Parts

-Perspex baseplate
-Delrin stator
-R834DIA magnets for the stator
-B448 magnets for the rotor (OC)/??? bar magnets polarized end-wise for the rotor (Al)
-10 nylon 8-32 screws for stator magnets
-tiny ball-bearings for stator magnets--RC helicopter spare parts.
-Stator magnet/bearing plastic housings/holders

OC- Oct 4th 2007 First Post on New Thread *The OC Magnetic Perpetual Motion Machine*

(I decided this thing deserves a thread of its own)
New PMM configuration and animation - someone please tell me why it won't work!.

My previous animation was limited to a 5x8 configuration mostly because that was as much as I could geometrically visualize. I finally took the time to draw a 8x13 configuration and animate that as well. This looks much more promising. In fact, I don't see how it can fail.

Here it is:
http://www.imgbolt.com/files/view/100653/OC13-fast.gif
http://www.imgbolt.com/files/view/100653/OC13-slow.gif

If you want a detailed analysis of what's happening, I also have an annotated image of the first frame:

http://www.imgbolt.com/files/view/100653/OC13-Frame1.gif

Is there a sticky spot? Sure, there's a couple of them. But with all the other rotational forces in this rig, I don't see anything to stop it.

If you want to model this using some more sophisticated graphical and/or engineering software, go ahead ... and post some links to your work. Or just build the damn thing.

If anyone knows of any previous attempts to do this, I sure would appreciate some references.

OC- Oct 4th 2007

Response to sticky spot
.......A sticky spot in my terms is anyplace where there is a resistance to favorable movement. In this case, we have 2 forms of magnetic resistance in addition to such well-known things like friction and back EMF. The flip consumes a bit of energy, but not as much as most people might think. The major energy consumer is at the completion of the flip, the 2 magnets are in an attractive state, side by side, and we need to separate them such that they are in a repulsive position. This takes a lot of effort. Fortunately there are a lot of other magnets in this configuration contributing to that effort.....

OC- Oct 4th 2007

Note: I found a "flipping" magnet machine at the "Museum of Unworkable Devices".
http://www.lhup.edu/~dsimanek/museum/newacqui.htm#flip

There are some similarities. But there are also some significant differences.

1) My machine does not need gears to flip the magnets
2) Once past the sticky point, my machine uses both repulsion and attraction to provide the motional force instead of attraction alone.

eginerd- Oct 8th 2007

Nice graphic. Neat machine.

I don't see any reason that it should turn unless some outside system was rotating the stator magnets

OC- Oct 8th 2007

@enginerd,
Try it. It'll surprise you.

OC- Oct 10th 2007

Back to the topic

For those of you who don't quite believe that the magnets will rotate on their own, I took the time to set up a small demo experiment and photograph it. I created a linear representation of a small segment of the stator and rotor illustrated above. Now this is not anything that produces the overall effect, I don't currently have the proper magnets, materials, or time to do that. This is just a simple demonstration that the rotating magnets will flip polarity all on their own, without any gears or motors, etc.

http://imgbolt.com/files/100653/Exp1/StatorRotor.jpg shows the two components I created. They are flattened out segments of the 13 magnet stator and 8 magnet rotor previously illustrated.

Here's the construction materials I used to build it with http://imgbolt.com/files/100653/Exp1/Pieces.jpg, plus 9 half-inch cube neo magnets (I got careless and my 10th one shattered). The nonrotating magnets are actually 2 cubes each. The rotating magnets are 1 cube each. I attached roofing nails to the sides of the rotating magnets in order to kluge some sort of axle for them to rotate. Lots of tape and glue here. Pretty shoddy work, but maybe it will get the idea across.

http://imgbolt.com/files/100653/Exp1/RotatingMagnets.gif
In this animated sequence taken with a digital still camera, I am moving the stator instead of the rotor simply so you can see the magnetic relationships and the rotating magnets as the position changes. I actually only took one sequence of shots (17 frames from right to left) and then looped it backwards and forwards 10 times.

Nothing fancy, just a visual aid for those who don't think the magnets will rotate themselves. Have fun.

edit: I almost forgot to mention. In the static photos, you will see some toothpicks stuck into the rotating magnets. They are removed in the animation so you can see more rotation. The purpose of the toothpicks is to stop the rotation when passing through the sticky spot into a repulsive orientation. If I had kept the toothpicks in place, you would have seen only 1/2 flip.

OC- Oct 11th 2007

> *alsetalokin:*
> WTF? You know I am in favor of your ideas, OC, but here I fear you tread perilously close to Omni-bus's S-N-OT.

@Al, I only did this to visually illustrate that the magnets will rotate of their own accord. There have been comments in this and other threads claiming it couldn't be done without gears, servos, or cams. In attraction, the rotating magnets will actually align and keep themselves at an optimum angle. As we pass the sticky point, the magnets will want to flip back into attraction (as they do in this little experiment). The stop levers and ramps are designed to prevent this from occurring by locking the magnet into repulsion.

