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FILLING MACHINE FOR CONTAINERS

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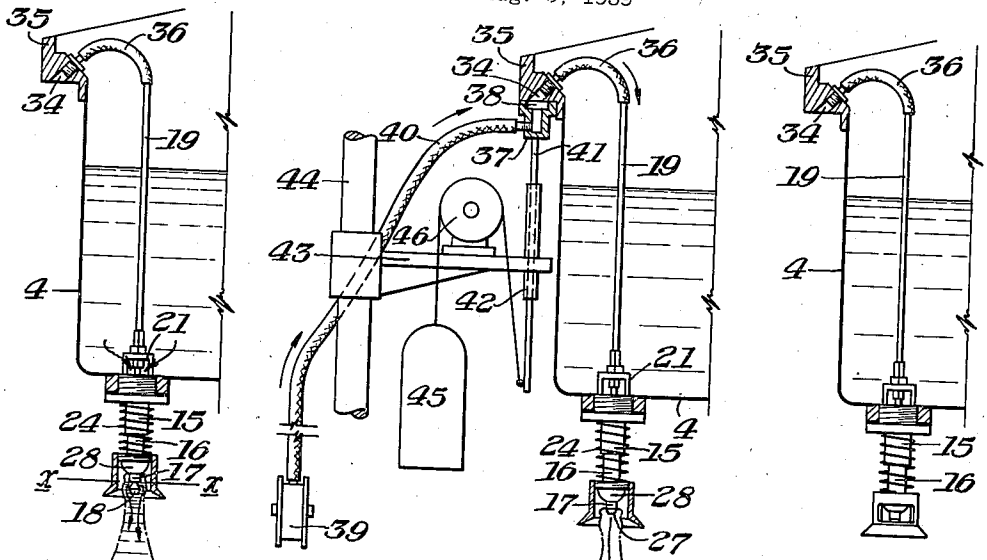


Fig. 4.

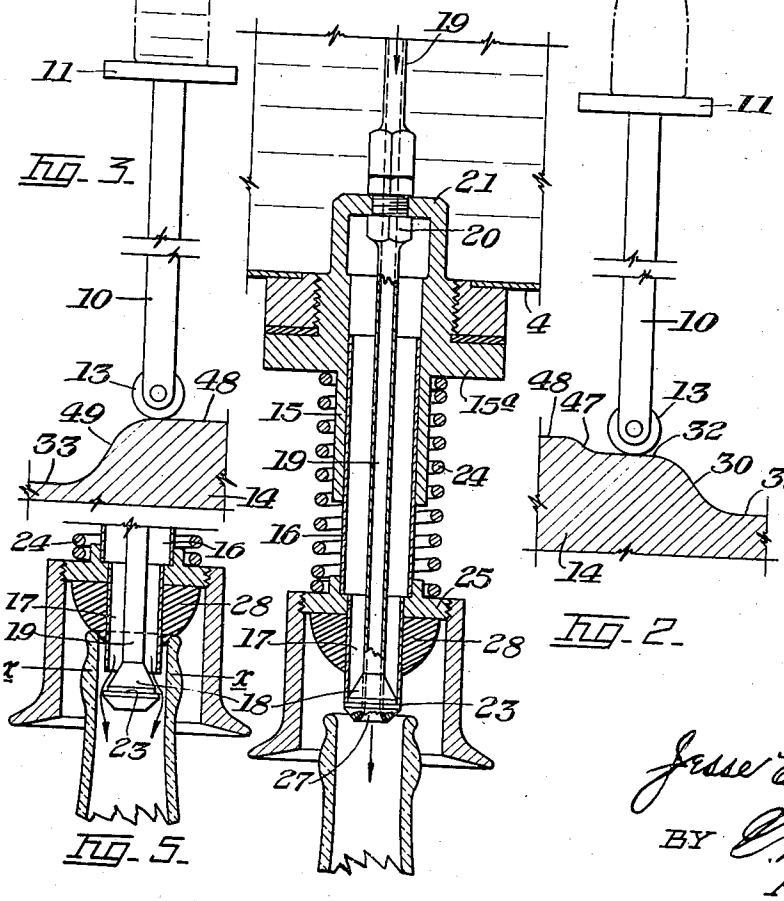


Fig. 3.

