Oct. 23, 1923. 1,471,867

C. E. STEERE

CAN FILLING MACHINE

Filed April 7, 1917 3 Sheets-Sheet 1

Fig. 1

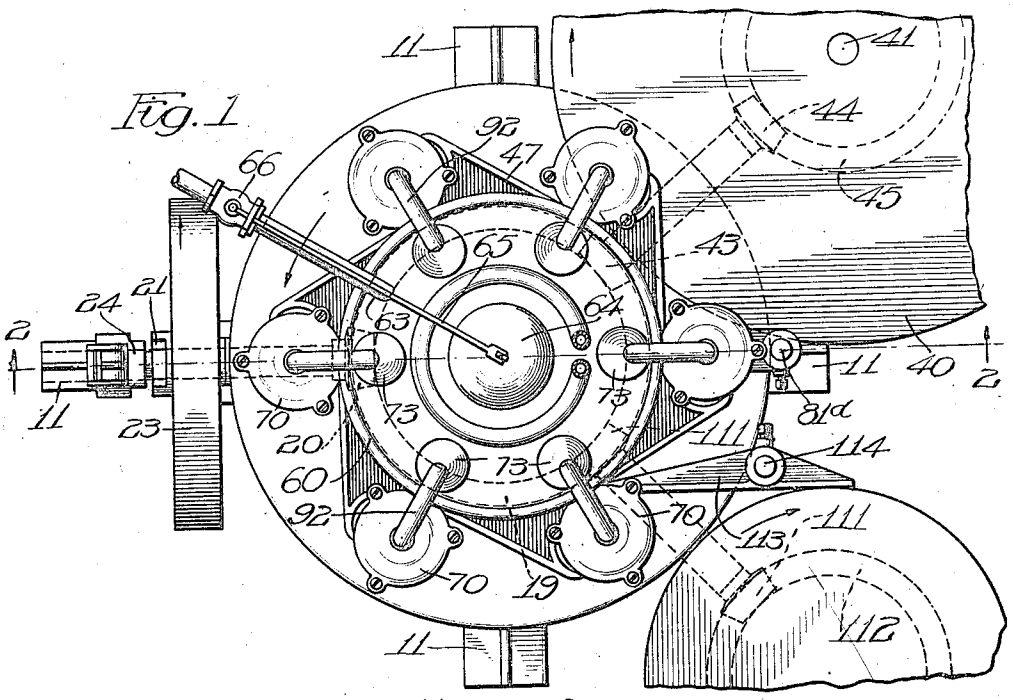
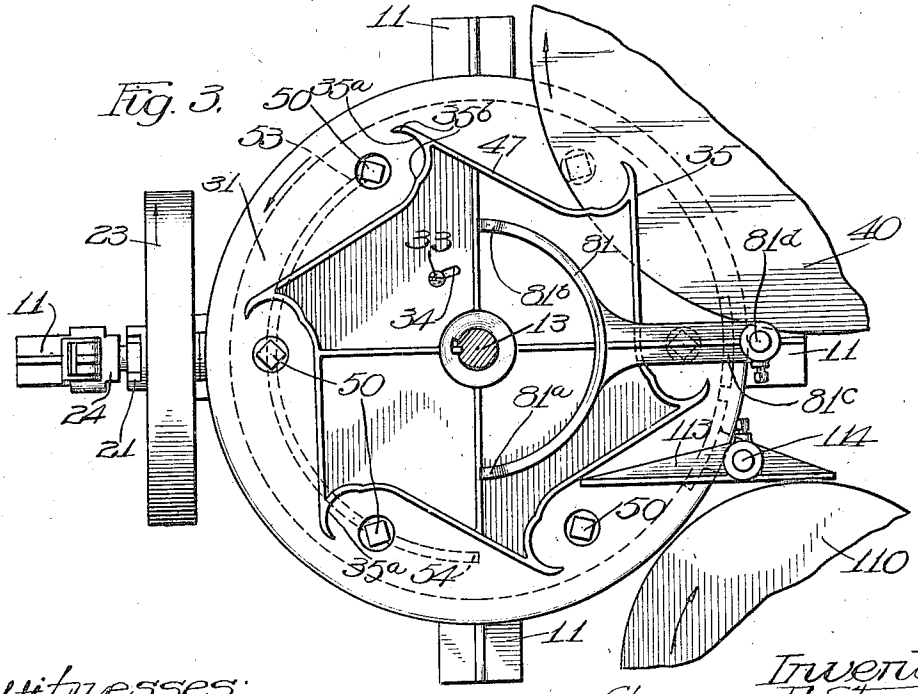



Fig. 3.