OC- Oct 11th 2007

> *alsetalokin:*@OC, I know, just ribbing you a bit.
> **But in your design, wouldn't the magnets need to rotate into position, relatively, just a bit *before* they do when you move the**

> **assembly by hand?** I mean, the *driving* rotation has to occur at a point in the cycle a bit earlier, than it occurs when the magnets are being *driven*, in order to get past the sticktion, I think. And doing it sooner is less favorable energetically...like pushing uphill instead of coasting downhill...?

That's very possible and it's something I hadn't considered. Since I haven't built it yet, the answer to that question is unknown (at least to me). I really wish someone with a magnetics lab at their disposal would actually build this thing and do the measurements.

OC- Oct 12th 2007
Back to the topic again

I'm going to try and continue the discussion about my PMM here by contrasting it with the unworkable device shown at: http://www.lhup.edu/~dsimanek/museum/newacqui.htm#flip and point out some additional faults with that system, beyond what has already described on its web page.

Both systems have something in common, rotating magnets which require effort to flip. No debate here, this does consume energy.

Stop the animation with one of the rotating magnets midway between 2 stator magnets. Note that the flip has already occurred, the gear is no longer engaged, and the rotating magnet is now free to rotate (but it doesn't seem to in the animation). If we let it rotate, it will orient itself to most favorable attraction with the next stator magnet. Unfortunately, it also aligns itself to most favorable attraction to the previous stator magnet, which will tend to resist further rotation.

In my concept, the rotating magnet is oriented so it is simultaneously repelled from one stationary magnet and attracted to the next, always in the direction of rotation. In this way, we gain the cumulative forces of 2 magnets in the desired direction instead of opposing forces.

In the unworkable device, the stator magnets are oriented with poles facing towards the center. The greatest magnetic forces will also be oriented in the same direction, not towards an approaching rotor magnet. The greatest magnetic force will be felt when the rotating magnet is near the center of the stator magnet, at the point where the gear engages. Very little of the force is oriented in the direction the rotor is turning and will tend to oppose magnet rotation very strongly.

In my concept, the "flipping" of the magnet takes place in the area between poles, where there is less resistance to rotation. And the non-rotating magnets are oriented in the direction of rotor movement. A larger portion

of the magnetic forces will be applied in the desired direction, utilizing both repulsion and attraction simultaneously to assist with continued rotor movement.

Comments?

OC- Oct 16th 2007

> *trim:* @OC
> I admire your unselfish attitude, giving away your ideas for free like you do. I wonder, if they ever proved to work whether you will regret not being able to patent them and seeing Asian countries making billions from them?

I have given things away before, some of them quite successful. Nothing with the potential this has. But it's just a persistent vision. I have no idea whether it will actually work. If it does work, I'm sure there will be moments where I'll kick myself for giving it all away. But overall, I can live with that.

I just wish someone would take it seriously enough to build it, or at least model it using a capable simulation software.

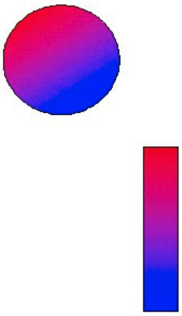
OC- Nov 7th 2007

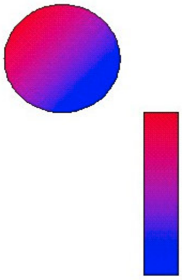
@Alsetalokin,

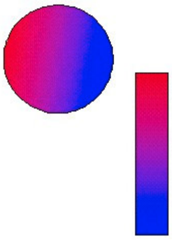
In regards to the idea I had for **reducing some of the resistance when passing through the sticky spot**, I just put together a small animation showing how the relationships between the magnets change as a rotor magnet passes the (rotating) stator magnet. This **requires some sort of spring on the rotor**. I did not draw the spring, only the magnets (springs are a lot harder to draw than circles and rectangles).

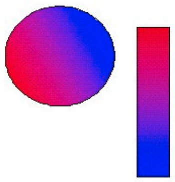
Anyway, if you want to look at the magnet orientations as the stator magnet interacts with the rotor magnet, check out this animated GIF. Animation is 5 sec per frame to allow time to read the text.
http://imgbolt.com/files/100653/MagnetRelationships.gif

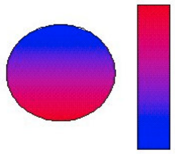
Rotor magnet (rectangular) moving up past stator magnet (round)

