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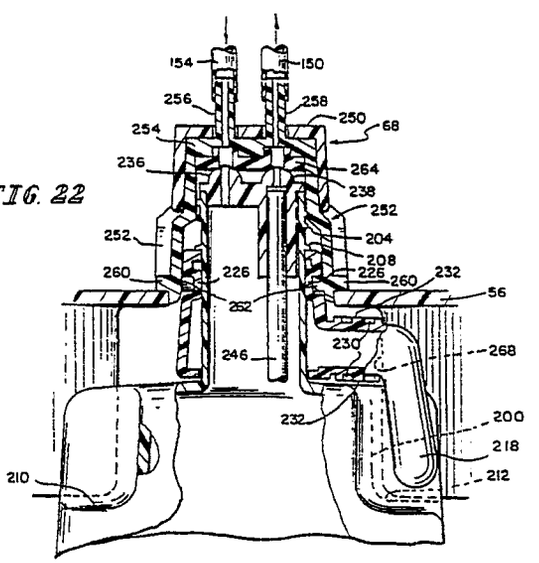
(54) Cleaning machine with removable container for dispensing cleaning fluid.

(57) The container has indentures 210 and 212 in its front surface and on its rear surface there are corresponding indentures which engage with abutments 268 of a docking port 68. An insert in the top of the bottle neck has a pair of nozzles 236 and 238 therein. Nozzle 236 is an inlet for compressed air supplied through tube 154 while nozzle 238 is connected to a tube 246 extending to the bottom of the container and forms an outlet for cleaning fluid to conduit 150.

A collar rotatable on the bottle neck by movement of an integral handle 218 between indentures 210 and 212 has a pair of cam grooves 226 into which lugs 262 are engaged so that the container is moved axially to engage nozzles 236 and 238 through sealing disc 264 with nipples 256 and 258 of a V-shaped clip 254 which fits within the docking housing 250, is located by projections 260 and carries the lugs 262.

FIG. 22



EP 0 404 279 A2

MACHINE FOR CLEANING SURFACES SUCH AS CARPETS, FLOORS AND THE LIKE

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to cleaning devices and more particularly to an improved machine for the cleaning of surfaces such as carpets, floors and the like.

In carpet cleaning machines, a liquid is projected onto the carpet and the dirty liquid is removed by a suction nozzle. An air-liquid separator is generally provided to remove air from the dirty, waste liquid and disperse the air into the atmosphere. Cleaning fluid may be added to the liquid. Usually the liquids trickle into a spray nozzle since they are above the spray nozzle. The liquids may be mixed in a mixing manifold. A typical example of such carpet cleaners is illustrated in U.S. Patent 2,986,764 issued June 6, 1961 to D. C. Krammes. Other systems use various arrangements of tanks, valves and controls to carry out carpet cleaning operations. In spite of all of these efforts directed to the cleaning of floors and carpets, there has not, heretofore, been provided a machine adapted for domestic use which provides effective cleaning of surfaces such as carpets, floors and the like, which is simple to use and sufficiently low in cost to be attractive to domestic users.

Accordingly, it is the object of the present invention to provide an improved machine for cleaning surfaces such as carpets, floors and the like which can be manufactured and sold at low cost and which, nevertheless, is both simple to use and effective in operation.

The objects and advantages of the invention are obtained in a machine having improved arrangements of containers for cleaning fluids, such as shampoos and concentrated cleaning solutions, fresh liquids, such as clean water and for the reception of waste liquids. The machine has a nozzle for projecting the liquids onto the surface to be cleaned and for picking up the waste liquid from the surface. Both the separation of waste liquid and air and the delivery of the liquids is conjointly carried out with suction and air pressure generated in a housing to which a common air pump is connected. The machine is further improved by facilities for removably attaching the containers to the frame of the machine and for the controlled and selective application of the liquids with different concentrations of cleaning liquid and fresh liquid.

Briefly described, a machine in accordance with the invention for cleaning surfaces such as carpets, floors and the like has a frame. An air pump is mounted on the frame. A housing communicating with the pump has a suction inlet and pressurized air outlets. A suction nozzle is mounted on the frame at the end of the frame which is disposed adjacent to the surface to be cleaned. A liquid projecting nozzle is also mounted on the frame at the end adjacent to the surface to be cleaned. A plurality of containers for concentrated cleaning liquid, fresh and waste liquid are utilized. The containers are removably mounted to the frame and the housing with a conduit connecting the housing and the waste liquid container to communicate waste liquid separated from air and liquid transported into the housing to the waste liquid container. A conduit for air and waste liquid from the suction nozzle is connected to the suction inlet of the housing. A coupling between the pressurized air outlets, the cleaning fluid container and the fresh liquid container provide for the pressurization thereof. A further coupling is connected to the outlets from the fresh liquid and cleaning liquid containers, in which coupling the fresh and cleaning liquids flow together to an outlet to the liquid projection nozzle so as to apply the fresh and cleaning liquids to the surface. This coupling utilizes simplified mixing and valving to control the flow of the liquid to the liquid projecting nozzle and to provide selected concentrations of the cleaning liquid and the fresh liquid.

Other features and advantages of the invention are provided by the arrangements used for assembling the containers, for providing the pressurized air and suction, and for separating waste liquid picked up from the surface to be cleaned from the air, the container for the cleaning liquid which is adapted to be readily attached and removed from the housing of the machine and the liquid projection and spray nozzles themselves.

The foregoing and other objects, features and advantages of the invention, as well as the presently preferred embodiment thereof will become more apparent from a reading of the following detailed description in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective of a cleaning device incorporating the principles of the present invention.

Figure 2 is a side view of the cleaning device of Figure 1.

Figure 3 is a partial cross-sectional view of

the cleaning device.

Figure 4 is a cross-sectional view of the spray nozzle incorporating the principles of the present invention.

Figure 5 is a plan view of a control switch and mixer in its initial closed position incorporating the principles of the present invention.

Figure 6 is a cross-sectional view taken along lines 6-6 of Figure 5.

Figure 7 is a plan view of the control switch and mixer in its spotting position.

Figure 8 is a cross-sectional view taken along lines 8-8 of Figure 7.

Figure 9 is a cross-sectional view of the trigger and spotting actuator assembly incorporating the principles of the present invention.

Figure 10 is a top view of a portion of the water tank and separator assembly.

Figure 11 is a combined cross-sectional view taken along lines 11-11 of Figure 10 and a fluid schematic of the fluid system incorporating the principles of the present invention.

Figure 18 is a side view of a cleaning fluid cartridge incorporating the principles of the present invention.

Figure 19 is a top view taken along lines 19-19 of Figure 18.

Figure 20 is a cross-sectional view taken along lines 20-20 of Figure 18.

Figure 21 is a perspective of a collar incorporating the principles of the present invention.

Figure 22 is a cross-sectional view of the cartridge and docking port incorporating the principles of the present invention.

Figure 23 is a cross-sectional view of the suction nozzle taken along lines 23-23 of Figure 24.

Figure 24 is a perspective view of the suction nozzle.

DETAILED DESCRIPTION

A cleaning device according to the present invention is illustrated in Figures 1, 2 and 3 as including a frame 30 to which are mounted a pair of wheels 32 by strut 34. As illustrated in Figure 2, the wheels are in their operable position allowing the cleaning device to move across the surface to be cleaned. For the stored position, the wheels are rotated forward or counter-clockwise in Figure 2 and comes to rest below the front end of the frame 30. Extending from the top end of the frame 30 is a handle 36 having fluid activation trigger 38 and a spotter actuator 40. Mounted to the front end of the frame is a spray nozzle 42 for projected cleaning fluid mixtures onto the surface to be cleaned and a suction nozzle 46 mounted to pipe 44 for removing fluids from the surface to be cleaned.

