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COUNTER-PRESSURE FILLER VALVE FOR BEVERAGES

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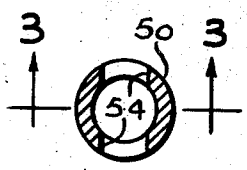


FIG. 2

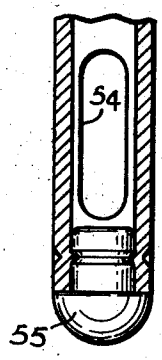


FIG. 3

FIG. 1

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COUNTER-PRESSURE FILLER VALVE FOR BEVERAGES

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1 Claim. (Cl. 141—305)

This invention relates to a counter-pressure filler valve adapted to insure more uniform filling of containers.

In high speed counter-pressure bottle filling machines adapted to fill bottles or other containers with a foam producing beverage such as beer, ale or carbonated water drinks, there has been some difficulty in obtaining a uniform fill, i. e., the bottles do not emerge from the machines filled to a uniform height.

It has been found that there are several reasons for uneven filling of containers resulting in some partially filled containers or so-called "shorts." If the beverage is agitated either in the bottle during filling or in the filler bowl and foam forms on top of the beverage as it rises in the bottle, the foam has a tendency to form a film over the apertures in the lower end of the vent tube, thus preventing the escape of air from the top of the bottle and shutting off the supply of liquid entering the bottle. This stoppage of liquid flow before the proper amount has entered the bottle results in "shorts" or partly filled bottles. Such "shorts" must be removed from the bottle line, emptied and rewashed before refilling, a process that is both time consuming and expensive.

A second cause of "shorts" is that as the beverage rises rapidly in the bottle it has a tendency to rise above the apertures in the vent tube and, when the counter-pressure in the top of the bottle is sniffed, some of this liquid and/or foam remains in the vent tube due to the small cross-sectional area of the tube. The surface tension of the beverage is, at times sufficient to prevent the complete cleaning of the tube even during scavenging. Thus when the tube enters a clean container and counter-pressure air is admitted to that container the foam is ejected into the clean container which causes foaming therein thus inducing further shorts.

It is an object of the present invention to provide a filler valve for counter-pressure filling machines which will give more uniform filling of beverage in a bottle or other container.

Another object of the invention is to provide a filler valve which will reduce the number of shorts during the filling operation.

A further object is to provide a filler valve having a vent tube which will reduce the effect of surface tension of the beverage within the tube.

A still further object is to provide a vent tube for a filler valve in a counter-pressure filling machine which will drain more readily.

A still further object is to provide a vent tube for a counter-pressure filler valve which will be less affected by foaming liquid than those now in use.

Still further objects will become apparent from the following specification which when taken in conjunction with the accompanying drawing, illustrates a preferred form of the invention.

In the drawings:

Fig. 1 is a cross-section through a filler bowl and a filler valve and illustrates the invention;

Fig. 2 is a transverse cross-section through the bottom of the vent tube shown in Fig. 1, and is a cross-section on the line 2—2 of Fig. 1; and

Fig. 3 is a cross-section taken on the line 3—3 of Fig. 2.

Referring to the drawings, a plurality of filler valves, generally designated 10 are mounted about the periphery of a rotary filler bowl 11, so that as the bowl rotates, bottles 12 are received under the successive filler valves 10, lifted into sealing engagement with the valves and are filled as the machine rotates. The bottles are removed from the machine when filling is completed and pass through a crowner which seals the neck of the bottles.

The filler valve 10 comprises a valve cage 15 inserted and seating in an aperture in the bottom of the filler bowl. The cage 15 has apertures 16 in the vertical sides thereof which admit liquid from the bowl to the interior of the cage, and an aperture 17 in the top of the cage to permit passage of the hollow valve stem 20 through the cage and also to permit passage of the liquid into the cage.

The upper side of the valve cage 15 supports a cylindrical housing 22, having openings 23 in the sides thereof for the passage of liquid. The housing 22 centers a valve stem guide 25, the guide being urged upwardly by a helical compression spring 27 which is mounted in the housing 22 between the top of the cage and the bottom of the guide 25.

The valve stem 20 is secured on a liquid valve 28. The valve 28 has an annular rubber valve seat 30 mounted therein which seats in the closed position of the valve 28 on a conical seat 32.

The valve seat 32 forms the upper surface of a snifter block 33. The snifter block 33 has a central opening 35 therethrough which conveys the beverage flowing past the valve 28 from the valve cage and delivers it through a funnel 37 to the interior of the bottle 12.

The funnel 37 is mounted in a rubber sealing block 38. A snifter valve 40 is mechanically actuated through a button 41 to vent air from the top of the bottle after filling is completed.

The valve 28 has a longitudinal opening 42 therethrough which communicates at its upper end with a vertical opening 42' through the valve stem 20.

Air through the valve 28 and valve stem 20 is controlled by a valve 43. The valve 43 is actuated from outside the filler bowl 11 by a cam 45 which is rotated by a shaft 46 projecting through the bowl. A weak spring 48 retains the valve 43 in open position after the cam has opened the valve against the air pressure in the top of the bowl.

The lower end of the opening 42 communicates with the interior of a vent tube 50 screwed into the bottom of the valve 28.

To fill the bottle the cam 45 is actuated by a follower (not shown) mounted on the exterior of the bowl 11 to open the valve 43 against air pressure within the bowl, the valve 43 being retained in open position by the spring 48.

Air or other gas then flows through the valve 43, through the valve stem 20, through the vent tube 50 and out through a pair of elongated openings 54 in the vent tube and into the bottle. When the gas pressure within the bottle is equal to the pressure within the bowl, the spring 27 becomes effective to raise the liquid valve 28 permitting the beverage to flow down the exterior of the vent tube 50 and off a spreader element 56 onto the inner side of the bottle.

As the bottle fills the counter-pressure air in the bottle returns through the elongated opening 54 to the top of the filler bowl 11. Due to the elongated openings 54 in the vent tube, the beverage being supplied to the

bottles passes freely into and out of the vent tube since the elongated openings are of sufficient size to break the surface tension of the liquid even for very slight pressures of gas on the liquid surface. Due to apertures 54 not supporting the surface tension across its area, the tube is kept substantially free of foam and liquid and as a result bottles are filled to a uniform height with a minimum of foaming.

It is to be understood that the form of the invention herein shown and described is to be taken merely as a preferred embodiment thereof and that various changes in size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claim.

That which is claimed as new and is desired to be secured by United States Letters Patent is:

In a filler valve for a counter-pressure filling machine, a liquid valve adapted to control the flow of liquid to a container to be filled, a hollow stem connected to the upper end of said liquid valve, a valve on said stem adapted to permit passage of a counter-pressure gas to and from the container, a vent tube attached to the lower end of said liquid valve and in communication with the passage through said valve stem, said vent tube having a spreader element thereon located intermediate the ends thereof and deflecting the beverage from the tube onto the inner wall of the container and means closing the end of said vent tube, said vent tube having an elongated opening adjacent the lower end of the vent tube to break the surface tension on liquid entering or leaving the vent tube to prevent shorts.

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