Oct. 11, 1932. E. MALLINCKRODT, JR 1,881,784

FILLER

Original Filed Jan. 5, 1928 4 Sheets-Sheet 1

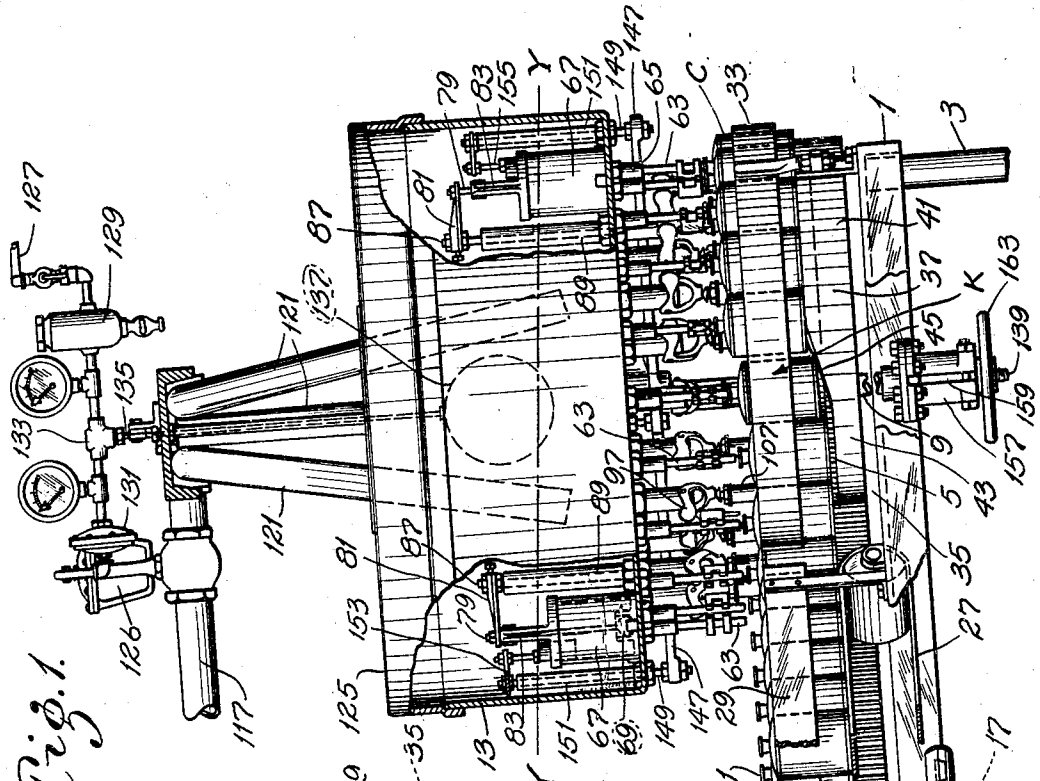


Fig. 1.

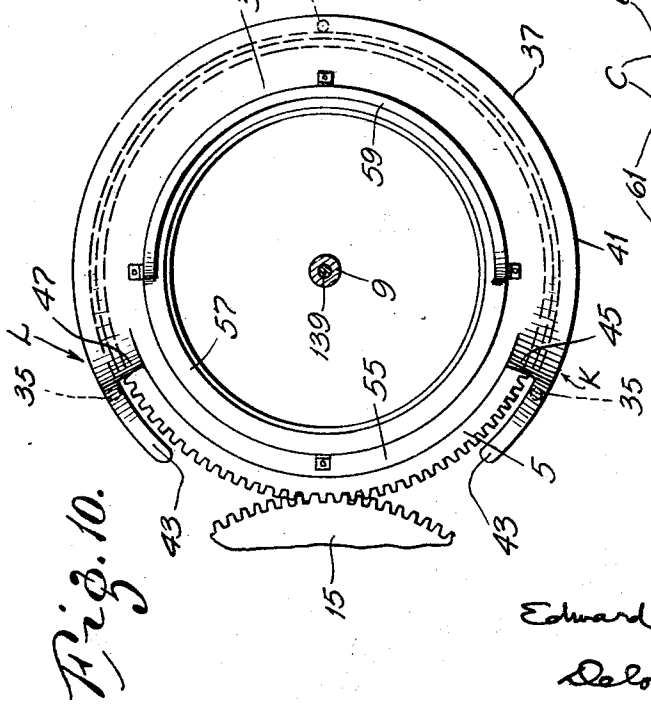


Fig. 10.

