Nov. 22, 1938. F. D. CHAPMAN 2,137,389

RECEPTACLE FILLING MACHINE

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Fig. 1.

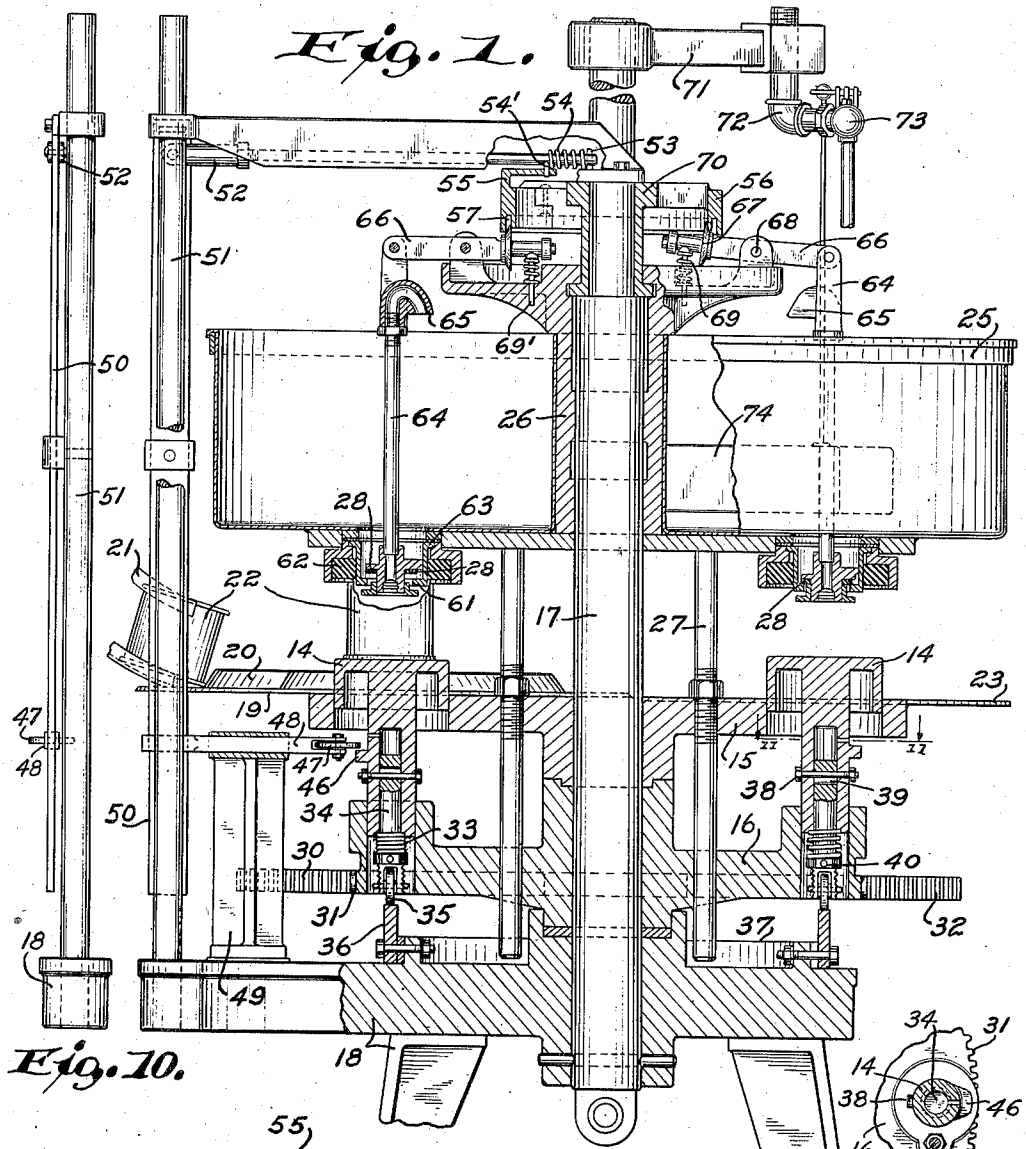


Fig. 10.

