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SOLAR POWERED GROUND DRILLER FOR AGRICULTURAL PURPOSE

D. Hariprasad[1], Dr. K. Prahlada Rao[2]

[1]PG Scholar, [2]Associate Professor, Department of Mechanical Engineering
JNTUA College of Engineering, Anantapur, Andhra Pradesh 515002.

Abstract - *Solar Power Ground Drilling Machine, Solar photovoltaic systems" refers to a wide variety of solar electricity systems. Solar photovoltaic systems use solar panels made of silicon to convert sunlight into electricity. About the soil drilling machine which is used for plantation of smaller saplings. This machine uses the principle of auger drilling machine which is used in pile foundation during construction. The auger drill is made of required size by scaling down its original size as per the requirement. The machine is made automatic by employing a D.C motor which serves as a power source for digging the soil. The motor can be rotated both in clockwise and anti-clockwise direction. This makes the auger to drill hole in the soil and the return back to its original position. The size of the auger is designed as per the sap-ling size. This machine is designed for a preliminary aim of avoiding the use of shovels & levers in plantation of saplings thereby enhancing the plantation process by making it facile.*

Key Words: Solar Panel, dc motor, screw threaded shaft, auger bit, battery.

1. INTRODUCTION:-

Now a days the people shows interest towards agriculture is increases due to the effect of global warming, rise in global temperatures. Due to the consumption of inorganic food the health diseases will coming. That's why the people are showing interest towards agriculture. The project makes use of solar panel, drilling bit, dc motor, battery, charge controller, screw threaded shaft. The project aim is building an solar power ground driller for agricultural purpose. Now a days the people are showing interest towards the agriculture. Due to the lack of the labor for doing agriculture some times the farmers will feel difficult for doing the work for sapling plantation. In this project we are using the battery for the rotation of the dc motor. The dc motor shaft is connected to the drill bit shaft when ever the dc motor rotates the drill bit will also rotates and move into the earth surface. Here we are using two dc motors one for the rotation of drill bit and another dc motor used for up and down motion of the drill bit. We are using the screw threaded shaft for moving the drill bit up and down motion .The battery is recharged by using the solar panel and also we are using the charge controller for controlling the charge of the battery. The total frame is made with the mild steel material and by using the welding process we are joining the material. A charge controller is used for controlling the charge in the battery.

2. LITERATURE SURVEY:-

Joshi S.G et al (2014) presents a high speed solar powered system in cultivation based on robotic platform and artificial agent which is steered by DC motor remote control. The IR sensor is used and the seed block can be detected and solved using water pressure.

Limo Kipkoech Eliudet al (2011) proposed machine is driven by the tractor power take-off (PTO). The PTO shaft will be connected to the vertical shaft by a set of straight mitre bevel gears at 90 degree. The design borrows from Bush hog, auger type drilling units with the auger being replaced by the vertical shaft carrying a cutter pate.

Kyada. A. R et al (2014) proposing for seed to seed spacing and depth of seed placement, using mechanisms such as seed meter mechanism, plunger mechanism, lever fulcrum mechanism, cam shaft and power transmission, pulling mechanism.

3. BLOCK DIAGRAM:-

Solar panel, battery, DC motor, screw threaded shaft, drill bit. The main aim of the project is to drill hole for the sapling of plantation in agricultural purpose

