Increasing the Efficiency of Simple Lever Machines
By Increasing the Mechanical Advantage
Using Magnetic Levitation, A.K.A. "The Effect"

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Levitation Effect Demonstration Device

Abstract of the Discovery

The date of the Discovery was September 9, 2017. Mr. Rowley, an amateur physicist for most of his life, has experimented with magnets and magnetic flux lines/fields for over 20 years. During several experiments during the summer of 2017 Mr. Rowley discovered a levitating effect by placing the repelling poles of two bar magnets at specific angles of attack (other than the standard 90 degrees) in a controlled manner. If this controlled repulsion could be harnessed it could be incorporated into a lifting platform for raising and moving weights/masses. This paper discusses the general consensus of magnetic force and magnetic levitation, the cause of the new levitating effect, and the results of testing this new effect through a demonstration device. This important discovery

could have many benefits for mankind in reducing the energy requirements of certain simple machines and electric motor driven platforms.

Introduction

Classical Physics teaches us that permanent magnets do no work. Permanent magnets do not move a mass forward and upward against gravity by itself. Lorentz's Law denotes that the magnetic forces between other magnets and ferrous materials assume only perpendicular movements***. [1]***

The Lorentz's equation states:

F = q * v * b * Theta (sine) F = force in Newtons q = charge of particle in Coulombs v = velocity in m/s b = magnetic field strength in Teslas (T)

This equation shows a full lifting effect (levitation) when the repulsive forces of the magnet fields are at a perpendicular angle or 90 degrees. The sine of 90 degrees is 1***. [2]*** This effect is how maglev trains suspend above the tracks. But no work is done because no weight is accelerated to a higher plane against the force of gravity.

The sine of 180 degrees and the sine of 0 degrees equals 0. So the force would be equal to 0. What will be looked at in the paper will be the Sine of 30 degrees. Following this law and plugging in the sine value for 30 degrees should reflect a smaller force than the Total Force generated if the sine was equal to 1. We will return later in the paper to analyze the findings.

"What is Levitation, really? Apparently two magnets, in the horizontal position, with similar poles in opposite directions will reject one another. You can already imagine how the one on top floats above the one laying down." ***[3]*** "In 1842 British mathematician, Samuel Earnshaw proved that it is impossible to put two magnets is such balance. ***[4]***

The movement of the MagLev ***[5]*** train is parallel to the ground and moved by a secondary force, electromagnetism, to propel the train down the tracks.

"Maglev (derived from magnetic levitation) uses magnetic levitation to propel vehicles with magnets rather than wheels, axles and bearings. With maglev, a vehicle is levitated a short distance away from a guide way using magnets to create both lift and thrust." ***[5]***

When the Maglev train is lifted it also has to be propelled down the track and guided. "Levitation and Guidance Systems/Levitation implies vertical support and guidance implies lateral support to insure that the train does not run off the track." ***[6]***

Another use of levitation is to raise objects from the ground to above the ground using electromagnetism. For example lifting scrap metal and car parts at a junk yard using a large electromagnet attached to a crane.

Another use uncovered was the "Magnetic levitation apparatus and Method by inventor Louis P. Quinn" ***[7]*** "These and other purposes, objects, and advantages are realized in a method and apparatus of levitating objects in a magnetic field comprising, positioning at least one electromagnet above an object or objects to be levitated and connecting the electromagnet to a switchable electrical power source." ***[7]*** In order to raise the objects permanent magnets are attached to the objects. The electromagnet is energized and the object is lifted because of the different fields of attraction.

The methods and uses shown up to this point include electromagnets and some permanent magnets. What is proposed is an apparatus that uses only permanent magnets and a small electric motor for the driving force. The apparatus is designed to mimic the levitating effect discovered when bringing two bar magnets together and intersecting the repelling magnetic flux fields at an angle of 28-33 degrees. The question remains, "Can permanent magnets be arranged in a certain array/angle that they are able to reduce the Force required to raise weights on an inclined

plane?" Using experiments and the demonstration model several procedures were developed to test this assumption. If levitation is able to be achieved it should lower the weight of an object against the force of gravity. The results should show the reductions in the force necessary to move an object up an inclined plane.

Experimenting with An Inclined Plane with an Angle of 30 degrees

Manual experiments were developed to test the forces necessary to move a mass up an inclined plane using a model ramp with an incline angle of 30 degrees. The inclined plane is a simple machine invented thousands of years ago and used by the Egyptians to build the pyramids. The inclined plane or wedge allows the user to have a mechanical advantage of moving a mass to a height that is greater than where the mass is currently located.

Model of Inclined Plane Used in the Experiments

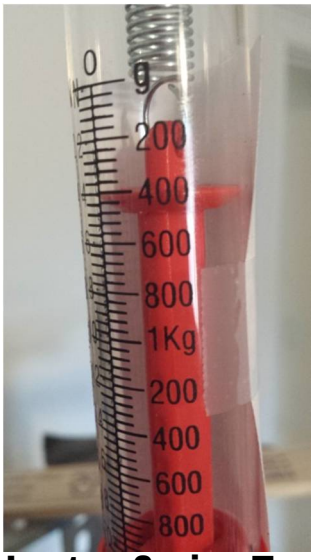
The force (in Newtons) required to pull a set of weights in a small cart (with wheels) up an inclined plane were measured with a pair of Newton Springs Tool. Next the experiments continued with a set of wooden dowels underneath the base of the model ramp. These setups are considered frictionless or *"Ideal Inclined Plane"*. ***[8]***

If there is no friction between the object being moved and the inclined

plane, the device is called an *Ideal Inclined Plane*. This condition is met when the base of the inclined plane is fixed and the object to be moved is gliding on wheels or casters.

Experiments continued by adding casters to the base of the inclined plane. This would change the inclined plane into a wedge because the wedge in now moving and considered frictionless. A lift rod was attached to a fixed guide post. The weighted cart was attached to the lift rod. This arrangement would cause the weighed cart to rise up vertically with the lift arm when the inclined plane or ramp was pulled underneath.

