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Ferro-Magnetic Plug

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***Abstract*— A Ferro-Magnetic Plug is a smart electrical arrangement which facilitates the safer and firm connecting of the plug to the socket. The current scenario only allows connection of plug and socket in such a way that any force of disturbance could make the connection disconnected due to the un-firm connection between the socket and the plug. Here arise the need for a better socket-plug design which facilitates the more firm connection of the arrangement made possible. Traditionally the socket-plug system is common in all temporary devices to get connected to the electric supply. The electricity is the source of power in this type of temporary devices. Many cases, especially in houses where children are present the electric connections should be given more care than usual. There arises the need for firm connection of a socket-plug system in order to remain safe and also to obtain the uninterrupted power supply to the temporary electrical devices. For some of the electrical devices, the sudden interruption which leads to improper shutdown of equipment will sometimes makes the device to failure. Frequent unplugging occurs in this way when a person moves along a space with loss electric wire distribution. The Ferro-Magnetic Plug is a strong promise made by the science for the un-interrupted power supply in a socket-plug system. The pins are made with Ferro-Magnetic materials, which posses the property of changing into a magnet when introduced to electricity. This facilitates the safe and rigid capturing of the socket and plug firmly together without any interruption of electric supply, whenever the switch is in ON.**

***Index Terms*—Ferro-Magnetism, Socket-Plug System, Power supply, Electric Wires.**

I. Introduction

A Ferro-Magnetic Plug is a smart electrical arrangement which facilitates the safer and firm connecting of the plug to the socket. The traditional system allows connection of plug and socket in such a way that any force of disturbance could make the connection disconnected due to the un-firm connection between the socket and the plug. The Ferro-Magnetic materials are those materials which become magnetized when introduced to electric field. Either the socket or the plug connection pins could be made of Ferro-Magnetic materials so that the connection will be made firm and uninterrupted supply is made possible.

Traditionally the socket-plug system is common in all temporary devices to get connected to the electric supply. The inner pins of a socket or a plug is made with normal alloy. The traditional system does not look forward about the firm and safety connection of electric supply.

There is always a connection needed in between the supply to demand area, which is been satisfied by the socket plug system. The electricity is the source of power in this type of temporary devices. There occur different cases of loosing of connection between the socket and the plug, due to the disturbances made in the environment. Many cases, especially in houses where children are present the electric connections should be given more care than usual.

There arises the need for firm connection of a socket-plug system in order to remain safe and also to obtain the uninterrupted power supply to the temporary electrical devices. For some of the electrical devices, the sudden interruption which leads to improper shutdown of equipment will sometimes makes the device to failure.

Frequent unplugging occurs in this way when a person moves along a space with loss electric wire distribution. The Ferro-Magnetic Plug is a strong promise made by the science for the un-interrupted power supply in a socket-plug system. It ensures safety both to the device and supply board.

The pins are made with Ferro-Magnetic materials, which posses the property of changing into a magnet when introduced to electricity. This is a unique property of a Ferro-Magnetic material, which makes it a smart material that makes it suitable for any electric wire connections. This facilitates the safe and rigid capturing of the socket and plug firmly together, whenever the switch is in ON.

This is sure to be a successful commercial product which will be used worldwide, wherever electricity connection is present. We cannot neglect the use of socket or plug in an electric connection, due to the large variety of temporary devices that are available.

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STUDY OF SUBJECT

FERRO-MAGNETISM

Ferro-Magnetism is the basic mechanism by which certain materials (such as iron) form permanent magnets, or are attracted to magnets. In physics, several different types of magnetism are distinguished. Ferromagnetism is the strongest type: it is the only one that typically creates forces strong enough to be felt, and is responsible for the common phenomena of magnetism in magnets encountered in everyday life. Substances respond weakly to magnetic fields with three other types of magnetism, Para-Magnetism, diamagnetism, and Anti Ferro-Magnetism, but the forces are usually so weak that they can only be detected by sensitive instruments in a laboratory.

An everyday example of ferromagnetism is a refrigerator magnet used to hold notes on a refrigerator door. The attraction between a magnet and ferromagnetic material is "the quality of magnetism first apparent to the ancient world, and to us today". Permanent magnets (materials that can be magnetized by an external magnetic field and remain magnetized after the external field is removed) are either ferromagnetic or Ferri-magnetic, as are other materials that are noticeably attracted to them.

