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VIBRATORY SCREEN

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2 Sheets-Sheet 1

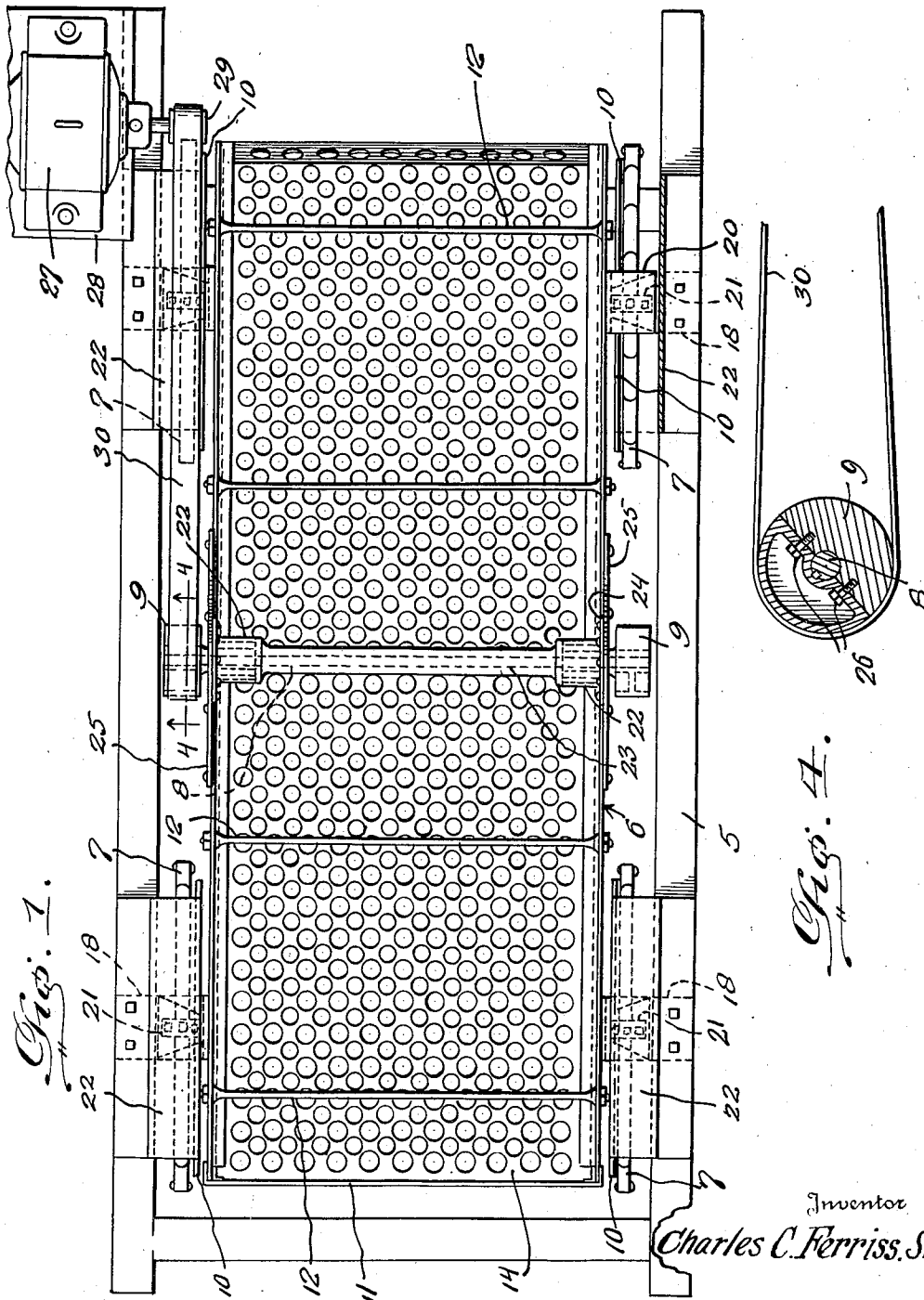


Fig. 1.

Fig. 4.

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VIBRATORY SCREEN

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5 Claims. (Cl. 209—326)

This invention relates to a device for screening rocks, gravel, and other material, and has more particular reference to an improved screening device of the vibratory type wherein a screen carrying frame is resiliently supported, and wherein means is provided for vibrating the screen carrying frame including a rotatable shaft journaled on the screen carrying frame and provided with unbalanced or eccentrically weighted rotors rotatable with the shaft at high speed.

