

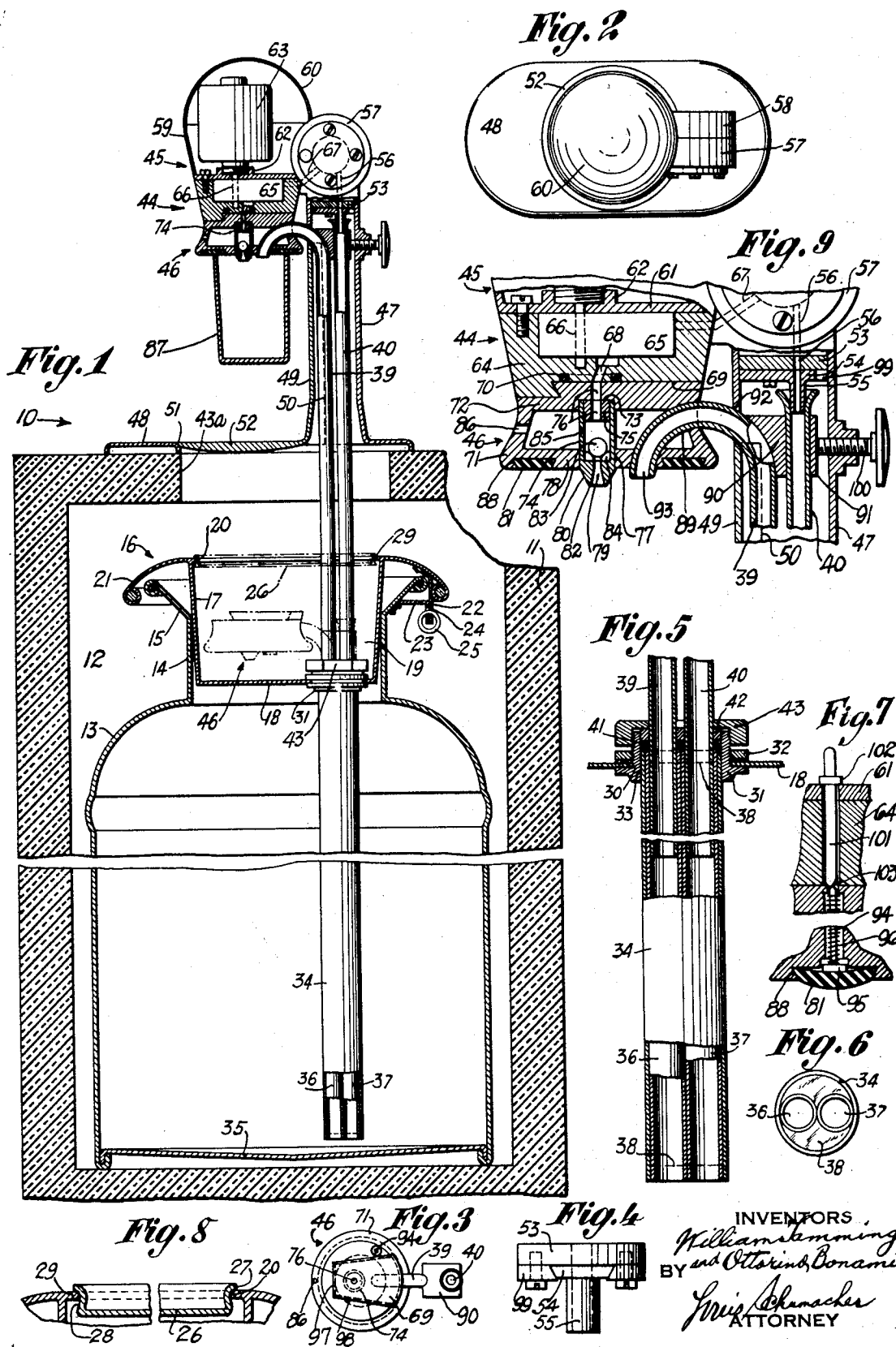
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W. TAMMINGA ET AL

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LIQUID DISPENSER

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LIQUID DISPENSER

William Tamminga and Ottorino Bonami, New York, N. Y., assignors to Robert E. Corradini, New York, N. Y.

