

July 15, 1952

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APPARATUS FOR BOTTLING CARBONATED BEVERAGES

Filed Jan. 5, 1946

2 SHEETS—SHEET 1

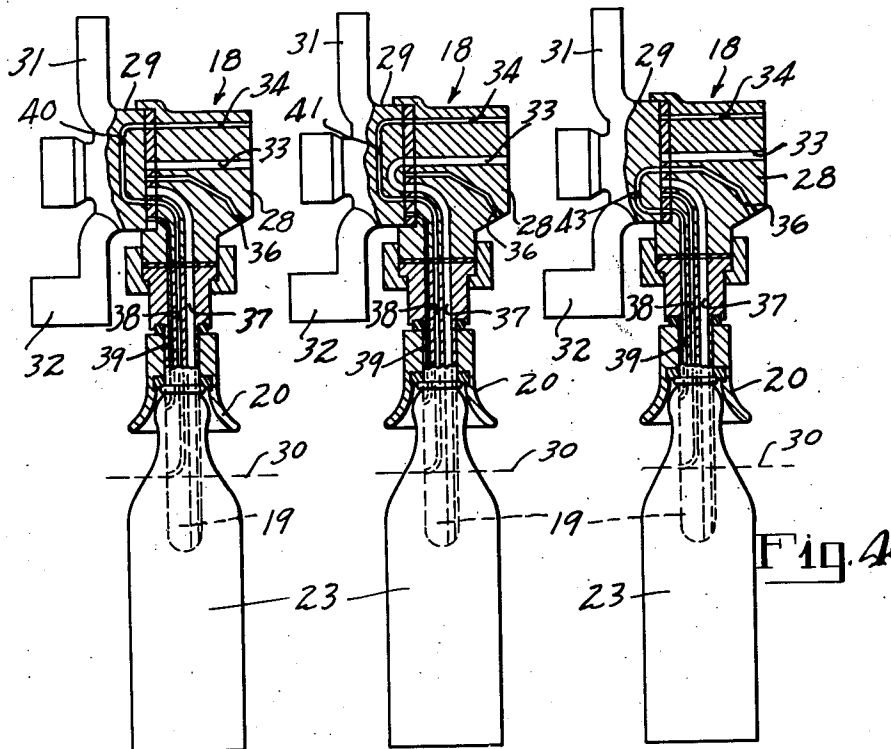
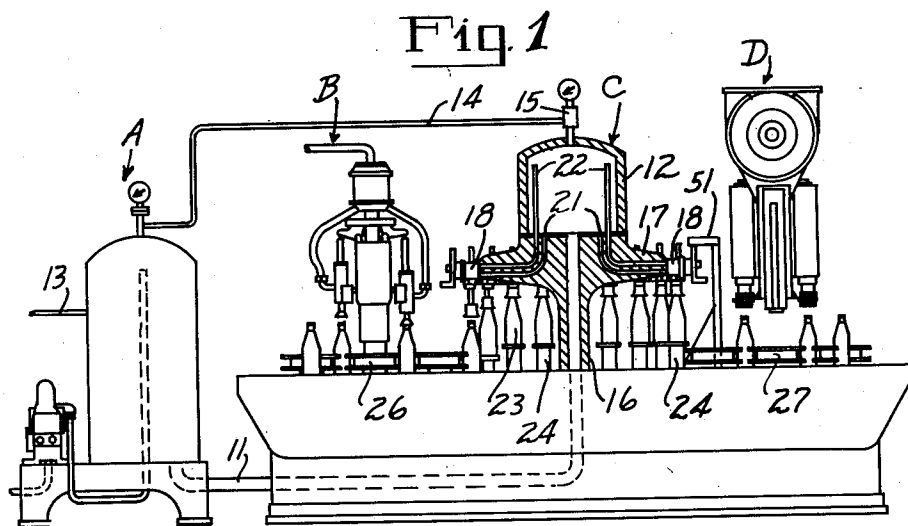


