

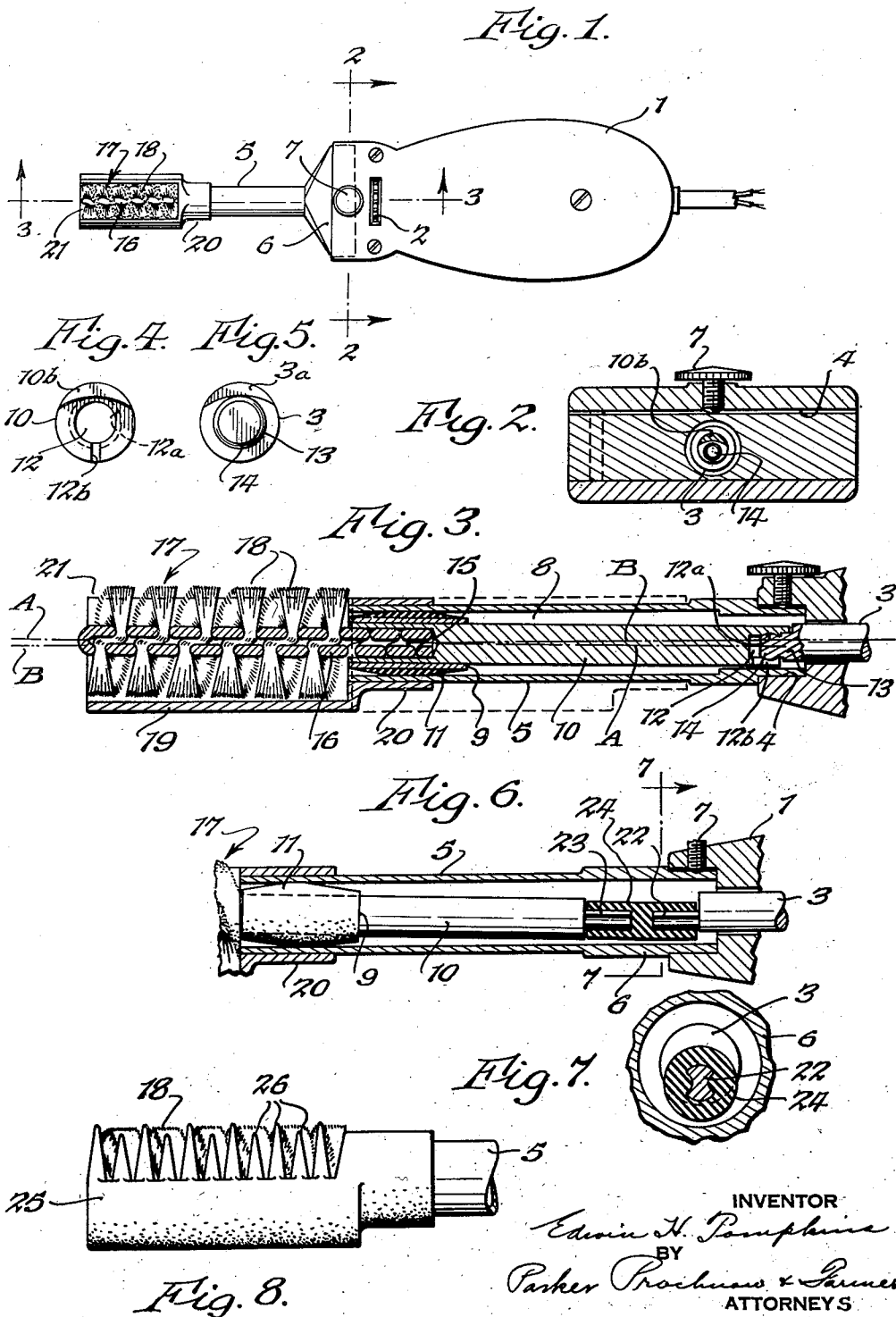
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POWER-OPERATED TOOTHBRUSH

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POWER-OPERATED TOOTHBRUSH

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This invention relates to power operated tooth brushes, and particularly to those which are incorporated in small, complete self-contained units.

