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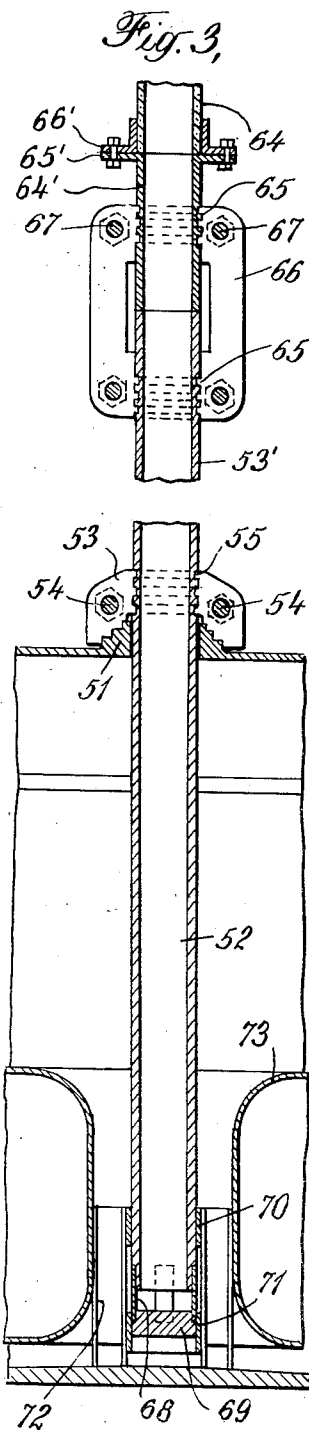
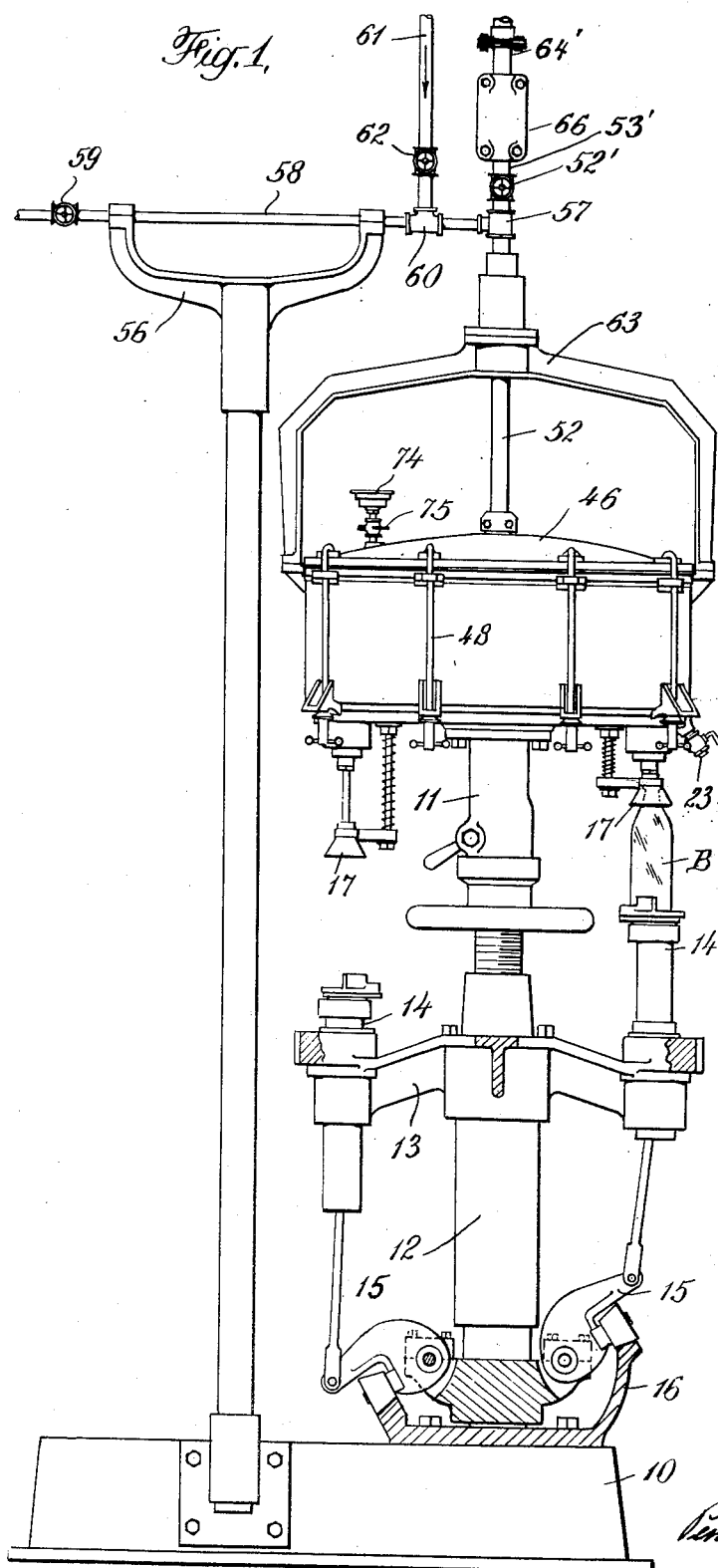
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LIQUID DISPENSING APPARATUS