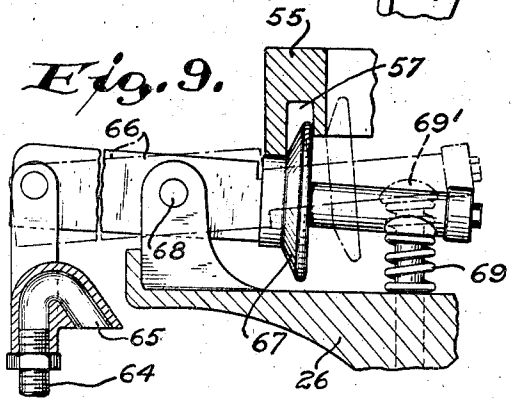


Fig. 9.

Fig. 11.

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Fig. 2.

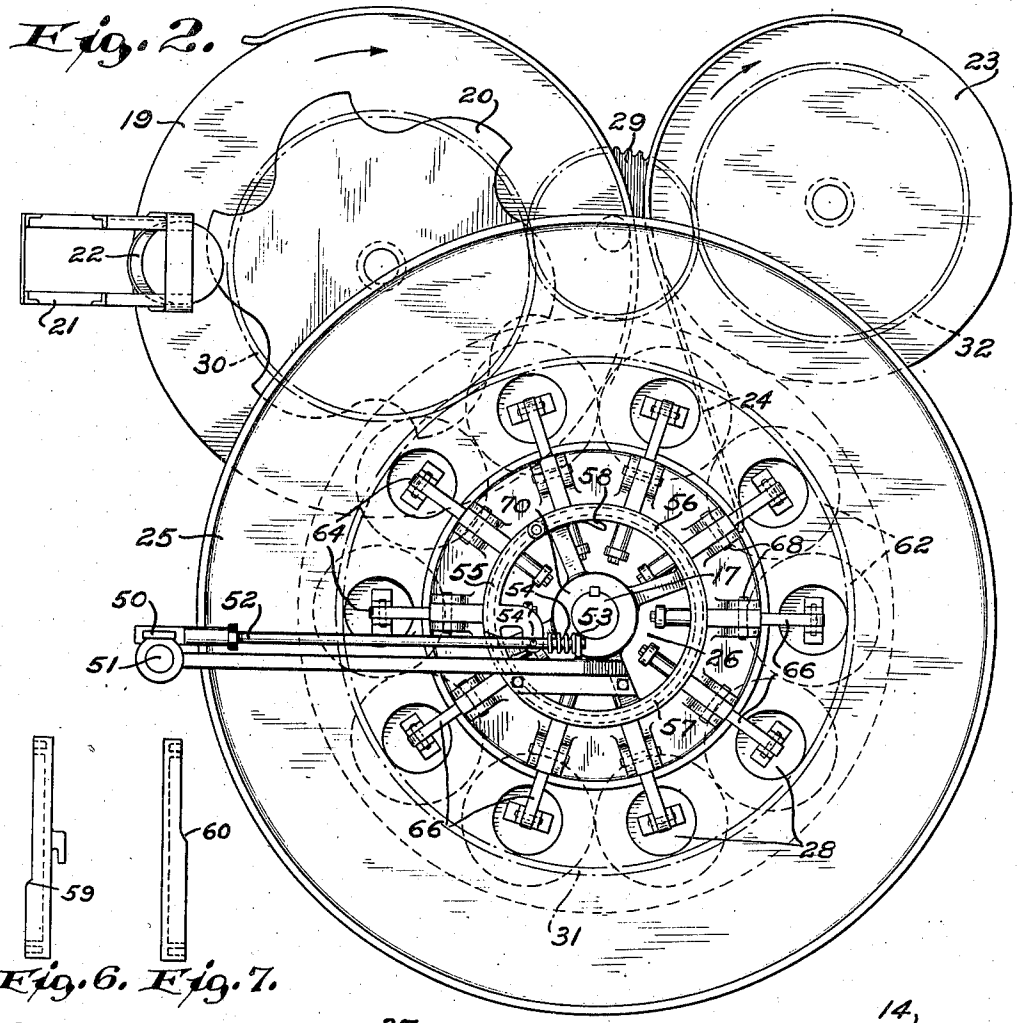


Fig. 6. Fig. 7.

