MULTI-PURPOSE SIEVING MACHINE

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Abstract:

This paper introduces the concept of a Multi-purpose Sieving Machine, which is mostly used in manufacturing. Every activity has been made faster and easier in this world as a result of technical advancements, and every industry aspires to achieve a high production rate while keeping product quality and standard at a low average cost. We've created a conceptual model of a machine that can conduct multiple operations at the same time and with ease. In this machine, we employ a motor to drive the main shaft, and the slider-crank mechanism is directly coupled to the motor; the slider-crank mechanism is used for sawing. With the help of a DC motor, the table is fastened with a crank that moves the tray to vibrate it and act as a divider. And the main/driven shaft of the motor is attached to a pulley mechanism. As a result, the Sieving Machine was designed and manufactured to assist industrialists and farmers on the global market. The benefit is the ability to easily separate objects according to mesh, as well as a reduction in costs related with electricity usage, an improvement in production rate, and the ability to generate less space, among other things.

Keywords — **Sieving mesh, grinding, single slider crank mechanism, agricultural purpose, etc.**

I. INTRODUCTION

In In technical education, sieving education plays a significant part in the operations of a variety of industries. For the separation of industrial wastes such as bolts, nuts, washers, and nails of varied particle sizes of the holes, many types of sieves are utilized. The systematic approach is used to construct a work device under a constraint. Sieving is a simple method for separating particles of different sizes. [2] By grinding the fine coarse particles against one other and through screen apertures, the fine coarse particles are separated or broken up. [3] To sift flour core, this sieve has very fine little holes. Agricultural equipment uses sieves of the same type. It aids in the development of new ideas and possibilities for possible applications. The primary goal of Sieving Machine study is to

integrate various skills and information and to point students in the direction of practical application. A multipurpose sieving machine is used to separate desired elements from unwanted material, as well as to characterize the element to the required size using a sample allocation. [1] Using a mesh or net as a pane. To separate and break up clumps in dry component particles like sand and wheat, a sifter is employed. This project focuses on providing descriptions of all of the essential DC motor functioning concepts and design.

A sieve, also known as a riddle, is a mechanical vibrating element that is used to separate needed elements from undesired material. It is also used to characterize the element to the required size by assigning a sample.

[4] Using a mesh or net as a pane. Sifter is a tool that is used to separate and break up clumps in dry component particles such as sand and flour. This project focuses on providing descriptions of all of the essential DC motor functioning concepts and design. Sieving education plays a significant role in the functioning of numerous sectors. The systematic approach is used to construct the work device under the constraints. The primary goal of Sieving Machine study is to integrate various skills and information and to point students in the direction of practical application. It aids in the development of new ideas and possibilities for possible applications. Sieving is a straightforward method for separating particles of various sizes. This sieve has very fine little pores that are used to sift flour core. [3] The excellent Grind against one another and screen apertures separate or break up coarse particles. For the separation of industrial wastes such as bolts, nuts, washers, and nails of varied particle sizes of the holes, many types of sieves are utilized. A similar sort of sieve is utilized in the manufacturing of agricultural equipment.

The budget investment as well as the time required to prepare the goods for building work may vary depending on the needs of the customer. The purpose of a sieving machine is t to reduce he time factor as well as the human aspect involved in the screening process. Rather than investing on the pay of the workers, they may purchase a basic electrical machine. The mesh net's holes may vary depending on the sorts of particles to be separated. Customers in metropolitan regions anticipate a high level of production with a low level of investment. Instead of employing manual personnel to do sieving operations, we encourage the use of an automatic sieving machine that separates waste particles. In this crucial region, our project has a place. If we want a specific size of sand, we'll have to spend more money. The focus of our paper is on the use of an electrical motor for sieving operations. Above all, the machine is designed to be more simple, and it has been proven to perform at a high output rate. The sieving process has a long history in the construction and industrial industries. It is made up of various layers that allow the output sand to be obtained in the desired sizes. The la ck of diverse sizes of sand in the market is the main issue highlighted in this process.