Fig. 2

Fig. 3

Fig. 4

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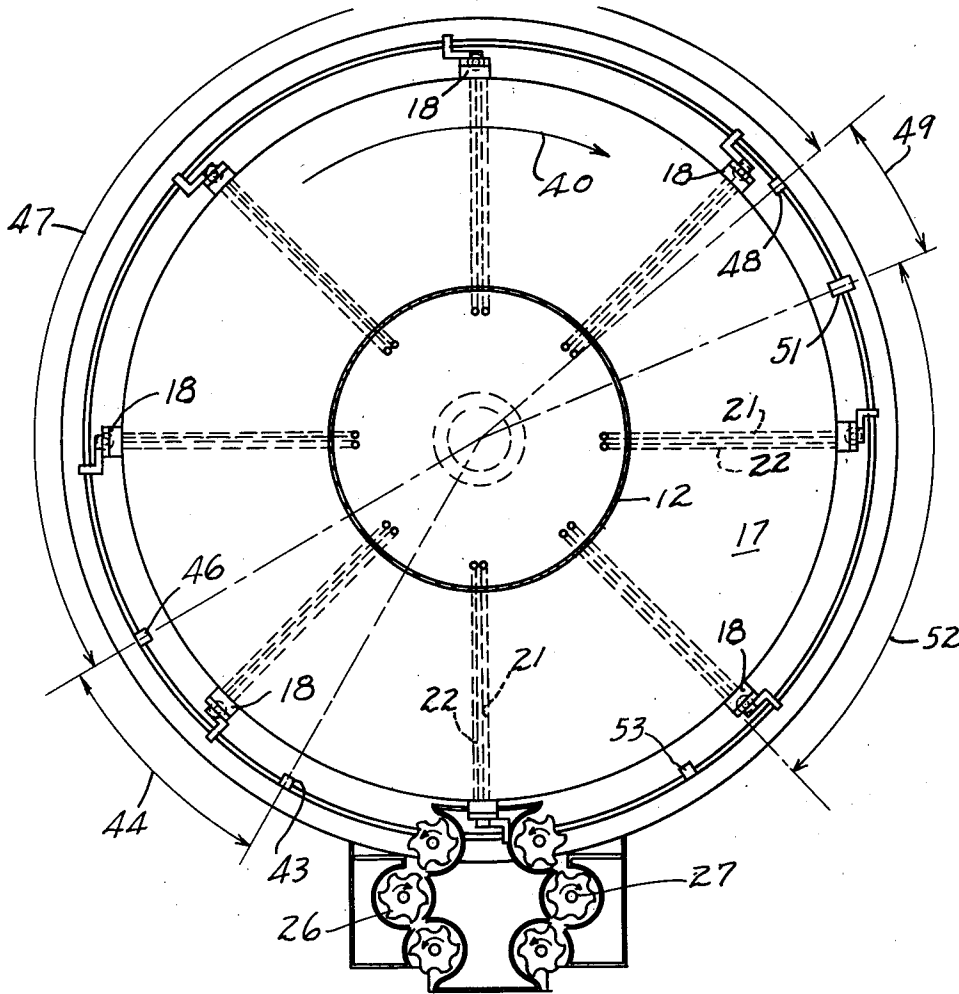


Fig. 5

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APPARATUS FOR BOTTLING CARBONATED BEVERAGES

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1 Claim. (Cl. 226—117)

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My present invention relates to an improved method and apparatus for bottling carbonated beverages.

In the art to which my invention relates, difficulties have existed in bottling carbonated beverages which have resulted in the loss of large quantities thereof because of improper filling of the bottles. In the methods and with the apparatus heretofore in use, it has been found that a large percentage of the bottles delivered from the bottling machinery contain liquid below the minimum permissible, salable quantity. Another percentage has been found to be worthless because so much carbonic gas, with which the water is charged, has escaped that it is substandard as to carbonic content, such a bottle then being known to the trade as a "flat" or "dead" bottle. In the first of the above cases, such bottles must be separated by hand from the delivery mechanism of the bottling machine, and their contents poured out as waste, there being no commercially feasible way to salvage the syrup content. In the latter case, the "dead" bottles are delivered to the trade and refunds made on account thereof, there being no way to tell by inspection whether or not the bottle is sub-standard in carbonic content. I have found in a plant delivering as much as 3600 cases of beverages per day that a loss of from 30 to 50 cases per day can normally be expected on account of not being filled to standard, and that another, though smaller, number are lost due to loss of a part of their carbonic gas content.

The bottling of carbonated beverages as heretofore practiced, has included the following steps: (1) piping to the bottle the desired quantity of syrup; (2) temporarily sealing the bottle; (3) producing a counterpressure in the bottle corresponding to the pressure in the carbonated water tank; (4) filling the bottle as nearly as possible to a predetermined level with carbonated water; (5) breaking the temporary seal to relieve pressure in the unfilled portion of the bottle, this step being known to the bottling industry as "sniffing"; and (6) after a relatively long period of time, capping the bottle. I have discovered that it is during steps 5 and 6, above, that the difficulties mentioned herein have arisen, it being understood that automatic machinery for carrying out all of the above steps has been used. It is known that as soon as the temporary seal is broken the carbonated water commences to effervesce and escapes with the escaping gas through the "sniffing" opening due to pressure

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in the unfilled portion, resulting in what is known as a "wet sniff" and causing the liquid content of the bottle to fall below standard. Under certain conditions of temperature and pressure obtaining during normal operation of the bottling plant, the quantity of liquid thus escaping from some of the bottles is so great that they are sub-standard as to quantity, and the entire contents must be poured out as waste. Further, due in part both to the "wet sniffing" and to the relatively long period of time between "sniffing" and final capping of the bottle, sufficient gas escapes from other bottles to cause the contents to become sub-standard as to carbonic gas content.

