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POWER OPERATED VIBRATORS

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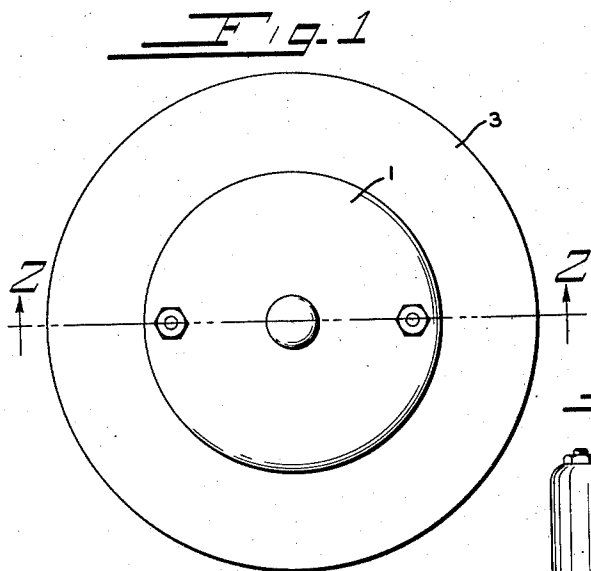


Fig. 2

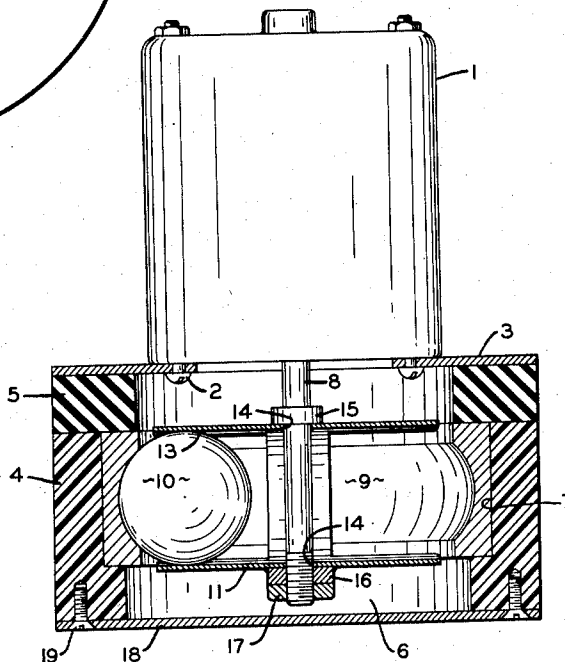


Fig. 3

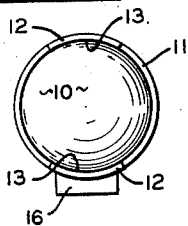
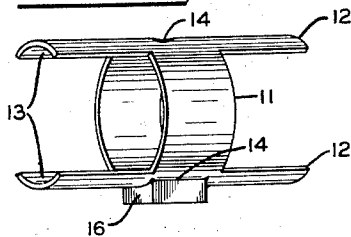


Fig. 4



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POWER OPERATED VIBRATORS

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10 Claims. (Cl. 74—87)

This invention relates to electrically operated vibrators, and it particularly pertains to relatively small portable vibrators which may be easily handled for being manually held against an object to be vibrated or suspended thereon.

Vibrators heretofore constructed have a rotatable impeller, fixed to a drive shaft, in which a ball is loosely mounted for being rotated with the driven impeller and adapted, by centrifugal force, to ride in an annular raceway disposed on a surrounding stator member. The ball is freely fitted in a recess in the impeller, or the impeller is in the form of a tubular sleeve forming a recess for the ball. Or the impeller may simply be an arm adapted to contact the back of the ball for causing it to be rotated. However, in all of such constructions, the point or area of contact between the impeller and the ball is in back of the ball which is farthest removed from the axis of rotation of the ball, thereby causing the greatest amount of friction between the ball and the impeller.

Accordingly, one of the principal objects of the present invention is a vibrator of a construction having minimum friction between the impeller and the unbalanced weight member.

