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3,108,300

POWER-DRIVEN ROTARY TOOTHBRUSH AND LIQUID APPLICATOR

Filed March 6, 1959

2 Sheets-Sheet 1

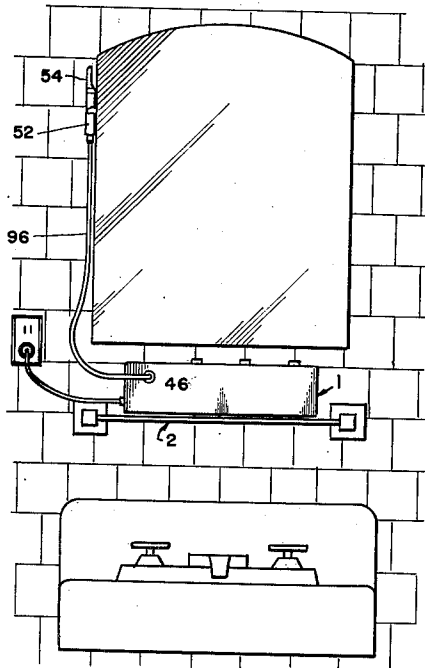


FIG. 1

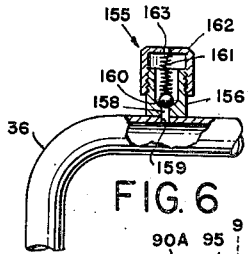


FIG. 6

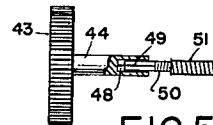


FIG.5

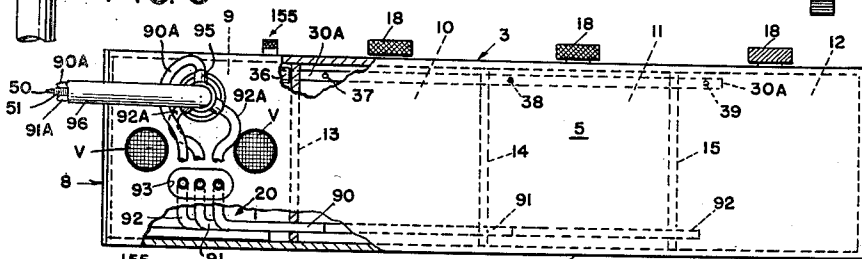


FIG. 2

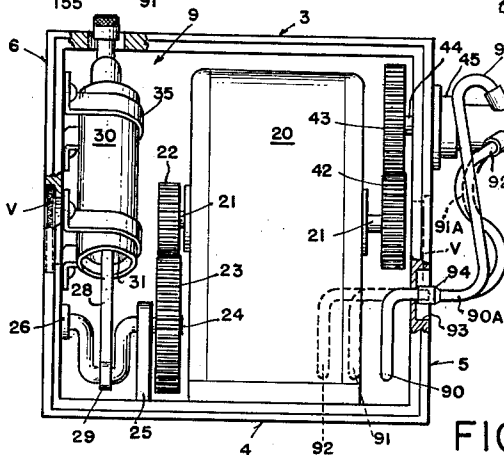


FIG. 3

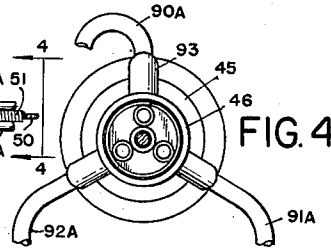


FIG. 4

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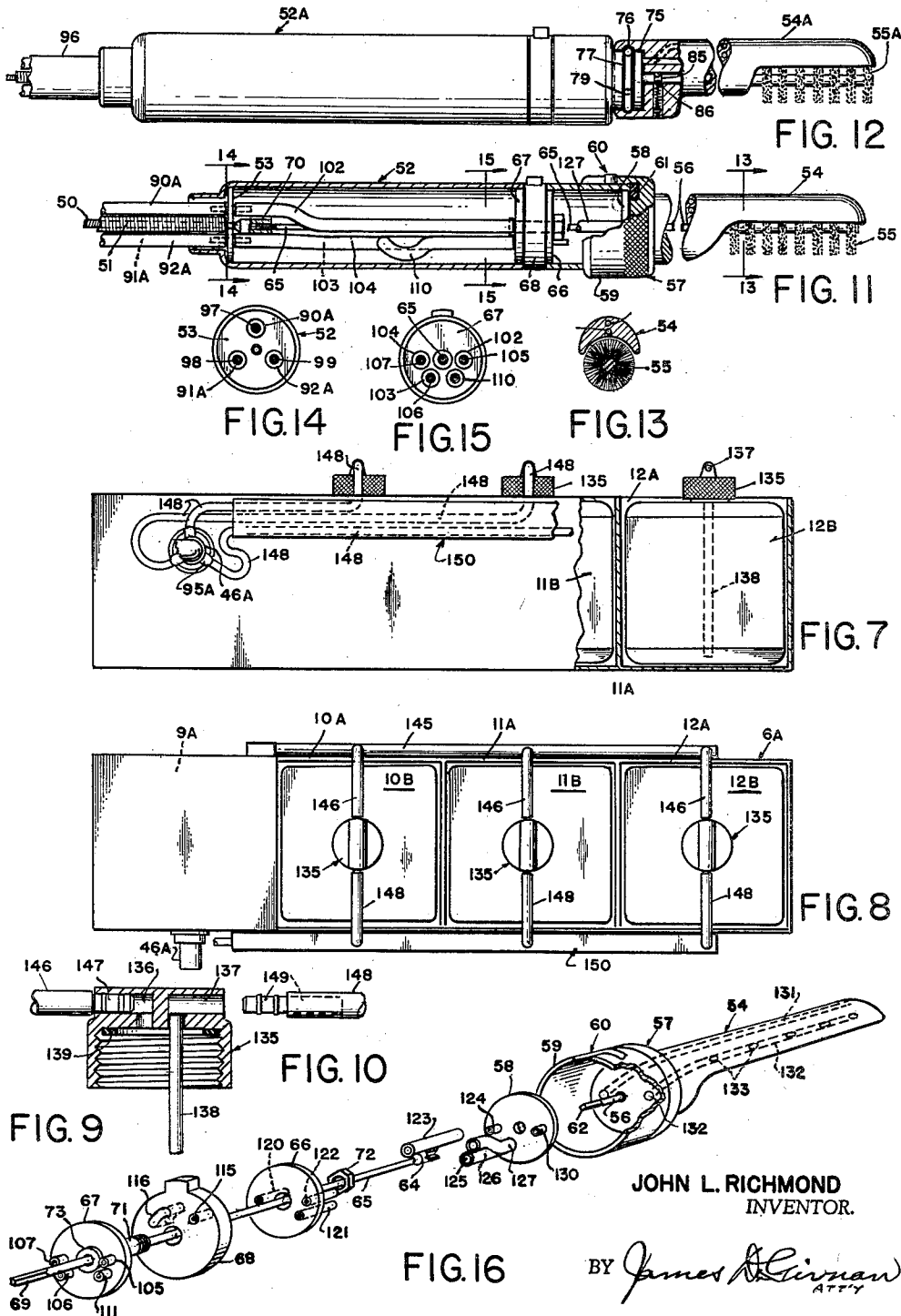
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POWER-DRIVEN ROTARY TOOTHBRUSH AND LIQUID APPLICATOR

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3,108,300 POWER-DRIVEN ROTARY TOOTHBRUSH AND LIQUID APPLICATOR

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1 Claim. (Cl. 15-24)

This invention relates to rotary toothbrushes, and more particularly to an electric motor operated apparatus especially adapted for domestic or home use and also usable in dental offices or clinics and the like.

It is one of the principal objects of my invention to provide a toothbrush of the character described having associated therewith a compartmented cabinet containing liquid dentifrice, antiseptic solution, and water and delivery conduits controlled through a single valve means for selectively delivering the contents of the compartments under pressure to the brush or to the mouth of the user.

The foregoing and other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a fragmentary elevational view of a wall of a dwelling showing the invention supported upon a shelf secured to the wall.

FIGURE 2 is a front elevational view of the dispensing cabinet of the invention with fragments of its front wall broken away for convenience of illustration.

FIGURE 3 is a view on an enlarged scale of the left hand end of FIGURE 2 with the end wall of the cabinet removed.

FIGURE 4 is an end view on a still larger scale taken approximately along the line 4-4 of FIGURE 3.

FIGURE 5 is a fragmentary detail view of a driving gear coupled to a flexible drive shaft.

FIGURE 6 is a similar view of a pressure escapement control valve.

FIGURE 7 is a view similar to FIGURE 2 showing a modified form of dispensing cabinet.

FIGURE 8 is a top plan view of FIGURE 7.

FIGURE 9 is a sectional side view of a typical closure cap for the receptacles within the dispensing cabinet of FIGURES 7 and 8.

FIGURE 10 is a detail view of a conduit coupling for the closure cap of FIGURE 9.

