Feb. 8, 1949. J. KANTOR ET AL 2,461,326

FILLER VALVE FOR CONTAINER FILLING MACHINES

Filed June 25, 1945 2 Sheets-Sheet 1

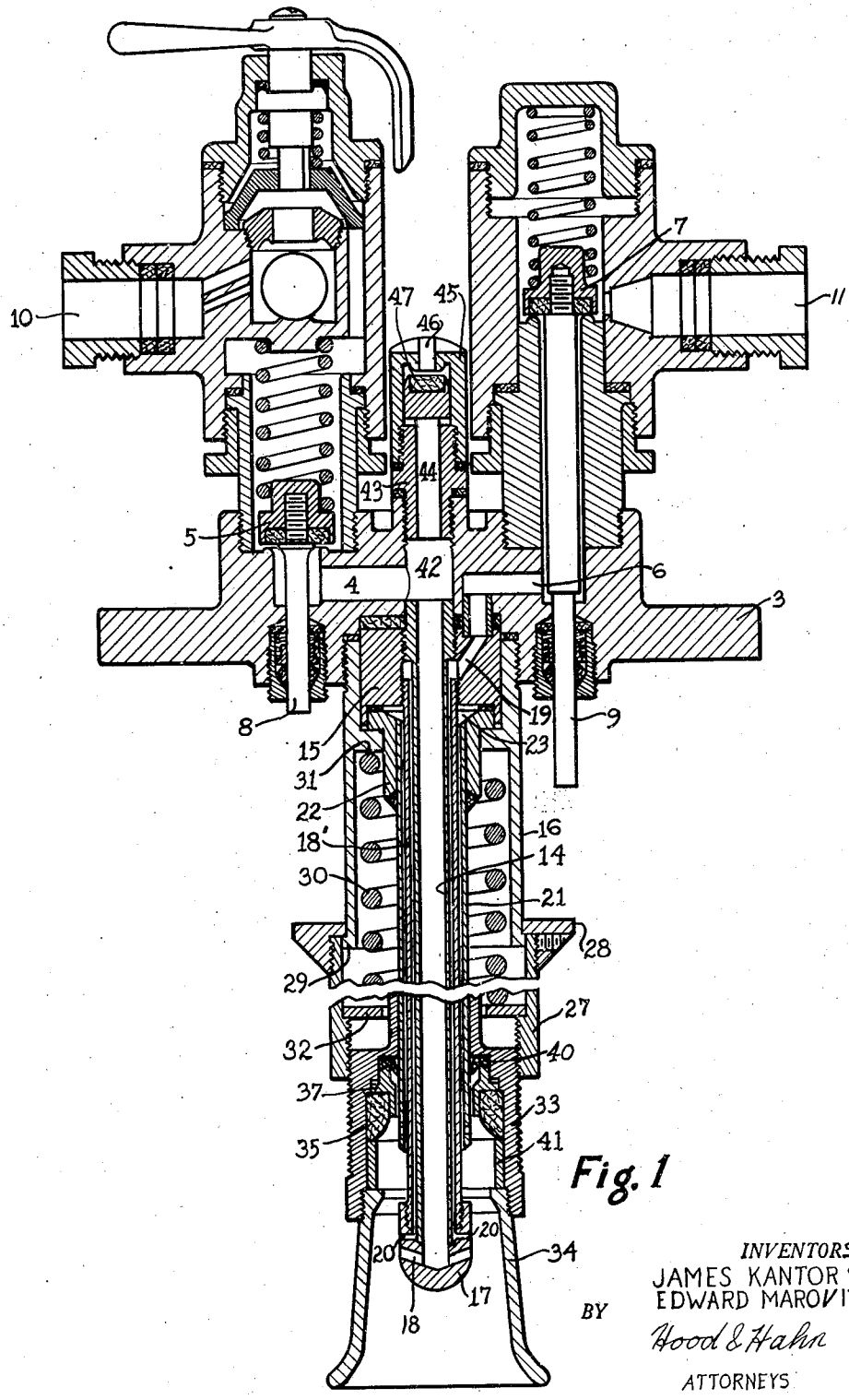


Fig. 1

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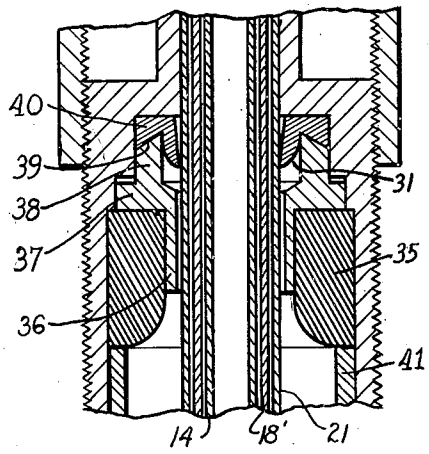


