Nov. 29, 1938. W. M. RYAN ET AL 2,138,355

APPARATUS FOR FILLING CONTAINERS UNDER GAS

Filed Sept. 5, 1935 6 Sheets-Sheet 1

Fig. 1.

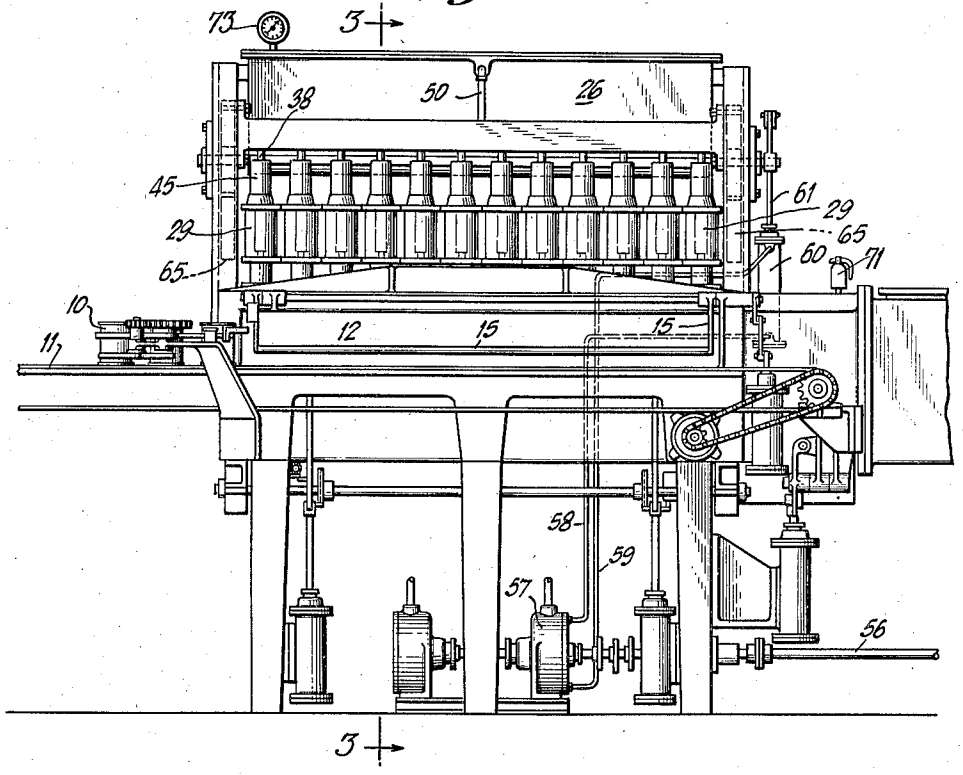
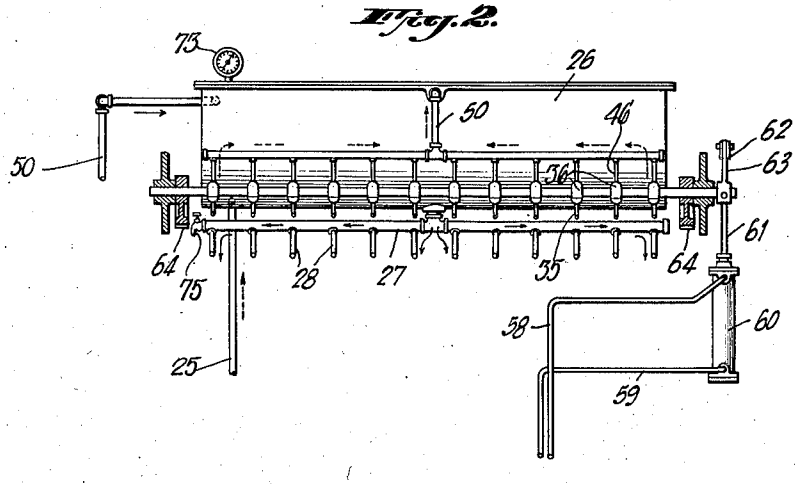


Fig. 2.



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APPARATUS FOR FILLING CONTAINERS UNDER GAS

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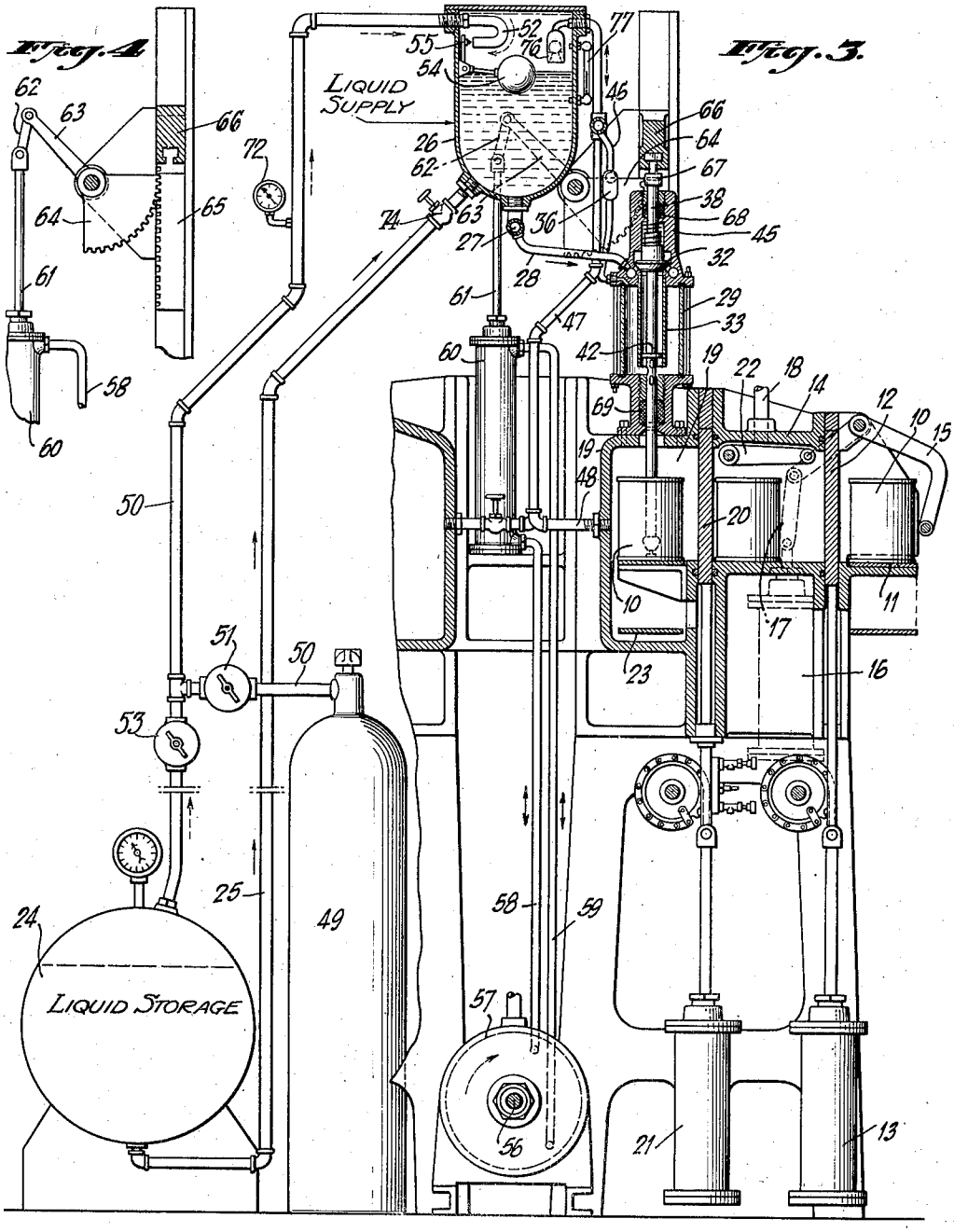

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APPARATUS FOR FILLING CONTAINERS UNDER GAS

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Fig. 5.