Other objects of the invention are to provide a vibratory screen which is simple and compact in construction, which is efficient in operation, which may be manufactured at a minimum cost, and which may be maintained in proper operating condition without difficulty or great expense.

Still another object of the present invention is to provide improved means for resiliently supporting the screen carrying frame and for producing vibration of said frame in a novel manner to secure a most efficient screening operation.

The present invention also consists in certain other features of construction, and in the novel combination and arrangement of the several parts, as hereinafter fully described, illustrated in the accompanying drawings, and claimed.

In the drawings:

Figure 1 is a top plan view, partly broken away, of a screening device constructed in accordance with the present invention.

Figure 2 is a side elevational view thereof, partly broken away.

Figure 3 is a transverse section on line 3—3 of Figure 2; and

Figure 4 is a sectional detail view showing the construction of one of the unbalanced or eccentrically weighted rotors.

Referring in detail to the drawings, the illustrated embodiment of the invention consists of a base frame 5, a screen carrying frame 6, elliptical springs 7 supporting the screen carrying frame 6 on the base frame 5, and means including a driven shaft 8 provided with unbalanced or eccentrically weighted rotors 9 and journaled on and transversely of the screen carrying frame 6 for vibrating the latter relative to the base frame 5. The springs 7 are located at opposite sides of the screen carrying frame 6 at each end of the latter and are restrained against lateral swaying movement by guide plates 10 so as to restrain the screen carrying frame 6 against lateral swinging or tilting movement.

The frame 6 is open at one end and closed by a wall 11 at its other end, and embodies spaced side walls rigidly connected at intervals by trans-

verse brace and spreader bolts 12. Secured on the inner faces of the side walls of frame 6 are opposed pairs of angle iron supports 13 upon which are arranged an upper screen 14 and a lower screen 15 of either perforated plate or wire mesh type reinforced at the sides by means of an angle iron 16 and a clamping bar 17 between which the side margins of the screen are bolted. By reason of this construction, the screens are readily removable for renewal or repair, and it is obvious that either one or both of the screens may be employed as found necessary or desirable. When both screens are used, the top screen may be of wider mesh than the lower screen so that when the screen carrying frame is vibrated the material will be moved and screened so that the large particles will drop off the top screen at the at the open lower end of frame 6, the still smaller particles will pass through the top screen and be caught by the lower screen, the particles too large to pass through the lower screen travelling along the same and dropping off the lower end thereof at the open lower end of frames 6, the still smaller particles which pass through the lower screen being disposed of in any suitable manner. This operation is useful when it is desired to screen the material or grade the same into three different sizes, while only one screen will be used when grading in two sizes is desired.

The base frame 5 consists of rigidly connected side rails upon which are bolted inwardly projecting hanger plates 18 upon the projecting inner portions of which the springs 7 are bolted and clamped as at 19. The guide plates 10 are flanged and bolted at their lower ends to the hanger plates 18 at the inner sides of the springs 7 as shown clearly in Figure 3, and fastened on the outer faces of the side walls of frame 6 are angular hanger plates 20 having outwardly projecting upper ends which bear upon the upper portions of the springs 7 and are bolted and clamped thereto as at 21. In this way the screen carrying frame 6 is resiliently supported for vibration relative to the base frame 5. An angular cover or shield 22 is preferably provided for each of the springs 7, said covers or shields being bolted at their outwardly flanged lower ends upon the side rails of base frame 5.

The driven shaft 8 is journaled in roller bearings provided within the enlarged ends 22 of a tubular shaft housing 23 mounted transversely of and directly above the screen carrying frame 6 intermediate the ends of the latter. As shown, the ends of housing 23 are provided with annular flanges 24 bolted to the inner faces of bracket

plates 25 rigidly fastened to and projecting above the side walls of screen carrying frame 6. The bracket plates 25 have openings aligned with shaft 8 and outwardly through which the ends of said shaft 8 project, the unbalanced or eccentrically weighted rotors 9 being secured upon such projecting ends of shaft 8 at the outer sides of frame 6. The rotors 9 are preferably in the form of diametrically split or divided pulleys bolted upon the ends of shaft 8 as at 26, one section of each pulley being of solid or weighted construction, and the other section thereof being of unweighted webbed or hollow construction. In this way, either one of the eccentrically weighted pulleys or rotors 9 may be utilized as a part of a means for rotating shaft 8 and said eccentrically weighted pulleys or rotors for imparting vibratory motion to screen carrying frame 6. As shown, a high speed electric motor 27 may be mounted upon a fixed or stationary support 28 at one side of and adjacent one end of the screen, said motor 27 having a pulley 29 on the armature shaft thereof connected by a belt 30 with the rotor or pulley 9 located at the same side of the screen.

