

Jan. 16, 1940.

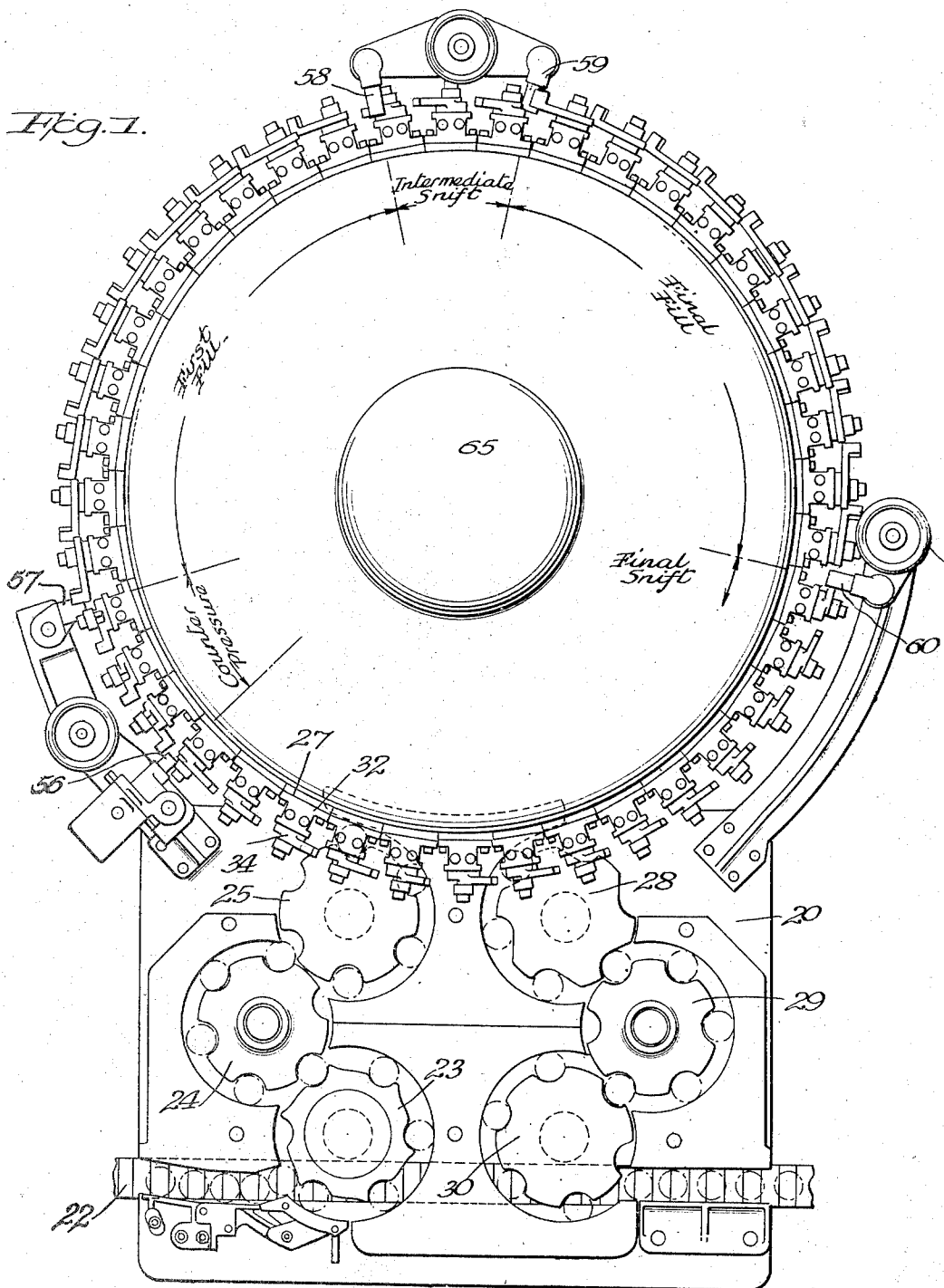
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2,187,332

FILLING MACHINE AND METHOD OF FILLING CONTAINERS

Filed Nov. 24, 1937

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

Fig. 2.