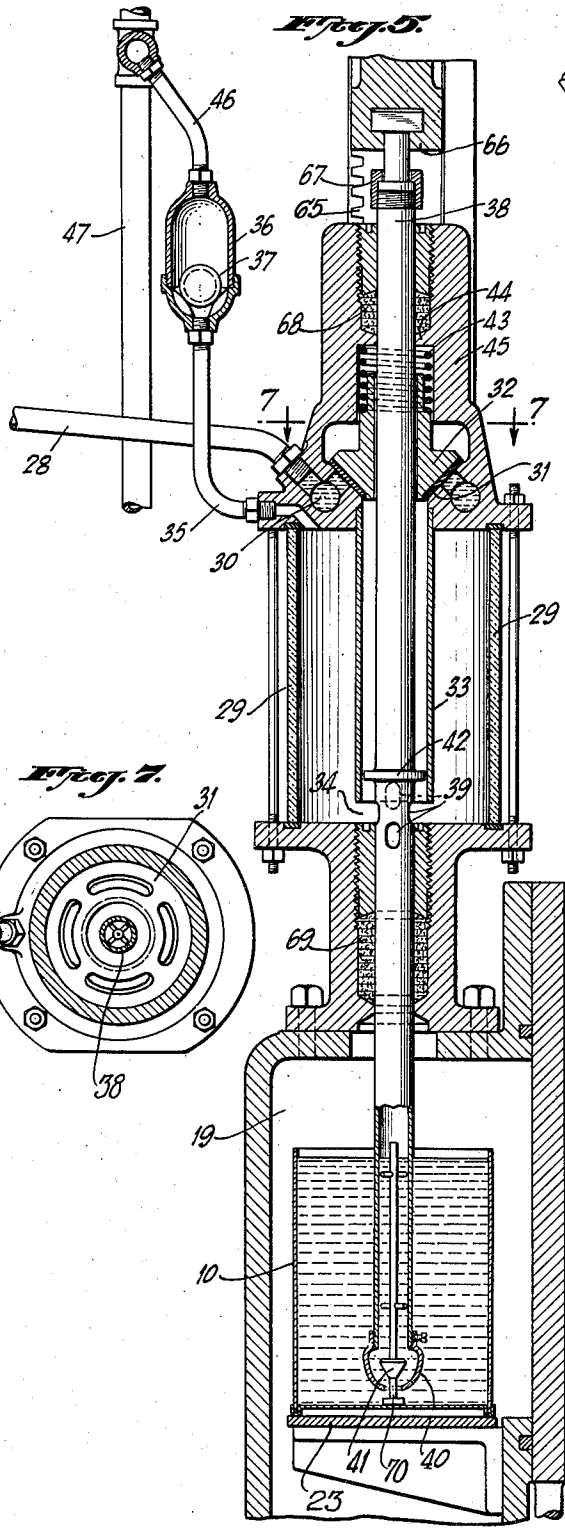

Fig. 6.

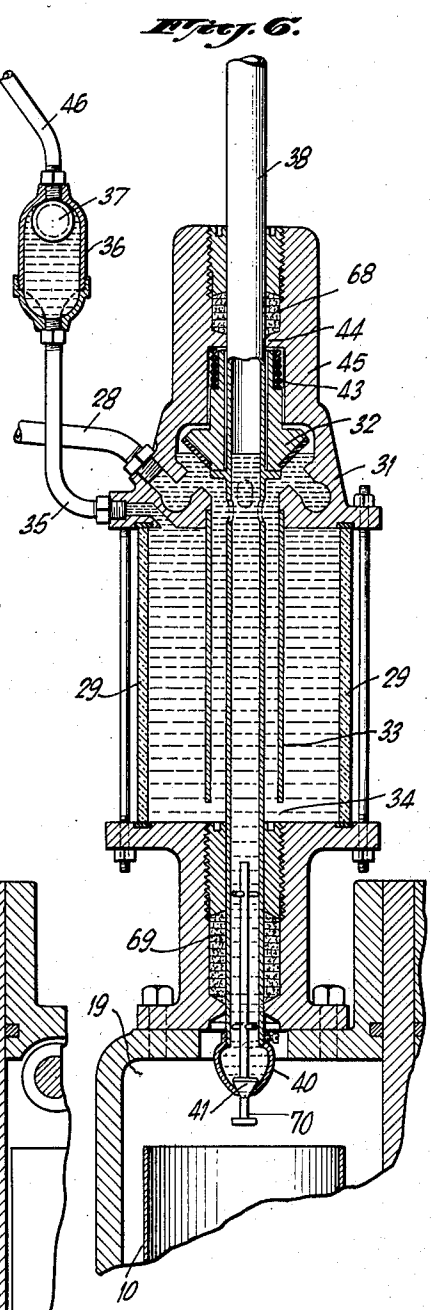

Fig. 7.