Filed Jan. 21, 1931

2 Sheets-Sheet 1



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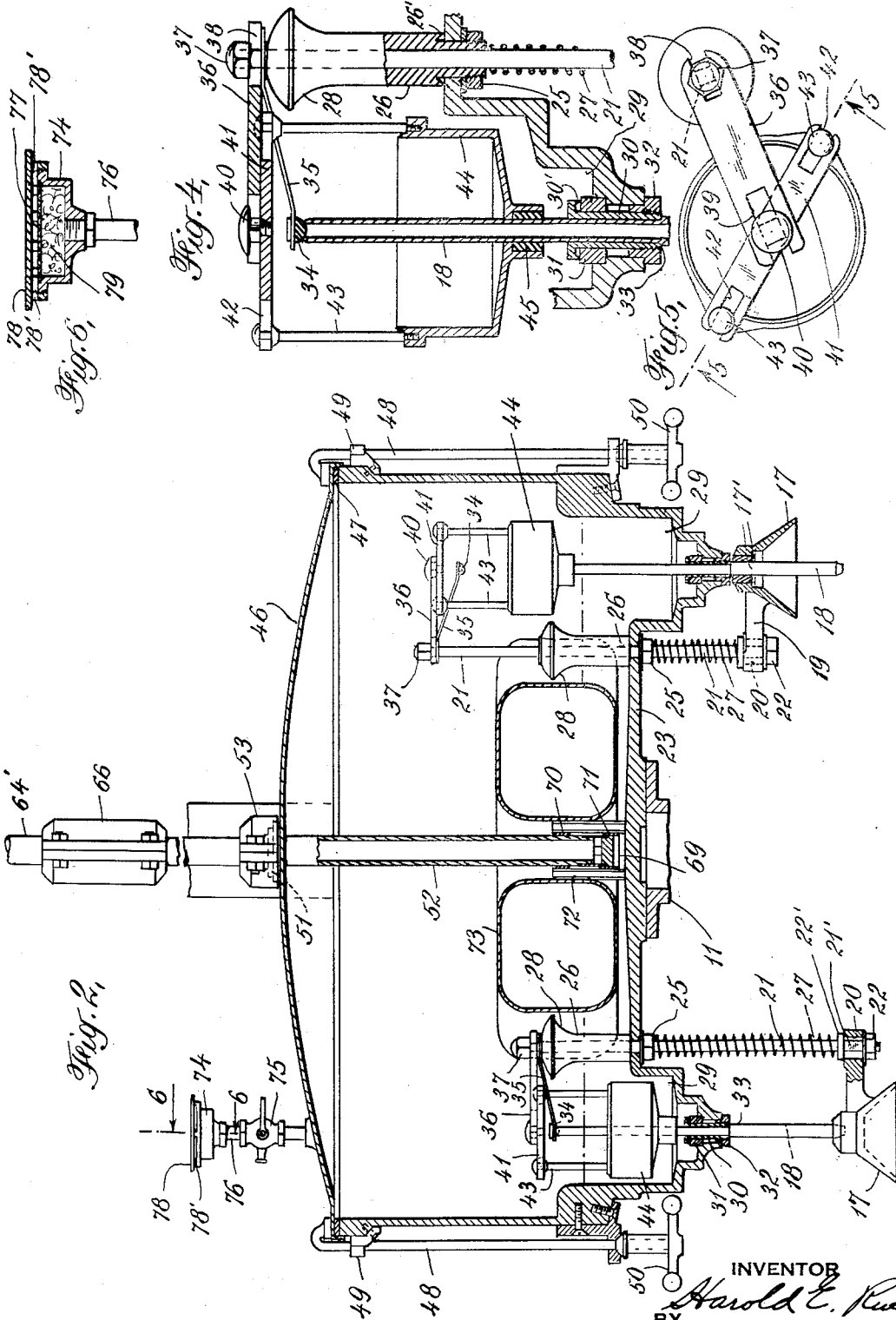
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UNITED STATES PATENT OFFICE