An object of the invention is to provide an improved, power operated tooth brush, which carries a power unit in the handle; with which danger of injury to the gums and the inside of the cheeks and lips will be largely reduced or prevented; with which the brush portion may be quickly and fully accessible for cleaning separately from the power operating unit; which may be disassembled for storage, packing or shipping and reassembled in a simple manner; and which will be exceptionally compact, simple, efficient, convenient and inexpensive.

Another object of the invention is to provide an improved, power operated toothbrush, with which the teeth may be subjected to the cleaning action of moving bristles; with which the bristles are given a rotary movement, as well as bodily gyratory movement in a small closed loop path; which will have an improved drive for converting rotary movement into combined rotary and gyratory movement; and which will be relatively simple, compact and inexpensive.

Another object of the invention is to provide an improved guard for rotary and other toothbrushes; which will prevent injury to the gums of the teeth during the use of the brush.

Various other objects and advantages will be apparent from the following description of the two embodiments of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims. In the accompanying drawing:

Fig. 1 is a plan of a power operated toothbrush constructed in accordance with this invention;

Fig. 2 is a transverse, sectional elevation through the same, the section being taken approximately along the line 2-2, Fig. 1;

Fig. 3 is a longitudinal, sectional elevation of a portion of the same, the section being taken approximately along the line 3-3, Fig. 1.

Fig. 4 is one end elevation of the brush shaft;

Fig. 5 is one end elevation of the armature shaft;

Fig. 6 is a longitudinal, sectional elevation somewhat similar to that of Fig. 3, but illustrating a modified coupling between the brush shaft and the armature shaft;

Fig. 7 is a transverse, sectional elevation through the same, with the section taken approximately along the line 7-7 of Fig. 6, and

Fig. 8 is a side elevation of the brush-carrying

end of the device, with a modified guard thereon, so as to additionally protect the gums and to limit the movements of the brush to such an extent that extensive contact of the moving brush with the gums will be prevented.

In the embodiment of the invention illustrated in Figs. 1 to 5, the improved toothbrush includes a suitable hollow handle 1, about the size of a small electric safety razor or dry shaver, having therein an electric motor with a starting wheel 2 on the armature shaft 3. Electric motors of this type are well known in the art of electric dry shavers, and the details of the electric motor per se form no part of this invention. A very simple and practical form of electric motor which is suitable for this purpose and which is extensively used in the electric razor art, is a small make and break type of motor which is not ordinarily self-starting, but which may be started 20 by giving a tangential push on the starting disk 2, as usual in electric razors. Any suitable type of small electric motor may be used, however.

One end of the handle 1 is provided with a transverse channel 4, Figs. 2 and 3, into which one end of the armature shaft 3 extends. A tubular element 5 abuts endwise against the handle 1 and is provided with a laterally elongated end portion 6 which is received in the channel 4 and detachably secured therein in any suitable manner, such as by a set screw 7. Disposed in the passage 8 of the element 5, adjacent its outer end, is a cylindrical bearing 9 which receives and rotatably supports a brush shaft 10. This bearing 9 carries an encircling rubber sleeve 11 which has a convex periphery, in a direction from end to end, as clearly shown in Fig. 3. This rubber sleeve 11 snugly fits under small compression, the passage 8, so as to retain its position therein, yet because of its longitudinally convex curvature, and its transversely circular shape, and its resilient rubber composition, the bearing 9 can rock to a limited extent in a universal manner within the passage 8 at the outer end thereof.

The brush shaft 10 is provided at its inner end with a recess 12 opening from its inner end, disposed eccentrically of the longitudinal axis of the shaft 10 and having an enlarged seat 12a. The corresponding and abutting end of the armature shaft 3 is reduced in size so as to provide 50 an eccentric pin or stud 13 with somewhat ball-like head 14 which is received in the seat 12a of the recess 12. The end of shaft 10 along one side of recess 12 is slit at 12b so that the walls of the recess 12 can spring apart to yieldingly grip the head 14. Shaft 10 at one side of recess

12 has an endwise extending lug 10b, (Fig. 4), which is received in an eccentric recess 3a (Fig. 5) in the adjacent end of the shaft 3. Because of the eccentricity of the stud 13 and the recess 12 with respect to the shafts 3 and 10, and the engagement of lug 10b in the recess 3a, the rotation of the armature shaft 3 will cause rotation at the same speed of the shaft 10 and simultaneously rock or oscillate the shaft 10 and its bearing within the passage 8, as shown for example by the dot and dash lines A and B in Fig. 3, which indicate the difference of position of the axes of the shaft 10 and the armature shaft 3. Thus, the armature shaft 3 will not only rotate the brush shaft 10 at the same speed, but also cause bodily gyration of the free or outer end of shaft 10 in a small, closed loop path.

