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NON-CONTACT TYPE ELECTROMAGNETIC BRAKING SYSTEM

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ABSTRACT

Now-a-days most vehicle rely mainly or solely on Mechanical frictional brakes. These brakes pose several problems, like Brake fade, wear, High heat dissipation, etc. Due to this the frequency of accidents is now-a-days increasing. To tackle this a non-friction electromagnetic braking system is developed. For braking this system uses magnetic power, However a disc is connected to a shaft and small permanent magnets is placed on the disc and electromagnets is mounted on a frame. When brake is applied and electricity is passed through the coil a magnetic field is developed across the coil and causes disc to get attracted towards the coil. As a result, eventually the vehicle comes to rest. These brakes can be joined in substantial vehicles and auto as an assistant brake. The electromagnetic brakes can be utilized as a bit of business vehicles by controlling the current provided for make the engaging development. Making a few upgrades in the brakes it can be utilized as a part of vehicles in future.

INTRODUCTION

Electromagnetic braking means applying brakes using electrical and magnetic power. Here we use the principle of electromagnetism to achieve friction less braking. This tends to increase the life span and reliability of brakes since no friction leads to less wearing out of brakes. This is an upcoming technological replacement for traditional braking systems. The main purpose behind the proposed use of these brakes in vehicles is that it is frictionless. This leads to a sizably less maintenance cost due to no friction and no oiling. Also traditional braking systems are prone to slipping while this one is guaranteed to apply brakes to the

vehicle. So without friction or need of lubrication this technology is a preferred replacement for traditional braking. Also it is quite smaller in size compared to the traditional braking systems. It aims to minimize the brake failure to avoid the road accidents. An advantage of this system is that it can be used on any vehicle with minor modifications to the transmission and electrical systems. Electromagnetic brakes operate electrically, but transmit torque mechanically. This is why they used to be referred to as electro-mechanical brakes. Over the years, EM brakes became known as electromagnetic, referring to their actuation method.

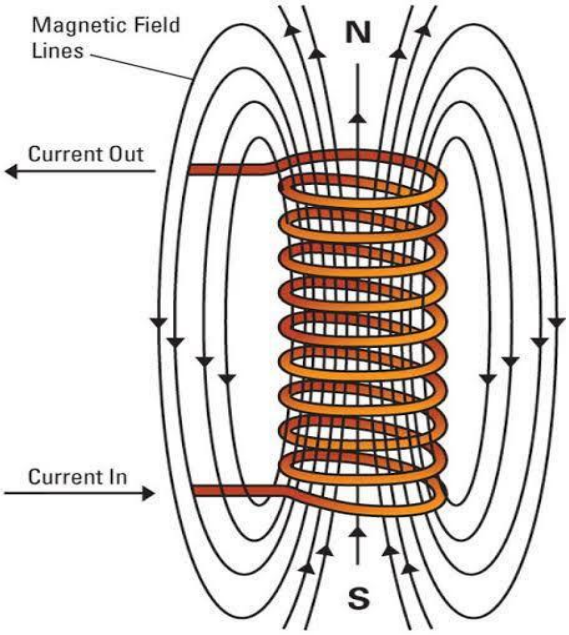
1) CONSTRUCTION - The construction of the electromagnetic braking system is very simple. The parts needed for the construction are electro magnets, rheostat, sensors, and magnetic insulator. A cylindrical ring shaped electro magnet with winding is placed parallel to rotating wheel disc/ rotor. The electro magnet is fixed, like as stator and coils are wounded along the electromagnet. These coils are connected with electrical circuit containing one rheostat, which is connected with brake pedal. In addition, the rheostat is used to control the electric current flowing in the coils, which are wounded on the electro magnet, and a magnetic insulator is used to focus and control the magnetic flux. In addition, it is used to prevent the magnetization of other parts like those that axle and it act as a support frame for the electromagnet. The sensors used to indicate the disconnection in the whole circuit. If there is any error, it gives an alert, so we can avoid accident. The prototype have the disc connected to a shaft and the electromagnet is mounted on the frame When electricity is applied to the coil a magnetic field is developed across the coil, there is a creation of eddy current with in a metal disc rotating between a electromagnets which set up a force opposing the rotation of the disc. As a result eventually the vehicle comes to rest.

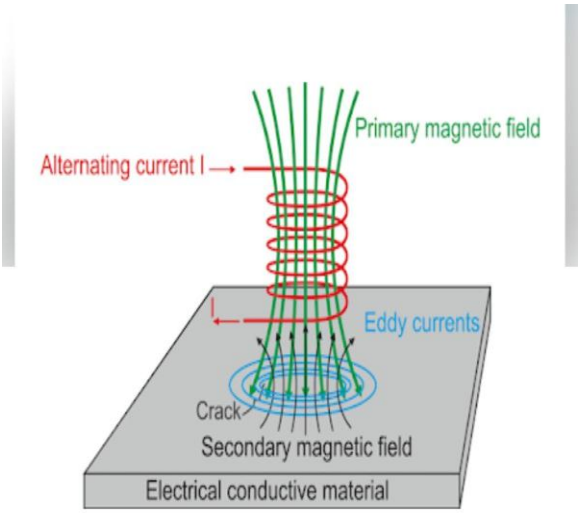
2) WORKING PRINCIPLE

The electromagnetic braking system is based on the creation of eddy currents within a metal disc rotating between two electromagnets which set up a force opposing the rotation of the disc.

