Design & Fabrication of Solar Water Sprayer

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Abstract- *Solar energy plays an important role in drying agriculture products and for irrigation purpose for pumping the well water in remote villages without electricity. ThisTechnology on solar energy can be extended for spraying pesticides, Fungicides and Fertilizers etc., using Solar Sprayers. This paper deals how a 'Power Sprayer'which is already in use and works with fossil fuelcan be converted into solar sprayer's works without any fossil fuel.*

Keywords- Solar Panel, DC Motor, 12V Battery, Pipes, Nozzles, etc.

I. INTRODUCTION

Sprayers are mechanical devices that are specifically designed to spray liquids quickly and easily. They come in a number of different varieties. In this project we'll take a look at solar operated mechanical sprayers. A sprayer of this type is a great way to use solar energy.

In this project an aluminum frame is constructed using aluminum bars to keep the weight of the frame low. Inthis frame a retractable link is fixed to the top end of which a solar photovoltaic panel that converts solar power into electricity. This electricity is then provided to battery via a charging circuit and is used for charging the battery. Electric power from this battery is given to an electric motor via control switches by controlling which entire device can be operated. To the shaft of this electric motor a blower fan is connected. This blower blows high speed air into the blower pipe.

This blower pipe is held with hand by the device operator and is directed onto the area where he wishes to spray the pesticides / insecticides. The insecticide reservoir is connected to the blower pipe . By continuously feeding this insecticide to the blower pipe the same is spread or sprinkled where wished. Liquid insecticide is sprayed on the crops using Spray pipe, which receives liquid from a reservoir with the help of a pump. This pump is driven by another DC motor that receives power from the same battery. Thus insecticide in liquid form is sprayed where wished. The project can also run emergency lamp using battery power thus this project can be of very much use and can be very beneficial for farmers. The running cost of project is nil.

II. EQUIPMENT USES

- Spraying fluid tank
- Spraying pipe.
- Solar panel.
- Battery.
- Charger.
- Pump.
- Motor, Etc……

III. SPECIFICATION

A) According to Spraying Capacity & Discharge Capacity Of Spray Motor Is Selected

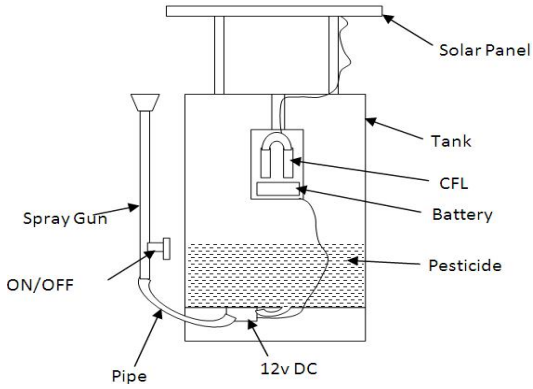
- Weight of the motor : 1kg (approx)
- Current :7Amp
- Operating power required : 84 watt
- Operating Voltage : 12V
- Motor Speed : 1,600 rpm.
- Discharge Capacity : 0-12 Lit/min
- Flow rate : >560ml / 10 seconds
- Fluid pressure : 1.6kgf/cm2

B) According To Motor Operating Power Battery Is Selected

- Weight of the battery : 2 kg.
- Cost of the battery : Rs.1200
- Output power : 144 watt.
- Operating voltage : 12v

C) According to Battery Output Power Solar Panel Is Selected

- Power : 10 watt
- Dimension : 397*278*25 mm
- Weight : 1.6 kg
- Open Circuit Voltage : 21.5 volt
- Short Circuit Current : 0.65Amp
- Operating Current : 12 Amp.



IV.WORKING OF SOLAR SPRAYER

The solar agro sprayer consist of three main parts namely,

- Solar panel unit
- Storage battery unit and
- Rotating motor.

In the solar agro sprayer the two stroke petrol engine component of the power sprayer has been replaced with a combination of storage battery and rotating motor. The action of the rotating motor could be controlled by a switch attached with it in the assembly. Solar panel arrangement has been provided at the top of the unit to charge the storage battery. The units of solar panel, storage battery and a rotating DC motor were mutually attached with one another. A solar panel of size of 1m2 area with an output power of 75 watt has been mounted on a circular metal frame which is enclosed over the cylindrical chemical tank of capacity 20 l. The solar panel arrangement was made at an angle of 45° to the vertical so that it should not create any trouble to the person who is loading the unit on his back. Moreover it is able to receive maximum solar radiations continuously from the sun during the operation of the unit in the field. The output of the panel is connected in parallel with the 12 V storage battery to store the electrical energy from the panel. The 12 V battery is properly connected with a 12 V DC motor attachment on the frame. The operation of the motor is controlled by a press type switch attached on the assembly. energy received from the solar cell is stored in a storage battery unit for application. This stored electrical energy can be converted in to mechanical energy by rotating the motor. For this mechanical operation there is no need of conventional fuel like petrol and oil.

Figure 2. Trolly Based Solar Operated Pesticide Sprayer.

V. CONCLUSIONS

The main findings of the designed and fabricated solar sprayer are:

1. The prepared solar operated sprayer is environment friendly and cost efficient.
2. The prepared solar operated sprayer can be used largely in agriculture field effectively.
3. The prepared solar pesticide sprayer is the best option to farmer who economically challenged and facing electrical problems like load shedding etc.
4. It does not create air pollution and noise.
5. It does not require fuel hence it is a zero fuel operated equipment.
6. It can use in municipality for killing insects and mosquitoes.
7. It is maintenance free device.
8. It is easy to operate and portable.

The solar operated sprayer will help the farmers of those remote areas of country where fuel is not available easily. They can perform their regular work as well as saves fuel up to large extent. At the same time they can do their pesticide spraying work with very less environment pollution.

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