Fig. 3

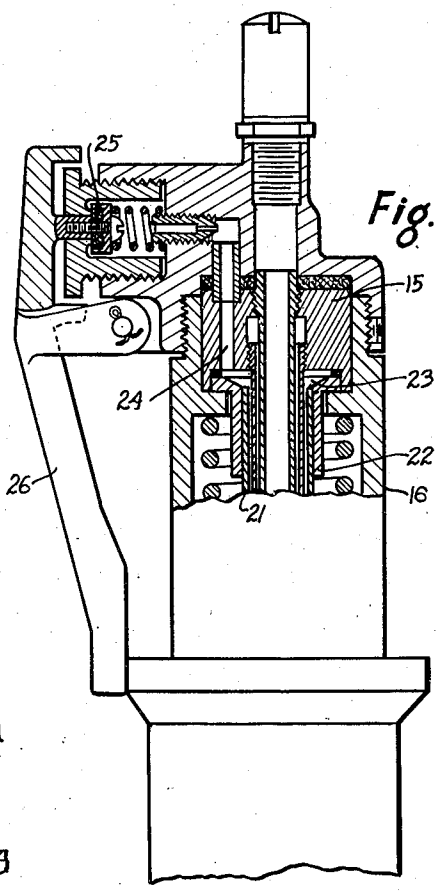


Fig. 2

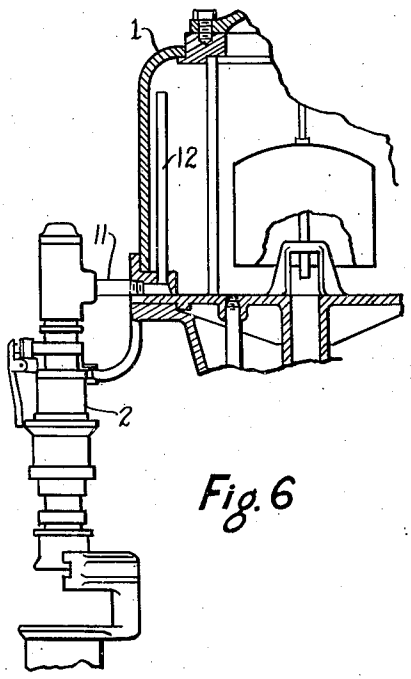


Fig. 6

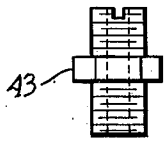


Fig. 4

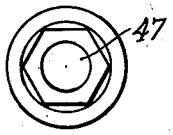


Fig. 5

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FILLER VALVE FOR CONTAINER FILLING MACHINES

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10 Claims. (Cl. 226—115)

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The present invention relates to improvements in container filling machines, primarily adapted for filling bottles and similar containers with carbonated beverages.

More specifically, the invention relates to an improvement in the filling valve now used in a large number of certain types of commercial filling machines in bottling and other plants.

In certain types of commercial filling machines, the machines are provided with a suitable tank, in which is adapted to be maintained a supply of carbonated beverage or water. These tanks are provided with a plurality of filling valves, which control the flow of the liquid from the filling tank into the container adapted to be filled.

These filling valves are, as a rule, provided with an elongated tube adapted to be projected into the container to be filled and through which the carbonated beverage is adapted to be flowed into the container. One difficulty which has heretofore been experienced in this type of filling valve is that of holding constant the liquid level in each bottle, as the bottles or containers are filled on the machine. Various expedients have been resorted to for this purpose, including that of providing a shut off valve at the bottom of the tube, which at the proper time closes the bottom of the tube, after the flow of liquid from the filler tank to the tube has been shut off. This prevents the escape of the liquid in the tube, after it has been shut off, into the container or bottle. If such a shut off valve at the bottom of the tube were not used, the amount of liquid escaping from the tube after the supply had been shut off at the tank would vary and thereby vary the liquid level in the bottle. All of the liquid in the tube would not always flow out of the tube, as the amount remaining in the tube would depend on various factors such as the degree of carbonation of the liquid, the leakage of cushioning gas from the top of the bottle and other factors. While the provision of the shut off valve at the bottom of the tube, in some respects, has been quite satisfactory, however, this arrangement has involved a rather large number of parts to control the operation of this shut off valve. This has very materially added to the cost and complication of the apparatus, and these parts are, furthermore, subject to considerable wear, necessitating frequent adjustments and replacement of parts to insure accurate operation of the filling valve, as a whole, and to insure the filling of the container to the proper level.

