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ijirset@gmail.com



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Design and Fabrication of Cashew Apple and Nut Separator

Gauresh G. Naik ¹, Narayan L. Desai ², Sachin S. Naik ³, Vishwanath S. Prabhu ⁴,

Kaustubh A. Kadane ⁵, Aditya R. Sawant ⁶, Mr. Milind R. Desai ⁷.

Students of Department of Mechanical Engineering, Yashwantrao Bhonsale Institute of Technology, Charathe,
Sawantwadi, India ^{1,2,3,4,5,6}

Lecturer in Department of Mechanical Engineering, Yashwantrao Bhonsale Institute of Technology, Charathe,
Sawantwadi, India ⁷

ABSTRACT: Cashew is one of the main potential fruit. Traditional method of cashew seed separation from the cashew apple is time consuming. Cashew seed separator machine was designed and fabricated to easy the work of farmer. At present, these cashew apples are either used as a fertilizer to the cashew plant or thrown away as garbage. This project aims at reducing the human labour and time involved in the traditional way. In a short duration of time the machine can convert large quantity of raw materials into acceptable final products. The machine is manufactured from locally available materials and assembled and maintained at a relatively low cost. This mechanism is connected to the two flat plate one is fixed and other is movable. These movable plates which is connected to the rack and pinion mechanism moves to and fro motion. At that time knife edge separates the cashew nut from cashew apple. At the bottom of movable plate collects the cashew nuts and top surface of the fixed plate collects the cashew apple. So, in this machine we can perform the operation with less time & reduced manpower also cashew fruit is not damaged. The separated fruit is used as fodder for castles.

KEYWORDS : Cashew fruit; cashew nut; cashew apple, cashew apple and nut separation.

I. INTRODUCTION

1.1 Introduction

The cashew-nut tree is an evergreen tropical tree with the fruit ripening within 2 months. The fruit of the cashew tree, called the cashew fruit or cashew apple, is an accessory fruit (sometimes called a pseudo carp or false fruit) that is an oval or pear-shaped structure that develops from a pedicel and the receptacle of the cashew flower. The cashew apple ripens into a yellow and/or red structure about 5-11 cm long. The true fruit of the cashew tree is a kidney-shaped drupe that grows at the end of the cashew apple. The cashew fruit develops first on the tree, and then the pedicel expands to become the cashew fruit. Adjacent and connected to the cashew fruit is a single seed, the cashew nut. The seed is surrounded by a double shell. Cashew is the main crop in Sindhudurg along with other crop like mango, coconut, rice, etc. Approximately 7 lakhs hectares land is cover under cashew crop. And Maharashtra produce Cashew over 14-15 lakhs tonnes annually. Cashew crops is having main parts like cashew nut, cashew apple and shell. Nut is the premium product and it is used in food products, bakery products, sweets, etc. Cashew shell is used for oil manufacturing and paint. Along with this cashew apple is used for making juice and beverages, but it is least attended items. Cashew apple and nut separation is done manually which is time consuming process. With the help of proposed cashew apple and nut separated machine we can done more value addition for cashew apple.

II. LITERATURE SURVEY

1.1 Literature Survey

The concept of image inpainting was first introduced by S.A.Wani et al [1] The design and implementation of a machine for the collection and separation of cashew fruit. The paper states that the cultivation and processing of cashews in india is not as productive or efficient as it could be, and that modern agricultural technology is needed to increase productivity. The machine described in the paper aims to partially automate the collection and separation processes, reducing the need for manual labour and increasing efficiency. The machine consists of a roller type

collector for gathering the cashews from the ground, and a separator for separating the cashew apple from the cashew nut.

Yuvaraj K.B et al [2] The design and fabrication of a cashew fruit and nut separating machine. The traditional approach of separating cashew seeds from the fruit is time-consuming and labour-intensive. Therefore, researchers have developed machines to make this process easier and more efficient. The section provides an overview of three different machines that have been developed, highlighting their features and limitations. The authors conclude that there is a need for a machine with higher productivity and mass production capabilities..

Vaibhav Vishwas Konduskar et al [3] A novel cashew apple separating machine for cashew nuts. The machine is designed to separate cashew apples from cashew nuts and has a hopper for loading cashew apples and nuts. The machine uses movable and flexible nozzles to hold the cashew apples and nuts, and after rotation, the cashew apples are separated from the nuts. The separated cashew nuts are collected in a tray with a vibration mechanism, while the cashew apples are ground into small pieces and collected in a compost/fertilizer collection tray. The machine is useful for preparing raw alcohol from cashew apples and compost/fertilizer for farming.

