

Nov. 10, 1970

W. STEMME

3,538,530

TOOTHBRUSH

Filed Jan. 28, 1969

2 Sheets-Sheet 1

FIG. 1

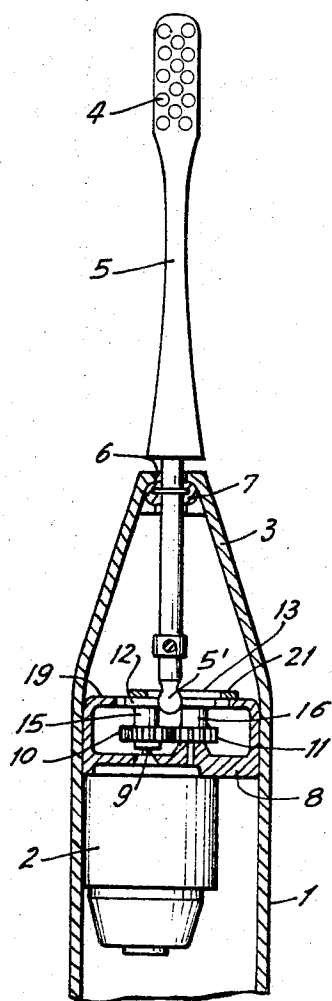
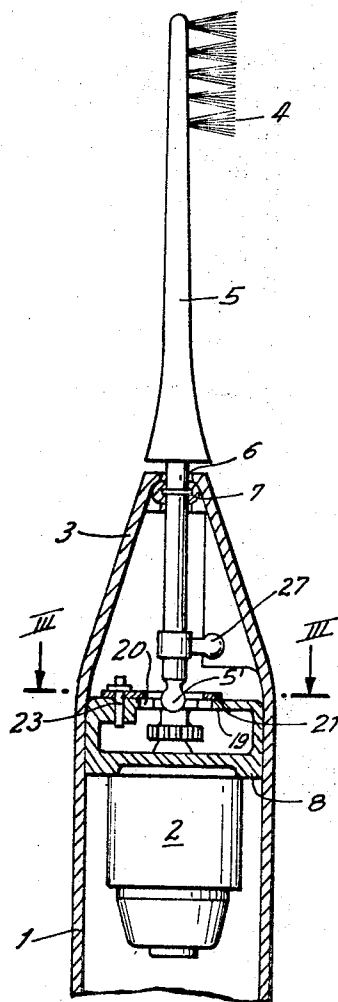


FIG. 2



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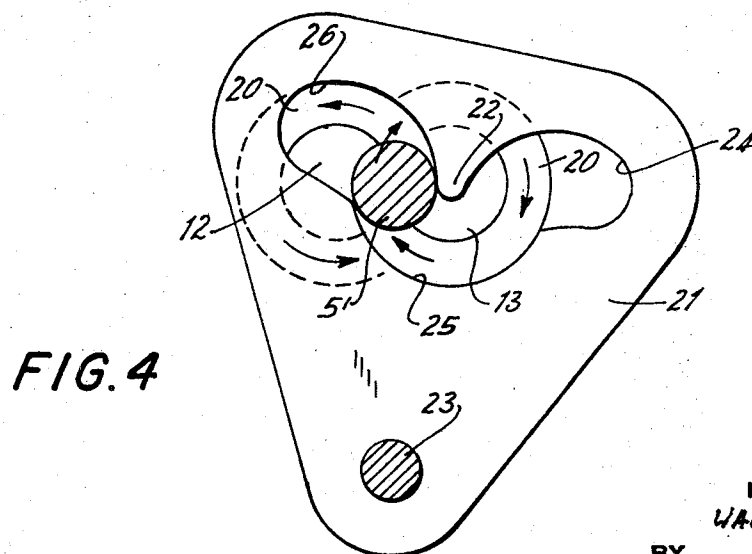
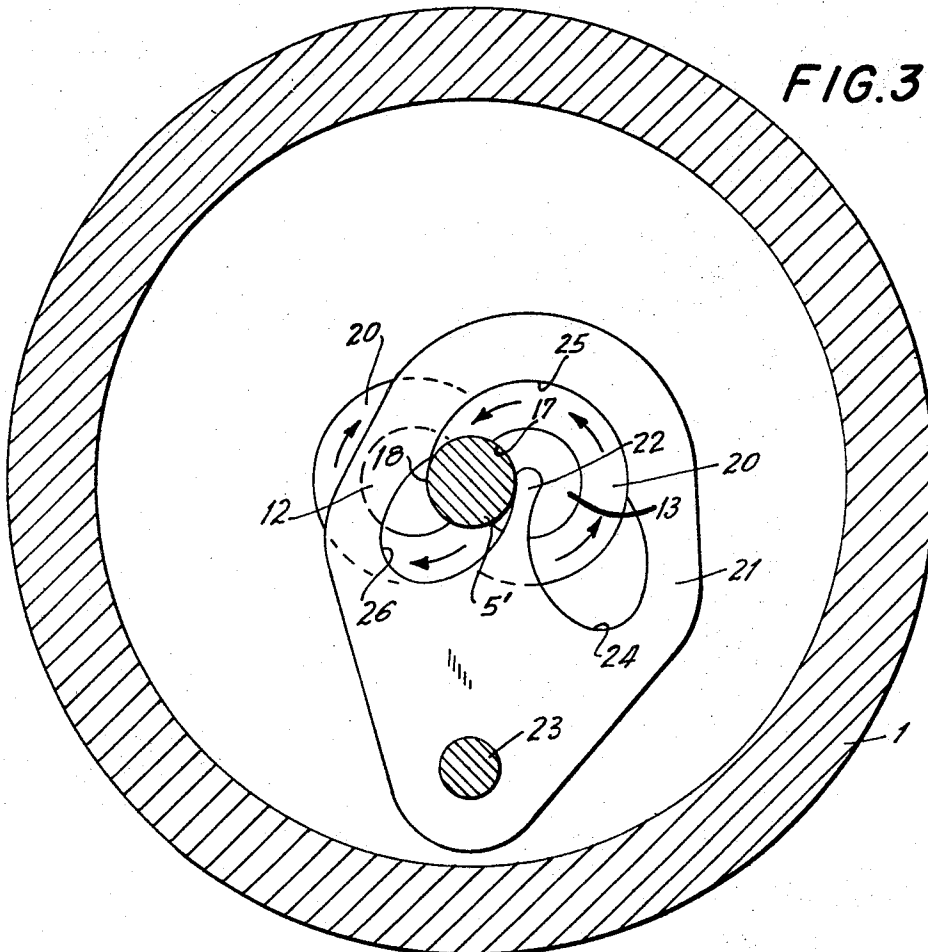
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2 Sheets-Sheet 2



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TOOTHBRUSH

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Filed Jan. 28, 1969, Ser. No. 794,653

Claims priority, application Germany, Jan. 30, 1968,
1,632,386

Int. Cl. A46b 13/02

U.S. Cl. 15—22

10 Claims

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interiors of the loops in response to rotation of the afore-
mentioned annuli.

The novel features which are considered as character-
istic for the invention are set forth in particular in the
appended claims. The invention itself, however, both as
to its construction and its method of operation, together
with additional objects and advantages thereof, will be
best understood from the following description of specific
embodiments when read in connection with the ac-
companying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary sectional elevation of a tooth-
brush embodying the present invention as seen from the
front of the bristles;

FIG. 2 is a view similar to FIG. 1 but in side-
elevation;

FIG. 3 is a section taken on the line III—III of
FIG. 2 but on an enlarged scale and showing the guide
means according to my invention in a top-plan view;
and

FIG. 4 is a top-plan view similar to that showing the
guide means in FIG. 3 but illustrating a different em-
bodiment of the guide means.

DESCRIPTION OF THE PREFERRED
EMBODIMENTS

Discussing now the drawing in detail, and firstly FIGS.
1—3 thereof, it will be seen that the housing of the tooth-
brush is identified with reference numeral 1. Mounted in
the housing eccentrically thereof is a motor 2 which is
adapted to be energized in suitable manner, either by a
non-illustrated battery or by a source of alternating cur-
rent. The housing 1 has a tapering free end 3 provided
with an opening 6 into which a portion of the stem 5
of the actual brush extends. The free end of the stem 5
is located outwardly of the housing and carries the con-
ventional bristles 4. The opening 6 in the housing 1 is such
that the stem 5 may perform requisite movements with
respect to the housing and a sealing member 7 is provided
to seal this opening against entry of contaminants and
water or the like.

Located between the motor 2 and the inner end portion
5' of the stem 5 is a journal 8. The motor 2 is provided
with an output shaft 9 carrying a driver 10, and a sim-
ilarly-dimensioned gear 11 which cams with the driver
10 and is mounted for turning movement in the journal
8. Connecting portions 15 and 16 respectively connect
the driver 10 and the gear 11 with two annular members
12, 13 so that, when the driver 10 and the gear 11 turn,
the annular members 12 and 13 respectively rotate about
their axes. The annular members 12 and 13 in the il-
lustrated embodiment are of identical size.

Referring to FIG. 3 it will be seen that each of the
annular members 12 and 13 is provided at its circum-
ference with a cutout which in the case of the member
12 is identified with reference numeral 18, and in the
case of the member 13 with reference numeral 17. In
the illustrated embodiment the cross-section of the end
portion 5' of the stem 5 is circular and FIG. 3 shows
that the cross-sectional configuration of the respective
cutouts 17, 18 corresponds thereto. It will be seen that
the annular members 12, 13 are located at the level of the
upper wall 19 of the journal 8 and that in the region of
the annular members 12 and 13 the wall 9 is so recessed
that each annular member is surrounded by a circular cut-
out with equidistant spacing. These circular cutouts, or
rather their faces constitute, together with the annular
members 12 and 13, a guide arrangement having two
abutting loops together constituting a figure eight. The
centers of the respective loops coincide with the centers
of the respective annuli 12 and 13.

ABSTRACT OF THE DISCLOSURE

A motor-driven toothbrush includes a housing and a
brush whose stem extends into the housing at a free end
thereof. A guide arrangement provides cam faces whose
outline resembles a figure eight and shifts the portion of
the stem extending into the housing, and thereby the entire
brush, in a path resembling a figure eight.

BACKGROUND OF THE INVENTION

The present invention relates to toothbrushes in general,
and more particularly to motor-driven toothbrushes.

Electric toothbrushes are already well known. Basically,
there are two types of such toothbrushes, namely one
type wherein the actual brush coming in contact with the
teeth of the user is reciprocated axially of the elongation
of its handle housing the motor, and a second type where-
in the brush is additionally or exclusively moved in direc-
tion transversely to the axis of the handle. The present
invention is concerned with the latter type because the
brushing action provided with this type of motion is far
superior to that provided with the other type of motion
and the brush can be held much more naturally than
otherwise.

The prior art concerning the second type of motorized
toothbrush requires rather elaborate arrangements for im-
parting the desired type of movement to the actual brush.
This of course is expensive because it requires the manu-
facture and assembly of a plurality of relatively compli-
cated parts, including levers, bearings, linkages and the
like.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide
a motorized toothbrush of the type under discussion which
is significantly simpler in its construction than those known
from the art.

More particularly, it is an object of the present inven-
tion to provide such a toothbrush which obtains the
requisite movements of the actual brush with simpler
means than heretofore known.

A concomitant object of the present invention is to
provide such a toothbrush whose effectiveness on the
teeth and gums of a user is improved over that known
from the prior art.

In pursuance of the above objects, and others which
will become apparent hereafter, one feature of my in-
vention resides in the provision of a toothbrush which
includes a housing having a free end and a brush whose
stem has a portion extending into the housing at the
free end of the latter. Means is provided operative for
effecting movement of the brush with reference to the
housing and this includes guide means which guides the
portion of the brush which extends into the housing for
movement in a path resembling a figure eight. The guide
means comprises wall means and a pair of rotatable annuli
together providing cam faces outlining a figure eight hav-
ing two linked loops, and shifting means which is opera-
tive for shifting the portion of the stem between the

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A control or shifting member is provided where the two loops abut one another. FIG. 3 shows most clearly that it consists of a shifting member 21 provided with a projection 22, and the member is mounted pivotable about a pin 23 secured in the wall 19. The pin 23 extends, as is shown more clearly in FIG. 2, in parallelism with the longitudinal axis of the housing 1 and with the axis of rotation of the annuli 12 and 13 from which latter axis is laterally offset.

The projection 22 is made by providing the shifting or switching member 21 with cutouts which surround the projection 22 in form of three arcuately curved segments 24, 25 and 26. The arcuately curved edge faces of these cutouts 24, 25 and 26 constitute cam faces or guide faces which cooperate by engagement with the end portion 5' of the brush stem 5 as the end portion 5'—and thereby the brush stem—undergoes a movement in form of a figure eight by moving first through one and then into and through the other of the loops constituted by the annuli 12 and 13. The shifting member 21 and thereby its projection 22 is first tilted about the pin 23 to one side, and subsequently to the other side, in each case permitting the end portion 5' of the stem 5 to pass from one of the loops into the other. Of course, the projection 22 actually provides guidance for movement of the end portion 5' in this sense.

The two annuli 12 and 13 are rotated at identical speeds so that when each completes one rotation, their cutouts 17 and 18 overlap, making it possible for the end portion 5' to pass from one into the other interior of the respective annuli with the help of the projection 22.

I have further provided an arm 27 which is mounted in the end portion 3 of the housing 1 tiltably and shiftably transversely to the longitudinal axis of the housing. The end portion of the arm 27 which extends into the housing engages the brush stem 5 and prevents the same from rotation about its own axis.

The operation of my novel device will be obvious from the drawing and from what has been set forth heretofore. The end portion 5' of the stem 5 will be guided by one of the cutouts, say the cutout 17 of the annular member 13, through the cam-guide arrangement 20 in form of a figure eight. That portion of the end portion 5 which is located immediately adjacent to the portion contacting the cam faces 20 as seen in direction toward the opening 6, will slide along the cam face 24 of the shifting member 21 and will thus cause the latter and thereby the projection 22 thereof to pivot to an end position in which the projection 22 points to the center of the annulus 13. Shortly before the annulus 13 has completed one rotation and the cutout 17 becomes located at the point of abutment of the two loops, the end portion 5' will move along the projection 22 into the cutout 18 and then along the cam face 26, taking along the shifting member 21 which turns about its pivot 23, so that the projection 22 now points towards the center of the annular member 12 and assumes its second end position. Accordingly, after the annular member 12 completes a revolution, the end portion 5 is again guided back into the other loop.

It will be appreciated that the control for movement of the end portion 5', and thereby of the stem 5 carrying the bristles, is completely automatic and that under these circumstances the brush in its entirety will perform a motion in the shape of a figure eight, so that during each cycle the bristles 4 will move from one gum over the teeth towards the other gum, only to thereupon reverse their movement. This, of course, is the brushing motion which is vastly preferred by dental specialists to the conventional to-and-fro motion which is still being widely used and which is being provided even by some motorized toothbrushes.

The embodiment of FIG. 4 differs from that of FIG. 3 only in that the projection 22 of the member 21 points in direction towards the pin 23 about which the member

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21 pivots, whereas in FIG. 3 it points away from the pin 23. In all other respects FIG. 4 corresponds to the embodiment of FIG. 3. The arm 27 is also provided in FIG. 4.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a toothbrush, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without in any way departing from the spirit of the present invention.

I claim:

1. A toothbrush comprising, in combination, a housing having a free end; a brush including a stem having a portion extending into said housing at said free end; and means operative for effecting movement of said brush with reference to said housing, including guide means guiding said portion of said brush for movement in a path resembling a figure eight, said guide means comprising wall means and a pair of rotatable annuli together providing cam faces outlining a figure eight having two linked loops, and shifting means operative for shifting said portion between the interior of said loops in response to rotation of said annuli.

2. A toothbrush as defined in claim 1, wherein said annuli are rotatable in mutually opposite directions.

3. A toothbrush as defined in claim 1, said annuli being mounted for rotation at identical speeds.

4. A toothbrush as defined in claim 3, each of said annuli being circumferentially incomplete and provided with a cut-out in its periphery which communicates with the interior of the respective annulus, and the respective cut-out registering with one another during each revolution of said annuli so that at such time the interior of one annulus communicates with the interior of the other annulus and said portion is enabled to move from one interior to the other through the registering cut-outs.

5. A toothbrush as defined in claim 4, said shifting means comprising a shifting member pivotable about an axis parallel to but laterally spaced from the axes of rotation of said annuli and having a part overlapping the junction between said loops and provided with cam faces for engaging and guiding said portion from one interior into the other.

6. A toothbrush as defined in claim 1, further comprising engaging means operative for engaging said portion and for maintaining the same, and thereby said stem, against rotation about the axis of said stem.

7. A toothbrush as defined in claim 6, said guide means being located in said housing inwardly spaced from said free end, and said engaging means engaging said portion intermediate said guide means and said free end.

8. A toothbrush as defined in claim 1, said housing having an endwall at said free end and provided with an opening through which said portion of said stem extends; and further comprising sealing means in said opening surrounding said stem and sealing said opening against entry of contaminants while permitting movement of said brush in said path.

9. A toothbrush as defined in claim 4, wherein said annuli are circular and of identical diameter.

10. A toothbrush as defined in claim 9, said annuli overlapping one another to a predetermined extent so that said cut-outs overlap when they are in registry, said portion having a circular cross-section and the cut-outs in registry having a cross-section corresponding to that of said portion.

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EDWARD L. ROBERTS, Primary Examiner