SOME GUIDES I CAN GO IN THE PROCESS
THANKS FOR ALL

No, not really. I never built this device. But on the web site are a few replications with contact information of the builders. I suggest you send them an email. /Eric

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solon williams 4/11/2007

I was shown a magnet that was cut in half each side was machined so that a copper wire was coiled inside it when put together half the wire was in the negitive and the other in the positive side of the magnet. My friend put in inline on a power cord and turn on the light, then he unplugged it and the blub kept putting out light. He said that it would only product 10 anps, if you know of a device like the one I have mention please e mail me. thank you

I never heard about a device like that. /Eric

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good and coole

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Richard Leschen 3/30/2007

Dear Sir,
Can you please send me the very latest you have on this web-site? I love these developments in Magnetic Science.
Cheers,

Richard Leschen

The Dual Piston Device is the latest, at the moment. /Eric

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Latif Mutlu 2/22/2007

Regarding the Dual Minato-Wheel Theory, please could you let me have the Patent Number. We are also involved on this subject.
Kind regards.

If you refer to the document "Dual Minato-Wheel Theory", there is no patent. The document however is written (and thereby copyrighted) by Jason Owens. /Eric

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Aiman 2/11/2007

intresting web page...

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AlfredMC 2/8/2007

Hello, my name is Alfred, i'm a newbie here. I really do like your forum and really interested in things you discuss here, also would like to enter your community, hope it is possible:-)
Cya around, best regards, Alfred!

Thanks. Welcome at http://tech.groups.yahoo.com/group/minatowheel/messages
/Eric

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Joseph K Zirbes 1/18/2007

Son of Lloyd B Zirbes, Have much information for you. We should chat...

That is a nice offer. However, I sent you a few private emails but without any luck. Please contact me by email eric@fdp.nu /Eric

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Ronan McDonagh 12/24/2006

I am interesting to study and make a magnet motor for free energy.

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Scott Mitchell 12/19/2006

Dunno how you post to the site but the opposing piston thing was kind of interesting except the magnet would not be strong enough to do the work with steel pistons. They would have to be steel , the normal aluminum pistons wouldnt work , Even if you just made the top of the piston steel. Also on the Jan Cack wheel. I guess the exact opposing forces of the other side of the magnet was forgotten about. Draw 2 arrows bettwen each magnet you see, each one opposite pointing. I think youll see the picture then.

The pistons (top) are in fact magnets. Same pole pointed to the shield. /Eric

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Richard Krieg 12/13/2006

Looking forward to more free energy projects.

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Peter Oceretko 11/29/2006

You've sparked a long-latent interest, dormant for some 25 years.
Circa 1979-80 I built a off-set gravity wheel.....which didn't work, of course.
This KISS Motor intrigues me. I'm going to try to get an interest sparked in my friend, compatriot & "partner in crime".
Goal is to have prototype up & running (or not) by the new year.

Good luck. Please send me an update when you have some results. / Eric

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iacob alex 10/18/2006

Hi Eric!I just "enrolled" your address on my computer..it's something different,it has some "soul touch".If we have some common visions(take a look at my web site,if you have time...)...I am here,"via" e-mail.All the Bests!/Alex

eMail: (is only visible for the webmaster) Homepage »»

Mark Brincat 10/4/2006

Hi, I am a 16 year old student doing a project at school where we have to innovate/ design a clean energy generator. I thought magnets are a very good idea! Can you please help me? Can i make a model which keeps on moving in a circular motion? I was thinking of a plate with magnets placed with the NORTH to the circumference. Then this plate woul be surrounded with another set of magnets. Their North would face the plate's magnets at 90 degrees. would this work? If no, can u send me a picture of your best model till now? :D

THANKS ALOT

I answered you by mail. /Eric

eMail: (is only visible for the webmaster) no Homepage

Wayne Webb 9/26/2006

Outstanding work!!!

eMail: (is only visible for the webmaster) no Homepage

Norm 9/24/2006

Keep trying. It took Edison 10,000 tries to make a reliable light bulb.

eMail: (is only visible for the webmaster) no Homepage

Joe Mamma 9/14/2006

Why don't you have any videos of any of these devices working. It should be easy to do so for the Robert Calloway's device.

I wish I could, but none of the devices proved to be a self runner. / Eric

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ahmet r kuldemir 8/27/2006

hi eric,
isnt completed the zipper MRE?
thanks
best regards
ahmet r kuldemir
turkey

The publication of the Zipper documents gave me more problems then satisfaction. I stopped the experiments with it as well. /Eric

eMail: (is only visible for the webmaster) no Homepage

Nick Kyriakoulias 8/20/2006

Free Energy is a worthy cause.

eMail: (is only visible for the webmaster) no Homepage

LAos 7/31/2006

Stop wasting your time. None of these devices will never ever get to work. The physics and time will give me the reason. Sorry, this is the irony of our search for the imposible.

Well, luckely you cannot decide over my time. /Eric

eMail: (is only visible for the webmaster) no Homepage

Erik Buck 7/17/2006

It appears to work equally well in either direction. Is it self-starting? If so, which direction does it perfer?

What device do you have in mind? /Eric

eMail: (is only visible for the webmaster) no Homepage

Leonard Belfroy 7/9/2006

See my alternative science site. It has information on free energy, over unity devices, space travel, time travel, computer science and mathematics.

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Craig Stangland 5/31/2006

For those of you posting photos and updates, many of your postings have no dates, so it's difficult for the rest of us to deterimine how old your work is. Thanks

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Craig Stangland 5/31/2006

Finally found a website with "others" experimenting with magnets. Am interested in knowing what's happened with the triangle gate experience "squirrel cage" idea. Seems to have stopped a year or so ago.

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Albert 4/23/2006

I have done an analysis of torque of rotor and satalite wheels of the "kiss" magnet motor, I am willing to send the femm files, the lua scripts that increment the wheel for the torque calculations and the torque results if anyone is interested. could somone tell me who I should send them to?

In short, my calculations show that the wheel will not turn, the torque generated by the rotor is almost exactly balanced by the torque of the ten satalite wheels. It is of course possible that I have made mistakes in calculating the results, therefore I am willing to share my files and scripts so others can analyse what I have done.

Best regards

Albert

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Wayne Webb 4/15/2006

Great information. I have ordered neodymium magnets and are starting my own experiments and I found your site. The more you know the better you are prepared.

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Thomas H. King User 4/10/2006

If you would like information in the US about this invention, please contact me directly at 925-287-0153. We are actively seeking investors for a US start-up. Thank you.

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Thomas H. King User User 4/10/2006

I have worked with Mr. Minato and consider him a personal friend... This machine works!

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Anon 2006-03-22

US patent 6,867,514 (Fecera) seems to have passed everybody by...

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Len Hobson 2006-03-22

This is marvellous. Where can I buy a ready made Perendevco motor?

The official website for Perendev is:
http://www.perendev-power.com/
You can find investor information there. /Eric

eMail: (is only visible for the webmaster) no Homepage

ahmet r kuldemir 2006-03-15

hi
perendev II wery enteresting
are you investigation to p2?
thanks
best regards
ahmetrkuldemir

If you mean the device that was shown at TeslaTech 2005 (by PES network) I would not call that a Perendev since it need handcraft to rotate. /Eric

eMail: (is only visible for the webmaster) no Homepage

Heinrich Dreier 2006-03-08

Hallo
Wie komme ich an Firmen, mit denen ich in deutsch komunizieren kann? Mein englisch ist leider grottenschlecht.Wo in Deutschland kann ich mir Motoren oder andere Geräte zur FE anschauen, und ewentuell auch bei der Vermarktung helfen?
Grüße
Heinrich

Sie können mit Stefan Hartman an www.overunity.com in Verbindung treten. Er ist von Berlin und kann Ihnen möglicherweise helfen. /Eric

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Tim Goymerac 2006-03-02

Is there math info on the spirals? This site is great!

Not more math then what is needed to draw circles. /Eric

eMail: (is only visible for the webmaster) no Homepage

Tony 2006-02-11

Does anyone have a link to the videos?

http://fdp.nu/photobooks/photobookindex.htm
There you find the chapter: Minato movies
/Eric

eMail: (is only visible for the webmaster) no Homepage

- 2006-02-10

Finally I found the videos of the Minato wheel, and they put my mind to rest. Saved me the trouble of building something like this.

He's obviously- and I mean OBVIOUSLY- freaking DUH clue-by-4-to-the-temple obviously- making it go by pushing it with the large magnet he's holding in his hand. If he was a scientist trying to demonstrate a real effect, and not a charlatan trying to fool the credulous, he would know better. The only reason the stator is not shown attatched to a fixed bracket in any of the videos is that, if it were, the wheel would come to a stop.

Why have you even given this wheel a second thought after seeing those videos? It's a joke.

The video's are the latest addition to the Minato subject on this site. The video' s ARE the second thought. /Eric

eMail: (is only visible for the webmaster) no Homepage

Pierre 2006-01-26

Hej Eric!!
Du gör ett otroligt jobb!!
Jätte bra jobbat på din sida!!
Pierre

Tack Pierre. Design är inte min starkaste sida men jag är själv också nöjd. Vi ses. /Eric

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Diego 2005-12-31

Eric:
I'm glad to see more progress and organization in your site.I have followed it for a couple of years.....I have discovered an unseen effect of the magnets: I've found the way to avoid the magnetic lock up!!! the thing is I can't find the way to apply it to a regular motor setting ,we need to think in a very different way ..... the arrangement has to be precise yet,simple just like some of the ones on your site, I don't think is imposible.....I just don't have the technical means,and I'm sure with the regular amount of work of any hobbyst an tools it could be done.....it's me I'm burned out!!!... now working togheter I'm sure we could find a solution to this ....so How can I protect it and still be able to share it so we could find a workable solution??.See??the thing in my believe has to be put out in a controllable manner for security reasons,more than anything

else,and also without profit out of it people simply will take it for granted, we know that....but I'm sure many others would find several different arrangements.....once revealed, is a combination of things that after many years I have found that work....I couldn't believe my eyes then
See??? more than 2 years ago I found this exciting principle and my hair has also been falling ever since, out of anxiety for not being able to find the right arrangement to get work out of it!!...any ideas??.Best regards

Thank you for your message. I sent a message to your private mail. /Eric.

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Troy 2005-12-30

I have a couple of curious questions relating to an all permenent magnet motor.
1.Have you ever heard of anyone talking or mentioning anything about (compounded acceleration) or (accelerated exponentionaly) or (multiable means of acceleration per a given unit or set) or (multiple units of acceleration per a given set or means) or (acceleration caused by more then one means).
2. Have you ever heard anything about two like poles attracting when they get to close. I think Howard Johnson might have hinted on this, but I'm not sure.
If you have heard anything about any one of these subjects can you please pass it on to me. Thanks Troy

I'm note sure that I have heard about your point 1, but I know that like poles are attracting when they get further away from each other. /Eric

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william hughes 2005-12-29

i agree. a bar magnet doesn't have a porth pole, neither does a compass needle. they each have one red end which points north. you are quite right. this dutchman guy is confusing the issue. good site though.

Perhaps this link will give you some insights: http://my.execpc.com/~rhoadley/magpole.htm
/Eric

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colin 2005-12-29

Your Magnet Facts page is wrong.
The earth's "north pole" is located towards the Geographical north pole (at this point in history).
The end of a compass needle which points towards this north pole is more correctly called "the north-seeking end" of the needle".

I'm afraid that I cannot agree with you. I remember doing a lot of Googling before I made my statement and I don't think the polarities changed after that. /Eric

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Wouter 2005-12-25

fijne kerstdagen en een gelukkig niewjaar.

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don fairbanks 2005-12-19

thanks for your minato video clips more people should see them especially the skeptics.

My pleasure. /Eric

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Richard 2005-12-16

Great side!Just one thing:
Are there really "free energy" devices that works?
besides wind and sun energy.
I have tried many things but i couldn't get them to work,not even the wonderfull perendevshit.

I haven't had a working device in my hands either. But the experiments show me that magnets can do work. We only have to find out how to put the working part together to one device. /Eric

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milli 2005-12-10

hoi erik,ik kreeg dit site van een collega van mij en ben zeer geintereseerd met alles wat ik hier tegen ben gekomen ,we zijn zelfsal begonnen om er eentje te bouwen ,zijn er modellen die echt werken ,groetjes murat

Veel succes met je experiment. Een 'closed loop' is nog niet bewezen maar de experimenten zullen je leren dat er heel wat krachten aanwezig zijn. /Eric.

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RADEC 2005-12-07

Bye ERIC, LOL

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RADEC 2005-12-06

Eric,
My apologies. I did not mean to ofend anyone. My point here is, lets face it NOBODY in his sane judgment should be giving away ideas. I'm pretty sure that our end goal is to make MONEY. If something looks promising why displaying to the public? I'm holding to my previous post. Publishing your stuff regardless who's the creator is, is simply stupid.

Hopefully you become rich and famous before the creation of your prototype and the patents have ruined you financially. /Eric

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RADEC 2005-12-05

Well, I saw the so called KISS motor. Also, I had read the article. My simple question is. If it is so possible, why you don't make it to work?. So stop wasting time writting about your wonderful motor. Build a proto and get a patent.

I'm my case I'm working on a motor for 5 month or so. I have testet it in some working prototypes, but I will never show my work here nor any other place. This is the stupid thing to do. I have my feet firmly palnted on the ground. If I suceed with my motor I will sell it in a powerplant making sure nobody will ever get access to it iternals.

Everybody keeps telling the world what took you a lot of headaches, the see yourself doom. Sorry world, NOT wife and Kids

You read the article but missed that this is not my wonderfull motor. I'm reporting what is available so that others can make their own conclusions and decide without pressure if they want to give it a try or not. So what is your problem exactly? /Eric.

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Nick 2005-11-25

Eric all the stuff seems unrealistic cause in case it really works why don't we see devices like this in the market??? This is good money, isn't it?

No sales means no money. You could have figured that out all by yourself. /Eric

eMail: (is only visible for the webmaster) no Homepage

Nick 2005-11-20

Is it all relal?
... i would like to have one or two!... (or more) :)

The experiments and the ideas are for real but there are no devices for sale yet. /Eric

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Dijon Rios 2005-11-12

Hi Eric, I find the triangle/rail experiments interesting. I was wondering if could a set of cylindrical magnets roll from a starting V, then continue past the last V without any 'pull back' like in a SMOT? This would show the possibility for a closed loop.

Perhaps. /Eric

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John Dryden 2005-11-11

Have you check out www.fuelforless.com for their Gravity engine? Thanks for the Tesla stuff. I do not think we understand enough about magnets as yet. Think about Coral Castle!

Yes, I have seen that. Knowing what a magnet is, will probably give us the solution to free energy. /Eric

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Matthew Trovato 2005-11-10

I think you need stronger magnets to overcome the friction and weight of the device.

True. That is why I made some ultra light wheel experiments: to reduce weight and friction. The next step must be full sized wheels with neo's. /Eric

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Anthony 2005-10-26

Awesome site my friend. Keep up the good work ... someday you will find it !

Thanks. /Eric

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philip b tatro 2005-10-24

eric vogel hey remember i gave you kohie minatos info i lost his web and personal email can you send it to me ..philip ,los angeles usa

I remember you and I sent you the information. /Eric

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JIM GLINSKI 2005-10-23

HELLO MY THOUGHTS ON ALL OF THE DEVICES WOULD BE TO USE THE MAGNETIC RAIL AND A GRAVITY WHEEL TOGETHER TO KEEP THE WEIGHT PUSHED OUT TO THE RIM ALL THE TIME AND ALLWAYS OFF BALANCE THE RECYCLEING OF THE WEIGHT IS WITH THE TURNING GOING BACK TO THE CENTER AND FALLING INTO PLACE TO START ANEW AGAIN

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JAMES KELLY 2005-10-12

I AM INTERESTED IN ALL FREE POWER

Great. /Eric

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ahmet r kuldemir 2005-10-07

where is the zipper MRE?
why it is cleared this site?
do you know?
thanks
best regards
ahmet r kuldemir
turkey

I removed the zipper because defending why I published the document took more time then building the device. I have just sent you the page by email so you can see it off-line. /Eric

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Eric from Canda 2005-10-04

Eric,

I started to build a motor based on the Lloyd B. Zirbes blueprints, since it made a lot of sense (eg: the opposed N-N magnets poles are cancelled when a piece of iron is in the middle)...

I saw my rotor moved for a turn or so, and I was very excited about it... However, after taking a analytical approach, I noticed that my rotor was not well balanced, and it was all due to the gravity.

Did you get any positive results from these blueprints? (ie: prepetual movement)

Thank you,

Eric from Canada

That is very interesting. I didn't build yet but you certainly made me interested again. I'll send you a private email. /Eric

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Nicolaie N.Vlad 2005-09-26

OERSTED was right in 1820 when he said
the lines of magnetic field [he said then CONFLICTUS ELECTRICI]are spirals around conductor with el.curent.My experiments[begining in 1981] with toroidals windings give him right.Please see the two . jpeg photos that give an ideea on my experiments.
with respect,Nic.N.Vlad

I did not find the jpegs at the link. /Eric

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Önay 2005-09-25

i look ur site and see free energy applications. i curious about that why we dont use that machines alternative to petrol... if you answer me i ll be glad. thanx

onaygurgen@yahoo.com

Unfortunately none of the devices is a completed self-runner yet. /Eric

eMail: (is only visible for the webmaster) no Homepage

Eric 2005-09-23

I started to look at some alternative power source in the past weeks since the outrageous price of gas in north america...

I saw the pendev mag-motor, however there was not too much explanation.

This site is awesome, there is a lot of good info!!!

I am going to try to build my own, I am quite sure I will be back on this web site for more info.

Thanks again,

Eric from Canada

Thanks. Unfortunately there is not much Perendev information available. No replications are reported as working devices. /Eric

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RADEC 2005-09-23

Hi,
Nice site with nice ideas. Have you ever take a look of Cycclone Mag. engine. They claim a 300 hp working protoype to be installed on a car. Is saw the video but it didn't convince me. See it on www.cycclone.com

Yes, I've seen it but I cannot say that visitors are overloaded with recent updates. /Eric

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Gerdi 2005-09-20

nice side and well presented with some good information and very interessting. Please visit us also under www.shopping-round-the-world.com
yours Gerdi

Thank you. /Eric

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J.Wesley Marceaux 2005-09-09

I have been working on magnetic motors for nearly fifty years and have built many of the devices I see today. Only I was not smart enough to share my work with others. I did not even know others were working on the same thing. Many things I have discovered stey in my memory, but as I get older ,,well you know. All of these motors , well the ones I have seen ,, suffer from the same problem. they suffer from non productive wave pattern interferances. these waves tend to counter the positive effects one wishes to produce. When I was a small child I saw a man with a rubber ball make , what to me was one of the best magnetic motors I have seen to date. I could not re-create his rubberball motor but I witnessed it . Still trying to get there. Keep it simple guys. He only had six nails , a rubberball and a small magnet and a stand,, and it turned for 30 minutes before stoping.

Yes; 'keep it simple' is the key. /Eric

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john 2005-08-23

ik ben pas deze site tegen gekomen via een andere die meer met windmolens te maken had. Toch vind ik het best wel intressant wat ik hier lees. Ik ben de laatste dagen veel tegen gekomen over PMM en dergelijke. Maar dit is wel de enige site die echt experimenten laat zien en toelichtingen geeft. Daar voor al heb ik de nodige respect. Nu is bij mij ook wel de intresse gewekt en de zin om wat te experimenteren met magneten. Mijn vraag is dan ook een beetje heb je nog meer info te delen dan ik op de site tegen kom en ben je inderdaad een nederlander ?

Ja, ik ben een Nederlander. Ik stuur je een email. /Eric

eMail: (is only visible for the webmaster) no Homepage

Stuart Ulrich 2005-08-09

Not bad

Thank you. /Eric

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Frank 2005-07-06

>>>>A very small detail can be the difference between working and not working. Even devices that look similar can act totally different. /Eric<<<<<

Gosh, that was a quick reply.
When i mentioned similar, i meant in concept not design. The design i have in mind is very much different to what i have seen on this site, though the site has been very informative and some of the basic ideas i have, seem to work after having seen some of the small video footage, but still need to carry out own research and make prototypes to ensure that information at hand is correct. I guess, the task at hand at the moment is deciding whether to use neo magnets, (not certain if they can be machined to shape?), or to make my own permanent magnets taking into account material properties such as permeability/hysterisis, strenghth, thermal properties, weather resistance, etc. Maybe someone can shed some light on where i can find some info.

Thanks for the quick reply.

The list with sponsored links on the start page of this web site contains some magnet manufacturers. I always adapt design to available shapes and sizes. /Eric

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Frank 2005-07-06

One finds strange things when looking up permanent magnetic DC motors on the net. I was astounded when i came across this site. I spent half the night last night conceptualizing a different design for a permanent magnetic dc motor that was self propelled. The concept i came up with last night was similar, (but not the same), to the ones of the flying dutchman projects. I spent a large portion of the day looking up permanent magnets today for a prototype, thinking that i might be onto something. Looks like someone beat me to it. C'est la vie.

A very small detail can be the difference between working and not working. Even devices that look similar can act totally different. /Eric

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B Travis Shafer 2005-06-30

I am just getting in to permanent magnetic motors.

I like the ideas here. Something to think about.

I hope you'll find information here that inspires you to continue. /Eric

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Dan Quale 2005-05-26

You appear to have made a great mistake in your replication of the perendev motor, all magnets outside are oriented with the same pole inward ,should be all red in your illustration.All outer magnets repel all the inner magnets! Certain kinds of steel (stainless for ex. are NON-magnetic) Also you might find MY designs easier to build at magnetodynamics.info and magnetodynamics.biz I will be visiting again.P.S. have you seen faraday.nu yet?

Except for a drawing, I never replicated the Perendev. The page is showing the hard work of other people. Their email addresses are published as well. There is no faraday.nu registrated. /Eric

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dark count 2005-05-24

I really love the content of this site.Its serves as a source of valuable
information in my life.I will continue to visit this websites often,and I would like
to thank you for your continual service.
http://www.flash-jokes.com

Thanks. I like your site also. /Eric

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Dan Quale 2005-05-19

see also www.magnetodyanmics.info check out my sites you will like my ideas.

Thanks Dan. Interesting idea. /Eric

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thomas marshall 2005-05-02

HOW CAN I BUY A BOWMAN MAGNETIC MOTORS

No idea. I haven't seen them for sale. All devices are experimental. / Eric

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Leonard Belfroy 2005-03-17

Theoretical Space Science site has some ideas on alternative science such as free energy, time travel, space travel, computer science.

The link points to an impressive collection with information.
Thanks. /Eric

eMail: (is only visible for the webmaster) Homepage »»

Bucho 2005-03-02

You have all my support !

Nick name Bucho,

Slovenia

Thank you Bucho, I need that. /Eric

eMail: (is only visible for the webmaster) no Homepage

Egon 2005-02-06

Good work mate! Your persistence and determination to keep on going and trying new approaches is very admirable. I hope you eventually succeed - you deserve to!

