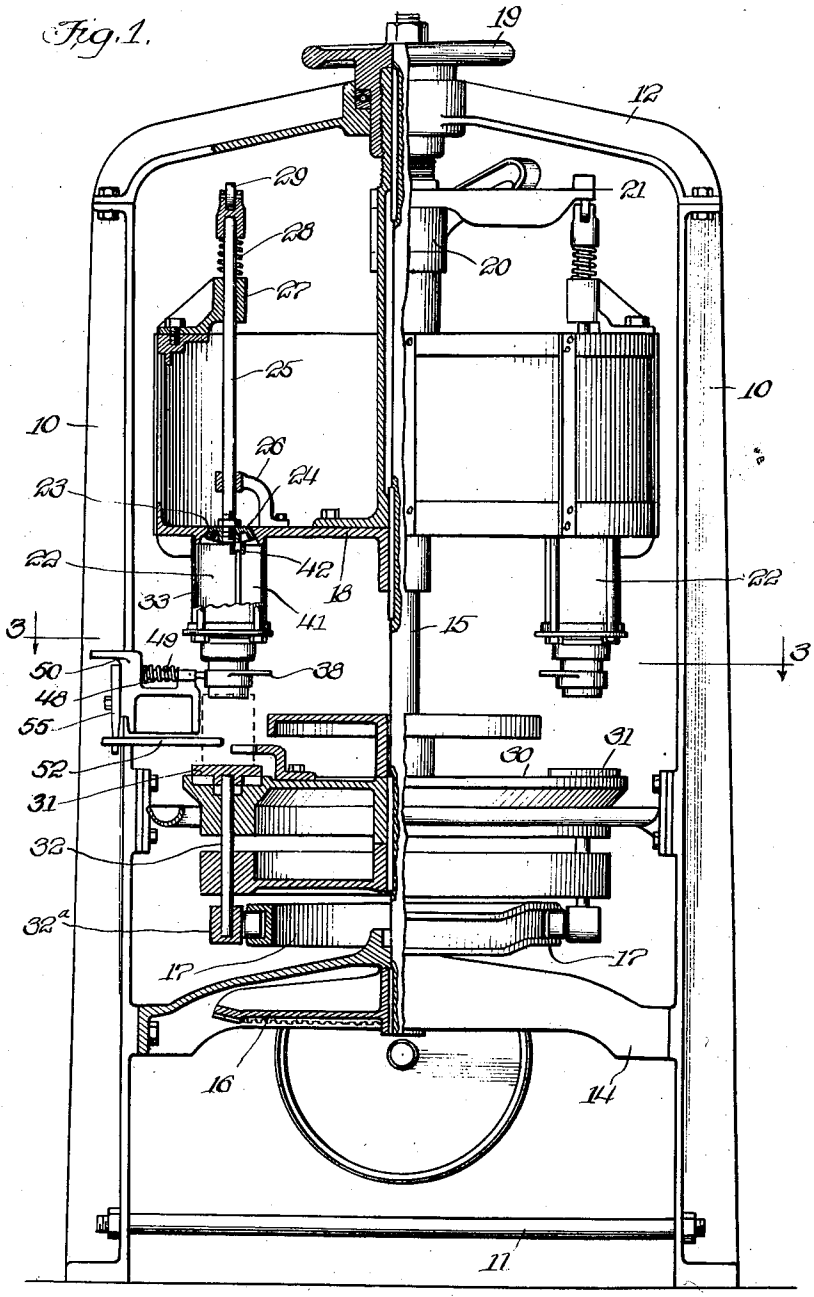
May 13, 1930. F. A. FOSTER 1,758,508

CAN FILLING MACHINE

Filed March 19, 1921 3 Sheets-Sheet 1

Fig. 1.



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CAN FILLING MACHINE

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Fig. 2.