A water tank 48 and waste fluid or return tank 50 are connected as a single unit including a handle 52. The tanks are removably mounted to the frame 30 and are secured thereto by a cam latch 54 engaging the bottom of the waste fluid tank 50. An upper housing 56 mounted to frame 30 above the tank unit includes an air fluid separator 58, a motor 60 and a pump or fan 62 as illustrated in Figure 3. An opening 57 is provided in the upper housing 56 to view the fluid in the separator 58 which has a transparent body. An electrical switch 63 activates the motor 60 and an electric cord 65 provides power.

A container or cartridge of detergent, shampoo or other concentrated cleaning fluid 64 including a collar 66 is mounted to docking port 68 in the upper housing 56 as illustrated in Figure 2. The cleaning fluid is mixed with water from the water tank and projected through spray nozzle 42.

Initially, the water tank 48 is filled with fluid and mounted to the frame 30 and securely held thereto by cam latch 54. A concentrated cleaning fluid cartridge 64 is mounted into docking port 68. Now the system is ready for operation. As will be explained more fully below, the cleaning device operates by activating the motor 63 to turn on the motor to operate the fan and pump 62 to create a force to project a mixture of cleaning fluid and water out of spray nozzle 42 on the surface as well as to create a suction to draw fluid through suction nozzle 46. With the trigger 38 in its normal position, no fluid is dispensed. Upon depressing trigger 38, the amount of fluid projected from spray nozzle 42 can be controlled. If a stubborn stain or especially dirty surface is to be cleaned, the spotting actuator 40 is operated to increase the mixing ratio of detergent to water. The dirty or waste fluid from suction nozzle 46 is provided to separator 58 wherein the air is separated from the dirty fluid which is provided to waste fluid tank 50. The air is provided back through the fan/pump 62 to be reintroduced to the spray nozzle 42. Once the cleaning is done, the tank assembly is removed by releasing cam latch 54 and the contents of the waste fluid tank 50 are emptied. This cycle of operation may be repeated.

The spray nozzle 42, which is illustrated in detail in Figure 4, is an air venturi system which draws a cleaning fluid mixture and projects it onto the cleaning surface. Spray nozzle 42 includes an air manifold having two complementary pieces 70 and 72 joined along a line or plane 74 (see Figure 2). As illustrated in detail in Figure 4 with the top air manifold 72 removed, the nozzle of the air manifold is generally fan-shaped having a plurality of nozzle channels 76 extending therethrough. Unitary to the air manifold is an inlet tube or conduit 78 connected to a source of pressurized air or the

output of the fan 62. Mounted interior the air manifold is a fluid manifold 80 having a plurality of fingers 82 extending therefrom and lying in the nozzle channels 76. Supports 84 and 85, which are integral with the air manifold elements 70 and 72, position the fluid manifold 80 and its fingers 82 central within the air manifold and supports 84 and the nozzle channels 76. The fluid manifold 80 includes an inlet 86 extending through the back wall of the air manifold and is connected by tubing 88 to the source of a cleaning fluid mixture.

Air introduced into conduit 78 moves through the air manifold around the liquid manifold 80 and fingers 82 and exit nozzle channels 76. The restriction of the air through the nozzle channels creates a venturi effect so as to draw or educe cleaning fluid mixture from the fingers 82 to be forceably ejected onto a surface to be cleaned. Although the system has been designed to operate on a pure eduction principle, it is preferred that the source of cleaning fluid mixture be pressurized so as to maintain an even flow of cleaning mixture fluid to the spray nozzle 42. Since the principle force to draw the cleaning fluid mixture is the venturi effect produced by the air manifold, the pressure provided to the cleaning fluid source is substantially smaller than that provided to the air manifold.

The cleaning fluid mixture provided to the spray nozzle 42 by tubing 88 is from a control switch and mixer illustrated specifically in Figures 5-8 and operated by the trigger actuator 40 and the spotting actuator 38 illustrated in detail in Figure 9. A mixing V or connector 90 which is mounted to the frame 30 has a mixing outlet connected to tube 88, a water inlet connected to tube 92 and a cleaning fluid inlet connected to tubing 94. The water from tube 92 and the cleaning fluid from tube 94 are mixed in the V 90 and provided to outlet tube 88. Engaging one side of the outlet tube 88 is an anvil 96 and adjacent one side of the water inlet tube 92 is an anvil 98. Pivotally connected to the frame 30 at 100 is a rocker arm 102 having hammers 104 and 106 respectively on opposite sides of the pivot 100. A biasing means or spring 108 is received in a spring housing 110 on the frame 30 and engages the rocker arm 102 around post 112. The biasing means or spring 108 biases the rocker arm 102 counter-clockwise in Figure 5. A slot 114 in the rocker arm 102 receives a control link or wire 116 connected to the spotter actuator 40 and the trigger 38.

Without operation of the trigger 38 or spotting actuator 40, spring 108 rotates the rocker arm 102 to its initial position illustrated in Figure 5 such that hammer 104 is pressed against anvil 96 completely restricting the tubing 88 at the outlet of the mixer 90. This is illustrated specifically in the cross-section of Figure 6. In this position, no cleaning fluid mixture is provided to the spray nozzle 42. Thus, if the electric motor is actuated, only air is blown onto the surface to be cleaned. This could produce an air drying if desired.

With movement of the control wire 116 to the right, the rocker arm 102 rotates counter-clockwise moving the hammer 104 away from the anvil 96 so as to begin to open the closed outlet tube 88. Dependent upon the amount of motion of wire 116 and pivotal rotation of rocker arm 102, the flow rate of cleaning fluid mixture can be controlled. The rocker arm 102 can be rotated to a position allowing unrestricted flow of the outlet tube 88 as well as unrestricted flow from water inlet tubing 92.

Further rightward motion of wire 116 and counter-clockwise rotation of rocker arm 102 causes hammer 106 to engage the water inlet tube 92 and being restricting its flow into the mixing V 90. The degree of restriction of water inlet 92 permitted is defined by a stop 118 and is illustrated in Figures 7 and 8. This restricted position of water inlet tube 92 defines a specific ratio of concentrated cleaning fluid from tube 94 and water from tube 92 to remove stubborn stains or spots and is known as the spotting position.

Thus, it can be seen that the rocker arm 102 sequentially operates from a first position illustrated in Figure 5 wherein the outlet is restricted by anvil 96 and hammer 104 for zero flow rate through a first plurality of intermediate angular positions having intermediate restrictions of the outlet to define various flow rates and a second plurality of intermediate angular positions having intermediate restrictions of the water inlet 92 provided by anvil 98 and hammer 106 to define the mixing ratio. Thus, a single assembly is provided which controls both the flow rate of dispensing cleaning fluid mixture as well as the mixing ratio of cleaning fluid to water. If required, the rocker arm can be reshaped such that hammer 106 will begin to restrict water inlet tube 92 while hammer 104 also restricts outlet tube 88.

The operation of the rocker arm 102 is controlled via wire 116 by the spotting actuator 40 and trigger 38 illustrated in detail in Figure 9. The spotting actuator 40 is pivotally mounted to the handle 36 at 120 as is trigger 38. The control wire 116 is connected to post 122 on spotting actuator 40. Post 122 lies in a elongated slot 124 in the trigger 38. The spotting actuator 40 extends from the top of the handle while the trigger 38 extends from the bottom of the handle. This allows activation of either control with the same hand that holds and directs the cleaning device. The spotting actuator 40 may be controlled by the thumb and the trigger 38 by the other fingers which wrap about the handle 36.

Counter-clockwise rotation of trigger 38 as illustrated in Figure 9 from its initial position causes

counter-clockwise rotation of the spotting actuator 40 and moves the control wire 116 to the right. The trigger 38 is designed such that the total amount of angular motion which it is capable of travelling is limited to produce via control wire 116 rotation of the rocker arm 102 from the fully restricted condition of outlet tube 88 of mixer 90 to the completely unrestricted condition of outlet tube 88 and no restriction of the water inlet tube 92. The restriction of water inlet tube 92 by hammer 106 is produced by the further motion by travel produced by spotting actuator 40. The counter-clockwise rotation of spotter actuator 40 moves the wire 116 further to the right without further motion of trigger 38 since post 122 moves in slot 124. It should also be noted that spotter actuator 40 may be operated independent of trigger 38 because of the slot 124. The biasing means 108 of rocker arm 102 is sufficiently strong to clamp the outlet tubing 88 and retains the spotting actuator 38 and trigger 40 in their position illustrated in Figure 9 via wire 116.

