May 1, 1962 K. PLOCK ETAL 3,032,077

BACK-PRESSURE RACKING APPARATUS FOR RACKING ESPECIALLY CARBON DIOXIDE CONTAINING BEVERAGES

Filed Jan. 29, 1958 2 Sheets-Sheet 1

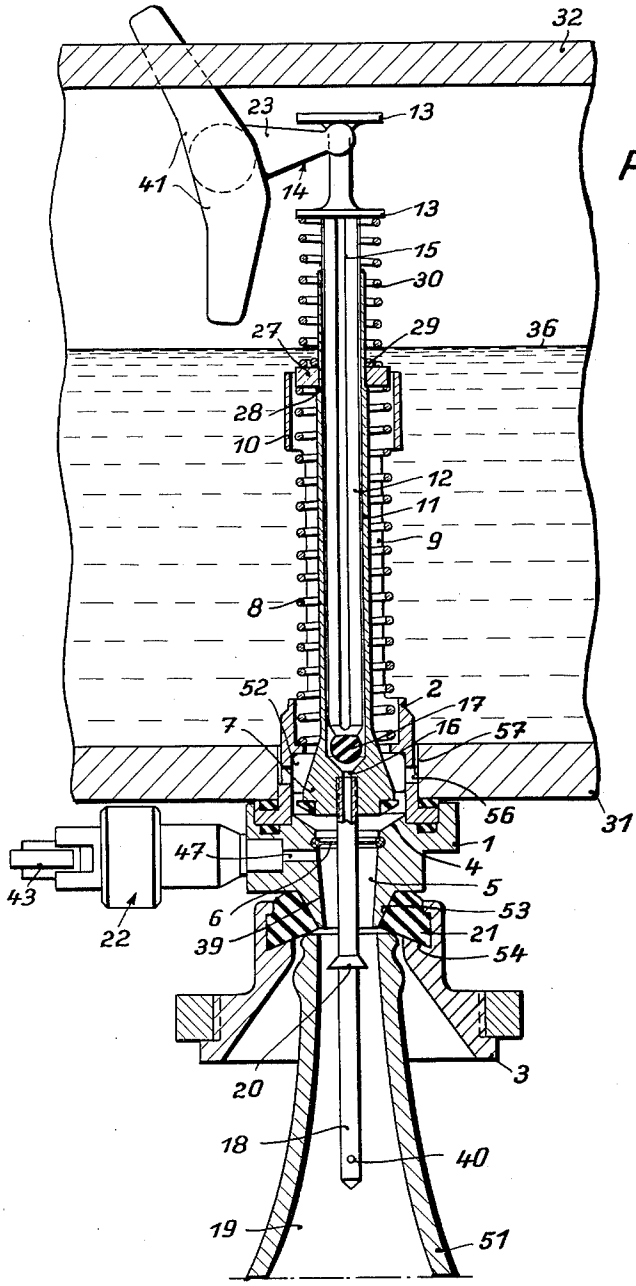

Fig. 1

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Fig. 2

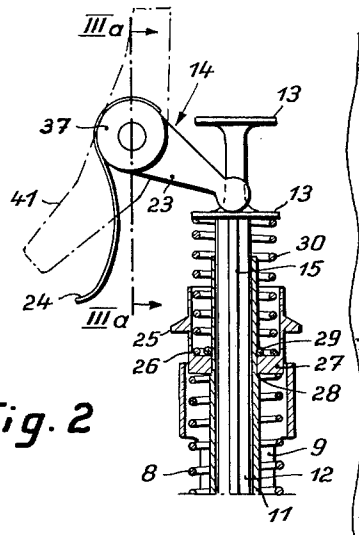


Fig. 3

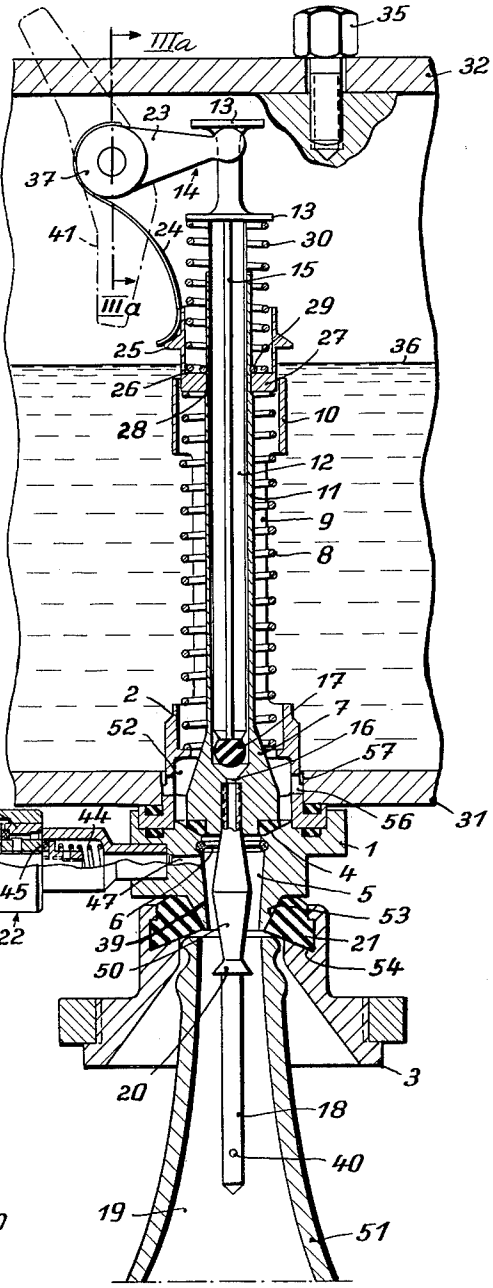
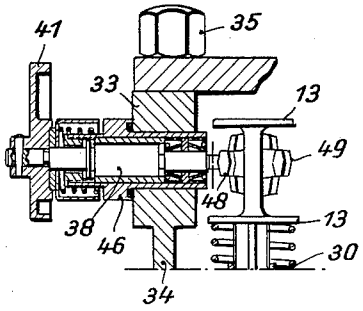


Fig. 3a



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BACK-PRESSURE RACKING APPARATUS FOR RACKING ESPECIALLY CARBON DIOXIDE CONTAINING BEVERAGES

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The invention relates to a back-pressure racking machine for racking especially carbon dioxide containing beverages, the filling taps of which each being provided with a gas valve and a liquid valve.

According to the invention the gas valve is arranged within the liquid valve. Preferably the gas valve is positioned below the liquid level in the supply vessel such that the gas valve is arranged at the lowest point within the liquid valve cone.

According to the invention the gas valve is actuated with a rod projecting beyond the liquid level by means of a control device arranged at the exterior ring of the vessel. This rod is provided with grooves of small cross section serving as gas passages.

Filling taps for bottle filling machines with gas and liquid valves are known. In these filling taps the gas valve is arranged far above the liquid valve in the gas room of the supply vessel. Thus in the vessel below the gas valve there is formed a gas room of considerable volume, which expands, when after the filling step the bottle neck is relieved, so as to press a part of the liquid, which has risen up to the level of the vessel, into the bottle and thus provoking an agitation of the bottled beverage. In the valve arrangement according to the invention this gas-room is not present, so that no liquid is driven out and no CO_2 is freed, and the beverage may be racked calmly from the filling valve. A foaming does not occur.

