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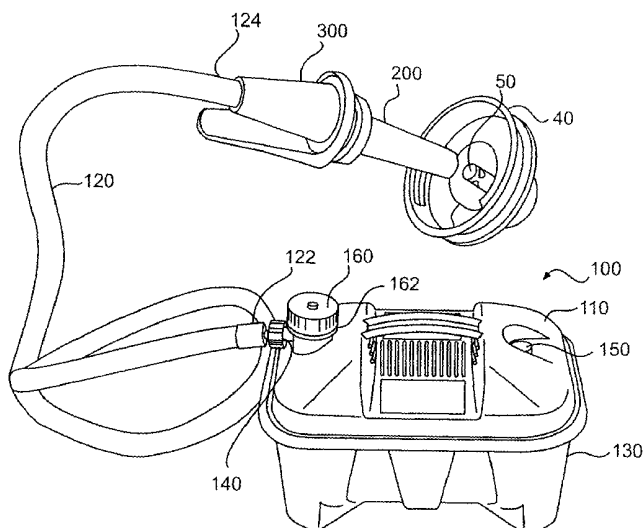
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(54) Title: METHOD AND DEVICE FOR SANITIZING BOTTLED WATER DISPENSERS



(57) Abstract: A method of sanitizing a bottled water dispenser may include transporting a portable boiler (110) to a location of a bottled water dispenser (40). The method also may include generating steam in the portable boiler (110) at the location of the bottled water dispenser (40), and flowing steam through an outlet (200) of the portable boiler (110). The method may further include fluid coupling the outlet (200) of the portable boiler (110) with an opening (50) of the bottled water dispenser (40), wherein the opening (50) leads to a fluid flow path of the bottled water dispenser (40). The method may additionally include flowing steam into the fluid flow path through the opening (50) of the bottled water dispenser (40), and maintaining steam flow through at least a portion of the fluid flow path for a time period sufficient to sanitize the portion of the fluid flow path. The invention may also include a device for sanitizing a bottled water dispenser (40) with steam.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD AND DEVICE
FOR SANITIZING BOTTLED WATER DISPENSERS
BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a method of sanitizing bottled water dispensers and a device for sanitizing bottled water dispensers. More particularly, the present invention relates to a method of sanitizing a bottled water dispenser with steam and a device for sanitizing a bottled water dispenser with steam.

Description of Related Art

Bottled water dispensers are found in enormous numbers throughout the world to provide a safe and healthy source of drinking water. Such dispensers are commonly found in, for example, workshops, offices, reception rooms, stores, and other public areas, as well as private residences. As the public grows more health conscious and increasingly aware of the benefits of consuming purified drinking water, the number of bottled water dispensers continues to grow.

To assure that water obtained from such dispensers is free of contamination, it is important to regularly clean and sanitize components of the bottled water dispenser coming into contact with the water. In particular, over time, a bottled water dispenser can develop bacteria, algae, and other impurities inside the fluid passageways of the dispenser. Absent regular cleaning and sanitizing of the fluid passageways, such impurities can end up in the drinking water dispensed from the dispenser.

Conventional bottled water dispensers come in many varieties. Most dispensers are designed to accept plastic containers (e.g., 5 gallon bottles) containing spring or purified water that are installed on the dispenser in an inverted orientation. Although the designs of bottled water dispensers currently on the market widely vary, most dispensers include certain standard water-contacting components that require regular cleaning and sanitizing. For example, conventional dispensers generally include a reservoir designed to maintain a supply of water ready to be dispensed from the reservoir via an

outlet conduit including a faucet (i.e., dispensing valve). Indeed, some dispensers include a reservoir designed to maintain water at multiple temperatures. Such reservoirs often include a cooling element designed to maintain water at a chilled temperature in a particular section of the reservoir. The reservoir may also include a separate section for maintaining water at room temperature (i.e., cook temperature). Some dispensers further include a heating element to provide hot water in a particular section of the reservoir. Water dispensers designed to dispense water of multiple temperatures generally have a reservoir divided into several sections and have an outlet conduit including several faucets (i.e., hot, cold, and/or cook faucets)

Bottled water dispensers also generally include a receiving component that provides an inlet conduit to enable flow of water from an interior of the inverted water bottle into the reservoir and to enable flow of air from the reservoir into the interior of the inverted water bottle. In some dispensers, the receiving component supports at least a portion of the weight of the inverted water bottle, while in other dispensers the weight of the inverted water bottle is supported by other components, such as a cover plate of the dispenser. In modern dispensers, the receiving component is often equipped with a no-spill system designed to provide a substantially contamination-free flow path for water from the inverted water bottle to the water reservoir. Such systems generally permit a user of the water dispenser to install and remove a filled water bottle without spilling water from the water bottle. For example, U.S. Patent No. 5,413,152 discloses an exemplary no-spill system, the disclosure of which is incorporated herein by reference.

The receiving component of many no-spill systems may include a feed probe designed to couple with a special closure on the water bottle to provide a contamination-free flow path from the interior of the water bottle to the reservoir. The receiving component may also include a seal member to provide a seal between the receiving component and an interior of the reservoir. By sealing the receiving component with the interior of the reservoir, the no-spill system helps to prevent air-born impurities from contaminating the water in the reservoir. Such no-spill systems often also

include a separate air conduit that enables outside air to communicate with the reservoir and the interior of the inverted water bottle. The air conduit may include a conventional air filter to prevent air-borne impurities from entering components of the water dispenser via the air conduit.

To maintain a sanitary, contamination-free fluid flow path inside the bottled water dispenser, all water-contacting components should be cleaned and sanitized on a regular basis. As mentioned above, such water-contacting components can include at least the inlet conduit, the reservoir, and the outlet conduit including the faucets. The air conduit should also be regularly cleaned and sanitized when included on the particular dispenser. Indeed, conventional techniques for cleaning and sanitizing components of bottled water dispensers have proven to be time consuming, labor intensive, environmentally unfriendly, and generally unsatisfactory.

One conventional technique for cleaning bottled water dispensers is a washing method. In this method, the components requiring cleaning are removed from the dispenser and cleaned in a washing machine approved for commercial kitchens. This method has numerous disadvantages. For example, the washing method is labor intensive since components of the dispenser have a tendency to become stuck and are often difficult to remove and reinstall. Additionally, in bottled water dispensers with air conduits, it may not be practicable to remove the air conduit from the dispenser to wash it. Moreover, there is a risk of contamination of the components when reinstalling them into the dispenser.

Another conventional cleaning technique is a chemical method. In this method, similar to the washing method, the components requiring cleaning may be removed from the bottled water dispenser. The components may then be cleaned with a bactericidal chemical and rinsed with pure water. Like the washing method, the chemical method is labor intensive, has a risk of contamination of the components during reinstallation, and may not be satisfactory for dispensers having air conduits. Also, it may be difficult to know when the bactericidal chemical has been completely rinsed from the components. The possibility of failing to adequately rinse chemicals from the

dispenser components is a significant downside to this method since a primary purpose of the bottled water dispenser is to provide pure and natural water, free of contaminants.

An additional cleaning method is a swap-out method. In this method, the components requiring cleaning are removed and replaced with new components. This method is labor intensive, environmentally unfriendly, and costly since the used components are often discarded. Moreover, this method, like the previous two, has a risk of contamination of the components during reinstallation.

Yet another cleaning method is an ozonation method. This method involves flushing the fluid passageways of the dispenser with ozonated water. However, this method requires special equipment and sometimes is not completely effective.

In light of the foregoing, there is a need in the art for an improved method and device for sanitizing bottled water dispensers.

BRIEF SUMMARY OF A FEW ASPECTS OF THE INVENTION

In accordance with the purpose of the invention, as embodied and broadly described herein, the invention includes a method of sanitizing a bottled water dispenser with steam. The method may include transporting a portable boiler to a location of a bottled water dispenser. The method also may include generating steam in the portable boiler at the location of the bottled water dispenser, and flowing steam through an outlet of the portable boiler. The method may further include flow coupling the outlet of the portable boiler with an opening of the bottled water dispenser, wherein the opening leads to a fluid flow path of the bottled water dispenser. The method may additionally include flowing steam into the fluid flow path through the opening of the bottled water dispenser, and maintaining steam flow through at least a portion of the fluid flow path for a time period sufficient to sanitize the portion of the fluid flow path.

In an aspect, the method may further include transporting the portable boiler to a location of a different bottled water dispenser, and sanitizing at least a portion of a fluid flow path of the different bottled water dispenser.

In another aspect, the method may include flow coupling an outlet of a portable boiler with a nozzle, flow coupling a reservoir of a bottled water dispenser with an adapter configured to removably seal with an opening of the reservoir, and flow coupling the nozzle with an inlet of the adapter.

