

**FORM 2**  
**THE PATENT ACT 1970**  
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**&**  
**The Patents Rules, 2003**  
**COMPLETE SPECIFICATION**  
**(See section 10 and M.13)**

**DESIGN OF HARNESSING HIGHWAY WIND FOR SUSTAINABLE  
LIGHTING SOLUTIONS USING VERTICAL AXIS WIND TURBINES**

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# **DESIGN OF HARNESSING HIGHWAY WIND FOR SUSTAINABLE LIGHTING SOLUTIONS USING VERTICAL AXIS WIND TURBINES**

## **FIELD OF INVENTION**

This invention is designed to capture and utilize wind energy to power highway lights, reducing reliance on traditional power sources and promoting environmental sustainability.

## **BACKGROUND OF INVENTION**

The "Harnessing Highway Wind for Sustainable Lighting Solutions" is a novel concept that aims to capture and utilize wind energy from highway traffic using vertical axis wind turbines. As vehicles travel at high speeds, they create wind currents that can be captured and converted into usable energy. This method offers a novel way to generate renewable energy, utilizing a resource that is consistently available. Implementing a system that captures wind energy from highway traffic can significantly reduce our reliance on traditional power sources. By shifting towards renewable energy, we can lower operational costs in the long term, as these systems require less maintenance and have lower running costs compared to conventional power plants.

## **SUMMARY OF INVENTION**

"Harnessing Highway Wind for Sustainable Lighting Solutions" focuses on an innovative approach to generating renewable energy by harnessing wind energy from highway traffic. By capturing the wind currents created by moving vehicles, this system can generate and store energy to power highway lights. This method not only reduces reliance on traditional, non-renewable power sources but also lowers operational costs and promotes environmental sustainability. The stored energy ensures consistent illumination of highway roads, enhancing safety and visibility for drivers and contributing to overall road safety. This invention represents a significant step towards a more sustainable and eco-friendly future by effectively utilizing a readily available and often overlooked resource.

## **OBJECTS OF THE INVENTION**

To develop the invention, Vertical Axis Wind Turbines capture wind energy generated by the movement of vehicles on the highway. Their design allows them to effectively utilize wind from any direction, making them suitable for varying wind conditions. It converts the kinetic energy from the wind into rotational mechanical energy. Dynamo Motors convert mechanical energy from the rotating turbines into electrical energy which helps to generate electrical power by harnessing the rotation of the turbines. Permanent Synchronous Generators stabilize and condition the electrical output from the dynamo motors to ensure the electrical energy produced is consistent and suitable for storage and use, by adjusting voltage and current as needed. Battery Banks store the electrical energy generated by the turbines for later use. Highway Lights utilize the stored energy from the battery banks to illuminate the highway.

## **DETAIL DESCRIPTION**

The methodology proposes to harness wind energy generated by highway traffic to power highway lights, promoting sustainability, and reducing reliance on traditional power sources. Vertical axis wind turbines are strategically installed along highways to capture the wind currents created by moving vehicles. These turbines are connected to dynamo motors, which convert the mechanical energy from the turbines into electrical energy. This electrical energy

is then stabilized and conditioned by permanent synchronous generators before being stored in battery banks. The stored energy is used to power highway lights, ensuring illumination and improved visibility for drivers.

### **DETAIL DESCRIPTION ABOUT DRAWING**

Vertical axis wind turbines are positioned to capture the wind generated by moving vehicles. Each turbine is represented as an input block that collects kinetic wind energy. It converts wind energy into mechanical rotational energy. Dynamo Motors are connected to each wind turbine, the dynamo motors convert the mechanical rotational energy from the turbines into electrical energy and produce electrical power from the turbine's mechanical energy. The electrical output from the dynamo motors is fed into permanent synchronous generators. These generators are represented as processing blocks in the diagram. It stabilizes and adjusts the electrical output to ensure it is suitable for storage. The stabilized electrical energy is routed to battery banks for storage. The battery banks are shown as storage blocks. It stores the electrical energy for later use, providing a reserve supply for the highway lights. The stored energy in the battery banks is used to power highway lights, represented as output blocks in the diagram. Illuminate the highway, enhancing visibility and safety for drivers.