FIGURE 11 is a side elevational view of a rotary toothbrush operatively attached to a handle and with fragments broken away to reveal internal parts.

FIGURE 12 is a view similar to FIGURE 11 showing a modified form of brush-attaching means.

FIGURE 13 is a sectional end view of either brush as taken along the line 13-13 of FIGURE 11.

FIGURES 14 and 15 are sectional detail views taken respectively along the lines 14-14 and 15-15 of FIGURE 11.

FIGURE 16 is an exploded perspective view of the parts within the handle shown in FIGURE 11 and the brush head attached thereto.

With continuing reference to the drawings wherein like reference numerals designate like parts and particularly FIGURES 1-4 thereof, reference numeral 1 indicates generally a dispensing cabinet made in accordance with the invention and adapted to rest upon, or be attached to, a supporting shelf, or the like, indicated at 2 secured in any approved manner to a wall of a dwelling as shown.

As best illustrated in FIGURES 2 and 3, the cabinet comprises a top wall 3, bottom wall 4, front and rear

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walls 5 and 6 and end walls 7 and 8, the latter of which is removably attached to the cabinet by a pressed fit into the end of the cabinet as shown, or it may be attached by a hinge (not shown) if desired. The cabinet is divided into compartments 9, 10, 11 and 12 by the end wall 8, partition walls 13, 14 and 15 and by end wall 7. The compartments 10, 11 and 12 are fluid tight and each has a filler opening therein provided with a filler cap 18. In the present embodiment of the invention, the compartments 10, 11 and 12 are filled respectively with liquid dentifrice, antiseptic solution and water.

Within the compartment 9, which will sometimes be hereinafter referred to as the motor compartment, is mounted an electric motor 20 whose shaft 21 is provided at one of its ends with a first driving gear 22 enmeshed at all times with a driven gear 23 secured to one end of a crank shaft 24 journaled at one of its ends in a bracket 25 and at its opposite end as at 26 in the rear wall 6 of the cabinet. One end of a connecting rod 28 is operatively connected as at 29 to the crank shaft 24, and its opposite end is provided with a piston 31 operatively disposed within a pump cylinder 30 secured to the rear wall 6 by any suitable type of brackets 35. The motor compartment is provided with screened ventilator openings V. A conduit 36 is in open communication with the pressure output end of the pump cylinder 30 and by means of a distributing conduit 30A with the interior of each of the compartments 10, 11 and 12 through pressure outlet openings 37, 38 and 39 respectively opening to each of the compartments whereby all three compartments will be pressurized simultaneously upon actuation of the pump. The piston 31 is provided with the well-known type of flapper valve (not shown) whereby air passes upwardly through the piston on the down stroke, is trapped above the piston and thereby compressed on the up stroke.

The motor shaft 21 at its opposite end is provided with a second driving gear 42 enmeshed at all times with a driven gear 43 secured to one end of a shaft 44 extending outwardly through the front wall 5 of the cabinet 1 and journaled in a bearing 45 secured to the exterior of the wall and provided with a hollow tubular extension 46.

The outer end of the shaft 44 (see FIGURE 5) is provided with an inwardly extending squared recess 48 to receive a correspondingly squared end 49 of a flexible shaft 50 extending throughout the length of a flexible tubular housing 51 whose one end is secured to and in open communication with the outer end of the hollow tubular extension 46. The opposite end of the tubular housing 51 terminates within one end of a hollow handle 52 (see FIGURE 11) in abutment with a disc 53 secured within the same end of the handle. The opposite end of the hollow handle is provided with a removably attached hollow brush head 54 partially embracing a rotary brush 55 secured to a shaft 56 journaled through the inner end of the brush head and the end wall of a cap 57 and a disc 58 secured within the corresponding end of the hollow handle. The skirt portion 59 of the cap is adapted for attachment to this end of the hollow handle by means of a conventional bayonet lock indicated generally at 60 and rendered fluid tight by means of a rubber gasket, or the like, indicated at 61. The inner end of the brush shaft 56, as shown in FIGURE 16, is squared as at 62 and thereby adapted for removable engagement with a correspondingly hollow squared end 64 of a solid shaft 65 journaled through fixed discs 66 and 67, through a rotatable valve disc 68 and terminates at its opposite end in a squared portion 69. This squared end of the shaft 65 is adapted for engagement with the hollow, enlarged squared end 70 (see FIGURE 11) of the flexible shaft 50 which, it will be noted, is within the handle and rotatably bears

against the disc 53 to thereby attach the flexible shaft and its flexible housing 51 to the handle.