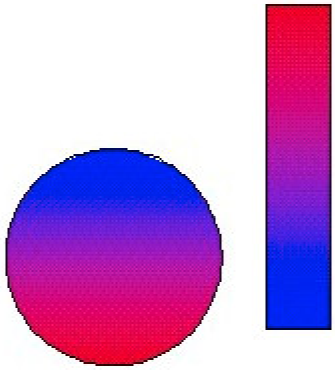






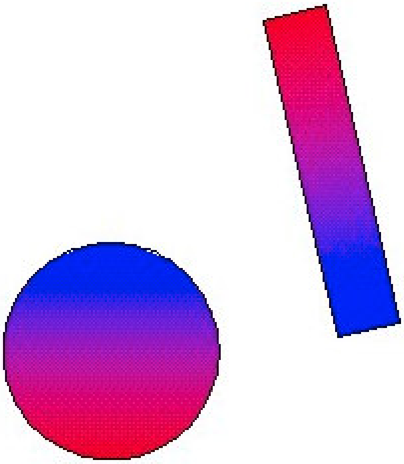






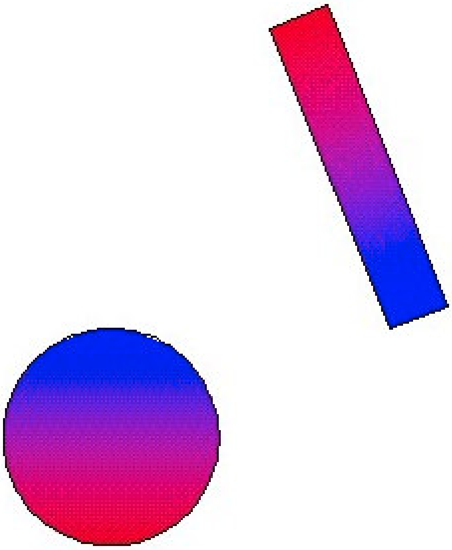
Stator magnet begins
to encounter some
resistance.

Lock in this
position until
rotor is more
than halfway to
the next rotating
stator magnet.



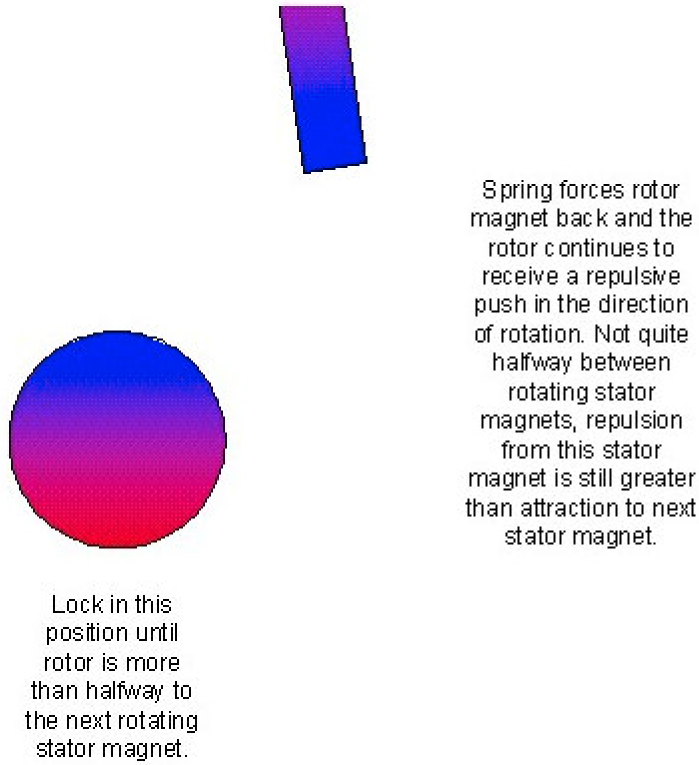
If we allow rotor magnet to tilt away from stator magnet it eases the transition into repulsion. A spring can be compressed here to allow this movement..

Lock in this position until rotor is more than halfway to the next rotating stator magnet.