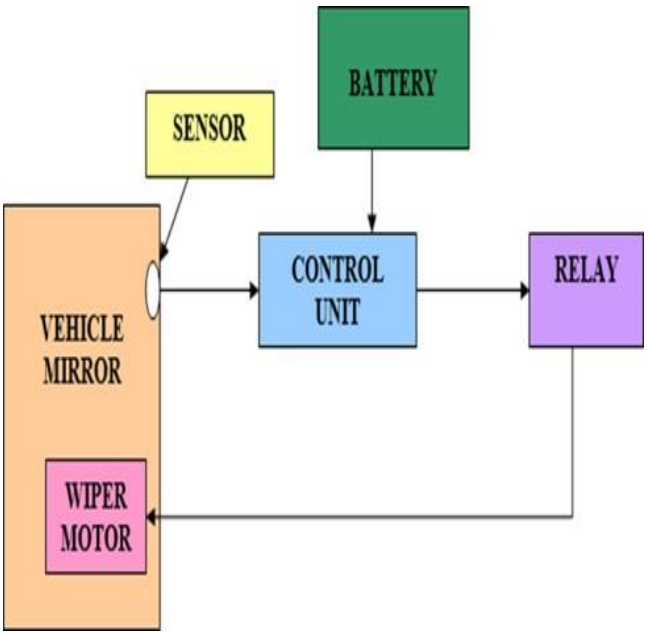

Fig.1: Semantic Layout of Multipurpose Sieving Machine

II. ROLLER CHAIN

From For years, the human community has been the most essential thing. The majority of sediments, including sand, are made up of rock pieces that have been worn by the elements such as wind and rain (weathering). They're made up of larger particles (gravel) that break down when rivers move them downstream; the finer the particle, the farther it's traveled. In other words, big gravel chunks can be discovered at a river 's mouth. Gravel becomes finer as it flows downstream, becoming cobble, pebble, granule, and lastly sand, before eventually flowing into the ocean, where the sediments are deposited. From trenches with subducting tectonic plates, sediments deposited in the ocean subduct to the Earth's interior (mantle). Pieces of the wall continental plate rip loose from time to time, becoming part of a new continent. Accrutionary bodies are geological structures created in this manner (prisms). In subduction zones like Japan, where accretionary bodies make up a substantial portion of the Japanese islands, accretionary bodies are frequent. Because sand is a fundamental component of all construction projects and is frequently found in mixtures (gravel), several methods for removing sand from mixtures are being developed. This method sieves the sand into different sizes depending on the size of the net used. This smooth sand or product is typically utilized as the primary building material in structures or homes. Smooth sand is required for higher-quality items, as it is for any other product. The updated sieving process is shown in Figure 2. It rotates with a handle, making the sieving process more efficient. It is primarily used in tiny, manufactured processes, such as in laboratories. It has since been upgraded to use a motor to substitute human power, as seen in Figure 3. Because this equipment is so crucial in our daily lives, it has been upgraded and marked all over the world one by one. With the growth of technology and industrialisation, a more efficient and portable sand sieve is now a must. Starting with the separation using a mesh strainer, a simple sand sieve procedure has been in use for a long time. Following concepts are examined after examining the aim tree for developing a sieving machine

- Concept 1: A basic hand-operated reciprocating sand sieve was considered for the first concept. The initial sieving process was a simple machine with a mesh strainer, which is still in use in many parts of the world today. A clever improvisation is the vertical reciprocating sand sieve. It works by sliding the mesh back and forth, creating a reciprocating action.
- Concept 2: After the vertical reciprocating sieve was introduced, the machine became easier and more efficient by adding a rotational mechanism to provide relative motion that aids in separation.

- Concept 3: Since the introduction of automation in the machinery field, automation has become a requirement in all machinery fields. In order to make the machine more efficient and easy to run, we have installed a DC motor in our sand sieve machine. Our motor turns the shaft at around 60 RPM, causing relative motion between it and the sieve net, allowing finer sand to pass through the net while the remaining particles slide into the collection

