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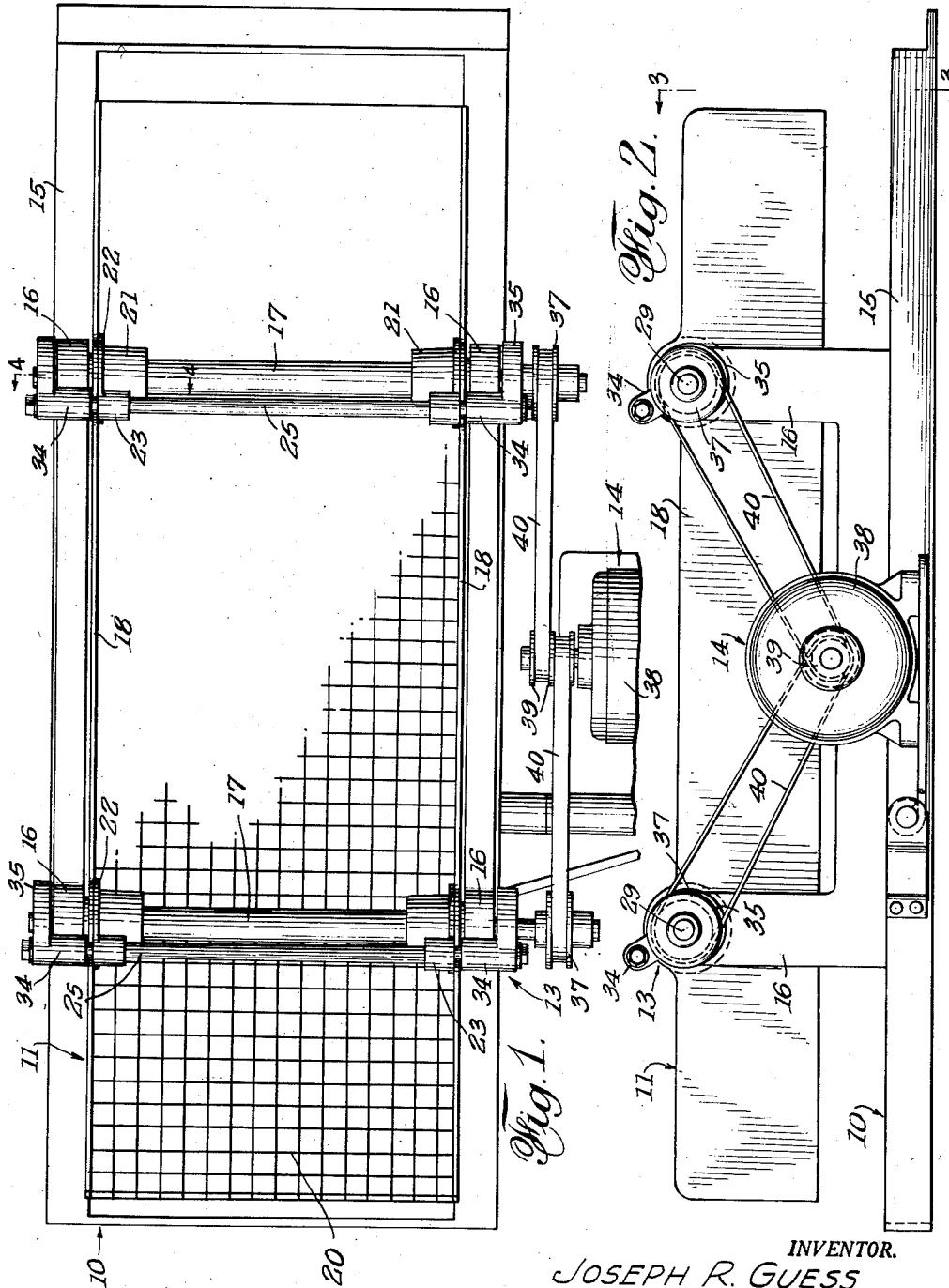
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2,849,119

