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Cycling of Induced Magnets (CIM) – Principle: A New Discovery

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ABSTRACT- Cycling of Induced Magnets (CIM) within the interruption of repulsion is a new discovered phenomenon that utilizes the inherent induction and repulsion properties of magnetic materials. The cyclic motion of magnetic conductors, the effect of CIM, is utilized to facilitate the prime mover action for generation of electrical energy as per Faraday's law. This CIM may leads to the innovation and development of new technology in the area of electrical power generation. In this paper the foundation stage, which can be referred as 'Zero Base' stage of the new discovered principle of CIM, is stated and detailed cause effect and orientation prospects for the justification of the principle is discussed. The application of the outcome of CIM for electrical power generation possibility is also presented.

Keywords: Faraday's Law, Magnetic Conductors, Polar Separator.

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1. INTRODUCTION

Magnets, the visual attractive and repulsive feel exhibiting material is an interesting itemized concept sharing major propulsion of science and engineering. It is worthwhile to incorporate that electrical power generation technologies majorly depends on the magnetic materials, their orientation, characteristics and properties. On the other hand they also share the day to day consumer market with their technology derivatives and profound applications. A permanent magnetic material possesses high coercive force and is a source of magnetic field that persists even in the presence of high opposing fields.

The bar magnet is a permanent magnet in which the line joining the north and south poles of a magnet is called polar axes or axial line and the line bisecting polar axes orthogonally at its centre is called magnetic neutral axis or equatorial line. In the case of cylindrically wound permanent magnets the equatorial line is a circular loop that separates north and south polar surfaces and can be referred as polar separator.

The important behavioral properties of magnetic materials are induction and repulsion. Due to induction property magnetic conductors becomes induced magnets when comes in contact with a magnet whereas the repulsion principle is the surety test of a magnet in accordance that like poles repel each other. Cycling of induced magnets principle is developed based on the behavioral properties of permanent magnets. Two-dimensional axis visualization of permanent magnets helps in testing polar separator and polar axis. If a straight magnetic conductor is placed along any one of the reference dimensional axes, x or y, and if that magnetic conductor experiences a forcible shift either of the sides respective to reference axis it can be confirmed that reference axis is an equatorial line in the case of bar magnets and a polar separator loop in the case of cylindrically wound magnets. On the other hand, if that magnetic conductor seats firmly on its placement positioned axis without undergoing any forcible shift, particular axis is set to be polar axis or axial line. Testing of polar separator and polar axis helps in positioning of the magnetic conductors on the external wound surface of hallow cylindrical magnet for accomplishing the cycling.

2. LITERATURE APPRAISAL

As on date majority of researchers are concentrating on the development of long-distance transfer and routing of static electromagnets (C. Navau et al, 2014), electronic structures of novel magnetic systems (Jayita Chakraborty, 2013), study of magnetism in functional materials (Vijay R. Singh, 2013). However, the derived magnetic properties were not assorted for creating feasibility of new outcomes as did in the proposed paper. Regarding power generation, some major technologies already in existence and theoretically justified are presented here under. However, the outcome of the proposed discovery leading to the development of electric generators without the necessity of additional prime mover is a different orientation.

In the 1880's, Nikola Tesla invented the alternating current system we use today. Ten years later after patenting a thriving method for producing alternating current, Nikola Tesla claimed the invention of an electrical generator that would be its own prime mover and would not consume any fuel (Oliver Nichelson, 2007). In the process of developing such a generator, Tesla developed the following two devices namely, Dynamo-

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Electric Machine and Fuel less generator powered by cosmic rays. In the dynamo metal disks are rotated between magnets to produce an electric current. Compared to Tesla's alternating current generator, this "dynamo" represents something of an inquisitive reversion (Nikola Tesla, 1891) to the existence of Faraday's early experiments progressed with a copper disk and a magnet.

Regarding fuel less generator powered by cosmic rays (Nikola Tesla, n.d), Tesla's intent was to condense the energy trapped between the earth and its upper atmosphere and to turn it into an electric current. The sun was pictured as an immense ball of electricity, positively charged with about 200 billion volts potential. On the other hand, the earth is considered negatively charged. The incredible electrical force at least in part existing between these sun and earth bodies is called cosmic energy. This energy is always present, however may get varied from night to day, and from season to season.

In the year 2013, "The Andrew Abolafia Co.," an industry located in Granville, NY, has discovered that in certain types of permanent magnets there are large amounts of intrinsic energy stored which can be extracted for converting it to electric power. Through its discovery it is realized that the amount of stored energy and the ease of obtaining it from certain types of permanent magnets make them useful as a large and long-lasting source of stored energy (www.prnewswire.com). In India, in relevance to the proposed discovery, current Research & Development work is focusing majorly on synthesis, characterization and physical property measurements of magnetic materials (Indian Association for the Cultivation of Science, Kolkata, Annual Report 2005-06) and magnetic susceptibility measurement, magnetization studies of synthesized nano-structured iron oxides (M. Mohapatra and S. Anand, 2010) and study on Solid Earth Geomagnetism (Indian institute of Geomagnetism, n.d).