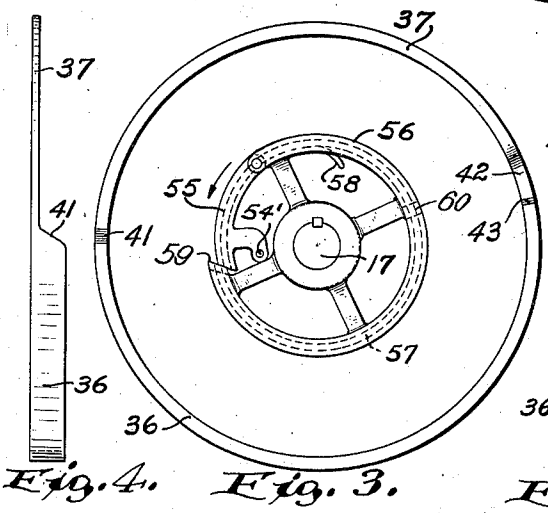


Fig. 4. Fig. 3.

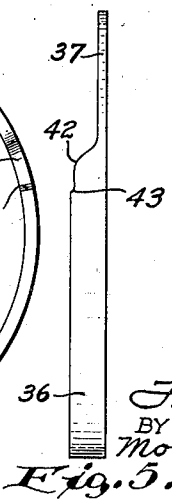


Fig. 5.

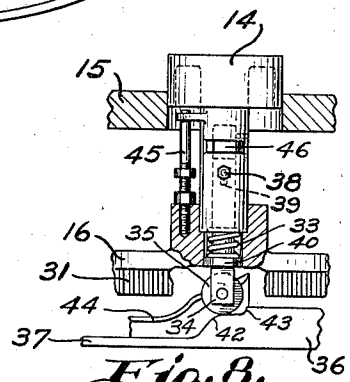


Fig. 8.

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UNITED STATES PATENT OFFICE

2,137,389

RECEPTACLE FILLING MACHINE

Frank D. Chapman, Berlin, Wis.

Application November 10, 1936, Serial No. 110,047

12 Claims. (Cl. 226—98)

My present invention relates generally to improvements in the art of delivering successive batches of fluent substances to receptacles, and relates more particularly to improvements in the construction and operation of machines for supplying liquid to a succession of containers such as cans.

In general, the present invention contemplates provision of an improved receptacle filling machine which is simple in construction and which is operable with minimum waste or loss of commodity.

In my prior Patent No. 1,922,356, granted August 15, 1933, I have shown and described a highly practical liquid dispensing machine for delivering successive batches of brine or syrup to a succession of cans while the latter are being advanced along a definite path. This prior device is provided with a series of vertically movable can supports which are revolvable about an axis beneath the liquid supply tank and dispensing valves, and has a resilient connection between each of the can supports and its elevating means for permitting relative displacement of these elements so that such displacement may be utilized to actuate the dispensing valves. It has been found, that this prior valve actuating mechanism operates in a highly satisfactory manner when the machine is operating at relatively low speed and the supply of cans is uninterrupted, but the previous machine will not entirely eliminate waste of commodity when operating at relatively high speed and in case no cans are being delivered thereto. In order to eliminate spillage when operating at high speed, the successive cans must be conducted to and from the zone of filling without shock or sudden change in the direction of advancement and it has also been found desirable to positively seal the liquid dispensing valves when no cans are being delivered to the machine.

It is therefore a specific object of my present invention to provide an improved liquid dispensing machine of the above mentioned general type, which is operable at high speed or when the can supply is interrupted, without waste of liquid and in a most efficient manner.

A more specific object of my invention is to provide improved instrumentalities for automatically elevating the successive cans into operative engagement with the dispensing nozzles and for subsequently likewise retracting the loaded cans and for delivering them from the filling machine, without spilling liquid therefrom.

Another more specific object of my invention is the provision of improved mechanism for automatically tightly sealing the individual liquid dispensing valves of a can filling machine or the like in the event that the can supply is interrupted.

A further specific object of my invention is to provide an improved liquid dispensing machine of the type commonly designated as a syruper, which is compact and durable in construction and which is automatic and most efficient in operation under all operating conditions.

These and other specific objects and advantages of the present improvement will be apparent from the following detailed description.

