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ENERGY REGENERATIVE SUSPENSION SYSTEM

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Abstract—*Regenerative Shock absorber is a type of suspension system that converts parasitic intermittent linear motion and vibration into useful energy, such as electricity. Conventional shock absorbers simply dissipate this energy as heat. In our project, we used shock absorber, rack & pinion arrangement and alternator. As shock absorber effect is formed, spring is compressed and linear movement of rack is converted in rotary motion of pinion moves as the rack is meshed with pinion. And the pinion is mounted on the shaft which is connected to shaft of alternator. Due to this arrangement, rotary motion of pinion is used to rotate dynamo. As alternator rotation leads to generation of electricity and this energy is used to charge the battery and this stored electrical energy is used for different vehicle accessories like power window, lights and air conditioner etc. This energy is applicable in most of the military vehicles, race automobile etc.*

Keywords- *Energy, Rack, Pinion, Shaft ,Shock absorber, Alternator*

I.INTRODUCTION

We propose a design plan that converts the suspension energy in vehicles to electrical energy much more efficiently than it has been done before. The electricity generated will then be used to recharge the vehicle battery for further use or functioning of the vehicle.

1.1CONSTRUCTION

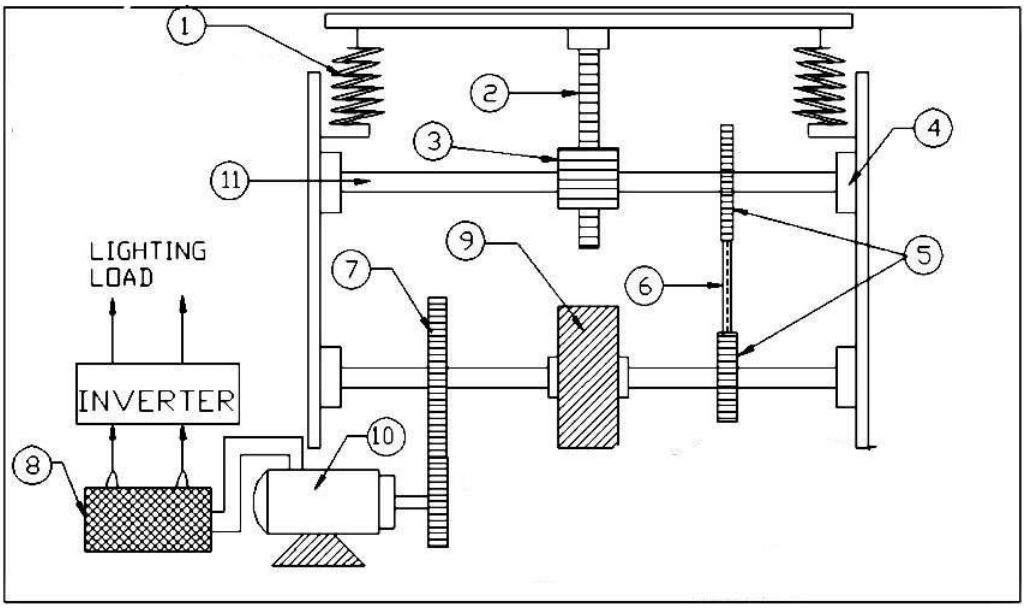

Figure. Rank and Pinion operated Suspension energy generation

1) In above figure :
   1. Suspension
   2. Rack
   3. Pinion
   4. Bearing
   5. Pulleys

6. Belt
7. Gear
8. Battery
9. Flywheel
10. Alternator

II.WORKING MECHANISM

The vehicle moves over the speed breakers, at height resulting in increase in kinetic energy. This kinetic energy can be harvested by using rack and pinion arrangement in regenerative suspension system. In this system, the linear moment of rack is obtained because of the compression and expansion of suspension spring. The rack and ratchet gears give a positive motion especially compared to the friction drive. The shaft is connected to driven gear with ratchet-wheel type mechanism. This result in rotation of a geared shaft loaded with recoil springs. The output of this shaft is coupled to a dynamo (generator) to convert rotational energy into electricity with help of bevel gears. A vehicle loaded with 1,000 kg going up a height of 10 cm on such a rough road produces approximately 0.98 kilowatt power.

III. PROBLEM STATEMENT

This project will introduce a new method of obtaining energy from suspension system for vehicles. We call this method as "energy regenerative suspension system" a new method of obtaining energy from suspension system for land vehicles. As is known, the suspension system is installed in each vehicle and when the vehicle is moving, there will be movement in the suspension system and will then produce energy that can be converted into electrical energy with help of a rack and pinion mechanism. The electricity generated by the suspension system can be used in applications such as car radios, lights, refrigeration, air conditioning and others.

3.1 SPECIAL FEATURES OF PROJECT

- Suspension energy is readily available in every vehicle.
- We can apply hydraulic system to electric generation with help of mechanical system.
- We have used rack and pinion mechanism for electricity generation this system is low cost as compared to hydraulic system.
- It has low maintenance cost as compared to hydraulic system.
- We have achieved electricity generation by using conventional suspension of a car.

3.1.1 FUTURE SCOPE

- In near future if the regenerative suspension system is fitted on each wheel of every vehicle, there will be no need of using alternators coupled with vehicle engine to charge the batteries and wastage of huge amount of fuel and suspension energy can be avoided.
- There is great future scope for regenerative suspension system in hybrid and electric vehicles, as they partially/completely run on electricity. Regenerative suspension system will provide those extra kilometers per charge by charging the batteries continuously during the working period of these vehicles.

IV.WORK METHODOLOGY

1. Market Survey
2. Need/Aim
3. Synthsis
4. Selection of material
5. Material Discription
6. Design of Component
7. Modification
8. Detail Drawing
9. Manufacturing

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