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This invention relates to liquid dispensers, and has particular reference to sanitary devices of this character that are adapted to measure the quantity of liquid dispensed.

One object of the invention is to provide a device of the character described having improved automatic means delicately responsive to the level of a liquid for accurately cutting off the flow thereof in order to effect a reliable measuring action.

Another object of the invention is the provision of a device of the nature set forth having improved collapsible or detachable means, or both, to facilitate the cleaning of the device, and more specifically, to permit the portions of the device through which a flow of liquid occurs to be housed in conjunction with the liquid supply container for reshipment with the latter to the liquid supply or canning plant.

A further object of the invention is to construct a device of the class alluded to having relatively few and simple parts, and which is inexpensive to manufacture and assemble, convenient, expeditious, durable, reliable, and efficient in use.

Other objects and advantages of the invention will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists in the novel combinations and arrangements of parts hereinafter described in their preferred embodiments, pointed out in the subjoined claims, and illustrated in the annexed drawing, wherein like parts are designated by the same reference characters throughout the several views.

In the drawing:

Figure 1 is a view in vertical section of a device embodying the invention.

Fig. 2 is an enlarged top plan view of the pump portion of the device.

Fig. 3 is a top view of a removable unit of the pump means.

Fig. 4 is an enlarged view in elevation of the suction tube attaching means.

Fig. 5 is an enlarged fragmentary sectional view of a tubular means and mounting therefor.

Fig. 6 is a bottom end view thereof.

Fig. 7 is a fragmentary sectional view of a switch actuator.

Fig. 8 is an enlarged fragmentary sectional view of the auxiliary cover for the can cover.

Fig. 9 is an enlarged fragmentary sectional view of the pumping means and connections therefor.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in one and the same structure, but, useful devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which the invention appertains, that the same may be incorporated in several different constructions. The accompanying drawing, therefore, is submitted merely as showing the preferred exemplification of the invention.

Generally described, the invention relates to fluid or liquid dispensers of the type disclosed in our application, Serial No. 617,330, filed June 15, 1932. The invention may include a member having a plane downward facing ring seat of resilient material for fluid tight removable engagement with the rim of a container or glass that is to be filled with liquid. A pump operated by an electric motor may have its suction side connected to the member within the ring seat to communicate with the removable container and evacuate air therefrom so that liquid will flow into the container through a liquid inlet similarly connected to said member. The suction passage may terminate in an upright tubular element whose lower end may project into the removable container and whose upper and lower ends may be constricted to form upper and lower ports controlled by a freely movable ball valve in the tubular element. Spacing means, or merely the air inflow caused by the suction tend to maintain the valve spaced from the lower port to permit the air inflow, but when liquid enters the constricted lower port, it impinges the light or hollow ball valve to project the same upward to close the upper port, the suction holding the ball valve against the latter. Such impingement may be increased by having the lower end of the tubular element terminating in an annular sharp edge to permit a drop of liquid to be torn away at said edge to impinge on the ball valve, whereby it is unnecessary to have a larger quantity of liquid to actuate the ball valve and wet the same, with a possible formation of a hardened deposit, as in the case of milk. In this manner, the instant that contact of the liquid with the sharp edge occurs, the flow of liquid stops, assuring accurate measurement. Intermediate of the upper and lower ports, an air inlet of such size as not to materially affect the suction when the ball valve is down, may break the suction on the removable container when the ball valve closes the upper port, and hence renders easier the removal of

said container. A switch for the motor is responsive to a movement of a portion of the resilient ring seat, so as to close the motor circuit when the removable container is seated on the ring and to open the circuit when the container is removed. The positive suction pump will of course act as a brake for the motor. The liquid to the liquid inlet is supplied by a tube extending into a liquid tank. A second tube may supply the air discharged by the pump into the liquid in the tank for agitating the same. The tank may have a cover connected thereto by a seal which may be broken at the liquid supply plant for cleaning the tank. The two tubes may be receivable in a compartment of the cover and may be slidable therethrough, if desired, so that the tubes may be housed in the container and cover for convenient reshipment to the plant. Preferably all parts through which liquid flows, and including the ball valve and tubular element are returned to the plant for cleaning, and hence may for convenience be permanently mounted on a tube and detached from the pump. Desirably the tube for the agitating air is likewise disconnectible for a like reason, and suitable seating members may coact between the tubes and their respective mating elements for ease and reliability in assembling the members as a unit, or otherwise, and all these detachable parts are receivable in the compartment in the cover. The latter compartment may have its own removable cover.

