
REVIEW OF SEMIAUTOMATIC COCONUT DEHUSKING MACHINE

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ABSTRACT

There are many farm equipment's which are developed for the post harvesting of coconut. Mostly all the post harvesting operations are tedious jobs to perform. The dehusking of a coconut is regarded as the most time consuming, tiring, and difficult operation to perform. Many attempts has been done to perform this task of dehusking manually as well as mechanized. Traditionally this task of dehusking was performed by using different hand tools. By hand tools the dehusking depends on the skill of worker and involves training. In order to face this tedious job, we had introduced mechanized or the power operated machines. Coconut dehusking machine consists of high stabilized spikes on the rollers which are driven by means of external source. Due to the maximum torque experienced by the roller it creates the high force on the crushers. These forces help in removing the fibre coating of coconut easily.

I. INTRODUCTION

Today the agriculture is mechanized with the modern means. The agricultural activities like ploughing, sowing, harvesting nowadays involves many light weight to heavy machinery. Use of such machines is beneficial for both farmer and labour as it saves time of farmer and the tedious and cumbersome work is simplified to workers. It also enhances the productivity of farm. The agricultural activities are broadly classified into three groups. Pre-harvesting, harvesting and post-harvesting activities. All these three groups of activities are nowadays mechanized with machines. Pre harvesting operations are inserting seeds into farms, ploughing, irrigation etc. Harvesting means obtaining the fruits from the plants. Post harvesting is the operation which is required for the further processing of the fruits obtained from the plants. Amongst different post harvesting operations the coconut dehusking is regarded as a difficult task to perform. Coconut in India is grown on a large scale because of its numerous advantages and the atmosphere in coastal areas is favorable for its cultivation. Coconut gives coconut oil, coconut powder, husk is used to manufacture ropes, its medicinal properties etc. Hence its post harvesting is important. Many attempts have been made to make its post harvesting mechanized either manually or power operated. These attempts of mechanization have their own advantages and limitations. An invention on these kinds of tools and machines is necessary for the usage of suitable mechanism to satisfy the desired need of small scale or large scale.

II. LITERATURE REVIEW

Amal P V et.al coconut husk is used in coir industry, shell as a fuel, copra as food, coconut water as nutritious liquid. The dehusking of a coconut is regarded as the most time consuming, tiring, and difficult operation to perform and involves much human drudgery. Dehusking with traditional hand tools like machete or a spike depends on the skill of worker and involves training. Nowadays there is shortage of such skilled workers. The mechanized or the power operated machines are developed to eliminate the drawbacks of manual tools. This present work aims to design and develop a semiautomatic coconut dehusking machine with eliminating the above mentioned drawbacks of the existing tools and machines. The machine conceived shall have main parts like dehusking unit mounted on a frame with electric motor as a power source along with speed reducing unit. The dehusking unit shall have a pair of cylindrical rollers with tynes (cutting pins) on its surface. These rollers will rotate in opposite direction with different speeds so that the tynes will penetrate into the husk and tear it away from the shell. The proper tearing of husk from shell occurs when the coconut offers good mesh with the tynes and it depends on the depth of insertion of nut into rollers and profile of tynes. Also the suitable profile of tynes is required for effective dehusking. These tynes shall be attached to the cylinders with fasteners so that

replacement can be easily done.

