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CAN FILLING APPARATUS

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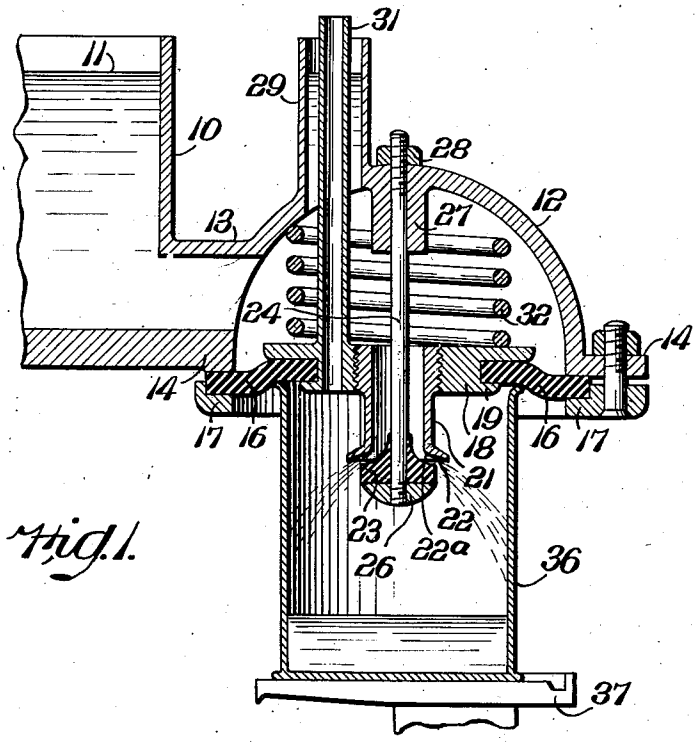


Fig. 1.

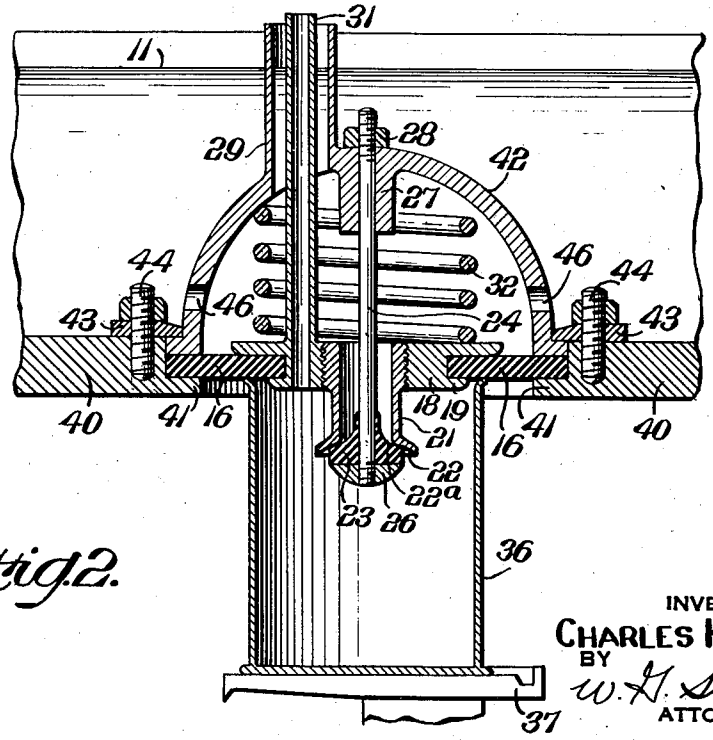


Fig. 2.

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CAN FILLING APPARATUS

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3 Claims. (Cl. 226—124)

This invention relates to can filling apparatus, and more particularly to improved means for rapidly supplying cans or the like with liquid, such as syrup or brine.

I am familiar with prior apparatus of the above general type wherein valve means operable by can movement control flow of liquid to the can but the amount of liquid passing to the valve means during each filling operation has to be measured or accurately controlled to prevent overflow. This results in a relatively complicated construction in addition to retarding the speed at which cans may be filled. Prior constructions of this general type have also provided for the escape of air from the cans through the liquid in a supply tank resulting in an undesirable "boiling" of the supply liquid.

It is a primary object of the invention to provide simple and efficient apparatus including valve means for rapidly supplying liquid to cans or the like without waste and without requiring that the amount of liquid passing to the valve means during the filling operation be accurately controlled.

Another object of the invention is to provide simple and efficient apparatus for supplying liquid to cans or the like, and wherein air escaping from the cans, during the filling operation, is vented directly to atmosphere and without contacting liquid in a supply tank.

Another object of the invention is to provide can filling apparatus of the above type adapted to provide a smooth liquid flow into the cans with minimum agitation due to escaping air.

A further object of the invention is to provide can filling apparatus of the above type having improved valve means associated therewith.

