April 18, 1967 E. R. HITCHMAN 3,314,539

SCREEN APPARATUS FOR CLASSIFYING MATERIALS

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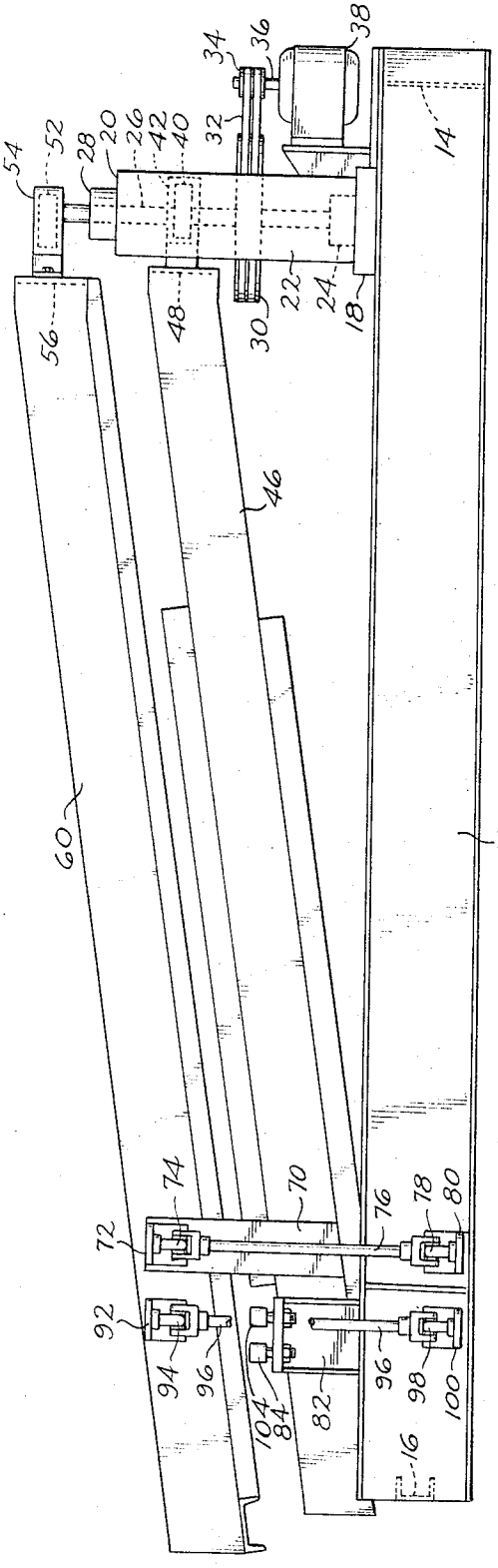


Fig. 1.

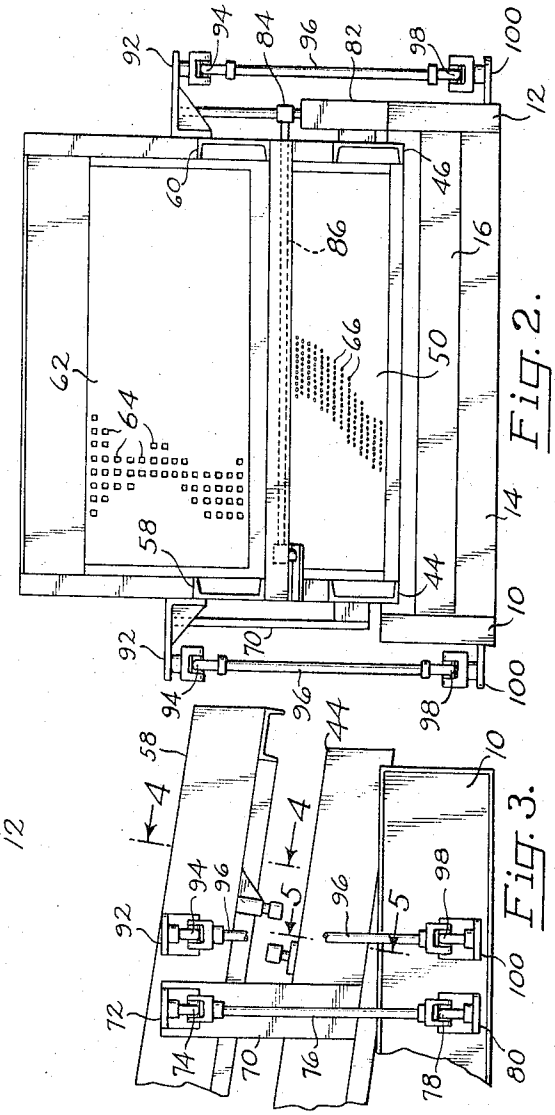


Fig. 2.



Fig. 3.

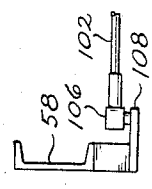


Fig. 4.

