Desing & Fabrication of Multipurpose Sorting Machine

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Abstract - Different type of sand, grains, powders & materials are separated by using vibrating screening machines. This machine can be used in different industries like mining, chemical, food & in metallurgical industries to separate component in different sizes. Idea to develop of multipurpose sieve machine is come from the supervisor that gives a task and a title for this project. This project focuses in design, fabrication of the mechanical part of machine and the system of the multipurpose sieve machine. To achieve this project objective, this multipurpose sieve machine body structure and mechanical system needs to concern some other criteria such as strength, safety and ergonomic design. This project flow must start from design and fabrication process before develop the multipurpose sieve machine, it must compare with other product in market. It is because to study the customer need and to create a new design with new feature. The work can be done by less time, cost, effort & manpower. It requires very less time for completing work. This multipurpose screening machine is made up of structural material like steel having high strength. It has opening side at the top, from which different size of materials are feed to separate. In that multipurpose screening machine one vibrating screen is placed to separate two different sizes of material particles. The screens are made up of the wire mesh and come in various grid sizes.

Key Words: vibratory motor, vibration, material separation, low cost machine.

INTRODUCTION-A sieve is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a mesh or net. [This project focuses in design, fabrication of the mechanical part of multipurpose vibratory sieving machine and the system of the powder separation.[2] To achieve this project objective, this multipurpose vibratory sieve machine body structure and mechanical system needs to concern some other criteria such as strength, safety and ergonomic design.[4] Horizontal multipurpose vibratory sieving machine is a machine designed to separate the particle according to their mesh size different levels.in many industries for example the pharmaceutical, it is often desirable to separate particulate matter.[5] A small sieve such as used for sifting flour has very small holes. Depending upon the types of particles to be separated, sieves with different types of holes are used. Sieve are also used to separate stones from stand. [6]A metallic plate or sheet, or other similar device, with regularly spaced apertures of uniform sizes, mounted in a suitable frame or holder, for use in separating material according to size.[7] A number used to designate the size of a sieve, usually the approximate number of openings per inch. The normal size of openings usually between cross wires of a testing sieve.[8]

LITURATURE SURVEY-

Jyoshi Anil Kumar, V S Lakshmi Ravuri, V Harshitha, done the work on, Fabrication Of A Solar Based Sand Sieving Machine, according to his work, A demonstration of design and fabrication of solar based sand sieving system is done.[1] As sand is used in construction, manufacturing and many industrial purposes, it needs to be filtered and separated from unneeded particles, stones and other large particles before put to use. This system puts forward a fully automated sand filtering and separator that automatically filters the sand poured on it. For this a motorized shaft is mounted horizontally on the mounts.[2] The shaft is connected to a filter frame with a mesh below and enclosed frame on sides which operates the motor when switched on. [3]The solar traveller is easily accessible, safe and practical with limited maintenance requirements because of few mechanical parts. It is ideal

not only for the experienced cyclists but also for those non-athletes, the elderly and
Individuals with health problems. This is the best source to replace the fuel which is exhausting day by day and becoming more costly.[4]

AIM & OBJECTIVE

1. To design and fabricate new and portable sieve machine.
2. To make a system to sieving powder particles into different size and grade.
3. To make a system to sieving powder separator for all sizes of material.
4. To reduce man power & cost of powder material separation with high-speed operations.
5. To learnt how to arrange the time and budget, to apply all knowledge in this low-cost machine design & fabrication.

CONSTRUCTION & WORKING

The Machine consists of the following parts,

Motor:

Thus, selecting a motor of the following specifications. Motor is a DC motor, Power 50 watt; Speed is continuously variable from 40 to 60 rpm. The speed of motor is Variator by means of an electronic speed Variator. Motor is a accumulator motor i.e., the current to motor is supplied to motor by means of carbon brushes. The power input to motor is varied by changing the current supply to these brushes by the speed Variator; thereby the speed is also is changes. Motor is foot mounted and is bolted to the motor base plate welded to the base frame of the indexer table. The electric motor used in the machine has the following specifications.[8]

DC motor

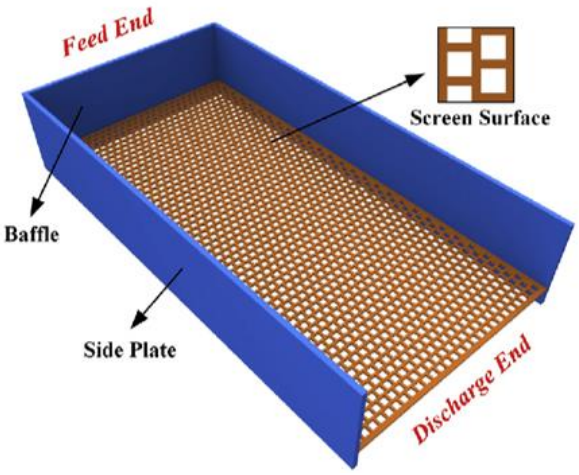
Power =50 watt

Speed= 40-60 rpm (variable)

DC Motor.

Grit Frame:

This is the supporting member in which the guides are housed to grit. This member has vibration motion on which the grits slide to and fro.

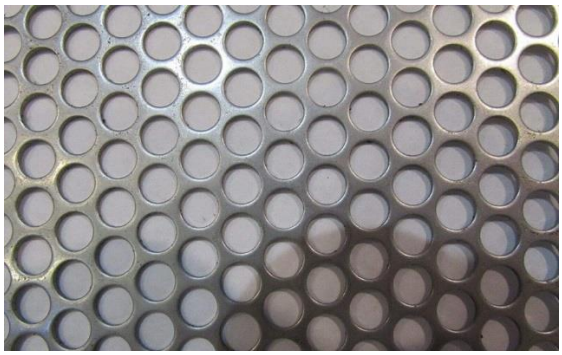


Grit Frame.

