June 7, 1938. J. MESS ET AL 2,120,032

VIBRATORY SCREEN

Filed April 30, 1937 2 Sheets-Sheet 1

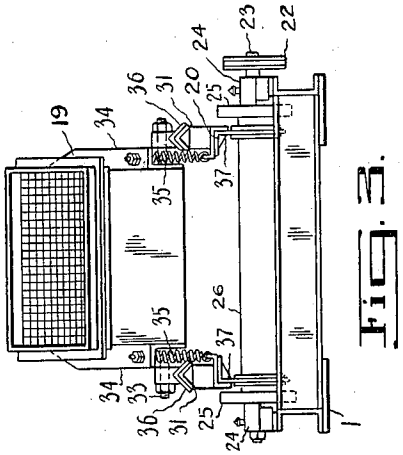
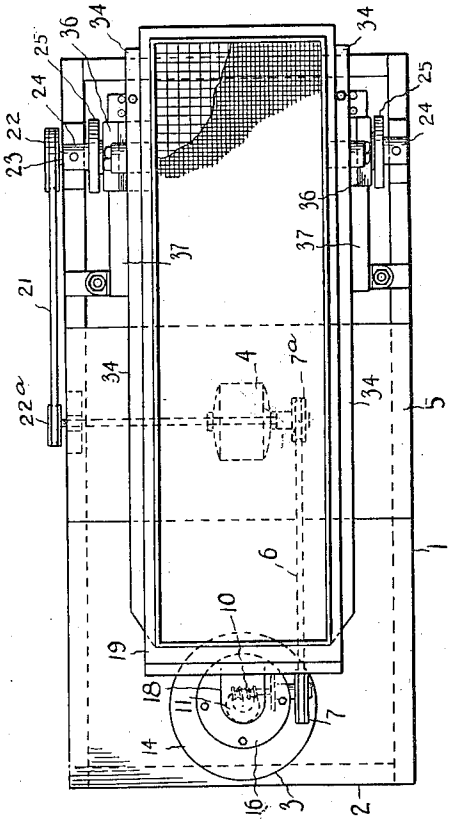


Fig. 3.

Fig. 1.



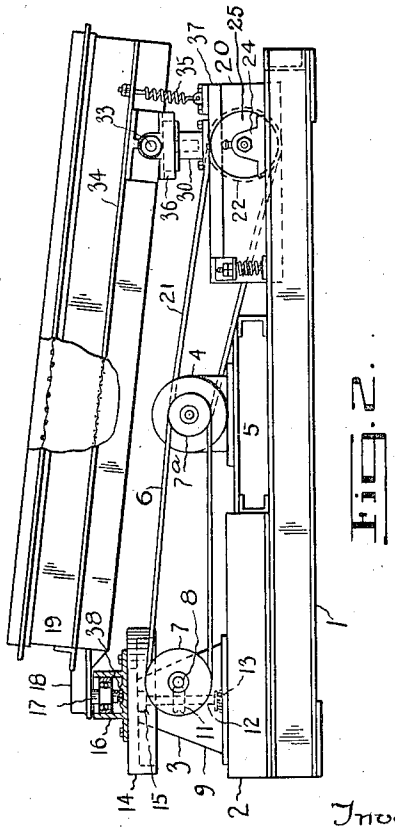


Fig. 2.

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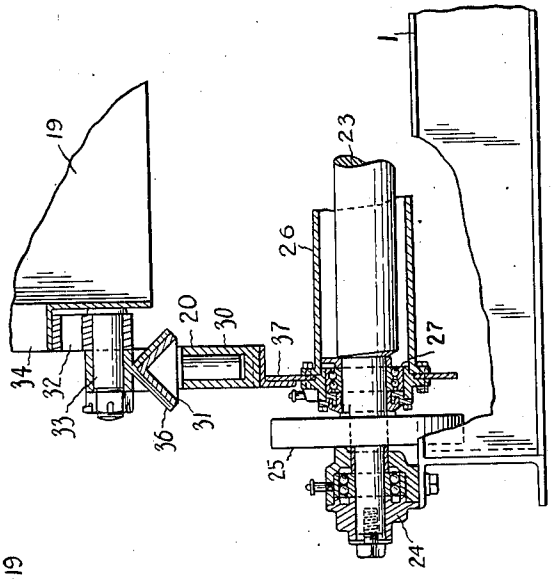


Fig. 5.

