

- [54] **DENTAL HYGIENE APPLIANCE**
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- [52] **U.S. Cl.**..... 15/23, 15/28, 32/59
 [51] **Int. Cl.**..... **A46b 13/02**
 [58] **Field of Search**..... 15/23, 24, 28, 29; 32/27,
 32/59

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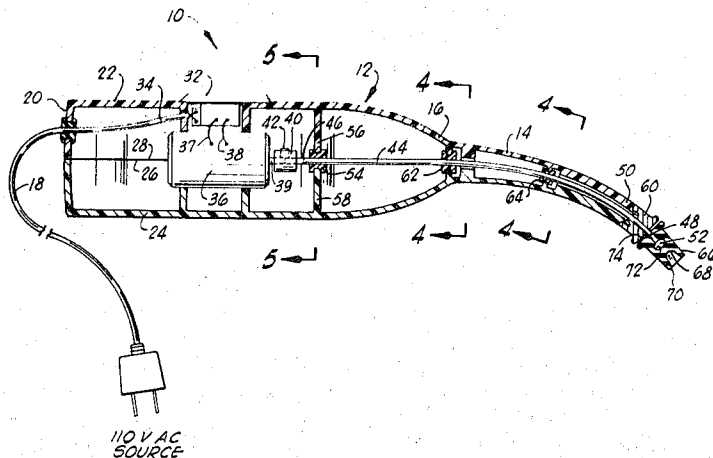
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 Dougherty & Codding

[57] **ABSTRACT**

A dental hygiene appliance having a housing with a curved tubular extension formed on one end thereof. An electric motor is carried within the housing and is drivably connected to one end of a flexible shaft disposed within the tubular extension. The opposite end of the flexible shaft extends beyond the end of the tubular extension and is removably drivably secured to a rotary tooth cleaning tool. In one form of the invention, the rotary tooth cleaning tool comprises a tooth polishing cup formed of elastomeric material. In another form of the invention the rotary tooth cleaning tool comprises a brush. One or more flexible shaft bearings are disposed within the tubular extension intermediate the electric motor and the rotary tooth cleaning tool.