VIBRATION SCREEN DEVICE

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

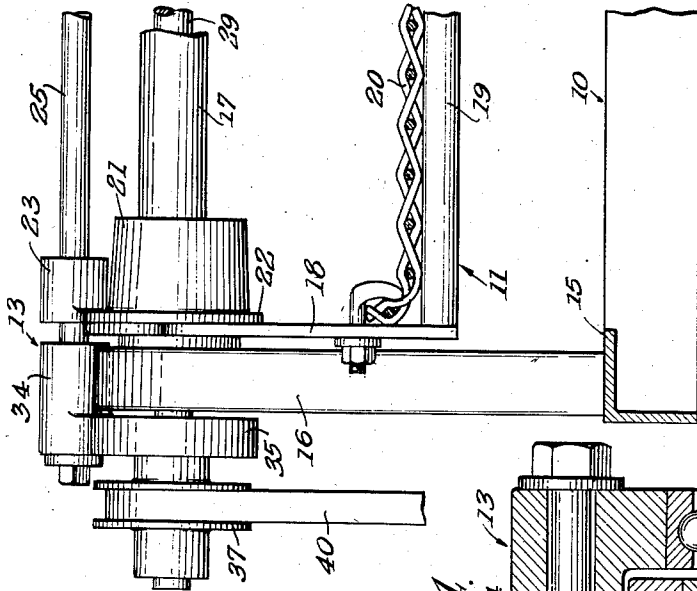


Fig. 3.

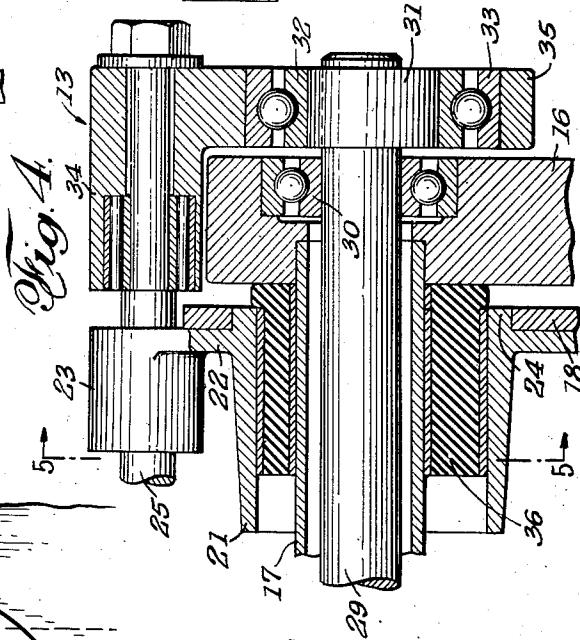


Fig. 4.

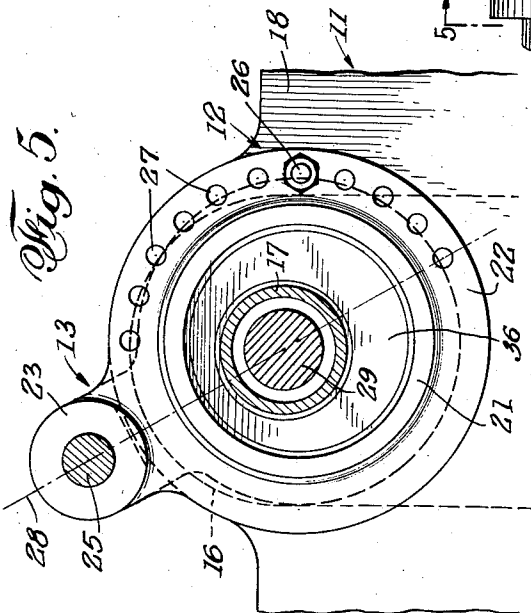


Fig. 5.

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VIBRATING SCREEN DEVICE

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6 Claims. (Cl. 209—365)

This invention relates to a screen device for sorting materials and deals more particularly with a vibrating screen for sorting one size of material from the remainder thereof.

In the sorting or sifting of rock, stone, gravel, sand, etc., in which a screen is used, said screen is usually disposed on a slope or angle that varies according to the material being handled and the same is vibrated, jarred or agitated to jounce the material progressively along the slope of the screen, while material particles fall through the interstices of the screen. In the main, such conventional sloping screens can be varied in their action only by changing the slope of the screen, by adjusting the vibration-inducing means, or by changing the screen cloth to change the mesh size thereof. In any case, the speed or rate of feed of material from one end of the screen to the other is, primarily, a function of the screen slope, the force of vibration being maintained constant. Even if vibration is increased, the slope of the screen is necessary to create a progression or movement of the material from the higher end to the lower end.

An object of this invention is to provide a material-separating screen that is maintained level or substantially so, at all times, and in which the separating screen is moved in a vibratory path such as to progressively move the material from one end of the screen to the other.