A clear conception of the present improved features, and of the mode of constructing and of operating liquid dispensing machines built in accordance with the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a somewhat diagrammatic part sectional side elevation of one of the improved receptacle filling machines;

Fig. 2 is a top view of the filling machine of Fig. 1;

Fig. 3 is a top view of the improved upper and lower cam track assemblages separated from the remainder of the machine;

Fig. 4 is a side view of the lower plunger actuating cam track looking toward the can elevating portion thereof;

Fig. 5 is an opposite side view of the lower cam track looking directly toward the can lowering portion thereof;

Fig. 6 is a side view of the upper valve actuating cam track looking toward the valve opening portion thereof;

Fig. 7 is an opposite side view of the upper cam track looking directly toward the valve closing portion thereof;

Fig. 8 is a fragmentary sectional view through the machine taken adjacent one of the can supporting plungers and showing the plunger lowering cam track portion in action;

Fig. 9 is an enlarged fragmentary sectional view through the machine adjacent to the upper cam track;

Fig. 10 is an end view of a portion of the linkage for actuating the liquid dispensing valves; and

Fig. 11 is a transverse horizontal section through one of the can supporting plungers taken along the line 11—11 of Fig. 1.

Although my invention has been shown and described herein as being specifically embodied in a briner or syruper for delivering liquid to a succession of tin cans, it is not the intent to thereby unnecessarily restrict the scope, since some of the improved features and mechanisms may be applied advantageously to dispense other commodities.

With reference to the drawings, the improved liquid dispensing machine shown therein, comprises in general an annular series of ten similar vertically movable can supporting plungers 14 slidably mounted in vertically alined bores in a two-part rotor 15, 16 which is revolvable about a stationary central shaft 17 fixedly secured to the main frame 18; a horizontal can feed disk 19 and can hooks 20 cooperable with a can supply chute 21 to deliver the successive empty cans 22 upon the advancing plungers 14; a horizontal can discharge disk 23 and a guide 24 for removing the successive filled cans 22 from the plungers 14 and for delivering the same from the machine; a liquid supply reservoir or tank 25 rotatably suspended from the rotor 15, 16 and from the fixed shaft 17 by means of a carrier frame 26 and rods 27 and having liquid dispensing nozzles and valves 28 disposed in vertical alinement with the plungers 14; and mechanism including a train of gears 29, 30, 31, 32 for driving the movable parts of the machine.

The can supporting plungers 14 are supported through compression springs 33, supporting guide rods 34 and rollers 35 directly upon a lower annular cam track 36 which is removably attached to the frame 18 concentrically of the shaft 17; and the upper enlarged portions of these plungers 14 are adapted to lie substantially flush with the upper surface of the upper rotor part 15 and with the disks 19, 23 when the rollers 35 are riding along the lower track section 37. The guide rods 34 are slidable vertically within the reduced lower portions of the plungers 14, and are confined within the plunger bores by means of transverse bolts 38 passing through guide slots 39. The springs 33 coact with the lower ends of the plungers 14 and with nuts 40 which are adjustable along the rods 34 so as to vary the spring tension. The rollers 35 are rotatably attached to the lower ends of the plungers 14 and are prevented from rotating out of alinement with the track 36 by the bolts 38 coacting with the slots 39. When the rollers 35 are riding along the higher portion of the cam track 36, the plungers 14 will be in maximum elevated position, and the track 36 is provided with a plunger elevating inclined portion 41 as clearly shown in Figs. 3 and 4, and also has a specially curved and inclined plunger lowering portion 42 provided with an unsealing portion 43 as shown in Figs. 3, 5 and 8. The cam track 36 is also preferably provided with a releasing rail 44 which is engageable with the inwardly projecting ends of the successive roller supporting pins to positively pull the plungers 14 downwardly in case they tend to remain in elevated position, see Fig. 8. It will thus be apparent that each of the plungers 14 is supported from the lower cam track 36 through a resilient support or mounting afforded by the corresponding spring 33, and each plunger 14 is additionally guided and is prevented from turning about its own axis by means of an adjustable guide pin and plunger stop 45 illustrated in Fig. 8.

The plungers 14 are also provided with outwardly extending integral cam lugs 46 which are adapted to successively coact with a roller 47 carried by the inner end of a horizontally slidable bar 48, when the corresponding springs 33 are not compressed by a can 22 coacting with the top of the plunger, but these lugs 46 normally do not contact the roller 47. The bar 48 is horizontally slidable within a fixed bracket 49 carried by the main frame 18, and has its outer end formed with a loop which loosely embraces the lower end portion of an upright lever 50, see Figs. 1 and 10. The medial portion of the lever 50 is pivotally suspended from a fixed vertical rod 51 secured to the frame 18, and the upper portion of the lever 50 is pivotally attached to the outer end of a horizontal push rod 52, the inner end of which is slidable in a fixed guide 53. A compression spring 54 embracing the rod 52, coacts with the fixed guide 53 and with a pin 54' secured to the rod 52 and coacting with the swinging end of a movable section 55 of the upper cam track 56 which is mounted upon and is rigidly attached to the fixed shaft 17. The cam track 56 has a lower groove 57 which is continuous or uninterrupted when the section 55 is being held outwardly by the spring 54, and this track also has a fixed guide lug 58 and downwardly offset portions 59, 60 as clearly shown in Figs. 3, 6 and 7. The valve opening offset portion 59 is located at the break between the swinging end of the section 55 and the fixed cam track, and the valve closing offset portion 60 is disposed on the opposite side of the track in advance of the guide lug 58.