Only a few substances are ferromagnetic. The common ones are iron, nickel, cobalt and most of their alloys, some compounds of rare earth metals, and a few naturally-occurring minerals such as lodestone. Ferromagnetism is very important in industry and modern technology, and is the basis for many electrical and electromechanical devices such as electromagnets, electric motors, generators, transformers, and magnetic storage such as tape recorders, and hard disks.

The term ferromagnetism was used for any material that could exhibit spontaneous magnetization: a net magnetic moment in the absence of an external magnetic field. This general definition is still in common use. More recently, however, different classes of spontaneous magnetization have been identified when there is more than one magnetic ion per primitive cell of the material, leading to a stricter definition of "ferromagnetism" that is often used to distinguish it from Ferri-magnetism. In particular, a material is "ferromagnetic" in this narrower sense only if all of its magnetic ions add a positive contribution to the net magnetization. What we normally think of as magnetic materials are technically ferromagnetic.

Among the elements, only cobalt, iron and nickel are strongly ferromagnetic, their Curie temperatures being about 1400, 1040 and 630 K respectively. Gadolinium is ferromagnetic at low temperatures; its Curie temperature is about 289 K. Dysprosium is ferromagnetic below its Curie temperature of about 105 K. There are many artificial alloys and ceramic materials which are ferromagnetic.

As with paramagnetic materials, the atoms have permanent magnetic moments, but with the difference that these moments are not randomly oriented but are strongly aligned to the crystallographic axes. Within a single crystal, there exist domains, within which all the magnetic moments are parallel and are aligned with a particular axis. In an adjacent domain, again all the moments are parallel to each other, but they may be aligned with a different axis, perhaps at right angles to the first domain, or perhaps aligned with the same axis but pointing in the opposite direction.

Thus we have a number of domains, each highly magnetized, but with some domains magnetized in one direction and some in another. The domains are separated by domain boundaries, or “Bloch walls”, perhaps a few hundred atoms thick, within which the orientation of the magnetic moments gradually changes from one domain to the next.

Now, if the field is reduced, the magnetic moments relax and take up their normal positions parallel to a crystallographic axis. But, as the field is further reduced (d), there is no reason for the domains to reverse their polarity as happened at stage (b). That is, when stage (b) originally happened, this was an irreversible process. The demagnetization curve does not follow the magnetization curve in reverse.

Consequently, when the magnetizing field has been reduced to zero, the specimen retains a remanent magnetization with all domains still favorably oriented. In order to reduce the magnetization to zero, you have to apply a field in the reverse direction. The reverse field needed to reduce the magnetization to zero is called the coercive force

Because of the irreversible process, magnetic energy is dissipated as heat during a complete cycle, the about of energy loss being proportional to the area of the hysteresis loop. The amount of the hysteresis depends on how freely the domain walls can move, which in turn depends on the physical and chemical constitution of the magnetic materials, particularly on the number of impurities present that can inhibit Bloch wall movement. For a permanent magnet, you need a material with a fat hysteresis loop, with a large remanent magnetization as well as a large coercive force, so that it cannot be demagnetized easily. For a transformer core, you need a material with a narrow hysteresis loop.

If you put a magnetic material inside a solenoid with alternating current inside the solenoid, the magnetization will repeatedly go around the hysteresis loop. If you now gradually decrease the amplitude of the current in the solenoid, the hysteresis loop will gradually become smaller and smaller, vanishing to a point (H and M both zero) when the current is reduced to zero. This provides a method of demagnetizing a specimen.

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PROPOSED METHODOLOGY

PRINCIPLE USED

Ferro-Magnets are materials that have domains in which the magnetic fields of individual atoms align in random and in such a way that no net magnetic field.

When an external electric field is applied, the magnetic fields of the individual domains line up in the direction of the external field

FERRO- MAGNETISM

Ferro-magnetism may be thought of as a special case of Para-magnetism in which the individual spin magnetic moments interact. When an external electric field is applied, the Ferro-Magnetic material becomes magnetized.