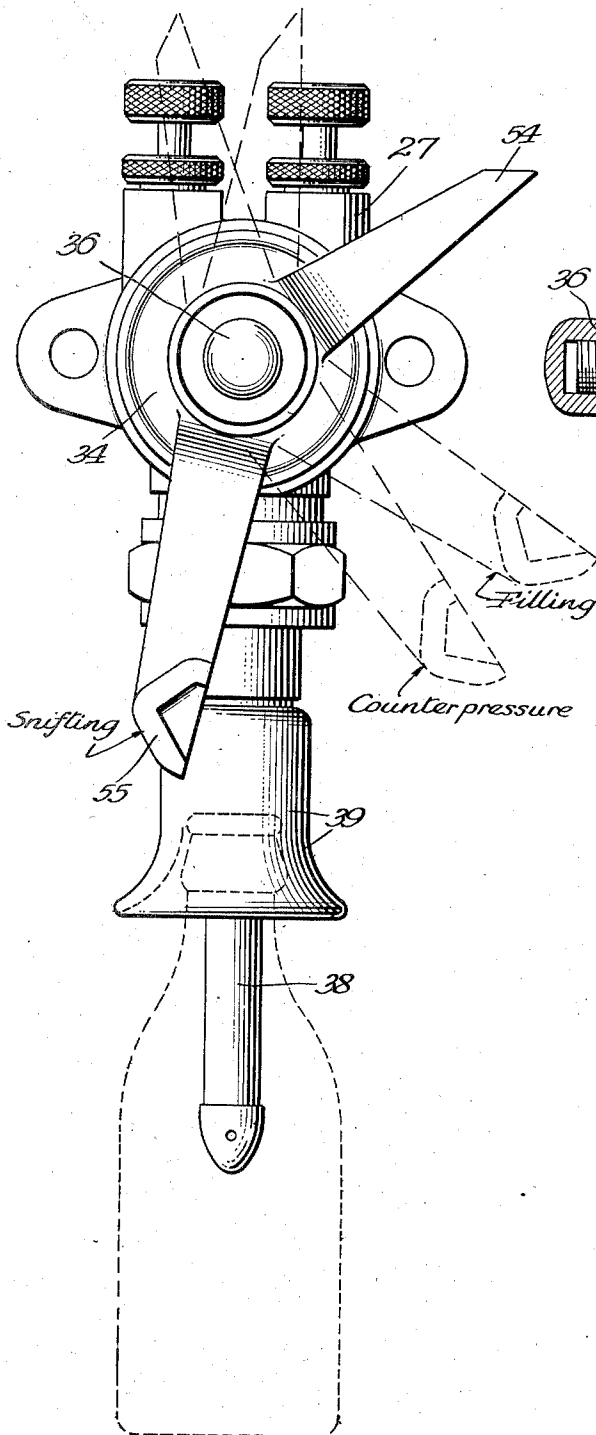
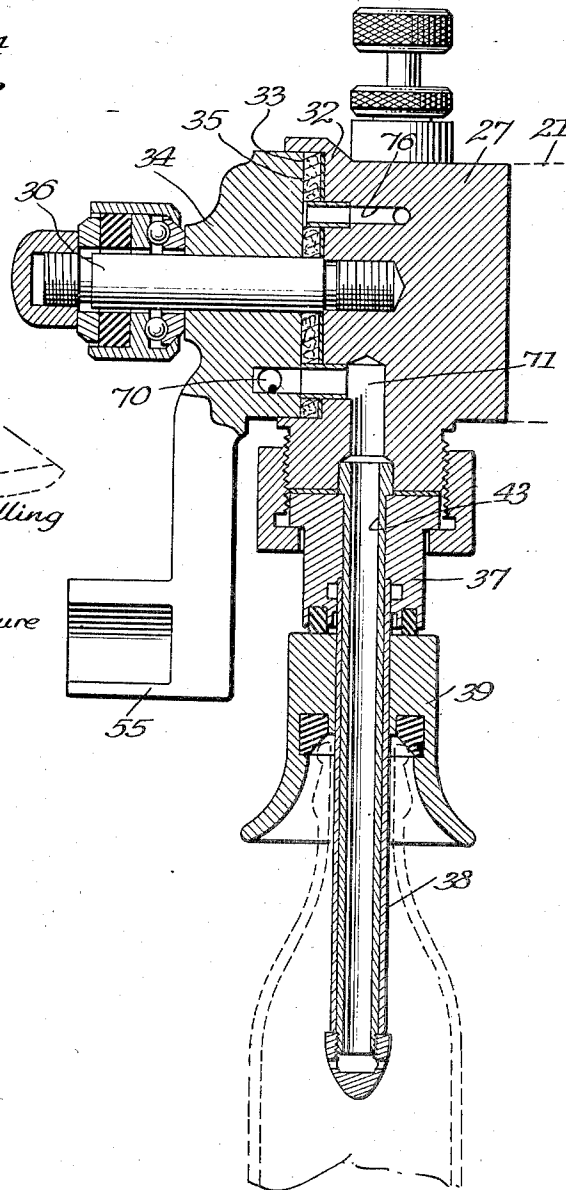


Fig. 3.