The force (in Newtons) required to move the rolling ramp instead of the cart was similar to the force (in Newtons) to move the cart when the ramp was fixed. The Newton Spring Tool was used to take the measurements.



Newton Spring Tool

Picture of the cart stationary on the ramp

The force acting on the inclined plane is an example of Newton's Second Law and states:

F = m a

Force is equal to mass times acceleration. ***[9]***

The standard mathematical equation related to the Force required to move a mass up an incline ramp assuming no friction on the surface of the incline plane is:

F(N) = (m)(g)(sin0) ***[10]***

Note: In the demonstration tests we are using equations that assume frictionless components such as casters on the cart and rollers or bearings on the bottom side of the wedge. Using the demonstration device certain variables will remain constant throughout the testing. The first constant is the mass. The mass being lifted is constantly set at 621 grams. The second constant is the angle of the inclined plane is always 30 degrees.

The letters in the equation are as follows:

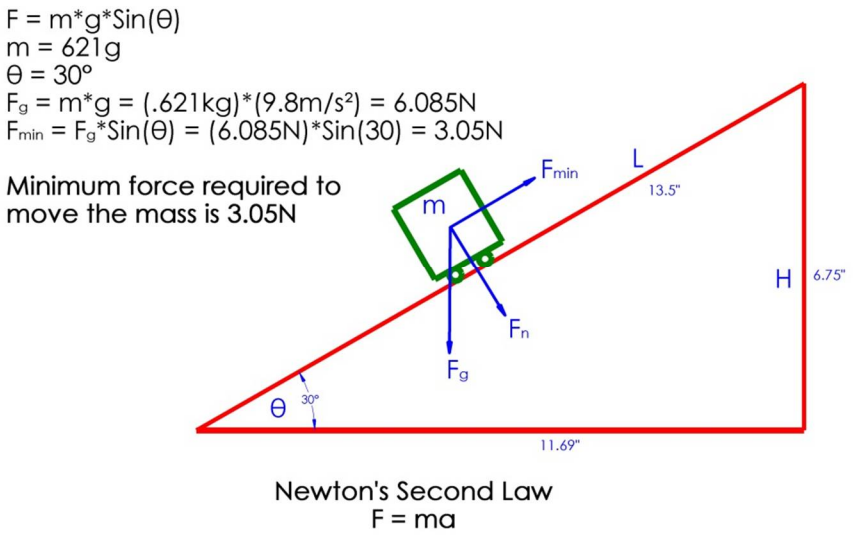
m= mass to be lifted = 621 gms
g = the coefficient of the force of gravity or 9.8 ms squared
sine of 30 degrees for the inclined plane (1/2)

Due to conservation of energy, for a frictionless inclined plane the work done on the load lifting it, **W**out, is equal to the work done by the input force, **W**in. ***[11]***

Substituting the values into the equation results in the following calculation:

F(N) = (621 gms)(g)(sine 30 degrees)
(g) = acceleration of gravity 9.81 m/s2
(Sine of 30 degrees) = 1/2
The mass (621 gms)(g) = 6.09 Newtons
F(N) = 3.05 Newtons

The action of the frictionless ramp has a mechanical advantage of approximately 2:1. The amount of force required to move the 621 grams up a 30 degree ramp is approximately 3.05 Newtons.



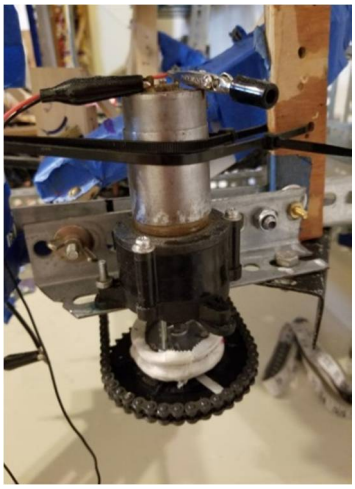
This Force, 3.05 Newtons, equals the force required for the baseline in the experiments with the Demonstration device. This is the force required to move the weight over one inclined plane.

Moving to the Next Procedure by Adding Automation

To complete the experiments, further study "the Effect", and record useful data a permanent demonstration device had to be designed and built. Mr. Rowley designed and engineered the mechanics of the demonstration apparatus. The final model included a rotating base platform, three identical ramps (to simulate the initial tests with the blue painted standalone ramp shown in the picture) installed on the top of a rotating base platform, a supporting frame, and an electric motor for automation. The design had taken into account various measurement methods that could collect useful data.

Now instead of manually moving the platform base to take measurements a small D.C. electric motor was added to rotate the base. The electric D.C. motor served three purposes. The first purpose was to add constant torque for smooth rotation of the base, the second purpose was to move from a manual operation to an automatic operation, and the third purpose was to have a hands free ability to derive useful data using an in line watt meter and other digital instruments.

A 6.5 volt D.C. electric geared motor drives the rotating platform via a plastic chain and a set of gears. The electric motor is powered by a battery pack consisting of 6 lithium batteries. The electrical arrangement allows for digital measurements of load, wattage, voltage, amperage, and battery draw-down using a digital Watt Meter.



D.C. Electric Motor 6.5 Volts

Other measurements tracked using the demonstration device were speed (rpm's recorded by a digital tachometer), time (recorded digitally by digital stop watch), and distance (length of travel measured in feet/meters). This ability to derive and provide good useful data is the key to show the force differences between baseline (normal conditions) and "the Effect".

RC Battery Pack & Watt Meter Used

The top of the photo shows the R.C. lithium battery pack that was used to power the D.C. electric motor in the tests. The bottom of the photo shows the Watt Meter that was placed between the battery pack and the

electric motor (load).

Moving the Experiments forward

Experiments to establish the force requirement for the baseline on moving a weight over one inclined plane have been completed. Next is to establish the correct equation to calculate the force of moving the weight 621 grams up three inclined planes on the rotating the base platform in one revolution.

The equation is as follows:
1 rev = 3 x (Fn)
1 rev = 3 x 3.05 N
1 rev = 9.15 N

Force for one revolution.

