

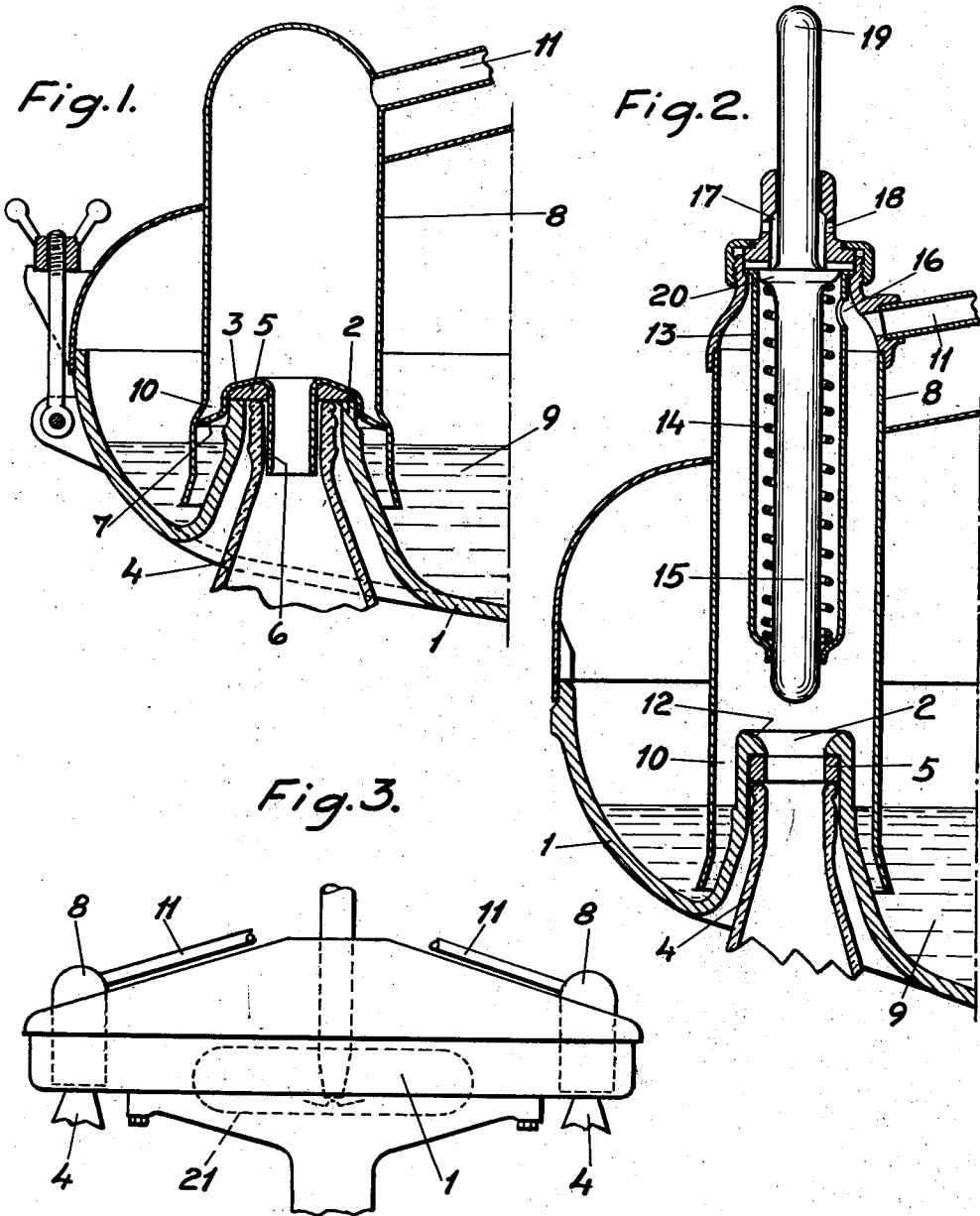
Aug. 19, 1952

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2,607,521

APPARATUS FOR FILLING BOTTLES OR THE LIKE WITH LIQUID

Filed June 2, 1949



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UNITED STATES PATENT OFFICE

2,607,521

APPARATUS FOR FILLING BOTTLES OR THE LIKE WITH LIQUID

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Application June 2, 1949, Serial No. 96,656
In Great Britain June 18, 1948

6 Claims. (Cl. 226—116)

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This invention relates to apparatus for filling bottles or like containers with liquid. The invention is particularly adapted for filling milk bottles but is not necessarily limited to this particular application of the invention.

