Multipurpose Sieving Machine

Kapase Kartik Shivaji[1], Pund Pravin Mahadev[2], Jamale Kaustubh Dhanaji[3], Ghodke Santosh Manohar [4] , Prof. Waghmare Vikas Pandurang[5]

[1, 2, 3, 4] Dept of Mechanical Engineering

[5]Guide Lecturer, Dept of Mechanical Engineering

[1, 2, 3, 4, 5] Vishweshwarayya Abhiyantriki Padvika Mahavidhyalaya, Almala, Maharashtra, India.

Abstract- *Today in this world every task has been made quicker and fast due to technological advancement, every industry desires to make a high productivity rate maintaining the quality and standard of the product at a low average cost. We have developed a conceptual model of a machine capable of performing different operations simultaneously and easily. In this machine, we drive to the main shaft using a motor to which the slider-crank mechanism is directly attached; the slider-crank mechanism is used for sawing operation. The table is fixed with the crank which moves the tray to vibrate it and act as a separator with the help of a DC motor. And motor shaft (main/driven shaft) is mounted to pulley type mechanism. Thus the Design and fabricating of the Sieving Machine is to help the industrial people and farmers on the global market. The advantage is to obtain the easy separation of things according to mesh and reduction in cost associated with power usage, increase in productivity rate and produce less space. This article is an overview of a Multi-purpose Sieving Machine, which is a machine that is typically utilized in the manufacturing industry. Because of the improvements in technology, every task that can be performed in our world can now be done more quickly and with less effort. The goal of every industry today is to increase their production rate while maintaining high product quality and standards at a lower overall cost. We have developed a mental image of a device that is capable of performing a number of distinct tasks concurrently and without much difficulty. In this particular piece of machinery, the main shaft is driven by a motor, and the slider-crank mechanism, which is responsible for sawing, is directly attached to the motor. The table is secured with a crank that, with the assistance of a DC motor, rotates the tray to vibrate it and act as a divider. The table is held in place. A pulley mechanism is coupled to the motor's main shaft, which is the shaft that is driven by the motor. As a direct consequence of this, the Sieving Machine was conceived of and created to serve the needs of industrialists and farmers operating on a global scale. The capacity to quickly and easily separate objects according to the mesh is one of the benefits, along with a reduction in costs linked to the utilization of electricity, an improvement in production rate, and the ability to generate less space, amongst other advantages. Sieving mesh, grinding, a single slider crank mechanism, agricultural use, and other related topics are included here.*

Keywords- Sieving Machine, Sand Sieving Machine, Fabrication Sieving machine.

I. LITERATURE REVIEW

From The human community has been the most important thing for years. The majority of sediments, including sand, are comprised of fragments of rock that have been weathered by wind and rain (weathering). In general, they are created as larger fragments (gravel) that break down as rivers carry them downstream; the finer the particle, the further it has traveled. In other words, large pieces of gravel can be found close to the head of a river. Flowing downstream, gravel becomes finer and becomes cobble, pebble, granule, and eventually sand, then finally flowing into the ocean, where the sediments are deposited. Sediments formed in the ocean sub-duct to Earth's interior (mantle) from trenches with sub-ducting tectonic plates. Occasionally, pieces tear loose from the wall continental plate, becoming part of a new continent. Geological structures formed in this way are called accretionary bodies (prisms). Accretionary bodies are common in sub-duction zones like Japan, which makes up a large part of the Japanese islands. Since sand is a basic element in all construction projects, and most often available in mixtures (gravel), there are numerous ideas being developed to remove the sand from mixtures. Depending on the size of the net that is used, this process sieves the sand into its size. Usually, this smooth sand or product is used as the main building material in buildings or houses. To attain better quality products, smooth sand is necessary, for instance for any other product.

INTRODUCTION

Today's world requires speed in each and every field. Hence rapidness and quick working is most important. Now a day for achieving rapidness, various machines and the equipment are being manufactured. In such a modern era of liberalization, small scale industries are contributing in a big way to the growth of our country. New machines and techniques are being developed continuously to manufacture various products at cheaper rates and high quality. This project focuses in design, fabrication of the mechanical part of

machine and the system of the sieving machine. Sieving Machine mainly depends on converting rotary motion provided by AC motor. With the help of pulley attached to motor the Rotary Motion is converted into Reciprocating Motion with help of Connecting Rod and Wheels. The horizontal sieving machine is worked on the basis of crank and slider mechanism. The sieving box is placed inside the rail track and the machine is started. When the sieving box moves in the reciprocating motion the sieving process is performed. Sieving is an uncomplicated practice for sorting out the particles of different sizes. Generally, while preparing the concrete for construction purpose, the process of sieving is carried out manually. Sieving of sand is carried out using rectangular mesh which is inclined at certain angle. In the present sand sieving method, the sample is subjected to horizontal movement in accordance with the chosen method. This causes a relative motion between the particles and the sieve. Depending on their size the individual particles either pass through the sieve mesh or retained on the sieve surface. There are different machines that are being used for sand Sieving, but we demonstrate the design & fabrication of automatically driven sand sieving machine which have low cost and simple in operation. For small scale farming in rural areas the main aim of the cultivator is over domestic use. The harvest is usually a small bulk. Therefore, they are not taken in for refining in major refining factories. Here we generate an idea to solve the problem of filtering or refining the harvested crops mainly grains, cardamom etc. This project is a domestic sieving machine which can be used to separate or sieve or filter out dirt and unwanted particles from the harvested crops. The machine is compatible and requires only a limited amount of space. The machine can also sort out stones and other unwanted particles from purchased goods or stored crops.