In an additional aspect, the invention includes a device for sanitizing a bottled water dispenser with steam. The device may include a housing and a heating element configured to generate steam in the housing. For example, the housing and the heating element could be a portion of a portable boiler. If the device includes a housing, the device may further include an outlet of said housing configured to dispense steam from said housing. The device may also include a nozzle adapted to engage an opening of a bottled water dispenser leading to a fluid flow path. The nozzle is optionally designed to flow couple the outlet of the housing with the opening of the bottled water dispenser to thereby cause a sanitizing steam environment within the fluid flow path of the bottled water dispenser.

It is to be understood that both the foregoing general description and the following detailed description are exemplary, and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention. In the drawings,

Fig. 1 illustrates an embodiment of a device for sanitizing a bottled water dispenser;

Fig. 2 is a schematic cross-sectional view of an embodiment of the nozzle and the guard illustrated in Fig. 1;

Fig. 3 is a schematic cross-sectional view of an alternate embodiment of the nozzle and the guard illustrated in Fig. 1;

Fig. 4A is a schematic view of the guard shown in Figs. 2 and 3;

Fig. 4B is a schematic cross-sectional view of the guard shown in

Fig. 4A cut along line A-A;

Fig. 4C is a schematic view of a first side of the guard shown in Figs. 4A and 4B;

Fig. 4D is a schematic view of a second side of the guard shown in Figs. 4A, 4B, and 4C;

Fig. 5 is a schematic view of a first embodiment of an adapter for coupling with a bottled water dispenser;

Fig. 6 is an exemplary illustration of a prior art bottled water dispenser for use in connection with the invention;

Fig. 7 is a view of the prior art bottled water dispenser of Fig. 6 with the water bottle removed;

Fig. 8 is a view of a receiving component of the prior art bottled water dispenser of Figs. 6 and 7;

Fig. 9 is a partial-schematic cross-sectional view of a nozzle and a receiving component of the prior art bottled water dispenser shown in Figs. 6-8;

Fig. 10 is a view of a second embodiment of an adapter for coupling with a bottled water dispenser; and

Fig. 11 is a view of a third embodiment of an adapter for coupling with a bottled water dispenser.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

In accordance with the invention, there is provided a device for sanitizing a bottled water dispenser with steam. Fig. 1 shows a view of a device 100 and a receiving component 40 of a bottled water dispenser. The device 100 may include a boiler 110 for generating steam and a steam tube 120. The boiler 110 may be portable. Alternatively, the boiler 110 could be provided at a particular location, and the bottled water dispenser could be transported to the boiler 110. The portable boiler 110 may be, for example, a

portion of a portable wallpaper stripper. The portable boiler 110 may include a housing 130 and a heating element configured to generate steam in the housing 130. The heating element may be, for example, a 2,300 Watt electrical heating element provided in the housing 130. The steam generated by the portable boiler 110 may be about 100°C, although the actual temperature of the steam may vary depending on the local atmospheric pressure. The steam could also be slightly superheated (i.e., higher temperature than boiling water).

The housing 130 may include an outlet 140 configured to couple (directly or indirectly) with the steam tube 120. The housing 130 may also includes a fill opening 160 and a closure 162 on the fill opening 160 to facilitate filling of the housing 130 with liquid water. In an embodiment, the housing 130 may be filled with up to about 4 liters or more of liquid water for conversion to steam. Depending on the type of portable boiler, as well as the amount and temperature of the liquid water added to the housing 130 of the portable boiler 110, the amount of time required for the portable boiler 110 to begin producing steam may vary. For example, the portable boiler 110 may take up to approximately 15 minutes to begin producing steam. Alternatively, the portable boiler 110 may be capable of generating steam in a matter of seconds. The portable boiler 110 also may optionally include a pressure relief valve 150 to prevent pressure from building up in the housing 130.

In an embodiment of the device 100 including the steam tube 120, the steam tube 120 has a first end 122 and a second end 124. The first end 122 may be designed to couple with the outlet 140 of the portable boiler 110. The steam tube 120 may be a flexible hose; however, the steam tube could also be a rigid or semi-rigid tube. Alternatively, the device 100 may not include a steam tube 120 and the outlet 140 of the portable boiler 110 may be configured to flow couple with an opening of a bottled water dispenser without use of a steam tube.

Figs. 6 and 7 are views of an exemplary prior art bottled water dispenser that could be used in accordance with the invention. One of ordinary skill in the art will appreciate that bottled water dispensers come in

many varieties and the example shown in the drawings and described herein is merely for illustrative purposes.

The dispenser 10 may include a cabinet 20 and a cover plate 30 on an upper portion of the cabinet 20. The dispenser 10 may also optionally include a receiving component 40 coupled with a reservoir of the dispenser 10. The reservoir may hold a supply of water for dispensing. Alternately, the dispenser 10 may be configured to dispense water directly from a water bottle through a conduit optionally capable of heating or cooling the water prior to dispensing.

Fig. 8 shows a view of the receiving component 40 removed from the dispenser 10. The receiving component 40 may include a seal member 92 for sealing the receiving component 40 with an interior of the reservoir of the dispenser 10. The receiving component 40 may also include a tubular feed probe 50 having openings 52. The receiving component 40 also optionally includes an air filter 60 on an end of an air conduit 62 enabling air flow between the reservoir and outside of the dispenser 10.

The dispenser 10 may further include an outlet conduit enabling flow of water from the reservoir. In the embodiment shown, the outlet conduit may include a first outlet conduit 70 and a second outlet conduit 72. The first outlet conduit 70 may include a first dispensing valve 74. The first outlet conduit 70, for example, may be coupled with a section of the reservoir configured to provide chilled water. The second outlet conduit 72 may include a second dispensing valve 76. The second outlet conduit 72, for example, may be coupled with a section of the reservoir configured to provide one of hot water and room temperature water.

Fig. 2 shows a schematic cross-sectional view of a nozzle 200 and a guard 300, similar to the nozzle and the guard illustrated in Fig. 1. The nozzle 200 may be configured to direct steam flowing from the steam tube 120 in at least a portion of a fluid flow path of the bottled water dispenser 10. In an embodiment, the fluid flow path of the dispenser 10 may include at least the reservoir, the feed probe 50, the first and second outlet conduits 70, 72, and the air conduit 62. Alternately, the fluid flow path may include various

combinations of these components, and/or other components of the bottled water dispenser. The nozzle 200 may be optionally adapted to couple with one or more of the feed probe 50, the first and second outlet conduits 70, 72, and the outlet end of the air conduit 62.

In the embodiment shown in Fig. 2, the nozzle 200 may include a first portion 210 and a second portion 220. The first portion 210 includes a first end 212 of the nozzle 200, and the second portion 220 includes a second end 222 of the nozzle 200. The first portion 210 may be tapered so that the first portion 210 has a smaller cross-section adjacent to the first end 212 of the nozzle 200. The second portion 220 may be tapered so that the second portion 220 has a smaller cross-section adjacent to the second end 222 of the nozzle 200. The first end 212 of the nozzle 200 may be configured to couple with the second end 124 of the steam tube 120. The second end 222 of the nozzle 200 may be configured to couple with the receiving component 40 of the dispenser 10.

Fig. 9 shows a partial-schematic cross-sectional view of the nozzle 200 flow coupled with the feed probe 50 of the receiving component 40. In an embodiment, the second portion 220 of the nozzle 200 has an inner wall 226 having a diameter greater than a diameter of an outer wall 54 of the feed probe 50. When the feed probe 50 is placed at least partially inside the second portion 220 via an opening in the second end 222, the inner wall 226 and the outer wall 54 define a gap 56. The nozzle 200 may be adapted to direct steam flowing from the nozzle 200 into the gap 56 and into the openings 52 of the feed probe 50 to thereby sanitize the outer wall 54 and an interior 58 of the feed probe 50. In one embodiment, the gap 56 may be about 3 mm so as to assure that the nozzle 200 does not contact the probe 50 and thereby cause contamination between the nozzle 200 and the probe 50.

The nozzle 200 may also be adapted so that steam flowing from the nozzle 200 provides a pressure in the gap 56 sufficient to force steam from the gap 56 into the openings 52 of the feed probe 50. The nozzle 200 may be sized so that the feed probe 50 fits at least substantially inside the second

portion 220 of the nozzle 200 and the second end 222 of the nozzle 220 is able to contact a bottom surface 82 of a cylindrical portion 80 of the receiving component 40.

In an embodiment, the nozzle 200 may optionally include a seal member 290 (e.g. O-ring) on the second portion 220 sized to seal against a wall 84 of the cylindrical portion 80. The device 100 may include an adapter designed to couple with the nozzle 200 for sealing against the wall 84. For example, the adapter could be an annular member including an O-ring groove machined along a circumference with an O-ring in the groove. The adapter may be adapted to couple with both the nozzle 200 and the wall 84 of the cylindrical portion 80. Alternatively, the adapter and the nozzle 200 may be a single piece of unitary construction.