It is one of the objects of the present invention to provide a filling valve, wherein the shut off

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valve at the bottom of the filling tube and all of the associated parts necessary for the proper timing operation of the same may be dispensed with, and at the same time, provide a filling valve which will always fill the container to the predetermined level of liquid in the container.

For the purpose of disclosing the invention, an embodiment of the same is disclosed in the accompanying drawings, in which:

Fig. 1 is a longitudinal, sectional view of a filling valve embodying the invention;

Fig. 2 is a side elevation, partially in section, of the snift valve forming a part of the filling valve;

Fig. 3 is a detailed sectional view of the gland for maintaining an air tight junction between the filling tube and its associated sliding sleeve;

Fig. 4 is a detailed side elevation of a portion of the air inlet valve;

Fig. 5 is a plan view of the control member of the air inlet valve; and

Fig. 6 is a detailed sectional view of a filling machine, showing the position of the filling valve, with respect to the water tank.

Referring to Fig. 6, there is provided a filling tank 1 adapted to contain carbonated water or other liquid to be supplied to the bottle or container to be filled. This tank is provided with a series of filling valves 2 adapted to be engaged by the containers to be filled and to control the flow of liquid to the container from the tank.

In the specific form of valve illustrated, a base casting 3 is provided having a water inlet port 4 controlled by a valve 5 and a gas inlet port 6, in turn controlled by a valve 7. These valves are respectively provided with operating stems 8 and 9, which project below the base 3 and are adapted to be engaged by a reciprocating part of the filler valve to thereby control the opening and closing of the valves 5 and 7. The stem 8 of the valve 5 is considerably shorter than the stem 9, so that in the operation of the machine, the valve 7 will be opened prior to the opening of the valve 5.

The water inlet port 4 communicates by a suitable connection 10 with the filling tank 1, so that the water will flow from the filling tank through this connection and through the port 4 into the container to be filled, under proper operating conditions. The counter pressure gas inlet port 6 communicates by means of the pipe connection 11 and a riser 12 in the tank 1, with the top of the tank, the top of the tank being filled with carbonic gas. When the valve port 6 is open, carbonic gas, generally identified as counter pres-

sure will pass from the top of the tank into the container to be filled.

The water inlet port 4 communicates with the water filler tube 14 threadedly supported in a plug 15 mounted in the upper end a relatively stationary sleeve 16, which sleeve is threaded into a recess in the bottom of the base 3. The lower end of this tube terminates in a nipple 17, which is provided with transversely extending upwardly inclined outlet ports 18.

Surrounding the tube 14, but spaced therefrom, is a counter pressure tube 18' threaded into the plug 15 and communicating at its upper end through a passage 19 with the counter pressure in the port 6. This tube terminates at its lower end in the nipple 17, which nipple is provided with a plurality of divergent outlet ports 20.

A snifter tube 21 surrounds the two heretofore mentioned water and counter pressure tubes, being spaced from the counter pressure tube 18'. This snifter tube terminates in a suitable supporting collar 22 supported in the plug 15, but spaced apart from the bottom portion of the plug to provide an outlet chamber 23. This chamber communicates with the atmosphere through a suitable outlet port 24 controlled by a snifter valve, the movable member 25 of which is operated by a snift lever 26.

The sleeve 16 has telescopically mounted thereon a sliding collar 27 having a cap 28 threaded thereon, which cap is provided with a central opening sufficiently small in diameter to prevent the annular lip 29 on the sleeve 16 from passing therethrough, to thereby limit the downward movement of the collar 27. The collar 27 is biased in its downward position through the medium of the coiled spring 30 interposed between an internal flange 31 in the sleeve 16 and a relatively stationary washer 32 in the collar 27. This collar 27 at its lower end has adjustably secured therein, a throat support 33, which is screw threaded into the collar to permit the same to be adjusted vertically relatively thereto. This throat support at its lower end is provided with a neck receiving throat 34 adapted to receive the neck of a bottle or container, as it is reciprocated relatively to the filler valve. In the operation of the apparatus, the bottle is reciprocated vertically relatively to the filler valve and in its upward movement, enters the throat 34, engaging the throat which seats the bottle. The continued upward movement of the container moves the collar 27 and its associated parts upwardly, which movement causes the sequential operation of the parts, for the purpose of controlling the flow of liquid into the bottle.