In the subject of invention the gas valve and the liquid valve are spring-loaded in opening direction, and in the operating position both the valves are maintained closed by the over-pressure in the vessel.

In the known embodiments of these valves a control device at first lifts the gas valve from its seat against the back-pressure acting upon this valve and simultaneously releases the opening spring. After the gas valve has been opened the pressurized gas in the supply vessel flows into the bottle. As soon as the pressure difference between the supply vessel and the bottle has become smaller than the force of the spring actuating the liquid valve, the latter is opened. Initially the liquid flows into the bottle with a velocity depending on the difference between the levels and on the remaining over-pressure. With liquids being particularly sensitive this pressure difference may have a disadvantageous influence upon the racking operation.

In order to remove such a deficiency it is further proposed by the invention to pose the control device of the gas valve with a finger upon the abutment of the spring belonging to the liquid valve. Preferably in the filling valve according to the invention the control device is provided with a resilient finger.

Furthermore it is proposed to provide the gas tube at its outlet end with a double-cone-shaped reinforcement for decreasing the outlet velocity of the liquid.

The finger serves the purpose to maintain the liquid valve in closed condition until the pressure in the bottle exactly equals the pressure within the supply vessel.

Then the liquid flows into the bottle with a velocity exclusively depending upon the difference between the levels, so that an agitation of the liquid in the bottle is prevented.

The finger posing upon the abutment of the spring, which belongs to the liquid valve, and the double-cone-shaped reinforcement of the gas tube at the outlet end are effective in the same sense such as to prevent an agitation of the liquid by excessive rates of flow.