The liquid supply tank 25 which is rotatably suspended from the shaft 17 by the central carrier frame 26 and by the rods 27 which connect this frame to the upper rotor part 15, is provided with an annular series of lower outlets each of which has a valve seat 61 associated therewith. The valve seats 61 are surrounded by resilient sealing pads 62 with which the tops of the cans 22 are adapted to coact when these cans are elevated by their supporting plungers 14, and the dispensing valves 28 are adapted to either engage their seats 61 as shown at the right of Fig. 1 or to be lifted away from these seats as shown at the left. The valves 28 are slidable within the seat supporting walls 63 and are suspended from the lower ends of hollow stems 64, the upper ends of which are provided with vent spouts 65 and are pivotally suspended from the outer ends of levers 66, the inner ends of which carry cam rollers 67 which are engageable with the valve actuating cam track 56. The medial portions of the levers 66 are pivotally attached to the carrier frame 26 by means of pins 68, and the extreme inner ends of these levers are constantly urged upwardly by means of compression springs 69 coacting with plungers 69' as shown in detail in Figs. 1 and 9. The rollers 67 which are formed as indicated in Fig. 9, are mounted for limited movement longitudinally of the levers 66, and are also rotatable thereon, and these rollers are adapted to coact with the lower groove 57 of the track 56 and to open the corresponding valves 28 against the action of the springs 69 when the cans 22 are elevated and pressed against the pads 62 by the plungers 14; but will ride out of the groove 57 and along the innermost edge of the track 56 as shown in dot-and-dash lines in Fig. 9 when no cans 22 are delivered to the plungers 14, thereby causing the springs 69 to maintain the valves 28 closed under such conditions of operation. When the rollers 67 coact with the interior of the track 56 in the manner just described, they are automatically returned to the groove 57 before reaching the movable

track section 55, by the fixed guide lug 58; and if no cans 22 are in position, the section 55 will be automatically swung inwardly to the position shown in Fig. 3 by the lever 50 and the associated elements, to thereby guide the rollers 67 out of the groove 57 while the plungers 14 are being elevated.

The fixed central shaft 17 is also provided with a bearing portion 70 keyed or otherwise firmly attached to the central shaft 17 as shown in Fig. 2, and upon which the carrier frame 26 is journaled and to which the upper cam 56 is attached, and the upper extremity of this shaft 17 carries an arm 71 which supports a liquid supply pipe 72. The supply pipe 72 has a float controlled valve 73 located outwardly beyond the path of travel of the valve stems 64, and this valve is operable by means of a curved float 74 which rests upon the liquid within the tank 25 and is also positioned to avoid interference with the rotation of the tank 25 and of the valve stems 64.