The water line 92 and the cleaning fluid line 94 of the mixing V 90 are connected to the fluid circuit illustrated in Figure 11. A block 126 includes an air port 128 and a water port 130. An air inlet nipple 132 and a water outlet nipple 134 are provided in the top of water tank 48. A tube 136 extends down from the water outlet nipple 134 to the bottom of the water tank 48. The nipples 132 and 134 are received in ports 128 and 130 respectively of the block 126. As will be explained more fully below, the block 126 is mounted to the separator 58 to receive the nipples 132 and 134 during mounting of the tank assembly onto the frame as illustrated in Figure 10. A ball 138 in water port 130 acts as a check valve to prevent back flow into the water tank 48.

Connected to the other end of water port 130 is a first fitting 140 having a main outlet 142 connected to the mixing water inlet tube 92 and a restricted outlet 144. The axis of the inlet of fitting 140 is coincident with the axis of the restricted outlet 144 and is orthogonal to the main outlet 142 axis. The cross-sectional area of main outlet 142 is substantially larger than the cross-sectional area of restricted outlet 144. By way of example, the main outlet may have a cross-sectional area four times that of the restricted outlet.

Connected to the first fitting 140 about restricted outlet 144 is a second fitting 146. A primary cleaning fluid inlet 148 of fitting 146 is connected to the concentrated cleaning fluid container 64 by tube 150. The restricted outlet 144 provides a secondary inlet to the second fitting 146. The outlet 152 of the second fitting 146 is connected to cleaning fluid inlet pipe 94 of the mixer 90. The fan or pump 62 provides pressurized air via tubing 154 to an input of the concentrated cleaning fluid container 64 and by tubing 156 to water tank 48 via air port 128. The primary outlet of pump 62 is through conduit 158 to the air manifold of spray nozzle 142.

When the outlet tubing 88 of mixer 90 is totally restricted, no fluid is flowing in the circuitry of Figure 11. Once the restriction of outlet tubing 88 is removed, water under pressure leaves the tank 48 through tubing 136, nipple 134 and port 132 to raise check valve 138 and the flow through main outlet 142 and tubing 92 to the mixing valve 90. Similarly, concentrated cleaning fluid from container 64 flows via conduit 150 and fitting 146 to tubing 94 and mixer 90. In this state, very little water, if any, exits the restricted outlet 144 from the first fitting 140 into the second fitting 146. For spotting or any other condition wherein the water inlet tubing 92 is restricted, the flow in main outlet 142 of fitting 140 is reduced and therefore the flow in restricted outlet 144 is increased. Although this flow introduces water into the concentrated cleaning fluid, it does not dilute it compared to the unrestricted waterline flow mixture. It also increases the pressure in tubing 94. This allows for greater flow rate of the concentrated cleaning fluid into the mixer 90 and thus the resulting cleaning fluid mixture exiting the mixer 90 has a substantially increased ratio of cleaning fluid to water.

As can be seen from the circuit of Figure 11, the water and the cleaning fluid supply of the system are pressurized. This produces even control of the fluids such that their mixing ratio and flow rate can be assured. The system also takes advantage of the natural siphoning effect which results from the venturi spray nozzle 42.

Realizing this, the pressure provided by pump 62 via tubing 154 and 156 to the concentrated fluid supply and the water supply respectively is small compared to the overall air pressure provided via conduit 158 to the venturi spray nozzle 42. Although the pressure supply via tubing 154 and 156 is small, it is very important that it be constant to maintain the desired mixing ratio and flow rates. It should also be noted that by providing the water outlet on the top of tank 48 and the secondary passage 144 of fitting 140 being vertical, the force of gravity helps to further reduce the amount of fluid flowing through restrictive passage 144 into the concentrated cleaning fluid fitting 146.

The unique cartridge 64 including collar 66 is illustrated in Figures 18-21. The cartridge 64 includes a non-circular body 200 having a neck 202 extending therefrom. Threaded portions 204 on neck 202 receives cap 206. A circumferential ridge 208 on neck 202 retains the collar 66 between the top of the cartridge and the ridge 208 such that the collar may rotate relative to the cartridge 64 without any axial motion between the collar and cartridge. The sides of the cartridge adjacent the top includes

four indentures 210, 212, 214 and 216. Indentures 210 and 212 receive a handle 218 extending from collar 66 to define two distinct positions of the collar relative to the body. As will be explained more fully below, when the handle 218 is in recess 210, the collar 66 is in its initial angular position capable of entering into the docking port 68 of the cleaning device. As the collar 66 is rotated counterclockwise in Figure 19, the handle will be received in recess 212 which will define a final locked angular position of the collar in the docking port. It should also be noted that the recess 210 allows the handle to be received substantially within the body 200 and therefore allows for easy packaging.

The collar 66 includes a pair of camming recesses 220 therein to receive a pair of tabs in the docking port of the cleaning device. Each recess 220 includes an entry slot 222 on the top of the collar connected respectively to a inclined portion 224 followed by a horizontal lock portion 226. A pair of lugs 260 (Figure 22) on the docking port 68 are received in entry slots 222 and the collar is rotated relative to the body causing the total assembly to move axially without rotation of the cartridge 64. The lugs 260 ride down the inclined portion 224 along portion 226 to lock the collar and cartridge in place in the docking port. The locking portion 226 prevents reverse rotation by vibration or use of the cleaning device. Since the cartridge is part of a pressure fluid system, it is important that the docking be firm and secure for proper operation of the cleaning device. Thus, alignment and airtight connection is critical. As illustrated in Figure 21, the collar 66 is formed of two portions connected by an integral lying hinge 228. The collar is wrapped around the neck 202 below ridge 208 with latch 232 locking on top of catch 230.

Indentures 214 and 216 receive shoulders or keys in the docking port to align and restrain the cartridge from rotating during axial insertion into the docking port by hand as well as by rotation of the collar 66.

Received in the top opening of the bottle neck 202 is an insert 234 having a pair of nozzles 236 and 238 thereon. As will be explained below, these nozzles are aligned with ports in the docking port with nozzle 236 being an air inlet and nozzle 238 being a fluid outlet. The insert 234 has a pair of circumferial ridges 240 which engage and seal the insert against the interior of the neck 202. As previously discussed, this is a positive pressure supply system and therefore this seal must be maintained. An axial keyway 242 is provided in the insert 234 and is received in key 244 running along the interior of the neck 202. This aligns the insert 234 and the nozzles 236 and 238 to the cartridge and consequently to the collar. This assures alignment of the nozzle and the appropriate inlet and outlet of the docking port. A tube 246 extends from the bottom of the body 200 to the fluid outlet nozzle 238.

The cartridge 64 in docking port 68 is illustrated in detail in Figure 22. The docking port is an assembly which includes a docking housing 250 mounted to the upper housing 56. A pair of opposed slots 252 are provided in the docking housing 250. A U-shaped clip 254 is inserted in the docking housing having a pair of nipples 256 and 258 extending through the housing 250 to receive air inlet conduit 154 from the outlet of the pump and cleaning fluid supply tubing 150 leading to the second fitting 146 (see Figure 11). The outer edges of the U-shaped clip 254 has tabs 260 which engage the bottom of the slots 252 in the docking housing to maintain the clip therein. Extending to the interior of the docking housing are a pair of lugs 262. These lugs form the complementary camming surfaces to be used with the camming recesses 220 in the collar 66. A molded rubber sealing disc 264 is received in the U-shaped clip 254.