According to the invention the flared mouth piece is provided with a rubber gasket which at its upper end engages the liquid outlet and with its lower end may contact the bottle neck.

It also belongs to the invention that the liquid from the outlet end of the controlled filling valve directly flows into the bottle without any filling tube; if desired the liquid may be deviated towards the bottle wall by means of a screen-like extension of the centrally arranged air tube.

Further improvements and further embodiments of the invention will be elucidated in connection with the enclosed drawings.

FIG. 1 shows a longitudinal sectional view of a filling valve according to the invention with the control device, the valve being opened,

FIG. 2 shows a longitudinal sectional view of the upper part of a filling valve according to the invention with a somewhat modified control device,

FIG. 3 shows a longitudinal sectional view of the same filling valve, the gas valve of which being opened,

FIG. 3*a* shows a sectional view taken along the line IIIa—IIIa of FIGS. 2 and 3 of the hub of the control lever belonging to the control device of the supply vessel.

As to be seen from FIG. 1 the filling tap consists of a valve housing **1** with the valve head-piece **2** and the flared centering mouth piece **3**. In a way described later-on in detail this filling valve is mounted in a supply vessel, the bottom being designated **31** and the cover of which being designated **32**.

Within the valve housing **1** there is arranged the valve seat **4** with the liquid outlet **5** which is screened by a wire braid **6** and is formed like a cone converging downwardly as shown at **39**. Within the valve head-piece **2** provided with ports **52** there is arranged a valve cone **7**, which in opening direction is loaded by a spring **8**. The valve head piece **2** is provided with a bridge member **9** carrying a sleeve **10**, in which a tubular extension **11** of the valve cone **7** of the liquid valve is guided. In this extension **11** of the valve cone **7** a rod **12** is arranged for actuating the gas valve. On the tubular extension **11** a flange **27** is fastened, against which the one end of the spring **8** abuts, the other end of said spring being supported by the valve head-piece **2**. In the shown embodiment the flange **27** at its one side is supported on a shoulder **28** of the tubular extension **11**; the other side of said flange supports a rubber ring **29** being positioned in a corresponding annular groove of the tubular extension **11**.

The rod **12** with its upper end projects beyond the tube **11** of the liquid valve cone **7** and carries two disks **13** arranged one above the other such as to be engaged by a lever **23** of the control device **14** of the filling valve. Between the flange **27** and the lower disk **13** a spring **30** is provided. The rod **12** of the gas valve is provided with grooves **15** serving as gas passages and carries at its lowest end a ball **17** adapted to close a bore **16** in the interior of the valve cone **7**. In the valve cone **7** as a prolongation of this bore **16** a small gas tube **18** having a transversal opening **40** is fastened with a thread, said small gas tube projects into the neck **19** of the bottle **51** and carries a screen **20** for deviating the liquid. The spring **30** urges the gas valve toward the open position, but the gas valve **17** normally remains closed when there

is no bottle beneath the filling valve, due to the pressure within the supply vessel.

Into the centering mouth piece 3, which in a way not shown in detail is mounted displaceably in vertical longitudinal direction by means of guiding rods or other means, a rubber gasket 21 is inserted. The rubber gasket 21 at its upper side contacts with a cone surface 53 a corresponding cone surface of the valve housing 1 encompassing the outlet 5 and at its lower side contacts with a cone surface 54 the mouth of the bottle 51. An opening 47 is laterally arranged at the valve housing 1, said opening discharges into a pressure relieve valve, which is generally denominated 22 and mounted at the housing 1.

During the racking step at first the gas valve is opened by lifting the ball 17 by means of the control device 14 arranged in the external ring of the vessel (compare the following specification). Thus pressure gas enters the bottle 51. As soon as the pressure is equalized, the interior pressure in the vessel, which up to now acted upon the liquid valve, is relieved, so that this valve opens by lifting the valve cone 7 under the influence of the appertaining helical spring 8. Now the liquid flows through the slotted valve head-piece 2, through the seat 4 of the liquid valve and through the narrow wire braid 6 into the outlet 5. From here the liquid flows over the screen 20 arranged closely below at the gas tube 18 towards the bottle wall and runs in a very thin veil downwardly to the bottom. When this occurs the gas of the bottle enters the gas tube 18 through the bore 40 and is returned to the vessel through the gas valve comprising the bore 16 and the cone 17. Spring 30 will keep the gas valve open after the gas valve has been lifted by lever device 14, and the force of this spring will be overcome by the pressure in the vessel acting on plates 13 as soon as the opening 40 has been closed by the rising liquid level in the bottle to be filled.

