Jan. 6, 1931. G. W. BEHNKE ET AL 1,787,852

VIBRATING SCREEN

Filed Oct. 21, 1926 3 Sheets-Sheet 1

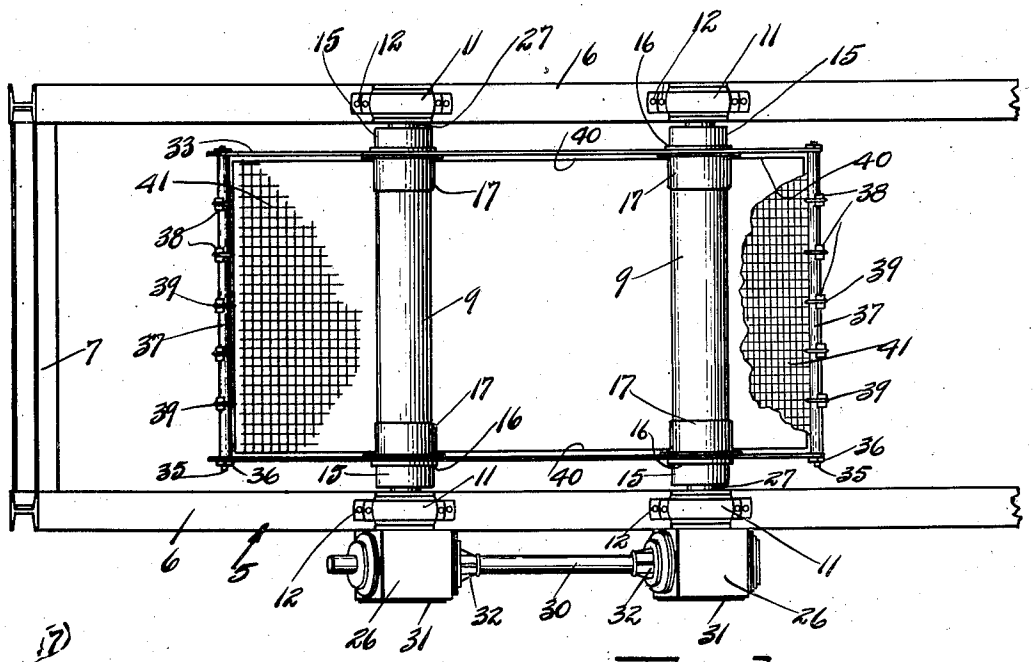


Fig. 2.

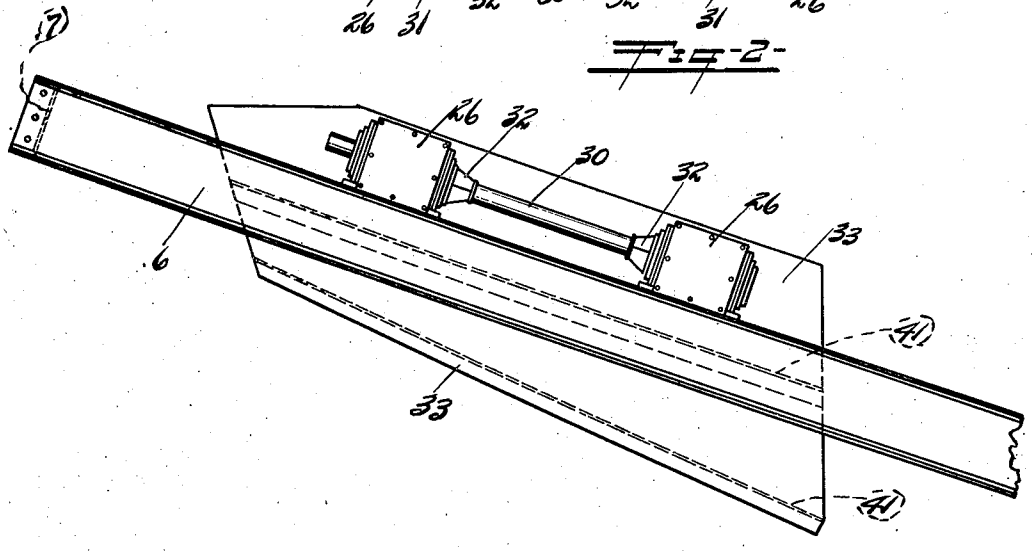


Fig. 1.

