

SOLAR MULTI PURPOSE SPRAYER

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Abstract:

This project deals with design and fabrication of a “Solar multi-purpose sprayer”. This non-conventional device basically consists of a plastic bucket which serves as a hopper. The bottom of the hopper has opened through which the material falls on a hose. The machine, Solar multi-purpose sprayer, we introduce through our project is mainly useful for Agricultural purpose. This machine works under non-conventional energy sources. The solar energy is converted into electrical energy with the help of solar cells. The converted electrical energy is completely stored in the battery and a D.C. Motor is run by utilizing this electrical energy. A different type of seed is sited with the help of sprayer unit. This machine is not only used to spray the solid substance and also powder particles. The device can be operated by a single person and an unskilled labor can operate it. Using this, a single person can sow seeds and cover an area of 6 hectares of land on a single day.

I. INTRODUCTION

It is often said food, clothing & shelter are the 3 basic needs of mankind. All the above 3 are based on agriculture. Agriculture is known to our people for thousands of years. But still our farmers in the villages are using only age-old technology. The population in our country has increased at least 3 times since our independence. The agricultural land has diminished in size as some agricultural lands have been diverted for industrial and domestic purposes. For improving the productivity of our agricultural lands, it is stressed that they must provide high technology in every activity and involves the use of tractors, electrical

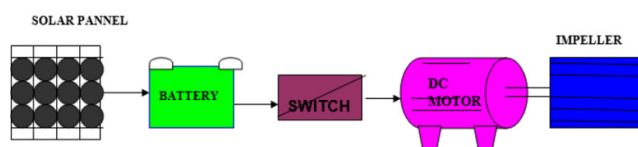
pumps and motors etc. While this can be used in positive way in many plants, it cannot be used in remote places for the want of either electricity or oil. Hence, it'll be within the fitness of things to style a tool which may be operated manually. Agriculture starts with sowing of seeds and fertilizers hence to be applied several times. Hence if a manually operated sprayer be designed in a small step but with a very high potential of growth. The use of this sprayer will end in uniform broadcasting which can't be obtained, in other devices at such a coffee cost. Since the electricity is not required, this can be used anywhere. Since oil is not used and it is pollution free. An attempt has been made to design

and fabricate such a solar multi-purpose sprayer, which can be used even by an unskilled operator.

II. PROPOSED METHOD

Our project "Solar multi-purpose sprayer" is that the most advantageous and a simple device. It's a sprayer like construction which may be hung within the operator with the assistance of the belt tied on the shoulders of the operator, because the weight of this device is extremely less. By pouring the seeds inside the hopper and just turn on the D.C motor the seeds are often broadcast within the field very efficiently. High uniformity is obtained and hence high yield. The value of device is extremely less, and an unskilled labour can operate this device.

II. BLOCK DIAGRAM



III. CONSTRUCTION AND WORKING

The blower fan is formed to rotate by employing a 12 V DC motor. The supply of the present is been given from the 12 V battery provided. The chemical liquid provided within the Hooper may reach the nose for spray by the gravity. During the sunshine the panel board absorbs the warmth energy from the Sun, and it converts it to the electricity and sends the present to the battery for the storage provision. The stored energy from battery is supplied to the motor and operates the blower fan. The discharge of the electricity from the battery are going to be adequate to the charging of the battery by the solar photo galvanic cell.

Photo-voltaic cell

Electromagnetic energy is often converted on to electricity within the photo galvanic cell,

commonly called the photovoltaic cell. Like the cell the utmost conversion efficiency of the system isn't limited. By the efficiency of an externally reversible engine cycle, despite this, however the conversion of solar power into electricity is restricted to relatively low conversion efficiencies. The principle of operation of the photo galvanic cell was discovered by Adams and day in 1876, using selenium in 1919, Cob Lenz discovered that a voltage is induced between the illuminated and dark regions of semi conductivity crystals. The owl discovered the photo voltaic effect at the P-N junction of 2 semi-conductors. Primary interest in these systems provides the possible conversion of the electromagnetic energy from the sun directly into electricity. Using the solar constant of 1395 w/sq. m it are often shown that the effective radiating temperature at the surface of the sun is around 6000 k (10800 R), consistent with the wines displacement law for thermal radiation, the foremost probable energy of the radiation is about 2.8 EV, while this value is extremely small compared to the energies encounters is nuclear reactions, it is more than sufficient to strip the valence electrons from many materials. The successful operation of a solar cell is release on the action of the P-N junction. When a P-N junction is first formed, there is a transient charging process that establishes an electric field in the vicinity of junction. Although both the N type and P type semiconductors are naturally charged by them. This essentially makes the N material positively charged and the P material negatively charged in the vicinity of the junction. This charging process is continuous until the electrical field or junction potential inhibits further net flow and therefore the electron and hole flow are that the same in both directions as indicated. The photons react with the valence electrons near p-n junctions to produce an effect like that produced by the forward bias voltage. In this case V1 is that the external voltage that's generated by the photons.

