

# Generation Of Electricity Using Permanent Magnets On The Working Principle Of Magnetic Repulsion (Magneto Lamp)

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## Abstract

*“Magneto Lamp” is a device that can generate Electrical Energy, on the basis of Magnetism concept. It is such a device which uses Magnetic force to exhibit a Circular motion (Mechanical Energy) and this Mechanical Energy can be further converted into Electrical Energy with the help of a Dynamo. Here, the Magnetism effect is produced by using Permanent Neodymium Magnets. Being Eco-friendly and not causing any harm to the nature, this device can be called as a Green Gadget. This paper attempts to identify the benefits on usage of Magneto Lamp in producing electricity and also show that how far it can overcome the scarcity of electricity.*

## 1. Introduction

Magneto Lamp is a device which works on the concept of Magnetism. It is a device which converts Mechanical Energy into Electrical Energy. It uses permanent magnets to generate the energy. So, it does not require any kind of fuel in order to generate Electricity.

In order to make this device we need Neodymium magnets (Nd<sub>2</sub>Fe<sub>14</sub>B)[1] which have high magnetic strength, Ball Bearings to reduce friction, an axial to rotate at higher r.p.m and a dynamo.

## 2. Motivation

In spite of being in 21<sup>st</sup> century, certain rural areas in India and other undeveloped countries are still facing scarcity of Electricity and also for the people who cannot afford inverters and batteries for backup power, the usage of Magneto Lamp can make them happy. This will be of affordable price, doesn't need any power to run, and also a green gadget.

## 3. Construction

The construction of the Magneto Lamp is pretty simple. Let us see how it actually works.

### a) Materials Required

- 1) A Neodymium Magnet
- 2) Ball Bearing to reduce friction
- 3) Axial of light weight in order to rotate at higher rpm
- 4) Dynamo
- 5) Thick and light material to make the body part.

### b) Why Neodymium Magnet ?

Neodymium Magnets are famous for their great strength. They are even called as the strongest earth magnets. Actually these are alloyed earth magnets.

In case of the Magneto Lamp we need such kind of magnets which can exhibit high strength of magnetism, should have high potential of coercivity, and it should also exhibit good remanence properties. If you notice all these properties are exhibited by the Neodymium Magnet. In fact its price is also pretty much affordable.

### c) Neodymium Magnet Now-a-days

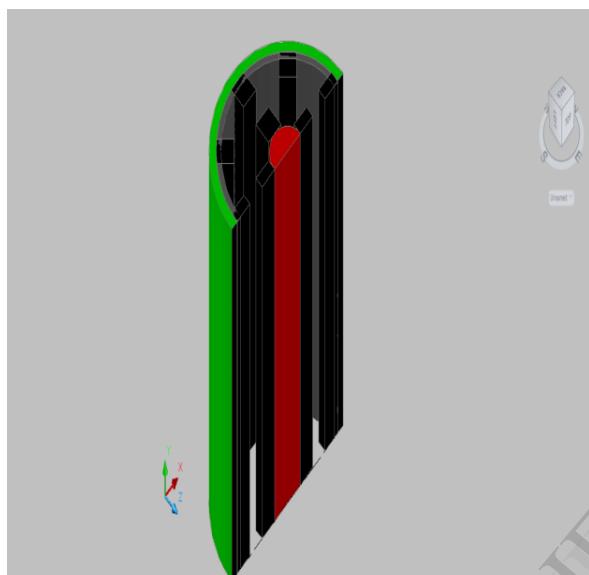
Since last two decades the usage of Neodymium Magnets is increased rapidly. Many countries like Japan, USA, China and etc.. have increased the production of these magnets rapidly. According to a survey in 2008 the annual production of these magnets in USA and few European Countries has crossed 30,000 tons per year.[1]

This sharp increase in its growth has occurred due to its unique and desirable properties, separating it with the rest of the magnets. These are majorly used in the motors.[2] The reason behind this is the fact that there are growing calls to reduce power consumption and increase the use of energy-saving equipment in order to cut CO<sub>2</sub> and other greenhouse gas emissions in line with the ratification of KYOTO

