iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 2017 **Issue:** **Month of publication:** March 31, 2017

DOI:

Emergency Braking System for Hill Station Vehicle

R. Vijaykumar[1], A. Anantharaj[2], S. Gokula Kannan[2], N. Yuva Bharathi[2]
[1]*Assistant Professor, Department of Mechanical Engineering, Arjun College of Technology, Coimbatore – 641 120*
[2]*U.G. Scholars, Department of Mechanical (Final Year), Arjun College of Technology, Coimbatore – 641 120*

Abstract- In this project we are introducing the automatic brake for hill station vehicles. The main reason to fabricate the automatic brake is to avoid the reverse movement of vehicle during the vehicle is in off condition .this project is to avoid the accident due to reverse movement of the vehicle in hill stations. The project contains simple mechanical arrangement. This project consists of following parts sprocket, reveres braking, linkage joint, linkage support and motor. In this project we are introducing the automatic brake for hill station vehicles. The main reason for fabricate the automatic brake is to avoid the reverse movement of vehicle during the vehicle is off condition due to the reverse movement the vehicle get accident for impacting to other vehicle so this project is highly avoid the accident due to this reverse movement on the vehicle. The project contains simple mechanical arrangement and operation is simple.
Keywords : sprocket, Automatic brake, Reverse movement.

I. INTRODUCTION

Vehicles, derived from the Latin word, *vehiculum*, are non-living means of transport. Most often they are manufactured (e.g. bicycles, cars, motorcycles, trains, ships, boats, and aircraft), although some other means of transport which are not made by humans also may be called vehicles; examples include icebergs and floating tree trunks. Vehicles may be propelled or pulled by animals, for instance, a chariot, a stagecoach, a mule-drawn barge, or an ox-cart. However, animals on their own, though used as a means of transport, are not called vehicles, but rather beasts of burden or draft animals. This distinction includes humans carrying another human, for example a child or a disabled person. A rickshaw is a vehicle that may carry a human and be powered by a human, but it is the mechanical form or cart that is powered by the human that is labeled as the vehicle. For some human-powered vehicles the human providing the power is labeled as a *driver*., Vehicles that do not travel on land often are called craft, such as watercraft, sail craft, aircraft, hovercraft, and spacecraft, Land vehicles are classified broadly by what is used to apply steering and drive forces against the ground: wheeled, tracked, railed, or skied.

II. COMPONENTS AND EXPLANATION

A. Sprocket

A sprocket is a profiled wheel with teeth that meshes with a chain, track or other perforated or indented material. It is distinguished from a gear in that sprockets are never meshed together directly, and from a pulley by not usually having a flange at each side. Sprockets are used in bicycles, motorcycles, cars, tanks, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc.

B. Wheel

A wheel is a circular device that is capable of rotating on its axis, facilitating movement or transportation or performing labour in machines. A wheel together with an axle overcomes friction by facilitating motion by rolling. In order for wheels to rotate a moment needs to be applied to the wheel about its axis, either by way of gravity or by application of another external force. Common examples are found in transport applications. More generally the term is also used for other circular objects that rotate or turn, such as a Ship's wheel and flywheel. The wheel most likely originated in ancient. The wheel is a device that enables efficient movement of an object across a surface where there is a force pressing the object to the surface. Common examples are a cart drawn by a horse, and the rollers on an aircraft flap mechanism. The wheel is not a machine, and should not be confused with the wheel and axle, one of the simple machines. A driven wheel is a special case, that is a wheel and axle. Wheels are used in conjunction with axles, either the wheel turns on the axle or the axle turns in the object body. The mechanics are the same in either case. The normal force at the sliding interface is the same. The sliding distance is reduced for a given distance of travel. The coefficient of friction at the interface is usually lower.

