IOSR Journal of Engineering (IOSR JEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 49-53

Reel Lawn Mower

ShahrukhKhatik [1], Sayyad Obaid[2], Mohammad Mustafa [3]Maaz Omair[4,]Muddassir Nazar[5]
[1,2,3,4]*(Students, Mechanical Engineering Department, MaulanaMukhtar Ahmad Nadvi Technical Campus, Mansoora, Malegaon, India)*

Abstract: *Now a day's grass cutting is important task in agriculture field. Currently in India former used conventional method for the grass cutting purpose. I.e. manually cutting using labor but this method is lengthy and time consuming. This project aim is to design and fabrication of small field grass cutter machine for small height grass. The machine consists of electric motor to operate cutting roller and blade. When compare to manual grass cutting by and this machine has a capacity to cut the grass in faster. This project is to fabricate a grass cutter with helix shaped blade. The design objective is to come up with a mower that is portable, durable, easy to operate and maintain. In our project we fabricate the grass cutting machine for the use of agricultural field, to cut the crops in the field. This is a new innovative concept mainly used in agricultural field. It is simple in construction and its working is easy. The components that are used are wheel, gear arrangement, roller, bearing, and base frame. Below the gear arrangement cutting blade is revolved. As the gear arrangement rotates the reel mover tends to cut the plants or crops. The reel consists of several helix shaped blades mounted to a rotating shaft. The whole set up is placed on a movable base which has a wheel arrangement. It is used to maintain and upkeep lawns in gardens, schools, college's etc.*

Keywords: *cost effective, cutting blade, environment friendly, lawn mower, motor*

I. Introductions

A lawn mower is a machine utilizing one or more revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower, but generally is adjustable by the operator, typically by a single master lever, or by a lever or nut and bolt on each of the machine's wheels. The blades are powered by electric motor, through belt and pulley arrangement which is mechanically connected to the cutting blades so that when the electric power is supplied to the motor then the blades are spin, due to rotation of the spiral cutter the lawn get share out very smoothly at the require height.

Two main styles of blades are used in lawn mowers. Lawn mowers employing a single blade that rotates about a single vertical axis are known as rotary mowers, while those employing a cutting bar and multiple blade assembly that rotates about a single horizontal axis are known as cylinder or reel mowers (although in some versions, the cutting bar is the only blade, and the rotating assembly consists of flat metal pieces which force the blades of grass against the sharp cutting bar).suited for complex terrain. In large size of lawn in the park, schools, college are maintained manually. The gardener used hand scissors to cut and maintain lawn regularly which also takes more time. It is not easy and also very difficult to maintain uniform size. Hence this works to make an electric powered automatic grass cutter. The unskilled gardener is enough to operate this grass cutter. The electric powered grass cutter is easy to operate and it consists of helix cutter blade, roller etc. The blade removes the extra growth of the lawn and roller gives light pressure to the top surface of lawn. It gives fine look to the lawn and uniform look throughout the lawn. The Project work was very great successful one. It is used to maintain lawn of our college garden for lawn maintenance. This Project of an electric powered lawn mower will reduce environmental pollution and man power. This design is meant to be an alternate green option to the popular and environmentally hazardous gas powered lawn mower. Ultimately, the consumer will be doing more for the environment while doing less work in their daily lives. The hope is to keep working on this project until a suitable design can be implemented and then be ultimately placed on the market.

II. Literature review

Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil,[February 2018]

In this paper they are trying to make a daily purpose robot which is able to cut the grasses in lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. Automated solar grass cutter are increasingly sophisticated, are self –docking and some contain rain sensors if necessary, nearly eliminating human interaction. It works much the same as the Robomow with a boundary wire implanted at the border of your lawn. The system is switched to automatic mode in which the robot's infrared

sensors make a comparison between, cut and uncut grass. The mower continues this process until it completes the job. The system uses 12v batteries to power the vehicle movement motors as well as the grass cutter motor.

They also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection.

The microcontroller moves the vehicle motors in the forward direction in case no obstacle is detected. If in case obstacle is detected by the sensor then the microcontroller stops the grass cutter motor so as to avoid any damage to the object/human/animal coming. [1]

Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil [January-June 2017]

For human enlargement in many countries there are studies and trials going on the solar energy and the wind energy, so they made their new concept solar power grass cutting machine. In this concept they cut the grass on the agricultural land or small plants in lawns and gardens. The design of solar powered agricultural equipment will include direct current (DC) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory. The purpose of the project here is to design and build a remote controlled grass cutter. The device consists of linear blades and it does not affected by climatic conditions. They have used many components for preparing grass cutter like DC Motor(3) for rotating the wheels and blade, wheels(4), battery, Solar panel, IR sensor, Collapsible blade. There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller.[2]

