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T. MILLS ET AL

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AIR OPERATED VIBRATOR FOR DENTISTRY

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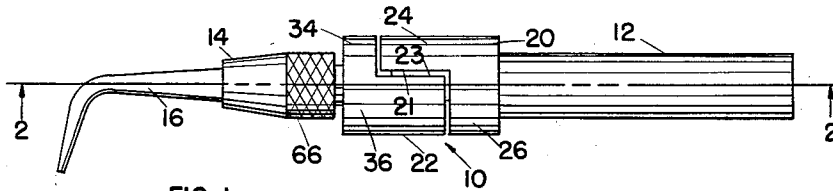


FIG. 1

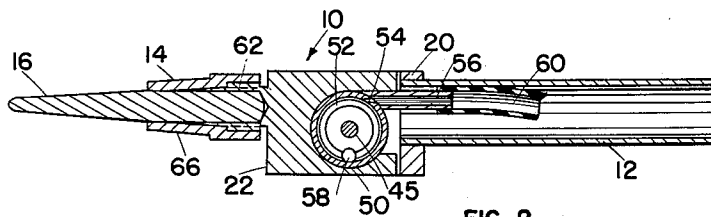


FIG. 2

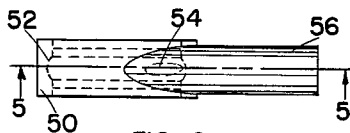


FIG. 6

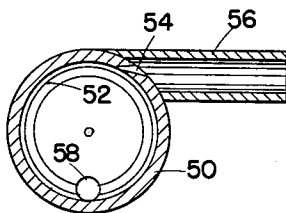


FIG. 5

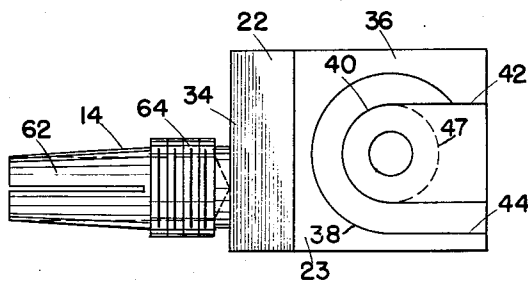


FIG. 3

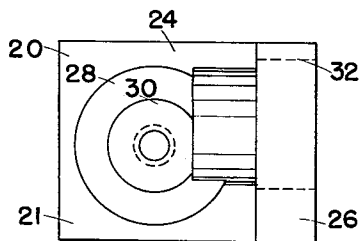


FIG. 4

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1

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AIR OPERATED VIBRATOR FOR DENTISTRY

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3 Claims. (Cl. 32-56)

This invention relates to vibrators for use particularly in dentistry, and more particularly, the invention relates to a vibrator for dentistry which is operated by a stream of air under pressure.

Various means for operating vibrators in dentistry have previously been known. Primarily these include electrically operated vibrators. Use of these vibrators has not been entirely satisfactory and a need has existed in the art for providing a new and improved means of vibrating the tool.

In accordance with the present invention, a stream of air under pressure is used to provide the driving power for vibrating the tool. More particularly, a stream of air under pressure is directed into a housing, wherein it rotates a single ball-bearing around the housing to set up high speed vibrations in the housing, which in turn are transmitted through a mounting block or chuck to the dentistry tool.

Accordingly, it is an object of this invention to provide a new and improved means of vibrating a dentistry tool.

Another object of this invention is to provide an air-driven vibrator for dentistry tools.

Another object of this invention is to provide an air-driven vibrator for dentistry tools wherein air under pressure is directed to an annular chamber in the housing where it rotates a hardened ball around the housing to set up high speed vibration within the tool.

A further object of the invention is to provide a new and improved air-driven vibrator.

A further object of the invention is to provide a vibrator for a dentistry tool which makes use of the air supply usually present in dentists' offices.

Various other objects, advantages and features of the invention will become apparent from the following description taken in connection with the accompanying drawings of a preferred specific embodiment of the invention, in which:

FIG. 1 is a side elevation view of the air-driven vibrator of the invention.

FIG. 2 is a cross sectional view taken along the line 2-2 of FIG. 1.

FIG. 3 is a plan view of the part of the housing having the chuck assembly thereon.

FIG. 4 is a plan view of the other portion of the housing.

FIG. 5 is a side elevation view of the motor assembly removed from the housing.

FIG. 6 is a top plan view of the motor assembly.

The following is a discussion and a description of a preferred specific embodiment of the new air-operated vibrator of the invention, such being made with reference to the drawings whereon the same reference numerals are used to indicate the same or similar parts and/or structure. It is to be understood that such discussion and description is not to unduly limit the scope of the invention.

2

Referring now to the drawings in detail, the air operated vibrator for dentistry of the invention includes a housing, shown generally at 10, a hollow handle 12 secured to one end thereof, a chuck assembly 14 on the other end of the housing 10, and a tool 16 which is to be vibrated by the present device.

