

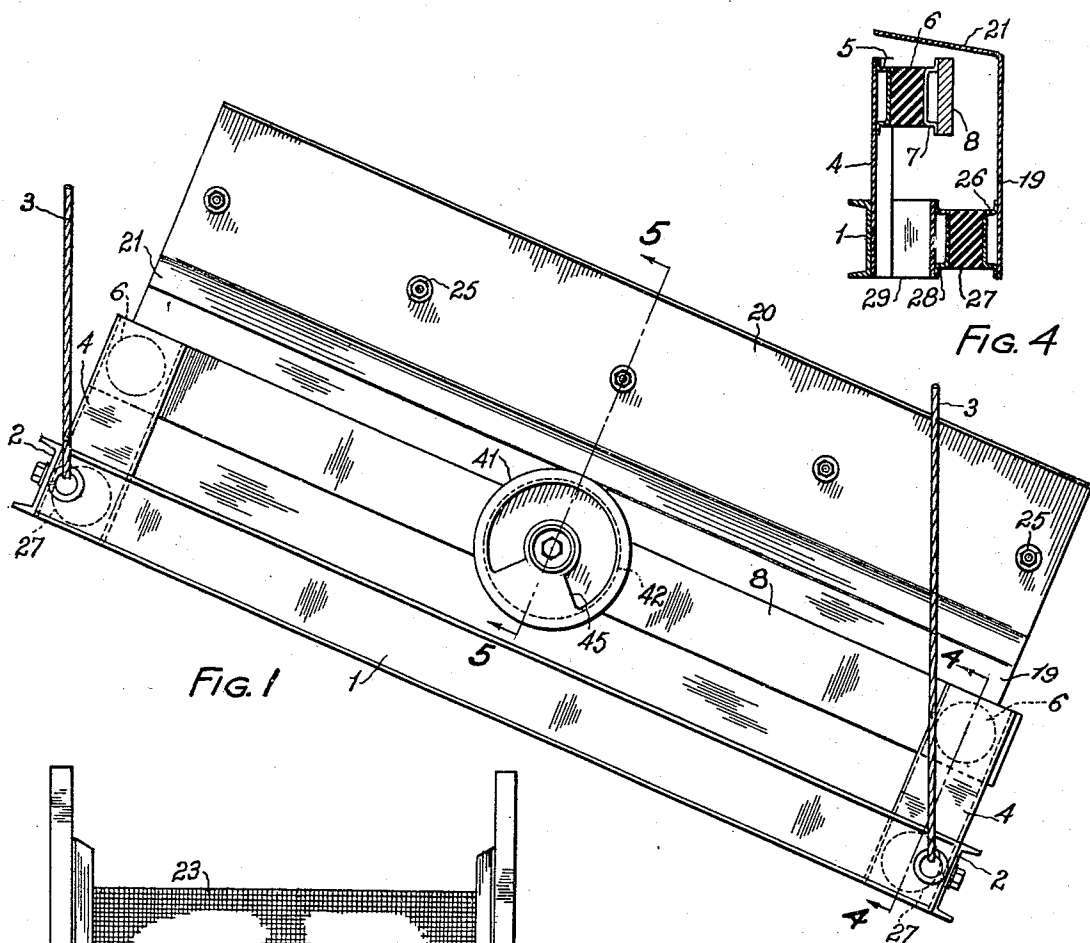
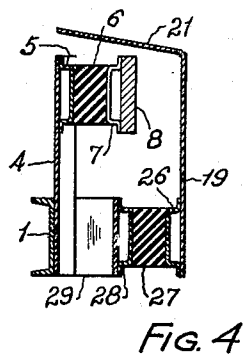