By using a clip 254 to be inserted through the docking housing, it can be made of hard material capable of many insertions on the camming surface. For example, it may be made of Delrin plastic. This reduces the cost of the overall device by making the shaped clip of such expensive material instead of requiring the whole docking housing to be so made. The molded rubber seal 264 creates an airtight seal since it receives nozzles 236 and 238 on the container and deforms as the container is moved axially within the docking housing. A pair of shoulders 266 and 268 extend from the housing wall 56 and provide guides or key for indentures 214 and 216 of the cartridge.

As can be seen from Figures 2 and 22, the cartridge 64 lies in a chamber in the upper housing 56 with the neck portion 202 extending into a recess portion and the body 200 lying in a cavity portion of the chamber. The cavity encompasses at least three of the sides of the body.

A cartridge 64 of concentrated cleaning fluid may be mounted to the docking port 68 by aligning the indentures 214 and 216 of the cartridge with shoulders 266 and 268 of the housing, respectively. The collar 66 is placed in its initial or insertion position as defined by the handle 218 lying in indenture 210 of the body. The body and collar are moved axially until the lugs 262 of the docking port are received in entry slots 222 in the top of the collar. The collar 66 is then rotated by handle 218 accessible from the exterior of the cavity causing the body and collar to move axially during rotation of the collar. The indentures 214 and 216 engage the shoulders 266 and 268 to prevent the cartridge 64 from rotating. The collar is rotated to its final or

lock position defined by the handle 218 being received in indenture 212 on the body. In this position, orifices in nozzles 236 and 238 are aligned and received with apertures in the base of nipples 256 and 258. The insert 234 having a keyway assures alignment of the nozzles with the body and the camming recess 220 of the collar with tabs 262 assure initial alignment as well as indentures 214 and 216 of the body and shoulders 266 and 268 of the housing assure initial alignment of the body and nozzles during the axial movement of the body produced by rotation of the collar 66.

The suction nozzle 46 of the present invention as illustrated in Figures 23 and 24 is composed of a front-top piece 270 and a back-bottom piece 272 joined by appropriate fasteners. The nozzle includes a first or inlet passage 274 and a second or outlet passage 276. The inlet passage 274 is generally U-shaped along a cross-section transverse to the flow axis having a flat bight portion 278 and a pair of short leg portions 280. The front flat bight portion 278 has a substantially triangular configuration diminishing from the base or nozzle inlet 282 to its juncture 284 with the outlet passage 276. As can be seen from Figure 23, the distance of separation between the front and back portions of the walls of the front and bottom pieces 270 and 272, respectively increase from the base or inlet portion 282 to the juncture 284 between the inlet, first passage 274 and the outlet, second passage 276. This change of distance of separation compensates for the diminishing triangular portion of the front and back faces such that the cross-sectional area of the inlet passage 274 is substantially equal along the flow axis. This allows a uniform draw or suction throughout the inlet passage 278 and prevents fluid from hanging up and flowing back out the inlet 282.

The second passage or outlet passage 276 as illustrated in Figure 23 has a generally triangular cross-section along the flow axis such that its cross-sectional area, transfers to the flow axis, increases along the flow axis. A cylindrical connector portion 285 receives pipe 44 of the housing. The bottom wall 286 of the outlet passage extends diagonally across the connector inlet 284 (see Figure 3). Thus, the projected axis of the pipe 44 and outlet connector 285 intersects the first, inlet passage 278 below the juncture 284 of the inlet and outlet passages 274 and 276, respectively, and forms an oblique angle therewith. Thus, the outlet passage 276 forms a horizontal trough to collect fluid which will drip from the conduits between the nozzle 46 and the fluid separator 58 when the motor and suction system are deactivated. Thus, no fluid will exit the outlet 282 when the device is turned off.

In order for the user to determine the condition of the extracted fluid being drawn through nozzle inlet 282, at least the top wall 288 of the outlet section 276 should be transparent. The front, top and sides of the top piece of the nozzle 46 are transparent. This allows viewing of the fluid by the user during use. The operator cannot see the front wall of passage 274 since he generally stands behind the device during use. To further increase visibility of the fluid, the enlarged cross-sectional area of the trough 276 causes a pressure drop to slow down the fluid at the juncture or intersection 284. The bottom wall 286 maintains the fluid adjacent the top wall 288 for better vieweing. When this fluid is slowed down, the exact content and color can be more readily ascertained. It should also be noted that by providing the front or inlet passage 274 as U-shaped, the fluid from legs 280 on entering the outlet passage 276 intersect the primary flow from the bight portion 280 and create eddy currents at their junction. These eddy currents further slow down the fluid in the viewing area.

To further increase visibility, the back and bottom walls of the bottom piece 272 should be made of non-transparent material. Preferably, they should be white such that additional light may be provided from the back to illuminate the extracted fluids. It should be noted that the outside side walls are extended at 290 to provide a shield for the spray nozzle 42 to prevent water from being sprayed outside the suction nozzle 46.

From the preceding description of the preferred embodiments, it is evident that the objects of the invention are attained, and although the invention has been described and illustrated in detail, it is to be clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation. The spirit and scope of the invention are to be limited only by the terms of the appended claims.

Claims

1. Apparatus for use in a cleaning device comprising a container and a docking recess for the container, said container comprising a collar encompassing and rotatable thereabout, a cam surface on said collar for cooperating with a respective cam surface on said docking recess, and means on said collar and said container defining an initial entry angular position of said collar on said container and defining a final locked angular position of said collar on said container.

2. Apparatus for use in a cleaning device for assembling a container with said cleaning device, said apparatus characterized in that said cleaning device has a housing, a docking recess in said housing, a pair of spaced apertures in a base wall

of said docking recess, a container being receivable in said docking recess, said container having a pair of laterally spaced orifices with the same central spacing as said pair of apertures, and collar means mounted to said container and engaging said docking recess for aligning and axially advancing said container in said docking recess to mate said apertures and orifices when rotated without rotation of said container and for locking said container onto said housing.

3. The apparatus according to Claim 2 including a non-circular cross-section cavity extending from said docking recess, and said container having a non-circular cross-section at least in said cavity and being prevented from rotation by engaging the walls of said cavity.

4. The apparatus according to Claim 3 wherein said container includes a neck portion in said docking recess, and said collar means encompasses said neck and includes a handle extending therefrom and accessible from exterior said cavity.

5. The apparatus according to Claim 4 wherein said cavity encompasses three lateral walls of said container and exposes a portion of a fourth lateral wall and a portion of said collar means, and wherein said collar means includes a portion in said docking recess and a portion in said cavity and said handle extends from said collar means cavity portion.

6. The apparatus according to Claim 2 wherein said docking recess includes at least one radially extending lug, and said collar means includes a circumferential camming recess to receive said lug and axially advance said container when said collar means is rotated.

7. The apparatus according to Claim 6 wherein a pair of said lugs extend from said recess, said camming recess includes two camming recesses, one for each lug.

8. The apparatus according to Claim 6 wherein said camming recess includes at least one entry slot at the top of said collar means to receive said lug.

9. The apparatus according to Claim 8 wherein said camming recess includes an incline portion extending from the entry slot to produce the axial motion upon rotation of said collar means.

10. The apparatus according to Claim 9 wherein said camming recess includes at least one level portion extending from a respective incline portion to produce said locking.

11. The apparatus according to Claim 6 wherein said lug is made of a material different from said docking recess and is mounted therein.

12. The apparatus according to Claim 2 whrein said collar means includes a handle extending therefrom and accessible from exterior said docking recess.

13. The apparatus according to Claim 10 wherein said handle and said container are shaped so that said handle engages said container in an entry angular position and in a locked angular position.

14. The apparatus according to Claim 2 wherein said orifices are each on a respective nozzle extending above said container neck, said nozzles extending into a respective aperture.

15. The apparatus according to Claim 14 wherein said apertures are in a deformable seal layer between said body and said nozzles.

16. The invention according to Claim 2 wherein said recess includes at least one longitudinal key and said container includes a longitudinal keyway for aligning and limiting rotation of said container in said docking recess.

