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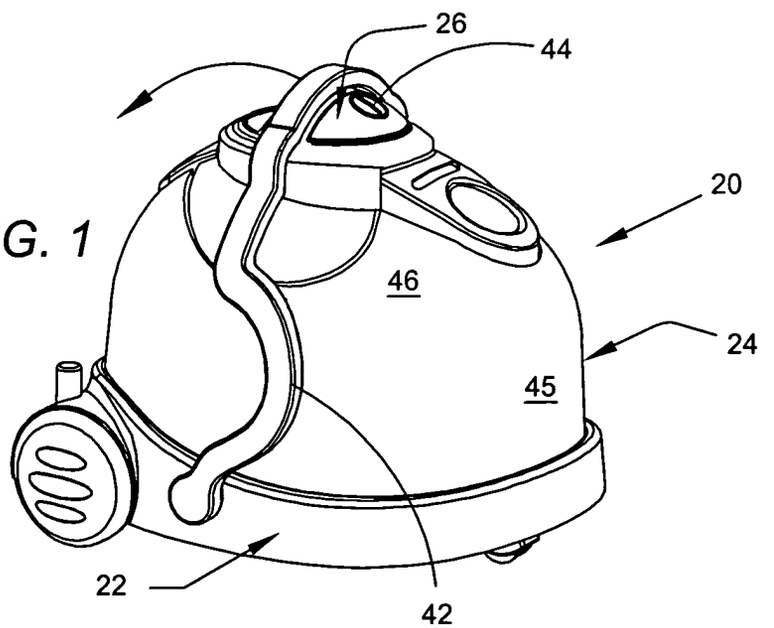
(54) Water filtration vacuum cleaner

(57) A water filtration vacuum cleaner (20) that has a modular construction. A motor module (26) fits deep into a central opening of a water tank module (24) so that the center of gravity of the vacuum cleaner (20) is lowered. The water tank module (24) is then placed on top of a trolley module (22), which has a rotatable arm (42). When rotated into a substantially vertical position, the arm (42) secures the water tank module (24) and motor module (26) to the trolley module (22). A vacuum hose (77) connects into the water tank (24) from above. The air path from the hose (77) into the water tank module (24) extends through an upper surface of the water tank module (24) that incorporates the motor module (26). When activated, motor cooling air is drawn in through the bottom of a central opening (36) in the trolley module (22).

FIG. 1



EP 1 535 563 A2

Description

Cross Reference to Related Applications

[0001] This application claims priority from the provisional patent application Serial No. 60/525,399 filed November 26, 2003 in the name of Raymond (Hoi-Tak) Lam entitled "Water Filtration Vacuum Cleaner," incorporated herein by reference.

Field of the Invention

[0002] This invention relates to vacuum cleaners and more particularly to water filtration vacuum cleaners.

Background of the Invention

[0003] Water filtration vacuum cleaners have been sold that have a canister with an outer, "main" housing enclosing the motor, blower, motor cooling fan and water pan in that main housing that forms the exterior of the canister.

[0004] In some canister-type water filtration vacuum cleaners the liquid tank is small because the allocation of space in the housing does not allow for a larger tank. This requires more frequent emptying and refilling than does a larger tank.

[0005] Another shortcoming of some water filtration vacuum cleaners described in the art is that they are top-heavy. Their high center of gravity can lead to accidental tipping. Some designs appear to have dealt with this problem by spreading the wheels out farther on projecting wheel supports, but this increases the footprint of the vacuum cleaner. Furthermore, such designs are unattractive.

[0006] In some canister-type water filtration vacuum cleaners described in the art, the vacuum hose inconveniently connects into an opening in the side of the canister rather than an upward facing surface where the interconnection of hose and canister is easier to see.

Brief Summary

[0007] In accordance with the present invention a canister-type water filtration vacuum cleaner is provided that forgoes the "main housing" construction approach and instead adopts a modular construction. The water tank is large and provides the major portion of the exterior of the canister.

[0008] A motor unit nests deep into a central opening through the tank so that the center of gravity of the canister is lowered. Motor cooling air is drawn in through the bottom of the central opening. Conveniently, the vacuum hose connects into the water tank from above. The air path from the hose into the tank extends through an upper surface of the module that incorporates the motor.

[0009] The three modules of the canister of the vacuum cleaner in accordance with the invention are the motor module, the tank module and a wheeled trolley into which the tank module fits. A single generally U-shaped arm is pivotally connected at its two arm ends to the trolley. Pivoted upward it engages the top of the motor module seated in its recess in the tank. To separate the modules the U-shaped arm is swung to a substantially horizontal position and the motor module is lifted out of its seat in the central opening in the tank. The tank is then lifted off of the trolley for emptying and refilling. A convenient handle spans the central opening through the tank, sliding from a lower, rest position to an upper position where it can be grasped to lift the tank.

[0010] The vacuum hose has, at one end, a tubular quick connect fitting. It includes a groove into which fits a raised connector projection molded into the opening in the upward-facing motor module surface. A quarter turn or less of the fitting wedges the boss within the groove for a secure connection.

[0011] At its other end the hose carries another tubular fitting. It has a pair of integrally molded resilient fingers with raised tips. The tips snap into confirming openings in a tubular intermediate mate that fits over the tubular fitting. The mate is joined to a metal nozzle by a third tubular connector part and a special resilient plastic C-clamp. The third tubular part slips over the remaining end of the mate. Openings in the third part align with a groove encircling the mate. Radially inward projections on the resilient C-clamp protrude through the openings into the aligned groove to lock the mate to the third part. The nozzle can be disconnected from the hose by pressing inward the projections on the resilient fingers of the tubular fitting and sliding the tubular fitting from within its mate. The remote end of the nozzle is tapered slightly so as to be press fit in an extensible tube. A floor and rug cleaning tool, crevice cleaning tool or other tool is then pressed onto the further end of the extensible tool.

[0012] The floor and rug cleaning tool or attachment of the vacuum cleaner of the invention includes a retractable brush. The brush is mounted on a rocker plate supported pivotally within the tool. A manually depressible actuator extends through an opening in the upper surface of the tool to push the rocker, against the action of biasing springs, from its brush retracted position to its brush projected position.

[0013] The above and further objects and advantages of the invention will be better understood by reference to the following detailed description of one or more preferred, exemplary embodiments taken in consideration with the accompanying drawings.

Brief Description of the Drawings

[0014]

Fig. 1 is a perspective view of a water filtration vacuum cleaner canister in accordance with the invention;

Fig. 2 is a perspective view of a removable water

tank of a vacuum cleaner like that of Fig. 1;
Fig. 3 is a perspective view of the motor unit of the vacuum cleaner of Fig. 1;
Fig. 4 is a perspective view of a removable suction tube for the intake of air into the water tank of Fig. 2;
Fig. 5 is a perspective view of a combination foam filter and safety float unit that fits into the tank of Fig. 2;
Fig. 6 is a perspective view of a flexible hose with an inlet nozzle and a fitting for connection to the canister of Fig. 1;
Fig. 7 is a perspective view of a telescopic extension tube that connects to the inlet nozzle of the hose of Fig. 6;
Fig. 8 is a perspective view of a floor and rug vacuuming attachment that fits onto the extension tube of Fig. 7;
Fig. 9 is a perspective view of an upholstery tool that fits onto the extension tube of Fig. 7;
Fig. 10 is a perspective view of a crevice tool that fits on the extension tube of Fig. 7;
Figs. 11A-D are exploded views of the vacuum cleaner canister of Fig. 1;
Fig. 12 is a top plan view of the vacuum cleaner canister of Fig. 1;
Fig. 13 is a front view of the vacuum cleaner canister of Fig. 1;
Fig. 14 is a right side view of the vacuum cleaner canister of Fig. 1;
Fig. 15 is a bottom view of the vacuum cleaner canister of Fig. 1;
Fig. 16 is a section view of the vacuum cleaner canister of Fig. 1;
Fig. 17 is a cross-sectional view, partly diagrammatic and illustrating motor cooling air flow in the vacuum cleaner of the invention;
Fig. 18 is a further perspective view of parts broken away for clarity showing air flow into and out of the water tank of Fig. 2;
Fig. 19 is a further cross-sectional view of the canister of Fig. 1 indicating vacuum cleaning air flow through the water tank of the canister of Fig. 1;
Fig. 20 is a view, partly exploded and partly perspective of the components that attach the inlet nozzle and hose of Fig. 6; and
Fig. 21 is an exploded view of the floor and rug vacuuming attachment of Fig. 8 with parts broken away for clarity.

Detailed Description

[0015] As seen in Fig. 1, rather than having a main housing into which the constituent parts of a water filtration vacuum cleaner canister are assembled, a modular water filtration vacuum cleaner canister 20 in accordance with the preferred embodiment of the present invention includes three major interfitting units. These are a cradle car or trolley 22, a removable water tank 24 and a motor unit 26. As can be seen from Figs. 11 -16, the trolley 22 is movably supported on a two-wheeled front caster 28 and two relatively large rear wheels 30 and 32. As shown in Fig. 16, the caster 28 has a stem 29 secured rotatably in a socket 34 formed in the body of the trolley unit 22. The independently rotatable two large rear wheels 30 and 32 and the rotatably mounted caster 28 permit easy movement of the canister in all directions during vacuum cleaning.

[0016] Centrally, the trolley 22 defines an opening 36 (Fig. 11B) through which motor cooling air is drawn as described more fully below. The trolley car provides an interior bottom surface 38 and sidewalls 40 into which the removable water tank 24 nests. Pivotally connected to the trolley sidewalls at each side of the trolley is a handle 42 best seen in Figs. 1 and 11B. In its upright position as shown in Fig. 1, the handle 12 retains the removable water tank 24 and motor unit 26 in place on the trolley 22. The handle 42 in its upright position snaps into place between a stop 44 and a detent 46 (Figs. 3 and 11C). When the handle 42 is pivoted in the direction of the unnumbered arrow in Fig. 1 to a substantially horizontal position, the motor unit 26, the removable water tank 24, and the trolley 22 can be separated. As can be seen from Figs. 12 - 15, when the modules are assembled, no one unit forms the exterior of the canister 20. Rather the three modules combine to define the unified appearance, each module contributing to a greater or lesser extent.

[0017] As shown in Fig. 2 the water tank 24 is of a generally saddle-shaped configuration to accommodate the motor unit 26. It has a bottom 43 joined to an upper portion 44. When sealed together these form an enclosure with exterior, upstanding sidewalls 45. The sidewalls 45 contribute a major exterior surface of the canister. Near their tops the sidewalls 45 slope inwardly towards the center of the tank and merge with slanted upward facing wall portions 46. Centrally the bottom 43 and upper portion 44 join to form an opening 47 that extends through the tank from top to bottom.

