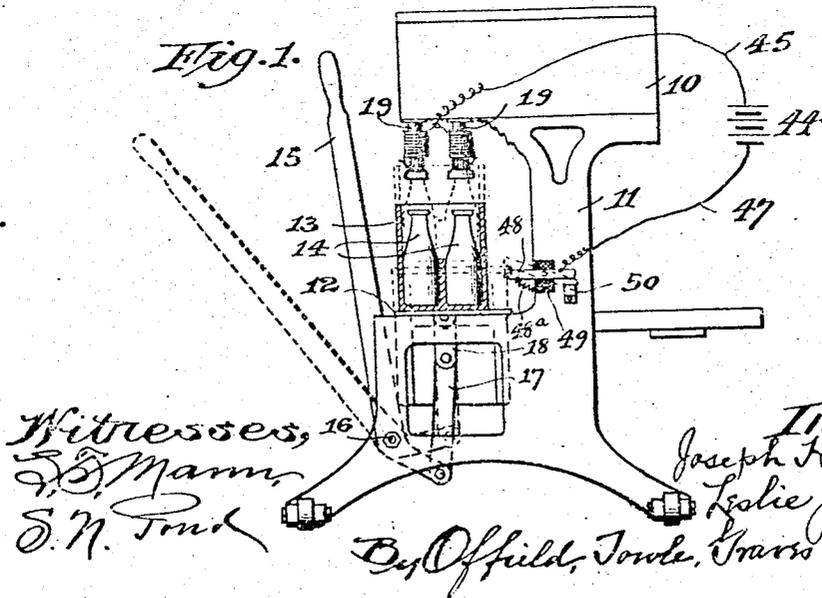
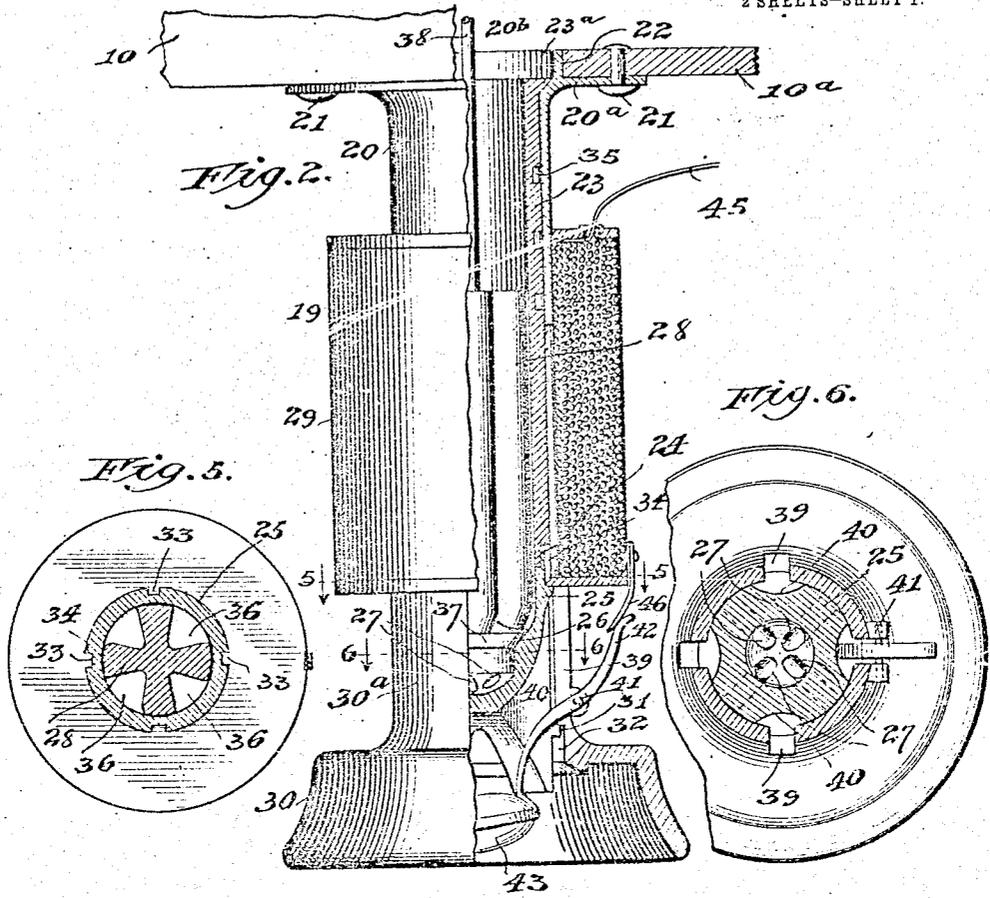