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LIQUID DISPENSING APPARATUS

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11 Claims. (Cl. 226—102)

This invention relates to liquid dispensing apparatus, and has particular reference to apparatus for dispensing measured quantities of syrup, fruit juices or the like, to bottles or other receptacles in which carbonated beverages or the like are adapted to be contained.

Certain standard types of syrup dispensing machines have been used heretofore in the beverage manufacturing and bottling industry, and in general this apparatus includes a tank for containing the syrup which is supplied thereto by means of a conduit, usually entering the tank at the top. A float-controlled valve maintains the syrup in this tank at a predetermined level, and a plurality of measuring cups are located in the tank and are raised periodically to supply a measured quantity of syrup to tubes inserted into the bottles, the bottles being raised in position by a cam mechanism, and actuate the measuring cups in the manner described.

It will be seen from the foregoing description that the former types of syrup dispensing machines contained many moving and sliding parts which were subject to contamination because they were not accessible for cleaning, and the viscous and sticky syrup was trapped in the many inaccessible corners and apertures of the apparatus to provide an active medium for the germination of bacteria.

As mentioned above, the syrup is supplied to a tank and its level therein is controlled by a float-operated valve, and as this valve in the former machines was of the quick closing type, an objectionable hydraulic hammer action was obtained, which frequently set up vibrations in the syrup conduits, and, especially in modern plants where these conduits are made of glass in the interest of cleanliness, there is always a danger that this hydraulic hammer action will fracture the glass conduit. Also, the loose cover of the tank permitted dirt and bacteria to enter readily and rendered the syrup in the tank subject to rapid contamination.

In the present syrup dispensing apparatus, much the same principle of operation of the former machines is employed, but with many refinements and improvements therein, whereby the objections to the former types of syrup dispensing apparatus are obviated. In this new machine, the syrup tank is hermetically sealed against the entrance of dirt and bacteria and is fitted with a sterile breather. Thus the syrup tank is sealed during the usual washing and steam sterilizing operations. After the steam has been withdrawn or condensed, the vacuum naturally

resulting within the hermetically sealed tank is broken only through the sterile breather, whereby contamination after the steam sterilizing process is prevented, which would not be the case if the tank were open to the air in any way at all, as in that case the steam sterilizing would not have any beneficial effect. In order to seal the joints between the tank and the intake pipe without using the objectionable non-metallic packings, a novel labyrinth packing has been designed, a modified form of which also is used in the syrup supply pipe connection.

Located within the syrup tank is the usual number of measuring cups, which are raised above the syrup level in the tank by the empty bottles as the latter are raised by a cam, so that a measured quantity of syrup is discharged from a cup into the corresponding bottle. Each tube is removably secured in a frame and is normally closed at one end by a cap, which is removed when the measuring action takes place, and the tube is inserted into the bottle to discharge the contents of the syrup cup. Rubber or other non-metallic packings, bushings, and gaskets are dispensed with entirely and are substituted by metallic elements which have no pockets or recesses for the lodgment of syrup or dirt, and all sliding joints are made wiping so as to continuously clean themselves as the machine operates. As the measuring cups rise and fall they agitate the syrup in the tank and it tends to splash upon the cup-lifting mechanism and lodge in cracks and crevices where it is liable to deteriorate, and so in the present machine splash guards are provided adjacent the cups to deflect the splashing syrup downwardly away from the exposed lifting mechanism.