In another embodiment, the nozzle 200 may be configured to seal with a wall 86 of the receiving component 40. For example, referring to Fig. 11, the device 100 may include an adapter 700 sized to couple with the wall 86 of the receiving component 40. The adapter 700 may include an annular part 702 having an inlet 704 for receiving the nozzle 200. The inlet 704 may include a groove 706 for receiving a seal member that may be on the nozzle 200. The annular part 702 may also include a groove 708 capable of including a seal member for sealing the wall 86. Alternatively, the annular part 702 of the adapter 700 may be sized to removably couple with an interior of a reservoir of a bottled water dispenser.

Referring to Figs 2, 3, and 4A-4D, the device 100 may also include a guard 300 configured to protect a hand of an operator of the device 100 from contact with high temperature steam flowing from the nozzle 200. The guard 300 may include a receiving portion 310 adapted to receive the second end 124 of the steam tube 120. The guard may also include a cylindrical portion 320 having a first end 322 and a second end 324. The first end 322 may include the receiving portion 310, and the second end 324 may include an opening. An exterior of the cylindrical portion 320 may advantageously provides a gripping part for an operator of the device 100. The cylindrical portion 320 may be tapered from a larger cross-section adjacent to the

second end 324 to a smaller cross-section adjacent to the first end 322.

In the embodiment shown in Fig. 2, the receiving portion 310 may include a tubular member 330 extending through the first end 322 of the cylindrical portion 320. The tubular member 330 has an inlet end 332 and an outlet end 334. The inlet end 332 may be adapted to couple with the second end 124 of the steam tube 120. The outlet end 334 may be adapted to couple with the first end 212 of the nozzle 200. The inlet end 332 may include a threaded section 336 adapted to couple with a corresponding threaded section on the second end 124 of the steam tube 120.

Fig. 3 shows an alternate embodiment for coupling the nozzle 200 and the guard 300. In this embodiment, the outlet end 334 of the tubular member 330 may be optionally adapted to couple with the second end 222 of the nozzle 200. By coupling the second end 222 of the nozzle 200 with the second end 124 of the steam tube 120 via the tubular member 330, the device 100 may be used to apply steam from the first end 212 of the nozzle 200 to, for example, the cabinet 20 of the dispenser 10. Applying steam from the first end 212 of the nozzle 200 may advantageously provide a higher velocity stream than the second end 222. The higher velocity stream may be useful for cleaning, for example, the exterior of the dispenser 10.

The guard 300 may also include a shield member 340 on the cylindrical portion 320. The shield member 340 may extend in a direction substantially parallel to a direction of flow of steam from the second end 124 of the steam tube 120 when the steam tube 120 is coupled with the tubular member 330 of the guard 300. The shield member 340 may provide an operator of the device 100 with additional protection from the steam.

As shown in Fig. 2, the guard 300 may be configured so that an air barrier is formed between an interior 326 of the cylindrical portion 320 of the guard 300 and an exterior 240 of the nozzle 200 when the guard 300 and the nozzle 200 are coupled together. The air barrier may provide a layer of thermal insulation between the cylindrical portion 320 and the nozzle 200 to further protect an operator of the device 100 from heat generated by the steam.

The guard may further include one or more slots 350 and the nozzle may further include one or more tabs 230 to facilitate coupling of the nozzle 200 and the guard 300. The slots 350 and the tabs 230 may be configured so that the tabs 230 fit into the slots 350 to couple the guard 300 and the nozzle 200. For example, the tabs 230 may lock in the slots 350 when an operator inserts the tabs 230 into the slots 350 and turns the nozzle 200 relative to the guard 300.

Fig. 5 shows a schematic view of an adapter 400 removably coupled with a reservoir 500. The reservoir 500 is a schematic representation of a reservoir of the type commonly provided in bottled water dispensers. The adapter 400 may be used in connection with sanitizing bottled water dispensers that do not include a no-spill system or other inlet components capable of easily coupling with the nozzle 200 to create a steam environment in the fluid flow path of the bottled water dispenser. The adapter 400 may be configured to removably seal with an opening of the reservoir 500. (See also, the adapter 700 of Fig. 11 described *supra*.) For example, the adapter 400 may include an annular member having an O-ring groove machined along the circumference. The adapter 400 may further include a seal member 420 for sealing with an interior of the reservoir 500. For example, the seal member 420 may be an O-ring sized to fit in an O-ring groove machined along the circumference of the adapter 400. The adapter 400 may also include an inlet 410 configured to couple with the second end 222 of the nozzle 200. In an alternate embodiment, the adapter 400 and the nozzle 200 may be a single piece of unitary construction.

Fig. 10 is a view of an adapter 600 for removably coupling the nozzle 200 with one of the dispensing valves 74, 76 of the bottled water dispenser 10. The adapter 600 may include an annular member 602 having a first portion 604 for receiving the dispensing valves 74, 76 and a second portion 606 for receiving the nozzle 200. The first portion 604 may include a groove 608 capable of including a seal member (e.g., O-ring). When the groove 602 includes a seal member, the seal member may be configured to provide a substantially sealed connection between the adapter 600 and the dispensing

valves 74, 76. The second portion 606 may also include a groove 610 for receiving a seal member that may be on the nozzle 200. Alternatively, the second portion 606 may be configured so that the nozzle 200 can be press-fit into the second portion 606. In an embodiment, the adapter 600 and the nozzle 200 may be a single piece of unitary construction.

In another embodiment, the present invention includes a method of sanitizing the bottled water dispenser 10 with steam. The method may include transporting the portable boiler 110 to a location of a bottled water dispenser 10. For example, a distributor of bottled water may transport the portable boiler 110 to a customer having a bottled water dispenser requiring sanitizing. Alternatively, the bottled water dispenser 10 could be transported to a boiler at a particular location. The method may also include generating steam in the portable boiler 110, and flow coupling the outlet 140 of the portable boiler 110 with an opening of the bottled water dispenser 10 leading to a fluid flow path of the bottled water dispenser. When sanitizing the dispenser 10, the portable boiler 110 could be flow coupled to any one of the feed probe 50, the first outlet conduit 70, the second outlet conduit 72, and the air conduit 62. The method may further include flowing steam into the fluid flow path of the dispenser 10 through one of the openings set forth above, and maintaining steam flow through at least a portion of the fluid flow path for a time period sufficient to sanitize the portion of the fluid flow path. For example, steam may be flowed through an opening in the reservoir, through the openings 52 of the feed tube 50, through one of the first and second outlet conduits 70, 72, and/or through the air conduit 62. Optionally, the steam flow may be maintained in one or more of the reservoir, the feed tube 50, the first and second outlet conduits 70, 72, and/or the air conduit 62 for a time period sufficient to sanitize therein. In an embodiment, a minimum time period for maintaining steam flow is at least twenty seconds. In another embodiment, the minimum time period for maintaining steam flow is at least three minutes.

In an embodiment, the method may further include transporting the portable boiler 110 from the location of the bottled water dispenser 10 to a

location of a different bottled water dispenser, for sanitizing the fluid flow path of the different bottled water dispenser.

In another embodiment, the method may include using the device 100 provided with various combinations of the optional features of the device 100 described above to sanitize a bottled water dispenser.

In a further embodiment, the method may include sanitizing a bottled water dispenser having a feed probe 50 of known outer diameter using the portable boiler 110 with the nozzle 200 flow coupled thereto. The nozzle 200 may be adapted so that the inner wall 226 has a diameter greater than a diameter of the outer wall 54 of the feed probe 50 (i.e., internal diameter of nozzle 200 is greater than external diameter of feed probe 50). The method may include flow coupling the nozzle 200 and the openings 52 of the feed probe 50 by placing the feed probe 50 at least partially inside the nozzle 200 so that a gap 56 exists between the outer diameter of the feed probe 50 and an inner diameter of the nozzle 200. The method may further include flowing steam into the gap 56 and into the openings 52 of the feed probe 50 to thereby sanitize the exterior and interior of the feed probe 50. In an embodiment, the exterior and interior of the feed probe 50 may be sanitized simultaneously. The method may also include flowing steam into the gap 56 to increase pressure in the gap 56 so that steam is forced from the gap 56 into the openings 52 of the feed probe 50. The method may further include flow coupling the nozzle 200 and the feed probe 50 by placing the nozzle 200 over the feed probe 50 so that the second end 222 of the nozzle 200 contacts the bottom surface 82 of the cylindrical portion 80.

In an embodiment, the nozzle 200 may be tapered so that an inner diameter of the nozzle 200 adjacent to the second end 222 of the nozzle 200 is only slightly larger than the outside diameter of the probe 50. For example, the nozzle 200 may include a seal member for providing a seal 280 between the outer wall 54 and the inner wall 226 adjacent to the second end 222 of the nozzle 200. In this embodiment, the nozzle 200 may have a larger inner diameter a short distance from the second end 222, so that the gap 56 exists between the outer wall 54 and the inner wall 226. Providing the seal

member 280 may facilitate a pressure increase in the gap 56 to force steam into the openings 52 of the feed probe 50.

