Jan. 26, 1965 R. SIMMEN 3,166,943

WATERTIGHT SEALING MEANS FOR ELECTRIC TOOTHBRUSHES AND THE LIKE

Filed Sept. 4, 1962

FIG. 1

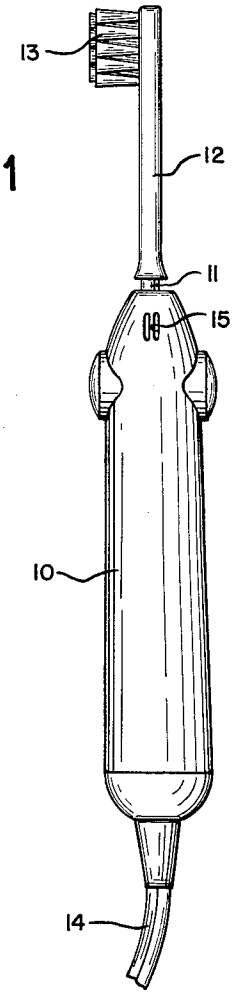


FIG. 2

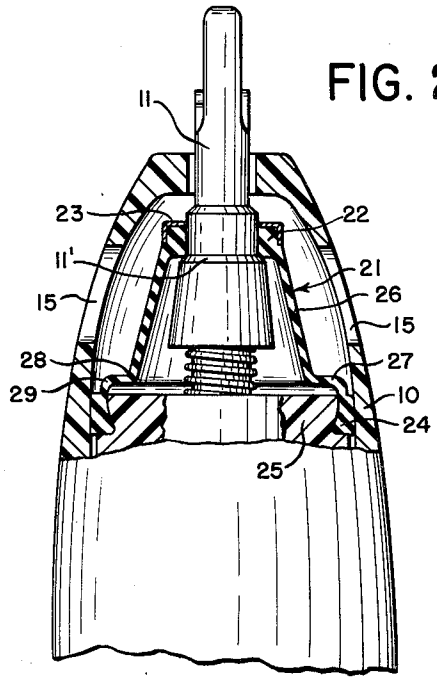
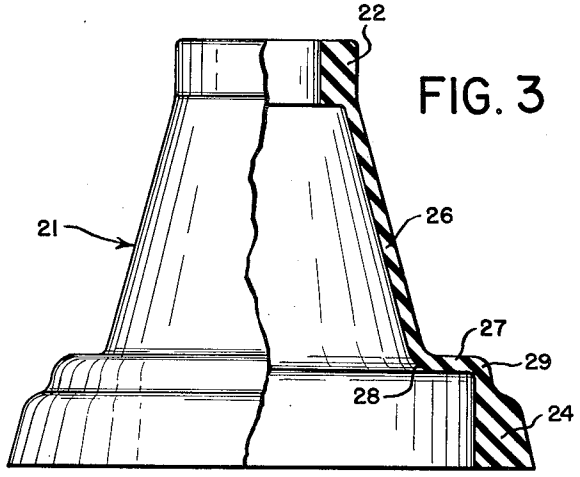


FIG. 3



INVENTOR
Robert Simmen
BY
Pennie, Edmonds, Morton, Barrows & Taylor
ATTORNEYS

United States Patent Office 3,166,943 Patented Jan. 26, 1965

3,166,943

WATERTIGHT SEALING MEANS FOR ELECTRIC TOOTHBRUSHES AND THE LIKE

Robert Simmen, Geneva, Switzerland, assignor to Etablissement Aesup, Vaduz, Liechtenstein, a firm of Liechtenstein

Filed Sept. 4, 1962, Ser. No. 221,258
4 Claims. (Cl. 74—18)

This invention relates to an electrically-operated hand appliance for corporal care, particularly an electrically-operated toothbrush, and is directed to the provision of a watertight sealing means therefor.

In U.S. Patent 2,917,758, issued December 22, 1959, to Held et al. for Electrically-controlled Toothbrush," an electrically-operated toothbrush is described including an elongated casing forming a handle and an electric motor in the casing which produces rotational oscillation of a shaft projecting outside of the casing and adapted for the attachment of a toothbrush head thereto.

By using different types of heads, the appliance can be used for other types of corporal care, such as massage, beauty treatment, etc.