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4 Sheets-Sheet 3

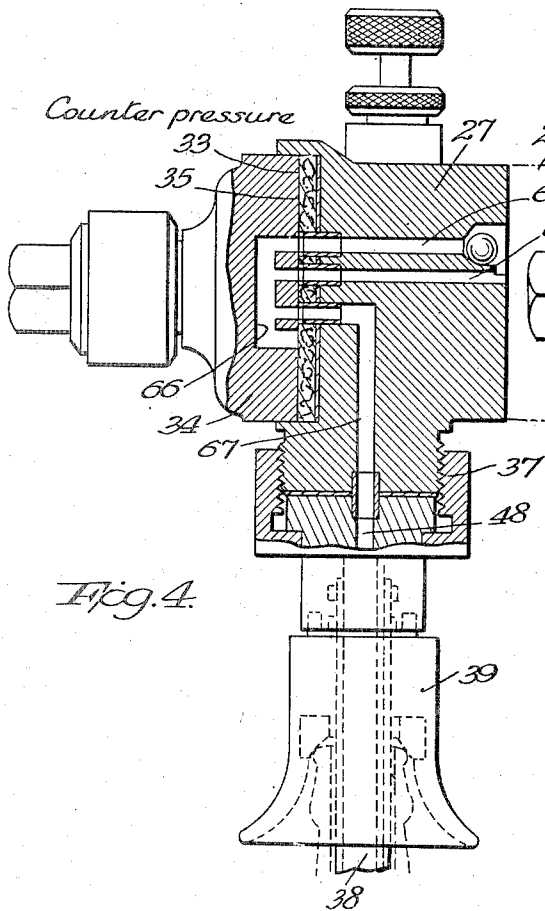


Fig. 4.

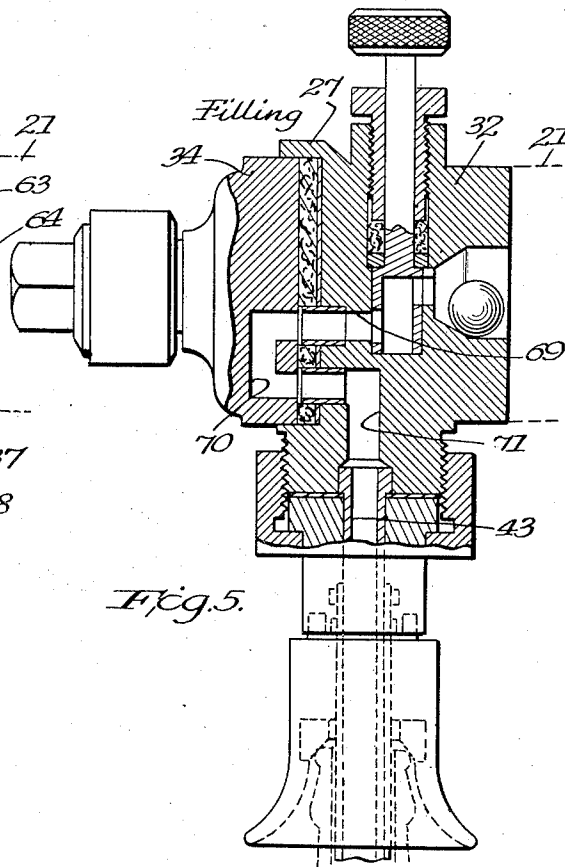


Fig. 5.

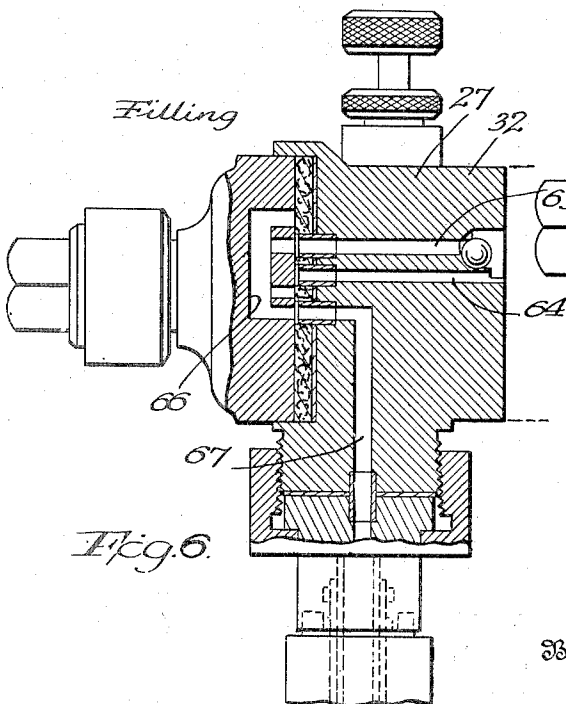


Fig. 6.

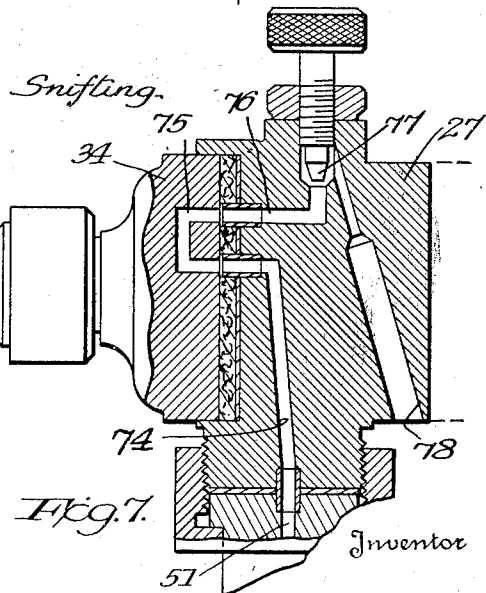


Fig. 7.

