

# Development of Pedal Driven Cotton Ginning Machine

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**Abstract**— Cotton is the world’s most widely used textile fibre. Thus the quality of cotton is extremely critical for successful critical for successful textile processing. The quality of baled cotton depends on many factors including variety, weather conditions, harvesting and storage practices, moisture, trash contents and ginning processes. The problem in ginning of cotton in India is that while separating lint from seed the ginning machine damages the cotton fibre as well as seed because of outdated local machinery. In this research our aim is to modify the existing ginning mechanism with emphasis on the design and development in saw gin blade to improve the spinning characteristics of lint cotton. Ginning machines are widely useful in rural areas where there is problem of power or electricity or use of electricity is unaffordable. The present research aims to develop human powered pedal operated ginning machine with low cost, which will facilitate the rural areas.

**Key words:** Ginning Machine, Cotton

## I. INTRODUCTION

Cotton Ginning is a primary processing industry whose major function is to clean and gin the seed cotton, clean the lint and form a bale. During 2012 13 and 2013 14 in about 1500 modern and 2500 semi modern ginneries using double roller gins could able to gin about 36.5 and 38 million bales, respectively . The four Ginning Technologies,

1) Saw Ginning (about 55%) 2) Double Roller Ginning (about 35%) 3) Rotobar or Rotary Knife Roller Gin (about 5%) and 4) Single Roller (about 5%) being used in the world . These technologies are having their own considerations and the competitiveness of the cotton processing which in turn affects their adaptation .In advanced countries most of the ginning is performed on saw gins. Of late, however, there has been renewed interest in roller ginning especially , its advantages over saw ginning in respect of higher ginning percentage and better retention of fibre length. It may be mentioned here that the saw ginning always results in loss of fibres sometimes to the extent of 2%. Further, most short fibres with length less than 12 mm are left un-ginned requiring further processing. It is also known that saw ginning leads to more neps in the yarn. Maintenance of saw gin is costly as compared to roller gins and spare parts are not easily available. Rotary Knife roller ginning technology is having major disadvantages like seed cut fibre neps and un- ginned cotton going with seeds

**Need for New Developments in Ginning Technology**

- To obtain maximum length of fibre on Seed without breakage.
- To preserve inherent qualities of fibre.
- To obtain undamaged clean seed.
- To obtain lint free of Trash and contaminants.
- Lowest cost per unit of Ginning

## II. GINNING INDUSTRY OF INDIA

In India, roller gins are most commonly used in ginnery. The principal purpose of ginning is to separate cotton fibres from seeds. In a roller gin, a spirally grooved leather roller pressed against a fixed knife is made to rotate at a definite speed. A moving blade, known as the beater or "moving knife" oscillates by means of crank or eccentric shaft, close to the leather roller. Seed cotton, when fed to the machine, fibres adhere to the rough surface of the roller. Then it is carried in between the fixed knife and the roller such that the fibres are partially gripped between them. The oscillating knife beats the seeds and separates the fibres, which are gripped from the seed end. This process is repeated a number of times and due to the "Push and Pull" the fibres are separated from the seed, carried forward on the roller and dropped out of the machine. The ginned seeds drop down to the reserve box. In these machines, the ginning efficiency primarily depends upon the surface speed of the roller and the number of effective working strokes of the moving knife.

## III. OBJECTIVE OF THE RESEARCH

- To analyse the basic needs and resources available with an average cotton producing farmers.
- To develop a potable ginning machine this can be human powered and low cost with higher efficiency of performance.

India is a country where 60% of the population still live in villages and forest areas. One major source of their survival is agriculture. A huge portion of Indian population relies heavily on agriculture. Today a condition of Indian farmer is becoming worst day by day. One major reason for the poor condition is unfavourable weather conditions and low output of their produce. Today, every farmer wants correct price for the crop they produce in order to repay loans and improve their financial conditions. This is an attempt to provide human operated machine so that a processing of cotton can be carried out without aid of electricity and will help as a supplementary unit of production.