10 Claims, 7 Drawing Figures



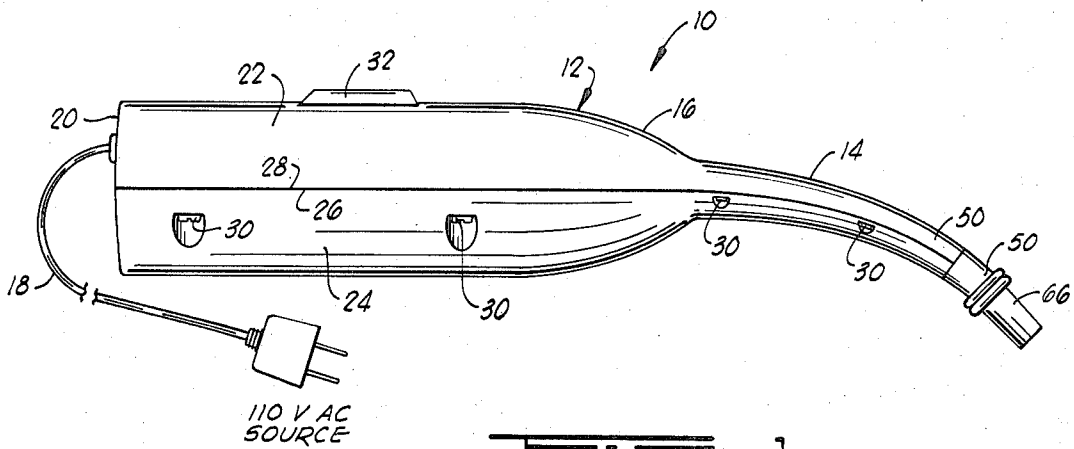


FIG. 1

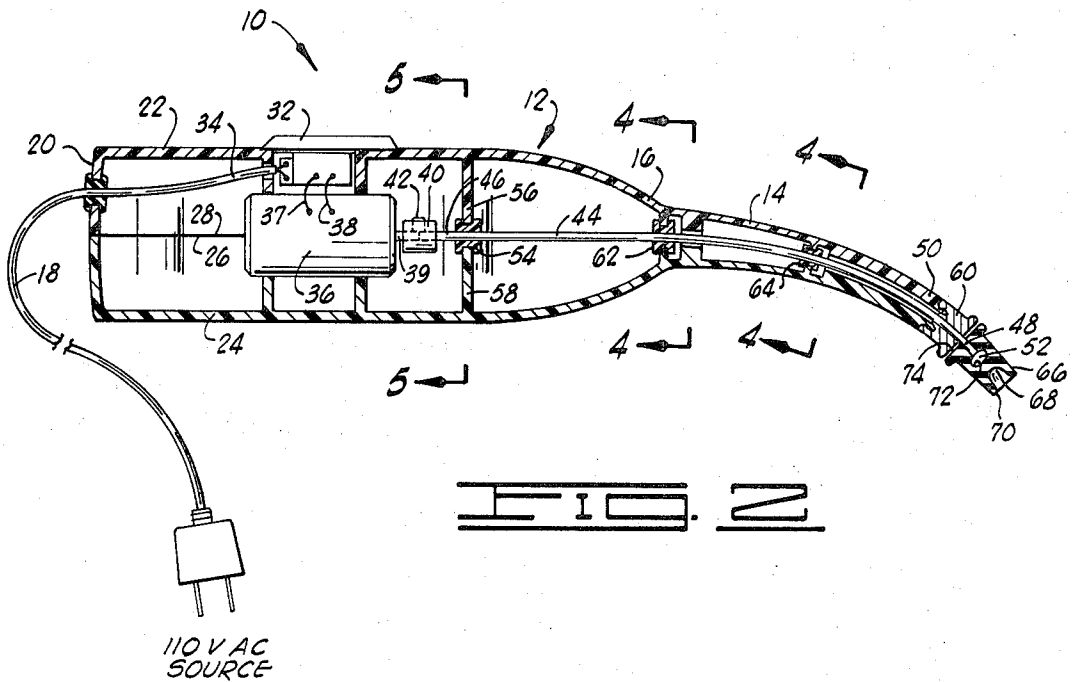


FIG. 2

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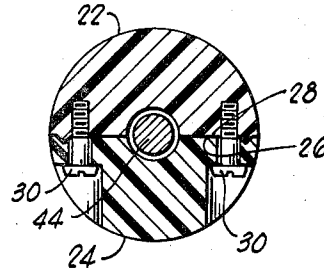
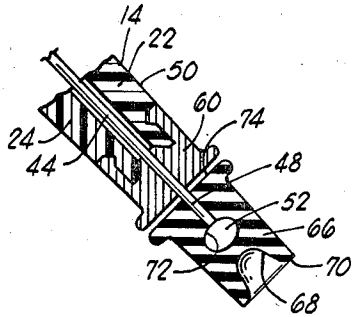


FIG. 3

FIG. 4

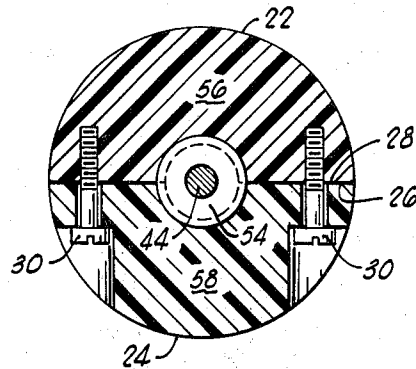
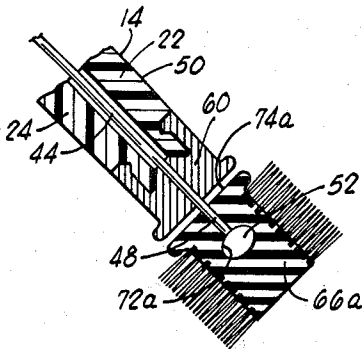


FIG. 7

FIG. 8

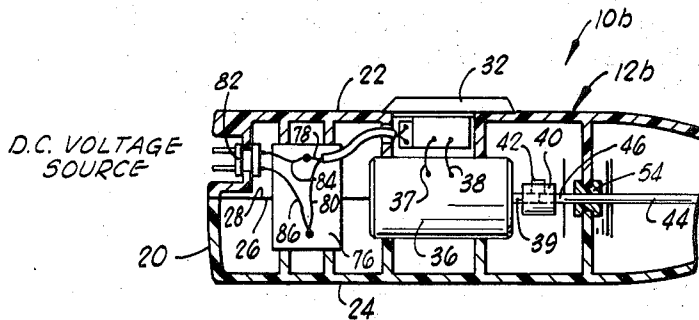


FIG. 9

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DENTAL HYGIENE APPLIANCE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to improvements in dental equipment, and more particularly, but not by way of limitation, to apparatus for cleaning and polishing teeth.