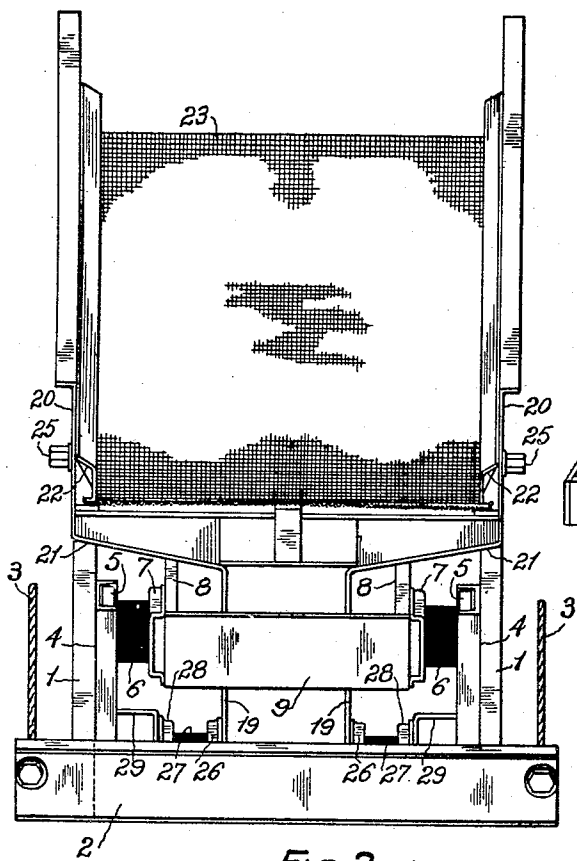
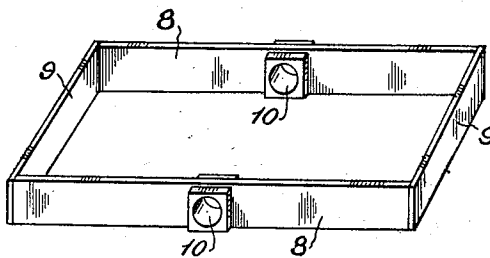
Feb. 16, 1943.