The outer end of the shaft 10 is provided with a non-circular recess 15 which receives a non-circular end of the twisted wire shank 16 of a suitable brush 17 which carries bristles 18. Brushes of this type are well known in the art and the bristles may be arranged in small groups or they may be formed in a sort of spiral or helical row in the twisted wire shank. The shank 16 is snugly received in the recess 15 so that rotation of the shaft 10 will cause similar rotation of the brush 17. Likewise the rocking of the shaft 10 simultaneously with its rotation will be transmitted to the brush 17. Thus, while the handle 1 is held in one's hand, with the motor running, the rotary and bodily gyrating brush 16 may be applied to the teeth with suitable water and tooth paste or tooth powder, so as to thoroughly and quickly clean the teeth.

Power driven brushes heretofore have not become popular, owing to the fact that when such a rapidly moving brush engages the gums of the teeth or the inside of the cheeks which overlies the teeth, serious scratching or injuries to the tissues of the mouth occur, with resulting danger of infection. It is highly desirable that the brushing be confined as fully as possible to the teeth alone and not to surrounding tissue. Accordingly, in accordance with this invention, a guard 19 is provided with a reduced end 20 which slidably telescopes over the outer end of the tubular element 5 so as to slide endwise thereon. The remainder of the guard is larger in diameter or crosswise dimensions than the element 5, so that the guard may, when desired, be slid fully into the dash line position shown in Fig. 3, in which the outer end of the guard is then approximately aligned with the outer end of the element 5. This exposes all of the bristles of the rotary brush around the entire periphery of the brush. Such a brush may then be held under the faucet for rinsing or it may be swished in soap suds and then rinsed in order to fully dislodge all foreign matter and render it clear for subsequent use.

The guard 19 may then be slid back into the full line position shown in Fig. 3. This guard 19 comprises more than half of a cylinder in the portion where it is coextensive in length with the bristle-carrying portion of the brush shank 17, but is not a complete cylinder, so that the guard, in effect, has an open window 21 along one side thereof in length coextensive with the bristle-carrying portion of the brush. Because of this, the bristles 18 may project slightly through this window, as shown in Fig. 3. When such a rotating brush is applied to the teeth, the handle 1 is so held that the window 21 will approach the teeth, with the brush projecting to engage the teeth. The guard, which otherwise

surrounds the rotating brush, will prevent contact of the rotating brush with the gums or with the cheek tissues which normally abut against the teeth or the gums. There is thus no injury to the tissues of the mouth, and there is also nothing to prevent full application of the rotary and gyrating brush to all of the exposed surfaces of the teeth. The device is thus perfectly safe to use, yet the guard can be quickly shifted endwise into the dash line position for cleaning. The part 20 of the guard 19, which slides on the tubular part 5, may be split endwise, if desired, so as to frictionally grip the part 5, thus providing a simple way of holding the guard 19 in either of its two positions shown.

When the brush is not in use, the set screw 7 may be backed off slightly to release the tubular element 5. The latter may then be detached from the handle, which enables the detached end to be disposed alongside the handle 1, thus greatly cutting down the overall dimensions of the case in which such devices can be packed. The device can be quickly reassembled, as shown in Figs. 1 to 3, by reversing the steps. The brush 16 can also be detached from the recess 15 for replacement when necessary, or different individuals can use the handle and tubular element and merely substitute their own individual brush 16 in the recess 15 and then remove it after use.