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APPARATUS FOR FILLING CONTAINERS UNDER GAS

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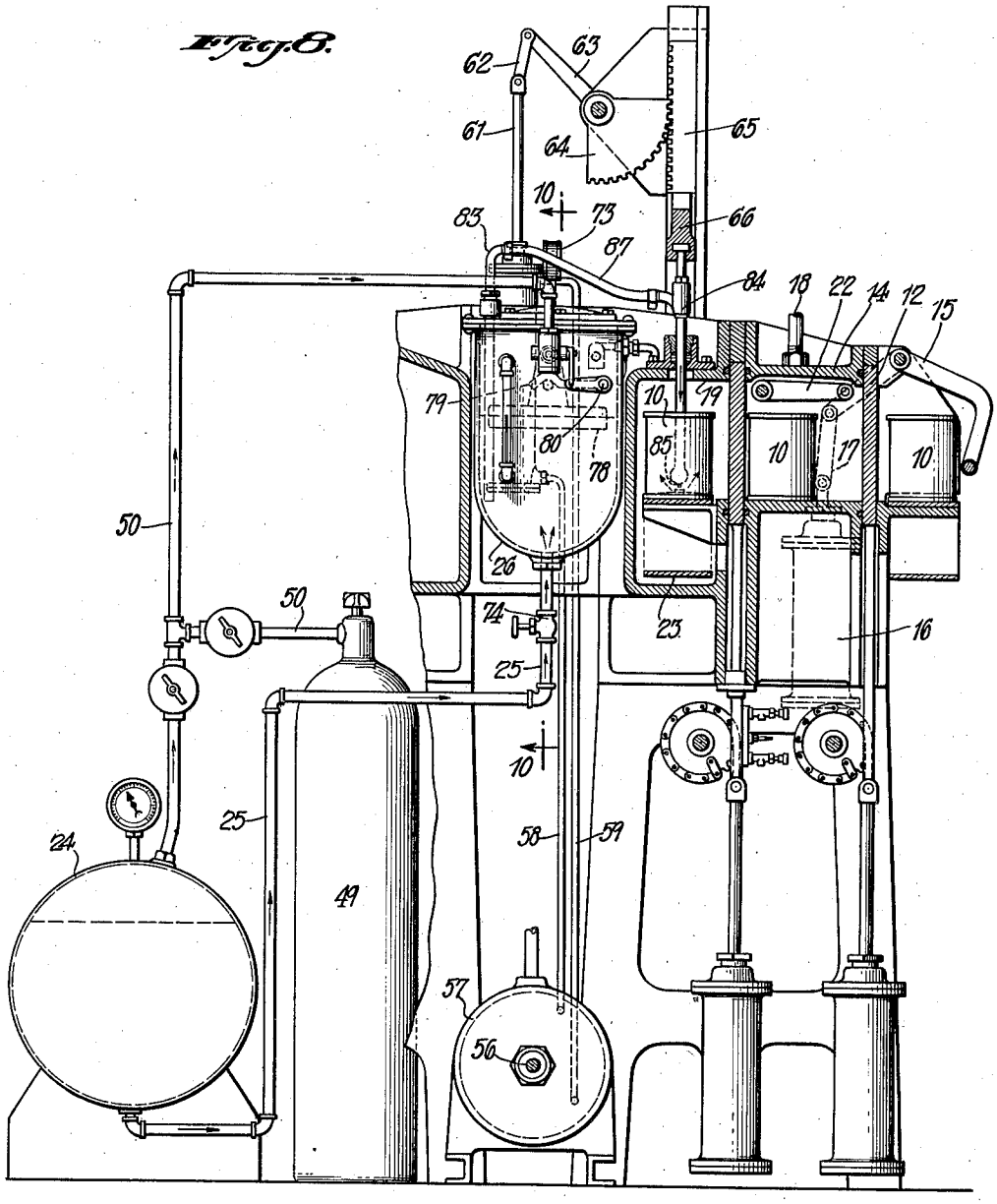
Fig. 8.



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APPARATUS FOR FILLING CONTAINERS UNDER GAS

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Fig. 9.

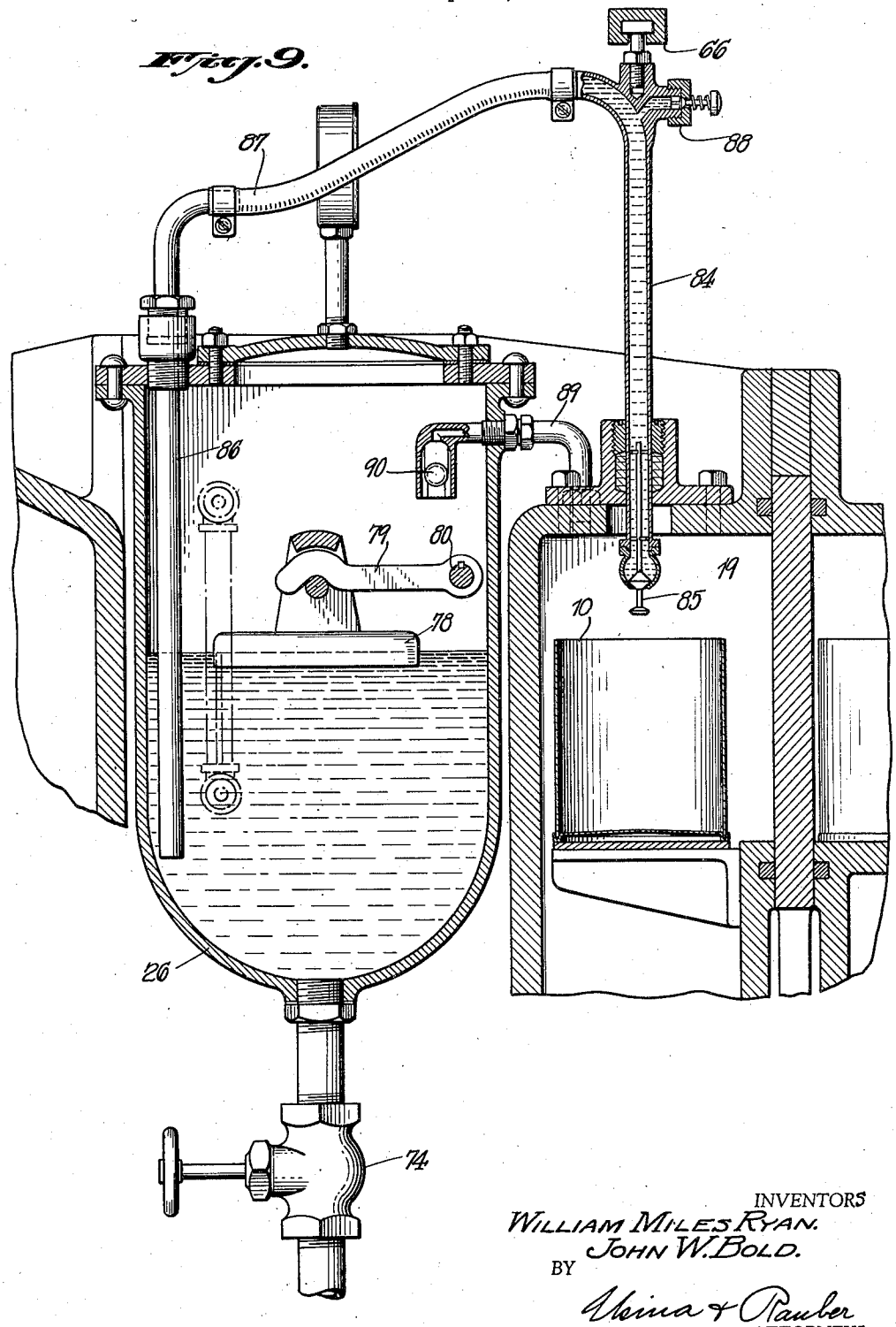

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Fig. 10.

