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Design and Fabrication of Mini Corn Thresher

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ABSTRACT

This document shows how to extract corn from the cob using a dry corn threshing machine. Traditionally, the leaf was removed by hand or the corn was chopped with a wooden rod to separate the seed. The biggest issue with these machines is that they are beyond of reach for farmers with smaller farms who don't require such large threshing machines. Due to the high expense of these devices, many Indian farmers cannot afford to utilise them. As a result, as a man-machine system, these machines have a straightforward mechanical design.

Keywords: Thresher, machine.

1. INTRODUCTION

In India, Corn is one of the most significant crop and it has a source of a vast variety of industrial products alongside its use as human food and animal feed. A spike tooth cylinder is more positive in feeding than rasp bar cylinders with the added advantage that, it does not plug in easily. Rasp bars, on the other hand, are easier to modify and monitor, as well as to operate and maintain. Shelling machine efficiency varies from machine to machine, depending on elements such as crop moisture content, feeding rate, shelling mechanism, and concave cylinder clearance. India is currently in need of technology in the agricultural industry, as farmers must do all segregation processes manually, which is a difficult effort for them and raises the cost of final products. This machine, which is cheap to farmers, was invented to solve the problem of removing its outer sheath and de-husking the cobs. As a result, the importance of pedal force in the context of thousands of years of human work cannot be overstated. This machine is non-polluting and thus environmentally friendly. It will bring agricultural engineering innovation and mechanisation. Unskilled women may also find work. Development of such an energy source, which has enormous use in energising many rural-based process machines in areas where electric energy reliability is quite poor. A drill machine is used to power the tiny corn thresher.

2. LIST OF COMPONENTS

2.1 STEEL PIPE:

Steel pipes are long, hollow tubes with a range of applications. They are made using two different procedures that result in either welded or seamless pipes. Raw steel is initially cast into a more practical beginning form in both procedures. The steel is then stretched out into a seamless tube or the edges are forced together and welded together to form a pipe. Steel pipe production methods were first established in the early 1800s, and they have steadily evolved into the modern technologies we use today. Steel pipe is produced in millions of tonnes each year.

2.2 DRILL MACHINE:

Drilling Machines are the most basic, somewhat accurate, and widely utilised machine tools in practically all manufacturing factories and tool rooms. Drilling is a single- purpose machine tool whose primary function is to drill holes in the workpiece.

2.3 SHEET METAL:

Metal can be purchased in a variety of shapes and forms, including sheet metal. Sheet metal is defined as any metal with a thickness of 0.5 to 6 mm. Metals are classified by thickness using different measurement units.

2.5 BEARING:

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are

classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts. Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial loads from the source of the load to the structure supporting it.

ROTATING SHAFT:

A shaft is a revolving machined device that transmits power from the machine's source to its other components. The cross section of the shaft is normally round. It is an important component of any machine. Because the machine will not be able to transmit power without shafts. The pulleys and gears are usually mounted on the shafts to aid in motion transmission. With the aid of a key, various other spinning devices, including pulleys and gears, can be mounted on the shaft.

3. LITREATURE REVIEW

The primary drawbacks with these machines, according to the journal [1], are that they are not cheap to farmers with smaller farms who do not require these large threshing machines. The cost of these machines prevents many farmers in India from using them. As a result, as a man-machine system, these machines provide a straightforward mechanical design. Deseeding is done using large gear, which is ineffective in a developing nation like India, where farmers have little money to invest. As a result, the Indian farmer requires a creative idea or product that is realistic, safe, cost-effective, and productive.

They reported in the journal [2] that detecting weeds and crops is an important step in precision spraying with a spraying herbicide robot and exact fertilising for agriculture machines in the field. A method combining multi feature fusion and support vector machine (SVM) was proposed to identify and detect the position of corn seedlings and weeds, to reduce the harm of weeds on corn growth, and to achieve accurate fertilisation, thereby realising precise weeding or fertilising, on the basis of k-mean clustering image segmentation using colour information and connected region analysis. It fed information about weed and crop positions to the spraying herbicide robot or the precision fertilisation equipment, allowing for exact spraying and fertilising.

The ways used to separate seed in the past were removing the leaf by hand or slicing the corn with a wooden rod, according to the journal [3]. The biggest issue with these machines is that they are out of reach for farmers who have smaller farms and do not require such large threshing machines. Corn de-seeding machines now in use in the agriculture industry simply separate grains. However, another machine is necessary to make corn paste, which is out of reach for most farmers. So, with these considerations in mind, we created novel concept that combines three operations: seed separation, sand cob crushing into a single assembly. There is no need for any further attachment in this concept. The machine's concept model was created using AutoCAD software, and the necessary calculations were performed. After freezing the concept, CATIA software was used to transform it into a 3D model.