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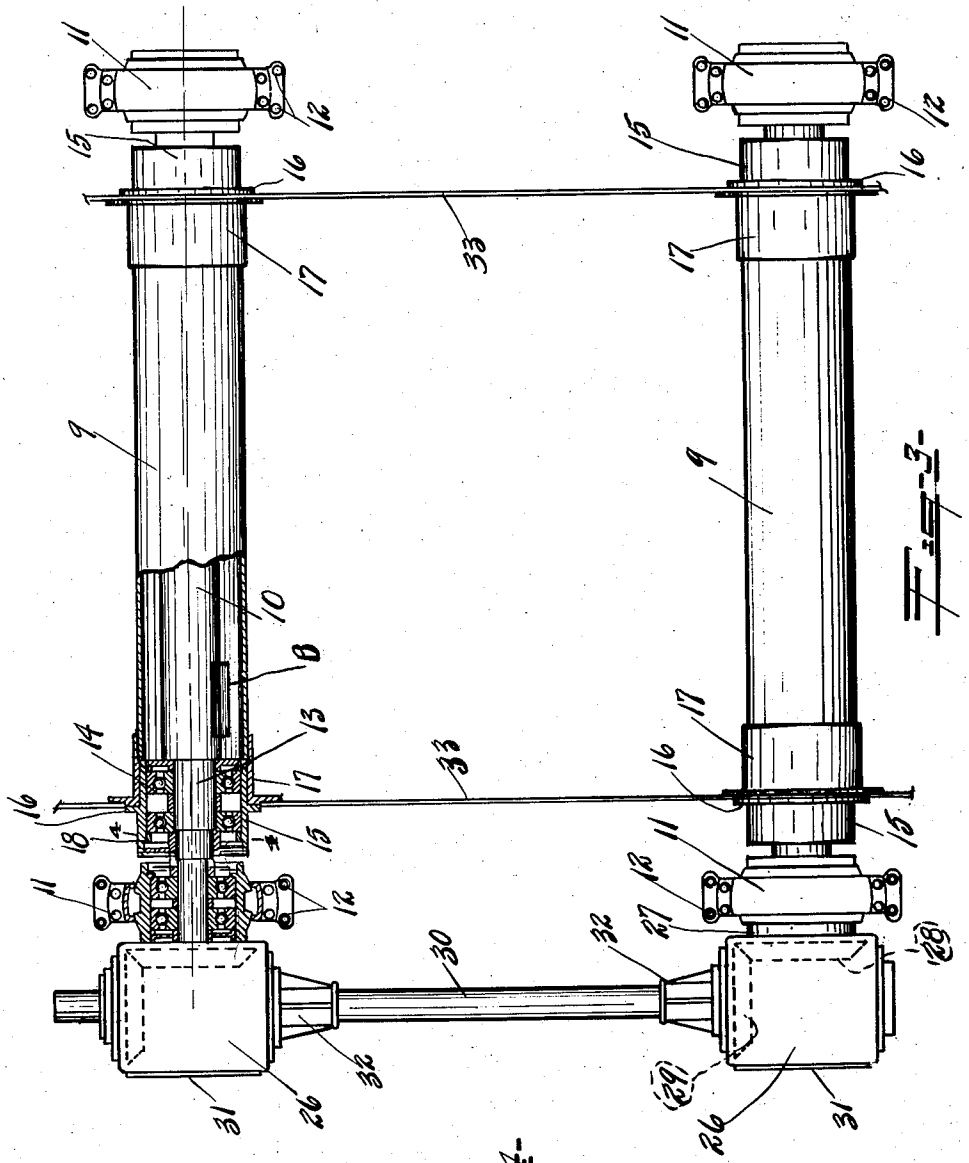


Fig. 3.

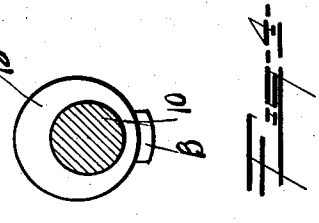


Fig. 4.

