DESIGN AND FABRICATION OF GROUNDNUT SHELLING AND SEPARATING MACHINE

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Abstract— This work focused on the design and fabrication of a groundnut shelling and separating machine electrically powered by a 0.5hp motor. The machine has the capacity of shelling 60kg of groundnut per hour with a shelling and separating efficiencies of 80% and 85% respectively. The machine was fabricated from locally sourced materials, which makes it cheap and easily affordable and also easy and cheaper to maintain. It is also of light weight and comprises of the hopper, crushing chamber, separation chamber and the blower unit. During the process of testing, it was observedthat majority of the groundnut pods that came out unshelled or partially shelled were the oneswith one seed per pod and those with two small seeds in their pods.

Keywords— Design and fabrication, groundnut shelling, separating machine, locally sourced materials.

INTRODUCTION

The purpose of this paperis to understand the knowledge of design andfabrication mechanism of groundnut Sheller machine.The design is an environment friendly and uses simple mechanism properties such as shelling system, blowering mechanism and automation separating system etc. In this, some crushing force is needed to crush the groundnut. The design is so done that the knowledge of designing, mechanism and forces are increased. This project consists of designing and fabrication of an automatic groundnut Sheller machine considering various important parameters. In this project, designing & development of a machine to crush or shell groundnut so the farmers can gain high profit by selling groundnut direct in market. As well as the study of manufacturing was very important in order to carry out this project to ensure that what are needs to do. This project involves the process of designing and fabrication of different parts of this shelling machine considering forces and ergonomic factor for people to use. This project is mainly about generating a new concept of groundnut shell (crush) that would make easier to bring anywhere and easier to crush groundnut. After the design has completed, it was transformed to its real product where the design is used for guideline.

PROBLEM IDENTIFICATION

In the beginning the peanuts were separated from its shells by the workers. They simply decoct the groundnut by their hands and separate the peanuts from its shell. The output got from this method, was very low and it does not fulfill the market demand because it was very time consuming process. It was also a boring work for the worker. Traditional method of separating nuts from groundnuts by Putting the peanuts in a cloth bag and rolling over it with a rolling pin. This technique did a good job of cracking the shells (deleting the painful fingers problem), but we still had to pick the peanuts out since they didn't come all the way loose. This is not a reliable method for shell a ground nut due to this crack the ground nut and nuts mixed with shell.Introduction gives knowledge that the traditional method is not a sufficient method for separating the groundnut. Due to this manual process, identify some major problem & to over-come this problem some idea or concepts generates. According to generated ideas deciding objective of project. Formers and small businessman are facing following main problems:-

(1) Currently base process is manually operated (pedal operated)
(2) Nuts & husk (outer covering of groundnut) is mixed after crushing (shelling operation).
(3) Low productivity & time consuming.

PROBLEM FORMULATION

The aim is to design & develop a low cost ground nut shelling machine which will help farmer to sell finished (shelled groundnut) instead of unshelled groundnut. Considering the above problems we are going to design and fabricate such a machine that will eliminate most of the problems from previous available manually shelling machine, so human effort is reduced and getting more productivity, earn more profit to former. The machine shown in figure below is the modeling of groundnut Sheller machine.

Concept

Introducing low cost automation was to overcome problems with the current manual traditional method. The concept of the work is,
(1) Observe the manual methods to identify the important process variables.
(2) Quantify the important method.
(3) Develop a prototype automation system which could control over all of the process.
(4) Investigate all areas of automated forming.
(5) Produce a specification for a low cost automated system.
(6) Refined design of the machine & fabricate the machine, as this plays a major role in rural area.

Objective

The main aim of this project is to overcome the traditional method.

(1) To reduce wastage due to crack or crushed groundnut.

(2) To increase the efficiency.

(3) To reduce the hard work and To reduced time to shell the groundnut.

(4) To develop a low cost machine which can be used by farmer to convert their semi-finished (shell groundnut) into finished product (groundnut).

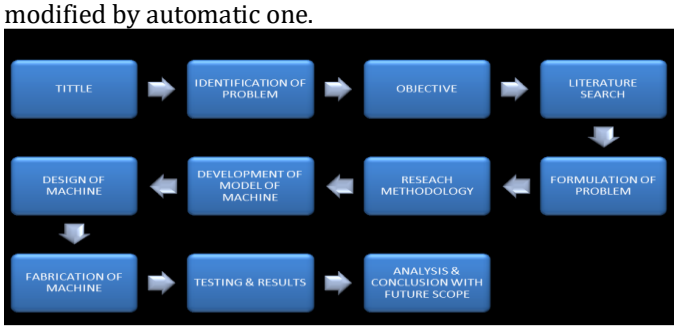
(5) It satisfies the need of village people to earn more money.