In still another embodiment, the method may include assembling certain parts of the device 100. For example, the operator of the device 100 may couple the portable boiler 110 with the steam tube 120. The steam tube 110 may be coupled with both the guard 300 and the nozzle 200. The operator may fill the housing 130 of the portable boiler 110 with water. When sanitizing a dispenser configured to provide hot water, the operator may fill the housing 130 with hot water from the dispenser to decrease the amount of time required for the portable boiler 110 to begin producing steam.

In an embodiment, the steam may be provided in the fluid flow path of the dispenser for at least twenty seconds, and may be provided for three minutes or more. Temperature in the fluid-contacting components may reach a minimum of from about 75°C to about 100°C to assure that the components are sanitized (i.e., algae, bacteria, and/or other live contaminants are killed and/or removed).

In another embodiment, prior to providing steam in the fluid flow path, the air filter 60 may be removed from the air conduit 62 and at least one of the dispensing valves 74, 76 may be opened. The dispensing valves 74, 76 may be maintained in an open position by using a specially designed clip and/or any other suitable device. Removing the air filter 60 and opening the dispensing valves 74, 76 may facilitate the flow of steam throughout the fluid flow path.

In still another embodiment, the method may include coupling the nozzle 200 with one of the dispensing valves 74, 76 to provide steam in one of the first and second outlet conduits 70, 72 via an adapter such as the adapter 600 shown in Fig. 10. When employing this embodiment of the method, the dispensing valves 74, 76 may be maintained in the open position using a suitable clip or other device. Steam provided in the outlet conduit (e.g., first and second outlet conduits 70, 72) may be allowed to flow into the reservoir, and from the reservoir into the air conduit 62 and the feed probe 50.

In yet another embodiment, the method may include coupling the

nozzle 200 with the outlet end of the air conduit 62. The air filter 60 may be removed before coupling the nozzle 200 with the air conduit 62. After coupling the nozzle 200 and the air conduit 62, steam may be provided in the air conduit 62 and allowed to flow into the reservoir, and from the reservoir into the feed probe 50 and into the first and second outlet conduits 74, 76.

In still another embodiment, the method may include sanitizing a bottled water dispenser that does not include a receiving component including a feed probe 50. Referring to Fig. 5, this embodiment of the method may include flow coupling the outlet 140 of the portable boiler 110, flow coupling the reservoir 500 with the adapter 400 to removably seal the adapter 400 with the reservoir 500, and flow coupling the nozzle 200 with the inlet 410 of the adapter 400. After flowing steam from the nozzle 200 into the reservoir 500 via the adapter 400, the adapter 400 may be removed from the reservoir 500. This embodiment of the method may alternately include use of the adapter 700 of Fig. 11 when the adapter 700 is sized to removably couple with an interior of a reservoir of a bottled water dispenser.

Referring to Fig. 3, in another embodiment, the method may include flow coupling the second end 222 of the nozzle 200 with the outlet end 334 of the tubular member 330, and applying steam from the first end 212 of the nozzle 200 to an exterior of the dispenser 10 (e.g., the cabinet 20 and cover plate 30) to clean and sanitize the exterior of the dispenser 10. The exterior of the dispenser 10 may be sanitized either before or after sanitizing the components defining the fluid flow path.

In another embodiment, after transporting the device 100 to the location of the bottled water dispenser 10, a water bottle 90 installed on the dispenser 10 may be removed from the dispenser 10 (see Fig. 6). The operator may then drain water from the reservoir, and sanitize the device according to one of the embodiments of the method described above. The operator may also replace one or more parts on the water dispenser 10. For example, the operator may replace the air filter 60 with a new air filter and/or replace the receiving component 40 with a new receiving component. After the sanitizing is complete, the operator may reinstall a water bottle (either

same or new) on the dispenser 10. The dispenser 10 may advantageously allow bottled water distributors and others to conduct dispenser sanitizing on site, without the use of harsh chemicals or the need to substantially disassemble the dispenser.

Although the method provided herein has been described primarily in connection with a bottled water dispenser, one of ordinary skill in the art will appreciate that the method may be used in connection with a water dispenser that dispenses water from sources other than a water bottle. For example, the method may include sanitizing a drinking fountain and/or a point-of-use water dispenser. Such dispensers may be permanently plumbed into a water source or may have a reservoir that is manually filled with water.

In an additional embodiment, the method may include sanitizing a potable liquid dispenser that dispenses a liquid other than water. For example, the potable liquid dispenser may dispense a fruit drink.

As used herein, the term "couple" means linked together in some respect. The term "couple" is not intended to require direct physical contact between components coupled. The term "flow couple" means placed in flow communication.

It will be apparent to those skilled in the art that various modifications and variations can be made to the structure and methodology of the present invention without departing from the scope or spirit of the invention. In view of the foregoing, it is intended that the present invention covers modifications and variations of this invention, provided that they fall within the scope of the following claims and their equivalents.

WHAT IS CLAIMED IS:

1. A method of sanitizing a bottled water dispenser, the method comprising:
transporting a portable boiler to a location of a bottled water dispenser;
generating steam in the portable boiler at the location of the bottled water dispenser;
flow coupling an outlet of the portable boiler with an opening of the bottled water dispenser, the opening leading to a fluid flow path of the bottled water dispenser;
flowing steam through the outlet of the portable boiler;
flowing steam into the fluid flow path through the opening of the bottled water dispenser; and
maintaining steam flow through at least a portion of the fluid flow path for a time period sufficient to sanitize said portion of the fluid flow path.
2. The method of claim 1, wherein the fluid flow path includes a reservoir for containing water, and wherein steam flow is maintained in the reservoir for a time period sufficient to sanitize the reservoir.
3. The method of claim 2, wherein the fluid flow path includes an inlet conduit configured to enable flow of water and air between the reservoir and an inverted water bottle on the bottled water dispenser, and wherein steam flow is maintained in the inlet conduit for a time period sufficient to sanitize the inlet conduit.
4. The method of claim 3, wherein the fluid flow path further includes an outlet conduit configured to enable dispensing of water from the reservoir, and wherein steam flow is maintained in the outlet conduit for a time period sufficient to sanitize the outlet conduit.
5. The method of claim 1, wherein the fluid flow path further includes an air conduit configured to enable flow of air into the reservoir from

outside of the water dispenser, and wherein steam is maintained in the outlet conduit for a time period sufficient to sanitize the outlet conduit.

6. The method of claim 3, wherein the inlet conduit includes a feed probe having at least one opening, and wherein the flow coupling includes flow coupling the outlet of the portable boiler with the at least one opening of the feed probe so that steam flows into the at least one opening of the feed probe.

7. The method of claim 4, wherein the flow coupling includes flow coupling the outlet of the portable boiler with the outlet conduit so that steam flows into the fluid flow path through an opening in the outlet conduit.

8. The method of claim 7, further comprising opening a dispensing valve on the outlet conduit, and wherein the flow coupling includes flow coupling the outlet of the portable boiler with the dispensing valve so that steam flows into the fluid flow path through the dispensing valve.

9. The method of claim 5, wherein the flow coupling includes flow coupling the outlet of the portable boiler with the air conduit so that steam flows into the fluid flow path through an opening in the air conduit.

10. The method of claim 5, further comprising removing an air filter on an end of the air conduit.

11. The method of claim 1, wherein a minimum time for maintaining steam flow is about three minutes.

12. The method of claim 2, wherein the flow coupling includes flow coupling the outlet of the portable boiler with a nozzle,
flow coupling a reservoir of the bottled water dispenser with an adapter configured to removably seal with an opening of the reservoir, the adapter

having an inlet configured to flow couple with the nozzle, and
flow coupling the nozzle with the inlet connector of the adapter.

13. The method of claim 1, wherein the method further comprises transporting the portable boiler from the location of the bottled water dispenser to a location of a different bottled water dispenser for sanitizing at least a portion of a fluid flow path of said different bottled water dispenser.

14. A method of sanitizing a bottled water dispenser having a feed probe of known outer diameter, the method comprising:

generating steam in a boiler at a location of the bottled water dispenser;

flowing steam from the boiler through a nozzle having an internal diameter greater than the known outer diameter of the feed probe, so that when the nozzle is placed over the feed probe a gap exists between the outer diameter of the feed probe and the inner diameter of the nozzle opening;

flow coupling the nozzle with the feed probe by placing the feed probe at least partially inside the nozzle;

flowing steam into an opening in the feed probe to sanitize at least an inner portion of the feed probe; and

flowing steam into the gap between the nozzle and the feed probe to sanitize an exterior portion of the feed probe while at least the inner portion of the feed probe is being sanitized.

15. The method of claim 14, wherein said flowing of steam into the gap increases a pressure in the gap sufficient to force steam from the gap into the at least one opening in the feed probe.

16. The method of claim 14, further comprising preventing injury to the hand of an operator by blocking flow of steam from the gap to a gripping portion by providing a steam guard between the nozzle opening and the gripping portion.