17. A container mountable to a cleaning device comprising:
a body;
a pair of laterally spaced orifices;
a collar encompassing and rotatable about a portion of said body;
a cam surface on said collar for cooperating with a respective cam surface of said device; and
means on said collar and said body defining an initial entry angular position of said collar on said body and defining a final locked angular position of said collar on said body.

18. A container according to Claim 17 wherein said body includes a neck portion, said collar encompasses said neck and said orifices are on the top of said neck.

19. A container according to Claim 18 wherein said neck includes a circumferential ridge for engaging said collar and preventing axial motion of said collar relative to said body.

20. A container according to Claim 18 including a cap threadably mounted to said neck and covering said orifices.

21. A contianer according to Claim 18 wherein said neck includes an interior key and said orifices are in a lid mounted in said neck and having a keyway aligned with said key.

22. A container according to Claim 21 wherein said orifices are in a pair of nozzles extending from said lid.

23. A container according to Claim 17 wherein said cam surface on said collar is a circumferential camming recess having a pair of entry slots in the top of said collar.

24. A container according to Claim 23 wherein said camming recess includes a pair of inclined portions extending from a respective slot and a pair of level portions extending from a respective inclined position.

25. A container according to Claim 17 wherein said defining means includes a handle extending

from said collar and engaging said body at a first point to said entry position and at a second point to define said locked position.

26. A container according to Claim 25 wherein said collar and handle are unitary and include two halves connected at a first end by a hinge and at a second end by a latch.

27. A container according to Claim 25 wherein said body includes a pair of indentures, one at each of said points for receiving said handle.

28. A container according to Claim 27 wherein said indentures have a depth sufficient to receive a substantial portion of said handle.

29. A container according to Claim 17 including a pair of spaced keyways in a back wall of said body and extending down from the top wall for receiving alignment keys on a dispenser.

30. A container according to Claim 17 wherein said body is transparent.

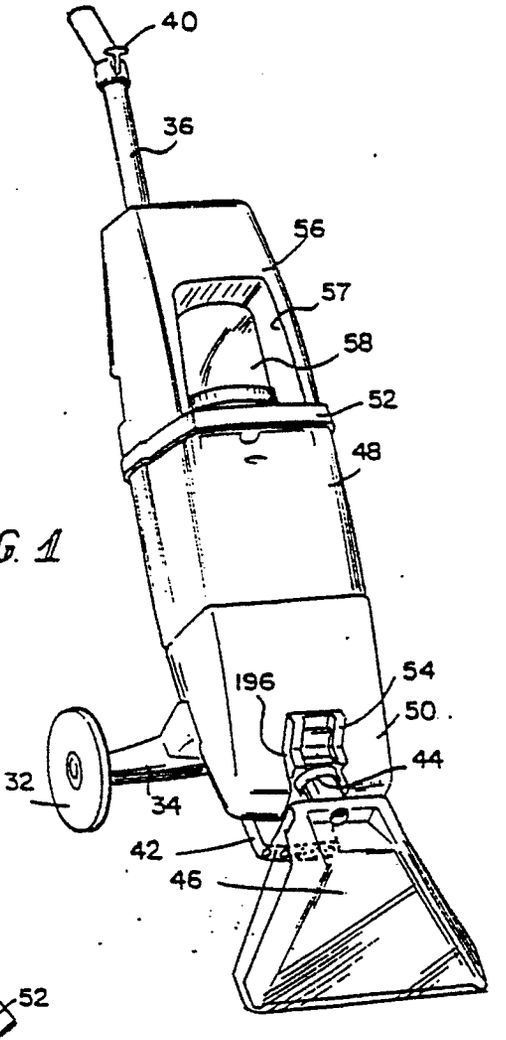

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FIG. 1

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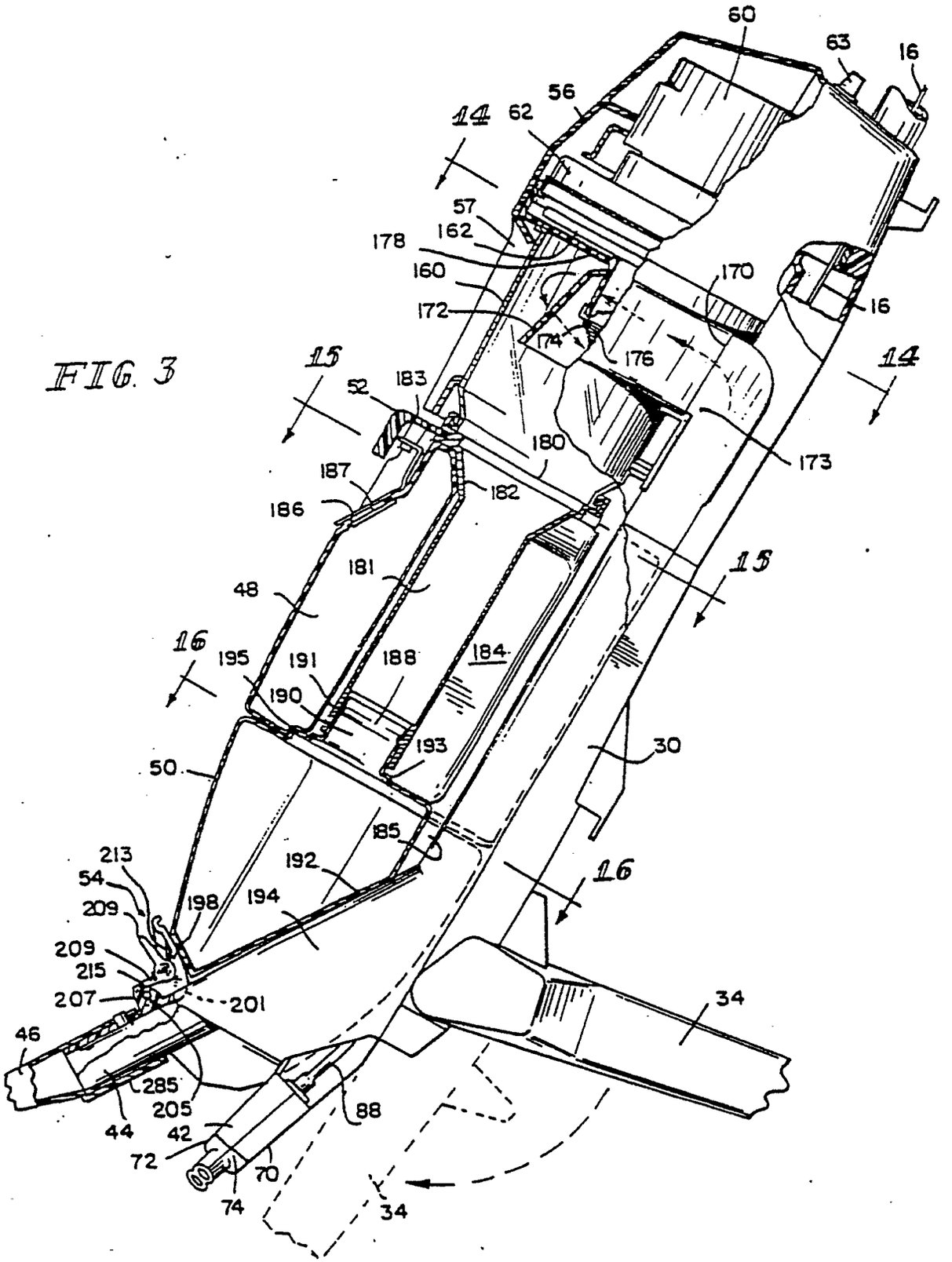
FIG. 2