According to the invention, a liquid supply tank has a valve opening in or adjacent the base thereof and liquid flow through said opening is controlled by valve means including a resilient member operable by can movement. A portion of the valve means projects into the can during the time the valve is fully open and provides sufficient displacement in the can for receiving liquid which may continue to flow while the valve means is closing. Thus, the necessity for accurately controlling or measuring the amount of liquid passing to the valve means from the supply tank during each filling operation to prevent overflow is eliminated. The inflowing liquid is directed towards and against the sides of the can resulting in a smooth flow and reducing agitation and foaming to a minimum. Additionally, vent means are provided for the direct escape of air from the can during the filling operation without bubbling through the liquid in the supply tank.

The drawing illustrates embodiments of my invention and the views therein are as follows:

Figure 1 is an elevational sectional view showing my improved apparatus disposed externally of a liquid supply tank, and

Figure 2 is a view generally similar to Figure 1, but wherein the valve means are disposed within the supply tank.

Referring now to the drawing, and particularly to Figure 1, I have indicated generally at 10 a supply tank adapted to be filled with liquid, such as syrup or brine, to a desired level 11. Disposed externally of tank 10 is a generally dome-shaped housing 12 which communicates with the tank through a passage 13, whereby liquid may be continuously supplied to housing 12 from tank 10. Housing 12 is shown formed integrally with the tank, but it is understood that the housing may be detachably secured to the tank, if desired. Housing 12 is provided with an external peripheral flange 14 joining the tank base, and an annular element 16, formed of rubber or other suitable resilient material, is sealingly clamped between flange 14 and a ring 17.

It will be noted by reference to Figures 1 and 2 that the top portion of housing 12 is below the normal liquid level 11 in the supply tank, whereby a predetermined volume of liquid will be received in the housing.

Movably supported by element 16 is a generally circular valve element 18 having a circular groove 19 therein for receiving the inner peripheral portion of element 16. Due to the resilience of element 16, it may be forced over and around the lower flange of groove 19 to its assembled position. Threadedly supported by valve member 18 is a tube 21 having an external circular lip 22 at its lower end. The lower face of lip 22 is inclined downwardly, at least, at the outer portion thereof, for a purpose to be later described. The inner portion of lip 22 forms a valve seat 22*a*, which may be horizontal or slightly inclined. Valve seat 22*a* is adapted to engage a valve 23 formed of rubber or other suitable material. Valve 23 is projected over the lower end of a rod 24, and is secured by a nut 26. The upper surface of valve 23 is of tapering tubular form to provide a curved surface adapted to direct liquid flow laterally and substantially uniformly in all directions. Nut 26 preferably has a curved lower face, and may be provided with grooves (not shown) for rotating the same. Rod 24 threadedly

engages a boss 27 formed on the upper central portion of housing 12, whereby the rod may be moved vertically to adjust the position of valve 23. A lock nut 28 maintains rod 24 in an adjusted position. Extending from the upper portion of housing 12 is an open-ended tube 29 which is of sufficient height to receive liquid to the maximum liquid level of supply tank 10, since liquid will reach the same level in tank 10 and tube 29. A vent tube 31 extends from member 18 through tube 29, and preferably terminates slightly above tube 29.

A compression spring 32 engages the top portion of housing 12 and the upper surface of member 18, and will normally maintain valve seat 22*a* in sealing engagement with valve 23.

The operation of the above described apparatus will now be explained. Liquid from supply tank 10 will flow through passage 13 to the housing 12 and up through tube 29 to a level corresponding with the liquid level in the supply tank. A can 36, to which liquid is to be supplied, is supported on a lift table 37 disposed beneath housing 12, and the can is projected upwardly by the lift table, whereby the top edge of the can will engage the resilient annular element 16 and force the radially inner portion of element 16 upwardly against the force of spring 32. Member 18 and tube 21 will also be forced upwardly, thereby moving valve seat 22*a* from engagement with valve 23, and permitting liquid from tube 21 to flow between lip 22 and valve 23 into the can. The curved upper surface of valve 23 directs the liquid substantially uniformly outwardly. Lip 22 directs the liquid slightly downwardly, and the resultant effect is that the liquid is directed against the sides of the can in a smooth stream, thereby reducing foaming and agitation of the liquid to a minimum. It will be apparent that if the liquid would drop directly to the base of the can, or directly into the liquid in the lower portion of the can, that considerable foaming and agitation of the liquid would result. As the can fills, air is expelled through vent tube 31 and the liquid in tube 29 forms a liquid seal within which tube 31 is freely movable. The time required to fill the can can be accurately predetermined, and when the can is filled it is withdrawn downwardly through lowering movement of the lift table, and valve seat 22*a* is forced into sealing engagement with valve 23 by spring 32.

With the above described arrangement it is not necessary to pre-measure or accurately control the amount of liquid passing to the valve means since any excess liquid will merely tend to rise in vent pipe 31 to the level of liquid in housing 12, and since the liquid level in housing 12 is rapidly reduced during the filling operation, a relatively small amount of liquid will be disposed in the vent tube 31. The portion of tube 21 extending into the can, together with valve 23 and nut 26, provides sufficient displacement space in the can to receive any liquid from tube 31 as the can is being withdrawn without overflow, and the displacement space can be controlled by moving tube 21 and valve 23 vertically to dispose a greater or lesser portion of tube 21 in the can.