## IV. COMPONENTS AND THEIR DIMENSIONS

Frame Material: ISA 4040	Length: 1200 mm
	Breath: 400 mm
	Height: 690 mm
Saw roller 3 mm metal	cylinder Dia: 300 mm
	length: 300 mm sheet
	No. of blade: 11
Fan roller 3 mm metal	cylinder Diameter: 260 mm
	length: 300 mm sheet
	No. Of blade: 4
Bearing	Type: 6204zz
	Size: 20 mm
	No. of bearing: 4

Spur Gears	Gear diameter: 300 mm Teeth: 95
	Pinion diameter: 284 mm Teeth: 90

Table 1:

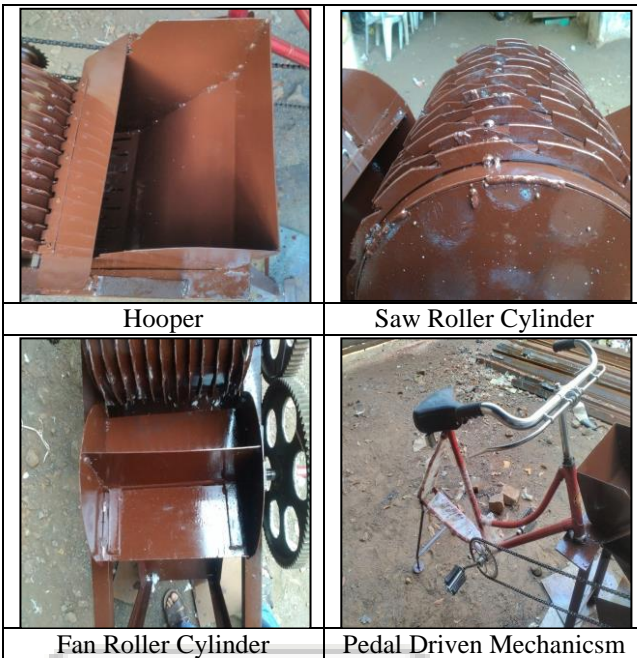


Table 2:



Fig. 1: Pedal Driven Ginning Machine

A. Cost Analysis

Cycle Frame	Rs 1500
Chain and Sprocket	Rs 1200
Handle, seat and pedal	Rs 800
Main Frame	Rs 1800
Saw Drum	Rs 2000
Fan Drum	Rs 1200
2 Shaft	Rs 800
4 Bearing with plumber block	Rs 1000
Hopper	Rs 700
2 Bottom Tray	Rs 400
Paint	Rs 500
Lab, labour and power	Rs 4100
Total cost	Rs 16000 (Approx.)

Table 3:

V. RESULTS & DISCUSSION

For this project to be successful, analysis few parameters is as below

Raw cotton consist of 65% seed and only 35% fibre

Cost of raw cotton	: Rs 45 per kg
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Cost of lint	: Rs 120 per kg
Cost of seeds	: Rs 25 per kg

Table 4:

Let us consider for 10 kg of raw cotton. It will produce nearly 6 kg of seeds, 3 kg of lint and 1 kg of other product, therefore

Total cost of raw cotton	: 10*45	: Rs 450
Total cost of seeds	: 25*6	: Rs 150
Total cost of lint	: 120*3	: Rs 360
Profit earned from ginning	: 510-450	: Rs 60

Table 5:

Hence from ginning 10 kg of cotton, a farmer can earn Rs 60, therefore by ginning 1 quintal, farmer will earn upto Rs 600 and even a medium cotton producing farmer produces at least 5 quintal of cotton. So in this way any medium cotton producing farmer can earn upto Rs 3000.

VI. ADVANTAGES

- 1) It is eco-friendly and easy to use.
- 2) It utilises human power for its functioning, which is renewable source of energy
- 3) It is not affected by surrounding environment like humidity etc.
- 4) It can be used by any type of worker and it doesn't require any pre-requisite training.
- 5) It can easily be transported by to the required place by 2 or 3 worker.
- 6) It doesn't need any installation work before starting for use.
- 7) Its construction is very simple and can be produce in large quantity for getting lower machine cost.

VII. LIMITATIONS

- 1) Quality of fibre decreases in saw ginning mechanism compared to roller gin mechanism.
- 2) After excessive use, its teeth profile may get affected and damage the seeds.
- 3) Only clean cotton could be used for ginning as this machine doesn't has room for lint pre-cleaners.
- 4) Not suitable for high quality cotton fibre.

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