Oct. 2, 1962 G. VLACANCICH 3,056,151

ELECTRIC TOOTHBRUSH WITH DENTIFRICE FEED AND RINSER

Filed Oct. 11, 1961 2 Sheets-Sheet 1

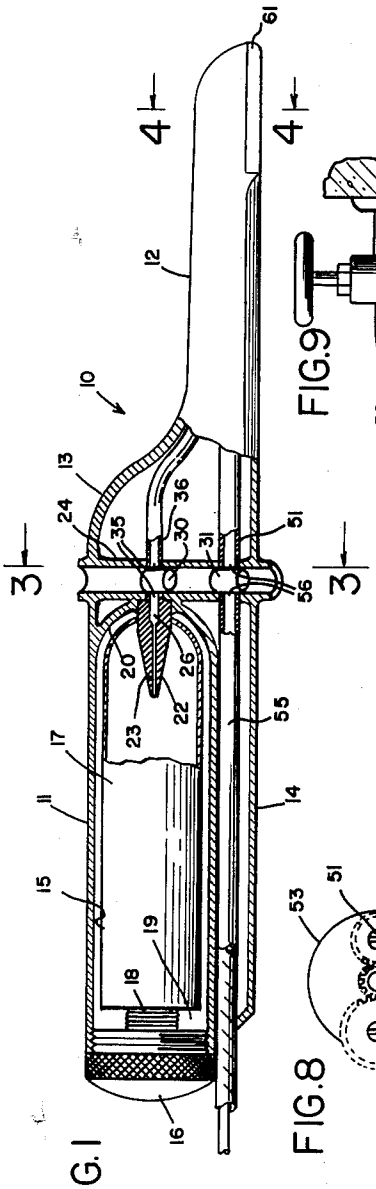

FIG. 1

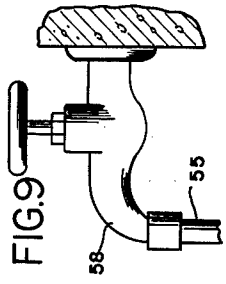

FIG. 9

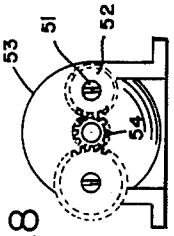

FIG. 8

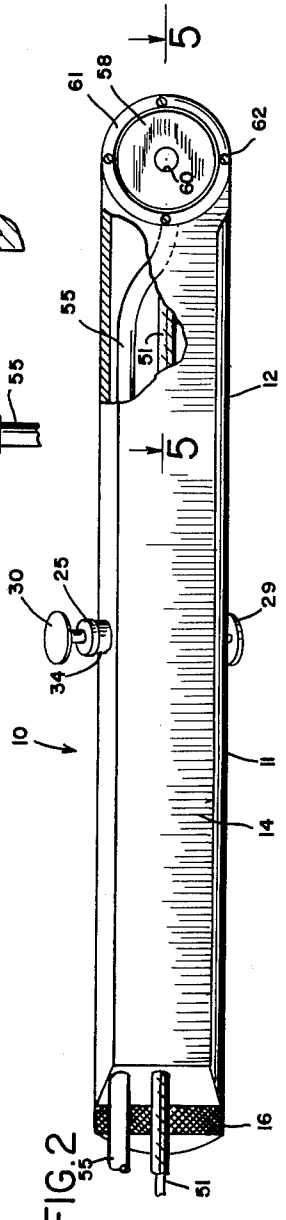

FIG. 2

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FIG. 3

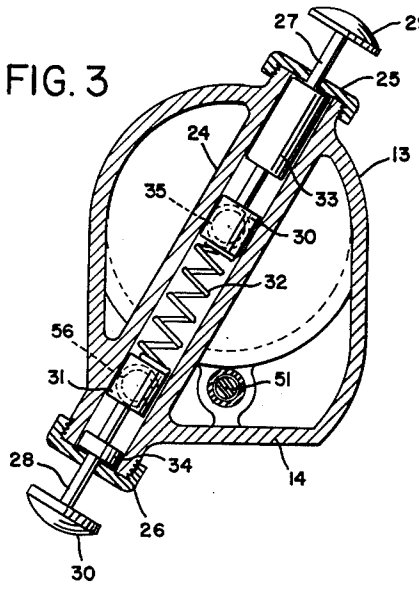


FIG. 4

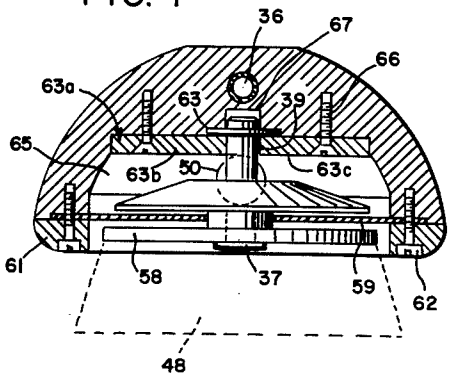


FIG. 5

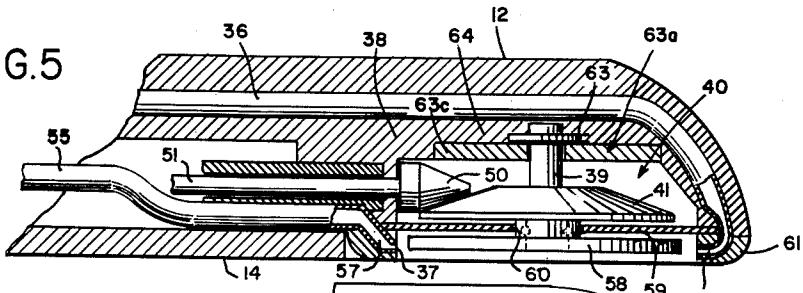


FIG. 7

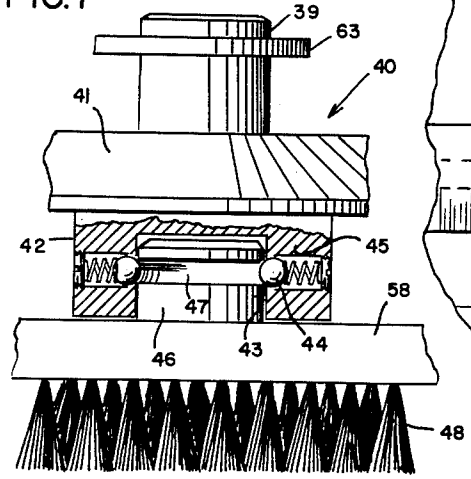
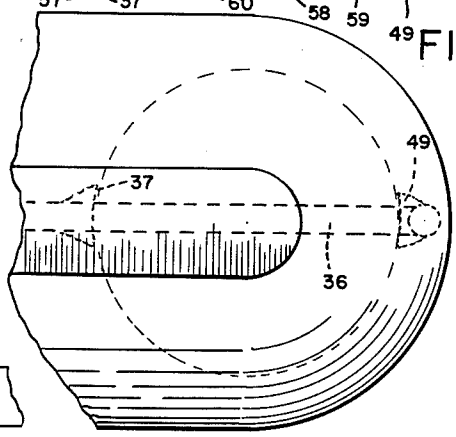


FIG. 6



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United States Patent Office 3,056,151 Patented Oct. 2, 1962

3,056,151

ELECTRIC TOOTHBRUSH WITH DENTIFRICE FEED AND RINSER

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Filed Oct. 11, 1961, Ser. No. 144,371
5 Claims. (Cl. 15—29)

This invention relates to appliances for cleaning and brushing the teeth, and an object thereof is the provision of a novel and useful combined powered toothbrush, dentifrice feed and rinser.

A further object of the invention is the provision of a novel finger-operated duplex valve whereby the flow of dentifrice, such as toothpaste, or water onto the rotary brush may be easily selectively controlled.

Another object of the invention is the provision of a rotor and a toothbrush with means for readily securing the brush for rotation together with the rotor and for readily detaching the brush from the rotor either for replacement of the brush or for substitution of another rotary member such as, for example, a massager provided with the same means for securing it in the rotor.

A still further object of the invention is the provision within the housing of the device of a cartridge holding compartment provided with a cartridge penetrating tip whereby upon mounting the cartridge containing the toothpaste the tip penetrates the cartridge so that the toothpaste under pressure will enter the tip which leads into the channel through which the toothpaste is fed on to the brush.

The above as well as additional and more specific objects will be clarified in the following description wherein reference numerals refer to like-numbered parts in the accompanying drawing. It is to be noted that the drawing is intended primarily for the purpose of illustration and that it is therefore neither desired nor intended to limit the invention necessarily to any or all of the exact details shown or described except insofar as they may be deemed essential to the invention.

Referring briefly to the drawing,

FIG. 1 is a side elevational view of a dental appliance embodying features of the present invention, with parts broken away partly in section and with parts omitted.

FIG. 2 is a bottom plan view of the device, with parts broken away, partly in section and with parts omitted.

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1.

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 1.

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 2.

FIG. 6 is a fragmentary top plan view of the appliance.

FIG. 7 is an elevational view of the rotor per se, with parts broken away and partly in section and with a rotary toothbrush secured thereto.

FIG. 8 is a view, largely diagrammatic, of an electric motor provided with means for actuating the flexible shaft for rotating the rotor of the device.

FIG. 9 is a view of a water tap with a hose leading to the conduit in the device attached thereto.

Referring in detail to the drawing, the numeral **10** indicates a substantially hollow body having one end **11** relatively enlarged and the other end **12** relatively reduced, with an intermediate portion **13** therebetween. The bottom surface **14** of the body is substantially flat.

A substantially cylindrical compartment **15** is provided in the enlarged portion **11**, having the end thereof near the portion **13** rounded, and the other end of the compartment is open and threaded to receive a threaded cap **16**. A cartridge **17** adapted to contain toothpaste and made of puncturable material, is adapted to be registered

in the compartment, substantially as shown. A coiled spring **18** on the cap **16** normally urges the cartridge to the right-hand end, FIG. 1, of the compartment.

The material of which the cartridge is made further has the property of being readily collapsible so that as its contents are discharged from the right-hand end thereof the pressure of the spring urges its base **19** toward the right. The right-hand end of the compartment **15** is closed by a rounded wall **20** provided with an axial opening therethrough in which the reduced base of a tapered piercing nipple **22** registers, as the cartridge moves to the right, FIG. 1, it is pierced by the nipple whence the toothpaste is discharged through the passage **23** in the nipple. Axially aligned push-button valves are provided in a dual cylindrical valve housing **24** which extends substantially diagonally through the body **10** at the junction of the portions **11** and **13** thereof, and which has caps **25** and **26** closing the ends thereof. Stems **27** and **28**, respectively, are slidably mounted in the caps **25** and **26**, the stems having button-like heads **29** and **30**, respectively. At the inner end of the stem **27** a cylindrical block **30** is integral therewith, and on the inner end of the stem **28** a cylindrical block **31** is integral therewith. Between these two blocks is a coiled compression spring **32** which normally urges the blocks and hence the stems apart. Limit stop guides **33** and **34**, respectively, are provided on the two stems.

Referring first to the valve assembly including the button **29** and its associated elements, in its limit stop position, shown in FIG. 3, the block **30** blocks a passage **35** through diametrically opposite locations in the housing **24**, and it is apparent that upon depressing the button **29** this passage through the housing will be unblocked to a degree depending upon how far the button is pushed in. From the right-hand passage **35**, FIG. 1, a tube or pipe **36** leads toward the reduced extremity **12**.

A circular cut-out **37** is provided in the floor or bottom wall **14** of the body at its reduced extremity. Rotatably supported in a frame portion **38** within the body is the stub shaft **39** of a rotor **40**. The latter consists of a bevel gear **41** having an axial collar **42** depending therefrom and providing with a cylindrical opening **43** in its lower end. Spring biased balls **44** are mounted in diametrically opposed passages **45** and are normally urged to project into the opening **45**. Thus the stub shaft **46**, provided with a complementary circumferential groove **47** in which the balls may releasably register, may be frictionally, yet to an extent, yieldably locked on the rotor. FIG. 7 shows the shaft **46** on a rotary toothbrush **48**. The yieldability provided between the collar **42** and the shaft **46** by the balls **44** permits a degree of slippage in case of overloading the brush by, for example, applying too great a pressure on the teeth.

As seen in FIG. 5, the tube or passage **36** terminates in an outlet tip **49** which is curved back so that it will discharge toothpaste at a position to be applied to the brush **48**, not shown in FIG. 5.

A bevel pinion **50** is rotatably supported in the frame portion **38** within the body in mesh with the bevel gear **41**. This pinion is on the end of a flexible shaft **51** of standard construction which extends through the body, and beyond to be actuated by an electric motor **53** through the medium of a pinion **52** driven by a gear **54** on the motor shaft. No means for switching on or off the electric motor is shown, as such means are well known.

A pipe or hose **55** also extends through the body **10** from left to right, FIG. 1, and is aligned and communicates with two diametrically opposed openings **56** in the housing **24**. This pipe terminates in an outlet tip **57** adjacent the rotor **40** so that water may be discharged on the toothbrush.

As seen in FIG. 3, the passages 56 are normally blocked by the block 31, and pushing the button 30 upward opens these passages for the flow of water through the pipe 55 on to the brush. The end of the pipe or hose which extends from the left-hand end, FIG. 2, of the body 10 is connected to a faucet 58. The length of hose 55 as well as the length of the flexible shaft 51 is of course a matter of choice.

The brush 48 has its bristles depending from a circular plate or disc 58, and a massager would be provided with a similar disc 58. A wall or dividing member or disc 59 is provided, having an opening 60 therethrough, through which the collar 42 of the rotor projects downwardly. This wall separates the bevel gear 41 from the brush disc or head plate 58. An annular cap 61 secured axially to the bottom of the device under the rotor by screws or the like 62, serves also to secured the wall 59 in place. The cap 61 has its passages terminating in the tips 57 and 49, respectively, FIG. 6, formed therein and aligned with the respective tubes or conduits 55 and 36 when attached.

The rotor 40 down to and including the collar 42 is mounted in the body 10 as shown in FIGS. 4 and 5, the shaft 39 thereof having a flange 63 thereon spaced from the upper end of the shaft. A plate 63*a* is shown made of two complementary semi-discs 63*b* and 63*c* having complementary semicircular cut-outs therein so that when they are fitted together about the shaft 39 they provide a circular opening through which the shaft passes. With this plate positioned as shown, with the shaft 39 extending therethrough and the flange 63 resting thereon, before the wall 59 and cap are applied, the plate 63*a* is secured against the roof 64 of the opening 65 provided in the body for the rotor, by any desired number of screws 66, the roof being provided with a suitable cut-out recess 67 for the reception of the upwardly protruding end of the shaft 39 and the flange 63. Finally the wall 59 is mounted in place, and the device is ready for use upon attaching a brush or massager to the rotor in the manner previously described.

Identical devices like the one illustrated may be used simultaneously by two or more persons by having two or more pinions like the pinion 52 driven by the motor to drive a second shaft 51 of a second device, and by having a suitable coupling applied to the water tap 58 so that two or more hoses like the hose 55 may be attached thereto.

In use, either before the brush is rotated or after it has begun to rotate, the button 30 is depressed to wet the brush, and then the button 29 is depressed, after first releasing the button 30, to apply toothpaste to the brush. The teeth are then brushed in an obvious manner, and finally they as well as the mouth may be thoroughly rinsed by keeping only the button 30 depressed. The exact sequence of operating the button or buttons is of course a matter of choice to the user. The larger end 11 of the body 10 serves as a handle for the device, and it is obvious that the buttons 29 and 30 may readily be depressed by selected fingers of the hand holding the device.

While the invention has been described with reference to the particular construction shown in the drawing, such is not intended to provide limitations on the invention which is best defined in the appended claims.

It is to be noted that both the rotary brush shown and a rotary massager, not shown, may be termed applicators.

The invention having thus been described, what is claimed and desired to be secured by Letters Patent is as follows:

1. A dental appliance comprising an elongated body having an enlarged handle portion, a reduced extension portion and an intermediate portion between said handle portion and said reduced portion, the reduced portion having a cut-out therein at the outer end thereof, a rotor rotatably supported in said cut-out, a rotatable shaft extending in one direction through the body from the outer

end of said handle portion into said cut-out, means partly on the end of said shaft in said cut-out and partly on the rotor for rotating the rotor by the shaft, a toothpaste containing compartment in said handle portion, a toothpaste conduit leading from said compartment through the body and terminating adjacent said rotor, a water conduit extending in one direction through the body from said outer end of the handle into said cut-out and terminating adjacent said rotor, said shaft extending from said outer end of the handle portion in the opposite direction and being adapted to be connected to an electric motor for rotation of the shaft, the water conduit extending in the opposite direction from said outer end of the handle portion and being adapted to be connected to a water tap, normally closed selectively operated valve means positioned in said intermediate portion and interposed in said toothpaste conduit and said water conduit, said shaft and said water conduit having extensions from said outer end of the handle portion formed of flexible material, means for normally urging toothpaste from said compartment into said toothpaste conduit, and a dental applicator secured to said rotor, said valve means comprising a cylindrical housing closed at both ends extending transversely through said intermediate portion of the body, the housing having a first pair of opposed openings therein and a second pair of opposed openings therein longitudinally spaced from said first pair, said conduits each being composed of two sections whose juxtaposed ends are positioned in said intermediate portion, the juxtaposed ends of the sections of one of the conduits being connected to the housing in alignment with said first pair of openings, the juxtaposed ends of the sections of the other of said conduits being connected to the housing in alignment with said second pair of openings, two cylindrical blocks slidably mounted in the housing, means including resilient means normally maintaining one of the blocks in alignment with the first pair of openings to block the passage between the openings and the other of said blocks in alignment with said second pair of openings to block the passage between the openings, and means for selectively moving said blocks out of alignment with their respective said openings.

2. A dental appliance according to claim 1, said last-named means comprising stems on said blocks extending slidably through the closed ends of said housing, said stems having heads on their outer extremities adapted to be pushed inward into the housing to disalign the blocks from the adjacent opposed openings.

3. A dental appliance according to claim 2, said resilient means comprising a coiled compression spring interposed in the housing between said blocks.

4. A dental appliance comprising an elongated body including an enlarged handle portion, a reduced extension portion and an intermediate portion between the handle portion and the reduced portion, the handle portion having a substantially cylindrical compartment therein at its outer end adapted to receive a substantially complementary collapsible toothpaste containing cartridge and having screw threads on the outer end of the handle surrounding the compartment, a screw cap adjustably secured on said screw threads including means for urging the cartridge toward the other end of the compartment, said other end of the compartment comprising a wall having an axial passage therethrough, a piercing nipple surrounding said axial passage positioned within the compartment and adapted to penetrate the end of the cartridge adjacent said wall, a rotor mounted in the outer end of said reduced portion, a bevel gear on said rotor, a flexible shaft of substantially greater length than the body extending through the body from the outer end of the handle portion and terminating in a bevel pinion in mesh with said bevel gear, a rotary applicator releasably secured to the rotor, means partly on the applicator and partly on the rotor for releasably securing the applicator to the rotor for rotation of the applicator

by the rotor, a water conduit extending into the body at said outer end of the handle portion, a valve housing closed at both ends extending through said intermediate portion at right angles to the axis of said compartment and having a diametrical opening connected with and aligned with said axial passage, the valve housing having a second diametrical opening aligned with said first-named diametrical opening, a conduit extending from said second diametrical opening through said reduced portion and terminating in a discharge tip positioned adjacent said applicator, the water conduit extending from said outer end of the handle portion to said valve housing, the valve housing having two additional aligned diametrical openings longitudinally spaced from said first-named diametrical openings, said water conduit being connected to one of said additional diametrical openings, a second water conduit extending from the other of said additional diametrical openings through said reduced portion and terminating in a discharge tip adjacent the applicator and circumferentially spaced from said first-named discharge tip, said housing having two longitudinally spaced blocks slidable therein, resilient means normally urging the blocks outward toward opposite ends of the housing, stems extending from said blocks through the closed ends of the housing, stop means on said stems normally positioning one of the blocks to obstruct said first-named and said second-named diametrical openings and the other of said blocks to obstruct said additional diametrical openings, said stems having push buttons thereon protruding from the closed ends of the housing, said water conduit including a hose extending from the body adapted to be connected to a water tap, the portion of said shaft outside the body being adapted to be connected to the shaft of an electric motor for rotation thereof by the motor.

5. A dental appliance comprising an elongated body having an enlarged handle portion, a reduced extension portion and an intermediate portion between the handle portion and the reduced portion, the reduced portion having a cut-out therein at the outer end thereof, a rotor rotatably supported in said cut-out, a rotatable shaft extending in one direction through the body from the outer end of said handle portion into said cut-out, means partly on the end of said shaft in said cut-out and partly on the rotor for rotating the rotor by the shaft, a toothpaste containing compartment in said handle portion, a toothpaste conduit leading from the compartment through the body and terminating adjacent said rotor, a water conduit extending in one direction through the body from said outer end of the handle portion into said cut-out and terminating adjacent said rotor, said shaft extending from said handle portion in the opposite direction and being adapted to be connected to an electric motor for rotation of the shaft, the water conduit extending in the opposite direction from said outer end of the handle portion and being adapted to be connected to a water tap, valve means including two normally closed, axially aligned, mutually opposed and selectively operable push-button valves positioned in said intermediate portion, one of the valves being interposed in said toothpaste conduit and the other of said valves being interposed in said water conduit, said shaft and said water conduit having extensions from said outer end of the handle portion formed of flexible material, means for normally urging toothpaste from said compartment into said toothpaste conduit, and a dental applicator secured to said rotor.

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