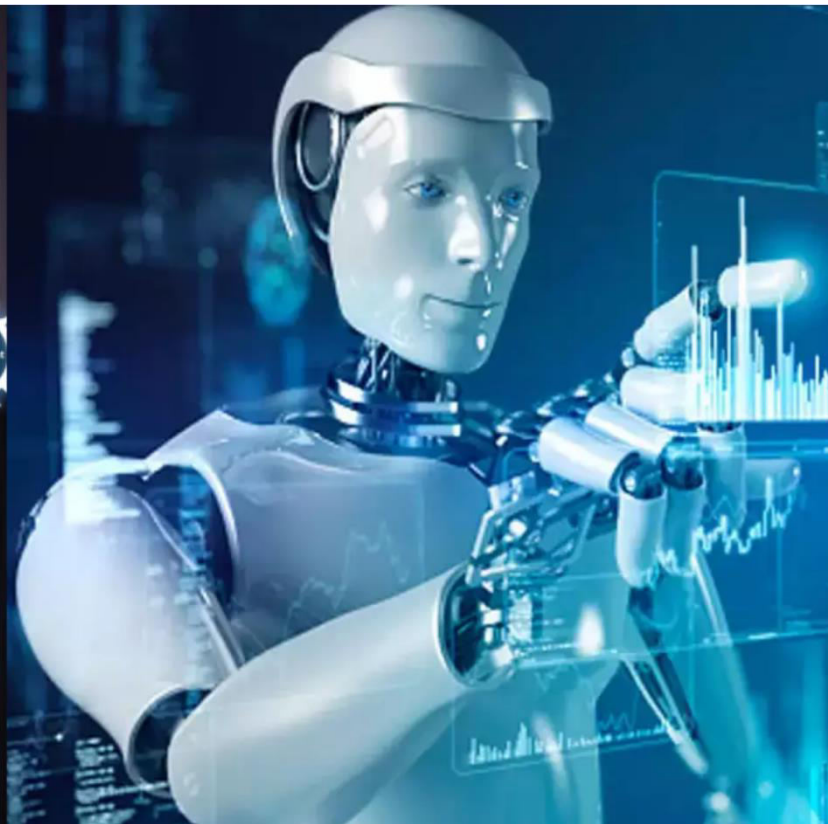




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Design and Fabrication of Speed Breaker Electricity Generator

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ABSTRACT: In today world, equipment requires electricity for its working and the demand for the electricity is increasing in many folds. In this project, studies conventional methods for the generation of electricity from the wasted energy these conventional energy sources are polluting and responsible for global warming. So, nonconventional sources are needed to be developed for power generations which are clean, environment friendly and sustainable. Our project is to enlighten the streets utilizing the jerking pressure during the number of vehicles crossing over the speed breaker in roads Due to this a large amount of energy is wasted daily on the speed breaker through the friction between the speed breakers and the vehicle tires during vehicle passes. There are four mechanisms to generate electricity through the speed breaker like Rack and pinion mechanisms, gear and flywheel mechanisms and spring coil mechanisms. We can tap the energy generated by moving vehicles and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be converted into mechanical energy through rack and pinion mechanism and this mechanical energy will be converted to electrical energy using generator which will be saved using rechargeable battery. Therefore, by using this mechanism we can save lot of energy which can fulfill our future demands.

KEYWORDS: Speed breaker, Non-conventional, Rack and pinion, generator.

I. INTRODUCTION

Man has needed and used energy at an increasing rate for his sustenance and wellbeing ever since he came on the earth a few million years ago. Primitive man required energy primarily in the form of food. He derived this by eating plants or animals, which he hunted. Subsequently he discovered fire, and his energy needs increased as he started to make use of wood and other biomass to supply the energy needs for cooking as well as for keeping himself warm. With the passage of time, man started to cultivate land for agriculture. He added a new dimension to the use of energy by domesticating and training animals to work for him. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy. In the present-day power becomes the major need for human life. Energy is an important input in all the sectors of any countries economy. The availability of conventional fossil fuels will be the main sources for power generation, but there is a fear that they will get exhausted eventually by the next few decades The pollution caused by generating power is enormously high-Power stations and automobiles are the major pollution producing places. We proposed the generation of electricity using speed breaker is one of the easiest ways as now a day's everyone is having vehicle. It can be widely accepted individual level because of its low production cost also it doesn't need any extra effort. The energy generated using speed breaker mechanism can be used to store in batteries and can be used apart for various purposes. The work basically aims to produce free electricity with no fuel cost, no pollution and with minimum requirement of space. The global demand for sustainable and renewable energy sources has driven the exploration of innovative methods to harness energy from everyday activities. One such promising concept is the generation of electricity through mechanical energy produced by vehicles passing over speed breakers. Speed breakers, commonly used on roads to control vehicle speed, offer a unique opportunity to convert the kinetic energy of moving vehicles into electrical energy, which can be harnessed and utilized to power local systems or contribute to the electrical grid. The primary goal of this project is to design and implement a system that captures the mechanical energy from vehicles as they pass over speed breakers and converts it into usable electrical energy.