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4 Sheets-Sheet 4

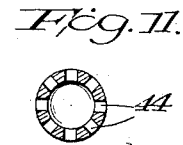
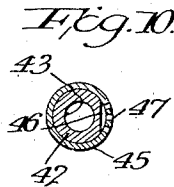
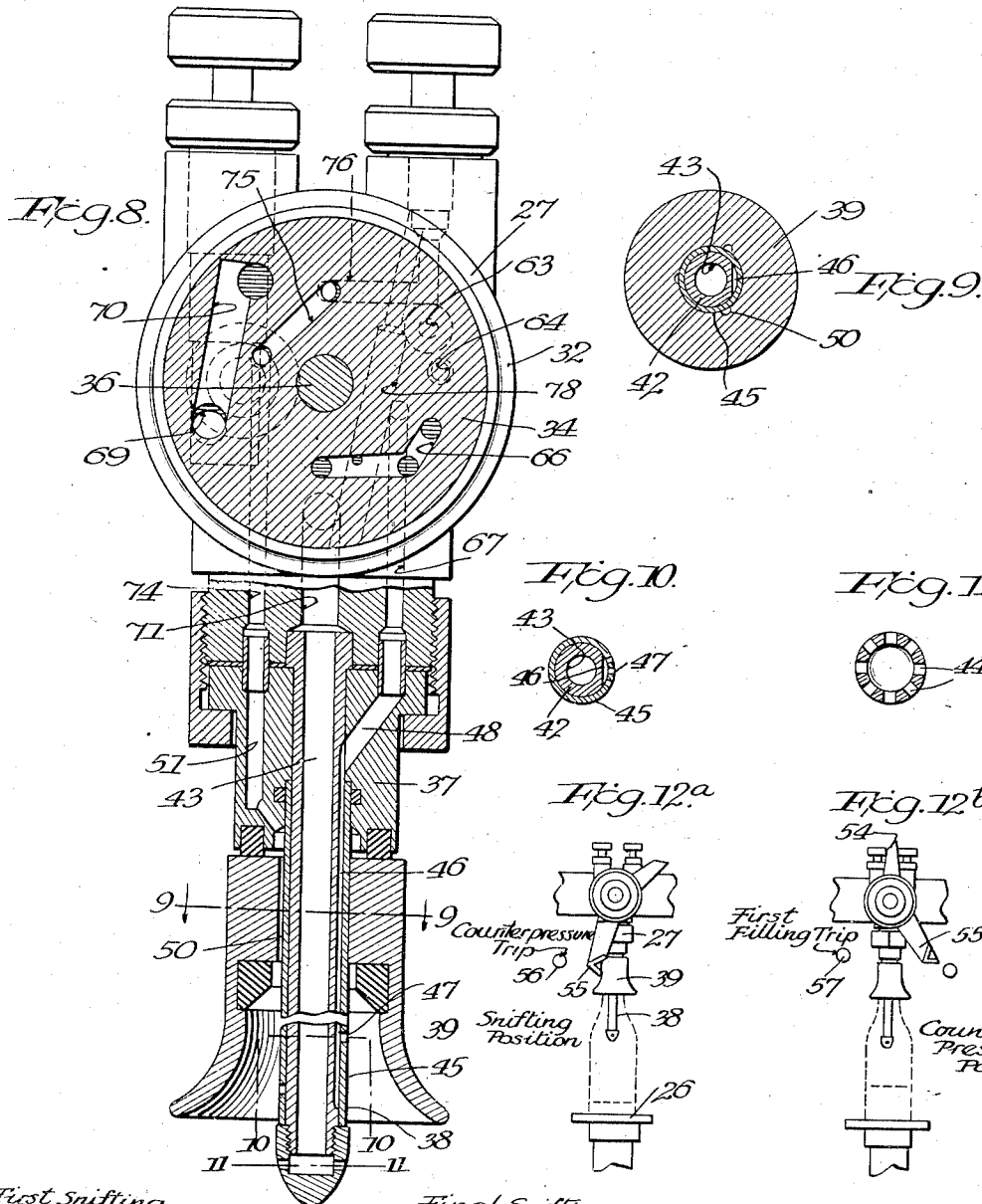


Fig. 12^a

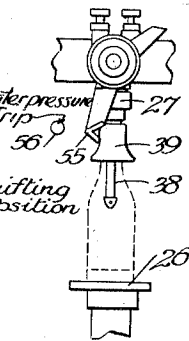
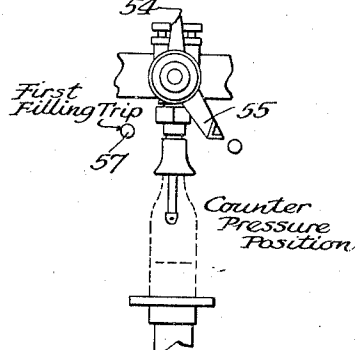


