Jan. 18, 1955 F. X. WRIGHT 2,699,718

FILLING APPARATUS WITH BEVERAGE PREPARATION MECHANISM

Filed April 10, 1952

3 Sheets-Sheet 1

FIG. 1

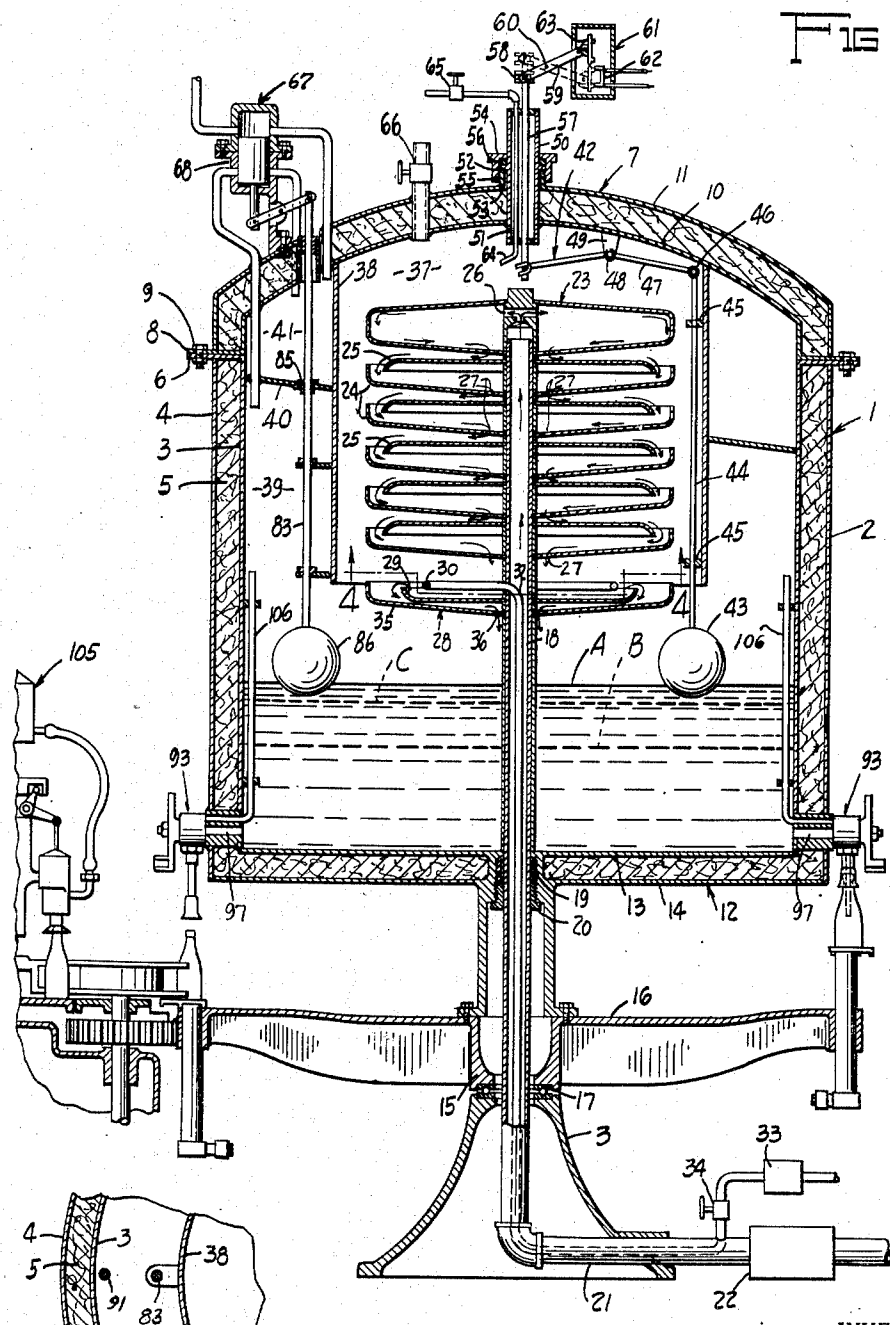


FIG. 2

INVENTOR.

