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Semi-Automatic Slope Stability.

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Abstract
The study is concern with Manual Hill Control of the vehicle using shifting transmission. Resisting the vehicle from rolling back on the slope or at hill-start without any electronic device such as sensor etc. Which will reduce ultimately cost of manufacturing in different ways.

Keywords: *one-way rotation mechanism, semi-automatic slope stability.*

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I. INTRODUCTION

Every new Automobile drive experiences the rolling back of his/her vehicle on the slope while taking a motion in forward direction initially. In recent Automobile we have a sensor which senses the hill-start or vehicle is standing on slope. This sensors helps in holding a vehicle on its position for 2-3 sec after ignition is giving to vehicle. Whereas the old vehicles are not such features as recent as vehicles are having, so such old vehicles are holding and moving up their vehicles by simultaneously pressing clutch pad and accelerator pad/brake pad. Such functioning may lead to quick and fast of wear and frequent repair. Whereas controlling vehicle from rolling back on slope can be done by Manual Hill Control concept. Which will hold the vehicle on the slope for indefinite period.

II. LITERATURE REVIEW

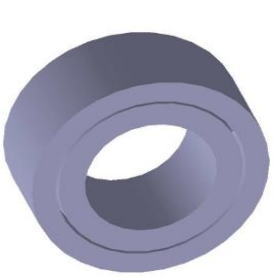
In April 2017 students from [1] Kerala device one self-locking mechanism using ratchet and pawl controlled by gyroscope and electrical components similarly [2] ratchet mechanism was introduced in differential and [3] ratchet and pawl was controlled by pedal manually. Whereas same mechanism was used by [4] [5] and [6] Bhavanarayana Kotte from Andhra Pradesh introduced new mechanism named (MAC)-manual actuated control which has connection with brake and clutch.

All above mention research have ultimate aim to resist the roll back of automobile especially car but it was concern with one specific item (car) and they were not focused on forces exerted on above mentioned mechanism which would led to sudden failure of mechanism without any intimation.

Whereas our study have develop a mechanism which would be fitted in automobile as an accessories with little change and give you the required function.

III. PART LIST AND CAD MODEL

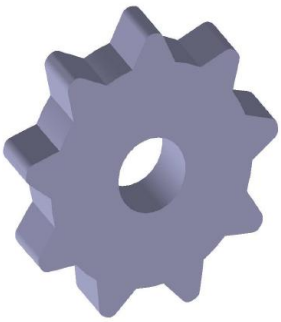
1. Two Gears.
2. Auxiliary shaft.
3. Bearings.
4. Dog clutch.
5. Shift Rod.
6. One way rotation mechanism.



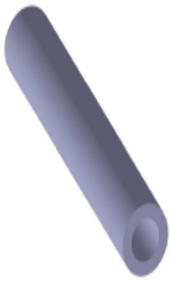
Ball bearing

Dog Cultch

Gear 1



Gear 2



Main Shaft

Auxiliary shaft

Shift Rod

IV. WORKING AND CONSTRUCTION

It consists of two meshing helical gears and dog clutch which is similar to gear present in transmission box of manual transmission vehicles. Two gears are always in mesh. One is gear fitted on drive shaft on bearing with interference fit. And second gear is fitted on auxiliary shaft which is also fitted on bearing with interference fit. Both gears are free to rotate any clockwise and anticlockwise direction. A dog clutch is fitted on auxiliary shaft. It is provided with longitudinal movement parallel to shaft axis. Longitudinal movement is possible due to providing a slot on shaft and one projection on dog clutch which is replica of that slot and free to move in that

slot easily. But dog clutch is provided with one extra feature which plays important role in rotational movement of dog clutch that is one way rotation of dog clutch by ratchet mechanism. This allows the dog clutch to move only in one direction which is opposite to direction of rotation of drive shaft when vehicle is in forward motion gear. The longitudinal movement of dog clutch is controlled by shift rod which is engaged with it. By moving the shift we can engaged the do clutch with gear placed on auxiliary shaft. By engaging the dog clutch with gear, the whole shaft is tend to move only in one direction which the dog clutch allows

CASE 1:- Vehicle not having '<u>Manual Hill Control</u>'.