WORKING PRINCIPLE

The Multipurpose Sieving Machine is very easy to construct and can be operated easily. It is very economic among this kind of machines. This project is fabricated with the help of parts like a motor, crank and slider link mechanism, bearing, C.I. wheels, sieving box. The horizontal sieving machine is worked on the basis of crank and slider mechanism. Here crank is attached to the sieve box the power is given by motor through pulley belt arrangement. The rail bracket is made in which the sieving box moves init. The sieving box fixed with the connecting rod in order to move when the wheel is rotated by means of pulley attached to the motor. The sieving box is placed inside the rail bracket and the machine is started. When the sieving box moves in the reciprocating motion the sieving process is performed for various operations by changing the inner sieve for different applications.

CONSTRUCTION

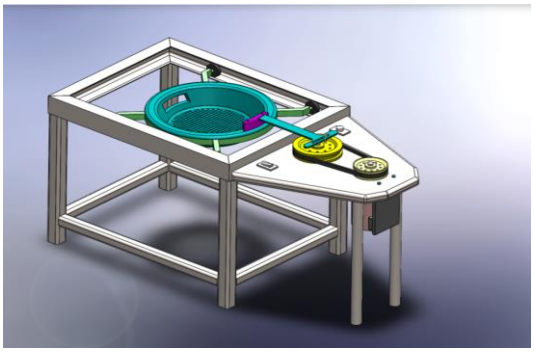

Fig No 2 Model

1.1 MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft. An electric generator is mechanically identical to an electric motor, but operates with a reversed flow of power, converting mechanical energy into electrical energy. Electric motors can be powered by direct current (DC) sources, such as from batteries, or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators.

Fig No 4 Motor

1.2PULLEY

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave or pulley wheel.

A pulley may have a groove or grooves between flanges around its circumference to locate the cable or belt. The drive element of a pulley system can be a rope, cable, belt, or chain.

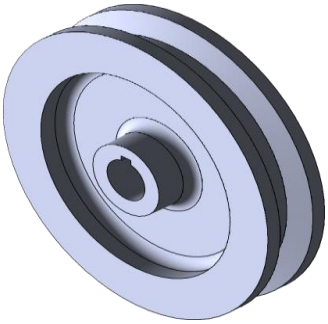

Fig No 3 Pulley

1.3BEARING

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.

Fig No 5 Bearing

1.4 BELT

A belt is a loop of flexible material used to link two or more rotating shafts mechanically, most often parallel. Belts may be used as a source of motion, to transmit power efficiently or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys, and the shafts need not be parallel. In a two pulley system, the belt can either drive the pulleys normally in one direction (the same if on parallel shafts), or the belt may be crossed, so that the direction of the driven shaft is reversed (the opposite direction to the driver if on parallel shafts). The belt drive can also be used to change the speed of rotation, either up or down, by using different sized pulleys.

Fig No 6 Belt

1.5SIEVE

A sieve, fine mesh strainer, or sift, is a device for separating wanted elements from unwanted material or for controlling the particle size distribution of a sample, using a screen such as a woven mesh or net or perforated sheet material. Sieving is a simple technique for separating particles of different sizes. A sieve such as used for sifting flour has very small holes. Coarse particles are separated or broken up by grinding against one another and the screen openings. Depending upon the types of particles to be separated, sieves with different types of holes are used. Sieves are also used to separate stones from sand. Sieving plays an important role in food industries where sieves (often vibrating) are used to prevent the contamination of the product by foreign bodies. The design of the industrial sieve is of primary importance here.

Fig No 7 Sieve

II. METHODOLOGY

The methodology is the proposed work will be carried out with following steps:-

1. Study of sieving machine.
2. Study of different operations which is need for fabrication.
3. Selecting the project's components.

4. Calculation.
5. Experimentation by assembling all components.
6. Testing.
7. Result.

III. ADVANTAGES

1. Simple in construction.
2. Nowadays, separation of different sizes of solid material is a need of hours; this project can be used for the separation of different sizes of solid only by changing mesh of required size.
3. Compact in size and required less space.
4. Less in weight.
5. Here different types of materials can be separated which depends on the mesh size used

IV. CONCLUSION

In this research study, the mild steel failure problems encountered by loads were successfully. Thus, a cost effective and simple design motor operated multipurpose sieving machine is fabricated. This machine reduces the human effort and hence we don't need multiple persons to filter/sieve at a time. Also, machine is portable as it can be de-assembled and assembled easily.

Concluding the project up to now after research four different types of sieving machine was conceptualized to select the best considering every factor to make it more efficient, portable and easily operable. Then the required materials were selected by market study although the fabrication process was undoable due to condition occurred we continued the design process in Solid works and some preliminary calculations. This report also includes doing method of construction and research design flowchart and the Gantt chart. According to calculations and assumptions, this type of sieving machine will be efficient and easily operable, which can help society to learn new way of sieving sand.

V. FUTURE ASPECTS

The project can be made for higher capacities by increasing the dimension and improving the design aspects. The machine can be operated using solar energy also which is economically useful.

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