Francis X. Wright

BY Robb & Robb,

Attorneys

Jan. 18, 1955 F. X. WRIGHT 2,699,718

FILLING APPARATUS WITH BEVERAGE PREPARATION MECHANISM

Filed April 10, 1952

3 Sheets-Sheet 2

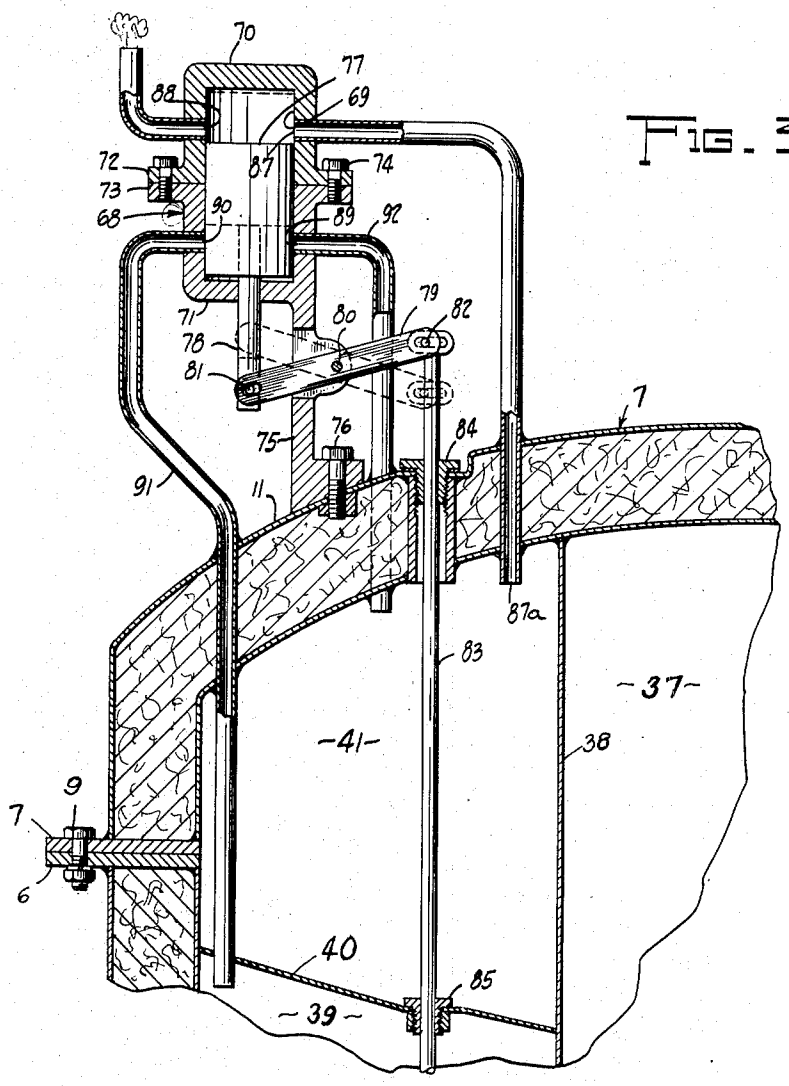


Fig. 3

INVENTOR.
Francis X. Wright
BY Robb & Robb,
Attorneys

Jan. 18, 1955 F. X. WRIGHT 2,699,718

FILLING APPARATUS WITH BEVERAGE PREPARATION MECHANISM

Filed April 10, 1952

3 Sheets-Sheet 3

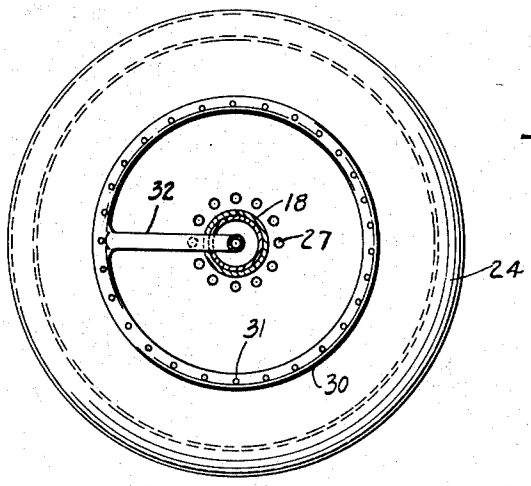


FIG. 4

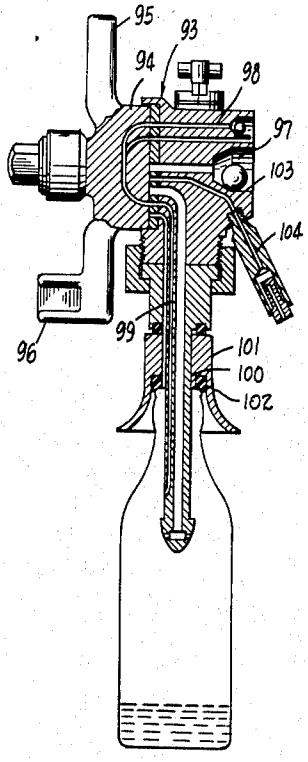


FIG. 5

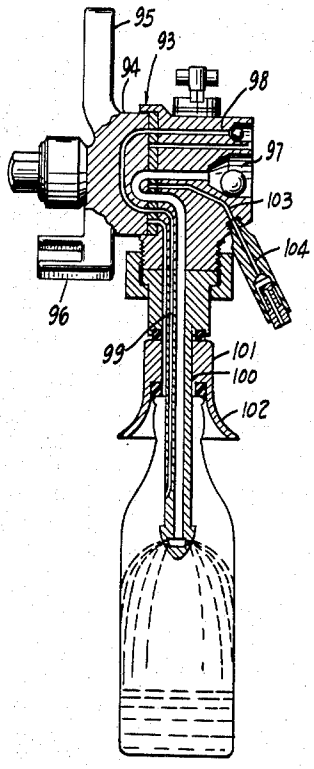
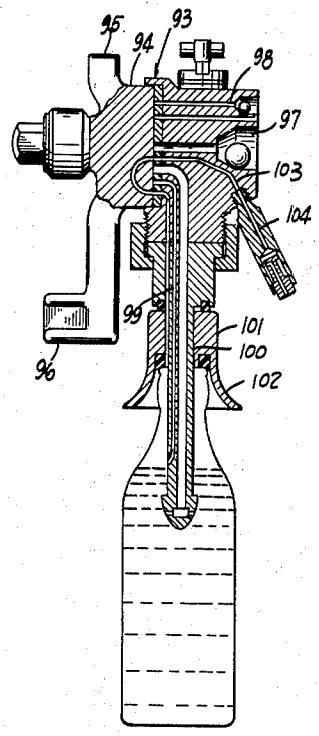


FIG. 6

FIG. 7



INVENTOR.
Francis X. Wright
BY Robb & Robb,
Attorneys

United States Patent Office 2,699,718
Patented Jan. 18, 1955

2,699,718

FILLING APPARATUS WITH BEVERAGE PREPARATION MECHANISM

Francis X. Wright, Cleveland Heights, Ohio

Application April 10, 1952, Serial No. 281,494

9 Claims. (Cl. 99—275)

This invention relates to filling apparatus, and more particularly to such apparatus which is suitable for use for carbonated beverages.

At the present time, systems which involve the use of filling apparatus also include a number of separate units which are so arranged as to pass bottles to be filled with the carbonated beverage from station to station on related, but timed separate machines. The various positions into which the bottles pass involve the use of a syruping device wherein the said bottles are provided with a slug of syrup and thereafter moved into positions beneath a storage tank in which water previously carbonated by a separate apparatus is stored and supplied to the bottles as they move with respect to the machine in a circular path while the filling operation takes place.