After the liquid has reached the gas tube 18, it rises therein up to the level of the liquid in the vessel, thus terminating the filling step. The liquid flow is interrupted as soon as the gas still remaining in the bottle neck no longer finds an outlet. The sieve 6 arranged in the upper part of the outlet prevents, that the gas enters the liquid passage 5 and through this the gas room of the vessel. After the gas valve and the liquid valve have been closed by a mechanical actuation of the control device 14, the relieve valve 22 is actuated and the pressure in the bottle 51 reduced to atmospheric pressure. Simultaneously also the content of the gas tube plunging into the bottle neck is relieved. A liquid discharge, however, may not occur, because by arranging the gas valve within the liquid valve no expansion forces will be freed.

In this consists the essential advantage in regard to the known valves arranged at the head of the filling taps. By expansion of the gas room below the gas valve in these former valve arrangements liquid from the gas tube could be pressed into the bottle 51, thus agitating the previously bottled liquid. After the pressure relieve the bottle 51 is removed from the filling tap.

The embodiment shown in FIGS. 2, 3 and 3*a* in all essential parts corresponds to the embodiment of FIG. 1, so that for all elements, which in both the embodiments are identical, the same reference marks have been chosen. In the embodiments according to FIGS. 2–3*a* the small gas tube 18, however, above the screen 20 is provided with a double-cone-shaped reinforcement 50 being positioned within the region of the cone 39 of the outlet 5 and serving for throttling the liquid flow.

Further in the embodiment according to FIGS. 2–3*a* the control of the filling tap by means of the control device 14 is modified such as to improve the mode of operation of the filling tap considerably. For this purpose at the hub of the lever 23 a finger 24 formed of a leave spring is mounted; when the lever 23 is lifted, said finger poses upon a collar 25, which is fastened to the tubular extension 11 of the valve cone 7 by means of a projection 26 and a flange 27.

During racking at first the gas valve is opened by actuating the control device 14. The lever 23 is raised so as to engage below the upper disk 13 for lifting the ball 17 from its seat and opening the gas passage into the bottle. Simultaneously the leave spring finger 24 poses upon the collar 25 for keeping closed the liquid valve 7. Even if the force of the spring 8 already surpasses the pressure difference between the supply vessel and the bottle, the spring 8 is not able to open the liquid valve 7.

After the pressure in the bottle has become equal to the pressure in the supply vessel, the lever 23 will be disengaged from the upper disk 13 and moved into an intermediate position. During this movement the finger 24 leaves the collar 25, and now the spring 8 may open the liquid valve, so that the liquid flows into the bottle.

After the bottle has been filled the lever 23 of the control device 14 engages the lower disk 13 for closing the gas valve and the liquid valve.

In connection with FIGS. 2 to 3*a* now it shall be explained in detail, now the filling tap is mounted in a supply vessel. This explanation is also valid for the embodiment of the invention according to FIG. 1.

The valve head-piece 2 of the filling valve is fastened to the bottom 31 of a supply vessel in a way not shown in detail; the cover or lid of said vessel being designated 32. Bottom 31 and cover 32 are interconnected by means of a side wall 34, the upper end of which terminates in an external ring 33. The cover 32 is fastened to the external ring by means of bolts 35.

In a known way the base of the supply vessel has an annular shape, and the vessel rotates slowly around a not shown center post. A plurality of filling taps is equidistantly distributed around the circumference of this supply vessel. The liquid level within the supply vessel is denominated 36. In any suitable way, e.g. by means of a not shown float, the liquid level is maintained at constant height. The space above the liquid level is filled in a known way with pressurized air or pressurized gas, especially gaseous carbon dioxide. The means for supplying the liquid and the pressure air respectively the pressure gas are not shown in detail, since they are known and do not belong to the invention.

As especially is to be seen from FIG. 3*a* the lever 23 of the control device 14 is designed as a fork, the two prongs 48, 49 of which encompass the rod 12 between the two disks 13. The hub 37 of the lever 23 is mounted on an axis 38 being led tightly through the external ring 33 of the supply vessel by means of a jacket 46. At the outer end of the axis a two-armed lever 41 is fastened, by means of which the axis 38 and thus the lever 23 are pivoted to and fro. The mode of actuation of the two-armed lever 41 is not shown in detail, because it does not belong to the invention. For the actuation of the lever 41 substantially serve abutment and cam means, operated by its relative movement in regard to the lever 41 during the rotation of the supply vessel.