Thanks. /Eric

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J.C. Renaud 2005-01-28

I also do some magnetic experiments and i find your site very instructive!
J.C. Renaud
Quebec, Canada

That is nice to hear. Good luck with your experiments. /Eric

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Steve 2005-01-07

The Prendev device may be easier to duplicate using magnetic amplifiers shown in US patent # 5929732. You can DL it at www.uspto.gov.

Thanks Steve. I will bring this into the group. /Eric

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Jack R Welch 2004-12-02

Great info.Thanks jw

Thanks. /Eric

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Mirko 2004-11-10

Give a look at http://mmmgroup.altervista.org/e-magnet.html
This definitely should work!

Thanks. The TOMI idea itself will work as long as there is a start en an end to the track. The circle formed track (no start, no end) will leave the magnets in the middle without any drag. /Eric

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Pierre 2004-10-18

Tjena Eric!!
Suverän hemsida.
Pierre

Tack så mycket. Vi ses på jobbet. /Eric

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David D. Glass 2004-10-09

I am working on a device, your site has been a valuable resource for information on current overunity theory. thank you.

You're welcome. I hope that you are succesful with your device. /Eric

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Jan Bout 2004-10-03

Dag Eric, ik weet niet of het allemaal voor je gaat lukken maar ik heb het diepste respect voor je doorzettingsvermogen. Vroeger was ik ook wel in de weer met Mecano en vliegwielen, mechanica heeft me altijd aangetrokken. Eén grote hulp heb je in ieder geval: het bestaan van het Internet.
Ik wens je veel succes!

Bedankt Jan. En ik gebruik nog steeds de houten versie van Meccano voor fast prototyping. /Eric

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Franz J Ehrengruber 2004-09-10

I'm impressed by your determination. Good luck.

Franz.

Thank you. /Eric

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Free Energy from the Air 2004-07-23

With your Magnetic shape material,

If i stand on a frictionless trolley, and people throw balls (virtual atmosphere particals)
at me and i use a baseball bat to deflect them (without actually giving them enery) then i can deflect them all in the 1 direction which will push me along! The energy for my movement comes from the balls.
Well, this could be done with nano size deflectors on the surface on an object with the result that AIR particals are deflected all in the same direction and the aircraft will be pushed along!
This means an aircraft with such material could be pushed along without needing energy. The energy comes from the air particals!!

Interesting thought. Thanks. /Eric

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John Day 2004-06-02

Great work Eric. Of course Flying Dutchman would be from Holland. Go ahead and send the patent.
Thanks and if you get a chance have a good look at that wheel motor if you can. They supposedly tested it as a wind genny in the development.
Cheers,
John

Thanks. /Eric

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John 2004-05-18

Eric, what results did you obtain with your 64 NEO magnet "shield" ?
Did it work at all ?
What is the US patent no ?
Thanks, John

It was found in the European Patent Database, World Patent Number is WO 93/12574. My prototype did not show the shielding effect. /Eric

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jenny lee 2004-04-08

u heard n e thing about some sort of magnetic breakthru by a co in NH?

no details..just talk of a SKUNKWORKS project.

I've not heard about that. /Eric

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Oxygon 2004-04-01

I envy you! I love the way you have done soo much actual testing... I havent had the funds or zeal to myself... Good Luck!

Thank you. I'm glad that I found a way to create wheels for as little money as possible. /Eric

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David 2004-03-10

Really awesome! I think you are just about to catch up with me on discoveries of magnetic propolsion.

AWESOME SITE!!!!!!!!!

Thank you. /Eric

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Nairda 2004-01-21

I read the article about the "mikell" device. It seems as if "mikell" has stopped giving away information about this "infinite energy resource". If you are looking for him try http://groups.msn.com/VonBraunPhysics/ .
he is faking to be Wernher von Braun's Grandson

Thank you, for this information. /Eric.

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Roman 2004-01-17

Great site. Good Luck!

Thanks. /Eric

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Jeroen 2004-01-15

Hoi Eric, Helaas moet ik je via je Guestbook benaderen. Maar ik wacht al een tijd op een email van je. Je bood aan om een link door te geven van de gehele film van de Minato wheel. Ik vraag me af of je mijn email (2x)wel hebt ontvangen.

Hallo Jeroen.
En ik heb al twee keer teruggestuurd. Ik begrijp niet waar het blijft. Ik heb je nu de email maar nog een keer gestuurd. Het lijkt wel fout te gaan als ik 'reply' doe. Laat maar weten of je deze keer wat kreeg. Sorry voor deze gang van zaken. Je krijgt de filmen, al moet ik ze met de post versturen. /Eric.

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Jeroen 2004-01-01

Hi Eric, leuke site. Ik ben blij met de posted Minato videos. Een opmerking over je 'real Minato replica' al je magneten staan in een andere hoek bestudeer de zwart witte foto van dichtbij het zijn vierkante magneten die vast zitten in een klem (die een maansikel vorm lijken te hebben) maar alle magneten van Minato staan in dezelfde hoek. Een tip gebruik niet een vaste aandrijf magneet maar een die de hand beweging nabootst b.v. met een veer kijk naar de Finsrud PPM om een idee op te doen. En ja ook ik ben bezig met het nabouwen van een Minato wheel. Nog een vraag is het gebruik van foam sterk genoeg om magneten van 25x25x1mm met een sterke van N25 op hun plaats te houden.

Bedankt. Ik heb de B&W als model gebruikt. Een veer reageert te laat (waait met de wind mee). Piepschuim is sterk zat, als je de magneet maar voorzichtig inbrengt, tijdens het inbrengen en uitpeuteren wordt de grootste schade aangericht aan het piepschuim. Geduld is een schone zaak. /Eric.

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Trevor 2003-12-04

Hi Eric,
Darren has used velcro ,and he is tired
Vertically curved, was the question.
No I do not have working free running Minato, or Calloway wheel.
Do you, I am in the process of getting quotes from magnet suppliers for scaled down, custom made Nibs as per my dimentions,Minatos magnets are the same volume as a bar magnet,90mm long by 72mm wide by 15mm thick. may be you could buy them for me.
regards Trevor

Hi. Please stop using my guest book as a message board and continue the discussion in the e-group. /Eric

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Lesley Butler 2003-12-03

Hi,Eric
I am Trevor's neighbour could you help with the code for his e group as he is not getting anything from the email account he has got it may be easier to get mine.
thanking you lesley

I'll fix. /Eric

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trevor 2003-12-03

Hi,Eric
Trying to join the egroup can't get verification code not being sent to my email address.could you pass on feedback or tell me how to get code please.

I think that the problem is that you don't have a Yahoo account. But I can make you member, then you only need a Yahoo account for going into the file section. But all pictures are on my site as well. / Eric

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Trevor 2003-11-13

To Eric. Re,Minato madness and the Calloway curse. I think this is the cure. First do not mix the two,and ignore every thing writtern. Study of the photos is the key,what surfaces did the flash reflect on. Here are my findings to share with all who beleive that free energy is possible. 1.wheel is 432mm in dia,with a radius of 216mm and circumference of 1357.1712mm 2.There are 16 rare earth magnets covering 180 degrees,each magnet is in 11.25 degs. 3. Distance from pole to pole is 60 mm [rad,divided by 3.6] 4.Width is 72 mm [dia,devided by 6] 5.Thickness at nutral zone is 36 mm [dia,devided by 12] 6.Pole face is 15 mm[dia,devided by 28.8] 7.Angle of pole face to edge of wheel is 50.625 degrees 8.All north poles directed out and all south poles inward. This wheel works in my opinion for several reasons one is harmonics of measurement and is a push and pull action. Well Eric here is your first dose,I will send more medison on 15 /11/03 Regards from Whykids.

Thank you. I consider myself as a real believer. I'm looking forward for the second dose. /Eric

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Stanley 2003-10-18

please continue your search and share results with us. We also need some guideline. Do not worry. We are not alone

I will continue. But there are no real guidelines for over-unity. But we can collect as many facts as possible and hope the solution is somewhere in between. /Eric

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Gordon J Martin 2003-10-18

Hello Eric,
Good site mate!
You may be interested in looking at JP2003-092870--- looks promising.

Thanks Gordon. And thanks for the patent. /Eric

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John D 2003-08-16

Hi Eric, Great stuff you're doing. Roamer on KeelyNet had some interesting points. Have you communicated with him yet? Seems like he might be a real good resource person for you. I check your site every week for updates.
John

Thank you. Yes, I contacted Roamer and wait for his answer. /Eric

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Bill 2003-07-08

Eric,

Thank you for putting your research on the Web for all to see. I wish you success.

You're welcome, and thank you for your kind words. I truly hope that someone some day will find an energy source that saves the world. I'm not sure if it will be me but this way I can at least make a contribution. /Eric

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Wayne 2003-02-12

Eric
Great web site. I made a simple test model from a CD and glued styofoam on top. Then put some small 15mm dia magnetics and got some results. Now I going to try using 1/4" 1/4" rod rare earth magnetics and get going. I think retangle or maybe rod might be the best. Also do you get the same results vertical and horiz test? The Korean version is vertical. I hope one day we can all have free energy. I will let you know how I make out.
Thks
Wayne, Canada

Thanks. Vertical should work best because there is no force on the wheel sideways. But vertical is harder to balance. Good luck with your experiments. Please keep me informed. /Eric

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Tom 2002-12-30

Great work and great site, I enjoy checking your updated progress. I'm working on a project with simular insterests as yours but totally different design. I was just curious if you ever found somebody that sold the exciter magent with the spec of (5" long, by 2 1/2" wide, by 1/2" thick vertically curved magnet in the repulsive mode) Thanks, and good luck!

Thanks. I composed that big magnet with smaller (40x25x10mm) magnets. But your question made me think; I used a straight magnet (like Minato) and not 'vertically curved' as Calloway described. /Eric

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Terri Saaranen 2002-11-18

Good Luck on your experiment this month. It Looks good, have did you ever get a chance to change the angle on the magnet on the wooden wheels?

Thank you. I'm changing angles and number of magnets between every experiment. I need to make flux-fields visible. /Eric.

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Paul Sinkovitz 2002-09-05

We need to talk. You are on the right track. Don Adsitt is building a wheel that when complete will magnetically mirror the Earth. When placed in the magnet field of a sun ring as suggested by Christain 2002-08-10 and my model 1999-01-01 it will spin. Send link or address channel to blueridgemotors@Yahoo.com. I am open to anyone with an intrest to perfecting a no-energy input motor. I am very, very close.

I'll contact you by email. /Eric

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jayrelay 2002-08-20

I am certainly a novice at such things ..but could you please explain to me if there would be any benifit to making some of the magnets pivot on the wheel experiment. I am speaking to the ones afixed to the 3 wheels ...thank you

I cannot explain this at the moment. It must be tested first. Thanks. /Eric

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Christian 2002-08-10

Heya .. saw your page and see your delema. Have you tried atraction mode and flipping the magnet at the end for releas? as in at its most atractive point turn the magnet clockwise or counter clockwise by 90 degrees to release it. In this mode you magnaets will need to be set up not north to south but sidways as in ns to sn and when u spin the magnet it will still be atracting but on a mutch smaller scale and the momentium can push it by. This would work with 1 wheel. I am putting this here cause i didnt see an email address for you on your page.

Thanks, also for the picture you sent. I'll try it. /Eric

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Mike Silao 2002-07-16

Hello Eric, Mike here from New Zealand. I am happy to see that you are persistent. I believe that what you are missing is a ALUMINIUM PLATE slotted between the magnets which can be moved in or out. Please find out about the "REED MOTOR" on JLN and you will solve your problem. Thanks.

I will look at it. Thank you. /Eric

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Jack 2002-07-13

YOUR DESIGN IS FLAWED!!!

Probably, but when I try long enough, the right design maybe pops up. /Eric

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Bob 2002-07-13

YOU WILL FAIL!!! HAHAHAHAHA!!!

May be, but what is so funny about that? Anyway, I'm happy that you are having a good time. /Eric

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H.Vogels 2002-07-09

Je bent lekker bezig! Indrukwekkend.

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hasse & ike 2002-06-23

fin hemsida...fina bilder på sommarstugan :)

Tack. /Eric

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Grannarna Häggström 2002-05-01

Bra jobbat Eric!

Bilder på familjen vore kul att se.....

Tack. Familjebilder.... då behöver vi bara övertyga Ullis att det är kul. /Eric

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H.Vogels 2002-04-30

Hallo Eric,
Leuk om van afstand jouw werk te kunnen zien. Blijf vooral doorgaan.
Pa

Door het opzetten van deze website ben ik gedwongen om alle experimenten te beschrijven en te dokumenteren. Ik ga door. /Eric

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Don Adsitt 2002-04-30

Good job with this Eric, I appreciate your studies with the Minato Wheel, as always, there seems to be some key information that missing - I'm sure that with you preservernce you will find success!

