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HYBRID POWER SPRAYER

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ABSTRACT:Sprayers are mechanical devices that are specifically designed to spray liquids quickly and easily. They are of different varieties, in this paper we'll take a look at solar & Wind operated mechanical sprayers. A sprayer of this type is a great way to use Hybrid energy. Solar based pesticides sprayer pump is one of the improved versions of petrol engine pesticide sprayer pump. It is vastly used in the agriculture field & also used for many purposes. This is having more advantages over petrol engine sprayer pump. It uses the solar power to run the motor. So it is a pollution free pump compared to petrol engine sprayer Pump. This System is also equipped with a Wind Energy System, a Small wind turbine is provided with this arrangement which is used to charge the battery if the Sunlight is not available for Solar panel. Mostly used pesticide sprayer available in market is petrol engine sprayer, which is bulky to carry, needs lot of maintenance (to engine and carburettors) and cost incurred to maintenance, petrol to operate is noticeable. So improving operating time and solar / Wind energy harvesting is motivation of this paper.

KEY WORDS:-Energy alternate device, solar sprayer, Agriculture implements, misting, Performance analysis, wind energy, and household purpose.

I.INTRODUCTION

To extend the concept of solar PV-Technology and wind energy system on "sprayers" as "Energy Alternate devices". To convert the "Fuel operating system" as "Free Energy operating system" foragriculture implementation. The another model which is inspired us to take this paper is electrical pesticide sprayer in which battery is charged using conventional electricity but operates only for four hours once battery is fully charged. So improving operating time and solar / Wind energy harvesting is motivation of paper. This system is also provided with a USB Mobile Phone charging Circuit and Emergency Light. This type of system is mostly useful in rural areas. This system has advantages of safety, saving energy, good effect of misting, high use ratio of pesticide, broad range of using. It is suitable to use in prevention of plant diseases and pests, such as cotton, wheat, paddy, fruit trees, and tea trees and so on. It can also be used for the prevention of the pests of garden flower, epidemic prevention of hotel, station and other public places and poultry.

II.EXISTING POWER SPRAYER:

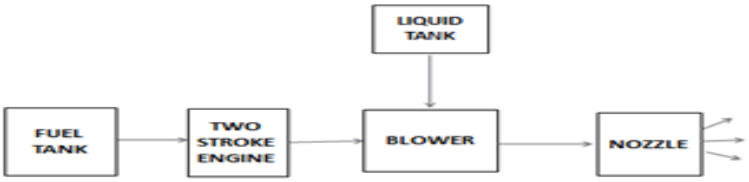
Power sprayers are used to discharge pesticides and fertilizers in the liquid form. It is two stroke petrol engines. It needs fuel and oil for its operation. The mechanical parts of the engine operate with this fuel energy. The two stroke petrol engine mounted on a power sprayer

THE MAJOR COMPONENTS USED IN THIS SPRAYER:

- Two stroke engine
- Fuel tank
- Blower
- Nozzle
- Liquid tank

OPERATION:

In this device, sprayer works on the basis of fuel and petrol is used as a fuel for its operation. This fuel is connected to the two stroke engine which is used to discharge the liquid from liquid tank to blower. The two stroke engine is fixed in between the fuel tank and blower. Thisfuel helps to run the two stroke engine converts fuel energy into mechanical energy. This mechanical energy helps to take liquid from liquid tank to blower and this blower helps to pump the liquid to crops through the nozzles.



"Fig 1.1: Block diagram of existing system"

MAINTENANCE AND CARE:

To keep the efficiency of the machine, care must be taken in the following areas.

- Maintenance of air filter must be strictly observed.
- Cleaning is necessary after every three hours operation of the engine.
- Service and maintenance of the carburettor should be adopted strictly as per the instruction of the company.
- The spark plug has to remain clean and always free from oil and deposits.
- Pipes and carburettor should always be kept clean.
- Servicing and repair of the ignition system shall be done by an expert only.
- If the engine is to be put out of service for a longer time, then the corrosion preventive oil should be added.

III.PROPOSED POWER SPRAYER:

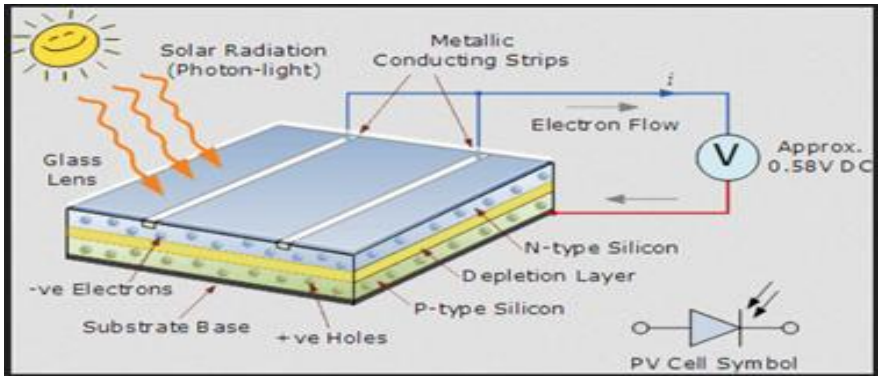
Toovercome the demerits in the existing models and to reduce the operating cost of the power sprayer, a modified model has been designed and introduced for effective operation without fossil fuel. In this modified model the two stroke petrol engine is replaced by a single motor. This can be operated by the electrical energy stored in the 12V battery attached in the Unit. The 12V battery can be charged by the Solar Panels.