In order to prevent the damaging effects of the hydraulic hammer, caused by the relatively rapid closing of the float valve of the former machines, the new machine uses a slow-operating sleeve valve which is directly connected to the float in the syrup tank. This sleeve valve is closed gradually so that the flow of the heavy, viscous syrup is gradually decreased in velocity to the zero point when the sleeve valve closes, so that no hydraulic hammer results.

Also, in the present machine, the measuring cups contained in the tank are each suspended on a self-aligning support which permits the cups to accommodate and compensate for any ordinary disalignment or bends in the thin tubes through which they discharge their syrup into the bottles. This self-aligning arrangement is of considerable importance as in the former ma-

chines the cups would jam and not operate properly if the corresponding tube were out of alignment or bent. This support also permits the cups to be readily detached and removed without disturbing their alignment in the tubes when it is desired to clean or repair them or the tank in which they are mounted.

It will be seen that a very effective and simple syrup dispensing apparatus is obtained by this invention, whereby cleanliness, facility of operation and maintenance, and efficiency are procured, while at the same time the objectionable features of the former machines as outlined above are obviated.

For a better understanding of the invention, reference is made to the accompanying drawings, in which

Figure 1 is an elevation of the liquid dispensing machine of this invention;

Fig. 2 is an enlarged vertical section of the syrup tank and syrup measuring mechanism of this new machine;

Fig. 3 is an enlarged axial section of the intake pipe and the novel labyrinth packings therein;

Fig. 4 is an enlarged vertical section of the syrup measuring cup and its supporting means;

Fig. 5 is a plan view thereof; and

Fig. 6 illustrates in section the sterile breather of the syrup tank.

In these drawings, numeral 10 designates a base plate upon which is mounted the pedestal 11 of the machine, this pedestal having a rotatable sleeve 12 carrying the spider 13 in which the vertical reciprocating bottle supports 14 are slidably mounted. As the sleeve 12 rotates, the rockers 15 are actuated by the stationary cam ring 16 to raise and lower the bottle supports 14 in the usual way. Superimposed directly above each bottle support 14 is a centering bell 17 of the syrup dispensing apparatus. This centering bell is shown in enlarged view, Fig. 2, as consisting of an all metal element having a central bore through which is adapted to slide the filling tube 18. A plurality of radial saw cuts 17' communicate with the tube bore and serve as air vents in a manner to be described. Each bell 17 is supported by an integral lateral arm 19 having the elongated slot 20 through which passes the squared portion 21' of the lower end of rod 21, the arm 19 being clamped on the rod 21 between the shoulder or bead 22' thereof and nut 22. The slot 20 in the bell arm 19 is provided for the purpose of enabling the bell 17 to be accurately centered on tube 18, so that it will slide easily up and down along this tube during operation of the machine. By means of this arrangement, any manufacturing or assembling inequalities which might result in inaccurate spacing between rod 21 and tube 18 and thus cause bell 17 to scrape or jam on tube 18, may be compensated for by simply loosening nut 22, moving bell 17 laterally until it is accurately centered on tube 18 and then tightening down nut 22 to lock the bell 17 in this adjusted position. This adjustment is available at any time to compensate for any subsequent misalignment of the bell 17 on tube 18.

Rod 21 passes through a sleeve 26 secured through the bottom of syrup tank 23, which is supported on the pedestal 11 and is provided with a drain cock 23'. The reduced lower end of the sleeve 26 which projects through the bottom of the tank 23 is threaded for the reception of the securing nut 25, and the shoulder thereof

is provided with a knife-edge ring 26' arranged to seal itself upon the bottom of the syrup tank 23 to form a liquid-proof joint when nut 25 is tightened.

A spring 27 surrounds the rod 21, and is placed between the bell arm 19 and nut 25, so that the rod 21 is normally urged in a downward direction. As shown particularly in Figure 2, the upper end of sleeve 26 within the tank 23 is flared to form a splash guard 28 for deflecting splashing syrup downwardly in a manner to be described in greater detail later.