It is therefore a principal object of this invention to provide an apparatus which, literally speaking, combines substantially all of the prior units into one unit, thus obviously reducing the initial investment required, and likewise in a large measure effecting an important saving in the cost of operation.

It is a further object of this invention to provide an apparatus which fundamentally involves the combining in a single unit, the three separate units which may be designated as the saturator, the carbonated water storage tank, and the syruper, which will thus reduce the time involved in cleaning as well as cost of apparatus for effecting the same.

It is a still further object of this invention to provide a novel form of combined storage and filling unit wherein a saturator is located, and to so divide the apparatus as to effectively carry on all of the foregoing different operations in one unit while still providing the same type of operation which has been found to be most desirable in connection with carbonated beverage manufacture.

It is a still further object of this invention to provide an apparatus which is of relatively simple construction, and into which water or other liquid may be introduced to thereafter be saturated and without transfer to another device be delivered to the bottles from which the beverage is finally dispensed. A still further object of this invention is to provide a novel arrangement which avails of the inherent qualities of air and carbon dioxide gas, such that the air may be removed without substantial loss in quantity of the carbon dioxide gas, relying upon the stratification of the respective air and carbon dioxide gas.

It is a still further object of this invention to provide novel control elements for the apparatus, which are responsive to changes in liquid level so as to regulate the movement of air with a minimum amount of loss of carbon dioxide gas.