17. The method of claim 14, wherein the boiler is portable, and wherein the method further comprises transporting the portable boiler to the location of the bottled water dispenser

18. A device for steam sanitizing a bottled water dispenser having a feed probe, said feed probe including at least one opening enabling air and water to flow between a reservoir of the bottled water dispenser and an inverted water bottle on the bottled water dispenser, the device comprising:

a nozzle having an opening in an end thereof, said opening being sized to fit over an end of the feed probe, said nozzle having an inner wall with a diameter greater than a diameter of an outer wall of the feed probe, said inner and outer walls defining a gap when the feed probe is placed at least partially inside said nozzle; and

a guard configured to couple with the nozzle for shielding a hand of an operator of the device from steam flowing from the gap.

19. The device of claim 18, further comprising a portable boiler for generating steam, said portable boiler including an outlet configured to be flow coupled with said nozzle, and wherein said nozzle is adapted to simultaneously direct steam flowing from said outlet of said portable boiler into said gap and into the at least one opening of the feed probe when the feed probe is placed at least partially inside said nozzle, said device thereby steam sanitizing an exterior and an interior of said feed probe.

20. The device of claim 19, wherein said nozzle is adapted so that steam flowing from said nozzle provides a pressure in the gap sufficient to force steam from the gap into the at least one opening in the feed probe when the feed probe is placed at least partially inside said nozzle.

21. The device of claim 18, wherein said guard and said nozzle are configured so that an air barrier is formed between an interior of said guard and an exterior of said nozzle when said guard and said nozzle are coupled

together, said air barrier providing a layer of thermal insulation between said guard and said nozzle.

22. A device for sanitizing a bottled water dispenser with steam, the device comprising:

a housing;

a heating element configured to generate steam in said housing;

an outlet of said housing, said outlet being configured to dispense steam from said housing; and

a nozzle adapted to engage an opening of a bottled water dispenser leading to a fluid flow path, said nozzle being designed to flow couple the outlet of the housing with the opening of the bottled water dispenser to thereby cause a sanitizing steam environment within the fluid flow path of the bottled water dispenser.

23. The device of claim 22, further comprising a steam tube coupling said outlet of said housing with said nozzle.

24. The device of claim 22, further comprising a guard configured to couple with the nozzle for shielding a hand of an operator from steam flowing from the nozzle.

25. The device of claim 24, wherein said guard and said nozzle are configured so that an air barrier is formed between an interior of said guard and an exterior of said nozzle when said guard and said nozzle are coupled together, said air barrier providing a layer of thermal insulation between said guard and said nozzle.

26. The device of claim 22, further comprising an adapter configured to removably seal with an opening of a reservoir of the bottled water dispenser, said adapter having an inlet configured to flow couple with the nozzle.

27. A method of sanitizing a potable liquid dispenser, the method comprising:

- transporting a portable boiler to a location of a potable liquid dispenser;
- generating steam in the portable boiler at the location of the potable liquid dispenser;
- flow coupling an outlet of the portable boiler with an opening of the potable liquid dispenser, the opening leading to a fluid flow path of the potable liquid dispenser;
- flowing steam through the outlet of the portable boiler;
- flowing steam into the fluid flow path through the opening of the potable liquid dispenser; and
- maintaining steam flow through at least a portion of the fluid flow path for a time period sufficient to sanitize said portion of the fluid flow path.

28. The method of claim 27, wherein the potable liquid dispenser is a dispenser for dispensing water, and wherein the transporting includes transporting the portable boiler to the location of the water dispenser.