Harish Hadimani et al [4] The international journal of advances in engineering and management, featuring a design and analysis of a nut separator from cashew fruit. The machine aims to automate the process of separating cashew nuts from the fruit, and it is operated by motors and a controller unit. The article provides technical details and diagrams of the machine, but does not discuss the potential benefits of using it for cashew farmers

Mohd. S. Alam et al [5] The design and development of a cashew nut scooping machine that aims to reduce manual work, eliminate health hazards, and increase profits for cashew industries. The machine uses impact force to automatically scoop cashew nuts from the shell, with a higher scooping efficiency and whole kernel recovery rate compared to manual scooping. The machine has a throughput of 150 kg/h, significantly higher than the 15 kg/h achievable by manual scooping. The advantages of the machine include less manpower, low cost, easy maintenance, increased profit, and reduced health hazards.

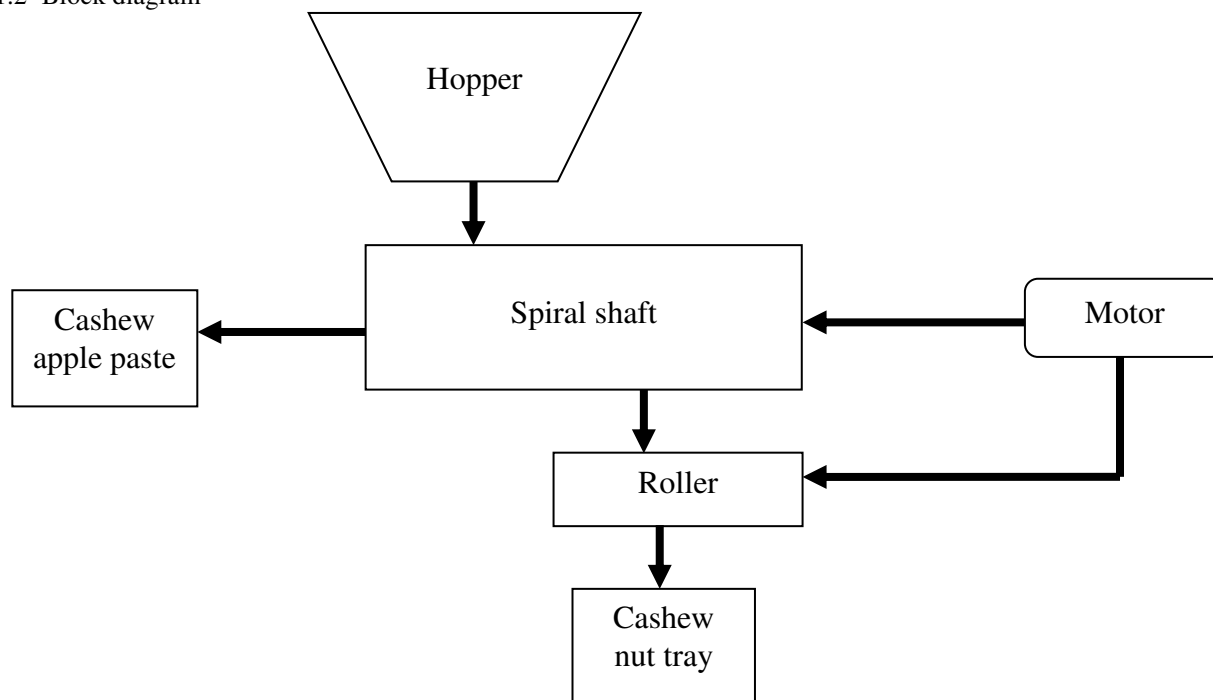
M. S. Gawankar et al [6] The power press uses a ram connected to a crankshaft and flywheel to convert rotating motion into reciprocating motion using an electric motor and clutch mechanism. The flywheel stores kinetic energy and transfers power when pressing stroke required. Scarp strip layout is used to produce blanking parts from strip material in press work. It improves economical use of material and prevents twisting and wedging between punch and die. Distance between blank and strip edge and blank to blank must increase with material thickness.

E. Elakkiya et al [7] Cashew nut production in india. It highlights india's position as the largest producer, processor, consumer, and exporter of cashews in the world. The document analyzes the growth and performance of cashew nut production using data from 1965-66 to 2015-16 and provides descriptive statistics for both large and small samples. It also includes tables showing cashew nut production in major producing states, discussing changes in rankings over time. The document concludes by emphasizing the need for support programs to improve the livelihood security of cashew growers and suggests government measures such as supporting prices, insurance, and subsidies.