[0018] A slidable handle 48 shown in Fig. 11A has slightly enlarged ends 50 that are slidably retained in a pair of complimentary shaped vertical slots 52 within the opening 47. One of these can be seen in Figs. 2 and 11A. A pair of blocks 54 is secured to the tank 24 at the top of the two slots 52 by small screws or other suitable fasteners to block the upward travel of the handle 48. With the motor unit 26 removed, the handle 48 is slid upward into engagement with the blocks 54 and affords a convenient means to carry the tank 24. Dropped to the bottom of the slots 52, the handle 48 is out-of-the-way. It lies across the central opening 47. That opening aligns with the central opening 36 in the trolley 22 to permit motor-cooling air flow into the motor unit 26 as described below.

[0019] As seen in Fig. 2 the tank 24 has deep side cavities 49 and shallower front and rear cavities 51 and 53. Centrally, the tank has a large deep well 55 which is

a part of the opening through the tank. The well 55 accommodates the motor-containing lowest portion 151 of the motor unit 26. The deep side cavities allow venting of air through a pair of grills 184 and 199 at the level of the motor 140 as seen, for example, in Figs. 17 and 18 and as described below. The shallower front and rear cavities 51 and 53 accommodate projecting wings 159 and 161 that provide a vacuum hose connection and an air movement path out of the tank, as also described below. The seating of the motor 140 deep in the well 55 as seen in Figs. 17 and 18 allows for a low canister height and a very low center of gravity. The canister can be dragged about by its hose 77 without fear of tipping even though the hose attaches near the top of the canister.

[0020] Water is introduced into the tank 24 through an opening 58 formed in a substantially horizontal, recessed land 58' integrally molded into tank upper portion. Minimum and maximum filling levels are marked on the side of the tank 24 at 57 and 59. The tank is transparent, tinted transparent or translucent so that the water level is visible. A second opening 60 into the tank 24 is formed in a second substantially horizontal recessed land 60' molded into the tank upper portion. The opening 60 accommodates a foam filter and safety float unit 62. The unit 62 has a floating stopper 64, a downward projecting basket 66 in which the stopper 64 is free to slide and a centrally open rear support seal 68. A sock-like sponge filter 70 covers the exterior of the basket 66. It is through the filter 70, the basket 66 and the rear support seal 4 that air is withdrawn from the interior of the tank 24. Extreme overfilling of the tank 24 when replenishing the water supply or by vacuuming water and debris into the tank floats the stopper 5 up into substantially airtight engagement with the support seal 4. This cuts off the withdrawal of air from the tank 24 which thereby denies the reduced air pressure (i.e. suction) within the tank 24 needed to draw air, water and/or dirt into the tank to continue vacuum cleaning.

[0021] A removable suction tube 72 extends into the opening 58. This suction tube has a support plate 74 that rests on the surface of the tank 24 surrounding the opening 58. A conforming front support seal 76 may seal the periphery of the plate 74 against the undersurface of the motor unit 26 when the three modules are assembled. A flexible hose 77 shown in Fig. 6 has connected at its outlet end a fitting 79 that, when in place, extends to an upper opening 80 of the suction tube 72. The fitting is a three-piece unit consisting of an outer hose holder 81 shown in Fig. 11C, a hose seal 82 and an inner hose holder 83. The inner holder 83 has a cylindrical projection 84 that extends into the interior of the flexible hose 77 and a larger axially slotted cylindrical portion 85 that inserts into the interior of the outer hose holder 81 snapping in place with a boss 86 riding over a circular shoulder (87 in Fig. 16) formed in the interior of the outer hose holder 81. The seal 82 is captured between a flange 89 on the inner hose holder 83 and an inwardly directed circular flange in the interior of the outer hose holder 81. The outer hose holder 81 has a cylindrical projection 90 that inserts in an opening 91 in an inclined upwardly facing outer surface 92 of the wing 159 of the motor unit 26 and into a channel 93 formed on a lower portion of the wing 159. Interfitting raised connector projections 94 and 95 provide a quick connection of the hose holder into the interior of the channel 93 of the lower enclosure portion 94. A slight turn of the holder 81 wedges the raised connector 95 in a tapered groove defined between the connector 94 and a flange 96 on the holder 84.

[0022] At its further end the flexible hose 77 has a fixed inlet nozzle 100 as shown in Fig. 6. To the nozzle 100 a telescopic extension tube 102, shown in Fig. 7, can be attached. To the slightly tapered end 103 of the telescopic extension tube 102 any of several cleaning tools such as the floor and rug tool 104 of Fig. 8, the upholstery tool 106 of Fig. 9 or the crevice tool 108 of Fig. 10 can be attached. Also on the flexible hose 77 a slidable tool caddy has a slidable cylindrical sleeve 110 fitting on the hose 78 and two cylindrical tool mounts 112 and 114 on which two of tools 104, 106 and 108 can be carried.

[0023] The manner of attachment of the inlet nozzle 100 to the flexible hose 77 is better illustrated in Fig. 20. The slightly curved inlet nozzle 100 has an end 103 slightly tapered to press fit tightly into the end of the telescopic extension tube 102 of Fig. 7. A thumb operated slide 104 opens and closes an aperture 105 into interior of the nozzle 100 to permit some adjustment of the cleaning suction. At its further end the nozzle 100 defines a seat 106 for a resilient split ring 108. An end portion 110 of a connector 112 inserts into the interior of the nozzle 100 extending past the interior of the seat 106. The connector 112 is formed with a series of flanges 114 that define slots 116 extending around the exterior of the connector. One of these slots aligns with a pair of openings 118 formed through the seat 106. The split ring 108 is expanded and placed onto the seat 106. A pair of projections 120 extend through the openings 118 into the aligned slot 116. A further projection 122 extends through a similar slot opposite the slots 118, unseen in Fig. 19. The connector 112 and the nozzle 100 are thus rotatably coupled. On the end of the hose 77 is affixed a collar 124. Slidably received on the hose, but detained thereon by the collar 124, is a coupling 126. The coupling 126 has a pair of slots 128 on opposite sides, just one of which is shown in Fig. 19. Into each slot 128 extends a resiliently moveable finger 130. On the end of each finger 130 is formed a slightly raised catch 132. The shoulder 124 and the portion of the coupling 126 that contains the slot 128, finger 130 and catch 132 slide into the interior of the connector 112. The cylindrical exterior of the inserted portion of the coupling 126 that extends into the fastener 112 interior closely fits the interior of the fastener. Each slightly raised catch 132 rides into a conforming hole 134 on each side of the fastener 112. A cam surface 136 may be provided within the interior

of the fastener 112 extending to the opening 134 from the end of the fastener where the catch 132 enters the interior of the fastener 112 to facilitate the catch 132 riding up the cam surface 136 and snapping into place in the hole 134. A slight depression 135 about the hole permits depression of the catch by finger pressure enabling withdrawal of the coupling 126 from the connector 112.

[0024] The enclosure formed by the joining of the two enclosure portions 93 and 94 of the motor unit 26 encloses a variable speed motor 140 (Figs. 11D and 16 - 19). A motor shaft (not shown) extends from each end of the motor. At its lower end the motor shaft carries an impeller 142 for drawing motor cooling air into the lower portion 97 of the motor enclosure. At its upper end, the motor shaft drives a fan 144 that draws air in through a central opening 146 and expels air radially outward through louvers 148 in a fan cover 150. The motor 140 sits within the lower portion 97 of the motor enclosure 97. A motor cover 152 is secured to the lower enclosure portion 97 above the motor by suitable fasteners such as small self-threading screws. A central opening 154 in the cover 152 aligns with a duct cover 156 that is secured, similarly, to the top of the cover 152. The motor cover 152 and the duct cover 156 cooperate to define a duct 157. This duct communicates between the central opening 146 into the fan 144 to the top of the foam filter and safety float unit. The fan 140 thus draws air through the filter and the duct cover 156 reducing the pressure in the tank 24.

[0025] The upper portion 89 of the motor enclosure supports within it a push button power switch 160 (Figs. 11C and 19). An upper curved plate 162 is depressible downward against the bias of a pair of springs 164 (Fig. 11C) into engagement with the push button switch 160 to activate the switch. A printed circuit board 161 also carries a slide activated variable resistor 166. A slide knob 169 extends through a slot 170 in the upper housing 89 to operate a slider 168 of the variable resistor 166. The variable resistor 166, in association with a conventional power supply circuit (not shown) and conventional power cord and plug 170, provides motor speed control to vary the suction at the hose 77.

[0026] As seen in Fig. 17 motor cooling air flow is indicated by the arrows numbered 180. The impeller 142 draws air in through the bottom of the canister via the opening 36 formed on the trolley 22 and the opening 56 through the water tank 24. The air is exhausted outwardly to the side passing through a cooling air filter 182 and a grill 184.

[0027] As illustrated in Figs. 18 and 19 dirt laden air indicated by the arrows 184 is drawn via the vacuum attachment extensible tube 102 (of Fig. 7) and hose 78 (of Fig. 6) into the suction tube 72. As indicated by the arrows 185 air emerges from the tube 72 into the water contained in the lower portion of the tank 24. A turbulent frothing action occurs assisted by the presence of a baffle 187 secured to the bottom 43 of the tank 24. This turbulent churning of air, dirt and water is followed by a flow of the air over and around the baffle 187, over and through the water in the bottom of the tank, around the walls that house the motor and define the opening 56 through the center of the tank, again as indicated by the arrows 185. At the rear of the tank air and water meet a further baffle 189. Air is drawn into the foam filter 70 covering the basket of the foam filter and safety float unit 62. The baffles 187 and 189 slow movement of air and water facilitating the deposit of dirt being carried along. As indicated by the arrow 186 air moves through the filter and safety float unit 62. The air is directed along the interior of the duct cover 156 as indicated by the arrow 192. The air moves into the central opening 146 of the fan cover 150 as shown at the arrow 194. The air is exhausted through the louvers 148 and passes through a final HEPA filter 195 carried in the motor unit 26 as shown in Fig. 17 and as indicated by the arrows 197. Thus cleansed by three filtering actions, the air escapes the canister through a grill 199. The grill 199 is removably secured in place to permit access to the final filter 195 for replacement of that filter.

