Nov. 5, 1963 H. F. GREENWELL 3,109,808

SIEVE SHAKER

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FIG. 1

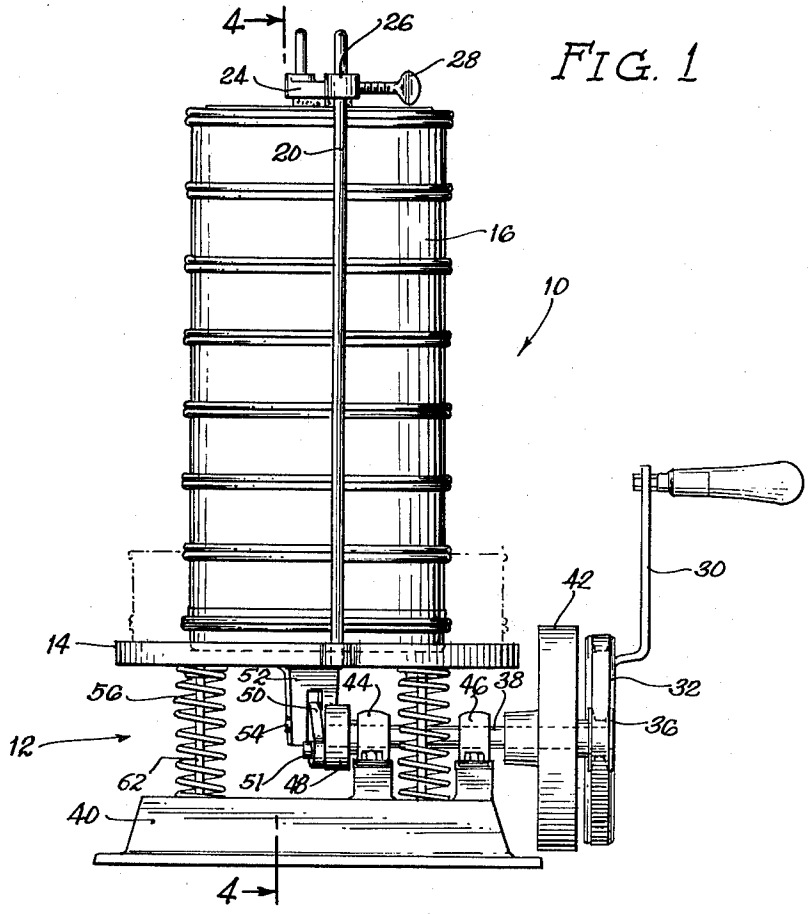
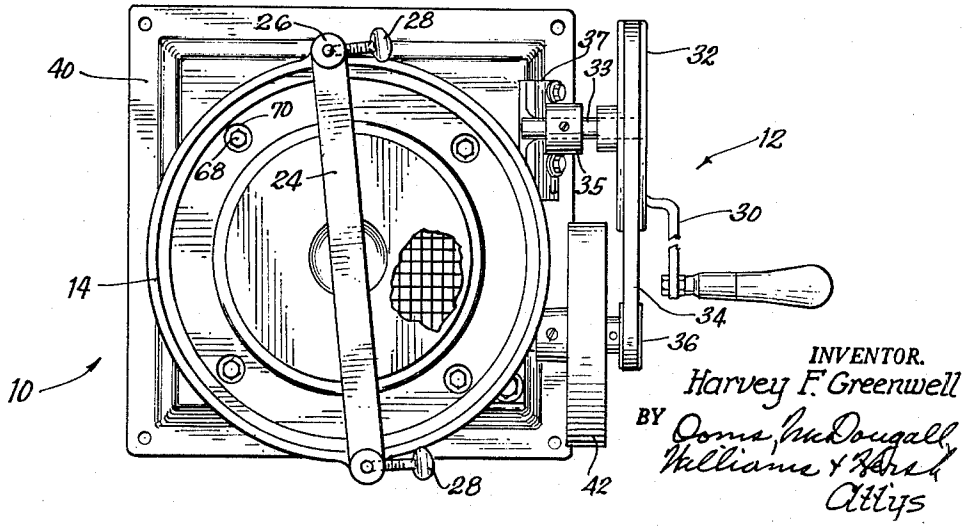