W. J. PARKS
SCREENING APPARATUS

Filed May 13, 1939

2,311,279

3 Sheets-Sheet 1



INVENTOR
WALTER J. PARKS
BY
Horace B. Fay
ATTORNEY

Feb. 16, 1943.

W. J. PARKS

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3 Sheets-Sheet 2

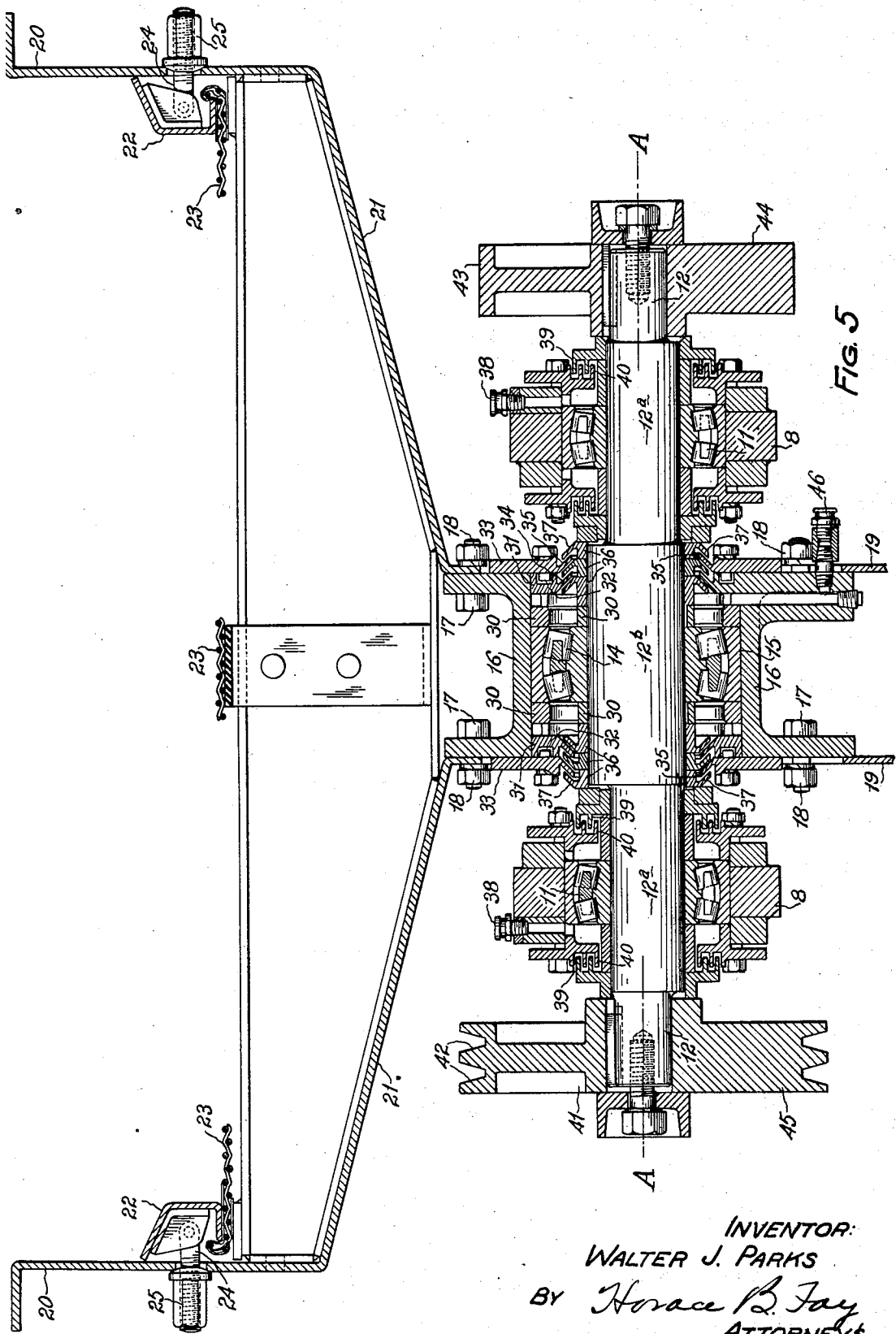


FIG. 5

INVENTOR:
WALTER J. PARKS
BY *Horace B. Fay*
ATTORNEY.

Feb. 16, 1943.