Another object of the invention is to provide a screen of the character indicated in which the material is jounced or tossed in an angular direction that is the component of an up-and-down force and a forwardly applied force. Thus, although the screen is level, the material bounces upwardly and forwardly toward the discharge end of the screen.

A further object of the invention is to provide means to vary the angle of the mentioned component of vibrating forces to, thereby, vary the rate of movement of the material from the inlet to the discharge end of the screen.

A still further object of the invention is to provide a material-separating screen that can be adjusted as easily to move material in one direction as in the other.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a top plan view of a screen according to the present invention, a portion of the driving means being broken away.

Fig. 2 is a side elevational view thereof.

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Fig. 3 is an enlarged vertical sectional view as taken on line 3—3 of Fig. 2.

Fig. 4 is a further enlarged fragmentary sectional view as taken substantially on the plane of line 4—4 of Fig. 1.

Fig. 5 is a cross-sectional view as taken on line 5—5 of Fig. 4.

The vibrating screen device that is illustrated comprises, generally, a base 10, a screen unit 11 mounted on said base, means 12 (Fig. 5) to adjust the angle of movement of the screen unit, means 13 to operate said screen unit, and means 14 to drive the operating means 13.

The base 10 simply comprises an enclosure or frame 15 that defines the space in which the screened materials are received and from which the same pass either to another screen device or to storage, as the case may be. In the present instance, said base, on each side thereof, is provided with longitudinally spaced bearing standards 16, the same being disposed as transverse pairs, as shown in Fig. 1. A transverse tube 17 extends between the standards of each pair and the same, because of its immovability, may be considered as part of the base.

The screen unit 11 comprises sides 18 that are connected at the lower edges as by transverse members 19 and above which a screen cloth 20 is placed, as can be seen from Fig. 3. The unit 11 further includes hubs 21 that are each provided with a flange 22 and with a bearing 23 constituting an extension of said hub and flange. The hubs 21 encircle tubes 17 inward of and adjacent to bearing standards 16. Said hubs have circular concentric-extensions 24 that fit suitable circular openings in sides 18. Thus, as seen best in Fig. 4, said hubs may be angularly adjusted around the respective axes of tubes 17.

The bearings 23, on opposite sides, are connected by a tube or rod 25 that, therefore, is offset from and parallel to its respective tube 17. Said rod 25 insures that the angular adjustment of bearings 23 on opposite sides is the same. The rods 25 constitute parts of the means 12 and the adjustment is shown, in this case, as being locked by a bolt 26 extending through each flange 22 and through adjacent side 18. A series of selective holes 27 in each flange 22 is provided, as shown in Fig. 5, to enable adjustment, as above. In Fig. 5, an angle of 30° to the vertical is shown and it will be clear that this angle can be increased, decreased to zero, and, if desired, provided in the opposite direction with respect to the zero position. The above simple adjusting means are intended as exemplary of any suitable adjusting means that may be employed to change the angular degree and disposition of line 28.

The means 13 to operate the screen unit 11 is shown as comprising a shaft 29 extending axially through each tube 17, the ends of each said shaft being carried by anti-friction bearings 30 in the respective bearing standards 16. A preferably circular eccentric 31 is carried by each end of each shaft 29 beyond bearing standards 16. The inner race 32 of an anti-friction bearing 33 is fitted over each said eccentric.

Each end of rod 25 extends through a bearing 34 that is offset from a strap portion 35 in which each of said bearings 33 is fitted. It will be clear that rotation of shafts 29 and of cams or eccentrics 31 thereon imparts, through strap 35, reciprocative movement to rods 25. Accordingly, the screen unit 11 is reciprocated bodily along the line 28 (Fig. 5). If the angle of line 28 is changed by use of adjusting means 12, the reciprocative direction of movement of the screen unit 11 will change accordingly.

An important component of the operating means 13 is a compressible sleeve 36 positioned within each hub 21 and surrounding the end of each tube 17 that is in register with each respective hub. Said sleeves 36 are made with

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an external diameter to fit within hubs 21 and an internal diameter to fit around tubes 17. For easier application of said sleeve, the same may be provided with metallic outer and inner tubes to which the compressible material is bonded. In this case, one of the synthetic rubbers, such as thiokol or neoprene, may be advantageously used as the compressible core of sleeve 36.

