



FABRICATION OF MULTIPURPOSE AGRICULTURE MACHINE

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ABSTRACT

FABRICATION OF MULTIPURPOSE SIEVING MACHINE

Fabrication of Multi-purpose Sieving Machine mainly carried out for production-based industries. 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.

This project focuses on the design and development of an advanced sieving 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, etc.

I. INTRODUCTION

Today's world requires speed in each and every field. Hence rapidness and quick working is most important. Now a day's 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 fabrication of the mechanical part of machine and the system of the sieving machine. Sieving Machine mainly depends on converting rotary motion provided by DC 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. 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. The machine can also sort out stones and other unwanted particles from purchased goods or stored crops.

A Multipurpose sieving machine is used for the extrication of the needed elements from unwanted material further it is used for characterizing the element to the required size by the allocation of a sample. Using a pane such as a mesh or net. A sifter is used to separate and break up clumps in the dry ingredient particles like sand and flour. This project titled concentrates on providing descriptions of all the basic operation principles and design of DC motor.

1.1 HISTORY:

The history of sieving machines dates back centuries, evolving from manual methods to mechanized systems. Early civilizations used simple sieves made of woven materials like grass or animal hair to separate grains from dust. With the industrial revolution, sieving machines became more sophisticated, incorporating materials like wire mesh and metal frames. The multipurpose aspect emerged as industries adapted sieving technology for various applications, from food processing to mining and construction. Today, modern sieving machines employ advanced technologies like vibrating screens and centrifugal sifters, catering to diverse industries with efficiency and precision.

Ancient Grain Sieving:

- Sieving began in Ancient Egypt as a way to grade grain harvests. The process involved using simple mesh strainers to separate the needed elements from unwanted material.
- The earliest sieves were made of woven materials, but even then, punched plate sieves (made with holes) were used. These sieves are depicted in early Egyptian drawings.
- The primary purpose was to prepare foodstuffs by separating particles of different sizes.



1.2 Problem Statement:

In many industries and agricultural operations, sieving is a fundamental process. This process involves the separation of desired elements from unwanted material, or characterizing the particle size distribution of a sample. However, traditional sieving methods can be time-consuming, labor-intensive, and inefficient. Moreover, different materials require different sieve sizes, leading to the need for multiple machines or frequent equipment changes. The goal, therefore, is to design and fabricate a multipurpose sieving machine that can handle different sieving operations efficiently. This machine should be capable of changing sieve sizes easily to accommodate different materials, from grains to sand. It should also be designed with considerations for strength, safety, ergonomic design, and maintainability.

The machine should aim to reduce the time and labor involved in the sieving process, increase productivity, and maintain the quality and standard of the product at a low average cost. The design should also consider environmental friendliness and bring many benefits. The fabrication of such a machine would involve several steps, including studying existing sieving machines, selecting the project's components, performing necessary calculations, assembling all components, and testing the final product.

1.3 Objectives:

- To make a machine that can sieve multiple sizes of sand grains, metal powders, food grains are depending on the usage at required.
- To reduce the time that is consumed by a manual sand sieving technique
- To design and fabricate a machine that can be operated by unskilled labor too.
- To design and fabricate rotator sand sieving machine which separates required grain size from mixture of grains.
- To replace traditional method of using hand as it is time consuming.

- To learn sliding crank mechanism.
- To develop interpersonal skills and to be familiar with the tools and process used in mechanical workshop.
- To learn how to arrange time and budget.
- By changing the mesh size of this multi-purpose sieving machine.

II. METHODOLOGY

2.1 MATERIALS

SL.NO	PARTS	MATERIAL
1.	Hollow Square Pipe	Mild Steel
2.	DC Motor	12volts
3.	Sieve	Stainless Steel
4.	Bearings	High carbon steel
5.	Pulleys	Cast Iron
6.	Slider	Steel
7.	Belt	synthetic polymers
8.	Battery	12 volts, 7ah

Table:2.1 Materials

2.2 COMPONENTS:

- Hollow Square Pipe.
- Frame.
- DC Motor.
- Sieves
- Bearings.
- Pulleys.
- Slider.
- Belt.
- Battery.

2.2.1 HOLLOW SQUARE PIPE



Fig:2.2.1 Hollow Square Pipe

Hollow square pipes are crafted from materials such as steel, aluminum, stainless steel, or other alloys. The choice of material depends on the intended application and environmental factors such as corrosion resistance and load-bearing capacity. The manufacturing process involves cold-forming or hot-forming methods, where flat strips of metal are bent into the desired square shape and welded along the seam to create a hollow structure.

