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Unique Solar Operated Spray Jet

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ABSTRACT: *Science is basically "passive" observation of the universe, as it exists to generate knowledge. Engineering is making use of that knowledge to meet human needs by creating machine, systems, process and technologies that have not previously existed. Design and manufacturing are the synthetic part of engineering practice. Manufacturer has received a lot of attention recently for very good economic reasons. In Indian farms generally two types of spray pumps are used for spraying; hand operated spray pump and fuel operated spray pump. Of which hand operated spray pump is most popular. The main drawback of hand operated spray pump is that the user can't use it for more than 5-6 hours continuously as he gets tired after some hours where as fuel operated spray pump requires fuel which is expensive and availability of fuel is not easy at rural places. At the same time it exhausts carbon dioxide as pollutant which is harmful to our environment. In such situation we should think to move towards some non-conventional energy. Considering it, solar energy would be one of the solutions. This paper emphasis on the spraying of pesticides using solar power as energy. It can be most often used at various locations such as farms, gardens although it can become more popular in rural areas as well. The additional advantage of this project is it can be used as home lighting system as its battery can be used at night too.*

Keywords: *Solarenergy, Spray jet,carbon dioxide*

I. INTRODUCATION

Solar spray are the ultimate cost effective solution at the locations where spraying is required. This solar-powered spray pump system uses solar energy as source. Solar energy is first used to charge a storage battery. The solar energy stored in the battery is utilized to operate motor which functions as pump.As the name of the paper suggests, it deals with the constant discharge of pesticide, compress air control system, solar power, battery charging, monitoring as well as timer and non-conventional power controlling techniques. As far as controlling is concerned, it include the parameters such as pressure, pesticide level, battery voltage, current, solar cell and discharge condition.

In this paper we are trying to make unique equipment for cultivation users. Mostly in the forming process pesticide spray is taking a critical role due to poison properties of chemical. So, in this paper committed to do something unique and useful equipment with non-conventional source technique. Also reduce the weight of unique solar spray jet as compare to diesel spray jet.

I.I Solar Energy Calculation as Per Sun

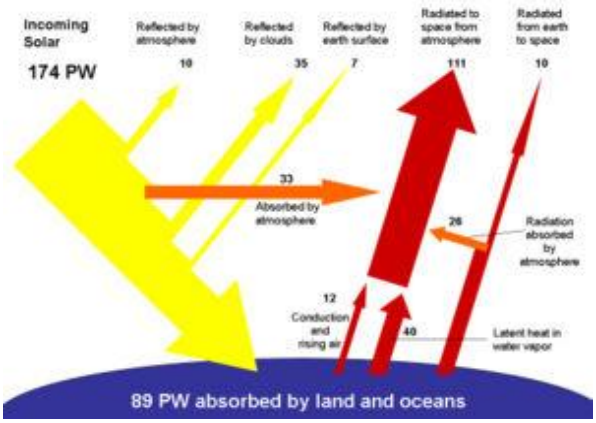


Fig.1

About half the incoming energy from the sun is absorbed by water and land masses, while the rest is reradiated back into space.

1.2 Storage of solar energy

Solar energy can be stored to utilize at night and when there is a cloudy conditions. Storage is an important issue in the development of solar energy because continuous availability is a vital requirement of modern energy use. Solar energy is only available in the hours of daylight.
Solar energy is stored in form of heat or electrical energy. Solar energy is also stored as Mechanical energy in the form of flywheel.

1.3 Working of solar panel

A solar panel is a device that collects and converts solar energy into electricity or heat. It transfers energy from the sun into electricity or heat which can be used by (for example) nearby buildings. Solar panels can be made so that the sun's energy excites the atoms a silicon layer between two protector panels. The atoms split up and the electrons travel down wires into the home for electricity. Solar panels were in use over one hundred years ago for hot water heating in homes. Solar panels can also be made with a specially shaped mirror that concentrates light onto a tube of oil. The oil then heats up, and travels through a vat of water, instantly boiling it. The steam created turns a turbine for power.
Photovoltaic panels, used to generate renewable electricity directly from sunlight
Solar thermal energy collection systems, used to generate electricity through a system of mirrors and fluid-filled tubes
Solar thermal collector, used to generate heat
Solar hot water panel, used to heat water, often in homes and other private housing estates.