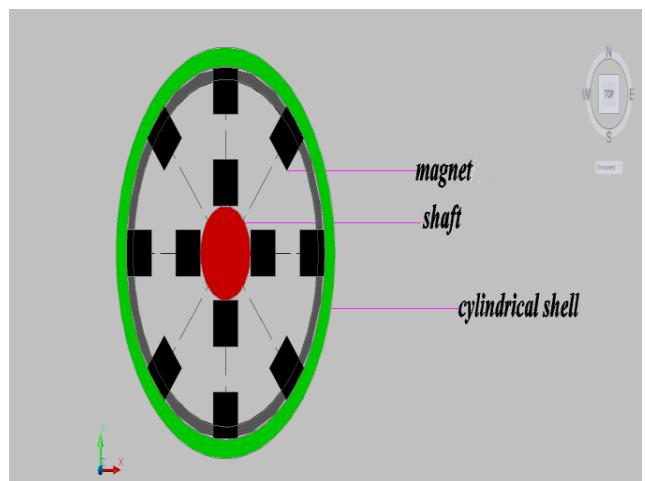
PROTOCOL. Hence we can say that the neodymium magnet is a trump card for Energy saving[1].

#### d) Construction

As said earlier the construction of a Magneto lamp is pretty simple. Actually this construction of the Magneto Lamp looks like a “hollow cylinder fitted with a axial at the centre”. The Pro-Engineering design of the Magnet is shown below.

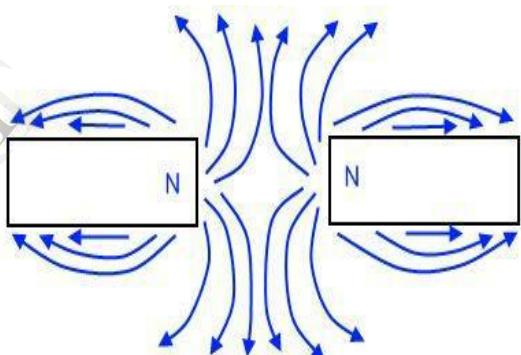


Sectional view of Magneto Lamp



Top View of Magneto Lamp

#### 4. Working



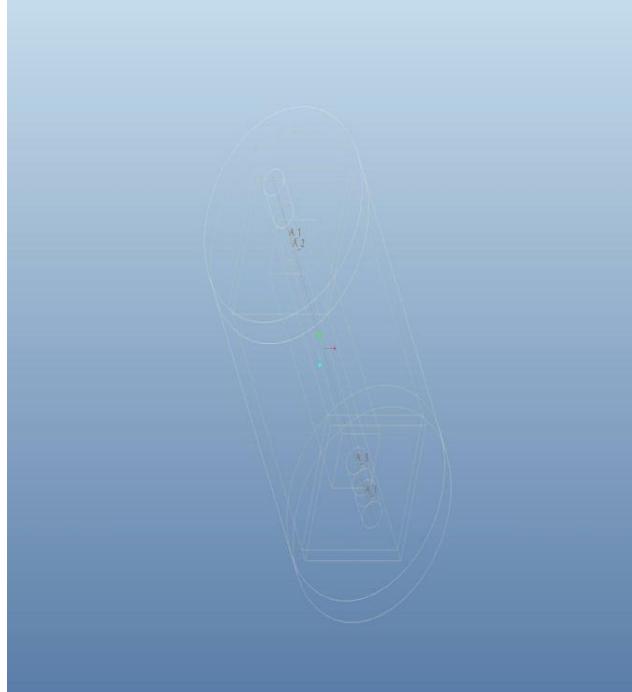
As shown in the figure at first the Neodymium Magnets are to be fixed to the axial in such a way that the North poles of each and every Magnet should be facing outwards. Which makes the device look like a Hallow cylinder fitted with an Axial in between.

Now, on the inner surface of the hour glass where the diameter is minimum the Neodymium Magnets are to be fitted in such a way that the like poles should face each other and let this axial is fixed to a lever which can bring an on/off condition.