During normal operation of the improved can filling machine, the gearing 29, 30, 31, 32 is being operated to revolve the rotor 15, 16 and the tank 25 about the shaft 17, and the valve 73 is set to deliver an abundant supply of liquid to the interior of the tank 25. The successive empty cans 22 are delivered from the supply chute 21 onto the disk 19 and are picked up by the can hooks 20, being eventually delivered in succession upon the advancing support plungers 14, when the upper faces of these plungers are in substantial alinement with the supply disk 19. When a can 22 has been deposited upon a plunger 14, the plunger advances to a position wherein the lower roller 35 associated therewith engages the plunger actuating portion 41 of the lower cam track 36. The plunger 14 and the can 22 resting thereon are then automatically elevated so as to bring the upper edge of the can into snug engagement with the adjacent sealing pad 62, the can edge being embedded in this pad so as to provide a perfect seal. Shortly after the can has been thus positioned in engagement with the pad 62, and as the can and plunger proceed, the corresponding upper cam roller 67 which is riding within the groove 57 of the upper valve actuating cam 56, will ride along the offset portion 59 of the upper cam 56 and will thereby move the corresponding lever 66 so as to open the valve 28 suspended from this lever. Liquid will then flow by gravity into the can 22 past the valve seat 61, and air will escape through the corresponding valve stem 64 and will be delivered to the atmosphere while any entrained liquid will be returned to the tank 25 through the spout 65. The can 22 thus remains in communication with the tank 25 until the roller 67 has passed the offset portion 60 of the cam 56 and has thus permitted the valve 28 to close under the influence of the adjacent spring 69. Shortly thereafter, the plunger supporting roller 35 will pass over the offset portion 43 of the lower cam track 36, thereby unsealing the joint between the top of the can 22 and the resilient pad 62. The roller 35 will then be caused to gradually advance over the curved cam track portion 42 and will thus gradually lower the plunger 14 and the filled can 22 to the level of the can discharge disk 23. The loaded can is subsequently engaged by the fixed guide 24 and is thus removed from the plunger 14 onto the discharge disk 23 from whence it may be delivered to a discharge conveyor or to a capping machine. As long as cans 22 are being supplied to the machine, the successive cans will thus be quickly filled with liquid from the tank 25 and will thereafter be gently discharged from the machine by the cam track portions 43, 42 cooperating with the guide 24 and with the discharge disk 23. It is to be noted that if a plunger 14 tends to remain in uppermost position, the fixed track portion 44 will positively pull the plunger downwardly and compel the roller 35 to cooperate with the cam portions 42, 43.

In the event that no cans 22 are being delivered to the machine, the continued rotation of the rotor 15, 16 will cause the plungers 14 to revolve about the axis of the fixed shaft 17, but when the supporting roller 35 of a plunger 14 engages the lower cam track portion 41 to elevate the corresponding plunger 14, the cam lug 46 thereof will be raised higher than when a can 22 is in place thereon. The spring 33 will then become effective to elevate the plunger 14 to such an extent that the cam lug 46 will engage the roller 47 and will thereby push the rod 48 outwardly. The outward movement of the rod 38 swings the upright lever 50 and causes the upper end thereof to push the upper rod 52 inwardly against the normal action of the spring 54. The pin 54' then swings the movable section 55 of the upper cam track 56 inwardly and causes the projecting cam roller 67 to advance out of the groove 57 and to roll along the innermost edge of the cam track 56. With the roller 67 thus positioned, the adjacent spring 69 becomes effective to swing the valve actuating lever 66 about its pivot 68 so as to move the valve 28 downwardly into firm engagement with its seat 61. This closure and tight sealing of the valve 28 prevents liquid from escaping from the tank 25, and the same sequence of actions takes place with respect to each of the individual valves 28, when no can 22 is delivered to the corresponding plunger 14 thereof. It will thus be noted that interruption in the can supply automatically seals the successive liquid dispensing valves 28 and maintains them closed and sealed against possible leakage. When the cam rollers 67 have advanced to the zone of the guide projection 58, they are again automatically returned to the cam groove 57, and if the movable section 55 has been returned to a position of alinement with the fixed cam track 56, the valve actuating roller 67 will remain within the groove 57.

From the foregoing specific description of the operation of the improved machine, it will be apparent that when cans 22 are being delivered to the machine, they are effectively supplied with liquid from the tank 25 and are discharged from the machine without danger of spilling any of the liquid. In the event that no cans 22 are being supplied, the mechanism will function automatically to seal the liquid dispensing valves, thereby eliminating waste of liquid due to unintentional opening of the valves 28. The entire mechanism functions automatically and with the utmost precision, and the machine is capable of operation at a high rate of speed without danger of wasting the commodity. The improved assemblage is relatively durable and compact in construction, and the machine has proven highly satisfactory in actual commercial operation.

It should be understood that it is not desired to limit the present invention to the exact details of construction or to the precise mode of operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:—

1. In combination, a series of can supports movable about an axis, a liquid supply tank above said supports, a valve for controlling the delivery of liquid from said tank toward each of said supports, means for elevating said supports to move the cans carried thereby into operative relation with said valves, and means including linkage operable by said supports for maintaining said valves closed when no cans are disposed upon said supports, said linkage extending from said supports and around the exterior of said tank and cooperating with said valves from above.