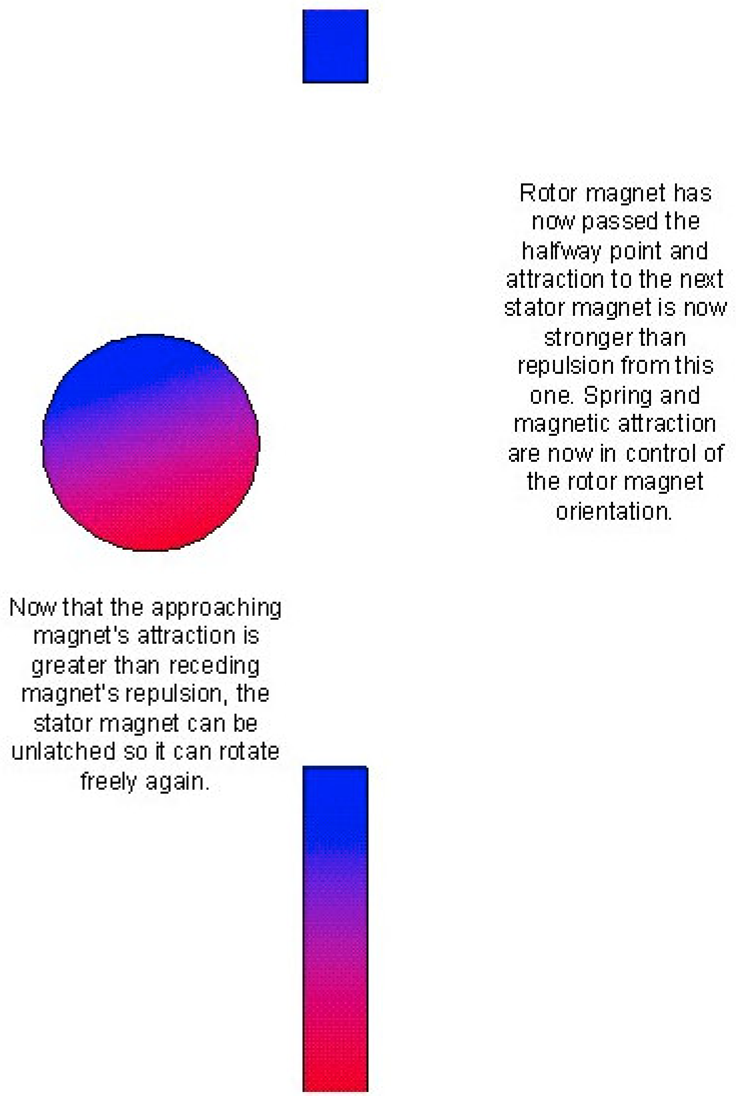


Maximum distance. Spring starts forcing rotor magnet back as repulsive forces lessen with distance.

Lock in this position until rotor is more than halfway to the next rotating stator magnet.



Spring forces rotor magnet back and the rotor continues to receive a repulsive push in the direction of rotation. Not quite halfway between rotating stator magnets, repulsion from this stator magnet is still greater than attraction to next stator magnet.
Lock in this position until rotor is more than halfway to the next rotating stator magnet.



You can get a "feel" for it by just using a couple cube magnets in your hands and follow the path I indicate in the graphic, and allow one of the magnets to rotate as shown.

Al- Nov 7th 2007

OK, that's clear enough, but I still don't see how it could possibly work--I mean, yes, if you get past the "sticky spot" sure, but that's the rub--?
I do like the idea of the springs allowing the angle of the rotor magnets to change--that's an idea I haven't seen before.
I won't let my skepticism get in the way of genuinely trying to implement your idea, though. I'll try to order some of the magnets you linked--what's the minimum number that you think will be needed?
I'm still not sure about how to implement the rotation of the stator magnets--**I**

just can't quite visualize them rolling on their own, *and any linkage I can imagine will be a loser, energetically speaking...*

OC- Nov 7th 2007

I think the optimum would be 13 rotating stator magnets with 8 spring-mounted rotor magnets. But that's just from the picture in my head. It has to be an odd/even combination, where there are an odd number of rotating magnets. I'm trying to put together something with a 5/4 configuration at the moment, my first crude attempt to validate the idea.

> I'm still not sure about how to implement the rotation of the stator magnets--I just can't quite visualize them rolling on their own, and any linkage I can imagine will be a loser, energetically speaking...

They really do rotate all on their own. You saw my crude cardboard demo animation, right? Try it out with a couple handheld magnets.

Al- Nov 8th 2007
I looked at the K&J Magnet site. Which of these would be most suitable for the rolling "stator" magnets, do you think?
R834DIA
or
D48DIA

I can see some construction advantages for the central hole, maybe. I wish I could afford to get bigger ones, but if we need 13 or so I'll have to get the smaller cheaper ones.
And given that constraint, which magnets would you choose for the "rotor" magnets?

(ETA the link to K&J http://www.kjmagnetics.com/search.asp)

OC- Nov 8th 2007
@Al,

Either would work, but I would pick (I did pick) the R834DIA for 2 reasons: tiny things don't agree with my fat fingers, and having the hole in the disc simplifies mounting it so it will rotate. I'm using 3/16" wooden dowel for a shaft and it's a good loose fit.

I also ordered some B442 (http://www.kjmagnetics.com/proddetail.asp?

prod=B442), **B444**
(http://www.kjmagnetics.com/proddetail.asp?prod=B444), **and B448**
(http://www.kjmagnetics.com/proddetail.asp?
prod=B448) **for the rotor**, so I could see what effect different rotor magnet lengths might have on the stator magnet rotation.

It looks like I might have my rotor done sometime next week. Then I can start putting together a stator. ***My initial impression for best rotation of 1/2" diameter stator magnets, the rotor magnets should be between 1/2" and 3/4" long***. *This may change with speed though.*

Al- Nov 20th 2007
Yeah, I plan to try it both ways.
Didn't get a chance to order magnets today, too busy with other things, hopefully will get a few moments tomorrow.
Do you think the rotating magnets should be on ball bearings? I can get some non-magnetic ones from Small Parts Co. if they are needed.