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By: Edgar Francis Beaubien
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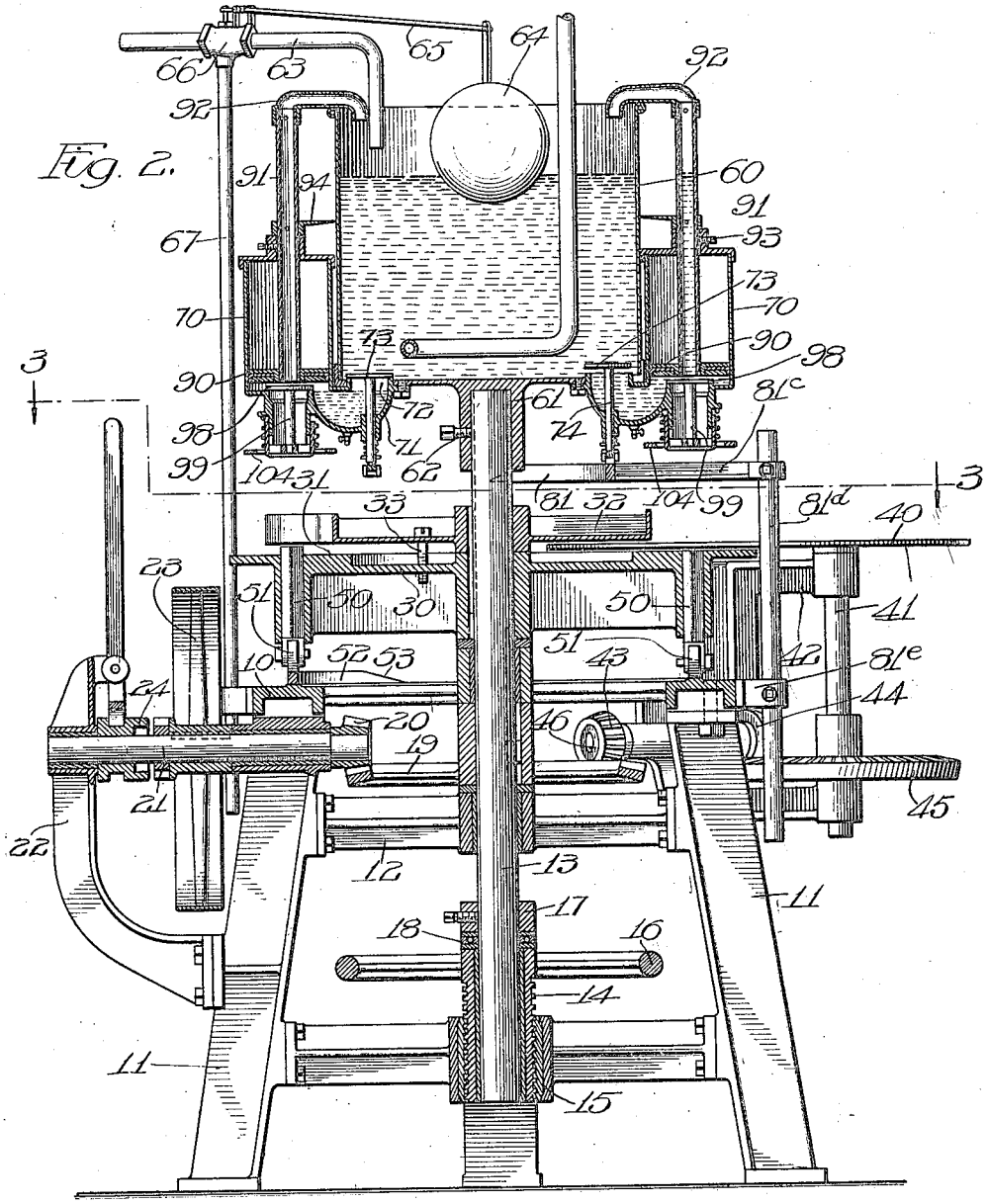
Oct. 23, 1923. 1,471,867

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CAN FILLING MACHINE

Filed April 7, 1917 3 Sheets-Sheet 2

Fig. 2.