Now as the like poles are face to face the magnets try to repel. But as these are fixed to the axial, this repulsive force will make the axial to rotate itself generating certain Mechanical Energy. And to convert this Energy into Electrical Energy Efficiently this axial should be connected to the Gears in order to regulate the speed of rotation and this should be further connected to a Dynamo. Here, basically Hub Dynamos can be used. When this dynamo rotates with certain speed in rpm the AC produced from the dynamo can be filtered by using any rectifier and can finally light the LED lamp and to turn off this lamp the lever which is connected to the axial should be pulled upwards so that there is no repulsion between the magnets. This lever can be arranged in a spring type of action for on/off purpose of the Magneto Lamp.

Considering the type of lamp to be used, LED lights will be best suited for this device and the type of light that is to be used can be varied as per the requirement. Because, Now-a-days in market the range

of availability of LED starts from a little over 1.5W of LED power.

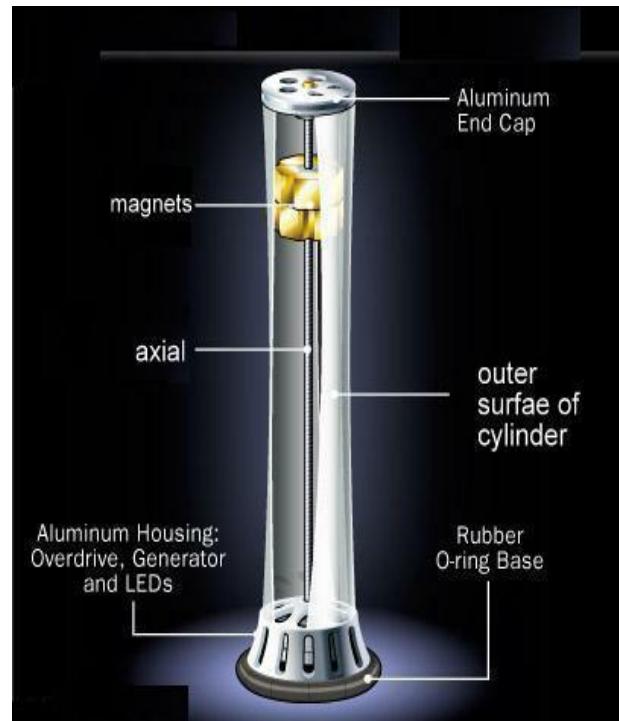


Actually the working of this device is same and can also be applicable for the working of electric motors using permanent magnets.[2] The usage of permanent magnets in motors emerged in late 21<sup>st</sup> century for obtaining high efficiency levels. Even in case of these electric motors the Neodymium Magnets are used these magnets are first invented by Mr. Sagawa in 1983. from a survey it is revealed that the efficiency of these motors is increased by about 30% by using these permanent Neodymium Magnets.

#### Other parts

Magneto lamp isn't finished yet. As discussed earlier Neodymium magnets have high strengths of Magnetic properties which is hazardous. So in order to keep this magnets away from holding a thick metal is to be used to surround device. The base of this device should be made of rubber or at least it should be covered with a rubber O-ring as shown in the figure.

The imaginary picture of this product will be as shown in the figure below.



**Working Model of the Magneto Lamp**

#### 5. Necessity

These devices can be very much useful. These devices can produce electricity continuously and even their maintenance cost being low these devices can also save electricity, because usage of these lights in each and every home in the nights might save some huge amounts of power. And it can be of a great use during the power cuts. These can work throughout the year no matter what the season is and how the climate outside is.

Another best part of this device is it is of light weight and can be easily portable. It can also be used as a torch. The Governments should know the prominence of this device as they can also be used as power banks that to for cheap and unlimited production of Electrical Energy.

#### 6. Technical Challenges

Magneto Lamp is a green gadget but still there are certain technical challenges that are to be concerned and are to be subdued for the efficient working of it. They are :

- 1) The precision of the alignment of the magnets is a concern because if there are any errors

during its designing the device may hang and also may not give any output.

