International Journal of Emerging Trends in Engineering and Basic Sciences (IJEEBS)
ISSN (Online) 2349-6967
Volume 7, Special Issue 2 (March-April 2020), PP. 213-215

MULTI-STAGE GRAIN CLEANING MACHINE WITH ATTACHED FLOUR MILL

Tejeshwar Pine[1], Mithilesh Umate[1], Chetan Motghare[1], Akshata Thakare[1], Tanvi Chauhan[1], Anuj Dole[1]

[1]Datta Meghe Institute of Engineering Technology And Research, Wardha Maharashtra 442001,
tejeshwarpine@gmail.com

Abstract: This project is to design and develop an effective multistage grains cleaning machine attached with a flour mill. Grain cleaning is one of the major problem which world faces day by day because of the increase in working schedule. Conventional method of grain cleaning consumes lot of time so we need an improvement in this method. Multistage grains cleaning machine can be used for management of this critical situation. This machine comes with a sieve box which moves in a to and fro motion when given a power supply which leads to the separation of stones, weeds etc. and gives us a pure form of grains. Secondly it comes with an attached flour mill. Basically it is a pulveriser containing blades of ceramic stone (stones which was used earlier for grinding purpose). The purified grains get into it and start grinding thus giving us a refined flour. Both the process of sorting and grinding is done at a same time with the help of single power source.

Keywords: Ceramic blade, Cleaning, Grinding, Pulverizer, Sieve box.

I. INTRODUCTION

India is the largest producer of grains. Grains are an important component of both the vegetarian as well as non-vegetarian in India. Grains consist of main source of protein in the Indian diet. Grains occupy an important place in the world food and nutrition economy. Grains are an important constituent in the diet and are primary source of protein. They also provide substantial quantity of minerals and vitamins to diet.

Any Indian cuisine cannot be imagined without grains. Grains are one of the highly consumed eatables in India. This is accredited to its palatability and nutritious quality. Grains are the major source of protein in one's diet. Hence they are must for people of all ages and especially children in order to attain optimum growth. Wheat which goes through various stages from harvesting to arriving at our tables is subjected to several natural and unnatural contaminants which pose a risk to quality and human health. Elimination in all these contaminants from the before it is processed into flour and comes to the dinner table as finished product is crucial.

In order to obtain a good quality of flour, wheat should be stored free of foreign substances. Five principles can be used to eliminate these foreign substances. These are

1. Sorting by size
2. Sorting by specific weight
3. Sorting by air resistance
4. Sorting by natural characteristics
5. Sorting by shape

II. PROBLEM STATEMENT

- Conventional method of cleaning grains is tedious as well as time consuming and also handling grains to flour mill requires time and expenses

III. OBJECTIVES

- To reduce human effort.
- To make the process simple and affordable.
- To introduce attached flour mill.

IV. BLOCK DIAGRAM

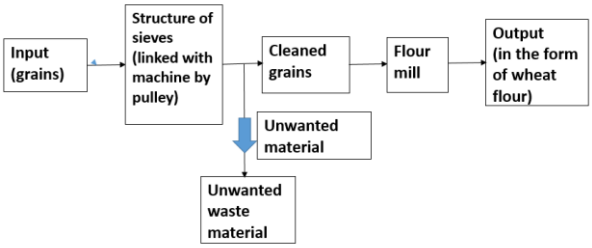


Fig.1. Proposed system

V. HARDWARE SETUP & TESTING

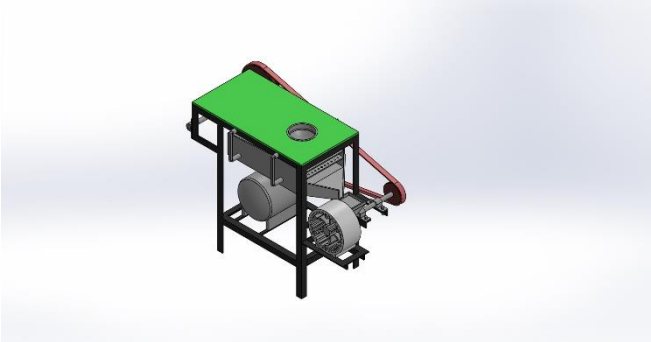
The machine consists of multi-stage grain cleaning and a mill. The cleaning process is done in the sieve box while the milling process is done in the flour mill. The mechanical power needed is provided by the motor and this power is utilized by sieve box and flour mill by the use of shafts and belt and pulley arrangement. The motor is of 1 HP and requires 220V supply. The sieve box and the flour mill are explained in the respective process i.e. the cleaning process and the milling process.

Cleaning process:-The cleaning process starts by unloading the raw grains into hopper. When motor is given supply, mechanical power is produced. This mechanical power is utilized by sieve box as linear back and forth motion. The belt and pulley arrangement is connected to the attached shaft of sieve box which makes it possible for it to move in linear back and forth motion. There are two pulleys in the machine, a bigger one and a smaller one, of which the bigger one is connected to the shaft of sieve box. This is so because not much power and speed are required for operation of sieve box. As mentioned earlier, there are two sieves in the sieve box, one of 4 mm diameter and the other one of 2 mm diameter. In sieve no. 1, impurities like twigs, stones, plant remains, etc. are removed. The sieve no. 1 is tilted by 10° which makes all these impurities to be thrown out of sieve box at one end. The remaining raw grains fall down through the sieve no. 1 on the sieve no. 2. The sieve no. 2 has 2 mm diameter. From this sieve, the dirt, dust and smaller grains are removed through the sieve holes. The grains are completely clean at this stage as all the impurities are eliminated. Only the good quality grains proceed further for milling process as the grains are bigger than the diameter of holes in sieve.

Milling process:-The cleaned grains proceed to the hopper of the flour mill which has a small opening with a moveable metal sheet attached to regulate the flow of incoming grains in the mill. A shaft is connected to the

grinders of the mill, which from the other end is attached to the pulley. On this shaft, a smaller pulley is provided so as to achieve the required speed to crush the grains. Hence the motor provides required rotational motion to the mill. When the grains enter the mill, they are crushed between the grinders and teeth of the outline. The grains are crushed until the flour obtained is fine. To ensure that the flour obtained is fine, a flour processing sieve is provided at the bottom of the flour mill. Only the fine flour can enter through the flour processing sieve, until then the grains keep getting crushed between the grinders and teeth wall.

VI. CAD Model



VI .RESULT AND DISCUSSION

The cleaning and sorting experiment is done using multistage grain cleaning machine attached with a flour mill. Cleaning of wheat can be achieved by using sieve box to a great extent. The quality of flour is good as it is grinded by the blade using ceramic stone on it nearly same as traditional method.The consistency of flour can be adjusted by replacing the net (jalli) while the process is going on the flour can be thick or thin according to us.

VII. CONCLUSION

1. A hardware based multistage grains cleaning machine attached with a flour mill is proposed.
2. The pulley arrangement allows the single motor to rotate sieve box as well as pulveriser.
3. The increase in speed of motor can disturb the pulley arrangement.
4. The efficiency of machine is good and it can be used for household purpose.

REFERENCES

[1] J.E. Harmond, N.R. Brandenburg and D.E. Booster, “Seed cleaning by electrostatic separation,” in *Agricultural Engineering*, vol. 42, pp.22-25.
[2] J. Anderson. L. Parohek, M. Bergongnon and I.Inclvet, Electrostatic separation of coal macerals, ***IEEETransactions*** on ***Zndustry Applications,*** **Vol. 1.4-15,**1979, 291-293.