FIG. 2



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FIG. 3

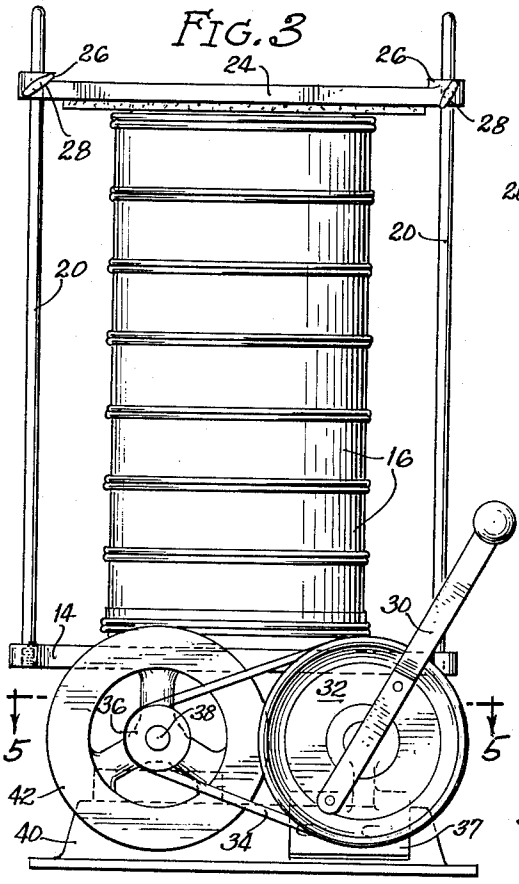


FIG. 4

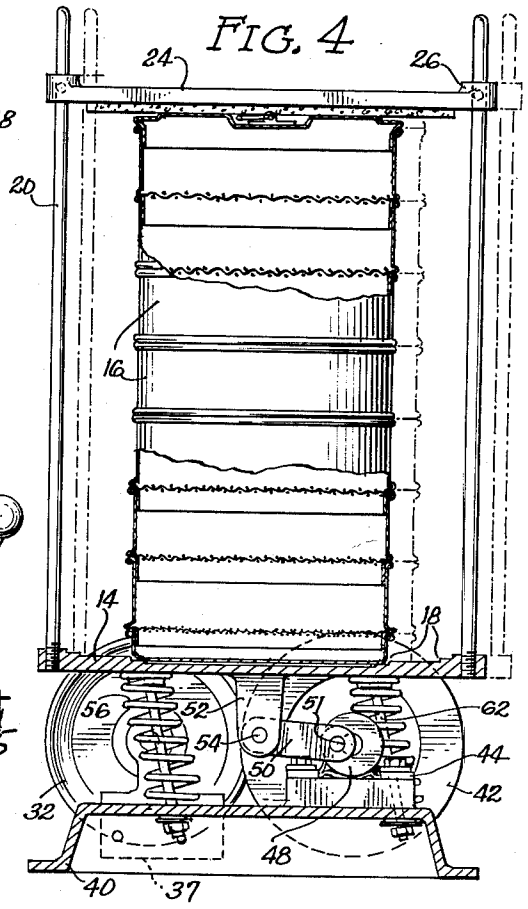
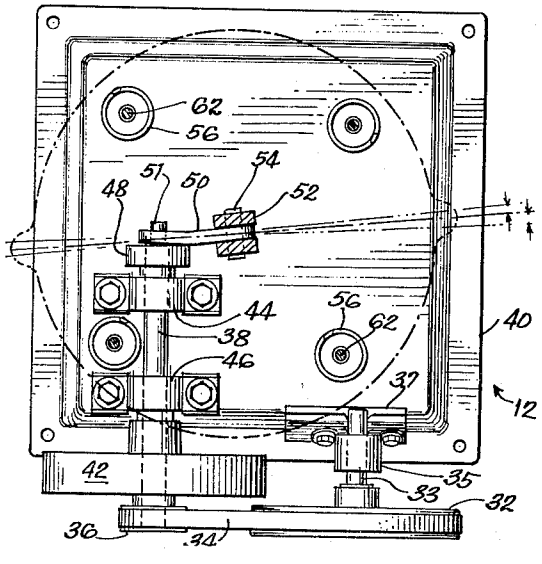


FIG. 5



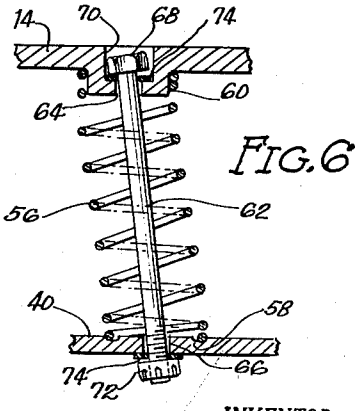


FIG. 6

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5 Claims. (Cl. 209—309)

This invention relates to an improved sieve shaker, and more particularly, relates to a sieve shaker suitable for use in the testing and grading of aggregate material such as sand, gravel, asphalt, concrete and the like. The present apparatus is peculiarly adapted for use in the laboratory or in the field.

It is an object of this invention to provide a sieve shaker suitable for use in the testing and grading of aggregate and like materials, whether such testing and grading is to be carried on in a laboratory or in the field.

It is an additional object of this invention to provide an apparatus capable of sieving all types of material in a manner which results in maximum accuracy, insofar as material analysis is concerned, and extreme efficiency insofar as the duration of the operation is concerned.