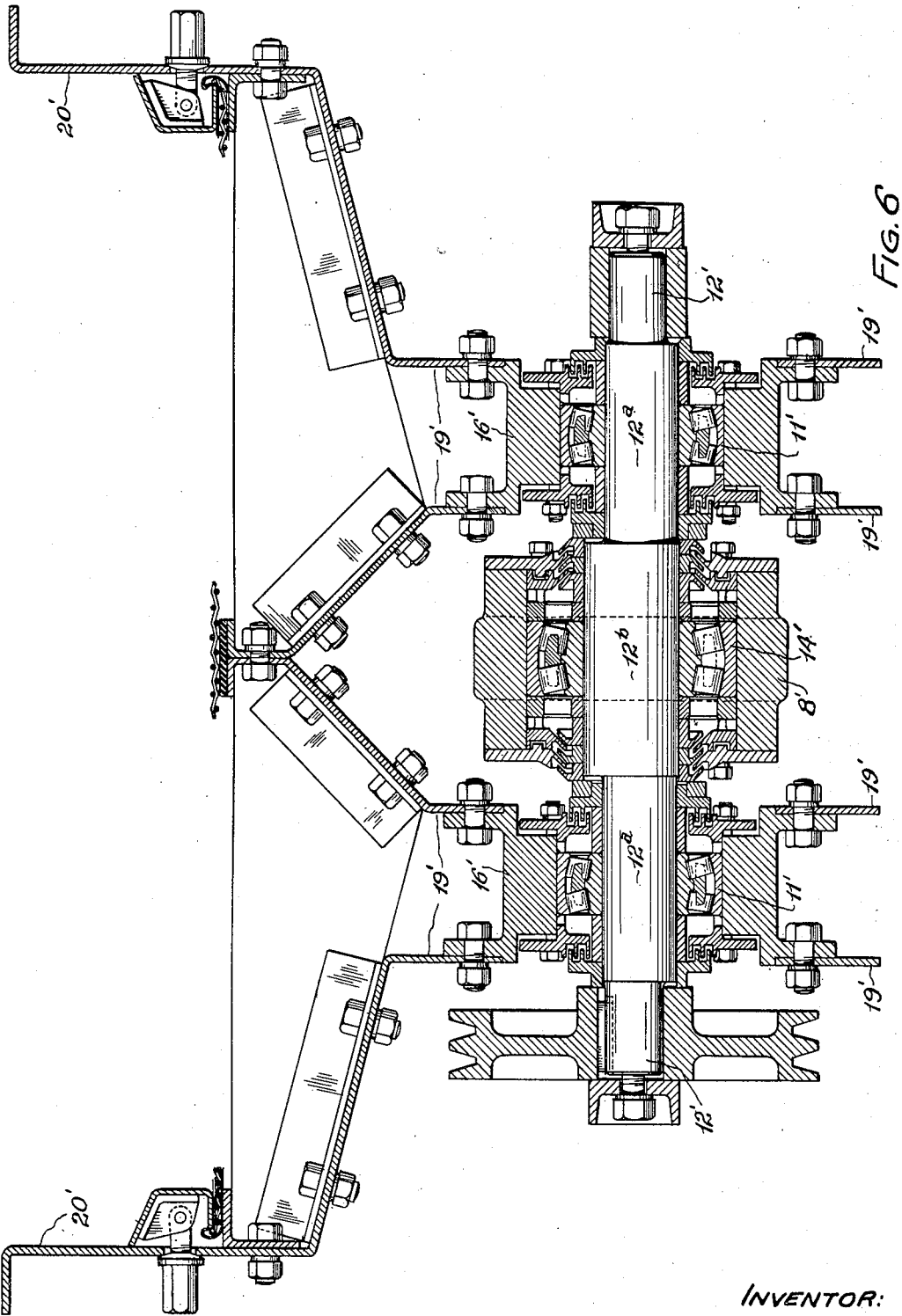
W. J. PARKS

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SCREENING APPARATUS

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3 Sheets-Sheet 3



INVENTOR:

WALTER J. PARKS

BY

Horace B. Joy

ATTORNEY.

UNITED STATES PATENT OFFICE

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SCREENING APPARATUS

Walter J. Parks, Shaker Heights, Ohio

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6 Claims. (Cl. 209—326)

This invention relates generally to screening apparatus, and has reference more particularly to that type of screening apparatus in which the screen body has imparted thereto a gyratory movement in a circular path lying in a plane at right angles to the drive shaft.

A primary object of the invention is to provide apparatus of the aforesaid character, in which a considerable saving is effected in bearing and other costs by the use of only three bearings in association with the drive shaft of the apparatus.

Another object of the invention is to provide apparatus of the aforesaid character in which the bending of the drive shaft is minimized.

A further object of the invention is to provide in apparatus of the character described a more compact arrangement of the drive shaft supporting arms and of the bearings.

A further object of the invention is to provide self-aligning bearing seals which are effective through a much wider range of angular movement between the drive shaft and the bearing housing than has heretofore been possible with existing types of seals.

A still further object of the invention is to so arrange the driving elements in apparatus of the character described in such a manner as to make the counter-balance flywheels more accessible for removal, replacement, adjustments, etc.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and the following description setting forth in detail a certain structure embodying the invention, such disclosed means constituting, however, but one of structural forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a side elevational view of screening apparatus embodying my invention;

Fig. 2 is a front elevation of the apparatus;

Fig. 3 is a perspective view of the drive shaft supporting frame;

Fig. 4 is a fragmentary cross-sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a transverse cross-sectional view, taken on the line 5—5 of Fig. 1; and

Fig. 6 is a view similar to Fig. 5, but showing a modification of the apparatus.