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Filed Oct. 21, 1926 3 Sheets-Sheet 3

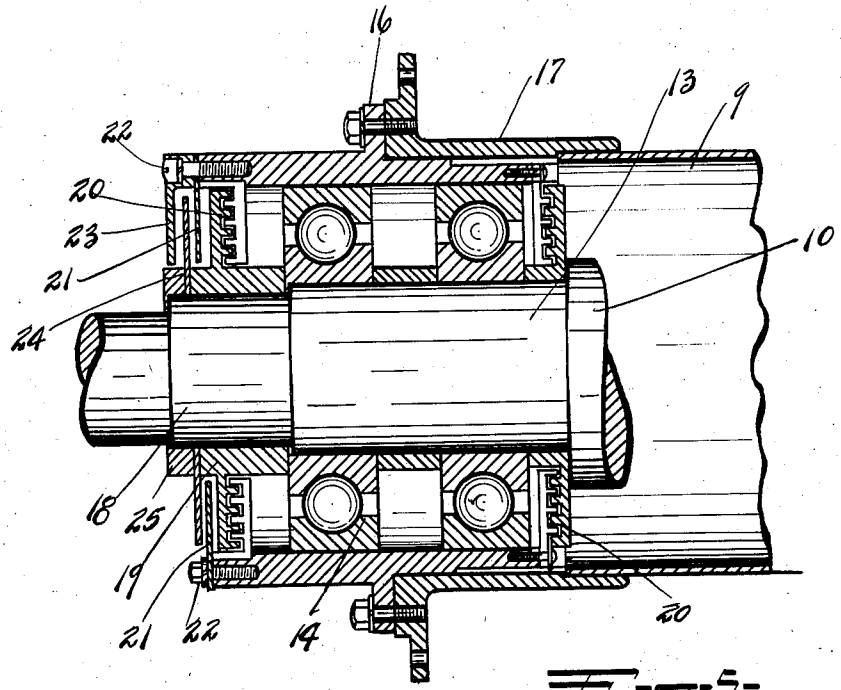


Fig. 5.

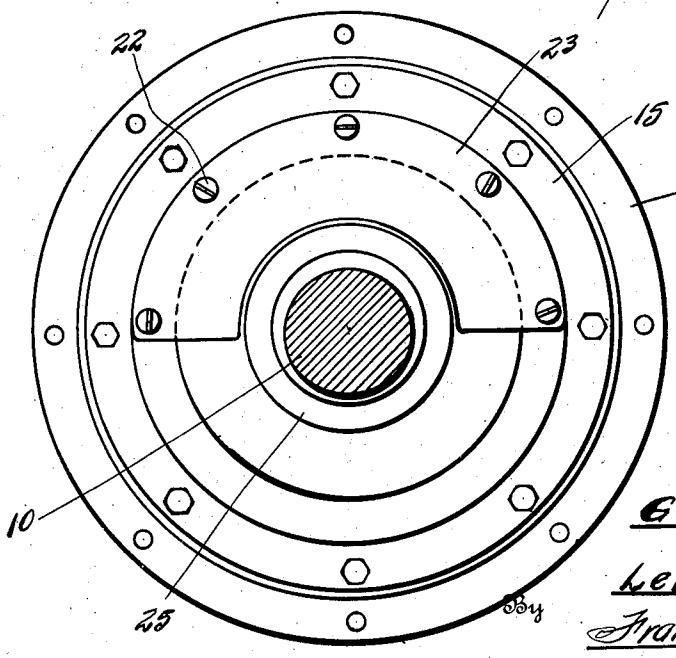


Fig. 6.

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UNITED STATES PATENT OFFICE

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VIBRATING SCREEN

Application filed October 21, 1926. Serial No. 143,059.

This invention relates to oscillatory screens for screening sand, gravel, coal, ore, slag and various other fragmentary materials of either wet or dry classification.

The prime object of the invention is to design a balanced oscillatory screen in which frame vibration is entirely eliminated, and provide means for imparting an eccentric oscillatory movement to the screen to throw the product being screened both horizontally and vertically.

One object of the invention is to design a screen having an eccentric movement which will have no dead spots, which will not blind or load, and in which the action is exactly the same at the extreme edges as at the center of the screen.

Another object is to design a practical, substantial and efficient screening device, which will have a maximum capacity for the area of the screen, and to which additional screen units may be quickly and easily added without changing the driving mechanism or frame proper.

A further object is to design a screen in which the entire driving mechanism, such as shafting, bearings, gears, etc., is entirely enclosed in a dust proof housing, making it dust and dirt proof.