Fig. 12^b



First Sniffling Trip

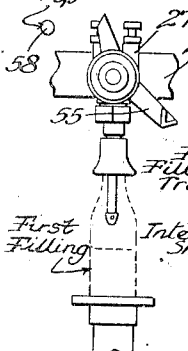


Fig. 12^c

Final Sniffling Trip

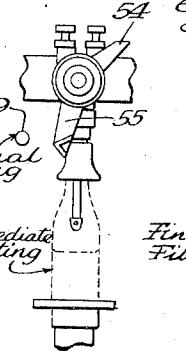


Fig. 12^d

First Sniffling Trip

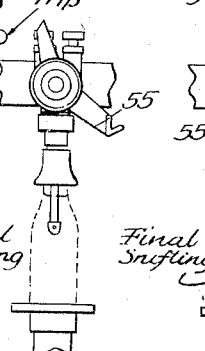


Fig. 12^e

Final Sniffling Trip

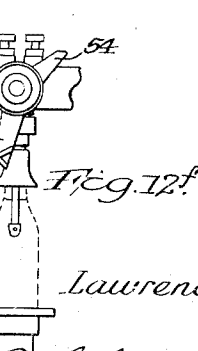


Fig. 12^f

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UNITED STATES PATENT OFFICE

2,187,332

FILLING MACHINE AND METHOD OF
FILLING CONTAINERSLawrence P. Sinz, Los Angeles, Calif., assignor to
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tion of New York

Application November 24, 1937, Serial No. 176,328

7 Claims. (Cl. 226—98)

The present invention relates to a filling machine and method of filling containers.

Filling machines for filling containers such as bottles with carbonated beverages usually include a filling reservoir having a body of carbonated water therein with a body of gas above and exerting pressure on the water. Each filling head of the machine includes a line communicating with the gas containing portion of the reservoir and another line communicating with the body of water. The filling method used with such an apparatus ordinarily consists of three steps or stages, the first or "counter-pressure" stage involving flowing gas from the reservoir to each previously syruiped bottle so that the pressure within the bottle will be the same as the pressure above the body of water in the reservoir. On the second or "filling" stage, the bottle is placed in communication with the body of water so that water will flow into the bottle by gravity flow while the counter-pressure gas in the bottle simultaneously flows back to the reservoir through a vent provided in the filling head nozzle. The flow of water into the bottle will continue until the water rises above the gas vent, and then some counter-pressure gas will be trapped in the neck of the bottle above this vent. On the third stage, termed the "sniffting" stage, the gas filled space in the neck of the bottle is opened to the atmosphere, so that the compressed gas in this space may be vented. Simultaneously with this operation, or immediately subsequent thereto, the mouth of the bottle is moved out of engagement with the filling head.

The principal object of the present invention is to provide an apparatus and method to improve upon the filling apparatus and method described above, in order that bottles may be more rapidly and efficiently filled, and with a minimum possibility of foaming.

The apparatus and method of the present invention may be generally described as involving the provision of an intermediate sniffing step during the usual filling stage. By this arrangement, the bottle is first snifted when it has been partially filled with carbonated water. As a result of such sniffing, any unbalanced condition contributing to the excessive evolution of gas from the carbonated water, and such as would result in foaming, will be stabilized while there is sufficient space above the mixture of water and syrup in the bottle to allow for foam expansion entirely within the bottle. When this sniffing has been completed, the filling is resumed, and when the bottle has been filled to the usual point, it is

again and finally snifted to relieve the gas pressure above the surface of the liquid in the bottle.

The filling apparatus and method of the present invention have the further advantage of enabling bottles to be more rapidly filled, thereby giving the filling machine a higher than normal output of bottles per minute. The increased rate of filling results from the fact that after the bottle has been intermediately snifted, and filling is resumed, the filling water may be flowed very rapidly into the bottle because the intermediate sniffing has brought the contents of the bottle to a condition of equilibrium. Obviously, since the filling water in the reservoir is subject to the body of gas above it, the water will at first be flowed down into the bottle at a fairly rapid rate and it is found that the entire cycle is thus conducted in a shorter time than the usual three stage cycle customarily followed.

Other objects and advantages of the invention will be apparent from the following specification and drawings, wherein

Figure 1 is a general plan view of a filling machine of a type upon which the method included in the present invention may be conducted. The syruiping and crowning mechanism ordinarily included in such a machine is omitted from the figure.

Figure 2 is an elevation of a type of filling head which may be used with the present invention.

Figure 3 is a central vertical sectional view through the filling head of Figure 2.

Figure 4 is a vertical sectional view through the filling head of Figure 2 and showing the valve thereof in the position it occupies during the counter pressure stage, the view being diagrammatic in that it shows the passages and ports involved in the counter pressure stage in the same vertical plane.

Figure 5 is a view of the same type as Figure 4, but showing the passages used for water flow during the filling stages and in the same vertical plane.

Figure 6 is a view also of the same type as Figure 4, but showing the venting ports used in the filling stages and in the same vertical plane.

Figure 7 is a view of the same type as the three preceding figures, but with the passages used during intermediate and final sniffing shown in the same vertical plane.

Figure 8 is a sectional view of a filling head, showing the passages and ports of the valve body and valve, the filling nozzle being shown in vertical section. In this view, the filling valve is shown rotated just slightly past sniffing position

in order to make the arrangement of the aligned passages more apparent.

Figure 9 is a horizontal sectional view on the line 9—9 of Figure 8.

