

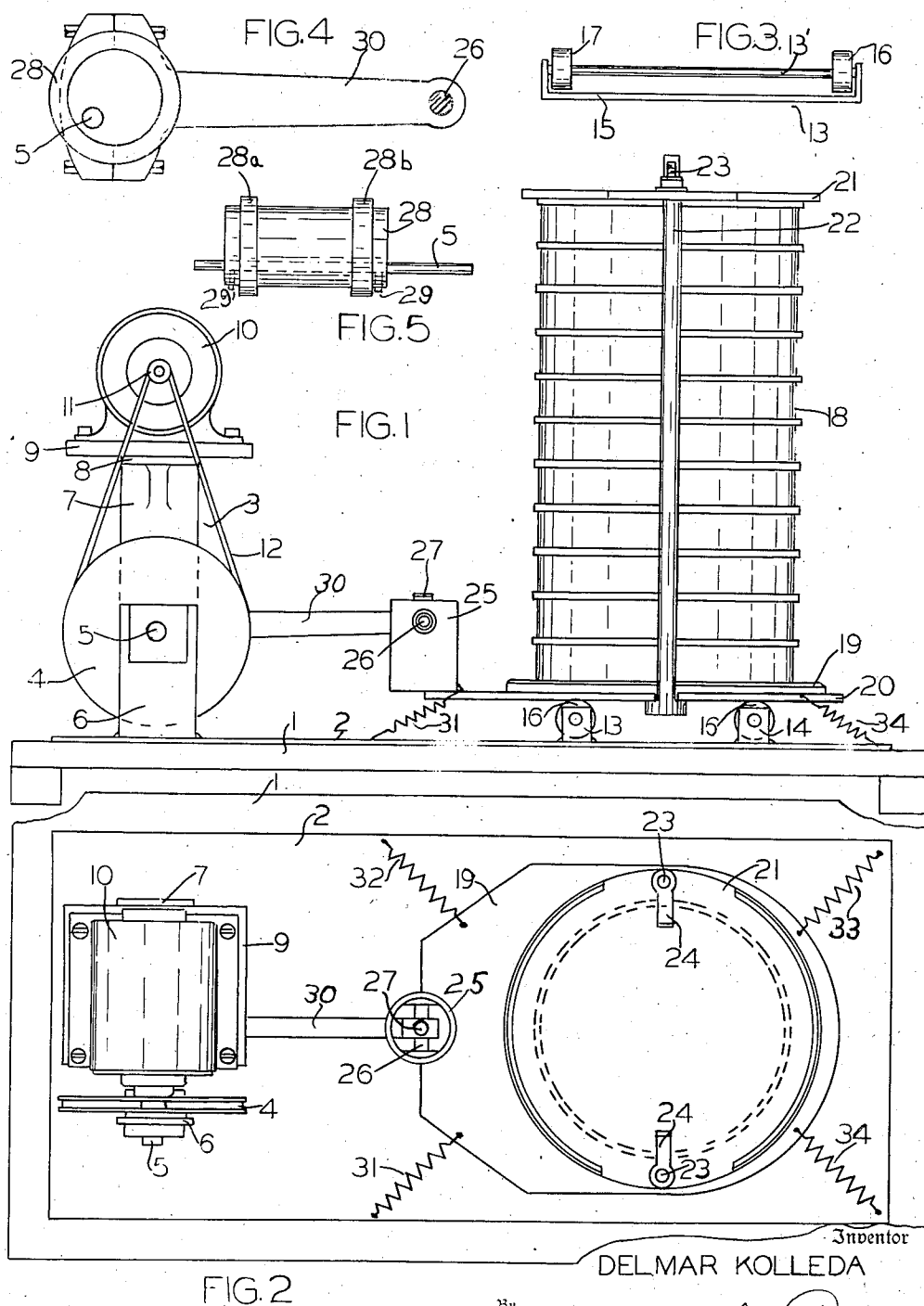
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GRADING MACHINE

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GRADING MACHINE

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This invention relates to sand sifters and graders and in its more specific aspects is directed to an improved agitating means and mechanism for increasing the efficiency of the device.

The object of this invention is to provide a machine for shaking or agitating standard testing sieves employed in making fines tests of Portland cements, ores, fertilizers, sands and other dry comminuted materials.

Other objects of the invention are to increase the speed of making tests, simplify the operating mechanism and increase the accuracy of testing.

Still another object of the invention is to provide a machine for shaking or agitating the testing or grading sieves which will accomplish the desired result in a more uniform and constantly satisfactory manner so as to secure more reliable standards of comparison of the sifted material.

Other and further objects of the invention will occur to those skilled in the arts to which this invention pertains as the description proceeds which taken in connection with the accompanying drawing sets forth a preferred embodiment thereof but such disclosure is not to be construed as a limitation of the invention which is limited only by the appended claims and any and all modifications, alterations and variations of structure coming within the spirit and scope thereof are deemed to be included herein.

In the drawing:

Fig. 1 is a front elevational view of the mechanism embodying the invention.

Fig. 2 is a plan view thereof.