2. Description of the Prior Art

Various mechanically operated tooth brushes are disclosed in the prior art. Generally, these tooth brushes are characterized by either rotating or oscillating brushes powered by an integral electric motor or other means. Other devices are available which provide tooth polishing means, but derive their driving power from a conventional dental engine and are therefore restricted to use in a dentist's office.

SUMMARY OF THE INVENTION

The present invention contemplates a novel dental hygiene appliance for use in the home or other location remote from a dentist's office which includes a housing having opposite ends and rotary drive means carried in said housing intermediate said opposite ends. A tubular extension is formed on one end of the housing and has an outer end formed thereon. A drive shaft, having a first end and a second end, is rotatably disposed within the tubular extension, the first end thereof being drivably connected to the drive means and the second end thereof extending through the outer end of the tubular extension. The drive shaft is rotationally responsive to the rotary drive means. A rotary tooth cleaning tool is drivably secured to the second end of the drive shaft to rotate therewith.

An object of the present invention is to provide a dental hygiene appliance capable of performing tooth brushing and polishing functions at a site remote from the dentist's office.

Another object of the present invention is to provide a dental hygiene appliance which can be used by a dentist or dental hygienist for home or hospital calls.

A further object of the present invention is to provide a dental hygiene appliance which carries its own drive means integral therewith.

A still further object of the present invention is to provide a dental hygiene appliance which provides more efficient tooth stain removal and fluoride application to the teeth than is available with existing devices.

Yet another object of the present invention is to provide a dental hygiene appliance which is economical to construct and maintain, and simple and convenient to operate.

Further objects and advantages of the present invention will be evident from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of the apparatus of the present invention.

FIG. 2 is a vertical cross-sectional view of the apparatus of the present invention.

FIG. 3 is an enlarged cross-sectional view more clearly illustrating the rotary tooth cleaning tool and its attachment to the drive shaft.

FIG. 4 is an enlarged cross-sectional view taken along lines 4—4 of FIG. 2.

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 2.

FIG. 6 is a fragmentary cross-sectional view similar to FIG. 2 illustrating another embodiment of the present invention.

FIG. 7 is an enlarged cross-sectional view similar to FIG. 3 and illustrating another form of rotary tooth cleaning tool.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and to FIGS. 1 and 2 in particular, the dental hygiene appliance of the present invention is generally designated by the reference character 10. The appliance 10 includes a housing 12 having a tubular extension 14 formed on one end 16 thereof. The housing 12 is preferably constructed of a suitably synthetic resin material such as Delrin or Cyclocac. Power connecting means 18 extend from the opposite end 20 of the housing 12. The power connecting means 18 is preferably a conventional electric cord having a conventional plug connected to one end thereof for connection to a conventional 110 V.A.C. source of electrical power.

The tubular extension 14 formed on the housing 12 is preferably of a curved configuration for convenience to the operator of the appliance.

The housing 12 comprises an upper portion 22 and a lower portion 24, each portion comprising approximately one-half of the housing 12. The lower edge 26 of the upper portion 22 engages the upper edge 28 of the lower portion 24. The upper and lower portions 22 and 24 of the housing 12 are rigidly secured together in assembled position by means of a plurality of threaded screws 30 extending through the lower portion 24 and threadedly engaging the upper portion 22, as more clearly shown in FIGS. 4 and 5.

A switch 32 is mounted on the upper portion 22 of the housing 12 and extends therethrough into the interior of the housing 12. As shown in FIG. 2, the inner end 34 of the power connecting means 18 is electrically connected to the switch 32. An electric drive motor 36 is rigidly supported within the housing 12. The drive motor 36 is electrically connected to the switch 32 by means of connecting wires 37 and 38. The switch 32 provides means for switching electric current on and off from the source of electricity to the drive motor 36.