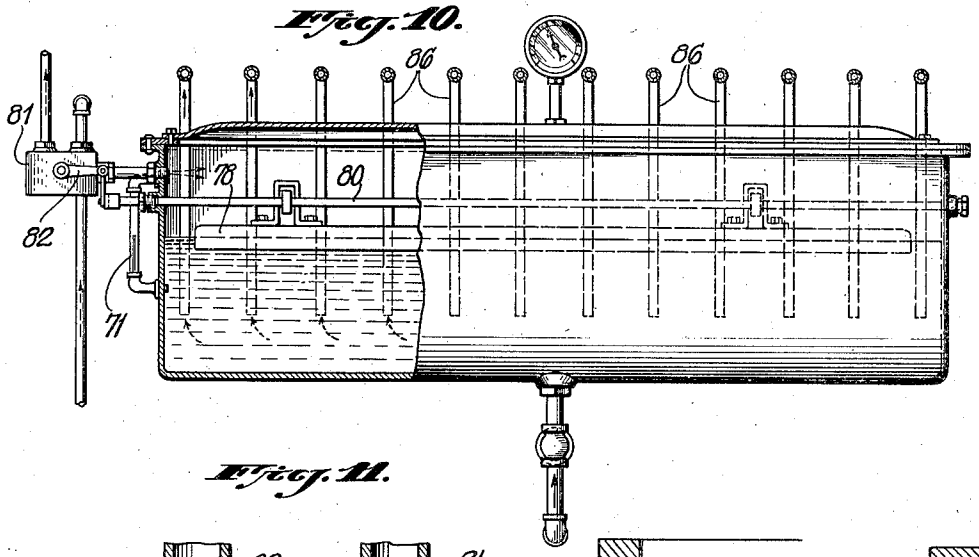
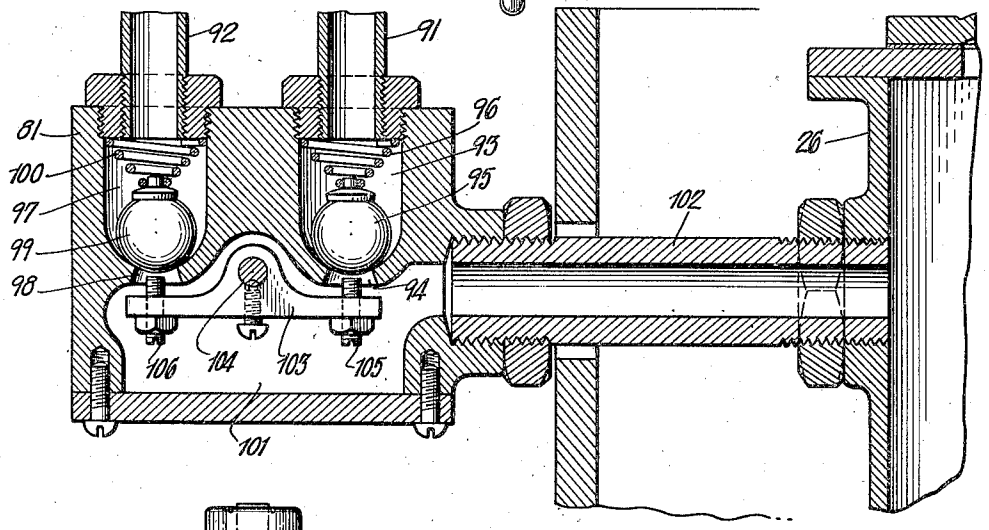


Fig. 11.



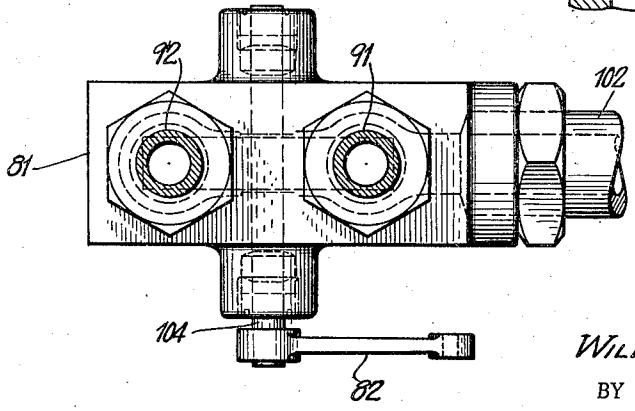


Fig. 12.

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Patented Nov. 29, 1938

2,138,355

UNITED STATES PATENT OFFICE

2,138,355

APPARATUS FOR FILLING CONTAINERS UNDER GAS

William Miles Ryan and John W. Bold, Brooklyn, N. Y., assignors to Ryan Coffee Corporation, Brooklyn, N. Y., a corporation of New York

Application September 5, 1935, Serial No. 39,270

15 Claims. (Cl. 226—68)

Our present invention relates to an apparatus for sealing containers, such as bottles and cans, under a selected gas, and more particularly under a selected gas at a selected or predetermined pressure.

Our present invention is an improvement on the apparatus disclosed in our co-pending applications Ser. No. 655,733, filed February 8, 1933; Ser. No. 740,372, filed August 18, 1934, and Ser. No. 194, filed January 3, 1935.

In canning or bottling products, such as beer and similar beverages, it is necessary to charge the container with a selected gas, such as carbon dioxide, under superatmospheric pressure. It is also very desirable to prevent the presence of even a small amount of air in the container, as even a very small amount or trace of oxygen of the air affects the taste or quality of the product. Removal of atmospheric air from contact with charged material in a container presents insuperable difficulties because if the air be withdrawn or evacuated the gaseous contents of the product which it is desirable to retain will also be withdrawn.

These difficulties are overcome in our present invention which provides an apparatus whereby a container may be filled with the liquid or material without loss of gas from the latter, and without including air in the container or charging the gas or material with air.

Various features of the invention are illustrated in the accompanying drawings in which Fig. 1 is a vertical front view of the apparatus embodying a preferred form of the invention for filling the containers with the material in an atmosphere of selected gas preparatory to sealing the containers; Fig. 2 is a diagrammatic or skeleton view of certain mechanisms for measuring the product into the containers in a selected gas atmosphere; Fig. 3 is a section on the line 3—3 of Fig. 1 of the filling apparatus; Fig. 4 is a detail view of an element of the filling and measuring mechanism; Figs. 5 and 6 are vertical sectional views through the measuring and filling apparatus in different positions of operation, and Fig. 7 is a horizontal sectional view taken on the line 7—7 of Fig. 5. Fig. 8 is a vertical section of a modification of the measuring and filling apparatus; Figs. 9, 10, and 11 are vertical sections and Fig. 12 a horizontal section of details of the filling apparatus.

In our present invention empty containers are supplied in groups to an entrance chamber in which all of the air is withdrawn to a very high vacuum and which is then filled with a selected gas under the pressure at which the material is to be sealed in the container. Communication is then opened to a filling chamber also filled with gas at the sealing pressure, whereupon the communication between the two chambers is again closed, the selected gas withdrawn from the entrance chamber and replaced with air, whereupon it may be opened to receive a succeeding group of containers.

The apparatus for accomplishing this may be of the type shown in our co-pending application Ser. No. 740,372.

In the filling chamber the containers are filled with a measured quantity of the product, such as beer or other beverages.

The material to be supplied to the containers is drawn as needed from a liquid storage tank to a supply reservoir in which there is always maintained a sufficient quantity to supply the containers. Generally the liquid storage and the supply reservoir are kept under a selected gas pressure at which the material is to be supplied to the containers, but may be under a different gaseous pressure, either higher or lower than that at which the material is to be sealed in the containers.

From the liquid supply tank the liquid is supplied at intervals to a vessel and fills the latter with a measured quantity, thereafter interrupting the supply. Immediately thereafter the liquid is fed from the measuring glass through a feeding tube to the bottom of the container to be filled. An equalization of gas between the filling chamber and the upper part of the measuring glass enables the fluid to flow from the measuring glass into the container by gravity. When the liquid has run from the measuring glass to the liquid container, the measuring apparatus returns to its original position to be again refilled with a measured quantity for a succeeding container, while the filled containers pass to a capping or sealing machine.

In the modification shown in Figs. 8 to 12 inclusive the measuring glass is dispensed with and the filling liquid is siphoned into containers to a predetermined level directly from the supply reservoir maintained at the filling level.