OC- Nov 20th 2007
The easier it is for the magnets to rotate, the better. *They will be experiencing some fairly strong radial loads as well. If you use bearings, make sure they can handle the varying load. Nylon roller bearings might be pretty good. I definitely wouldn't use jewel bearings. Teflon bushings might work pretty well.*

Al- Nov 29th 2007
Still waiting for magnets to arrive (I ordered 15 of the R834DIA http://www.kjmagnetics.com/prodimages/R834DIA.jpg), but I made a few "mock-magnets" out of aluminum so I could start making the rotor and stator plastic pieces...will be using slightly turned-down #8 plastic screws to hold these magnets to the stator baseplate...

Al- Dec 5th 2007
Magnets arrived today--15 ea. R834DIA diametrically magnetized N42 ring magnets.
These are really neat little magnets--the diametric magnetization makes them fun to play with because they stack in all kinds of interesting ways. **Also got some of the magnetic field indicating film.**
Next is to use the black magic marker to mark each magnet, by coloring one half according to its polarity.

Al- Dec 6th 2007
Progress report on the OC MPMM:
Today I made a "jig", not really a motor yet, but a circle of 10 mounting holes for the 834s on a **perspex baseplate**, with a central mounting for a **rotor of Delrin**

running on a **couple little flanged precision ball bearings.**
The 834s are mounted on the circle of 10 nylon 8-32 screws threaded from the bottom up thru the baseplate, and secured with nylon nuts, loosely so the magnets can rotate freely. I haven't put any magnets in the Delrin central rotor yet, but it is mounted on its bearings already. The central rotor is about 2 inches in diameter, a little small for a reason, and I will be making a larger one as well.
I also examined the magnets with the field viewing film and marked them to show their polarization and to make it easier to see them when they move.
I have already discovered a lot of interesting behaviors with this little rig.
Nothing too encouraging, I'm afraid, but pretty cool nevertheless.
Tomorrow I will most probably be able to make and post a short video on YouTube showing what I've done so far, so that OC et al. can criticize and suggest, as appropriate.

Al- Dec 7th 2007
OK, I posted a video of the "test jig" on YouTube. This is not intended to "run"! I just wanted to experiment with the magnets to get an idea how they would be behaving. **Note especially that the 834s do rotate like OC predicted, if the magnets on the rotor are not too far away.**
I can almost get the rotor to spin all the way around, by "driving" just one of the 834s by hand.
http://www.youtube.com/watch?v=hP0QEj4BgiE

OC- Dec 7th 2007

1) **The rotor magnets need to be oriented tangent to the rotor disc such that the fields are parallel and opposite to the stator magnets when centered in closest proximity**. This allows for a balanced response to attractive forces on the way in and repulsive forces on the way out. If the rotor magnets are oriented properly, the stator magnets should rotate better even with larger gaps.
2) The rotor magnets in your video seem a bit large. Are the poles on the large faces? I seem to get the best effects when the length (distance between poles) is equal to or slightly greater than the diameter of the diametrically magnetized magnets. **My rotor magnets are http://www.kjmagnetics.com/proddetail.asp?prod=B448 and I have tried extending them to 3/4" with 1/4" cubes.**

Have you figured out a good latching mechanism to prevent the 834s from flipping back to attraction once a repulsive force is applied on the way out (as the rotor magnet passes the closest point)?

Al- Dec 7th 2007
Umm, I don't quite follow your Point 1--any magnets mounted on the rotor will either have to be exactly radial (one pole toward center, other pole out, axis on a

radius) or on a tangent to some diameter of the rotor. Do you mean that, when the rotor magnets are at their closest approach to the stator magnets, they should be oriented tangentially at that point, that is, at 90 degrees to a line connecting the center of the rotor with the stator magnet? "Parallel and opposite to the stator magnets"--I don't get this phrase. Can you explain, or maybe draw a picture? Poles on the ends, or on the big faces?

As to Point 2--yes, they are just some ceramic magnets that I had lying about, I think they are cabinet latch magnets. They are polarized on the large faces. I intend to use bar magnets polarized end-wise, as soon as I can get some of the right strength and size. The only bar magnets I could find today in the lab stash appear to be N52 grade--I couldn't even pull them apart by hand, even though they were individually wrapped in foam. Too strong!! *I guess I'll be placing another order to KJ on Monday.*

I'm going to make little mounts for the 834s that will incorporate a circle of holes, that can hold little pins, that will provide an adjustable place for an escapement pawl to latch. *The problem here is firmly attaching something to the magnet that will be strong enough to withstand the torques likely to be generated, yet small and lightweight. I have some high-strength epoxy that might work.* But I'm definitely taking the weekend off, so it will be Monday or Tuesday before I'm back at it.