II. NEED FOR NON-CONVENTIONAL ENERGY

As the world grapples with increasing energy demands, environmental degradation, and the depletion of traditional energy resources, the need for alternative and sustainable sources of power has never been more critical. Conventional energy generation through fossil fuels, such as coal, oil, and natural gas, has long been the backbone of global power infrastructure. However, the harmful environmental impacts of these resources, including air pollution, greenhouse gas emissions, and climate change, have accelerated the need to explore non-conventional, renewable sources of energy. One innovative solution gaining attention is the concept of power generation using speed breaker electricity generators. This approach taps into the energy produced by moving vehicles over speed breakers to generate electricity, offering a novel, sustainable way to harness energy in urban and high-traffic areas. One of the key advantages of power generation using speed breakers is that it harnesses energy from a constant and readily available source - traffic. Roads and highways are continuously used by vehicles, making this a reliable and predictable source of kinetic energy. As vehicles pass over speed breakers, they exert pressure on a mechanical system that converts this pressure into electrical energy. By integrating such systems into existing infrastructure, this approach makes use of resources that would otherwise go untapped, generating electricity in high-traffic areas without requiring additional space or land. Unlike large-scale renewable energy projects such as solar farms or wind turbines, which require significant upfront investment and maintenance costs, speed breaker electricity generators offer a relatively low-cost alternative. These systems can be integrated into existing infrastructure with minimal disruption, reducing installation costs. Moreover, once installed, they require relatively low maintenance compared to traditional power plants. With the potential for energy generation from everyday traffic, this system becomes a cost-effective solution, particularly in urban environments where electricity demand is high. As cities continue to expand, the demand for electricity increases, putting pressure on existing energy resources and infrastructure. Power generation using speed breaker electricity generators supports the idea of sustainable urban development, where energy solutions are integrated into the fabric of daily life. These generators can be strategically placed in areas with high traffic volumes, such as highways, busy intersections, and commercial zones. In addition to providing a renewable source of energy, such systems can also serve as a symbol of innovation and sustainability, inspiring further advancements in urban energy infrastructure. The need for non-conventional energy sources is more pressing than ever as the world faces the dual challenges of environmental degradation and rising energy demands. Power generation using speed breaker electricity generators represents an exciting step forward in the pursuit of sustainable, renewable energy solutions. By harnessing the kinetic energy produced by everyday traffic, this innovative technology not only provides an alternative to fossil fuels but also promotes energy security, cost savings, and environmental sustainability. As we continue to explore and implement such creative energy solutions, we can take meaningful steps toward reducing our reliance on conventional energy sources, safeguarding the planet, and fostering a more sustainable future for generations to come.

III. COMPONENTS AND DESCRIPTION

The block diagram of the speed brake power generation is shown in figure. The main components of this project are,

- Speed Brake arrangement
- Rack and pinion arrangement
- Sprocket and chain Drive
- Fly wheel
- D.C generator
- Battery
- Inverter Circuit and
- Light Arrangement

SPEED BRAKE ARRANGEMENT

This is made up of mild steel. The complete set up is fixed in a box. The two L-angles frame is fixed in the above two ends of the box. Below this L-angle window, the actual speed brake arrangement is constructed. This L-angle window pushes the speed brake when the time of vehicle moving on this arrangement.