The syrup tank 23 is provided with an annular trough 29, through the bottom of which is sealed a sleeve 30 by means of bushing 31 and nut 32 to form a packless joint having no recesses where syrup or dirt may be trapped. This joint is assembled by inserting sleeve 30 from inside the tank through bushing 31, with which it forms a liquid-tight joint by virtue of the knife edge 30' on the underside of the flange thereof. Then the nut 32 is screwed down tightly upon the lower end of sleeve 30, so that the knife-edge 30' seals itself on bushing 31, whereby a tight integral packing is formed around which no syrup or other liquid can leak under any circumstances. This joint is shown in greater detail in Figure 4.

The tube 18 is formed of one piece and about half of its length is slightly reduced in diameter so that the shoulder 33 is formed thereon. The sleeve 30 is sweated on the reduced portion of tube 18 so that the shoulder 33 engages the lower end of sleeve 30. Accordingly, when the sleeve is assembled with the bushing 31 and nut 32 through the bottom of tank 23, the tube 18 projects upwardly into the syrup tank 23. The upper end of this tube 18 extends above the normal syrup level in the tank 23 and is normally closed by a cap 34 mounted on the end of a spring steel strip 35, which is anchored at its other end to the upper end of the rod 21, under an arm 36 and nut 37.

As shown especially in Figure 5, the arm is slotted lengthwise at each end, the square end of rod 21 passing through the slot 38 at one end of arm 36, while the slot 39 in the other end of arm 36 embraces the square shank of stud 40 carried by the clip 41, so that the latter is suspended by arm 36. The ends of clip 41 are also provided with lengthwise slots 42, which embrace a reduced portion at the top ends of rods 43, from whose lower ends is suspended a syrup cup 44. The bottom of this syrup cup 44 is fitted with a bushing 45 and is slidably mounted on the tube 18, as shown in Figure 4. Notch 39 in arm 36, and notches 42 in the ends of clip 41 render the arm 36 and the clip 41 self-compensating in that these slots permit them to assume a position without strain, whereby the syrup cup 44 is centered naturally with respect to tube 18 upon which it slides upwardly and downwardly. The bushing 45 continuously wipes the tube 18 free of surplus syrup as the cup 44 moves along it, so that no syrup can accumulate and become contaminated.

The syrup tank 23 is hermetically sealed by means of the cover 46 over a gasket 47, the cover being clamped in position by several clamp bolts 48 guided in brackets 49 mounted on the side of tank 23, and screwed down in place by handles 50. The cover 46 is provided with a central aperture, around which is secured a stepped ring 51, shown in detail in enlarged Figure 3. Fitting closely through this stepped ring 51 is an intake pipe 52 whose lower end extends adjacent

the bottom of the tank 23. At a point adjacent and above the stepped ring 51 of the cover 46 this pipe is provided with a plurality of annular grooves spaced apart lengthwise of the pipe to form beads thereon. Fitting into these grooves and shaped to coact with the steps of ring 51 is a packing gland 53 made in two parts securable together by the bolts 54. The steps on this gland 53 and the cover ring 51 form a labyrinth packing which seals the joint between the pipe and the cover 46, while the beads 55 on the gland 52 coact with the grooves in the pipe to form a labyrinth packing, whereby the pipe is sealed at this point. By means of this double labyrinth packing, the pipe 52 is sealed in the cover 46 without requiring non-metallic packings such as leather, fibre, or rubber, which are difficult to keep clean, whereas the present joint may be cleaned simply by wiping and is readily steamed and sterilized. Also, by means of the split feature of the gland 53, the pipe 52 may be readily withdrawn from and emplaced in the cover 46 with no labor other than loosening bolts 54.

Mounted in yoke 56 and entering intake pipe 52 through a T fitting 57 is a water pipe 58 controllable by a valve 59. Entering water pipe 58 behind the valve 59 through a T fitting 60 is a steam pipe 61 controllable by valve 62. The intake pipe 52 is supported in a yoke 63 mounted on the syrup tank 23.

