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MacFarland

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[54] **HAND HELD VIBRATOR WITH FLEXIBLE DRIVE SHAFT**

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[52] **U.S. Cl.** .....**128/36,** 128/62 R

[51] **Int. Cl.** **A61h 1/00**

[58] **Field of Search**.....128/24.5, 24.2, 34, 128/35, 36, 41, 44; 310/77, 81; 209/366.5, 367

[56] **References Cited**

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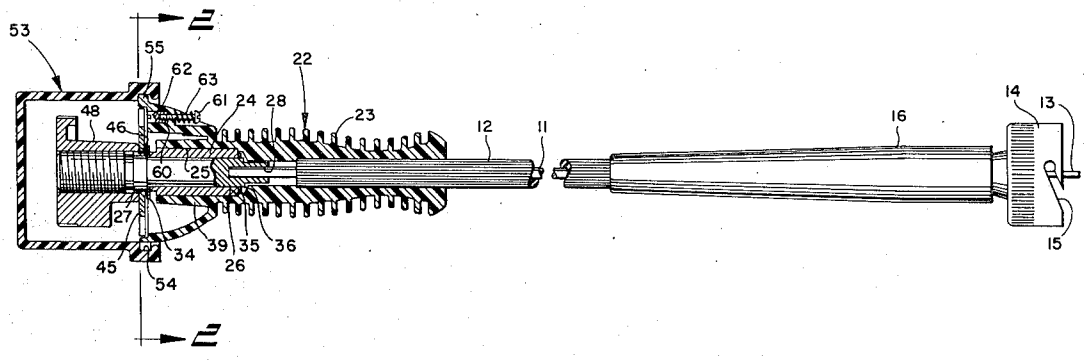
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[57] **ABSTRACT**

A vibrator is disclosed which includes a flexible drive shaft and a connector at one end of the drive shaft for manually connecting and disconnecting the one end to a vacuum cleaner power source for rotating the drive shaft. An eccentric weight is releasably attached to the other end of the drive shaft for vibrating a handle. A first stop member is secured to the other end of the drive shaft, and a second stop member is secured to the handle for engaging the first stop member and preventing rotational movement of the drive shaft to permit manual removal of the eccentric weight. A cover is releasably secured to the handle to cover the eccentric weight by an annular groove on the cover extending through 360° and an annular lip on the handle extending through slightly more than 180°. The handle encapsulates the other end of the drive shaft to prevent abrupt bending thereof.