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 BOTTLE FILLING DEVICE.
 APPLICATION FILED OCT. 18, 1909.

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2 SHEETS-SHEET 1.



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To all whom it may concern:

Be it known that we, JOSEPH H. GODFREY and LESLIE J. HOUSEL, both citizens of the United States, residing, respectively, at Chicago, in the county of Cook and State of Illinois, and at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Bottle-Filling Devices, of which the following is a specification.

This invention relates to devices for filling bottles and similar receptacles, and has reference more particularly to that type of filling mechanism wherein a valve controlling the flow of liquid to the bottle is opened through the agency of an electro-magnet when the empty bottle has been suitably positioned relatively to the filling device to receive the liquid, and is subsequently closed by the automatic deenergizing of the magnet to cut off the flow of liquid to the bottle when the latter has been filled to the proper height.

The main object of the present invention is to produce a device of the character mentioned of increased simplicity, efficiency and reliability of operation, and low cost of manufacture and maintenance, as compared with analogous devices at present in use; other objects being to provide a thoroughly sanitary device which may be readily cleaned, and which will automatically operate to insure the complete filling of the bottle or other receptacle to the desired extent.

To these ends the invention consists in the matters hereinafter described and more particularly pointed out in the claims.

Our invention will be readily understood when considered in connection with the accompanying drawings, which illustrate one practical mechanical form in which the same may be embodied, and in which—

Figure 1 is a side elevational view of a multiple bottle-filling machine of a known and common type having our present improvements applied thereto. Fig. 2 is an enlarged view, partly in side elevation and partly in vertical section, of the filling valve and its controlling devices, the same being shown in the relative positions occupied by the parts when idle. Fig. 3 is a central vertical sectional view of the mechanism shown in Fig. 2, the parts appearing in the relative

positions which they assume when an empty bottle has been presented in proper position for filling. Fig. 4 is a similar view to Fig. 3, broken off above the valve, and showing the relative positions which the parts assume when the bottle has been filled and is about to be removed; and Figs. 5 and 6 are cross-sectional details on the lines 5—5 and 6—6 of Fig. 2, respectively.

Our present improvements relate chiefly to the means for controlling the flow of the liquid from an overhead tank or reservoir through a valve-controlled delivery spout into the open upper end of a bottle; and these improvements are herein illustrated as applied to a machine for filling milk bottles, although it will be understood that the kind or character of the fluid handled by the machine is entirely immaterial to the invention itself.

Referring to Fig. 1, 10 designates a tank or reservoir suitably supported on a frame 11, this latter having a vertically slidable platform 12 adapted to support a crate 13 containing a charge of bottles 14, said platform being actuated from a hand lever 15 pivoted at 16 to the frame of the machine and connected to the platform by links 17 and 18. Communicating with and depending from the bottom wall 10^a of the tank 10 are a series of delivery spouts designated as an entirety by 19, such spouts corresponding in number and arrangement with the bottles carried by the crate 13, all as usual in machines of this class.