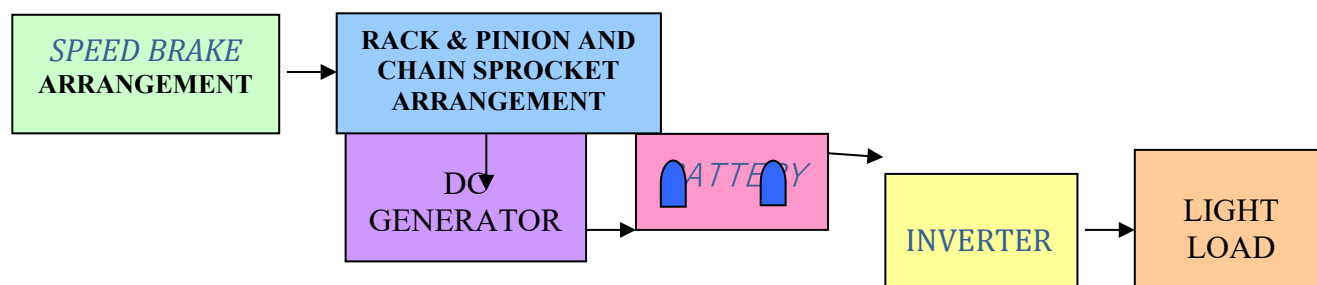


Fig. 1 Block diagram of the power generation

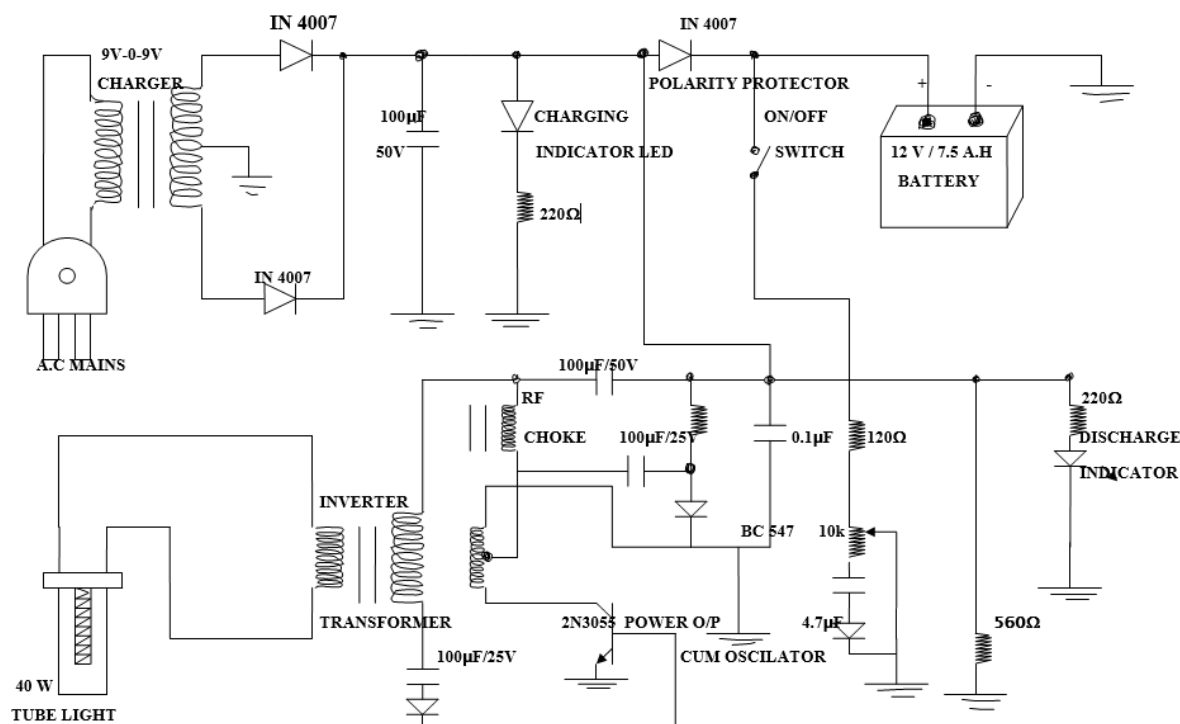


Fig. 2 Circuit diagram of the power generation

IV. WORKING PRINCIPLE

The complete diagram of the power generation using speed brake is given above. L-angle window is inclined in certain small angle which is used to generate the power. The pushing power is converted into electrical energy by proper driving arrangement. The rack & pinion, spring arrangement is fixed at the speed brake which is mounded below the L-angle window. The spring is used to return the inclined L-angle window in same position by releasing the load. The pinion shaft is connected to the supporter by end bearings as shown in fig. The larger sprocket also coupled with the pinion shaft, so that it is running the same speed of pinion. The larger sprocket is coupled to the small cycle sprocket with the help of chain (cycle). This larger sprocket is used to transfer the rotation force to the smaller sprocket. The smaller sprocket is running same direction for the forward and reverse direction of rotational movement of the larger sprocket. This action looks like a cycle pedalling action. The fly wheel and gear wheel are also coupled to the smaller sprocket shaft. The flywheel is used to increase the rpm of the smaller sprocket shaft. The gear wheel is coupled to the generator shaft with the help of another gear wheel. The generator is used here, is permanent magnet D.C generator.

The generated voltage is 12Volt D.C. This D.C voltage is stored to the Lead-acid 12 Volt battery. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This working principle is already explained the above chapter. This 230 Volt A.C voltage is used to activate the light, fan etc. By increasing the capacity of battery and inverter circuit, the power rating is increased. This arrangement is fitted in highways; the complete arrangement is kept inside the floor level except the speed brake arrangement.

