

[54] **VENT TUBE WITH SLIDABLE SPREADER FOR FILLING CONTAINERS**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 146,686, May 25, 1971, abandoned.

[52] U.S. Cl. **141/286, 141/90**

[51] Int. Cl. **B65b 3/18, B67c 3/02**

[58] Field of Search **141/37, 39-43,**
141/59-61, 65, 66, 90, 286, 392; 239/515

References Cited

UNITED STATES PATENTS

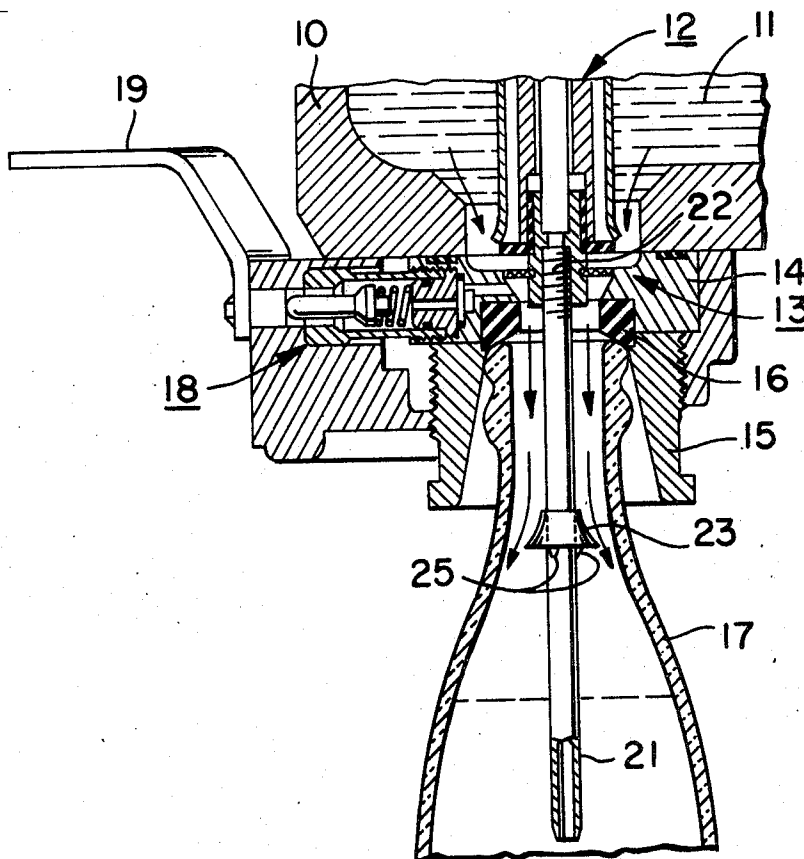
3,209,794 10/1965 Granier **141/286**

Primary Examiner—Houston S. Bell, Jr.
Attorney—William Crighton Sessions et al.

[57] **ABSTRACT**

A vent tube for container filling machines of the type in which the container to be filled, such as a bottle or can, is moved into contact with a filling valve which discharges a beverage into the container. The vent tube projects into the container and permits gas to flow out of the container as the beverage flows in. The vent tube is provided with a spreader that deflects the beverage outwardly toward the sides of the container. In order to prevent damage to the spreader or the container if it should not be properly aligned with the vent tube when the container is moved into engagement with the valve, the spreader is loosely mounted on the vent tube. If a container should strike the spreader as the container is being moved into the valve, the spreader will simply move upwardly out of the way.