2.2.2 FRAME:



Fig:2.2.2 Frame

A frame is often a structural system that supports other components of a physical construction. The frame is structural body that supports the five operations. Frame is the main component of the multipurpose agriculture machine. Frame is defined as a rigid structure that doesn't allow any part to move relative to the other parts. This means that in a frame, all components are fixed and cannot move independently

2.2.3 DC MOTOR



Fig:2.2.3 DC Motor

At the heart of the DC motor lies a robust design optimized for efficiency and reliability. Typically, these motors feature a brushed DC design, incorporating essential components such as a rotor, stator, brushes, and commutator. The rotor comprises a shaft and windings, while the stator houses field windings or permanent magnets.

2.2.4 SIEVES:



Sieves are fundamental tools used in various industries for particle size analysis, separation, and classification. Whether in pharmaceuticals, food processing, agriculture, or construction, sieves play a critical role in ensuring product quality, consistency, and compliance with regulatory standards. In this comprehensive guide, we explore the principles, types, applications, and benefits of sieves in diverse industrial contexts. sieving involves the separation of particles based on size through the use of a mesh screen or sieve. The process relies on the principle that particles smaller than the sieve openings will pass through, while larger particles are retained.

2.2.5 BEARINGS:



Fig : 2.2.5 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.

2.2.6 PULLEYS:



Fig:2.2.6 Pulleys

Pulleys are simple yet essential mechanical devices that have been used for centuries to transfer motion and force in various applications. Consisting of a wheel with a groove around its circumference and a rope or belt running along this groove, pulleys provide a means of changing the direction of a force, transmitting power, and multiplying mechanical advantage.

2.2.7 SLIDER:

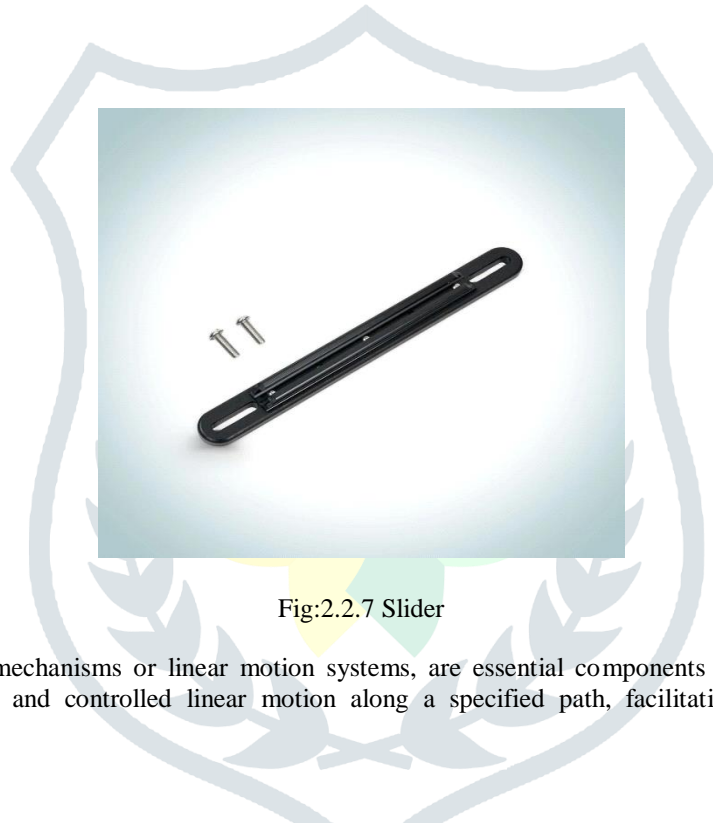


Fig:2.2.7 Slider

Sliders, also known as slide mechanisms or linear motion systems, are essential components in mechanical engineering and design. They provide smooth and controlled linear motion along a specified path, facilitating various applications across industries.