Don

Thanks, I will continue. /Eric

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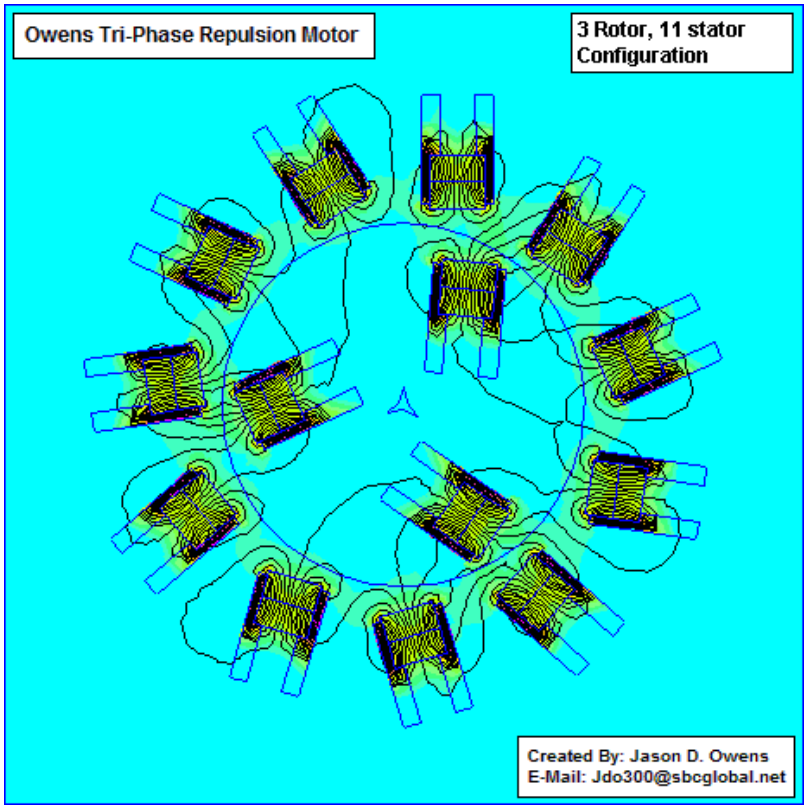
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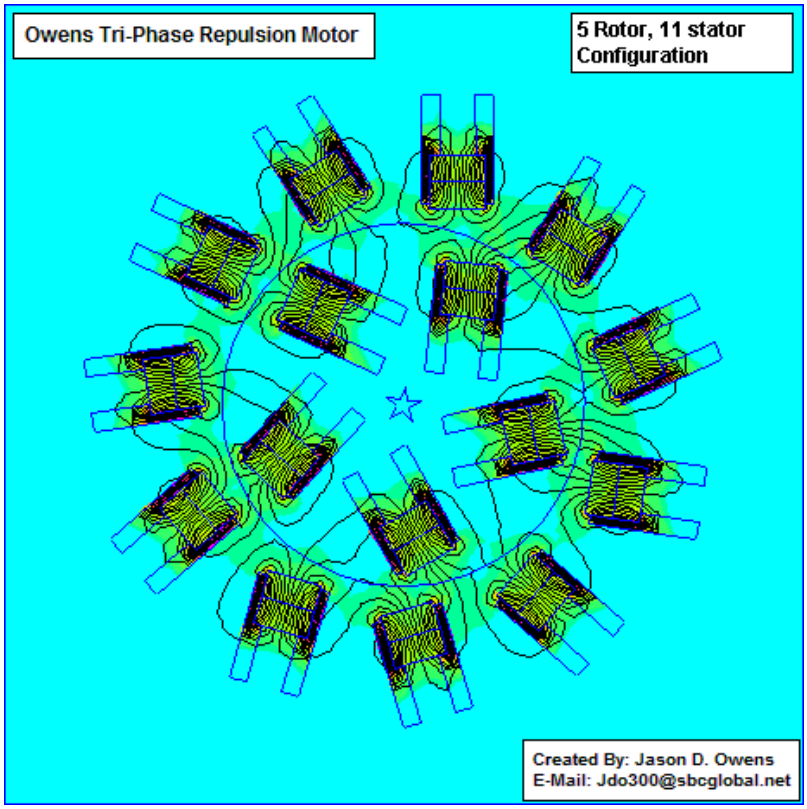
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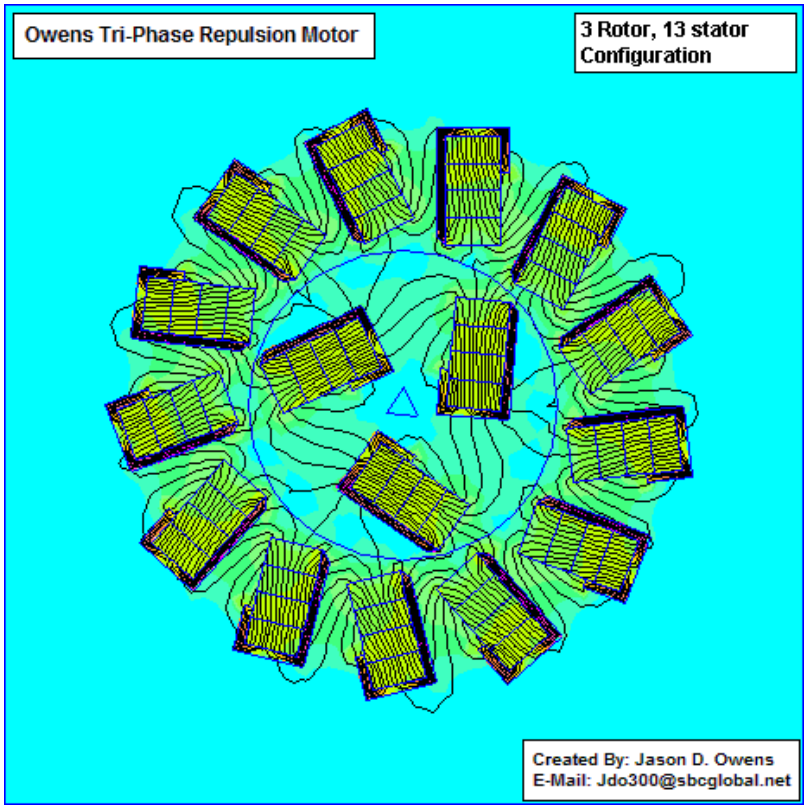
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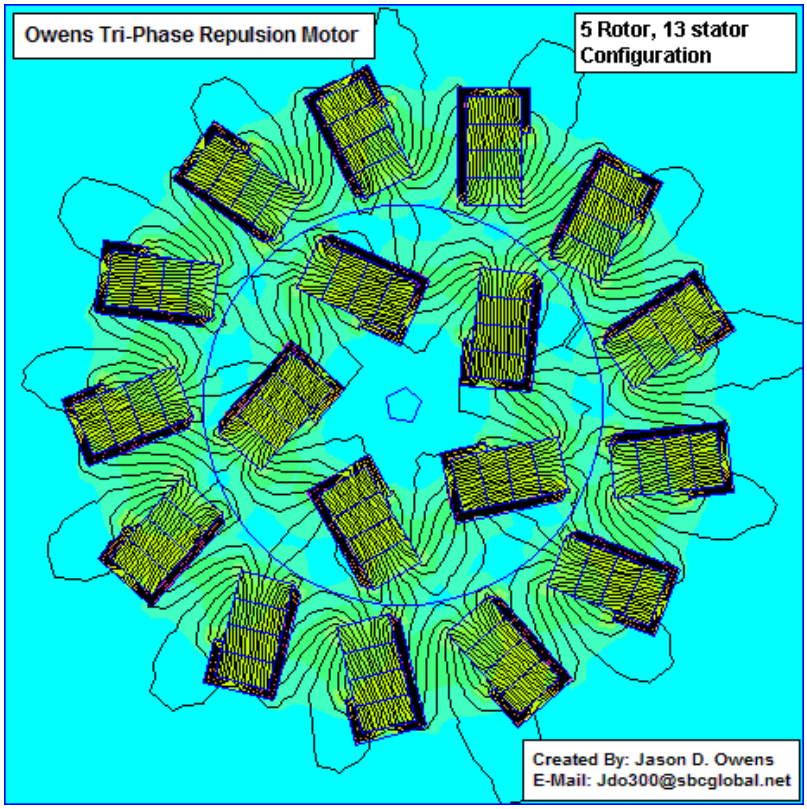
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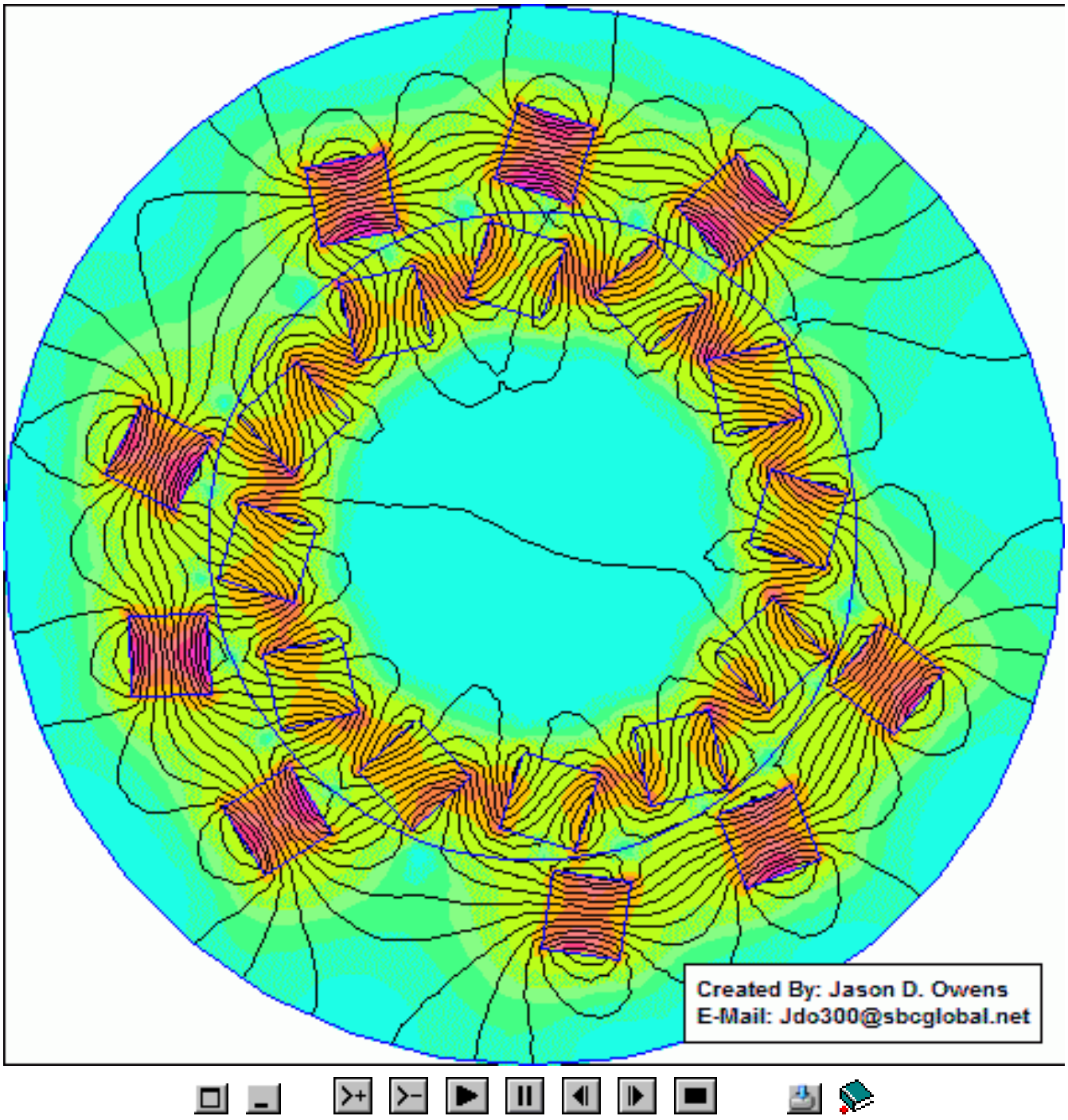
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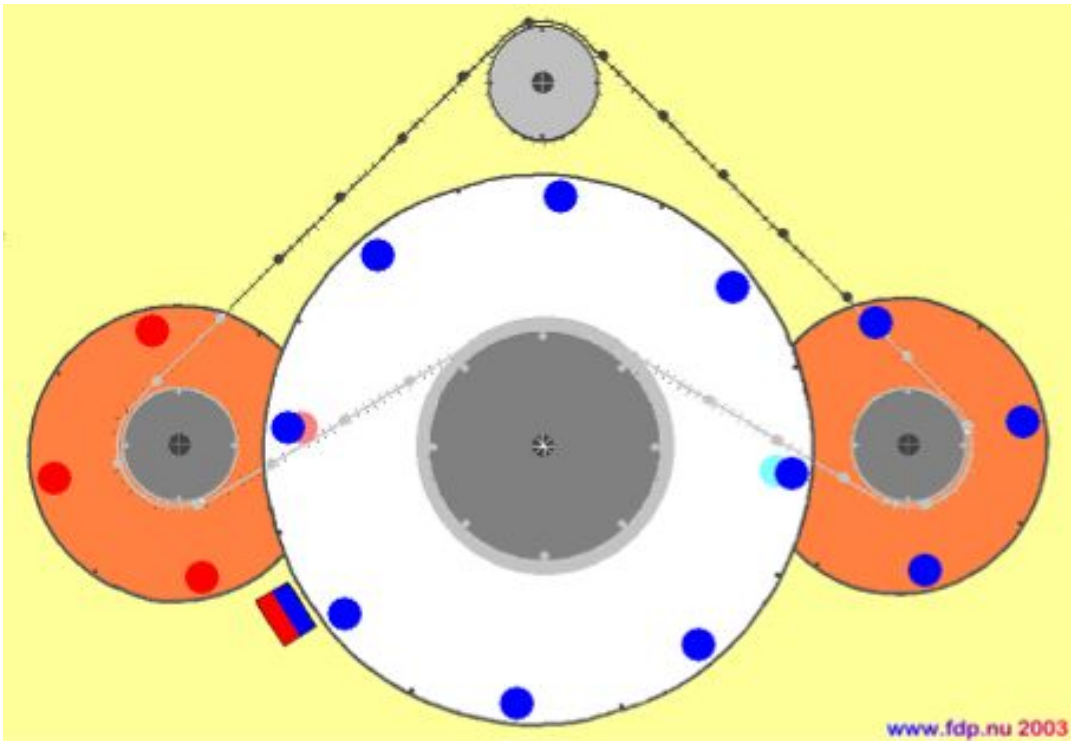
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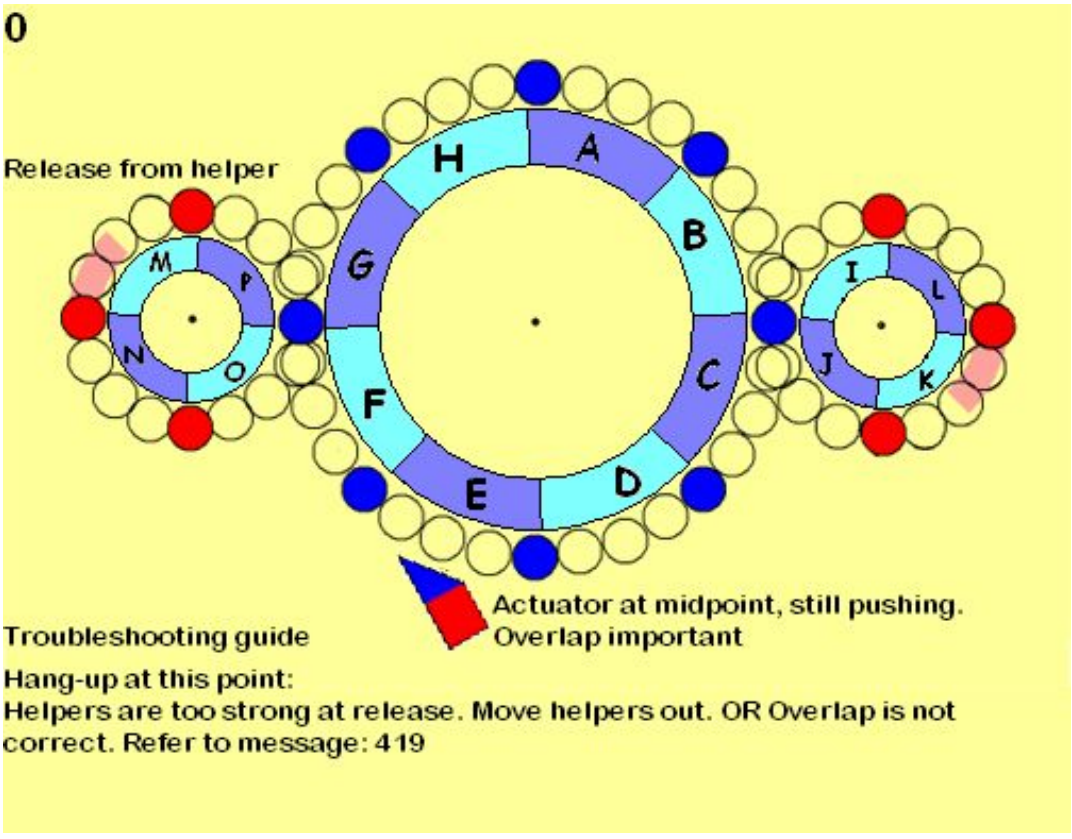
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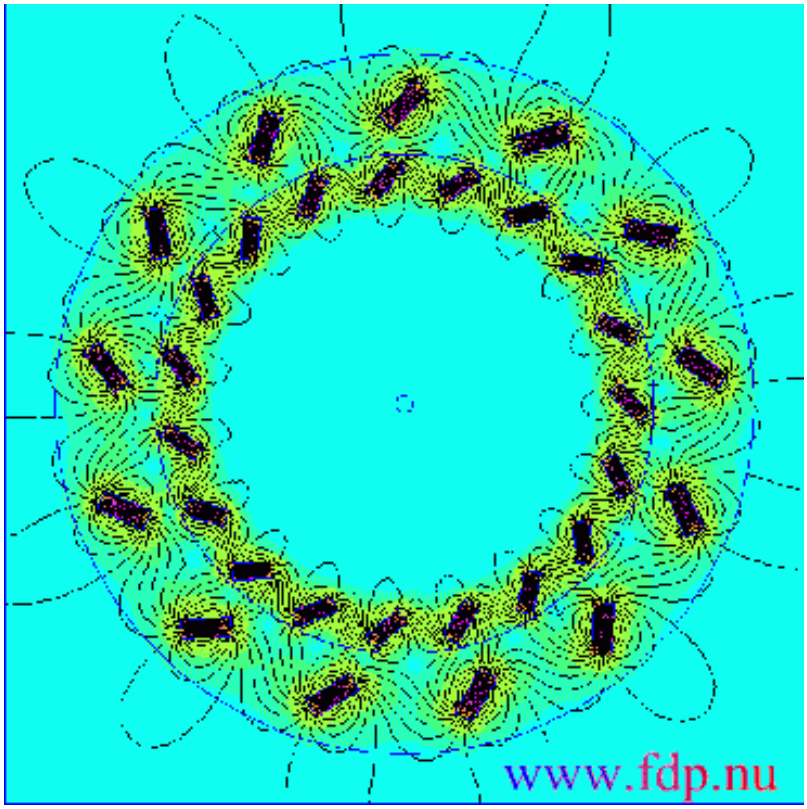
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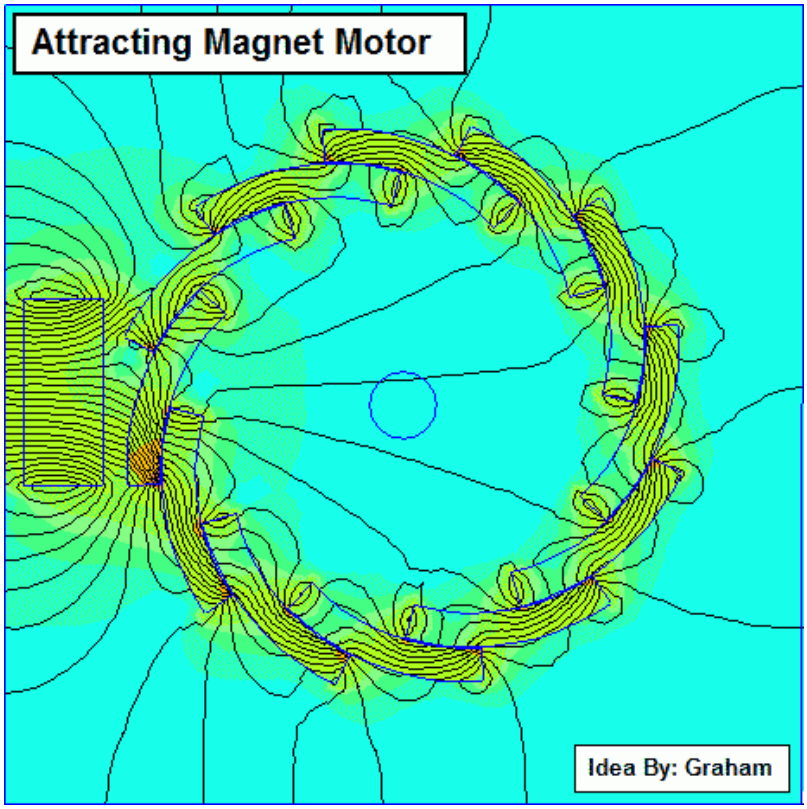
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Attracting magnet motor



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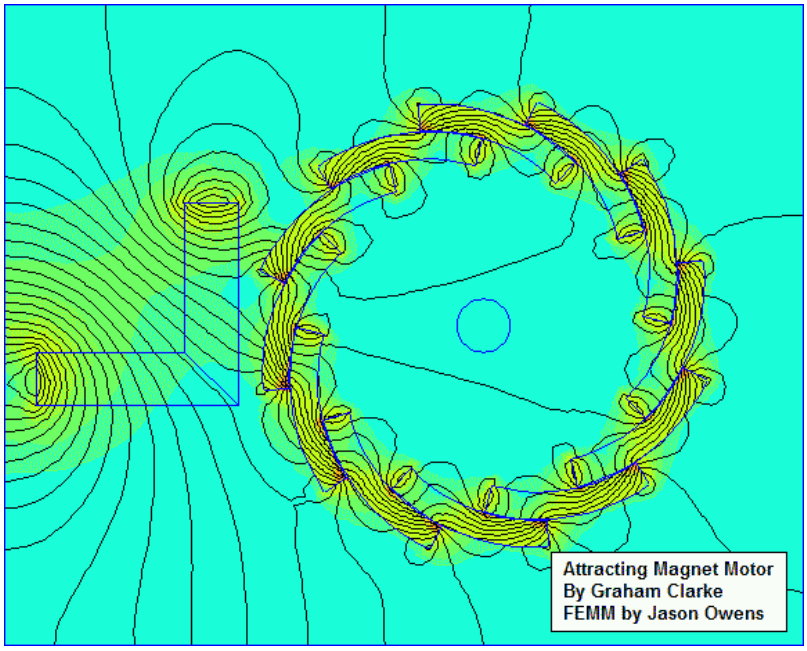
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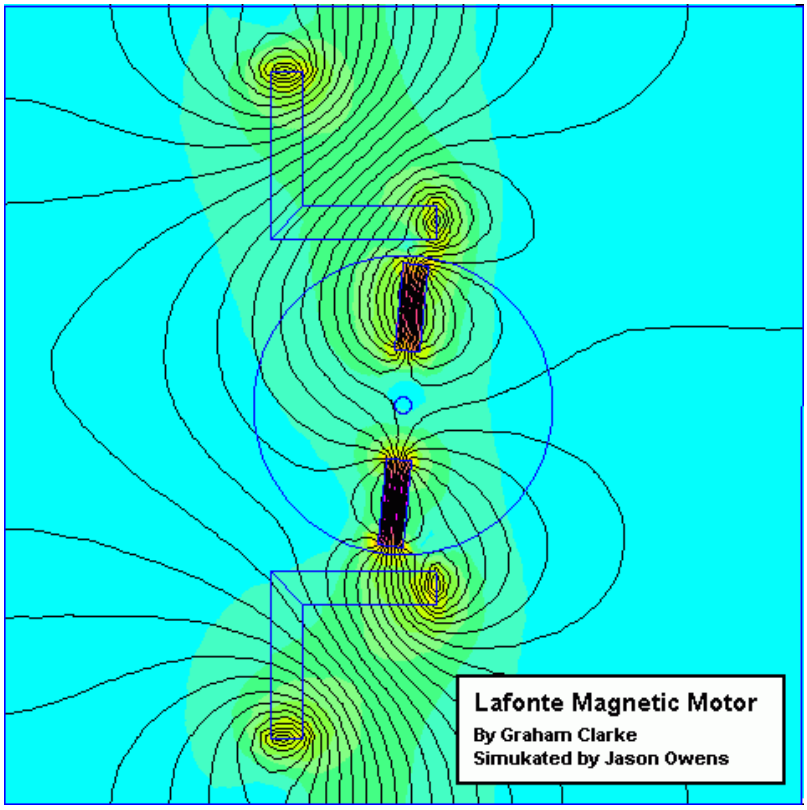


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Lafonte balance motor



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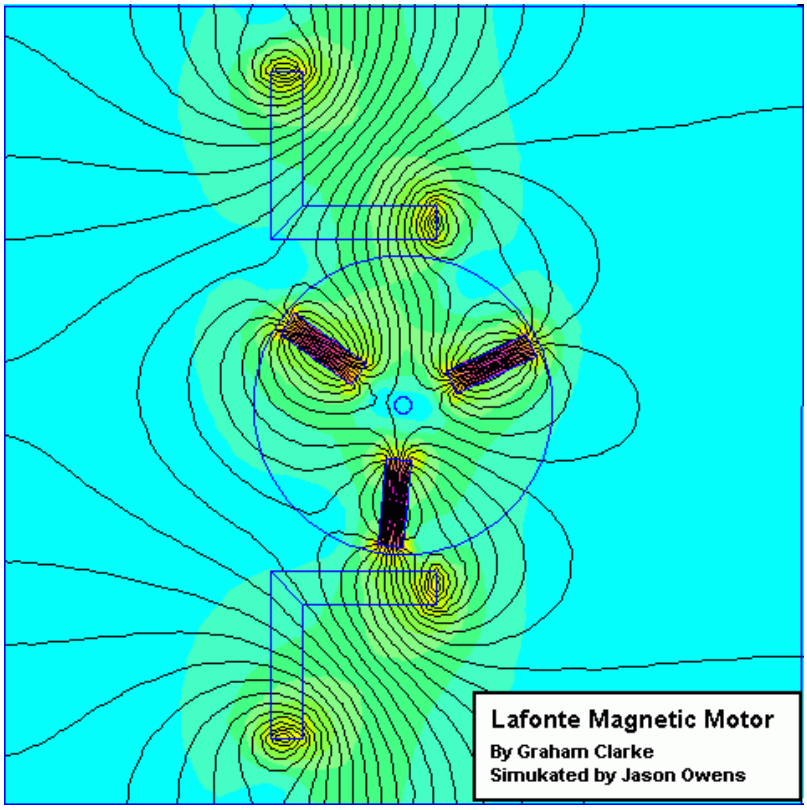
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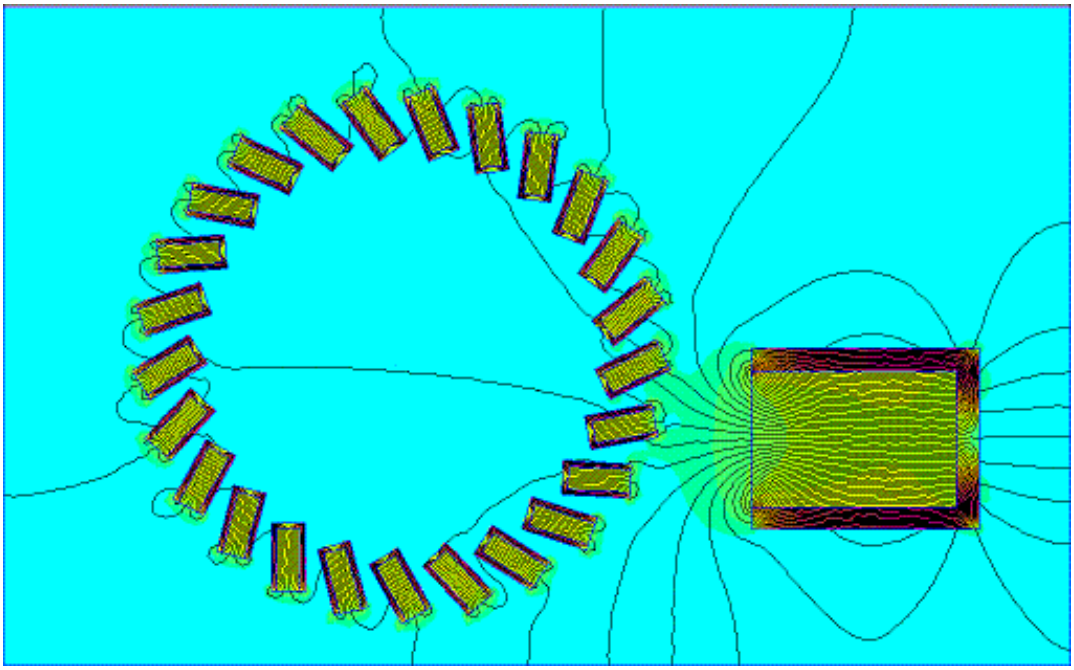
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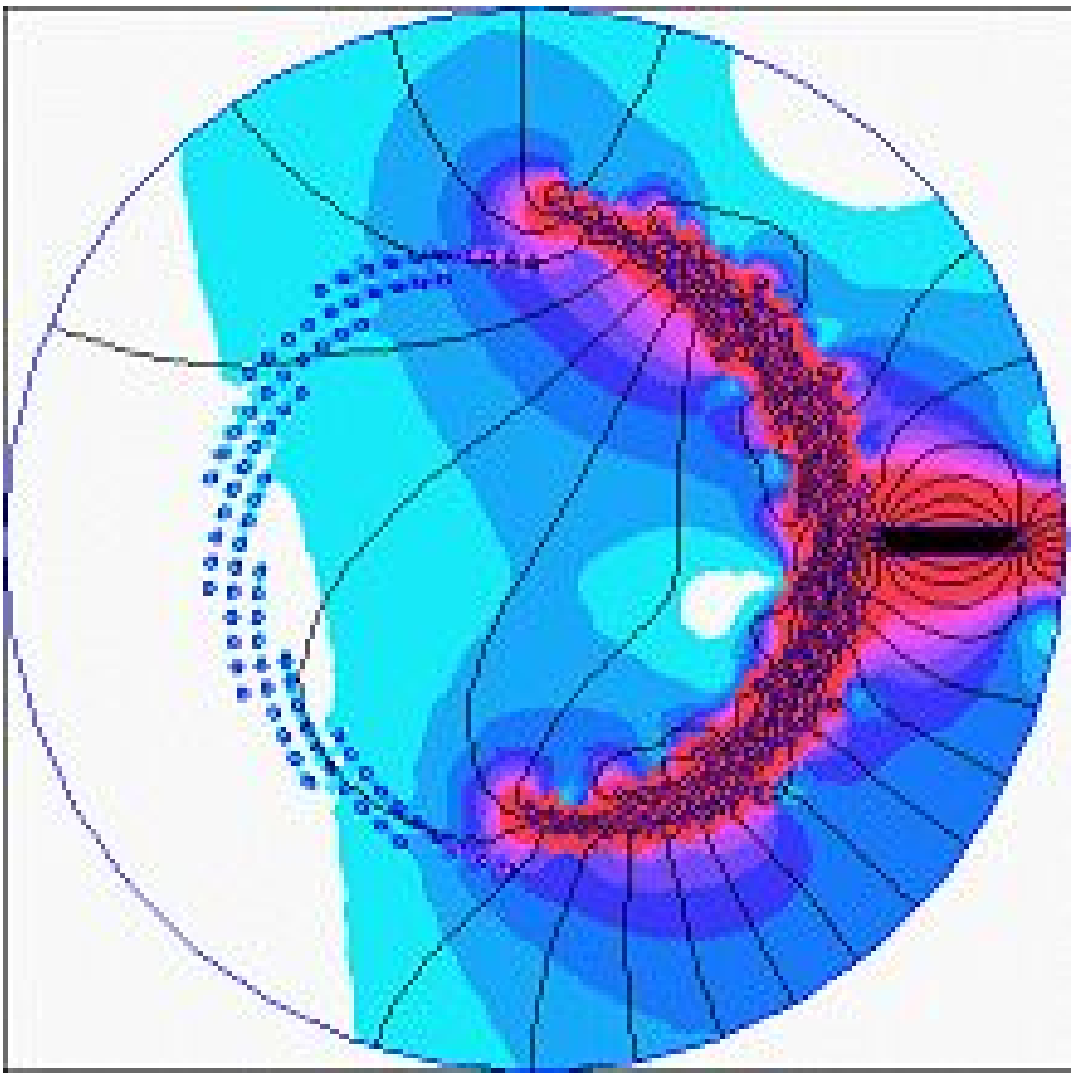
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Minato principle animation