9 Claims, 9 Drawing Figures



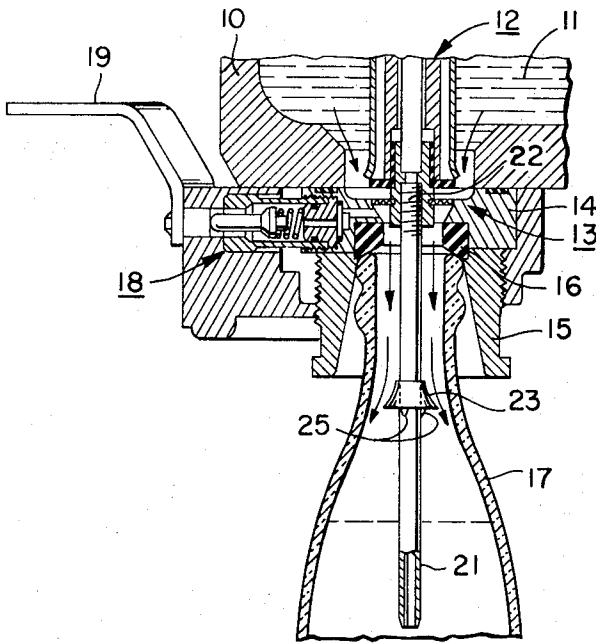


FIG. 1

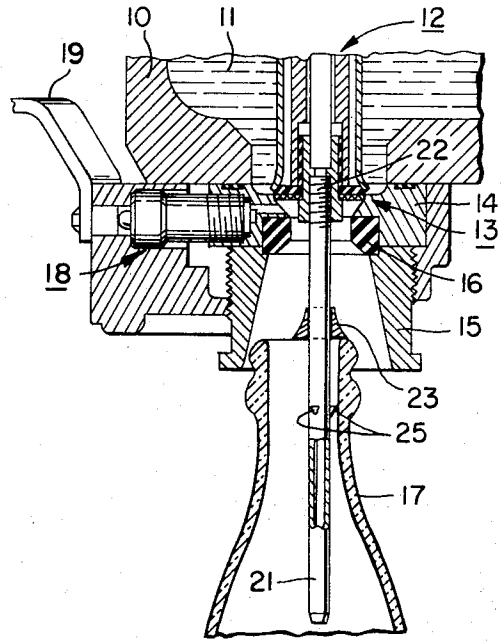


FIG. 2

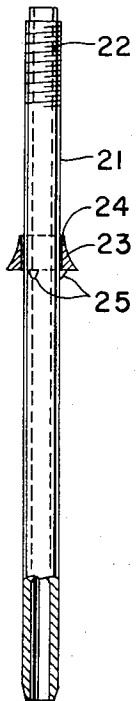


FIG. 3

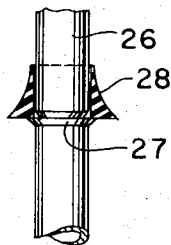


FIG. 4

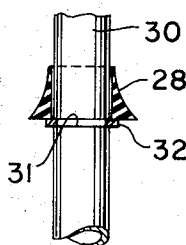


FIG. 5

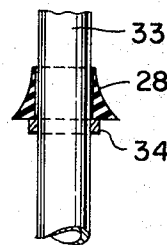


FIG. 6

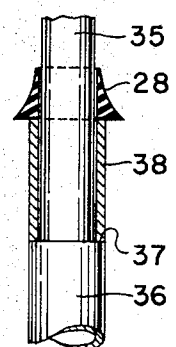


FIG. 7

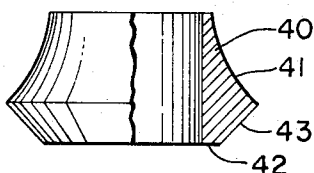


FIG. 8

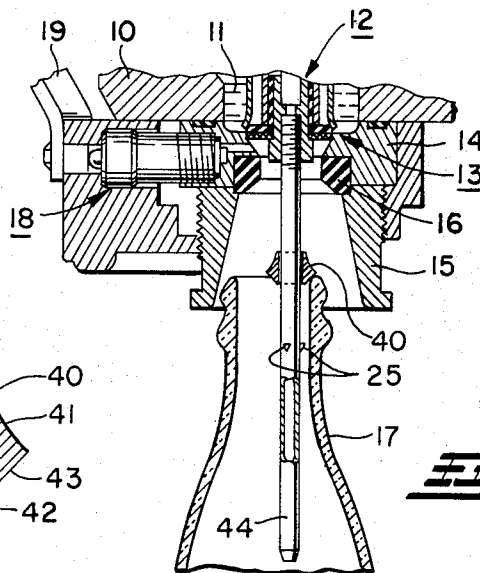


FIG. 9

VENT TUBE WITH SLIDABLE SPREADER FOR FILLING CONTAINERS

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. application Ser. No. 146,686, filed May 25, 1971, now abandoned.