[0028] Shown in Fig. 21 the floor and rug tool 104 includes a retractable brush 205 along its forward edge and a squeegee-like flexible blade 206 along its rearward edge. These are secured in slots 208 and 210 formed along a rocking plate 212. The plate is biased toward the brush retracted position by a pair of springs 214 (one shown in Fig. 21). The springs act between the plate 212 and a further, bottom plate 214. A pair of screws or other suitable fasteners (not shown) extends through a pair of openings 216 in the bottom plate, through the springs 214 and aligned holes 218 in the rocking plate 212 and thread into a pair of posts 220 molded in an upper, box-like part 222 of the tool 104. A further pair of screws (not shown) or other suitable fasteners connects the bottom plate 214 to the box-like part 222, passing through a pair of holes 224 and into a further pair of molded posts 226.

[0029] Suction is delivered to the tool 104 from the hose 77 and tube 102 through a short tubular fitting 228 rotatably connected to a mating fitting 230. The fitting 230 connects to a pivotal plate 232. The interior of the fitting 230 communicates with a rectangular in cross-section vacuum coupling 234, a small part of which is visible in Fig. 21. The coupling 234 is integrally molded with the plate 232 and the fitting 230. Together they open into a suction duct 236. The duct 236 extends into the interior of the box-like part 222 where it opens through an opening 238, the edges 240 of which engage the plate 214 about an opening 242. A channel 244 along the bottom of the plate 214 communicates suction from the opening 242 to the floor or rug being vacuumed.

[0030] A brush actuator, shown in Fig. 8 at 246, is pivotally supported on a shaft 248 (Fig. 21). The actuator 246 pivots a shaft 248 to which it is connected through an opening 262. This moves a pair of cams 250 and 252 against a pair of cam follower surfaces 254 and 256 formed in the rocking plate 212 to rock the plate outward

against the bias of the springs 214 to extend the brush 205.

[0031] At the actuator 246 a pair of plates 258 and 260 closes the opening 262 through which the actuator extends when the actuator is pivoted to one or the other end of its limited pivotal movement. The shaft 248 is pivotally supported at its ends in a pair of integrally molded, thin, flexible leaf springs 264. The shaft 248 includes an offset central section 266 so as to extend the pivotal movement of the actuator 246 across the duct 236 to the cam 252. Wheels 270 are provided to help move the tool 104 across the floor or rug.

[0032] While one or more specific preferred embodiments have been described herein, those skilled in the art will readily recognize modifications, variations and equivalents that do not depart from the spirit and scope of the subject invention, as herein claimed.

Claims

1. A water filtration vacuum cleaner of the kind including a hose and canister; the canister comprising:

(a) a liquid container module having a bottom and an exterior upstanding wall;
(b) the exterior upstanding wall of the liquid container module forming the major exterior surface of the canister;
(c) the exterior upstanding wall of the liquid container module being transparent or translucent to permit visual observation of the level of liquid in the liquid container module;
(d) the exterior upstanding wall of the liquid container sloping inwardly and merging with a top wall of the liquid container module;
(e) the top wall of the liquid container module sloping downwardly centrally of the liquid container module to merge with an upstanding central wall surrounding a central opening through the liquid container module;
(f) a suction opening into the interior of the liquid container module adapted to receive a suction hose;
(g) the suction opening into the interior of the liquid container module opening through an upwardly facing exterior surface portion of the liquid container module through the one of a sloping inwardly location of the exterior upstanding wall and the top wall of the liquid container module;
(h) an air exhaust opening from the liquid container module;
(i) a motor module;
(j) the motor module being at least partially recessed within the central opening through the liquid container module;
(k) the motor module having an outer casing forming a minor exterior surface of the canister; and
(l) a fan carried by a shaft of a motor housed in the motor module.

2. The water filtration vacuum cleaner according to claim 1, the fan being in air moving communication with the interior of the liquid container module and operative to draw dirty air through the hose, into the liquid container module and clean air through the air exhaust opening from the liquid container module.

3. The water filtration vacuum cleaner according to claim 1, additionally comprising a flexible suction hose having a tubular fitting adapted to be releasably secured to the suction opening.

4. The water filtration vacuum cleaner according to claim 3, additionally comprising a floor cleaning attachment adapted to be releasably attached to the flexible suction hose;

wherein the attachment has a retractable brush mounted on a rocker plate supported pivotally within the attachment.

5. The water filtration vacuum cleaner according to claim 3, wherein a manually depressible actuator extends through an opening in the upper surface of the attachment to push the rocker plate from a brush retracted position to a brush projected position.

6. The water filtration vacuum cleaner according to claim 3, wherein the flexible suction hose includes tool mounts adapted to carry vacuum tools.

7. The water filtration vacuum cleaner according to claim 1, additionally comprising a trolley module having wheels and adapted to hold the liquid container module.

8. The water filtration vacuum cleaner according to claim 7, additionally comprising a u-shaped handle that is pivotally connected at its two arms to the trolley module.

9. The water filtration vacuum cleaner according to claim 8, wherein the handle is adapted to secure the liquid container module to the trolley module when the handle is moved to a first, substantially vertical position.

10. The water filtration vacuum cleaner according to claim 9, wherein the handle is adapted to engage the top of the motor module when handle is in the first, vertical position.

11. The water filtration vacuum cleaner according to

claim 9, wherein the handle is adapted release the liquid module from the trolley module when the handle moved from the first, substantially vertical position to a second, substantially horizontal position.

12. A method of water filtration vacuum cleaning, comprising:

(a) providing a motor module having a motor connected to a fan via a shaft;
(b) providing a liquid container module having an exterior, a hollow interior adapted to accommodate a liquid, and an air filtration pathway, wherein the air filtration pathway travels from an air inlet located on the exterior of the liquid container, through the hollow interior, and passes through an air exhaust opening located on the exterior of the liquid container;
(c) providing a trolley module having a bottom surface, sidewalls and a handle pivotally connected to the sidewalls, wherein the bottom surface and sidewalls define a cradle member;
(d) placing the motor module into an opening of the liquid container module so that a lower portion of the motor module is recessed in the liquid container module;
(e) placing the liquid container module in the cradle member of the trolley;
(f) releasably securing the liquid container module to the trolley module by moving the handle into a locked position;
(g) inserting a liquid into the liquid container module;
(h) placing at least one air filter along the air filtration pathway between the air inlet and the exhaust opening;
(i) providing at least one baffle located in the hollow interior along the air filtration pathway;
(j) drawing air through the inlet nozzle and along the air filtration pathway when the motor module is powered; and
(k) causing at least some of the air to travel through the liquid, the air filter and through the exhaust opening.

13. The method of claim 12, wherein the motor module is placed into the opening of the liquid container module into a position so that the vacuum cleaner has a low center of gravity.

14. The method of claim 12, additionally comprising the step of drawing air through an opening located at the bottom center of the trolley module for cooling the motor module.

15. The method of claim 12, additionally comprising the step of releasably securing a flexible suction hose to the air inlet.

16. The method of claim 12, additionally comprising the step of providing the inlet at a location on the upper portion of the water tank.

17. The method of claim 12, additionally comprising the step of emptying the liquid container module.

18. The method of claim 17, wherein the emptying step additionally comprising moving the handle to a release position and lifting the liquid container module off of the trolley module.

19. The method of claim 17, wherein the emptying step comprises removing the motor module from the liquid container module.

20. A water filtration vacuum cleaner comprising:

tank means for holding a reservoir of liquid, wherein the tank means includes a plurality of baffle means for improving the circulation of air through the reservoir of liquid;
filter means for filtering the air that circulated through the reservoir of liquid;
transport means for moving the vacuum cleaner;
handle means for removably securing the tank means to the transport means; and
motor means for providing motive power to circulate air through the vacuum cleaner.

21. The water filtration vacuum cleaner of claim 20, additionally comprising a hose means for suction of dirty air.

22. The water filtration vacuum cleaner of claim 21, wherein the hose means additionally comprises an attachment means for cleaning a floor.

23. The water filtration vacuum cleaner of claim 21, additionally comprising a connection means for attaching a cleaning tool to the hose means.

24. The water filtration vacuum cleaner of claim 21, wherein the hose means additionally comprises a connection means for attaching the tank means to the hose means.

25. A modular water filtration vacuum cleaner having a tank module, a motor module, a trolley module and an air intake hose, the tank module having an outer surface forming a major portion of the vacuum cleaner, the tank module having a central opening therethrough receiving the motor module and the trolley module having an upper surface seating the tank module and a central opening, the motor module carrying a flow in moving communication with the interior of the tank module, the hank module

having an intake opening adapted for connection with the hose and an air outlet, the fan being located to move air in through the hose to the interior of the tank module, through water contained in the tank module, through a filter and out through the air outlet, the motor module having an air moving impeller in communication with the central openings of the trolley module and tank module for moving motor-cooling air through the central opening of the trolley module into the central opening of the tank module and into cooling relation with a motor in the motor module.

26. The water filtration vacuum cleaner of claim 25 further comprising a tank module lifting handle spanning the central opening through the tank module.

27. The water filtration vacuum cleaner of claim 26, wherein the lifting handle has ends slidingly attached to the liquid container module on opposite sides of the central opening allowing the handle to slide upward to a lifting position and downward to retracted position.

28. The water filtration vacuum cleaner of claim 25, wherein the hose and the liquid container module have interfitting connecting parts including an arcuate groomed part and a raised arcuate projection; at least one of which groove and projection broadens lengthwise such that the parts are wedged together upon less than a full turn of one part with respect to the other when brought together.

29. The water filtration vacuum cleaner of claim 25, wherein the hose carries at its intake end a tubular fitting having integrally molded resilient figures with raised tips, a tubular intermediate mating fitting having openings into which the tips snap, a metal nozzle joined to the mating fitting by a further tubular connector fitting over the mating fitting, and an extensible tool mounting tube connected to the tubular connector.

30. The water filtration vacuum cleaner of claim 29, wherein the further tubular connector has openings aligning with grooves encircling the mating fitting, a c-clamp with radially inward projections partly encircling the further tubular connector with its projections extending through openings into grooves.