FIG. 3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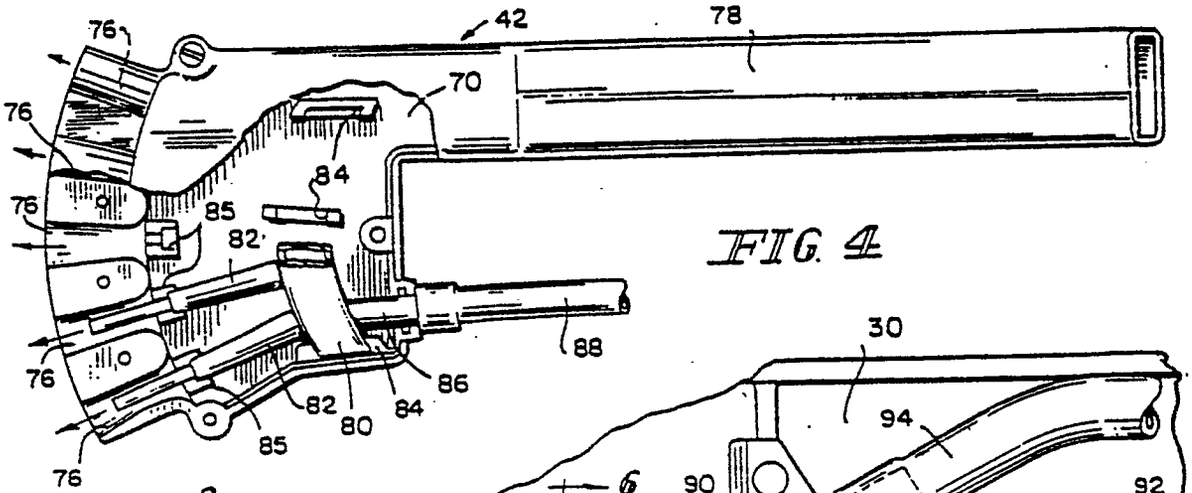


