A Review on Design and Modification of Grass Cutting Machine

(Cylinder Lawn Mover)

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Abstract: This paper summarizes and reviews technological development for making efficient and cost effective grass cutter. Our aim is to study the various developments in the grass cutter machines and their performance. Current technology commonly used for cutting the grass by the manually handled device From the survey we found that various types of grass cutter available in market which are run by means of solar, electric and internal combustion engine. We are going to fabricate the grass cutting machine for the use cutting lawn grass.

Keywords: **Blade, Solar Panel, DC motor, Eliminator**

I. INTRODUCTION

In the past and even until now, cutting of grasses in the schools, sports tracks, fields, industries, hotels, public center, etc. was done with a cutlass. This method of manual cutting is time consuming because human effort is needed for the cutting. Also inaccuracy in cutting level was observed using the manual cutting method. This work deals with the cutting of verdant (shrubs, stubborn, grass, flowers, leaves of trees) and also with the design of the machine, its efficiency, rigidity, mode of operation and the selection of materials. The design gives a greater degree of flexible mobility and interchangeability. Grass Cutting project is our major project. We will operate this machine using solar panel. We found tough to get idea from Internet because its tough to get combined material to make machine design.

There are two ways to cut grass – one radial and another is axial. Normally grass cutter machines are axial type. We will cut grass with radial method.We will use HSS – High speed steel or CS- carbon steel for cutting grass. We are using high torque PM -permanent magnet type motor for driving blades. Blade will be welded or bolted on shaft. We are using solar panel as a secondary source of electricity. Solar panel will help to charge battery. First of all solar panel will give AC output. So ac will be converted in to DC using bridge and filters. Output of supply will have given to battery charging circuit.

We are using high speed large torque DC motor in this project, DC motors are compact in size and have a less weight. We are also designing a body which have less weight,minimum vibration and easy to move. We are also providing arrangement that will charge the battery.

II. LITERATURE REVIEW

1. **T Karthik:**In his paper author fabricated grass cutting machine with rotary blades by using solar energy. The solar energy is trapped in the photovoltaic cell to generate electricity. The cells may be grouped in the form of panels or arrays. Solar panel is placed such that to absorb high intensity from sun and it will incline at 450 . The main function of solar charger is increased current during batteries are charging and also disconnect when they are fully charged. Circuit's breakers are used to start or stop the motor. By considering ground clearance they can adjust the height of grass.

2. **Praful P. Ulhe :** In his paper they have prepared manually operated grass cutter with spiral roller blades due to spiral blades increases the efficiency of cutting. For adjusting the height reel cutter is component placed on grass cutter. This grass cutter used to cut the grass uniformly and also it can cut the different types grasses. The battery can be charged during working conditions and it also having AC charging. For

   collection of cutting grass cutting box is placed over grass cutter so the cut grass put outside the lawn. It is having light in weight and compact in design.

3. **Pankaj Malviya :** Author prepared manually handle device. The battery can be charged by using solar panel as well as external power supply and DC motor which is controllable is used for changing the direction of grass cutter as per need are used. The most modern regulator is used for preventing overcharging and discharging of battery which saves span of battery. Due to industrialisation more electricity is required for various industrial applications and electrical gadgets so solar energy is best alternative for electricity. Solar panel, battery, DC motor, solar charger these components are used for fabrication of grass cutter. They have used less number of moving components so there is less maintenance. This grass cutter will give much more physical exercise to operator and it will easily handle.

III. METHODOLOGY

Basically it consist of a rectangular framing section handle, DC gear motor, sheet metal, Fiber sheet, tyres, solar panel battery etc. In operation the solar energy absorbed by the solar panel is been stored in the battery and the energy stored into the battery will be used for further operation. The hybrid grass cutter uses an eliminator to use AC current to run the cutter. The operator just needs to push the machine in which ever direction he needs then he just needs to switch on the motor as soon as the motor is switch on the cutting action gets activated and these blades are been attached to the shaft of the motor as the blade gets mesh up with the grass the grass gets cut.