C. Spur Gear

Spur gears are the simplest and most common type of gear. Their general form is a cylinder or disk. The teeth project radially, and with these straight-cut gears, the leading edges of the teeth are aligned parallel to the axis of rotation. These gears can only mesh correctly if they are fitted to parallel axles. The torque ratio can be determined by considering the force that a tooth of one gear exerts on a tooth of the other gear. Consider two teeth in contact at a point on the line joining the shaft axes of the two gears. The force will have both a radial and a circumferential component. Gears are a very useful simple machine. The torque ratio can be determined by considering the force that a tooth of one gear exerts on a tooth of the other gear. Consider two teeth in contact at a point on the line joining the shaft axes of the two gears.

Fig.1

A gear is component within a transmission device. Transmit rotational force to another gear or device. A gear is different from a pulley in that a gear is a round wheel. Mesh with other gear teeth, allowing force to be fully transferred without slippage

D. Electric Brakes

This type of brakes, through not very popular, as service brakes, has been commonly used on trailers. One such example is Warner electric brake. The current from the battery is utilized to energize an electromagnet within the brake drum, which in turn actuates the mechanism to expand the brake shoes. When current stops, the cam brake shoes are returned to the release position by retractor springs. The severity of braking is controlled by means of a rheostat, which is operated by the driver through the foot pedal. As an alternative to the foot-operated rheostat, hydraulic pressure has also been used to apply electric brakes. As pedal is pressed more, hydraulic pressure actuates the rheostat to increase the current to the electromagnet. Still another method uses an inertia weight to uncover a light.

E. Motor

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

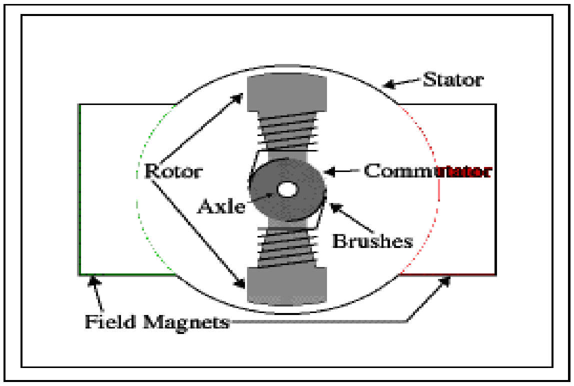


Fig.2

Every DC motor has six basic parts -- axle, rotor (armature), stator, commutator, field magnet(s), and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnets. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotates with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets.

The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding. Given our example two-pole motor, the rotation reverses the direction of current through the rotor winding, leading to a "flip" of the rotor's magnetic field, driving it to continue rotating.

In real life, though, DC motors will always have more than two poles (three is a very common number). In particular, this avoids "dead spots" in the commutator. You can imagine how with our example two-pole motor, if the rotor is exactly at the middle of its rotation (perfectly aligned with the field magnets), it will get "stuck" there. Meanwhile, with a two-pole motor, there is a moment where the commutator shorts out the power supply. This would be bad for the power supply, waste energy, and damage motor components as well. Yet another disadvantage of such a simple motor is that it would exhibit a high amount of torque "ripple" (the amount of torque it could produce is cyclic with the position of the rotor).

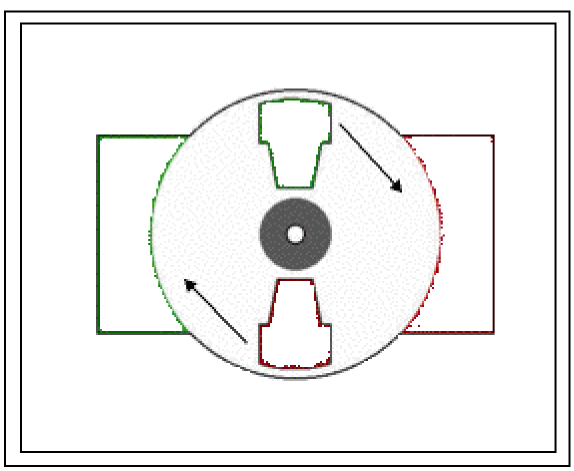


Fig.3

So since most small DC motors are of a three-pole design, let's tinker with the workings of one via an interactive animation (JavaScript required):