Fig. 2.

Fig. 1.

Fig. 5.

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FILLING MACHINE FOR CONTAINERS

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4 Claims. (Cl. 226—98)

This invention relates to improvements in filling machines and the method of filling containers.

In the filling of containers with liquids and the like, it is common practice to employ what are known as filling valves or heads operable to vent the container and fill the latter from a supply source. At the end of the filling cycle some of the liquid enters the vent in the filling valve, necessitating cleaning the vent prior to the next filling operation.

Various cleaning means and methods have been employed heretofore including the application of air pressure to clean the vent, as is variably shown in the patent to Haller No. 1,425,960 of August 15, 1922.

In the said patented construction, the air blast occurs immediately after the filling operation, making it necessary to limit the air pressure to avoid splashing the container contents from the open mouth thereof.

In conjunction with the filling of certain heavy liquids or semi-liquids, it is necessary to exert considerable pressure upon the clogged vent, and it thereby becomes increasingly difficult in present constructions, to avoid splashing and soiling the container as well as to avoid the waste resulting therefrom, when venting air is applied after filling.

I have discovered that the vent cleanout may be advantageously carried out in conjunction with the type of apparatus illustrated in the Haller patent, by the process of a controlled positive timing of the scavenging operation, properly occurring during a partially raised position of the container toward the filling valve, and prior to opening it.

By means of my invention, an appreciable air pressure may be applied to the vent for preliminary positive and rapid displacement of the material lodged in said vent prior to filling, without danger of interfering in any way with the container or its contents.

The advantages and operation of my invention may be more readily understood from the following description, taken in connection with the accompanying drawing, wherein:

Fig. 1 is a diagrammatic view, partly in section, of an embodiment of my invention, showing a container in position at the start of the venting and filling cycle;

Fig. 2 is a similar view showing the vent cleaning step;

Fig. 3 is a similar view, showing the container completely filled;

Fig. 4 is an enlarged sectional view through a filling valve in the venting position of Fig. 2; and

Fig. 5 is a view of a portion of Fig. 4, showing the valve in the open position of Fig. 3, for filling the container.

In the practice of my invention, I prefer to employ what is commonly known as a rotary filling machine, wherein a liquid reservoir or tank having an annular series of filling valves, together with a series of container supports, rotate about a common vertical axis. The container supports travel over a stationary cam track whereby the supports are successively and progressively raised for venting and filling and then lowered, to engage and disengage the containers with and from the filling valves or heads. In its main elements a somewhat similar machine is shown and described in the said patent to Haller No. 1,425,960.

I have illustrated a single filling valve or head with its cooperating container support and cam track for filling a container from an elevated reservoir or tank, it being understood that a plurality of valves or supports may be employed and that the same, together with the reservoir, are rotatable in relation to the cam track as shown in said patent.

It will be understood also that the invention is not limited to a rotary type filling machine but may be utilized with a non-rotatable machine for raising and lowering the containers, as in a straight line type.

In the drawing, 4 designates an elevated rotatable tank or supply reservoir for the liquid or the like being dispensed in the filling machine, which machine generally provides a rotatable annular series of filling stations beneath said reservoir.

At each filling station is provided a vertically movable rod 10 having a container support or table 11 at the upper end thereof. The lower end of each rod 10 is provided with a roller 13 cooperating with a stationary annular cam track 14 for automatically raising and lowering the container supports in their annular travel, as is customary in machines of the character stated.

At each filling station, the bottom of the reservoir 4 is provided with an outlet opening in which is mounted a depending filling valve or head including fixed sleeve 15 secured in said opening, and having an inner telescoping sleeve 16. (See Fig. 4.)