Step 1:- Now firstly, vehicle is standing/stop on slope in neutral gear with holding brake pedal.
Step 2:- If vehicle tries to move forward by changing gear from neutral to first gear. During this vehicle is hold on its position by applying brake but to complete our forward motion we have release brake pedal and clutch pedal and press accelerator pedal.
Step 3:- But while performing such sequence of action we go through one situation where vehicle
Tries to come back as clutch is press (which disengages the gear box transmission shaft) vehicle tends to move in backward direction due inefficient power supply by acceleration.

CASE 2:- Vehicle having '<u>Manual Hill Control</u>'.

In this case **Step 1** & **Step 2** will be same as explain in CASE 1
But there will be difference in 3rd step which is describe below.
Step 3:- As we changes the gear from neutral to first the dog clutch fitted on auxiliary shaft moves and get engages with gear placed on auxiliary shaft. As this gear is in mesh with the gear placed on drive shaft, it restricts the rotation of shaft in only one direction.
Step .4:- As we start removing leg from clutch pedal and tries to move the vehicle forward by pressing acceleration pedal vehicle will stand at its position firmly and will move forward after getting efficient acceleration without rolling back.

V. ASSEMBLY CAD MODEL

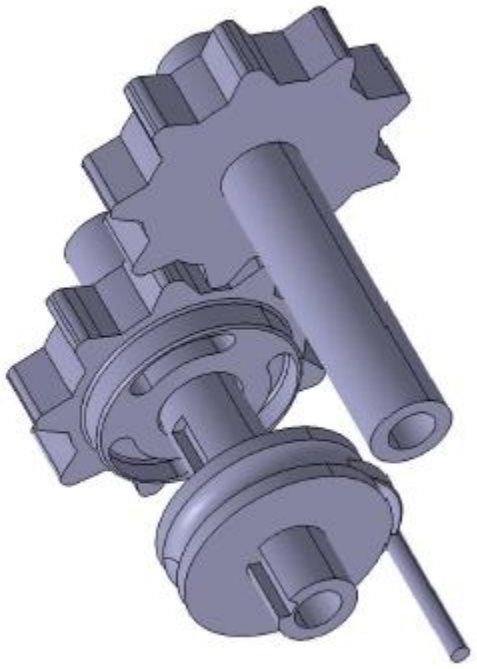


Fig. parts of mechanism

VI. CONCLUSION

All By applying this mechanism we avoid accident. We can use this mechanism in all types of automobiles including Electric vehicles with minor changes.

REFERENCES

[1]. Design and Fabrication of Self-Locking Wheel Mechanism for Manual Transmission 4 Wheeled Automobiles Subjected to Positive Gradients (IJIRST/ Volume 3 / Issue 11/ 029).
[2]. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 03 | Mar-2016 p-ISSN: 2395-0072 © 2016, IRJET ISO 9001:2008 Certified Journal Automobile Reverse Locking Differential Mechanism.
[3]. International Journal of Scientific & Engineering Research Volume 8, Issue 7, July-2017 ISSN 2229-5518 DESIGN AND FABRICATION OF ANTI SLIDING SYSTEM IN VEHICLES.
[4]. International Journal of Pure and Applied Mathematics Volume 119 No. 12 2018, 9779-9786 ISSN: 1314-3395 (on-line version) DESIGN AND FABRICATION OF REVERSE BRAKE APPLIED IN HILL STATION.
[5]. International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE) ISSN: 0976-1353 Volume 12 Issue 3 –JANUARY 2015. DESIGN AND FABRICATION OF ANTI ROLL BACK SYSTEM IN VEHICLES USING RATCHET AND PAWL MECHANISM.
[6]. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 04 | Apr -2017 www.irjet.net p-ISSN: 2395-0072 © 2017, IRJET | Impact Factor value: 5.181 | ISO 9001:2008 Certified Journal | Page 2318 Development and Fabrication of MAC Technology for a Vehicle to Control Roll Back Effect.
[7]. The 2nd International Conference on Computer Application and System Modeling (2012) Research on Hill Start Control for Heavy Truck with AMT.