It is a still further object of this invention to provide means for effecting a mixture of carbonated water with syrup whereby the thus carbonated beverage may be dispensed directly to the bottles without resort to a previous syruping operation.

It is a still further object of this invention to provide a filling apparatus in which the carbonating of the liquid introduced thereto, in accordance with well-known desirable characteristics, by the introduction of refrigerated water, will take place in a quiescent manner, without unnecessary agitation of the liquid so as to maintain the carbonated concentration of the liquid and reduce the tendency for the carbon dioxide to be freed and be unnecessarily wasted thereby.

Other and further objects of this invention will be set

forth in the appended specification and claims, and illustrated in the drawings, wherein:

Figure 1 is a view partly in section and partly in elevation, showing the general relationship of the parts which comprise this invention, and in particular certain of the details by which the objects thereof are carried out.

Figure 2 is a section, somewhat fragmentary in nature, taken about on the line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view, showing the control unit for regulating the movement of air from the storage tank.

Figure 4 is a fragmentary sectional view, taken about on the line 4—4 of Figure 1, illustrating certain of the details of the syruping portion of the apparatus.

Figure 5 is a sectional view of one of the filling heads in an initial position.

Figure 6 is a section similar to Figure 5 of a filling head, showing the same in a second position.

Figure 7 is a sectional view of a filling head, showing the same in a third position.

Referring now to Figure 1 where is shown the apparatus of this invention generally designated 1, which includes a substantially cylindrical tank 2, mounted for rotation upon a support 3. The tank 2 comprises a cylindrical outer wall, including inner cylindrical member 3 and an outer cylindrical member 4 spaced therefrom. Between the members 3 and 4, suitable insulating material 5 is provided, and said members 3 and 4 terminate in a flange 6, to which is fastened the top 7 of the tank, by provision of a suitable flange 8 thereon by means of the bolts 9. The top 7 of the tank is of course formed so as to include the insulating material between the inner and outer members 10 and 11 thereof, the top 7 being removable as is apparent.

The bottom 12 of the tank is formed of double construction and includes insulating material therein also, between the inner and outer members 13 and 14, respectively. The bottom 12 of the tank is in turn equipped with a suitable trunnion member 15, from which extend the arms 16, the member 15 being provided with a raceway 17 at its lower base adapted to engage a corresponding raceway in the support 3.

Located substantially centrally of the bottom of the tank and passing upwardly therethrough is a water supply tube, designated 18, which tube 18 is suitably sealed with respect to the bottom by provision of the packing 19, maintained in its sealing position by the flange nut 20 in any suitable manner. The supply tube 18 is fixed against rotation, and at its lower end is connected with a pipe or tube 21, leading from a pump 22, which pump 22 is connected to any suitable source of water, said water of course being refrigerated in accordance with well-known practice.

At the upper end of the tube 18, and substantially centrally of the tank, is the saturator 23 which may be constructed in any well-known manner, and comprises a series of pans 24 and 25. The water forced into the tube 18 by the pump 22 flows out of the top of the tube at 26 and passes in a circuitous path over the upper pan 25 in a thin film at the outer edge of the pan, and downwardly into the lower pan 24, and through suitable openings 27 therein. The water follows this path in repetition over the series of pans as shown in the Figure 1, until it reaches the lowermost pan thereof. Carbon dioxide gas having been introduced at the upper part of the tank, the said water will have absorbed the necessary quantity of gas during its path of travel as above outlined, in accordance with well-known practice. The provision for the introduction of the carbon dioxide gas will be subsequently described.

When the carbonated water has thus reached the lowermost pan 24, it passes downwardly through the openings 27 which are closely adjacent the tube 18, on to a syruping unit generally designated 28. The syruping unit 28 includes a flat circular pan 29 on to which the carbonated water flows, and the syrup is metered to the water on the pan by the provision of a tubular ring 30 in which a series of holes at the lower portion thereof, designated 31, are formed. The ring 30 is supplied by a small tube 32, which tube 32 passes through the tube 18 and is supplied by a pump 33. The pump 33 is in turn supplied from

any suitable source of syrup, and a calibrated valve **34** in the tube **32** is provided for regulating the flow of syrup to the syruping ring **30** in any preferred proportion in accordance with previously determined concentration desired.

Of course the tube **32** is sealed with respect to the tubes **18** and **21**.

