An Innovative SOLAVATOR, Time Reducer and Effortless Farming Tool

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***Abstract*-In Indian agriculture, the preparation of fertile land for deep plough using additional machinery and ploughing tools are increased. Solavator or cultivator is one of the plough machines most suitable for seedbed preparation. In this project our main aim is ploughing the field by using tiller which operates on solar panel power, which helps us to increase the use of renewable energy sources. Here we take the help of solar panel that is providing by Government scheme and we take power by that panel for rotavator operation. Assembly of Solavator includes motor, shaft, connector, blades, etc. That is projected on manual operating handle. With help of this Solavator soil is spaded i.e., the field is plough by Solavator after that cultivation of field become easy. We are upheavaling the method of farming with the help of renewable energy the most farmers aware of the solar panel scheme of the Government which helps farmers in minimum-of-cost cultivation without using non-renewable energy (diesel, petrol, etc.). As we all know, India is the land of farmers so the main source of our living is agriculture. So, we conceive about farmers and try to help the farmers in agriculture by rotavator which makes their work effective and easy in less time. Solavator perform both operation like ploughing and levelling of fertile land.**

Key Words: Gear Motor, Cutting Blades, Pannel, Battery etc.

I INTRODUCTION

We are developing a novel approach to Solavator that works on solar energy with help of a solar panel. Presently farmers use non-renewable sources (petrol, diesel) for farming, which results in too much investment but Solavator works on renewable source of energy. So it reduces the cost of fuel used by former in cultivation.

We know that agriculture is the main source of living for our country & farmers are backbone of agriculture. We try to help farmer by innovating in agriculture machinery with best alternative solar energy solution. This allows formers to easily plough the field with leveling it. It assists farmers with simple farming method & low cost farming.

It is a one-time investment with long term benefits. It is a conducive and major project that can contribute to the progress and development of country's economy.

Cultivation of soil is one of the most labour-intensive jobs in the garden or field but also one of the most beneficial. Cultivation of the soil will improve the structure of soil as it reduces soil compaction & improve soil aeration. The effect of this is that there more oxygen available to the plats roots and the heater drainage is improved. It also makes it easier for plant roots to operate and reach our further into soil.

Need of machine-

- Reduce the manpower.
- Reduce the risk.
- Improve the soil properties.
- To improving the productivity of agriculture.

"Solavator" an agricultural machine composed of many small different components together at one stand Farming Solavator effective performance in compact size. Lets here some shorts machinery details used in processing this device.Main parts of Solavator are gear motor and many other parts are showing below with short rating review.

- Solar panel 17V, 64WATT
- Gear motor 12V
- Battery 12V, 8Ah
- Battery charging level with voltage indicator
- Spur Gear
- Shaft with rotary wheel (tiller)
- Leveler

Our main motive behind the production of Solavator is to easily provide accessibility for small field to plough

such in negatable cultivation. Tractor bulky machinery not having easily gone at any small or certain area used by farmer for negotiation. Thus, our effort in facilitate the best and beneficial product making former in easily operating and less investment in cost with higher productivity giving relief in themselves or individual.

II CONSTRUCTION

Solavator operates on solar energy is consisting of three main components which are battery, motor and blades. Battery is mounted on the shaft frame, motor is placed on iron base near shaft and blades are mounted on shaft both ends. There is use if charging level & voltage indicator which signalize the charge level and voltage of battery. The main shaft is rotated by rotational motion of motor shaft, the power transmitted by sprocket and chain mechanism. The important of using flexible in solar panel by using crocodile pin makes helpful in carrying the machine. In this machine, we adjust the height of handle foe human being using adjustable handle. Also give the adjustment in wheel for maintaining the rotavator depth of blades and pressure in soil. The solar plate (Heart of machine) is added in it to charge the battery and also charge the battery with electricity according to condition.

Main focus comes on charging the battery with use of solar panel takes renewable energy source sunlight and makes it prominence.

III DESIGN AND DETAILS OF COMPONENT

Solavator is a machine which is used to plough the soil of small field. Power tiller blades are used to achieve advantages of fast and easy breakdown of soil and leveling behind.

In Solavator, Blades are most critical parts which are engaged with the soil to prepare seedbed and mix to fertilizer when the blades are pressured onto the soil to produce unbalancing force subjected to obtain desire force depend on soil hardness for increasing the efficiency and reducing complexity wearing of blades. The design optimization and manufacturing errors can be minimized by simple and proper design analysis of the components.

(a) MOTOR SPECIFICATION

Geared Motor

Voltage – 12V

Rated Current –6A

Output Watt – 72W

Rated Speed – 130 rpm

Fig 1: Gear Motor

(b) BLADES AND SPECIFICATION

Shape of blade – J shape

No. of flange – 2

No. of blade on one flange – 4

Thickness of blade – 4 mm

Cutting edge thickness – 2 mm

Length of blade – 110 mm

Outer diameter of hub – 26 mm

Inner diameter of hub – 20 mm

Hole of hub – One hole of 9 mm

Split pin diameter – 9 mm

Fig 2: J Shaped Cutting Blade

(c) FRAME

Length – 400 mm

Breadth – 250 mm

Height – 25 mm

Thickness – 3 mm

Fig 3:Frame Design

(d) ADJUSTABLE WHEEL
Outer diameter – 200 mm
Bore diameter – 15 mm
Thickness – 50 mm
It is adjustable three times; the distance between the holes is 50 mm. It is depends on the tilling depth.