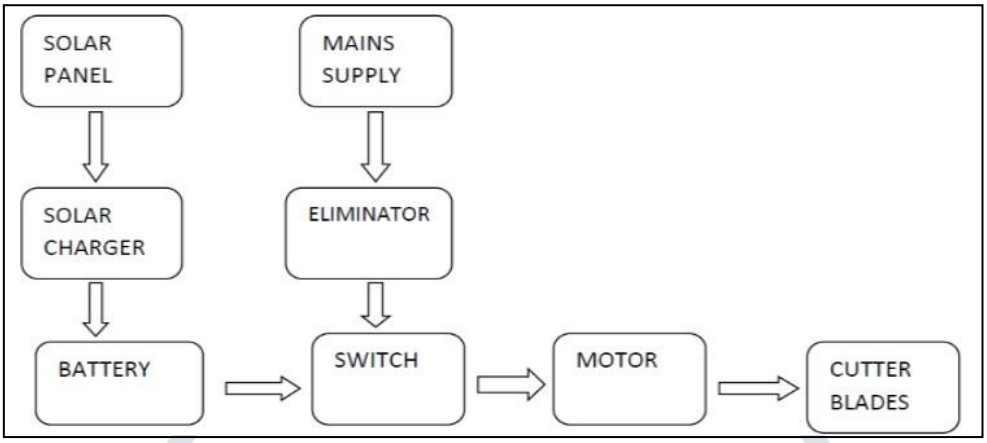

Figure :Flowchart of methodology

IV. OBJECTIVES

1) The main project objective is to minimize overall weight so we can move this easily.
2) Ac motor create more vibrations and have more noisy therefore to remove vibrations and noise we use DC motor which have a less weight and create a less noise.
3) Ac motor need more power and long wire to provide power for working of machine, we remove this disadvantage by using battery and solar panel. Solar panel is secondary source to charge battery.
4) Machines available in market have less space for storing of trimmed grass; we eliminate this disadvantage by providing big tray on the top of chassis.

V. COMPONENTS

1. CYLINDERICAL BLADES

Cylinder lawn mowers have cylindrical blades that rotate vertically at the front of the mower. They cut against a fixed blade at the bottom. The cylinder should have multiple blades – three or more is best.
Cylinder lawnmowers are best for flat lawns that you want to keep short and well-manicured. They can be electric, petrol-powered and push mowers.

Figure: Cylindrical Blades

2. DC MOTOR

A DC motor is any of a class of rotary electrical motor that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor.

Figure: DC Motor

3. SOLAR PANEL

The term solar panel is used colloquially for a photo-voltaic (PV) module**.** A PV module is an assembly of photo-voltaic cells mounted in a frame work for installation. Photo-voltaic cells use sunlight as a source of energy and generate direct current electricity. A collection of PV modules is called a PV Panel, and a system of Panels is an Array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

Figure: Solar Panel

4. BATTERY

A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

Figure: Battery

5. ROLLER,SHAFTS AND BEARINGS

Rollers are generally used for power transmission from motor to equipment. . Shafts are used for power transmission from motor to equipment and bearing are used for frictionless transmission.

6. FRAME AND BODY

A frame is often a structural system that supports other components of a physical construction and/or steel frame that limits the construction's extent And body is use for support and protection of the internal physical equipments.

VI. WORKING

• It has panel mounted on top of model on top of rod in a particular arrangement such that angle of inclination is 45 degree hence it can be receive solar radiation easily. Solar panel converts solar energy into electrical energy. This electrical energy is stored in the battery. The motor is connected to the battery through connecting wires.

Figure:Roller,Bearing and Shaft

•DC motor is connected to the body. Shaft of DC motor consist roller.one end of shat is connected to motor and other end is connected to bearing. Bearing is fixed to the frame. Roller are mesh with one of the wheel of rotor. When DC motor is on shaft rotates and roller mounted on it also rotates.

Figure: DC motor connected to body

•Due to rotation of roller wheel of the cylindrical wheel rotate and cylindrical cutter also rotate with it and cut grass of flat ground. This machine do not require man power to move it.

Figure: Machine with solar Panel

VII. FUTURE SCOPE

Man is always trying to develop more and more techniques with increasing aesthetic look considerations. Hence there is more and more scope. Whatever he might have created of course after experience of presently manufacturing the things. We completed our project with the minimum available resources but the results and modifications are not up to expectations. This can be further improved by the following modifications to obtain better results.

- The efficiency can be improved by increasing the battery capacity.
- By using light weight material for the frame and handle the weight of the assembly can be reduced.
- By using the cutter blade with high strength and increasing power it can be used for many applications in agricultural sector like shrub cutting, maize cutting, cane cutting.
- Currently the project is manually operated .It can be automated to reduce human fatigue.
- Also using modified blade designs it will be more beneficial to farmers.

VIII. CONCLUSION

We have presented a detailed description of methodology , components ,design and modification with images of grass cutting machine. In this way we conclude review of a modification of grass cutting machine. In this we concluded that the modern machine having better efficiency as compare to old machines because of using the solar panel and better material of blades and it also reduces the man power. A lawn mower which is simply called as a grass cutter machine becomes very popular today and it is very commonly used for furnishing soft grasses. Now it is necessary for cleaning gardens. Since it is easily operating machine so now it is used for various applications.

IX. REFERENCES

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