Referring now more particularly to those features of improvement wherein our present invention resides, and which have to do chiefly with the delivery spout 19 and the means for controlling the flow of the liquid there-through, 20 designates a short tube section having at its upper end a horizontal flange 20^a by which it is secured to the bottom wall of the tank 10 as by rivets 21, the upper end of said tube section registering with an aperture 22 formed in the bottom wall of the tank and preferably having a short vertical flange 20^b snugly fitting said aperture. Removably supported and guided within the tube section 20 by means of an enlarged or flared upper end 23^a engaging a correspondingly shaped seat in the tube section 20 is the upper section 23 of a delivery spout of

brass or other non-magnetic material, the lower end of which has a screw-threaded connection at 24 with the lower-section 25 of said spout, the latter being formed with a valve-seat 26, and, beneath the latter, with a plurality of downwardly divergent ducts 27 leading to and through the lower end of the lower spout section 25. Slidably mounted within the delivery spout, thus formed, is a valve-stem 28 constituting the armature of an electro-magnet, the spool of which is shown at 29 as surrounding the depending tube section 20 and delivery spout 23, 25. The magnet spool is slidable vertically for a limited distance, and is supported by and upon the hollow stem 30^a of an underlying bell 30, this latter in turn being slidably mounted upon the lower section 25 of the delivery spout, and supported on the latter in its lowermost position by lateral lugs 31 on the spout section engaging the upper ends of short vertical grooves 32 in the interior wall of the neck of the bell. To prevent a turning movement of the magnet spool around its longitudinal axis, we may provide the lower head of the spool with one or more short tongues 33, best shown in Fig. 5, which engage vertical grooves 34 formed in the upper end of the lower section 25 of the delivery spout.

The upper section 23 of the delivery spout is preferably provided with one or more small external circumferential grooves or channels 35 (Figs. 2 and 3) that become filled with liquid that may leak down between the delivery spout and the surrounding tube member 20 and constitute a liquid packing to prevent further leakage of the liquid beyond the lower end of the supporting tube section 20. It will be observed by reference to the cross-sectional view, Fig. 5, that the armature 28 which slidably engages the interior wall of the delivery spout is so formed as to permit the ready flow of the liquid thereby. As herein shown it has the form in cross-section of a Maltese cross, which provides ample passages 36 between the arms thereof; but the particular form of the armature is immaterial, so long as it permits the flow of the liquid therethrough or therearound. Fast on the lower end of the armature 28 is a valve 37 adapted to cooperate with the valve-seat 26 in a manner to control the flow of the liquid through the delivery ducts 27 beneath the valve-seat. As shown, the valve 37 is adapted to close by gravity, but it may, of course, be spring-actuated in its closing movement, if desired. The armature 28 is preferably provided at its upper end with an upwardly extending stem 38 which forms a convenient handle for its removal, when required for purposes of cleaning.

The neck 30^a of the bell 30 is vertically

slotted at intervals therearound, these slots being clearly shown at 39 in Fig. 6, for the purpose of permitting free escape of the air from the bottle as the latter is filled; the lower section 25 of the delivery spout also being externally grooved or channeled at points opposite the slots 39, as shown at 40, to further facilitate the free escape of the air therearound. Pivoted at 41 in one of the slots 39 is a lever 42, the upper arm of which constitutes a contact device or switch, while its lower arm extends downwardly into the mouthpiece 30 and supports a float 43 disposed substantially centrally of the mouthpiece.

44 (Fig. 1) designates a battery, or other source of electrical energy, from one side of which leads a circuit wire 45 connected to the upper end of the winding of the magnet spool, the lower end of said winding terminating in a depending contact strip 46 extending below the lower end of the magnet spool and insulated therefrom and adapted to cooperate with the upper contact arm of the float lever 42. The opposite side of the generator 44 is connected by a circuit wire 47 with a master-switch 48 pivotally mounted on the metallic frame 11 and insulated therefrom by a suitable insulating strip indicated at 49. The master-switch 48 is normally held open by a spring 48^a and at one end projects into the path of movement of the platform 12, while its opposite end cooperates with a contact-piece 50 secured to and grounded on the frame 11. From this it will be seen that, when the master-switch has been closed by the raising of the bottles to filling position, as indicated in dotted lines in Fig. 1, the circuit is from one side of the battery through the wire 47, master-switch 48, contact 50, frame 11, tank 10, metallic supporting parts of the magnet spool and mouthpiece (comprising tube section 20, delivery spout 23, 25, and neck 30^a of the mouthpiece), float lever 42, contact-strip 46, magnet winding, and circuit wire 45 back to the opposite pole of the generator; the circuit thus including two switches, 42 and 48, the opening of either of which opens the circuit and deenergizes the magnet.