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Oct. 23, 1923. 1,471,867

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CAN FILLING MACHINE

Filed April 7, 1917 3 Sheets-Sheet 3

Fig. 8.

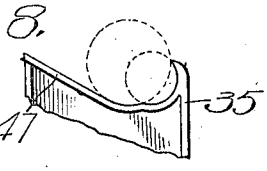



Fig. 4.

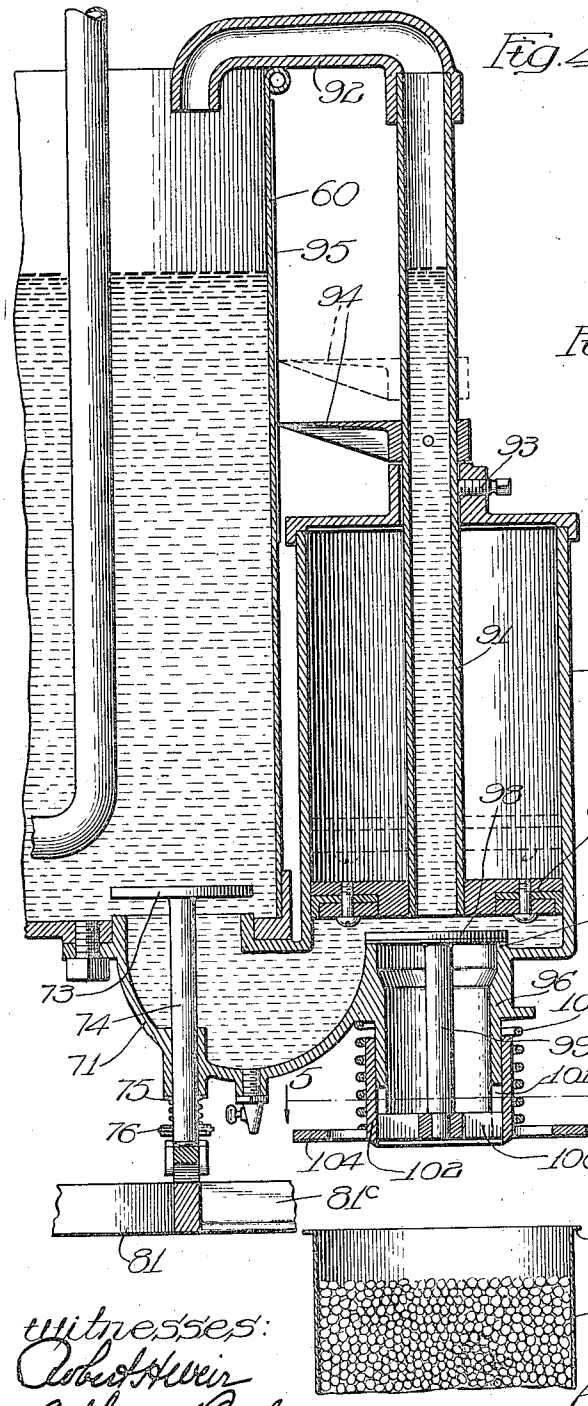



Fig. 6.

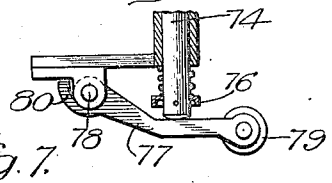



Fig. 7.

