Design and Modification of Chaff Cutter
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Abstract—The chaff cutter was simple but ingenious device for cutting straw or chaff or hay and oats into small pieces before being mixed together with other forage and fed to horses and cattle. In order to avoid un-destroying the grass and cut the grass as short as you can also to avoid blockage of grass we make it smaller and flexible as modify the chaff cutter. This is simple in construction and low cost. Less energy and time required as compared to previous chaff cutter.

Keywords: Manufacturing Process, Chaff Cutter, Mechanical Linkages

I. INTRODUCTION

A chaff cutter is a mechanical device used to cut the straw of grass into small pieces, mix together with small piece of sugarcane, and feed the cattle. Our project is related with a country having maximum population of farmers. Day by day, there are advancement in the agriculture field for the betterment of farmers and the relative industrialist that is the industrialist to work for developing and manufacturing machine for agriculture implement. Chaff-cutter or Kadabakutti machine is one such machine due to which the labor requirement is reduce as well as the productivity is increase. The present design of chaff-cutter machine has same technical problem, which we are going to solve through our project. The farmers chop forage into small pieces for easy consumption by the animals. As per today’s scenario, the population of cattle is drastically increased. These machines are perfectly suitable for fulfill all requirements of farmers. These machines are either hand operated or motor operated.

A. Objectives
- Save work time of farmers
- Save electricity
- Make portable machine
- Compact and safe to use
- Affordable for farmers
- Easy to assemble and disassemble

B. Types of Chaff Cutter
- According to semi-automatic Feeding system
  - Hand Operated Chaff Cutter
  - According to Automatic Feeding system
  - Single phase Chaff Cutter
  - Blower type Chaff Cutter
  - Fodder type Chaff Cutter
- According to Power
  2HP Chaff Cutter
  - 3 HP Chaff Cutter
  - 5 HP Heavy Duty Chaff Cutter
  - 7.5 HP Heavy Duty Chaff Cutter
  - 10 HP Chaff Cutter

II. COMPONENT AND WORKING

<table>
<thead>
<tr>
<th>SR.NO</th>
<th>PART NAME</th>
<th>MATERIAL</th>
<th>QUANTITY</th>
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<tbody>
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<td>Table</td>
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<tr>
<td>2</td>
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<td>C.S</td>
<td>2</td>
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<tr>
<td>3</td>
<td>Worm gear</td>
<td>C.S</td>
<td>1</td>
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<tr>
<td>4</td>
<td>Gear</td>
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<td>5</td>
<td>Belt</td>
<td>Rubber</td>
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<tr>
<td>6</td>
<td>Key</td>
<td>M.S</td>
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<tr>
<td>7</td>
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<tr>
<td>8</td>
<td>Shaft</td>
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<td>4</td>
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<tr>
<td>9</td>
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<td>12</td>
<td>Motor</td>
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</tr>
<tr>
<td>13</td>
<td>Bevel gear</td>
<td>M.S</td>
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</tbody>
</table>

Table 1:

Fig. 1:
The table is the main component, which hold the entire component and absorb all vibration. The table consist of four legs, Leg supports and finger support on each leg. The leg shall be made of angle section of size 55mm x 55mm x 2mm. the total height, legth, and width of the stand is 47 Inch x 18 Inch x 30 Inch. The table is made of mild steel.

A. Feed Roller:

Fig. 2:
In machine there are two feed roller are used to push the grass at forward to cut. The feed rollers are mounting on two shafts as upper and lower. The roller is rotated opposite to each other. The rollers are feet in a mouth of machine. Space between two rollers 13 mm.
The diameter of the roller is 90 mm and length is 230 mm. The feed roller is made of cast iron and the number of teeth on the roller is 10.

B. Worm Gear:

Fig. 3:
Worm gear is the main part of the gearbox, which can rotate the two gears one is upper gear and lower gear. Worm gear is mounting on the main shaft. Worm gear slows the speed of cutter. It is important part in the gearbox.