It will be understood that there is an individual filling mechanism for each container of the group admitted to the filling chamber. The filling and measuring mechanisms are timed and synchronized with the capping machine and with the apparatus for opening and closing the entrance and filling chambers in a manner as described in co-pending application Ser. No. 740,372. After

sealing, the sealed containers may be removed from the sealing apparatus as described in said application.

Referring more particularly to the accompanying drawings (Figs. 1 to 7), a series of containers 10 is carried, preferably in single file, by a belt 11 to a position in front of an inlet gate 12 of an entrance chamber 14. When the containers have been positioned in front of the gate 12 the latter is lowered to open position by means of a fluid pressure cylinder and piston 13 and the containers pushed over the threshold into the chamber 14 by means of rocking pushers 15 operated by means of a fluid pressure cylinder 16 through the linkage 17 as described in application Ser. No. 740,372. Thereafter the gate 12 is closed thereby enclosing the containers in the chamber 14. Air is then withdrawn from the chamber 14 through the pipe 18 creating a high vacuum in the chamber 14 and then the selected gas, such as carbon dioxide, is admitted through the pipe 18 until the pressure equals or approximates the gaseous pressure in filling chamber 19; thereupon communication between the chambers 14 and 19 is opened by lowering a communicating gate 20 operated by means of a fluid pressure cylinder 21.

The containers are pushed from the entrance chamber 14 into the filling chamber 19 by means of a rocking pusher 22; thereupon the gate 20 is lifted closing the chamber 19 from the chamber 14. The selected gas is then withdrawn from the chamber 14 and replaced with air and the gate 12 lowered to open the entrance chamber 14 to receive a succeeding group of containers.

When a group of containers 10 have been pushed into the chamber 19 they are received and held in position on a conveyor belt 23. The containers are held in stationary position on this belt until they have been filled with the measured quantity of material whereupon they are released and transferred to a capping or closing machine.

The material to be filled into the containers in the chamber 19 is supplied from a storage tank 24 through a pipe 25 to a supply reservoir 26 which is kept supplied to a level sufficient to ensure an adequate feed of material to the measuring apparatus and containers. From the supply reservoir 26 a liquid or fluid flows through a manifold 27 into individual branch pipes 28 leading to measuring glasses 29, there being one measuring glass for each container to be filled. The branch supply pipes 28 enter a channel or recess 30 in a valve seat 31, illustrated in the accompanying drawings in Figs. 5 and 6 as positioned at the upper part of the measuring glass.

The channels 30 are closed by means of a valve 32 which rests on the valve seat. This valve is lifted at timed intervals to the position shown in Fig. 6 whereupon the liquid supplied through the pipe 28 flows over the valve seat 31 and downwardly through a depending pipe 33 to the lower or bottom part of the measuring glass 29 and thence outwardly into the latter through lateral openings 34. The flow of liquid into the measuring glass 29 continues until the latter is entirely filled and thence upwardly through a gas inlet pipe 35 until it enters and fills a float valve chamber 36 and lifts a float valve 37 to close this chamber and prevent the further inflow of liquid.

It will be understood that the volume of the measuring glass 29, the pipe 35 and chamber 36, will contain just the amount or volume of liquid required to fill the container to the desired fullness.

When the measuring glass has been completely filled the valve 32 is again lowered to close against further inflow of liquid and the liquid in the measuring glass is supplied to containers 10 in the filling chamber 19. For this purpose a stem 38 extending downwardly through the measuring glass 29 is lowered from the position shown in Fig. 6 to that shown in Fig. 5. The lower part of the stem 38 is hollow and is provided with inlet openings 39 which in the lowered position of Fig. 5 are on a level with the bottom of the measuring glass so that liquid can flow from the measuring glass into the downwardly extending stem.

The lower end of the stem 38 is open and is provided with a valve chamber 40 containing a lift valve 41 that is opened when the stem 38 is lowered sufficiently to cause the valve 41 to rest on the bottom of the measuring glass. A collar or flange 42 is mounted on the stem 38 immediately above the openings 39 to engage and lift the valve 32.

The stem 38 is lifted to the position shown in Fig. 6 and lowered to the position shown in Fig. 5 at intervals in timed relation or sequence to the opening and closing of the gates 12 and 20 and the operation of the capping or closing machine. When it is lifted to the position shown in Fig. 6 the valve 41 is closed and the valve 32 is lifted so that liquid may flow into the measuring glass and fill the latter until the float valve 37 is lifted whereupon further inflow is prevented.

When the stem 38 moves downwardly the collar 42 permits the valve 32 to fall and close against the valve seat 31 thus shutting off further inflow through the recess 30. The seating of the valve 32 may be ensured by a spring 43 confined between the upper end of the valve and an inwardly extending flange 44 on the cap 45 of the measuring glass. As the stem reaches its lowermost position, as in Fig. 5, the valve 41 opens and the liquid flows downwardly through the hollow stem into the bottom of the container 10 and rises until it fills all of the container with the liquid contained in the measuring glass.

The stem 38 may rise if necessary during the latter part of this filling operation. The emptying of the gauge glass causes gas to flow into the valve chamber 36 and pipe 35 and this gas is again forced out when liquid enters the measuring glass in the position shown in Fig. 6.

The gas supply to the pipe 35 is connected through branch pipes 46, 47 and 48 to the filling chamber 19 so that the pressures between the filling chamber and the upper end of the measuring glass are always equalized. The pipe 47 also connects with the supply reservoir 26 equalizing pressure between the latter and the measuring glasses so that liquid will flow by gravity from the supply reservoir into the latter. Gas may be supplied to the supply reservoir and the piping connected to it from a gas supply 49 through a pipe 53 and pressure regulator 51 and enter the upper part of the supply reservoir 26 through a return bend 52. Gas is also supplied from the source 49, or any other source, through the pressure regulator 51 and a second pressure regulator 53 to the storage tank 24.

When the liquid reaches a predetermined level or height it lifts a float 54 which opens a valve 55 controlling the inflow of gas to the reservoir.

The stem 38 may be lifted and lowered by any suitable mechanism in timed relation to the operation of the capping or sealing machine and the gates 12 and 20 and the associated gas and air withdrawing and supplying means.

In the apparatus described in our co-pending application Ser. No. 740,372, and reproduced in part in the accompanying drawings, the sequence of operations is controlled and timed by a shaft 56 driven in synchronism with the capping or closing machine. This shaft 56 rotates a rotary valve 57 which controls the supply of pressure fluid to the various operating mechanisms of the apparatus in timed sequence. It may also be arranged to supply pressure fluid alternatively to pipes 58 and 59 which lead to opposite ends of a cylinder 60 which drives mechanism for raising and lowering the stem 38. When pressure fluid is admitted to opposite ends of the cylinder 60 it lifts or lowers a piston rod 61 which, as shown in Fig. 4, is connected through a link 62 to an arm 63 of a rocking gear segment 64. The segment 64 in turn meshes with a vertically reciprocating rack 65 which carries a horizontal bar 66 extending lengthwise above the filling chamber. The bar 66 has a number of recesses, one for each stem 38 extending upwardly and each receiving and holding a connecting stem 66 the lower end of which has a cap 67 into which the upper end of its respective stem 38 is threaded.

