

CORN THRESHER

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ABSTRACT

The present invention relates to a corn thresher comprising at least one feeder mounted on a platform, and having an opened top for receiving a load of corn. It also consists of a cylinder, which is being electrically actuated to push a corn from one end of the feeder to its opposite end horizontally through a passage way within the feeder. A magnetic sensor coupled to each of the cylinder for controlling its movement on the platform. At least one cutter, each configured at the opposite end of each feeder for threshing the corn's seeds from its stem. In this context, filtering is located below the cutter for separating the corn seeds and the stem. A collector disposed under the filtering means for collecting the corn seeds; wherein the cylinder is configured to continuously push another corn from the one end of the feeder when the threshed corn leaves the cutter. Overall, this invention can reduce the human effort and increase the productivity in the corn food processing industries.

Field of Research: *Electrical and mechanical automatic corn threshing device, corn-based food processing industry*

1. INTRODUCTION

A corn threshing device or corn thresher is usually applied to separate the corn seeds or corn grains from its central stem for use in various corn-based or food processing industries. There are many types of corn threshers available in the existing technologies, and they are usually made of various different materials and designed with different specifications in order to meet the requirements of the manufacturers from the relevant industries. Generally, most of the commercially available corn threshers can be used for threshing a wide variety of corns including fresh corns, sweet corns or frozen corns. However, productivity of different corn threshing systems as well as the quality of the corn seeds or grains produced may be greatly varied among different corn threshers.

En, Qu (2005) has disclosed a three-spiral roller driving threshing machine for fresh corns. This machine applies the mechanism of the three spiral rollers which are uniformly distributed on the same circumference of a cylinder casing. The spiral roller is having a belt pulley, a rubber lining core provided with a spike harrows, and an elastic cutting tool. The spike harrows penetrate through a corn seed layer to prick into an ear core body, and the ear core body and the three spiral rollers are rotated together and are moved in an axial way. The elastic cutting tool arranged on the radial direction of the casing causes corn seeds to be cut down in the

processes of rotating and moving for the corn ear core body, seeds are removed from an outlet at the bottom part of the casing and the corn ear core body is separated out of the back part of the casing. As revealed by this prior art, this simple machine does not contain any specific component incorporated within the machine to improve the speed of its corn threshing or its overall productivity.

However, Wang Jinqi (2008) discloses a peeling-free corn threshing machine, which comprises a threshing cylinder with an anti-winding protective cover, a material collector which is communicated with a trash eliminator and a corn seed separator. There is also a secondary separate window and an impurity-removing wind inlet arranged on the material collector. The corn threshing and impurity removal system of this corn threshing machine are operated based on the absorption mechanism of the wind, and not the design or configuration of any mechanical component which enhances the efficiency of the machine.

As revealed by the prior art, most of the corn threshers available in the existing technologies are not designed with improved efficiency which is capable of meeting the requirements of various corn-based or food processing industries. Moreover, there is also no safety feature equipped within these corn threshers to protect the operator from any untoward incidents. Therefore, it is desirable for the present invention to provide an automatic corn thresher which is capable of overcoming the drawbacks of the present invention. It is also necessary for the corn thresher to have an electronic component which facilitates in its overall performance and productivity.

2. BRIEF DESCRIPTIONS OF THE PRODUCT

This Smart Corn Seed Slider was built using combination of both mechanical and electronic devices. The main devices of this machine are cylinder, power source, controller, end cap, solenoid and magnetic sensor. Cylinder has dual role in this machine. Firstly, its function is to 'push-in' the corn to the platform. The second role is as 'push-out' off the thresher after the seeds' are being cut off. The cutter is specially made just to slide off the corn seed as per the required size. This machine could cut 1 corn's seeds in a maximum of 4 seconds; which means it could cut 1440 corn's seed in 1 hour (high productivity in less time). Since cylinder being used to 'push-in' the corn to the platform, so, no injury will take place to any human that operate this machine. Programmable Integrated Circuit (PIC) was used to program the process takes place in the machine.

3. DETAILED DESCRIPTION OF THE PRODUCT

The present product relates to a corn or maize threshing device. In more particular, the present product provides a highly efficient automatic corn threshing device having improved designs in both its mechanical and electronic components, and suitable to be used in various corn-based or food processing industries.