Grit:

Grit is nothing but a net with holes smaller than the size of the granules to be separated that we desire to screen. This grit will hold the desired powder and drop the undesirable small size powder on top the next grit. A perforated metal is a piece of sheet metal that has been stamped, fabricated, or punched to create a pattern of holes, slots, and various aesthetic shapes. A wide range of metals are used in

the perforating metal process, which include steel, aluminium, stainless steel, copper, and titanium. Though the process of perforating enhances the appearance of metals, it has other useful effects such as protection and noise suppression.



Grit.

Supporting Frame:

This is the base of the machine on which the entire arrangement is fitted. This is made from M.S. It is use for the foundation of system means on the base we fitted all system components. The frame of our machine is basically used to support the components mounted on it. That is springs, motor, screen is mounted on frame.

Nut and Bolt:

As nuts and bolts are not perfectly rigid, but stretch slightly under load, the distribution of stress on the threads is not uniform. In fact, on a theoretically infinitely long bolt, the first thread takes a third of the load, the first three threads take three-quarters of the load, and the first six threads take essentially the whole load. Beyond the first six threads, the remaining threads are under essentially no load at all. Therefore, a nut or bolt with six threads acts very much like an infinitely long nut or bolt.

Nut and Bolt.

Washer:

A washer is a thin plate (typically disk-shaped) with a hole (typically in the middle) that is normally used to distribute the load of a threaded fastener such as a screw or nut. Other uses are as a spacer, spring (wave washer), wear pad, preload indicating device, locking device, and to reduce vibration (rubber washer). Washers usually have an outer diameter (OD) about twice the width of their inner diameter (ID). Washers are usually metal or plastic. High quality bolted joints require hardened steel washers to prevent the loss of pre-load due to Brinelling after the torque is applied. Rubber or fiber gaskets used in taps (or faucets, or valves) to stop the flow of water are sometimes referred to colloquially as washers; but, while they may look similar, washers and gaskets are usually designed for different functions and made differently. Washers are also important for preventing galvanic corrosion, particularly by insulating steel screws from aluminum surfaces.

Washer.

12 Volt Battery:

An electric battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell contains a positive terminal, or cathode, and a negative terminal, or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work.

12 Volt Battery.

Solar Panel:

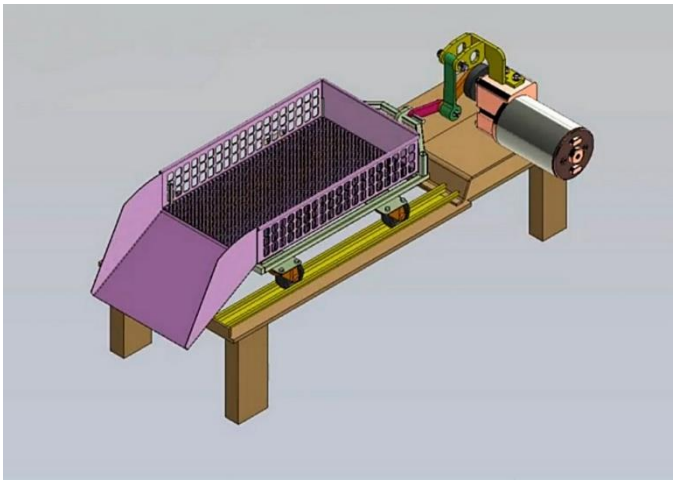
The photo- voltaic effect can be observed in nature in a variety of materials that have shown that the best performance in sunlight is the semiconductors as stated above. When photons from the sun are absorbed in a semiconductor, that create free electrons with higher energies than the created there must be an electric field to induce these higher energy electrons to flow out of the semi-conductor to do useful work. A junction of materials, which have different electrical properties, provides the electric field in most solar cells for the photon interaction in a semiconductor. A solar cell consists of,

1. Semi –conductor in which electron hole pairs are created by the absorption of incident solar radiation.
2. Region containing a drift field for charge separation.
3. Charge collecting front and back electrodes.

Solar panel.

Working of Project:

When motor is started, slider crank shaft will rotate. The shaft which is connected to the grit screen with motor. This motor frame foundation end which is connected center of sieve causes to reciprocating motion of the grit slide. The amplitude and frequency of reciprocating motion to the grit can vary by changing the speed of motor rotational speeds. Provision can be made to operate one or more grits changing as per requirements. The Horizontal sieving machine is very easy to construct and can be operated easily. It is very economic among this kind of machines. The raw material collecting box is fixed below the sieve in order to collect material. The sieving grit is placed inside the upper material collecting tray, when the machine is started due to reciprocating motion material is separated as per required size. [4]



FABRICTION MODEL

CONCLUSION

While concluding this report, we feel quite fulfil in having completed the project assignment well on time, we had enormous practical experience on fulfilment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose. Although the design criterions imposed challenging problems which, however were overcome by us due to availability of good reference books. The selection of choice raw materials helped us in machining of the various components to very close tolerance and thereby minimizing the level of balancing problem. Needless to emphasis here that we had lift no stone unturned in our potential efforts during machining, fabrication and assembly work of the project model to our entire satisfaction to solve the problem in field. Hence, we selected this project to contribute for sustainable machine.

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