A further object still is to provide spaced apart shafts having dust proof housings with eccentrics mounted therein a screen and frame hung from said housing and which are synchronized by a shaft and gearing, eliminating vibration from the machine frame proper.

The above and other objects will appear as the specification progresses, reference being had to the accompanying drawings in which we have shown the preferred embodiment of our invention, and in which like reference numerals indicate like parts throughout the several views thereof.

In the drawings.

Fig. 1 is a side view of our improved screening device showing a two deck machine.

Fig. 2 is a top plan view thereof.

Fig. 3 is an enlarged part sectional detail of the dust proof housing and drive.

Fig. 4 is a section taken on the line 4—4 of Fig. 3, and illustrating the eccentric.

Fig. 5 is an enlarged fragmentary sectional view illustrating the dust proof closure for the end of the shell.

Fig. 6 is an end view thereof.

Referring now particularly to the drawings in which we have shown the preferred embodiment of our invention, the numeral 5 indicates the frame of the machine which comprises spaced apart inclined side members 6 connected at the top and bottom by means of a cross member 7, and while in the present instance we have shown and prefer to make the frame of structural members, it will of course be understood that cast side plates or any other suitable construction may be used.

A pair of dust proof housings 9 extend transversely across the frame, and are adapted to contain the vibrating mechanism for imparting motion to the screen proper, shafts 10 being mounted therein and journaled in ball type self alining bearings 11 secured to the frame by means of bolts 12 in the usual manner.

Certain spaced apart sections of the shaft 10 are turned to form counterbalanced eccentrics as clearly shown at 13 in Fig. 3 of the drawings, and are surrounded by ball races 14 which are mounted in a tubular brace container 15, and which is provided with a centrally disposed vertical fin or flange 16 formed integral therewith, a flanged tubular member 17 being the one end of the container 15, and is adapted to receive the end of the tubular housing 9 which can be welded or otherwise secured thereto to provide a leak and dust proof joint. The counterbalancing of the main shaft is accomplished by turning certain sections of the main shaft off center to form eccentrics which are journalled in the said bearings on which the tubular brace container or housing 9 is mounted. The central section of the main shaft acts as a weight or counterbalance which is directly opposed to the throw of the eccentrics, and in manufacturing these shafts they are accurately weighed with relation to the throw of the eccentrics to produce the desired counter-

balancing action. The shaft immediately adjacent the one end of the bearing is turned to a smaller diameter as shown at 18, a hub 19 being mounted thereon and provided with grooved interlocking flanges 20, which form a closure for the end of the member 15, as well as an oil seal to prevent the escape of oil from the bearing, suitable fittings, (not shown) being provided for introducing oil to the bearings.

A disc or shield member 21 is secured to the end of the tubular housing 15 by means of set screws 22, which also secure the member 23 in position, said member being formed as clearly shown in Fig. 6 of the drawings, and acting as a slinger to throw dirt, dust, and foreign matter from the bearing; a second disc or shield member 24 embraces the shaft, and a hub 25 holds it tightly in position; the above described arrangement precludes the possibility of dirt or foreign matter getting to the bearing.

Gear boxes 26 are provided at one side of the frame into which the ends of the shafts 10 extend, and these gear boxes are secured to the tubular member 27 of the bearing 11 in any approved manner, a bevel gear 28 being mounted on the end of the shaft 10, meshing with and being driven by a similar gear 29 which is mounted on a longitudinally disposed shaft 30, which connects and drives the shafts 10, a motor (not shown), being mounted on the upper end of the frame, and connected to the projecting end of the shaft 30 to form a direct drive, or a gear or pulley can be mounted on this shaft and driven from any convenient source of power, and it will be obvious that the screen actuating mechanism will be accurately synchronized by the shaft and gears, and that the action will be exactly the same on all parts of the screen.

Plates 31 are detachably connected to the side of the gear boxes, and removable sleeves 32 provide bearings for the transversely disposed shafts.

Vertically disposed side plates 33 are secured to and hang from the flanges 16 of the members 15, and are secured thereto by means of bolts, the lower ends of the plates being connected by means of a rod 35, the ends of which are threaded to receive nuts 36, a pipe spacer 37 being mounted on the rod, and clips 38 are secured thereon in spaced relation, and are formed with suitable openings adapted to receive the threaded end of a hook bolt 39 which engages the frame 40 over which the screen 41 is stretched, and when it is desired to remove the screen, it is merely necessary to release the nuts on the hook bolts, when the screen can be quickly and easily removed.