It is an object of my invention, therefore, to provide apparatus for bottling carbonated beverages which shall be adapted to operate in a manner whereby the time element of the "sniffing" step is closely controlled, thus resulting in what is termed a "dry sniff" of the bottles, and preventing the wastage of liquid therefrom, so that bottles filled by my method contain a standard quantity of properly carbonated liquid.

A further object is to provide a method and apparatus of the character designated in which a bottle being filled has the pressure in its unfilled portion released without the loss of liquid therefrom, and in which the time interval during which the "sniff" takes place is such that gas still in solution in the water is not released, thus maintaining the water in the bottle at substantially the same gas content as when admitted thereto.

A still further object is to provide a method in which a bottle being filled with charged water has the pressure released from the unfilled top without loss of liquid content, and in which the bottle is again temporarily sealed for a period of time sufficient to permit the charged water therein to close substantially all effervescing, so that when the temporary seal is removed preparatory to capping, the water will not effervesce out of the open bottle.

Apparatus embodying features of my invention is illustrated in the accompanying drawing, forming a part of this application, in which

Fig. 1 is a somewhat diagrammatic cross sectional view of a complete bottling machine;

Figs. 2, 3 and 4 are cross sectional views of the filling valve with the parts thereof in the counter-pressure, filling, and "sniffing" positions, respectively; and

Fig. 5 is a diagrammatic plan view of a rotary filling machine and illustrating the points at

which the various steps in my improved bottling method commence and end.

Referring now to the drawing for a better understanding of my invention, I show a preferred form of rotary bottling machine which is well known to the trade, but various bottling machines now in use may be adapted to carry out my method. The machine embodies in general four units, namely, a saturator A, for carbonating water, a syrup feeder B, a rotary filler C, and a crowner D. The saturator supplies carbonated water through a pipe 11 to a tank 12 on the filling machine C, the carbonic gas being admitted to the system through a pipe 13 from the usual cylinder, not shown. Head pressure in the saturator A is carried to the tank 12 through a pipe 14, and a rotary connector 15.

The rotary filling unit C comprises a vertical column 16 carrying at its upper end a circular portion 17 on top of which is the tank 12, and at the periphery of which are mounted a plurality of filling valves 18, each of which has a downwardly extending filling tube 19 and the usual bell assembly 20. Leading from each valve 18 to the bottom of tank 12 is a pipe 21, through which carbonated water flows to the valve. A second pipe 22 opens into the top of the tank 12 so that gas pressure therein is supplied to the valve. The filler is rotated in a manner well understood in the art, it being sufficient here to say that the valve 18, and bottles 23 being filled thereby, rotate substantially 360 degrees, the bottles being supplied to and removed from bottle lifters 24 by sets of rotating transfer spiders 26 and 27.

Syrup is supplied to the bottles prior to reaching the filler by the syrup feeder B, and the bottles are capped after making the circuit around the filler by the crowner D.

Referring now more particularly to Figs. 2, 3 and 4, it will be seen that the filling valves 18 each comprise a stationary portion 28 with the filling tube 19 and bell assembly 20 depending therefrom. Associated with the face of the stationary part 28 is a complementary section 29 which is rotatable with respect to part 28 by means of upper and lower actuating arms 31 and 32, adapted, as the filler rotates, to strike lugs secured to suitable stationary parts of the filler frame, for purposes later to be described.

The stationary section 28 of each valve 18 is drilled to provide a passage 33 therethrough to which is connected the pipe 21 for admission of carbonated water to the valve. Another passage 34 is connected to the top of tank 12 through pipe 22 for the admission to the valve face of gas pressure in the tank 12. Still another passage 36 is provided and opens to atmosphere.

The filling tube 19 is provided with a passage 37, opening at the lower end thereof, and extending up through the part 28 and opening into the face of the valve. A second passage 38 commences at the valve face and opens from the filling tube at the height of fill desired in the bottle, as indicated by the dotted lines 30 in Figs. 2, 3 and 4. A third passage 39 commences at the valve face and opens out from the filling tube at a point above the open ends of passages 37 and 38, just inside the neck of the bottle 23.

From the above description of the valve 18, it will be apparent that with the two sections 28 and 29 thereof in the position shown in Fig. 2, counterpressure from the tank 12 is admitted through the pipe 22, passage 34 and a passage 40 in the movable portion 29, thence into the passage 38, and thence into the bottle 23. Sufficient

pressure is thus established in a bottle being filled to balance the system.