Wadile et.al a Review Coconut is very important ingredient of Indian food just because of its versatility in use. Extracting the edible part from a coconut is not so easy task when it comes to process it from its very initial state. To make it possible and easier, we have manufactured coconut de-husking, cutting and grating machine. Design and manufacturing of coconut de-husking machine consists of three operations, namely peeling of coconut fibers i.e. de-husking of coconut. India is the world's third largest producer of coconut after the Philippines and Indonesia. India alone accounts for about 70% of the world production of coir and coir products. The total output of coir and coir products in India is estimated to be around Rs.1500.00 core including exports of Rs.350.00 core. All the parts of coconut orchard such as coconut husk, shell, copra, coconut water are useful. Coconut husk is used in coir industry, shell as a fuel, copra as food, coconut water as nutritious liquid. There are many farm equipment's and tools which are developed for the post harvesting operation of horticultural crops. The dehusking of a coconut is regarded as the most time consuming, tiring, and difficult operation to perform and involves much human drudgery. Many attempts has been done to perform coconut dehusking manually as well as mechanized. Dehusking with traditional hand tools like machete or a spike depends on the skill of worker and involves training. Nowadays there is shortage of such skilled workers. The mechanized or the power operated machines are developed to eliminate the drawbacks of manual tools. Such manual tools and machines are developed all over the world and a very few have become popular, rest got vanished due to their limitations. The reasons for the failure of these tools include unsatisfactory and incomplete dehusking, breakage of the coconut shell while dehusking, spoilage of useful coir, greater effort needed than manual methods, etc. This present work aims to design and develop a semiautomatic coconut dehusking machine with eliminating the abovementioned drawbacks of the existing tools and machines. The machine conceived shall have main parts like dehusking unit mounted on a frame with electric motor as a power source along with speed reducing unit. The dehusking unit shall have a pair of cylindrical rollers with tines (cutting pins) on its surface. These rollers will rotate in opposite direction with different speeds so that the tines will penetrate into the husk and tear it away from the shell. The proper tearing of husk from shell occurs when the coconut offers good mesh with the tynes and it depends on the depth of insertion of nut into rollers and profile of tynes. As coconuts varies considerably in size and shape there is a need of adjustment in distance between pair of rollers for desired depth of in section also the suitable profile of tynes is required for effective dehusking. These tynes shall be attached to the cylinders with fasteners so that replacement can be easily done.

Dany Thoma et.al this paper presents the design and fabrication activities involved in developing an automated coconut de-husking machine. The main purpose of this machine is to eliminate the skilled operator involved in de-husking the coconut and to completely automate the dehusking and crown removing process. Although coconut dehusking machines have already been demonstrated in the work and also in some small-scale industries, the process is either manual or semi-automatic. A completely automated machine with manual loading and unloading of coconuts will yield productivity higher than the existing process. Because of that, the current work is mainly focused on an automated machine for dehusking and crown removing. Also, we can yield lot of useful and commercial products from coconut at various stages of its lifecycle. The machine aims at de-husking and removing the crown of the de-husked coconut of various sizes. In order to get to know about the different sizes of the coconut, various places are visited where exuberant yielding of coconuts are made. Also, dimensional data of coconuts have been collected. Based on the survey the maximum and minimum sizes of the coconut are determined. The machine is designed to accommodate different sizes of the coconut that are cultivated anywhere in the world. Also, various experiments have been conducted on both dry and mature coconuts in order to determine the force required to de-husk the coconut.

Roopashree C R et.al generally, coconuts are dehusked manually using a hand cutting tool. These methods require skilled labor which is difficult and painstaking process. Attempts made so far in the development of dehusking tools have only been partially successful and not effective in replacing manual methods. The reasons stated for the partial success of these tools includes unsatisfactory, incomplete dehusking, breakage of the coconut shell. Based on this a power - operated coconut dehusking machine is being designed and fabricated to solve the existing problems. To reduce the human efforts, the power operated machine is designed and

developed. The new power operated de husking machine works on the principle of gear mechanism. Here the labor efforts and the time consumption for the de husking are reduced.