Dated this 4<sup>th</sup> of September 2024



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## I/WE CLAIM

1. A highway wind energy harvesting system (100) comprises of
  - i) Wind from moving vehicles (1);
  - ii) Vertical Axis Wind Turbines (2);
  - iii) Dynamo motor (3);
  - iv) Permanent Synchronous Generator (4);
  - v) Battery storage device (5);
  - vi) LED drive circuit (6);
2. A highway wind energy harvesting system (100), as claimed in 1, wherein the said invention captures wind from the moving vehicles to generate electricity.
3. A highway wind energy harvesting system (100), as claimed in 1, wherein the said vertical axis wind turbines, positioned along the highway to capture wind generated by moving vehicles and convert it into rotational energy.
4. A highway wind energy harvesting system (100), as claimed in 1, wherein the said invention uses the Dynamo Motor to convert the mechanical energy from the Vertical Axis Wind Turbines into electrical energy.
5. A highway wind energy harvesting system (100), as claimed in 1, wherein the said invention uses the Permanent Synchronous Generator to generate a stable electrical output suitable for charging the energy storage devices.
6. A highway wind energy harvesting system (100), as claimed in 1, wherein the said invention uses batteries or capacitors to serve as the energy storage devices to store electrical energy.
7. A highway wind energy harvesting system (100), as claimed in 1, wherein the said invention LED drive circuit powered by the stored energy in the battery storage device to provide lighting or other electrical functions.

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100

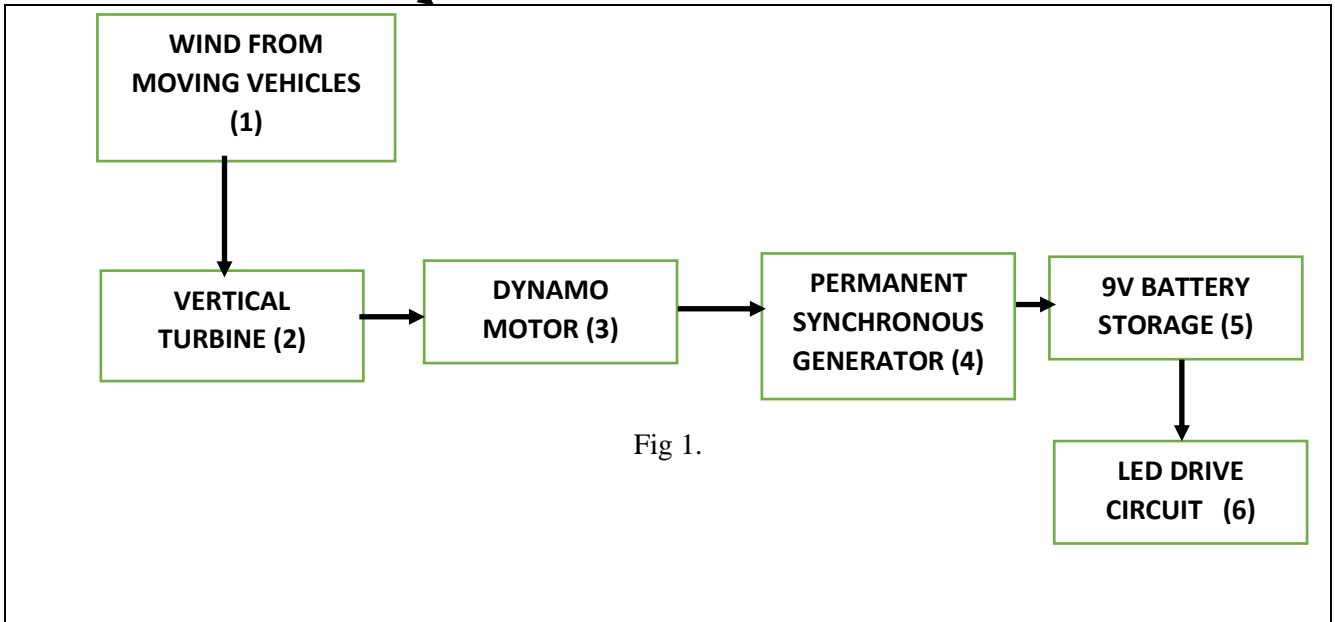


Fig 1.