5 Figure 10 is a horizontal sectional view on the line 10—10 of Figure 8.

Figure 11 is a horizontal sectional view on the line 11—11 of Figure 8, and

10 Figures 12a to 12f respectively show the position of the valve arms of the filling head valve during the various stages of the filling cycle of the present invention.

The filling machine shown in Figure 1 is of the type disclosed in the application of Robert J. Stewart and Frank S. Bell for Filling machine, Serial No. 166,403, filed September 29, 1937, and includes a stationary or work table 20 and a rotatable filling table 21 positioned adjacent the same. As is fully described in the above mentioned Stewart and Bell application, incoming bottles to be filled move into the machine upon a straight line conveyor 22 which moves across the stationary table 20, the bottles being removed from the conveyor 22 by an infeed dial 23 which 25 positions them in the pockets of a dial 24 provided beneath the syringing mechanism, not shown, so that each bottle will receive a charge of syrup. A transfer dial 25 removes each bottle from the syringing dial 24 and positions the same upon a vertically movable bottle supporting platform 26, as indicated in Figure 12a. One of the bottle supporting platforms is provided beneath each of the filling heads 27 shown secured about the upper periphery of the filling table 21. 30 The filling table shown in Figure 1 includes forty such filling heads but this number may of course be varied.

The stationary table 20 also includes a second transfer dial 28 which is adapted to remove filled bottles from the filling platforms 26 of the filling table and conduct them to a dial 29 positioned 40 beneath the crowning mechanism, not shown. During the movement of the bottles with the dial 29 they are crowned in the usual manner and are removed from this dial by an outfeed dial 30 45 which positions the bottles upon the outfeed end of the straight line conveyor 22 so that they will be removed from the machine.

The filling heads 27 shown in the drawings are of the rotary disc type disclosed in the application of George J. Huntley and Robert J. Stewart for Filling machine, filed May 15, 1933, Serial No. 671,266. Each filling head 27 comprises a valve body 32 having a seat face 33 on which a valve disc 34 including a packet seat face 35 is 55 mounted. The valve disc 34 is rotatable on a stud 36 threaded in the valve body as shown in Figure 3. The valve body 32 includes a depending portion 37 from which extends a filling nozzle 38. 60 A centering bell 39 is slidable upon the nozzle 38 in the usual manner.

Each valve body 32 has a plurality of horizontal passages therein extending from its seat face 33 to its rear face, and a number of angled passages extending from the seat face down to the filling nozzle 38. The ends of these passages are adapted to be bridged by passages in the valve disc 34 during movement of the valve disc, all as specifically described in the above-mentioned 70 Huntley and Stewart application, and as hereinafter generally described. As best shown in Figure 8, the filling nozzle 38 includes a central tube 42 having a bore 43 therein from which water may flow into a bottle through ports 44. 75 The filling nozzle also includes a sleeve 45 sur-

rounding the tube 42, and, as shown in Figures 8 to 10, the tube has a flattened portion extending down along the same to provide a passage 46 between the interior of the sleeve 45 and the flat surface of tube 42. Passage 46 opens to the interior of a bottle through ports 47 in sleeve 45. The upper end of the flattened portion extends up above the end of sleeve 45 so that the passage 46 formed thereby may communicate with a passage 48 in the body member of the filling head as 10 shown in Figure 8.

The centering bell 39 includes a central bore so that it may slide on the filling nozzle 45, and kerfs 50 are spaced about the wall of this bore. When the centering ball bears upon a bottle, the lower ends of the kerfs will communicate with the bottle interior, and since the upper end of the centering bell will at such time be in sealed contact with the lower end of the body element 32 of the filling head as shown in Figure 8, the upper ends 20 of the kerfs 50 will be in communication with a passage 51 in the valve body.

Each valve disc 34 is provided with an upwardly extending valve arm 54 and a downwardly extending valve arm 55, both arranged to contact with trips passed about the path of rotation of the filling table. As best shown in Figure 1, a counter pressure trip 56 is positioned adjacent the point at which bottles are initially placed upon the filling table 21. A short distance from the counter pressure trip 56, in a clockwise direction, a first filling trip 57 is arranged in the path of movement of the filling heads. At the rear of the machine and at a point substantially midway of the path of movement of the bottles on the filling table an intermediate sniffing trip 58 is positioned, and a final filling trip 59 is provided a short distance further along in a clockwise direction. The final sniffing trip 60 is positioned near the point at which the bottles return to the stationary table 20, and at a point coinciding with or very closely adjacent the point at which the bottles are moved downwardly and out of contact with the filling heads. 40

As is the usual practice, each bottle supporting platform 26 will be flush with the surface of the stationary table 20 at the time that a bottle is positioned on the platform by the transfer dial 25, the platform being held downwardly in this position by a fixed arcuate cam, not shown, and with which a roller, not shown, included in the bottle platform structure engages. Immediately after the bottle has been positioned upon the bottle supporting platform, the cam engaging roller of that platform will move out of engagement with the stationary cam and will move the bottle upwardly to place its mouth in engagement with the aligned filling head 27 as shown in Figures 2, 3 and 12a. At this time the bottle will of course usually have a charge of syrup therein as 60 shown in Figure 12a.

