

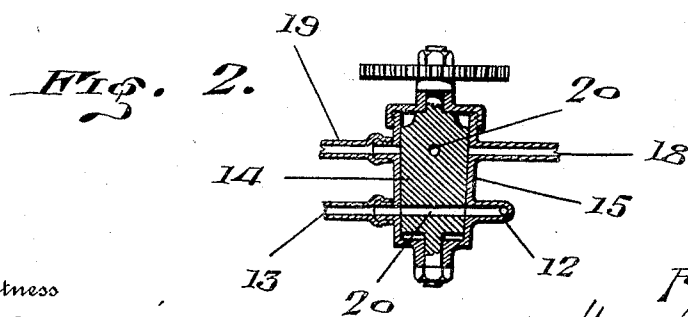
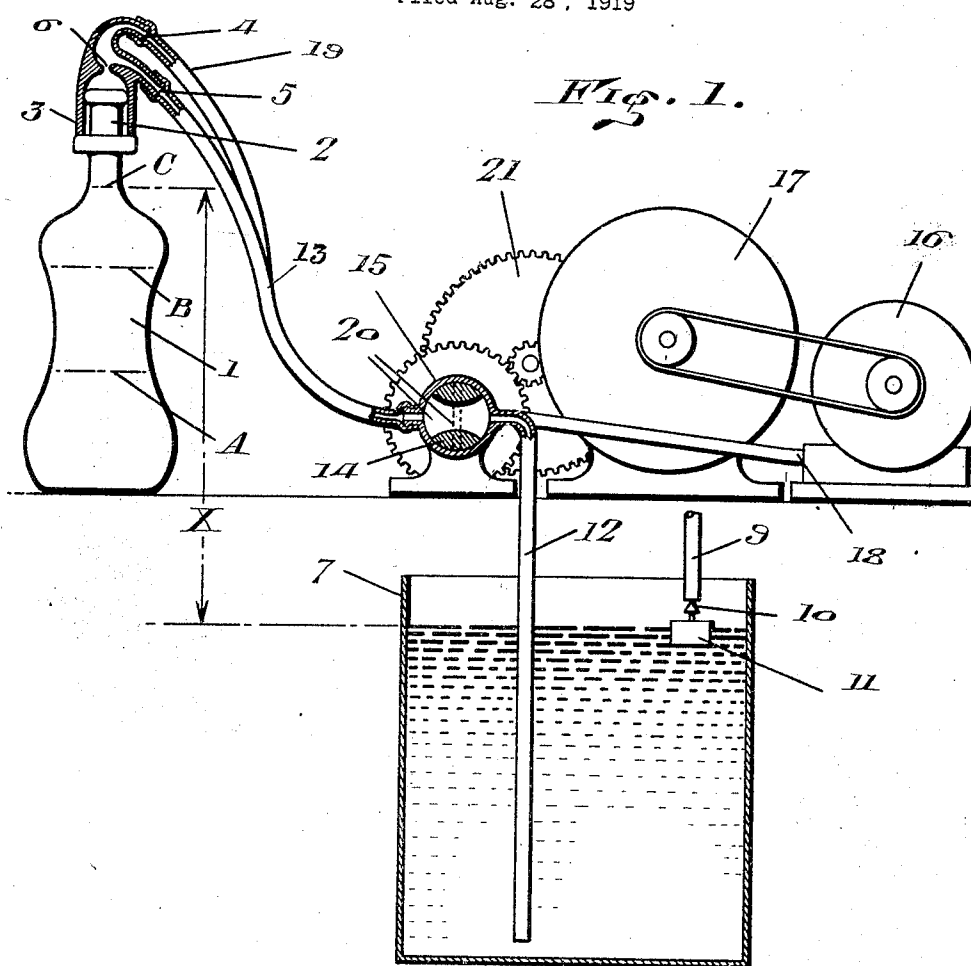
April 22, 1924.

F. L. SHELOR

1,491,071

APPARATUS FOR FILLING VESSELS

Filed Aug. 23, 1919



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR FILLING VESSELS.

Application filed August 28, 1919. Serial No. 320,526.

To all whom it may concern:

Be it known that I, FREDERICK L. SHELOR, a citizen of the United States, and residing at Salem, in the county of Roanoke and State of Virginia, have invented certain Improvements in an Apparatus for Filling Vessels, of which the following is a specification.

The present invention relates to an apparatus for filling bottles and other vessels, and aims to provide a novel and improved apparatus for conveniently and efficiently filling bottles and other vessels having small necks, being especially useful with such vessels, but also useful with vessels having larger mouths if desired.