Although I have only illustrated and described one valve means, it is understood that any desired number may be disposed around the tank, and in practice I employ eight or ten such valve means disposed around a circular tank. However, it is understood that a tank of any desired contour may be employed, and that the tank may be stationary or rotating. For speed of operation, I prefer to rotate the tank and associated valve means by any suitable means, and to concurrently rotate the lift tables so that a lift table will always be disposed beneath each housing 12. At a point in the rotary path of the lift table, a can is disposed thereon in upright position and centrally beneath housing 12; the lift table at this point being in a lowered position so that the top edge of the can can be moved laterally beneath nut 26 and as the lift table moves along its path it is raised to bring the can into contact with element 16 and operate the valve mechanism in the manner described. At the completion of the filling operation, the can is withdrawn downwardly to a position so that it may clear nut 26 and be moved from the lift table.

The particular manner of rotating the tank and operating the lift table constitutes no particular part of my present invention, and since such mechanism is well known only a brief description has been given herein.

Referring now to Figure 2, I have shown a modification of my invention generally similar to that illustrated in Figure 1, but wherein the housing and valve mechanism are disposed within the tank rather than externally thereof. In this modification, the tank base 40 is provided with a generally circular opening formed to provide a shoulder 41. Element 16 is seated upon shoulder 41 and the base of housing 42 rests upon element 16 and is preferably detachably secured to the tank base by means of lugs 43 and bolts 44. Of course, sufficient pressure is exerted on element 16 to maintain a liquid-tight joint. A plurality of holes 46 are provided in housing 42 adjacent the tank base, whereby liquid from the supply tank may enter the housing. The operation of the valve mechanism is as described in connection with the modification of Figure 1.

Although I have shown and described preferred forms of my invention, I contemplate that numerous extensions and departures therefrom may be made without departing from the spirit of the invention and the scope of the appended claims.

The invention is hereby claimed as follows:

1. Can filling apparatus comprising a liquid supply tank, a closed liquid-receiving housing associated with the tank having its top portion below the normal level of liquid in the tank, continuously open and restricted communicating means between the tank and housing whereby a predetermined volume of liquid will be received in the housing, an annular flexible member sealingly secured to the housing base, a tubular valve element carried by the flexible member and movable therewith, said tubular element extending a substantial distance below said flexible member and being adapted to extend into a can during filling thereof, means operable independently of housing fluid pressure for lifting a can upwardly against the flexible member, a fixed valve member extending below the tubular element and normally closing the lower end thereof, the tubular element being movable by can pressure directed upwardly against the flexible member to permit liquid passage therethrough at a rate of speed greater than the speed of flow of the liquid from the supply tank into the liquid-receiving housing, and a continuously open vent tube extending through the housing to atmosphere and adapted to communicate with a can for venting air from the can during filling.

2. Can filling apparatus comprising a liquid

supply tank, a closed liquid-receiving housing associated with the tank having its top portion below the normal level of liquid in the tank, the top portion of the housing being continuously open to atmosphere, continuously open and restricted communicating means between the tank and housing whereby a predetermined volume of liquid will be received in the housing, an annular flexible member sealingly secured to the housing base, a valve element carried by the flexible member including a tubular portion extending a substantial distance below said flexible member and adapted to extend into a can during filling thereof, the lower end of the tubular portion being outwardly flared to provide a valve seat, a fixed valve member extending below the tubular portion and normally engaging the valve, the valve element being movable upwardly by can pressure exerted against the flexible member and independently of housing fluid pressure to permit liquid passage therethrough at a rate of speed greater than the speed of flow of the liquid from the supply tank into the liquid-receiving housing, and a continuously open vent tube extending through the valve element and housing to atmosphere for venting air from a can during filling.

3. Can filling apparatus comprising a liquid supply tank, a dome-shaped closed liquid-receiving housing associated with the tank having its top portion below the normal level of liquid in the tank, continuously open and restricted communicating means between the tank and housing whereby a predetermined volume of liquid will be received in the housing, a flexible member sealingly secured to the tank base, a valve element supported centrally of the flexible member and movable therewith, said valve element comprising a tubular portion extending a substantial distance below said flexible member and adapted to extend into a can during filling thereof having a valve seat at its lower end, a rod supported by the housing and projected through the tubular portion, a fixed valve member supported by the rod and normally closing the valve seat, the flexible member and valve element being movable upwardly by can pressure and independently of housing fluid pressure to permit liquid passage therethrough at a rate of speed greater than the speed of flow of the liquid from the supply tank into the liquid-receiving housing, and a continuously open vent tube to atmosphere extending through the valve element and movable therewith disposed laterally of the tubular portion for venting air during filling.

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