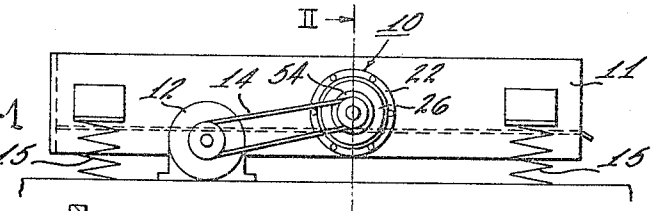
Aug. 9, 1966 R. G. HOLMES 3,264,887

ROLLER VIBRATOR

Filed Nov. 29, 1963

Fig. 1



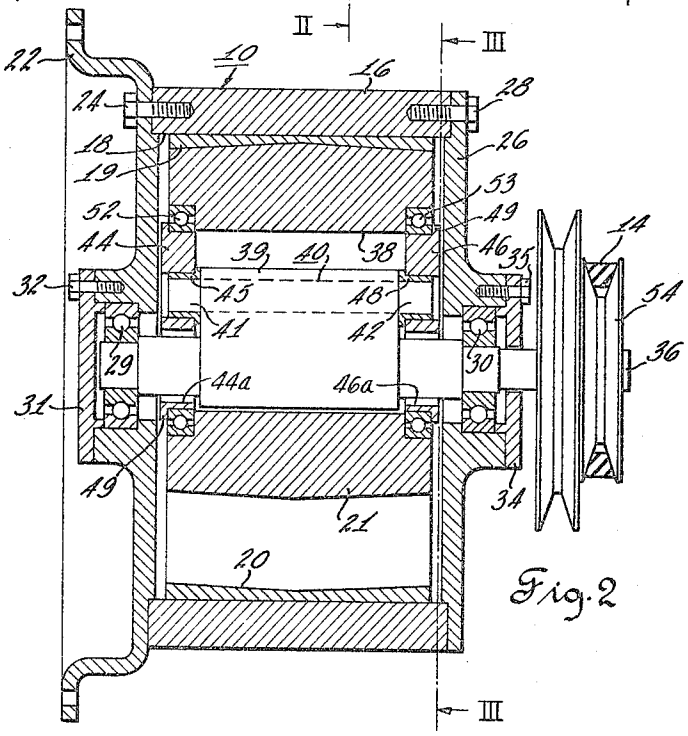


Fig. 2

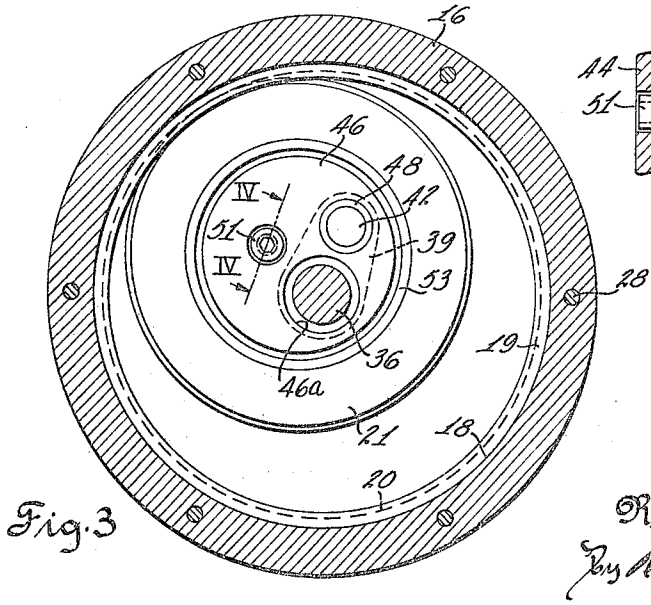


Fig. 3

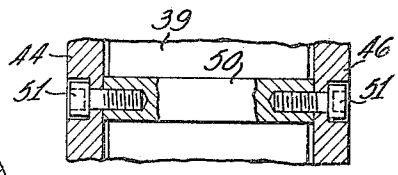


Fig. 4

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ROLLER VIBRATOR

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5 Claims. (Cl. 74—87)

This invention relates generally to roller vibrators and more particularly to an improvement in connecting the roller to its driving shaft.