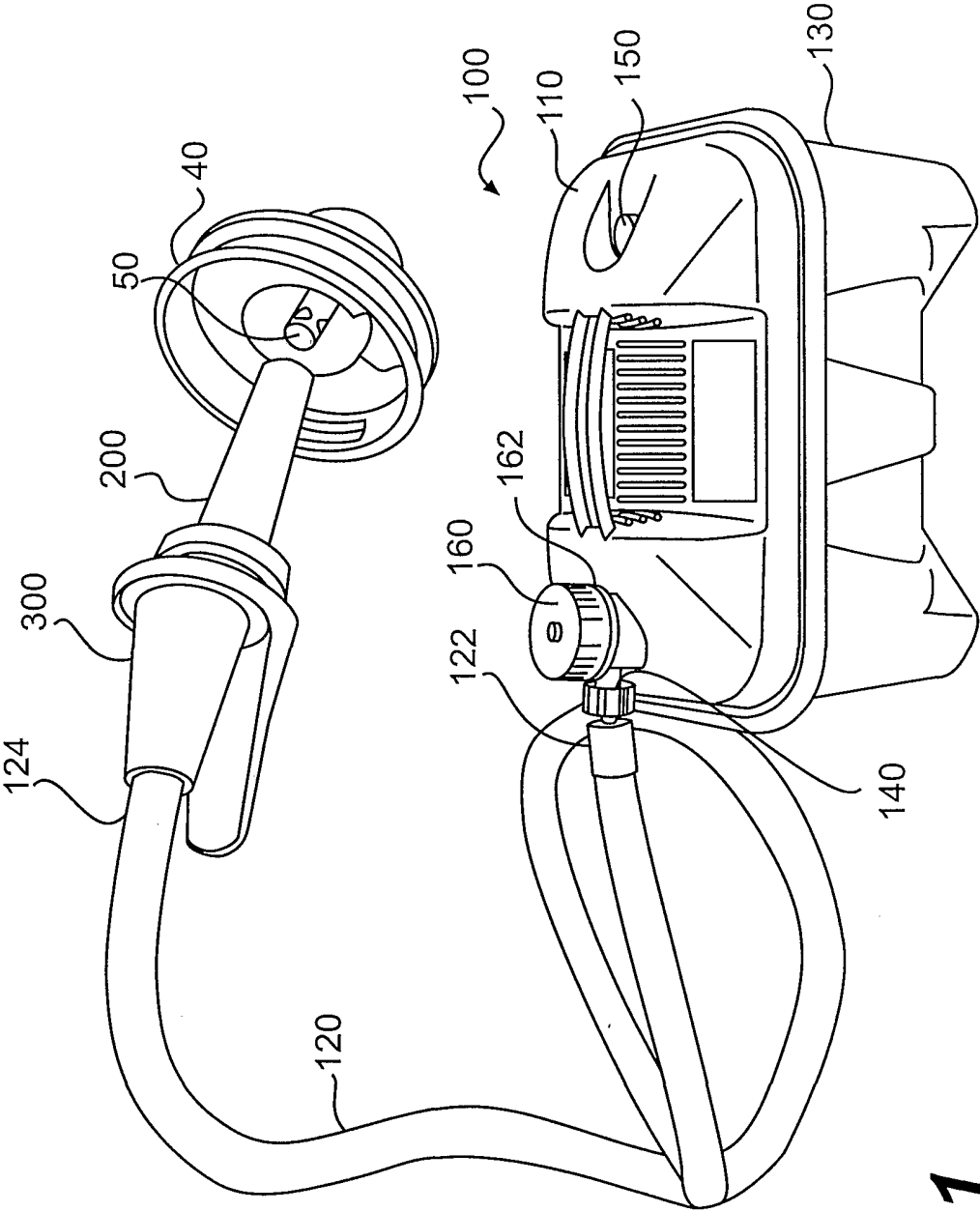


FIG. 1

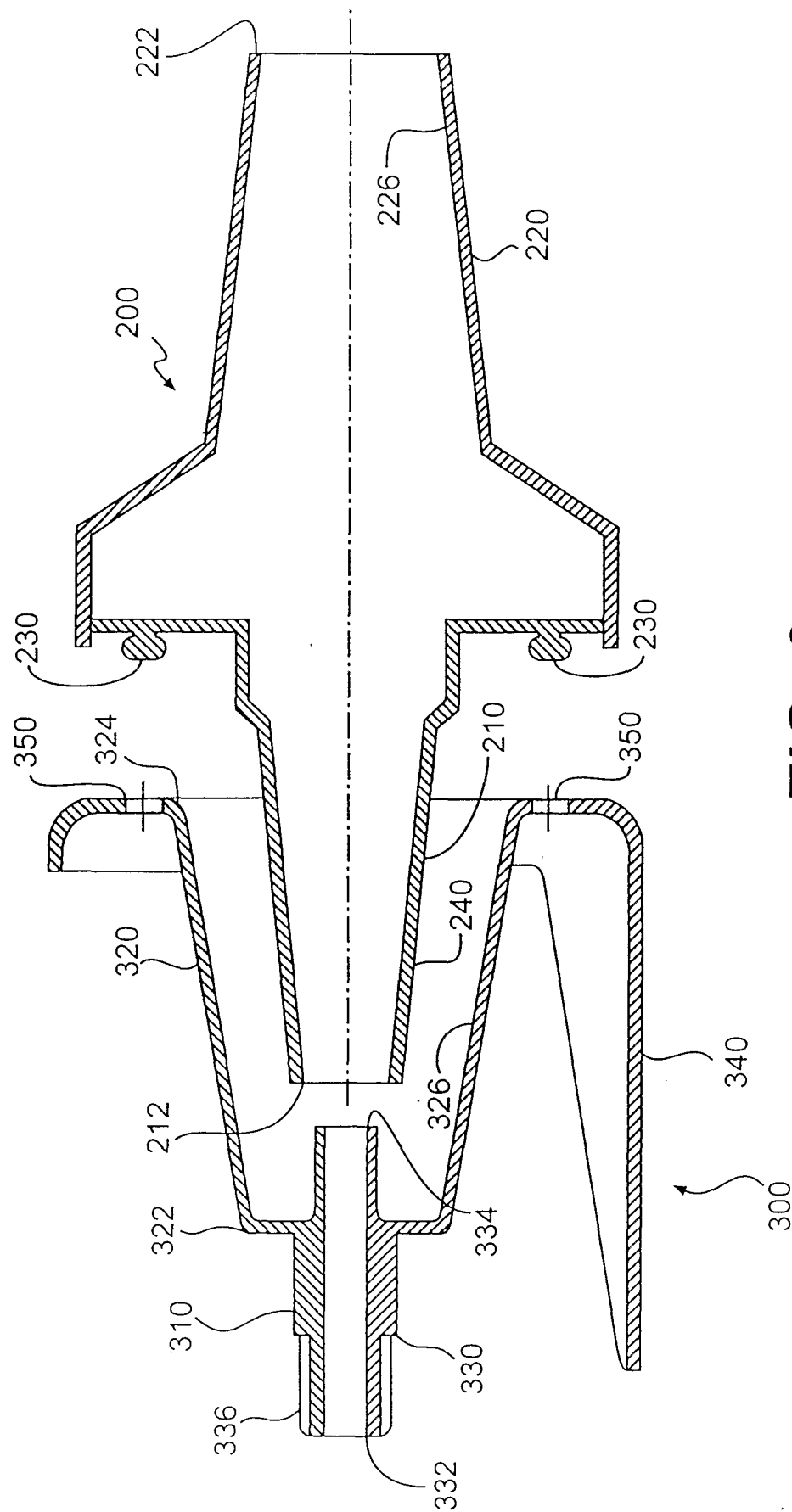
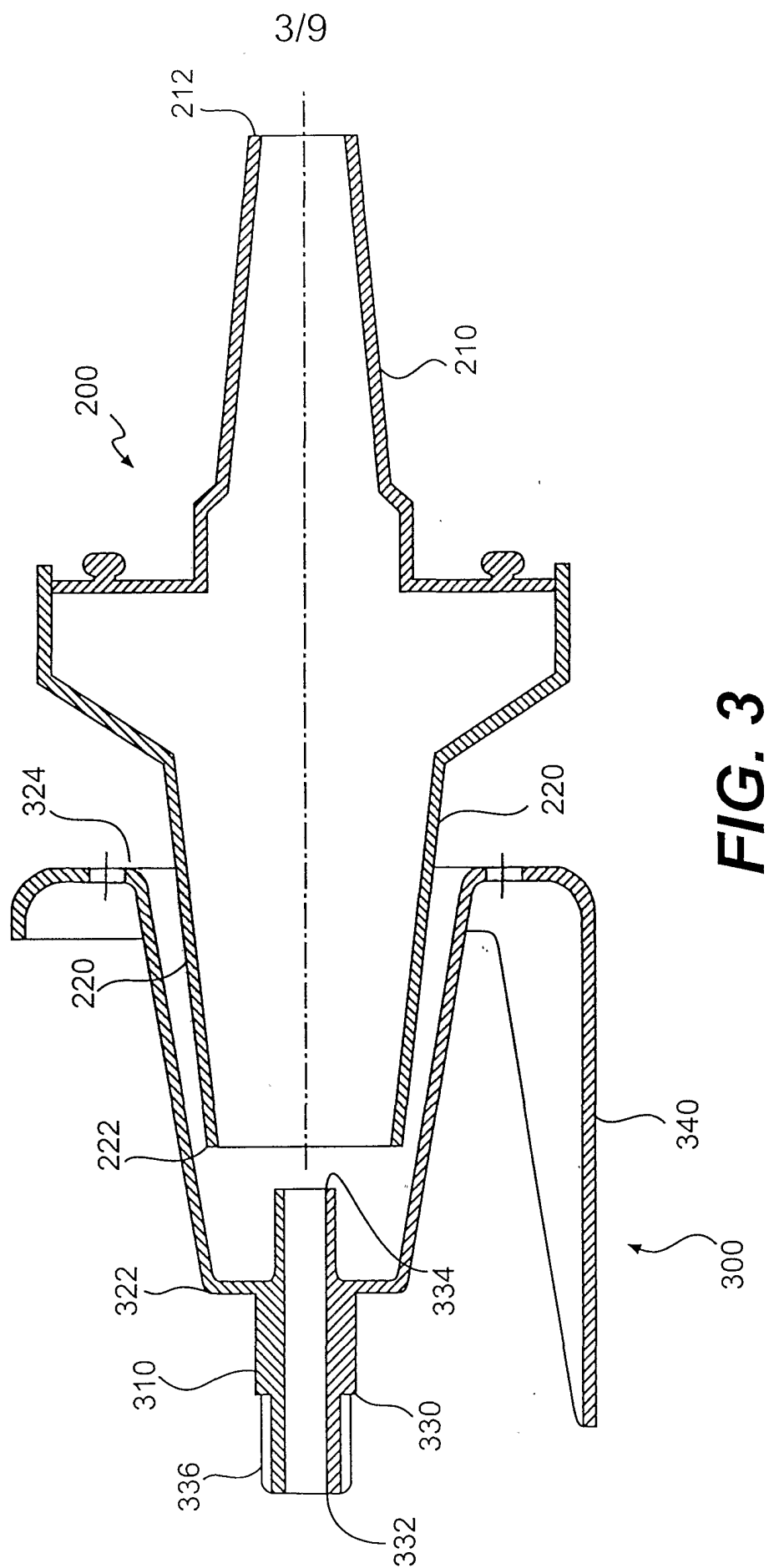
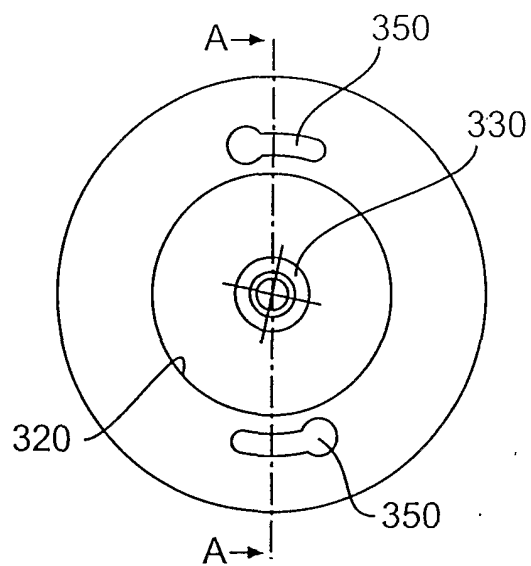
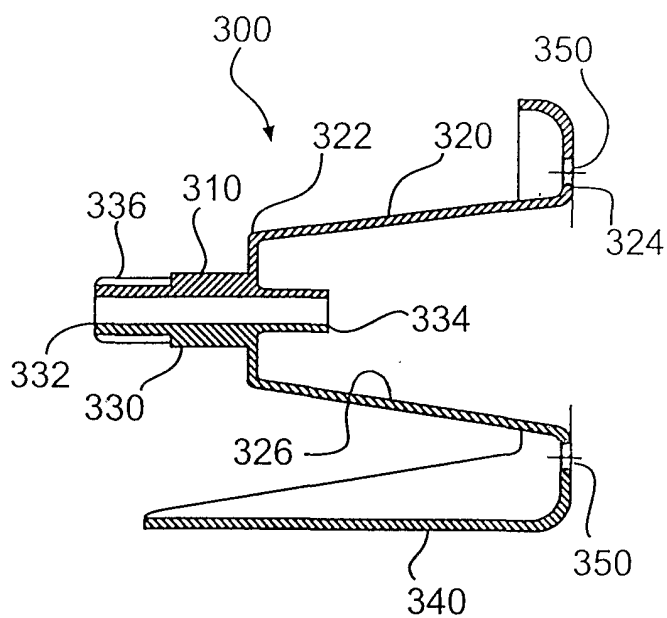
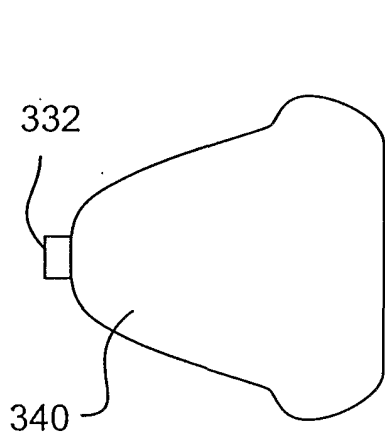
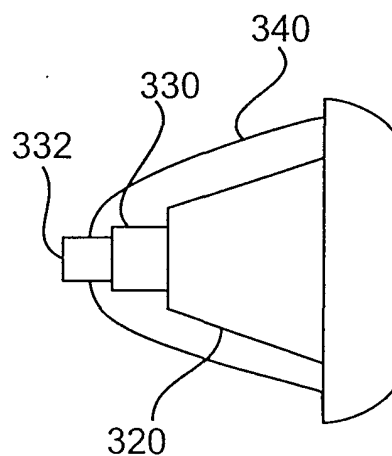


