International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 02 | Feb -2017 www.irjet.net p-ISSN: 2395-0072

DESIGN AND FABRICATION OF COTTON BOLL PICKER MACHINE

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Abstract – *In this paper we have design a cotton boll picker machine, this machine is useful for harvesting cotton. Cotton plays an important role in our lives, most of the things are made of containing cotton. Cotton is the most abundantly produced natural fibre in the world. This machine will help small scale farmers for harvesting cotton. Nowadays there are machines available in market which is very costlier, which small scale farmers can't afford. But these machine small farmers can easily afford, and can perform harvesting. In India entire cotton is handpick by labor. There are internationally available machine for cotton boll picking which is costlier. By using the available machines the strength of the cotton fibre is get reduced. In this machine the strength of the fibre will not be affected, and it will provide the human comfort while performing cotton picking operation. And will reduce the wastage of money for harvesting machine. In this machine only the cotton boll is picked, which will not affect the cotton. As there are the machine in which along with the cotton so many unwanted material like burr, leaves, are get collected in collector tank but by the use of this machine only the cotton is get collected in the collector thank. Almost 1/3rd of the cotton produced in the world is mechanically picked and about 2/3rd is picked by hand, but increasing labour cost of farmers. This makes more countries to considered machine picking. This machine is fully mechanically operated and save the costs of small farmers which they spends on labour for harvestings.*

Key Words: DC Geared Motor, Rollers, Battery, Load Cell, Potentiometer, Collector Tank.

1. INTRODUCTION

Cotton is most important commodity in world and it is cultivated by large areas in India. Cotton picking is done mostly by hands in India primarily by women. Cotton is picking from cotton boll by human hands. Generally workers go to field in the morning to start picking and continuously work till evening. Generally a white open flower takes 50-55days to develop to the stage where white and harvestable lint is showing. Higher heat accelerated the cotton boll maturity level but does not result in genetic improvement. So we aim to utilize the best knowledge of science to design such efficient machine which can do perform work in field and reduces human efforts. This machine pick cotton in farm and will reduce the excess manpower required while cotton harvesting. As more money is required in farm for labour work and the harvesting of cotton is performed in some intervals of time. This makes small scale farmers to spend money on the labour for harvesting. Therefore this machine will save the money of small scale farmers; it will reduce the effort required will performing the picking operations.

2. SYSTEM USED FOR PICKING COTTON

There are machines which are so much costlier for harvesting the cotton. The system used for picking cotton is

2.1 Stripping

Strippers have rollers or mechanical brushes that remove entire bolls from the cotton plant and also along with the cotton boll it collects a lot of cotton plants material like leaves, burr, and branches of plants.

2.2 Spindle

Spindle pickers pull the cotton boll from the plant which has the open bolls, the boll which is fully mature. It uses a revolving spindle that rolls fibre in spindle and releases them softly so that is to be carried to the basket. Now this type of picking system affects the cotton boll. If we see the strength of the cotton boll by using this machine, we get the cotton having poor quality of strength. In this strength is getting reduced.

3. BLOCK DIAGRAM

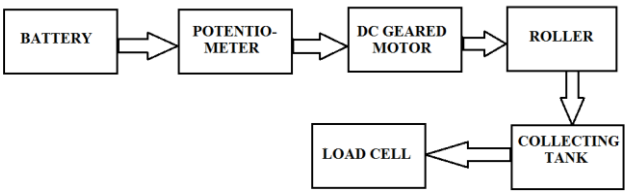

Fig -1: Block Diagram of Cotton Boll Picker Machine

3.1 Hardware Description

1) Battery:

In this project we have use battery to operate our machine, in this machine battery is the main source for the other components to perform their functions.

2) Potentiometer:

In this project we have use potentiometer. This potentiometer is used to regulate the voltage.

3) D.C Motor:
In this project we have use D.C Geared to operate the rollers. By the use of motors, the rollers are rotating and performing their functions. The motors get power from the battery.

3) Rollers:
Roller is main part of our machine. These rollers are operated by the geared motors. In our machine this rollers consist of belts which is used for picking operations.

4) Collector Tank:
Now in this collector tank the cotton which is picked by the rollers is get collected and stored in it.

5) Load Cell:
Now the collector tank is connected to the load cell. This load cell will give the capacity of the cotton boll collected in the collector tank.

4. CALCULATION

The forces acting on the cotton boll can be considered as the actual force and the cohesive force.

Actual force: - The force acting on cotton can be considered as actual force.

F=W t of cotton * gravity = 0.0654N

Now the cohesive force is defined as

Cohesive force: - The force required to pull the cotton can be considered as cohesive force. This force is calculated by using strain gauge. The formula is given by

Strain (μ) = $\sigma*F*L/\epsilon*b*t^2$ = $1.7*10^{-6}$

From this the total force is given by

$F_{TOTAL} = F_{ACTUAL} + F_{COHESIVE} = 0.90N$

Now torque acting on cotton boll is given by

Torque (T) = ($F_{ACTUAL}+F_{COHESIVE}$)*Perpendicular distances
= 101.25N/mm

The speed requiring rotating the D.C geared motor is considered in the range of 1000-2000 rpm. Now by this the power required to drive the motor is calculated as

Power = $2\Pi NT/60$ = 15.40W

4.1 Time Calculations

Average cotton cultivated in one acre of farm

1quintal =1000kg = 10^6gm

Average cotton boll weights = 6.6gm (By considering three samples of cotton in three categories and they are Small, Medium, Large).
One cotton boll requires = 0.05sec
Therefore 1quintal cotton requires = 2.1hours of operations = 126 minutes
Hence our machine harvest One acre of farm in = 2.1 hours
It is very much less than the time consumed by the workers.

5. CONCLUSIONS

The Design of Cotton Boll picking machine is easy to handle, and it is easy to operate. Also it is of light weight. It will reduce the money required for harvesting process and also reduces the risk of injury. It will provide human comfort while performing the cotton picking operations.

ACKNOWLEDGEMENT
We are immensely grateful to our guide Prof. Sandeep Lutade (Dept. of Mechanical Engineering) for helping us to solve the difficulties arises during the project work, and for guiding us in our project work when we required.

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