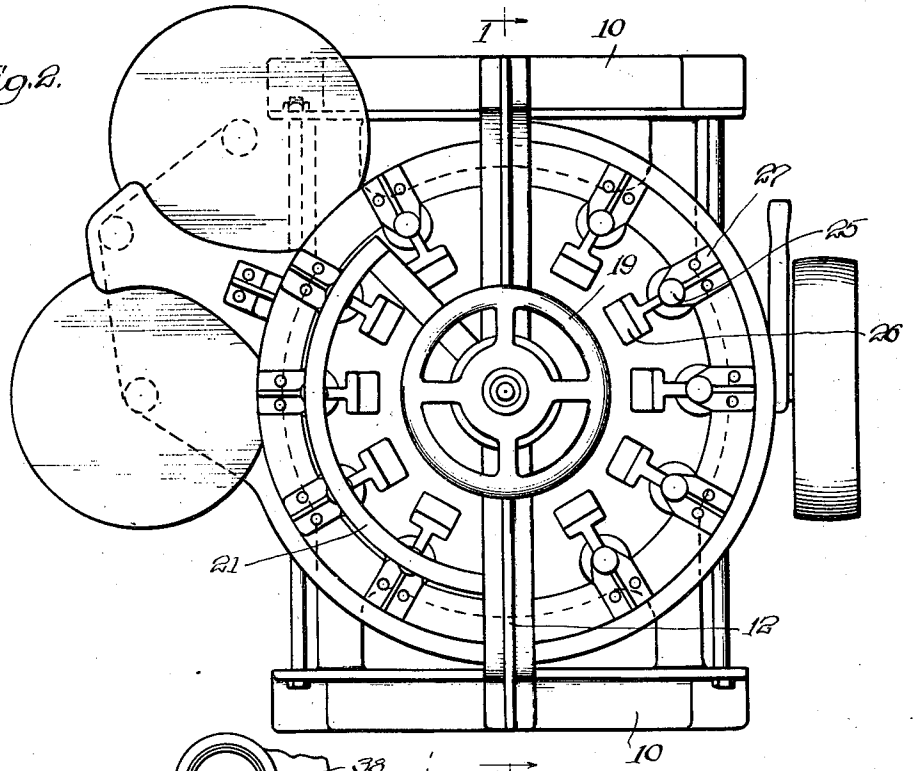


Fig. 4.

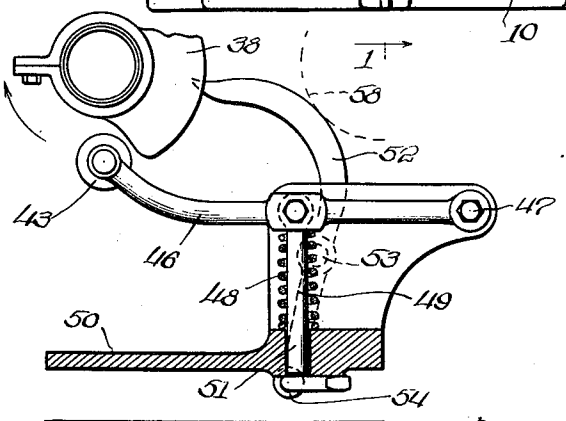
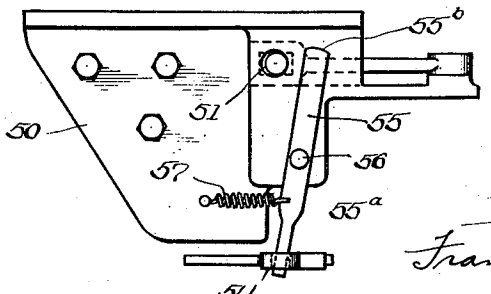


Fig. 5.



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CAN FILLING MACHINE

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Fig. 3.