From the above discussions it is worthwhile to say that the majority of research work relevant to magnetic materials is focusing on the synthesis and properties analysis on magnetic materials including geomagnetism. The proposed paper on Cycling of Induced Magnets is a new scientific discovery that is diversified with the technology practiced as on date in the area of magnetic materials.

Related to the applications of magnetic materials for power generation, cycling of induced magnets presented in this paper facilitates the prime mover action which differs in the orientations introduced by "Tesla" and even the latest concept for power generation, by extracting the intrinsic energy stored in certain types of permanent magnets, discovered by "The Andrew Abolafia Co".

3. PRINCIPLE OF CIM

The discovered principle of Cycling of Induced Magnets (CIM) can be stated as "whenever identical cylindrical bar type magnetic conductors are placed on the external round surface of the hallow cylindrical magnet, parallel to axial line and to each other, forming a serial closed path, is been disturbed by applying a turning force on any one of the said conductors such that the disturbed conductor starts rotating about its own axis to a distance effecting the neighboring conductor to displace by its axial rotation which intern effects the other neighboring conductor the same thereby the process continues and can establish a serial rotation of parallel magnetic conductors on the closed loop wound magnetic surface of the hallow cylindrical magnet, in the direction of applied force".

For convenience Cycling of Induced Magnets is termed as 'CIM' and hallow cylindrical magnet as the 'field magnet' in rest of the paper. As per the above stated principle the essential requirements to achieve CIM are the field magnet, particularly the hallow cylindrical surface wound magnet and identically symmetrical cylindrical magnetic conductors whose length is equal to the width of the field magnet and the diameter is relatively very less in comparison with the external diameter of the field magnet.

3.1 Materialize Setup for Achieving CIM

The field magnet is arranged in such a way that its external surface is convenient for rotation of magnetic conductors. *Figure (1)* illustrates the cut view of external round surface path of hallow cylindrical magnet along X-XX. The magnetic conductors are placed parallel to axial line and to each other on the external wound surface of the field magnet such that they are in firm position orthogonal to polar separator, i.e. half portion lying above and the other half lying below the polar separator of the field magnet. These magnetic conductors now become induced magnets. The internal span of the magnetic conductors depends upon the induced magnetic field created by them.

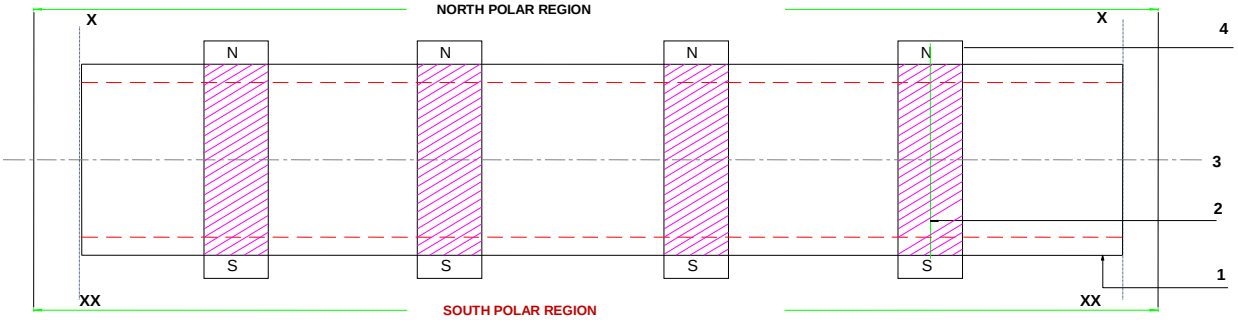

Figure 1: Cut view of external round surface path of hallow cylindrical magnet along x-xx

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In *figure 1*,
1-External surface path of hallow cylindrical magnet
2-Axial line or polar axis
3-Polar separator
4-Magnetic conductor

If we let the external peripheral surface portion of field magnet above polar separator as north pole region and the portion below the polar separator as south pole region, the portion of all the magnetic conductors placed above and below the polar separator will also become induced north and south pole portions respectively or in other words symmetrical pole creation within magnetic conductors will take place accordingly on either side of the polar separator of the field magnet. Now if rotational force is applied on any one of the magnetic conductors, along the polar separator of the field magnet, it can be observed that the force experiencing magnetic conductor starts rotating about its own axis and displaces in the direction of applied force. Once this magnetic conductor traverses some distance, the next magnetic conductor starts rotating about its own axis in the direction of applied force and moves along the path. As far as it traverses some distance from its position it also affects the next neighboring conductor causing the same which intern affects the other. Thus, the translational and rotational motion of magnetic conductors, along the direction of applied force is attained, which is a consequence of repulsive force existing between the symmetrically induced magnetic poles within the magnetic conductors lying on either side of the polar separator of the field magnet.