It will, therefore, be understood that the stem 38 will be reciprocated through the rack 65 by fluid supplied to the cylinder 60 at predetermined intervals in the rotation of the shaft 56. The movement of the stem 38 is guided through stuffing boxes 68 and 69 which seal the upper and lower ends of the measuring glass respectively.

The length of the stem 70 of the valve 41 is not sufficient, when the latter is closed, to reach to the surface of the conveyor 23 upon which the containers 10 rest and, therefore, will not open unless a container is in position on the conveyor. This ensures against a delivery of the filling material whenever, for any reason, a container may not be in position beneath its respective filling mechanism.

A predetermined pressure is ensured throughout the apparatus by means of a pressure release valve 71, Fig. 1, which will open upon an excess of pressure in case pressure is being employed in the apparatus. The pressure gauges 72, Fig. 3 and 73, Figs. 1 and 2, are provided to indicate the pressure within the apparatus. A hand operated valve 74 is also provided in the feed line 25 and a drain cock 75 in the manifold 27, Fig. 2.

A check valve 76 is also provided at the entrance to the pipe 47 to prevent entrance of the filling material into the latter in the event of failure of any of the parts. A gauge glass 77 indicates the level of the material.

The operation of the apparatus is as follows: Assuming the liquid supply tank 26 and the measuring glass 29 and all the piping from these two containers to be empty, and the pipe 50 to be filled with selected gas from the liquid storage 24, the hand control valve 74 closed and the gate 20 raised to closed position, the chamber 19 and all of the chambers connected with it, the pipes 48, 47 and 46 and the measuring glass 29 and the liquid supply tank 26 are then subjected to a vacuum drawing the air out as completely as possible.

The chamber 19, liquid supply tank and measuring glass and the connecting piping are then completely filled with the selected gas to the desired or predetermined pressure. Thereupon the hand operated valve 74 is opened and the filling liquid will flow into the liquid supply tank 26 until the float 54 is raised and opens the valve 55. When this occurs gas passes through the pipe 50 under pressure equal to or somewhat above that supplied to the liquid storage tank 24 and through the valve 55 into the liquid supply tank forcing the liquid downwardly until the float 54 drops sufficiently to close the valve 55. Thereafter with each drop in the surface of the liquid in the supply tank 26 the pressure in the liquid storage tank will force it upwardly until the float 54 opens the valve 55 and counterbalances the lifting pressure on the liquid.

It will be understood that the movements of the float 54 will be very small and the level of the liquid will be substantially constant. If through any failure of the mechanism the liquid level should rise to the entrance of the gas pipe 47, the float check valve 76 will close and prevent the material from overflowing through the pipes 47 and 48 into the chamber 19.

When the apparatus is thus filled the capping or sealing machine is started and rotates the shaft 56. Thereupon in succession the gate 12 is lowered, the container 10 is pushed by the rocker arm pusher 15 into the chamber 14, the gate 12 is raised to close the chamber 14 from the atmosphere, air is withdrawn from the chamber 14 through the pipe 18 and replaced with selected gas until the predetermined pressure is reached sufficient to balance the pressure within the chamber 19. Thereupon the gate 20 is lowered and the container pushed by the rocker arm pusher 22 into the chamber 19 and on to the conveyor belt 23.

Prior to the placing of the container 10 on the conveyor 23, the stem 38 will be in raised position, Fig. 6, and the valve 32 will be lifted so that the measuring glass 29 will be completely filled, then pressure fluid is admitted to the lower end of the cylinder 60 forcing the piston rod 61 upwardly and rotating the gear segment 64 to lower the stem 38 first closing the valve 32 and then opening the valve 40 when the stem reaches its lowermost position, and the valve stem rests upon the bottom of the container. The filling fluid then flows by gravity from the measuring glass 29 into the container 10, there being an equalization of gas pressure between the container and the upper part of the measuring glass 29 through the pipes 48, 47 and 46. Then in timed sequence pressure fluid is admitted by the rotary valve 57 through the pipe 59 to the upper part of the cylinder 60 and exhausted from the lower part, whereupon the gear segment 64 is rotated to lift the rack 65 and the stem 38 to the position shown in Fig. 6. This first causes the valve 41 to close and then opens the valve 32 permitting fluid to flow therethrough downwardly through the tube 33 and upwardly in the measuring glass until it fills the latter and piping 35 and float valve chamber 36. The filling mechanism remains in this position until the filled containers have moved on and a new set of containers have taken their place.

In the modification of the invention shown in Figs. 9 to 12 inclusive there is no measuring glass between the liquid supply reservoir 26 and the container 10 in the room 19. Instead of a measuring glass, the reservoir 26 is so positioned that the liquid level in it is even with the level to which the container 10 is to be filled and liquid is siphoned from the reservoir directly into the container until the levels are equal. Thereupon the siphon is withdrawn out of the container and the latter moves on to the sealing or closing mechanism.

The reservoir 26 is lowered to a position alongside of the chamber 19 and is filled from the liquid storage tank 24 through the pipe 25 and valve

74, as in Fig. 3. The pipes 58 are connected to the gas supply 49, the liquid storage tank and the liquid supply reservoir 26, as in Fig. 3. The gas pressure forces the liquid through the pipe 25 into the reservoir 26 until the level of liquid raises the float 78 which extends lengthwise within the reservoir 26 sufficiently to tilt the lever arm 79 and shaft 80, Fig. 10, which in turn operates a valve 81 through a crank arm 82 to admit pressure to the supply reservoir above the liquid level until this pressure plus the head of liquid balances the pressure on the liquid storage tank. By means of the float 78 a constant level of liquid is maintained in the supply reservoir 26 even with the level to which the containers 10 are to be filled in the room 19.

The liquid is siphoned at properly timed intervals from the common supply reservoir 26 through a number of individual siphons 83 to the individual containers 10 in the filling room 19, twelve siphons being shown in Fig. 10 by way of example. When an empty container 10 has been moved into position to be filled a vertically movable leg 84 of the siphon 83 secured to the horizontal bar 66 as in Figs. 1 to 7 is lowered by means of the rack 65 and segment 64 and operating mechanism, as described above, until a foot valve 85, similar in construction to the valve 70, contacts with the bottom of the container and opens it. The liquid then flows upwardly through a leg 86 of the siphon extending downwardly into the liquid in the reservoir 26, thence through a flexible connecting link 87 into the leg 84 and the container 10; there being no obstruction to the flow, liquid will flow through the siphon until the level of liquid in the container 10 rises to that in the reservoir 26. As several containers are filled simultaneously, a relatively long time can be allowed for this filling while still maintaining a high rate for the individual containers. The long filling time and slow flow of fluid eliminate all danger of splashing and foaming. After a properly timed interval, sufficient to permit the flow and equalization of the liquid levels, the rack 65 and horizontal bar 66 are lifted thereby lifting the leg 84 to the position shown in Fig. 9. As the valve 85 is lifted from contact with the bottom of the container 10 it closes and prevents further siphoning of liquid until the container 10 is replaced by a succeeding container and the leg 84 again lowered.

It will be understood that there are as many siphons as there are containers to be filled and that all of them are actuated in unison by the single horizontal lifting bar 66. It will also be understood that the valve 85 is so arranged that it will not open unless there is a container in position. The siphon remains filled with the filling fluid throughout the operation of the apparatus but the siphon may be broken by an inlet valve 88 when the operation of the apparatus is to be discontinued for cleaning or emptying.