Connected with and depending from said inner sleeve 16 is a filling tube 17, the lower end of which cooperates with a tapered enlargement or valve proper 18 formed on the lower end of a

central vent tube 19. Said vent tube extends longitudinally within the sleeves 15 and 16 and filling tube 17, and is fixed at 20 to a supporting open side yoke structure 21 at the upper end of sleeve 15.

An expansion spring 24 extends between a collar abutment 15a of sleeve 15 and a provided collar abutment 25, the latter also serving to connect the lower end of telescoping sleeve 16 to the filling tube 17. The action of the spring 24 normally seats and closes the lower end of the filling tube 17 on its seat 23 on the flange of terminal valve 18, as in Figs. 2 and 4, preventing a flow of liquid from the reservoir around the filling valve or head until final opening of the filling tube at its maximum elevation, Fig. 5.

The lower end of the vent tube 19 is open at 27 for continuous venting communication with a bottle or other container.

An annular sealing abutment 28 of rubber or the like is carried by the filling tube 17 for engagement by a container being filled, such as the bottle illustrated, the seal 28 being spaced from and movable upwardly with the terminal end of the filling tube in accordance with the height of the desired fill in the container.

The upward pressure exerted by the container on the seal 28 is transmitted to the telescoping sleeve 16 for raising and opening the filling tube 17, as in Figs. 3 and 5.

In the former practice, a container or bottle was placed upon the support 11, and through rotation of the latter with the filling valve and reservoir in relation to the cam track 14, the support and container were elevated toward the filling valve to immediately engage the container and seal 28.

Under my improved method, the upward travel of the container by means of an initial cam rise 30 is terminated short of making contact between the container and the seal 28, as in Fig. 2, by means of an intermediate rest or step 32 of the cam track 14.

The elevation of the rest period step 32 above the lowermost or base surface 33 of the cam 14, is preferably sufficient to elevate the container to at least slightly above the open terminal 27 of the vent tube 19 so that it is entered into the mouth of the container and bottle, whereby upon blowing or cleaning the vent in such position, no splashing or soiling of the container is produced. Hence, a considerable pressure may be applied to the vent and the contents of the vent completely and quickly discharged into the container, as indicated in Figs. 2 and 4.

For the purpose of blowing the vent tube 19 as the lower end 27 thereof is positioned relative to the container by means of cam step 32, the vent tube 19 connects a port 34 in an annular rim 35 of the reservoir 4, as by means of a hose 36.

37 designates a shoe slidably contacting the ring 35 and having a recess 38 adapted to register with the port 34 when the container support roller 13 is on the step 32 of the cam track.

The recess 38 of shoe 37 is connected with a compressor or other source of air, gas, steam or other fluid pressure 39 by a hose 40 for delivering an air blast to the vent tube 19 through said recess 38, port 34 and hose 36, suitable valve mechanism being provided to control the flow.

Shoe 37 is mounted on a rod 41 loosely held in a guide sleeve 42 secured in a supporting arm 43 fixedly and adjustably positioned on a support 44.

A weight 45 depends over a pulley 46 by a cord secured to the lower end of the shoe rod 41, whereby the shoe 37 is pressed upwardly against the tank rim 35.

Hence, it will be seen that as the container is positioned by the cam step 32, and in partly elevated temporarily stationary position, the registering of port 34 and recess 38 of shoe 37 will blow the vent tube 19, discharging any retained liquid directly into the empty container, as indicated in Figs. 2 and 4.

Following the vent cleanout step, the machine continues to rotate, passing reservoir port 34 beyond and out of register with recess 38 of shoe 37, and roller 13 moves up a second incline 47 to the filling step 48 of the cam track 14, during which elevation the container finally engages the seal 28 to elevate the filling tube 17, opening the same away from valve 18 for liquid discharge into the container, as in Figs. 3 and 5, following completion of venting. Such reverse air venting flow through tube 19 is freely open to atmosphere through the uncovered port 34, as in Fig. 3.