Shifting the Demonstration Device from Manual to Automatic

In order to use standard physics equations the demonstration device was completed and automatized in order to measure the forces at work. These Forces include the movement of a single vector weighted lift arm, displacement of masses, velocity, time and frequency, and travel line distances, electrical loads, and magnetic field magnitudes.

The basic operation allows a freely moving base platform to travel inside a race or fixed to an axle. In the demonstrations presented the axle method was used. Three inclined ramps are mounted on the rotating base platform. These ramps are similar to the lobes on a camshaft and lifter operation for valves in an internal combustion engine. This basic operation was used to measure the baseline performance. The baseline tests were recorded and completed first. The tables of the test results are displayed later in the report.

Adding Magnets to the Demonstration Device to Study "the Effect"

Now that the baseline tests have been completed the experiments were changed by attaching magnets to the top of each ramp and to the bottom of the cart attached to the lift rod. Using the same movements as the baseline the weighted cart with magnet attached levitates above the ramp (inclined plane, wedge) as it tracks below.

To understand what is happening when the magnets are added we turn back to the Classical laws of physics. Two main laws of Physics are referenced to describe the repulsive effects and forces of magnets. These two laws pertain to magnets placed end to end and magnets that are aligned perpendicular to one another respectively.

The first law is Coulomb's Law of Magnetic Repulsion.

Coulomb's Law ***[12]***

$$Fe = Ke \frac{(q1 \times q2)}{R^2}$$

Where **Fe** is the electric force (e can be the magnetic force)

Ke is the Coulomb constant = **8.9875 x10*9N x M*2/C*2**

q1 (magnitude of the charge) is the charge on object 1**, q2** (magnitude of the charge) is the charge on object 2 and **r** is the distance between the charges. Coulomb's law says the electrical (or magnetic) force between the two charges divided by the distance between the two charges squared. Since the charges of **q** can be either positive or negative Coulomb's law implies that the resultant force can be either attractive or repulsive.

The next law to be looked at is **Lorentz's law**. (We had discussed this

earlier in the paper).

Lorentz's Law for magnets and magnetism in a parallel plane *[1]*

Fb = (q)*(v)*(b)*Sine theta

F =Force q = point charge v = velocity or speed b= magnetic field

To better understand the repulsion that is happening we would need to go back to the explanation of the law when a Sine other than 1 is used. Refer to page 2.

The two laws mentioned above do not clearly describe what is happening in the demonstration device when the magnets are in play.

Understanding the basics of how permanent magnets push against one another is important to understand "the Effect". However, the laws are describing angles of 90 degrees.

Maybe a third theory could be used to explain "the Effect", centrifugal pressure.

"Magnetic lines of force spread outwards and away from each other in the space between two like magnetic poles. Hence the lines of force from each pole come together laterally, and the repulsion is caused by the centrifugal pressure in the equatorial plane of the electron-positron dipoles that make up the lines of force…the repulsive force will be attributable to the dipole field, and it should therefore take on an inverse cube law relationship just like centrifugal force on the large scale…Magnetic levitation does occur and it should not really be a mystery even if we are to accept the orthodox teaching that magnetic repulsion obeys an inverse square law…At any rate, it is highly probable that magnetic repulsion obeys some kind of non-analytical law which approximates more closely to the inverse cube law of centrifugal force"***. [13]***

With three different theories pointing to three different ways of looking at repulsive forces we should retreat to the sidelines and look at the actual test results. The results should then direct the researcher to which theory or combination of theories is most correct. The experiments moved on to running the experiments for levitation and analyzing the results. The test results for "the Effect" are displayed later in the report. If the levitation theory is correct the results with the magnets should show less force used to move the weights up the inclines.

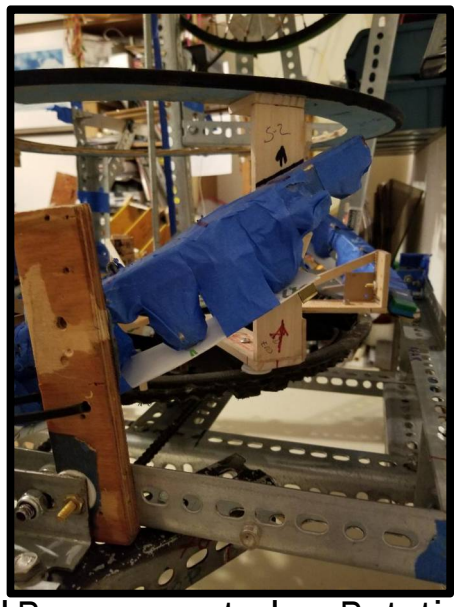
Some Details of the Construction of the Demonstration Device

Before analyzing the results of the experiments the researcher wanted to share some construction details of the Demonstration Device.

This is a photo of the top of the ramp showing the magnets incased with tape and glue to hold them in place. These magnet pads are placed on the top of each of the three ramps.

Prototype magnet pads on top of ramp

The demonstration device was built to perform “the Effect”, levitation motion, repetitiously by incorporating a circular base platform with curved ramps. The ramps were modeled after the first incline plane model used in the early experiments. However, a clear distinction was that the new ramps were curved to follow the circumference of the circulating base platform .



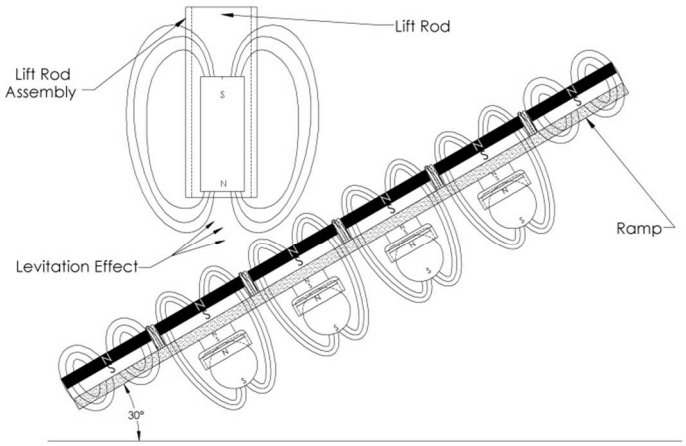
Curved Ramp mounted on Rotating Base

After the magnet was inserted into lift arm the demonstration device was readied to demonstrate “the Effect”. When the base platform rotated underneath the life arm “the levitating effect” was displayed. The photo below shows the levitation occurring.