Referring more particularly to Figs. 1 to 5 inclusive of the drawings, the apparatus is seen to comprise a rectangular supporting frame consisting of channels 1 and 2 and supported in an

inclined position, as by means of cables 3, which are secured to an overhead supporting structure (not shown).

Secured to the channels 1, adjacent the ends thereof, and extending perpendicularly to such channels, are channel members 4, having channel-shaped plates 5 secured to the webs thereof at their upper ends, such plates having vulcanized thereto circular blocks 6 of rubber or like resilient material.

Secured, as by vulcanization, to the inner faces of the rubber blocks 6, are channel-shaped plates 7, which, in turn, support a gyratory body comprising a pair of transversely spaced side arms 8, connected at their ends, as by cross arms 9. The side arms have circular openings 10 therein at points midway of the ends thereof, and disposed within these openings are self-aligning roller bearings 11, in which are journaled the portions 12^a of a drive shaft 12. The shaft 12 also has a central portion 12^b which is eccentric to the portions 12^a of the shaft, and which is journaled in a self-aligning roller bearing 14 mounted in the central bore 15 of a bearing housing 16.

The bearing housing 16 is secured, as by means of bolts 17 and nuts 18, to the transversely spaced portions 19 of a gyratory screen body or support having side plates 20 and sloping bottoms 21, the portions 19 being parallel with the side plates 20. Secured to the side plates 20, as by means of stretcher strips 22, is the screen 23, the tension of which may be adjusted by means of the clevis bolts 24 and nuts 25, as is common in this type of apparatus.

The plates 19 have secured thereto adjacent their lower edges, channel-shaped plates 26, to which are vulcanized circular rubber blocks 27, which, in turn, are vulcanized to channel-shaped plates 28, these in turn being supported by brackets 29, which are secured to the channel members 4 and channels 2.

Disposed adjacent the roller bearing 14 are inside spacers 30, and in spaced relation to the spacers 30 are bearing seal rings 31, the outer faces of which are flush with the outer faces of the bearing housing 16. The rings 31 are held against rotation by means of dowel pins 32 on sealing elements 33 which are secured to the bearing housing. The rings 31 and sealing elements 33 are respectively provided with flanges 34 and 35 which are in the form of frustrums of hollow cones having a common axis which is the axis of the eccentric portion 12^b of the drive shaft. Mounted on the eccentric portion 12^b of the drive shaft adjacent the spacers 30 and ro-

tatable therewith, is a series of bearing slingers 36, each of which has an annular flange 37, in the form of a frustrum of a hollow cone having as its axis the axis of the eccentric portion 12^b of the drive shaft, the flanges of the respective slingers being spaced apart axially to provide spaces for the flanges 34 and 35. The flanges 34, 35 and 37, it will be noted, are spaced from each other to an appreciable extent, and the function of these flanges will be presently described.

The bearings 11 are adapted to receive a supply of grease through Alemite fittings 38, and are accordingly provided with sealing elements 39 and 40 which prevent the grease from working its way out of the bearings and also serve to prevent entrance of dirt and dust into the bearings.

The shaft 12 is adapted to be driven by means of a drive of the endless V-belt type, and for this purpose has been keyed to one end thereof a pulley 41 having V-grooves 42 in the periphery. Mounted on the other end of the drive shaft is a flywheel 43 having an eccentric mass 44, which together with an eccentric mass 45 of the pulley 41, is available for balancing the mass of the screen body.