- 2) The device has a rotating part which means there is a possibility of frictional resistance and in order to avoid this ball bearings are to be used which can reduce the existing friction.
- 3) For efficient and uniform outputs gear system is to be used. Using a gear system the speed of the axial can be controlled. It can also regulate the axial speed
- 4) Another big concern of this device is the life of the Magneto Lamp. Though Neodymium Magnet can exhibit its magnetic properties for life time when kept independently. The back emf produced during the functioning of this device may affect the life of the Magnet, and the flux density of the other magnet is also to be considered because it may also effect the magnets life. But these magnets are said to have a very long life[12]. Yet, to overcome this concern, these magnets are to be replaced when they lose their magnetic properties and for this, the design of this device is to be made in such a way that they can be easily portable.
- 5) According to research[5] it is also proved that these magnets are corrosion resistant because of the alloy formation.
- 6) Another challenge to be faced by this device is the occurring of Back-Electro-Motive force.[8] This can reduce the speed of the rotating of the axial and which in return can reduce the efficiency of the device. Hence, even back emf is to be suspended. The suppression of back emf can be done as shown in the experiment as shown in [8].

## 7. Features of the Magneto Lamp

If this device is available in the market the features of it can be mentioned as below :

- 1) It can be built at low cost.
- 2) The maintenance cost is also very low
- 3) It is Eco-friendly
- 4) It is portable device
- 5) It does not affect the planet in any way.
- 6) It can be a good friend for the people in rural areas that are facing electricity scarcity.

## 8. Conclusion

In this paper we have discussed how different and useful the Neodymium Magnets are and also the wide spread of the usage of these magnets. Then, the making of the device called "Magneto Lamp". Also we have discussed the construction and necessity of this device.

So, from this paper we just want to convey that a Magneto Lamp can be a vanguard in case of power scarcity. In fact it is a green gadget which means it does not affect the environment in any way and the best part of this device is, the cost of making of this device is of affordable low price which can make this device reach a poor common man too.

## 9. References

- [1] S.R.Trot and Yury Zhilichev's *effective use of Neodymium iron boron magnets, case studies* published in Electrical Manufacturing and coil winding '99 conference, october 1999
- [2] *Trends and problems in research of Permanent Magnets for Motors* by Sumio Kozawa. Edition published in 2011
- [3] M.Khanchol, G.Krebs, C.Marchand, F.Alves, A.Battelier and M.Roze's *Design and study of permanent magnet synchronous Motor for an Electric compressor*. Published on 20-23,2011.
- [4] *The Physical characteristics of Neodymium iron boron Magnets for tooth extrusion* by G.P. Mancini, J.H.Noar and R.D.Evans published in european journal of orthodontics 21 (1999) 541-550
- [5] M.Drak and L.A.Dobrzanski's *corrosion of Nd-Fe-B permanent magnet* published in JAMME volume 20 issue 1-2 January-February 2007
- [6] Powerful pull to new magnets by Mitch Jacoby published in volume 91 issue 1 on january 7, 2013.
- [7] <http://www.launc.tased.edu.au/online/sciences/physics/Lenz's.html>
- [8] [http://www.dccwiki.com/Back\\_EMF](http://www.dccwiki.com/Back_EMF)
- [9] <http://www.greenoptimistic.com/2008/02/02/teslas-unipolar-dynamo-working-principles/>
- [10] <http://www.progeny.co.uk/Back-EMF-Suppression.aspx>
- [11] [http://en.wikipedia.org/wiki/Lenz's\\_law](http://en.wikipedia.org/wiki/Lenz's_law)
- [12] <http://physics.stackexchange.com/questions/14667/how-long-does-a-permanent-magnet-remain-a-magnet>
- [13] [http://en.wikipedia.org/wiki/Neodymium\\_magnet](http://en.wikipedia.org/wiki/Neodymium_magnet)
- [14] Ron Kurtus's *characteristics of force* in school of champions.

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