The housing 10 is preferably composed of two generally L-shaped sections or parts 20 and 22. The two parts 20 and 22 have facing surfaces 21 and 23 respectively, the planes of which are generally longitudinal of the cylinder. The section or part 20 of the housing 10 is best shown in FIG. 4, and includes a main or body portion 24 and a leg 26. The body portion 24 has the surface 21 which faces the surface 23 cut away at 28 to form a generally annular recess. A second annular recess 30 is cut away within the recess 28 and is preferably concentric therewith. A hole 32 is cut through the leg 26 and through a portion of the body 24 of the section 20. The hole 32 is circular in cross section through the leg 26 and meets the cutaway portions 28 and 30 in the body portion 24, as shown in FIG. 4.

The piece or portion 22 of the housing 10, as shown in FIG. 3, includes a leg 34 and a body portion 36. The body portion 36 has two annular cut-outs 38 and 40 in the surface 23. The cutouts 38 and 40 are concentric with each other and are preferably the same size as the cut-outs 28 and 30 of the portion 24. The cutaway portion 40 extends into a rectangularly shaped cut-out 42, which continues to the edge of the section 22 opposite from the leg 34. The cut-out portion 38, of course, also intersects the cut-out 42. An additional cutaway portion 44 is provided at the lower side of the piece 22, as shown in FIG. 3, which is rectangular in cross section and intersects the arcuate cut-out portion 38, on a line tangential thereto. The sections 20 and 22 are preferably secured together as shown in FIG. 2 by a suitable screw or bolt 45 and a recess 47 can be provided in the cylindrical surface of portion 22 to counter sink the head of the screw or bolt 45.

When the sections 20 and 22 are secured together, the cut-outs 28, 30, 38, and 40 together define a chamber which is generally circular in planar cross section for the reception of the vibrator motor assembly to be described more fully hereinafter. The hole 32 in the leg 26 of section 20 receives the handle 12 which is retained therein by any suitable means. The hole 32 can be made slightly larger in diameter than the distance across the opening 42, so that when the handle 12 is mounted as just described, the inside dimensions of the handle 12 will be approximately the same as those as the cut away portion 42.

The vibrator motor assembly of the invention is best seen in FIGS. 5 and 6. The motor assembly includes a tubular or ring-shaped member 50. The member 50 is preferably made of a hardened metal and has a groove around the inside periphery as shown at 52. The member 50 is similar in construction to the outer race of a ball-bearing, and in some installations such a race can be used. A small opening or venturi 54 is drilled through the member 50 so that the venturi 54 is tangential to the groove 52 in the member 50. A tube 56, which can be of copper or other suitable metals or plastics, is secured to the outside of the member 50 and surrounds the venturi

54. The tube 56 can be secured to member 50 by soldering, welding, or other suitable means. A single ball or spherical element 58 completes the motor assembly. The ball 58 will roll around in the groove 52 formed in the member 50 when driven by air from conduit 56.

The motor assembly is mounted in the chamber of the housing 10 as shown in FIG. 2. The member 50 should be of such a size as to snugly fit within the cutaway portions 23 and 38 of the housing pieces or portions 20 and 22. The tube 56 will extend into the handle 12. With the motor assembly mounted in this position, there is an open space left on either side of the member 50, which is created by the cutaway portions 30 and 40 in the members 20 and 22, respectively, by the cutaway portions 42 and 44 in member 22, and by the hole 32 in member 20. This space have been provided for a reason to be explained in full hereinafter. With the motor assembly in position between the housing portions or pieces 20 and 22, the screw or bolt 45 is passed through the sections and the motor assembly and tightened to secure the assembly with the housing.

An air supply tube 60 is secured to the free end of tube 56 and is preferably made of a flexible material, such as rubber, synthetic rubber, flexible plastics and the like. The tube 60 can be secured to the tube 56 either before or after the motor assembly is mounted in the housing 10.

A chuck assembly 14 is mounted on and extends from the end of the housing opposite from the handle. The chuck assembly 14 is preferably made integral with the housing portion 22, however, it can be made separate and secured thereto by any suitable means. Also, the chuck assembly can, in some applications, extend from the sides of the housing. The chuck assembly 14 is of the usual construction and includes a split projecting male portion 62 which is externally threaded at 64 as shown in FIG. 3. A female portion 66 is internally threaded and dimensioned so as to receive and be secured to the portion 62. When the portion 66 is screwed onto the portion 62, the split sections 62 will be urged towards each other to engage and secure an instrument therein in the usual manner.

A dentist's vibrator tool 16 is received in the chuck assembly 14. The tool 16 is preferably shaped as shown for easy use, and made of steel. The tool 16 can be, for example, an amalgam condenser, which is used to compact material used in filling a tooth. Other tools can, of course, be used with the vibrator of the invention.