Almost immediately after a bottle has been positioned upon a bottle supporting platform 26 and in contact with a filling head as described above and as diagrammatically shown in Figure 12a, the lower valve arm 55 of the filling head will contact with the counter pressure trip 56, thereby moving the valve arm to the position indicated in Figure 12b, which position corresponds to the "counter pressure" position of the valve disc indicated in dotted lines in Figure 2. The disc valve 34 will thereby be rotated so that flow will occur through the passages diagrammatically illustrated in Figure 4. Referring to Figure 4, horizontal counter pressure gas flow passages 75

63 and 64 which receive counter pressure gas from the upper portion of the reservoir 65 of the filling table through pipes, not shown, will communicate with one end of a passage 66 in the valve disc 34. The other end of valve disc passage 66 will open to an angled passage 67 leading from valve body seat face 33 to the passage 48 which opens to the passage 46 (Figure 8) between the filling nozzle tube 42 and sleeve 45. As a result, counter pressure gas will flow into the bottle to establish the same pressure in the bottle as is present above the body of carbonated water in the reservoir.

Very shortly after the above operation of the lower valve arm 55 by the counter pressure trip 56, this valve arm will come into contact with the first filling trip 57 so that the valve arm will be moved to the position shown in Figure 12c and indicated in dotted lines at "filling" in Figure 2. In the position to which the valve disc 34 is now turned, a passage 68 (Figure 5) in the valve body 27 which is connected to the lower and water containing portion of the reservoir 65 will, by a passage 70 in the valve disk, be placed in communication with an angled passage 71 in the valve body which opens to the bore 43 of the filling nozzle 38. As a result, water will flow downwardly into the bottle. The same movement of the valve disc will cause the position of the valve disc passage 66 to be slightly changed, but as indicated in Figure 6, this passage will still bridge the passages 63 and 67 of the valve body, so that the gas which has just been placed in the bottle will move upwardly to the gas containing portion of reservoir 65.

The above described flow of water into the bottle and the simultaneous venting of counter pressure gas therefrom will continue until the bottle is about one-half full of water and syrup as shown in Figure 12c, at which time the filling head will come opposite the intermediate snifting trip 58 which will contact with the upper valve arm 54 of the valve disc so that the latter will be turned in a counterclockwise direction from the position shown in Figure 12c to that shown in Figure 12d and also at "snifting" in Figure 2. The two sets of passages shown in Figures 5 and 6 will then be closed and the interior of the bottle will be opened to the atmosphere through the kerfs 50 in the centering bell 39, passage 51 in the valve body, and the passages indicated in Figure 7, viz., the valve body passage 74, valve disc passage 75, valve body passage 76 and past a snift adjustment valve 77 through passage 78 which opens to the atmosphere. As a result, the flow of water into the bottle will be stopped and all of the gas which is above the surface of the water in the bottle will be vented to the atmosphere. Also, if the liquid in the bottle has any instability because of the gas therein, this instability will be cleared up. By the present method, if the mixture of syrup and carbonated water in the bottle tends to foam, it will have ample space in the bottle for foaming and without the possibility of any foam moving up into the snift passages of the filling head to clog the same.

The snifting action described above need only be momentary and the final filling trip 59 may therefore be positioned quite close to the intermediate snifting trip 58 as shown in Figure 1. As illustrated in Figure 12d the final filling trip 59 is positioned in the path of the lower valve arm 55 and will cause the latter to be moved from the position indicated in 12d to the position shown in Figure 12e. The relative position of

the passages of the valve body and valve disc will be the same during this final or second filling stage as was the case in the first filling stage. That is to say, carbonated water will again flow into the bottle through the passages shown in Figure 5, and the gas passages shown in Figure 6 will also be aligned for flow. However, since the bottle is now half filled with liquid and half filled with gas or air at atmospheric pressure while the water moving toward the bottle through the water passages is under the pressure of a certain head and also under the pressure of the gas in the reservoir 65, the incoming water will move into the bottle at a rapid rate. This rapid rate of flow of the water will not continue indefinitely because gas will be flowing into the bottle from the upper portion of the reservoir through the passages shown in Figure 6. Consequently, by the present method, conditions in the bottle will be brought to equilibrium before the bottle has been entirely filled with water. That is, the gas moving into the bottle through the passages of Figure 6 will shortly establish the same pressure in the upper portion of the bottle as exists in the upper portion of the reservoir 65 and thereafter the water moving into the passages shown in Figure 5 will flow only because of its own head, created by the difference in height between the bottle and the reservoir 65.

Water will continue to flow into the bottle until the surface of the water reaches the ports 47 in the filling nozzle sleeve, and through which counter pressure gas has been escaping. With the gas venting now stopped, the counter pressure gas in the bottle will be compressed in the mouth of the bottle to resist further flow of water into the bottle.