People employ numerous methods to remove corn shells and deseed corns with minimal damage to the corns, as documented in the journal [4]. Two of those methods are given below. Corn shelling and threshing is done manually in many parts of India; this method is traditional, but productivity and production are low, hence there is a need to move to a mechanical motorised system for corn shelling and threshing. Corn shelling and threshing with a mechanical motorised corn sheller and thresher produces better outcomes than the traditional manual method. It tends to save time while also saving money. For economic reasons, it is preferable to employ a low-cost corn sheller and thresher.

They discussed how solar energy is harvested utilising a variety of technologies including photovoltaic, solar panels, solar thermal energy, solar architecture, and artificial photosynthesis in the journal [5]. In order to alleviate the problem of energy scarcity, the researchers set out to design and construct a project that would harness solar energy using solar panels as the source of electricity. Solar panels are used to harness the sun's energy in the project solar powered corn threshing machine. It has the potential to be a very helpful machine, particularly for small- scale farmers. The major goal of this research was to design and build a solar- powered maize threshing machine for efficient de-seeding in small-scale corn farming.

They reported in the journal [6] that the machine could be run continuously for a long time at a high shelling rate without producing kernel damage. For shelling maize cobs, four shelling devices with a chain and sprocket system can be provided. The machine was found to be simple to run, with an average kernel shelling rate of 110 kg/hr when operated by two people with no kernel damage. Overall, this research examines many processes such as design, production, and assembly of various components.

They observed that as the guiding vane tilt increased, loss from the shelling unit decreased, power needs and specific energy consumption climbed linearly, and the grain breakage difference was not significant, according to the journal [7]. A study of rotor speed and feed rate found that increasing the rotor speed reduced shelling losses while increasing grain breakage, power needs, and specific energy consumption. The loss from the shelling unit, grain breakage, and power requirements increased as the feed rate was raised; however, the specific energy usage dropped.

They stated in the journal [8] that many farmers grow maize but cannot afford to purchase some of the imported threshing equipment due to their high cost. These folks rely on hand threshing, which results in low efficiency, a high level of waste, and a lot of labour. The purpose of this machine was to shell maize and separate the cob from the grains. It was built with locally accessible materials at a very cheap and inexpensive cost. It has a threshing efficiency of 99.2 percent, with extremely little breakage and losses.

They reported in the journal [9] that their average shelling capacity is 55 kg/hr, that its shelling effectiveness is 91.29 percent, and that breakage and losses are negligible. The equipment can assist reduce the amount of human effort and stress required in shelling maize, as well as the amount of time spent doing so on farms. The machine will undoubtedly help to solve the long-term problem of maize shelling, particularly for rural farmers.

In the journal [10] when they compared to alternative moisture contents and shelling speeds, they found that shelling maize at 13 percent moisture content dry basis at an 886rpm shelling speed resulted in the maximum efficiency and capacity of the machine. The maximum values for shelling efficiency, cleaning efficiency, grain recovery efficiency, and output capacity were 87.08 percent, 95.89 percent, 95.48 percent, and 623.99kg/hr, respectively, for 13 percent moisture content of maize and 886rpm shelling speed.

4. PROBLEM IDENTIFICATION

- The main problems with these machines are not affordable to farmers who are having less acereage farms and which they do not require these big machines.
- Transmission of machine is difficult.
- Moisture content should not exeed 20%.

5. EXPERIMENTAL SETUP

The various parts are assembled to make the corn thrusher. The rotating shaft is fixed inside the cylindrical drum with two ball bearings at the corresponding edges of the cylindrical drum.the cylindrical drum has three openings with shutters, one for the inlet of the corn, another one for the outlet of husks and the third one is provided with a number holes in the bottom of the drum for the outlet of corn. The shaft having the thrusher line is rotaing at high speed with the help of the drill machine.

6. DESIGN OF CORN THRUSHER

7. WORKING PRINCIPLE

The mechanism is simple as like thrasher. The rotating shaft having shellar line which acts shear force on seeds. Impact of force is very high due to high speed rotation. It causes removal of seeds from cob. The high speed rotation of the shaft is obtained from the drill machine.

8. RESULT AND DISCUSSION

The corn thresher machine is extensively used in farms, houses, and the agricultural sector in general, and it is distinguished by its small size, low noise, simple operation, and compact arrangement, among other features. The machine is efficient and can shell both the grain at the cob's tip and the remainder of the cob. Materials were found locally, lowering production costs.

9. CONCLUSION

The machine is efficient and can shell both the grain at the cob's tip and the remainder of the cob. Materials were found locally, lowering production costs. The corn thresher machine is extensively used in farms, houses, and the agricultural sector in general, and it is distinguished by its small size, low noise, simple operation, and compact arrangement, among other features.

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