It is a further object of this invention to provide a novel shaker capable of imparting simultaneously to a plurality of sieves identical motions consisting of simultaneous movements in horizontal and vertical planes.

It is a further object of this invention to provide a sieve shaker capable of achieving the above objects and additionally adapted for operation through the use of all types of motive power, including hand operation.

These and other objects of this invention will appear hereinafter, and for purposes of illustration but not of limitation, specific embodiments of this invention are shown in the accompanying drawings in which—

FIGURE 1 is a side elevation view of a sieve shaker embodying the concepts of this invention;

FIGURE 2 is a top plan view of the sieve shaker of FIGURE 1;

FIGURE 3 is a front elevation view of the sieve shaker shown in the previous figures;

FIGURE 4 is a sectional view taken about the line 4—4 of FIGURE 1, showing the sieve shaker in an oscillated position;

FIGURE 5 is a sectional view taken about the line 5—5 of FIGURE 3; and

FIGURE 6 is a detail view of the spring supporting means employed in the novel sieve shaker of this invention.

The apparatus of this invention is broadly characterized by the ability to impart a unique oscillating motion which provides accurate and efficient grading and testing of materials. The motion is best described as consisting in the main of a side to side motion accompanied by simultaneous rotary and up and down movements. The unique pattern is realized due to the positioning of an arm connecting the sieve table with a main drive shaft in combination with the positioning of compression springs supporting the table with respect to the shaker base.

The accompanying figures illustrate an eccentrically mounted sieve shaker 10 including a driving unit 12 adapted to shake the table 14 and the sieves 16 carried thereon. A recess 18 is provided in the table 14 (see FIGURE 4) in order that the sieves 16 may be securely fitted with respect to the table 14. It will be noted that recesses 18 of various diameters may be provided to accommodate different diameter sieves. The recesses 18 shown may, for example, be adapted for standard 8-inch and 12-inch diameter sieves.

Clamping posts 20 are secured to the table 14 at 22 and a clamping bar 24 is adapted to be adjustably secured to the post 20 at 26 by means of the screws 28. The

position of the clamping bar 24 will depend on the number of sieves 16 to be employed.

The driving mechanism of this invention generally designated as 12 includes a cranking arm 30 secured to the pulley 32 which is mounted on a shaft 33 and journalled at 35 in a bearing fixed to the bracket 37. The belt 34 is associated with pulley 32 and pulley 36, the latter being mounted on shaft 38. Also secured to the shaft 38 is a flywheel 42.

The shaft 38 is journalled in bearings 44 and 46, and has secured at its end a disk-shaped eccentric connecting means 48. An arm 50 journalled on a pin 51 is located on the disk 48 at a point off center with respect to the shaft 38. The arm 50 is bent away from a line perpendicular to the axis of the shaft 38, and is journalled at its other end to an extension 52 formed perpendicularly with respect to the table 14. The pin 54 inserted in corresponding holes in the arm 50 and the extension 52 provides the journal arrangement which permits pivoting of the arm with respect to the extension.

Compression springs 56 are located intermediate the table 14 and the base 40. As shown in FIGURE 6, the lower end of the spring 56 fits within a groove 58, formed in the base 40. The upper end of the spring 56 is shown fitted about a shoulder 60 formed on the table 14. A bolt 62 passes through over-sized holes 64 and 66, formed in the table 14 and the base 40. The head 68 of the bolt is provided with a seat 70 in the table 14, and the nut 72 of the bolt fixes the other end of the bolt with respect to the base 40. Nylon washers 74 are preferably associated with the head and nut of the bolt 62.

It will be apparent when considering FIGURE 5 that the axes of the bolts 62 and the springs 56 are co-extensive. It will also be appreciated when considering this figure that these axes form the corners of a rectangle. Two sides of this rectangle are disposed at an acute angle with respect to the axis of the shaft 38, and this arrangement contributes to the unique shaking action of the apparatus.

As is best shown in FIGURE 5, it will be apparent that lines drawn through the center of any two adjacent bolts 62 are at an acute angle with respect to the sides of the base 40. It is also to be noted that the axis of the shaft 38 is neither parallel nor perpendicular to any of the aforesaid lines, and this is likewise true of a line drawn lengthwise through the bent portion of the arm 50. With regard to the angular relationship of the bent portion of arm 50, it is to be noted that the variation from a parallel or perpendicular relationship with lines drawn through the center of adjacent bolts is greater than with respect to the same relationship between the axis of the shaft 38 and these lines.

It will be apparent from the following description that it is the particular arrangement of the cooperating parts of this apparatus which provides the ideal sifting conditions, rather than any specific angular relationship. However, as a non-limiting example, a variation by lines passing through the center of adjacent bolts 62 of about 5 degrees with lines parallel or perpendicular to the axis of the shaft 38, and a variation of 10 degrees with a line passing through the center of the bent portion of the arm 50, will be suitable.