The flow through intake pipe 52 is controllable by valve 52', to which is connected a short length of pipe 53' of non-corrosive metal. Communicating with this short pipe 53' is a similar short length of pipe 64', having the flange 65' on its upper end to which is connected the flange 66' on the lower end of tube 64. Tube 64 is preferably made of glass in the interests of cleanliness and to enable observation of the flow of syrup or other liquid from the source of supply to the tank 23. The outer surfaces of the adjacent ends of the two short pipes 53' and 64' are provided with spaced grooves and beads which interengage with complementary grooves and beads 65 formed on the inner surfaces of collar 66, which is made in two parts secured together by bolts 67. The short length of pipes 53' and 64' enable them to be readily handled when being ground to accurately match up with the collar 66, these pipes 53' and 64' and collar 66 thus forming a labyrinth joint which seals the syrup supply pipe connections against the escape of syrup or other liquid flowing to tank 23. At the same time, this joint provides a means whereby the glass tube 64 may be readily dismounted for cleaning, replacement and the like, as it is only necessary to loosen bolts 67 to remove split collar 66 and thus free the lower end of tube 64 and its extension pipe 64'. This joint is inherently clean, as there are no cavities in which impurities may collect, nor are there any non-metallic packing rings which might contribute to uncleanness. Also, as this joint is formed entirely of metal it may be readily cleaned and sterilized.

The lower end of intake pipe 52, which is adjacent the bottom of tank 23, is provided with spaced straps 68 carrying at their lower ends the plug or block 69. Slidably mounted on the outer surface of tube 52 are the sleeves 70 and 71, which are spaced apart the proper distance by brackets 72 so that sleeves 70 and 71 move as a unit, being spaced from the bottom of tank 23 by the engagement of the ends of brackets 72 with the bottom of the tank 23. Brackets 72 also carry the hollow float 73, which moves up and

down with the changing syrup level in tank 23, and maintains it approximately constant by supplying syrup thereto from pipe 52 by means of the novel sleeve valve just described. It will be seen that as the float rises with the increase in the supply of syrup to tank 23, lower sleeve 71 of the sleeve valve gradually closes the spaces between the straps 68 through which the syrup flows into the tank 23 from pipe 52, upper sleeve 70 acting as a guide. When lower sleeve 71 of the sleeve valve closes these spaces, the syrup ceases to flow, though its flow has been gradually reduced to the zero point while the valve closed. Conversely, as the syrup is gradually dispensed, float 73 falls, so that the sleeve valve reopens to allow more syrup to gradually flow into tank 23 without causing a sudden surge or any hydraulic hammer action of the syrup within the pipes 52 and 64, such as would occur if the valve were closed suddenly.

The cover 46 of the hermetically sealed tank 23 is provided with the sterile breather 74, which may be shut off by the valve 75 and is shown in detail in Figure 6. This sterile breather includes the pipe 76 connected through the cover 46 and communicating at its upper end with the interior of the breather 74, which comprises a cup closed at its open end by a screen 77 secured in place by the cap 78 having annular air openings 78'. This cup is filled with sterile cotton 79 as illustrated. The purpose of this sterile breather will be described later.

In operation, the machine of this invention is supplied with bottles B which are placed upon the bottle holders 14. As these bottles B are raised by the ring cam 16, the lips thereof engage the corresponding centering bell 17 of the dispensing apparatus. The lip of the bottle is sealed in this bell against syrup leakage, but the radial saw cuts 17' act as vents to permit air to flow out of the bottle as it is displaced by the syrup supplied thereto. Further raising of this bottle by cam ring 16 causes it to raise the centering bell 17, and with it the arm 19 and rod 21 against the tension of spring 27. As the upper end of rod 21 is connected to the measuring cup 44 through rods 43, clip 41, and arm 36, this measuring cup 44 is also raised to slide along tube 18, carrying with it a measured supply of syrup from annular trough 29 of syrup tank 23. Also, as the cup 44 rises, cap 34 is lifted from the upper end of stationary tube 18, while the lower end of this tube, being stationary, is inserted in the bottle B as the latter rises. When the level of the syrup in the rising cup 44 reaches the upper end of stationary tube 18, the syrup is discharged through the latter into the bottle B, which is then lowered after the corresponding measuring cup 44 has emptied its syrup therein. This action of ring cam 16 in lowering bottle B also allows the cup 44 to drop under the tension of spring 27 until it again rests in annular trough 29 of tank 23 and is filled with more syrup in consequence. Likewise, cap 34 closes the upper end of tube 18.

