

Mechanical Operated Non-Return Break for Heavy Duty Vehicle

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Abstract— In this study, while climbing of hill in ghat section due to higher gradiability and loading condition most of the time commercial vehicle fail to climb the ghat section, they may come return or most of the driver used stone or wooden blocks to avoid such situation and after completion of ghat they kept stone as it is. This may be responsible for accident of other road users or in other situation the vehicle subject to accident. By this concept we develop simple ratchet and pawl mechanism along with brake system of heavy duty vehicle. This will avoid reverse motion of vehicle while climbing of ghat section, also its overcome driver effort to stop the vehicle and reduce load on braking system and transmission system along with engine.

Keywords— Ratchet and pawl, Hand lever, Wheel drum, S-type mechanism, Brake cable.

I. INTRODUCTION

As we know that the brake is very important component in automobile field. With the help of brake vehicle can stop within instant time. There are many types of brakes are used in vehicle such as, Mechanical brake, hydraulic brake, pneumatic brake. Day by day new innovations are created and that are essential for example.

In past we are used mechanical brake system but now are used hydraulic, pneumatic, vacuum, electrical brake for reducing the effort of the driver and avoid the failure of braking system. In recent year it has become important for automobile to safety many demands, now a days in commercials vehicle hand operated brakes are used at the time of ghat section they can't sustain load for example. Sugar cane tractor due to this we avoid this condition by using principle one way clutch it delivered power in one direction with the help of ratchet and pawl mechanism mounted on wheel drum so that when lock ratchet with pawl it allow turn wheels in one direction not in reverse direction which will avoid running down the heavy vehicle from up gradient.

This ratchet and pawl mechanism will be same as single purchase scarab machine.

With help of this ratchet and pawl mechanism it definitely gives advantages because it helpful for reducing effort of driver wear of brake shoes and avoiding accident in ghat section. Mostly in ghat section driver used wooden blocks or stone as obstacle to avoid the reverse motion of vehicle but instead of this concept we are use the ratchet and pawl mechanism.

A. Ratchet Gear

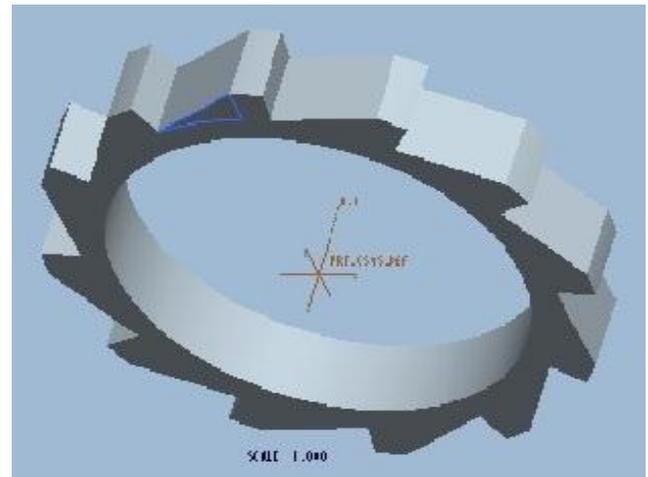


Figure I- Ratchet

Ratchet is oldest mechanism which are used for transmitting power only in one direction avoid the return motion with help of pawl.

For manufacturing of ratchet required a hard, wear resistive material like En8 material that are corrosion resistance.