Levitation Occuring

The Levitating Effect

This levitating effect is named “the Effect” by the author. The Demonstration Device that shows and proves “the Effect” is known as E.D.D. This acronym stands for the Effect Demonstration Device. “The Effect” is caused by combining the mechanical advantage of the inclined plane, the repelling characteristics of like magnetic poles, and moving the like charges past each other at an angle of 30 degrees. The following graphic displays the magnetic lines of flux that are in play in producing “the Effect”, levitation.



Magnetic Flux Lines

Continued Details of the Construction of the Demonstration Device

The Demonstration Device houses three identical curved inclined ramps, a circular base platform, a small gear drive D.C. electric motor, and a weighted lifting rod.

Incline Ramps Each inclined ramp is designed at a 30 degree angle and has a curved body to follow the arc of the base platform's circumference.

The top of each ramp is made from three layers of material. The bottom layer is curved balsa wood and serves as the base support. The balsa wood is 1/4" thick and is cut to match the curve/arc of the circular rotating base platform. The width of the wood is 1" wide and measures approximately 13.5" long. It includes protrusions from each end that offer supporting tabs to attach brass straps. The brass straps connect the top ramp assembly to the supporting framework. Each inclined ramp and framework is bolted to the base platform equal distance from each other on the topside of the base wheel. The next layer up is the magnet support base. This layer is made from 1/8" ABS plastic and is cut into an arch to match the underlying balsa wood layer. This layer is also 1" wide and 13.5" long. The upper layer is made up of 6 bar magnets that are laid

end to end. The magnets are low gauss and measure 2 inches long and 1 inch wide. They are magnetized from the top through the bottom. The magnets are installed with "N" field in the up position. The magnets are attached to the ABS plastic layer via glue and tape.

Circular Platform Base The base platform measures approximately 44" in circumference and is supported by an axle via a vertical shaft. The base platform rotates via a 6.5 volt D.C. electric reduction gear motor. The circular base platform rotates at approximately 33 r.p.m.s. not loaded. This rotational speed allows for the 3 ramps to interact with the lift rod/weight assembly approximately 100 times per minute. The RPM speeds of the base in the testing phases are lower because they have loads.

The Lift Rod and Weight Assembly

The lift rod and weight assembly consists of 5 main parts:

1) The supporting assembly
2) The lift rod subassembly
3) The weight container
4) The N52 Neo Magnet
5) The top connecting rod

The supporting assembly is a slide assembly consisting of a vertical steel "C" shaped housing with ball bearing guides. This housing supports the lift arm in 4 different directions and is supported vertically and laterally. This subassembly is mounted to a mainframe assembly that keeps the subassembly rigid.

The lift rod subassembly rides vertically in the support assembly. The lift rod moves only up and down and there is no flexing motion. There is no stop at the top. There is a stop at the bottom which allows the dropping lift rod/weight subassembly to land just inside the exit flux pattern of the entry magnet.

The weight container is attached to the lift rod subassembly. The weight

container is a plastic container with an opening in the top to add or remove ballast. The ballast is copper coated lead shot. The lead shot is added to the container to add more weight to the lift rod. Other ballast used in the testing included 2.5 inch long 14 gauge copper wire pieces.

The Neo Magnet is an N-52 cylindrical magnet 1" inch diameter and 1.5" long. The magnet is magnetized through the length and the flux field extends from the ends. The magnet is mounted vertically in a hollowed out area in the center and bottom of the lift rod assembly. The N-52 magnet is installed with the "N" field pointing down. The bottom of the housing has two plates one in the forward position and one in the rear position of the housing past the magnet. These plates hold two plastic ball bearings that act as guides. When the lift rod is not levitated (during the baseline demonstration without a magnet), the ball bearings track the top surface of the ramps to reduce the amount of friction.

The connecting rod is a rigid threaded rod with swivels at the top and bottom. This arrangement allows connections from the top of the lift rod/weight assembly to another higher moving mass. In the demonstrations it is connected to the braking mechanism.

Demonstrating the Device and Collecting the Test Results

The setup of the demonstration device is very important in order to obtain useful data. The following items were kept constant during the testing periods. All the tests were performed by the same Demonstration Device. All the tests were performed using the same inclined ramp angle of 30 degrees. All the tests were performed using the same 6.5 volt D.C. electric motor, the same battery pack, the same battery charger, and the same measuring digital and analog instruments.

The Demonstration Device was outfitted with a braking apparatus (Re-gen) to slow the fall of the weighted lift arm. This braking device does not affect the outcome of the data. It only acts to slow down the force of the dropping lift arm as it travels off of the top of the ramp. Without the

brake on the falling lift arm serious damage would occur to the Demonstration Device. The experiments are only measuring the force required to move the weight up the incline ramps.

The weight (mass) of the lift arm assembly is measured before the baseline tests. The weight (mass) of the lift arm assembly is measured at 621 grams. The weight (mass) of the lift arm is also weighed prior to the Demonstration Device tests for "the Effect". With the additional weight of the Neo magnet in the lift arm assembly ballast has to be taken out of weight container to match the **weigh in** weight of 621 grams.

It was determined the simplest way to measure the total force required to move the lift rod/weight assembly vertically up throughout the tests was to convert the mechanical energy to electrical energy. Using this method of conversion it was only necessary to measure the time and distance traveled that was required to drain down the lithium battery to a specific set point in Amp Hours Utilized.

A digital stopwatch was used to keep track of the elapsed time in minutes and seconds for each test. A digital tachometer was used to display the RPM's of the rotating base platform live.

A digital watt meter was used to measure the total Watts used, live Wattage readings, live volts, and live amps pertaining to the load drawn by the small D.C. electric motor as it powered the Demonstration Device. The watt meter also measured the battery draw down in Ah (Amp Hours).