8 Claims, 3 Drawing Figures



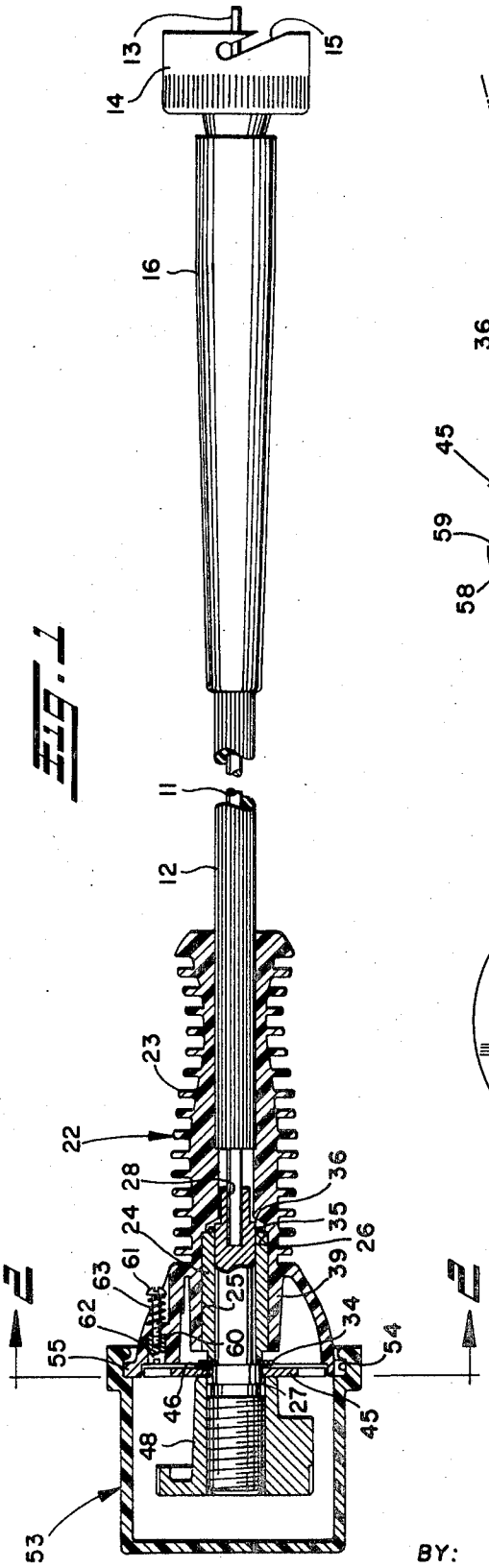


FIG. 1

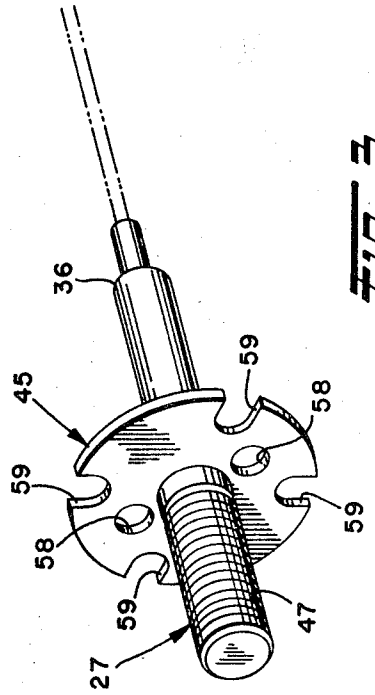


FIG. 3

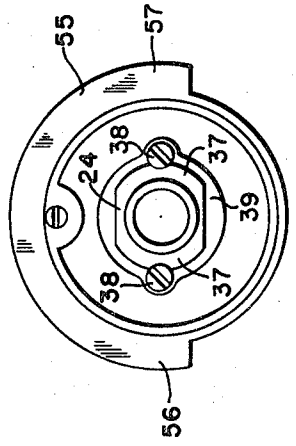


FIG. 2

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HAND HELD VIBRATOR WITH FLEXIBLE DRIVE SHAFT

BACKGROUND OF THE INVENTION

This invention relates generally to a vibrator attachment for a vaccum cleaner, and more particularly to such a vibrator attachment which is driven by a flexible power shaft so that the operator need not support the weight of the power source when using it.

Vibrators for massaging portions of the human body generally include a power source, such as an electric motor, and an eccentric weight which is rotated by the power source to produce a vibration. Such prior art vibrators may be of the integral type in which the power source is contained in a single unit with the eccentric weight, or of the type in which the eccentric weight is driven by a flexible power shaft from a remotely located power source. The available power of the former type is generally limited by weight considerations, because the operator must support the weight of the power source when using the device. Although this is not a problem with the latter type vibrator, the additional cost of the more powerful power source and of the flexible cable of the latter type may render such a device economically impractical.

SUMMARY OF THE INVENTION

The present invention overcomes these and other problems and disadvantages of prior art vibrators by providing a flexible power shaft driven vibrator which utilizes the electric motor of a household vacuum cleaner for its power source. In this manner, a rather powerful power source generally heretofor available only on professional vibrators is made available to the occasional household user without undue cost. Furthermore, the operator need not support the weight of the motor when using the vibrator. The present invention also provides such a vibrator which may be easily converted by the operator to provide a flexible power shaft for use with a wide variety of other tools and appliances.