In practice, the device is mounted at an angle or inclination, and the material to be screened is deposited on the screen proper at the high closed end of screen frame 6. Due to the form and arrangement of springs 7 and the use of guide plates 10 to prevent lateral swaying of said springs, the vibrating action of screen carrying frame 6 is different from that attained in prior screening devices. The frame 6 is vibrated in a vertically elongated orbital or elliptical path whose major axis is inclined at an angle between horizontal and vertical and upwardly toward the higher feed end of the screen. This causes the material to be thrown up toward the feed end of the screen as it slides down along the latter, in addition to eddying around on the screen. Thus, the screening operation is made most efficient, and ordinarily the finer particles have passed through the screen proper before the material has travelled half the length of the screen proper. This speeds up the screening operation as well as promoting the efficiency thereof, by making it practical to set the screening device at a decided inclination. The particular operation described is believed to be the result of the kind and arrangement of the springs 7 and the use of the guide plates 10, in addition to the restraining influence of belt 30 upon tendency of the screen carrying frame to shift longitudinally in one direction while being vibrated.

It will be particularly noted that the means for vibrating the screen carrying frame is very simple and durable in construction and provides for driving the shaft 8 at either side of the apparatus.

From the foregoing description, it is believed that the advantages and novel features of the invention will be readily apparent. Changes in the specific details of construction illustrated and described are contemplated within the spirit and scope of the invention as claimed.

What I claim as new is:

1. In a screening apparatus, the combination of an inclined screen carrying frame and revoluble weighted means thereon for imparting vibratory movement to said frame in a vertically elongated elliptical path whose major axis is inclined upwardly toward the higher feed end of the

screen, a base, elliptical springs mounting said frame upon said base for such vibratory movement, said elliptical springs being longitudinally disposed at opposite sides of the frame at each end thereof, and means for guiding said springs when flexed while the frame is vibrated to prevent lateral movement of said frame, and belt driving means for said revoluble weighted means restraining said screen carrying frame from longitudinal shifting in the direction of its higher end, whereby the material being screened is thrown up toward the higher feed end of the screen as it slides down the latter and is also caused to eddy around on the screen.

2. A screening apparatus including a base, an inclined screen frame disposed above the base, elliptical springs resiliently supporting the screen frame above the base, said springs being disposed at opposite sides of the screen frame at each end of the latter, belt driven revoluble weighted means for vibrating said screen frame in a vertically elongated elliptical path having its major axis inclined at an angle between the vertical and the horizontal, and upwardly toward the higher end of the screen frame and means for guiding said springs when flexed while the screen frame is vibrated to prevent lateral movement of said frame.

3. A screening apparatus including a base, an inclined screen frame disposed above the base, elliptical springs resiliently supporting the frame above the base, said springs being disposed at opposite sides of the frame at each end of the latter, belt driven revoluble weighted means for vibrating said frame in a vertically elongated elliptical path having its major axis inclined at an angle between the vertical and the horizontal and toward the higher end of the screen frame, and guiding means for said springs to prevent lateral swaying of said frame.

4. A screening apparatus including a base, an inclined screen frame disposed above the base, elliptical springs resiliently supporting the frame above the base, said springs being disposed at opposite sides of the frame at each end of the latter, belt-driven revoluble weighted means for vibrating said frame in a vertically elongated elliptical path having its major axis inclined at an angle between the vertical and the horizontal and toward the higher end of the screen frame, and angular covers for said springs mounted upon the base and disposed at the outer sides of and over tops of said springs, said covers cooperating with said springs to prevent lateral swaying of said screen frame.

5. A screening apparatus comprising a base, an inclined screen carrying frame, resilient means supporting said frame above said base for free vertical and limited longitudinal vibration, means operatively associated with said resilient means to restrain said frame against lateral swaying and tilting movement, and belt-driven revoluble weighted means on said frame for imparting vibratory movement to the latter in an elongated path whose major axis lies in a plane inclined between planes parallel with and perpendicular to the plane of the screen carrying frame and also inclined toward the higher end of said frame, said resilient means comprising elliptical springs disposed longitudinally at opposite sides of the frame at each end of the latter.

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