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Sub-folders in folder: .\group\minatowheel\files\Graham Clarke
Size of current folder: 16 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	
	Corner Gate Graham's Corner Gate	20	
	Gem motor Gem Motor - by Graham CLarke	2	
	Ideas A collection of Graham's ideas, drawings, simulations and video clips	9	

Files in folder: .\group\minatowheel\files\Graham Clarke

Type	Filename	YYYY-MM-DD	Size	Action
	No files			



FLYING DUTCHMAN PROJECTS

- Home
- Magnetic research
- Free Energy eBooks/Articles
- Guest book
-
- Administration

In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Graham Clarke\Corner Gate\Devices with the corner gate
Size of current folder: 4 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	20	

Files in folder: .\group\minatowheel\files\Graham Clarke\Corner Gate\Devices with the corner gate

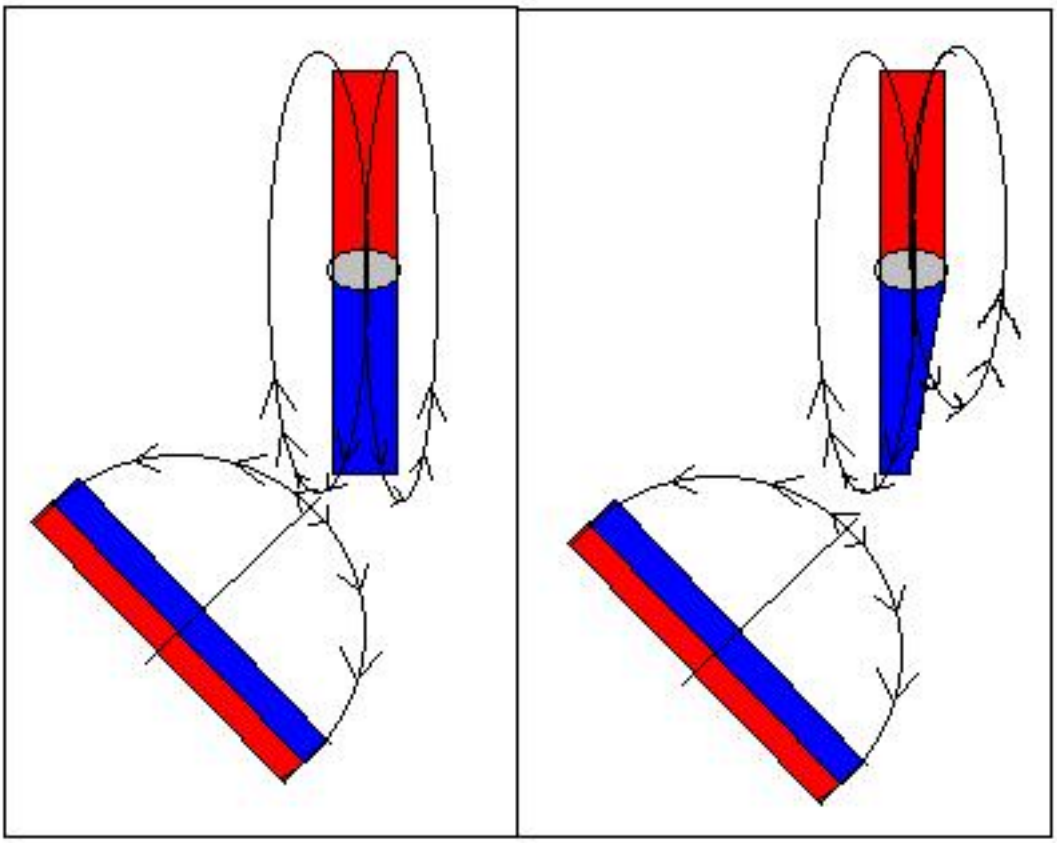
Type	Filename	YYYY-MM-DD	Size	Action
	Alternate Rotor Setups.jpg (Jason Owens)	2006-04-05	52 kb	
	EllipsRotor.GIF (Rotor magnets make an ellips rotation. Eric.)	2006-04-05	7 kb	
	gate.avi (A motor using the Clarke Gate, by Graham.)	2006-04-05	3.64 mb	
	Rotor Setup Idea.jpg (Jason Owens)	2006-04-05	13 kb	

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//AlmostBalancedRotor.wmv

Select All

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Normal Rotor in Repel Angled Rotor in Repel



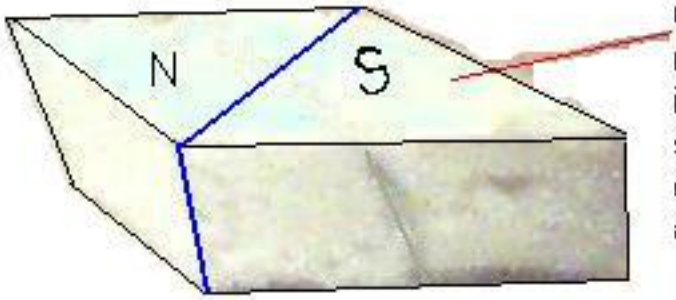
How I think the flux patten is with a normal rotor from the repelling side of my gate and a angled rotor again from the repel side of my gate, the gate is straighter then the drawing so the arrows going one way would be closer

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//AngledRotorinRepel.jpg

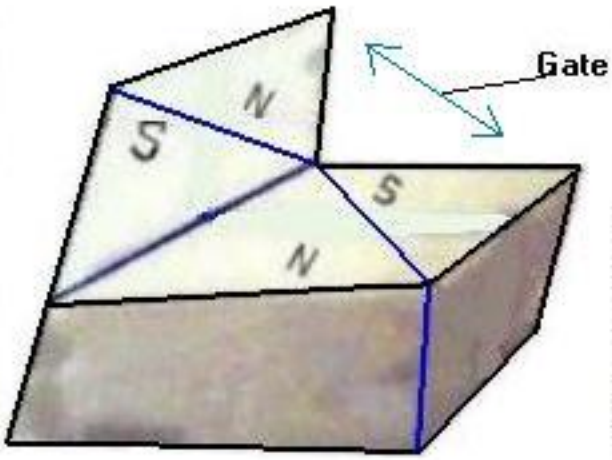
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ArrowHead Gate
By Graham Clarke



One arrowhead magnet the line in the middle shows were the different pole are



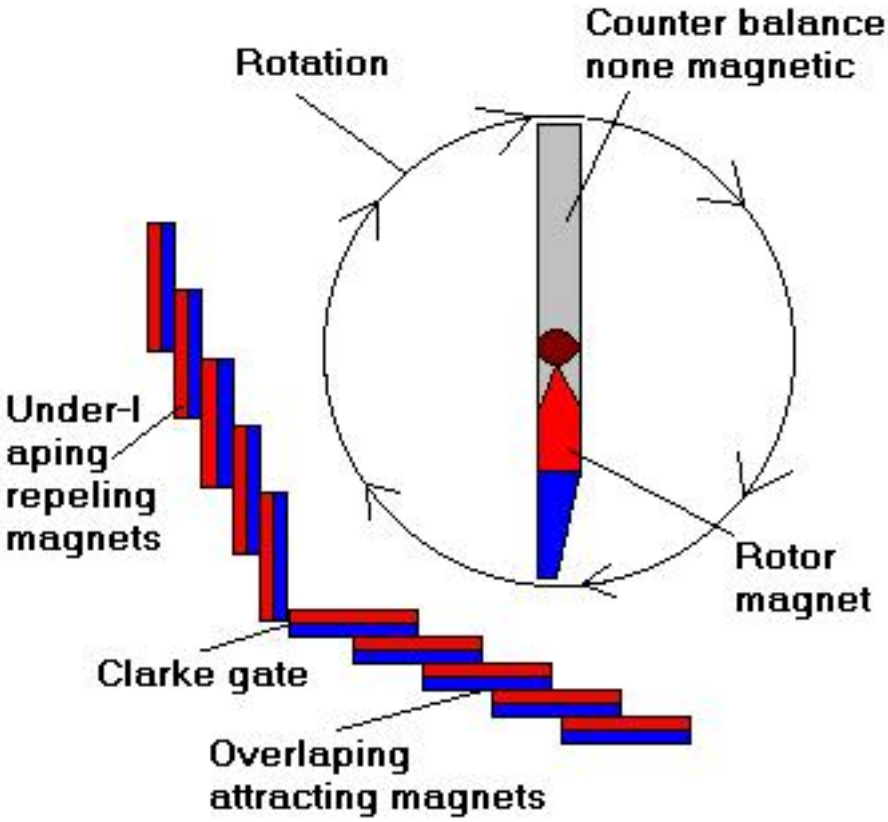
Two arrowhead magnets together the blue line in the middle shows were the two poles are

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//ArrowHeadGate.jpg

Select All

Close window

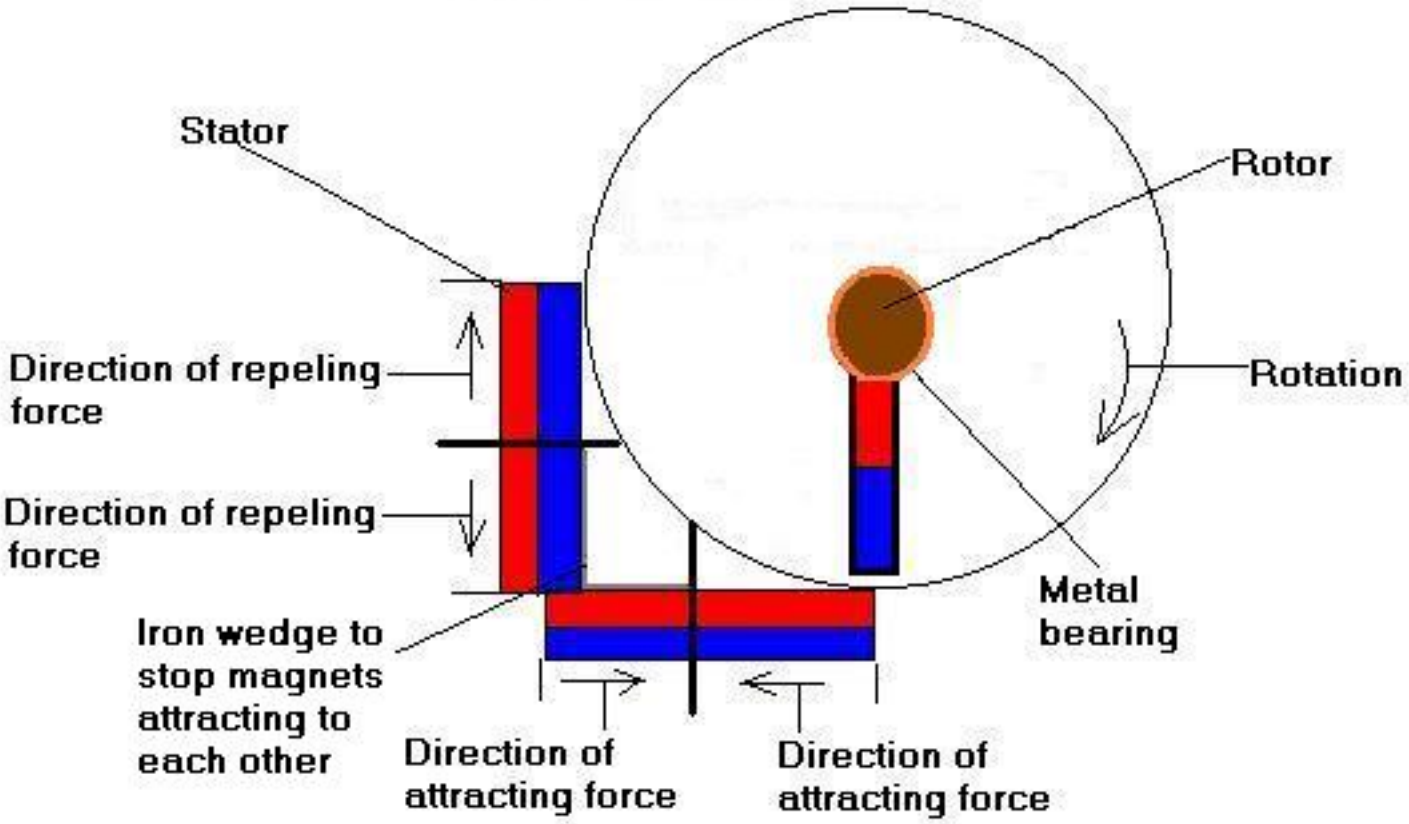
Clarke permanet magnet motor
By Graham Clarke



http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//ClarkeMotor.jpg

Select All Close window

Corner Gate
by Graham Clarke



How this works

The directions are showing what way the magnetic field is going when all magnets are engaged, the direction of the attract in and repel out are going the same way, the magnetic field going in the opposite direction to what you want is weaked by the iron and being further away from the rotor. The closer you bring the two dark lines together in the middle the better this setup works, you may also improve it by using pot magnets for the corner magnets, this should give you even more attraction in.

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//CornerGate.jpg

Select All Close window

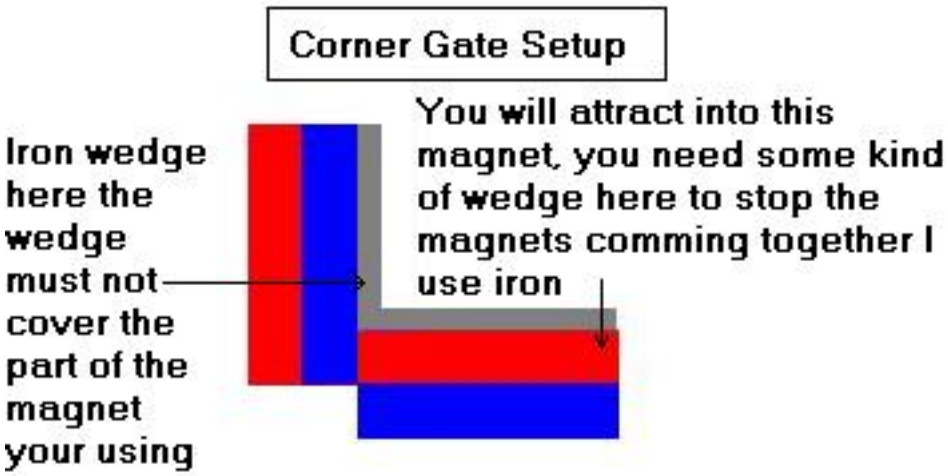
http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//CornerGate2.WMV

Select All Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//CornerGateEric.avi

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Close window

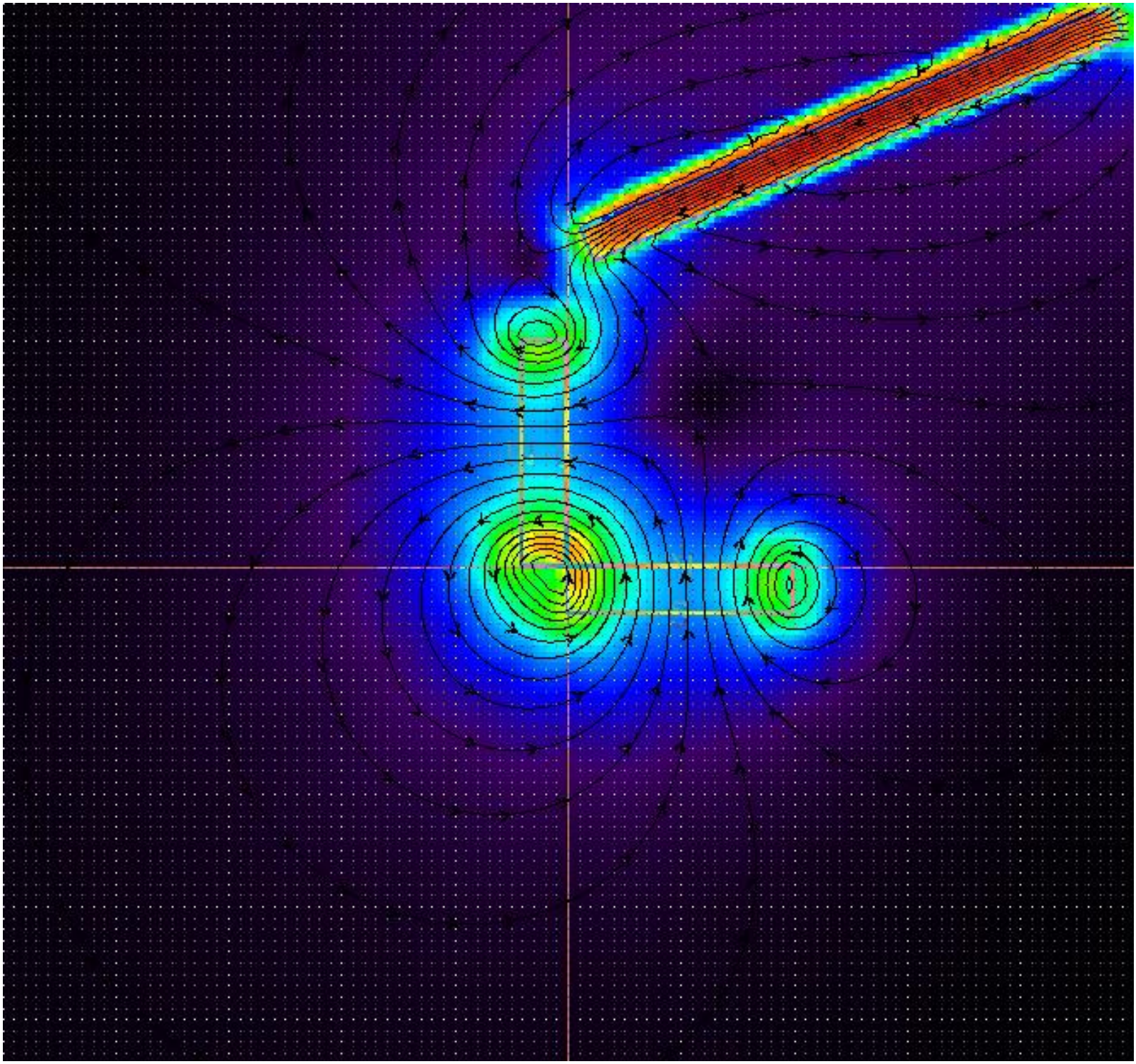


Both magnets the same size, I am using neo magnet 25cm height 25cm length and 20cm width.

For best result have your rotor go ever above or below your corner magnet and in you test use a bar magnet for your rotor the bar magnet I use I got from toys R us its 70mm long 10m wide and 5mm thick