Another object of the invention is a vibrator having the driving connection between the impeller and the unbalanced weight member at the axis of rotation of the unbalanced weight member.

Another object of the invention is a vibrator which is simple in construction and efficient in operation.

A still further object of the invention is a vibrator in which the driving connection is at the axis of rotation on opposite sides of the anti-friction member.

A still further object of the invention is a vibrator which is portable and adapted for general use.

Further objects, and objects relating to details of construction and economies of operation, will readily appear from the detailed description to follow. In one instance, I have accomplished the objects of my invention by the device and means set forth in the following specification. My invention is clearly defined and pointed out in the appended claims. A structure constituting a preferred embodiment of my invention is illustrated in the accompanying drawings, forming a part of this specification, in which:

Fig. 1 is an end view of an electrically powered vibrator, embodying the invention.

Fig. 2 is a cross section of the vibrator on line 2—2 of Fig. 1.

Fig. 3 is an end view of the impeller with the ball mounted therein.

Fig. 4 is a perspective view of the impeller.

Generally described, the invention comprises a motor fixed to a stator member having an annular chamber therein in which the motor shaft projects. The wall of the chamber is cylindrical, forming a raceway or adapted to receive a raceway for an unbalanced weight member, such as a roller or ball, that is circumferentially driven by an impeller fixed to the motor shaft. The impeller is provided with a pair of oppositely disposed arms oper-

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atively connected with the unbalanced weight member at its axis of rotation for rotating said weight member in its raceway but permitting free radial movement thereof. Except for this driving connection between the unbalanced weight member and the impeller at the axis of rotation of said unbalanced weight member, the impeller is out of contact with said unbalanced weight member. In other words, the driving connection between the impeller and the unbalanced weight member is on opposite sides of the unbalanced weight along or at the axis of rotation and where there is minimum friction.

Referring specifically to the drawings in which like numerals designate like parts, numeral 1 is a motor fixed by bolts 2 to a plate 3 that is fitted against the vibrated member 4, there being an elastic gasket disc or ring 5 of some such elastic material as rubber interposed between the member 4 and the plate. The plate 3 is preferably bonded to the elastic ring 5 by some adhesive material and the ring 5 is likewise bonded to one side of member 4.

The member 4, which can be of any material such as metal, wood, plastic and the like, is provided with a chamber 6 having an annular wall 7 concentric with the motor shaft 8 that extends within said chamber. An annular raceway 9 is preferably mounted in the chamber disposed about an unbalanced weight member, in the form of ball 10, that is mounted in an impeller member 11 fixed to the motor shaft 8 for being driven by said impeller when the shaft is rotated.

The impeller member 11 is in the form of a cylindrical tube from which wall portions have been removed to leave oppositely disposed arms 12. By reason of the cylindrical formation of this tube, the arms 12 are of arcuate conformation for forming a groove or channel 13 generally conforming to the curvature of the ball 10. The significant factor is that these arms 12 project from spaced points lengthwise to the axis of rotation so that they will support the unbalanced weight member 10 along its axis of rotation rather than at a point remote from its axis of rotation, particularly the side which is farthest removed from the axis of rotation.

The wall of the main body of the impeller 11 is perforated at opposite points 14 for the motor shaft 8 which is projected therethrough, the impeller 11 being clamped against a shoulder 15 on the motor shaft 8 by means of a nut 16 screwed to the end of said motor shaft. The nut 16 can be fixed to the wall of the impeller 11 as by welding. A clamp nut 17 is also screwed to the end of the motor shaft for abutting nut 16. While only one unbalanced weight member 10 is used for each impeller 11, said impeller is preferably made with a pair of arms 12 at each of its opposite ends so that it will be evenly balanced. It will, of course, be understood that two or more impellers 11 might be disposed side by side lengthwise of the shaft, each with an unbalanced weight member 10 mounted therein.

The opposite side of the vibrator 4 is closed by a plate 18 attached thereto by any suitable means, such as screws 19. Or this closure could be made an integral part of the impeller 4.

The wall or casing of the motor 1 can be advantageously provided with a base or legs (not shown) for being bolted or otherwise attached to any member that is to be vibrated. The invention is not limited to any particular manner for attaching the vibrator to the member to be vibrated.