4. METHOD FOR ACHIEVING CONTINUOUS CYCLING

Clarity diagram is developed for navigating the continuous process of CIM. Referring to *figure (2)* for clarity diagram, D is the external and d is the internal diameters of the considered hallow cylindrical field magnet. C_0 is the starting magnetic conductor on which a rotational force should exert for cycling. C_p is the proceeding magnetic conductor that proceeds the cycling during break of repulsive forcing. C_1, C_2 & C_3 are the working magnetic conductors and P_1, P_2, P_3 & P_4 are the tracing points 7.

Tracing point is the point at which the exertion of repulsive force by one magnetic conductor on the other comes into picture and depends on the magnetic field created by them. Forcing switch is a switch that helps in proper starting of CIM with its indirect force applicable nature. It plays a key role in establishing CIM and continuing it. Initially it should hold C_p and C_0 tightly, and at the desire of cycling, it should release C_0 first without effecting the C_p position. But during the action of rotational movement of magnetic conductors on the external round surface of the field magnet, as explained in the previous section, before the precedence of C_p reaches, it should release C_p smoothly as force free take off. Care should be taken while releasing C_0 and later C_p against counter repulsive movement with respect to C_0 at the time of switching.

On the surface of field magnet, magnetic conductors are arranged in such a fashion explained in the *section 2.1*. As C_p and C_0 are parallel to each other, half portion of these magnetic conductors lie above and the other half lies below the polar separator loop of the field magnet thereby attaining symmetrical pole creation within the magnetic conductors on the either side of the polar separator loop of field magnet. Therefore, to handle these two magnetic conductors closely and tightly certain force is to be applied against the repulsive force existing between them and is done by the Forcing switch.

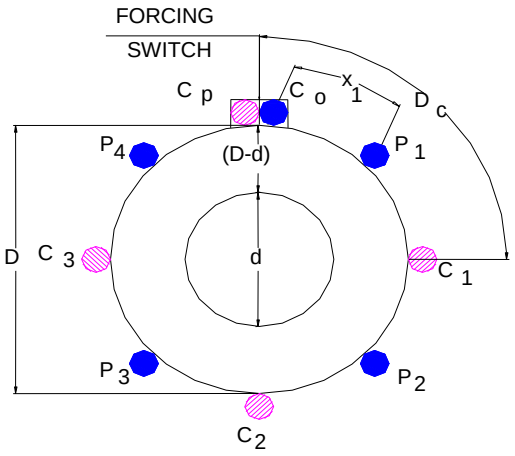

Figure 2: Clarity Diagram

At the time of starting the CIM, forcing switch releases the C_0 which experiences rushing force towards the neighboring conductor in the direction of releasing force, say in clockwise direction. Now as soon as C_0 reaches the tracing point P_1, at a distance X_1 from its initial position, it exerts repulsive force on the magnetic conductor C_1 leading to its axial rotation on the path in the direction of exerted force. At this instance C_0 is at P_1. As far as C_1 traverse a distance X_2 from its position reaching tracing point P_2, it affects the next magnetic conductor C_2 to trace X_3 distance reaching tracing point P_3 that intern affects C_3 to reach P_4. If C_p is not positioned at the specified location, at this situation the curvilinear distance between C_3 which is at P_4 and C_0 which is at P_1 will be more than the effect of exerting repulsive force by C_3 on C_0 which may result in failure of cycling. Hence to overcome this problem the C_p is placed at the starting position which is initially held and later released smoothly by the Forcing switch before its turn comes. Thus, the force exerted by C_3 which is at P_4 affects the C_p causing its axial rotation to trace a distance X_p. Due to shortened distance between C_p and C_0 in comparison to first start, the force exerted by C_p on C_0 will be more resulting in the procurement of effectiveness in the revolution of the magnetic conductors thus completing first cycle of rotation of magnetic conductors on the external wound surface of the field magnet and leading to repetitive cycling process. In this manner the process of rotation of each magnetic conductor on the external surface path of the field magnet is made possible causing continuity in cycling.

It is important to note that, the force to be applied by forcing switch should be exactly along the path of polar separator loop of field magnet. Both rotational and translational motion of each magnetic conductor is possible and estimation of clear tracing points results in absolute cycling.

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4.1 Estimation of Number of Magnetic Conductors

The number of magnetic conductors depends on the circumference of the field magnet and the internal span of the magnetic conductors, where the later depends on the induced magnetic field created between them.