III. Components and Methods

Table no 1: Shows components of lawn mower

S.NO	COMPONENTS	QUANTITY
1	BLADES/CUTTER	1
2	BED KNIFE	1
3	WHEELS	2
4	PUSH HANDLE	1
5	ELECTRIC MOTOR	1
6	COLLECTOR	1

COMPONENTS DESCRIPTION: In this lawn mower we use some components. The components we used here are

- Blades/cutter
- Bed knife
- Wheels
- Electric motor
- Push handle
- Collector

1. Blades/cutter

The spinning blades of the mower do not actually cut the grass. It manipulates the grass to be cut by the cutter blade or bed knife. The cutting surface shears the grass as it is caught between the spinning drum and the cutter blade. A reel mower cuts grass with a scissors like shearing action, as the moving helix shaped blades pass over the stationary bed knife. The cutting action requires that the bed knife and reel blades matched, and in close relationship with each other. This weld is then ground to be a perfect cylinder. The reel is supported by precision bearings held within the side plates. The side plates are held in place by a frame. This becomes the reel assembly, and is a precision cutting tool. The reel assembly is supported by rollers, and pulled along the ground by a carrier frame. Everything comes together, to make a precision cutting tool. The spinning blades of the mower do not actually cut the grass. It manipulates the grass to be cut by the cutter blade or bed knife. The reel consists of five or six helix shaped blades, welded to supports and mounted to a shaft. This weld is then ground to be a perfect cylinder. The reel is supported by precision bearings held within the side plates. The side plates are held in place by a frame.

This becomes the reel assembly, and is a precision cutting tool. The reel assembly is supported by rollers, and pulled along the ground by a carrier frame. Everything comes together, to make a precision cutting tool.

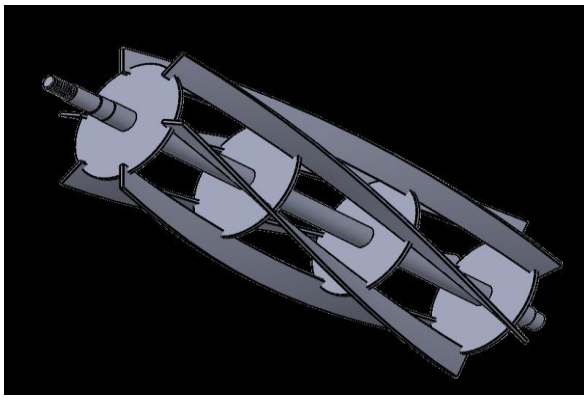

Fig. 1: Blades/cutter

2. Bed knife

The bed knife is held rigidly in position on the bed bar by screws. The bed knife is sharpened to be flat and square so the sharp edge contacts the reel blades across the entire length. If the bed knife is not flat, or the reel is not a perfect cylinder, it is impossible to get the bed knife to contact along the entire length of the reel. The contact between the blade reel and cutter blade provides a shearing force which cuts the grass. It consists of a horizontal knife screwed to bed knife bar.

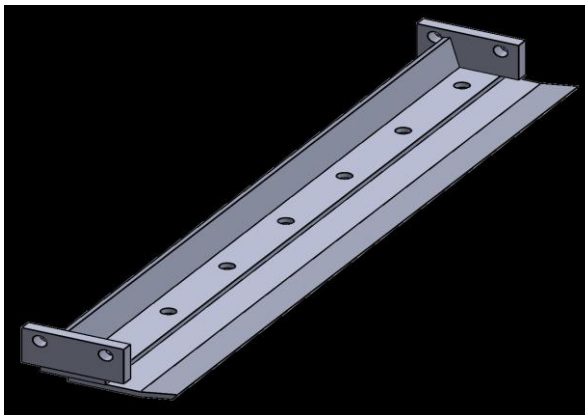

Fig 2: Bed knife

3. Wheel

Wheel is the mother part of all the components. Attached to the axle and used to move the entire system. The main wheels are the contact point with the ground. The ring gear having 63 teeth and it is covered by the frame need of protection. The circular diameter of wheel is 200 mm. Tire is covered outer side of the wheel which gives the grip on wheel rotation

Fig 3: wheel

4. ELECTRIC MOTOR

The power source of lawn mower is electric motor connected to switch board by wire.An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and winding currents to generate force in the form of rotation. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy (such as from flowing water) and converting this mechanical energy into electrical energy.

Fig 4: Motor

5. PUSH HANDLE

The power source of manually operated mover. This is sturdy T-shape handle and connected to frame.

6. COLLECTER

It is also called grass bags and grass boxes.It collects the sliced grass through clippings.

IV. Working Methodology

A lawn mower is a machine that uses cutting blades or strings which is used to cut the grass in gardens or yards at an even length. The working principle of the lawn mower is to provide a high speed rotation to the helix or spiral blades, which aids in cutting the grass through generated kinetic energy.