Referring in detail to the drawing, 10 denotes a device embodying the invention. The same may include a conventional refrigerator 11, the compartment 12 of which is adapted to receive any well known liquid container 13. The latter may have a neck 14 and a conoidal mouth 15. For closing the container, a suitable cover 16 may be provided, which may have a side wall 17 and a bottom wall 18 providing a receptacle or compartment 19 which is adapted to set into the neck 14. The compartment 19 may have a top opening 20, and an annular flange 21 adapted to overlie the mouth portion 15. Secured to said flange in a downward extending arm 22 engageable in side by side relation with an arm 23 connected to the mouth portion 15, the arms 22, 23 having registering holes 24 through which frangible sealing ring 25 may be passed to hold the cover locked in closing position. The compartment 19 may be closed by an auxiliary cover 26 which may have an annular flange 27 outwardly snap into an annular lip 29 of the opening 20.

The bottom wall 18 of the compartment 19 may have an opening 30 for receiving a bushing 31 secured by a locknut 32. Connected to the bushing at 33 is a pipe 34 which extends downward into the container 13 into proximity to the bottom wall 35 of the latter. Mounted in the pipe 34 are one or more tubes 36, 37 which extend from end to end thereof and have their surrounding spaces sealed by plates 38 at said ends, for sanitary reasons. Slidably fitted in the tubes 36, 37 are the respective suction tube 39 and air feed tube 40. A packing 41 and a gland 42 therefor may be fitted around the tubes 39, 40 within the bushing and so as to bear against the upper plate 30, and a packing nut 43 may act on the gland to compress the packing and render the joint for the telescoping tubes 36, 37 fluid tight.

The refrigerator 11 may have a top opening 43a through which the tubes 39, 40 may extend

into cooperation with a suitable pumping means 44. The latter may be split into two units 45, 46, as will be described in detail hereinafter, the part 46 including connections secured to the upper ends of the tubes 39, 40 for detachable engagement with the unit 45 to complete the pump means. The parts are so proportioned that the tubes 39, 40 are movable downward in tubes 36, 37 in the container 13 until the upper ends of the tubes 39, 40 together with the unit 46 are housed within the compartment 19, that may be closed by cover 26, as shown in dot-dash lines in Fig. 1. Then again, on removal of the latter, the unit 46 and tubes 39, 40 may be moved upward through opening 43a and engaged with the unit 45.

Mounted on the member 11, is a hollow standard 47 having a base 48 secured to the member. Said standard may have a removable section 49 engaging the main standard section along a line 50. The base 48 may have an opening 51 which is closed by a removable cover 52 which may be of one piece construction with the section 49. The upper end of the standard 47 may be closed by a plate 53 to which may be secured a member 54 having a downward extending tube 55 adapted to be snugly removably received in the upper end of air tube 40 which may have its edge flared for guiding engagement. The passage of the tube 55 may be in register with a passage 56 extending through the plate 53 and into a filter 57 schematically shown. An electrical switch means 58 similarly shown may extend alongside of the filter 57, and the means 57, 58 may include casings secured to the standards, and on which casings may be mounted the unit 45.

The unit 45 may include a casing 59 having a removable cover 60. The bottom wall 61 of said casing may have a hub 62 for engaging a corresponding hub of an electric motor 63 having a vertical axis. Secured to the bottom wall 61 is any well known pump 64 having means 65 including any suitable pumping elements actuated by the motor shaft 66. This pump may communicate with the filter 57 through an outlet passage 67. An inlet passage 68 may extend from the pump to the plane seat 69 and a sealing ring 70 that may be of rubber may be provided in said seat so as to extend around said passage.