OC- Dec 7th 2007
Yes. In the little diagram above, the 834 magnet has already rotated almost 180 degrees as the rotor magnet approached. This would be its stable position at this point if no latching was performed. The 834 should actually be latched a few degrees before this point, so the axes will actually never be quite parallel.

Al- Dec 13th 2007

I can see that the rotation of the stator magnets is extracting energy from the rotation of the rotor, and so I am going to mount all the rotating magnets on ball-bearings. That means I need to go to the LHS (local hobby shop) to get a handful of *tiny ball-bearings--RC helicopter spare parts.*
Jaro K. tells me that I should only use one, or perhaps two, magnets in the rotor, until I get the spacing and positioning roughly tuned.

Al- Dec 13th 2007
OK, now that I understand my polarity mistake and have corrected it--
I have to say this:

I am amazed. Overconfident's design comes closer to "working" than any magnet motor design I have yet encountered (and I have seen a few, believe me.)

The little test jig I built is already pretty amazing, even without the mechanism for latching the stator magnets.

Not that I have been converted, you understand--but if I drop out of sight and turn up slumped over in an airport parking lot, you'll know what happened.

OC- Dec 13th 2007

You ain't seen nuthin yet. Wait until you get the latches in place on the stator magnets and add the spring mechanism to the rotor magnets, then scale up the number of magnets to 5x8 or 8x13 (5x8 was what I saw in my dream, but 8x13 looks even better once I took the time to draw it).

OC- Dec 13th 2007
alsetalokin:Hmm--it would seem that the alternating rotor polarity would require there to be an even number of magnets in the rotor?
Whereas the chained polarity could be done with odd or even numbers?
(alternating= n-s s-n n-s s-n etc. around the circle
chained= n-s n-s n-s n-s etc. around the circle)

You are welcome to try the chained polarity BUT I think the alternating polarity is the only way there is a chance for it to work. As far as putting an ODD number of magnets on the rotor, just take what you have now, hold the rotor still and spin the stator ... voila, you now have a rotor with an ODD number of magnets.

Al- Dec 13th 2007

OK, good. For a minute there I thought I was totally lost!
So for the alternating polarity we agree that there must be an even number of magnets.
It turns out that I am really busy in the lab today so I may not get a chance to do any real work.

(ETA did you see the note I put with the pics about the differences in the rotating magnet rotations? **I have confirmed--the rotating magnets rotate 2 full turns for each full revolution of the rotor in the alternating config,** ***and the rotating magnets rotate 4 full turns for each revolution of the rotor in the chained config.)***

Al- Dec 14th 2007
27.692307692307......

which means that even I can't maintain that accuracy...
if I use 27.7, that means 0.1 degree of accumulated error around the circle, so 12 gaps will be 27.7 degrees
and 1 will be 27.6 degrees.

Al- Dec 14th 2007
I began laying out the 13x8 baseplate today, and I have someone out buying more ball bearings. This one will have a 6" diameter rotor.
Also I explained a bit of what was going on to the boss, who also has an interest in these matters. He laughed, but it was very hard to pull him away from the Test Jig #2 assembly. He was fascinated...

I made the 13x8 baseplate, laid out the hole pattern, drilled and tapped the holes, attached the LRFs (little rubber feets). Also cut and trued a blank for the rotor. I didn't have any Delrin of the right size so I cut the rotor blank from some UHMW plastic, or maybe it's HDPE, but anyway it's nasty stuff, not nearly as nice to machine as Delrin. But I got it done nevertheless.

OC- Dec 14th 2007
@Al,

Latching should occur to stop stator magnet rotation just before the 2 magnetic fields become
parallel/opposite

----><----

For the 5-magnet stator, maybe about 15 to 20 degrees before the magnets align. For the 13-magnet stator, about 5 to 10 degrees before alignment. Sorry I can't give better figures. The tolerances on my rig aren't very precise.

Latches should release when the approaching rotor magnet (in attraction) and the receding rotor magnet (in repulsion) are equidistant from the respective poles of the stator magnet. I'm afraid I haven't given much thought to this part yet. I'm just using toothpicks and my finger to stop rotation and I have to remove them each time in order to make more headway. I have considered some sort of magnetic triplever that releases the latch when the rotor reaches a certain position, but haven't really done any experiments with that concept. ***For initial testing some small solenoid latches could be used*** (doesn't provide any real power to the mechanism, just latches at the appropriate point).

Al- Dec 14th 2007
re latching: I think I see where you intend the latch to occur, but wait till I have a chance to post photos
showing the rotation of the various parts, with some reference marks, so you can

see exactly where, on this jig.
I was thinking of using some notches or teeth machined into the magnet housings, a spring loaded pawl to do the latching*, *and a cam or "bumper" on the rotor itself to release the pawl. That way there's only the mechanical motion of the machine doing the work. But I like the solenoid idea too, it might make testing easier, as you say.
It's fascinating to put the field-viewing film over the assembly and watch the interplay of the fields as everything is rotating.