Most vibrators utilize a weight which is rotated about the driving shaft while the weight is in contact with some means adapted to be connected to a mass to be vibrated. Due to centrifugal force, the weight exerts a force of constantly changing direction on the means as the weight moves along its arc. The means, since attached to the mass to be vibrated, transmits the varying force or vibration to the mass. The mass is often a trough for conveying loose material or a device for screening same.

The vibrators, although operating on the same principle noted above, frequently differ in the manner in which the weight is connected to its driving shaft. Some vibrators utilize a yokelike element rigidly mounted on a straight drive shaft to slidably journal the roller shaft. The yoke thus drives the roller which is allowed to slide outward by centrifugal force until it contacts the means. Other vibrators use a yokelike element which in addition to being connected to the roller is pivotally connected to the shaft. Centrifugal force causes the yoke and weight to move outward to contact the means by moving about the pivotal connection. It might be noted that both methods of providing roller and means contact during vibrator operation eliminate the need for close tolerances between roller and means dimensions which would otherwise be required if it is desired to transmit vibrations to the mass directly rather than by way of the bearings.

This invention is an improvement over the pivoting yoke arrangement of the prior art. The yoke element of the arrangement has proved to be the weak point of the vibrator when long rollers are used due to its single support at the pivotal connection and the long connector between yoke arms which must span the entire length of the roller. Applicant has in effect replaced this conventional yoke with what might be denominated as an internal yoke since it is located basically inside the roller. This structure, besides being stronger, provides greater vibrating effect for the same length of casing or means because space is no longer required between the roller and the casing for the yoke arms.

It is, therefore, an object of this invention to provide a new and improved roller vibrator.

Another object of this invention is to provide a roller vibrator having a more compact structure.

Another object of this invention is to provide a roller vibrator that is suitable for longer and heavier rollers.

Another object of this invention is to provide a roller vibrator that can be mounted vertically or horizontally on the apparatus which is to be vibrated.

Another object of this invention is to provide a roller vibrator that can be manufactured and sold economically.

Other objects and advantages will become apparent from the following description in conjunction with the attached drawings, in which:

FIG. 1 is a view of a roller vibrator used in connection with a screen adapted to grade crushed stone or the like;

FIG. 2 is a vertical cross section taken along line II—II of FIG. 1;

FIG. 3 is a vertical cross section taken along line III—III of FIG. 2; and

FIG. 4 is a vertical cross section taken along line IV—IV of FIG. 3.

Referring to FIG. 1, the roller vibrator 10 is attached to the side of screen 11 or other structure to be vibrated. The vibrator is driven by an electric motor 12 through V-belt 14.

The screen 11 is mounted on vertical coil springs 15 which allow limited horizontal and vertical travel of the screen. Although the vibrator is shown mounted vertically on the screen side wall, it is to be understood that the vibrator could also be mounted on a horizontal portion of the screen. This will become apparent in the course of the description to be hereinafter set forth.

Referring to FIGS. 2, 3 and 4, the vibrator 10 consists of a cylindrical casing 16 made preferably of aluminum or other light weight material. The casing has a cylindrical aperture 18 therethrough in which is located the vibrating mechanism.

The aperture 18 has a liner ring or race 19 having a concave inner surface 20 which receives and axially restrains roller weight 21. The casing has cover plate 22 which is secured to one end of casing 16 by machine screws 24. Cover plate 22 is also provided with suitable perforations to allow fastening of the vibrator to a structure to be vibrated. Cover plate 26 is secured to the other end of casing 16 by machine screws 28.

Cover plates 22 and 26 also have cylindrical apertures for the mounting of bearings 29 and 30, respectively. Bearing cover plate 31 attached to cover plate 22 by machine screws 32 closes the aperture for bearing 29 and thus prevents the entrance of foreign matter therein. Bearing cover plate 34 is attached to cover plate 26 at the other end of the vibrator by machine screws 35 to close the aperture for bearing 30 except for the outlet for drive shaft 36.