MAJOR COMPONENTS USED IN THIS SPRAYER

- Solar panels
- Wind power turbine
- 12V battery
- USB charging unit
- Motor
- LED lights
- Charge controller

SOLAR ENERGY:

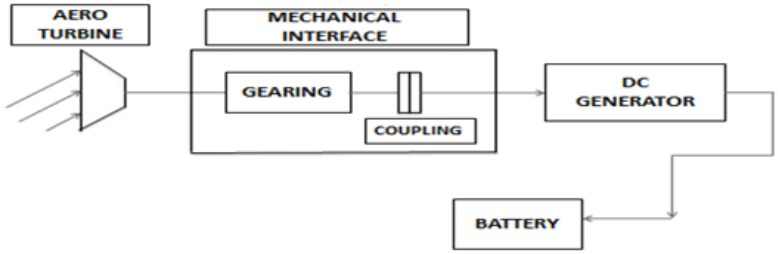
Solar radiation can be converted directly into electricity using semiconductor devices, which are known as photovoltaic (PV) cells. When sunlight falls upon the solar cell a part of the light is absorbed and it is converted into Electricity Energy by means of Electron movements. Solar panel works on the basis of PN-Junction diode. This panel consists of two regions that are N&P Regions. These two regions are separated by the depletion layer. When the sunlight falls on the panel, the electrons gets excited in the N-Region due to majority carriers are electrons. The majority carriers in P-Region are holes so the excited electron gets moved through the load to P-Region. This solar panel is connected to 12V lead acid battery for storing the electrical energy. A 12V dc motor is connected to this lead acid battery to convert the electrical energy into mechanical energy



"Fig1.2 operation of PV cell "

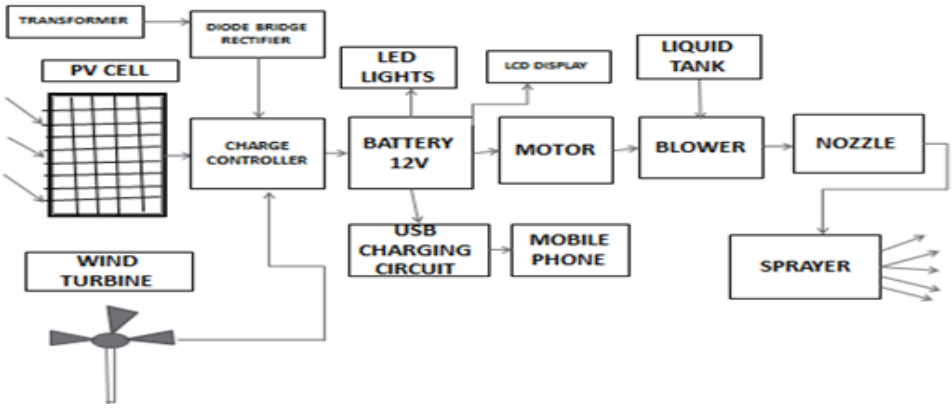
WIND ENERGY:

Most modern electrical wind power is generated by converting rotation of turbine blades into electrical currents by means of electrical generator. Windmills provide mechanical power, the basic technique adopted in the blades of windmill to facilitate proper rotation is the pressure difference among the blades. *Other industrial uses of windmill machinery are wind pumps, used for water pumping or drainage.*



" Fig 1.3: Block diagram of wind energy system"

PROPOSED SYSTEM:



"Fig1.4: Block diagram of proposed system"

This Hybrid Pesticide Sprayer is having more advantages over petrol engine sprayer pump. It uses the solar power to run the motor. So it is a pollution free pump compared to petrol engine sprayer Pump. This System is also equipped with Wind Energy System, a Small wind turbine is provide with this arrangement which is used to charge the battery if the Sunlight is not available for Solar Panel. This system is also provided with an AC 220V operated battery charging System, if Solar and Wind energy is not available to charge the battery.

Mostly used pesticide sprayer available in market is petrol engine sprayer, which is Bulky to carry, needs lot of maintenance (to engine and carborators) and cost incurred to maintenance, petrol to operate is noticeable. The another model which is inspired us to take this paper is electrical pesticide sprayer in which battery is charged using conventional electricity but operates only for four hours once battery is fully charged. So improving operating time and solar / Wind energy harvesting is motivation of paper. This system is equipped with a battery Voltage monitoring circuit. This circuit is designed using Microcontroller of Atmega 8. LM317 based charging circuit is used to charge a 12V/ 7Ah battery efficiently, if any of the power source is available.

ADVANTAGES:

- It reduces the cost of the fuel.
- It reduces maintenance cost.
- It reduces environmental pollution.
- It can be used to various purposes like household purpose and agriculture purpose.

APPLICATIONS:

It is used to spray the fertilizers to paddy crops, sugar cane plants etc. In the household purpose it is used to spray the water to the plants. It is also used to charge the mobile and for led lightning purposes.

V.CONCLUSION:

To promote efficient technologies which could meet the energy demands of the people with locally available renewable energy sources, we tried to develop the solar/wind hybrid systems which independently provide a stable power source. Building a Hybrid Powered pesticide sprayer came out successfully using

Microcontroller of AVR Family, wind Turbine, Solar Panel and AC Power Source. LM317 based charge controller is used to charge the battery efficiently if any one power source is available. 12V / 7 Ah battery is connected to the device as a main standby power source to the pesticide sprayer. DC Water Pump is used to spray pesticide and once it is fully charged it can power up to 4 hrs.

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