In operation, the flexible supply tube 60 is connected to a source of air pressure (not shown) which is usually available in a dentist's office. The air under pressure will travel through the tubes 60 and 56, through the venturi 54 and be directed into the annular groove 52 of the member 50. The air is under sufficient pressure for the stream thereof to cause the ball 58 to be rotated around the member 50 in the groove 52. The ball 58 is, of course, loose within the member 50 and will contact the sides thereof as it runs around, which will create high frequency vibrations in the motor assembly. These high frequency vibrations in turn are transmitted through the housing 10 and the chuck assembly 14 to the tool 16. The space on either side of the motor assembly as defined by the cutaway portions 30, 40, 42, 44, and the hole 32 provides a path for the air to escape. The air can leave either through the handle 12 or the housing sections 20 and 22 can be spaced slightly to allow the air to escape between them. The ball 58 will continue to travel groove 52 and create the high frequency vibrations as long as air under pressure is supplied to the tube 60. The vibrations created are preferably of a high frequency which are inaudible to the human ear to prevent discomfort to the operator and the patient. The high frequency used also prevents any unnecessary discomfort to the patient when the tool 16 contacts the tooth.

As will be evident from the above description, a new and improved means of vibrating a denistry tool has

been provided by this invention. The device is small and compact and utilizes the supply of air pressure already available in the dentist's office. Unnecessary noise and pain to the patient have been eliminated by this invention.

5 As is apparent from the previous discussion, a minimum of moving parts is required, which reduces the initial cost as well as continued maintenance cost.

While the invention has been described in connection with a preferred specific embodiment thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the claims.

15 It will be evident to those skilled in the art that various modifications of this invention can be made, or followed, in the light of this description and discussion, without departing from the spirit of the disclosure or the scope of the claims.

We claim:

1. An air operated vibrator for dentistry or the like comprising, in combination, a generally cylindrical housing for a vibrator motor, said housing being formed of two separate pieces having facing surfaces the planes of which are generally longitudinal of said cylinder, said facing surfaces being cut away to form a chamber for the receipt of a motor assembly therebetween, said chamber being generally circular in planar cross section, a vibrator motor assembly mounted within said chamber of said housing, said assembly comprising a hardened and internally grooved tubular member and one ball within said member, a screw securing said housing pieces together, said screw passing through the center of said chamber and said motor assembly, an aperture in one end of said housing, a hollow handle mounted in said aperture, a rigid tube soldered to said motor assembly and extending into said handle, a venturi passage through said tubular member connecting said tube and the groove of said tubular member, said venturi passage being tangential to said groove, a flexible supply tube connecting said rigid tube to a supply of air under pressure, a threaded chuck assembly secured to and extending from the end of said housing opposite said handle, an elongated condensing tool removably mounted in said chuck in longitudinal reciprocating relation to said vibrator motor assembly in operation, said tool being bent intermediate its ends for easy contact with a filling of a tooth, said air operated vibrator being constructed and adapted to supply air under pressure to said motor assembly through said tubes and said venturi passage whereupon said ball will be rotated around said grooved tubular member and thereby create high frequency vibrations which in turn are transmitted through said housing and said chuck to said tool to thereby compact material used in filling a tooth.

2. An air operated vibrator for dentistry or the like comprising, in combination, a housing for a vibrator motor, said housing being formed of two pieces having facing surfaces which form a chamber for the receipt of the motor assembly therein, a vibrator motor assembly mounted within said chamber, said assembly comprising a grooved annular member and a spherical element, means securing said housing pieces together when said motor assembly is mounted therein, a hollow handle mounted on one end of said housing, a rigid tube within said handle secured to said motor assembly, a passage through the annular member of said assembly connecting said tube with the groove of said motor assembly, means supplying air under pressure to said tube and said motor assembly, a chuck assembly mounted on the housing, a condensing tool removably mounted in said chuck in longitudinal reciprocating relation to said vibrator motor assembly in operation, said air operated vibrator being constructed and adapted to supply air under pressure to said motor assembly, whereupon said spherical element will be passed around the groove in said annular member in said motor assembly to create high frequency vibrations which

5

are transmitted through said housing and said chuck assembly to said condensing tool.

3. Gas operated condenser means for dentistry and the like comprising, in combination, a housing, gas operated vibrator motor means mounted in said housing and connected thereto to vibrate same, conduit means operatively connected to said motor means and connectable to a source of gas under pressure to provide gas to said motor means to operate same, a condensing tool rigidly and operatively connected to said housing, a portion of said tool being positioned relative to said motor means to have a longitudinal vibratory motion imparted thereto by said vibrator motor means during operation of said motor means, said gas operated condenser means being

6

constructed and adapted to in operation be vibrated by gas supplied through said conduit means to said motor means so that said portion of said tool has a longitudinal vibratory motion imparted thereto by said motor means and can be placed in engagement with amalgam or the like to condense same.

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