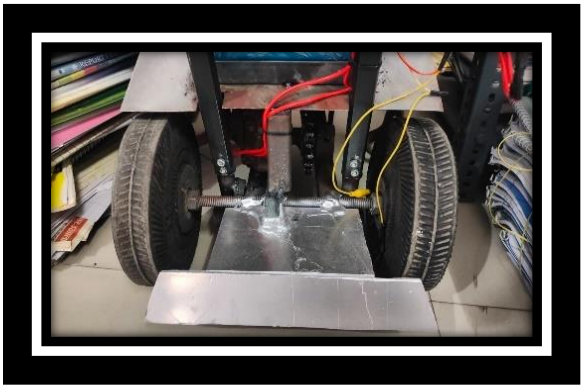

Fig 4: Solavator Adjustable Wheel

(e) ADJUSTABLE HANDLE
Diameter of handle pipe – 35 mm
Diameter of small pipe – 33 mm
Hole on pipe – 10 mm
Distance between three holes – 50 mm
It is adjust the height according to require.

Fig 5: Adjustable Handle

(f) SHAFT AND SPECIFICATION
Material of shaft – mild steel
Diameter of shaft – 20 mm
Length – 400 mm
Teeth of sprocket – 28
Sprocket mounted at a center of shaft

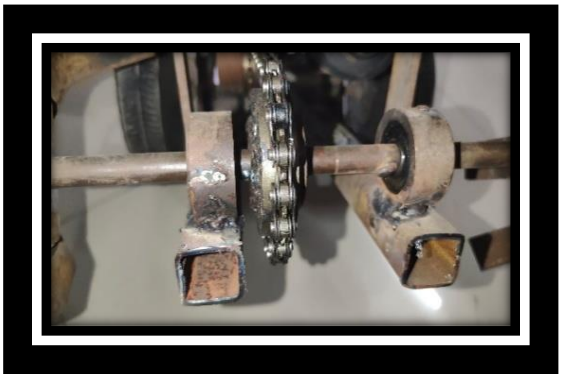

Fig 6: Shaft with Gear

(g) SOLAR PLATE
Voltage - 12 Volt
Current – 2amp

Fig 7: Solar Plate

IV DESCRIPTIONS

The Solavator work with gear motor power. The blades powered from the direct current motor, the gear mount on motor shaft is with 18 teeth and the gear mount on main shaft with same 18 teeth. Hence the speed is low and high torque speed of motor 50rpm and the speed of main shaft is 50 rpm. The blades rotate with 50rpm and torque is 8.25Nm. It is adjustable depth of plough by the adjustment of wheel and also its height is to be adjusted by adjusting the handle. The solar plate is used to charge the battery. It is renewable and economical.

V DIFFICULTIES IN EXTREME OPERATING ENVIRONMENT

The operating environment for farm machinery in Indian scenario is quite extreme due to dust, dirt, high humidity and temperatures up to 46-48°C in summers. It demands durable and reliable power electronics components and efficient thermal management for electronics components, battery pack and electric motor. Active thermal management to cool the systems will deplete the battery faster.

Fig 7: Difficulties during Humidity

(a) DIFFICULTIES WITH BATTERY TECHNOLOGY:

The major challenge is battery efficiency. Existing battery technologies have yet not achieved the power density and energy density to compete with IC engines based conventional tractors in the field work. Mere increasing the battery size adds to high cost and weight of the vehicle, which reduces the overall efficiency of the vehicle.

(b) DIFFICULTIES WITH FIELD SIZE:

Many factors influence field efficiency, heat of the day, type of fuel, idling the tractor, etc. The tractor is the heart of field work so the highlight of my presentation how it goes in small field where there limit is space such as in vegetation. Though these facing difficulties by farmer, so we made Solavator. Which farmer can easily operate in small or large field at any time when required for ploughing?

Fig 8: Difficulties during Ploughing

Some area of village also facing limit in number of tractor in there region. Which in peak month of forming (March/April) continuously busy and all other farmers as in waiting for tractor when they provide So, Solavator solve these problem or difficulties if every farmer use it and aware of these using technology.

VI SIGNIFICANCE OF THE PROJECT

These Solavator are eco-friendly as compared to traditional tractors. No one can say that the electricity you use comes from the electric company; you can charge your Solavator by a solar system. It does not make noise while in use. There are no extra expenses for fuel. These Solavator are much more efficient as compared to the traditional tractor. No smoke is another achievement of a Solavator.

Cost reduction surely is done by the electric drive; reduction of fossil fuel is the best example of that. Prices of these Solavator are almost the same as traditional hand operated diesel tractors. Cost reduction is an important benefit of Solavator because the high cost is a big problem for farmers. The Solavator is reducing extra cost as compare to hand operated diesel tractors.

These Solavator are efficient; it gives great accuracy when it works. The diesel tractor has 35% efficiency when it converts thermal energy into mechanical energy. Compare that with the efficiency of charging or discharging batteries 80%, while Solavator are more efficient.

VII TESTING AND RESULTS

Solavator is used to plough soil and break down it completely. There is facility of leveling of soil behind the plough. The tilling depth is adjustable with the help

of wheel, tilling up to 60-70 mm and fully charged battery run 50-60 minutes with solar plate it runs. There is also indication of voltage and charging level signal in voltmeter indicator having 5 line when battery is fully charged. Provide stopping of Solavator by two way that one with clutch on top of handle and second with toggle switch above battery position.

Fig 9: Testing and Results

VIII CONCLUSION

Our project is successfully implemented for emphasizes on minimization of harmful efforts of using the manual rotavator. The new developed battery powered rotavator is operated. Renewable energy utilization is the best option to reduce the use of various non-renewable energy sources. From the various references we come to conclusion that solar energy utilization is more advantageous than other energy sources. Solar energy absorbed by solar panel and stored in the battery and then this solar energy issue to run various equipment. Here in our project, we conclude that by using this machine we reduce the manpower, risk, and cost. Our main intention is to help the farmers.

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