The total distance traveled by the lift arm was first measured for the distance traveled in one revolution of the base platform. The length of travel for the baseline track and "the Effect" track are different and are calculated as follows:

A Classical Physics Equation was referenced to calculate distance traveled over time. The Standard Measurement for Distance Traveled *F[14]*

"The positions of the words in the triangle show where they need to go in

the equations. To find distance speed is beside time, so distance is speed multiplied by time."

D = v x t

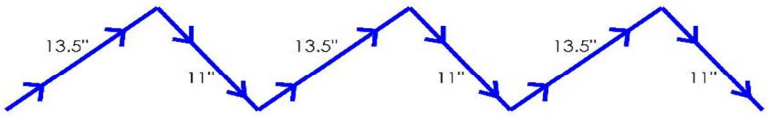
D= total distance traveled

v = speed (Revolutions/Minute)

t = Elapsed Time (Minutes)

This equation will be applied to both the baseline tests and "the Effect" tests to calculate the total distance traveled by the lift arm.

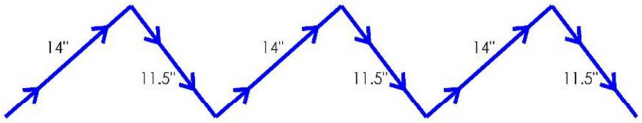
The baseline track for each revolution covers a total distance of 73.5 inches (6.125 linear feet) for the baseline tests. This distance was measured using a cloth tape measure to follow the curvature of the ramps and the drop down from the top of the ramp to the entry point of the follow ramp.



Travel Line of Lift Rod for Baseline

Baseline Travel Line

The tracking distance traveled for “the Effect” is slightly longer due to the higher lift heights and longer fall heights due to the levitation. The lift height is approximately ½ higher and the fall distance is approximately ½ inch longer. So the total distance tracked for each revolution for “the Effect” totals 76.5 inches (6.375 linear feet).



Travel Line of Lift Rod for "The Effect"

Travel Line of “The Effect”

It was determined that using the total elapsed time for the battery to draw down to a particular set point would be one factor necessary to determine total force. The second obvious factor would be the total distance traveled for the lift arm. This factor would be the total revolutions counted during the testing time. Using these measurements the total Force can be determined.

The charts presented include these two important measurement plus two other factors tracked and recorded during the experiments using the Demonstration Device. These two other factors include the constant set points for the battery draw down in Amp Hours used and the voltage being supplied at the time the set points are reached.

The charts used state the data acquired for each test. These charts contain these 4 parameters and are entered and labeled as 4 columns.

These four columns are labeled as follows:

Column 1 is the remaining voltage supply left in the battery during specific draw down set points. The voltage will steadily drop in the battery as the D.C. electric motor continues to run during the tests and drawn down the power of the battery. These draw down voltages will be recorded at the elapsed times when the eight set points of the battery draw down are reached.

Column 2 is the recording of the elapsed time data. At each of the eight set points for Total Wattage Used the elapsed time is recorded along with the remaining voltage, and RPM'S of the base.

Column 3 is the recordings of the RPM's of the base platform at the 8 set points. As the demonstration device runs the RPM's progressively slow down.

Column 4 is the listing of the 8 set points for the Total Wattage Used during the demonstration tests. These same set points are used throughout the baseline tests and the tests for "the Effect".

The chart's rows are lined up to display the fields of data collected when the 8 set points are reached viewing the LED screen of the Watt meter.

A chart will be prepared for each baseline test and each test for "the Effect". There are 4 charts for the baseline results and 4 charts for "the Effect". The sets of data from the charts for the baseline and "the Effect" will be compared to each other at the end of the testing. The key data fields to analyze for each tests will be the total amount of elapsed time (the ending time) to reach the drawdown of the battery to .150 Amp Hours Used, the total average revolutions. With this information the total average distance traveled can be calculated.

The longer the elapsed times, the higher the RPM's totals, and the longer total distances traveled will be key indicators in showing the more effective method. Each test is lifting the same amount of weight. So the type of test that runs the longest will be the most effective.

Four baseline tests were run first followed by 4 tests to test "the Effect." The charts with the results of the four baseline tests are as follows:

Test Baseline-1

Voltage Beg. 8.59	**Elapsed Time**	**RPM'S of Base**	**Wattage Used**
8.32	1:30	18.60	.015
8.16	3:30	17.64	.035
8.07	5:00	16.38	.050
7.96	7:33	16.24	.075
7.87	10:02	16.02	.100
7.82	11:03	15.44	.110
7.81	12:30	14.86	.125
7.74	14:55	14.44	.150
Average		16.2	

Test Baseline-2

Voltage Beg. 8.57	**Elapsed Time**	**RPM'S of Base**	**Wattage Used**
8.16	1:30	18.70	.015
8.03	3:34	17.22	.035
7.97	5:07	16.66	.050
7.87	7:42	16.20	.075
7.81	10:12	15.28	.100
7.77	11:13	14.62	.110
7.74	12:45	14.48	.125
7.67	15:08	13.86	.150
Average		15.87	

Test Baseline-3

Voltage Beg. 8.56	Elapsed Time	Base RPM'S	Wattage Used
8.03	1:33	17.70	.015
7.93	3:34	17.14	.035
7.86	5:06	16.50	.050
7.78	7:39	16.22	.075
7.74	10:10	15.54	.100
7.69	11:22	15.24	.110
7.63	12.45	14.87	.125
7.60	15:10	14.66	.150
Average		15.98	

Test Baseline-4

Voltage Beg. 8.59	Elapsed Time	Base RPM'S	Wattage Used
8.23	1:30	17.56	.015
8.09	3:32	16.30	.035
8.01	5:06	15.74	.050
7.90	7:37	14.82	.075
7.83	10:10	14.70	.100
7.78	11:15	14.40	.110
7.75	12:39	14.18	.125
7.70	15:06	14.00	.150
Average		15.21	

A chart will be prepared later in the paper to show the average Elapsed

Times, the average RPM's, and the average total distance traveled from the baseline tests.