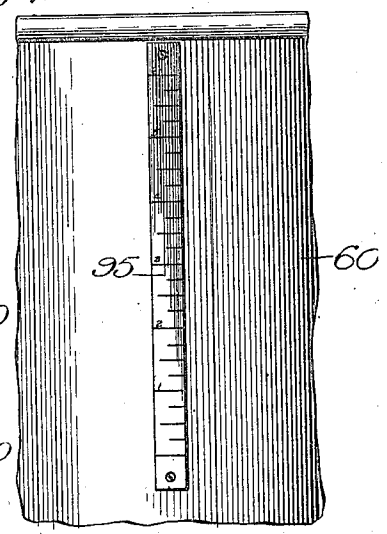
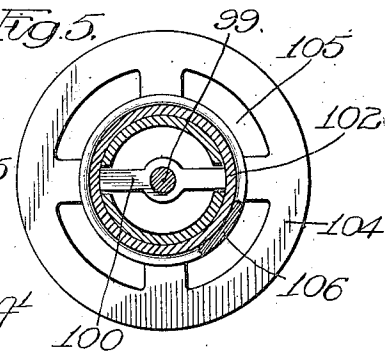



Fig. 5.




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Patented Oct. 23, 1923. 1,471,867

# UNITED STATES PATENT OFFICE.

CLARENCE E. STEERE, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO HENRY SCARBOROUGH, OF MILWAUKEE, WISCONSIN.

## CAN-FILLING MACHINE.

Application filed April 7, 1917. Serial No. 160,471.

*To all whom it may concern:*

Be it known that I, CLARENCE E. STEERE, a citizen of the United States of America, and resident of Milwaukee, Milwaukee County, Wisconsin, have invented a certain new and useful Improvement in Can-Filling Machines, of which the following is a specification.

My invention relates to improvements in machines for supplying free flowing liquids to containers, of the open top type, such as cans, glass jars and the like.

One of the objects of my invention is to provide an improved machine of this character which will supply liquid in measured quantities to containers at a high rate of speed, without waste, and which will be continuous and entirely automatic in operation and simple, durable and reliable in construction.

Other objects of my invention will appear hereinafter.

My invention consists in the features of novelty exemplified by the construction, combination and arrangement of parts hereinafter described, shown in the accompanying drawings, and more particularly set forth in the appended claims.

Referring to the drawings:—

Fig. 1 is a top plan view of a machine embodying my invention;

Fig. 2 is a vertical, central section substantially on line 2—2 of Fig. 1;

Fig. 3 is a plan view of the mechanism below the filling head, this view being taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged central section of one of the liquid measuring devices associated with the filling head;

Fig. 5 is a transverse detail view of one of the can actuated valves, this view being taken on line 5—5 of Fig. 4;

Fig. 6 is a detail of the lifting device for the valve which controls the flow of liquid to the measuring device;

Fig. 7 is a fragmentary view of the reservoir showing the gauge by which the adjustment of the measuring device is determined.

Fig. 8 is a detail of one of the cells or pockets of the can retaining member illustrating the formation of this pocket for the purpose of adapting it to different sized cans.

My invention primarily involves the supplying to open-top containers any free-flowing liquid such as brine and syrups as distinguished from solids or bulk material and I purpose to supply accurately measured quantities of liquid to the containers without any waste whatever and at a high rate of speed. I accomplish these results by the provision of a machine which is continuous and entirely automatic in its operations and supplies the liquid to the containers which are successively fed to the machine. The particular machine shown in the drawings and which exemplifies the functions and operations involved in my invention, is designed more particularly for the purpose of supplying measured quantities of brine or tomato sauce to cans which have previously been supplied with bulk goods such as peas or beans, and the type of can for which this machine is intended is illustrated at A in Fig. 4. These cans, as will be noted, have their entire upper ends open, and are of the type which, after having been filled with material, are closed by a cap or plate which is seamed or crimped on the flange $A^1$ formed on the upper edge of the can. This machine shown in the drawings has a supporting frame which consists of a flat annularly shaped top member 10 supported by four legs or standards 11, the latter being braced by upper and lower cross-bars or members 12. These spiders or cross members 12 also provide bearings for a central vertically disposed shaft 13. The lower bearing is in the form of a sleeve 14, which is threaded into a central hub 15 in the lower spider, and which is rotatable, by means of the hand wheel 16, to adjust the height of the bearing. In this structure the entire filling head is not only supported entirely by this central shaft, but it is also rotated thereby. And it is by means of the simple hand-operated bearing just described, that the filling head is adjusted vertically with respect to the can. In order to take the downward thrust on the shaft, the shaft has a collar 17 rigidly secured thereto and supported by the upper end of the adjustable bearing sleeve 14, a suitable ball bearing 18 being interposed between the collar and this sleeve bearing. This shaft and also the filling head and other mechanism mounted thereon, is rotated constantly by means of a train of gears driven from a suitable source of power. The shaft has a large crown gear 19 keyed thereto and positioned above the

