

AUTOMATIC COCONUT DE-HUSKING AND DE-SHELLING MACHINE

Mr. Varad V. Bhalekar, Mr. Shubham M. Langarkar Prof. S. B. Kamble
U. G. studentS, Department of mechanical engineering, Bharati vidyapeeth's college of engineering,
Kolhapur, India.

Assistant Professor, Mechanical Department, Bharati vidyapeeth's college of engineering, Kolhapur, India.

Abstract : Agriculture forms the backbone of our country economy. About 50-60% of citizen are depending on agriculture. For developing our country means providing our farmers with more advanced technology or tools, which would reduce overall time and cost required for work. This would make work more easy and comfortable.

Coconut is one of the world most useful and important perennial plant. Coconut plays an important role in economic, social and cultural activities of millions of people in our country, hence we develop coconut de-husking machine. Manual de-husking is time consuming since it is hand operated using sharp blade. Besides, it is dangerous and may cause back pain to the worker. The main purpose of this machine is to eliminate the skilled operator involved in de-husking the coconut and to completely automate the de-husking and de-shelling and this would help increase the production rate. This paper presents design and operational activities involved in developing an automated coconut de-husking and de-shelling machine.

Keywords: Coconut, Automatic, Coconut De-Husking, De-Shelling, Toothed Rollers, Small Scale Farmers, Production Rate.

I INTRODUCTION

Coconut tree is known as "Kalpa Vriksha" in Sanskrit which means the tree that gives all that is necessary for living. Coconuts are grown in more than 93 countries in the world and therefor there is considerable scope to develop this machine. India is a major producer of coconut in the world. The various parts of the coconut have a number of culinary uses. The seed provides oil for frying, cooking, and making margarine. The coconut water is consumed as a refreshing drink throughout the humid tropics and is gaining popularity as a sports' drink. Coconut water can be fermented to produce coconut vinegar. The machine proposed in this work basically does two processes. They are de-husking and de-shelling, de-husking is the process of removing the husk from the nut. Majority of de-husking is carried out manually by machete or a spike, it show that there are no superior machines develop to handle the coconut. Coconut de-husking is the most fundamental issue in terms of finding labor and improving productivity.

Now a day's various techniques are used for de-husking of coconut. They are as follows:

1. Manual de-husking :
 - a) By using machete or spike
 - b) By using traditional tool
2. Pedal operated de-husking
3. Hydraulic operated de-husking
4. Pneumatic operated de-husking

At present, the de-husking of coconut is carried out by various machines like spike, traditional tool, pedal operated machine, hydraulic and pneumatic machines, etc.

From all above methods of coconut de-husking we understood that there are many limitations which creates difficulties during coconut de-husking. To overcome these difficulties and to increase production rate, we have decided to make " Automatic coconut de-husking machine." And also for removing the shell of coconut, the special attachment is provided.

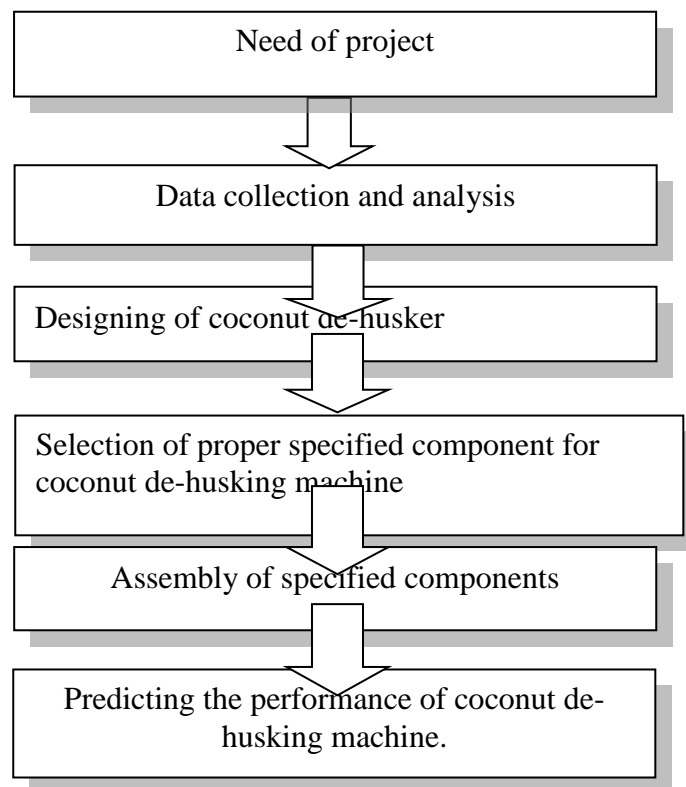
II. LITERATURE REVIEW

Venkataramanan S, Abhinav Ram B, Rahul R discussed in "Design and Development of Automated Coconut De-husking and Crown Removal Machine" paper, presents the design and analysis activities involved in developing an automated coconut de-husking and coconut crown removal machine. The main purpose of this machine is to eliminate the skilled operator involved in de-husking the coconut and to completely automate the de-husking and crown removing process[1]. Y. Prashant, C. Gopinath, Vignesh Ravichandran discussed in "DESIGN AND DEVELOPMENT OF COCONUT FIBER EXTRACTION