WORKING PRINCIPLE

Groundnut SHELLER is operated on the shearing action blowering action and separating action. Firstly the inputs i.e. the groundnut are fed to the machine through the hopper. Then groundnuts come in contact with the two members, one is semicircular net and another is roll shaft. Semicircular net is a stationary member while the roll shaft is rotating member. When the groundnut comes in contact with these two members then the shearing action takes place here. Due to shearing action (crushing) the groundnuts gets shelled and divided into two parts. i.e. in the peanut and outer shell of the groundnuts. There clearance is provided between the net and roll shaft. The clearance provided is depends upon the size of the groundnuts which is to be decocted. After shelleing the groundnut the peanut and shells of the groundnut gets dropped from the semicircular net, in downward direction then a centrifugal force is applied by a fan on the peanut and shell of the groundnut. Due to more weight, the peanuts gets moved downward and collected in the separator. But due to lighter weight the shell of the groundnuts are thrown outside the machine and which are collected from the backside of the machine. From the shelling chamber the unshelled groundnuts also gets dropped in the tray (7% to 10%). This groundnut gets dropped from the clearance made among the grill. The three kinds of the nets can be used with different size of capsule slots, size vise small, medium and large for various size of groundnuts. In this way the "GROUNDNUT SHELLER" works.

RESEARCH METHODOLOGY

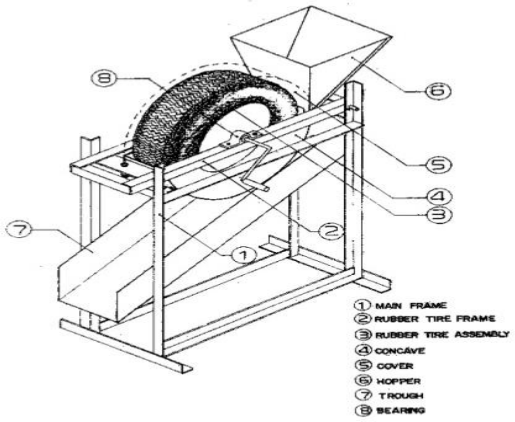
Research methodology deals with design &fabricated all of component which are to be used in the machine with required modification. Firstly synthesis the all the problem which are consult with project. After that design complete atomize machine, then regarding development done on shelling machine. Parameters will be selected according to objectives.2D & 3D diagrams of components and assembled machine and line diagrams with labeling. The various instruments used for fabrication of machine.As seen on last project, it is based on manually operated (paddle operated). Existing project will be modified by making motorized (semi-automize). Another problem is that nuts and husk is mixed coming after shelling operation, this problem will be remove by using blower or other mechanism to separate nuts and husk (outer covering of a ground nut). By making motorization (semi-atomizing) productivity improve with minimizing time consuming and damages of nuts, capacity also improve. The approach will be synthesis, design, development & testing of the machine. By keeping the point in our mind, we think that we should make such a machine, whose production capacity is more & machine gets operated on 1 H.P. electric motor instead of manual work. The new and small former or business man can start their business by investing less capital. As last system is manually operated it is now modified by automatic one.



Modeling & Fabrication B.

After that design complete semi-automize machine, then regarding development done on shelling machine. Parameters will be selected according to objectives. 3D diagrams & photos of each components and assembled machine and line diagrams with labeling. Main objectives of this project were to develop the first prototype of an easy to use, low priced and efficient ground nut decorticator and test its performance. Taking leads from previous researchers following design constraints were established. Design should be easy to maintain and should not require highly skilled labor, which is difficult to befound in rural areas.Design should be based on easily available material in rural areas.Manufacturing process should be simple and based on locally available machines in rural areas. The various instruments used for fabrication of machine. Following are the main components of machine:-

(1) Hopper
(2) Semicircular Net
(3) Roll Shaft
(4) Fan Shaft
(5) Pedestals Bearing
(6) Pulleys
(7) Foundation Frame
(8) Fan Cover



Assembly

The arrangement of various component of "Groundnut SHELLER" is being done are as follows:

(1) The foundation frame is being selected which carry the entire load of the machine.

(2) The roller shaft is mounted on the top face of the foundation frame with the help of pedestals bearing which is fasten using nut and bolt.

(3) The fan shaft is mounted at the back face of the foundation frame with the help of pedestals bearing which is fasten using nut and bolt.

(4) The semicircular net mounted on the support provided at inner side of the foundation frame.

(5) The hopper is mounted on foundation frame covering rolling shaft, and permantely fastened at one side using hinged, and other side is temporary fasten for time to time change of semicircular net.

(6) Fan cover fastened using nut and bolt to back side of foundation frame, which cover fan shaft.

(7) End of foundation frame (top face) carry the electric motor, which provide necessary power.

(8) 18 inch, 9 inch, and 3 inch pulley is mounted on roller, fan and motor shaft respectively, over which belt is mounted for transmission of power.

(9) The above arrangement ensure that all element of the project are balanced and also center of gravity of the assembly is on axis as that of the center of gravity human body that is on spiral cord. labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization," or "Magnetization, M," not just "M." If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization (A (m(1)," not just "A/m." Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)," not "Temperature/K."

Acknowledgment

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g." Avoid the stilted expression "one of us (R. B. G.) thanks. Instead, try "R. B. G. thanks...". Put sponsor acknowledgments in the unnumbered footnote on the first page.

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