When the syrup and carbonated water passes over the pan **29** at its outer edge, it is flowed on to the lower cylindrical pan **35** and thus inwardly toward the tube **18** and downwardly through holes **36** closely adjacent the tube with a space in the bottom of the tank provided for temporary storage of the liquid.

It should be understood that any preferred form of saturator **23** may be provided, and that the syruper **28** may be of any likewise preferred form, the same shown herein being suitable for the purpose.

In view of the foregoing, it will be understood from a consideration of Figure 1, that the saturator **23** is located in a section which will be designated **37** as the carbon dioxide gas section. This section is formed by reason of the provision of a cylindrical baffle **38** suitably fixed at its upper end to the top **7** of the unit, and depending from the said top to a point in a plane spaced from the usual liquid level which will be maintained in the tank. Since the baffle **38** is spaced from the side **3** of the tank, there is thus formed an annular area which will be designated **39** and denoted the carbon dioxide gas and air section. These two sections **37** and **39** are of course in communication by reason of the position of the lower edge of the baffle **38**.

A transverse baffle **40** is provided suitably fixed to the baffle **38** and may preferably be placed in a somewhat diagonal plane as respects the axis of the tank, the periphery of the baffle **40** being very close to the inner member **3** of the wall so as to provide a substantial sealing engagement therewith. There is thus formed what is termed an air chamber **41** between the baffle **40** and the lower member of the top of the tank **7**.

In order to provide for the control of the level of liquid within the tank **2**, there is provided a float unit designated **42**, which includes a float member **43** suitably fastened to a vertically extending float rod **44**, the float rod **44** being guided in members **45** fastened to the inner side of the baffle **38**, the rod **44** at its upper end being pivotally connected at **46** to a lever arm **47** which lever arm **47** is pivoted substantially centrally thereof at **48** to a bracket **49**, depending from the top **7** of the tank. Located substantially centrally of the top of the tank, is a gland unit **50**, which includes tubular non-rotatable member **51**, having a flange **52** fastened integrally thereto. The flange **52** is adapted to be supported upon an upwardly extending outlet portion **53** of the tank top **7**, and a suitable gland nut **54** is provided, having threads **55** therein adapted to engage corresponding threads on the extension **53**. By means of a suitable seal element **56**, and suitable tightening of the gland nut **54**, said tubular member **51** may be sealed in place as respects the tank. With the tubular member **51** closed at both ends, an opening is provided in each end closure through which a vertically movable rod **57** is operated by the lever arm **47** previously referred to. At the upper end of the rod **57**, a suitable head member thereon **58**, is adapted to engage a lever **59** pivotally supported at **60** by a bracket (not shown) readily provided by one skilled in the art, the lever **59** having at its outer end pivotal engagement with a switch unit **61**.

The switch unit **61** may be of any preferred form, the same illustrated being comprised of contact unit **62**, and contact unit **63** operable by the arm **59**. It will thus be apparent that upward movement of the rod **57** will cause a corresponding downward movement of the switch member **63** so as to contact the member **62**, and thus effect operation of the motor for the pump **22** previously referred to. In view of the arrangement of the control unit **42** just described, it will be apparent that when the liquid level in the tank falls from the position designated A therein, to a position designated by the dotted line B, the float **43** will be thus following the liquid level, and in turn cause an actuation of the switch **61** so as to start into operation the pump **22**, and thus supply the tank with additional liquid to be carbonated.

The tubular member **51** at the top of the tank is additionally provided with tube **64** passing therethrough by means of which the carbon dioxide gas is admitted into the section **37**, which is the carbon dioxide gas section as previously mentioned. The source of carbon dioxide gas may be as is usually the case, any suitable storage tank, and the same is controlled by means of a valve **65** in accordance with conventional practice.

The top of the tank **7** is provided with a valve generally designated **66** which may be used to permit the carbon dioxide gas within the tank to be drawn off as the occasion demands, during certain phases of the use of the apparatus herein being discussed.