Fig. 3 is detail view of one of the roller brackets supporting the sifter mechanism.

Fig. 4 is a detail view of the crank mechanism.

Fig. 5 is a detail side elevational view of the crank eccentric.

Prior practice in making standard tests employed testing sieves which varied from 6"-8" in diameter fitted with graduated standardized wire mesh. The actual work has usually been done by shaking or agitating the sieves by hand or in mechanism that subjects them to a reversely operated rotary motion to shake out the "fines," etc. This manner of making tests is, however, necessarily a very inaccurate and uncertain one, as the personal element entering into the shaking or sole rotary motion encountered in such shaking or agitating does not make possible making two tests alike nor subject the sieves to a universally constant and similar agitating motion; and although various efforts have been made in the past to produce machines that would successfully shake the testing sieves so as to

standardize the motion on the sieves and method such machines have not been successful nor have they proved satisfactory.

The objects and advantages attempted to be sought as outlined above are accomplished in a device and mechanism set forth in the accompanying drawing in which 1 is an appropriate machine base having a supporting plate 2 secured thereto in any well known conventional manner. Rigidly secured to the plate 2 by welding or other appropriate means is a pedestal member 3 having appropriate brackets thereon that support a sheave 4 and an axle 5, the latter being journaled in the forward upright portion 6 of the pedestal 3. The other end of the shaft 5 is journaled in the rear vertical portion 7 of the pedestal and integrally associated with the upright portion 7 is a horizontal portion 8 to which a motor support 9 is appropriately fixed and on which a motor 10 is mounted. Motor 10 is provided with a sheave or pulley 11 and power transmitting element 12 preferably in the form of a belt is led about sheaves 4 and 11 to transmit rotative movement from the motor 10 to the crankshaft 5.

The other end of the support 2 has a pair of roller brackets 13 and 14 welded thereto although other modes of securement could be employed. Each of these brackets comprises a longitudinally extended bar element 15 as shown more particularly in Fig. 3 having its ends bent at right angles to the principal length of the bar. Rollers 16 and 17 are rotatably mounted thereon and the four rollers form the principal support for the sifter device. It should be understood that there are two brackets provided, spaced an appreciable distance apart on plate 2 and each has rollers 16 and 17 mounted on a through shaft 13'.

The sifter device is a standardized mechanism consisting of a plurality of graduated screens arranged in a vertical column that vary in mesh size from 6-270 per inch, the finer mesh being the lower one. These several sieves are mounted on an appropriate foot piece 19 secured to a supporting plate 20. A cover element 21 is provided that has a pair of apertures therein and with the foot piece and supporting plates 19 and 20 slotted as shown. Fitted into the slots and extending through apertures in the cover is a tension member 22, of which there are two provided, which is equipped with a reduced diameter end portion 23 that is threaded and which have special nut elements 24 thereon by means of which the sifter elements may be securely fastened to the plate 20.

Plate or support 20 has a fixture 25 firmly se-

cured thereto in which a pin 26 is rotatably supported. Suitable lubrication means 27 are provided to lubricate the bearing surface. Axle 5 has a collared eccentric element 28 mounted thereon provided with collars 28a and 28b between which the bearing of connecting rod 30 fits. It has been found that when a one-half inch shaft is employed for axle 5 the center thereof is displaced five-eighths inch from the center of eccentric 28. The eccentric element has a pair of screws 29 therein that extend into the bore in the eccentric which receives the axle 5. The connecting rod 30 is so constructed and arranged that it can be easily removed and assembled in position by means well known to the arts as shown. Suitable lubrication means similar to 27 may be provided for the crank pin and the crank shaft bearings.

Attention is invited to the fact that the horizontal plane through the pin 26 is at a different level than a horizontal plane through axle 5. Best operation results when the levels of the centers are vertically displaced three-fourths of an inch apart.

In order to keep the plate or support 20 centered with respect to the two pairs of rollers 16 and 17 a plurality of springs 31, 32, 33 and 34 are provided to maintain the proper relationship.

The operation of the device is such that the sifter mechanism 18 is subject to a lateral and an arcuate movement. This arcuate movement is of a compound character for the reason that the sifter is pivoted about roller support 14 during one portion of the rotation of the eccentric or crank 28 and pivots about roller support 13 during another portion of the same rotation of the eccentric or crank 28.

It will be observed in the drawing that the height of the column of sieves is far greater than the distance between the centers of the supports 13 and 14. This ratio is necessary to provide for the tipping of the sieve or sifter column about the individual roller supports 13 and 14. This unbalances the sifter column 18 during the movement applied to it by the crank or eccentric 28 so as to cause the tipping action about each of the roller supports. More generally stated the couple of the vertical gravity force about the point of pivot is less than the couple of the horizontal acceleration forces about the same pivot. The reactive force of the plate and sieves plus materials therein is outside the angle which has its vertex at the center of gravity of the moving load and a side directed from the center of gravity to (approximately) the center of the nearest shaft 13'.