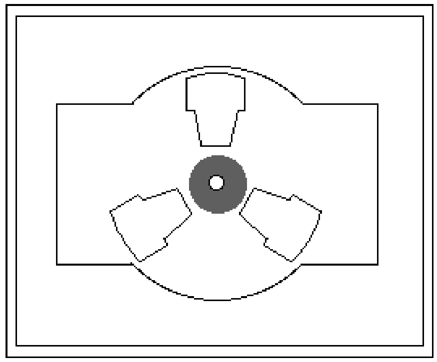


Fig.4

A few things from this -- namely, one pole is fully energized at a time (but two others are "partially" energized). As each brush transitions from one commutator contact to the next, one coil's field will rapidly collapse, as the next coil's field will rapidly charge up (this occurs within a few microsecond). We'll see more about the effects of this later, but in the meantime you can see that this is a direct result of the coil windings' series wiring:

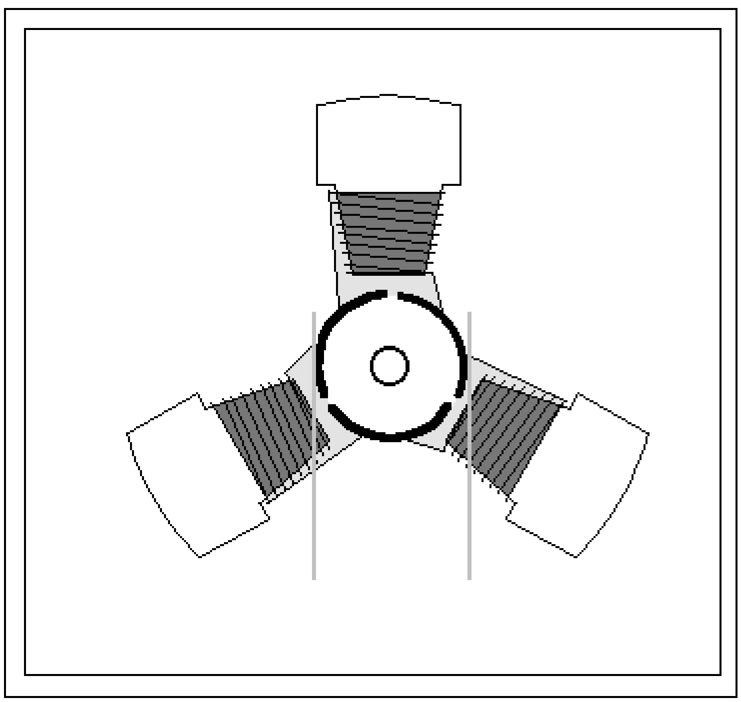


Fig.5

There's probably no better way to see how an average DC motor is put together, than by just opening one up. Unfortunately this is tedious work, as well as requiring the destruction of a perfectly good motor. The guts of a disassembled Mabuchi FF-030-PN motor (the same model that Solarbotics sells) are available for (on 10 lines / cm graph paper). This is a basic 3-pole DC motor, with 2 brushes and three commutator contacts.

The use of an iron core armature (as in the Mabuchi, above) is quite common, and has a number of advantages. First off, the iron core provides a strong, rigid support for the windings -- a particularly important consideration for high-torque motors. The core also conducts heat away from the rotor windings, allowing the motor to be driven harder than might otherwise be the case. Iron core construction is also relatively inexpensive compared with other construction types. But iron core construction also has several disadvantages. The iron armature has a relatively high inertia which limits motor acceleration. This construction also results in high

winding inductances which limit brush and commutator life.
In small motors, an alternative design is often used which features a 'coreless' armature winding. This design depends upon the coil wire itself for structural integrity. As a result, the armature is hollow, and the permanent magnet can be mounted **inside** the rotor coil. Coreless DC motors have much lower armature inductance than iron-core motors of comparable size, extending brush and commutator life.