From the foregoing description of the construction, its operation should be obvious. The ball 10 is freely slidable radially in the channel of the impeller 11 between arms 12 but will be caused to be driven circumferentially with the impeller, by reason of the grooves or channels 13 in said arms formed from their inwardly curved conformation, the ball being forced outwardly radially be-

tween said arms 12 by centrifugal force to ride in the raceway 9 of the stator 4 with the horizontal forces transmitted thereto by the trailing edges of arms 12 or by reason of the ball being confined between said trailing edges. The driving connections between the arms 12 of the impeller 11 and the ball 10 by reason of their inwardly curved conformation is at the axis of rotation of the ball and provide positive means for rotating same in the raceway. Moreover, two points of connection are provided between the ball 10 and the arms 12 of the impeller 11, at opposite sides of the ball, for driving said ball rather than only one as would result were the arms 12 of the impeller spaced apart in a direction transverse to the motor shaft. In such a construction, one arm only would function to impel the ball at the point of contact on a side of the ball farthest removed upon its axis of rotation.

I am aware that there may be various changes in details of construction without departing from the spirit of my invention, and, therefore, I claim my invention broadly as indicated by the appended claims.

Having thus described my invention, what I claim as new and useful and desire to secure by U. S. Letters Patent, is:

1. A vibrator comprising a stator member having a chamber therein, a motor driven shaft mounted on said stator member and projecting into the chamber, an impeller, with transverse means spaced apart lengthwise of the axis of rotation of the shaft, fixed to the shaft, an unbalanced weight member loosely mounted between the spaced-apart transverse means and in contact with said transverse means along its axis of rotation and a raceway, provided in the stator member for the unbalanced weight member.

2. The vibrator of claim 1 in which the unbalanced weight is connected to the transverse spaced-apart means along its axis of rotation.

3. The vibrator of claim 2 in which the spaced-apart arms provide a radially extending channel in which the unbalance weight member is radially movable.

4. A vibrator comprising a stator member having a chamber therein, a motor driven shaft mounted on said stator member and projecting into the chamber, an impeller fixed to the shaft having radially extending arms spaced apart lengthwise of the axis of rotation, a radially extending channel formed by the arms, an unbalanced spherical weight member housed in said channel, and a raceway for the unbalanced spherical weight member mounted in the chamber of the stator member.

5. A vibrator comprising a chambered member to which a motor is attached with the shaft thereof extending into the chamber, an impeller fixed to the motor shaft having a pair of longitudinally spaced apart radially extending arms, an unbalanced spherical weight means dis-

posed between the arms, a radially extending channel formed in each of the arms for connecting said arms to the unbalanced spherical weight means through its axis of rotation, and a raceway mounted in the chamber for the unbalanced spherical weight member.

6. The vibrator of claim 5 in which the unbalanced weight member is a ball and the inside surfaces of the arms are concave for being operatively connected to said ball.

7. The vibrator of claim 5 in which the unbalanced weight member is out of contact with the impeller member other than at points of connection at the axis of rotation.

8. A vibrator comprising an electric motor fixed to a member to be vibrated, an elastic strip interposed between said member and the motor, a chamber formed in said member in which the shaft of the motor projects and provided with an annular wall forming a raceway, an impeller fixed to the shaft, and an unbalanced spherical weight member loosely connected to the impeller along its axis of rotation and traveling in said raceway.

9. The vibrator of claim 8 in which the impeller has a pair of longitudinally spaced apart radially extending arms forming a radial channel, and an unbalanced spherical weight member slidably mounted in said channel and connected to said arms through its axis of rotation.

10. A vibrator comprising a stator member having a chamber therein, a motor driven shaft mounted on said stator member and projecting into the chamber, an impeller fixed to the shaft comprising a cylindrical body with opposite wall portions removed from its ends to provide a ring having oppositely disposed arms projecting from opposite ends with said arms disposed in spaced-apart relation in the direction of the axis of the motor shaft, an unbalanced spherical weight slidable radially in the impeller, and an annular raceway surrounding the weight circumferentially.

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