The operation of the mechanism will be readily understood from a consideration of the various positions of the parts successively represented in Figs. 1, 2, 3 and 4. Fig. 1 shows in full lines the relative positions of the parts when the filling mechanism is idle and a crate of empty bottles is about to be introduced thereto, Fig. 2 showing the relative positions of the valve and its controlling devices at such time, wherein it will be seen that the valve 37 is closed. As the lever 15 is operated to raise the platform 12 and carry the bottles into registration with the bells 30, as shown in dotted

lines in Fig. 1, said table strikes and raises the adjacent end of the master-switch 38, thus closing the circuit (the contacts 42 and 46 being closed at this time by the gravity of the float 43). As the upper end of each bottle engages its cooperating bell 30, it raises the latter a slight distance, at the same time raising the magnet spool; and, the latter being in a live condition, the valve 37 is simultaneously raised through the attraction of the valve-stem or armature 28, and the liquid at once begins to flow past the open valve through the ducts 27 into the bottle, the position of the parts at this stage being represented in Fig. 3. As the bottle becomes filled to the desired or required height, as indicated in Fig. 4, the float 43 is raised, thereby breaking the circuit at 42, 46 and deenergizing the magnet, whereupon the valve 37 instantly falls to closed position, all as shown in Fig. 4. The subsequent lowering of the crate of filled bottles permits the several mouthpieces and the magnet spools supported thereby to drop, thus again closing the contacts 42 and 46, as shown in Fig. 2, but at the same time opening the master-switch 48, so that no current is wasted during the intervals when the crate of filled bottles is being removed and a crate of empty bottles substituted, or the machine is otherwise idle.

It will be observed that in case froth or foam forms on top of the liquid in the bottle in quantity sufficient to raise the float and close the valve, upon the subsidence of such froth or foam the float drops, automatically reclosing the circuit, energizing the magnet, and opening the valve, and permitting the flow of more liquid into the bottle. In this way the complete filling of the bottle to the desired or required height is insured through the automatic operation of the mechanism after the bottle has been correctly positioned for filling; and this we regard as an important feature and capability of our invention. It is also to be noted that by making the delivery spout yieldable in the direction of its length perfect registration of all the bottles and the filling of all to the same extent is insured, notwithstanding slight variations in the heights of the bottles which frequently occurs. If desired, the contact strip 46 may take the form of a ring or collar entirely surrounding the lower end of the spool, in which case the keying of the spool on the delivery spout will be unnecessary.

It will be noted that the construction and assembling of the delivery spout, armature, and valve relatively to their supporting parts is such that they are readily removable and replaceable through the bottom wall of the tank without disturbing or disassembling the supporting and carrying parts, thus making the thorough cleaning and

sterilizing of the parts which come in contact with the liquid an easy and simple matter.

While we have shown what we believe to be the best and most practical mechanical embodiment of our invention, it will be evident to those skilled in the art that the specific details of structure and arrangement are capable of variation within the principle of the invention and without sacrificing any of the advantages secured thereby. Hence, we do not limit the invention to the exact and specific details and arrangement disclosed, except to the extent clearly indicated in specific claims.