upper spider 12. This gear is driven by a smaller gear 20 carried on the end of a horizontal shaft 21, this shaft being supported in suitable bearings in the frame and in an outstanding arm 22 as clearly shown in the drawings. The shaft 21 carries a loose belt pulley 23, which is driven from the source of power and which is connected with and disconnected from the shaft by means of a hand-operated clutch 24.

A can-carrying table 30 is mounted on and rotated by the central supporting shaft 13. This rotary table has a flat can-supporting surface 31, which rotates in a plane parallel to the plane of rotation of the measuring devices. And the distance between the measuring devices and the can-supporting surface, is constant for any given adjustment with respect to the size of the cans being filled. Just above the can-carrying table 30, is a can spacing and retaining disk or member 32, which is mounted upon but rotatable with respect to the central shaft 13. This can retaining member, however, is driven or rotated by the can carrying table 30 by means of a bolt 33 (see Fig. 2), which is inserted through a slot 34 in the member 32 and threaded into the can carrying table 30. The slot 34 is elongated so as to permit of a limited relative rotary adjustment of the can retaining member with respect to the can carrying table, this adjustment being for the purpose of adapting the structure to different size cans. The can retaining member has a number of peripheral projections which correspond in number to the number of measuring devices associated with the filling head, and which are spaced to correspond to the spacing of the filling and measuring devices. These projections form cells or pockets, so to speak, which embrace the cans and retain them on the can filling table in proper relation to the liquid measuring devices. In this particular machine the cans are periodically fed to the machine by means of a flat rotating table 40, which rotates parallel to the can carrying table and which overlaps the can carrying table. It is positioned just above the can supporting surface 31 and is comparatively thin so that the can supporting surface 31 and the conveyor table 40 are substantially in the same plane. This conveyor table is mounted upon the upper end of a suitable vertical shaft 41 journaled in brackets 42 of the frame, and is adapted to rotate in the same direction as the can carrying table. This table 40 is driven at the proper speed from the central gear 19 through the medium of the gears 43, 44 and 45. The gear 45 is keyed to the table shaft 41 and the gears 43 and 44 are on opposite ends of a short shaft and mesh with the gears 19 and 45 respectively. The shaft 46 upon which the gears 43 and 44 are mounted, is journaled in a suitable bearing on a frame. The cans to be filled are placed upon this conveyor table either manually or in any other suitable manner. In my co-pending application Serial No. 141,537, filed January 10, 1917, I illustrate a can-filling machine which is designed more particularly for supplying bulk goods in measured quantities to the cans. This machine is adapted to be used in conjunction with the machine of my present invention, and the conveyor table 40 is positioned between the two machines so that it will take the cans discharged from the bulk filling machine and carry them to the liquid filling machine. The conveyor table 40 carries the cans into the path of the moving projection 35 of the retaining member by which the cans are taken from the conveyor, transferred to the can supporting table and thence carried by this table during the filling operations. The edges or walls 47 of the can retaining member, which extend from one cell or pocket to the next projection 35, are substantially straight, so that during the rotation of the can retaining member these edges 47 will properly guide the cans into the pockets. In order to render the machine adaptable to different sized cans, I form the walls $35^A$ of the pockets on an arc corresponding to the diameter of the smallest sized can which the machine is intended to handle; hence, these pockets will properly hold the smallest can. Cans of larger diameter will be engaged by the two points $35^b$ as clearly shown in Fig. 8. Thus by rotatably adjusting the can retaining member relatively to the can supporting table, any sized can, within the range of sizes for which the machine is adapted, can be centered with respect to the measuring device. The can supporting table has a plurality of vertically reciprocal plungers 50, which are equally spaced apart on the circle in which the centers of the measuring devices are located, and which are positioned in vertical alignment or register with the centers of the measuring devices. The lower ends of these plungers are provided with small rollers 51, which ride or travel on the top of the top member 10 of the frame. Normally the upper ends of the plungers are substantially flush with the can supporting surface 31, but the frame member 10 has a raised portion or ridge 52, which is arc-shaped according to the path of the rollers, and which extends throughout substantially one-half of the complete circle of travel of the rollers. The ends 53 and 54 of this cam ridge are tapered so that the rollers will ride smoothly up on to the cam ridge and off of said ridge. When the rollers ride up on this cam ridge they project the upper ends of the plungers