Drive shaft 36 is mounted in bearings 29 and 30 and passes through the opening 38 in roller weight 21. Arm 39 is keyed to shaft 36 and rotates therewith. A portion of the arm extends radially outward from shaft 36. Hinge shaft 40 extends through an opening through this radial extension of arm 39. Hinge shaft 40 is rigidly connected to arm 39 and extends generally parallel to shaft 36. One end 41 of hinge shaft 40 projects from arm 39 generally adjacent bearing 29 and the other end 42 projects from arm 39 generally adjacent bearing 30.

Link means are provided to rotatably support the roller and pivotally connect same to the drive shaft. Specifically as shown, link disk 44 is pivotally connected to end 41 of shaft 40 through bushing 45, and link disk 46 is pivotally connected to end 42 of shaft 40 through bushing 48. Link disks 44 and 46 have shoulders 49 along their outer periphery. Screw connector 50 in conjunction with locking bolts 51 draw link disks 44 and 46 at shoulders 49 tightly against the inner race of roller bearings 52 and 53 located in shoulders in opposite ends of roller weight 21. A V-belt pulley 54 is attached to shaft 36 to cause rotation upon action of motor 12. Shaft 36 projects through an aperture 44*a* in link disk 44 and through aperture 46*a* in link disk 46. Apertures 44*a* and 46*a* are of

larger diameter than the portions of shaft 36 projecting therethrough thereby providing a clearance allowing relative movement between shaft 36 and the link disks 44, 46 upon relative pivotal movement between shaft 40 and link disks 44, 46.

In operation, as the motor driven shaft 36 rotates clockwise (FIG. 3) crank 39 attached thereto through hinge shaft 40 mounted in the crank causes eventual movement of roller 21 in a clockwise manner. This is accomplished by the ends 41 and 42 of shaft 40 driving link disks 44 and 46 through bushings 45 and 48, respectively. The link disks in turn because of being located inside bearings 52 and 53 of roller 21 cause movement of the bearings and the roller weight attached thereto. As the speed of the shaft 36, and consequently that of roller 21 increases, centrifugal force causes the roller to pivot outward on shaft 40 until the roller contacts race 19. The roller then continues to move with the shaft 36 while at the same time continually rollingly engaging race 19 by virtue of bearings 52 and 53. Due to the concave surface of race 19, the convex shaped roller 21 is kept in alignment axially with the race thus allowing vertical or horizontal mounting of the vibrator.

Centrifugal force developed by the roller 21 whose center of gravity is located outward of the axis of shaft 36 is absorbed by the race and casing in contact therewith and then transmitted to the screen 11. The force, since constantly varying in direction as the roller moves around the circumference of the race, creates a vibratory effect useful for conveying or screening loose material.

Having now particularly described the invention, it will be apparent to those skilled in the art that various modifications and changes can be made therein without departing from the spirit of the invention or the scope of the appended claims.

Having now particularly described and ascertained the nature of my said invention and the manner in which it is to be performed, I declare that what I claim is:

1. A roller vibrator comprising: support means adapted to be attached to a mass to be vibrated; a drive shaft having axially spaced journals supported by said means; an arm attached to said drive shaft for rotation therewith, said arm being located between said journals, said arm also extending radially from said drive shaft; a hinge shaft rigidly mounted in said radial extension of said arm substantially parallel to said drive shaft, one end of said hinge shaft projecting from said arm and being adjacent to one of said journals and the other end projecting from said arm and being adjacent to the other of said journals; link means comprising a pair of circular disks, each disk being pivotally connected to a different end of said hinge shaft; and a roller weight surrounding said drive shaft, arm, hinge shaft and disks; said roller weight, at spaced points, being rotatably attached around the circumference of each of said disks, said roller weight being adapted to rollingly engage said support means.