As the liquid in the container reaches the level x—x of the lower end of the filling tube 17, the flow ceases and the container is then lowered with accompanying closing of the filling valve by gravitation of the roller 13 and container support 11 down the fall 49 of the cam track 14 to the lowermost or base surface 33 of said cam track.

Control of the flow of liquid so that resulting liquid level or filling point will be at x, x, is effected by the rise of liquid over and around the air vent opening and the valve, which is followed by a compression of air above such level. When such compression is equal to the static head between x, x, and level of liquid in reservoir 4, the flow ceases.

I have thereby provided an improved mechanism and method of filling containers which are highly efficient and very positive in action both for accurate filling and scavenging the vent of the filling valve.

Various changes and modifications are contemplated within the scope of the following claims.

What I claim is:

1. In a filling machine, a liquid reservoir, a filling valve in circulation relation with the reservoir and having an air vent tube, means for moving a container in relation to the valve including a cam, said cam having a time period rest thereon for initially positioning and arresting the container in receiving relation with the air vent opening, means connecting the vent tube operable to apply fluid pressure to the vent tube while the container is in receiving relation therewith by the cam rest, and a step successively higher on the cam operable to elevate the container into sealing relation with the valve and to open the latter for flow of liquid from the reservoir to the container with accompanying free escape of air through the vent tube to the atmosphere.

2. In a filling machine, in combination with a reservoir having means for establishing timed connection between a source of fluid pressure and an air vent conduit, a fixed air vent tube in circulation with said connection provided with a terminal valve, a sectional telescoping spring-retracted conduit leading from the reservoir having a terminal valve-engaging tube and a surrounding annular sealing abutment for a receptacle neck, a vertically movable receptacle support having a cam-engaging terminal, and an actuating cam therefor having an initial lifting

face to bring the receptacle neck into partly elevated receiving relation with the air vent tube terminal and its valve in synchronism with inflowing fluid pressure circulation therethrough, a rest period cam face maintaining the receptacle in such unvarying partly elevated position during such circulation, said cam having an ultimate higher supporting face effecting further movement and final ultimate support of the receptacle to bring its neck into sealing engagement with said abutment around the valve-engaging tube to elevate it and open circulation between the reservoir and receptacle and from the receptacle through the air vent tube.

3. In a filling machine, in combination with a reservoir having means for establishing timed connection between a source of fluid pressure and an air vent conduit, a fixed air vent tube in circulation with said connection provided with a terminal valve, a sectional telescoping spring-retracted conduit leading from the reservoir having a terminal valve-engaging tube and a surrounding annular sealing abutment for a receptacle neck, a vertically movable receptacle support having a cam-engaging terminal, and an actuating cam therefor having an initial lifting face to bring the receptacle neck into partly elevated receiving relation with the air vent tube terminal and its valve in synchronism with inflowing fluid pressure circulation therethrough, a rest period cam face maintaining the receptacle in such unvarying partly elevated position during such circulation, said cam having an ultimate higher supporting face effecting further movement and final ultimate support of the receptacle to bring its neck into sealing engagement with said abutment around the valve-engaging tube to elevate it and open circulation between the reservoir and receptacle and from the receptacle through the air vent tube to atmosphere, and a lowering cam face providing for receding movement and separation of the receptacle.

4. In a filling machine, in combination with a reservoir having means for establishing timed connection between a source of fluid pressure and an air vent, a fixed air vent tube in circulation with said air connection provided with a terminal valve, a collapsible conduit leading from the reservoir having a terminal valve-engaging closure and a surrounding annular sealing abutment for a receptacle neck, means for supporting, elevating, and lowering a receptacle in register with the valve and the air vent tube adapted to first bring the receptacle into receiving relation with the vent tube with timed delay for blowing the vent tube in such receiving relation, thereafter to further elevate the receptacle into engagement with said sealing abutment with accompanying elevation of the valve engaging closure to effect filling and sealing of the receptacle followed by lowering of the closure and cessation of flow from the reservoir upon lowering of the receptacle consisting of a cam having a primary lift face, a rest period face, a secondary further lift face, and a final lowering face.

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