Due to the fact that during the filling operation, the bottle should be sealed against the ingress of air, which sealing is affected by its engagement with the throat 34 and due to the fact that there is a sliding movement between the parts and the snifter valve 21, it is quite essential that an effective seal be provided to prevent the escape of air past the filler valve during the filling operation. To this end, within the throat holder 33 there is provided a preferably soft rubber gland 35 surrounding a metal sleeve 36 in turn surrounding, but spaced from the snift tube 21. This sleeve 36 extends downwardly from an annular collar 37, which is provided with an upwardly extending annular lip 38, the upper end of which is beveled as at 39. Surrounding the tube 16 is a second compressible gland member 40 provided with a downwardly extending lip 31 surrounding the snift tube 21. This gland is provided with a beveled undersurface adapted to be engaged by the beveled edge of the flange 38.

The gland 35 is maintained in position through the means of an internal sleeve 41 interposed between the bottom of the gland and the throat 34. It is to be noted that as the throat 34 is screw threaded into the support 33, the gland 35 will be placed under compression, thereby forcing the collar 37 upwardly. The collar 37 and sleeve 36 are slightly separated from the snift tube, so that the same will not engage the snift tube and the rubber seal 40 is preferably coated, compounded, or impregnated with a paraffin wax or other friction reducing material, so that the same will slide over the snift tube with a minimum of friction. We are thus enabled to maintain an effective seal against the inlet or outlet of air against this point, and at the same time, reduce friction between the sliding parts to a minimum.

The water inlet port 4 terminates in a chamber 42, with which the water tube 14 communicates. The top of this chamber is closed by a threaded plug 43 having a passage 44 therein. This plug is provided at its top with a cap 45 having an outlet passage 46 therein. Within this cap is provided a control valve 47 adapted to engage a seat surrounding the outlet passage 46, when raised under predetermined conditions.

In operation, as the bottle or container is raised and is seated in the throat 34, making sealing engagement with the gland 35, it will move the collar 27 upwardly, causing it to first engage the valve stem 9 opening the counter pressure valve 7. This permits the flow of counter pressure CO_2 from the top of the filling tank through the valve and port 6 to the passage 19, whence it passes into the counter pressure tube 18', being delivered into the container through the openings 20. When the container is completely filled with counter pressure gas, a portion of the gas will flow out of the container through the ports 18 and through the water tube 14 into the passage 44. This establishes a pressure against the under side of the movable valve member 47 and raises this valve to close the passage 46. Due to the fact that the port 46 is relatively small, the counter pressure gas will flow into the passage 44 faster than it can escape. By the time the counter pressure has completely filled the container and water tube, the valve stem 8 will have been engaged by the top of the sleeve 27, thus opening the water valve 5, and permitting the flow of water through the port 4 and into the water tube 14 against the counter pressure, and thence into the container. This flow of water through the port 4, the chamber 42 and the water tube 14 seals the bottom of the passage 44 and thereby traps a small pocket of CO_2 in this passage, maintaining the valve member 47 in its closed position. The water continues to flow into the bottle or container, forcing the counter pressure gas back through the counter pressure tube 18' into the top of the tank. When the water level rises in the container to the point where the openings 20 are closed by the water, the flow of the water will cease. By this time, the container has reached the upward limits of its fill, and has started its downward stroke. As it moves downwardly, the water valve 5 first closes, and with the continued downward movement, the counter pressure valve 7 closes. With the closing of the valve, the collar 28 on the sleeve 27 strikes the lower end of the lever 26, rocking this lever to open the snift valve 25, thereby "snifting" the bottle, by permitting the

escape through the snift tube 21 of such counter pressure gas, as is trapped in the top of the container. The snifting of the top of the bottle releases any pressure which would sustain the column of water in the water tube. As a result, this column will drop, untrapping the column of CO_2 in the passage 44, thereby permitting the valve member 47 to drop, opening the passage 46 to the atmosphere. Atmospheric pressure will be admitted above the top of the column of water in the water tube, and all of the water in the tube will be permitted to drain into the bottle or container irrespective of variations in pressures or the degree of carbonation. Therefore, after once setting the filling valve for the desired level in the container, further adjustment is unnecessary in variations of the above factors.

We claim as our invention:

1. In a bottle filling machine, the combination with a relatively stationary filling tube adapted to be projected into the container to be filled, when the container is moved into filling position, and a valve for controlling the flow of liquid through said tube, means for admitting a counter pressure fluid into the container, prior to the opening of said liquid valve, said tube at its top communicating with the atmosphere, means operated by the counter pressure admitted to the container for closing said communication, said closing means being operable to open said communication when the counter pressure in said filling tube and container is released.