Near one edge of the top **7**, there is provided a control unit generally designated **67**, whereby the air within the chamber **41** may be permitted to flow to the atmosphere during operation of the apparatus as will be subsequently set forth. The control unit **67** is more particularly shown in Figure 3, and includes a casing **68**, having a cylindrical bore **69** therein, the casing **68** being preferably formed of two parts, **70** and **71**. The two parts **70** and **71** may be fastened together by means of the flanges **72** and **73**, the flanges in turn being fastened by means of the bolts **74**. The lower section **71** includes a supporting member **75** adapted to be seated on the outer member **11** of the top **7** and maintained in place thereon by means of the bolt **76**. Within the cylindrical bore **69** of the casing **68**, there is mounted a piston **77**, adapted to be reciprocated upwardly and downwardly by means of a piston rod **78** extending through the lower section **71** of the casing. The piston rod **78** is in turn engaged with a lever **79**, the lever **79** being pivoted at **80** on the support **75**, and suitably attached at **81** to the said lever **79** at one end, and at **82** to downwardly extending substantially vertical rod **83**. The rod **83** passes through a gland member **84** in the top **7** of the tank, and downwardly through the air chamber **41**, and a further gland member **85**, and at its lower end is provided with a float member **86**. The float member **86** is adapted to rise and fall in response to changes in liquid level within the tank, and in doing so, the member **86** imparts upward and downward movement to the piston **77** previously mentioned. The piston **77** is so arranged that in its lowermost position, an exit or outlet line opening **87**, in the upper section **70** of the unit **67**, is uncovered, the outlet line extending from the top of the air chamber **41** as indicated at **87***a*. A suitable atmosphere port **88** is uncovered at the same time as the port **87**, and permits air to flow from the chamber **41** to the atmosphere, over the head of the piston **77**. When the piston **77** is moved upwardly, the same closes the ports **87** and **88**, and when the ports **87** and **88** are closed, the ports **89** and **90** are uncovered, the port **90** being connected by means of a suitable tubular member **91**, to the carbon dioxide gas and air section **39** of the apparatus. Thereby air flowing through the tube **91** and passing through the port **90** when the piston is in the dotted line position in the figure, will be transferred through the port **89** and tube **92** to the air chamber **41**. This foregoing of course takes place when the float **86** has moved downwardly in response to a lowering of the liquid level to a point such as indicated by the dotted line C in Figure 1, as will be subsequently explained during operation of the apparatus.

Around the lower periphery of the tank **2** there may be provided the usual filling heads **93**, in any preferred number, the said heads being of generally conventional construction, such as illustrated in Figures 5, 6 and 7. The filling heads **93** include the usual valve disc **94** thereon, operable in timed relation so as to be moved by the arms **95** and **96** thereon into the various positions shown in the respective Figures 5, 6 and 7. During the movement of the disc **94**, the liquid within the tank is permitted to flow by gravity into the bottles carried by the arms **16** in accordance with conventional construction. The filling heads **93** include therein the outlet passage **97**, connected so as to direct the flow of liquid out of the tank **2** in one position of the valve disc **94**, said heads being additionally provided with the counterpressure passage **98** therein, which as is known, passes through the valve disc **94** and downwardly through the passage **99** in the filling nozzle **100**, the filling nozzle **100** being provided with the usual bell-shaped member **101**, said member **101** being equipped with a sealing gasket, **102**, therein adapted to engage the opening in the bottle through which the filling nozzle **100** is inserted. A snifting passage **103** is provided connected with a snifting member **104**, for operation in accordance with conventional practice during the position of the valve disc **94** as shown in Figure 7. As is well known, rotation of the valve disc **94** will cause the various passages **97**, **98** and **103** to be connected so as to

carry out the respective functions thereof, as shown in Figures 5, 6 and 7 and as will be subsequently explained during the description of the operation of this apparatus.

In the event that the syruping unit **28** previously mentioned, is not to be used, the apparatus may be used in conjunction with the usual syruping apparatus, generally designated **105**, as shown in Figure 1, the same being operated in a conventional manner and therefore, not hereinafter referred to since the same is well known.

It should be noted that a counterpressure conduit **106** is provided, leading from the passage **98** into the interior of the tank **2** and thence upwardly to a point slightly above the bottom edge of the cylindrical baffle **38**, each one of the filling heads **93** of course being provided with such a conduit.

The operation of the apparatus of this invention will now be set forth, the filling of the bottles being carried out in the usual conventional manner. If the apparatus of this invention is intended to be used without the syruping unit **28**, the conventional syruping unit **105** is availed of and the bottles are entered thereinto and carried thereby to the various positions, whereby each bottle is provided with a slug of syrup in accordance with the predetermined desirable concentration of the final product.