BACKGROUND OF THE INVENTION

Automatic container filling machines are used widely in the beverage industry. These involve a series of beverage dispensing valves and conveyor mechanisms so that the containers to be filled are brought into contact with the valves and seated against the valves, whereupon the beverage is discharged into the containers. The containers are usually glass bottles or metal cans, especially crown-top cans. In order to admit the beverage rapidly it is necessary to provide a vent for the gas in the containers. This is done by means of a central vent tube associated with each valve, the vent tube projecting downwardly into the container and acting not only to vent gas from it but also to actuate mechanism for shutting off the flow of beverage into the container when the beverage has reached a desired level.

It is customary, particularly in machines for filling containers with carbonated beverages where foaming is a problem, to provide each vent tube with a spreader to divert the beverage outwardly from the vent tube and cause it to flow smoothly down the sides of the container to minimize foaming. The spreaders have been made of metal, rubber, or plastic and fixed to the exterior of the vent tubes. They are ordinarily in the shape of inverted frustums of cones. These known vent tubes and spreaders have presented a serious problem for many years in that the filling machines are operated at high speed and frequently the containers are misaligned with the valves so that as the containers are brought into engagement with the valves the vent tubes are not centered with respect to the containers and the inner surface of edge or lip of the top of the containers may engage the spreaders. With rubber or plastic spreaders damage to the spreaders can occur. Spreaders may also be damaged when containers such as glass bottles explode.

If the spreaders are damaged by the edge of a container, a small amount of the material of the spreader may find its way into the beverage. Also, if the spreaders are nicked, foaming and improper filling may take place. With metal spreaders damage can also occur to the spreaders in that they can be bent out of shape and also the containers themselves can be damaged. Furthermore, with spreaders fixed to the tubes there are minute interstices and crevices between the spreaders and the tubes or along the threads that are employed to support the spreaders. These provide excellent places for bacteria, molds and the like to grow and cannot be cleaned without removing the tubes from the valves and disassembling the spreaders from the tubes, operations that are time consuming and are seldom carried out.

SUMMARY OF THE INVENTION

It is, therefore, a general object of the present invention to provide an improved vent tube and spreader assembly for bottle and can filling machines in which the likelihood of damage to either the containers being filled or to the vent tubes and spreaders is substantially

eliminated and in which the likelihood of contamination and the development of unsanitary conditions is also substantially eliminated. Another object is the provision of such vent tubes that can be adapted readily to existing bottling machines. A further object is the provision of such vent tubes that can be manufactured at reasonable cost and that will be long-lived in service.

Briefly, I attain these and other objects of the invention by providing vent tubes in which the tubes themselves may take any conventional form depending upon the type of machine with which they are intended to be used and which embody a generally frusto-conical spreader slidably mounted on the exterior of the vent tube and supported at the desired level by an abutment extending from the tube and engaging the bottom of the spreader, the spreader being freely movable upwardly along the tube so that in the event a container that is misaligned with the filling valve strikes the spreader or the container explodes, the spreader will simply be moved upwardly out of the way of the container, until the bottle is finally correctly centered by the valve mechanism, whereupon the spreader will drop down to its normal operating position. The spreader is loosely fitted on the exterior of the vent tube with a clearance such that some of the beverage flows between the spreader and the vent tube. This flow, although small, is sufficient to provide a self-cleaning action for the space between the spreader and the vent tube and to prevent the accumulation of beverage or solids precipitated from the beverage in this space that might otherwise cause contamination.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings:

FIG. 1 is a fragmentary, vertical cross-section of a bottle filling machine that is of conventional structure except for a vent tube of the present invention;

FIG. 2 is a fragmentary cross-section like FIG. 1 and illustrates how a spreader of the present vent tube floats with respect to the tube to accommodate an off-center approach of a bottle;

FIG. 3 is a side elevational view, partly in section, of a vent tube embodying the present invention;

FIGS. 4 through 7 are enlarged, fragmentary side elevational views of modified forms of the vent tube of the present invention;