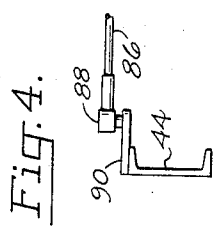


Fig. 5.

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# SCREEN APPARATUS FOR CLASSIFYING MATERIALS

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This invention relates to classifying apparatus, and more particularly to vibrating screen apparatus for separating particulate material into fractions of different sizes.

Oscillating or reciprocating multiple screen devices have been employed heretofore for separating particulate material, such as wood chips, into fractions of various sizes. In these prior devices the inclined vibrating screens have been connected at their upper, infeed ends to oscillating or reciprocating drive mechanism and their lower, outfeed ends have been supported slidably upon bearing plates. There have thus been two principal disadvantages attending the use of such devices: first, the sliding bearing support for the outfeed ends of the screens serve adversely to transmit a substantial magnitude of vibration to the framework structure supporting the screens and hence to the building structure supporting the device. This vibration not only contributes materially to premature deterioration of the device and other mechanisms in the vicinity thereof, but also represents a disconcerting factor to personnel working in the area thus subjected to vibration. Second the frictional sliding support of the screens on the bearing plates contributes adversely to rapid wearing of the bearing plates and screens, requiring frequent replacement or repair.

It is the principal object of the present invention to provide screen classifying apparatus of the class described in which the foregoing frictional sliding support of the screens is avoided and the consequent foregoing disadvantages of vibration and excessive wear are substantially eliminated.

Another important object of this invention is the provision of screen classifying apparatus of the class described which is of simplified but rugged construction, affording economical manufacture and long service life with a minimum of maintenance and repair.

The foregoing and other objects and advantages of the present invention will appear from the following detailed description, taken in connection with the accompanying drawing in which:

FIG. 1 is a view in side elevation of screen classifying apparatus embodying the features of the present invention;

FIG. 2 is a front elevation as viewed from the left in FIG. 1;

FIG. 3 is a fragmentary view in side elevation of the outfeed end of the apparatus, as viewed from the left in FIG. 2;

FIG. 4 is a fragmentary sectional view taken along the line 4—4 in FIG. 3; and

FIG. 5 is a fragmentary sectional view taken along the line 5—5 in FIG. 3.

The apparatus illustrated in the drawing includes a base frame which comprises the laterally spaced side frame members 10 and 12 interconnected at the infeed end of the apparatus by the transverse rear frame member 14 and at the outfeed end of the apparatus by the transverse front frame member 16. This latter member terminates at its lower edge above the lower edge of the side frame members, to accommodate access to the interior of the base frame for removing the fines fraction, as explained more fully hereinafter.

An upstanding hollow frame is supported upon the side frame members of the base frame adjacent the infeed end of the apparatus, and includes a bottom member 18, a top member 20 and interconnecting laterally spaced side members 22. The bottom member 18 supports a thrust



bearing 24 mounting the lower end of the rotary driven shaft 26, and the top member supports a bearing 28 through which the driven shaft extends. Secured to the shaft above the thrust bearing is a pulley 30 which is connected through the drive belts 32 to a pulley 34 mounted on the output shaft 36 of the electric drive motor 38 supported on the base frame.

Also secured to the driven shaft, between the pulley and the top member, is an eccentric cam 40 mounted rotatably in a bearing 42 secured to the infeed end of the lower screen assembly. This assembly includes laterally spaced side frame members 44 and 46 interconnected at their infeed end by the transverse rear frame member 48 to which the bearing 42 is secured. A perforate screen 50 is supported between the side frame members, adjacent the bottom edges thereof, and extends from the rear frame member to the forward, open, outlet end.

In similar manner, the end of the driven shaft 26 projecting upwardly from the top bearing 28 supports for rotation therewith a second eccentric cam 52 mounted for rotation in a bearing 54 secured to the transverse rear frame member 56 which interconnects the infeed ends of the laterally spaced side frame members 58 and 60 of the upper screen assembly. A perforate screen 62 is supported between the side frame members, adjacent the bottom edges thereof, and extends from the rear frame member forwardly to the open, outlet end.

The openings 64 in the top perforate screen 62 are larger than the openings 66 in the underlying perforate screen 50. Thus, as particulate material is deposited upon the infeed end of the top screen, the particles larger than the openings in the top screen are caused to travel downward along the latter to the outfeed end, from which they are collected for further processing. The particles smaller than the openings in the top screen pass through the latter onto the underlying screen. The fines material of smaller size than the openings in the underlying screen 50 pass through the latter, for collection by appropriate means, and the intermediate size particles move downward along the screen 50 to the outfeed end thereof for collection.

The foregoing structure is conventional and well known in the art, and hence forms no part of the present invention.