Next are 4 charts showing the test results for "the Effect" utilizing the Demonstrating Device. Posted below are the results of these four tests.

Test-RE1 (RE = "the Effect")

Voltage Beg. 8.59	Elapsed Time	RPM'S of Base	Wattage Used
8.29	2:08	20.1	.015
814	4:55	19.1	.035
8.07	7:05	18.35	.050
7.97	10:30	17.68	.075
7.87	14:00	16.80	.100
7.81	15:20	16.72	.110
7.74	17:24	16.67	.125
7.67	20:40	16.49	.150
Average		17.74	

Test-RE2

Voltage Beg. 8.59	Elapsed Time	RPM'S of Base	Wattage Used
8.37	1.15	21.0	.015
8.20	4.09	20.90	.035
8.13	5:31	19.83	.050
7.97	9:43	19.82	.075
7.86	12:30	19.63	.100
7.82	13:56	18.80	.110
7.80	15:30	16.82	.125
7.73	18:11	15.40	.150
Average		19.02	

Test-3RE

Voltage Beg. 8.59	Elapsed Time	RPM'S of Base	Wattage Used
8.26	1:53	20.60	.015
8.11	4:16	18.54	.035
8.03	6:00	18.40	.050
7.94	8:50	17.64	.075
7.87	11:40	16.76	.100
7.83	12:50	16.74	.110
7.80	14:25	16.62	.125
7.71	17:11	16.00	.150
Average		17.66	

Test-4RE

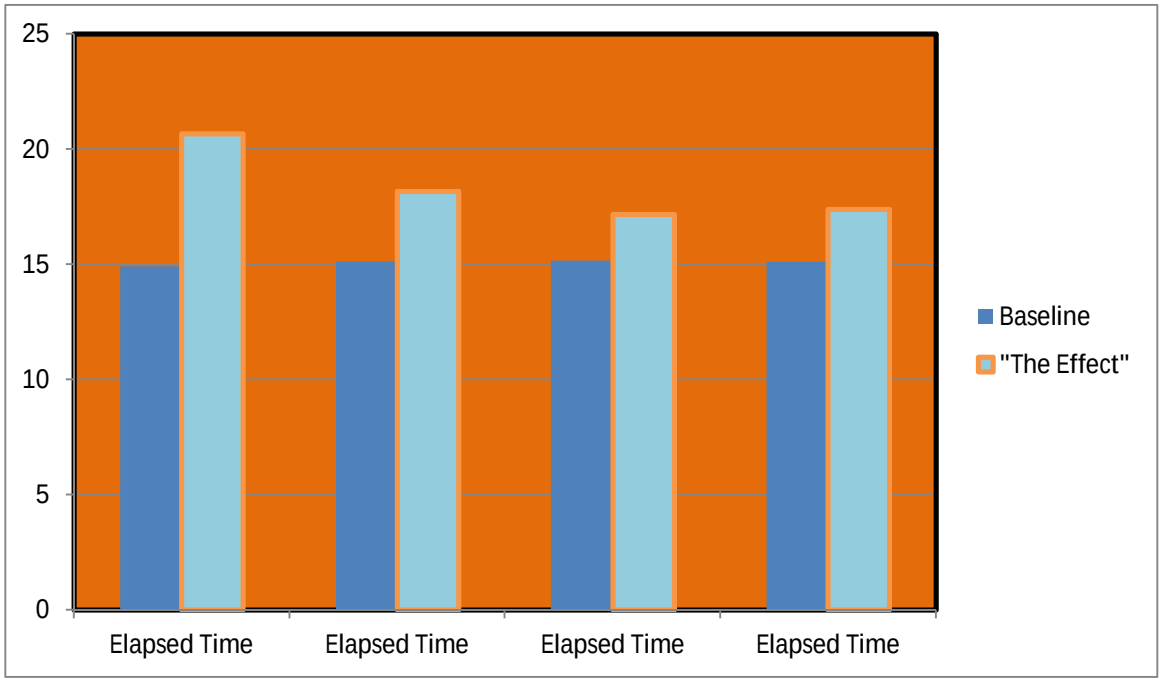
Voltage Beg. 8.65	Elapsed Time	RPM'S of Base	Wattage Used
8.28	1:55	20.0	.015
8.12	4:16	19.20	.035
8.05	6:02	18.22	.050
7.94	8:56	17.98	.075
7.86	11.48	17.54	.100
7.84	12:56	17.36	.110
7.79	14:39	16.52	.125
7.73	17:23	16.48	.150
Average		17.90	

The results of the baseline tests and "the Effect" tests were compared to each other. Because of the reduced amount of work performed by the

baseline experiments three areas of reduced efficiency show up quite dramatically in the test data. The noticed differences were: 1) the Elapsed Time to drain down the battery, 2) the Total Average RPM's of the base platform, and 3) the Total distance traveled by the Lift Arm. The baseline tests had lower numbers in all three categories. The test results for "the Effect" in the same categories showed higher numbers in all the tests performed. These results show higher efficiency for the "the Effect" using the Demonstration Device.

The first bar graph shows the Average Total Elapsed Times of the baseline tests verses the Average Total Elapsed Times of "the Effect" tests.