FIG. 8 is a view of a modified spreader partially in section; and

FIG. 9 is a view similar to FIG. 1, but showing the modified spreader of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The bottle filling machine with which the vent tube of this invention is used does not form a part of the invention and may be of known, conventional construction. The portion of a bottle filling machine illustrated in FIGS. 1 and 2 is for diagrammatic purposes only. In general, a container 10 containing a liquid 11 releases the liquid to flow around venting apparatus generally indicated at 12 through a valve structure generally represented at 13. The valve structure 13 includes annular collars 14 and 15 which jointly contain an elastomeric seating ring 16 against which a mouth of a glass bottle 17 seats during a filling operation. A valve generally indicated at 18 may be timely operated, as by a cam arm 19, to vent gas from the top of bottle 17 after

it has been filled. For a more detailed description of the structure and operation of the bottle filling machines, reference is made to the following U.S. Pats. No.: Meyer 2,063,326; Chelle 2,548,589; Breeback 2,679,346; Hi 3,155,126; Granier 3,209,794; Van Zyl 3,211,192; and Mallrich 3,252,486.

Referring more particularly to the present vent tube and to FIGS. 1 through 3, this embodiment comprises a metal tube 21, preferably of stainless steel, adapted for substantially vertical disposition in a bottle filling machine. The tube has an upper end adapted for attachment to venting apparatus 12 of FIGS. 1 and 2, such as external threads 22. The tube 21 carries a concentrically disposed annular spreader 22 having a generally frusto-conical outer surface that is preferably slightly concave to deflect liquid outwardly of the tube 21 as the liquid flows downwardly into the bottle as shown in FIG. 1. The small diameter of the concave, generally frustoconical surface is at the top of the spreader. The spreader 23 of FIGS. 1 through 3 is preferably fabricated from metal such as stainless steel, but it may comprise plastic and elastomeric materials.

The tube 21 and spreader 23 have a clearance exaggerated in the drawings at 24 (FIG. 3). This enables the spreader to move freely up or down the tube 21. Further, the clearance 24 preferably is sufficient to enable some of the liquid 11 entering the bottle 17 to flow between the tube 21 and spreader 23 to flush that area and provide a self-cleaning action. This prevents the accumulation of beverage or solids precipitated from the beverage which might otherwise lodge in this area and cause contamination. This same action also substantially eliminates the likelihood of bacterial growth.

The tube 21 has stop means to support the spreader 23 and to limit its movement toward the free end of the tube. Such means may comprise a laterally extending abutment. In the embodiment of FIGS. 1, 2, and 3, the stop means comprises stakes 25 struck from the metal of the tube itself. As shown in FIG. 3, the bottom of the spreader rests against the stakes 25 which prevent further downward travel.

In operation, should a bottle 17 be so misaligned with respect to a proper concentric insertion through the collars 14 and 15 and against the ring 16 that the spreader is struck by the bottle as represented in FIG. 2, there is no chipping or breaking of either the bottle or parts of the bottle filling machine. Instead, the spreader 23 moves upwardly along the tube 21 ahead of the bottle, until the inwardly tapering sides of collar 15 guide the entering mouth of the bottle 17 to a center position against the elastomeric ring 16. As soon as the spreader 23 is free of engagement with the bottle, the weight of the spreader and the pressure of liquid entering the bottle cause the spreader to drop down along the tube 21 until it strikes the stakes 25 which define the normal operating position of the spreader.

FIGS. 4 through 7 illustrate modified stop means for the tubes and, in addition, means for effectively varying the position of the stop means with respect to the tube. In FIG. 4, for example, a vent tube 26 has an outwardly directed ridge 27 formed by swaging the tube 26. The spreader 28 in FIG. 4 has the same shape as spreader 23 in FIG. 3, but spreader 28 is formed from plastic materials such as nylon, polyethylene, polyvinyl chloride, and the like; or from elastomeric materials such as polyurethane, butadiene-styrene copolymer, butadiene-acrylonitrile copolymer, and the like. In FIG. 5, a

vent tube 30 has a circumferential groove 31 in which a snap ring 32 seats to halt the free descent of the spreader 28. In FIG. 6, a vent tube 33 has a ring 34 of plastic or metal which is press-fitted about the tube to serve as stop means for spreader 28.

At times it is desired to adjust longitudinally the operating position of a spreader relative to a tube to alter the deflecting action of the spreader or to accommodate different bottle shapes. The embodiment of FIG. 7 illustrates an additional form of stop means as well as a modified structure designed to adjust the effective positioning of the stop means on the tube against which the spreader normally rests.