A rotary output shaft 39 extends from the drive motor 36 toward the tubular extension 14 of the housing 12. A collet 40 having a threaded set screw 42 mounted therein is fixedly secured to the rotary output shaft 39 to rotate therewith. A flexible drive shaft 44 is rigidly secured at its inner end 46 within the collet 40 by means of the set screw 42. The flexible drive shaft 44 extends forward through the tubular extension 14 with the outer end 48 thereof extending beyond the end 50 of the tubular extension 14. An enlarged portion 52 is formed on the outer end 48 of the flexible drive shaft 44.

The flexible drive shaft 44 is journaled within the housing 12, adjacent the inner end 46 thereof, in a bearing 54, as shown more clearly in FIG. 5. The bearing 54 is supported within the housing 12 by means of bulkheads 56 and 58 formed on the upper and lower

portions 22 and 24 of the housing 12, respectively. The flexible drive shaft 44 is journaled adjacent the outer end 48 thereof, within the tubular extension 14 in a bearing 60 which is rigidly secured in the end 50 of the tubular extension 14. As shown in FIGS. 2, 3 and 7, the bearing 60 is elongated along the longitudinal axis of the flexible drive shaft 44 journaled therein to provide rigid rotational support of the outer end 48 of the drive shaft and carry the lateral loading of the drive shaft incurred during operation of the appliance 10. The bearing 60 performs a secondary, but equally important function, by rigidly securing the upper and lower portions 22 and 24 of the housing 12 together at the end 50 of the tubular extension 14. The flexible drive shaft 44 is journaled intermediate the bearings 54 and 60 in bearings 62 and 64 which are carried within the tubular extension 14 in spaced relation along the flexible drive shaft 44.

It should be noted that the flexible drive shaft 44 is preferably constructed of stainless steel, however, other suitable material may be utilized in its construction such as Nylon or some other synthetic resin material. It should also be noted that the bearings 54, 60, 62 and 64 may be formed of a suitable metal or synthetic resin material or may be conventional ball bearings of suitable size. The bearings 54, 60, 62 and 64 minimize vibration caused by the rotating flexible shaft 44 thereby permitting more precise control of the appliance 10 by the operator and reducing power consumption and wear in the appliance 10. The previously mentioned elongated configuration of the bearing 60 minimizes vibration of the outer end 48 of the flexible shaft 44.

FIGS. 2 and 3 illustrate a rotary tooth cleaning tool 66 connected to the outer end 48 of the flexible shaft 44. The tool 66 has a cup shaped cavity 68 formed in one end 70 thereof. A second cavity 72 is formed in the opposite end 74 of the tool 66 and is sized and shaped to receive the enlarged portion 52 formed on the outer end 48 of the flexible shaft 44 to drivably secure the tool 66 to the shaft 44.

The rotary tooth cleaning tool 66 is constructed of a suitable elastomeric material which permits the tool 66 to be snapped on and off of the enlarged portion 52 of the flexible drive shaft 44. When secured, as described above, to the flexible drive shaft 44, the tool 66 is rotatable therewith.

FIG. 7 illustrates another form of tooth cleaning tool 66a comprising a tooth brush which is connected to the outer end 48 of the shaft 44. A cavity 72a is formed in the end 74a thereof and is sized and shaped to drivably engage the enlarged portion 52 of the shaft 44 for rotation therewith.

It should be noted that other forms of rotary tooth cleaning tools may be interchangeably secured to the flexible drive shaft 44 and may take the form of various tooth brushing or polishing devices.

OPERATION OF THE PREFERRED EMBODIMENT

To operate the dental hygiene appliance 10, the power connecting means is connected to a suitable source of electrical power. The switch 32 is placed in the "on" position thereby allowing electrical current to pass through the switch 32 to the electric drive motor 36 causing the rotation of the output shaft 39. The flexible drive shaft 44 is rotated by the rotary output shaft

39 and, in turn, rotates the rotary tooth cleaning tool 66. A suitable tooth polishing substance may be positioned in the cup-shaped cavity 68 of the tooth cleaning tool 66 to provide proper tooth cleaning action.