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//CornerGateSetup.jpg

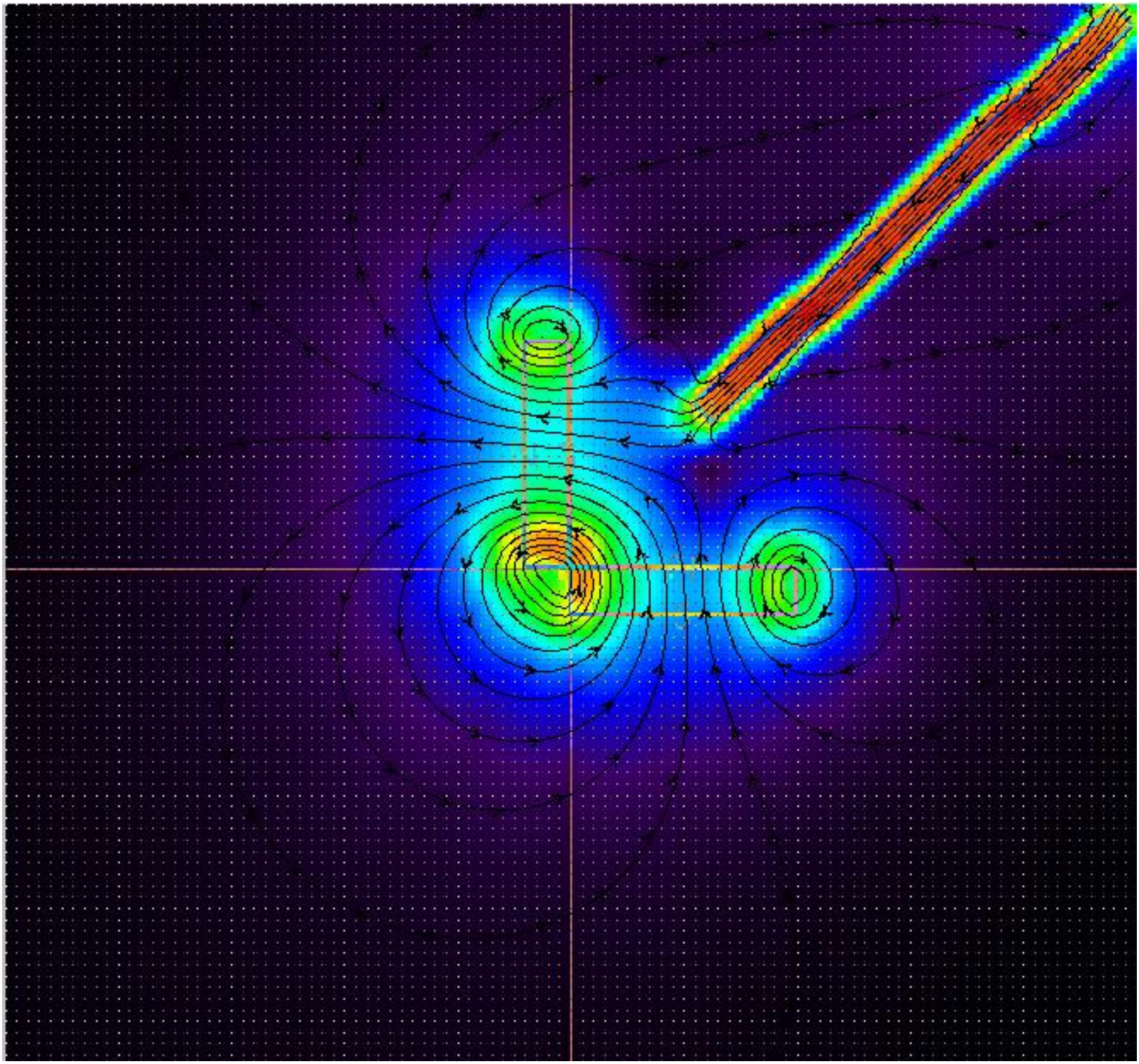
Select All Close window



http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%
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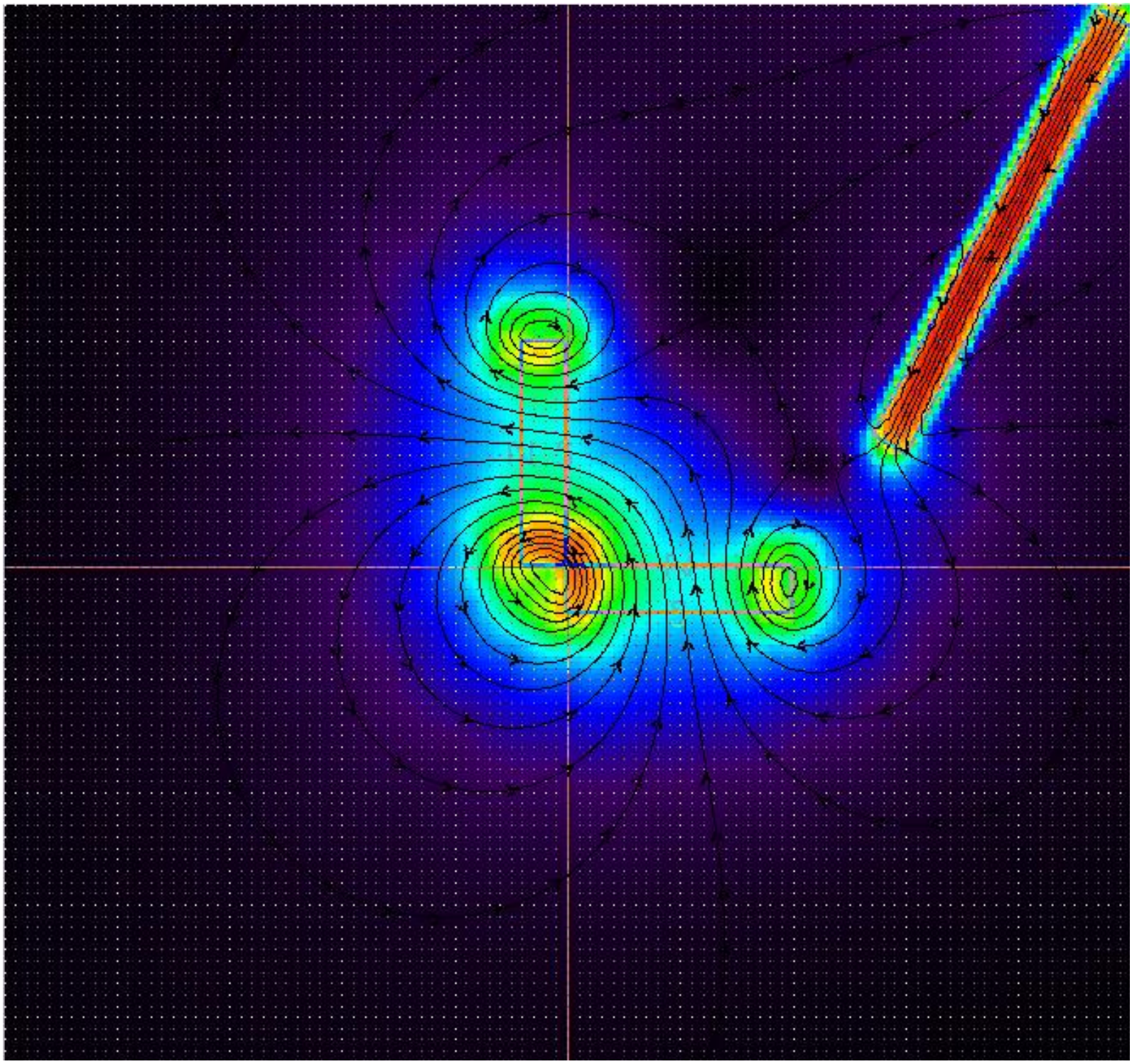
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http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%
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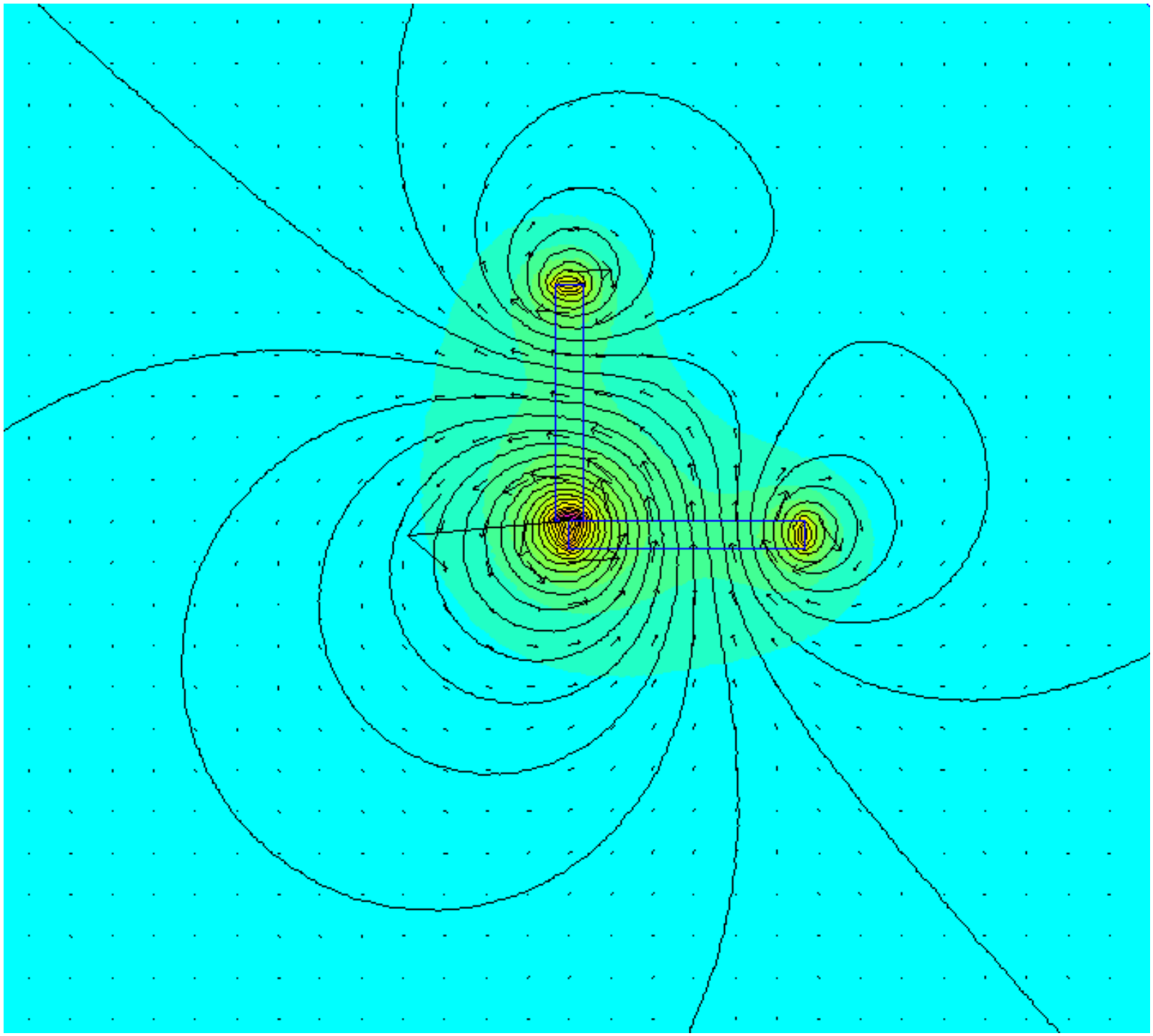
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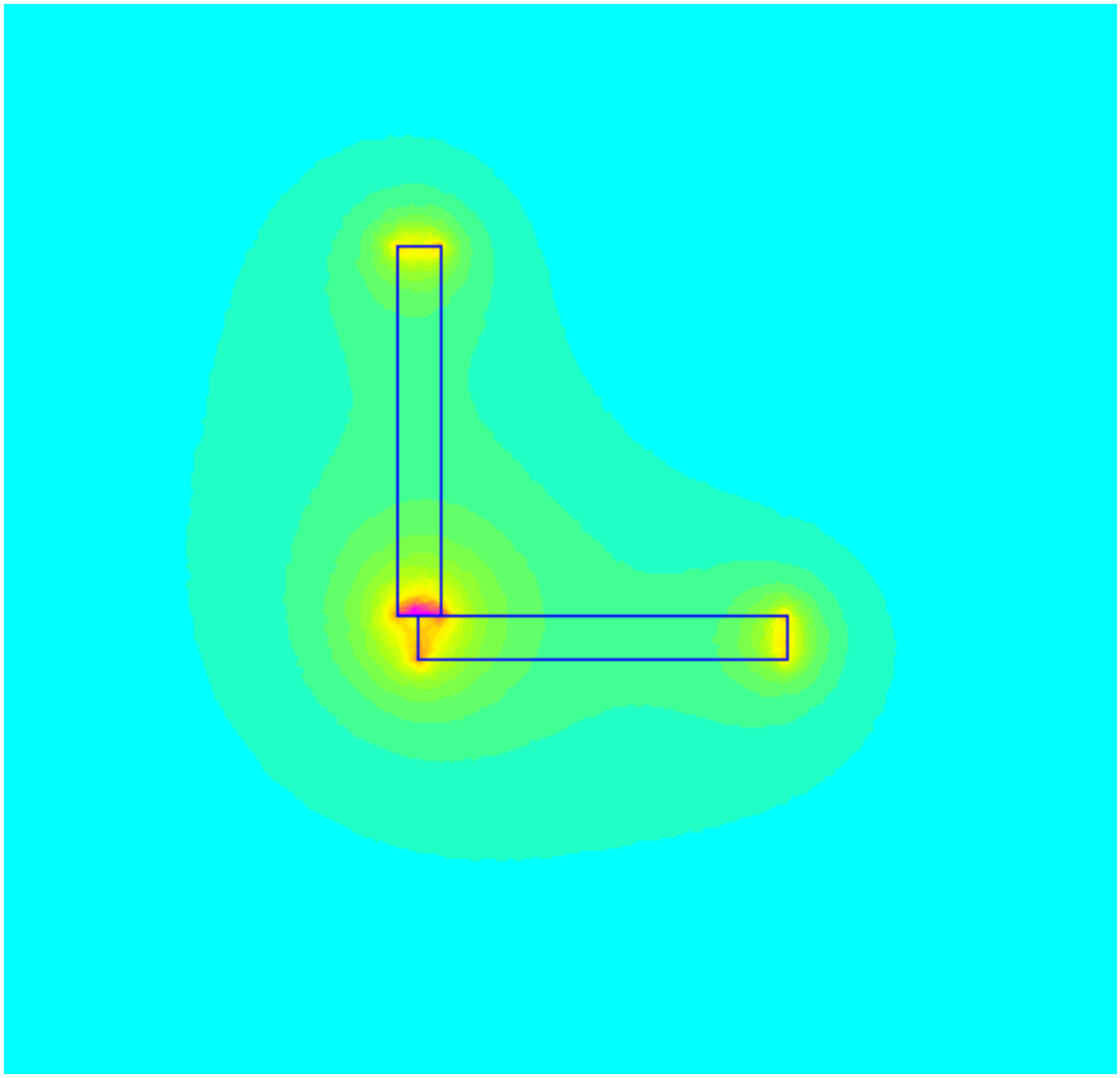
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Close window



http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%
20Gate//Graham%20Gate%201.png

Select All Close window



http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%
20Gate//Graham%20Gate%202.png

Select All Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//GrahamsCornerGate.wmv

Select All Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%
20Gate//RotorAtThreeOclock.WMV

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Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//SettingUpCornerGate%20.wmv

Select All Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//ThreeCornerGates.WMV

Select All Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//TwoCornerGates.WMV

Select All

Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate//With

Select All

Close window

http://www.fdp.nu/shared/files/Graham%20Clarke/Gem%
20motor//AboveGemMotor.WMV

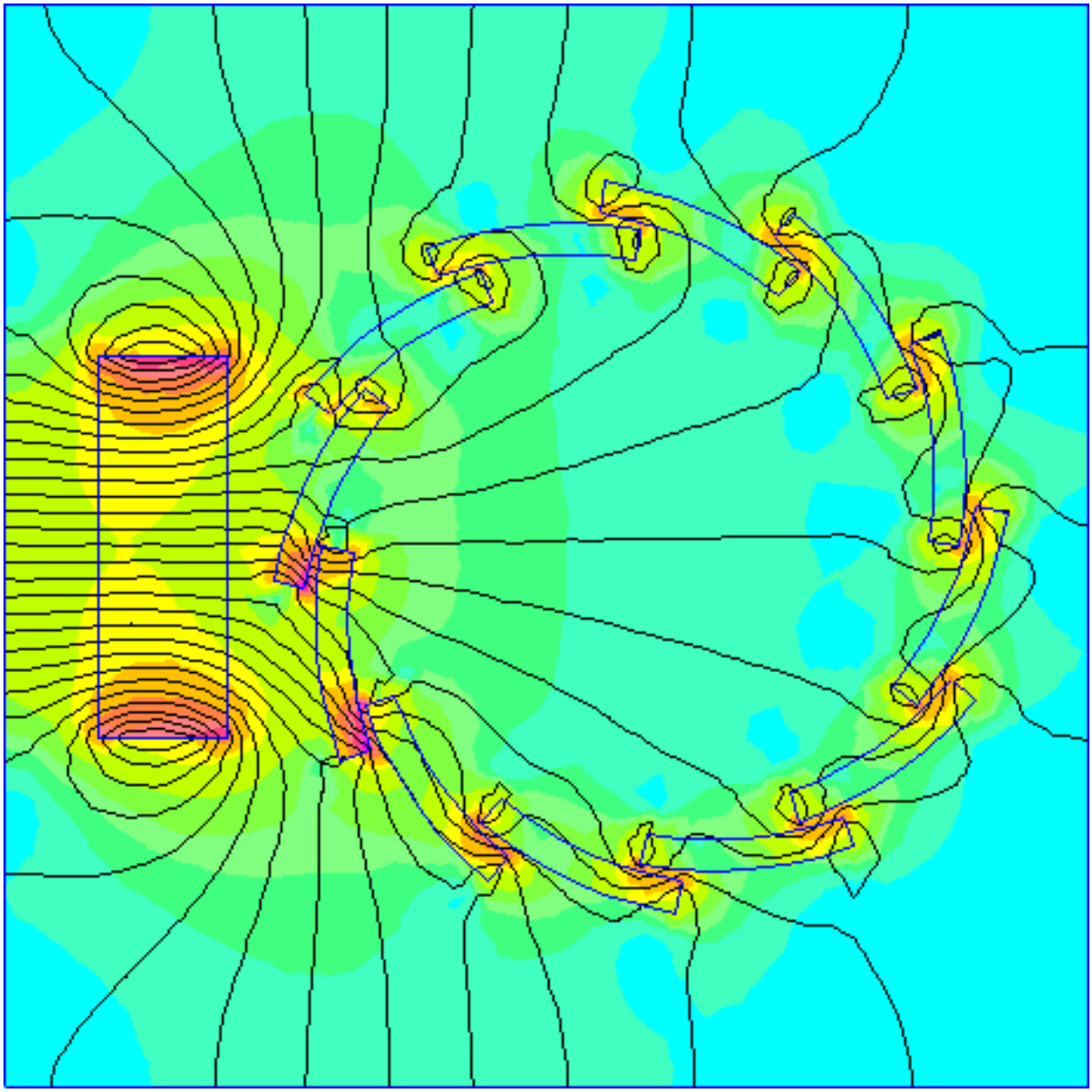
Select All Close window

Graham from Minato Wheel group here,
I wanted to send you a video of the one pulse electromagnetic motor I was talking about in the group.
I am sending it in the hope that you can post it to show other members.
The video shows the motor rotating using a reed switch to control the on off of the electromagnet, the reed switch will not be used in the finished project because it burns out to quick but its good for the demo because every time it is switched on it lights up making it easy to see on the video, as you will see it lights up once every rotation once it gets going, with this demo 3volts of power are going into the electromagnet every time it is switched on and as you will see with no change in the power going in the rotors speed increases, the begining of the video shows how the rotor reacts with the power off and as you will see the iron in the electromagnet attracts the magnets on the rotor from the first overlapping magnet around to the last then the rotor bounces back once the electromagnets power is switched on the rotor reaches the air gap and the electromagnet kcks it across to the first magnet starting the process again.
This video clearly shows the rotor rotating and the electromagnet pulsing on and off, I have other videos and drawings of this design I call the Gem Motor if others are interested I want this posted because I need help taking the design further, I don't know that much about electronics and in order to make this a self running I need help in making the best electromagnet using the least amount of energy we can make.
You may have to post some of what I have said here so others understand the video.

Graham

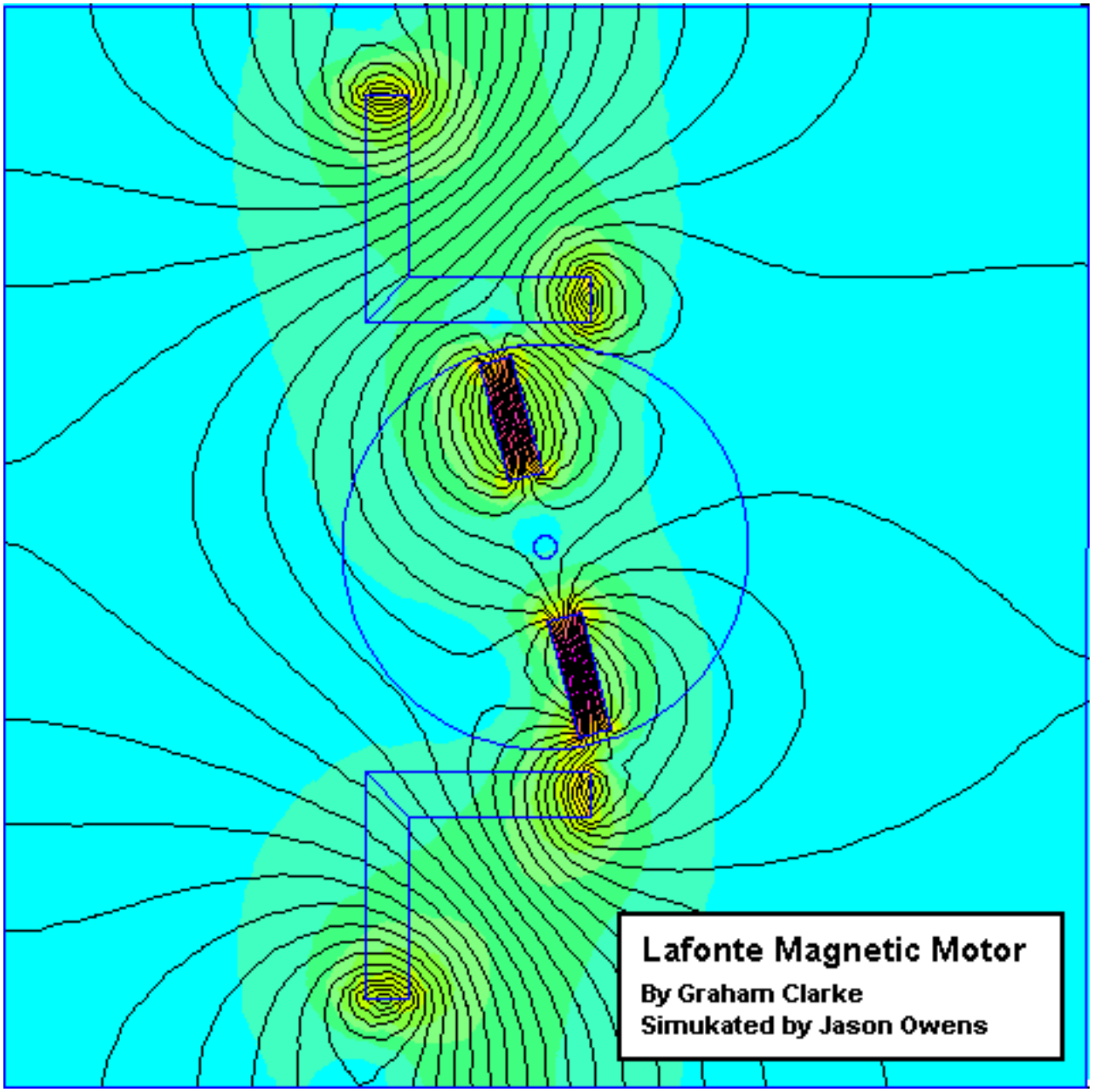
http://www.fdp.nu/shared/files/Graham%20Clarke/Gem%20motor//gem.txt

Select All | Close window



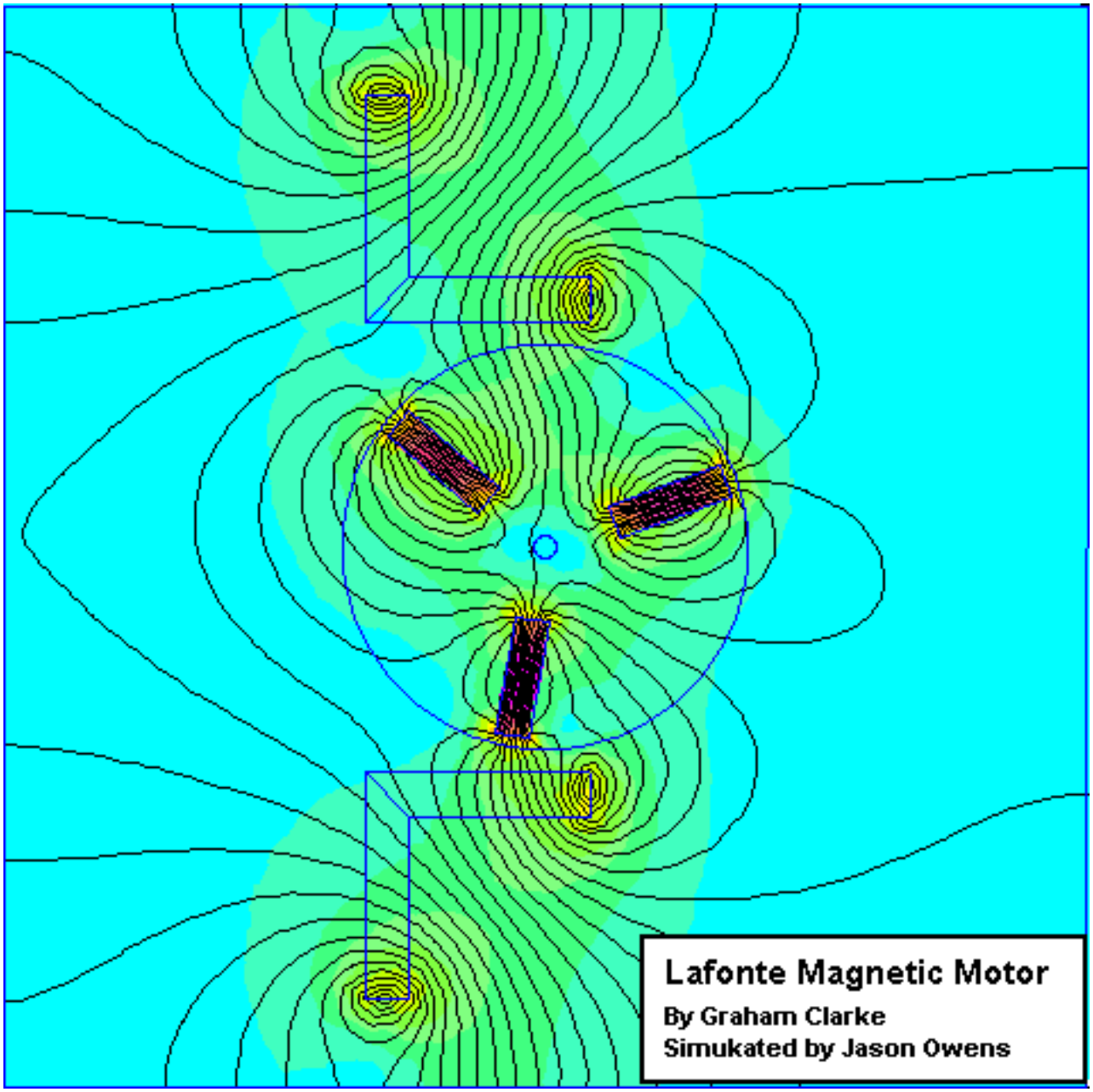
http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//Attraction_Magnet_motor.gif