In FIG. 7, a tube 35 has a lower end 36 of somewhat greater diameter than the upper end to form a shoulder 37 which serves as stop means. In addition, the embodiment of FIG. 7 has a sleeve 38 interposed between and contacting the shoulder 37 and spreader 28. This has the effect of raising the stop means a distance along tube 35 that is equal to the length of the sleeve 38. The sleeve 38 can be made in various lengths to meet various requirements. Preferably, the sleeve 38 fits loosely about the tube 35 so as to have a clearance with the tube 35 similar to that of spreaders 23 or 28. This provides a flushing, self-cleaning operation for the annular space between the sleeve 38 and tube 35 as well. However, sleeve 38 which can be either of metal or plastic may be press-fitted around tube 35 and held in position by the press fit. In this case, shoulder 37 is not needed.

FIGS. 8 and 9 illustrate a modified spreader 40 that is adapted to be positioned on a vent tube 44. Parts of FIG. 9 similar to corresponding parts of FIG. 2 have like reference numbers. Spreader 40 has a concave generally frustoconical outer surface 41 that deflects liquid laterally as in the case of spreaders 23 and 28. In addition, the lower end of spreader 40, as viewed in the drawings, has a small annular flat 42 normal to its central longitudinal axis and a circular beveled surface 43 directed outwardly and away from its lower end. When a bottle or other container is misaligned with respect to a vent tube so that its lip strikes the bottom of a spreader, as illustrated in FIG. 9, the top of the bottle engages beveled surface 43 and the spreader either rides upwardly on the tube as the bottle moves upwardly into engagement with the valve, which centers the bottle as in the previous modification, or cams the bottle laterally to the desired central position. This last action may take place after the spreader has slid part way up the vent tube and prevents damage if a worn or defective valve mechanism should fail to center the bottle properly.

Any modification may be used alone or in combination with one or more of the other modifications. While the foregoing describes several embodiments of the present invention, it is understood that the invention may be practiced in still other forms within the scope of the following claims.

What is claimed is:

1. Vent means adapted for substantially vertical disposition in the fluid flow passage of a machine for filling containers with a fluid, said vent means comprising an elongated hollow conduit having a lower end adapted for insertion downwardly into a container, an annular spreader disposed on the conduit for deflecting said fluid laterally, said spreader having a clearance with respect to the conduit to permit it to move freely therealong in the event that it is struck by an improv-

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erly aligned container, and stop means on the conduit to support and limit the extent of downward movement of the spreader toward said end.

2. The vent means of claim 1 in which said clearance is sufficient to permit passage of said fluid therethrough and thereby impart a self-cleaning action between the conduit and spreader.

3. The vent means of claim 1 in which the upper part of said annular spreader has a substantially frustoconical exterior surface with the smaller diameter at the top thereof.

4. The vent means of claim 1 in which said stop means comprises a laterally extending abutment on said conduit.

5. The vent means of claim 1 including a sleeve on said conduit interposed between and adapted to contact said spreader means and said stop means to vary the effective position of the stop means on the conduit.

6. The vent means of claim 5 in which said sleeve has a clearance with respect to said conduit sufficient to permit passage of said fluid therebetween.

7. The vent means of claim 4 in which the lower end of said spreader is outwardly beveled in a direction away from said end of the hollow conduit to provide a camming surface.

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8. A vent tube adapted for vertical disposition in the fluid flow passage of a machine for filling bottles with a fluid comprising a tube having one end adapted for attachment to said machine and the other end directed vertically downwardly for insertion into a bottle, an annular spreader concentrically disposed about the tube, said spreader having a generally frusto-conical cross-section with the laterally disposed surfaces thereof having a concavity in a vertical direction, said spreader having a clearance with respect to said tube permitting the spreader to move freely up and down the tube whereby the spreader can move upwardly along the tube in the event that it is struck by an improperly aligned bottle and then move downwardly along the tube after the bottle has been properly aligned, said clearance being sufficient to permit fluid therethrough to impart a self-cleaning action to the tube and spreader, and stop means on the tube engageable with the bottom of the spreader to limit its movement downwardly toward said other end and to support the spreader means at a normal position of operation.

9. Vent means according to claim 1 wherein the bottom surface of the spreader is beveled and is adapted to deflect such container laterally.

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