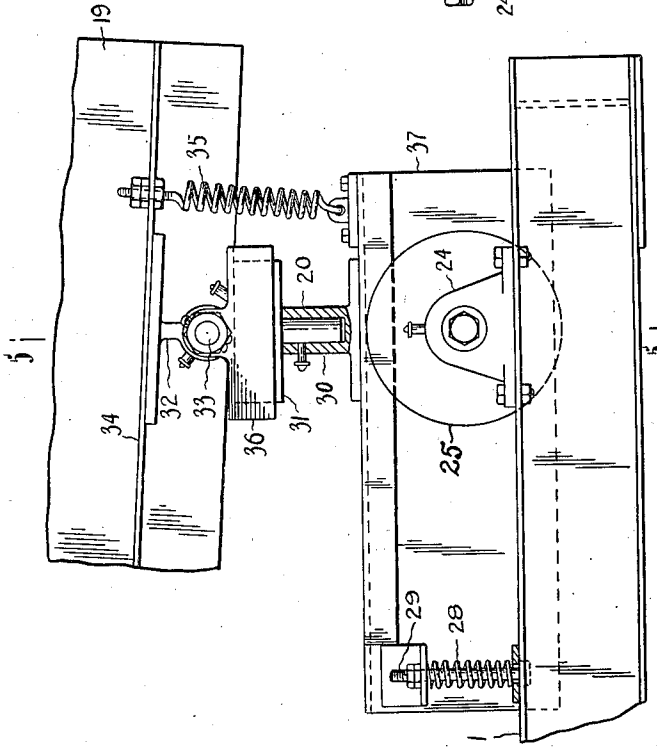


Fig. 4.

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UNITED STATES PATENT OFFICE

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VIBRATORY SCREEN

James Mess and Robert Stroud, Toronto, Ontario, Canada, assignors to Niagara Screens & Machines Limited, Toronto, Ontario, Canada

Application April 30, 1937, Serial No. 139,857

6 Claims. (Cl. 209—325)

This invention relates to screening apparatus in which movement is imparted to screens, which are but slightly inclined, to facilitate the flow of discrete material over the screens and the settling out of the smaller particles to pass through the screen, and my object is to devise a simple, durable construction which will effectively handle a wide range of material.

This object we attain by means of a construction which may be briefly described as follows. A slightly inclined screen frame is gyrated in the planes of its screens by eccentric gyrating means, the connection with the frame being at one end and such that the screen frame may rock vertically about an axis adjacent the gyrating means.

The other end of the screen frame is supported in such a way that it may move longitudinally in response to the gyrating means but not laterally, while means are provided to impart a vertical vibratory movement to said end.

The screen frame must also be rockable relative to the vibrating means on a vertical axis to permit of the gyratory movement taking place.

The invention is hereinafter more fully described and is illustrated in the accompanying drawings in which

Fig. 1 is a plan view of the apparatus;

Fig. 2 a side elevation;

Fig. 3 an end view;

Fig. 4 a side elevation partly broken away of the discharge end of the screen frame and the supporting and vibrating means; and

Fig. 5 a section on the line 5—5 in Fig. 4.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

The device is carried on a main base 1 on which is mounted on one end a sub base 2, and a gyrating unit 3.

The gyrating unit 3 is driven by a motor 4 which is mounted on the base 1 midway between its ends on a platform 5, through a V-belt 6 and pulleys 7, 7a. The pulley 7 is secured to a horizontal shaft 8 which is journalled in the worm gear housing 9 of the gyrating unit 3. Secured to the shaft 8 and substantially midway between its journals is a worm 10 which drives the worm wheel 11. The worm wheel 11 is secured to the vertical shaft 12. The vertical shaft 12 is journalled in bearings 13, 15 on the worm gear housing 9. To the upper end of the vertical shaft 12 is secured a fly wheel 14. Mounted on the top of the fly wheel 14 is a bearing 16 which is eccentric to the fly wheel 14. Journalled in the bearing 16 is a pin 17 which is part of a bracket 18 which is secured to the screen frame 19. The bearing 16 must be of a self-alining type to permit the screen frame to rock in a vertical direction as hereinafter described.

The object of having the bearing 16 off the centre line on which the fly wheel 14 rotates is that the bearing 16 will transmit a gyrating motion through the pin 17 and the bracket 18 to the screen frame 19. A thrust bearing 38 supports the pin 17 to hold up the bracket 18 clear of the housing of the bearing 16.

Carried in the screen frame 19 are one or more screens, the lower one of which is of a finer mesh than the upper one. On the other end of the main base 1 is carried a vibrating unit 20. The vibrating unit 20 is driven by the motor 4 through the V-belt 21 and pulleys 22, 22a. The pulley 22 is secured to a shaft 23 which is carried by the bearings 24, 24 on the main base. On the shaft 23 and on the inner side of the bearings 24, 24 and immediately adjacent thereto are fly wheels 25, 25. The shaft 23 between the two fly wheels 25, 25 is enclosed in a housing 26. Inside this housing at opposite ends are two bearings 27, 27 (only one shown, see Fig. 5) which are eccentric to the bearings 24, 24. Secured to the housing 26 at each end is a saddle 37 which is flexibly and resiliently connected at its front end to the main base 1 by a spring 28 and bolt 29 to permit of small rocking movements of the end in a vertical longitudinal plane. Carried on the saddle 37 are bearing members 30 in which the V-tracks 31, 31 are pivoted so that they may swing horizontally.

Carried on the angle members 34, 34 of the screen frame 19 and at the opposite end of the frame to the gyrating unit 3, are supports 32, 32 carrying journals 33, 33. Pivotally mounted on the journals 33, 33 of the supports 32, 32 are V-guides 36, 36 which rest on the V-tracks 31, 31.