In Fig. 6, the construction is generally similar to that shown in Figs. 1 to 5, and similar parts are given similar reference characters, but the detachable coupling between the armature shaft 3 and the brush shaft 10 has been replaced by a different type of coupling. This shaft 3 is provided with an eccentric pin 22, which is non-circular in shape, as shown in Fig. 5, and the shaft 10 similarly has an eccentric end pin 23 of non-circular shape. These eccentrically located pins are received in recesses provided in opposite ends of a flexible coupling element 24. This flexible element 24 is preferably of flexible, molded rubber which flexes with sufficient freedom to conform to the rockings of the shaft 10, yet is sufficiently rigid to provide a drive between the shafts 3 and 10. When the tubular element 5 is detached from the handle 1, the coupling element 24 slides off the pin 22 on the end of the armature shaft 3, and when the device is reassembled, as shown in Figs. 4 and 5, the coupling element 24 is slid over the pin 22 to reconnect the shafts 3 and 10.

In Fig. 8, the guard 25, which corresponds to the guard 19 of Figs. 1 to 7, is formed of molded rubber which is flexible yet with the consistency of ordinary rubber tubing, and the sides of the guard which provide the open window through which the bristles 18 may project are provided with small, tapered, pin-like projections 26 which, while flexible with reasonable freedom, have a tendency to return to their normal, upright positions, as shown in Fig. 6. When a guard of this type is applied around the moving brush, the engagement of the flexible rubber prongs 26 with the gums before the bristles engage the gums, will aid one in knowing when to stop the up and down movements of the brush, and thus prevent movement of the rapidly moving bristles against the gums. This guard 25 may be slid endwise on the tubular element 5, the same as the guard 19 in Figs. 1 to 5. Rubber products of this type are known as molded rubber, and the flexibility is approximately the same as that of rubber tubing or water bags, which are not only flexible, but normally are self-shape-retaining.

In the use of a brush of this type, the motor is started in operation and the handle 1 grasped in the hand. The guard 19 or 25 is shifted into its protective position shown in full lines in the drawing, and suitable tooth paste or powder is applied to the moving bristles. The brush is then applied to the exposed tooth surfaces and moved slowly up and down along the rows of teeth, both inside and out faces, until the desired cleaning action on the teeth is obtained. This guard prevents injury to the mouth tissues, and because of the rapidly moving bristles a more effective brushing is obtained with a minimum of physical effect. Because of the spiral arrangement of the bristles, all of the surfaces of the teeth receive adequate brushing, and the bristles also can more effectively penetrate into the cracks and spaces between the teeth and dislodge food particles therefrom. Not only is there the cleaning action on the teeth, due to the rotating bristles, but also the gyratory movement of the bristle-carrying end of the brush, of high frequency but of small amplitude impart to the teeth and through the teeth to the gums a slightly gyratory massage or movement which stimulates blood circulation through the gums, and thus tends to reduce infections and produce a more healthful condition of the teeth and gums.

While the brush illustrated is one formed of bristles projecting from a base, the word brush is intended to include within its scope and meaning, and as an equivalent of a bristle-carrying element, any other rotary cleaning element such as, for example, a cylinder of soft, resilient and flexible natural or synthetic rubber, preferably with small integral and radially extending, flexible projections on its periphery to engage in irregularities and depressions of the teeth and between the teeth. The synthetic rubbers include these rubber substitutes which have properties that closely approach those of natural rubber. These synthetic rubbers have various names, some being popularly known as neoprene, chloroprene, buna S, and buna N.

It will be understood that various changes in the details, materials and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. A power operated tooth brush comprising a hollow handle, an electric motor within said handle and having a rotatable armature, a tubular element detachably connected to and extending from said handle, a shaft extending through said element and at its inner end eccentrically and detachably coupled to said armature to be rotated thereby, a bearing through which said shaft extends and which rotatably supports said shaft, the periphery of said bearing being convex and within and rockably fitting the bore of said element, adjacent its outer end, whereby said shaft may rotate freely as driven by said armature and also rock, with its bearing, universally in said element, and tooth cleaning means carried on the outer end portion of said shaft for rotation thereby and also simultaneously gyrating bodily in a small, closed-loop path.

2. A power operated tooth brush comprising a hollow handle, an electric motor within said handle and having a rotatable armature, a tubular element connected to said handle and extending therefrom, a bearing disposed within said tubular element adjacent its outer end, resilient means interposed between said bearing and the interior of said element and mounting said bearing for a universal rocking movement within said element, a shaft extending through and rotatably supported by said bearing and having its inner end eccentrically coupled to said armature to be rotated thereby, and a brush carried by the outer end of said shaft for rotation with said shaft and bodily gyration in a small closed-loop path.

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