In operation, as the pulley 41 is driven, the drive shaft 12 rotates about a self-determined axis A—A, which lies between the axes of the bearings 11 and 14, so that the eccentric portion 12^b of the shaft imparts to the housing 16, and hence to the screen 25, a gyratory movement in a circular path lying in a plane at right angles to the drive shaft, and the portions 12^a of the drive shaft similarly impart a gyratory movement to the gyratory body 8—9 in a plane at right angles to the drive shaft.

Due to the provision of the drive shaft with a single eccentric drive portion at the center thereof for gyrating the screen body, instead of two such portions which are spaced apart, as in apparatus of this type heretofore used, a saving of one bearing is effected, as well as a saving in material, machining and other costs in the drive shaft, which, in this case, is considerably shorter than shafts heretofore used in apparatus of this type. Moreover, by using a shorter drive shaft, the bending of the shaft is considerably minimized, and a much more compact arrangement of the bearings and associated elements is attained than in apparatus of the type heretofore used.

Due to the manner in which the side plates are mounted in this type of construction, the possibility of relative angular displacement between the bearing housing 16 and the drive shaft is increased to some extent. However, by having the flanges 34, 35 and 37 of the rings and sealing elements extending at an angle to the drive shaft, and spaced slightly from each other, a greater range of such relative angular movement is possible, without causing binding of such flanges, and without in any way reducing the efficiency of these flanges in preventing the escape of grease supplied to the bearing 11 through Alemite fitting 46, or the entry of dirt and dust into such bearing.

During rotation of the outermost slingers 36, the flanges 37 thereof, by their centrifugal action, prevent dirt and dust from entering the space between such flanges 37 and the adjacent flanges 35 of the sealing elements 33. Similarly, the flanges 37 of the innermost slingers 36, by their centrifugal force, prevent the grease from working out of the space between such flange 37 and the adjacent flanges 34 of the rings 31. The

flanges 37 of the intermediate slingers 36 tend to retain any grease forced, when greasing, into the space between the flanges 34 and 35, inasmuch as the centrifugal force on both sides of these flanges 37 is directed outwardly towards the radially outermost portions of these spaces.

Another advantage of the present arrangement is that it permits the elements 41 and 43 to be disposed on the drive shaft outwardly of all of the bearings, as well as the side arms, thereby permitting ready access to the same for adjustment or replacement purposes.

Instead of mounting the portions 12^a of the shaft in a gyratory body, they may, if desired, be mounted in a fixed non- gyratory body, such as the supporting frame 1—2, which, in such case, will be suitably extended to support bearing housings for this purpose. In that case, the gyratory screen body will be counter balanced by means similar to the members 44 and 45, and the axis of rotation of the drive shaft will be the axis of the portions 12^a of the shaft, thereby eliminating gyratory vibrations in the supporting frame. This modification, since it will embody the use of sealing rings as described, and not more than three bearings, is deemed to be within the purview of the present invention.

In Fig. 6 I have shown a modification of the invention involving a reversal of parts. In this form of the invention the gyratory screen body 20' has two instead of one pair of transversely spaced portions 19', and the bearing housings 16' are secured to the portions 19'. Within these housings are mounted self-aligning roller bearings 11'. Journalled within the bearings 11' are the portions 12^a of the drive shaft 12, which in this case is identical in every respect with the drive shaft 12. Instead of employing a gyratory body having a pair of spaced side arms, as in the previously described form of construction, a gyratory body consisting of only a single centrally disposed longitudinally extending member 8' is used, and this body has mounted therein a self-aligning roller bearing 14', and this bearing has journalled therein the central portion 12^b of the drive shaft, which is eccentric to the portion 12^a. Bearing seals are provided for the bearing 14' which are identical in every respect with the seals shown for the bearing 14 in Fig. 5.

It will be understood that the drive shaft, when driven, will rotate about a self-determined axis which lies midway between the axes of the bearings 11' and 14'.

It is further understood that the portions 19' of the gyratory screen body 20' are resiliently secured at the lower portions of their ends to a stationary supporting frame (not shown), as in the first form of the invention, and that the gyratory body 8' is similarly secured at its ends to said frame (not shown).