When the apparatus shown in Figure 1 is started into operation, rotation of the unit **1** takes place, on the supporting member **3**. Initially however the pump **22** has been started into operation and carbon dioxide gas is permitted to enter the chamber **37** by means of the valve **65** which is calibrated so as to introduce the same in a desired quantity. Thus, with the pump **22** in operation, water flows upwardly in the tube **18** and the carbon dioxide gas entering the tube **64** is absorbed thereby as the water passes over the saturator **23**. Since the water level in the tank gradually rises, it reaches a point where the float **43** is moved upwardly which in turn, when the water level has reached the position A in Figure 1, will cause the switch unit **61** to be actuated and thereby interrupt the circuit which operates the pump **22**. Thus, the liquid in the tank **1** has reached the level A with a carbonated mixture which is to be delivered through the filling heads **93** to the bottles supported on the arms **16**. As the arms **16** rotate with each having a bottle thereon received from the syruper **105**, the filling head **93** is actuated so as to cause the valve disc **94** to assume the position shown in Figure 5. There is thus effected a connection of the interior of the bottle by means of the passage **99**, and passage **98** to the counterpressure conduit **106**, causing an equalization of the pressure within the bottle and within the tank **1**. This is in accordance with the usual desired conventional operation, the bottle being in engagement with and hermetically sealed under the valve **93**. Passage **97** for the carbonated water is of course closed, and the balance of the pressure in the complete system is effected as above pointed out. After the counterpressure action has taken place, the valve disc **94** is moved into the position shown in Figure 6, as the tank **1** continues to rotate. The counterpressure conduit **106** remains in connection with the passage **99**, and the carbonated water leaves the nozzles of the filling tube **100** to gently flow down the wall of the bottle and over the syrup. The counterpressure gas in the bottle is displaced by the carbonated water entering the same, and flows up the counterpressure conduit **106** into the carbon dioxide gas and air section **39** of the unit **1**. In view of the fact that the air is lighter than the carbon dioxide gas, the same will rise to a position just beneath the baffle **40** and remain there during the operation. As the liquid level in the tank **1** reaches the point C, the control unit **67** is actuated by reason of the fact that the float **86** falls somewhat, causing a movement of the piston **77** to the dotted line position shown in Figure 3. Thus, the ports **89** and **90** are placed in connection, and the air flows through the tube **91**, through the ports **90** and **89** and hence through the tube **92** into the chamber **41**.

Subsequently, in view of the fact that the liquid is being drawn off from the tank **2**, the float **43** also drops slightly, causing the switch unit **61** to be actuated by reason of the switch elements **63** and **62** coming into contact to thereby again commence operation of the pump **22**. Thus, liquid water again flows upwardly through the tube **18** and further carbonated liquid is thus provided as previously set forth. When the liquid level has again reached the position A, the float **86** of the control unit **67** also rises, and moves the piston **77** in the said control unit, downwardly so as to first close the ports **90** and **89** and subsequently open the ports **88** and **87** for connection of the interior of the chamber **41** with the atmosphere through the port **87***a*. Thus the air in the chamber **41** is permitted to flow to the atmosphere, and since the air in this chamber is only very slightly, if at all, diluted with carbon dioxide gas, a minimum amount of waste of the carbon dioxide gas takes place in the cycle above set forth.

As the tank **2** continues to rotate, the valve discs **94** on the various filling heads **93**, eventually reach the position as shown in Figure 7 to thereby close the carbonated water passage **97**. However, just prior to the closure of passage **97**, the liquid in the bottle being filled has risen to a point whereby the counterpressure tube **99** is closed at its end by the liquid. Since a balance of pressure exists within the system, the shut off of the flow of liquid to the bottle takes place in accordance with conventional operation of other types of filling apparatus.

When the fiilling head valve disc of each respective filling head **93** has reached the position shown in Figure 7, as previously mentioned the flow of liquid is positively shut off by rotation of the valve disc, and a gradual snift of the gas above the carbonated water takes place through the passage **103**.

Subsequently of course the bottle is removed from the filling head after the filling operation takes place, and passes thereafter to the usual crowning mechanism whereby the bottle is sealed and subsequently deposited for further delivery to its eventual place of use.

The foregoing explanation of the operation of this apparatus should be supplemented by stating that in view of the position at which the gas passing out of the bottle during the filling operation is entered into the tank **1**, through the counterpressure conduit **106**, said gas being introduced into the section **39** just above the bottom of the baffle **38**, so as to prevent a mixture of this carbon dioxide gas and air mixture with the carbon dioxide gas in the section **37**, and stratification of the gas and air takes place, there are in effect three sections provided within the single tank. These sections are the sections **37**, **39** and **41**, as previously indicated, the chamber **41** being completely sealed from the other two sections, and being operatively connected with section **39** by the control unit **67** responsive to changes in the liquid level in the tank.