FIG. 1

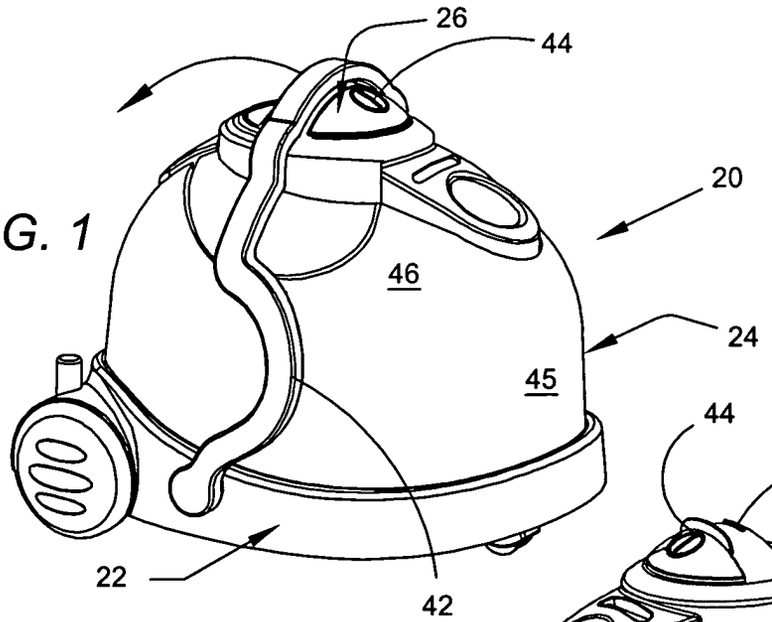


FIG. 3

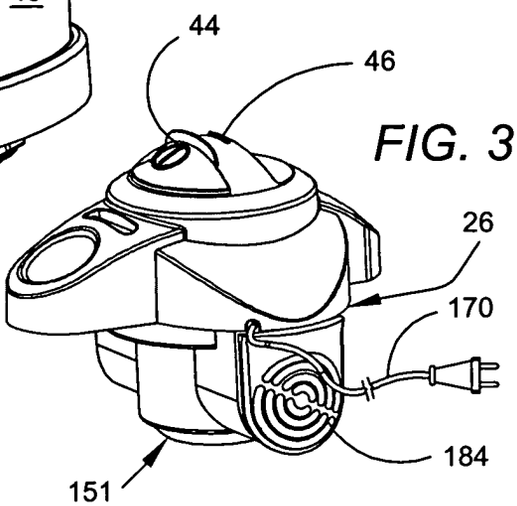


FIG. 4

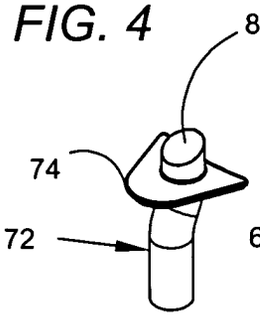


FIG. 5

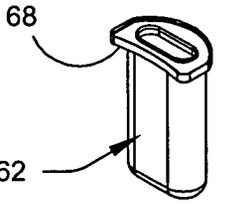
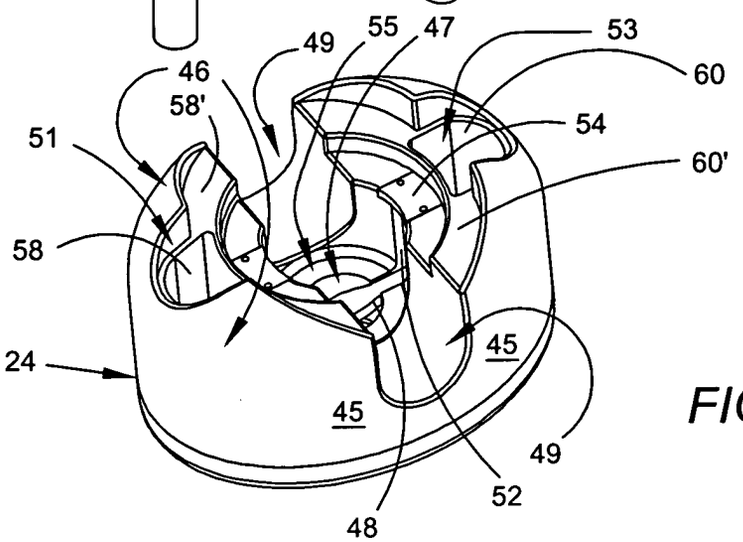