II. EQUATIONS AND DESIGN CALCULATION

2.1 Requirement of good spray

According to enquiry from 20 different farmers about spraying capacity of spray. Middle range of delivery spraying capacity that is 12feet to 15 feet & discharge capacity of spray is 10 to 12 lit/min.
According to requirement of spray, following motor is selected for this spray model

Specification of Motor

Motor Speed : 3000 rpm
Delivery capacity :15 to 16 feet
Discharge capacity :0 to 12 lit/min
Operating power required :84 watt
Operating voltage : 12 volt
Operating current :7 amp

II.II Calculation according to motor

According to motor operating power, following battery is selected

Specification of Battery
Output power : 84 watt
Output voltage : 12 volt
Output current : 7 amp
Cell : 6 cell
Connector : R

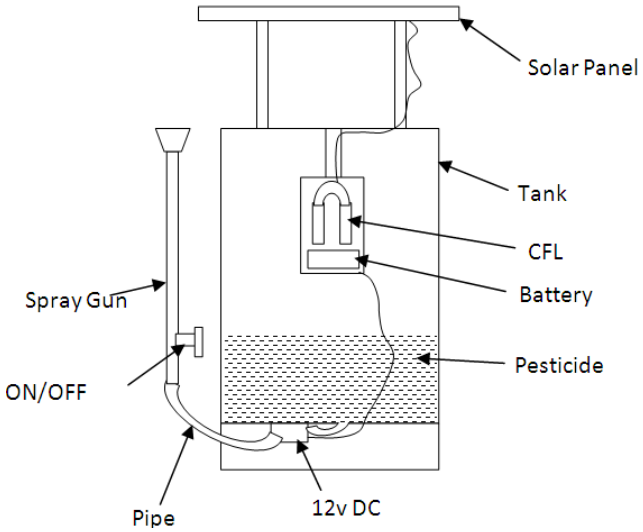
According to battery output power, following solar panel is selected

Specification of Solar Panel
Power : 10 watt
Peak output :660 mAh @ 16.8 V
Dimension : 397*278*25 mm
Weight : 1.6 kg
Appr. Watt-hr/day : 70 watt
Voltage : 15 volt
Current : 5 amp

2.3 Battery Charging time calculation

Instrument used to measure sun radiation : Sun meter
When the Solar radiation is between 200 to 300 mW/cm^2:3 to 4 hrs.
When the Solar radiation is between 300 to 400 mW/ cm^2:2 to 3 hrs.
When the Solar radiation is between 400 to 600 mW/cm^2: 1 hour. [1 & 3]

III.WORKING AND FIGURES



Working of this pump is simple. Solar panel collects the solar energy into electricity and supplies it to battery. Battery uses this electricity to charge itself. This battery next is used to operate motor and lighting system. Motor attached at the bottom of tank sucks the liquid from tank and deliver it. The 'ON' and 'OFF' of motor is controlled with handle attached to spray gun. A switch is given there to operate its function. As the handle is pushed, the valve of gun is released and at the same time the switch is pushed which supplies the current to motor. Thus motor sucks liquid and deliver it through delivery pipe.

The home lighting system is also available with this unit. The CFL light also operates through battery. An inverter circuit is used with battery to convert the DC supply into AC supply to 'ON' the CFL. A switch is used to 'ON' or 'OFF' the light.

IV. CONCLUSION

As we know 70% of population of our country lives in villages & their main occupation is agriculture. My prominent aim of this paper is to fulfill the tasks like hand spraying, IC engine spraying, and leg pump spraying etc. using non-conventional energy sources. Thus solar operated spray pump 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 upto large extent. At the same time they reduces environment pollution. Thus saving revenue of government & also most demanded fuel.

Along with this application unique solar operated spray jet is also used for lighting purpose and or running small fans etc.

REFERENCES

Journal Papers:
[1] R. Joshua, V. Vasu and P. Vincent 2010, Solar Sprayer - An Agriculture Implement, International Journal of Sustainable Agriculture 2 (1): 16-19, 2010
[2] Bhojraj N. Kale, Dr. S. V. Prayagi, M. P. Nimkar, Solar Energy Availability and Utilization in Nagpur, Maharashtra, International Journal of Engineering and Innovative Technology (IJEIT) Volume 2, Issue 12, June 2013.
Books:
[3] Tyler G. Hicks, Pumps Operation and maintenance (Tata McGraw Hill edition, 2001)
[4] Ravis Bradford, Solar Revolution: The Economic Transformation of the Global Energy Industry (MIT Press, 2006)
[5] G. D. Rai,Non-Conventional Energy Sources (Khanna Publishers, 2009)
[6]Sukhatme S.P., Solar Energy (Principle of Thermal Collection and Storage), Third edition, McGraw –Hill Publication, New Delhi, Page No. 37-287