DESCRIPTION OF THE EMBODIMENT OF FIG. 6

FIG. 6 illustrates another embodiment of dental hygiene appliance constructed in accordance with the present invention and generally designated by the reference character 10b. Many elements of the appliance 10b are identical to those previously described above and will therefore be designated by the same reference characters.

The dental hygiene appliance 10b includes a slightly modified housing 12b. An electric drive motor 36 is mounted in the housing 12b and is electrically connected to the switch 32 by means of wires 37 and 38. A rechargeable storage cell 76 is mounted within the housing 12b intermediate the electric drive motor 36 and the end 20 of the housing 12b. The storage cell 76 is electrically connected to the switch 32 by means of wires 78 and 80. A suitable plug 82 is mounted in the end 20 of the housing 12b and is electrically connected to the storage cell 76 by means of wires 84 and 86.

OPERATION OF THE EMBODIMENT OF FIG. 6

The dental hygiene appliance 10b provides the capability of cordless operation. With the switch 32 in the "off" position, a D.C. voltage source is connected to the plug 82 to provide recharging of the storage cell 76. To operate the dental hygiene appliance 10b, the D.C. voltage source is removed from the plug 82 and the switch 32 is placed in the "on" position allowing electric current to flow from the storage cell 76 through the switch 32 to the drive motor 36 to drive the flexible shaft 44 as described above.

From the foregoing detailed description of the various embodiments of the dental hygiene appliance of the present invention it can be readily seen that an appliance is provided which is capable of performing tooth brushing and polishing functions at a site remote from a dentist's office, thereby providing an appliance suitable for home or hospital use. It may further be seen that the present invention provides a dental hygiene appliance which is economical to construct and maintain, and simple and convenient to operate.

Changes may be made in the construction and arrangement of parts or elements of the various embodiments as disclosed herein without departing from the spirit and scope of the invention.

What is claimed is:

1. A dental hygiene appliance comprising:

a housing having opposite ends;

rotary drive means carried in said housing intermediate said opposite ends;

a curved tubular extension formed on one end of said housing and having an outer end formed thereon; a flexible drive shaft, having a first end and a second end, rotatably disposed within said curved tubular extension, the first end thereof being drivably connected to said drive means and the second end thereof extending through the outer end of said tubular extension, said flexible drive shaft being rotationally responsive to said rotary drive means;

said housing and curved tubular extension formed thereon being divided into an upper portion and a

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lower portion separable along a plane substantially intersecting the longitudinal axis of said rotary drive means and the longitudinal axis of said flexible drive shaft;

elongated bearing means fixedly secured to the outer end of said curved tubular extension for rigidly rotatably supporting said flexible drive shaft extending therethrough and for securing the upper and lower portions of said curved tubular extension together at the outer end thereof; and

a rotary tooth cleaning tool drivably secured to the second end of said flexible drive shaft to rotate therewith.

2. A dental hygiene appliance as defined in claim 1, characterized further to include:

at least one bearing carried within said curved tubular extension and encircling said flexible drive shaft whereby said drive shaft is rotatably supported intermediate said drive means and said rotary tooth cleaning tool.

3. A dental hygiene appliance as defined in claim 2, characterized further to include:

control means carried on said housing and operatively connected to said drive means whereby said drive means may be turned on and off.

4. A dental hygiene appliance as defined in claim 3 wherein said rotary tooth cleaning tool comprises a tooth brush, said tooth brush being removable from the second end of said flexible drive shaft.

5. A dental hygiene appliance as defined in claim 3 wherein said rotary tooth cleaning tool comprises a polishing cup of elastomeric material, said polishing cup being removable from the second end of said flexible drive shaft.

6. A dental hygiene appliance as defined in claim 3 wherein said rotary drive means is an electric motor.

7. A dental hygiene appliance as defined in claim 6, characterized further to include:

an electrical storage cell carried in said housing and operatively connected to said electric motor to provide electric current thereto.

8. A dental hygiene appliance as defined in claim 7 wherein said electrical storage cell is rechargeable from a source external to said dental hygiene appliance.

9. A dental hygiene appliance as defined in claim 8 wherein said flexible drive shaft is formed of a synthetic resin material.

10. A dental hygiene appliance as defined in claim 8 wherein said flexible shaft is formed of stainless steel.

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