2. A roller vibrator comprising: support means adapted to be attached to a mass to be vibrated; a drive shaft having axially spaced journals supported by said means; an arm attached to said drive shaft for rotation therewith, said arm being located between said journals, said arm also extending radially from said drive shaft; a hinge shaft rigidly mounted in said radial extension of said arm substantially parallel to said drive shaft, one end of said hinge shaft projecting from said arm and being adjacent to one of said journals and the other end projecting from said arm and being adjacent to the other of said journals; link means comprising a pair of circular disks with a connector therebetween, each disk being pivotally connected to a different end of said hinge shaft; and a roller weight surrounding said drive shaft, arm, hinge shaft, and disks; said roller weight at spaced points being rotatably attached around the circumference of each of said disks, said roller weight being adapted to rollingly engage said support means.

3. A roller vibrator comprising: support means adapted to be attached to a mass to be vibrated, said means comprising a casing defining a chamber having an annular surface; a drive shaft having axially spaced journals supported by said casing; an arm attached to said drive shaft for rotation therewith, said arm being located between said journals, said arm also extending radially from said drive shaft; a hinge shaft rigidly mounted in said radial extension of said arm substantially parallel to said drive shaft, one end of said hinge shaft projecting from said arm and being adjacent to one of said journals and the other end projecting from said arm and being adjacent to the other of said journals; link means comprising a pair of circular disks with a connector therebetween, each disk being pivotally connected to a different end of said hinge shaft; and a roller weight surrounding said drive shaft, arm, hinge shaft, and disks; said roller weight at spaced points being rotatably attached around the circumference of each of said disks, said roller weight being adapted to engage and roll around said annular surface.

4. A roller vibrator comprising: support means adapted to be attached to a mass to be vibrated, said means comprising a casing defining a chamber having an annular surface; a race having an annular external surface rigidly engaging said annular surface of said casing, the radially inner surface of said race being an axially extending generally concave surface that is transverse to the axis of said race, all points along said concave surface being a part of a series of joined annular configurations about said axis which form said concave race surface; a drive shaft having axially spaced journals supported by said casing; an arm attached to said drive shaft for rotation therewith, said arm being located between said journals, said arm also extending radially from said drive shaft; a hinge shaft rigidly mounted in said radial extension of said arm substantially parallel to said drive shaft one end of said hinge shaft projecting from said arm and being adjacent to one of said journals and the other end projecting from said arm and being adjacent to the other of said journals; link means comprising a pair of circular disks with a connector therebetween, each disk being pivotally connected to a different end of said hinge shaft; and a roller weight surrounding said drive shaft, arm, hinge shaft, and disks; said roller weight having a convex shaped outer surface and at spaced points being rotatably attached around the circumference of each of said disks, said roller weight being adapted to engage and roll around said concave surface of said race.

5. A roller vibrator comprising: support means adapted to be attached to a mass to be vibrated, said means comprising a casing defining a chamber having a circular surface; a race having a circular external surface rigidly engaging said circular surface of said casing, the radially inner surface of said race being an axially extending generally concave surface that is transverse to the axis of said race, all points along said concave surface being a series of joined circular configurations about said axis which form said concave race surface; a drive shaft having axially spaced journals supported by said casing, said journals being concentric with said casing circular surface and said concave surface of said race; an arm attached to said drive shaft for rotation therewith, said arm being located between said journals, said arm also extending radially from said drive shaft; a hinge shaft rigidly mounted in said radial extension of said arm, substantially parallel to said drive shaft, one end of said hinge shaft projecting from said arm and being adjacent to one of said journals and the other end projecting from said arm and being adjacent to the other of said journals; link means comprising a pair of circular disks with a connector therebetween, each disk being pivotally connected to a different end of said hinge shaft; and a roller weight surrounding said drive shaft, arm, hinge shaft and disks; said roller weight extending axially at least the length of the assem-

bly of said hinge shaft and said disks, said roller weight having a convex shape outer surface and at spaced points being rotatably attached around the circumference of each of said disks, said roller weight being adapted to engage and roll around said concave surface of said race.

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