ANTI-SLIDING BRAKING SYSTEM FOR VEHICLES IN INCLINED ROAD

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Abstract: A prototype of Safety Anti-Sliding Braking System is designed and tested. The prototype has been developed by the integrating features of all hardware components used. Presence of every component has been reasoned out and placed carefully thus contributing to the best working of the unit. In future, the Safety Anti-Sliding Braking System can be used in many vehicles to avoid collisions and accidents. This type of braking can be used in any type of hybrid vehicles and we can reduce the use of fossil fuels. The system was mounted on a miniature car and tested. When the distance was getting closer, the Anti-Sliding-braking system was working and the speed will slow down if a driver does not reduce the speed of automobile. We will replace an ultrasonic sensor with an IR sensor as the Anti-Sliding-braking system is mounted on a real automobile. If the obstacle is detected by the IR sensor, it passes the signal to power circuit and relay circuit to activate the DC gun. The Dc gun provided with a pneumatic type, push the spring and lock the ratchet. The vehicle get sudden break and can’t move further backward motion. When a vehicle moved forward motion the lock gets released and a vehicle is allowed to move backward motion or reverse gear motion.

Keywords: Ratchet and pin, Rear wheel assembly, Power drive

I. INTRODUCTION

Driving vehicle is little difficult in hill station when compared to driving on the plane road. The braking also very bad in the slippery road and to avoid this we have modified rear wheel assembly which allows the vehicle to move up and retards the backing of the vehicle in the slopes. This auto brake for hill station constructed by Ratchet and pin, Rear wheel assembly, Power drive. The car rear wheel in the hub is connected with the ratchet, for two wheels and the pin lock for ratchet is connected with the lever. This main lever is controlled by the hand lever in the car near gear lever. When this hand lever is lifted up, the mechanical assembly in the main lever brings the ratchet lock pin to the ratchet wheel. This mechanism helps in the inclined road by allowing the wheel to move front and avoiding the back lash of vehicle. This arrangement is very safe in the inclined road and provides the comfort driving experience to the driver.

Advantages
Safe and secured journey on th inclined road Simple mechanical arrangement.

Disadvantages
Connecting the ratchet wheel to the front wheel hub is expensive.
1.2 Application

Parts that are subject to high pressures and sharp impacts are still commonly case hardened. Examples include pin sand rifle bolt faces, or engine camshafts. In these cases, the surfaces requiring the hardness may be hardened selectively, leaving the bulk of the part in its original tough state. Firearms were a common item case hardened in the past, as they required precision machining best done on low carbon alloys, yet needed the hardness and wear resistance of a higher carbon alloy. Many modern replicas of older firearms, particularly single action revolvers, are still made with case hardened frames, or with case colorings, which simulates the mottled pattern left by traditional charcoal and bone case hardening. Another common application of case hardening is on screws, particularly self-drilling screws. In order for the screws to be able to drill, cut and tap into other materials like steel, the drill point and the forming threads must be harder than the material(s) that it is drilling into. However, if the whole screw is uniformly hard, it will become very brittle and it will break easily. This is overcome by ensuring that only the case is hardened and the core remains relatively soft. For screws and fasteners, case hardening is achieved by a simple heat treatment consisting of heating and then quenching. For theft prevention, lock shackles and chains are often case hardened to resist cutting, whilst remaining less brittle inside to resist impact. As case hardened components are difficult to machine, they are generally shaped before hardening.

II. MECHANICAL COMPONENTS

Hub: The hub is the center of the wheel, and typically houses a bearing, and is where the spokes meet. A hub less wheel (also known as a rim-rider or center less wheel) is a type of wheel with no center hub. More specifically, the hub is actually almost as big as the wheel itself. The axle is hollow, following the wheel at very close tolerances. A spoke is one of some number of rods radiating from the center of a wheel (the hub where the axle connects), connecting the hub with the round traction surface. The term originally referred to portions of a log which had been split lengthwise into four or six sections. The radial members of a wagon wheel were made by carving a spoke (from a log) into their finished shape. A spoke shave is a tool originally developed for this purpose. Eventually, the term spoke was more commonly applied to the finished product of the wheelwright's work, than to the materials he used. The rims of wire wheels are connected to their hubs by wire spokes. Although these wires are generally stiffer than a typical wire rope, they function mechanically the same as tensioned flexible wires, keeping the rim true while supporting applied loads. Wire wheels are used on most bicycles and still used on many motorcycles. They were invented by aeronautical engineer George Cayley and first used in bicycles by James Starley. A process of assembling wire wheels is described as wheel building.

Ratchet: A ratchet is a mechanical device that allows continuous linear or rotary motion in only one direction while preventing motion in the opposite direction. Ratchets are widely used in machinery and tools. Though something of a misnomer, "ratchet" is also often used to refer to ratcheting socket wrenches, a common tool with a ratcheting handle Function a ratchet moving in its "forward" direction. A ratchet consists of a round gear or linear rack with teeth, and a pivoting, spring loaded finger called a pawl that engages the teeth. The teeth are uniform but asymmetrical, with each tooth having a moderate slope on one edge and a much steeper slope on the other edge. When the teeth are moving in the unrestricted (i.e., forward) direction, the pawl easily slides up and over the gently sloped edges of the
teeth, with a spring forcing it (often with an audible ‘click’) into the depression between the teeth as it passes the tip of each tooth. When the teeth move in the opposite (backward) direction, however, the pawl will catch against the steeply sloped edge of the first tooth it encounters, thereby locking it against the tooth and preventing any further motion in that direction.

