

## GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES ELECTRIC GRASS CUTTER BY USING SCOTCH YOKE MECHANISM

Siddhesh Thikekar<sup>1</sup>, Anand Gaykar<sup>2</sup>, Saste Sushant<sup>3</sup>, Dhavale Rushikesh<sup>4</sup>, Mr.Sarode R.B.<sup>5</sup>

<sup>1, 2, 3, 4</sup>, Student, Department of Mechanical Engineering, Jaihind Polytechnic, Kuran, India

<sup>5</sup>Lecturer, Department of Mechanical Engineering, Jaihind Polytechnic, Kuran, India

### ABSTRACT

These papers conclude the grass cutting machine by using scotch yoke mechanism. The purpose of this project is to reduce the human effort of grass cutting by using simple mechanism of scotch yoke and conveyor. And sliding or linear blade is used at front. This sliding blade cuts the grass and grass falls on the conveyor. Conveyor moves backward to the tank and the grass falls in the tank. This grass cutter cuts the grass at same level or equal level. Due to the same level of grass cutting increases growth of grass production. Due to this grass cutter reduces the manpower. Which is very simple in construction. It is used to cut upkeep lawns as well as grass in farm.

**KEYWORDS:** linear blades or sliding blade, scotch yoke mechanism, conveyor mechanism.

## I. INTRODUCTION

Cutting of grass cannot be easily accomplished by elderly. Grass cutting machine moving with engine creates noise pollution due to the big engine. The air pollution due to the combustion in the engine. The engine having maintenance of changing of engine oil. Even though electric grass cutter is environmentally friendly, they too can be an inconvenience. Grass cutter machine is a device which helps to cut grass in a desired position hence assisting the farmers in saving money and time. The basic objective of cutting operation is to cut the grass in rows at desired height and spacing. The project discusses different aspects of grass cutter machine which will be helpful for the agriculture firm to move towards mechanization. The grass cutter machine helps the farmer to cut the grass with less time and give sufficient feed to the animal. Hence, there is a need of reducing the time of grass cutting. Mechanization of the agricultural firm in India is in a stage of infancy due to the lack of knowledge and the unavailability of advanced machinery and tools. The present review provides brief information about the various types of innovations done in grass cutting machine available for cutting the grass for animals. The grass cutter machine is a key component of agriculture field.

## II. LITERATURE REVIEW

### 2.1 Introduction

Grass cutter machine is a device which helps in the cut of grass in a desired position hence the farmers in saving time and money. The basic objective of cutting operation is to cut the grass in rows at desired height, collect the grass in the tank by using belt conveyor. The paper discusses different aspects of grass cutter machine which will be helpful for the agriculture firm to move towards mechanization. The agricultural industry is the backbone of India's sustained growth. Hence, there is a greater need of grass for animals in large scale. Mechanization of the agricultural firm in India is still in a stage of infancy due to unavailability and the less knowledge of advanced tools and machinery. In traditional methods grass cutting is done by broadcasting manually, To achieve the best performance from a grass cutting, the major factors are to be optimized by proper selection and design of the components, machine to suit the needs of the grass.

### 2.2 Traditional cutting methods are of the following limitations:

- i. In manual cutting, it is not possible to achieve uniformity in distribution of grass.
- ii. Farmer may not cut at desired height is likely to be uneven resulting in bunching and gaps in field.
- iii. Poor control over depth of grass.
- iv. More time required for cutting grass

## III. OBJECTIVE OF GRASS CUTTER

The general objective of the study was to design a grass cutter machine that is affordable as compared to currently available grass cutting machine, simple and thus can be fabricated in a regular machine shop, less in weight and thus can be easily handled by men, and is adaptable to local farm size and conditions. Specifically, it aimed to:

- i. Cut the grass in different spacing;
- ii. Grass cutter cut the grass in suitable height;
- iii. The machine cut the grass in row at one time;
- iv. Cut the grass at equal level in farm and lawn.