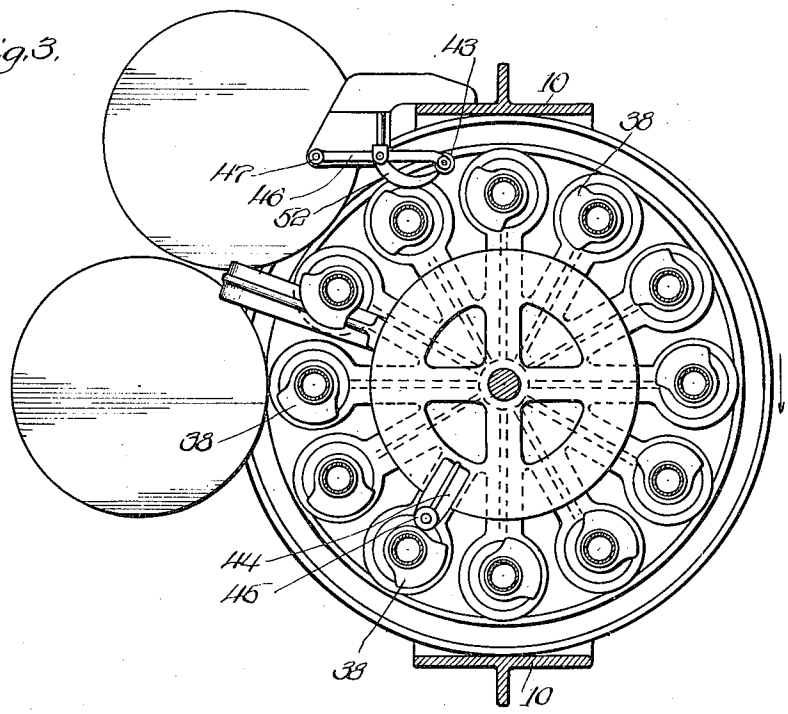


Fig. 7.

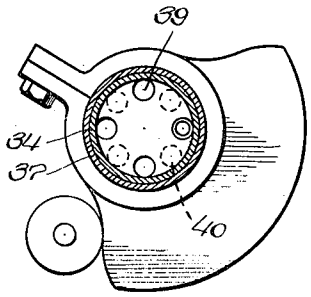
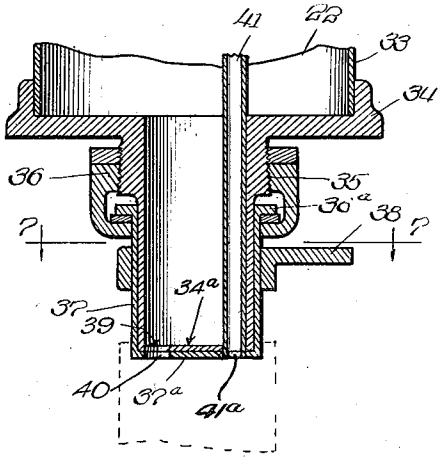


Fig. 6.



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UNITED STATES PATENT OFFICE

FRANK A. FOSTER, OF HOOPESTON, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SPRAGUE-SELLS CORPORATION, OF HOOPESTON, ILLINOIS

CAN-FILLING MACHINE

Application filed March 19, 1921. Serial No. 453,854.

My invention relates to can filling machines, and it has especial relation to machines wherein cans are supplied with liquid material and wherein means are provided for stopping the flow of material into the can after a certain amount of material has entered the can, whereby overflowing of the latter and consequent waste of material is eliminated.

The primary object of my invention is to provide a machine wherein cans may be filled to a uniform predetermined level. Many attempts to accomplish this object have been made in the machines heretofore employed but, so far as I am aware, all of said machines depended on prior measuring devices or upon displacement plates and the like to accomplish the aforesaid object.

Where pre-measuring devices are employed it is, of course, necessary to accurately measure the material prior to its delivery to the cans. The feature necessitates the employment of mechanism of such character that the material is handled twice or more in its passage from the main reservoir to the cans with the consequent difficulty in preventing loss. At the same time, it is difficult to associate, with such pre-measuring mechanism, adequate safety devices such as "the no-can, no-fill" apparatus which I shall hereinafter describe.

In the prior art machines employing displacement plates it has been usual to fit the open end of the can tightly against a cap to the lower side of which is attached said displacement plate. The volume of liquid which is displaced by said plate predetermines the height of the liquid when said can is withdrawn from engagement with said cap. It is apparent that any one plate will displace a given amount of material and therefore, should the diameters of the cans vary it will be necessary to effect an entire readjustment of these plates in order to obtain the same material height in each can.