Average Elapsed Times of the Battery Draw Down to .150 Ah

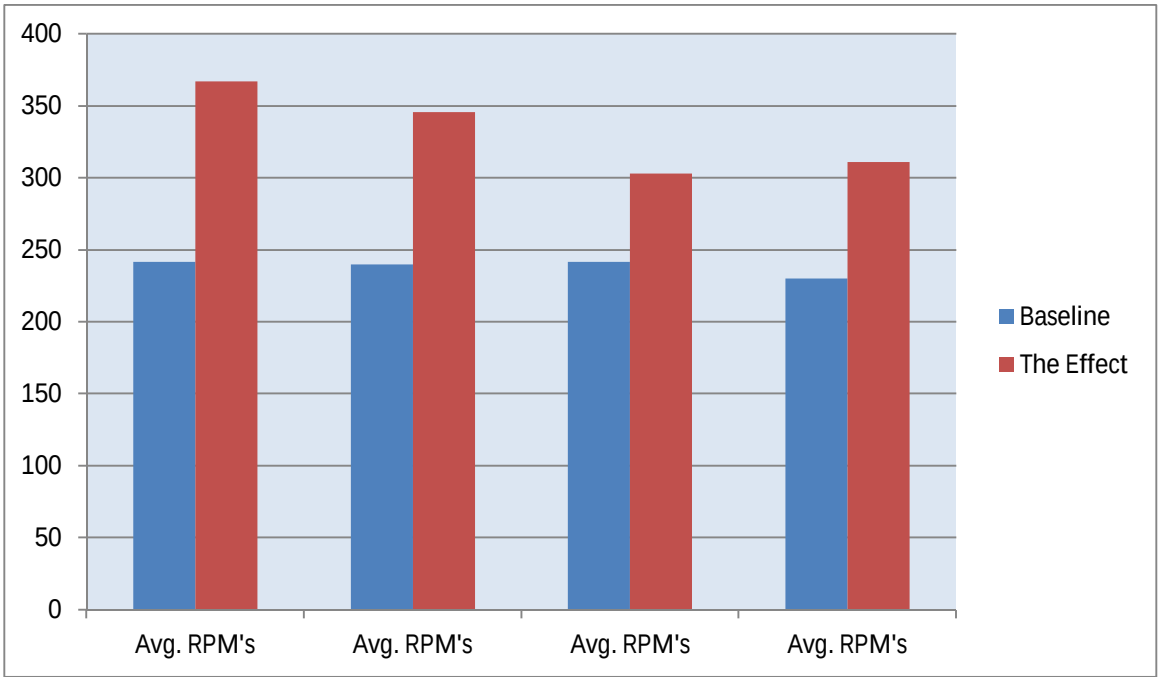


The total Average of the Elapsed times of the baseline tests was 905 seconds (15 minutes 5 seconds). The total Average of the Elapsed times for "the Effect" was 1101 seconds (18 minutes 21 seconds).

The percentage increase in the Total Average of Elapsed times for "the Effect" above the baseline is equal to **21.66%.**

The second bar graph shows the Average Total RPM's from the baseline tests verses the Average Total RPM's of "the Effect" tests. These are the total average RPM's measured during the Last (ending time) Recorded Elapsed Time of the Battery Draw Down to .150 Ah.

Chart Showing the RPM'S Measured During Total Run Time of the Tests

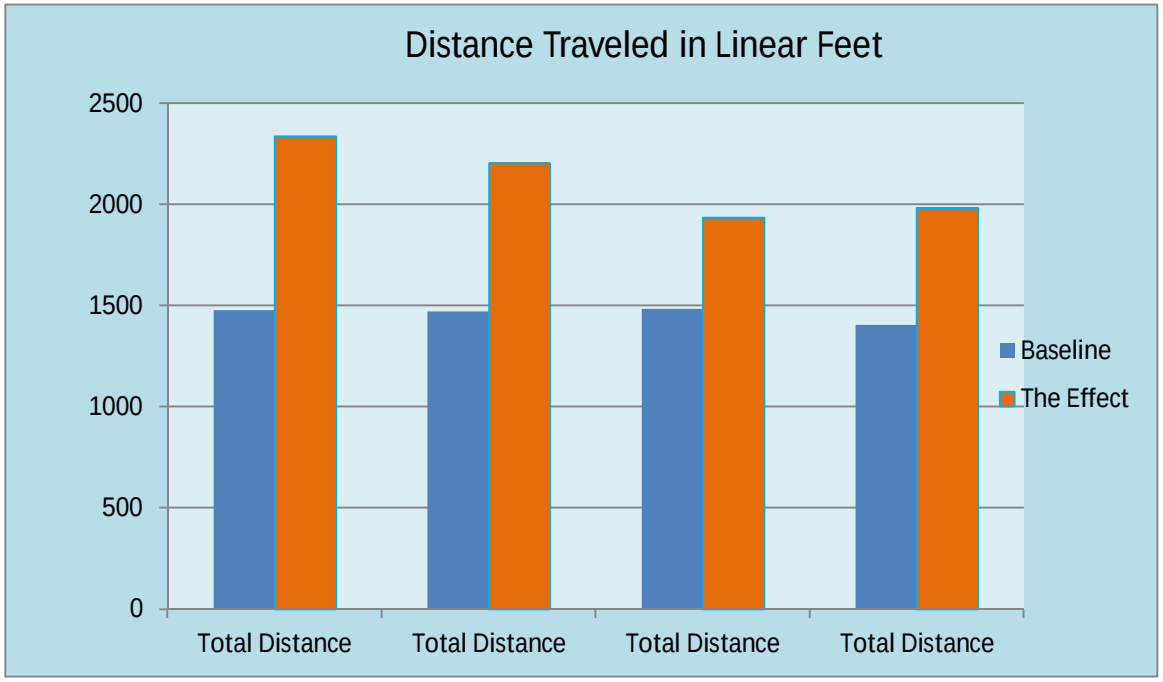


The data included in the above chart shows RPM totals for the Baseline tests to be 242 Rpms for BL-1, 240 Rpms for BL-2, 242 Rpms for BL-3, and 230 Rpms for BL-4. The Average Baseline RPM totals equals **239**.

The data included in the above chart shows RPM totals for "the Effect" tests to be 367 Rpms for Test RE-1, 346 Rpms for Test RE-2, 303 Rpms for Test RE-3, and 311 Rpms for Test RE-4. The Average RPM totals for "the Effect" equals **332**.

The percentage increase of "the Effect" for Total Average RPM's above the Baseline is equal to **38.91%.**

Next the data recorded for the total distance traveled for the lift arm assembly during the experiments for the baseline and "the Effect" will be analyzed.