The discs 66 and 67 are fixedly secured within the adjacent ends of the forward and rearward sections of the handle as shown, an through these discs and through the rotatable valve disc 68 therebetween extends a hollow shaft 71 threaded at one of its ends to receive a nut 72 and provided with a head 73 at its opposite end. The shaft 56 is rotatable through the hollow shaft, and by this arrangement the forward and rearward sections of the handle are held together.

In the modified form of brush head and handle assembly shown in FIGURE 12, the inner end of the brush head 54A is provided with an inwardly extending recess 75 provided with an annular groove 76 cooperating with a groove 77 formed in the outer periphery of the neck portion 78 of the handle 52A to accommodate a snap ring 79. By this arrangement, the brush head may be snapped into and out of engagement with the handle. The brush 55A is rotatably mounted by its shaft 56A being journaled in the rearward portion of the brush head and provided with an annular groove 85 for engagement with a spring urged ball detent 86. Similarly, the brush shaft may be snapped into and out of assembly with the brush head.

Reverting to FIGURES 2 and 3, three dispensing tubes 90, 91 and 92 are in open communication at one of their ends with the interior respectively of the compartments 10, 11 and 12 of the cabinet 1. Their opposite ends extend through the front wall of the cabinet to a recess 93 where they are connected to enlarged ends 94 of flexible conduits 90A, 91A and 92A extending through bushings 95 to the interior of the tubular extension 46 and out into and throughout the length of an elongated flexible tubular housing 96 secured at this one of its ends within the tubular extension 46 and secured at its opposite end within the rear end of the handle 52 or 52A. The opposite ends of the conduits 90A, 91A and 92A terminate within the handle 52 and are attached respectively to one end of hollow tubular connectors 97, 98 and 99 (see FIGURE 14) extending through the disc 53. To the opposite end of these connectors are attached one end respectively of tubes 102, 103 and 104 whose opposite ends are attached respectively to connectors 105, 106 and 107 (see also FIGURE 16) extending through the disc 67. The tube 104 is provided with a branch 110 attached to a connector 111 also extending through the disc 67.

As best shown in FIGURE 11, the discs 67 and 66 are in fluid-tight facial contact with opposite sides of the rotatable valve disc 68 which is provided with an opening 115 therethrough and also an arcuate opening 116 formed on a radius corresponding with the radial disposition of the tubular fittings 106 and 107 as is the opening 115 on the same radius as the disposition of the tubular fittings 105 and 111. The fixed disc 66 is provided with similarly disposed connectors 120, 121 and 122 extending there-through. One end of a tube 123 is attached to and in open communication with the connector 120 and at its opposite end with a hollow connector 124 extending through the fixed disc 58 at the forward end of the handle 52. Alongside of the tube 123 are two tubes 125 and 126 which are attached respectively to the connectors 121 and 122 and merge into a single tube 127 whose forward end is attached to a connector 130 extending through the disc 58. This disc is in fixed facial contact with the inner end of the brush head 54 and the connectors 124 and 130 are at all times in communication respectively with longitudinal ducts 131 and 132 within the brush head. The duct 131 is open at its forward end at the tip of the brush head while the corresponding end of the duct 132 is closed. Apertures 133 open downwardly from the duct 132 for the purpose of delivering dentifrice or water to the rotary brush, 55.

In the modified form of the dispensing cabinet shown in FIGURES 7 and 8, the compartments 10A, 11A and 12A are open at their top ends and thereby adapted to

receive removable containers 10B, 11B and 12B containing respectively liquid dentifrice, mouthwash and water, and each container is provided with a filler opening and closure cap 135. The typical closure cap, as best illustrated in FIGURE 9, is preferably made of molded material and has a pressure inlet port 136 in open communication with the interior of its respective container and an outlet port 137 in open communication with a tube 138 extending downwardly into the container and terminating in slight spaced relation to the bottom wall of the container as shown in FIGURE 7. The interior of the cap is provided with a suitable gasket 139 for sealing off the filler opening.

This cabinet also includes a motor compartment 9A within which a pump and driving motor and gear transmission, as shown in FIGURE 3, are disposed, and pressure from the pump is delivered to a manifold 145 attached in any satisfactory manner to the rear wall 6A of the cabinet. Pressure from the manifold is directed to the interior of each of the containers 10B, 11B and 12B by means of conduits 146, each provided at its outlet end with a tubular fitting 147 for a forced fit within the inlet port 136 in the closure cap 135, and outlet conduits 148 are similarly connected to the pressure outlet ports 137 in the closure caps by fittings 149. The outlet conduits 148, as best shown in FIGURE 8, are compactly encased within and protected by an elongated housing 150. The opposite ends of these conduits are in open communication with the hollow tubular extension 46A in the same manner as the tubes 90A, 91A and 92A in FIGURE 3 through bushings 95A. By reason of the novel attachment of the inlet and outlet conduits to the closure caps 135, the containers 10B, 11B and 12B may be removed from the cabinet when empty and replaced with refills.

