Pedal Operated Coconut Dehusker
Siva Kumar.V1, Sathya Moorthy.K2, Karthik Kumar.G3
Mechanical Department
Park College of Engineering and Technology, Tamil Nadu, India

Abstract:
Generally, coconuts are dehusked manually using either a machine or a spike. These methods require skilled labors and training to use. Moreover, the other advanced coconut dehuskers are highly motorized and its cost is high. Attempts made so far in the development of dehusking tools have been only partially successful. By solving these difficulties, our new project is designed with low cost. In our design a closed coil spring is used to increase the force of dehusking. It is simple in design with pedal operated. It does not need any motor to operate only manual work is needed. It does not need any skilled labour. And it is one of the cheap and best design for coconut dehusk. In our project we use spring mechanism. We joined the parts of the device by welding and pin joints.

Keywords: coconut dehusker, manual work, reduced operation time and cost, simple in design, used as home application.

I. INTRODUCTION
In the early stages the coconuts are dehusked by using the knife edged wooden stripes. But nowadays the coconuts are dehusked manually by using many mechanical instruments. This is one of the most adaptive and effective manual coconut dehusker, which is operated by using pedal. And this manual coconut dehusker consist of two knife edges one is fixed and the another one is movable with the help of the pedal. Then the closed coil helical spring is fitted with that movable knife-edge to increases the force and gives resistance to those knife-edges. This is one of the best compact manual coconut dehusker for household works.

Today the agriculture is mechanized with the modern means. The agricultural activities like ploughing, sowing, harvesting nowadays involves many lightweight 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 favourable 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. The study of such tools and machines is necessary for the selection of suitable mechanism to satisfy the desired need of small-scale works.

II. COMPONENTS
A. Pulley
The figure 1 shows the pulley it is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt along its circumference.

Fig - 1: pulley

B. Closed coil spring
The figure 2 shows the coil spring, it also known as a helical spring, is a mechanical device which is typically used to store energy and subsequently release it, to absorb shock, or to maintain a force between contacting surfaces.

Fig - 2: closed coil spring

C. Hinges
The figure 3 shows the hinge, it is a mechanical bearing that connects two solid objects, typically allowing only a limited angle of rotation between them. Two objects connected by an ideal hinge rotate relative to each other about a fixed axis of rotation.
D. Pedal

The figure 4 shows the pedal (from the Latin pes, pedis, meaning 'foot') is a lever activated by one's foot, sometimes called a "foot pedal" (but all pedals are used by a foot). A unit of length equal to one third of a yard or 12 inches.

Specification:

- Size = 30 x 10 cm
- Force applied = 100 N

E. Nuts and bolts

The figure 5 shows the bolt, it is an externally threaded fastener designed for insertion through holes in assembled parts, and is normally intended to be tightened or released by torquing a nut. An externally threaded fastener which is prevented from being turned during assembly and which can be tightened or released only by torquing a nut is a bolt.

(Example: round head bolts, track bolts, plow bolts.)

Specification:

- Our Bolt Size => M12 x 1.75
- Pitch = 1.75mm => Load = 10 N
- Major Dia (D) = 12mm
- Pitch Dia (d2) = 10.863mm
- Minor Bolt (d3) = 9.853 mm
- Diameter of nut (d1) = 10.106mm
- Depth of Thread (n2) = 1.074mm
- Maximum depth of Engagement (H1) = 0.947mm
- Stress Area (S) = 84.3mm2
- Stress Induced in Bolt (σ) = 10/84.3 = 0.118 N/mm2
- Shear Area = \( \pi \times (\text{Minor dia of Bolt} \times \text{Length of Engagement}) \)
  = \( \pi \times (9.853 \times 40) \)
  = 1238.1 mm2

F. Roller

The figure 6 shows the roller, it is a long curving wave is a comber, a wave that curls over and dissolves into foam is a breaker, and a long wave moving steadily shoreward is a roller.