FIG. 2



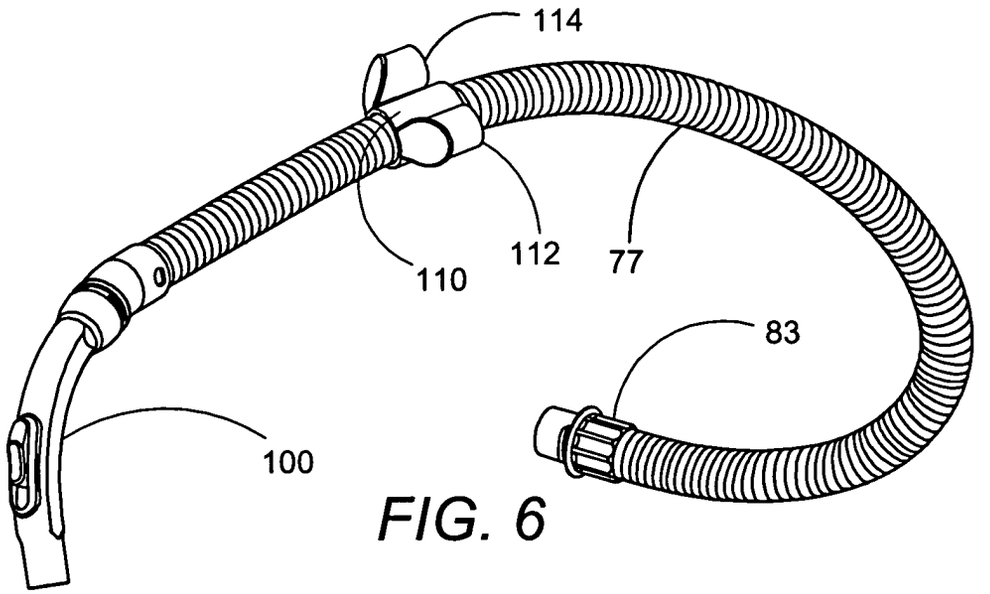


FIG. 6

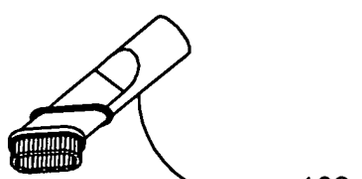


FIG. 10

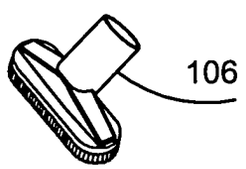


FIG. 9

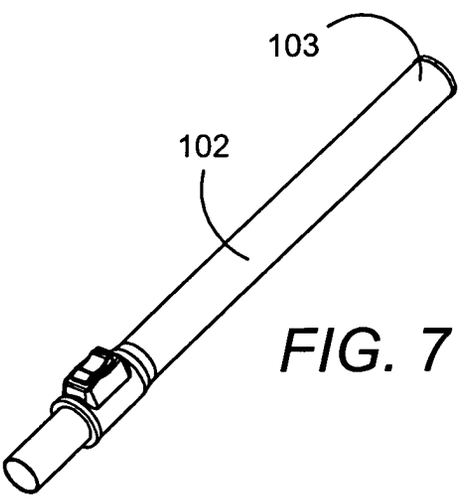


FIG. 7

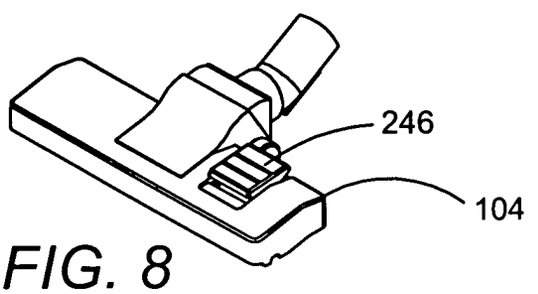


FIG. 8

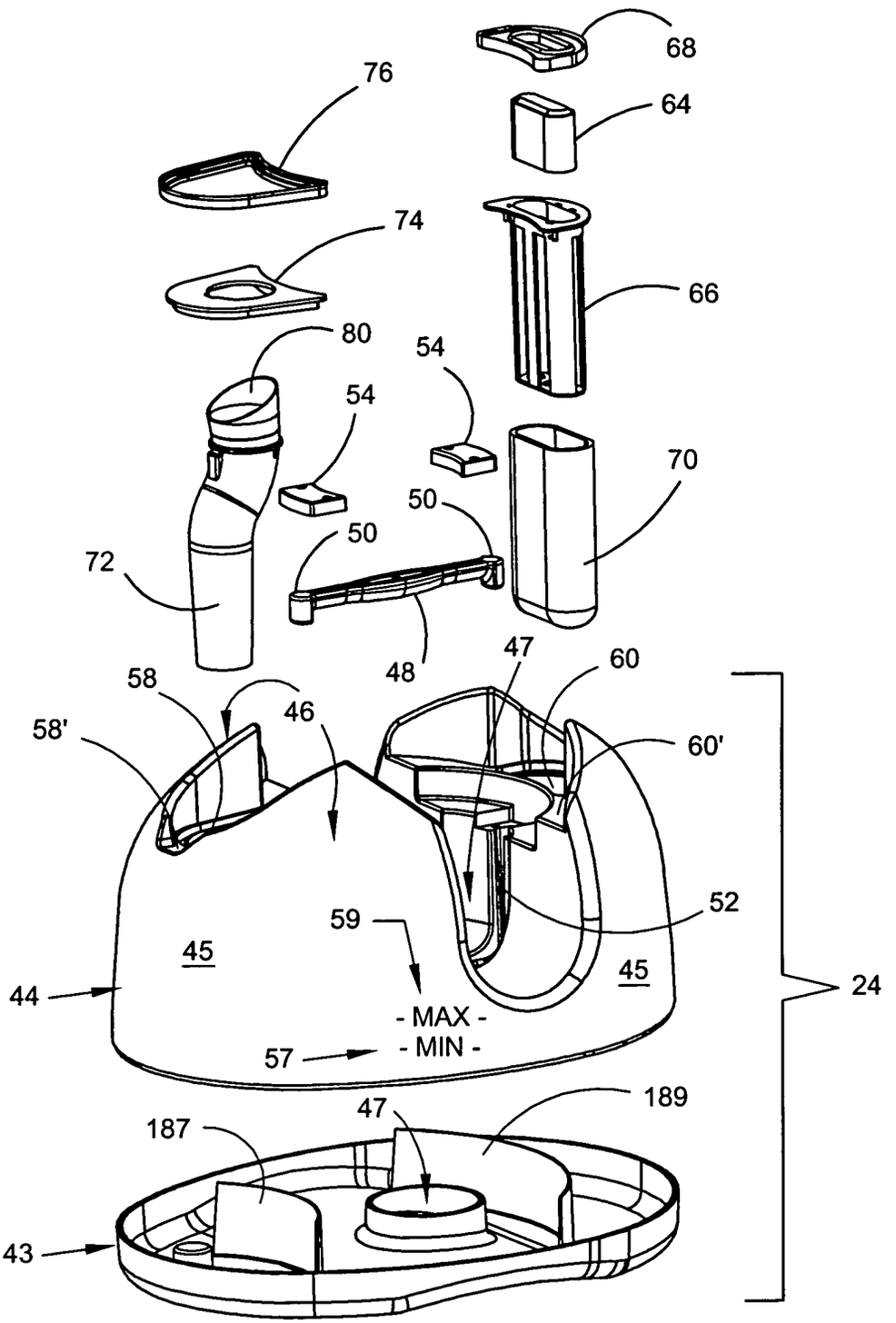

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FIG. 11A

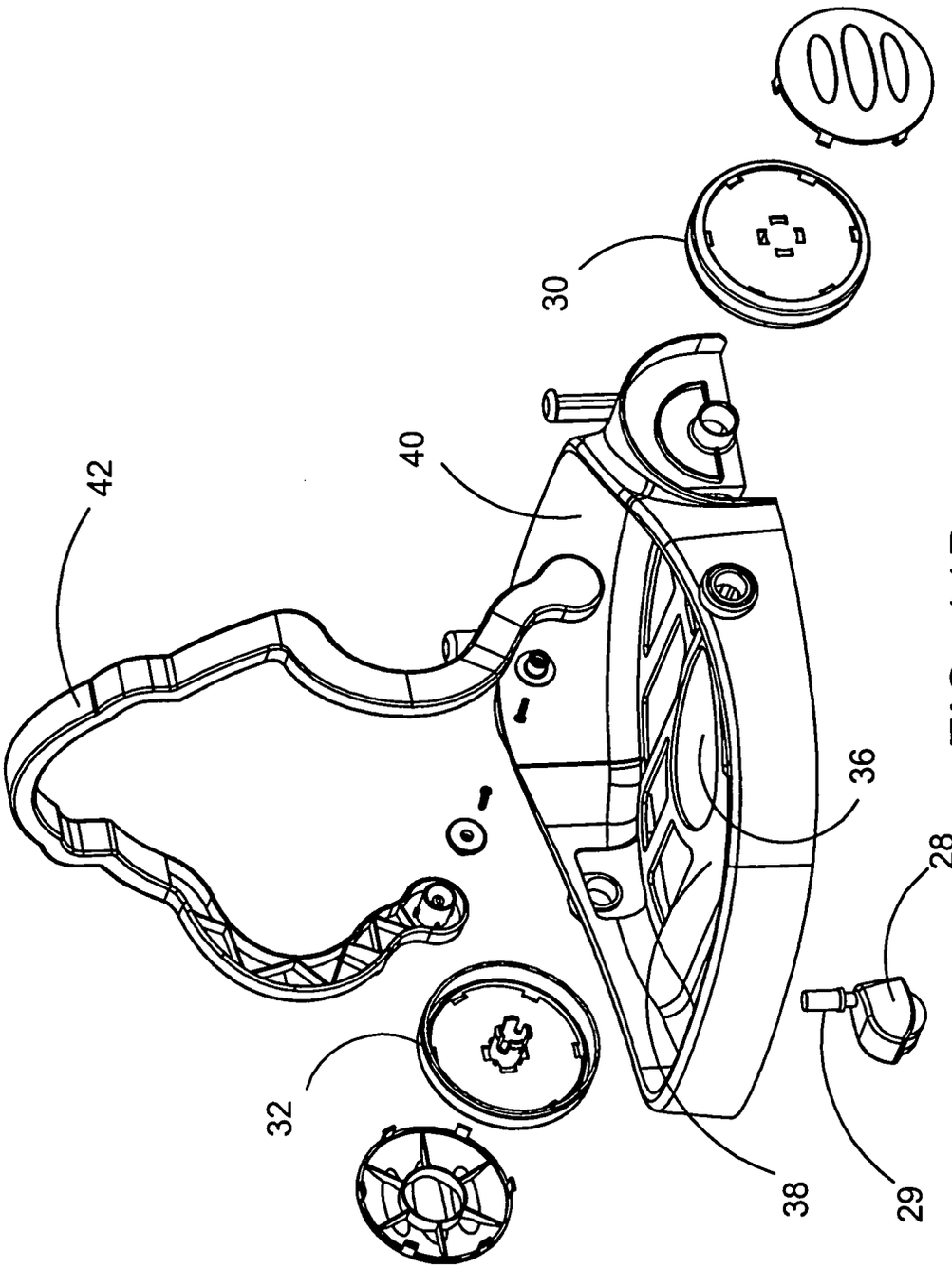

FIG. 11B

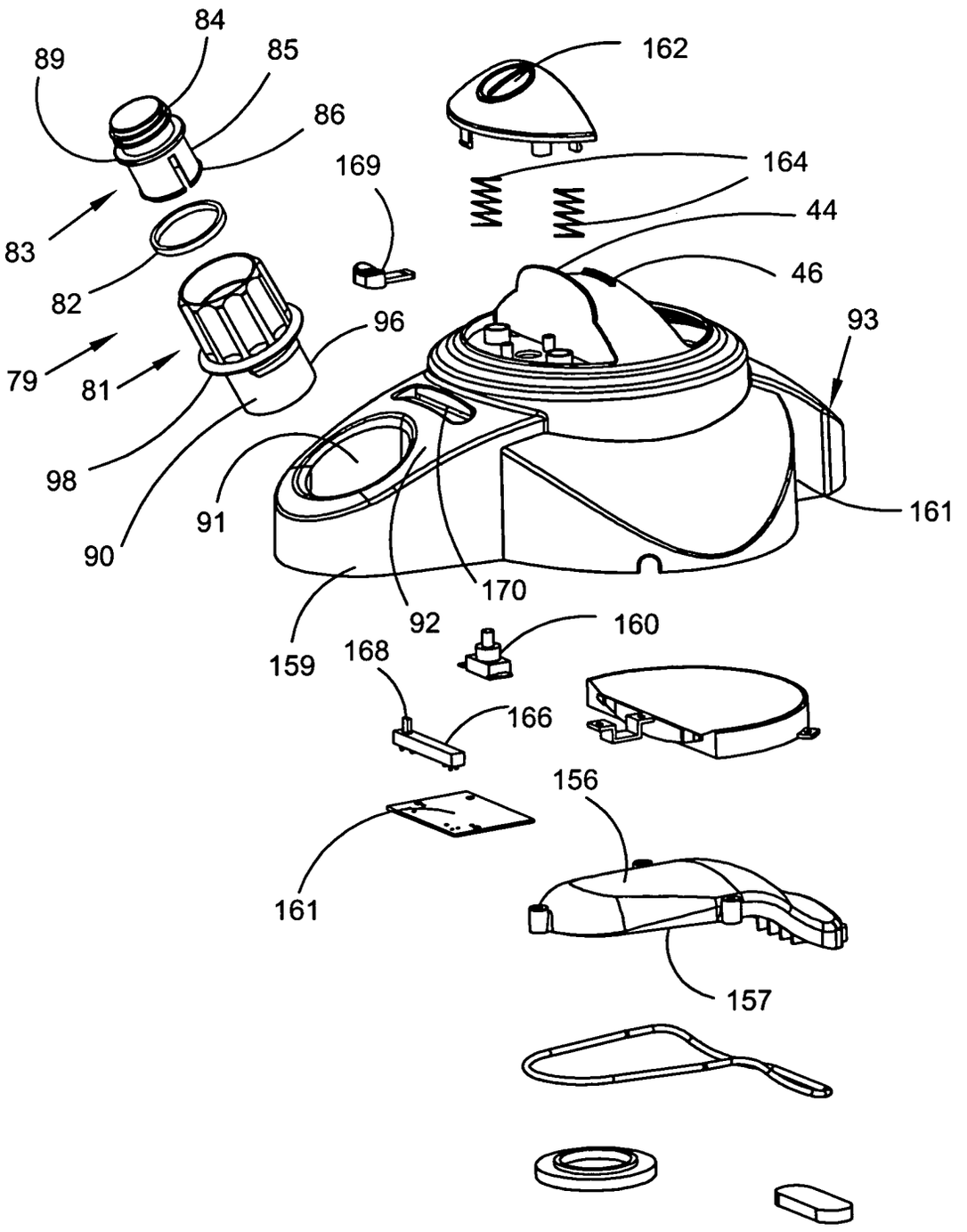
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FIG. 11C

