

# Development of Mechanism to Perform Multiple Operations on Grass

P. V. Chilbule<sup>1</sup>, G.R. Chavhan<sup>2</sup>

Address for Correspondence

1, 2 Department of Mechanical Engineering,  
Government College of Engineering,  
Chandrapur, Maharashtra, India 442403

**Abstract** - Various types of grass cutting, trimming machines are available in the market which is especially useful for lawn maintenance or cleaning. The aim of this work is to develop a mechanism capable of carrying out three operation i.e. grass cutting, bush trimming and pesticide or weedicide / herbicide spraying.

In order to bring this idea into reality various in hand mechanism were studied and few mechanisms are developed suitable for operating using different prime-movers i.e. I.C. engines and D.C. supply.

This machine with multiple attachments of different mechanisms can be useful in keeping premises of educational institutes, offices, farmhouses, bungalows etc. free of unwanted plants/weed.

**Keywords:-** Weed, herbicide

## 1. INTRODUCTION

Grass, bush cutting and pesticide spraying without mechanization and with the shortage of labor leads to delay or more labor days, poor work and is hazardous to the workers. The project is study about design and development of grass cutter making it multi operational. The machine is operated for grass cutting, trimming and pesticide / herbicide spraying on lawns and domestic grass and other agricultural crops. Conventional grass cutters are already available; the challenge before us is to make it multi operational, i.e. to enable one machine to be utilized for carrying out three operations individually or simultaneously depending upon height of grass/bush. Either it will cut or trimmed or pesticide/herbicide spraying will be done. Several criteria in engineering aspects must be considered to

convert idea into developed project. Automobile engine or D.G. set can be used to power the mechanism and is tested on the grass field available. The design and development of the project is done using the engineering theories and knowledge so as to get desired output.

## 2. PROBLEM STATEMENT

In general grasses are found to survive in variety of conditions and thus, it is needed to curtail their growth in order to enhance beauty and the safety of field or landscape at homes, institutes etc.

There are grass cutting machines are available in the market which are operated manually or using prime mover but to make these machines capable of carrying out multiple operations on the grass, bush, and crop is the challenge.

## 3. OBJECTIVE

The main objective were to learn to handle real time problems related to society, environment and provide techno feasible solution using engineering knowledge and experience.

## 4. CONCEPTUALIZATION OF MECHANISM

The existing designs were studied and with this knowledge the mechanism required to carry out three operations as per problem statement are designed by considering the prime mover as automobile engine and D.G. set.

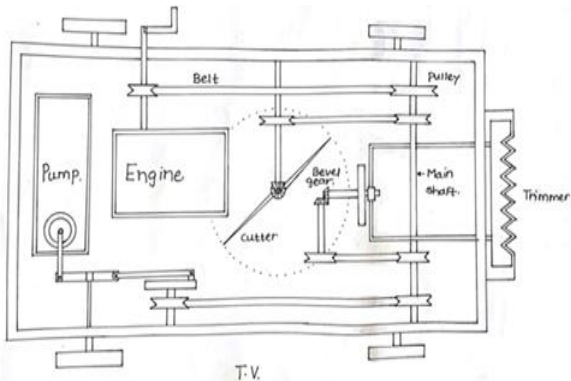
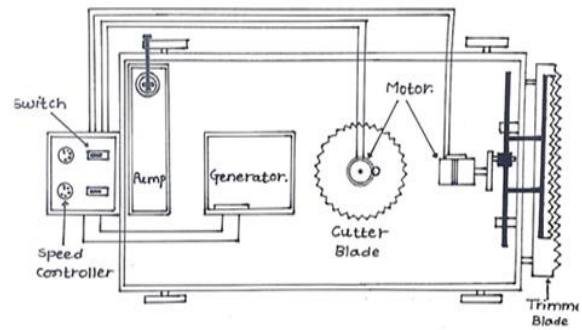


Fig. Concept design (Automobile Engine as prime mover)



T.V OF Grass cutter.  
Fig. Concept design (D. G. Set as prime mover)

### 5. WORKING MECHANISM



Fig. Multi-operational grass cutting machine

#### 5.1 Cutting mechanism

The cutting mechanism is mounted at the bottom of the trolley. Cutting operation carried out by rotation of blade which is mounted on the AC motor shaft. When electric power is supplied to the AC motor, blade mounted on the shaft of the motor rotates and it cuts the grass. The rotation of the blade is controlled by the controller as per the requirement for cutting of grass. The different type of blade can be used for this operation. For mounting different type of blade on the shaft of the motor, previous blade can be removed by unscrewing the bolt which is tightened over the shaft.

#### 5.2 Trimming mechanism

This trimming operation resembles to trimmer used for shaving, two blades with saw tooth cut on it are used for trimming of bush stem or crop. One blade is kept stationary or fixed on the frame and other blade is made to slide over it. The stem of the bush or crop which get trapped into the tooth of the blades get trimmed by shearing action. The sliding motion of the blade is achieved by scotch yoke mechanism also known as slotted link mechanism. It converts the linear motion of a slider into rotational motion or vice versa. Efficient trimming is achieved if the blades are close to each other like the blades of the scissor and also

on the sharpness of the tooth cut on the blades. This scotch yoke mechanism is powered by a motor.

#### 3.3 Spraying mechanism

The pesticide spray pump available in the market is operated manually by the handle. To minimize the efforts required by the workers to operate this spray pump, piston is mechanically operated by the connecting rod hinged to the crank which is fitted to one of the wheels of the trolley.

With the motion of the trolley wheel along the ground, crank rotates and imparts reciprocating motion to the connecting rod and thus to the piston of the spray pump. The pesticides can be sprayed on the grass, crop using flexible pipe attached to the delivery side of the pump.

### 6. CONCLUSION

Grass cutters /lawn mowers play important part in agriculture and aesthetics of so many different types of lawns or grass field.

The mechanisms used in grass cutter are evolving rapidly. This mechanism is innovative and feasible as it can be used for multiple operations on the grass and crop.

This machine combines three operations and these can be performed individually or simultaneously as demanded. With some modifications and attachments the mechanism can be used in agriculture field

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