By way of explanation, it may be stated, that bottles or other vessels, such as are used for shaking liquid therefrom in small drops, having necks of restricted or small cross section, are difficult if not impossible to fill with ordinary methods. It is difficult to pour the liquid into the bottle, due to the extremely small passage through the neck, through which the liquid can not flow into and the air flow out of simultaneously. Vacuum apparatus, such as shown in my copending applications, Serial No. 226,808, filed April 5, 1918, and Serial No. 238,503, filed June 6, 1918, can not readily be used to advantage, in view of the fact that the tubular stems that are required to enter the neck, would of necessity be of such small diameter, that they would break and become clogged easily. Some of these bottles have an opening or passage through the neck as small as one sixteenth of an inch in diameter, which precludes the practical simultaneous admission of liquid into the vessel and the removal of air therefrom. This invention has been devised with the object of filling such bottles or vessels in a commercially successful way, without requiring prohibitive time, labor or expense, and without waste of the liquid.

A further object is the provision of such an apparatus enabling bottles to be filled successfully by an inexperienced operator, without requiring but a simple manipulation of the apparatus, the operation being practically automatic aside from the application and removal of the filler head with respect to the bottles or vessels.

Another object is the provision of means for alternately creating a partial vacuum in

the vessel and admitting liquid, whereby such alternate withdrawal of air and admission of liquid will by a series of such alterations fill the vessel to the desired level, without over filling or spilling the liquid.

With the foregoing and other objects in view, which will be apparent as the invention is more fully understood, the invention resides in the method and apparatus herein-after described, it being understood that changes can be made within the scope of what is claimed without departing from the spirit of the invention.

The apparatus is illustrated in its simple form in the drawing, wherein:—

Fig. 1 is a side elevation of the apparatus, portions being shown in section.

Fig. 2 is a sectional detail of the valve.

The apparatus is shown in its simple embodiment in the drawing, for filling one vessel at a time, although it will be understood at the outset, that a number of vessels can be filled simultaneously by duplicating the filler heads and corresponding parts, as suggested in said applications. The numeral 1 designates a bottle or vessel such as used for shaking small drops of perfume, toilet-water, salad dressing or the like, molded with a small neck 2, the opening or passage of which is of restricted diameter. This provides for the restricted discharge of the liquid when the bottle is inverted or shaken, but, by so restricting the opening of the neck, it becomes a difficult matter to fill the bottles by methods and apparatus heretofore used.

In carrying out the invention, a filler head is provided to seal the mouth or neck of the bottle and provide for the withdrawal of air and entrance of liquid. This filler head has a cap or hood 3 composed of rubber or other resilient material, and is of a size to fit snugly and tightly over the head of the neck, to seal the interior of the bottle from the atmosphere. The cap when moved down over the neck, embraces the neck, and affords convenient means for applying the filler head to the bottle, the filler head being moved over the neck instead of into the neck as disclosed in said applications. The cap 3 has an air outlet nipple 4 extending upwardly therefrom, and a liquid inlet nipple 5 extending laterally from the base of the nipple 4 immediately adjacent to the top of the cap. The nipple 4 thus

extends upwardly above the nipple 5, so that any liquid entering the filler head through the nipple 5 will gravitate downwardly into the cap instead of rising into the nipple 4. The opening 6 between the nipple 4 and chamber of the cap 3 is of restricted size, thereby eliminating the liability for the liquid dripping through said opening or aperture 6 when the filler head is removed or lifted from the bottle. This filler head can be manually applied to and removed from the bottles in succession and can be operated by mechanical or other means, or the bottles can be applied to and removed from a stationary filler head, which, however, is more difficult and open to greater objection, as the filler head can be more easily handled than the bottle.

The supply of liquid with which the bottles are filled, is contained within a suitable reservoir or tank 7 that is located below the level of the bottle and point of filling, requiring the raising of the liquid to enter the bottle. The liquid is supplied into the reservoir 7 through a supply pipe 9 leading from another tank or source of liquid, and the level of the liquid in the reservoir 7 is maintained by a valve 10 controlling the flow from the pipe 9 and operated by a float 11 in the reservoir. It is important, with a possible few exceptions, to maintain the level of the liquid in the reservoir 7 at a predetermined distance X below the level to which the bottle is to be filled, as indicated in Fig. 1, for reasons hereinafter more fully set forth.

A tube or pipe 12 extends upwardly from within the reservoir 7 to conduct the liquid therefrom, and is connected to a tube or pipe 13 that is in turn fitted on or connected to the liquid nipple or inlet 5 of the filler head. The connection between the tubes 12 and 13 is made through a controlling valve having the valve member 14 rotatable within a casing 15. The tube 13 is preferably of rubber or flexible material, thereby permitting of the manipulation of the filler head in applying it to and removing it from the bottles in succession.