The continued rotation of the filling table will next bring the upper valve arm 54 into contact with the final snifting trip 60 so that the disc valve 34 will be moved from the position illustrated in Figure 12e to that illustrated in Figure 12f. This will cause the valve body and valve disc passages shown in Figure 7 to be again brought into alignment so that the gas in the extreme upper portion of the bottle may be vented through the kerfs 50 (Figure 8) and passages 51 and 74, valve disc passage 75 and thence through passages 76 and 78 to the atmosphere.

Simultaneously with the contact of the valve arm 54 with the final counter pressure trip 60, or immediately thereafter, the bottle supporting platform 28 will be moved downwardly by engagement of its roller, not shown, with the platform lowering cam, not shown. This will cause the mouth of the bottle to be opened to the atmosphere simultaneously with or almost simultaneously with the final snifting and if a bottle has any tendency to foam, it will be open to the atmosphere for such foaming so that the snifting passages may not be filled with foam. In the normal conduct of the apparatus and method, there is of course no tendency to foam at this point but the above arrangement eliminates the difficulties which would be resultant upon such foaming.

It will be noted that when the valve disc 34 is in the snifting position shown in Figure 7, the only passages which are aligned for flow will be open to the atmosphere. The bottle may therefore be moved from beneath the filling head by the transfer dial 25 and the valve disc may remain in this snifting position until a second bottle has been placed beneath its filling head by the infed dial 25.

It will be observed that the method of filling disclosed herein includes the practice of establishing a pressure in the bottle corresponding to that in the reservoir before flowing the water into the bottle, then placing the bottle in communication with the atmosphere, and then placing the bottle in communication with both the gas and the water in the reservoir so that a rapid flow of water is had. This method is particularly efficient because of the fact that prior to the last mentioned stage of flowing both water and gas into the bottle, the contents of the bottle have been brought to a state of equilibrium.

It will be understood that the invention is not limited to the details of construction shown in the drawings and that the example of the use of the machine and method which has been given does not include all of the uses of which they are capable; and that the phraseology employed in the specification is for the purpose of description and not of limitation.

I claim:

1. The combination in a filling machine having a rotary filling table, a reservoir for liquid and gas, a plurality of filling heads and means to support containers in alignment with the filling heads, the filling heads including valve means to control the flow of liquid and gas from the reservoir to the containers, of means spaced about the path of travel of the filling table to contact with and actuate each of said valve means seriatim to a plurality of positions to establish the same pressure in the container as exists in the reservoir so that liquid may flow to the container by gravity flow, to release the pressure from the container and to then permit both the gas and liquid to flow together to the container.

2. The combination in a filling machine having a rotary filling table, a reservoir for liquid and gas, a plurality of filling heads of rotary disc valve type and means to support containers in alignment with said filling heads, of means spaced about the path of travel of the filling table to cause the disc valves of said filling heads to be actuated seriatim to permit of counter pressure gas flow from the reservoir to the containers, filling liquid flow to the containers with simultaneous return flow of gas to the reservoir, cutting off of liquid flow and gas venting and the placing of the interior of the container in communication with the atmosphere, resumption of liquid flow with the container in communication with the gas containing portion of the reservoir, and finally again placing the interior of the container in communication with the atmosphere.

3. The method of filling containers with liquid from a reservoir having a body of liquid therein under fluid pressure, comprising establishing the

same pressure in the container as is present above the liquid in the reservoir, flowing liquid into the container, releasing the pressure in the container, and then simultaneously flowing liquid and gas into the container.

4. The method of filling containers with liquid from a reservoir having a body of liquid therein under fluid pressure, comprising establishing the same pressure in the container as is present above the liquid in the reservoir, flowing liquid into the container, stopping the flow of liquid and releasing the pressure in the container, and then simultaneously flowing liquid and gas into the container.

5. The method of filling containers with liquid from a reservoir having a body of liquid therein under fluid pressure, comprising establishing the same pressure in the container as is present above the liquid in the reservoir, flowing liquid into the container, stopping the flow of liquid and releasing the pressure in the container, and then simultaneously flowing liquid and gas into the container and subsequently placing the container in communication with the atmosphere.

6. The combination in a filling machine having a reservoir for liquid and gas, a plurality of filling heads and means to support containers in alignment with the filling heads, the filling heads including valve means to control the flow of liquid and gas from the reservoir to the containers, of means to actuate each of said valve means seriatim to a plurality of positions to establish the same pressure in the container as exists in the reservoir so that liquid may flow to the container by gravity flow, releasing the pressure from the container and then permitting the gas and liquid to simultaneously flow to the container, and means to hold each container mouth in sealed engagement with the aligned filling head throughout such movement of said valve means.

7. The combination in a filling machine having a rotary filling table, a reservoir for liquid and gas, a plurality of filling heads and means to support containers in alignment with the filling heads, the filling heads including valve means to control the flow of liquid and gas from the reservoir to the containers, of means spaced about the path of travel of the filling table to actuate each of said valve means seriatim to a plurality of positions to establish the same pressure in the container as exists in the reservoir so that liquid may flow to the container by gravity flow, releasing the pressure from the container and then permitting the gas and liquid to simultaneously flow to the container, and means to hold each container mouth in sealed engagement with the aligned filling head throughout such movement of said valve means.

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