We claim:

1. In a bottle-filling device, the combination with a delivery spout having a valve seat, of a valve, an electro-magnet having its spool surrounding said spout and its armature within said spout and connected to said valve, a circuit including said electro-magnet, a bell mounted on said delivery spout, and a float carried by a float-arm movably mounted on said bell, said float-arm constituting a switch to open and close said circuit under the action of the float, substantially as described.

2. In a bottle-filling device, the combination with a delivery spout having a valve-seat, of a valve therein, an electro-magnet having its spool surrounding said spout and its armature within said spout at one end directly attached to said valve, a circuit including said electro-magnet, a bell mounted on said delivery spout, and a float carried by a float-arm movably mounted on said bell, said float-arm constituting a switch to open and close said circuit under the action of the float, substantially as described.

3. In a bottle-filling device, the combination with a delivery spout and a valve therefor, of an electro-magnet controlling said valve, a circuit including said electro-magnet, a bell mounted on said delivery spout, and a float carried by a float-arm movably mounted on said bell, said float-arm constituting a switch to open and close said circuit under the action of the float, substantially as described.

4. In a bottle-filling device, the combination with a delivery spout and a valve therefor, of an electro-magnet controlling said valve, a circuit including said electro-magnet, a bell mounted on said delivery spout, and a float in said bell carried by the inner end of a float-arm pivotally mounted on said bell, the outer portion of said float-arm constituting a switch to open and close said circuit under the action of the float, substantially as described.

5. In a bottle-filling device, the combination with a spout-guide, of a delivery spout yieldably supported therein and formed with a valve-seat, a magnet spool surround-

ing said spout and keyed thereto, a bell engaging said magnet spool at one end, an armature slidably mounted within said spout, and a valve carried by said armature, substantially as described.

6. In a bottle-filling device, the combination with a spout-guide, of a delivery spout yieldably supported therein and formed with a valve seat at its lower end, a magnet spool surrounding said spout and keyed thereto with capacity for a limited sliding movement thereon, a bell slidably mounted on said delivery spout beneath and supporting said magnet spool, an armature slidably mounted within said spout and a valve on the lower end of said armature, substantially as described.

7. In a bottle-filling device, the combination with a delivery spout, of a valve controlling the flow of liquid therethrough, a movable electro-magnet the armature whereof is connected to said valve, a circuit including said electro-magnet, means to move said magnet in a direction to open said valve upon the introduction of a bottle to filling position, and means actuated by the liquid in the bottle when the latter has been filled for opening said circuit, substantially as described.

8. In a bottle-filling device, the combination with a delivery spout, of a valve controlling the flow of liquid therethrough, a movable electro-magnet the armature whereof is connected to said valve, a circuit including said electro-magnet, means actuated by a bottle when moved to filling position for moving said magnet in a direction to open said valve, and means actuated by the liquid in the bottle when the latter has been filled for opening said circuit, substantially as described.

9. In a bottle-filling device, the combination with a delivery spout, of a valve controlling the flow of liquid therethrough, an electro-magnet having a bodily movable spool and an armature connected to said valve, a circuit including said electro-magnet, means actuated by a bottle when moved to filling position for moving said magnet spool in a direction to effect the opening of said valve, and means actuated by the liquid in the bottle when the latter has been filled for opening said circuit, substantially as described.

10. In a bottle-filling device, the combination with a delivery spout having a valve-seat, of a gravity valve therein, an electro-magnet having a vertically movable spool and an armature connected to said valve to open the latter when said spool is in its raised position, a circuit including said electro-magnet, means actuated by a bottle when moved to filling position for raising said magnet spool, and means actuated by the liquid in the bottle when the latter has

been filled for opening said circuit and permitting said valve to drop to closed position, substantially as described.

11. In a bottle-filling device, the combination with a vertical delivery spout having a valve-seat, of a gravity valve therein, an electro-magnet having a spool slidably mounted on said delivery spout and an armature slidably mounted within said delivery spout and connected to said valve, said armature being so formed as to permit the flow of liquid thereby, a circuit including said electro-magnet, means actuated by a bottle when moved to filling position for raising said magnet spool, and means actuated by the liquid in the bottle when the latter has been filled for opening said circuit, substantially as described.