The operation of the device is as follows: With the motor and pump in operation and with the loaded tube contents sealed off by the valve disc 68, it will be readily apparent that rotation of the valve disc 68 to the right as viewed in FIGURE 16 will place the opening 115 in communication with the connectors 105 and 122 to thus deliver the liquid dentifrice from the conduit 90 through tubes 102, 126, connector 130 into the duct 132, out through the openings 133 and onto the brush. When it is desired to rinse the brush, it is merely necessary to rotate the disc 68 farther to the right to cut off the connector 122 and align the opening 115 with the connector 121 to thereby supply water from the conduit 92A through the tubes 103, 125, connector 130, out through the duct 132, openings 133 and onto the brush.

When it is desired to use only the mouthwash, the disc 68 is turned to the left until the bottom of the arcuate opening 116 registers with the connector 107 whereby the mouthwash will flow from conduit 91A through the arcuate opening, through the connector 120, tube 123, connector 124 and out through the duct 131 and directly into the mouth of the user in any desired direction as determined by manipulation of the handle 52. When it is desired to dilute the mouthwash with water, it is merely necessary to rotate the disc 68 a little more to the left so that both connectors 106 and 107 (connected respectively with conduits 91A and 92A) will be in communication with the arcuate opening 116, whereupon the mixture will flow through connector 120, tube 123, connector 124 and out through the duct 132.

As best shown in FIGURE 6, the conduit 36 is provided with a manually settable automatic pressure release control valve indicated generally at 155 and comprising a valve body 156 soldered as at 157 to the conduit and open to the interior thereof by aligned openings 158 and 159. The top of the opening 158 forms a valve seat against which a ball valve 160 is normally held by one end of a compression spring 161 whose opposite end bears at all times against a screw cap 162 having a vent opening 163 therein.

As previously pointed out, the contents of the com-

partments 10, 11 and 12 are dispensed under pressure through their respective conduits 90, 91 and 92. Since the motor 20 and, hence, the pump 30 are in continuous operation to provide continuous rotation to the toothbrush while the contents of the compartments are used only intermittently, it is obvious as a consequence thereof that excessive pressures would be built up within the compartments. This condition is obviated, however, by the release valve 155 wherein the ball 160, when subjected to back pressures from the dispensing conduits and from the interior of the compartments, will be forced from its seat against the reaction of the spring 161, whose compression load can be regulated by advancing or retracting its cap 162 relative to the valve body 166. Unseating the ball valve will, of course, allow escape-ment of excessive pressure through the vent opening 163.

While I have shown particular forms of embodiment of my invention, I am aware that many minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described my invention what I claim as new and desire to protect by Letters Patent is:

A component part of a structural assemblage of the class described comprising, a rotary toothbrush unit including an elongated hollow cylindrical handle of uniform diameter throughout its length to provide a convenient hand grip and comprising a forward section and a rearward section, a transversely disposed valve disc rotatably mounted between adjacent ends of said handle sections, a rigid brush head, means removably attaching the brush head to said forward handle section, a brush shaft rotatably carried by said head, said brush head having a first passageway and a second passageway therein, said first passageway extending longitudinally throughout the length of the head and open at both of its ends, said second passageway closed at the free end of said head open at the opposite end thereof and having spaced apart downwardly opening apertures therein, a brush rotatable with said shaft and partially shrouded by said head, a driven shaft rotatably mounted within said handle,

means at one end of said driven shaft interengaging said brush shaft, means at the opposite end of said driven shaft interengageable with a driving shaft, a first disc and a second disc fixedly secured within said handle respectively adjacent both faces of said valve disc, a first series of fluid dispensing tubes within said handle adapted at one of their ends, for communication with a series of tubes supplying fluids of different substances and having their opposite ends extending through said first disc, a second series of fluid dispensing tubes within the handle having one of their ends extending through said second disc and their opposite ends in communication with said brush head passageways, said valve disc having fluid flow control openings therethrough, whereby rotation of said valve disc will selectively cause flow of fluid from certain of said supply tubes to certain of said dispensing tubes and through one of said brush head passageways onto said brush and fluid from other of said tubes through the other of said passageways in a straight path of fluid flow above the orbit of rotation of the brush and directly into the mouth of the user without passing through the brush.

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