My invention, on the other hand, contemplates the employment of governing means for controlling the flow of material into the cans which are of such character that the height of the material in the can is the determining factor in said control, irrespective of other circumstances which might tend to vary said height if other methods of filling were employed.

Moreover, as I will hereinafter point out, the preferred form of my invention embodies these means in such a manner that the material height acts directly to control the flow of material into the can. In this fashion I am able to do away with all extraneous governing means for filling the can to a desired height. No elaborate system of displacement plates together with their accompanying attachment difficulties is employed and, as I will point out, the height to which the cans may be filled in my machine can be varied very rapidly and even while the machine is operating at normal speed. This variation of material level can be obtained in the above described machines by somewhat difficult adjustment.

The valve means which I employ has another decided advantage in that the filling of the cans may be performed with the top of the can open so that the air escapes freely and a complicated system of air vent pipes is unnecessary. As those skilled in the art are aware, such filling of the cans with the entire top of the latter open to the air is contributory to many advantages.

My invention contemplates the use of means whereby the material level in the can serves to hydrostatically control the flow of material into the can. In the machine hereinafter described means for positively mechanically controlling the material flow are also employed, these latter means operating after the flow has ceased.

More specifically my machine embodies a plurality of air-tight reservoirs which may be filled from any desired material tank. Extending into these reservoirs are air-supply means, the intake ends of which are adapted to extend predetermined distances into cans which are positioned to receive the material discharged from said reservoirs.

Mechanical actuating means are provided for closing the air intake means as well as the ports through which the material in the reservoirs is discharged into the cans. These

means are timed to hold the ports and the air supply closed as long as the reservoirs are being filled with material. Thereafter, and assuming that a can is properly positioned with the intake end of the air supply means extending thereinto, means are provided for mechanically opening the air supply and the reservoir ports. The air which enters the reservoir exerts a downward pressure on the top of the material therein and so unbalances the pressures that the material is forced out through the ports and into said can.

When the material in the can reaches the bottom, or the intake end, of the air supply means and covers the same the air supply therethrough will be stopped and a condition of pressure balance will again obtain whereupon the material will cease flowing through the ports. Finally, the mechanical air control and port closing means are actuated and the reservoir having thus been completely closed, the can may be withdrawn.

From this brief description it will be observed that I have provided means whereby cans may be filled with liquid to any desired level regardless of the volume of the can and its shape. Because of the ease of adjustment in my machine it is a matter of but a moment to regulate the amount of material which it is desired to place in the cans. From this description it will be apparent, to those skilled in the art, that my machine accomplishes something which has not heretofore been possible with other machines, since all such machines operated either to pre-measure the quantity of material which was to be supplied to the can, or by use of displacement plates predetermined an arbitrary level of the material in each can.

It is obvious that in order to fill cans of two different diameters to the same level it would be necessary to make a number of complex adjustments in a machine of the former type, that is, one in which the quantities were premeasured. On the other hand, machines which use a displacement plate have the same shortcoming in that here the controlling factor is the volume of the unfilled portion of the can, rather than the level to which the material therein is allowed to rise.

Finally, as I will hereinafter point out, a liquid valve constructed in accordance with my invention may be so applied to can filling machines that dripping from the can supply means, after the cans have been moved away therefrom, is practically eliminated.

For a better understanding of my invention reference may be had to the accompanying drawings, in which

Fig. 1 is an elevational view, partially in section and having portions broken away, illustrating a can-filling machine embodying my invention;

Fig. 2 is a top plan view of my machine;

Fig. 3 is a plan sectional view taken on the line 3—3 of Fig. 1;

Figs. 4 and 5 are fragmentary plan and elevational views, respectively, illustrating a desirable form of governing mechanism which I employ in my machine;

Fig. 6 is an elevational sectional view of a portion of my machine and illustrates in detail the valve mechanism employed therein; and

Fig. 7 is a fragmentary plan sectional view taken on the line 7—7 of Fig. 6.