In a preferred embodiment, the invention provides a vibrator which includes a flexible drive shaft, a flexible tubing substantially encapsulating the drive shaft, and a means for selectively connecting and disconnecting one end of the drive shaft to a household vacuum cleaner power means for rotating the flexible drive shaft. A handle at the other end of the drive shaft is provided for receiving a human hand, and a first attachment means is provided for manually releasably attaching the eccentric weight means to the other end of the flexible drive shaft for vibrating the handle when the flexible drive shaft is rotated by the vacuum cleaner motor. As used herein, the term "manually" means solely by human hand, without the aid or use of any type of tool. A cover is provided for encapsulating the eccentric weight, and a second attachment means is provided for manually releasably attaching the cover to the handle. In this manner, the invention provides a vibrator with a rather powerful power source without requiring the operator to support the weight of the motor and without undue cost. Still further, by providing a vibrator in which the eccentric weight is manually releasably secured to the flexible drive shaft, and in which a cover for the eccentric weight is manually releasably secured to the handle, the invention provides a vibrator in which the eccentric weight and cover may be removed so that the vibrator may be used as a power extension shaft for other tools and appliances.

In the preferred embodiment, the first attachment means for manually releasably attaching the eccentric weight includes a first stop means secured to the flexible drive shaft and a second stop means secured to the handle. The second stop means is movable between a normally retracted position and a projected position in which the second stop means engages the first stop means to prevent rotational movement of the flexible drive shaft in at least one direction. This permits easy removal of the eccentric weight so that it can be replaced by a wire brush or other desired tool or appliance.

In the preferred embodiment, the second attachment means for manually releasably attaching the cover to the handle includes an annular lip and an annular groove for receiving the lip. The annular lip extends through an arc of slightly greater than 180° so that the cover may be securely attached to the handle and will not loosen when the vibrator is used, yet the cover may be easily removed manually when desired because the lip of the handle does not extend the entire 360°. This permits the lip to be dimensioned such that it projects further into the groove to provide a reliable attachment means yet permits deflection of the cover for easy removal of the cover.

Still further, the invention provides a vibrator in which a handle includes a hand receiving portion which extends axially along the drive shaft adjacent the eccentric weight to prevent abrupt bending of the drive shaft and preclude the need for a separate reinforcing sleeve at that location.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the invention will become more readily apparent upon a full understanding of the preferred embodiment as shown in the drawings, wherein:

FIG. 1 is a side elevational view, partly in cross-section, of a vibrator according to the principles of the invention;

FIG. 2 is an end elevational view taken generally along reference view line 2—2 of FIG. 1, but with the cover means and all rotating members removed for clarity; and

FIG. 3 is a perspective view of the weight carrier member for the vibrator shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in greater detail, the vibrator shown in FIG. 1 includes a flexible drive shaft 11 which is substantially encapsulated by an externally serrated flexible tubing means 12. The flexible drive shaft 11 in the preferred embodiment is of circular cross-section, but is provided with an end portion 13 of square cross-section for connection to a square socket on a power means such as the electric motor or accessory attachment of a vacuum cleaner as shown in U.S. Pat. No. 2,954,652. The right end of the flexible tubing 12 is provided with a coupling member 14 for manually connecting the vibrator to and disconnecting the vibrator from the power source. The coupling member 14 is an open ended cup shaped member adapted to be received by a mating cylindrical coupling member (not shown) on the power source, and is provided with two

opposed notched portions **15**, only one of which may be seen in FIG. **1**, for receiving suitable pins to lock the coupling member **14** on the power means in a well-known manner. A flexible reinforcing sleeve **16** is also provided on the right end of the flexible tubing **12** immediately adjacent the coupling member **14**. The reinforcing sleeve **16** is provided to prevent abrupt bending of the drive shaft **11** and tubing **12** adjacent the coupling member **14**.