In the event it is desired to eliminate the use of the syruping unit **105**, the previously described syruping unit **28** may be availed of, by starting into operation the syrup pump **33**, and regulating the flow of syrup therefrom by means of the valve **34**. All of the foregoing of course will take place while the pump **22** is in operation so as to pump water into the saturator and the syrup pumped by pump **33** will be moved through the pipe **32** to the syruping ring **30**. The syrup will pass from the ring **30** in droplets through the openings **31** therein, and in to the carbonated liquid flowing over the pan **29**. Thus, by predetermined calculation the amount of syrup to be mixed with the carbonated water from the saturator may be determined, and thus the liquid stored in the tank will be a completely carbonated beverage of the desired flavor in accordance with the type of syrup passing through the syruping unit **28**. There is thus provided a simple means of eliminating the syruping unit **105** with the consequent increase in production and reduction of cost of installation and maintenance of the various equipment provided hereby.

It should also be understood that by reason of the provision of a tank such as the unit **1** which has a removable top therefor, cleaning of the apparatus may be readily affected for changing from one syrup flavor to another, and the loss of carbon dioxide gas will be minimized as will be apparent.

The apparatus shown and described herein will vastly simplify the usual type of carbonating equipment that is at present available since it combines in a single unit all of the attributes of three other prior units, including the saturator, the storage tank and the syruping unit. At the same time, the desirable operation of carbonating apparatus as at present known, is maintained by the provision of the tank such as the unit 1, wherein all of the various balancing of pressure together with the control of the liquid level and the saturation of the water passing into the tank may take place, as well as a syruping of the saturated water being possible to be carried out.

I claim:

1. A filling apparatus of the class described, in combination, a closed liquid storage tank, liquid supply means for said tank, carbonating means for liquid supplied to said tank, a liquid outlet unit for said tank, a first central carbon dioxide gas section in said tank, a second carbon dioxide gas and air section separate from the first section and connected therewith, an air storage chamber sealed from both of the sections aforesaid, a counterpressure line extending from the said liquid outlet unit to the said second section, and a unit for controlling the flow of air from said second section to the air storage chamber.

2. An apparatus as claimed in claim 1, wherein means are provided for regulating the flow of air from the air chamber to the atmosphere.

3. An apparatus as claimed in claim 1, wherein the control unit is adapted to alternately connect the second section with the air storage chamber and the air storage chamber with the atmosphere.

4. An apparatus as claimed in claim 1, wherein the control unit is operable in response to variations in the height of liquid in the tank.

5. A apparatus as claimed in claim 1, wherein the carbonating means comprises a saturator unit supported in the first section, means being provided to supply carbon dioxide gas thereto, combined with a syruping unit including a member to receive carbonated liquid supplied by the saturator, a flow control element adapted to distribute syrup uniformly through said liquid, and means to supply syrup to said element.

6. A filling apparatus of the class described, in combination, a closed liquid storage tank, liquid supply means for said tank, a first central carbon dioxide gas section in said tank, a saturator unit in said section, a second carbon dioxide gas and air section surrounding the first section and connected therewith, an air chamber surrounding the first section and sealed from both the first and second sections, filling heads connected to said tank for controlling the flow of liquid from said tank, counterpressure conduits leading from said filling heads to positions above the level of liquid in the tank, and a unit for controlling the movement of air from the second section aforesaid to the atmosphere.

7. An apparatus as claimed in claim 6, wherein the control unit includes instrumentalities operable to regulate movement of air from the said second section to the air chamber, and from the air chamber to the atmosphere.

8. An apparatus as claimed in claim 6, wherein the first and second sections are separated by a cylindrical baffle extending downwardly from the top of the tank, spaced from the wall thereof, and the air chamber is formed by a transverse baffle extending between the cylindrical baffle and the wall aforesaid.

9. An apparatus as claimed in claim 7, wherein the control unit is operable in response to changes in the liquid level in the tank.

References Cited in the file of this patent

UNITED STATES PATENTS

2,372,899	Kantor	Apr. 3, 1945
2,434,374	Tull	Jan. 13, 1948
2,462,019	Bowman	Feb. 15, 1949
2,603,399	Vance	July 15, 1952
2,617,510	Little	Nov. 11, 1952
2,657,628	Von Stoeser	Nov. 3, 1953