The product discloses a corn thresher comprising at least one feeder mounted on a platform, and having an opened top for receiving a load of corn. The cylinders are being electrically actuated to push a corn from one end of the feeder to its opposite end horizontally through a passage way within the feeder. A magnetic sensor coupled to each of the cylinder for controlling its movement on the platform. At least one cutter, each configured at the opposite end of each feeder, is placed for threshing the corn's seeds from its stem. A filter is being located below the cutter for separating the corn seeds and the stem. A collector is placed under the filtering for collecting the corn seeds, wherein the cylinder is configured to continuously push another corn from the one end of the feeder when the threshed corn leaves the cutter.

The corn thresher of the present invention is characterized by its innovative design of one or more threshing cylinder, preferably a pair of double acting cylinder, in which each cylinder is coupled with a magnetic sensor, which is capable of providing a faster corn threshing system with higher productivity and cost-efficiency. According to the preferred embodiment of the present invention, the feeder, which is mounted at the centre of the corn thresher's platform, can be loaded with a desired amount of corns from its opened top.

A pair of double acting cylinder is located on the platform of the corn thresher and adjacent to the feeder. The double acting cylinder is capable of being electrically actuated and automatically operated to push a corn from one end of the feeder to its opposite end horizontally through a passage way within the feeder. In accordance with the preferred embodiment of the present invention, the cylinder can be moved in high speed, and is electrically actuated by an on-off switch, which is preferably located below the platform of the corn thresher.

The magnetic sensor is coupled to each cylinder (attached underneath the cylinder on the platform) to control the movement of the cylinder on the platform. The incorporation of this magnetic sensor is capable of ensuring a smoother operation of the corn threshing system of the present invention. It is capable of detecting the location of the object (corn) and controlling the operation of the threshing system. The solenoid valve which is connected to each cylinder is for controlling its extension and retraction along the passage way to improve the efficiency of the cylinder.

When a corn is being pushed by the cylinder from one end of the feeder, at least one cutter is configured to cut or slide the corn's seeds from its stem. In accordance with still another preferred embodiment of the present invention, the cutter is a cylindrical knife, with the required degree of sharpness. The cutter is made of durable materials such as aluminum, steel or stainless steel, and having a diameter of 1 cm to 3 cm, in order to fit the average diameter of a corn's stem. Most preferably, the diameter of the cutter is 2.5 cm.

After sliding or threshing, the corn seeds can be separated, filtered or sieved from the corn stems by the filtering means which is located below the cutter. Consequently, the corn seeds are allowed to fall into the collector, which is disposed under the filtering, leaving the unwanted corn stems above the filtering. The collector can be constructed into a drawer-like container which can be pulled out from the side edge of the corn thresher to ease the retrieval of the corn seeds therefrom.

During this separation process, the cylinder of the corn thresher also plays a role in pushing out the unwanted stems to ensure the efficiency of the operation. In accordance with yet another preferred embodiment of the present invention, the corn thresher further comprises a threshing chamber configured above the collector for accommodating the threshed stems pushed out by the cylinder and separated from the corn seeds.

The electronic controlling unit includes a Programmable Integrated Circuit (PIC), a relay, a power supply and a limit switch, which are interconnected among each other. The PIC is used to program the operation which takes place within the corn thresher; whereas the relay serves as an intermediate controller for the overall electronic controlling unit.

The power supply is able to supply approximately 12V to the corn thresher for the operations of the corn thresher components including the magnetic sensor, the cylinder and the solenoid valve. Whilst, the limit switch functions as the circuit breaker, in order to stop the corn thresher

immediately if there is any faulty or emergency. For example, if the voltage goes beyond 12V, the operation of the corn thresher could be stopped. Therefore, the corn thresher of the present invention can be operated safely. Another safety feature is also provided, the emergency stop switch. This emergency stop switch can be equipped with an emergency stop arm holder to stop the corn thresher in case of emergency.

When a threshed corn leaves the cutter, the cylinder will push another corn to the platform from one end of the feeder towards the cutter at the opposite end of the feeder in order to have a flow of continuity in the corn threshing process. Besides, one or more feeders, cylinders and cutters can be configured to be operated simultaneously to thresh more than one corn at the same time.