Since such appliances are commonly used in the bathroom, where the appliance or the hands of the user may be wet, adequate protection against electric shock is required. In the case of a toothbrush, it is very important to prevent the entry of water, toothpaste mixture, etc. into the portion of the handle containing the electric motor and electrical connections.

In U.S. application Serial No. 699,580 filed November 29, 1957, by Woog for "Electrically-Operated Toothbrush," now Patent No. 3,060,474, a watertight sealing means is disclosed in the form of a sleeve of thin flexible water-impermeable material encircling the shaft inside the casing. One end of the sleeve is affixed in substantially watertight relationship around the shaft, and the other end is firmly clamped to the inside of the casing by a clamping ring. This has been found to provide a very satisfactory watertight sealing means. However, the longitudinally pleated sleeve specifically described therein is somewhat expensive to manufacture, and a smooth-walled sleeve is hence desirable.

In addition to providing for watertightness, the sleeve should be capable of reliable operation over long periods of time without undue wear, cracking, etc. which would impair its watertightness. In addition, it is desirable that the sleeve be sufficiently resilient and of such form as not to produce excessive restoring torques in view of the limited power available in a motor of convenient size. It has been found that smooth-walled sleeves which are satisfactory from the standpoint of watertightness, relatively long life, and adequately small restoring torque under continuous operation may, after an extended period of non-operation, become somewhat set or form a profile of resistance such that restarting the oscillations is impaired.

Since a toothbrush is used only intermittently, and there may be a considerable time between successive uses, it is highly desirable for operation to start immediately and with full oscillation amplitude, regardless of the period of non-use. The present invention is particularly directed to the provision of a flexible sleeve of such shape as to provide more satisfactory operation under various conditions of use.

In the drawings:

FIG. 1 is an overall view of the complete toothbrush;

FIG. 2 is a view partially in cross-section showing the novel sleeve of the invention mounted in place in the toothbrush; and

FIG. 3 is a cross-sectional view of the flexible sleeve itself.

Referring to FIG. 1, an elongated casing 10 forms the toothbrush handle and contains an electric motor for producing rotational oscillation of shaft 11 projecting from the front end thereof. A brush-stem 12 mounting bristles 13 is removably attached to shaft 11. Energization from the power mains is obtained through cord 14.

Referring to FIG. 2, the sleeve 21 is shown having a smaller diameter front end 22 affixed in substantially watertight relationship around the shaft 11. Advantageously the shaft is provided with a slightly enlarged section 11' and the end 22 is pressed thereagainst by a retaining washer 23. The larger diameter end 24 of the sleeve engages an inner annular surface of the casing 10 extending generally in the direction of shaft 11, and is firmly clamped thereagainst by a clamping ring 25. Ring 25 may be part of a member within the casing used in mounting other structures not forming part of the present invention.

Handle 10 is watertight rearward of sleeve 21, so that the sleeve protects the electric motor and circuit components contained therein. Apertures 15 permit washing the front end of the appliance ahead of the sleeve, and form no part of the present invention.

As shown in FIGS. 2 and 3, the sleeve 21 has a flaring section 26 extending from the smaller diameter end 22 thereof. This is advantageously conical. The flaring or conical section 26 is joined with the larger diameter end 24 of the sleeve through a laterally extending annular section 27. Advantageously, as shown in FIG. 2, the flaring section 26 is spaced from the shaft and the casing to avoid rubbing contact therewith during operation, and the laterally-extending annular section 27 is spaced from the adjacent end of ring 25 so as not to be in contact therewith during operation. Preferably, the flaring section 26 is conical, and the laterally-extending section 27 is approximately perpendicular to the shaft 11 in the rest position thereof.

In operation, the front end 22 of the sleeve will rotationally oscillate with shaft 11 and hence will be rotationally twisted with respect to the rear end 24. The amplitude of the angular oscillation may be of the order of 60°, or ±30° from the rest position. In consequence, the conical portion 26 will become somewhat wrinkeld in opposite directions as the shaft 11 oscillates. During the oscillation, the distance between a given point at end 22 and a corresponding point at end 24 cyclically increases and decreases. The laterally-extending section 27 allows bending at points 28 and 29 so that there is very little resistance to such increase and decrease. Thus section 27 can move forward and back during the oscillation of shaft 11. Also, some wrinkling at point 28 can occur without appreciably increasing the restoring torque. Even though there may be some setting of the material during a period of non-use, or some resistance to angular twisting of conical section 26, the relatively small resistance to bending at points 28 and 29 will prevent the sleeve from providing an excessive angular restoring torque which would block the motor oscillations.