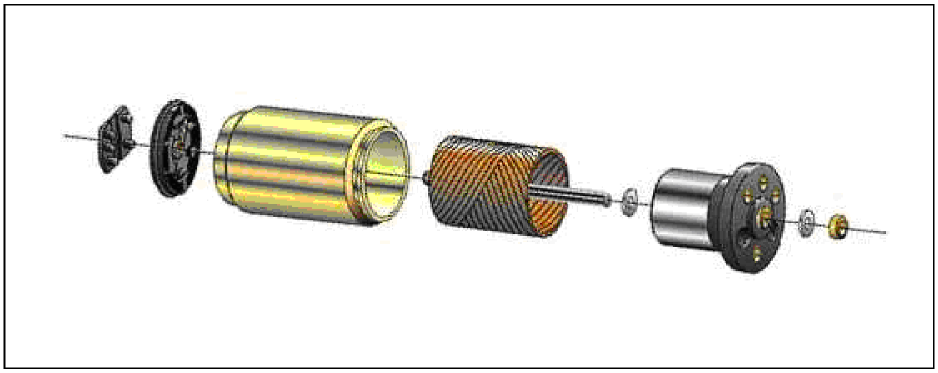


Fig.6

The coreless design also allows manufacturers to build smaller motors; meanwhile, due to the lack of iron in their rotors, coreless motors are somewhat prone to overheating. As a result, this design is generally used just in small, low-power motors. Beamers will most often see coreless DC motors in the form of pager motors. Again, disassembling a coreless motor can be instructive -- in this case, my hapless victim was a cheap pager vibrator motor. The guts of this disassembled motor are available (on 10 lines / cm graph paper). This is (or more accurately, was) a 3-pole coreless DC motor.

III. WORKING

The sprocket is fitted to the wheel shaft of the vehicle. The sprocket teeth is right hand splined shape the reverse braking shaft is attached between two teeth of sprockets and the reverse braking shaft is attached with the linkage joint the linkage joint is coupled with linkage support. The linkage support is the part used to fit the whole equipment on the vehicle. When the vehicle comes reverse during vehicle off condition then the reverse braking shaft is positioned between the two sprocket teeth and stop the movement of the vehicle when the vehicle switch on and the wheel runs the reverse braking shaft maintain its position and the rotation of the wheel could not disturb this arrangement the reverse braking shaft arrest the movement only in wheel’s reverse direction. Here the motor is used to drive the vehicle with the help of spur gear arrangement.

IV. ADVANTAGES

A. Brake Cost Will Be Less.
B. Free From Wear Adjustment.
C. Less Power Consumption.
D. Less Skill Technicians Is Sufficient To Operate.
E. It Gives Simplified Very Operation.
F. Installation Is Simplified Very Much.

V. APPLICATION

A. Now a day every institution needs automation. As a part of college automation, we have decided to do a project.
B. For automobile application
C. Industrial application

VI. CONCLUSION

A ratchet is a device which is used in vehicles over a few decades and when a vehicle is negotiating a turn, the outside wheel travels a greater distance and turns faster than the inside wheel. The ratchet gear is the device transmitting the power to each wheels, allows ne wheel to turn faster than the other.

REFERENCES

[1] Gohring F and Von Glasner E (1990), contributing to the improvement of the braking and handling performance of commercial vehicles, technical paper 905039, FISITA conference, 1990

[2] Knight I,Chinn B, Fenn B & Dodd M (2002), factors that limit improvements in commercial vehicle braking performance- final report . TRL project PR/SE/543/02. TRL limited crowthrance, UK.

[3] The New In-Depth, At-the-Scene, Accident Investigation Database in India by N.Rameshkrishnan, A. Sathyakumar, S. Balakumar, A. M. Hassan, R. Rajaraman, J. Padmanaban.