V. SPEED BREAKER ELECTRICITY GENERATOR

The project is focused on generating electricity using a setup similar to a speed breaker system. When a load, such as a passing vehicle, exerts force on the speed breaker, this force is transferred to a rack and pinion mechanism. In this system, the linear or reciprocating motion created by the vehicle passing over the speed breaker is converted into rotational motion through the rack and pinion arrangement. The pinion, which rotates as a result of this movement, is connected to a sprocket system. This system consists of two sprockets: one larger and one smaller. These sprockets are linked by a chain, which facilitates the transfer of rotational power from the larger sprocket to the smaller one. The larger sprocket, driven by the rack and pinion mechanism, rotates at a relatively lower speed, while the smaller sprocket is designed to rotate at a higher speed due to the difference in their sizes. This change in speed is due to the mechanical advantage provided by the sprocket system, where the smaller sprocket, connected by the chain, spins faster than the larger one. As the rotational speed increases at the smaller sprocket, it can be used to drive a generator or other electrical systems to convert this mechanical energy into electrical power.

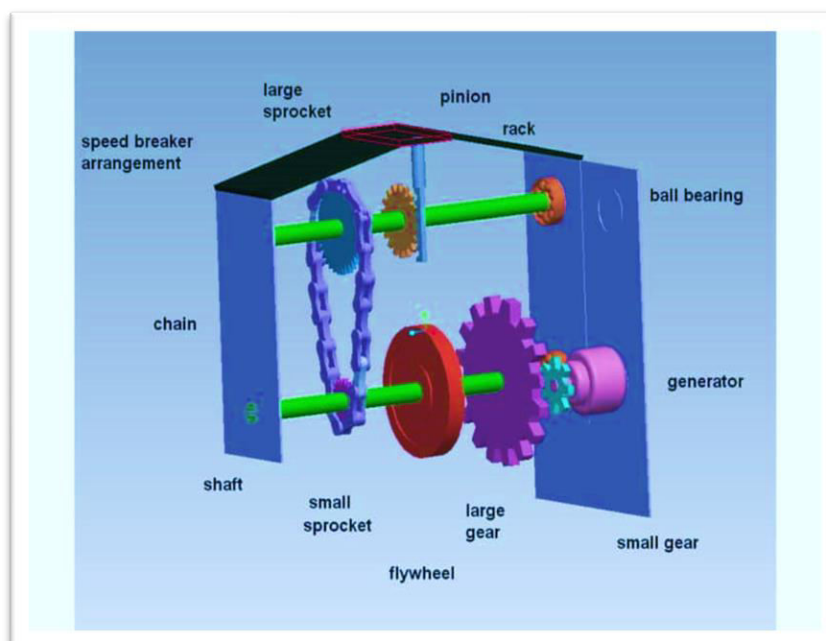


Fig.3 Drawing of speed breaker electricity generator

This method allows the energy produced by the pressure of vehicles on speed breakers to be harnessed efficiently, creating a sustainable and renewable source of electricity.



Fig.4 Fabricated Speed breaker electricity generator

VI. ADVANTAGES & DISADVANTAGES

ADVANTAGES

- Power generation is simply running the vehicle on this arrangement
- Power also generated by running or exercising on the brake
- No need fuel input
- This is a non-conventional system
- Battery is used to store the generated power

DISADVANTAGES

- Slight inclination is required in the speed brake
- Mechanical moving parts is high
- Initial cost of this arrangement is high
- Care should be taken for batteries

VII. CONCLUSION

The project of generating electricity from a speed breaker-like setup presents an innovative solution to harness the untapped potential of kinetic energy produced by vehicles in motion. By converting the linear motion caused by vehicles passing over speed breakers into rotational energy using a rack and pinion system, followed by amplifying the rotational speed through a sprocket and chain arrangement, this method offers a practical and efficient means of generating electricity. This approach not only contributes to sustainable energy production but also reduces dependence on conventional, non-renewable sources. The system's ability to transform the everyday force of traffic into electrical power makes it an attractive and cost-effective solution, especially in urban areas with high traffic volumes. Furthermore, the minimal maintenance required and the integration into existing infrastructure highlight its practicality for large-scale deployment. Ultimately, this project paves the way for exploring more decentralized and innovative energy solutions that can be easily implemented in high-traffic zones, such as highways, intersections, and urban roads. By leveraging the kinetic energy of vehicles, this system contributes to a cleaner, greener, and more energy-efficient future, promoting the transition to renewable energy sources while providing an additional benefit to existing infrastructure.

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