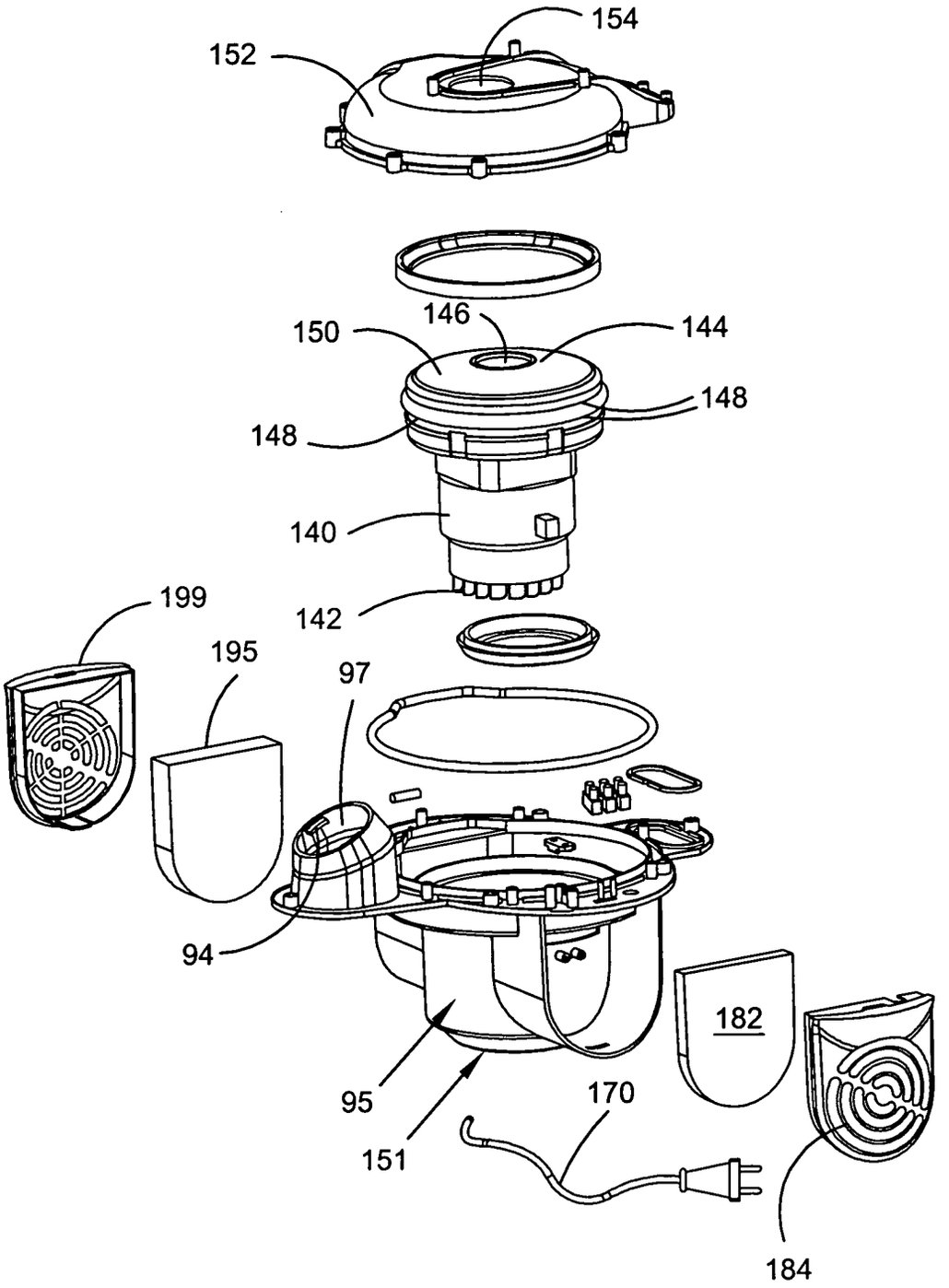
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FIG. 11D

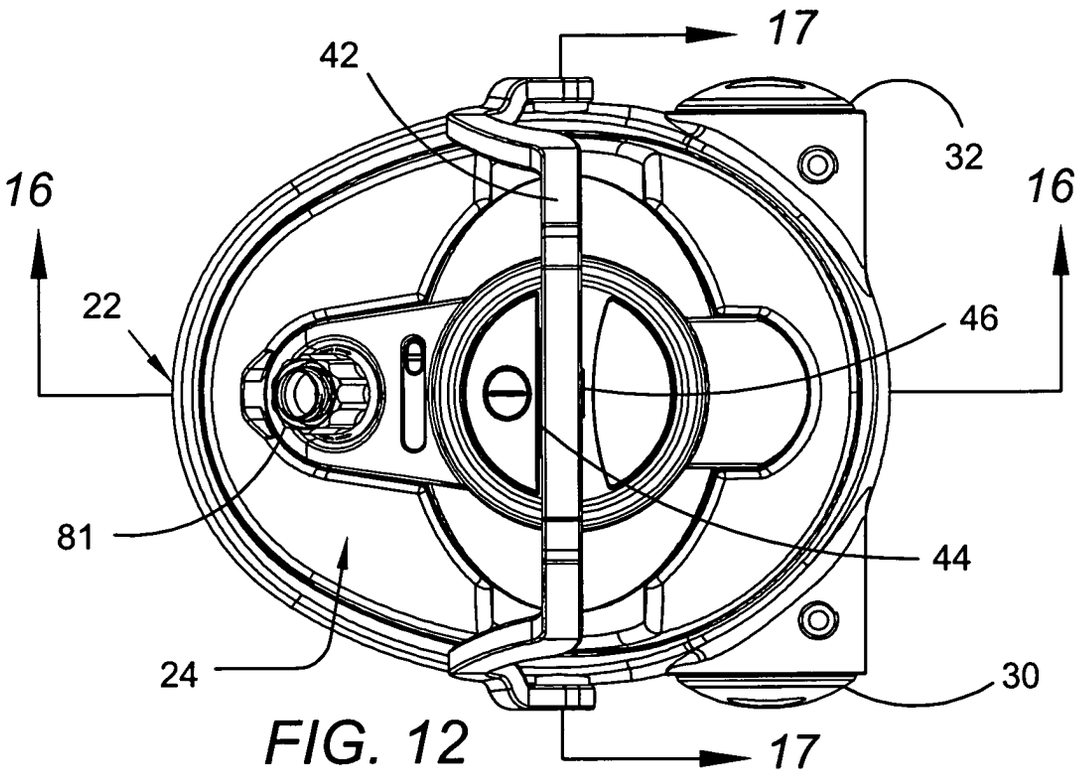

FIG. 12

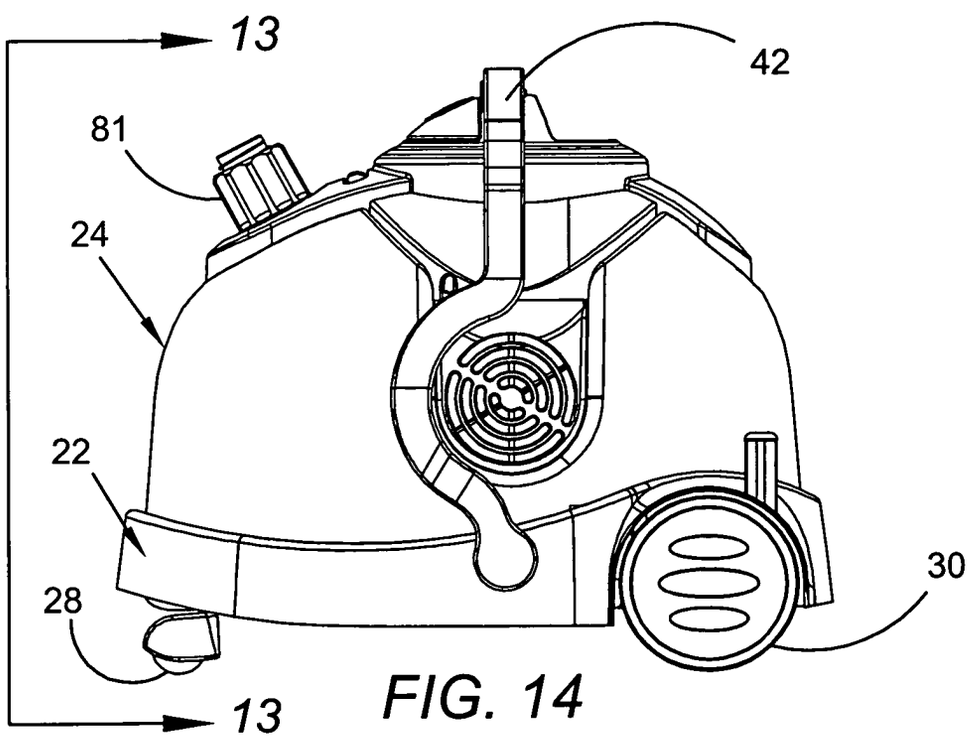

FIG. 14

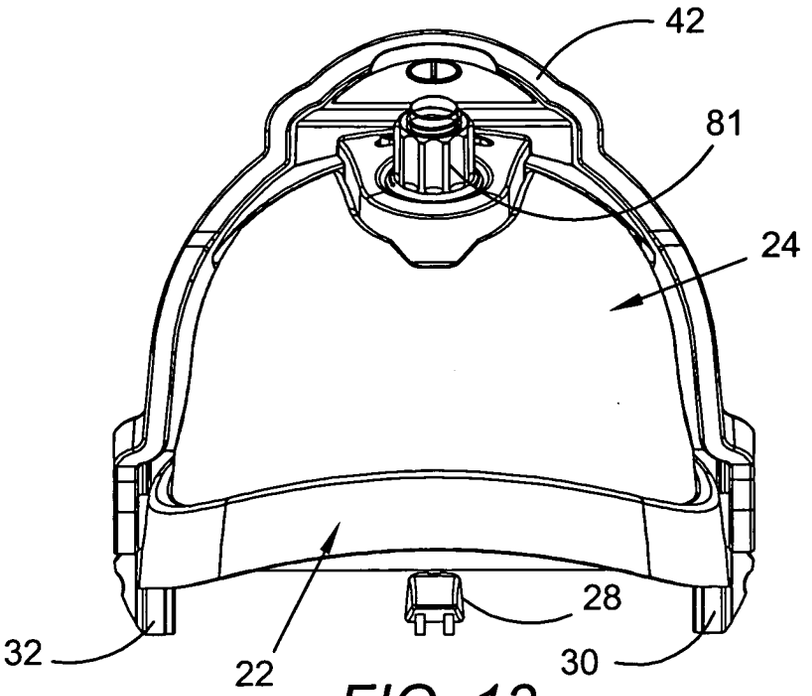
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FIG. 13

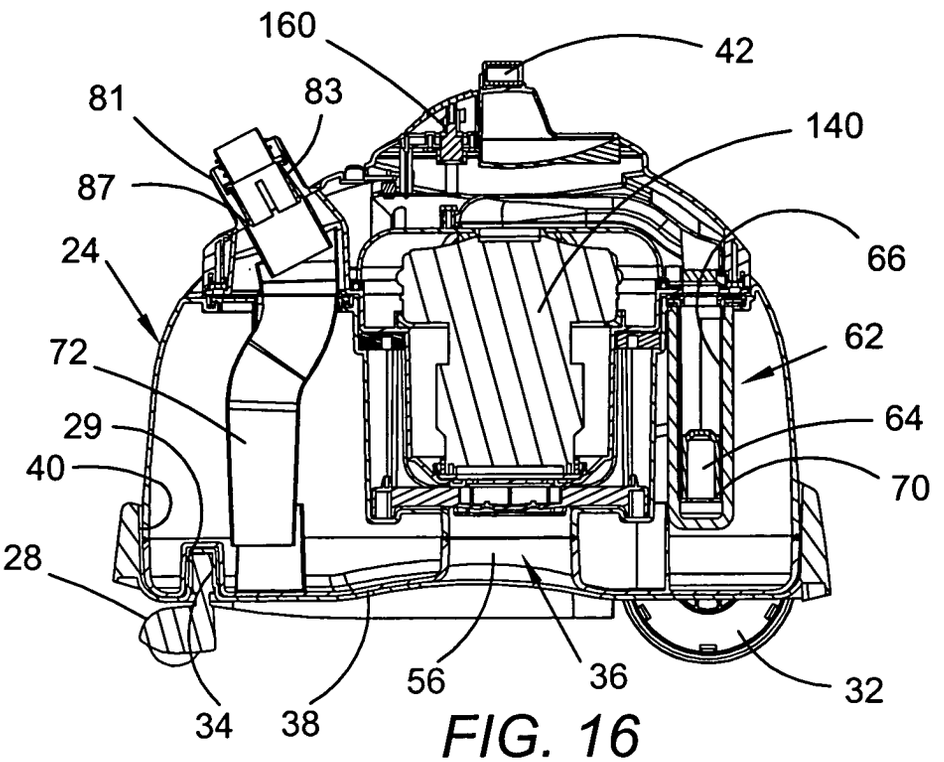
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FIG. 16