[4] Mahesh shahapuri-Anti-roll back system for manual transmission vehicles (WO 2013024491 A2)

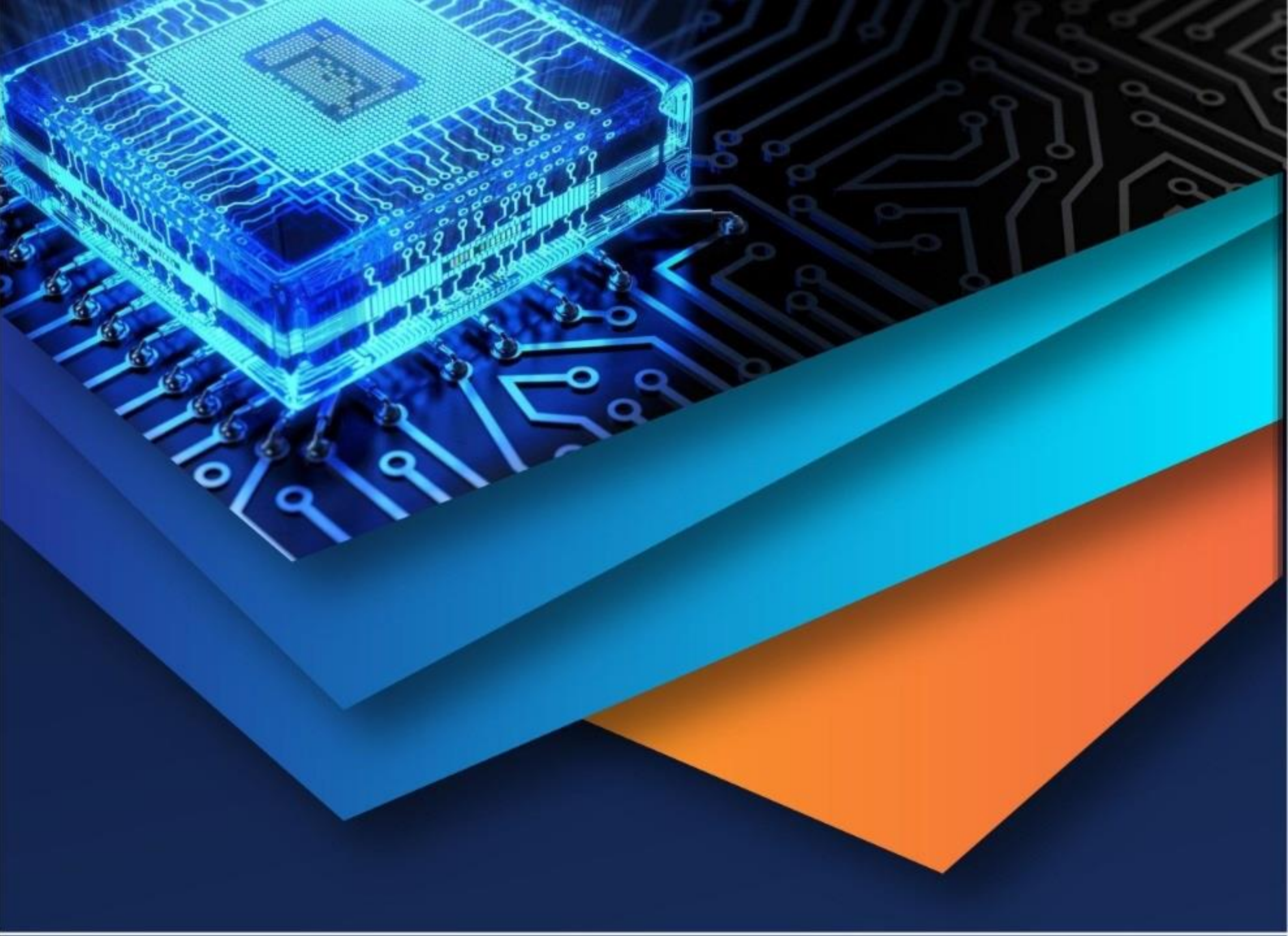
[5] Cook George -Anti creep and hill holder brake system (US 2938611 A)

[6] William kent-Improved release mechanism for a hill holder device

[7] Grzegorz Janiszewski-Improved release mechanism for a hill holder device.

[8] William K. Messersmith-Release mechanism for a hill holder device.

[9] Alvin H. Berger-Vehicle transmission hill holder.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY