

Sept. 5, 1939.

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2,172,195

ROTARY BRUSH

Filed Nov. 3, 1937

FIG. 1

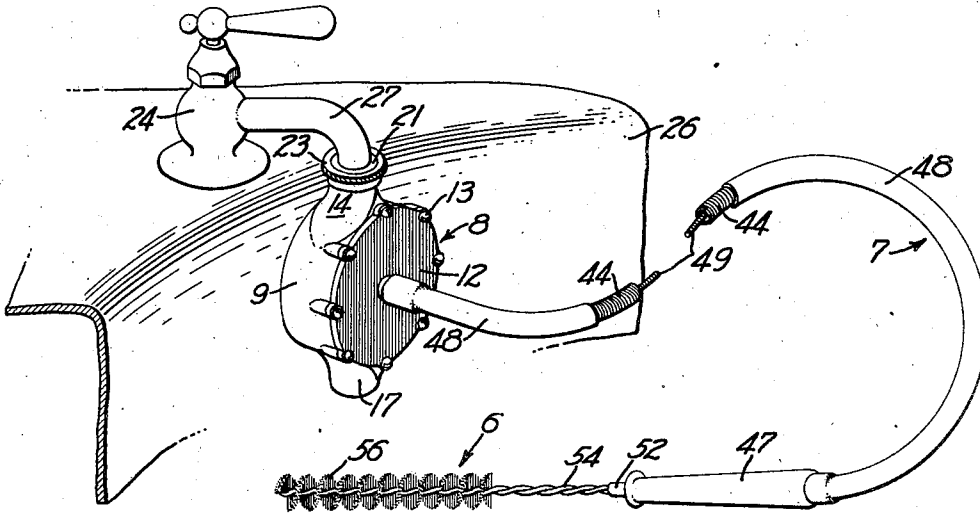


FIG. 2

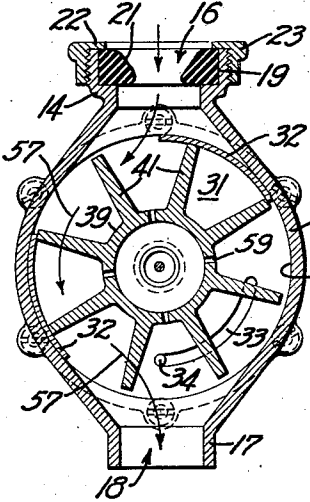


FIG. 3

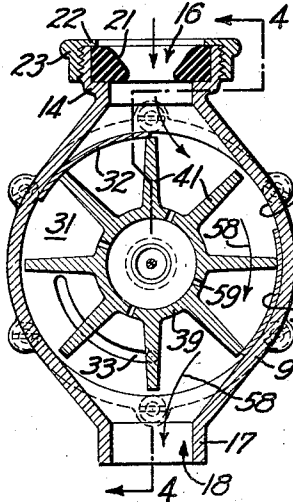


FIG. 4

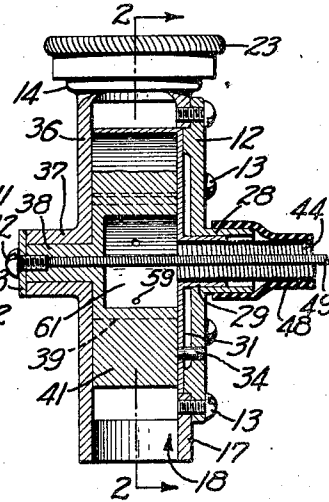


FIG. 5

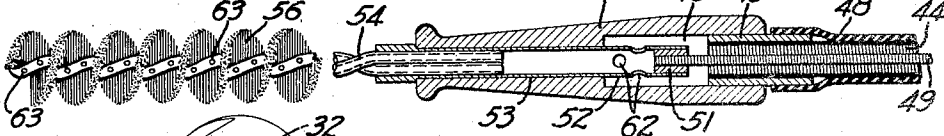
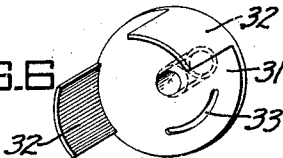


FIG. 6



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2,172,195

ROTARY BRUSH

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Application November 3, 1937, Serial No. 172,565

6 Claims. (Cl. 253—2)

This invention relates to rotary brushes and particularly to brushes used in the cleaning of teeth.

It is an object of the invention to provide a power-driven brush of the type described which is characterized by simplicity, efficient operation and economy of manufacture.

Another object of the invention is to provide a rotary toothbrush which, at all times during its operation, is supplied with a constant flow of water.

A further object of the invention is to provide, in drive mechanism for a toothbrush of the character referred to which is preferably fluid powered, a motor which, by the manipulation of simple mechanism incorporated therein, may be caused to quickly change the direction of rotation of the motor and also of the toothbrush.

The invention possesses other objects and features of advantage some of which, together with the foregoing, will be specifically set forth in the detailed description of the preferred form of the invention hereunto annexed. It is to be understood that the invention is not to be limited to the particular form thereof shown and described as various other embodiments thereof may be employed within the scope of the appended claims.

Referring to the drawing:

Figure 1 is a perspective view of the rotary toothbrush mechanism of my invention connected for operation with a water tap. Portions of the view are broken away to conserve space in the drawing.

Figure 2 is a vertical sectional view of the driving motor showing the position of the control shutter-valve when the movable rotor is rotating in a counter-clockwise direction. The plane in which the view is taken is indicated by the line 2—2 of Figure 4.

Figure 3 is a view identical with Figure 2 except that the control shutter-valve is shown in the position it occupies when the movable rotor is rotating in a clockwise direction.

Figure 4 is a vertical sectional view of the driving motor. The plane in which the view is taken is indicated by the line 4—4 of Figure 3.

Figure 5 is a view, partly in side elevation and partly in vertical section, of the rotary brush.

Figure 6 is a perspective view, to a reduced scale, of the shutter valve.

In detail, the apparatus of my invention comprises a rotary brush, generally indicated by the numeral 6, which may be held in, and manipulated by, the hand of the user. The brush

is connected by a flexible drive cable, generally indicated by the numeral 7, with a source of rotative power, preferably the fluid actuated motor generally indicated by the reference numeral 8.

The motor 8 comprises a hollow casing 9 having a circular recess 11 which is closed, to provide a chamber within the casing, by a cover plate 12 secured to the casing by a plurality of screws 13. Projecting from the top of the casing is a hub 14 centrally apertured to provide a fluid inlet 16 opening into the chamber within the casing, and diametrically opposite the hub 14 is provided a hub 17 also centrally apertured to provide an outlet passage 18 through which fluid admitted through the inlet opening 16 may leave the chamber. The hub 14 is provided with a counterbore 19 in which is seated a soft rubber annulus 21, the latter being retained in the counterbore by the overlying flange 22 of a cap 23 which is threadedly engaged with the hub 14. The structure associated with the hub 14 provides means whereby the motor 8 may be detachably connected to a source of fluid under pressure here indicated as one of the water taps 24 of a wash basin 26. The connection is effected by forcing the spout 27 of the tap into the opening of the rubber annulus 21 wherein it will be frictionally held until deliberately released. The operating position of the motor is shown in Figure 1 with the hub 17 pointing downwardly so that fluid discharged through the opening 18 thereof will be directed toward the drain opening at the bottom of the basin 26.

Projecting outwardly from the center of the cover plate 12 is a boss 28 which is centrally bored to provide a journal for the tubular shank 29 of a shutter-valve comprising a disk 31 formed integrally with the shank 29 having on its periphery, as is best shown in Figure 6, a pair of spaced arcuate wings 32 whose outer curved surface is slightly less in radius than the periphery of the casing recess 11 so that the shutter-valve may freely rotate in the recess. An arcuate slot 33, formed in the disk 31, engages a pin 34 fixed in the cover plate 12 so that the rotary movement of the shutter-valve will be limited.

Extending outwardly from the wall 36 of the casing is a boss 37 which is centrally bored to provide a journal for the shank 38 of a rotor comprising a hollow hub 39 having a plurality of radial vanes 41 extending outwardly therefrom and terminating slightly short of the inner surface of the shutter-valve wings 32. The rotor is thus mounted for free rotation within the

shutter-valve. To prevent axial movement of the rotor with respect to the casing, the shank 38 is provided with an axial bore part of which is threaded to receive a screw 42 which serves to hold a thrust washer 43 against the outer end of the boss 37.

Fixed in the inner bore of the shank 29 of the shutter-valve is one end of a closely wound coil spring casing 44 which forms part of the flexible drive cable 7, the opposite end of which terminates, and is secured, in a sleeve 45 fixed in one end of a bore 46 provided in the handle 47 of the brush 6. A sheath 48 of rubber tubing surrounds the casing 44 and, at its respective ends, telescopes over the boss 28 and a portion of the sleeve 46. A drive shaft 49, which is the usual wire wound flexible shaft found generally in flexible drives and remote control apparatus, is provided within the casing and is secured, at its respective ends, in the central bore of the rotor shank 38 and in a plug 51 which is fixed in the end of a tube 52 journaled in the bore 53 which extends through the handle 47. In the opposite end of the tube 52 is secured both ends of a continuous pipe 54 which is doubled upon itself in the shape of a hairpin and which serves as the spindle of the brush. The brush is formed by placing bristles 56 between the parallel sections of the pipe and twisting the latter so that they are disposed spirally about the axis of rotation of the sleeve 52. This pinches the bristles between the pipe sections and securely holds the former in place, they being then trimmed to provide the cylindrical brush shown in Figures 1 and 5.

It will be seen that since the rotor of the motor 8 and the tube 52, which is part of the brush spindle, are connected together by the drive shaft 49, rotation of the rotor will be transmitted through the drive shaft to the brush with the result that the latter will revolve in unison with the rotor. It will also be seen that the shank 29 of the shutter-valve is connected by the casing 44 with the brush handle 47, consequently rotary motion of the handle, which may be produced by the user rolling the latter between his thumb and fingers, will cause the shutter-valve to be moved from one limit of its motion to the other. This will position one of the wings 32, as is shown in Figure 2, below a portion of the inlet opening 16 to the right thereof which causes the water entering the opening to be diverted to pass through the motor in the direction of the arrows 57, thus causing the rotor to revolve in a counter-clockwise direction. Counter-rotation of the handle, by the operator, to its opposite extreme of movement will cause the wing 32 which overlies the inlet opening in Figure 2 to move toward the right and be replaced by the other wing which will move into the position shown in Figure 3 wherein the left hand portion of the inlet opening is covered thus diverting the incoming fluid through the motor in the direction of the arrows 58. This causes a reversal of the rotor to clockwise rotation. It will be seen therefore that the direction of rotation of the brush 6 may be selectively varied by the simple expedient of rotating the brush handle. This dispenses with the necessity of the user having to reach for and actuate the reverse mechanism in the motor.

Means is provided for supplying a flow of water to the brush. In the hub 39 of the rotor, between one pair or more of the vanes 41, is provided an aperture 59 which permits some of the water which impinges against the vanes to enter the chamber 61 within the hub from whence it will

flow through the annular passage provided between the drive shaft 49 and its casing 44 into the bore 46 of the handle 47. From the handle bore it may pass into the tube 52 through apertures 62 provided in the latter, thence into the pipes 54 and then through discharge openings 63 provided in the portion of the brush spindle carrying the bristles. Thus a constant flow of water is supplied to the brush whenever the motor 8 is operating.

The provision of a reversible motor to operate the brush is of prime importance. Most of the powered toothbrushes, of which I am aware, were designed for uni-directional rotation. Let us consider the operation of one of these devices. Suppose it is desired to brush the teeth of the right lower jaw. The rotation of the brush should be such that the bristles will move over the teeth from the gum line toward the top of the teeth. Let us now shift the brush to the teeth of the left lower jaw. Since the correct rotation of the brush in the first instance was clockwise, as viewed by the user, the shifting of the brush to the left side of the mouth will cause the bristles to be moved along the teeth from the top of the teeth toward the gum line. This is decidedly undesirable since the brush has a tendency to drive food particles downwardly between the gums and teeth and will, invariably, cause laceration of the gums which invites infection in the mouth. The toothbrush of my invention overcomes this difficulty by being easily and quickly reversible at the will of the user by the simple motion of rotating the brush handle.

The apparatus of my invention described above is characterized by simplicity and ease of manufacture and assembly; the various parts thereof lending themselves particularly well to mass production thereby permitting the cost thereof to be maintained at a very economical figure.

I claim:

1. A device of the character described comprising, in combination, a hollow housing having an inlet opening and an outlet opening, means in said inlet opening for connecting a duct through which fluid may flow into said housing, a rotor journaled in said housing to be rotated by the fluid flowing through the latter, movable means in said housing for directing therethrough said fluid in various paths past said rotor to effect reversal of rotation of the rotor, a tubular casing secured at one end to and for rotation with said fluid directing means and at the other end being provided with a handle, a shaft within said casing, said shaft being, at one end, secured to and rotatable with said rotor and being provided, at the other end, with a spindle journaled in said handle, and means to be rotated carried by said spindle.

2. A device of the character described comprising, in combination, a hollow housing having an inlet opening and an outlet opening, means in said inlet opening for connecting a duct through which fluid may flow into said housing, a rotor journaled in said housing to be rotated by the fluid flowing through the latter, movable means in said housing for directing therethrough said fluid in various paths past said rotor to effect reversal of rotation of the rotor, a tubular casing secured at one end to and for rotation with said fluid directing means and at the other end being provided with a handle, a shaft within said casing, said shaft being, at one end, secured to and rotatable with said rotor and being provided, at the other end, with a spindle journaled

in said handle, means functioning in the presence of fluid carried by said spindle, and means for directing fluid from said housing to said spindle-carried means.

5 3. A device of the character described comprising, in combination, a hollow housing having an inlet opening and an outlet opening, means in said inlet opening for connecting a duct
10 through which fluid may flow into said housing, a rotor journaled in said housing to be rotated by the fluid flowing through the latter, a shutter-valve comprising a disk, rotatably mounted in
15 said housing concentrically with said rotor, having a pair of arcuate wings overlying portions of the periphery of said rotor, said wings being movable into different positions interposed between said rotor and said inlet opening, a tubular
20 casing secured at one end to and for rotation with said shutter-valve disk and at the other end being provided with a handle, a shaft within said casing, said shaft being, at one end, secured to and rotatable with said rotor and being provided,
25 at the other end, with a spindle journaled in said handle, and means to be rotated carried by said spindle.

4. A device of the character described comprising, in combination, a hollow housing having an inlet opening and an outlet opening, means in
30 said inlet opening for connecting a duct through which fluid may flow into said housing, a rotor journaled in said housing to be rotated by the fluid flowing through the latter, a shutter-valve comprising a disk, rotatably mounted in said
35 housing concentrically with said rotor, having a pair of arcuate wings overlying portions of the periphery of said rotor, said wings being movable into different positions interposed between said rotor and said inlet opening, means for limiting the movement of said shutter-valve to establish the positions of said wings relative to
40 said inlet opening, a tubular casing secured at one end to and for rotation with said shutter-valve disk and at the other end being provided with a handle, a shaft within said casing, said
45 shaft being, at one end, secured to and rotatable

with said rotor and being provided, at the other end, with a spindle journaled in said handle, and means to be rotated carried by said spindle.

5. A device of the character described comprising, in combination, a hollow housing having
5 an inlet opening and an outlet opening, means in said inlet opening for connecting a duct through which fluid may flow into said housing, a rotor journaled in said housing to be rotated by the fluid flowing through the latter, a shutter-valve comprising a disk, rotatably mounted
10 in said housing concentrically with said rotor, having a pair of arcuate wings overlying portions of the periphery of said rotor, and an arcuate slot therein, a pin secured in said housing and entering said slot for limiting the movement of
15 said disk, said wings being movable into different positions interposed between said rotor and said inlet opening, a tubular casing secured at one end to and for rotation with said shutter-valve disk and at the other end being provided with a
20 handle, a shaft within said casing, said shaft being, at one end, secured to and rotatable with said rotor and being provided, at the other end, with a spindle journaled in said handle, and
25 means to be rotated carried by said spindle.

6. A device of the character described comprising, in combination, a rotatable handle, a relatively rotatable spindle journaled in said
30 handle, means to be rotated carried by said spindle, a fluid-actuated motor, connected with a source of fluid under pressure, having a rotatable element therein, said motor being situated a substantial distance apart from said handle, movable means associated with said motor for
35 controlling the flow of fluid therethrough for effecting reversal of rotation of said rotatable element, a flexible shaft of substantial length connecting said rotatable element and said spindle-carried means to be rotated for rotation together, and a flexible member paralleling said
40 flexible shaft and connecting said handle and said movable flow controlling means for motion together.

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