Before the actual fabrication process was carried out, the lawn mower was designed and simulated using Autodesk Inventor Professional 2016 software and solid work software which is shown in Figure. The body structure of the lawn mower had three main components which were the spiral or helix cutter, bed knife, electric motor, belt and pulley arrangement, handle, wheels and base. The handle and the wheels will be used as the navigation panel to control the lawn mower while the base acts as the support where the motor will be attached to it.

There are few advantages of this newly designed lawn mower. Firstly, the mower has two wheels which allow the user to maneuver the mower freely. Moreover, the weight of the lawn mower will be supported by the training wheels and hence less effort or workforce is required by the user. Besides that, since the cutting head will be installed in front of the base, therefore the lawn mower will be able to operate around acute areas such as trees or fences. With this simple design concept, the weight of the lawn mower can be reduced immensely. The lawn mower was designed in an ergonomic approach where the structure can be adjusted with the help of adjustable screws. Moreover, this enables the user to adjust the height or the angle based on his/her preference.

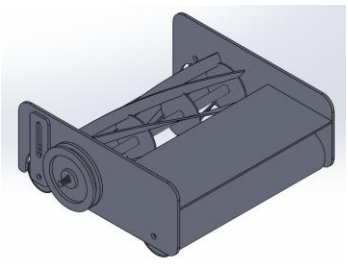

Figure. 4 Lawn mower

V. Conclusion

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. The proposed system is found to be more compact, user friendly and less complex, which can readily be used in order to perform several tedious and repetitive tasks. The spiral blade lawn mower was designed, fabricated and tested. This has electric motor and is powered by the electricity. Test revealed that, higher grass cutting efficiency is obtained when the lawn is dry before mowing. The machine is simply powered by electric motor. Therefore, it can be used by both rural as well as urban dwellers. It is also afford less since the cost of production is moderate. High moisture content and undulated nature of the field surface affected the efficiency of the machine. Effort should be made to adopt and popularize this design especially for the benefits of rural people who make up a great percentage of the nation's population. It is also hoped that, when mass produced, the unit cost will be reduced. The spiral blade lawn mower is environmental friendly.

Acknowledgements

I would like to express my deepest appreciation to all those who provided us the possibility to complete this project. A special gratitude we give to our final year project guide, Prof. Amjad khan. Whose contribution in stimulating suggestion and encouragement helped us to co-ordinate our project specially writhing this report. Furthermore I would also like to acknowledge with much appreciation to the principal of our college Dr. Muhammad Ramzan, and HOD of mechanical department, Prof. K.K. Sharma, who give the permission to use all required equipment and necessary materials to complete the project lawn mower.

References

[1]. Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil.Solar Based Grass Cutting in International Journal of Electrical and Electronics Engineers (IJEEE). January-June 2017.
[2]. BidgarPravinDilip, Nikhil BapuPagar, Vickey S. Ugale, SandipWani, Prof. Sharmila M. Design and Implementation of Automatic Solar Grass Cutter in International Journal of Advanced Research in Electrical(IJARE). Vol.6, April 2017.
[3]. Srishti Jain, Amar Khalore, ShashikantPatil. Self-Efficient and Sustainable Solar Powered Robotic Lawn Mower in International Journal of Trend in Research and Development(IJTRD). Vol.2 (6), December 2015.
[4]. Non-Conventional Energy sources by G.D.RAI, Khanna Publishers]
[5]. Raja, A.K., non-conventional power engineering, public printing service, New Delhi. 2007
[6]. "Smart Lawn Mower for Grass Trimming": Volume 3 Issue 3, March
[7]. D. Mukherjee, S. Chakrabarti, Fundamentals of renewable energy systems ,New Age international limited publishers, New Delhi, 2005
[8]. G Hemantha Kumar and Mohammad Imran,Research Avenues in Multimodal Biometrics‖, *IJCA* Special Issue on ―Recent Trends in Image Processing and Pattern Recognition‖RTIPPR, 2010.
[9]. S.Balameenakshi. S.Sumathi,‖ Biometric Recognition of Newborns: Identification using Footprints‖, *Proceedings of 2013 IEEE International Conference on Information and Communication Technologies (ICT 2013)*, 737-742, Tamilnadu, India
[10]. Hai-Yang Cai, *et al* ―Newborn Footprint Recognition using Orientation Feature‖, Neural Computing & Applications: 1-9, Dec ICIC 2010.
[11]. S.Balameenakshi, S.Sumathi and R.RaniHemamalini,‖Identity Verification of Newborn Using Biometrics‖, *International Journal of Engineering Research and Applications (IJERA*) ISSN: 2248-9622 National Conference on Advanced Communication & Computing Techniques (NCACCT-19 March 2013, Chennai).
[12]. Peter, W. I. L. D. "Single-sensor hand and footprint-based multimodal biometric recognition."
[13]. Khurmi R.S and Gupta J.K (2004) theory of machines.
[14]. Ms. YadavRutuja A Ms. ChavanNayana V., Ms. Patil Monika B., Mr. V. A. Mane February 2017 IJSDR | Volume 2, Issue 2