Referring now more particularly to the drawings, my machine comprises a frame portion composed of standards 10 which are braced at the bottom by tie rods 11 and which have, extending from one to another at their tops, a yoke member 12. A member 14 extends between the uprights 10—10, and serves as a support for the end of a vertically extending shaft 15, the other or upper end of which is journalled in the yoke 12 and said shaft is driven through a gear 16 keyed thereto. A cam member 17 is rigidly secured to the member 14, for purposes to be hereinafter described.

Mounted on the shaft 15 is a large material tank 18 which is so related to said shaft that it may be moved vertically thereof by a hand wheel 19 whereby certain adjustments, which I will hereinafter describe, are effected. A stationary collar 20 is secured to the yoke 12 in any well known manner, and serves to support a horizontally extending cam track 21. A plurality of material reservoirs 22 are secured to the bottom of the material tank 18 and, of course, are adapted to rotate therewith. Between the tank 18 and the reservoirs 22 are openings 23 which are adapted to be closed by valves 24. The latter valves 24 are mounted on stems 25 which reciprocate in guides 26 and 27 mounted upon the main tank structure. Springs 28 constantly bias the valves to closed position whence they are opened by the compression of the spring 28 when a wheel 29 at the top of the valve rod travels along the lowermost portion of the cam track 21 and thereby presses the valve rods downwardly. This cam track is so shaped that the movements of the valve stems are properly synchronized with other operations of said machines.

A can table 30 is secured to the shaft 15 and disposed substantially peripherially around the table 30 are a plurality of can lifts 31. Each lift is secured to a rod 32 which carries at its lower end a roller 32^a traveling in the track of the cam 17. This particular construction causes the cans to be raised after they have been initially supplied and are positioned on the can lifts.

Referring now more particularly to Fig. 6, it will be observed that the reservoirs 22 comprise a cylindrical open ended portion 33, the upper end of which abuts against the

bottom of the tank 18. The lower end thereof is closed by an integrally formed member 34 which is threaded at 35 to permit the mounting thereupon of an annular guide member 36. The lower end of the member 34 is closed by a plate 34ª. Supported in the guide member 36 is a substantial cup-shaped sleeve member 37 having a cam-like portion 38 rigidly secured thereto. This member 37 has an annular flange 36ª whereby it is supported for rotation about the barrel portion of the part 34. It will be observed that the bottom plate 34ª is provided with a plurality of apertures or ports 39 whereas the bottom plate 37ª of the member 37 is likewise provided with a plurality of apertures 40 which may be moved into registry with the ports 39 when the member 37 rotates about the member 34.

Extending from the bottom of the member 34 and substantially to the top of the reservoir 22 is a pipe 41. The lower end of said pipe extends through, and has its lower end flush with, the bottom of plate 34ª. It will be observed that the plate 37ª at the bottom of the member 37 is also provided with an aperture 41ª which may be made to register with the bottom open end of the pipe 41. Therefore, when the plate 37ª is moved relatively to the bottom plate 34ª the apertures 39 and 40 are brought into registry whereupon any material which is in the reservoir will flow downwardly as long as the proper conditions exist. The same movement of the plate 37ª uncovers the bottom of the pipe 41 by bringing the aperture 41ª into registry with the lower open end of said pipe.

A cap member 42 is carried by the valve 24. When this valve opens in a downward direction the cap covers the upper open end of the pipe 41 and prevents the flow of material thereinto. When, however, the valve 24 closes, the cap 42 is raised upwardly sufficiently to allow the air to flow through the pipe 41 and to exert pressure above the material in the reservoir 22 whereby said material flows out through ports 39 when they are opened.

Reference to Fig. 3 will illustrate the manner in which the plate 37ª is moved by the cam 38 and sleeve 37 to perform the desired functions. The cam-like portion 38 is arranged to be engaged by a roller 43 and when this roller does not yield, that is, when the same cannot be pushed aside by the portion 38, the latter is moved in such direction that the plate 37ª moves to open the ports 39 and the lower end of the air supply pipe.