Specification:

- Diameter = 10 cm

III. PLAN OF ACTION

G. Normal mode diagram:
H. Working mode diagram:

![Working mode diagram](image)

I. 3D Representation diagram:

![3D Representation diagram](image)

J. Working

Normally used manual coconut dehusker is modified with closed coil spring, which is connected to the pedal. Then it is operated manual without any motors and skilled labours. When we applied the load on the pedal the spring which is connected to the pedal gives the maximum force to the husker to husk the coconut. The components that are used in this coconut dehusker are manual husker, closed coil spring, metal roller, foot pedal. The coconut to which we want to husk is placed on the top of the knife edged pedal operated coconut dehusker. Then the load is applied to the pedal, which is connected with the coconut dehusker. Then the lever, which is connected to the pedal, get pulled with that force. The knife-edge coconut dehusker is opened with that force. After husking of coconut the knife-edge gets closed with the force which is generated by the spring.

K. Operations done

**Arc welding**

Arc welding is a type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metals at the welding point. They can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes. Some type of shielding gas, vapor, or slag usually protects the welding region. Arc welding processes may be manual, semiautomatic, or fully automated. First developed in the late part of the 19th century, arc welding became commercially important in shipbuilding during the Second World War. Today it remains an important process for the fabrication of steel structures and vehicles.

An electric arc is formed at the tip of the welding rod when a current passes across an air gap and continues through the grounded metal, which is being welded.

IV. Procedure

STEP 1: The manual coconut dehusker is taken without hand lever

STEP 2: The knife-edge of dehusker is connected with the lever by this arc welding

STEP 3: And then the lever is connected with the closed coil spring.

STEP 4: Then the lever is connected to the metal roller to rotate freely.

STEP 5: Petal is connected with that roller to give load.

STEP 6: Then this petal operated coconut dehusker is operated with manual power.

V. CONCLUSION

The design and fabrication of pedal operated coconut dehusker was carried out successfully meeting the required design standard. Hence its wide application in industries even in house. So it can be recommend for Aged peoples and it will be economical and can affordable to common people. We can also add new technology in this coconut dehusker. This system can be made highly efficient and effective if stringent environmental conditions are maintained. It is a onetime investment and it can last forever.

VI. LITERATURE REVIEW

- **Twin-Blade Husking Machine**

  A twin-blade was been developed in such a way that the husking of the coconut was done by inserting coconut onto one of its twin-blade and the other flat blade would help in the process of peeling. Belt to a long, cylindrical metal rod with two sharp blades fixed at the tip of the rod of the machine. The blades were 19 cm long and placed two inches apart. The rotating motion of the blade aided to husk the coconut easily. A switch was used to operate the machine by the operator the husking process. A better grip on the coconut was provided by the flat blade, which acted as the stopper that prevented the nut to slip away vertically. only by a skilled person, otherwise; hands may get cut as the worker has to hold the coconut in his hand during husking process. (ICETEM14) 30-31, December, 2014, Ernakulam, India

- **CPCRI Coconut Dehusking Tool**

  In Central Plantation Crop Research Institute (CPCRI), Kerala, India, a manually developed and improvised. It consisted of three sharp separable blades, which initially faced upwards and in a juxtaposed position. In operation, the blades would go up and outwardly by swinging about their pivots at the bottom. In the process, the husk of the coconut gets impaled upon the blades and the nut is ejected. The impaling of coconut and actuation of the blades were carried out using a hand-lever and a foot been accepted widely. Moreover, not only that the feeding was manual but also its
movable blade actuation was again manual. The major impediment with this device was its large.

- **Coconut Spanner**

A husking tool called the Coconut Spanner, the Malabar region, where its inventor was unknown. It is version of the smithy tongs with long handle and sharpened tongue. It is in juxtaposed or closed position and impaled on the coconut, and then separated to loosen the husk. The unit operation the kernel. Each time, the operator had to bend for manipulating the coconut placed on the platform which could be at the ground level. Then, he has to rise and straighten up for lifting the tool and imp could be the reason for it not becoming popular.  

VII. References