The double tipping or compound motion of the sifter column 18 shortens the time of sifting and results in a higher quality of sifting. The eccentric or cam 28 upon rotation will tend to move plate supports 19 and 20 horizontally and because column 18 is much higher than the lateral spacing of 13 and 14 and because 5 and 26 are vertically displaced the column 18 will tip about 14 during one part of each revolution and about 13 during another portion of the same revolution to produce the compound movement of the device because of the unbalancing for the reasons set forth above. The resultant movement is therefore a combined horizontal and (rotating) tipping movement of the sifter column 18.

It is clear that the above sets forth a machine that simplifies the operation and reduces its maintenance and upkeep.

That which is regarded new, novel and useful

and which is sought to be protected by Letters Patent of the United States is as follows:

1. In a grading machine; a base; a pair of laterally spaced roller brackets on said base having rollers mounted on each end of each of said brackets; a plate resting on said rollers; a plurality of sift-elements arranged in a column secured to said plate; a shaft provided with an eccentric; means to rotate said shaft; a connecting rod having one end secured to said eccentric; a bearing element fixed to said plate receiving the other end of said connecting rod; the axes of said shaft and of said bearing being at different elevations; and the height of said column of sifter elements being such that the reactive force of said plate is outside the angle which has its vertex at the center of gravity of said sieves and a load therein and a side directed from the center of gravity to substantially the center of the nearest axis of rotation of one of the sets of rollers on one of said brackets to unbalance said column such that when said shaft rotates said column will be successively tipped first about one set of rollers and then about the other set of rollers during each rotation of said shaft and reciprocation of said plate.

2. In a grading machine; a base; a pair of laterally spaced brackets each rotatably supporting a set of coaxially spaced rollers; a plate supporting a stack of sifter elements resting on said rollers; means to reciprocate said plate and stack of sifter elements which includes a motor driven eccentric, a bearing on said plate and a rod connecting said eccentric and bearing, the axis of rotation of said eccentric and the axis of said bearing being vertically displaced; and said stack unbalancing about each set of rollers during each rotation of said eccentric, said stack height being substantially greater than the lateral spacing of said brackets such that the couple of the gravity force about the point of pivot is less than the couple of the horizontal acceleration force about said point to thereby unbalance said stack about each of said sets of rollers during each reciprocation of said plate.

3. In a grading machine; a base; a pair of laterally spaced roller supports having aligned rollers on each support; a plate having a single column of sifters thereon resting on said rollers; an eccentric rotatably mounted on said base and a motor to drive same to reciprocate said plate on said rollers; a bearing and a pin fixed to said plate; a rod connecting said eccentric and pin, the axes of said pin and eccentric lying in different horizontal planes; and the height of said column being an amount substantially greater than the lateral spacing of said supports to cause said column to unbalance about each roller support during each rotation of said eccentric and reciprocation of said plate, said unbalancing caused by the couple of the vertical force about one of said supports being less than the horizontal accelerating force about said same support, said accelerating force increased because of said eccentric and pin axes lying in different horizontal planes.

4. In a sand testing machine; a base element; a prime mover and an eccentric and shaft driven thereby mounted on said base; a plate supporting means mounted on said base comprising a pair of laterally spaced roller supports having roller means on each support; a plate on said roller means; a column of sieves removably secured to said plate; means to maintain said plate in a proper spaced relationship with respect to said

supporting means; a fixture secured to said plate having a pin therein; a rod connecting said eccentric and pin; the axes of said pin and said eccentric disposed in different horizontal planes; and said length of stroke of said rod connecting said pin and shaft, the spacing of said roller means and the height of said column of sieves being so proportioned and arranged as to cause said stack and plate to tilt about each of said roller means during each reciprocation of said plate over said roller means.

5. In a comminuted materials testing device; a base element; an eccentric and shaft rotatably mounted on said base; a prime mover to rotate said shaft; a pair of spaced roller supports each having roller means thereon fixed to said base; a plate supported on said roller means; a column of sifter screen elements mounted on said plate; a plurality of spring elements connected between said base and said plate to hold said plate in engagement with said roller means; a fixture having a pin therein mounted on said plate; a connecting rod extending between said pin and shaft; the axes of said pin and shaft lying in different horizontal planes; and the length of stroke of said connecting rod and plate, the spacing of said roller supports and the height of said col-

umn of sifter screen elements being so proportioned and arranged that the said plate and column will tilt about each of said roller means during each reciprocation of said plate relative to said roller means.

6. In a comminuted materials testing machine; a base; means supporting an eccentric and shaft for rotation on said base; a prime mover to rotate said eccentric and shaft; a plate; means on said base supporting said plate for lateral motion comprising a pair of laterally spaced roller supports having rollers mounted thereon; a plurality of sifter elements removably secured to said plate; means connecting said eccentric and said plate; said sifter elements arranged in the form of a column; said plate tilting with respect to each of said roller supports during each reciprocation of said plate; the length of stroke of said eccentric, the spacing of said roller supports and height of screen stack proportioned and arranged to cause said stack and plate to tilt about each of said roller supports during each of said reciprocations of said plate; and a plurality of restraining elements operatively connecting said base and said plate to keep said plate aligned with respect to said rollers.

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