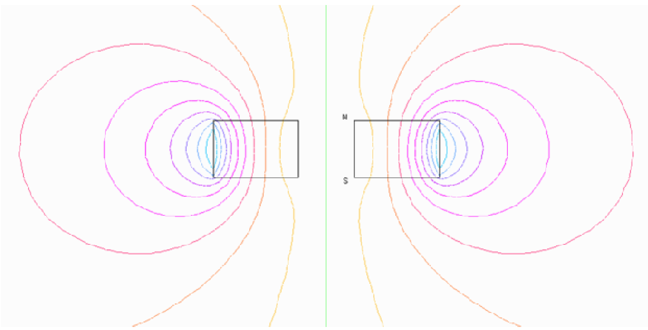

FIG-01

FERRO-MAGNETIC PLUG

The three major parts of a Ferromagnetic Plug are:

1. Socket
2. Plug
3. Electric wire

Socket: A socket is a temporary electricity supply outlet that is intended to supply electricity to various mobile devices, which are connected to it. A socket may be either placed fixed or made moveable by considering the condition of electricity supply that has to be satisfied.

Plug: A plug is an Inlet electricity supply arrangement which are made installed to a device to get connected to the electric supply, in case of need. The pins of the plug are made of Ferro-Magnetic material, so that in transfer of electricity it gets magnetized.

Electric wire: Electric wires are medium of electricity transmission from the supply to the demand. The wires help in transmission of electricity by minimizing the losses and maximizing the safety.

STAGES OF OPERATION

There exist three conditions in the operation for a Ferro-Magnetic. They are:

1. Plugged Out Condition
2. Plugged in Switch in Off Condition
3. Magnetized Condition

1. Plugged Out Condition

At the initial the socket and the plug are not connected to each other

PLUGGED OUT CONDITION

FIG-02

In this condition no transfer of electricity takes place

2. Plugged in Switch in Off Condition

Now the plug is made connected to the socket, but the switch is still in the off position.

PLUGGED IN - SWITCH IN OFF CONDITION

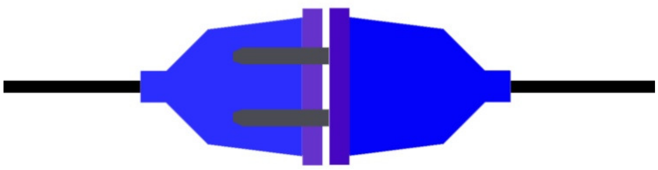

FIG-03

In this condition also there is no transfer of electricity.

3. Magnetized Condition.

Now the switch is made on, which makes the flow of electricity through the system. The Ferro-Magnetic pins of the plug get magnetized due to the flow of electricity through a Ferro-Magnetic material.

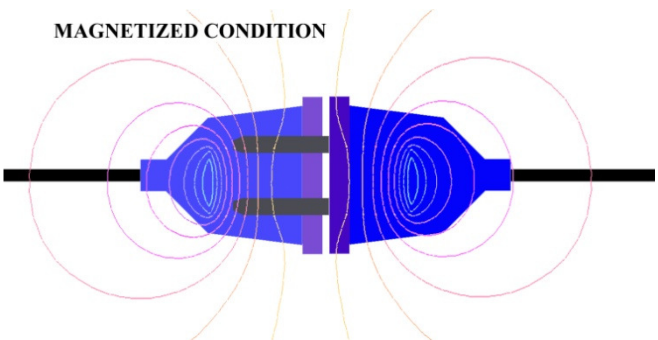

FIG-04

The plug won't get disconnected from the socket at any stage of electricity transformation, which ensures the safety and uninterrupted electricity supply. This makes the connection between the plug and socket more strong and rigid, by making them stick together.

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CONCLUSION

In a Ferro-Magnetic Plug, the socket-plug system will stay firmly whenever the switch is made to ON position. This is because that whenever an electric field is introduced to a Ferro-Magnetic material, it get magnetized causing firm connection with each other.

REFERENCES

[1] Chikazumi, Sōshin (2009). Physics of ferromagnetism. English edition prepared with the assistance of C.D. Graham, Jr (2nd ed.). Oxford: Oxford University Press. p. 118.ISBN 9780199564811.
[2] Bozorth, Richard M. Ferromagnetism, first published 1951, reprinted 1993 by IEEE Press, New York as a "Classic Reissue." ISBN 0-7803-1032-2.
[3] Herrera, J. M.; Bachschmidt, A; Villain, F; Bleuzen, A; Marvaud, V; Wernsdorfer, W; Verdaguer, M (13 January 2008). "Mixed valency and magnetism in cyanometallates and Prussian blue analogues". Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences **366** (1862): 127–138. Bibcode:2008RSPTA.366..127H.doi:10.1098/rsta.2007.2145.

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