Letting
N=Number of magnetic conductors
M_c=Circumference of the field magnet
R= Radius of the magnetic conductor
S_i=Net internal span between the magnetic conductors, i.e. center to center distance
D_c= Reference span between the magnetic conductors
H_{Ln}=Left induced magnetic field of n^{th} magnetic conductor
H_{Rn}=Right induced magnetic field of nth magnetic conductor
N_{PC}=number of proceeding magnetic conductors
X_n=Tracing path distance of n^{th} magnetic conductor i.e. distance between the n^{th} magnetic conductor position to its corresponding tracing point P_n. Then

$$M_c = (N-N_{PC}) \times D_c \quad (1)$$
$$\therefore N = (M_c/D_c) + N_{PC} \quad (2)$$
$$\text{Also, } M_c = 2\pi(D/2) \quad (3)$$

Thus, from equation (2) number of magnetic conductors required for establishing cycling can be approximated as the ratio of the circumference of the field magnet to the internal span of the magnetic conductors incremented by the number of proceeding magnetic conductors.

4.2 Condition for Absolute CIM

$$S_i = H_{Rn}+H_{L(n+1)} \quad (4)$$

In view of clarity diagram

$$H_{Rn} = H_{L(n+1)} = X_n \quad (5)$$
$$\therefore S_i = 2X_n \quad (6)$$
$$\text{Also, } S_i = D_c - R \quad (7)$$

Thus, from *equation (6)*, the necessary condition for achieving absolute CIM is that the internal span between any two consecutive magnetic conductors should be twice the tracing path distance of both the magnetic conductors.

4.3 Prospective Specifications

The developed system is supposed to be specified as **N x S CIM set.**

Where N=*Number of magnetic conductors*
S= *Speed of magnetic conductors in rotations per second (RPS)*
Number of magnetic conductors decides the size of CIM set while speed of each magnetic conductor becomes the reference for estimating the output of its specific application.

4.4 Estimation of Speed (S)

The speed of a magnetic conductor depends on the following:

- Circumference of the field magnet
- Diameter of the magnetic conductor
- Force existing between the magnetic conductors
- Tracing path distance

The speed will be helping to find out the amount of emf that can be generated, if CIM action is utilized in building a Self-Prime-Mover Generator.

5. APPLICATION OF CIM

Cycling of induced magnets on the surface of field magnet can be facilitated with necessary arrangements for generation of emf as per Faraday's law. According to the later principle an emf can be induced within the electrical conductor whenever there is a relative velocity or relative motion between the magnetic field and that electrical conductor. In coordination with CIM, Faraday's necessaries to generate emf can be facilitated as described below.

1. Magnetic field is produced by the field magnet with (D-d) as the effective region that produces magnetic field per pole surface as shown in *figure (2)*. Where 'D' is the external diameter and *'d'* is the internal diameter of the considered field magnet.

2. Electrical conductor is a solid cylindrical conductor with length as the sum of double the effective magnetic region per pole and diameter of the magnetic conductor(d_{mc}), i.e.
$$L_e = 2(D-d) + d_{mc} \quad (8)$$

3. The magnetic conductors are placed on the external wound surface of the field magnet such that each magnetic conductor is fixed with an electrical conductor on either side of its end tips with proper magnetic insulation between the two. The length of magnetic insulation should be equal to the air gap length between the above said conductors. There by one electrical conductor is at South Pole region and the other electrical conductor is at North Pole region. The bisection point of the electrical conductor is the point of fixing (PoF) with magnetic conductor. i.e.
$$PoF = L_e/2 \quad (9)$$

4. If the effective length of the magnetic conductor L_m is equal to width of the field magnet then the distance between the two electrical conductors L_{cc} is the sum of L_m and twice the length of insulation per side (L_i) i.e.
$$L_{cc} = L_m + 2(L_i) \quad (10)$$

5. Relative motion between field magnet and electrical conductor is achieved by the action of CIM.

Thus, the essential requirements to produce emf as per Faraday's law are facilitated along with the arrangements made for achieving CIM. By providing suitable collector rings on either sides of the electrical conductor emf generated can be measured and external load can be connected.

6. CONCLUSION

Thus, the new discovered principle 'Cycling of Induced Magnets (CIM)' presented in this paper is justified by the means of Clarity diagram illustrated. The application of Zero-Base stage development of CIM principle could create a base for new technology development in the area of electrical power generation. The next stage development of the CIM principle

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elaborates the theoretical assessment of the outcomes of CIM principle and estimation of possible dynamics of the induced magnets and nature of possible power generation.

It is conveyed that the research outcomes of CIM will be presented chronologically during its phase wise technology development.

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