The unit 46 may include a casing 71 having a top wall 72 formed with a recess 73 into which is permanently fitted an upright tubular element 74. The latter may be closed at its upper end by a plug 75 and a central passage 76 may extend through said plug and the wall 72 into register with the passage 68. The tubular element 74 may extend through the casing 71 and may have its lower end tightly fitted in an opening 77 of the lower wall 78. The lower end of said tubular element may be constricted to afford an intake orifice 79 which may be of Venturi form, if desired, this orifice being preferably embodied in a spud portion 80 which projects downward below the surrounding seat 81, and whose external surface may be conoidal or otherwise arranged so that the lower annular edge 82 of the orifice is relatively thin or sharp. Within the tube 74 is disposed a valve 83 which is so constructed and coordinated with its surrounding parts as to permit a flow of air through orifice 79 and passage 76, but which is responsive to liquid to raise the valve and control a flow controlling means such as the passage 76. For example, the valve 83 is spaced from the side walls of the tubular element 74 and may desirably be in the

nature of a ball which may freely gravitationally seat to close the orifice 79, but is preferably spaced thereover by a plurality of angularly spaced projections 84. Intermediate of the orifice 79 and the port 76, an air inlet or pin hole 85 may be provided adapted to communicate with the closed compartment of casing 71 and with an opening 86 in the wall of said compartment, which opening 86 may be larger than that at 85, and the latter being smaller than orifice 79 and port 76.

The invention utilizes a sufficient clearance in the tube 74 around the ball 83, and the port 79 being sufficiently small relative to the clearance to cause the stated operation to occur. If the area of port 79 were equal to that of the tube 74, no lifting of the ball would occur. If the clearance between the tube 74 and the ball 83 were very small, the ball would be lifted by the stream of air to close the outlet port 76. By making ball 83 larger in diameter than the port 79, and allowing ample clearance in 74 around the ball 83, the latter cannot be lifted sufficiently to close the outlet 76, except by the liquid. How great the clearance is in tube 74 is immaterial providing it is not so great as to permit the ball 83 to fall to a side when impinged by the liquid. The ball must be held in alinement with port 79. How much smaller the port 79 is than the ball is likewise immaterial, it being sufficient that it be large enough to afford a sufficient passage for a gas and liquid. If the seat 84 be used, the gas will not float the ball 83, and the latter may be static, until the liquid strikes it. The outlet 76 need not be of any particular size, since a pressure condition may prevail in tube 74. It is the velocity or momentum of a fluid which performs the work on the ball. The latter may be relatively heavy or very light in weight, the latter condition rendering the ball much more sensitive and operative by a small particle of liquid.

Extending about the orifice 79, the seat 81 may consist of a ring shaped element of resilient or elastic material such as rubber and arranged to afford a plane downward facing seat for removable engagement with the rim of a separate container or tumbler 87. The ring 81 may be secured to the wall 78 in any suitable manner as by being dovetailed thereinto at 88.

The liquid supply tube 39 may have at its upper end a gooseneck portion 89 which may be secured to a block 90 having a portion 91 engaging around the adjacent end of the tube 40, whereby these tubes are interconnected in a unit. The gooseneck portion 89 may project from the standard through a recess 92 and thence through the casing 71 so that the outlet end 93 thereof lies within the ring 81. In this manner, the tubes 39, 40 are permanently fixed to the unit 46.

In order to control the operation of the motor 63, the switch 58 therefore may be actuated by a rod 94 having a head 95 bearing down on a portion of the ring 81 intermediate of the edges thereof, under the force of an expansion coil spring 96 taking about the rod. The general construction and method of operation of the switch is disclosed in our copending application above referred to.

To permit engagement and disengagement of the units 45 and 46, a connection in the nature of a dovetail joint 97, 98 may be provided along the seat 69 between upper wall of the compartment 71 and the lower adjacent wall of the pump

64. The side dovetails may diverge sufficiently as shown in Fig. 3 to cause the engagement to be effected by a small sliding movement between the parts. Likewise the plate 54 may have similar dovetail engagement at 99 with the plate 53, the tubes 39, 40 being adapted to be sprung, and having sufficient clearance in the standard 47 to permit the joint at 99 to be engaged and disengaged. A screw 100 threaded in a wall of the standard and bearing against the element 91 serves to spring the tubes toward the left and hence causes simultaneous engagement at the joints 99 and also at the joint 97, 98 for assembling the device. To break the rod 94 in order to permit the engagement and disengagement aforesaid, the rod may terminate in the plane of the seat 69 as shown in Fig. 7, and a companion rod 101 alined with the rod 94, may extend freely through the wall of the pump 64 and through the bottom wall 61 of the casing 59 to actuate an element of a switch. To support the rod 101 when rod 94 is withdrawn along with the unit 46, a stop shoulder 102 may be provided on the former. The lower end of the rod 101 may have a cam portion 103 to facilitate interengagement with rod 94 when the unit 46 is moved toward the left into operative engaging position.