For some purposes, the form of apparatus shown in Fig. 6 is preferred over that shown in the other figures.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a screening apparatus of the character described, the combination of a gyratory body, a substantially horizontal drive shaft extending substantially centrally through said body and

having an eccentric portion centrally thereof, a single self-aligning bearing in said body for gyrating the same, said bearing engaging said eccentric portion at substantially the central portion of the latter, and means for supporting said gyratory body for gyrating movement, said means including resilient body supporting members constructed and arranged to permit substantially universal movement of said body in a plane perpendicular to said shaft and also a limited tilting movement thereof in a plane substantially parallel to said shaft.

2. In a screening apparatus of the character described, a combination of a gyratory screen body, a substantially horizontal drive shaft extending substantially centrally through said body transversely thereof and having an eccentric portion centrally thereof, a single self-aligning bearing in said body for gyrating the same, said bearing engaging said eccentric portion at substantially the central portion of the latter, and means for supporting said gyratory screen body for gyratory movement, said means including resilient body supporting members secured to the supporting means and to said body and constructed and arranged to permit substantially universal movement of said screen body in a plane perpendicular to said shaft and also a limited tilting movement thereof in a plane substantially parallel to said shaft.

3. The combination of a gyratory screen body, a second gyratory body having spaced side arms, a rotary driving shaft for said screen body arranged centrally and transversely thereof and journaled in said side arms, said shaft having an eccentric portion centrally of its length, a self-aligning bearing in the screen body for vibrating the same, said bearing engaging said eccentric portion at substantially the central portion of the latter, a means for supporting said gyratory bodies for gyratory movement, said means including resilient body supporting means for the screen body and for the second gyratory body, said resilient supporting means being constructed and arranged to permit substantially universal movement of said bodies in a plane perpendicular to said shaft and also a limited tilting movement thereof in a plane parallel to said shaft.

4. In a screening apparatus, the combination of two gyratory bodies, a horizontally extending drive shaft having its central portion eccentric with respect to the portions adjoining said cen-

tral portion, and three bearings, one of said bearings being self-aligning and journaling said eccentric portion of the shaft and attached to one of said bodies, and the other two bearings journaling said adjoining portions of the shaft and attached to the other of said bodies, a means for supporting said bodies for gyratory movement including resilient body supporting means constructed and arranged to permit substantially universal movement of said bodies in a plane perpendicular to said shaft and also a limited tilting movement in a plane parallel to said shaft.

5. The combination of a gyratory screen body, a second gyratory body comprising a substantially rectangular frame having spaced side arms, a rotary horizontally extending drive shaft for said screen body arranged centrally transversely thereof and journaled in said side arms, said shaft having a single eccentric portion centrally of its length, a central self-aligning bearing in the screen body for gyrating said screen body, a means for supporting said gyratory bodies for gyratory movements, said means including resilient body supporting means constructed and arranged to permit substantially universal movement of said bodies in a plane perpendicular to said shaft and also a limited tilting movement thereof in a plane parallel to said shaft.

6. A combination of a main supporting frame, a gyratory screen body, means for resiliently mounting said screen body on said frame, a second gyratory body, means for resiliently mounting said second body on said frame, said second body comprising a substantially rectangular frame having spaced side arms, a rotary horizontally extending drive shaft for said gyratory bodies arranged centrally and transversely thereof and journaled in said side arms, said shaft having a single eccentric portion centrally of its length, and a centrally self-aligning bearing in the screen body engaged by the eccentric portion of said shaft, said means for resiliently mounting said screen body and said second gyratory body including resilient body supporting members, said resilient body supporting means being constructed and arranged to permit substantially universal movement of said screen body in a plane perpendicular to said shaft and also a limited tilting movement thereof in a plane parallel to said shaft.

WALTER J. PARKS.