In practice the power is applied as above described, the shafts 10 revolve in the bearings 14, the eccentrics producing a distinct horizontal and vertical throw, the counterbalancing of these shafts eliminates frame vibration, and the synchronizing of these shafts insures the same vibration at every spot on the screen regardless of the speed, and the enclosing of all moving parts eliminates the possibility of accident or injury to the operator by having clothing or other material caught in the machine and provides a dust and dirt proof construction.

The fact that any reasonable number of screens may be added to the same unit without in any manner changing so that any desired separation may be secured is also a desirable feature.

From the foregoing description it will be obvious that we have perfected a very simple, substantial and effective screening device.

What we claim is:—

1. The combination of a screen provided with side plates rigidly connected to the screen and preventing independent vibration of the same, a transversely disposed counterbalanced shaft having eccentrics thereon, a dust proof case enclosing said counterbalanced shaft and eccentrics, the case being closed from end to end and connected with and supporting the side plates and the screen.

2. The combination of a frame, an oscillating mechanism mounted thereon and comprising a counterbalanced shaft provided with eccentrics, a dust proof case enclosing said shaft and eccentrics, a screen provided with substantially parallel side plates rigidly connected with the screen and with the case and preventing independent vibration of the screen, said plates depending from the dust proof case and adapted to receive additional screens, and means for driving said oscillating mechanism.

3. The combination of a frame, spaced apart oscillating mechanism mounted thereon and comprising transversely disposed counterbalanced shafts having eccentrics thereon, a plurality of screens provided with side plates common to all of the screens and rigidly connected with the same and preventing independent vibration of the screens, said side plates being secured to said oscillating mechanism, a case enclosing said shaft and eccentrics, said case being closed from end to end and connected with and bracing the side plates, and means connecting said transversely disposed shafts for driving and synchronizing the same.

4. The combination of a frame, an oscillating mechanism mounted thereon and comprising a transversely disposed counterbalanced shaft having eccentrics, a combined tubular brace and dust proof case enclosing said shaft and eccentrics, a screen having substantially parallel side plates rigidly connected with the screen and with the case and preventing independent vibration of said screen, said case being closed from end to end.

5. The combination of a screen having side

walls consisting of plates rigidly connected with the screen, an oscillating mechanism comprising transversely disposed counterbalanced shafts having eccentrics thereon, a tubular dust proof case enclosing each shaft and eccentrics and secured to said side walls at the upper portions thereof, said side walls depending from the tubular cases and preventing independent vibration of the screen and adapted to receive additional screens.

6. The combination of a screen having side walls consisting of plates rigidly connected with the screen and preventing independent vibration of the screen, an oscillating mechanism comprising spaced apart transversely disposed counterbalanced shafts having eccentrics thereon, a combined tubular brace and dust proof case enclosing each shaft and eccentrics and secured at its ends to the screen walls, said walls depending from the dust proof cases and adapted to receive additional screens, and means connected with the shafts for synchronizing and imparting rotary motion thereto.

7. The combination of a screen having side walls consisting of substantially parallel plates rigidly connected with the screen and preventing independent vibration of the same, oscillating mechanism comprising spaced apart transversely disposed counterbalanced shafts having eccentrics, a combined tubular brace and dust proof case enclosing each shaft and eccentrics and secured at its ends to said walls for supporting and stiffening the screen, said walls depending from the said cases and adapted to receive additional screens and said cases being closed from end to end, and driving means connecting the said shafts and synchronizing the same.

8. The combination of a screen having side walls consisting of substantially parallel plates rigidly connected with the screen and preventing independent vibration of the same oscillating mechanism comprising spaced apart transversely disposed counterbalanced shafts having eccentrics thereon, a combined tubular brace and dust proof case enclosing each shaft and eccentrics and secured to the ends of the screen walls at the upper portions thereof, said screen walls depending from the said dust proof cases and adapted to receive additional screens, means forming closures for the ends of the dust proof cases, and driving means connecting said shafts and synchronizing the same.

In testimony whereof we affix our signatures.

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