



ANTI ROLL SYSTEM USING IN VEHICLES USING RATCHET AND PAWL MECHANISM

K.Kanakaraj¹ Dr.M.Selvakumar² M.Sivashankar³ D.Vignesh⁴

R.Vimalnath⁵

¹Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

²Head of the Mechanical Engineering Department, Sengunthar Engineering college, Tiruchengode.

³Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

⁴Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

⁵Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

1. ABSTRACT

While driving on a hill road most of the drivers face the problem of rolling of a vehicle, it may be rolling backward or rolling forward which is terminal as roll back and roll front respectively. To overcome such situation drivers uses a handbrake due to which brakes get wear out. So this system requirement to successfully develop and deploy a less complicated, safe and secure mechanism for the uncontrolled reverse motion of the vehicle on hilly terrains. The mechanism consists of a vehicle and ratchet & pawl connected to the rear drive shaft of the vehicle and an actuator along with the help of an inclination sensor which will control the movement of the pawl while engaging or disengaging the mechanism. The engaging mechanism will represent the reverse motion is undesirable or to be restricted and disengaging mechanism when the reverse motion is desirable. The paper presents "ANTIROLL SYSTEM IN VEHICLES USING RATCHET AND PAWL MECHANISM" for both light and heavy vehicles.

2. INTRODUCTION

Ratchets and pawls are mechanical gearing assemblies that are used to transmit intermittent rotary motion, or to permit a shaft to rotate in one direction but not the other. They are used in many applications effectively which includes a Giant Wheel in the amusement parks. In this work the mechanism has been developed to stop the vehicle from rolling backwards when the vehicle is moving in the hill roads. Ratchet and Pawl mechanism has been identified to arrest the motion to the both axle. Ratchet and pawl mechanism is used in many applications effectively where the one side power transmission is required. The mechanism is to reverse brake using ratchet gear. By reverse locking the differential is disengaged from the axle. Thus the power is directly transmitted to the axle and hence to the wheels. This will considerably reduce the power loss in some occasions when unwanted loss is happening due to the transmission if power from the shaft to the ratchet gear and then to the axle and hence to the wheels. So in mechanism the unwanted power loss in the due course of transmission through the gear wheel is reduced.

In the hill station, the most common problem to the drivers is to park their cars in the slope and to start up the car. While waiting in the traffic, the cars have to move on step by step very slowly; this situation is a difficult one for the drivers to make their car not to roll back in the slope. So the mechanism has to be developed to stop the vehicle from rolling back and it should not stop the vehicle in accelerating forwards. This function can be achieved by using the ratchet and pawl mechanism. The ratchet and pawl has to be designed and has to be fit in the front drive shaft in case of the front drive vehicles.

4. WORKING PRINCIPLE

In this work, Ratchet and Pawl mechanism is identified to arrest the backward motion to the car. The ratchet is placed in the front drive shaft and the Pawl is fitted with the frame. When the vehicle is moved in the hill road, the lever has to make the pawl to touch the ratchet. If the vehicle tends to move backward direction, the pawl would stop the ratchet to move Counter Clock-wise direction with respect to front wheel.

As the vehicle is in neutral position, the pawl engaged the ratchet and the vehicle did not move in backward direction. So the hand brakes need not to be applied. When the vehicle is in moving condition, the engagement between the ratchet and pawl is detached.

The fabricated mechanism is fitted in drive shaft for testing experimentally to check whether the functionality has been achieved (Figure 5). The hand driven lever is turned in forward direction, similar to forward motion of the car, the pawl does not stop the ratchet to rotate. The hand lever is turned in opposite direction similar to the reverse motion of the car in the hill road, and the pawl stops the rotation of the ratchet. So, the drive shaft and the wheels did not rotate. The fabricated mechanism is fitted in drive shaft for testing experimentally to check whether the functionality has been achieved (Figure 5). The hand driven lever is turned in forward direction, similar to forward motion of the car, the pawl does not stop the ratchet to rotate. The hand lever is turned in opposite direction similar to the reverse motion of the car in the hill road, and the pawl stops the rotation of the ratchet. So, the drive shaft and the wheels did not rotate.

5. MATERIALS AND COMPONENTS

- Ratchet
- Pawl
- Actuator
- Inclinator

5. CALCULATION

Bearing No. 6202 (Data book page.no 4.13)

Outer Diameter of Bearing (D) = 37mm

Thickness of Bearing (B) = 12mm

Inner Diameter of the Bearing (d) = 15mm

r_1 = Corner radii on shaft and housing

r_1 = 1 (From design data book)

Mean Diameter (dm) = $(D + d) / 2$

Second International Conference on Nexgen Technologies

Sengunthar Engineering College, Tiruchengode, Namakkal Dist. Tamilnadu (India)



8th - 9th March 2019

www.conferenceworld.in

ISBN : 978-93-87793-75-0

$$(dm) = \frac{(37 + 15)}{2}$$

7. BENEFITS

- The main objective of our project is to prevent these types of accidents and unexpected reverse movement with some simple and economical means.
- To prevent the uncontrolled reverse motion of an automobile under slopes and hilly road.
- To protect drivers and pedestrians from disastrous accidents occurring due to Loss of control and improper handling of equipment.
- To ensure safety of the driver and vehicle on inclined terrains.

7. CONCLUSION

Our project “Anti roll system in vehicles using ratchet and pawl mechanism” would help in avoiding the rearward motion of the vehicle on the hilly terrains and Ghats. Since a less complex structure is been used in our design, it can be easily used by new drivers. Thus the mechanism can stop the vehicle from rolling back in hill roads. This would be more helpful for the drivers to drive their cars and park them comfortably in hilly roads.

8. REFERENCES

1. Health & safety Authority review on “Transport Safety Reversing Vehicles”, 2009.
2. Transport Research Wing article, “Road Accidents in India”, Ministry of Road Transport and Highways, India, 2011.
3. Criac Charles P, Thomas W. Cooper & W. MacDonald; “Reverse Locking Mechanism” US patent 10106436A; published on Sept 1936.
4. Arunkumar, Prof. V. Balasubramani; “Anti Roll Back System in vehicles using ratchet and pawl mechanism”; published by- IJETCSE, Vol-12; Jan - 2015.
5. Chetan Gajmal, Prof. Harshal Ahire; “Automobile Reverse Locking Differential Mechanism”; published by-IRJET, Vol-3; Mar-2016.