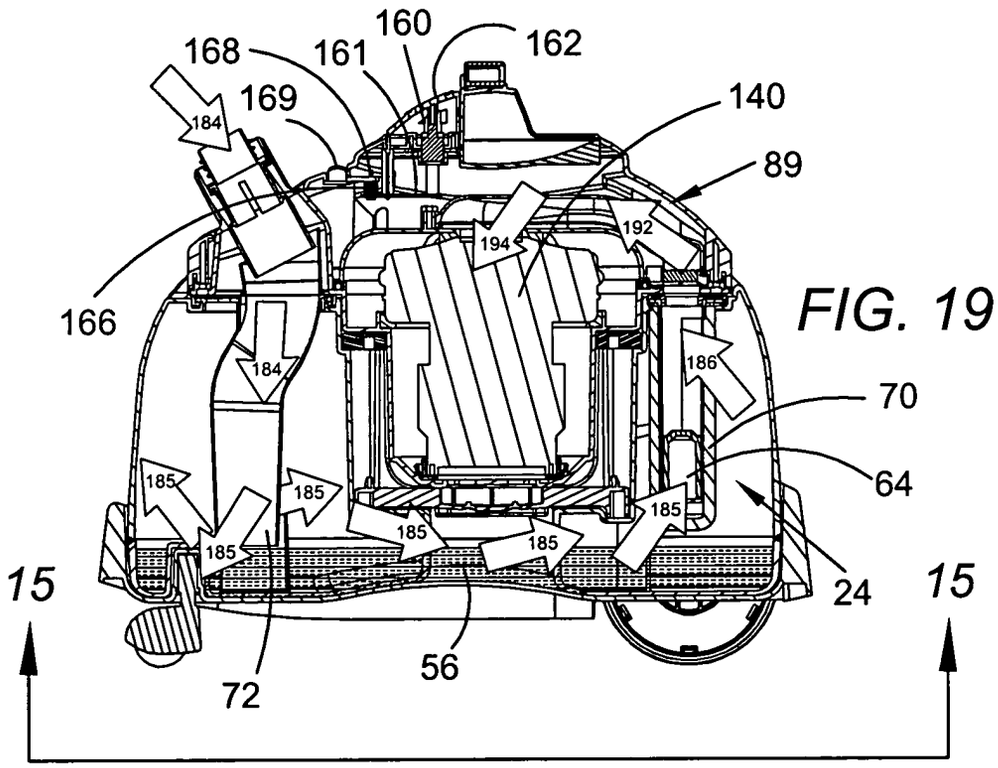
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FIG. 19

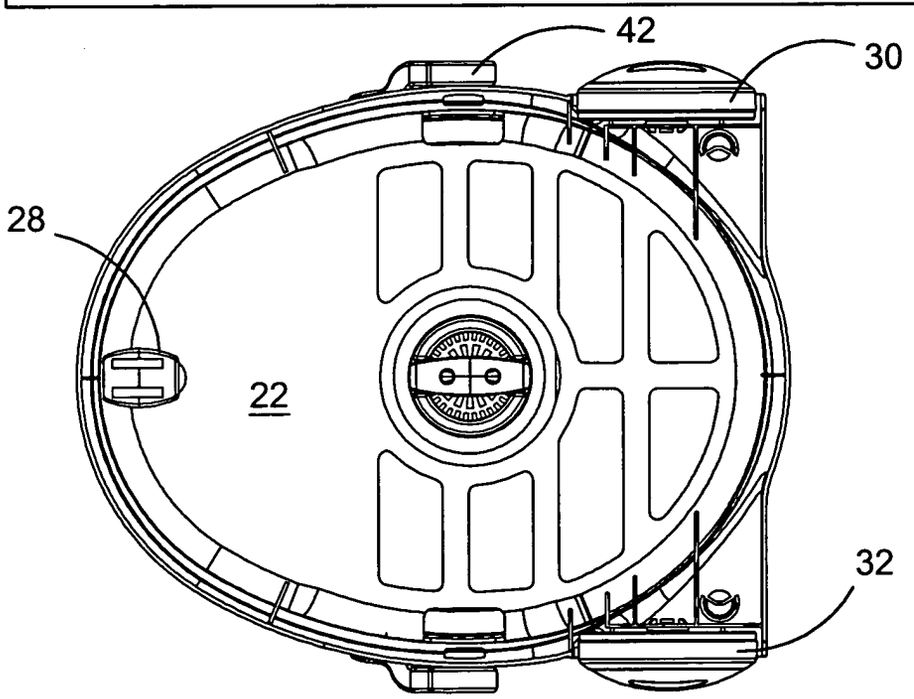
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FIG. 15

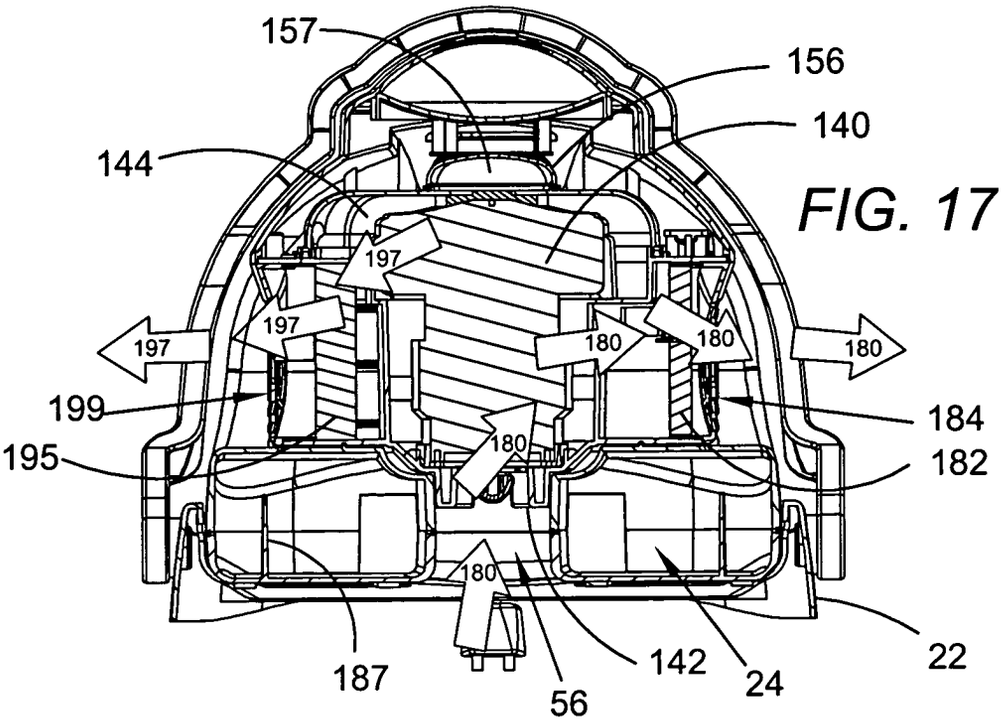
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FIG. 17

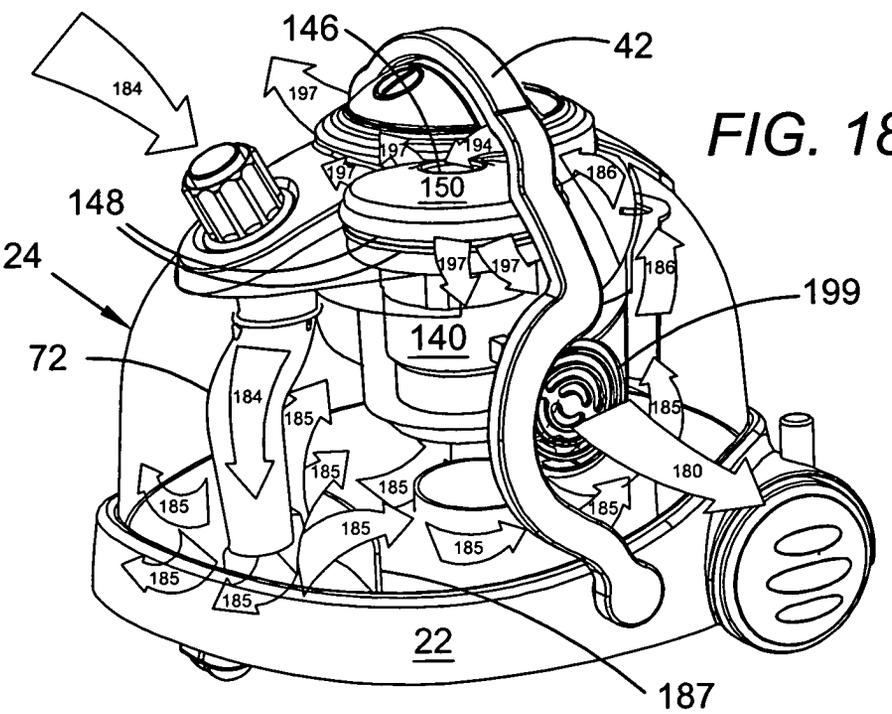
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FIG. 18