This action is repeated with all of the bottles which are supplied to the several measuring devices mounted on tank 23 until the syrup therein becomes partially depleted, when float 73 falls until the lower sleeve 71 of the sleeve valve gradually opens the aperture between the straps 68, and syrup again flows into the tank through pipe 52, the float 73 meanwhile rising with the gradual rising level of the syrup in tank 23 until the sleeve valve is again closed when the proper

syrup level is reached. This closing of the sleeve valve is very gradual and slow, and the momentum of the downwardly flowing syrup through pipes 52 and 64 is gradually decreased to the zero point, so that no hydraulic hammer action takes place as in the former machines, which had quick closing valves. Thus, undue vibration of pipes 52 and 64, and the liability of breakage of the latter, if made of glass, are obviated.

The quantity of the syrup in the tank 23 is such that the level thereof, indicated by the dot-and-dash line in Fig. 2, lies above the top edges of the cups 44 when they lie in their lowest positions, and below the upper ends of the tubes 18, so that the cups 44 are always completely immersed in the syrup when they are down and no syrup can flow into the tubes 18 except that supplied thereto by the corresponding cups.

As the cups 44 rise and fall in the syrup tank, a considerable amount of splashing of the syrup naturally takes place, and as it is desired to prevent it from splashing into the joints and clearances of the cup lifting mechanism and into the annular space between rod 21 and sleeve 26, the splash guard 28 on sleeve 26 is provided. This splash guard is shaped so as to deflect the syrup downwardly and so prevents the accumulation of the liquid in cracks and crevices wherein bacteria are liable to develop.

When it is desired to clean and sterilize the tank, as when syrup flavor is to be changed, the flow of syrup is stopped by closing valve 52', the syrup remaining in tank 23 is drained by opening drain cock 23' and valve 59 is opened to flush out tank 23 with water. After this has been done thoroughly, valve 59, breather valve 75, and cock 23' are closed and valve 62 is opened to allow live steam under pressure to flow into tank 23. The labyrinth packing 51, 53, 54, 55 at the joint between the cover and the pipe 52 prevents steam from leaking out as does gasket 47, and all interior surfaces of the tank are thoroughly sterilized and any bacteria which may have developed or collected in crevices are destroyed by the pressure steam. It will be noted that in this way the tank 23 may be cleaned and sterilized without opening it to the outside air or requiring scrubbing with unclean materials or tools.

After the steam sterilizing treatment has been completed, steam valve 62 is closed, and as the steam in tank 23 condenses, a vacuum is created therein which may be broken by opening breather valve 75, whereby air is allowed to enter the tank only through the sterile cotton filter 79 to exclude the dirt and germs which would enter if the tank were opened to the outside air. The cap 78 prevents the breather from being contaminated by liquids or dirt dropping from the top, the lateral openings 78' being so placed under the rim of cap 78 that foreign matter is not likely to enter them. Thus the tank is kept in sterile condition and new syrup may be introduced through pipes 64 and 52.

It will be seen that the new liquid dispensing apparatus of this invention is particularly adapted for dispensing syrup, fruit juices, or other heavy, viscous liquids, although its use is not limited thereto. All of the moving parts are self-wiping and thus remain clean; all of the joints and connections are self-draining and devoid of pockets where liquid may collect and become contaminated; and all of the packings are self-sealing, free of deteriorating rubber, leather or other non-metallic packings, readily disassembled, and easily cleaned. This is especially true of the two labyrinth packings 51-52-53 and

53'-64'-66, which may be cleaned and sterilized easily and are readily disassembled for this purpose, simply by removing their respective split collars 53 and 66. As the labyrinth grooves of these joints are ground truly, their parts need not be assembled in the same angular relation, as they are relatively rotatable, that is, pipe 51, cover 46 and collar 53 are all rotatable relatively to each other and pipes 53' and 66' and collar 66 are also rotatable relatively to each other. Accordingly, these labyrinth joints may also serve to connect together two rotatable pipes or other parts. Thus one part may be stationary and the other part rotatable relatively thereto.