Select All Close window


Lafonte Magnetic Motor
By Graham Clarke
Simukated by Jason Owens

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//Balance_Magnet_Motor_3.gif

Select All Close window


Lafonte Magnetic Motor
By Graham Clarke
Simukated by Jason Owens

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//Balance_Magnet_Motor_4.gif

Select All Close window

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//BasicOfBearingMotor.wmv

Select All Close window

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//Changingfields.jpg

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http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//Fields.jpg

Select All

Close window

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//Grahams_Atom_Motor.avi

Select All Close window

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//HowHydaulicsWouldWork.WMV

Select All Close window

http://www.fdp.nu/shared/files/Graham%
20Clarke/Ideas//MovingSensor.WMV

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In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

Sub-folders in folder: .\group\minatowheel\files\Torbay
Size of current folder: 58 of 200 Mb

Type	Folder Name	# files	Action
	.. (previous folder)	51	
	Gears	21	

Files in folder: .\group\minatowheel\files\Torbay

Type	Filename	YYYY-MM-DD	Size	Action
	2933a-15.vmc	2007-12-21	12 kb	
	new3.jpg	2006-04-08	51 kb	
	no_wedge.JPG	2006-04-08	81 kb	
	prototipo.jpg	2006-04-08	19 kb	
	prototipo_en_corte.jpg	2006-04-08	32 kb	
	Tao-Torbay11.avi	2006-04-08	167 kb	
	Tao-Torbay11.gif	2006-04-08	308 kb	
	Tao-Torbay22.avi	2006-04-08	166 kb	
	Tao-Torbay22.gif	2006-04-08	248 kb	

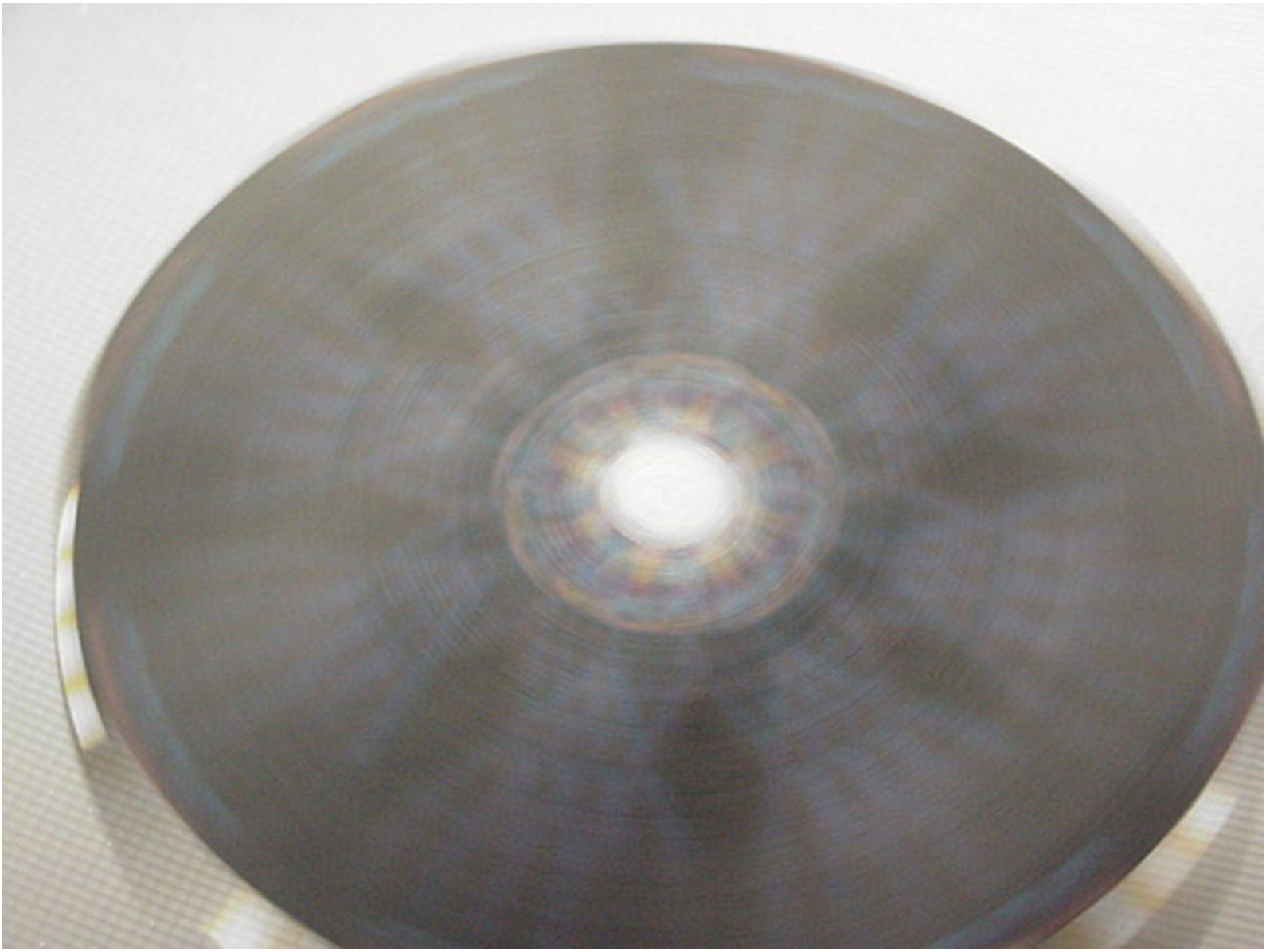
http://www.fdp.nu/shared/files/Torbay/Gears//4gearkort.avi

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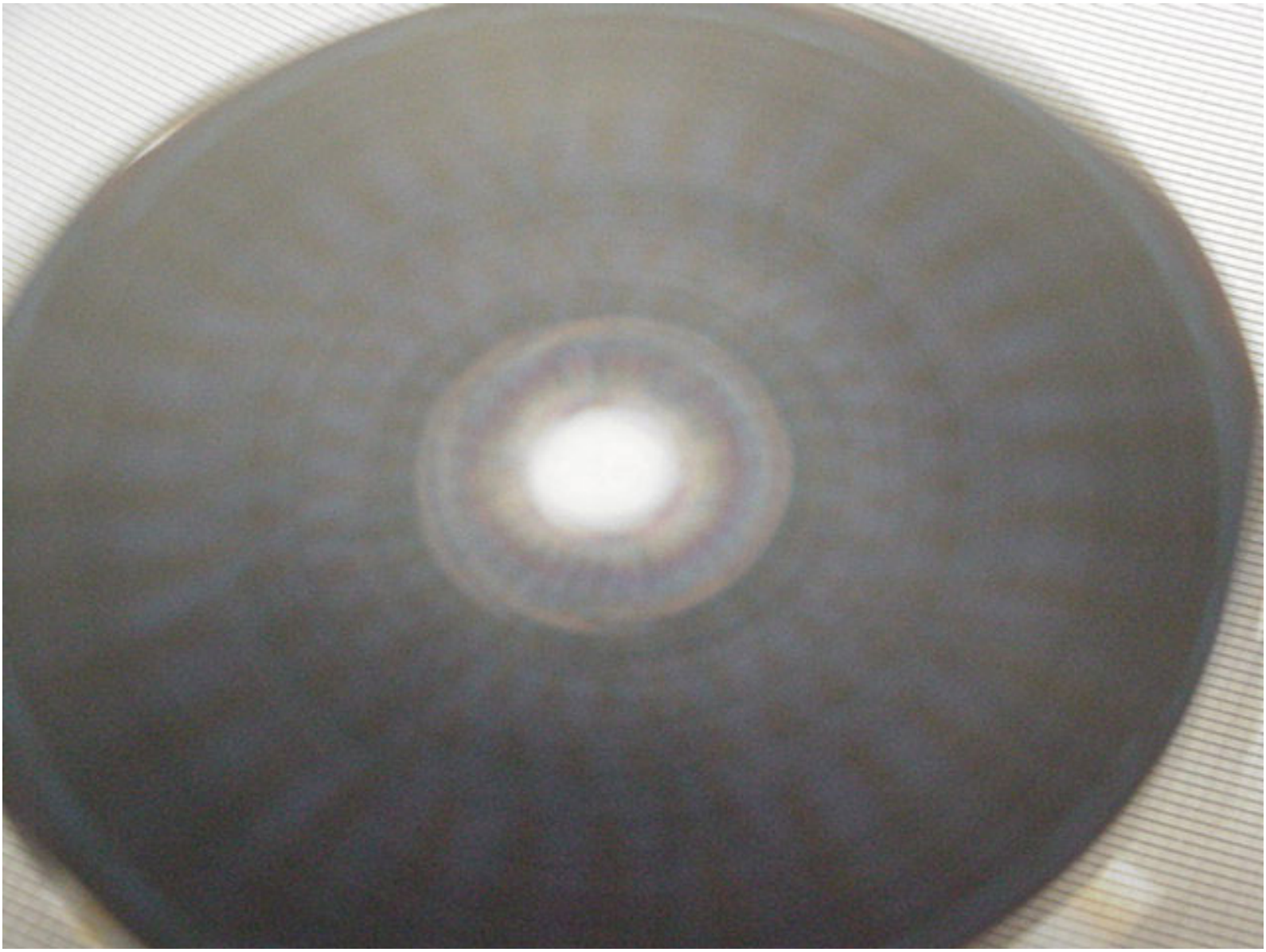
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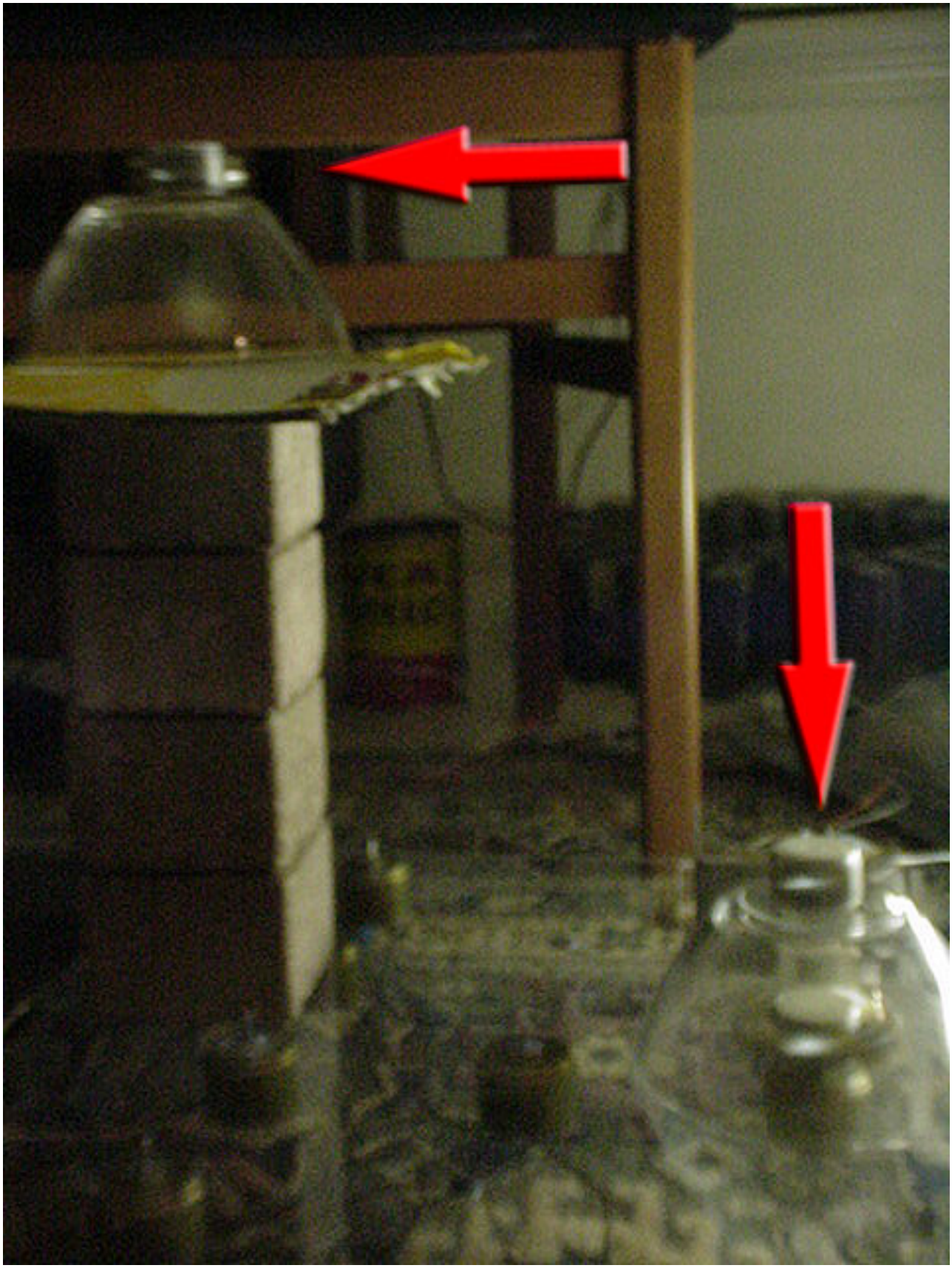
Close window



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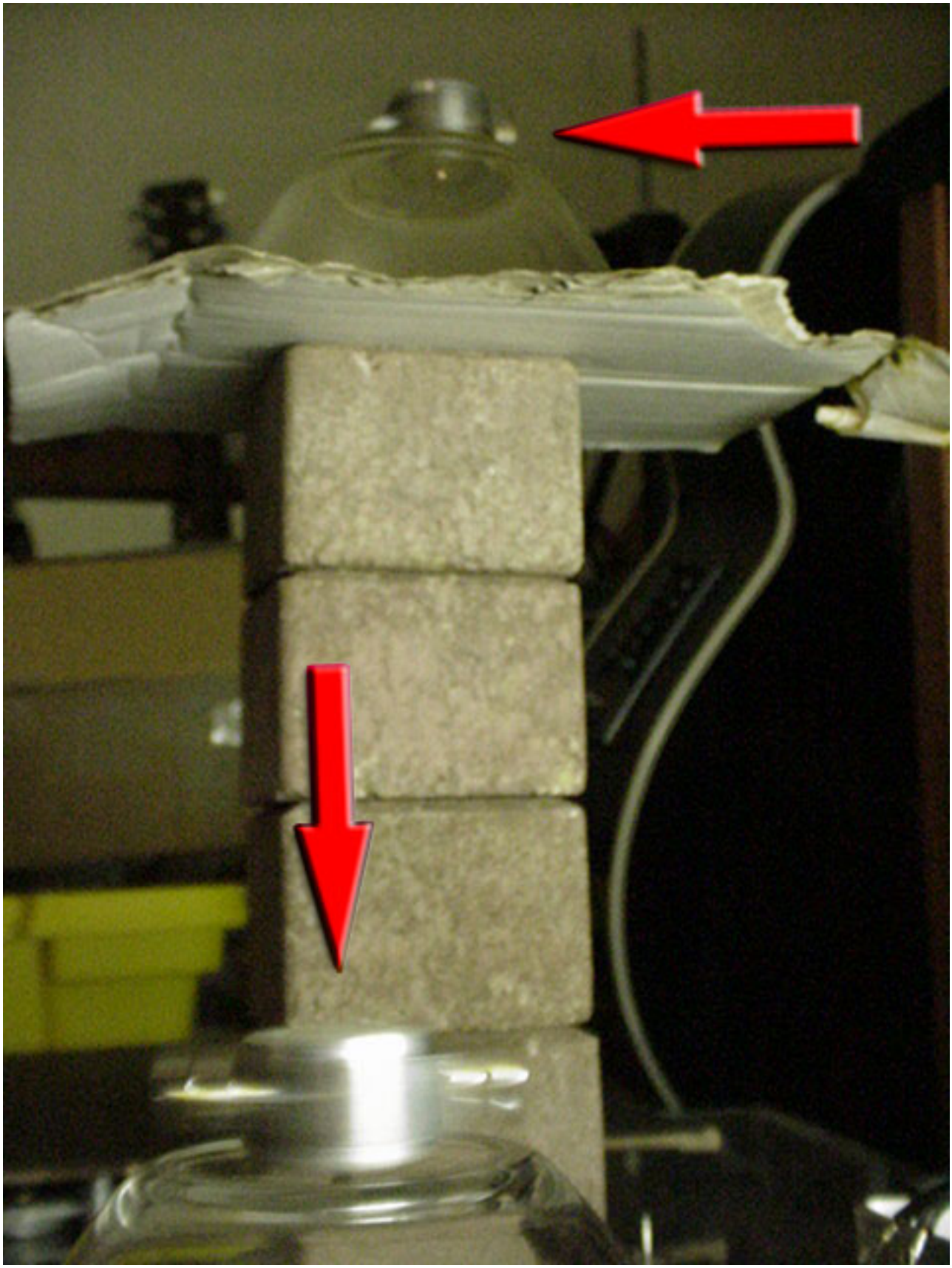
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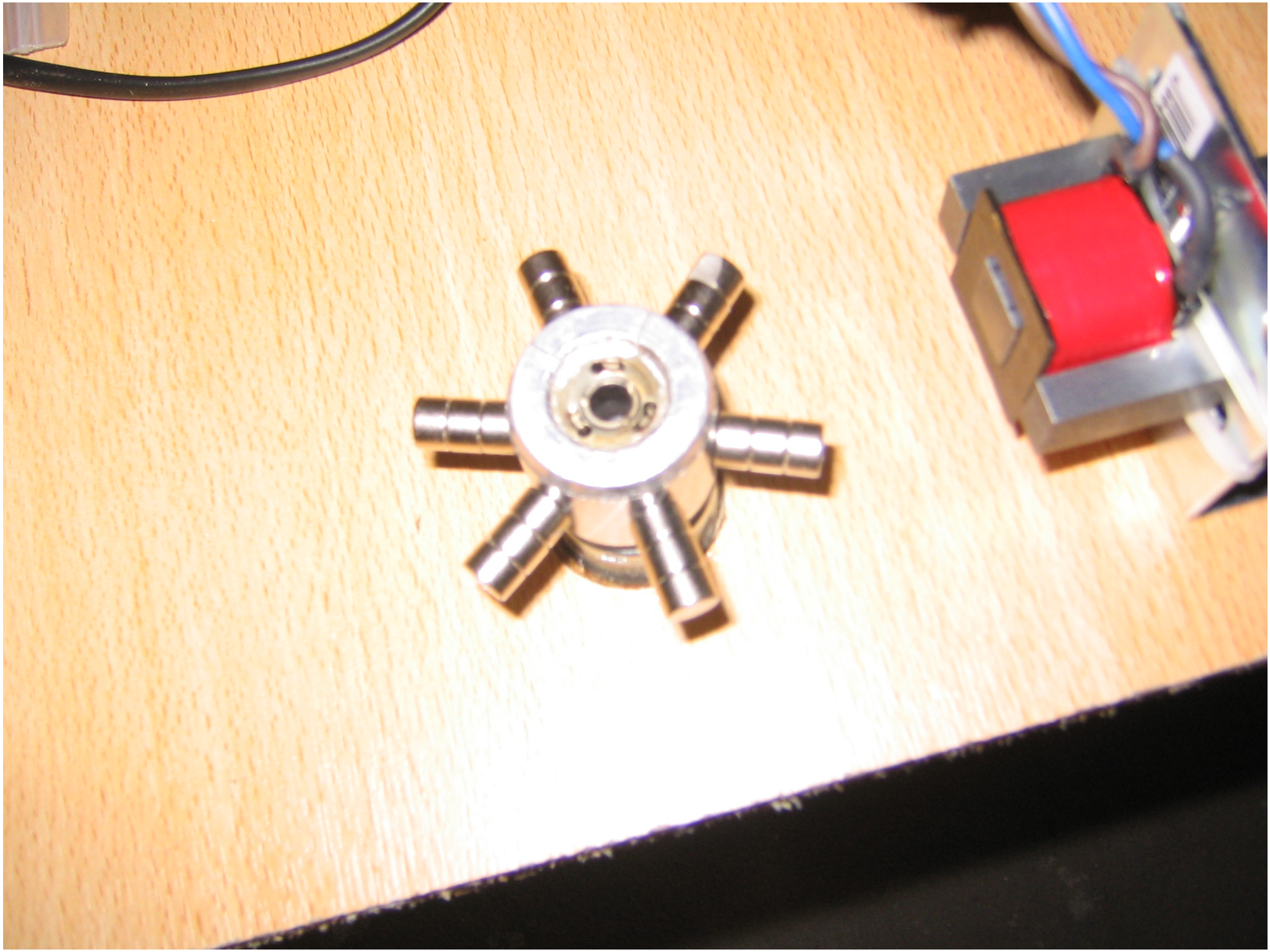
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Select All Close window