It will be realized that shafts 25 move in substantially straight lines and the straps 35 have the same reciprocative movement while, at the same time, moving in a gyratory path around circles having the amount of eccentricity as radii. Consequently, the sleeves 36 are alternately compressed on opposite sides as the eccentrics move past high and low dead centers. The resultant movement of the screen unit is along line 28 and within the limits of eccentricity of eccentrics 31.

As above indicated, the movement of the shafts 25 is substantially straight. Actually, because the members 36 are compressible, said shafts 25 tend to waver slightly with respect to the line 28, on both sides of said line. As a consequence, the actual movement of the screen, rather than being perfectly straight, is somewhat elliptical. However, the minor axis of such an ellipse is so small relative to its major axis, as determined by the degree of eccentricity of the eccentrics 31, that the screen movement is substantially or largely along the line 28. Thus, the line 28 represents a path of movement of the screen rather than indicating a movement along a straight line. Regardless whether the movement is straight or varying from the straight, the practical result is that the screen moves in a material-feeding manner as indicated.

The drive means 14 is here shown as a pulley 37 on one end of each shaft 29, a motor 38 mounting pulleys 39 in respective alignment with pulleys 37, and belts 40 interconnecting the respectively aligned pulleys. While not so shown, said pulleys and belts may be of the type that depend on positive drive by cleats in the latter in keying engagement in seats in the former. In this conventional manner, slippage between pulleys and belts is obviated and positive drive effected that uses the power of motor 38 to effect compression of sleeves 36.

Material to be screened is dumped on the end of screen 20 that is opposite to the direction of slope of line 28, in this case, on the right end. Now, as the screen reciprocates, the material is propelled toward the left end of the screen at a speed comparable to the angle of slope of said line. The greater the angle relative to the vertical, the more rapid the transition of material beyond the left end of the screen. Of course, in the process of such movement, material is screened, passing through the interstices of screen 20.

While the foregoing has illustrated and described what is now contemplated to be the best mode of carrying out the invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A material-screening device comprising a generally rectangular base provided with at least two pairs of bearings on opposite sides, a driven shaft extending between each pair of bearings and carrying an eccentric cam on each end thereof, a fixed tube around each shaft, a strap

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around each eccentric cam and an extension on each strap, a rod parallel to each shaft inter-connecting said strap extensions, a hub adjacent each end of each fixed tube, a compressible member between each hub and the fixed tube, an extension from each hub connected to the mentioned rod, a screen disposed above the base, and means adjustably connecting said hubs to said screen.

2. A material-screening device comprising a generally rectangular base at least two pairs of posts extending upwardly from said base, said posts being provided with at least two pairs of bearings, a driven shaft extending between each pair of bearings and carrying an eccentric cam on each end thereof, a fixed tube mounted between each pair of posts and around each shaft, a strap around each eccentric cam and an extension on each strap, a rod parallel to each shaft inter-connecting said strap extensions, a hub adjacent each end of each fixed tube, a compressible member between each hub and the fixed tube, an extension from each hub connected to the mentioned rod, a screen disposed above the base and adapted to be reciprocated, means adjustably connecting said hubs to said screen, and means to drive said shafts to rotate said cams in unison.

3. A material-screening device according to claim 2: means to adjust the angle of the direction of reciprocation of the screen comprising a flange on said hub, said flange and said hub being rotatable relative to said screen.

4. A material-screening device comprising at least two pairs of posts, a pair of tubes extending between each pair of posts, a pair of rotatable shafts within said tubes, said shafts being mounted by bearings in said posts, an eccentric on each end of each of said shafts, a pair of rods running between said posts parallel to said shafts, said rods and said shafts being inter-connected by a strap encircling said eccentrics, a set of hubs suspended from said rods, said hubs encircling said tubes adjacent the ends thereof, a compressible member disposed between said hubs and tubes, and a screen suspended from said hub and tube combination, said screen being adapted to reciprocate upon rotation of said shafts.

5. A material-screening device comprising a base, at least two longitudinally spaced pairs of posts extending upwardly from the base, a horizontal screen suspended from said posts and above said base, and means to reciprocate said screen along a sloping path that has an angle of slope with respect to the vertical, said means comprising pairs of eccentrics rotatably mounted on said pairs of posts, a strap engaged around each eccentric, a pair of rod members extending transversely between the straps and angularly offset from the axes of rotation of the eccentrics, said rods being connected to said straps and screen, and compressible means interposed between the screen and the posts.

6. A material-screening device according to claim 5 in which means is provided connecting the eccentrics in transverse pairs, and means to drive the eccentrics in unison.

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