In the operation of the apparatus of this invention, rotation of the drive shaft 38 is effected through the actuation of the crank 30 and associated pulleys 32 and 36, belt 34 and flywheel 42. The disk 48 holding the arm 50 will cause the movement of the table 14, and due to the fact that the springs 56 are disposed on a line at an angle with respect to the arm 50 and shaft 38, there will be a rotary action induced in a horizontal plane. There is also an obvious end to end movement resulting, due to the rotation of the disk 48, and up and down movement

is controlled by the compression springs 56 and the bolts 62 associated therewith, and occurs simultaneously with the rotary and end to end movements. It will be apparent that the up and down movement effected by the rotation of the disk 48 is controlled by the springs 56 and the bolts 62, since the bolts 62 control the vertical extent of travel in the upward direction, and the resistance of the springs control the travel in the downward direction.

The holes 64 and 66 and the seat 70 are designed oversize, as shown in FIGURE 6, to allow for the rocking movement of the bolt and head 68. The nylon washers 74 located at the holes are preferable, since they have the flexibility and durability necessary for standing up under the repeated movements of the head 68 and nut 72.

It will be apparent that the extent of the various movements which are effected due to the operation of the driving mechanism of this apparatus can be controlled by various modifications of the apparatus. The length of the bolts 62 and compressibility of the springs 56 can be varied to change the extent of up and down movement. The size of the connecting means 48 and the point of securement of the arm 50 thereon obviously can be modified in order to control movements in a vertical plane. The positioning of the springs 56 and the extent of bend in the arm 50 are the factors which allow for variation in rotary movement in a horizontal plane.

Although the apparatus of this invention has been described with reference to hand power, it will be obvious that engines may be fitted with the belt 34, and the apparatus driven in this manner. It will further be apparent that various mechanically equivalent devices capable of performing similar functions are contemplated with regard to the operating portions of the disclosed apparatus.

It will be understood that various modifications may be made in the above disclosed apparatus which provide the characteristics of this invention without departing from the spirit of this invention, particularly as defined in the following claims.

I claim:

1. A sieve shaker apparatus including a base, a table having an extension formed thereon, means for securely mounting a plurality of superposed sieves on said table, supporting means interposed between said base and table adapted to permit relative movement therebetween, said supporting means comprising four resilient members located at points defining the corners of a rectangle, said points being located near the periphery of said table, driving means for effecting said relative movement, said driving means comprising a prime mover adapted to rotate a shaft, said shaft having eccentric connecting means located thereon, an arm having one end journaled to said connecting means on said shaft at a point offset from the axis of said shaft and the other end journaled to said extension on said table, the two axes about which the ends of said arm are journaled being disposed at an acute angle with respect to each other and the two sides of the rectangle defined by said points being disposed at an acute angle with respect to the axis of shaft.

2. In a sieve shaker apparatus, including a table for mounting a plurality of superposed sieves and a base member positioned below said table, the improvement comprising supporting means adapted to permit relative movement in horizontal and vertical directions between said base and said table, said supporting means comprising four compression springs having axes defining the corners of a rectangle, said axes being located near the periphery of said table, driving means for effecting said relative movement, said driving means including an arm having a first journal connection with said table and a second journal connection with a rotatable eccentric connecting means, said eccentric connecting means being fixed to a shaft which is operatively connected to a prime mover for said apparatus, said first journal connection having an axis located at an acute angle with respect to the axis of said shaft, said second journal connection being located at a point on said eccentric connecting means offset from the axis of said shaft, and two sides of the rectangle defined by said axes being disposed at an acute angle with respect to the axis of said shaft.

3. In a sieve shaking apparatus including a table for mounting a plurality of superposed sieves, a base member positioned below said table, and motive power for driving said apparatus, the improvement comprising driving means operatively connected to said table adapted to impart side-to-side and up and down movement to said table when said motive power is effected, said driving means including an arm having a first journal connection with said table and a second journal connection with a rotatable eccentric connecting means, said eccentric connecting means being fixed to a shaft which is operatively connected to said prime mover, said first journal connection having an axis located at an acute angle with respect to the axis of said shaft and said second journal connection being located at a point on said eccentric connecting means offset from the axis of said shaft; and resilient supporting means cooperating with said driving means and connecting said table and said base, said supporting means comprises four compression springs having axes defining the corners of a rectangle, said axes being located near the periphery of said table and two sides of the rectangle defined by said axes being disposed at an acute angle with respect to the axis of said shaft.

4. An apparatus according to claim 3, wherein said table is provided with a plurality of receses of various diameters whereby a plurality of different size sieves may be employed therewith.

5. An apparatus according to claim 3, wherein said supporting means connects said table and said base by means of bolts passing through the center of said springs.

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