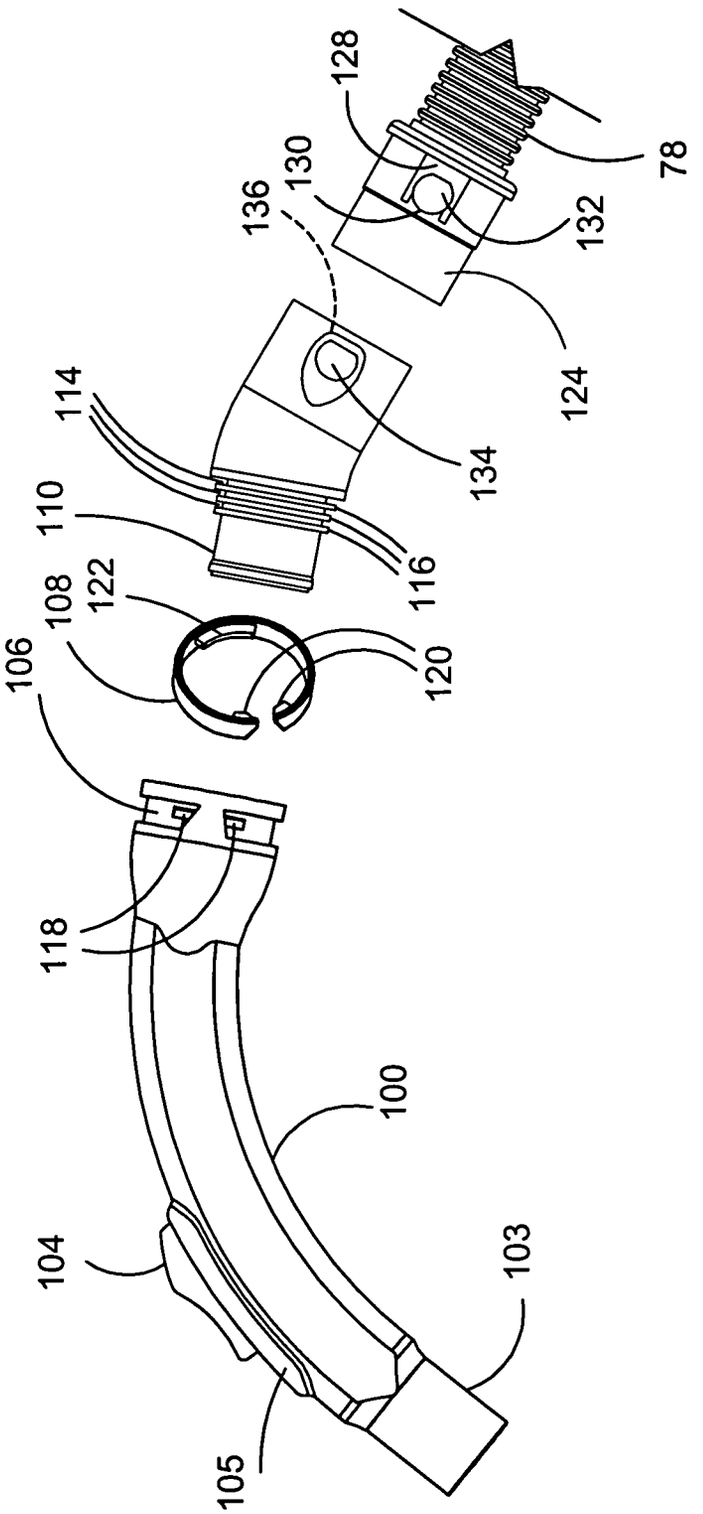
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FIG. 20

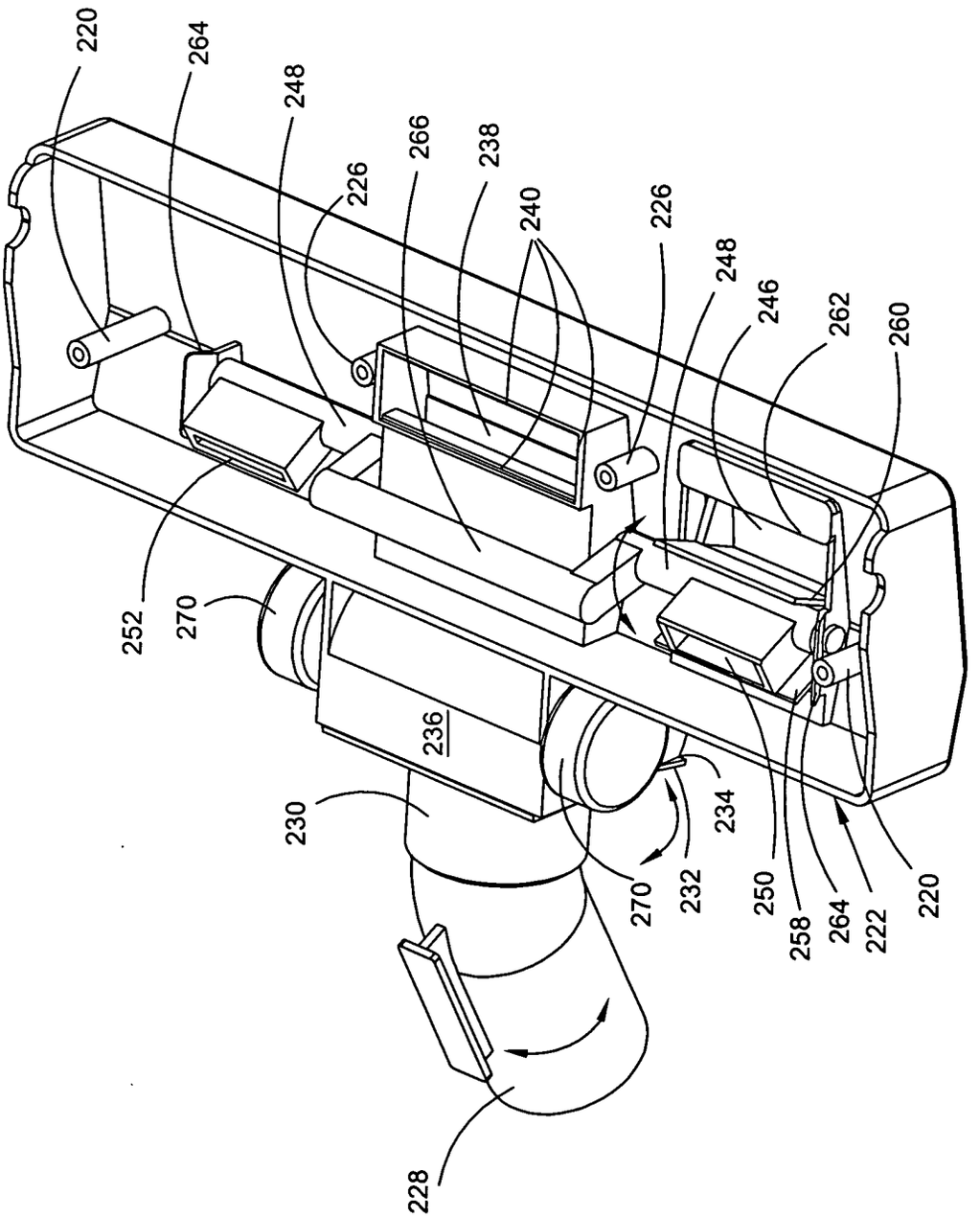
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FIG. 21A

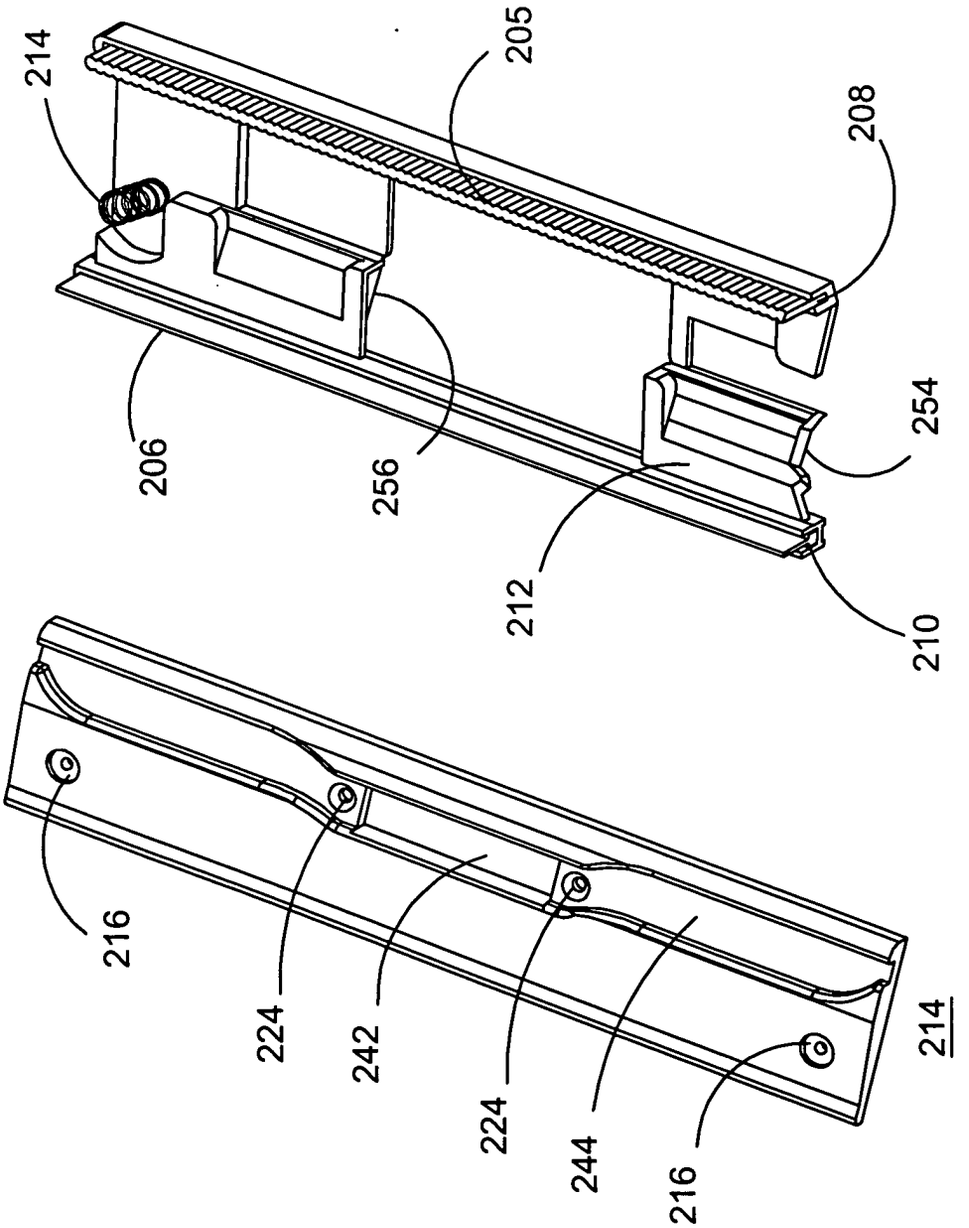

FIG. 21B