above the can supporting surface 31, and if the cans are in position in the pockets of the retaining member, the plungers will bodily lift or raise the cans the height of the cam ridge. This construction is for the purpose of raising or lifting the cans into and out of engagement with the valves of the measuring devices so as to cause the cans to automatically operate these valves, as will hereinafter appear. In this machine the forward end 53 of the elevating cam ridge, is positioned close to the point where the cans leave the conveyor table 40. The other end 54 of the cam ridge is located close to the point where the filled cans are discharged from the machine so that the cans will be lowered to the level of the can supporting surface 31 and will thereby close the measuring device valves just before the cans are discharged from the machine. It will thus be observed that in this machine the measuring device valves will be held open by the elevated cans during substantially one-half of a revolution of the machine, which, even though the machine fills the cans at the rate of one hundred fifty (150) cans per minute, is sufficient time for the liquid to flow from the measuring devices into the cans.

The measuring and filling head involves a large rotary tank or reservoir 60 substantially cylindrical in form and mounted upon the upper end of the central rotary support or shaft 13. The bottom of the reservoir has a large socket 61, into which the end of said shaft 13 is inserted, so that the filling-head may be rotated relatively to the can-supporting table for the purposes of adjustment. A set-screw 62 is used to fasten the reservoir in its adjusted position. This reservoir is supplied with liquid from a main source of supply through the medium of a pipe 63 which overhangs the upper end of the reservoir. The liquid in this reservoir is constantly maintained at a definite level, in any suitable manner. In this construction, I have shown a float-valve of the ordinary type. This float-valve involves a float 64 responsive to the level of the liquid in the reservoir, and mounted upon an arm 65, which operates a suitable valve 66 in the supply-pipe 63 so as to shut off the supply of liquid to the reservoir when the level therein of liquid corresponds to the desired level. The supply-pipe, for convenience, is supported by an upstanding rod 67 mounted on the frame. A plurality of measuring-devices are mounted on the outside of the reservoir, and are equally spaced apart to correspond with the number of cans positioned on the cam-supporting table. Each of these measuring-devices involves a cylinder 70 securely mounted on the side of the reservoir, and each has, at its lower end, a U-shaped member or casting 71 forming a passage for conveying the liquid from the reservoir to the valve-chamber or cylinder. These offset extensions are fastened to the bottom wall of the reservoir near the outer edge thereof and they are comparatively short in length and large in diameter so as to provide a sufficient direct passage for the liquid. The bottom wall of the reservoir has ports or openings 72 permitting the passage of the liquid into the measuring-device cylinders. Each of these ports are controlled by a valve, which, in this case, consists of a flat disk valve-head 73, mounted on a valve-rod 74. This valve-head covers the port normally and is adapted to be raised by the timing-mechanism to open the port and allow the liquid to flow from the reservoir to the measuring-device cylinder. The rods 74 pass through suitable bearings in the members 71 and project below said members. The valve is normally kept seated by a spring 75 which crushes against a collar 76 in the lower end of the valve-rod, as shown more clearly in Figs. 4 and 6, and to unseat the valve it is raised against the tension of this spring. Beneath the lower ends of the valve-rods are small levers 77 pivoted at one end 78 on suitable small brackets on the members 71, and provided at their other ends with rollers 79. These levers are provided at their pivot ends with small tail-pieces 80 which bear against the brackets and serve as limit-stops to hold the rollered-ends of the levers in position to be engaged by a cam. This cam 81, as shown more clearly in Figs. 2 and 3, is arc-shaped, corresponding to the path of rotary travel of the lever-rollers. The cam is positioned so that it will engage the levers successively and raise said levers and open the valves so that the liquid will flow into the measuring-device chamber. This cam extends through substantially a half revolution of the machine and holds the said valves open during substantially the half revolution so as to give plenty of time for the liquid to properly fill the measuring-device chambers and become settled or quiescent, as will hereinafter appear. The forward end $81^a$ and the rear end $81^b$ are beveled so as to permit the lever-rollers to rise onto and off of the cam smoothly. The forward end $81^a$ of this cam is positioned substantially at the point where the can-elevating cam terminates, so that the valves will be opened slightly after the cans are lowered and the can-actuated valves of the measuring-devices have been closed. The rear end $81^b$ of the cam is positioned close to the point where the cans leave the conveyor-table and pass on to the can-supporting table. This cam, however, terminates at a point so as to close the valves before the cans reach the elevating cam 52. The measuring-device cylinders have a liquid-tight piston 90 vertically movable therein to adjust the measuring-