Hooper

Before filling the seed in Hooper, please ascertain that the adjustable control valve is closed. Before mounting the machine on your back, start the motor.

Blower unit

It is made up of sheet metal. The fan (impeller) rotates inside the shell. The shell is so designed that the air is rushed out forcedly. The pesticide enters the front portion of the blower. The blower is fixed with the stand. At the one end of the blower the hose is fitted. The air forces the seed to the outer side.

Impeller (Fan)

Impeller is the most important component of the unit. It is made up of plastic. The vanes are readily constructed. The air is made to flow forward.

DC motor

The basic principle of motor action lies during a simple sketch. The working rule tells that, when a current carrying conductor is placed during a magnetic flux, a force is produced to maneuver the conductor far away from the magnetic flux.

Battery

Lead acid battery

The positive and negative electrodes of a lead acid battery are inserted in dilute sulphuric acid. When the battery is fully charged, there is lead peroxide and the positive plate and spongy lead on the negative plate as the active materials.

Chemical action

Sulfuric acid is a combination of hydrogen and sulphate ions. When the cell discharges, lead peroxide from the positive electrode combines with hydrogen ions to form water and with sulphate ions to form lead sulphate.

Current ratings

Lead-acid batteries are generally rated in terms of what proportion discharge currents they

will supply for a specified period; the output voltage must be maintained above a minimum level, which is 1.5 to 1.8V per cell. A common rating is ampere-hours supported a selected discharge time, which is usually 8h.

Specific gravity

Measuring the precise gravity of the electrolyte generally checks the state of discharge for a lead-acid cell. Specific gravity is a ratio of comparing the weight of a substance with the weight of a substance with the weight of water. For instance, concentrated vitriol is 1.835 times as heavy as water for an equivalent volume.

Battery voltage

A 6V battery consists of three cells of 2V each. The cells are all similar in interior construction and operation.

Hose

Hose are provided for smooth running of the pesticide from tank with the air enters the blower unit and it is forced out. The pesticides come out of the nozzle with the help of hoses from the tank.

Nozzle

Nozzles split the pesticides into atomized particles and sprays out. Nozzles may be in different diameters to make the air mixture more pressurized.

Adjustable screw

It is fixed bellow the Hooper by means of screw and nuts. It can slide smoothly through the guide ways. The valve can be fully opened or closed by means of screw arrangement. According to the types of seeds the control valve can be

adjusted.



IV.MERITS AND APPLICATIONS

Merits

Since the efficiency of the Sprayer is extremely high, it is often employed by the farmers. The material spreads uniformly. This device is portable. It is light in weight. Unskilled workers can also operate it. Low Cost. Maintenance is easy. This is non-conventional energy source. Since oil isn't used, it's pollution free. This device is very useful to small farmers.

Application

The solar multi-purpose sprayer is mainly used for spraying different type of seeds and with some arrangements we can spray the powered (dust) pesticides and fertilizers.

V.CONCLUSION

It is the true reflection of the state affairs to say that our country is highly agricultural. In this agricultural field seed broadcast is considered as one of the most important one. Though we have a number of ways in seed broadcasting no way is efficient and economical. So that, the study on this chapter says that there is a greater need in the development of new devices for solar seed spraying (broadcasting). A new device "Solar multi-purpose

sprayer" is designed and fabricated to suit the farmer's specifications. Utilization of this machine is used in agricultural purpose; result in the reduction of time by 50% than the other devices. Besides, this device can help to increase the productivity. This device is turns fabricated and tested successfully.

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