A handle member **22** is secured on the left end of the flexible tubing **12** such as by molding the handle member **22** directly thereon. The handle member **22** includes a hand receiving portion **23**, which is circumferentially ribbed to prevent slipping when held by a human hand. The hand receiving portion **23** extends axially along the drive shaft **11** and tubing **12** to serve as a reinforcing sleeve to prevent abrupt bending of the drive shaft **11** and tubing **12** at the left end thereof, in a manner similar to the reinforcing sleeve **16**. A suitable bronze bearing **24** is received within a passage **25** which extends axially from end to end through the handle **22**, and the bearing **24** butts against a shoulder **26** of the handle **22**. A generally cylindrical carrier member **27** is received by the bronze bearing **24**. An end portion of the drive shaft **11** extends into a bore **28** in the carrier member **27**, and the portion of the carrier member **27** surrounding the end portion of the drive shaft **11** is crimped radially inwardly to drivingly secure the drive shaft **11** to the carrier member **27**. A flat washer member **34** butts against a shoulder of the carrier member **27** and provides a bearing surface for the left end face of the bearing **24**. In a similar manner, a second generally flat washer member **35** provides a bearing surface for the right end face of the bearing **24**. The carrier member **27** is suitably staked at circumferentially spaced points **36** adjacent the washer member **35** to prevent any substantial relative axial movement between the carrier member **27** and the bearing **24**.

As best seen in FIG. **2**, the bearing **24** is secured against axial movement and rotational movement relative to the handle **22** in the bore **25** by providing the bearing **24** with radially opposed tabs **37** which are secured to the handle **22** by suitable self tapping screws **38** which are received in suitable holes (not shown) in a cylindrical portion **39** of the handle **22**. For reasons that are described in detail below, a disc shaped stop member **45** is carried by the carrier member **27**. The stop member **45** butts against a suitable shoulder of the carrier member **27**, and the carrier member **27** is staked at circumferentially spaced points as at **46** to secure the stop member **45** to the carrier member **27** in such a manner that the stop member **45** rotates with the carrier member **27**.

The carrier member **27** is provided with a threaded end portion **47** for threadably receiving an eccentric weight **48**. The threaded end portion **47** is threaded in such a manner that the eccentric weight member **48** is tightened thereon by the inertia force of the eccentric weight member **48** when the carrier member **27** is accelerated.

In the use of the vibrator shown in FIG. **1**, the operator first attaches the coupling member **14** and the square end portion **13** to a vacuum cleaner electric motor or accessory attachment. The hand receiving portion **23** of handle **22** is then grasped and held between the thumb and palm of the operator's hand. When the power source is turned on, the eccentric weight member **48** is rotated by the drive shaft **11**, producing vibrations which are transmitted to the hand receiving portion **23** by bearing **24**. The operator then places the fingers of the hand that is holding the vibrator in contact with the surface to be massaged so that the vibrations from the eccentric weight and the hand receiving portion **23** are transmitted to the surface to be massaged only through the operator's fingers. The operator need not support the weight of the motor when using the vibrator, so that the hand receiving portion **23** may easily be held by the thumb and palm of the hand to permit the fingers to engage the surface to be massaged.

A cover member **53** is provided to substantially encapsulate the eccentric weight member **48**. To provide access to the eccentric weight member **48** so that it may be removed to permit the device shown in FIG. **1** to be used as a flexible power shaft for driving any other desired tool or appliance, the invention provides a means for permitting the cover member **53** to be manually connected to and disconnected from the handle **22**. However, because of the vibrations encountered in the use of the device shown in FIG. **1**, the means for attaching the cover **53** to the handle **22** must prevent the cover **53** from being disconnected from the handle **22** due to the vibrations. For this purpose, the invention provides the cover member **53** with an annular groove **54** which, in the preferred embodiment extends for 360° about the entire diameter of the cover **53**. The invention also provides a lip portion **55** on the handle **22** which is adapted to be received by the groove **54**. The lip portion **55** extends through an arc of slightly greater than 180° and substantially less than 360°. This permits radially opposed portions **56** and **57** of the lip **55** to extend fully into the groove **54** to prevent the cover **53** from loosening from the handle **22** even under conditions of severe vibration. However, because the lip **55** does not extend through 360°, the cover member **53** may be easily removed.