The apparatus also includes means for creating a relatively high vacuum, for which purpose a suction pump 16 is used, being driven by an electrical motor 17 or other prime mover, so as to obtain a practically continuous even sub-atmospheric pressure. A tube or pipe 18 leading from the suction port of the pump 16 is connected to a tube or pipe 19 that is fitted on or attached to the air nipple 4 of the filler head, said tube 19 also being flexible similar to the tube 13. The tubes 18 and 19 are connected through the medium of the controlling valve, a single valve being shown for controlling both the air and liquid although separate valves can be used, as will be apparent to one

skilled in the art. The valve member 14 has passages 20 therethrough for alternately establishing communication between the liquid and air conduits, and this valve member is rotated so as to alternately and successively establish the flow of liquid and air. Various means can be used for so rotating the valve, and, as shown, the valve geared, as at 21, to the motor 17, so as to rotate at a relatively slow speed continually during the operation of the apparatus, so as to continually and automatically operate said valve. The passages 20 of the valve member can be so arranged as to permit the liquid passage or conduit to remain open longer than the air passage, in view of the fact that the flow of air can be much quicker than the flow of liquid. In other words, the air conduit need not be left open as long as the liquid conduit, because the same volume of air can flow through the tubing much faster than the liquid.

In operation, to carry out the method, it will be noted that when the filler head is removed from the bottle, the liquid will fall back down the liquid conduit, when the valve opens said liquid conduit, and when the air conduit is opened, air will be drawn from the atmosphere through the filler head, without carrying any liquid with it. To fill the bottle, the cap 3 of the filler head is slipped down over the neck of the bottle, and after the bottle is filled, this cap is withdrawn, which is all the manual effort required. The filler head is held down on the bottle until it is filled, and the operation of filling the bottle is as follows: When the air conduit is opened by the valve, the liquid conduit is closed, and vice versa. Therefore, the opening of the air conduit will result in the pump 16 withdrawing the air from the vessel, creating a high vacuum therein. The valve then closes the air conduit and opens the liquid conduit, so that the liquid will, in response to the suction created by the vacuum and air pressure on the liquid in the tank 7, flow upwardly through the tubes 12 and 13 and downwardly into the vessel. The liquid will gravitate from the nipple or inlet 5 through the opening 6. This fills the bottle 1 up to the first level A, and the liquid conduit is then closed by the valve and the air conduit again opened which will again create a vacuum in the bottle, after which the continued rotation of the valve closes the air conduit and opens the liquid conduit, so that the liquid again flows into the bottle to satisfy the vacuum. This fills the bottle up to the second level B, and the third operation will fill the bottle up to the filling level C. It will ordinarily require three of these operations to fill the vessel, although this may vary with different bottles and other conditions. Thus, as the vessel is filled step by step, the air space

above the liquid in the vessel becomes smaller each time, thereby decreasing the amount of liquid which enters the vessel during the successive intermittent filling operations.

5 When the bottle becomes filled up to the desired level, determined by the distance X between the filling level of the bottle and the level of the liquid in the reservoir 7 the filling of the vessel is practically stopped because of the balancing of the pressures in the liquid tube and on the liquid in the reservoir. It is a simple matter to stop the filling of the vessel at a predetermined level, when such level has been reached, by removing the filler head, a sufficient interval being permitted for the removal of such filler head without danger of over-filling the vessel. Thus, the flow of liquid through the tube 13 will continue intermittently until the weight of the fluid in said tube above the liquid level in tank 7, plus the air pressure above the liquid in tube 13, balances the atmospheric pressure on the liquid in the tank 7. When this condition occurs, the filling of the bottle or

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vessel is stopped due to the balance thus obtained. The operator can, however, by ob-

servation, remove the filler head from the bottle at any desired level to which the bottle is filled, should this be preferred. Another advantage gained by the present arrangement, is the absence of any overflow of liquid from the vessel, so that no liquid will enter the air conduit. This eliminates the necessity for an overflow trap, such as disclosed in said applications.

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Having thus described the invention, what is claimed as new is:—

An apparatus for filling vessels comprising an air suction conduit, means for exhausting the air from said conduit, a liquid conduit to communicate with a reservoir, a filler head for connecting said conduits with the vessel and sealing the mouth of the vessel, a valve device controlling the flow through said conduits for intermittently establishing the flow of air and liquid alternately with respect to one another, and means for operating said valve device continually.

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In testimony whereof I hereunto set my hand this 22nd day of August, 1919.

FRED. L. SHELOR.