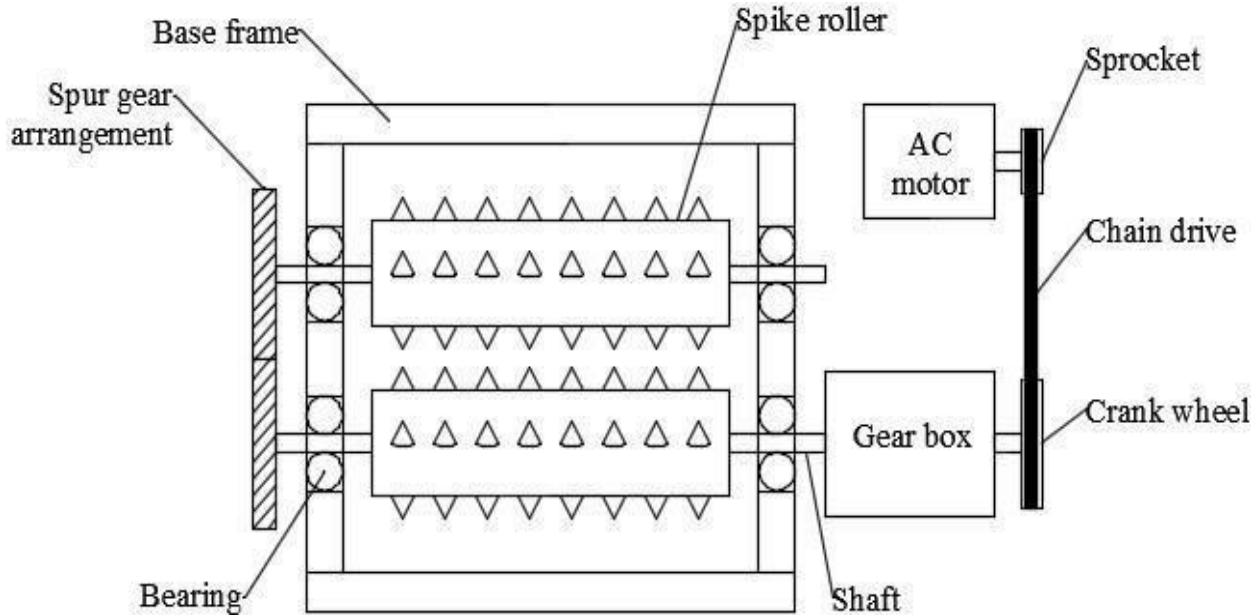


Fig. 1. 2D Layout of coconut dehusking machine

Table 1. Materials

Sl.No.	Description	Quantity	Material
1	Spur Gear	1	Mild Steel
2	Chain Drive	1	Stainless Steel
3	Bearing	8	Stainless Steel
4	Frame	As per requirement	Mild Steel
5	Shaft	As per requirement	Mild Steel
6	Metal Strip	As per requirement	Mild Steel
7	Crusher	1	Mild Steel
8	Gear Box	1	Mild Steel
9	A C Motor	1	

III. CONSTRUCTION

The base frame for mounting over all arrangement is fabricated using square tubes and channels by metal cutting and metal joining process called welding. The two specially designed rollers with high strength spikes on its surface are mounted with the bearing for experiencing free rotation. Here one roller is driver and another one is driven. Both the rollers are attached with spur gear and these spur gears are meshed with each other. The driver roller is attached with gear box setup which is coupled to the motor to rotate the roller to experience a high torque.

IV. WORKING PRINCIPLE

When the motor gets turned on it starts function the gear box, the rotation obtained from the gear box is steady with high torque in nature. This rotation is transferred to roller which is directly coupled with it to and tends to rotate in same direction, this rotation also affects the gear which gets meshed with it and transfers the rotation to the second roller. Both the rollers rotate in an opposite direction such that it exerts pushing and pulling force on the intermediate object which helps in dehusking operation. When the coconut placed in between these rollers experiences the force produced between this rollers and makes the fibre to loosen, by continuous activation the complete removal of fibre on the coconut is achieved.

V. ADVANTAGES

- Faster operation
- Less manpower requirement
- Labour requirement minimum
- Can be clubbed along with husk shredding units for mass production
- Nuts produced per hour is high when compared to hydraulic or pneumatic systems
- Cost is less when compared to hydraulic or pneumatic system.

VI. APPLICATIONS

Used for small, medium and large scale agricultural based industries. Used for commercial stores.

VII. CONCLUSION

A low cost coconut dehusking machine has been fabricated. The machine is appeared to be feasible, pollution less, economic. Number of nuts produced per hour depends upon the slack time and speed of roller units. Number of nuts dehusked per hour is found to be 220 nuts which are above other existing similar machines.

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