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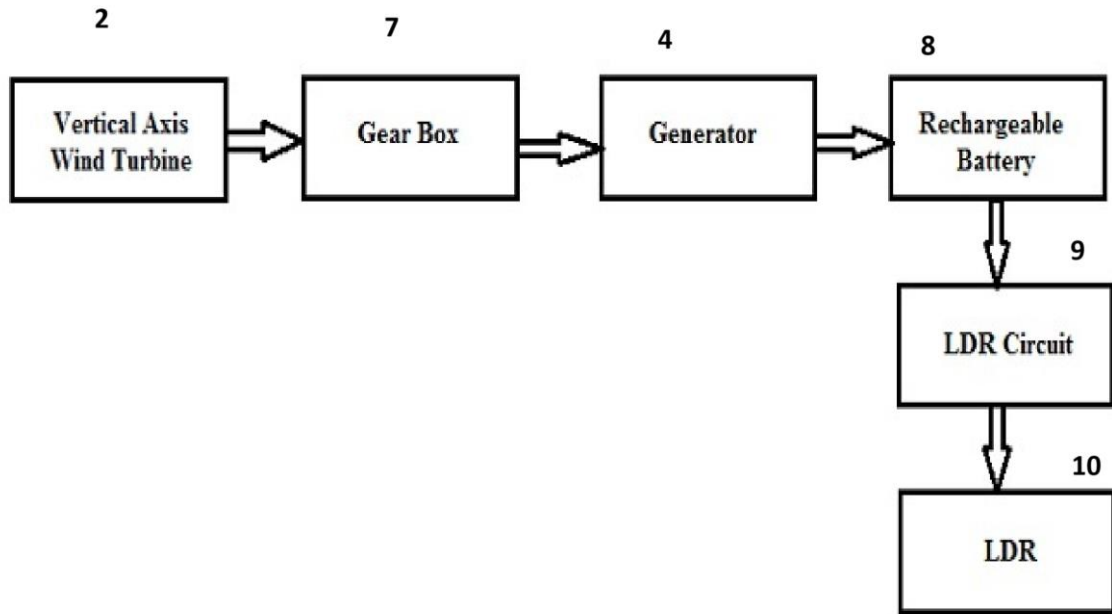


Fig 2.

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## ABSTRACT OF THE INVENTION

This invention presents an innovative approach to generating renewable energy by harnessing wind energy from highway traffic. The system captures wind currents produced by moving vehicles using strategically placed turbines 2 along highways. The kinetic energy 2 from these turbines is converted into electrical energy via dynamo motors and permanent synchronous generators 4. The generated energy is stored in battery banks and utilized to power highway lights, enhancing visibility and safety for drivers 8. This method offers a sustainable alternative to traditional power sources, reducing reliance on fossil fuels and lowering greenhouse gas emissions 9. Additionally, it provides economic benefits through reduced operational costs. The successful implementation of this system could transform highway infrastructure, contributing to a greener and more sustainable future.

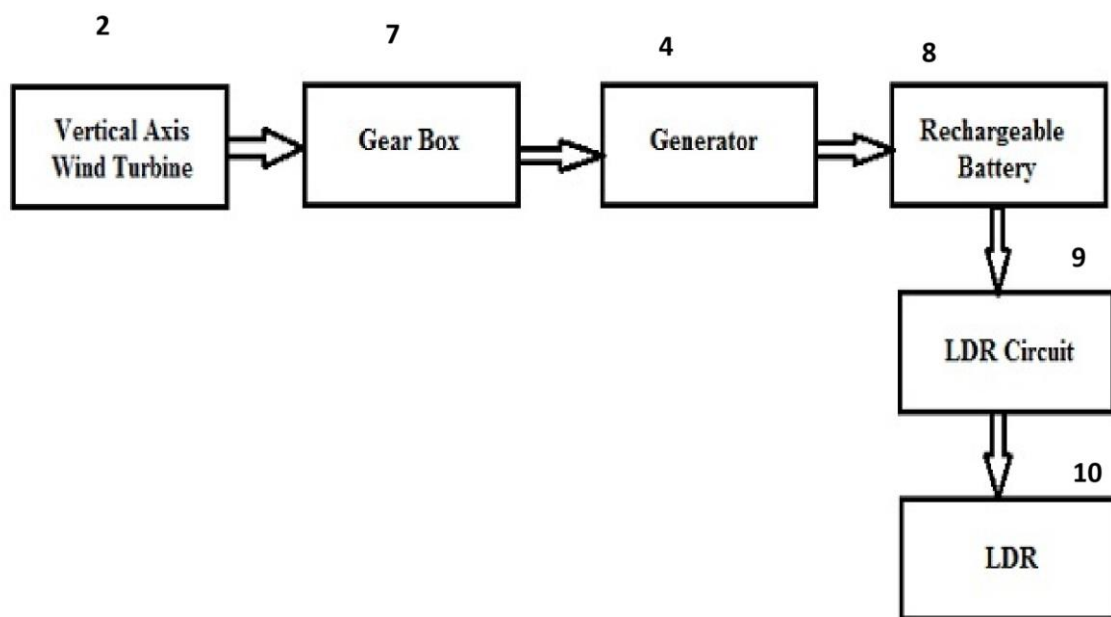



Fig.2.

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