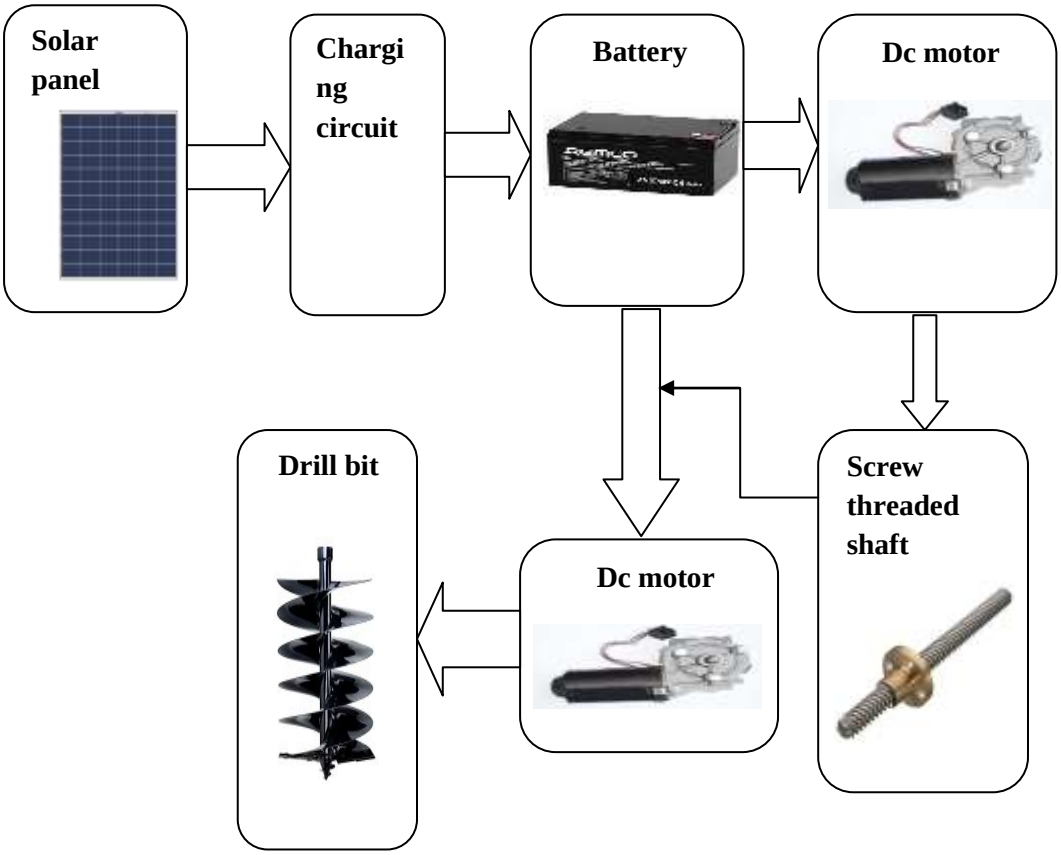

Fig 1:- Flow of solar powered ground driller for agricultural purpose

4. EQUIPMENTS USED

4.1 SOLAR PANNEL:-

Solar energy is the renewable energy resources. Solar energy can be directly converted to electrical energy by means of photovoltaic effect which is defined as the generation of the electro motive force as a result of the absorption of ionization radiation .Solar energy is the conversion of the light energy into the electricity. Here we are using photovoltaic cells, energy from the sun can be converted into electricity that we can use every day. Silicon is one of main materials that can be used in a photovoltaic cell to convert the sun's energy into electricity. As sunlight strikes a silicon solar cell the electricity generated can be used to power a motor. A lens can be used to collect a large amount of light and concentrate it to hit a smaller solar cell.

Fig 2 :- solar panel

Fig 3:- Auger drill bit

4.2 AUGER BIT

Drill The auger drill is usually made out of shaft which has shovel blades surrounding it as shown in Fig. No 3. The normal auger drill is usually made for a size of 6" diameter and 8m depth since it is being employed for pile making purpose. In our case the purpose is to make a small hole of 1.5" diameter so the auger is scaled down to a smaller size having the diameter suited for the above purpose and a depth of 2". The shaft is first made and then the blades are fixed on to it.

4.3 SCREW THREADED SHAFT

A shaft is a rotating element which is used for transferring the power from one place to the another place. Here we are using 10mm screw threaded shaft for the up and down motion to the drill bit.

The material used for shaft has the following properties:

- High strength
- Good heat treatment properties.
- High wear resistant properties.

Fig 4:- screw threaded shaft **Fig 5**:- dc motor

4.4 DC MOTOR:-

The power source for the solid digging machine is obtained from DC power supply. Hence DC motor is used to operate the auger drill the motor power is about 0.33 HP and it has an torque about 4.2 Nm sufficiently enough to turn the auger and lift the mud from the ground.

DC geared motor: Selection of this motor done on the basis of Torque Constant – 8 N.m (80 kg-cm), high torque motor beneficial for the drilling into the soil, so from online

Manufactures CatLog we have selected this 12 volt dc motor

Voltage: 12 Volt DC

- Output: 250 Watt
- Torque Constant – 8 N .m (80 kg-cm)
- Roller Diameter 0.3 inch
- Roller Width 0.16 inch

4.5 BATTERY:-

A battery is a electronic device which is used for storing of electrical energy. In isolated systems away from the grid, batteries are used for storage of excess solar energy converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage. In fact for small units with output less than one kilowatt.

Fig 6:- Battery

Batteries seem to be the only technically and economically available storage means. Since both the photo-voltaic system and batteries are high in capital costs. It is necessary that the overall system be optimized with respect to available energy and local demand pattern. To be economically attractive the storage of solar electricity requires a battery with a particular combination of properties:

(1) Low cost

(2) Long life

(3) High reliability

5. OVERVIEW OF THE PROJECT:-

The project makes use of solar panel, drilling bit, dc motor, battery, charge controller, screw threaded shaft. The project aim is building an solar power ground driller for agricultural purpose .Now a days the people are showing interest towards the agriculture. Due to the lack of the labor for doing agriculture some times the farmers will feel difficult for doing the work for sapling plantation. In this project we are using the battery for the rotation of the dc motor. The dc motor shaft is connected to the drill bit shaft when ever the dc motor rotates the drill bit will also rotates and move into the earth surface. Here we are using two dc motors one for the rotation of drill bit and another dc motor used for up and down motion of the drill bit. We are using the screw threaded shaft for moving the drill bit up and down motion .The battery is recharged by using the solar panel and also we are using the charge controller for controlling the charge of the battery. The total frame is made with the mild steel material and by using the welding process we are joining the material. A charge controller is used for controlling the charge in the battery.

Fig 7:- over view of solar powered ground driller

RESULT:-

The project solar powered ground driller for agricultural purpose was designed such that to construct a simple drilling machine the drilling machine is powered by solar with help of battery in agriculture it is very necessary for drilling the soil in regular basis by these drilling machine the small scale farmers are easily drill with a solar power it is necessary to minimize the workers involved in it.

The designed drilling machine can minimize the man power and electric power the motorized Mechanism is attached to the drilling bits the motor will move up and down of drilling machine.

CONCLUSIONS

From the experimental validation and theoretical analyses it is found that the above project is feasible and can be extensively used in Plantation of Sapling. We have identified the best auger drill design and material such that it operates effectively under different types of soils. During the design process we have intuitively guessed the value of torque required to dig a hole and found the guessed the value to be satisfactory.

After comparing the different method of soil digging and limitations of the existing machine, it is concluded that this solar powered soil digging machine is

- Environment friendly as no fuel is required
- Economically affordable

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