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Original Filed Jan. 5, 1928 4 Sheets-Sheet 2

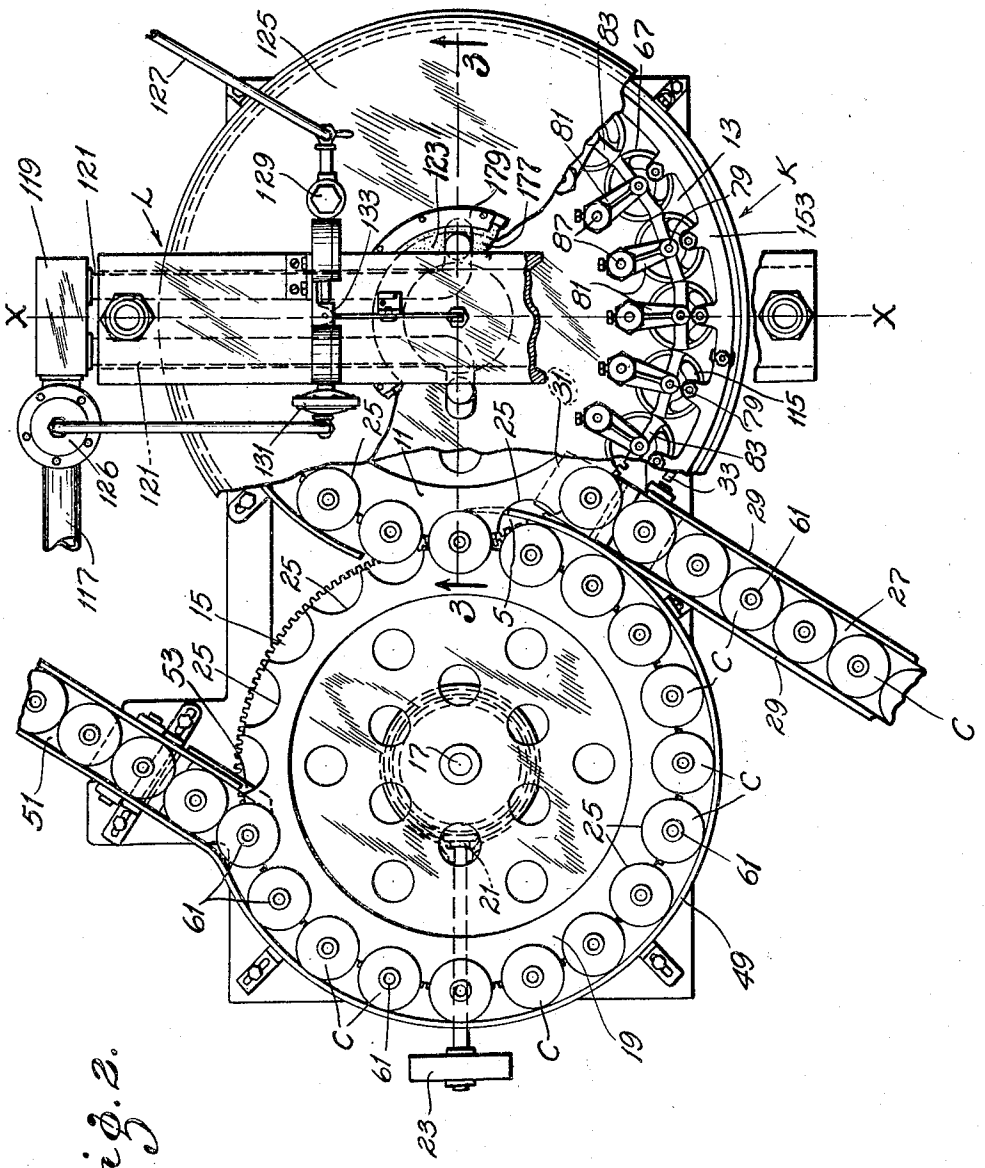


Fig. 2.

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FILLER

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Fig. 3.

