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A REVIEW PAPER ON BATTERY OPERATED SOLAR SPRAYER

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ABSTRACT

Solar-powered pump is a pump operating on electrical energy generated by the PV cells which traps the solar energy and converts it into useful electrical energy. The operation of SPV pumps is economical due to less operating and minimum maintenance and has less impact on environment also requires less effort and has less weight as compared with an internal combustion engine (ICE). Solar pumps are useful where the electric source is unavailable and also some alternative sources (in particular wind) which do not provide sufficient amount of energy.

Most of the increase in the area of irrigation land in the world has been due to the increasing use of petrol and diesel operated pumps. However, the increased the price of oil-based fuel has reduced the limit of profit gained by the farmers from irrigation that is the reason why the battery pumps are preferred at a large scale in agricultural field nowadays. The present up & down in price of oil, and the conventional oil-operated engine-driven pumps and mains electricity are expected to increase in the future. We have to decrease our dependence on the oil, so as to reduce the pollution and to provide comfort to humans from extra efforts required to operate engine-operated pumps.

Keywords *– Solar sprayer, SPV battery pump , Solar-powered pump.*

I. INTRODUCTION

Pump is other main component SPV battery pump. Solar water-pumps are specially designed to use solar power efficiently. Conventional pumps require stead AC current that utility lines or generators supply. Solar pumps use DC current from batteries or the PV panels. In addition, SPV battery pumps are designed for effective working in the lowlight conditions, at reduced voltage value, to avoid stalling or overheating problems.
Although there is availability of wide ranges sizes, most pumps used in the present watering applications have low volume, and yielding of 7-15 liters of water per minute. Low volume of pumping keeps the operating cost of the system reduced and by using minimum number of solar panels and the entire daylight period to pump water or to charge the batteries. Most solar water pumps are designed to operate on solar power most efficiently ranging from 12 to 36 volts DC.
The demand for electrical energy is more than require amount of supply, especially in the agricultural sector, and it is becoming increasingly difficult to meet this increasing growth in demand. To reduce this electrical energy demands and to avoid fuel cost there is necessity of using SPV battery pumps nowadays. According to some government subsidies the battery pumps are provided to the farmers so they need to invest 30% of cost to make total setup or by self-purchasing it takes almost up to Rs. 17000 /-

II. PRINCIPLE

The amount of energy stored in the solar panel determines its output and thus the working of the battery pump.
The main component of solar panel is the photovoltaic cell which converts the solar energy into useful electrical energy and i.e. how the pump operates .Each solar cell has two or more specially prepared layers of semiconductor material that produce electricity (DC current) when exposed to sunlight. This DC current is collected in the battery source by the connections of wire with the panel. It is then supplied either to a DC pump, which in turn pumps water whenever the sun shines, or stored in batteries for later use by the pump

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III. WORKING

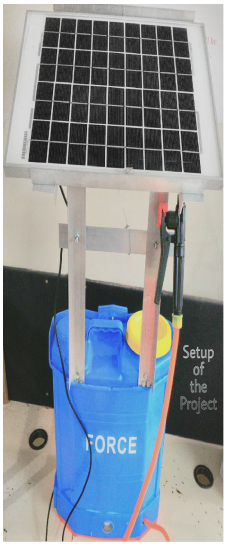

Fig. Setup of the project
(Solar sprayer)

The capacity of the tank is 16 liter which has the battery and motor inbuilt. When charged with electricity the battery takes 1 to 1:30 hours for full charging and when charged with solar panel it takes up to 3hr. But the efficiency of the pump increases when its battery is charged with application of solar panel rather than by electrical means.

- Calculations :-

- Power Generated by Solar panel (in watts)
  P = V×I
  = 17.2×0.63
  = 11 W
- Power generated by motor (in watts)
  P = V×I
  = 12×1.5
  = 18 W
- Energy generated by solar panel within specific time
  For the Solar panel of 11W kept for 4 hours in sunlight,
  = 11×4×0.85
  =37.4Wh
- Time required to charge the battery
  T = 37.4 (in Wh) ÷18 (hrs)
  = 2.07 hrs.
  The energy saved in battery can be used electrical appliances such as led light which meets need of electricity in load shading areas.
- Energy used by a 13W led bulb in 2hrs period from the battery = 13 (W)×2 (hrs)
  = 26Wh

IV. ADVANTAGES

- Fuel cost is neglected and requires less maintenance cost.
- More economical than diesel pump sets in the long run.
- Enables extra cultivation of crop.
- Helps to provide critical protective irrigation in water scarcity areas.

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- Saves time and labor.
- Weight is lighter in comparison with engine-driven pumps.

V. APPLICATIONS

- In agriculture field for farming and for extra cultivation of crops.
- It is used in garden for watering the plants and trees.

VI. CONCLUSION

The weight of the pump is less and requires no fuel. The maintenance cost and working of the setup is easy and it is more reliable. The pump is portable and can be used for extra cultivation of crops. So it is concluded that the solar sprayer is boon to farmers and also to peoples.

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