Springs 35 have each an end connected to the angle members 34, 34 by means of a nut and bolt, and the other end to the saddle 37 of the vibrating unit 20. The springs 35, 35 hold the V-guides 36, 36 against the V-tracks 31, 31.

The operation is as follows: The gyrating unit 3 is driven by the motor 4 by means already described. As the bearing 16 is mounted eccentrically on the fly wheel 14 each time the fly wheel rotates, a combined longitudinal and lateral motion is given the screen frame 19. This gives the part of the screen nearest the gyrator a very extensive gyratory action in the plane of the screen

which diminishes towards the end of the screen over the vibrator unit 20.

The vibrating unit 20, which is driven by the motor 4 by means already described, gives a very sharp up and down vibration at a point at which there is little or no lateral motion imparted by the gyrating unit.

From the foregoing, it may be seen that the screen has a swinging or gyrating motion given it in an approximate horizontal plane by the gyrating unit as well as a vertical vibrating motion given it by the vibrating unit, and that the screen frame is so supported as to permit these movements to take place simultaneously.

It has been found that the gyrating motion is very valuable for screening certain types of material, and the vibrating motion for other types of screening, and that the combining of the two motions makes it possible for the screen to handle practically all types of material.

Usually the gyratory movement will be much slower than the vibratory movement but any ratio may, of course, be arranged by varying the drive.

What we claim as our invention is:

1. Screening apparatus comprising a base; a screen frame; gyrating means on the base adapted to impart a gyratory movement to one end of the screen frame in a substantially horizontal plane; vibrating means on the base for imparting a vertical vibratory movement to the other end of the screen frame; connecting means between the screen frame and the gyrating means such that the screen frame may rock vertically on the gyrating means; and supporting means for the screen frame adjacent the vibrating means such that the screen frame may rock vertically on an axis at the first mentioned end and horizontally on an axis at the second mentioned end.

2. Screening apparatus comprising a base; a screen frame; gyrating means comprising a vertical shaft, a fly wheel secured thereto, a self-alining bearing secured to the fly wheel eccentric to the axis of the latter and a pin depending from one end of the screen frame and received in the bearing; vibrating means on the base for imparting a vertical vibratory movement to the other end of the screen frame; connecting means between the screen frame and the gyrating means such that the screen frame may rock vertically on the gyrating means; and supporting means for the screen frame adjacent the vibrating means such that the screen frame may rock vertically on an axis at the first mentioned end and horizontally on an axis at the second mentioned end.

3. Screening apparatus comprising a base; a screen frame; gyrating means on the base adapted to impart a gyratory movement to one end of the screen in a substantially horizontal plane and to support the said end for swinging vertically; a shaft journalled on the base transversely of the screen frame and remote from the gyrating means; eccentrics secured to the shaft; a saddle at each side of the device actuable by the adjacent eccentric to rise and fall; a resilient flexible connection between the saddle and the base to permit of a gyratory movement of the saddle in a vertical longitudinal plane; a V-track pivoted on each saddle to swing horizontally; and a V-guide resting on each V-track pivotally connected to the screen frame to rock in a vertical longitudinal plane.

4. Screening apparatus comprising a base; a screen frame; gyrating means on the base adapted to impart a gyratory movement to one end of the screen in a substantially horizontal plane and to support the said end for swinging vertically; a shaft journalled on the base transversely of the screen frame and remote from the gyrating means; eccentrics secured to the shaft; a saddle at each side of the device actuable by the adjacent eccentric to rise and fall; a resilient flexible connection between the saddle and the base to permit of a gyratory movement of the saddle in a vertical longitudinal plane; a V-track pivoted on each saddle to swing horizontally; a V-guide resting on each V-track pivotally connected to the screen frame to rock in a vertical longitudinal plane; and spring means holding the guides and tracks in engagement.

5. Screening apparatus comprising a base; a screen frame; gyrating means on the base adapted to impart a gyratory movement to one end of the screen in a substantially horizontal plane and to support the said end for swinging vertically; a shaft journalled on the base transversely of the screen frame and remote from the gyrating means; eccentrics secured to the shaft; a saddle member suitably supported and guided to be gyratable in a vertical longitudinal plane by the adjacent eccentric; a V-track pivoted on each saddle to swing horizontally; and a V-guide resting on each V-track pivotally connected to the screen frame to rock in a vertical longitudinal plane.

6. Screening apparatus comprising a base; a screen frame; gyrating means on the base adapted to impart a gyratory movement to one end of the screen in a substantially horizontal plane and to support the said end for swinging vertically; a shaft journalled on the base transversely of the screen frame and remote from the gyrating means; eccentrics secured to the shaft; a saddle member suitably supported and guided to be gyratable in a vertical longitudinal plane by the adjacent eccentric; a V-track pivoted on each saddle to swing horizontally; a V-guide resting on each V-track pivotally connected to the screen frame to rock in a vertical longitudinal plane; and spring means holding the guides and tracks in engagement.

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