2. In a bottle filling machine, the combination with a relatively stationary filling tube adapted to be projected into the container to be filled, a valve for controlling the flow of liquid through said tube into the container, an exhaust port in the top of said tube, a valve controlling said exhaust port, means for admitting counter fluid pressure into the container and said tube to act on said valve for the purpose of closing the same, and means for releasing said counter pressure in the top of the container, after the same has been filled to a predetermined level with liquid to release the pressure maintaining said valve closed, whereby any liquid contained in said filling tube will drain out of said tube after said fluid valve has been closed.

3. In a bottle filling machine, the combination with a relatively stationary filling tube of a sleeve telescoping said tube and movable with the container to be filled, when said container is moved into and out of filling position, a valve controlling the flow of liquid through said tube, a valve for controlling the admission of counter fluid pressure into the container and into said tube, said counter pressure valve and said fluid control valve being sequentially operated by the movement of said sleeve relatively to said tube, the top of said tube having an opening to the atmosphere, a valve controlling said opening, said valve being moved into closed position by counter pressure, admitted through said filling tube from the container upon the opening of said counter pressure tube and maintained in said closed position during the flow of liquid through said tube, and means for releasing the counter pressure in the top of the container, after the same has been filled, whereby said filling tube valve will be permitted to open, admitting atmospheric pressure to the top of said tube to permit any liquid contained in said tube to drain out of the same, after the fluid control valve has been closed.

4. In a bottle filling machine, the combination with a tube adapted for projection in the container to be filled, a sleeve telescoping said tube and having means for engaging and sealing the neck of the container to the atmosphere, and sealing means for sealing the sliding joint between said sleeve and tube comprising a resilient gasket surrounding said tube and expansible under pressure exerted in a direction parallel with the axis of said tube, and resilient means surrounding said tube and exerting pressure against said gasket.

5. In a bottle filling machine, the combination with a tube adapted to be projected into the container to be filled, a sleeve telescoping said tube movable relatively to said tube and having means for engaging and sealing the neck of the container to the atmosphere and sealing means for sealing the sliding joint between said sleeve and tube, comprising a gasket surrounding said tube having an annular flange extending parallel to said tube, a collar surrounding said tube having a wedge-shaped flange engaging said gasket and expanding said gasket flange against said tube, and biasing means carried by said sleeve for biasing said collar in a direction to expand said gasket against said tube.

6. In a bottle filling machine including a filling tube adapted to deliver liquid to the container to be filled and normally open at its upper end to the atmosphere, pressure operated means for closing the upper end of said tube to the atmosphere prior to the delivery of liquid to the container to be filled, and means for relieving the pressure on said pressure operated means to permit the same to open upon the completion of the filling of the container.

7. In a bottle filling machine, the combination with a filling tube adapted to be projected into a container to be filled and normally open at its top to the atmosphere, a valve for closing the top of said tube to the atmosphere, said tube having an opening below said valve for the admission of liquid to the tube, means for controlling the admission of counter pressure to the container and admitting said counter pressure to said tube to close the valve, and means for controlling the admission of liquid to said tube through said opening below said valve, said valve being operable to open, when the flow of water in said tube is shut off and the top of the container is placed in communication with the atmosphere.

8. In a bottle filling machine, the combination with a tube adapted to be projected into a container to be filled and normally open at its top to the atmosphere, a valve for closing the top of said tube to the atmosphere, means for admitting pressure to said tube beneath said valve for closing the same, said tube having a liquid inlet opening below said valve and means for controlling the flow of liquid through said inlet operable to effect the flow of liquid through said valve, after pressure has been admitted to said tube to close said valve, said valve being operable to open, upon the shutting off of the flow of liquid through said tube and the placing of said tube in communication with the atmosphere.

9. In a bottle filling machine, the combination with a tube adapted to be projected into the container to be filled, a sleeve telescoping said tube and having means for engaging and sealing the neck of the container to the atmosphere, and sealing means for sealing the sliding joint between said sleeve and tube comprising a resilient gasket surrounding said tube, said gasket having an annular wedge-shaped flange surrounding said tube, with the apex of the wedge directed to-

wards the lower end of the tube, and a collar surrounding said tube for supporting said gasket and spaced apart from said tube to permit the wedge-shaped flange to project between the tube and collar.

10. In a bottle filling machine, the combination with a tube adapted to be projected into the container to be filled, a sleeve telescoping said tube and having means for engaging and sealing the neck of the container to the atmosphere, and sealing means for sealing the sliding joint between said sleeve and tube comprising a resilient gasket surrounding said tube, said gasket having an annular flange surrounding said tube and collar surrounding said tube for supporting said gasket and spaced apart from said tube

to permit said flange to project between said tube and collar, said flange being chamferred towards the bottom of the tube on that side adjacent the collar.

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