12. In a bottle-filling device, the combination with a vertical delivery spout having a valve-seat, of a gravity valve therein, an electro-magnet having a spool slidably mounted on said delivery spout and an armature slidably mounted within said delivery spout and connected to said valve, said armature being so formed as to permit the flow of liquid thereby, a circuit including said electro-magnet, a bell slidably mounted on said delivery spout beneath and supporting said magnet spool and adapted to be raised by a bottle when moved to filling position, and means actuated by the liquid in the bottle when the latter has been filled for opening said circuit, substantially as described.

13. In a bottle-filling device, the combination with a delivery spout, of a valve controlling the flow of liquid therethrough, an electro-magnet the armature whereof is connected to and adapted to open said valve, a circuit including said electro-magnet, a switch included in said circuit, and a float adapted to enter the neck of a bottle and operating to open said switch and deenergize said magnet when the liquid has reached a predetermined height in the bottle, substantially as described.

14. In a bottle-filling device, the combination with a delivery spout having a valve-seat, of a valve therein controlling the flow of liquid therethrough, an electro-magnet having a spool surrounding said delivery spout and an armature slidably mounted within said valve spout and connected to said valve, a circuit including said electro-magnet, a switch included in said circuit, and a float adapted to enter the neck of a bottle and operating said switch when the liquid has reached a predetermined height in the bottle in a manner to effect the closure of said valve, substantially as described.

15. In a bottle-filling device, the combination with a vertical delivery spout having a valve-seat, of a gravity valve therein, an electro-magnet having a spool slidably

mounted on said delivery spout and an armature slidably mounted within said delivery spout and carrying said valve, said armature being so formed as to permit the
 5 flow of the liquid thereby, a bell slidably mounted on said delivery spout beneath and supporting said magnet spool and adapted to be raised by a bottle when moved to filling position, a circuit including said magnet
 10 spool and bell, normally closed contact devices carried by said magnet spool and bell, respectively, and a float adapted to enter the neck of a bottle and operating to separate said contact devices and thereby de-
 15 energize said magnet when the liquid has reached a predetermined height in the bottle, substantially as described.

16. In a bottle-filling machine, the combination with a tank and a valve-controlled
 20 liquid-delivering mechanism communicating therewith, of an electric circuit and an electro-magnet therein for actuating the valve of said liquid-delivering mechanism, means for effecting registration between said liquid
 25 delivering mechanism and a bottle to be filled thereby, and a master-switch in said circuit actuated by said means for effecting registration, substantially as described.

17. In a bottle-filling machine, the combination with a tank and a valve-controlled
 30 liquid-delivering mechanism communicating therewith, of an electric circuit and an electro-magnet therein for actuating the valve of said liquid-delivering mechanism,
 35 means for moving a bottle into register with said liquid-delivering mechanism, and a master-switch in said circuit actuated by

said bottle-moving means, substantially as described.

18. In a bottle-filling machine, the combination with a tank and a delivery spout depending therefrom and formed with a valve-seat, of a gravity valve in said spout, an electro-magnet having a spool slidably
 40 mounted on said spout and an armature slidably mounted within said spout and carrying said valve, said armature being so formed as to permit the flow of the liquid
 45 thereby, a bell slidably mounted on said delivery spout beneath and supporting said magnet spool and adapted to be raised by a bottle when moved to filling position, means for raising a bottle into registration with
 50 said bell, a circuit including said magnet spool and bell, normally closed contact devices carried by said magnet spool and bell, respectively, a normally open master-switch included in said circuit adapted to be closed
 55 by said bottle-raising means as the bottle is carried into registration with said bell, and a float adapted to enter the neck of the bottle and operating to separate said contact devices and thereby deenergizing said magnet when the liquid has reached a predetermined height in the bottle, substantially as
 60 described.
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