The manner of using the invention will now be described. The container 13 is received filled with a liquid such as milk, the cover 16 being sealed thereon, the tubes downwardly telescoped with unit 46 disposed within the cover compartment 19 as shown in dot dash lines in Fig. 1, and the cover 26 closing said compartment. The container 13 is inserted in any suitable manner into the refrigerator 11, as through a lateral opening therein, and the means 49, 52 and cover 26 removed. Then the unit 46 is raised, moving tubes 39, 40 upward as a unit and into the standard 47. The unit 46 is moved up against the seat 69, and the screw 100 applied, springing the tubes leftward to cause engagement of unit 46 with unit 45 along the dovetail connection and simultaneous similar dovetail connection between plates 53, 54. At the same time rod 94 moves into alinement with rod 101, and upon replacing member 49, 52, the device is completely assembled. To disassemble the device, the screw 100 is loosened causing reverse movements, with unit 46 received in compartment 19, which may be closed by cover 26.

To obtain a liquid, the container 87 is applied to the seat 81, causing rods 94, 101 to move upward to close the switch for the motor which operates the suction pump 64. Air is drawn from 87 through ports 79, 76 and expelled into the container 13 through passage 67, filter 57 and tubes 40, 37. Under the influence of suction, liquid flows up tubes 36, 39 and discharges into 87. When the liquid contacts edge 82, the suction in the surrounding pocket tears off a drop of liquid which is accelerated through orifice 79 to propel valve 83 upward to close suction port 76. The hole 85, whose effect was immaterial, now releases the suction on the container 87, so that the latter can be readily removed, whereupon the switch opens the motor circuit.

We claim:

1. A liquid dispenser including an upright tubular means having its upper and lower end portions contracted to form ports, a positive suction means communicating with the upper port to remove a gas for exerting a suction in the tubular means, and a valve freely movable

in the tubular means and normally resting on the lower end portion of the tubular means in close proximity to the port thereof, the lower port being the sole opening at the lower portion of the tubular means and being normally at the lower end of the tubular means, the lower port being sufficiently constricted to constitute a velocity producing orifice and said valve overlying the same as an obstruction, said valve being movable upward to close the upper port and being substantially unaffected in normal position by the suction in the tubular means, and said valve being adapted to maintain the upper port closed under the influence of the suction of the suction means when once the valve is caused to seat against the upper part by liquid entering and accelerated upward through the lower port to impinge on the valve and project the same upward into closing position in relation to the upper port.

2. In a liquid dispenser adapted for instantaneous positive control of a liquid level in a container, including means for causing a flow of liquid into the container, including means for causing a suction on the container and having a port, a valve movable to close the port but being normally remote therefrom and being substantially unaffected by the suction in said position, and impact causing means for instantaneously actuating the valve, the impact causing means including a tube communicating with the suction means and having at its lower end an orifice closely underlying the valve and sufficiently constricted to cause liquid entering the orifice to be accelerated upward into the tube to impinge on the valve and cause the latter to move into operative relation to the suction port, and the valve being adapted to be maintained in port closing position by the suction at the port.

3. A liquid dispenser having a chamber, said chamber having a bottom orifice for communication with a container that is to be filled with a liquid, means to cause a flow of liquid into said container, and means to control the first mentioned means for obtaining a required liquid level in the container, including a movable element in said chamber normally overlying said orifice in relative proximity to and in coaxial relation therewith, said orifice being downwardly diverging and being constricted at its upper end in close proximity to the element, whereby when the liquid in said container enters the orifice a portion of liquid is projected upwardly through the orifice with increased velocity at said constriction so as to elevate said element.