In accordance with the present invention, means is provided for supporting the outfeed ends of the screen assemblies in such manner as to avoid frictional sliding support of the assemblies and hence to substantially eliminate frictional wear and vibration. To this end there is provided, in the embodiment illustrated, a pair of upstanding brackets 70 one mounted on each of the side frame members 44 and 46 of the underlying screen assembly. An outwardly projecting flange 72 at the upper end of each bracket supports a downwardly extending universal joint connector 74 which is connected through the support rod 76 to the upwardly projecting universal joint connector 78 mounted on an outwardly projecting bracket 80 secured to the corresponding side frame member 10, 12 of the base frame.

Means also is provided for stabilizing the outfeed end of the underlying screen assembly against substantial lateral displacement. In the embodiment illustrated, an upstanding bracket 82 is mounted on one of the side frame members 12 of the base frame, for supporting the pivot connector 84. One end of an elongated stabilizer rod 86 is connected to this pivot connector, and the rod extends laterally therefrom between the top and underlying screen assemblies for connection at its opposite end to a pivot connector 88 supported on a bracket 90 secured to the side frame member 44 of the underlying screen assembly. Thus, the underlying screen assembly is permitted to oscillate longitudinally and laterally, by the action of the eccentric cam 40, and yet the outfeed end

of the screen assembly is confined against substantial lateral displacement.

The top screen assembly is supported at its outfeed end in similar manner. Thus, a bracket **92** projects laterally outward from each of the side frame members **58** and **60** and supports a downwardly projecting universal connector **94** which is connected through the support rod **96** to the upwardly projecting universal connector **98** mounted on the bracket **100** secured to the side frame member **12** of the base frame. Substantial lateral displacement of the top screen assembly is prevented by means of the elongated stabilizer rod **102** which is connected at one end to the pivot connector **104** mounted on the bracket **82**, and at the opposite end to the pivot connector **106** mounted on the bracket **108** secured to the side frame member **58** of the top screen assembly.

It will be apparent that the downwardly projecting universal connectors **74** may be supported by brackets secured directly to and projecting laterally outward from the side frame members **44**, **46** of the underlying screen assembly, and that the support rods **76** may be shortened correspondingly. The illustrated arrangement, utilizing the upstanding brackets **70**, is preferred for the advantage of standardizing all of the support rods **76** and **96** to a single length.

By means of the foregoing mounting structure, by which the outfeed ends of the screen assemblies are supported freely on the universally mounted support rods, oscillation of the screens occurs with complete freedom and without transmission of vibration to the base frame. The only points of wear are at the universal and pivot connectors, and these are of conventional types capable of long service life.

It will be apparent that various changes may be made in the details of construction described hereinbefore. For example, the number of vertically spaced screen assembiles may be varied, as desired, simply by the use of appropriately lengthened driven shaft, and corresponding numbers of eccentric cams, stabilizer rod assemblies and support rod assemblies. The screen assemblies may be displaced vertically above or below the base frame. The specific form of oscillating drive mechanism may be exchanged for other conventional types. If simple reciprocating movement in the longitudinal direction of the screens is employed, the universal pivot movement of the connectors for the support rods **76** and **96** may be reduced to a single pivotal movement about axes substantially transverse of the apparatus. These and other changes may be made without departing from the spirit of this invention and the scope of the appended claims.

Having now described my invention and the manner in which it may be used, what I claim as new and desire to secure by Letters Patent is:

**1.** In a vibrating screen classifier having a substantially horizontal frame mounting vibrator means supporting the infeed ends of a plurality of vertically displaced inclined screens for vibrating movement relative to the frame substantially in the planes of the screens, means supporting the outfeed ends of the screens, comprising

(a) a plurality of vertically disposed support rods spaced apart longitudinally with respect to the frame and disposed adjacent the sides of the frame and screens adjacent said outfeed ends,

(b) pivotal connector means securing one end of each support rod to the frame and the opposite end of each support rod to a different screen,

(c) a plurality of stabilizer rods extending substantially horizontally adjacent the frame and screens, and

(d) pivot means securing one end of each stabilizer rod to the frame and the opposite end of each stabilizer rod to a different screen.

**2.** The combination of claim **1** wherein the support rods are of equal length, and mounting brackets of different vertical length are secured to one of the frame and screens for supporting the corresponding pivotal connector means.

**3.** A vibrating screen classifier comprising

(a) a substantially horizontal frame,

(b) vibrator means mounted on the frame,

(c) a plurality of vertically displaced inclined screens supported at their infeed ends by the vibrator means for vibrating movement relative to the frame substantially in the planes of the screens,

(d) a plurality of vertically disposed support rods spaced apart longitudinally with respect to the frame and disposed adjacent the sides of the frame and screens adjacent the outfeed ends of the latter,

(e) pivotal connector means securing one end of each support rod to the frame and the opposite end of each support rod to a different screen,

(f) a plurality of stabilizer rods extending substantially horizontally adjacent the frame and screens, and

(g) pivot means securing one end of each stabilizer rod to the frame and the opposite end of each stabilizer rod to a different screen.

**4.** The vibrating screen classifier of claim **3** wherein the support rods are of equal length, and mounting brackets of different vertical length are secured to one of the frame and screens for supporting the corresponding pivotal connector means.


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