As more than one corn can be threshed to obtain the corn seeds simultaneously, and the corn threshing process can be operated continuously, this corn thresher is capable of demonstrating a high efficiency and productivity. The set of cylinder and cutter of the corn thresher is capable of efficiently threshing a corn's seeds from its stem in approximately 4 seconds. By having a pair of double acting cylinder facilitated by the double acting solenoid valve as well as the magnetic sensor, the seeds of approximately 1400 to 1800 of corns could be obtained within an hour. In other words, approximately 30 kg to 50kg of corns could be threshed using this corn thresher. As revealed by the experimental data, the level of effectiveness of this corn thresher is approximately 100% for corns having a diameter of 1 cm to 2.5 cm, and approximately 90% for corns having more than 2.5 cm in diameter.

4. METHODOLOGY

The block diagram below shows the summary of the methodology of this project.

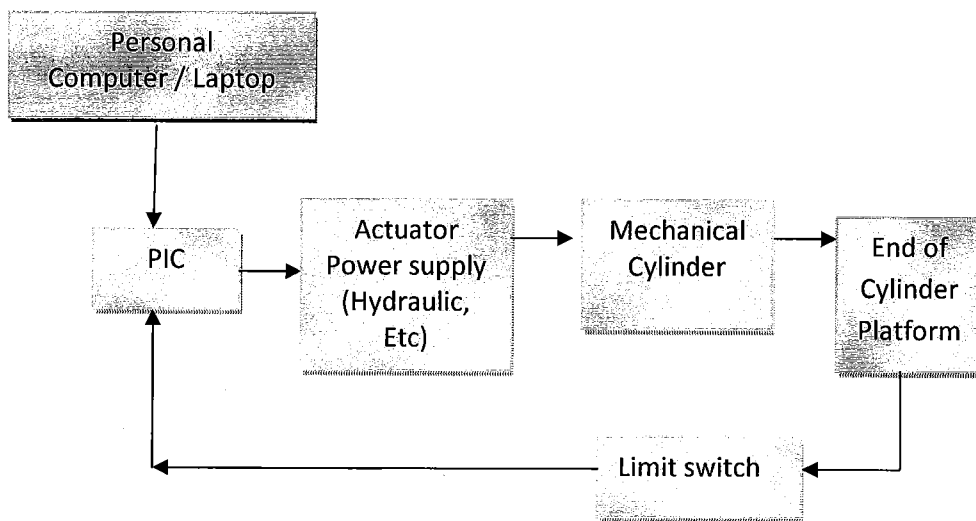


Figure 1 : The Corn Thresher System

5. NOVELTY AND INVENTIVENESS

This corn thresher can cut or slash the corns' seeds of two corns simultaneously in maximum a time period of maximum 4 seconds. This means, its equivalent to 1440 corns per hour. The sliding level of effectiveness is 100% for corns' diameter which are from 1 to 2.5cm, and approximately 90% for corns' more than 2.5cm in diameter. The machine operates at a faster rate compared to manual techniques. It directly reduces human assistance to operate this machine. Since using inexpensive equipments and parts, it is a low maintenance machine and the spare parts can be obtained from any local workshops. This machine is not heavy, made it easy to handle and moveable from one location to another. Since using very simple instructions, it is user friendly and the user needs less assistance to operate it. This machine also equipped with emergency stop arm holder to stop the machine in case any emergency. It is equipped with safety feature to protect the operator from any untoward incidents. This machine operates continuously in order to have high production in short time.

6. ENVIRONMENTAL FRIENDLINESS

This machine is termed as environmental friendly because the design is compact and can easily separate the corn's seeds from the stem, and 'spit' out the unwanted stem easily. In order to obtain the 'clean' seeds, the machine can separate the corn's seeds from the stem without breaking the stem. The whole design of this machine is complete stainless; constructed using steel. This is because it is very convenient to get the material and very popular with its higher 'peeling' rate and long-time span of knives. This machine also has lowest environmental impact. The environmental harmful substances is not used in the machine. The cutter will provide high quality and clean corn's seeds. Overall, the machine can produce high quality corns seeds with cheap production.