II. DETAILES OF DESIGN, WORKING

The mechanism of this machine is based on a slider crank mechanism. Using a revolving drive beam, a connecting rod, and a sli ding body, a slider crank mechanism converts a body's rotational motion into a reciprocating motion. The sieve's design is focused on material selection as well as the desire to work in a safer and more efficient manner. Because we need an extremely light material that is appropriate for the product size, the material used in each design influences the selection process. Almost a hundred different designs were created in attempt to address the flaws in the current models. The final design is then chosen and properly dimensioned in Solid Works design

program. The following criteria are taken into account when designing a sieve machine: Durability: When the machine is rotating, as well as when it is running under high load conditions, it must be durable. As a result, a material with high strength and hardness is chosen. The cost is determined by the materials used and the manufacturing procedures used. It should keep costs to a bare minimum. The slider crank mechanism is used to operate the sieve machine. The motor, crank, connecting rod, sieve net of various mesh sizes, supporting meshes, and base frame are the components utilized to make this machine. The DC electric motor provides the input rotating motion. The crank is attached to the motor shaft and is constructed with the appropriate radius. The connecting rod has one end that is attached to the crank and the other end that is connected to the sieve net, which is free to glide over the wheels in the collector box. As a result, when the input is delivered, power travels through the motor, actuating the motor shaft and causing the motor to rotate. As a result, the crank revolves at the same time as the motor. By usingthe connecting rod, the rotational motion is now changed to a reciprocating motion. As a result, the sieve net in the sliding chamber begins to reciprocate. In the collection box, the filtered sand is collected
individually.
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This machine's functioning principle is depicted in the conceptual diagram. As previously stated, the machine in this study operates on the principle of a slider crank mechanism. Because the primary electric motor is externally attached to the crank wheel, when the motor turns on its axis, the crank also rotates. A connecting rod converts the rotating motion of the crank wheel into a translating motion of the sieve net. The pure sand, which is free of contaminants, is collected in a cast iron collector box. Small rotating wheels are utilized to reduce friction between the sliding mesh net and the collector box. The output sand is collected through a small circular vent in the collector box's walls.

Domestic sieve machines must have been designed with various factors in mind. The design considerations must be carefully considered in order for the design to be easily built and the system to function. Then there's the material utilized in each design, which has an impact on the choice because we need alightweight material that fits the product size. The design is divided into three phases: first, choose as many recommended ideas as possible, then choose four designs and improve their functionality, and last, one is finalized and developed in full, including dimensions, using Solid Work software. Figure 2 depicts CAD drawings (a, b). Aside from that, the cost of design and fabrication must not exceed the budget allocated in order to reduce waste. The following criteria must be taken into account when developing the sieve machine: Durability: A domestic sieve machine must be able to withstand repeated use. Material: The material used for the Sieve machine must be suitable for fabrication and easy to obtain. The cost is determined by the materials used and the manufacturing procedures used. It should keep costs to a bare minimum.

The Domestic Sieving Machine is simple to put together and run. It is one of the most cost-effective devices of its kind. Parts such as a V-Belt, pulley, cam plate, and sieve mesh are used to construct this project. The reciprocating motion concept governs the operation of the machine. The motors begin to rotate at the required rpm as soon as the A.C. supply is turned on. The V-Belt pulley on the motor shaft is used to transfer power from one shaft to another. The sieve or mesh is linked to the connecting rod. Cam converts the rotational action of the sieve into a reciprocating motion, allowing foreign particles to gather on the container and grains in the mesh. Pulley and sieve CAD drawings.

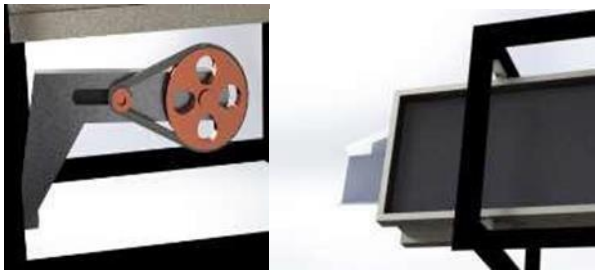

Fig.3 Pulley and Sieve

Fig.2 Conceptual Diagram

V. CONCLUSION

The project focusing on an IoT-based crop cutting machine presents an opportunity to transform the agricultural sector by automating and streamlining the crop cutting process. Through the integration of sensors, connectivity, data analysis, and control systems, this machine can efficiently navigate fields, identify crops, and execute cutting tasks with minimal human intervention. Key considerations in the project's development include meticulous planning of machine design, encompassing factors like size, weight, power supply, and cutting mechanism. the incorporation of various sensors such as cameras, GPS, moisture sensors, and weather sensors is essential for acquiring crucial data about

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