The gaseous pressure between the supply reservoir 26 and the filling room 19 is equalized by a connecting pipe or passageway 89 which connects the upper parts of the chamber and supply reservoir. A float valve 90 in the part of the pipe 89 within the supply reservoir 26 prevents possibility of flooding the chamber 19 in the event that the float control 78, 79 should fail for any reason.

It will be understood that the atmosphere within the supply reservoir 26 and the room 19 is maintained air free at all times inasmuch as all of the air is withdrawn from the containers in the entrance chamber 14 before the selected gas is admitted thereto and thus the entrance of air is eliminated. However, in the event that traces of air might enter the apparatus they are eliminated by passing the gas from the apparatus continuously through a purifier, as described in co-pending application Ser. No. 740,372.

An improved means is shown in Figs. 10, 11 and 12 for accurately controlling the level of liquid in the supply reservoir 26 with great sensitiveness and accuracy. For this purpose the valve 81 is provided with an inlet 91 for gas under pressure greater than that in the reservoir 26 and with an outlet pipe 92 leading from the valve chamber to a lower pressure as, for example, to a purifier as described in co-pending application Ser. No. 740,372. The incoming pressure pipe 91 opens into a valve chamber 93 having a valve seat and opening 94 which is closed by a ball valve 95 actuated by a spring 96. Similarly the outlet pipe 92 communicates with a valve chamber 97 having a valve opening 98 which is closed by a ball valve 99 actuated by a spring 100. The valves 94 and 98 communicate with a chamber 101 which communicates with the reservoir 26 by a connecting pipe 102. A rocking lever 103 is mounted on a rock shaft 104 to which the arm 82 is connected so that when the float 78 rises the lever 103 is rocked by the arm 82 in such a position as to cause a lifting screw 105 to lift the ball valve 95 and admit compressed gas to the chamber 101 and thence through the connecting pipe 102 to the upper part of the reservoir 26. This immediately stops the rise of the liquid level in the reservoir 26. As the float 76 tends to drop the arm 82 swings in the opposite direction permitting the ball valve 95 to close and then upon a further drop in the reservoir 26, the rocking of the lever 103 causes a pin 106 on the opposite arm of the lever to lift the ball valve 99 and permit gas to flow outwardly from the reservoir through the pipe 102 and chamber 101 into the outlet pipe 92.

This lowering of pressure of the liquid in the reservoir 26 permits the liquid level in the reservoir to again rise to the predetermined height. As the flow of gas through the valves 95 and 97 is relatively rapid, and the effective pressure of controlling the flow of liquid is instantaneous, the above arrangement holds the liquid level variation within very close limits. In practice the gaseous pressure will be held substantially constant and the liquid in the reservoir will be kept constant by the flow of liquid from the storage tank 24 to keep pace with the withdrawal of liquid into the containers 10. Any momentum of the flowing liquid will be promptly checked by the gas pressure control.

While the operation of the apparatus has been described in detail with reference to the movements and filling of a single container, it will be understood that a group of containers is lined in single file in properly placed position on the conveyor 11 in front of the door 12 and then move in a front formation successively into the chamber 14 and thence into the chamber 19 and are filled simultaneously from the measuring glass 29 and then conveyed by the conveyor 23 to the capping machine.

The apparatus and process have been described with particular reference to the packaging of beer under pressure with complete exclusion of air. Beer is commonly stored in containers which are kept filled with carbon dioxide under pressure and is thus free from air until the filling and sealing for packaging. The present

invention preserves this freedom from contact with air or oxygen and enables the beer to be sealed without loss or change in pressure and without contamination. It will be understood, however, that beer is mentioned merely by way of example and that other materials, such as fruit juices, and in fact any material that is sufficiently fluid to flow may be measured and filled by our invention.

The invention has also been described with particular reference to the type of mechanism shown in our co-pending application Ser. No. 740,372 which is particularly suited for carrying on the method and embodying the apparatus and our invention.

It will be understood, however, that our invention may be used with other mechanisms than that of the above application provided that the container is first evacuated to withdraw its air content, filled with the selected gas of the desired pressure and then with the measured quantity of the filling material while the latter is under an atmosphere of the selected gas.

Carbon dioxide has been described merely by way of example of a selected gas, other gases such as nitrogen may be employed.

Superatmospheric pressures have been described in connection with the selected gas, but it will be understood that the method and apparatus are also applicable to sub-atmospheric pressures.

What we claim is:

1. An apparatus for filling containers under a selected gas which comprises means for assembling a number of containers in a group formation, means for withdrawing air from said grouped containers and replacing said air with a selected gas, a number of measuring glasses, means for filling said measuring glasses with selected gas and for displacing said gas with filling material to a predetermined volume and means for flowing said measured quantities from said measuring glasses into the respective containers of said group enclosed in said selected gas.

2. Apparatus for filling containers under selected gas which comprises means for assembling a number of containers into a group formation, means for withdrawing air from the containers of said group and replacing it with selected gas, a number of measuring glasses, means for filling said measuring glasses with selected gas, means for displacing said selected gas from said measuring glasses with filling material and means for equalizing the gas pressure on said measuring glasses and their respective containers to permit said filling material to flow from said measuring glasses into said respective containers.

3. Apparatus for filling containers under selected gas which comprises a chamber, means for introducing containers into said chamber, means for withdrawing air from said chamber and replacing it with selected gas under a predetermined pressure, a measuring glass, means to supply said measuring glass with said selected gas, means for displacing gas from said glass with filling material, and thereafter flowing said material from said measuring glass into said containers in said selected atmosphere.

4. Apparatus for filling containers under selected gas which comprises a chamber, means for introducing containers into said chamber, means for withdrawing air from said chamber and replacing it with selected gas under a predetermined pressure, a measuring glass, means for supplying said measuring glass with said selected gas, means for displacing gas from said glass with filling material and thereafter flowing said material from said measuring glass into said containers in said selected atmosphere and a timing mechanism for cyclically operating said mechanism in timed sequence.

5. Apparatus for filling containers under selected gas which comprises a liquid supply tank, a liquid storage tank, a connection for fluid from the lower part of said liquid storage tank to the lower part of said liquid supply tank, means for creating a difference in pressure of said selected gas between said liquid storage tank and said liquid supply tank to force liquid into said liquid supply tank, means controlled by the liquid level in said liquid supply tank to interrupt said pressure difference above a predetermined level in said liquid supply tank, measuring glasses, means for feeding liquid from said supply tank to the bottom of said measuring glass, means for replacing air with selected gas in containers to be filled and means for flowing a measured quantity of liquid from said measuring glasses to the lower part of said containers.

6. Apparatus for filling containers under selected gas which comprises a liquid supply tank, a liquid storage tank, a connection for fluid from the lower part of said liquid storage tank to the lower part of said liquid supply tank, means for creating a difference in pressure of said selected gas between said liquid storage tank and said liquid supply tank to force liquid into said liquid supply tank, means controlled by the liquid level in said liquid supply tank to interrupt said pressure difference above a predetermined level in said liquid supply tank, a measuring glass, means for feeding liquid from said supply tank to the bottom of said measuring glass, means for replacing air with selected gas in containers to be filled, means for flowing a measured quantity of liquid from said measuring glass to the lower part of said container and means for equalizing the pressure of selected gas between said container, said measuring glass and said liquid supply tank.