The total distance traveled by the lift arm during the testing was calculated as follows:

The equation for the baseline tests is: D = (Rev Cir 1) x (Total Avg. Rev's) x Total Avg. E.T. of the Test

D = total distance traveled by lift arm

Rev Cir1 (73.5" inches traveled in one revolution) x Rev's (total avg. revolutions during the Total Avg. Elapsed time of the test).

The data for the total distance traveled (rounded to nearest linear foot) for the Baseline tests were calculated as follows: Baseline 1 equals 1,479', Baseline 2 equals 1,471', Baseline 3 equals 1,484', and Baseline 4 equals 1,406'. The average total distance traveled for the Baseline Tests is 1,460LF or 446 meters.

The equation for "the Effect" Tests is: D = (Rev Cir2) x Total Avg. Rev's for the Total Avg. Elapsed Time of the Test)

D = total distance traveled by lift arm
Rev Cir2 (76.5" inches traveled in one revolution) x Rev's (total avg. revolutions during the Total Elapsed time of the test).

The data for the total distance traveled (rounded to the nearest linear foot) for "the Effect" tests were calculated as follows: RE-1 Test equals 2,338', RE-2 Test equals 2,204', RE-3 Test equals 1,934' and RE-3 Test equals 1,983'. The average total distance traveled for "the Effect" is 2,115 LF or 645 Meters. The percentage increase for the total average distance traveled for "The Effect" above the baseline is equal to **44.62%.**

The data from these charts will be organized into a table to show the Percentage Differences from the testing of the Baseline and the testing of "the Effect" using the Demonstration Device.

Conclusions

Next we will examine the percentage difference of the findings in order to draw conclusions.

A Chart Showing the Comparisons of the Test Data

Test Data (Avg)	Baseline	The Effect	Percentage Diff.
Elapsed Time	15 min. 5 sec.	18 min. 21 sec.	**+21.66**
Total RPM's	239	332	**+38.91**
Total Distance	1464 LF (446M)	2117 LF (645M)	**+44.62**

Comparing the test data for the Total Elapsed Time of the baseline tests and the Total Elapsed Times of "The Effect" shows a marked improvement of "The Effect" over the baseline of +**21.66%.**

Comparing the test data for the Total Average RPM's of the baseline tests and The Average RPM's of "The Effect" shows a marked improvement of the "The Effect" over the baseline of +**38.91%.**

Comparing the test data for the Total Average Distance Traveled of the baseline tests and the tests for "The Effect" show a marked improvement of "The Effect over the baseline of +**44.62%.**

The results were converted to Work (Joules)

Work is defined as:

W = F (output N) x D (output M)

W = Work F = force (N) D = distance (meters) *[15]*

As discussed earlier in the report one revolution of the Demonstration Device creates a force of 9.15 N.

Work for the baseline equals 9.15 N X 446 meters = **4,081 Joules**

This amount of work was recorded using .015 Amp Hour from the lithium battery pack.

Work for "the Effect" 9.15 N X 645 meters = 5**,902 Joules**

This amount of work was recorded using .015 Amp Hour from the lithium battery pack.

The percentage difference of Work for "the Effect" over the baseline Work is **1821/4081 = 44.62%.**

New Setup

A colleague of mine, Robert Bley (Electronics technician and inventor), suggested another setup to eliminate some uncertainties caused by using a battery pack. These categories included differences in battery memory, temperatures, changing r.p.m.s as the battery pack reduced it's power during draw down, and amp hours.

He suggested using a D.C. power output with a constant output and measuring the elapsed time for using watt hours. This would keep the revolutions per minute the same and the power feed constant. The r.p.m.s were monitored during testing using a digital tachometer.

The following table shows the results of the baseline tests.

Watt Hours Used	R.P.M.s	Elapsed Time	Distance Traveled
BL-1 2	22	13:30	1819 L.F.
BL-2 2	22	13.14	1783 L.F.
BL-3 2	22	13:00	1752 L.F.
BL-4 2	22	12:46	1720 L.F.
Average 2	Average 22	Avg. E.T. 13.125 min.	Avg. 1,769 L.F.

Distance was calculated:

D = Time x Revolutions Per Minute x Travel Distance per Revolution

D = T x R's x E.T. x Distance per Rev.(6.125 L.F.)

Average Distance traveled for the Baseline Tests was **1,769 L.F.**

The following table shows the test results of "the Effect".

Watt Hours Used	R.P.M.s	Elapsed Time	Distance Traveled
RE-1 2	22	17:22	2,436 L.F.
RE-2 2	22	17:08	2,403 L.F.
RE-3 2	22	17:01	2,387 L.F.
RE-4 2	22	17:10	2,408 L.F.
Avg. 2	Avg. 22	Avg. 17.17 min.	Avg. 2,409 L.F.

Distance was calculated:

D = Time x Revolutions Per Minute x Travel Distance per Revolution

D = T x R's x E.T. x Distance per Rev. (6.375 L.F.)

Average Distance traveled for "the Effect" Tests was 2**,409 L.F.**

Comparing the test data for the Total Average Distance Traveled of the baseline tests and the tests for "The Effect" show a marked improvement of "The Effect over the baseline of **+36.17%.**

The results were converted to Work (Joules)

Work is defined as:

W = F (output N) x D (output M)

W = Work F = force (N) D = distance (meters) *[15]*

As discussed earlier in the report one revolution of the Demonstration Device creates a force of 9.15 N.

Work for the baseline equals 9.15 N X 539 meters = **4,932 Joules**

This amount of work was recorded using the average time elapsed for 2 Watt Hours from a constant D.C. power pack.

Work for "the Effect" 9.15 N X 734 meters = 6**,716 Joules**

This amount of work was recorded using the average time elapsed for 2 Watt Hours from a constant D.C. power pack.

The percentage difference of Work for "the Effect" over the baseline Work is 1784***/4932 = 36.17%.***

To answer the question: "Does adding magnets in a particular array and angle add increased mechanical advantage and efficiency of a simple lever mechanism using levitation?

The answer is yes. The increased efficiency is 36.17%.

W(Eff) = 1.36(Wbl) (Relied more heavier on the second setup due to less

variations in variables).

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