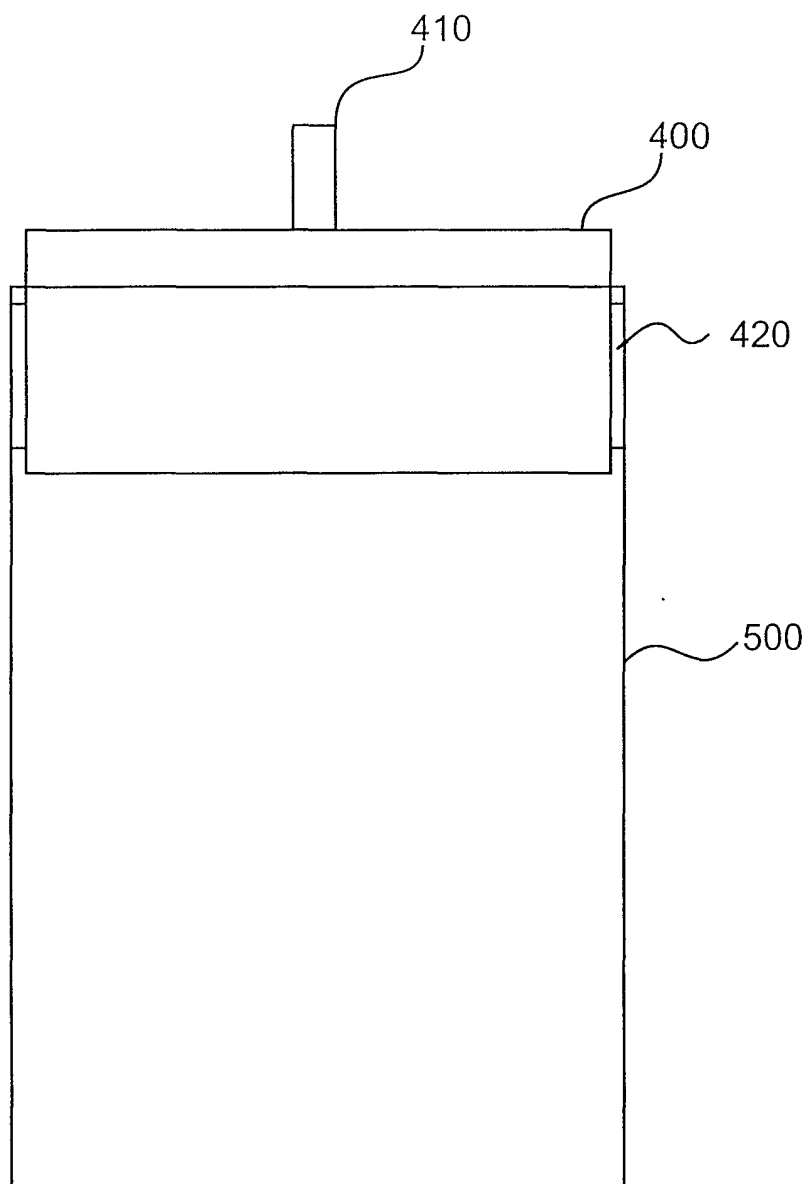
FIG. 2



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**FIG. 4A****FIG. 4B****FIG. 4C****FIG. 4D**

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**FIG. 5**

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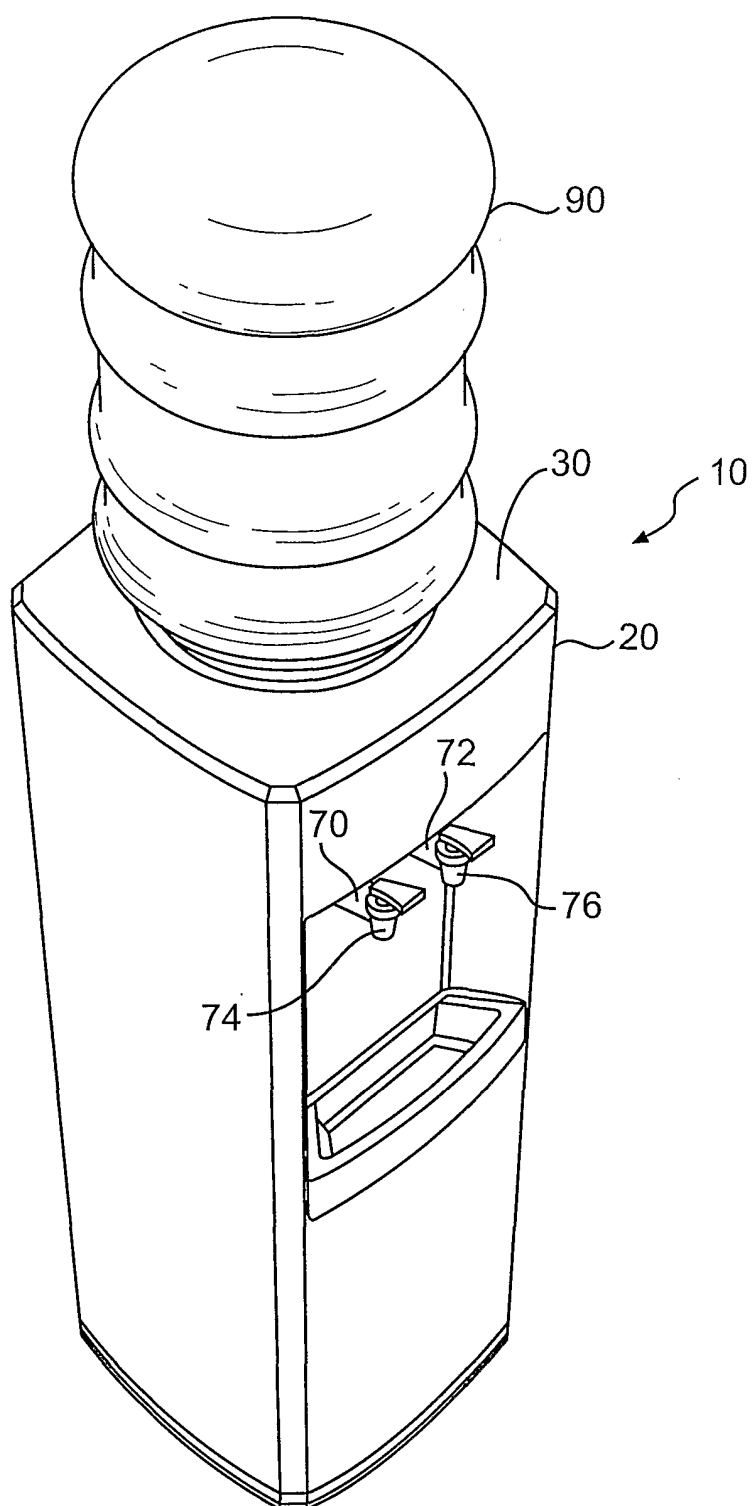