FIG. 4

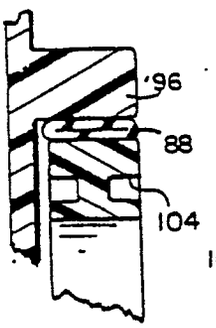


FIG. 6

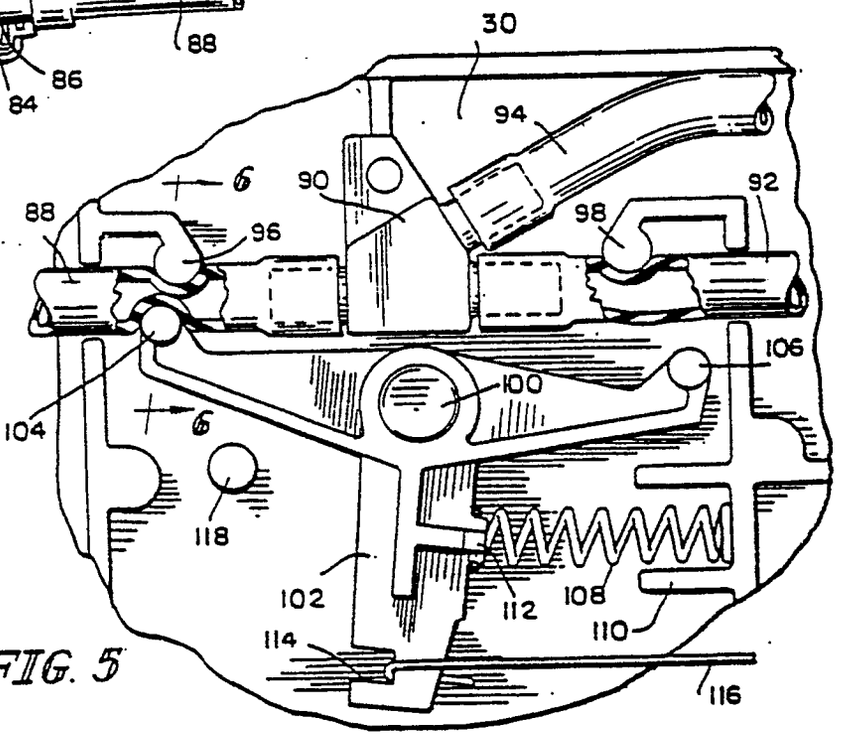


FIG. 5

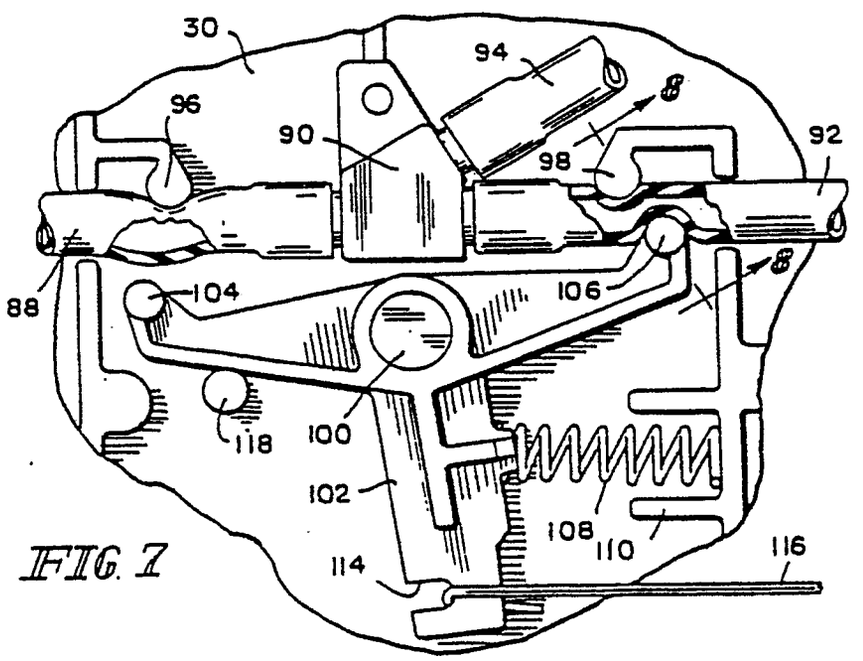


FIG. 7

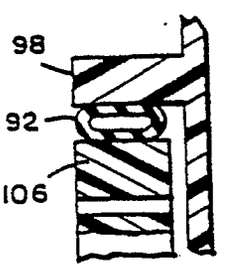


FIG. 8

FIG. 9

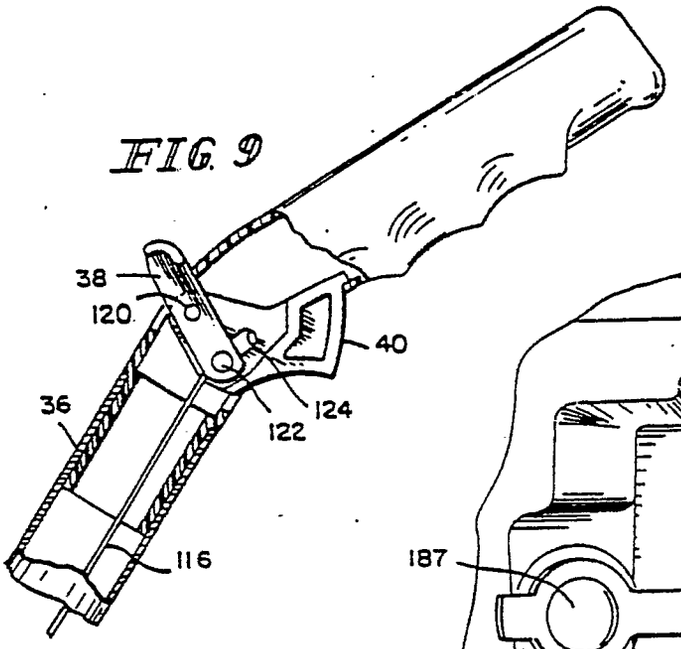


FIG. 10

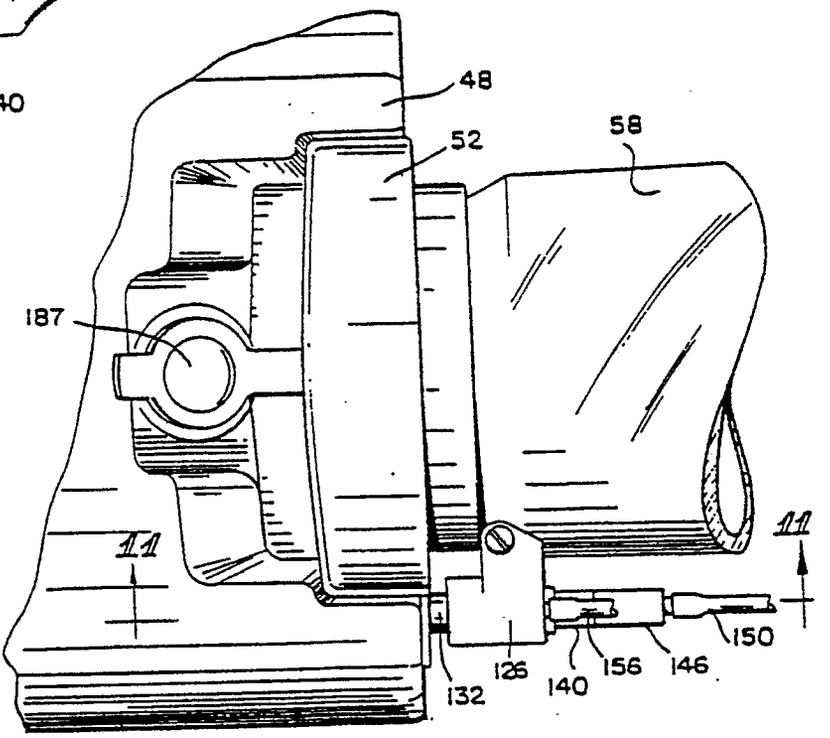


FIG. 11

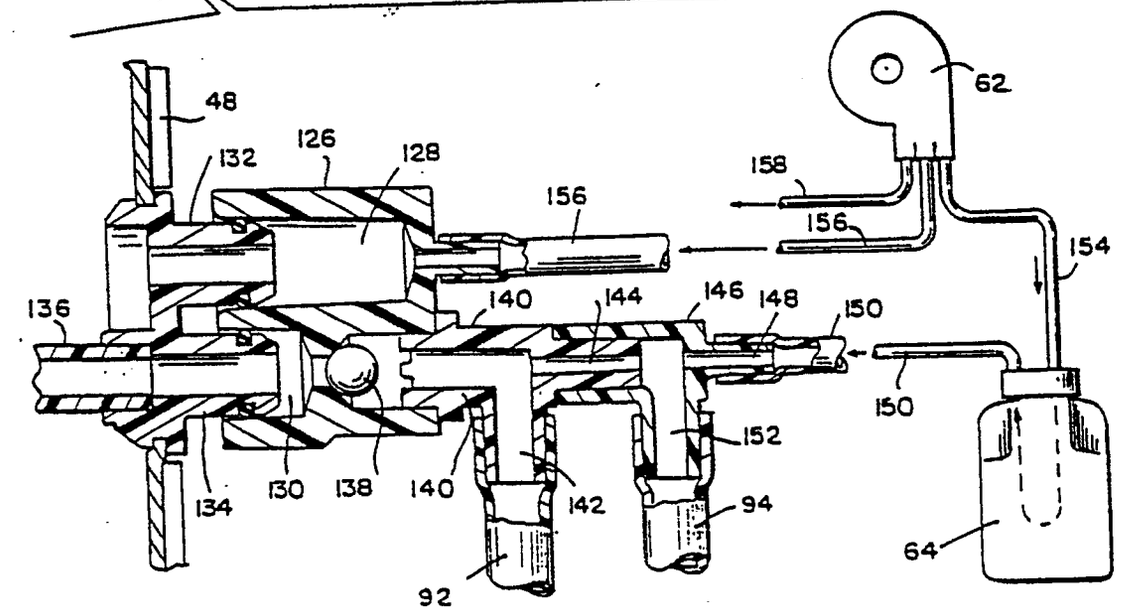
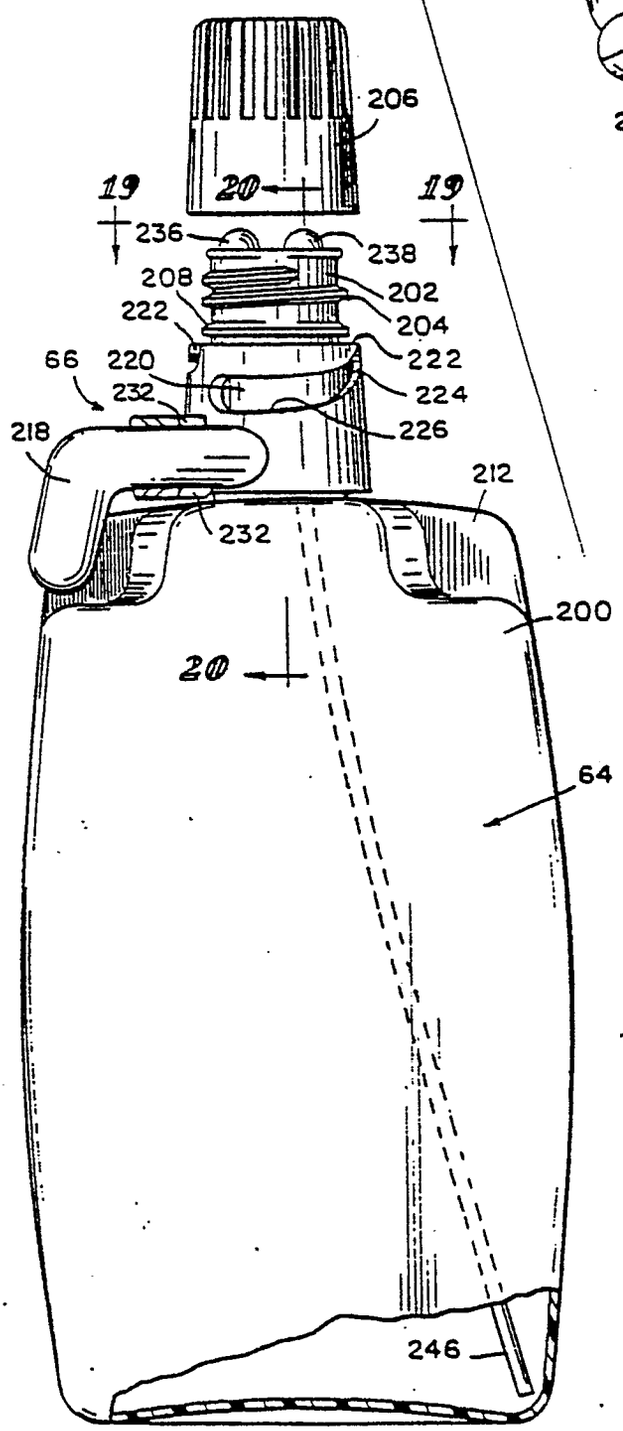