**Backlash:** Because the ratchet can only stop backward motion at discrete points (i.e., at tooth boundaries), a ratchet does allow a limited amount of backward motion. This backward motion which is limited to a maximum distance equal to the spacing between the teeth is called backlash. In cases where backlash must be minimized, a smooth, toothless ratchet with a high friction surface such as rubber is sometimes used. The pawl bears against the surface at an angle so that any backward motion will cause the pawl to jam against the surface and thus prevent any further backward motion. Since the backward travel distance is primarily a function of the compressibility of the high friction surface, this mechanism can result in significantly reduced backlash. Uses Ratchet mechanisms are used in a wide variety of applications, including these: Capstans, Clocks, Freewheel (overrunning clutch), Jacks, Roller, coasters, Slack lines, Turnstiles, handcuffs.

**Pinion:** A pinion is a round gear used in several applications: usually the smallest gear in a gear drive train, although in the case of John Blenkinsopp’s Salamanca, the pinion was rather large. In many cases, such as remote controlled toys, the pinion is also the drive gear. The smaller gear that drives in a 90-degree angle towards a crown gear in a differential drive. The small front sprocket on a chain driven motorcycle. the round gear that engages and drives a rack in a rack and pinion mechanism and against a rack in a rack railway. In the case of radio-controlled cars with an engine (i.e. nitro) this pinion gear can be referred to as a clutch bell when it is paired with a centrifugal clutch.

### III. ELECTRICAL COMPONENTS

**IR Sensor:** An IR sensor is a device which detects IR radiation falling on it. There are numerous types of IR sensors that are built and can be built depending on the application. Proximity sensors (Used in Touch Screen phones and Edge Avoiding Robots), contrast sensors (Used in Line Following Robots) and obstruction counters/sensors (Used for counting goods and in Burglar Alarms) are some examples, which use IR sensors. Before reading ahead, I would suggest you to go through this small post by Mayank on sensor fundamentals. It would help you in understanding the concepts discussed

**Relay Driven Circuit:** A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. It was invented by Joseph Henry in 1835. Because a relay is able to control an output circuit of higher power than the input circuit, it can be considered, in a broad sense, to be a form of an electrical amplifier

**Power Supply:** A power supply (sometimes known as a power supply unit or PSU) is a device or system that supplies electrical or other types of energy to an output load or group of loads. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.
IV. WORKING

With the references (6) we have made Anti-Sliding Braking System for hill station vehicle using IR sensor. In many journals and projects MEMS sensor is used in auto brake for hill station vehicle. We have choose IR sensor instead of MEMS sensor. In cost wise IR sensor is cheapest when compared to the MEMS sensor. We have bought following components and assembled for its working. They are
1. Wheels (4)
2. Chassis
3. DC motor (2)
4. DC gun with spring
5. Power circuit
6. Relay
7. IR sensor
8. Forward and backward switch
9. Battery

Wheel alignment is done for the movement of the vehicle. The wheels run at a speed of 60 rpm. The DC motors are connected at front wheels. The two DC motors are connected oppositely at front wheels. The IR sensor is used to sense the obstacle at a distance of 30cm apart. A DC gun is fixed at back which is kept next to the ratchet. The IR sensor and ratchet is used for hills station vehicle when the vehicle is at reverse gear.

In the reverse condition or reverse gear motion of vehicle when a obstacle is detected by IR sensor, it send a signal to relay circuit and then to power circuit. At that time a DC gun is activated where a diaphragm connected at in front of DC gun lock the ratchet.

Forward and backward motion of vehicle operation is based on switch which is connected to the 12 volt battery. For power supply we have connected whole setup with 12 volt battery which the setup can adoptable up to 20 volt. The chassis is made with medium carbon steel for easy movement at hills station area.

The relay is used to divert 12 volt power supply into 5 volt for IR sensor and 12 for DC motor. The power circuit provided for the control of DC motor fixed at front wheel. If needed another IR sensor also can fit at front when the gear is at forward motion.

A vehicle moved in slope area are at normal condition a reverse gear is applied on it and if any obstacle is interface on the way, the IR sensor detect the obstacle around the particular area.

IV. CONCLUSION

A prototype of Safety Anti-Sliding Braking System is designed and tested. The prototype has been developed by the integrating features of all hardware components used. Presence of every component has been reasoned out and placed carefully thus contributing to the best working of the unit. In future, the Safety Anti-Sliding Braking System can be used in many vehicles to avoid collisions and accidents. This type of braking can be used in any type of hybrid vehicles and we can reduce the use of fossil fuels. The system was mounted on a miniature car and tested. When the distance was getting closer, the Anti-Sliding-braking system was working and the speed will slow down if a driver does not
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REFERENCES