FIG. 6
PRIOR ART

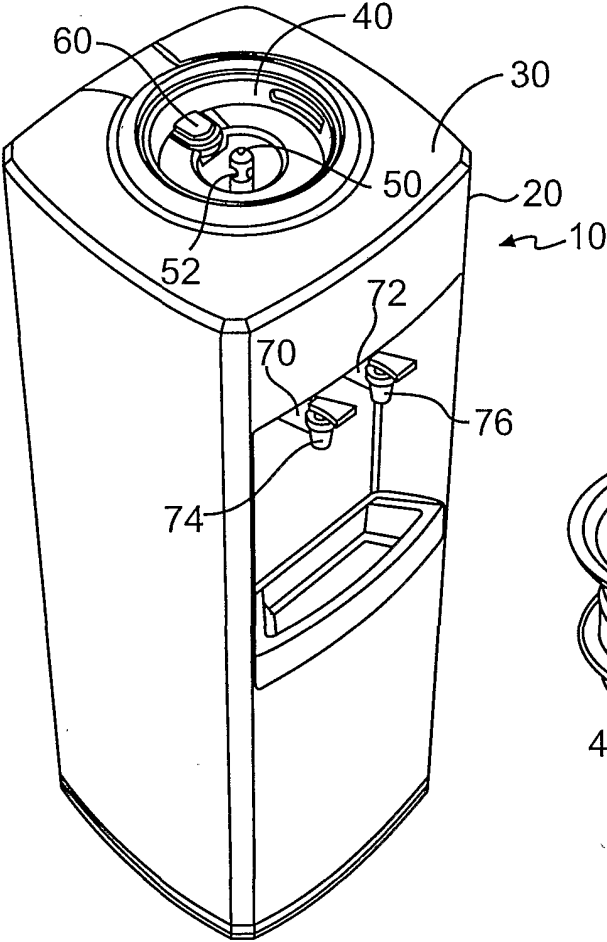


FIG. 7
PRIOR ART

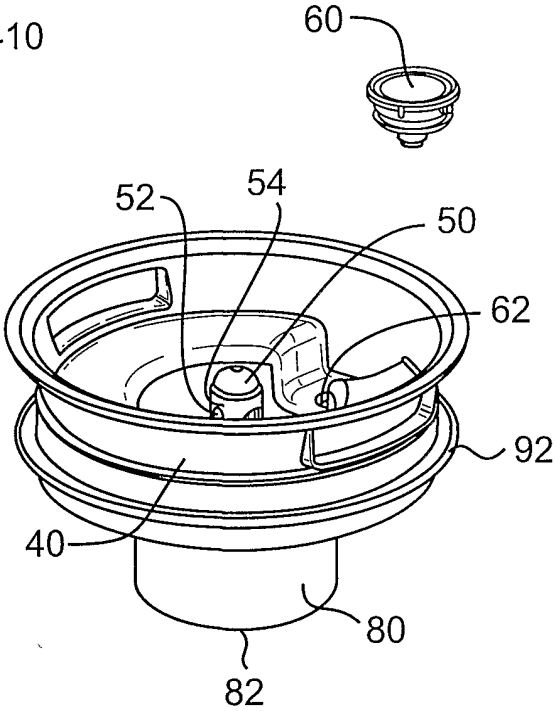


FIG. 8
PRIOR ART

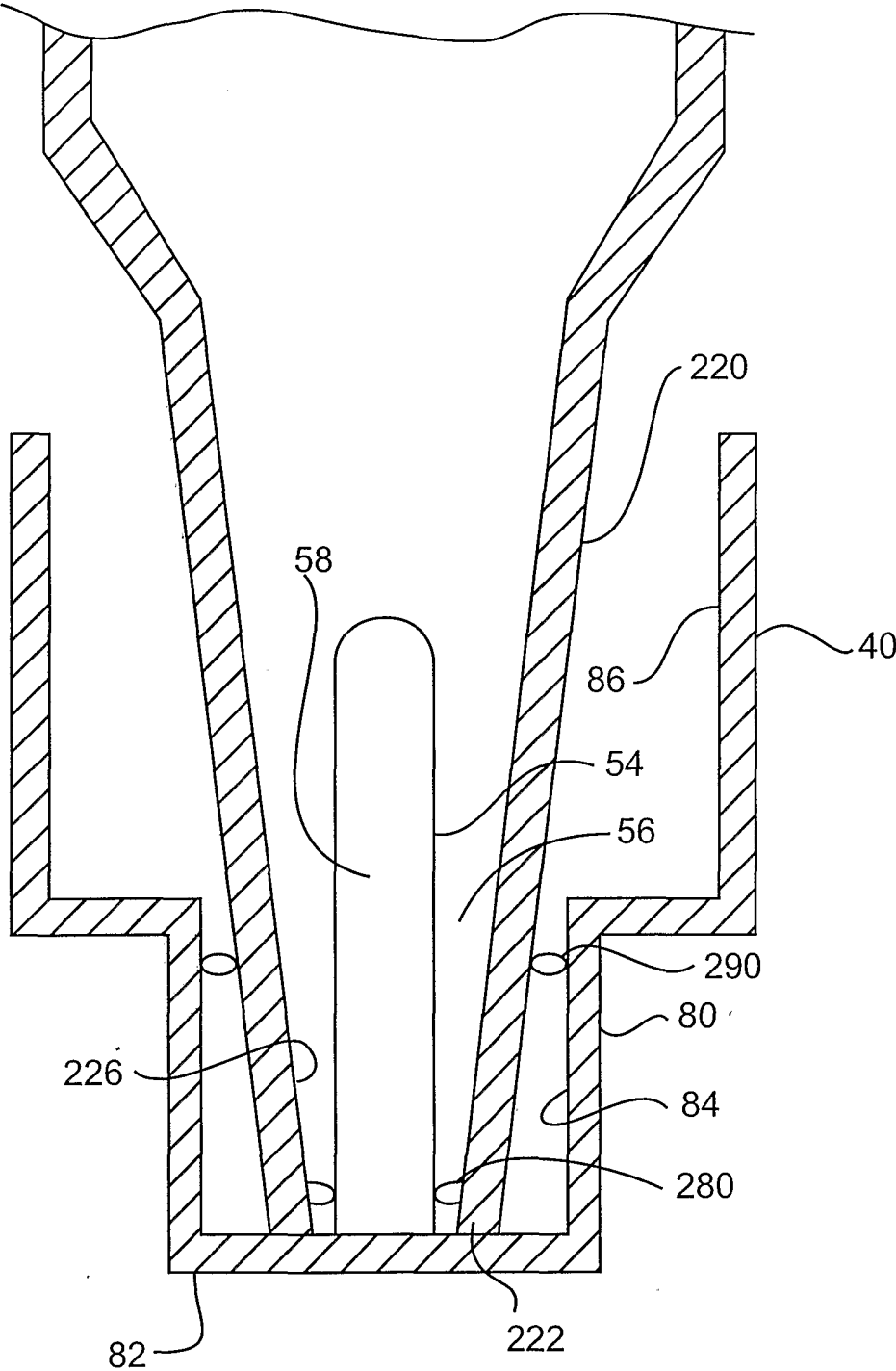
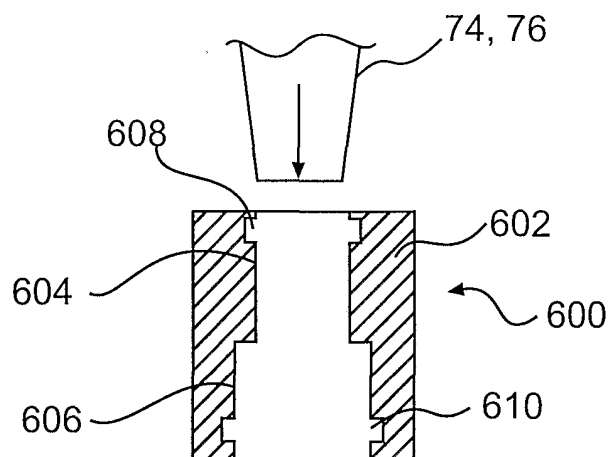
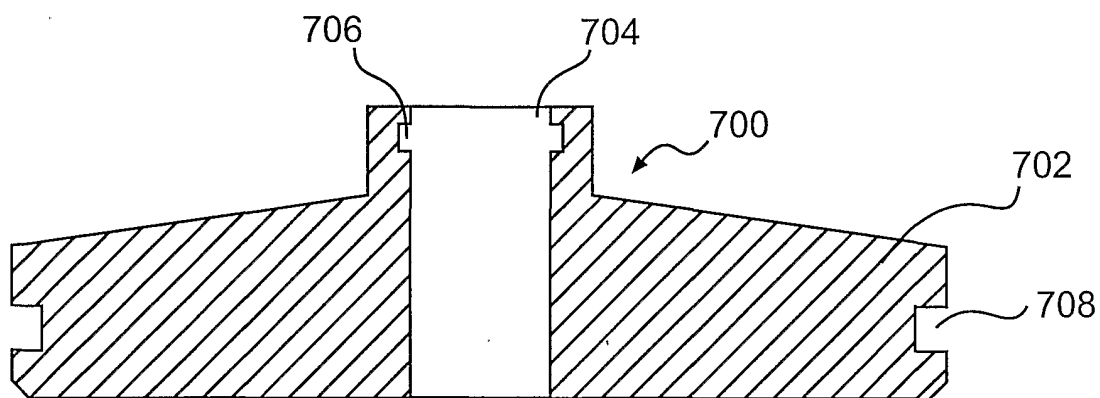


FIG. 9

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**FIG. 10****FIG. 11**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/01980

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61L 2/07; B08B 3/00

US CL : 422/26, 292, 298; 137/15.04; 141/92; 222/148; 62/389

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 422/26, 292, 298; 137/15.04; 141/85, 89, 91, 92; 222/148, 149, 151; 62/389

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,328,059 A (CAMPBELL) 12 July 1994 (12.07.94), see entire document.	1-28
X	US 5,649,575 A (TILL) 22 July 1997 (22.07.97), see entire document.	18, 22-24
A, P	US 6,085,540 A (DAVIS) 11 July 2000 (11.07.00), see entire document.	1-28

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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04 April 2001 (04.04.2001)

Date of mailing of the international search report

26 APR 2001

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