#### IV. COMPONENTS USED FOR GRASS CUTTER

The main components used for grass cutter are,

1. Blade
2. Mechanism used
3. Conveyor belt
4. Ac motors

##### 4.1 Blade

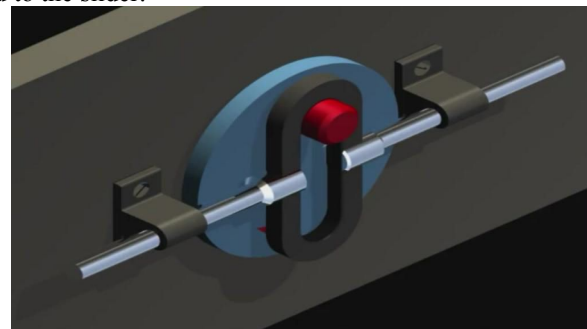
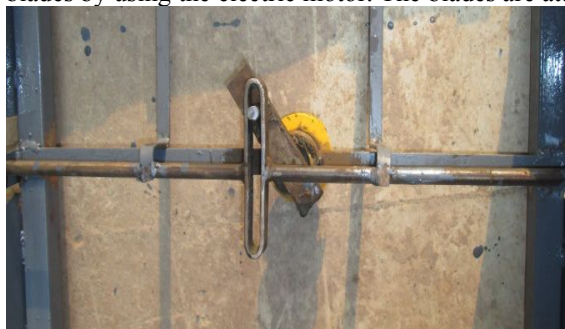
A blade is the important part for cutting purpose. Is that portion of a tool, weapon, or machine with an edge that is designed to cut or slash & slice the any surfaces or material. A blade may be made from mild steel, ceramic, or other material. In our project two mild steel blades are used i.e. fixed blade and sliding blade. Two types of blade are used in grass cutter. First is the fixed blade and another is a moving blade. They can place over each other. Fixed blade is fixed to the frame and sliding blade or moving blade is slide on fixed blade. They can mount at the front of the project. Due to the sliding action the grass is cut.



*Fig1. Blades*

##### 4.2 Scotch yoke mechanism

Reciprocating motion mechanism is Scotch yoke mechanism. This mechanism is used to convert the rotating motion into the reciprocating motion slider. The blades are directly coupled to the slider yoke which having linear motion. In grass cutter the scotch is driven by electric motor. In project the scotch yoke mechanism is used to reciprocate the blades by using the electric motor. The blades are attached to the slider.



*Fig2. Scotch yoke mechanism*

## V. WORKING OF ELECIC GRASS CUTTER

Coming to the working of electric powered grass cutter, by using electrical energy run the both motor one is driven to scotch yoke mechanism to convert rotary motion of fixed blade into linear or sliding motion. The fixed blade slide on stationary blade i.e. grass is cut by using sliding motion after that this grass is drop on conveyor belt and collect this grass behind the tank.

### 5.1 Formula for calculating power:-

- $P =$  (1)

Where,

N = Speed of motor

P = power

T = Torque

Then

$$P = V \times I \quad (2)$$

Where,

I=current

V=voltage

## VI. ADVANTAGES AND LIMITATION

### 6.1 ADVANTAGES:

- Small size.
- Simple in construction.
- It is portable.
- Less skill labour required.
- Labour cost minimizes because of we collect the grass.
- Less time required for cutting the grass.
- Less maintenance.

### 6.2 LIMITATIONS

- Operation is manually.
- Complicated to operate in rainy season.
- Timely lubrication needed.
- This machine run only where electricity available.
- 

### 6.3 APPLICATION

- For animals grass cutting.
- For football ground.
- All garden.
- Cut the unnecessary grass and weeds.
- For cutting some crops.

## VII. CONCLUSION

Our project entitled Fabrication of electric powered grass cutter is successfully completed and the results obtained are satisfactory. This project is more suitable for a common man as it is having much more advantages i.e. no pollution and no fuel cost no fuel require, less wear and tear because of less number of moving components and this can be operated by using electrical energy. This will give much more physical exercise to the people and can be easily handled. Our designed mechanical machine is advantageous over the existing machines in the following ways:

- It having low cost.
- The mode of operation is very simple.
- Efficiency is better than available grass cutter.

- The maintenance cost of this machine is very less.
- Grass cutter device plays wide roll in agricultural field.

### VIII. FUTURE SCOPE

We completed our project successfully. This can be improved by developing the following modifications to obtain better results:

- The cost of the implement should be decided by using proper material.
- And altering functional component as per IS- code for material.
- The mechanism which we used i.e. scotch yoke mechanism does not give better efficiency. Efficiency will be increased by using any other mechanism. Due to use of heavy material motor speed is reduced, this material can be change by using light weight material. And design of blades should base on application.
- The machine implement should be tested for different grass.
- The drive mechanism i.e. power transmission can be improved by using bevel or any other gears instead of pulley mechanism because it increases slippage and thus reduces field efficiency thus increases the cost of operation.
- Further modification in frame should be done for stability of the equipment.
- An arrangement can also be done to control the cutting rate of the grass by some adjustable.
- By using engine not pulling force required.

### REFERENCES

1. Amrutesh et al. *Int. Journal of Engineering Research and Applications* ISSN: 2248-9622, Vol. 4, Issue September 2014, pp.10-21.
2. A.P. Magar, M.D. Abuj, T.B. Bastewad and P.V.Adagale, *Performance evaluation of grass cutter International Journal of Agricultural Engineering*, Vol. 3 No. 1 (April, 2010): 153-155.
3. Sujendran .S1 , Vanitha .P2 J P.Bulski, S.D Yu & Davidge E D, *Investigation of sound induced by grass cutting blades, J Engg. Appl Sci*, 3 (2008)290-298.