OC- Dec 14th 2007
One thing I just noticed, the spacing for the stator magnets seems closer than it was on the 4x5 rig. I hope it's not too close. **There needs to be approximately twice the rotor magnet length, maybe more, between the rims of the stator magnets**.

We might need to go for a larger rotor. Oh well, let's see how it behaves

Al- Dec 15th 2007
Hmmm-yes, I see what you mean. I think there might wind up being about 3/2 length between, now. Might be a little small.

OC- Dec 15th 2007
It needs some space to accelerate and gain momentum between stator magnets. You are welcome to try this one, but I don't think it will be optimum. I can't give exact figures because I haven't got that far myself. It will take some trial and error (or a good simulaton) to determine what works best.

Al- Dec 15th 2007
re the size and spacing of the 13x8 model: I left it at the lab, and we are snowed in right now, but >>

I estimate (from the photo) that the holes are 4.2 cm apart. The stator magnets are 0.6 cm radius. So that means they will be 3 cm apart, edge-to-edge. These rotor magnets (in the 5x4 jig) are about 1.35 cm long. So that should be good--yes?

OC- Dec 16th 2007

Al,
I would consider that to be an absolute minimum. Go ahead and try it. You may want to experiment a bit. Just set up a couple stator magnets and use an adjustable length rotating arm with a single rotor magnet on it. Latch the first rotating magnet into place and observe how the rotor magnet behaves with different radius and distance between stator magnets. ***I seem to get (subjectively, I'm just going by feel) best response (strongest forces, most gain of momentum) between 2 and 3" center-to-center, using 1/2" long rectangular***

neos on the rotor.

OC- Dec 16th 2007

@Al,
Since we may have some idle time to discuss things, due to the blizzard, let me take the opportunity to do a quick review of where we are going and to throw another wrench into the works. I don't know if this will be necessary, but it's possible it could add some additional impetus.

We have discussed the required field orientations (**latching of rotating magnets**) and the minimization of resistance in repulsion (**hinged, spring loaded stator magnets**). There is one more topic I have not really covered. I briefly mentioned to Cloud Camper at one point that I also had **a way to introduce magnetic viscosity into the equation**. I have no idea whether it will make any difference, but there IS a way to add that as well. Unfortunately, it will most likely require some major redesign of the rotor.

If we use a rotor that has spokelike disc instead of a simple, round disc, where each spoke/arm has a magnet mounted at one end and is either hinged at the hub or has a certain amount of flex in it, we can have some dwell time at the point where each magnet provides maximum positive H to the other and reduce the time where the fields are in opposition (maximum negative H).

1) As the rotor magnet approaches the stator magnet the arm will tend towards it, compressing the spring in one direction, allowing the rotor magnet to get closer, sooner than it would otherwise, leading the rest of the rotor and *maximizing the time spent in the attractive field.* **(slow in)**

2) When the magnets are in closest proximity, the spring will relax and allow the rotor magnet to stay close until the spring compresses in the other direction to a critical point, lagging a bit. Then the combined forces of the rotating rotor and the spring action will *cause the arm to "jump" quickly past the sticky spot, minimizing the time spent in the repulsive field.* **(fast out)**

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Current rotor

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Proposed rotor for leveraging magnetic viscosity