Bajema et al [8] A rotary machine for separating hard components from soft matter in plant tissue, specifically in the context of separating cashew nuts from the fruit. The machine includes two rotary modules - one for softening and cutting away the soft fruit fiber, and the other for separating the hard nuts from the pulp. Various aspects of the machine's design, configurations, and features are discussed, including feeding systems, rotary assemblies, screens, knives, and barrier plates.

III. WORKING PRINCIPLE

1.2 Block diagram



Block Diagram No – 3.1.1

1.3 Working Principle

Collection and separation process will be done in separate sections with in machine. Another process will to separate cashew apple from cashew and it will achieve by cutting cashew apple and separating it from cashew. Separator where cashew apple and cashew will separate from each other. The cashew fruit separator machine is made up of several components that work together to separate the cashew nut from the fruit. The first component is the hopper, where the cashew fruits are fed into the machine.

The fruits then pass through a series of rollers and blades that cut and separate the nut from the fruit, which is then collected in a separate container. The nuts are then further processed to remove the outer shell. Approximate machine structure we have included in this synopsis. In actual process, roller will roll on ground, by which it will collect cashews. After that, the separator which will connected after the conveyer output will done separation process.

IV. SPECIFICATION

SR NO	MATERIAL NAME	SPECIFICATION
1.	Motar	Product type : electric motor brand : generic (made in india) Type of motor : single phase motor rated power : 3 hp, 2.25kw Winding : copper rpm : 1440 rpm voltage : 220-240 v
2.	Hopper	Length : 933mm, height : 100mm, width : 200mm & type : plastic, tube 40x40
3.	Shaft	Length : 822mm, dia : 50mm & type : hollow shaft mild steel
4.	Blade	Material : mild steel , pitch : 160, length : 200mm , curve length : 40mm

5.	Pulley	Dia : 300mm , width : 40mm
6.	Belt	Length : 400mm, dia 1: 300mm, dia 2 :125mm
7.	Sieve	Radius : 65mm, length : 622mm, hole : 12mm dia
8.	Frame	Length : 933mm, height : 700mm, width : 500mm & material : mild steel
9.	Groove roller	Dia : 40mm, length : 450mm
10.	Spiral roller	Dia : 40mm, length : 450mm
11.	Gear	Outer dia : 40mm, inner dia : 28mm,
12.	Spocket	Outer dia : 100mm, inner dia : 28mm,

Table No.4.1

V. METHODOLOGY

Analysis	<ul style="list-style-type: none"> •Figure out what's needed for the project and understand the cashew characteristics.
Market Research	<ul style="list-style-type: none"> •Check out existing cashew machines to improve on them
Conceptual Design	<ul style="list-style-type: none"> • Come up with ideas for the machine based on requirements and research.
Preliminary Design	<ul style="list-style-type: none"> • Pick the best idea and make a basic plan for the machine's parts.
Detailed Engineering Design	<ul style="list-style-type: none"> •Draw out all the machine's parts and specifications
Material Selection and Procurement	<ul style="list-style-type: none"> •Choose and buy the right materials.
Prototype Development	<ul style="list-style-type: none"> •Build a prototype of the machine.
Testing and Validation	<ul style="list-style-type: none"> • Try out the prototype to see if it works well.
Installation and Commissioning	<ul style="list-style-type: none"> •Set up the machines at cashew processing places and make sure they work right.

VI. OBJECTIVE

- To separate the fruit from nut
- To separate nut in faster rate
- To minimize wastage of time
- To overcome the labour problem
- To reduce the strain to operator
- To reduce labour charge
- A person can handle the equipment

VII. ADVANTAGES

- Time saving
- Easy to operate
- Cost of the unit is less when compared to other machine
- No fire hazard problem due to over loading
- Comparatively the operation cost is less
- Reducing manpower requirement
- Productivity increased

VIII. CONCLUSION

This paper deals with the solution for time consuming and effort taking process of Cashew Farming. Now day's process of Cashew collection and separation from fruit is manual process. And we know this large amount of Cashews collection and separation from fruit by human hands it is not better option. Also it takes lot of time and effort. So that this paper work inform that there is a best technical solution for this. To design machine cashew apple and nut separate automatic so decrease the human power and time this process.

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