It will be noted that the flaring section 26 is spaced from the shaft 11 and the casing 10, and that the laterally-extending section 27 is spaced from the front of ring 25. Accordingly, rubbing contact during oscillation is avoided. This is facilitated by forming the smaller diameter end 22 with an inwardly-extending beading and the larger diameter end 24 with an outwardly-extending beading, as shown. When the sleeve is secured in place, as shown in FIG. 2, the beadings hold the adjacent thin-walled sections away from shaft and casing, respectively, so as to avoid rubbing contact therewith.

It has been found that Neoprene is a particularly good material for the sleeve, although a high quality natural rubber may also be employed with success.

I claim:

1. In an electrically-operated hand appliance for personal care including a substantially watertight casing forming a handle, a shaft accessible from the outside of said casing and adapted for the attachment of an appliance head thereto, and an electric motor in said casing for producing rotational oscillation of said shaft and thereby of said appliance head, means for producing a watertight seal between said rotationally oscillating shaft and said casing which comprises

(*a*) a hollow non-reentrant sleeve of thin flexible water-impermeable material encircling said shaft inside said casing and extending therealong a substantial distance,

(*b*) said sleeve having a smaller diameter end thereof affixed in substantially watertight relationship around said shaft and a larger diameter end engaging an inner annular surface of the casing which extends generally in the direction of said shaft,

(*c*) and a clamping ring inside the larger diameter end of the sleeve for firmly clamping the end to said inner annular surface of the casing,

(*d*) said sleeve having a flaring section extending from the smaller diameter end thereof and a laterally-extending annular section joining the flaring section with the larger diameter end thereof,

(*e*) said laterally-extending annular section making a substantial bend with the flaring section at the junction thereof and a substantial bend with the adjacent clamped portion of the sleeve and spaced therefrom,

(*f*) said flaring section being substantially spaced from the shaft and casing and the laterally-extending section being substantially spaced from the clamping ring and casing to avoid rubbing contact therewith during operation.

2. Apparatus in accordance with claim 1 in which said flaring section is substantially conical and said laterally-extending section is substantially perpendicular to the shaft axis in the rest position thereof.

3. In an electrically-operated toothbrush including a substantially watertight casing forming a handle, a shaft extending through said casing and adapted for the attachment of a brush head thereto, and an electric motor in said casing for producing rotation oscillation of said shaft and thereby of said brush head, means for producing a watertight seal between said rotationally oscillating shaft and said casing which comprises

(*a*) a hollow non-reentrant sleeve of flexible water-impermeable materal having smaller and larger diameter ends with a thin-walled flaring section extending from the smaller diameter end and a laterally-extending annular section joining the flaring section with the larger diameter end,

(*b*) the smaller diameter end having an inwardly-extending beading and the larger diameter end having an outwardly-extending beading,

(*c*) said laterally-extending annular section making a substantial bend with the flaring section at the junction thereof and a substantial bend with the outwardly-extending beading and spaced therefrom,

(*d*) said sleeve encircling said shaft with the smaller diameter beaded end thereof affixed in substantially watertight relationship around said shaft and the larger diameter beaded end engaging an inner annular surface of the casing which extends generally in the direction of the shaft,

(*e*) and a clamping ring inside the larger diameter end of the sleeve for firmly clamping the end to said inner annular surface of the casing,

(*f*) said flaring section being substantially spaced from the shaft and casing and the laterally-extending section being substantially spaced from the clamping ring and casing to avoid rubbing contact therewith during operation.

4. Apparatus in accordance with claim 3 in which said flaring section is substantially conical and said laterally-extending section is substantially perpendicular to the shaft axis in the rest position thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,686,339	Murray	Oct. 2, 1928
1,807,139	Volodimirov	May 26, 1931
1,818,973	De Giers	Aug. 18, 1931
2,527,239	Woodson	Oct. 24, 1950
2,561,213	Mahowald	July 17, 1951

FOREIGN PATENTS

834,734	Great Britain	May 11, 1960