7. USEFULNESS AND APPLICATION

This machine can be used in the corn bread or muffin manufacturer. Also, this machine is useful in industry such as corn flour manufacturer, frozen corn manufacturer and local steam cup corn stalls. On top of that, this machine can develop the Small Medium Enterprise (SME) in the corn's seeds production industry.

8. CONCLUSION AND FUTURE RECOMMENDATION

The present disclosure includes as contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred form with a degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangements of parts may be resorted to without departing from the scope of the invention.

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APPENDIX

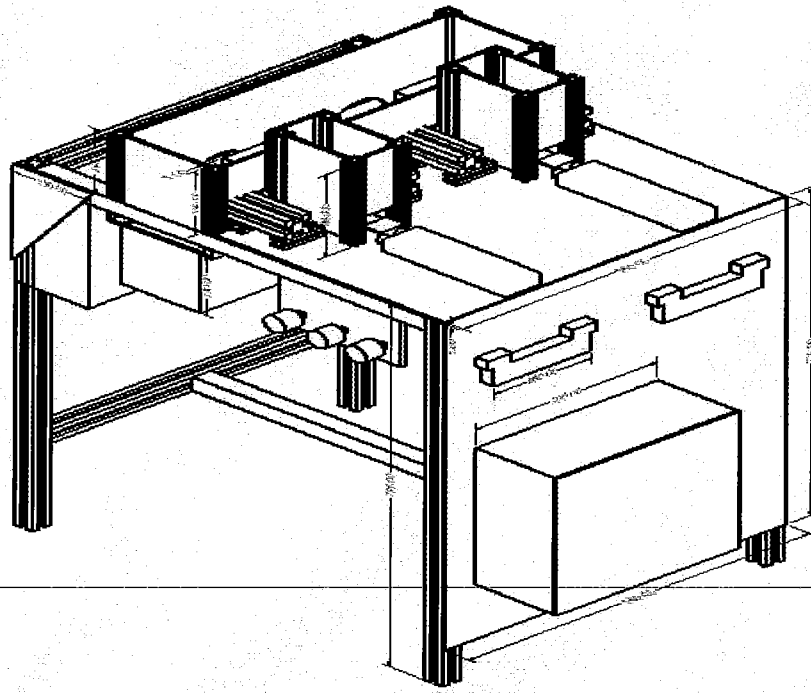


Figure 2 : 3 Dimensional Drawing of the Corn Thresher

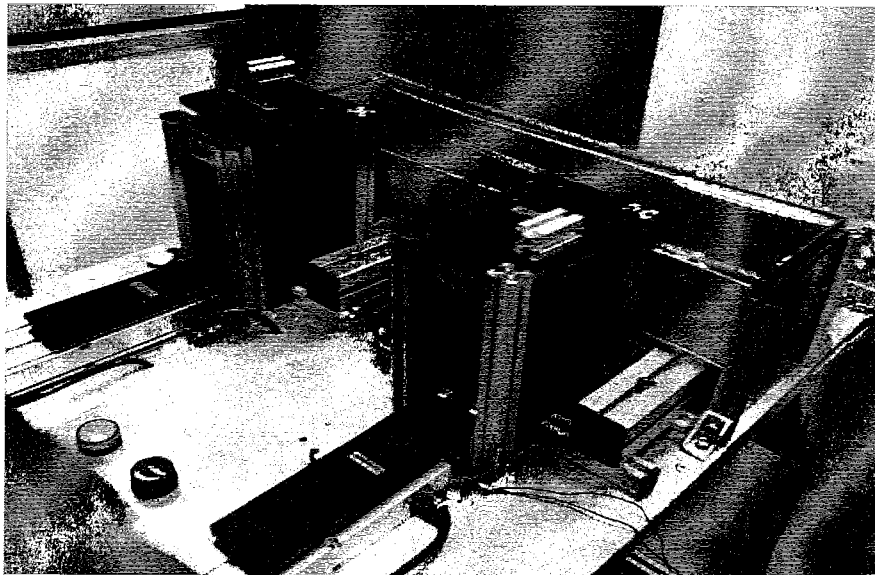


Figure 3 : Corn Thresher