Outer diameter of the worm gear 4.6 cm and Inner diameter is 3 cm and thickness is 0.8 cm.

C. Gear:

Fig. 4:
These two gear are used to roll the feed roller. It gives rotary motion to feed roller. There two gears mounted on warm gear. These gear are used to maintain the speed of feed roller and wheel of speed.

The diameter of the gear is 13.2 and the number of teeth on gear is 13.

D. Belt:

Fig. 5:
The v belt which transmit the speed from motor to driving shaft.
ISO 9001:2008
Belt no. B100 or B101

E. Key:

Fig. 6:
A key is made up of mild steel and inserted between shaft & rotating machine element on the shaft (like pulley). It is always inserted parallel to the axis of shaft. It is inserted in keyway of machine shaft & hub. It is temporary fixing element, which is removable when required.
Key Way: 8 x 4 mm

F. Cutter:

Fig. 7:
The cutter is main part of the machine and cut the grass. It is made by casting and steel plates which is economical to the customer. The cutter is made in two parts are support rod and another is cutter. The cutter is attached to the rod with the help of nut bolt or ribbet.

G. Shaft:
The shaft is the rotating element, which is used to transmit the power from one pulley to another.

1) Main shaft:

Fig. 9:
Length : 56 cm
Diameter : 23mm and 28mm
Keyway : 8x4 mm
Material – Cast iron
2) **Lower Shaft** :

![Lower Shaft Image](image10.png)

Length: 169mm  
Material: Cast iron

3) **Upper Shaft**

![Upper Shaft Image](image11.png)

Length: 469mm  
Material – Cast iron

**H. Bearings**

![Bearing Images](image12.png)

The main purpose of the bearing is to reduce the friction between the two mating parts. The mostly taper roller bearing used in gear box to reduce the friction. In pedestal bearing the pickew block is typically made up of cast iron or cast steel.

I. **Pulley**

![Pulley Image](image13.png)

It is the simplest part of the machine which consist of wheel with groove on it, which used to transmit the power.

J. **Wheel**:

![Wheel Image](image14.png)

The wheel is madeup of MS. The purpose of the wheel is to support the cutter and it is mounted on main shaft. the diameter of the wheel is 30 cm. and keyway of 8x4 mm.

**K. Motor**:

![Motor Image](image15.png)

Depending upon the customer requirement, we use two types of motor Sai Gokul or Lakshmi.  
Model: Lakshmi  
Power: 2HP  
RPM: 1440

**L. Bevel Gear**:

![Bevel Gear Image](image16.png)

The bevel gear is used to reduce the speed from motor to wheel. In this project, we used two types of bevel gear Small bevel gear and large bevel gear.
III. ADVANTAGES AND DISADVANTAGES

A. Advantages:
- Chaff Cutter has steel structure.
- Reliable and safety.
- Compact structure simple operation and installation.
- Chaff cutter has long service life.
- Skilled persons are not required.
- For operating, manually more energy is not required.

B. Disadvantages:
- Chaff cutter is not easily portable.
- High power consumption.

IV. CAD MODEL

![CAD Model Image]

V. ACTUAL MODEL

![Actual Model Image]

VI. CONCLUSION

It is durable, long lasting and low maintenance requiring machine and rough measure done on the grass cutter shows that it has ability of cutting 270 Kg/hr. It can be adjusted anywhere it required less space with no provision of fixing. This machine is different from other chaff cutters as this machine is having an advantage that it can be adjustable the length of grass. In this project we implement new ideas and design a new chaff cutter that can adjust the length of the chaff cutter. So that farmer can adjust the length of the grass.

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[6] FABRICATION AND PERFORMANCE MEASUREMENT OF MANUALLY POWERED FODDER CUTTER Kalaiselvan P¹ Kesavan P², Satheesh kumar p, Karthikeyan m, Sakthivel,
Baluvenkatesh Assistant Professor, Department of Mechanical Engineering, Knowledge Institute of Technology, Salem, India ¹ UG Scolar, Department of Automobile Engineering, KSRCE, Namakkal, India
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