Whenever the current carrying conductor cuts the magnetic field, the “e.m.f” is induced.
If the electromagnet is not energized, the rotation of the disc is free and accelerates uniformly under the action of the weight.

To which its shaft is connected. When the electromagnet is energized, the rotation of the disc is retarded and the energy absorbed appears as heating of the disc.





Eddy Current

1. WORKING OF THE PROTOTYPE

The prototype works with the principle of electromagnetic field where the wheel is made to run at a speed with the help of a motor, When the wheel is at the certain speed the electricity is stopped and wheel is on the free movement it is then the brakes are applied where the two electromagnets are mounted close the disc and an air gap is maintained between the disc and the electromagnet. The electromagnetic field is generated when there is supply of dc power to the coil. The working principle of brake is based on creation of eddy current with in a metal disc rotating between a electromagnets which set up a force opposing the rotation of the disc.

As a result eventually the vehicle comes to rest. If the electromagnet is not energized, the rotation of the disc is free and accelerates uniformly under the action of the weight to which its shaft is connected. When the electromagnet is energized, the rotation of the disc is retarded and the energy absorbed appears as heating of the disc.

2. COMPONENTS USED FOR PROTOTYPE- The electromagnetic braking system is a revolutionary concept, Where the components used in prototype are

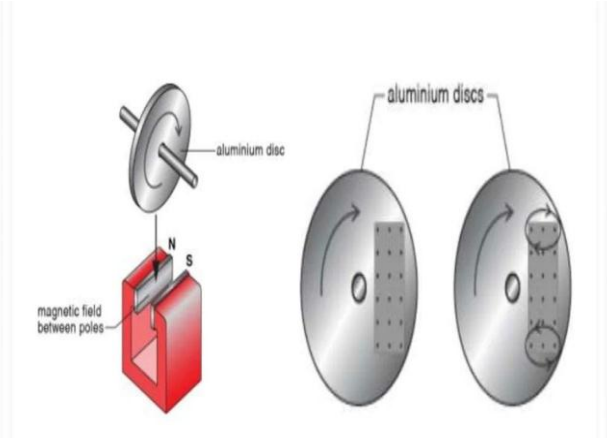
1. Wheel
2. Disc
3. Frame
4. Electromagnets
5. Motor
6. Battery

- **Wheel:** The wheel is a circular component that rotates on an axle bearing where it is one of the key component of the braking system
- **Disc:** The wheel is a circular component that rotates on an axle bearing where it is one of the key component of the braking system. It receives the retardation force and produces opposite rotational movement**.**
- **Frame**: It is stand like structure which supports all the components of braking system.
- **Electromagnets**: Since the name itself says "Electromagnetic braking system" and the main component required is the electromagnet, It is a type of magnet in which the magnetic field is produced by an electric current. Electromagnets usually consist of wire wound into a coil. A current through the wire creates a magnetic field which is concentrated in the hole, denoting the center of the coil.
- **Motor**: An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft. It is used to give rotary motion to wheel or a disc.
- **Battery:** Battery is an electrochemical device, which can be charged with an electric current and discharged whenever required.

Where it is used to power up the whole system especially electromagnets.

3) ADVANTAGES

1. Can be utilized as a part of industry to stop or decelerate turning parts.
2. No need of abs.
3. Fully electronically controlled.
4. Reduced wear.
5. Enhanced performance.
6. Fast & precise braking.
7. Less maintenance required
8. Longer life traverse contrasted with ordinary brakes.
9. Low running cost.
10. Improved heat dissipation.



4) APPLICATION

1. Auxiliary braking system in Automobile
2. Can be used in machines to stop delay run
3. Can be used in Railway track as track brakes
4. Can be used as additionally retarder in air crafts
5. may also find application in virtually any rotating system which have metallic parts.

5) CONCLUSION AND FUTURE SCOPE

The lots of new technologies are arriving in world. They create a lot of effect. Most industries got their new faces due to this arrival of technologies. Automobile industry is also one of them. As an important part of automobile, there are also innovations in brakes. Electromagnetic brake is one of them. This brake can be utilized as assistant stopping mechanism in vehicle. The utilization of abs can be dismissed by utilizing a smaller scale

controlled electromagnetic framework. Mix of these brakes expands the brake life and act like completely stacked brakes. This brake can be used in wet conditions to avoid slipping of the vehicle. It is found that electromagnetic brakes make up approximately 80% of all of the power applied brake applications. The brake linings would last considerably longer before requiring maintenance and the potentially "brake fade" problem could be avoided.

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