The syrup dispensing tubes, being necessarily small and light so as to fit into the small bottle openings, are liable to bend or become disaligned, whereby the syrup measuring mechanism would not function properly except for the self-aligning action of the slotted yokes which support the measuring cups, whereby the relationship between each cup and the tube upon which it slides remains true at all times. If the tube 18 and the bell 17 become disaligned it is only necessary to loosen nut 22 and center bell 17 on tube 18 to again place them in alignment. The cups 44 may be readily removed and replaced without disturbing the alignment between them and the corresponding tube 18, as it is only necessary to loosen nut 37 in order to disengage the cups for lifting them out of the tank. Because of the square upper extremity of rod 21 and the slots in parts 36, 41 and 35, the whole assembly may be remade with the assurance that the corresponding cup will occupy the same position as it did before disassembling.

While a preferred embodiment of this invention has been illustrated and described herein, it is to be understood that this invention is not to be limited thereto, but is susceptible to various changes in form and detail within its scope.

I claim:

1. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the bottom thereof, a cup slidable upon said tube, a sleeve sealed in said reservoir adjacent said cup, a rod slidably mounted in said sleeve and extending above said cup in said reservoir, and connections between said rod and the top of said cup, whereby elevation of said rod moves said cup along said tube to discharge its contents into said tube, said connections including means providing lost motion in all lateral directions to render the cup self-centering with respect to the tube.

2. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the bottom thereof, a cup slidable upon said tube, a member connected to the top of the cup for lifting said cup to permit its contents to flow into said tube, and loose connections between said cup and said member providing movement between them in any lateral direction, whereby the cup is made self-adjusting relatively to said tube.

3. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the bottom thereof, a cup slidable upon said tube, a member for lifting said cup to permit its contents to flow into said tube, rods extending upwardly from said cup, a clip having notches in which said rods are movably supported, and connections between said clip and member.

4. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the bottom thereof, a cup slidable upon said tube, a

member for lifting said cup to permit its contents to flow into said tube, a leaf spring extending from said member over the end of the tube, and a cap on said spring for normally closing said tube, said cap being removed from said tube as said member is lifted.

5 5. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube leading therefrom, a cup slidable on said tube, means
10 connected to the top of the cup for lifting the cup to discharge its contents into said tube, and releasable connections between the cup and said means providing lost motion in any lateral direction, whereby the cup is self-centering with re-
15 spect to the tube and may be removed and replaced without disturbing the centered relation between said cup and tube.

6. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the
20 bottom thereof, a cup slidable upon said tube, means for lifting said cup to discharge its contents into said tube, and a splash guard having a part extending laterally adjacent said cup to deflect splashing liquid downwardly.

25 7. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the bottom thereof, liquid dispensing mechanism adapted to discharge liquid into said tube, a member
30 slidable on said tube and connected to said mechanism for actuating the same, and means for adjusting the member laterally of said tube for maintaining them in centered relation.

8. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in
35 the bottom thereof, liquid dispensing mechanism adapted to discharge liquid into said tube, a

centering bell slidable on said tube and adapted to be actuated by the receptacle to which the liquid is to be dispensed, a rod connected to said mechanism to actuate the same, an arm on said bell having a lateral slot, and releasable means
80 securing said rod in the slot of the bell arm whereby the bell may be adjusted laterally to center the same upon said tube.

9. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the bottom thereof, a cup slidable upon said
85 tube, a sleeve sealed in said reservoir adjacent said cup, an overhanging portion on said sleeve serving as a liquid splash guard, a rod slidably mounted in said sleeve, connections between said rod and said cup, a member slidable on said tube and connected to the lower end of said rod for
90 actuating the same, and means centering said cup and said member on said tube.

10. In a liquid dispensing apparatus, the combination of a liquid reservoir, a tube sealed in the reservoir, a cup slidable on the tube within the reservoir, a member for lifting the cup to
95 permit its contents to flow into the upper open end of said tube, and connections between the cup and said member permitting self-adjustment of said cup relatively to said tube in any direction in a horizontal plane.

11. In a liquid dispensing apparatus, the combination of a reservoir, a tube extending through
105 the bottom of the reservoir, a cup slidable along the tube, means for raising the cup to discharge its contents into the tube, and an upwardly and outwardly flaring splash guard adjacent the means to deflect splashing liquid therefrom.
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