4. A liquid dispenser including an upright tubular means having a port at its upper end and an orifice at its lower end, means for causing a flow of liquid into a container, including a suction means communicating with the port, the orifice being communicable with the container to be filled with liquid, and a freely movable valve in the tubular means normally axially overlying the orifice in close proximity thereto, said valve being movable upward to close said port and being unaffected in normal position by the suction of the suction means, said orifice being downwardly diverging, whereby a portion of the liquid entering the lower portion of the orifice is accelerated upward through the orifice under the influence of the suction means to project the valve upward into engagement with said port, with the valve being maintained in port closing position by the suction of the suction means.

5. In a liquid dispenser having means to con-

trol a liquid flow through a pipe, the combination of a liquid container, a removable cover therefor having a compartment and a top opening therefor, a removable secondary cover for the top opening, a pipe extending slidably through the compartment for movement at will with the upper end of the pipe projecting through said opening or with the lower end of the pipe extending into the container and said upper end housed in said compartment, and sealing means for interengaging the pipe with the first mentioned cover, and a valve means forming a part of the flow controlling means and being connected to the pipe and wholly movable therewith into said compartment.

6. In a fluid dispensing device having a pump, the combination of a container, a removable cover therefor, a tube communicating with the container slidably through the cover, seating means for detachably interconnecting the pump and tube and including a plurality of interengageable members respectively connected to the pump and the tube, and the cover including a compartment adapted to wholly receive the seating member of the tube and a portion of the tube.

7. In a liquid dispensing device having pump means, the combination of a container, a cover detachably connected thereto, said cover having a compartment having bottom and side walls and a top opening, a secondary removable cover for the top opening, a liquid tube and an air tube movably connected to said bottom wall to communicate with the container, means for connecting said tubes with said pump, including separate interengageable elements on the pump and tubes, and the tubes and their elements being receivable in said compartment.

8. In a liquid dispensing device having pump means, the combination of a container, a cover detachably connected thereto, said cover having a compartment having bottom and side walls and a top opening, a secondary removable cover for the top opening, a liquid tube and an air tube movably connected to said bottom wall to communicate with the container, means for individually connecting the tubes to the inlet and outlet of the pump respectively, said means including separate relatively slidable engageable elements on the pump and the tubes, means for causing the elements on the tubes to engage as a unit with the elements on the pump, and said tubes and their elements being separable from the last mentioned means and receivable in said compartment.

9. A liquid dispenser including a suction pump, a tube having a port communicating therewith, said tube having an inlet orifice and an air inlet between the port and orifice, and a ball valve in the tube and adapted to gravitationally move toward said orifice to restrict the same and to be moved past the air inlet by a liquid entering the orifice so that said valve is in port closing position.

10. A liquid dispenser including a member, a rubber ring affording a downward facing plane seat for engagement with the rim of a removable liquid container, said ring being continuously connected along its peripheral inner and outer edges to said member and having a portion intermediate of said edges free of the member, a switch actuatable by the intermediate portion on moving a container into engagement with the ring, and a suction pump and a liquid inlet connected to said member within the ring to com-

municate with the container, the suction pump being controlled by the switch.

5 11. In a liquid dispenser having a pump, the combination of a liquid container, a removable cover therefor having a top opening compartment, a pipe extending movably through the compartment into the container, a head having a downward facing seat for removable engagement with a receptacle to be filled with liquid, said
10 head being connected to the upper end of said pipe in communication therewith and being connectible to said pump, said head and the upper end of said pipe being wholly removably receivable in said compartment.

15 12. In a liquid dispensing device having a suction pump, the combination of a liquid container, a removable cover therefor having a top opening compartment, a pipe extending movably through said compartment and into said container, a liquid discharging head connected to
20 and communicating with said pipe, said head having means for detachable connection with

said pump and having a valve to control the suction created thereon by the pump, said head being movable as a unit with the pipe and being wholly receivable in the cover compartment.

13. In a fluid dispensing device having a pump, 5 the combination of a substantially closed container having a wall provided with a recess, said recess constituting an externally opening compartment, a tube connected to the container through said wall, seating means for detachably
10 interconnecting the pump and tube, and including a plurality of seatably interengageable members respectively connected to the pump and tube, a flow controlling means including a valve mounted on the element connected to the tube, 15 the latter having a portion movable into and out of said compartment, and said compartment being adapted to wholly receive the seating member of the tube and the flow controlling means.

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WILLIAM TAMMINGA.
OTTORINO BONAMI.