FIG 18



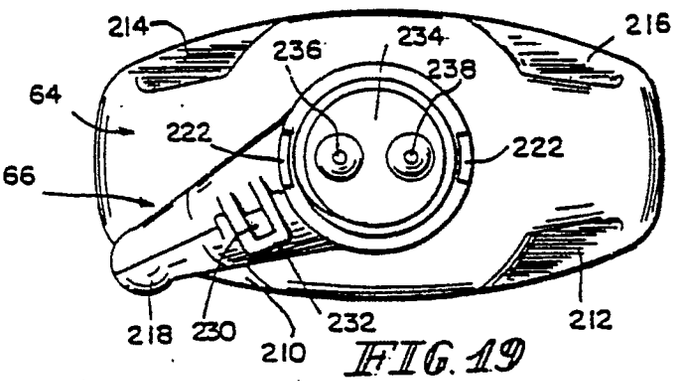


FIG. 19

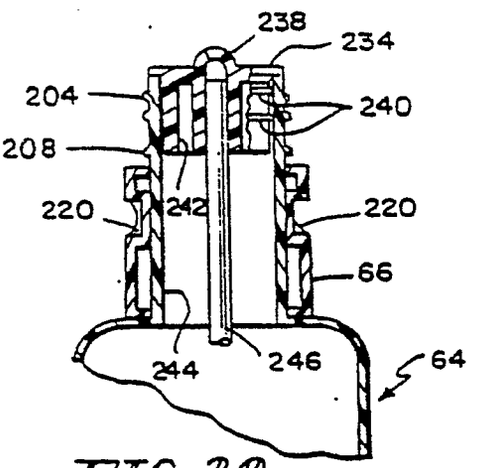


FIG. 20

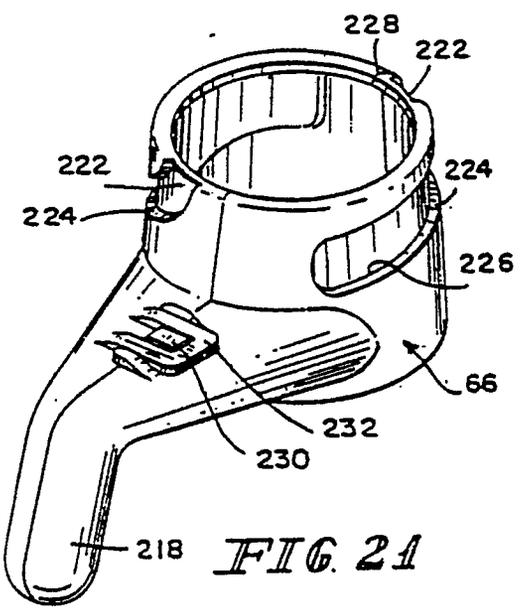
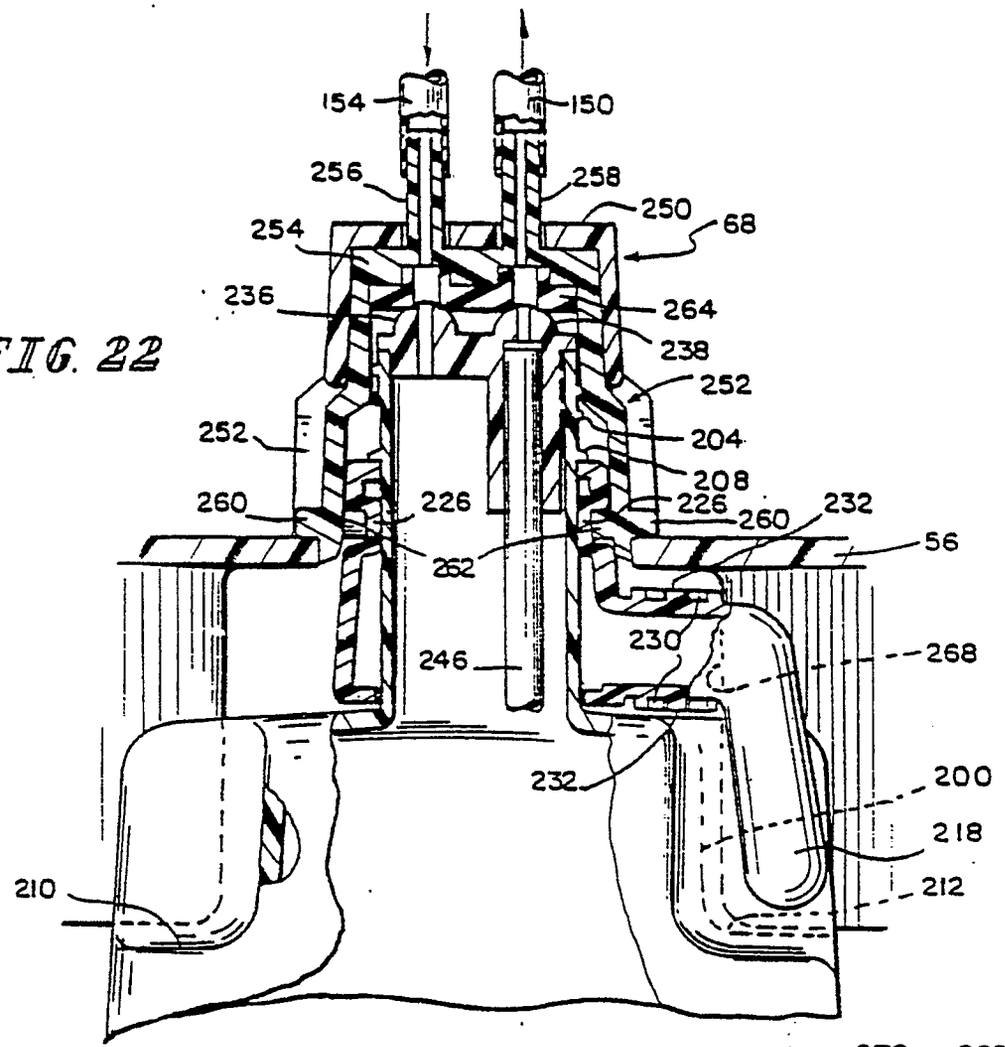
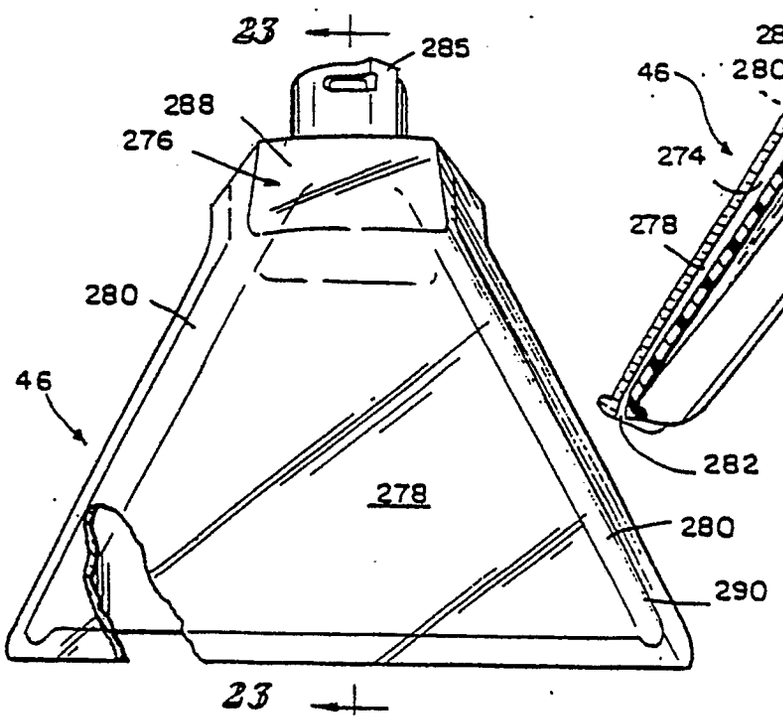


FIG. 21

FIG. 22





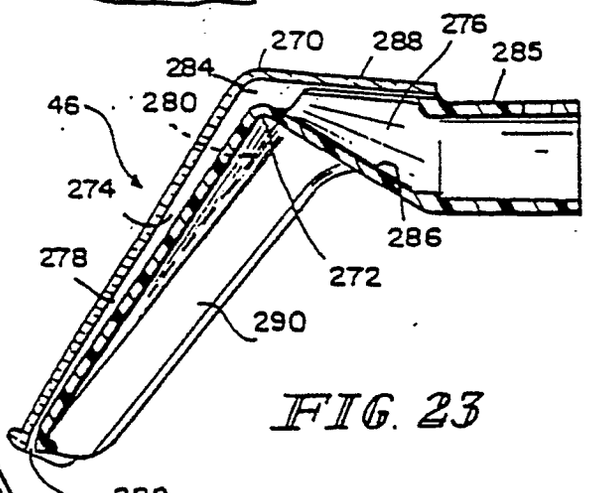


FIG. 23

FIG. 24