http://www.fdp.nu/shared/files/Torbay/Gears//distance4.jpg

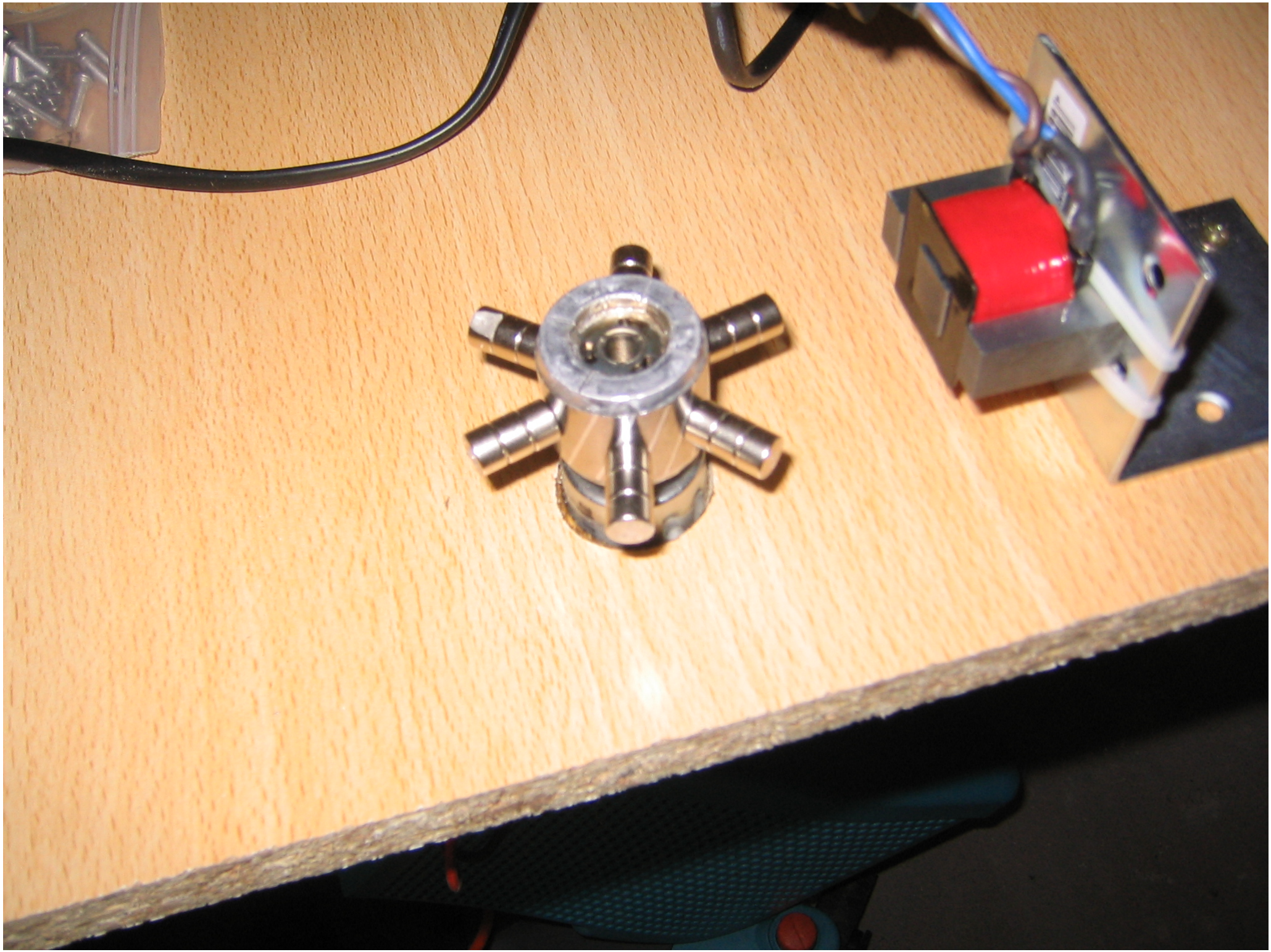
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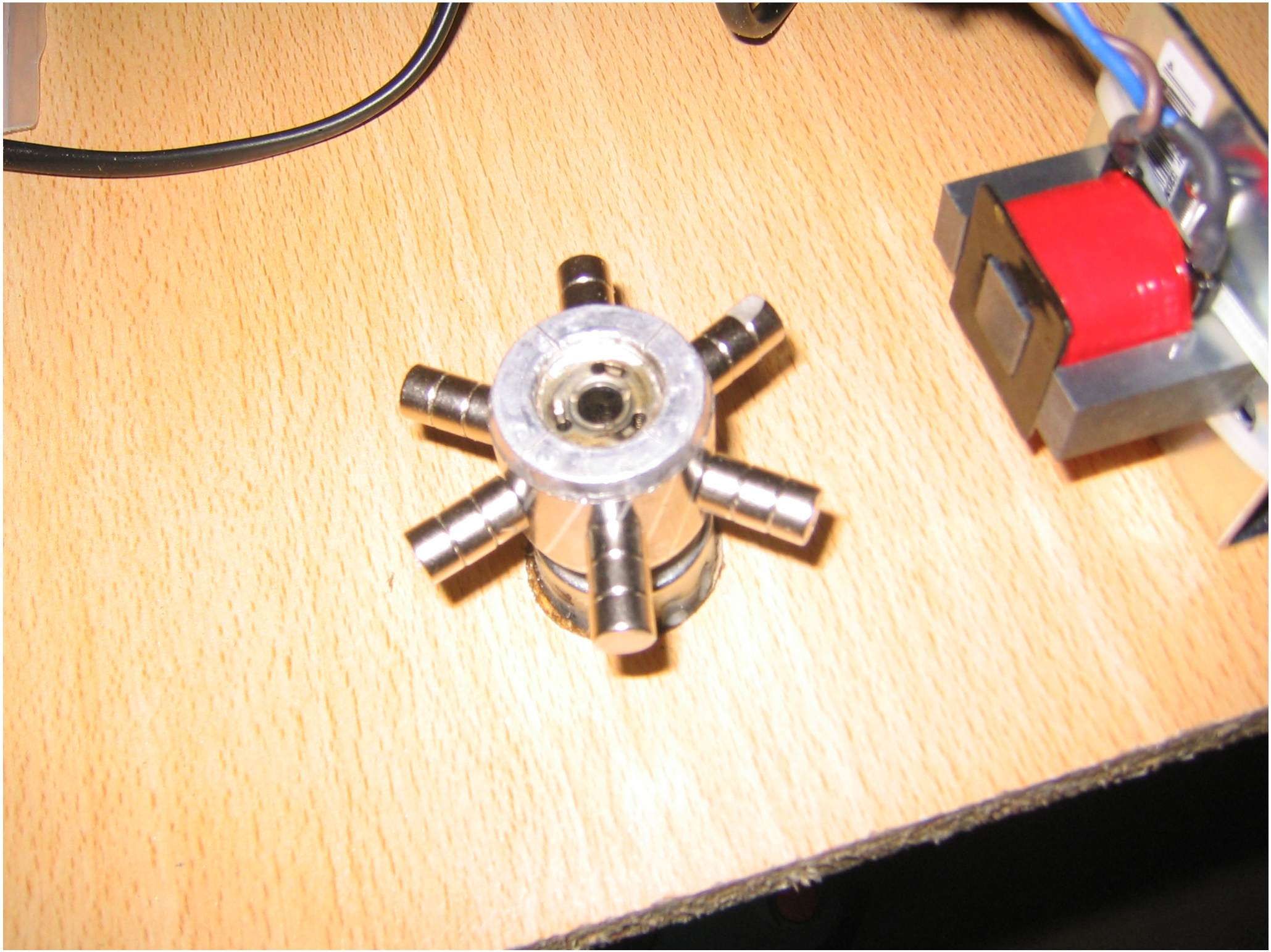
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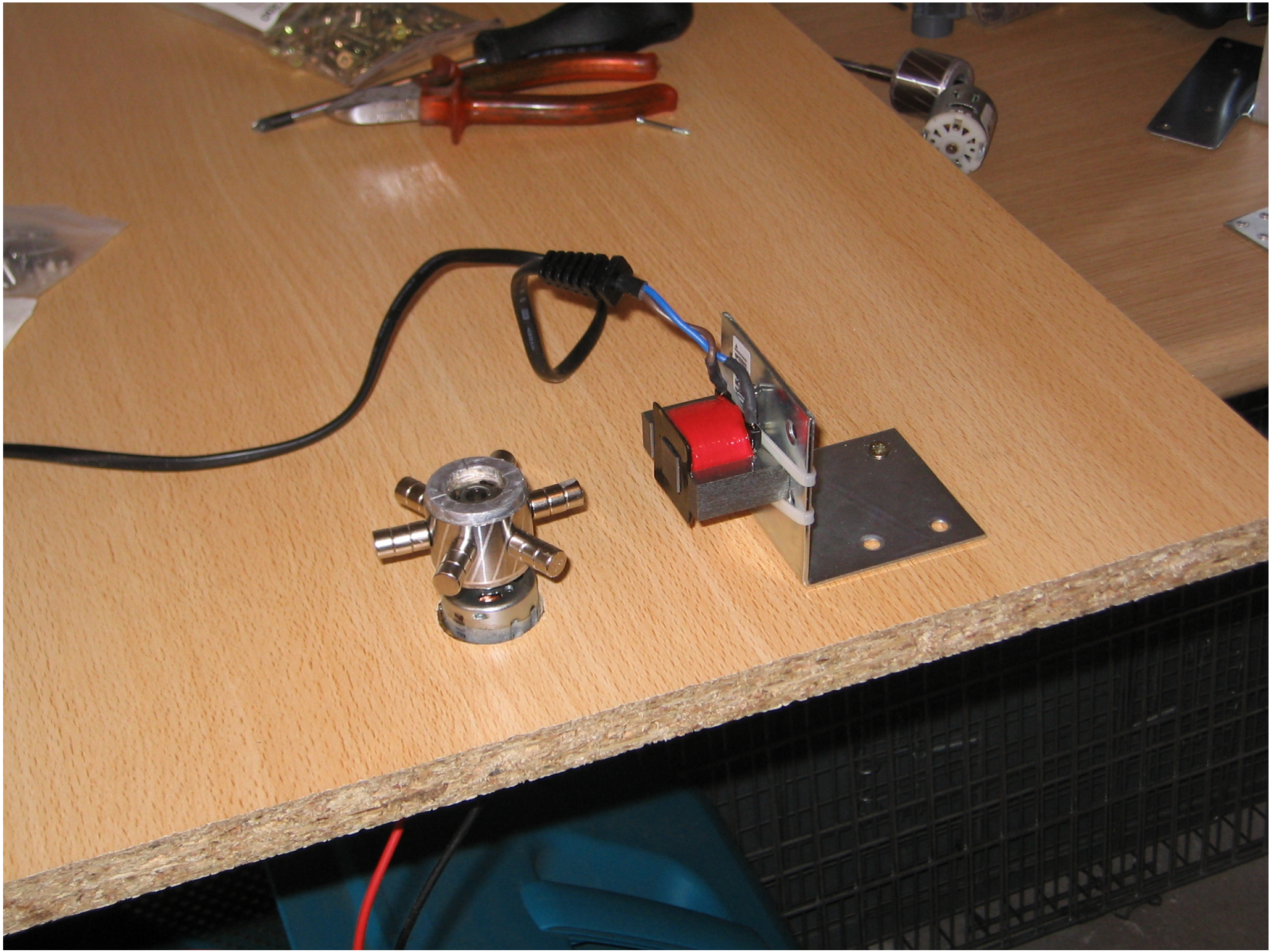
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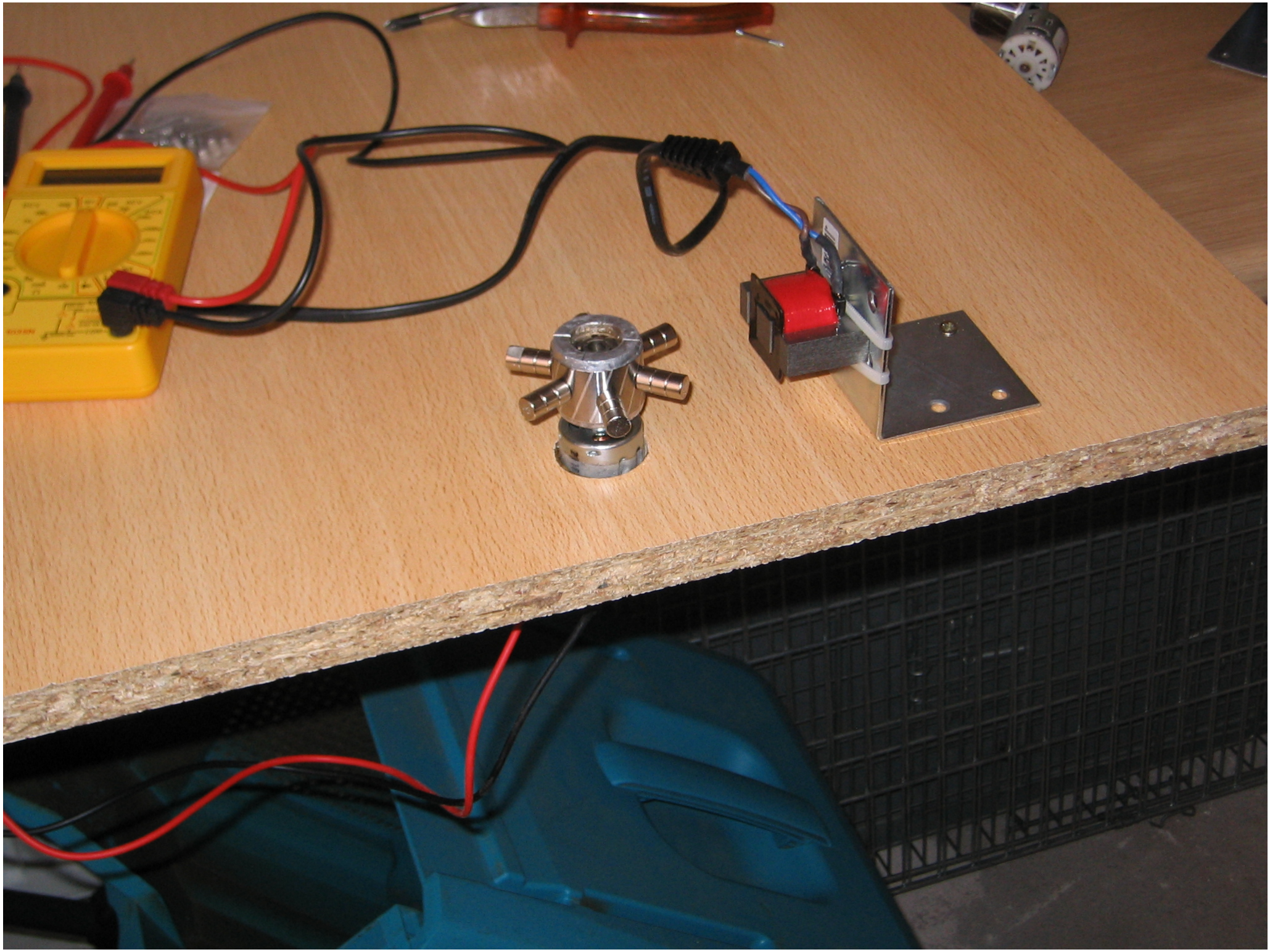
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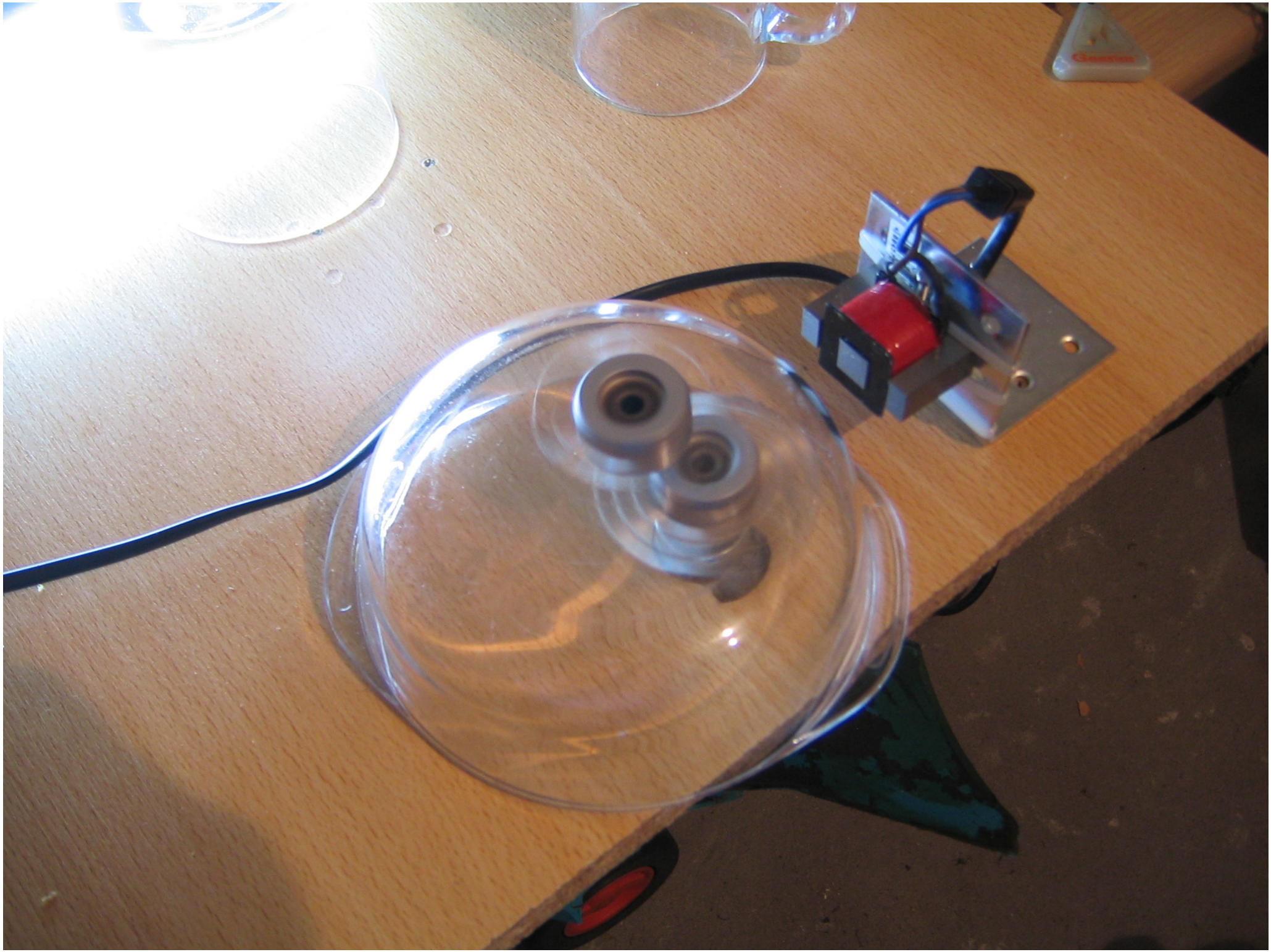
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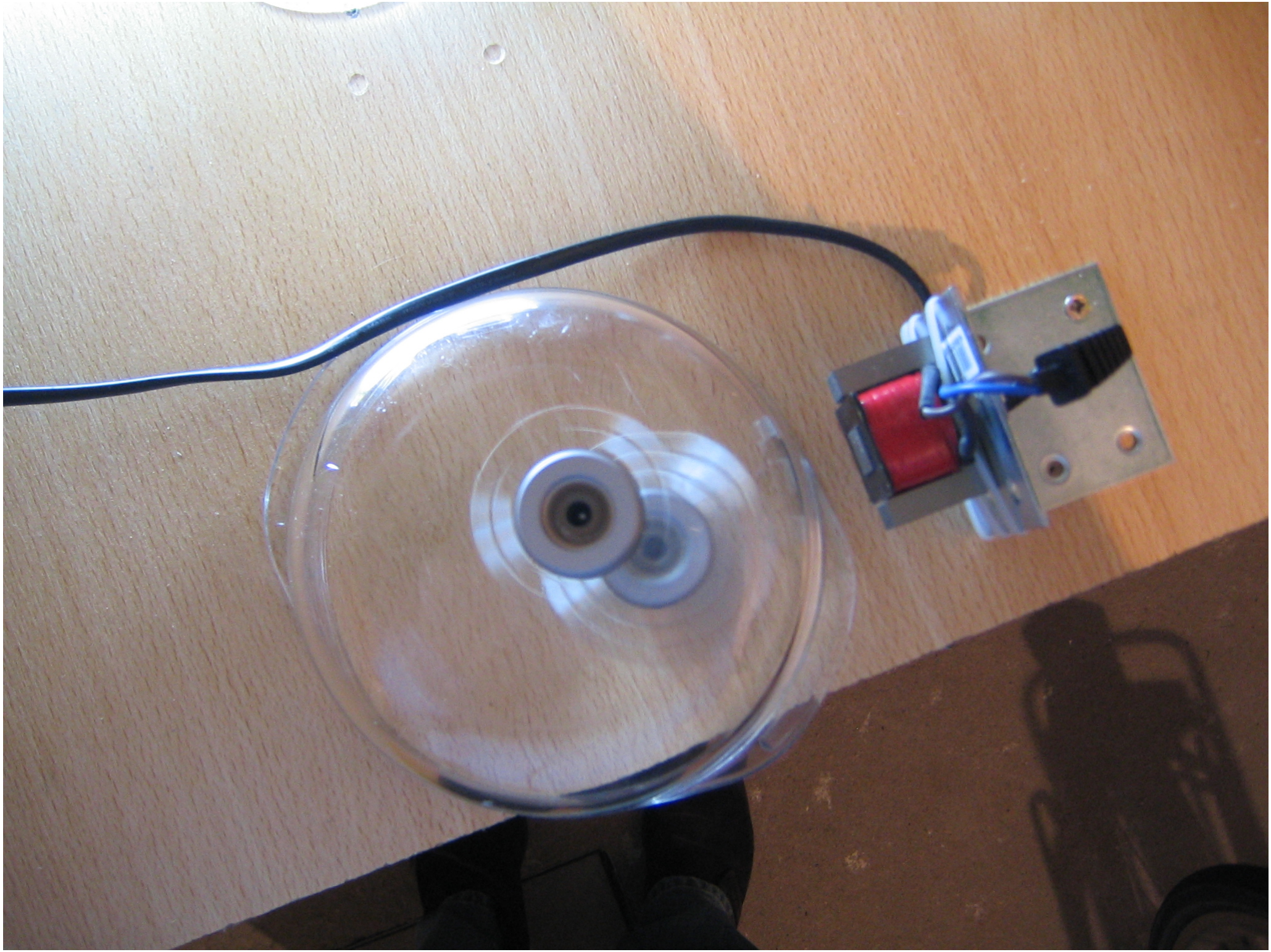
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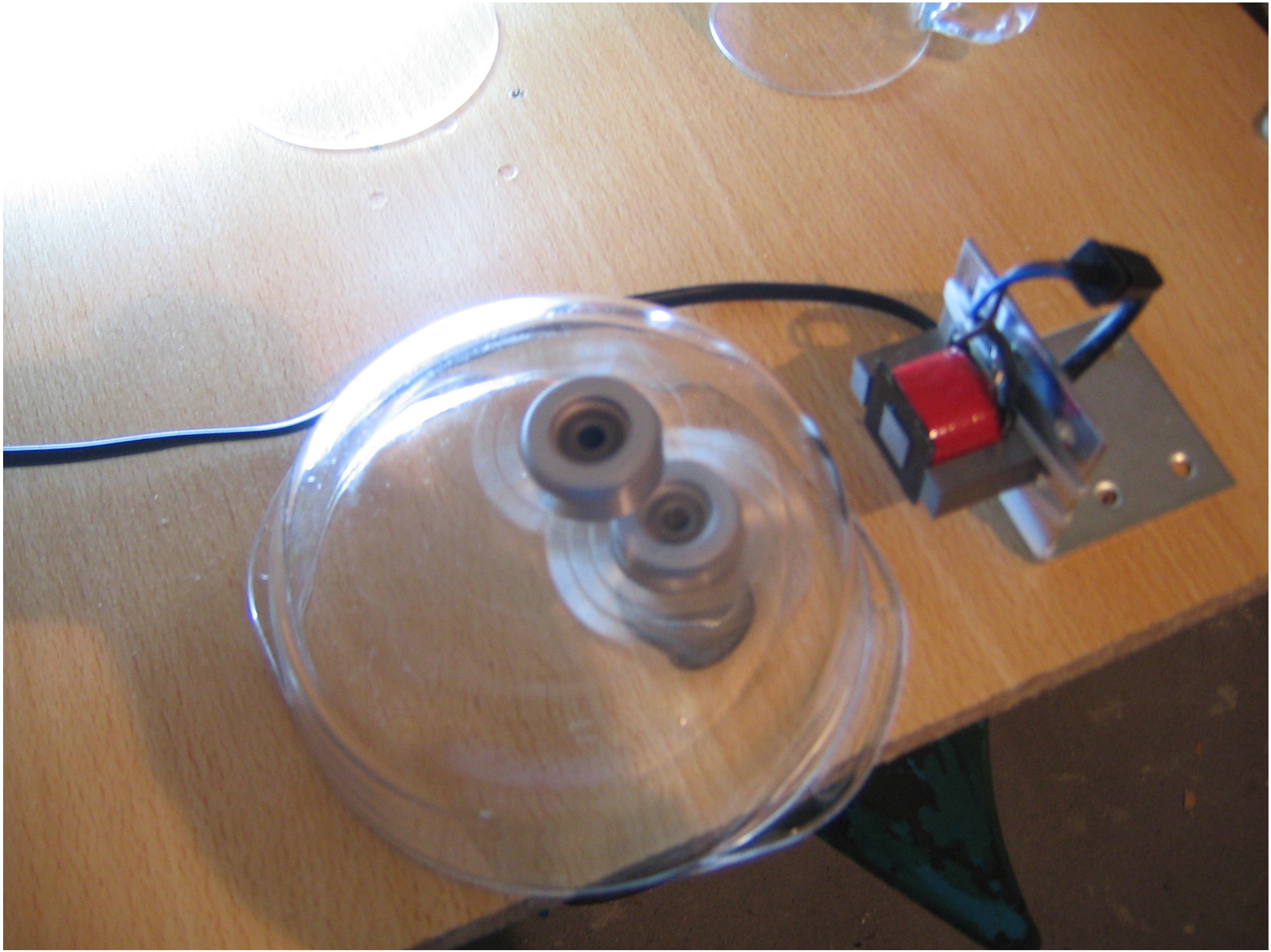
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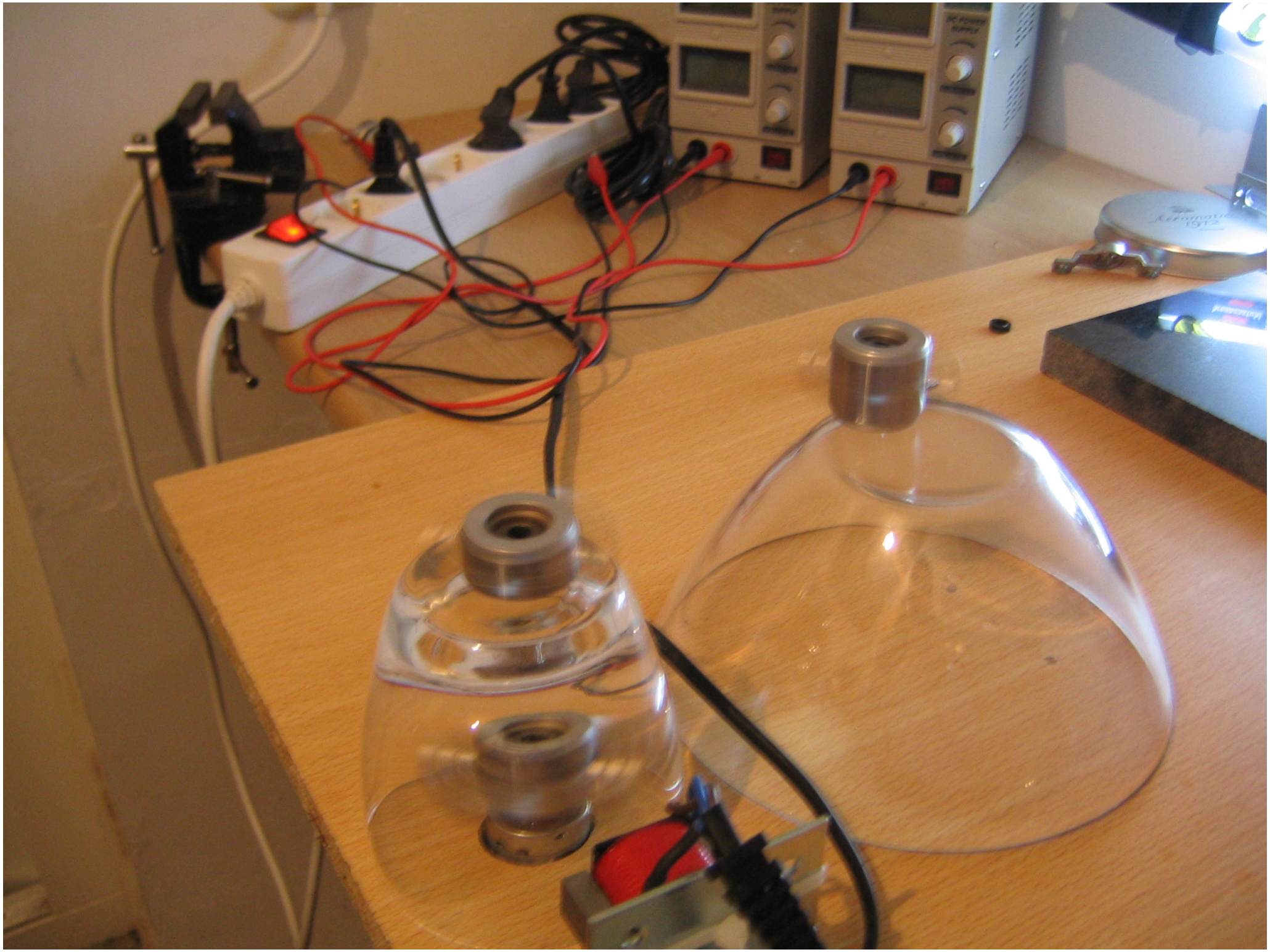
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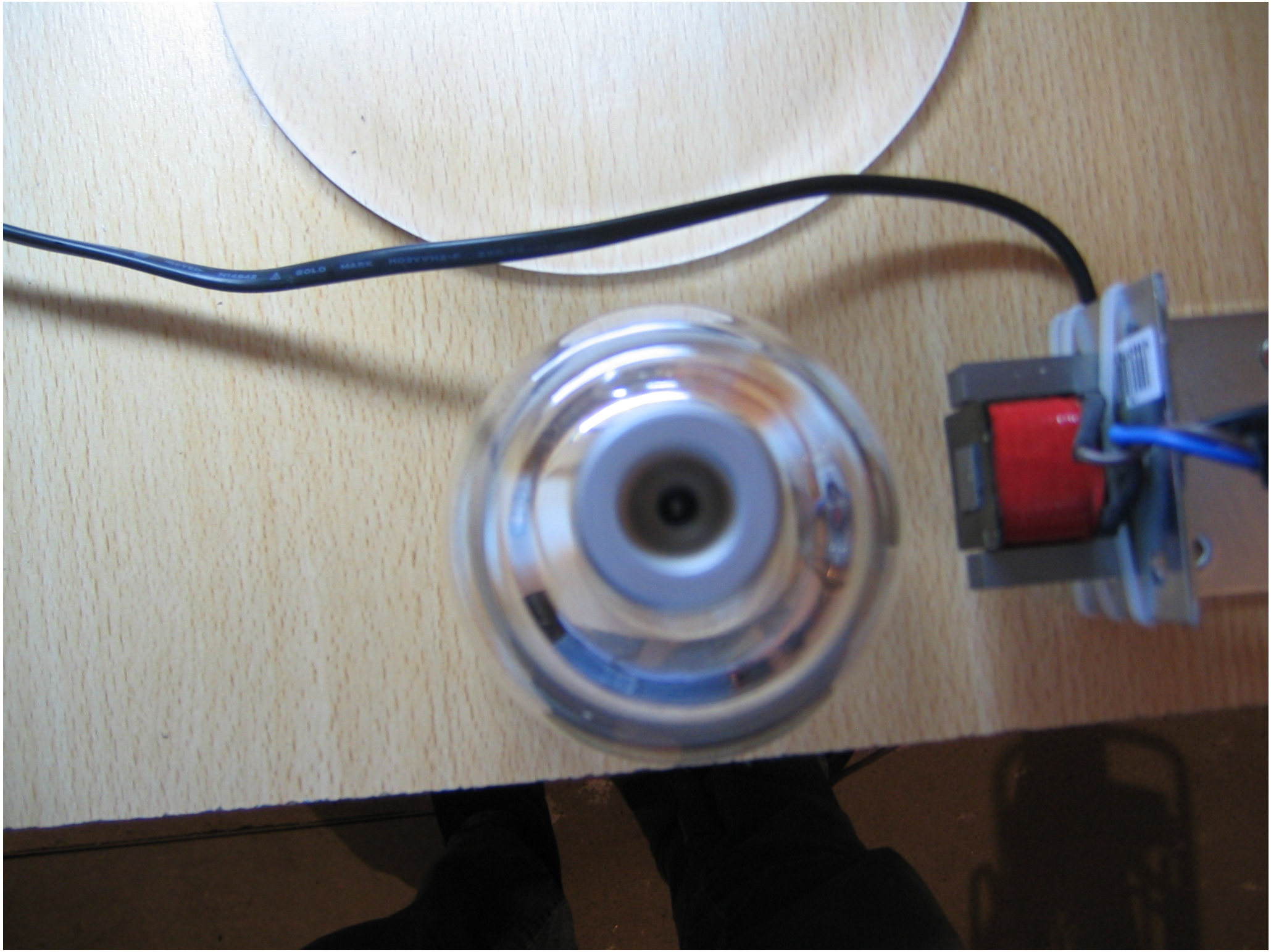
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Select All Close window