7. Apparatus for filling containers under selected gas which comprises a liquid supply tank, a liquid storage tank, a connection for fluid from the lower part of said liquid storage tank to the lower part of said liquid supply tank, means for creating a difference in pressure of said selected gas between said liquid storage tank and said liquid supply tank to force liquid into said liquid supply tank, means controlled by the liquid level in said liquid supply tank to interrupt said pressure difference above a predetermined level in said liquid supply tank, a measuring glass, means for feeding liquid from said supply tank to the bottom of said measuring glass, means for replacing air with selected gas in containers to be filled, means for flowing a measured quantity of liquid from said measuring glass to the lower part of said container, means for equalizing the pressure of selected gas between said container, said measuring glass and said liquid supply tank and means to prevent flow of fluid directly from said liquid supply tank to said containers.

8. Means for filling containers under selected gas which comprises a liquid supply tank, a measuring glass, means for replacing air in containers with selected gas, a liquid conduit from said supply tank to said measuring glass and delivering into the lower part of the latter, a vertically movable valve for closing said conduit when lowered, said valve having a hollow stem movable downwardly into said container, a lift valve in the

lower part of said hollow stem opening when said valve touches the bottom of the container.

9. Means for filling containers under selected gas which comprises a liquid supply tank, a measuring glass, means for replacing air in containers with selected gas, a liquid conduit from said supply tank to said measuring glass and delivering into the lower part of the latter, a vertically movable valve for closing said conduit when lowered, said valve having a hollow stem movable downwardly into said container, a lift valve in the lower part of said hollow stem opening when said valve touches the bottom of the container, a rack and segment for lifting and lowering said valve and stem.

10. Apparatus for filling containers under a selected gas atmosphere which comprises a measuring glass, means for positioning a container below said measuring glass and replacing air in said container with said selected gas, a liquid supply tank, a liquid conduit from said supply tank delivering into the lower part of said measuring glass, means to stop flow of liquid into said measuring glass at a predetermined level, a valve controlling the flow of liquid from said liquid supply tank through said conduit into said measuring glass, a stem depending from said valve, a lift valve in the lower part of said stem, said stem having an opening communicating with said measuring glass, means to lift and lower said valve and stem to close said valve in said conduit and to open said valve in said stem upon reaching the bottom of said container and reversely to close said valve in said stem and open the valve in said conduit upon being lifted to a predetermined height and means timed cyclically with the placing of said container to operate said valve and said stem-lifting means.

11. Apparatus for filling containers under a selected gas atmosphere which comprises a measuring glass, means for positioning a container below said measuring glass and replacing air in said container with said selected gas, a liquid supply tank, a liquid conduit from said supply tank delivering into the lower part of said measuring glass, means to stop flow of liquid into said measuring glass at a predetermined level, a valve controlling the flow of liquid from said liquid supply tank through said conduit into said measuring glass, a stem depending from said valve, a lift valve in the lower part of said stem, said stem having an opening communicating with said measuring glass, means to lift and lower said valve and stem to close said valve in said conduit and to open said valve and said stem upon reaching the bottom of said container and reversely to close said valve and said stem and open the valve in said conduit upon being lifted to a predetermined height and means timed cyclically with the placing of said container to operate said valve and said stem-lifting means, said container positioning means being at a sufficiently low level to prevent opening of said lifting valve by contact therewith.

12. Apparatus for filling containers under selected gas which comprises a filling chamber, a transfer chamber having closeable communication with said filling chamber and with the atmosphere, means for aligning a group of containers in position to enter said transfer chamber from the atmosphere, means to open said transfer chamber to the atmosphere to move said containers transversely to their alignment into said transfer chamber and to close the latter, means to withdraw air from said transfer chamber and replace it with a selected gas at the same pressure as in said filling chamber, means for opening communication between said transfer chamber and said filling chamber to move said containers sidewise of their alignment into said filling chamber and to close communication between said transfer chamber and said filling chamber, a number of measuring glasses one for each of said containers positioned above said filling chamber, means for supplying filling material to the lower part of said measuring glasses, means for limiting the level of liquid in said measuring glasses to a predetermined height, a liquid supply having conduits delivering to the lower part of said measuring glasses, vertically movable valve means alternately to open communication from said liquid supply to said measuring glasses and to close said communication and deliver material from said measuring glasses to the lower part of said containers in said filling chamber and means timed cyclically with the movements of said containers to raise and lower said valve means.

13. Apparatus for filling containers under selected gas which comprises a filling chamber, a transfer chamber having closeable communication with said filling chamber and with the atmosphere, means for aligning a group of containers in position to enter said transfer chamber from the atmosphere, means to open said transfer chamber to the atmosphere to move said containers transversely to their alignment into said transfer chamber and to close the latter, means to withdraw air from said transfer chamber and replace it with a selected gas at the same pressure as in said filling chamber, means for opening communication between said transfer chamber and said filling chamber to move said containers sidewise of their alignment into said filling chamber and to close communication between said transfer chamber and said filling chamber, a number of measuring glasses, one for each of said containers, positioned above said filling chamber, means for supplying filling material to the lower part of said measuring glasses, means for limiting the level of liquid in said measuring glasses to a predetermined height, a liquid supply having conduits delivering to the lower part of said measuring glasses, vertically movable valve means alternately to open communication from said liquid supply to said measuring glasses and to close said communication and deliver material from said measuring glasses to the lower part of said containers in said filling chamber and means timed cyclically with the movements of said containers to raise and lower said valve means, said valve means being inoperative to deliver liquid from each particular measuring glass unless a container is in position therebeneath, and means to prevent flow of fluid directly from said liquid supply to said filling chamber.

14. Apparatus for filling containers under selected gas which comprises a filling chamber, a transfer chamber having closeable communication with said filling chamber and with the atmosphere, means for aligning a group of containers in position to enter said transfer chamber from the atmosphere, means to open said transfer chamber to the atmosphere to move said containers transversely to their alignment into said transfer chamber and to close the latter, means to withdraw air from said transfer chamber and replace it with a selected gas at the same pressure as in said filling chamber, means

for opening communication between said transfer chamber and said filling chamber to move said containers sidewise of their alignment into said filling chamber and to close communication between said transfer chamber and said filling chamber, a number of measuring glasses, one for each of said containers, positioned above said filling chamber, means for supplying filling material to the lower part of said measuring glasses, means for limiting the level of liquid in said measuring glasses to a predetermined height, a liquid supply having conduits delivering to the lower part of said measuring glasses, vertically movable valve means alternately to open communication from said liquid supply to said measuring glasses and to close said communication and deliver material from said measuring glasses to the lower part of said containers in said filling chamber and means timed cyclically with the movements of said containers to raise and lower said valve means, means to equalize gaseous pressures between said filling chamber, said measuring glasses and said liquid supply tank.

15. Apparatus for filling a container with a charged liquid under air-free conditions which comprises a filling room, a vacuumizing and gassing chamber opened alternately to atmosphere and said chamber, means for alternately evacuating said room and admitting selected gas and air thereto, means outside of said room for measuring a quantity of liquid out of contact with the atmosphere and means for delivering said measured liquid to the lower part of said container in said room.

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