According to the present invention apparatus for filling bottles or like containers with liquid comprises means for raising the liquid by suction from a tank or like storage space into an annular space, surrounding the neck of the bottle to be filled, whereby the level of liquid in the annular space is raised above the top of the bottle neck, whence the liquid is allowed to flow by gravity from the annular space into the bottle in an annular stream, the hollow centre of which provides a passageway for air in the bottle to flow out therefrom as the bottle is filled with liquid.

The annular space may be formed by the wall of a bell or the like dipping into a tank surrounding the bottle neck, and a cylindrical wall of the tank surrounding an outlet in which the neck of the bottle is positioned. The bell or the like is adapted to be connected with a vacuum line for providing the necessary suction to raise the liquid from the tank upwardly within the annular space.

It will thus be seen that the apparatus comprises a tank for holding the liquid, means within the tank, which means provides an annular space surrounding the outlet from the tank around which outlet the neck of the bottle to be filled is adapted to be positioned, and means for raising the liquid by suction from the tank into the annular space to such a level that the liquid can flow by gravity into the bottle in an annular form.

When it is desired to ensure that each bottle is filled to the same extent, plunger means may be provided which, on actuation, is caused to enter the neck of the bottle to a predetermined depth, thereby displacing liquid from the neck of the bottle and forcing it to return to the tank.

The invention is particularly adapted for milk bottle filling machines of the rotary type wherein the bottles are automatically secured to outlets of a tank of milk on the machine and are filled and automatically released as the machine rotates.

The invention will now be described with reference to the accompanying drawing in which two forms of milk bottle filling machines of the rotary type and according to the invention are illustrated. In the drawing Figure 1 is a longitudinal section of one form, Figure 2 a similar view of another form and Figure 3 a diagrammatic elevation.

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Referring to Figure 1 the apparatus comprises a tank 1 having a series of outlets 2 and an annular sleeve 3 above and in axial alignment with the outlet 2 into which the neck of a bottle 4 is inserted by known means, the neck of the bottle being forced into engagement with a sealing gasket positioned between the sleeve 3 and outlet 2. The sleeve 3 is provided with a depending spout 6 which is adapted to extend into the neck of the bottle to be filled. The lower end of the sleeve is provided with ports 7 to allow of liquid flow from the tank to the spout. A bell or dome-shaped member 8 is provided for each outlet 2, the open end of the bell fitting around the outlet and dipping into the liquid 9 in the tank to a point below the normal minimum level of liquid. The cylindrical wall of the bell and the wall of the outlet inside the bell form an annular space 10, the purpose of which will become apparent below.

The upper end of the bell 8 is connected with a vacuum line 11 through which air in the bell can be exhausted by any suitable means, for example a centrifugal fan (not shown) it being, of course, understood that the suction, whilst being sufficient to exhaust the air to cause liquid in the tank to enter the bell is not sufficient to cause such an upsurge of liquid in the bell as to seal the outlet from the tank.

When it is desired to fill the bottles with liquid the machine is rotated in accordance with known mechanism, which of course forms no part of this invention, and the suction means is operated so that air is exhausted from the bell 8 through the pipe 11, the suction produced raising the liquid 9 from the tank up through the ports 7 in the sleeve 3 into the annular space 10 until the liquid in the space 10 is above the rim of the sleeve above the outlet. When liquid reaches this level it flows automatically by gravity over the rim of the sleeve into the spout 6 and thus into the bottle 4 in an annular stream and flows over the inside surface of the bottle. The central hollow space in the annular stream provides a passageway for air in the bottle to flow out as the bottle fills with liquid, and accordingly it is not necessary to provide any separate pipe or like means for exhausting the air. When the bottle has been filled to a predetermined level the bell is automatically disconnected from the vacuum line and connected to atmosphere, and the liquid still in the spout 6 at this moment falls into the bottle to complete the filling of the neck. The liquid in the annular space now being no longer under suction falls back into the tank 1.