2.2.8 Belt

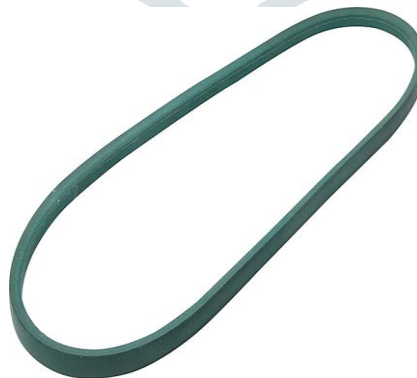


Fig:2.2.8 Belt

Belts are integral components in mechanical power transmission systems, providing a flexible and efficient means of transferring motion and power between rotating shafts. They consist of flexible loops or bands made from materials such as rubber, leather, or synthetic polymers, which wrap around pulleys or sheaves to transmit torque from the driving shaft to the driven shaft.

2.2.9 Battery



Fig:2.2.9 Battery

A 12V 7AH battery is a type of lead-acid battery that provides a voltage of 12 volts and has a capacity of 7 ampere-hours (Ah). This means it can supply 7 amperes of current for one hour before it needs recharging. These batteries are commonly used in a variety of applications, including Uninterruptible Power Supplies (UPS), alarm systems, emergency lighting, and small vehicles like scooters.

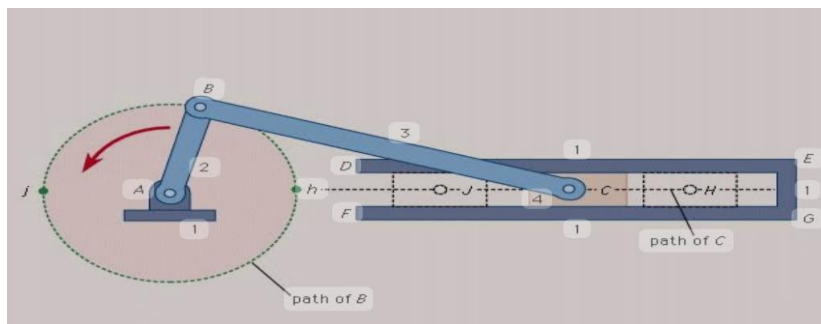
III.WORKING PRINCIPLE



Fig.3.1Fabrication of multipurpose agriculture machine

Above figure shows the multipurpose Sieving machine and the machine mainly works on the power. The multipurpose Sieving machine is consisting of different components. They are Frame, Hollow Square, Pipe, DC Motor (50 watt), Sieve, Bearings, Belt, Pulleys, Slider. 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, 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 in it. 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.

3.2 SLIDER CRANK MECHANISM:



A slider crank mechanism in a multi-purpose sieving machine is a common design choice. It converts rotary motion into reciprocating linear motion (or vice versa), which is useful for driving the sieving mechanism back and forth. This mechanism allows for efficient sieving of materials by providing controlled reciprocating motion to the sieve bed or vibrating screen, aiding in the separation of particles based on size or other properties. Additionally, it provides versatility

IV.RESULT AND CONCLUSION

4.1 ADVANTAGES:

- Simple in construction.
- Compact in size and required less space.
- Less in weight.
- Here different types of materials can be separated which depends on the mesh size used.
- 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.

4.2 DISADVANTAGE:

- Maintenance and Repairs.
- Initial cost is high.

4.3 APPLICATIONS:

- **Foodstuff industry:** sugar powder, starch, salt, rice.
- **Metals:** Metal powders, zinc powder, copper powder, coal powder, alloys, etc.
- **Coatings:** Powder coatings, pigment paints, etc.
- **Agricultural:** sorting of fruits grain.
- **Substance industry:** resin, pigment, industrial medicine, cosmetic, coatings.
- **Environment:** assistant detergent, active carbon.

4.4 CONCLUSION AND RESULT:

The multipurpose sieving machine is fabricated by incorporating different sizes of sieves for different particle sizes and materials. This allows it to efficiently sift various substances like sand, grains, gravel and powders. In this machine using DC motor and battery for giving power supply to motor.

Additionally, integrating adjustable vibrations settings and a robust frame enhances its versatility and durability yielding and precise and reliable result across different applications. This is mainly used in small scale industries for multi purposes such as sand sieving, sorting of food grains, sorting metal powders etc.,

4.5 FUTURE SCOPE:

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. The fabrication of a multipurpose sieving machine opens up possibilities for various industries such as agriculture, pharmaceuticals, and construction. Its future scope lies in refining its

design for greater efficiency, automation, and adaptability to different materials and particle sizes. Additionally, integrating smart technologies for real-time monitoring and data analysis could enhance its functionality and performance. As industries evolve, so will the demands placed on sieving machines, driving innovation and expanding their applications.

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