http://www.fdp.nu/shared/files/Torbay/Gears//IMG_1179.JPG

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Select All

Close window

http://www.fdp.nu/shared/files/Torbay/Gears//MVI_1166.AVI

Select All Close window

http://www.fdp.nu/shared/files/Torbay/Gears//SubRotor.mov

Select All

Close window

In case on-line viewing of a video clip doesn't work (busy server), you should try to download the file and look at it off-line.

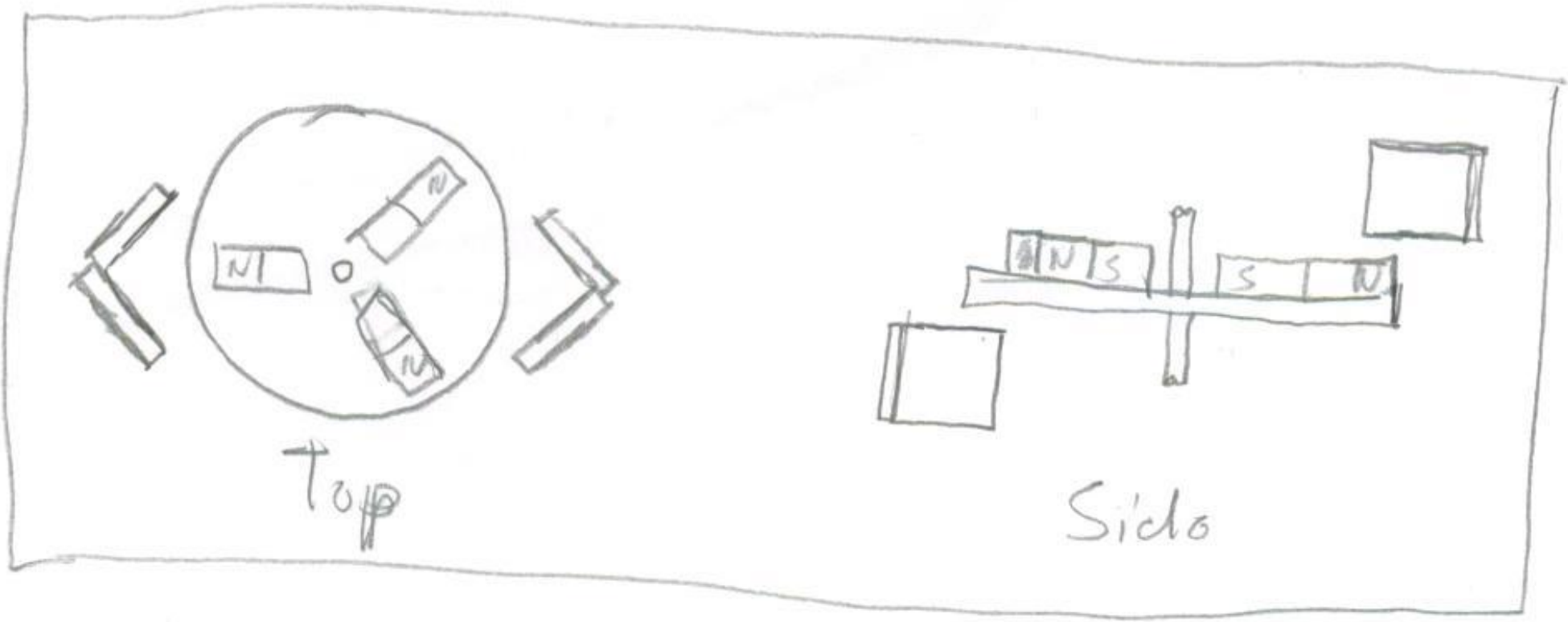
Sub-folders in folder: .\group\minatowheel\files\Graham Clarke\Corner Gate
Size of current folder: 9 of 200 Mb

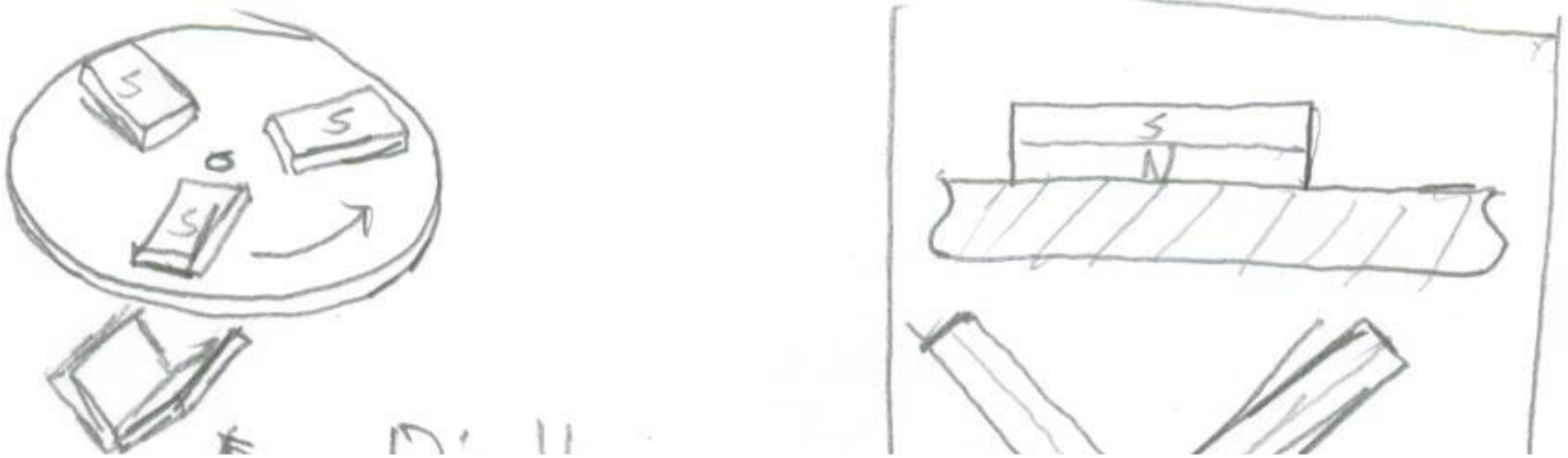
Type	Folder Name	# files	Action
	.. (previous folder)	3	
	Devices with the corner gate Some devices that use the Cornet Gate as propulsion	4	

Files in folder: .\group\minatowheel\files\Graham Clarke\Corner Gate

Type	Filename	YYYY-MM-DD	Size	Action
	AlmostBalancedRotor.wmv (Rotor going up hill through corner gate)	2006-04-05	202 kb	
	AngledRotorinRepel.jpg (Better rotor effect)	2006-04-05	38 kb	
	ArrowHeadGate.jpg (Wooden model of corner gate upgrade)	2006-04-05	34 kb	
	ClarkeMotor.jpg (A PMM idea with the Clark Gate. By Graham.)	2006-04-05	25 kb	
	CornerGate.jpg (How the corner gate works)	2006-04-05	62 kb	
	CornerGate2.WMV	2006-04-05	420 kb	
	CornerGateEric.avi (All NEO's, bar is off-center.)	2006-04-05	542 kb	

	CornerGateSetup.jpg (How to setup the corner gate)	**2006-04-05**	**33 kb**	
	Flux Density 1 Grahams Corner Gate.jpg	**2006-04-05**	**150 kb**	
	Flux Density 2 Grahams Corner Gate.jpg	**2006-04-05**	**152 kb**	
	Flux Density 3 Grahams Corner Gate.jpg	**2006-04-05**	**151 kb**	
	Graham Gate 1.png	**2006-04-05**	**33 kb**	
	Graham Gate 2.png	**2006-04-05**	**10 kb**	
	GrahamsCornerGate.wmv (Cornet gate using a bar magnet rotor)	**2006-04-05**	**331 kb**	
	RotorAtThreeOclock.WMV	**2006-04-05**	**325 kb**	
	SettingUpCornerGate .wmv (Corner gate setup video)	**2006-04-05**	**859 kb**	
	ThreeCornerGates.WMV	**2006-04-05**	**320 kb**	
	TwoCornerGates.WMV	**2006-04-05**	**454 kb**	
	With&WithoutNeoMagnet.WMV	**2006-04-05**	**612 kb**	


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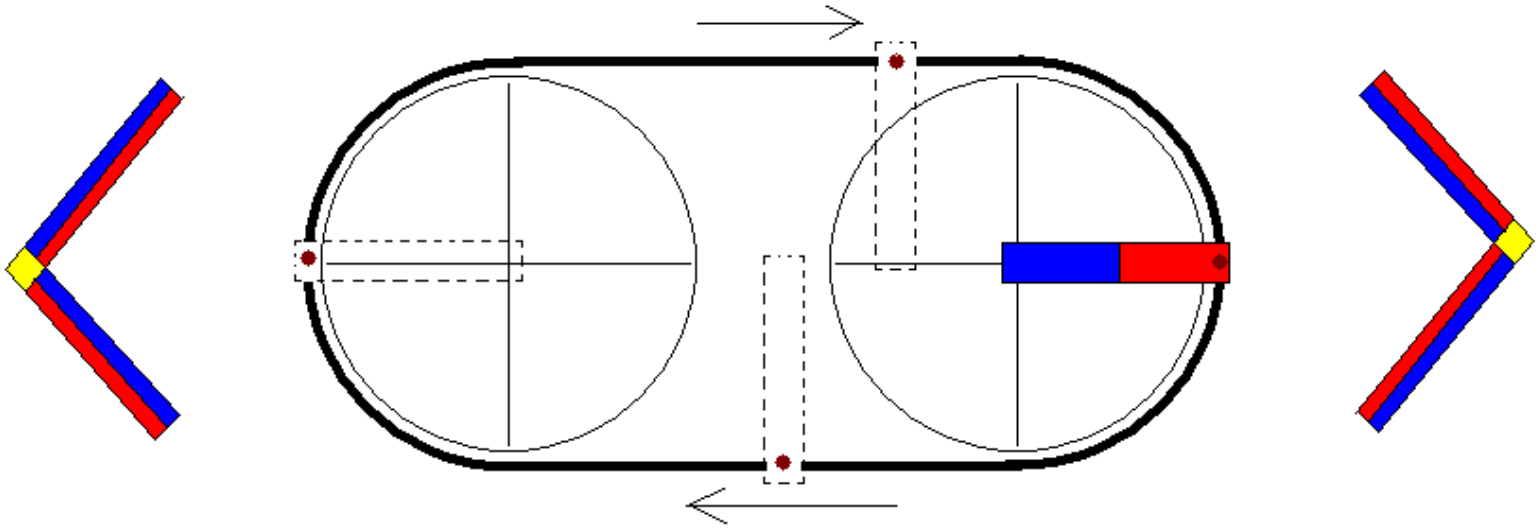


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http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate/Devices%20with%20the%20corner%20gate//Alternate%20Rotor%20Setups.jpg

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http://www.fdp.nu 19 dec '05

http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%
20Gate/Devices%20with%20the%20corner%

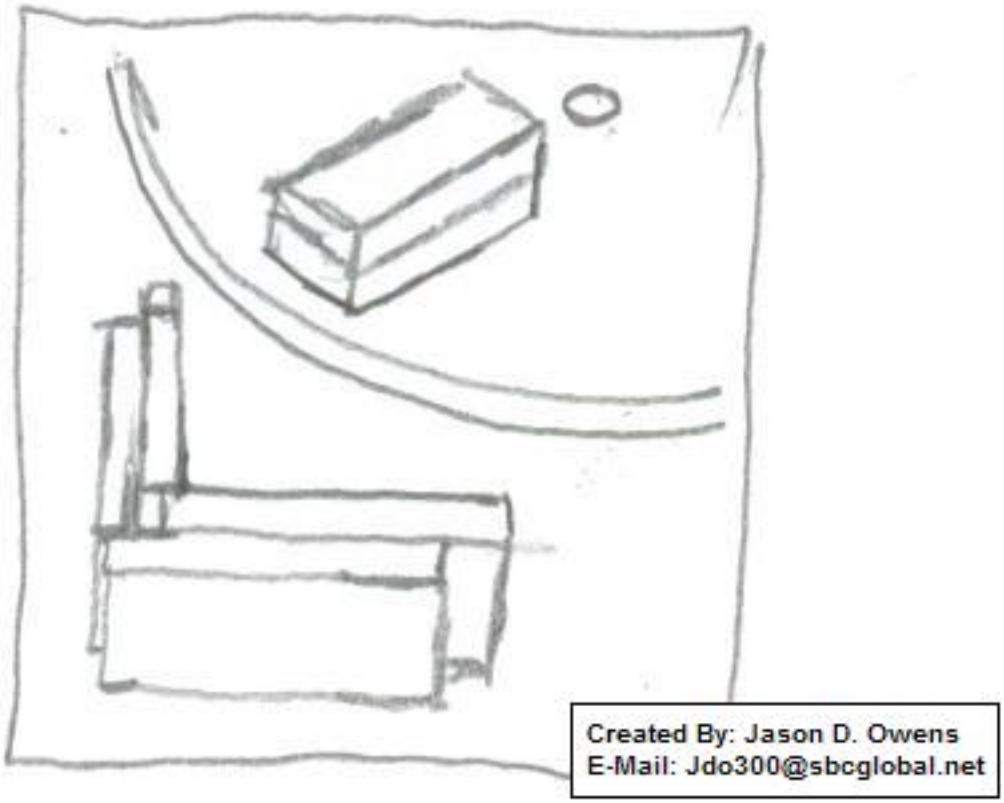
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http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate/Devices%20with%20the%20corner%20gate//gate.avi

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http://www.fdp.nu/shared/files/Graham%20Clarke/Corner%20Gate/Devices%20with%20the%20corner%20gate//Rotor%20Setup%20Idea.jpg

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