devices to any predetermined quantity of liquid, this regulation of the quantity of liquid being determined by varying the capacity of the cylinder-chamber below the piston. These pistons are carried at the lower ends of hollow tubes 91, the lower ends of which communicate directly with the cylinder-chambers below the pistons, so that the liquid entering these chambers will be free to rise in the tubular piston-rods 91 to the level of the liquid in the reservoir, as shown most clearly in Fig. 4. It will thus be seen that when the valves 73 are opened, the liquid will rush through the passages into the cylinder-chambers below the piston and will rise in the tubes 91. On account of the quantity of liquid in the reservoir, the liquid will rush into the measuring-devices under a considerable head of pressure and will acquire considerable momentum in rising in the tubes 91. This momentum is likely to carry the liquid in the tubes considerably higher than the level of liquid in the reservoir, but it will be observed that the valves 73 are open long enough so that the liquid will become quiesced and at rest, with its level in the tubes corresponding to the level in the reservoir. Before reaching this quiescent state, this liquid is likely to oscillate considerably in the tubes 91, and it might even have the tendency to splash out of the tubes. In order to prevent the spilling of the liquid outside of the machine, and thus prevent waste, I extend the tubes 91 to the top of the reservoir and provide them with horizontal portions 92, which overhang the reservoir and return the liquid to said reservoir. The tubular-piston rods 91 pass through suitable bearings in the upper heads of the cylinders and are slidable therein for the purpose of adjusting the pistons as hereinbefore described. Set-screws 93 are provided for securing the tubes in their adjusted positions. If desired, these tubes may carry pointers 94 which register with gauges 95 on the side of the reservoir, so as to indicate the adjustment of the measuring-device.

I have hereinbefore referred to release-valves which are actuated by the cans when they are elevated by the cam 52. In this construction, the cylinder casting has a central downwardly extending tubular-extension 96 of large internal diameter so as to provide large unobstructed passages for the liquid from the measuring-devices to the cans. The upper edges of these tubular-extensions form seats 97 for flat disk-shaped valve-heads 98, which control the flow of liquid from the measuring chambers to the cans. These valve heads are mounted on the upper ends of valve rods 99, the lower ends of which have cross members or bars 100, extending transversely of the tubular passages and guided in their operation by guide slots 101 in the lower ends of the tubular extensions 96. Sleeves 102 telescope with the tubular extension 96 and are attached to the cross members 100, and at the lower ends of these sleeves are fastened flat disks or plates 104 which are of a diameter larger than the diameter of the largest sized can which the machine is intended to handle. These disks or plates have large openings 105 therein to provide for the exit of air which is displaced in the cans by the liquid. The valves 98 are maintained normally closed by means of spiral springs 106, which surround the sleeves and tubular extensions and bear at the lower ends against the disks 104 and at their upper ends against shoulders formed on the outside of the tubular extensions.