Referring to the arrangement shown in Figure

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2 the outlet 2 is provided with a rounded off lip 12 so that the provision of the separate sleeve 3 becomes unnecessary. Within the bell 8 is arranged a casing 13 housing a spring 14 for controlling a plunger 15. The casing 13 is provided with an aperture 16 to establish air communication between the inside of the bell 8, a space 17 and an outlet 18. The plunger 15 extends out of the bell terminating in an operating extension 19, which extension is adapted to be contacted by a cam or like means (not shown) to cause the plunger 15 to be forced downwardly against the action of its spring.

When it is desired to fill the bottles, the machine is rotated as before and suction created in the pipe 11. If there is no bottle at an outlet 2 the suction merely causes air to be drawn up through the outlet 2 without causing liquid to be raised from the tank 9. As soon as a bottle is in position against the sealing gasket 5 a pressure difference is created between the bell 8 and tank 1 which causes liquid to be sucked up into the annular space 10 until liquid flows as before by gravity down the outlet 2 to fill the bottle. When the bottle is filled with liquid and starts to fill the outlet 2 the plunger is caused to move down to enter the outlet and neck of the bottle. The dimensions of the plunger are such as to leave a small annular space between it and the internal surfaces of the outlet, gasket and bottle neck. As the plunger descends so the suction in the bell 8 is destroyed as the outlet 18 is placed in direct communication with the pipe 11 through the space 17 and aperture 16 since the sealing shoulder 20 of the plunger is no longer on its seat. As the plunger 15 enters the outlet 2 and neck of the bottle it displaces liquid therefrom, which displaced liquid flows back into the annular space 10 and tank 1. Due to the differences in diameter between the plunger and the neck of the bottle a film of liquid still remains within the neck of the bottle and this liquid when the plunger is returned by its spring 14 falls back into the neck of the bottle to complete the filling action. The timing of the return of the plunger is such that the bottle 4 leaves the gasket 5 before the plunger has fully returned so that its shoulder 20 seals communication between the pipe 11 and outlet 18.

A float valve 21 (Figure 3) or other means may be provided for maintaining the correct level of liquid in the tank 1 so that the open or lower end of the bell is always submerged in liquid.

It will be appreciated that in the arrangement shown the suction pipe 11 communicates with the bell 8, it is, of course, quite clear that the suction line could, however, communicate direct with the tank 1 and in such a case when a sufficient head of liquid is raised in the tank 1 by suction the pressures in the tank and bell are equalised so that liquid begins to flow to the outlet and into the bottle.

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It will be appreciated that the apparatus comprises few parts all of which can be easily and completely cleansed which is an important advantage in the case of apparatus for bottling milk.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Apparatus for filling bottles or like containers with liquid including a liquid storage tank, means within the tank for positioning the neck of a bottle so as to project above the level of liquid in said tank, means within the tank for effectively sealing off the surface of the liquid occupying an annular space about the neck, means for reducing atmospheric pressure upon said annular shaped body of liquid immediately surrounding the bottle neck, whereby the level of liquid in the annular space is raised above the top of the bottle neck, whence the liquid is allowed to flow by gravity from the annular space into the bottle in an annular stream, the hollow centre of which provides a passageway for air in the bottle to flow out therefrom as the bottle is filled with liquid.

2. Apparatus according to claim 1, in which the sealing off means comprises bell-shaped means dipping into the tank, and surrounding the bottle neck, and the positioning means comprises an upwardly projecting cylindrical outlet wall in the tank, open for the reception of the bottle neck therein, and having the upper rim of the wall positioned above the liquid level in the tank.

3. Apparatus according to claim 2, in which said wall is formed integrally with the tank, and said rim is rounded.

4. Apparatus according to claim 1, in which the pressure reducing means comprises a vacuum producing means, connected to the bell-shaped means.

5. Apparatus according to claim 1, in which there is positioned in the annular space a sleeve member having a depending spout adapted to enter the bottle, the sleeve being ported to allow of liquid flow from the tank through the annular space to the spout.

6. Apparatus according to claim 1, also including plunger means adapted to enter the neck of the bottle to a predetermined depth so as to displace liquid therefrom and to force it to return into the tank, whereby a series of bottles can be filled to the same extent.

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The following references are of record in the file of this patent:

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