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o = a shaft, axle, or pivot point
^ = pawl
zzz = spring
rotation is clockwise
```

The viscous effects can be enhanced (slowed) by adding some small soft iron discs or washers to the ends of the rotor magnets.

OC- Dec 20th 2007

A good place to start would be with the pole facing directly towards the next stator magnet on the repulsive side, then rotate a bit away from the rotor to allow the opposite side to have a bit more effective attraction for the approaching rotor magnet. Each stator magnet will be simultaneously repelling one pole and attracting on the other, so both sides need to be considered. **Once you establish a good response on the repulsion side, rotate a bit away from the rotor to favor the attractive side a bit.**

Then rotate 180 degrees and latch again with opposite polarity for the next passing rotor magnet.

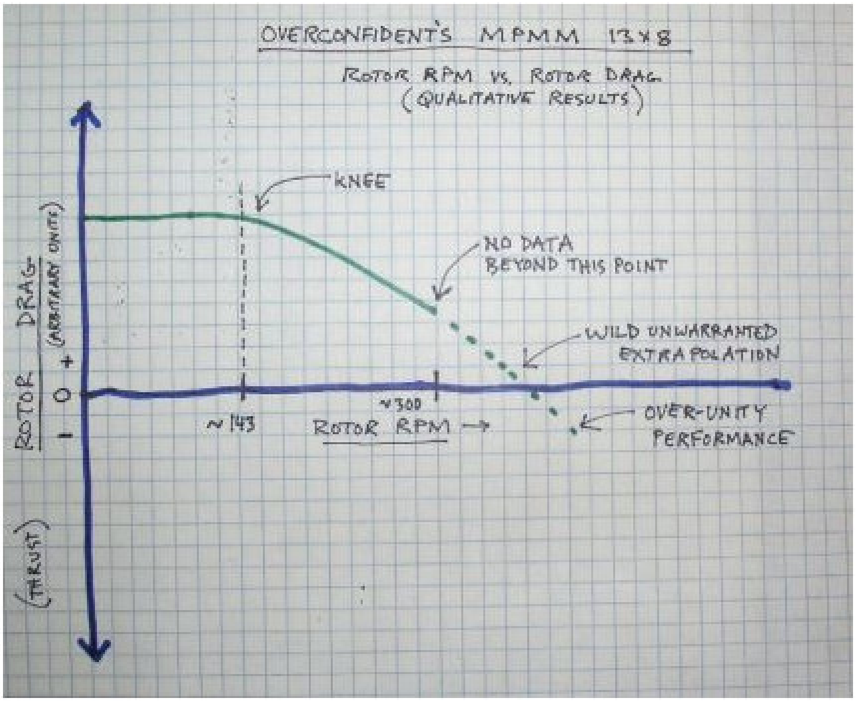
Some way to adjust the latches might be nice. If things start spinning really fast , we might want to retune things a bit.

Latch release should occur when the rotor magnet is somewhere around midpoint between stator magnets, maybe slightly before.

Al- Dec 21th 2007

I am already able to generate the kind of data with this rig, that makes people believe that PMMs might be possible.
To wit: rotor drag is inversely related to rotor RPM, at least over a limited speed range in preliminary testing.

Let that sink in for a while.



Al- Dec 22th 2007

I have described how the rotating magnets move in an oscillatory motion, like a washing machine agitator, as they are rotating. I believe the "knee" shown in the data graph occurs as the rotation of the stator magnets becomes so fast that they no longer "agitate" but rather rotate more or less smoothly all the way around. The acceleration of the rotor must be smooth and gradual so the stator magnets can stay locked in phase with the rotor magnets.
To be sure of this I will have to view the unit under the StroboTach, which, of course, is at the lab.

I'm sure this behavior will change when latches are implemented...

OC- Dec 22th 2007
Remember when I said the stator magnets looked too close together? I said then that I thought they should be spaced 2 - 3" apart. I just sat down and did some experiments using a couple of my "834" magnets and a 1/4" x 1/2" bar to see what the ***optimum stator magnet spacing*** would be. **I come up with about 4" center-to-center for an optimum distance.** *This is far enough apart that stator magnets have a minimum influence on each other and close enough for them to provide a significant continuous acceleration and increase in momentum in repulsion and attraction from one stator magnet to the next.* 4" is considerably larger than what we have now. Looks like we will need a 17 or 18" diameter rotor to get what I would consider optimum spacing.

One other other thing I noticed is ***the gap between rotor and stator magnets.*** *If we can cut this down to half, we'll be able to increase the available forces by 4x when magnets are in closest proximity.*

Al- Dec 23th 2007
Hmmm---bigger is not good for a number of reasons, such as cost of materials, stability and balance,
portability, and so forth, at this stage. It would be better to get smaller and/or weaker magnets, if it comes
to that.

When I incorporate the pivoting feature on the rotor magnets, the clearance to the stator magnets will be smaller.

The smaller rotor for the 5x4 version behaves interestingly when all its slots are filled with the flat
magnets, using mutual repulsion to shape the fields a bit asymmetrically.

I forgot to mention that JK, the real magnet motor specialist in our lab, has been looking over my shoulder with interest, and chuckling under his breath in some Slavonic dialect. (He's also the one who believes the Earth is hollow.) He has pointed out that mutual repulsion is stronger than mutual attraction at comparable distances. And of course most magnet motors attempt to make use of this fact in some manner

OC- Dec 23th 2007
@Al, the vision I had in my head when I woke up that morning was of a 5x8 configuration, as illustrated in one of my earlier animations. Afterwards, I sat down with pencil and paper and sketched out some other configurations. The only arrangements that "felt right" were 3x2, 5x8, and 13x8. When I thought about it a bit I realized there was a pattern here. They were all Fibonacci odd/even pairs, and the odd numbers were all prime. I guess I may have let that, possibly irrelevant, insight influence my concept.

The only hard requirement is that one side must have an even number of magnets in order to provide the alternating magnetic fields. The other side must have an odd number of magnets AND there must not be a common factor between the two sides in order to prevent more than one rotor/stator magnet being in the sticky spot at any given moment (6x9 would definitely be a bad choice