Assuming that the roller 43 has been held stationary and that, therefore, the member 38 has been moved in a counterclock-wise direction (see Fig. 3), it will be observed that after the reservoirs have moved to a point substantially opposite the roller 43, the cams 38 are successively brought into contact with a position restoring member 44 comprising a bracket having a roller 45 mounted thereupon.

When the roller 45 strikes against the cam 38 the latter is moved in a clockwise direction and by such movement carries the openings in the plates 37ª out of registry with the stationary ports in the bottom of the reservoir.

Referring now to Figs. 3, 4, and 5, I have illustrated a safety device which I find particularly adaptable in this type of filling machine. This device is provided to prevent the opening of the ports in the bottom of the reservoir 22 when the associated can is not properly positioned therebeneath.

It will be observed that the roller 43 is positioned at the end of an arm 46, the latter being pivoted at 47 whereby if said arm 46 is free to swing about its pivot, the cam 38, upon coming into contact with the roller 43 will swing said arm 46 aside, and the reservoirs will therefore pass this point without the ports being opened. This arm 46 is normally held in position, for engagement with the cam 38, by a spring 48 which surrounds a rod 49 extending substantially perpendicularly to the arm 46. The lower end of the spring 48 is braced against an upright plate member 50 which has a hole 51 therein through which the outer end of the rod 49 passes.

A can actuated arm 52 is pivoted at 53 in a plane below the pivot point 47 of the arm 46. The end 54 of the arm 52 is apertured to provide a socket engaging the lower end of a safety arm 55. This arm 55 is pivoted at 56 on the outer side of the member 50. It will be observed that, when the lower end 55ª, which is positioned in the end 54 of the pivot arm 52, swings to the right, the upper end 55ᵇ thereof is positioned directly over the hole in the member 50. Since this end 55ᵇ is substantially flush with the outer surface of the plate 50, the rod 49 is prevented from moving outwardly when the arm 55 is swung to such position that it closes the hole 51. A spring 57 is attached at one end to the plate 50 and at its other end to the lower side of the arm 55 whereby said arm 55 is biased to such position that the hole 51 is normally uncovered, and the rod 49 may slide therethrough.

Having described one embodiment of my invention the operation thereof is as follows:

It will be assumed that a can has been properly positioned upon one of the can lifts 31. This can 58 is indicated in Fig. 4 by the dotted portion of a circle. As the entire mechanism moves the can is rigidly held by suitable guards and therefore pushes the arm 52 to the left, which in turn, causes the lower end 55ª of the arm 55 to be swung to the right.

The upper portion 55ᵇ of this arm will be swung across the hole 51 whereby the rod 49 is precluded from moving outwardly and

therefore the roller 43 is held stationary. The plate 37ª is now in closed position and, thereafter, the air intake at the bottom of the pipe 41 as well as the ports 39 are closed. While these last mentioned ports are closed the coaction of the rollers 29 on the cam track 21 causes the successive opening of the valves 24 whereupon the reservoirs 22 are successively filled with material. After these reservoirs are filled the valves 24 are drawn upwardly and thereafter the reservoirs are filled with material and are air-tight.

Therefore, as the reservoirs with their associated plate operating cams 38, (the latter in the position shown in Figs. 3 and 4,) approach the roller 43, they are filled with material. Moreover, it will be understood that the coordination of the can lifts 31 and the remainder of the machine is such that, as the reservoirs approach the roller 43, the cans are lifted upwardly so that the bottom portion of the reservoir 22 extends downwardly into the can a predetermined distance.

The roller 43 now contacts with the cam 38 and inasmuch as said roller cannot be pushed aside by said cam the latter is in itself moved in a counterclockwise direction and the plate 37ª is so positioned that the ports 39 and 41ª are opened. The air then passes upwardly along the pipe 41 and exerts such a pressure above the material in the reservoirs 22 that said material flows outwardly through the ports 39 and is discharged into the can associated with that particular reservoir.