B. Pawl:

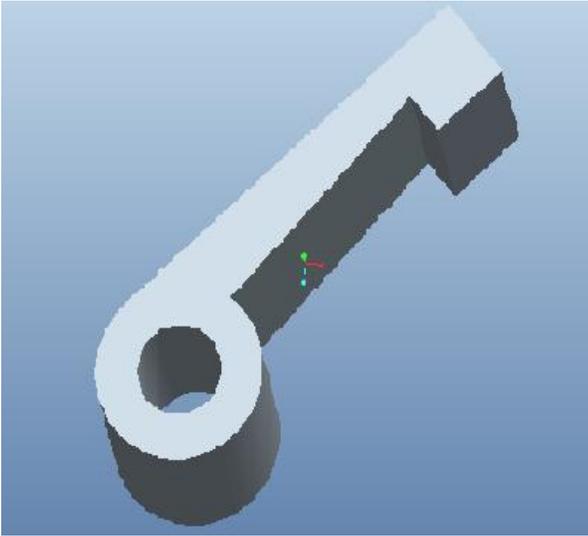


Figure II - Pawl

Pawl is the very important component in this mechanism because it sustains the all braking load that's why the pawl design is very important in this mechanism. When it is engaged to the ratchet tooth all brake load comes on this pawl and pin. The pawl is operated by hand brake lever. Pawl is also made from En8 material. Because this material is hard.

C. Load calculation for each wheel:

Resolving the forces along X-axis,

$$\mu R = W \sin \alpha \text{ ----- (1)}$$

Resolving the forces along Y-axis,

$$R = W \cos \alpha \text{ ----- (2)}$$

Substituting the value of R from equation 2 in equation 1

$$\mu W \cos \alpha = W \sin \alpha$$

$$\mu = \tan \alpha$$

D. S-type Mechanism

All the system is controlled with help of S-type mechanism. It is nothing but the linkages there are 5 links and that are joint with help of rivet. In that there are 4 movable joints and 2 fixed joints with help of this s-type mechanism the engagement and disengagement of pawl with ratchet is done. This mechanism is operated by hand brake lever with help of brake cable and tension spring.

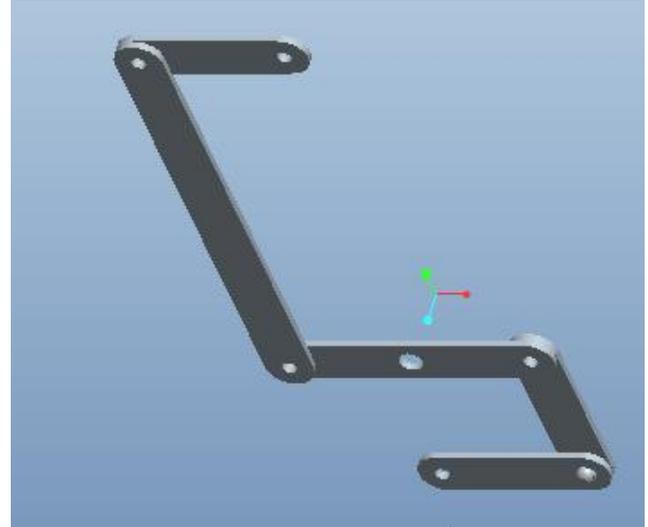


Figure III- S-type mechanism

The material of this mechanism is mild steel because of the mild steel is hard due to the hardness the strength of the mechanism increased. The spring is attached on the second strip due to this spring the pawl mechanism is control.

E. Non-return brake system

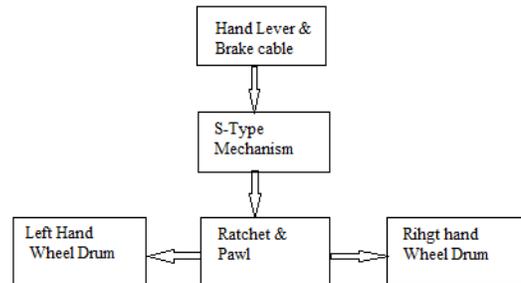


Figure III- Block diagram of Mechanical operated non-return brake for heavy duty vehicle

II. CONCLUSIONS

With help of this mechanical operated non return brake for heavy duty vehicle, driver has no need to large effort to apply brake, to reduce the accident in ghat section also reduce the wear of brake shoe and increase the brake efficiency of vehicle. This mechanism is helpful for safety to driver and vehicle.



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