The pressure relieve valve 22 is provided with a complex housing 55 with an axially displaceable valve body 42, in which a roll 43 is rotatably mounted. A stationary, not shown camming path cooperates with the roll 43 and thus with the valve body 42 in such a way, that the pressure relieve valve is opened respectively closed at the desired intervals. When opening the pressure relieve valve 22 the valve body 42 is lifted from a seat 45 contrary to the resistance of a spring 44.

Further the valve head-piece 2 is provided with transverse passages 55, which through a small annular gap 56 communicate with the lower part of the interior of the supply vessel, in order to allow an emptying of the supply vessel with built-in filling taps.

What we claim is:

1. In a back-pressure bottling machine, a supply vessel

containing the liquid to be bottled, pressurized gas in the upper part of said vessel for acting upon said liquid, outlet means at the bottom of said vessel, a flared centering mouthpiece at said outlet means adapted to engage the neck of the bottles, a liquid valve cooperating with said outlet means and adjacent thereto for dispensing said liquid into the bottles, a gas passage through said liquid valve and the lower part of said vessel for establishing communication between the upper part of the vessel and said outlet means, a gas valve regulating flow through said gas passage within the valve body of said liquid valve, and an actuating rod for said gas valve arranged within said gas passage and projecting above the liquid level of said vessel operatively associated with a valve control device for said liquid and gas valves, said rod being provided with grooves serving as gas channels.

2. In a back-pressure bottling machine, a supply vessel containing the liquid to be bottled, pressurized gas in the upper part of said vessel for acting upon said liquid, outlet means at the bottom of said vessel, a flared centering mouthpiece at said outlet means adapted to engage the neck of the bottles, a liquid valve cooperating with said outlet means and adjacent thereto for dispensing said liquid into the bottles, a gas passage through said liquid valve and the lower part of said vessel for establishing communication between the uper part of the vessel and said outlet means, said gas passage being a tubular extension of the valve body of said liquid valve and serving as an actuator for said liquid valve, a gas valve regulating flow through said gas passage within the valve body of said liquid valve, an actuating rod for said gas valve extending through said gas passage above the liquid level level of said gas passage, and valve operating means for successively operating said tubular extension and said actuating rod.

3. In a back-pressure bottling machine, a supply vessel containing the liquid to be bottled, pressurized gas in the upper part of said vessel for acting upon said liquid, outlet means at the bottom of said vessel, a flared centering mouth-piece at said outlet means adapted to engage the neck of the bottles, a liquid valve cooperating with said outlet means and adjacent thereto for dispensing said liquid into the bottles, first spring means for loading said liquid valve in the opening direction against the force of said pressurized gas tending to close said liquid valve, a gas passage through said liquid valve and the lower part of said vessel for establishing communication between the upper part of the vessel and said outlet means, said gas passage being a tubular extension of the valve body of said liquid valve and serving as an actuator for said liquid

valve, a gas valve regulating flow through said gas passage within the valve body of said liquid valve, second spring means for loading said gas valve in opening direction against the force of said pressurized gas tending to close said gas valve, an actuating rod for said gas valve extending in said gas passage above the liquid level of said gas passage, valve operating means for successively operating in a first position said actuating rod, and in a second position also said tubular extension, and means for preventing the first spring means from opening said liquid valve during said first operating position.

4. The invention as claimed in claim 3 wherein said means for preventing the first spring means from opening said liquid valve is a pivotally mounted resilient finger adapted to selectively engage an abutment engaging one end of said first spring means.

5. The invention as claimed in claim 3 wherein means for throttling the liquid flow through the outlet into the bottle neck is provided comprising a double-cone-shaped baffle affixed within the outlet concentric thereto.

6. The invention as claimed in claim 3, wherein the flared centering mouth-piece is provided with a rubber gasket, which at the upper side contacts the liquid outlet and at its lower side contacts the bottle mouth-piece.

7. In a back-pressure bottling machine, a filling tap for supplying the liquid to the bottles to be filled, said tap including an outlet in communication with the opening of the bottles, an axially movable liquid valve having a head within said outlet adjacent the bottle opening regulating the flow of liquid through said outlet, conduit means extending through said liquid valve and in communication with the bottles for supplying pressurized gas thereto, an axially movable gas valve within said liquid valve head regulating the flow of gas through said conduit means, the axes of said valves coinciding, and means operatively associated with said liquid and gas valves for the selective operation thereof.

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