It will be observed that on account of the large diameters of the tubular extensions and the sleeves, and the comparatively long bearing surfaces between the sleeves and the tubular extensions, this valve mechanism operates very freely and will not bind in the event that the pressure of the cans on one side of the disks 104 varies from that on the other side. When the cans are elevated by the cam 52 as hereinbefore described, the upper edges $A^1$ of the cans bear against the disks 104 and raise the valves 98 against the tension of the springs 106 to permit the liquid to flow from the cylinder chambers through the tubular extensions and into the cans. It will be noted that the passages from the cylinder chambers to the cans, are direct and comparatively short so that the liquid which is released from the measuring devices travels the shortest distance to the cans. The measured quantity of liquid, is that which is contained in the tube 91 and the cylinder chamber below the piston 90. When the valves 98 are opened, the valves 71 of course will have already been closed as previously described, and the measured quantity of liquid will discharge into the cans. The level of liquid in the measuring devices will then have been lowered to the plane of the valve seat 97, and when the valves 71 are again opened the liquid will fill up the cylinder chambers and tubes to the level of the reservoir, as hereinbefore described. The valve actuating cam 81 is for convenience of manufacture formed on an arm $81^c$, which is supported on a piston rod or bar $81^b$. It is adjustable on this arm both horizontally and vertically, so that the position of the cam may be accurately regulated. The supporting rod $81^a$ is adjustably mounted in a bracket $81^e$ on the frame of the machine. In the structure shown in the drawings, the cans are discharged at a point shortly after the cans leave the end of the cam 52, which lowers them away from the valves and again on to the can carrying table. Any suitable mechanism may be used for conveying the filled cans from the

machine as fast as they are discharged. In this structure I provide a rotating table 110 positioned adjacent the can carrying table 30 and having a surface substantially flush with the can supporting surface 31 so that the cans will slide from this supporting surface on to the table 110. This table, as indicated in Figs. 1 and 3, is preferably driven from the main crown gear 19 in the same manner as the table 40, by means of the gears 111 and 112. This table is supported in any suitable manner. A deflector arm 113, adjustably mounted on the upstanding rod 114 is positioned with its end in the path of the cans so as to deflect them from the can carrying table on to the table 110, from which they may be disposed of in any suitable manner.

I claim:

1. In a receptacle filling machine, a rotary main supply chamber, an auxiliary supply member carried by the chamber and having a passageway communicating therewith, a valve controlling said passageway and having a depending stem, a lever pivoted at one end to the outside of the chamber and extending under the end of the valve stem, an arcuate cam on which the other end of the lever rides during a portion of the rotation of said chamber to hold the valve open and fill the auxiliary supply chamber.

2. In a can filling machine, a rotary main supply chamber, an auxiliary supply member carried by the chamber and having a passage way communicating therewith, a valve controlling said passage way and having a depending stem, a stationary cam located beneath the rotary chamber and means operable by the cam during the rotation of the chamber to raise said stem and open the valve.

3. In a can filling machine, a rotary main supply chamber, an auxiliary supply member having a passage communicating with the main supply chamber, said auxiliary supply member having a depending discharge portion, a valve controlling the passage between the chamber and auxiliary supply member and having a depending stem, a stationary cam located beneath the rotary chamber, means operable by the cam during the rotation of the chamber to raise said stem and open the valve, a second valve controlling the flow thru the discharge portion and having a depending stem, a cam support, means automatically positioning the can on said support in registry with said discharge portion, and means for raising the can from its support to cause the same to operate the stem of the second mentioned valve to automatically open the same and fill the can while the first mentioned valve is closed.

4. In a can filling machine, a rotary main supply chamber, an auxiliary supply member having a passage communicating with the main supply chamber, said auxiliary supply member having a depending discharge portion, a valve controlling the passage between the chamber and auxiliary supply member and having a depending stem, a lever pivoted at one end to the outside of the chamber and extending under the end of the valve stem, an arcuate cam on which the other end of the lever rides during a portion of the rotation of said chamber to hold the valve open and fill the auxiliary supply member, a second valve controlling the flow thru the discharge portion and having a depending stem, a can support, means for automatically positioning the can on said support in registry with said discharge portion, and means for raising the can from its support to cause the same to operate the stem of the second mentioned valve to automatically open the latter and fill the can while the first mentioned valve is closed.

Signed by me at Chicago, Illinois, this 24th day of March 1917.

CLARENCE E. STEERE.