The invention further provides an attachment means for manually releasably attaching the eccentric weight **48** to the carrier member **27**. This attachment means includes the threaded end portion **47** and the stop member **45**, which is secured to the carrier member **27** for rotational movement therewith as described above. The stop member **45** includes two radially opposed apertures **58**, which provide access to the screws **38** for assembly purposes, and which otherwise do not form a part of this attachment means. The stop means **45** further includes four circumferentially spaced stop portions **59**, which are notches extending radially inwardly from the outer periphery of the stop member **45** in the preferred embodiment. An aperture **60** extends through the handle **22**, and receives a suitable machine screw **61** which is threadably connected to a stop member **62**. The screw **61** and stop member **62** are spring biased to a retracted position as shown in FIG. **1** by a coil spring **63**. When it is desired to remove the eccentric weight member **48**, the cover member **53** is first removed. The screw **61** and stop member **62** are manually displaced from the retracted position shown in FIG. **1** to an advanced position in which the stop member **62** projects into one of the notches **59** of stop member **45**. This secures the carrier member **27** against rotational movement. The eccentric weight member **48** may then be easily removed from its threaded connection to the carrier member **27**, without the use of other

tools since the carrier member 27 is locked against rotational movement. In this manner, the invention provides a means for attaching the eccentric weight 48 which permits easy manual removal of the eccentric weight so that it can be replaced by any desired tool or appliance and the vibrator can be used as a power extension shaft.

Although a specific embodiment of the invention has been shown and described in detail, various modifications and rearrangements of parts may be made without departing from the scope of the invention as defined by the following claims.

I claim:

1. A vibrator comprising a flexible drive shaft, a flexible tubing means substantially encapsulating said flexible drive shaft, means at one end of said flexible drive shaft for manually selectively connecting and disconnecting said one end to a vacuum cleaner power means for rotating said flexible drive shaft, handle means at the other end of said drive shaft, said handle means including an axially extending hand receiving portion means for being grasped by a human hand, said hand receiving portion means comprising solely an axially extending tubular reinforcing sleeve snugly encapsulating the end of said flexible tubing means adjacent said other end of said flexible drive shaft, eccentric weight means, first attachment means for manually releasably attaching said eccentric weight means to the other end of said flexible drive shaft for vibrating said handle means when said flexible drive shaft is rotated by said power means, cover means for at least partially encapsulating said eccentric weight means, second attachment means manually releasably attaching said cover means to said handle means and providing the sole means for preventing movement of said cover means relative to said handle means, and said second attachment means including continuous annular lip means of predetermined and nonextensible diameter extending through an arc of only slightly greater than 180° and an annular groove means for receiving said lip means, said annular lip means and annular groove means being disposed on said cover means and said handle means.

2. A vibrator as set forth in claim 1 wherein said continuous annular lip means extends fully into said groove means along the entire arcuate extent of said lip means.

3. A vibrator as set forth in claim 2 wherein said annular groove means extends through an arc of substantially 360°.

4. A vibrator as set forth in claim 3 wherein said annular lip means is on said handle means and said annular groove means is on said cover means.

5. A vibrator as set forth in claim 2 wherein said reinforcing sleeve provides the sole means for preventing abrupt bending of said last mentioned end of said flexible tubing and of said other end of said flexible drive shaft.

6. A vibrator as set forth in claim 5 including collar means covering the end of said flexible tubing means adjacent said one end of said flexible drive shaft for preventing abrupt bending of said last mentioned end of said flexible tubing means.

7. A vibrator as set forth in claim 2 wherein said first attachment means includes a first stop means secured to said other end of said flexible drive shaft, and a second stop means secured to said handle means and movable between a normally retracted position and a projected position in which said second stop means engages said first stop means to prevent rotational movement of said flexible drive shaft in at least one direction.

8. A vibrator as set forth in claim 7 wherein said second stop means is spring biased to said retracted position.

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