2. In combination, a series of vertically movable can supports revolvable about an axis, a liquid supply tank located above and revolvable with said supports, a valve for controlling the delivery of liquid from said tank toward each of said supports, and means including linkage operable by said supports for maintaining said valves closed when no cans are being transported by said supports, said linkage extending around the exterior of said tank and cooperating with said valves from above.

3. In combination, a series of can supports movable about an axis, a liquid supply tank having a valve for controlling the delivery of liquid toward each of said supports, means for successively moving said supports toward said valves, and means operable by said supports when no cans are coacting therewith for maintaining said valves in closed position, said means being disposed entirely outside of said tank and cooperating with said valves from above.

4. In combination, an annular series of can supports revolvable about a vertical axis, a liquid supply tank having a valve for controlling the downward delivery of liquid toward each of said supports, means for elevating the successive supports toward said valves, and means operable by said supports when no cans are resting thereon for maintaining said valves in closed position, said means being disposed entirely outside of said tank and cooperating with said valves from above.

5. In combination, a series of vertically movable can supporting plungers revolvable about an axis, a liquid supply tank located above and revolvable with said series, a series of valves associated with said tank above said supports, each of said valves being located in vertical alinement with one of said plungers, means for opening said valves in succession when cans are resting upon and are being transported by the corresponding plungers, and means operable by said plungers for maintaining said valves in closed position when no cans are present, said means cooperating with said valves from above and extending toward said plungers outside of and beyond the periphery of said tank.

6. In combination, a series of can supporting plungers movable along a definite path, a liquid supply tank located above and movable with said series, said tank having a series of sealing pads surrounding liquid dispensing openings located in vertical alinement with said plungers, a cam track beneath said plungers for elevating the cans resting thereon into engagement with said seals, valves for controlling the delivery of liquid from said tank through said openings and into said cans, a valve actuating cam track above said tank for normally opening said valves, and common means operable by said plungers in succession for making said valve actuating cam track ineffective when no cans are engaged by said pads.

7. In combination, a series of can supporting plungers movable along a definite path, a liquid supply tank located above and movable with said series, said tank having a series of sealing pads surrounding liquid dispensing openings located in vertical alinement with said plungers, a cam track beneath said plungers for elevating the cans resting thereon into engagement with said seals, valves for controlling the delivery of liquid from said tank through said openings and into said cans, a valve actuating cam track above said tank for normally opening said valves, and a single train of motion transmitting linkage operable by the movement of said plungers in succession for maintaining said valves closed when no cans are positioned therebeneath.

8. In combination, a tank rotatable about an axis and having a liquid dispensing valve at the bottom thereof, a lever disposed above said tank for opening said valve, a can carrying plunger revolvable with said tank and disposed beneath said valve, a vertically movable support for said plunger, and motion transmitting linkage extending from the path of travel of said plunger upwardly around said tank and toward said valve opening lever, said linkage being operable by the movement of said plunger to prevent valve opening movement of said lever.

9. In combination, a liquid supply tank rotatable about an axis and having a liquid dispensing valve revolvable about said axis, a cam track disposed above said tank, a lever cooperable with said cam track to open said valve, a vertically movable can support revolvable beneath said valve, a second cam track disposed beneath said support, a resilient connection between said support and said second cam track, and linkage operable by said can support when no can is resting thereon to prevent valve opening movement of said lever, said linkage remaining inactive when a can is being transported by said support.

10. In combination, a liquid supply tank rotatable about an axis and having a liquid dispensing valve revolvable about said axis, a cam track disposed above said tank, a lever cooperable with said cam track to open said valve, a vertically movable can support revolvable beneath said valve, a second cam track disposed beneath said support, a resilient connection between said support and said second cam track, and linkage operable by said can support when no can is resting thereon to prevent valve opening movement of said lever.

11. In combination, a tank rotatable about an axis and having a liquid dispensing valve at the bottom thereof, a lever disposed above said tank for opening said valve, a can conveying plunger revolvable with said tank and disposed beneath said valve, and motion transmitting linkage extending from the path of travel of said plunger upwardly around said tank and being cooperable with said lever to prevent opening of said valve when no can is present.

12. In combination, a liquid receptacle rotatable about an axis and having dispensing valves near the bottom thereof, levers disposed above said receptacle for opening said valves, a can conveying plunger revolvable about said axis beneath each of said valves, and motion transmitting mechanism extending from the path of travel of said plungers upwardly around said receptacle and being cooperable with said levers to prevent opening of said valves when no cans are present.

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