When the level of the material in the can is such that the bottom end of the pipe 41 is covered by said material, the flow of material is hydrostatically stopped inasmuch as the air pressures are again balanced. It is apparent, therefore, that the cans may be filled to any desired level by simply adjusting the entire tank through the hand wheel 19, whereby the reservoirs, as a whole, may be moved upwardly and downwardly to vary the distance which the bottom of the pipe 41 extends into the can.

After the flow of material has been hydrostatically prevented by the occurrence of the aforedescribed conditions, the cam is pushed in a clockwise direction by the roller 45. This occurs, as will be evident from a consideration of Fig. 3, after the can filling machine has moved through a considerable portion of a circumference of a circle. When the cam 38 is so moved the openings in the plates 37ª and 34ª are withdrawn from registry and the ports are thereby mechanically closed, the lower end of the pipe 41 likewise being mechanically closed at this time.

However, if it should happen that a reservoir approached the roller 43 and, by some untoward circumstances a can was not properly associated therewith, the arm 52 would not be pushed to the left but would remain as seen in Fig. 4. With the arm 52 in this position, as it always will be when unmoved by a cam, due to the spring 57, the arm 55 will not be in front of the hole 51. Therefore, the cam 38 will push the roller 43 aside and the ports will not be opened.

It will be noted that the safety mechanism is always automatically reset after the passage of each can whereby it is always ready to function as each new reservoir approaches it. After the contents of the reservoirs have been discharged, and the ports thereafter closed, first hydrostatically and then mechanically, the above described cycle of operations is repeated.

I find that the machine just described is capable of relatively fast operation because of the comparatively few parts which are employed in obtaining all of the complex combinations which are necessary to accomplish the results as above set forth. This advantage is particularly realized because of the manner in which the material in the reservoirs is hydrostatically fed to the associated cams. Again, it will be observed that the ports, as well as the air intake, are at the extreme bottom of the portion 37 of the reservoir whereby the dripping, which is occasioned when the can is withdrawn from the supply and which is a very difficult matter to overcome, is substantially eliminated.

Those skilled in the art will appreciate the clean-cut withdrawal which is possible when the hydrostatic principle is applied to control the flow of material into the cans. The fact that the closing plate for the discharge ports is at the extreme end insures that no intervening space is left wherein the liquid can remain after the ports are closed and therefore, the dripping, as above described, is substantially eliminated.

Again, cans may be filled by my machine without in any way providing for the prevention of overflowing. It is substantially impossible for cans which are filled in accordance with my invention to overflow because, irrespective of a breakdown at any point in the machine, the hydrostatic principle always applies and the cans cannot be further filled after the level of the material therein rises above the air intake pipe. Then too, the level to which it is desired to fill the cans may be easily varied in my machine by simply adjusting the entire tank and attached reservoirs through the hand wheel 19.

While I have described but one embodiment of my invention it is apparent that many modifications therein may occur to those skilled in the art and, since I believe that I am the first to provide, in a can filling machine, a combined hydrostatic and mechanical valve system, I desire that my invention be broadly interpreted and that it be limited only by the prior art and by the scope of the appended claims.

I claim—

1. In a can filling machine, a movable main material tank, an auxiliary air-tight reservoir adapted to be connected thereto and to discharge into a can, means for completely filling said auxiliary reservoir from the main tank, means comprising ports whereby the contents of said reservoir may be discharged into said can, means for introducing air above the contents of said reservoir when said ports are open and after said reservoir filling means is closed, and means for preventing said introduction of air and the opening of said ports unless a can is properly positioned with respect to said reservoir.

2. In a can filling machine, a movable main material tank, an auxiliary air-tight reservoir adapted to be connected thereto and to discharge into a can, means for completely filling said auxiliary reservoir from the main tank, means comprising ports whereby the contents of said reservoir may be discharged into said can, port controlling means, means for introducing air above the contents of said reservoir when said ports are open and after said reservoir filling means is closed, means for revolving said tank and appurtenant apparatus to actuate said port controlling means and said air introducing means, and means for preventing said introduction of air and the opening of said ports unless a can is properly positioned with respect to said reservoir.

3. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs whereby the latter may be completely filled, air supply pipes, each having one end thereof extending into one of said reservoirs, means whereby the said ends of the pipes may be covered while said valves are open, and whereby air may flow into said reservoirs when the latter discharge into cans.

4. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs, means comprising ports whereby the contents of said reservoirs may be discharged into a can, means for positively supplying air to the interior of said reservoirs, means for operating said valves to fill said reservoirs while said ports and air supply means are closed, and means for thereafter opening said ports and supplying air to the top of said reservoirs while said valves are closed to discharge the material from said reservoirs into a can, said air supply being governed by the material in said can.

5. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs, means comprising ports whereby the contents of said reservoirs may be discharged into a can, means for positively supplying air to the interior of said reservoirs, means for operating said valves to fill said reservoirs while said ports and air supply means are closed, and means for thereafter opening said ports and supplying air to the top of said reservoirs while said valves are closed to discharge the material from said reservoirs into a can, said air-supplying means being associated with said can to stop said air supply when the material in said can reaches a predetermined level.

6. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs, means comprising ports whereby the contents of said reservoirs may be discharged into a can, means for positively supplying air to the interior of said reservoirs while said ports and air supply means are closed, means for thereafter opening said ports and supplying air to the top of said reservoirs to discharge the material from said reservoirs into a can, said air-supply means being associated with said can to stop said air supply when the material reaches a predetermined level in said can, and means for thereafter closing said ports.

7. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs, means comprising ports whereby the contents of said reservoirs may be discharged into a can, means for positively supplying air to the interior of said reservoirs, means for operating said valve to fill said reservoirs while said ports and air supply means are closed, means for thereafter opening said ports and supplying air to the top of said reservoirs while said valves are closed to discharge the material from said reservoirs into a can, said air-supplying means being associated with said can to stop said air supply when the material in said can reaches a predetermined level whereby the flow of material through said ports ceases, and means for mechanically closing said ports and said air-supply means.

8. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs, means comprising ports whereby the contents of each reservoir may be discharged into a can, means comprising a pipe having one end opening into said reservoir, means for so positioning said can that the other end of said pipe may be covered when the material in said can reaches a predetermined level, means opening and closing said ports, and and means for withdrawing said can from said position only when said ports are closed.

9. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs, means comprising ports whereby the contents of each reservoir may

be discharged into a can, means comprising a pipe having one end opening into said reservoir, means for elevating the cans supplied to said machine so that the other end of said pipe extends a predetermined distance into said can, means for opening and closing the last mentioned end of said pipe, and means for actuating said last named means to open said pipe only when the can is in an elevated position.

10. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and reservoirs, means comprising ports whereby the contents of each reservoir may be discharged into a can, means comprising a pipe having one end opening into said reservoir, means for so positioning said can that the other end of said pipe may be covered when the material in said can reaches a predetermined level, means opening and closing said ports, means for elevating the cans supplied to said machine so that the other end of said pipe extends a predetermined distance into said can, means for opening and closing the last mentioned end of said pipe, and means for actuating said port-controlling means and said pipe-controlling means to open said ports and pipe only when the cans are in elevated poistion.

11. In a can filling machine, a movable main material tank, auxiliary air tight reservoirs connected to said tank, valves between said tank and each of said reservoirs, means comprising ports whereby the contents of said reservoirs may be discharged into cans, means comprising a pipe having one end opening into said reservoir, means for so positioning said can that the other end of said pipe may be covered when the material in said can reaches a predetermined level, means opening and closing said ports, means for elevating the cans supplied to said machine so that the other end of said pipe extends a predetermined distance into said can, means for opening and closing the last mentioned end of said pipes, means for actuating said port-controlled means and said pipe-controlling means to open said ports and pipe only when the cans are in elevated position, and means to close said air pipe and said ports after the flow of material through the latter has ceased due to the closure of the air pipe by the material in said can.

In witness whereof, I have hereunto subscribed my name.

FRANK A. FOSTER.