With the valve in the position shown in Fig. 3, which is the water filling position, the gas pressure just described, is maintained on the bottle, and water is admitted from the tank 12 through the pipe 21, passage 33, a passage 41 in the movable portion 29 of the valve, the passage 37, and thence into the bottle 23. It will be noted that the counterpressure is still connected, so that when water rises in the bottle to the level of the lowermost end of passage 38 no further water is admitted.

As shown in Fig. 4, the valve is in the "sniffing" position, the gas in the unfilled neck portion of the bottle passing upwardly through the passage 39, a passage 43 in the movable portion 29 of the valve, thence out to atmosphere through the passage 36.

Referring now more particularly to Fig. 5 of the drawing, bottles containing the correct amount of syrup are transferred to the filler by means of the spiders 26, and are moved onto the rotating filler and positioned beneath the individual valves 18. The filler is rotated in the direction of the arrow 40 and the bottle lifters 24 raise the bottles into engagement with the bell assembly of their respective valves 18. As soon as this is accomplished, a lug 43 fast to any suitable stationary portion of the filler, strikes the lower actuating arm 32 causing the valve to open to the position shown in Fig. 2, thereby establishing the necessary counterpressure in the bottle. When the machine has rotated the distance indicated by arrow 44, the actuating arm 32 engages a second lug 46 on a stationary part of the filler and the valve is moved to the position indicated in Fig. 3, which is the water filling position, admitting carbonated water through the pipe 21 into the bottle. Upon further rotation as indicated by the arrow 47, the bottle has completed filling to the point indicated by dotted lines 30 in Figs. 2, 3 and 4, and the actuating arm 32 strikes another lug 48 fast on a stationary part of the filler, moving the valve to the position indicated in Fig. 4. This is the "sniffing" position, and the valve is thus held during rotation indicated by arrow 49. At this point the upper arm 31 of the valve 18 strikes another lug 51 thereby closing the valve entirely, that is with no ports open and sealing the bottle. The bottle remains closed during the rotation indicated by arrow 52 until it is lowered from engagement with the bell assembly and transferred to the crowner D by the spiders 27. Another lug 53 is positioned to strike the actuating arms 32 of each valve and reset it for the next cycle.

I so arranged the speed of rotation of the filler and the spacing of lugs 48 and 51 that the bottle "sniffs" for a period of from one to three seconds. The rotational speed is also such that when the valve is returned to closed position by its actuating arm 32 striking lug 51, a period of from four to eight seconds elapses before the bottle is disengaged from the bell assembly by the lowering of the lifters 24. I have found that if these two time elements are maintained, the difficulties heretofore mentioned are completely overcome.

It will also be noted that the lug 48 is so positioned that "sniffing" takes place immediately after the bottle has completed filling. It is at this time that the carbonated water is the least effervescent and therefore opening the bottle to atmosphere for a short period of time does not permit the water to resume its effervescence.

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vescence, provided that the bottle is not held open too long. Accordingly, I have found that "sniffing" from one to three seconds not only causes the bottle to sniff dry, but that this period of time is insufficient to permit the escape of more than a small amount of carbonic gas in solution in the water. Further, the four to eight second settling period afforded by closing the bottle immediately after the one to three second "snift," causes the filled bottle to emerge from the machine after the filling operation with the carbonated water in a stable state. Thus, at the end of the cycle when the bell assembly is removed from the bottle, but little effervescence takes place, with the result that all bottles on the machine are filled to the desired level and their carbonic gas content remains substantially the same as when the water was admitted to the bottle.

While I have described by method and apparatus as being particularly applicable for bottling carbonated beverages, it will be apparent that it may be used for bottling charged water and other liquids containing gas in solution.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claim.

What I claim is:

In a rotary filling machine for bottling carbo-

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nated water embodying a tank for carbonated water under pressure, a rotating frame, a plurality of rotary filling valves connected to the bottom of the tank and to pressure at the top thereof and each adapted to receive a bottle to be filled, passages in the valves for admitting gas pressure and carbonated water to the bottles, and an exhaust passage for relieving pressure in the unfilled top portion of the bottles, to atmosphere, the combination of stationary members positioned in the path of movement of the valves with the tank to rotate them successively to the gas pressure and water filling positions, a stationary member in the path of movement of the valves to rotate them to position for relieving pressure in the unfilled top portion of the bottles, a stationary member so positioned in the path of the valves as to rotate them to a position wherein they will be closed entirely, and another stationary member to rotate the valves to reset them for the next cycle of operation.

JAMES B. VANCE.

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