MACHINE” paper that, to design and develop a coconut fiber extraction machine for farmers and small scale coir industries in India to provide an effective solution to the difficulties in existing process, reduce time and labour cost[2]. Mr. Vinod P. Sakhare, Mr. Ketan K. Tonpe, Dr. C. N. Sakhale discussed in “Performance Analysis of Hydraulically Operated Coconut De-husking Machine” paper that, we have many methods to de-husk the coconut. It is by manually, mechanically and also by the use of machines. Manual de-husking with knife is a common practice and there are also different methods of de-husking of coconut using machines such as two blade coconut de-husking machine and coconut de-husking by two roller machines[3]. S. D. S. Piyathissa, P. D. Kahandage discussed in “Introducing an appropriate mechanical way for coconut de-husking” paper that a preliminary experiment was carried out with hundred coconut selected from a properly maintained coconut plantation in order to find out the average measurement such as height and width of coconut, thickness of husk, height and width of nut[4]. T. Vidhan Singh, R. Udhayakumar discussed in “Development of coconut de-shelling machine” paper that a coconut is commercially cultivated in 93 countries. India contributes to 15.28% of the global area and 19.44% of global production and is the largest single market for coconut[5]. Stephen Kwasi Adzimah, Samuel Oppong Turkson, discussed in “Conceptual design of coconut de-husking machine” from this paper we get various traditional methods of de-husking the coconut as well as application, advantages and limitations of machine[6].

III. METHODOLOGY

The present work involves following methodology:



there are various methods are used for coconut de-husking such as manual by spike or machete, pedal operated etc. coconut de-husking by spike or machete is harmful to the worker and skilled labour is required. also in this method more effort is required, so to reduce that efforts decide to develop automated coconut de-husking and de-shelling machine. various research papers related to machine are referred and from that we get the knowledge for improvements. the coconut de-shelling machine would developed based on the basis that the availability of materials locally to reduce cost of production and maintenance of the machine. as per concept the conceptual design of machine is created. after improving some parameters the final design is obtained. as per design proper specified components such as gear, shaft, spikes are selected. while selecting different factors such as torque, material, speed, capacity to sustain load are considered. finally all parts are assembled as per final design and then takes trial on machine. while assembly of machine ergonomic considerations are taken into account.

IV CONCEPTUAL DESIGN

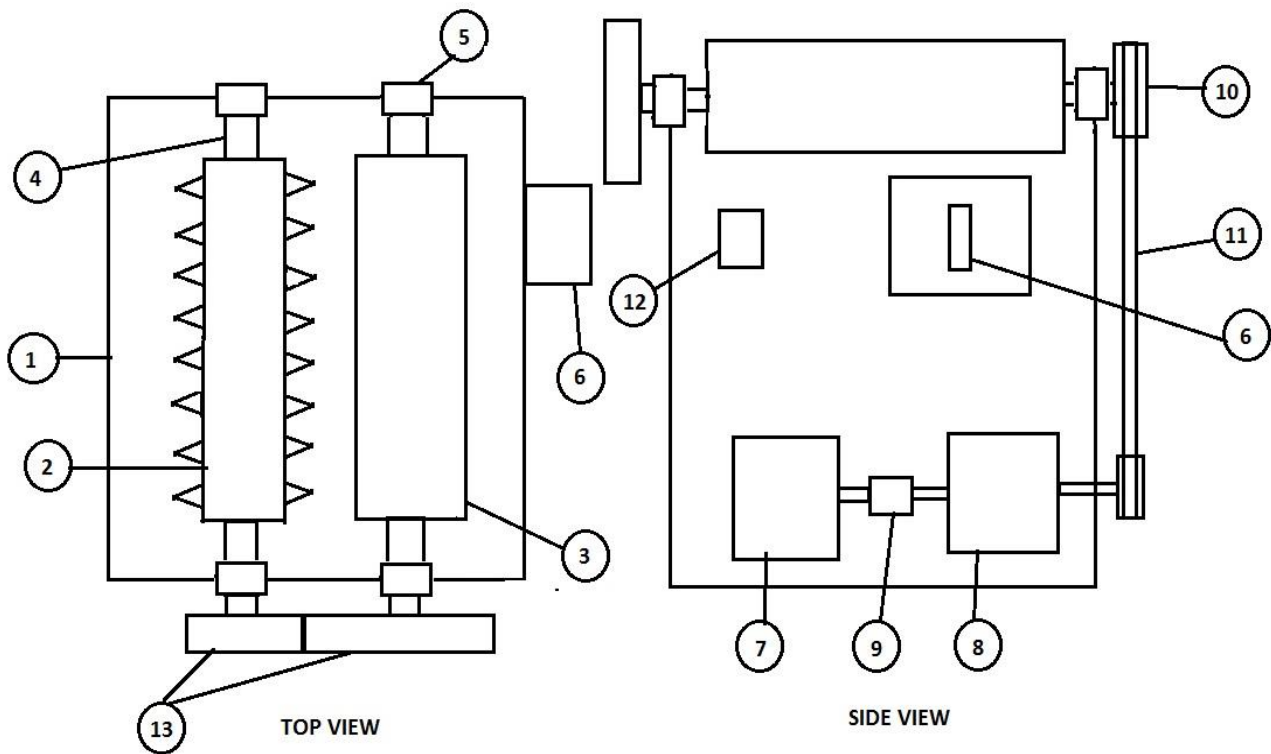


Fig. Conceptual design of machine

COMPONENTS OF MACHINE

- 1. Frame 2. Roller with spike 3. Roller without spike 4. Shaft 5. Bearing
- 6. Cutter 7. Motor 8. Gearbox 9. Coupling 10. Pulley
- 11. Belt 12. Switch 13. Gears

All Components of machine are shown in above, each plays an important role in de-husking process. The machine has designed such a way that any person can operate the machine with ease. This is done by considering aesthetic and ergonomic aspects. Roller with the spikes is used to de-husk the coconut and the plain roller guides the coconut i.e. it rotates the coconut. The spiked roller has the provision for changing the clearance between two rollers according to the coconut size. For transmitting the power from gearbox, the belt pulley arrangement is used. The gearbox is used to reduce the speed from motor speed to the required speed.

V PROCESS TO DEVELOP MACHINE

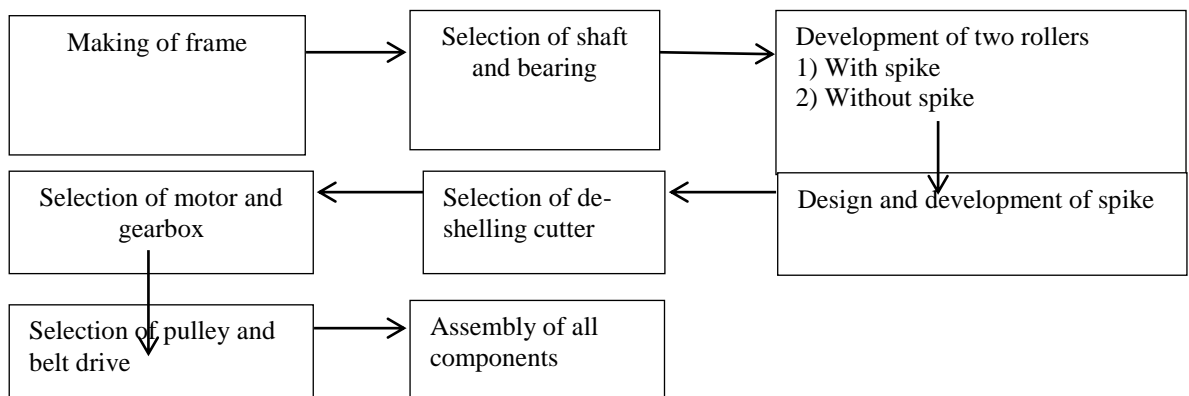


Fig. Block diagram for process to develop machine

VI WORKING OF MACHINE

First of all machine is started by using electric supply and the coconut is placed on two rollers. A spike roller is considered as the main mechanism of the machine. The lever is used to apply small force on coconut for piercing of spikes into husk. The roller without spike would rotate the coconut and the spike on the roller piercing in the coconut husk due to continue rotation. The spiked roller will grip the husks and tear the husks from nut. In this way the coconut de-husking takes place. During operation small vibrations are occurred so machine sometimes changes its position on plane surface, thus the special arrangement for removing the wheels is provided. To have this kind of operation, the coconut should be placed horizontally into the machine.

For de-shelling the coconut, the de-husked coconut is placed in front of the teeth of cutter. Due to rotation of the cutter the teeth of cutter is imparted on shell of coconut. Thus the breakage of shell takes place and the coconut de-shelling is carried out.

VII ADVANTAGES

1. It is simple and fast process.
2. No need of skilled labor.
3. Accidents are eliminated.
4. Increase in production rate.
5. Time required is less.

VIII CONCLUSION

A power operated coconut de-husking and de-shelling machine was designed and developed. Coconut de-husking and de-shelling machine which de-shell coconuts without nut breakage and machine is easy to operate and perform with an average de-husking capacity of approximately 200-250 nuts per hour. An automated machine for coconut de-husking and de-shelling has been developed for the small scale farm holder in the agriculture and rural areas. The operation of machine is simple, fool proofing and the maintenance of the machine is not expensive.

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