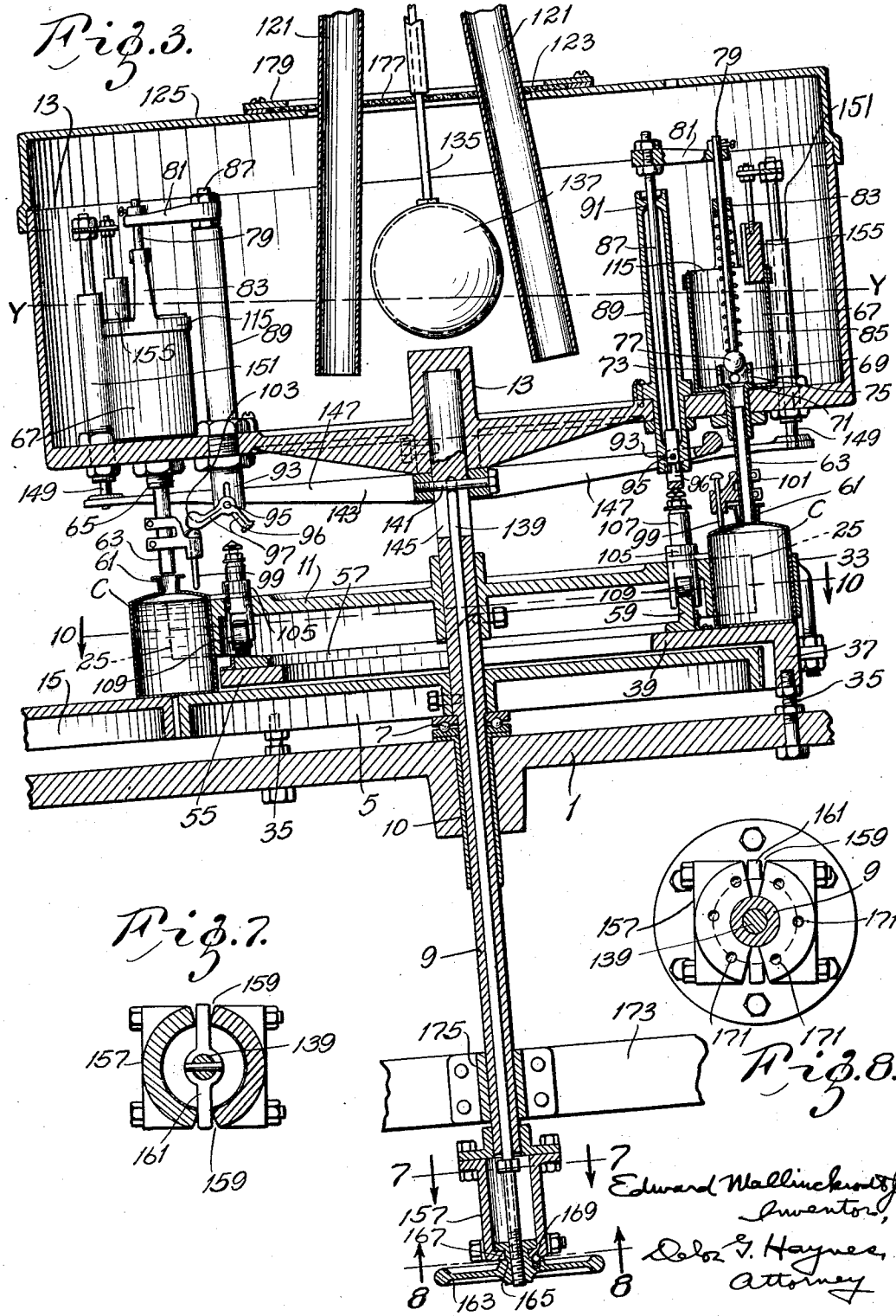


Fig. 7.

Fig. 8.

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Fig. 9.

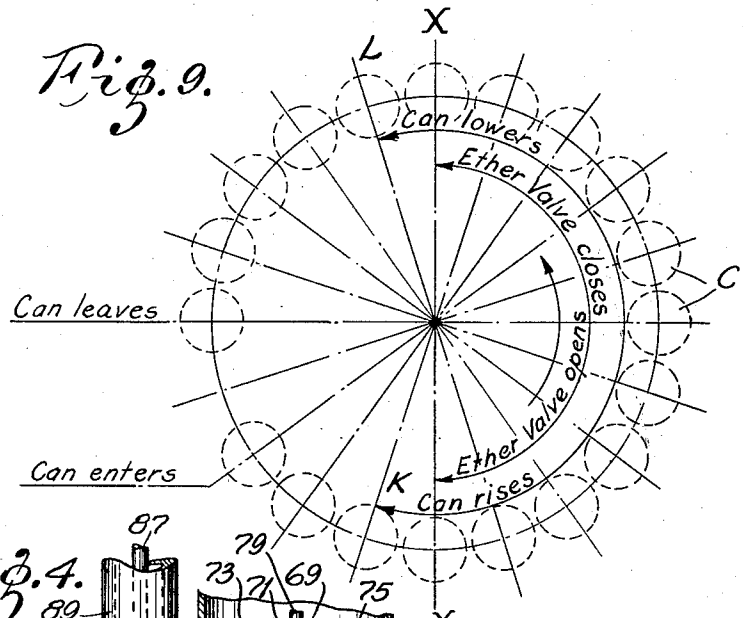


Fig. 4.

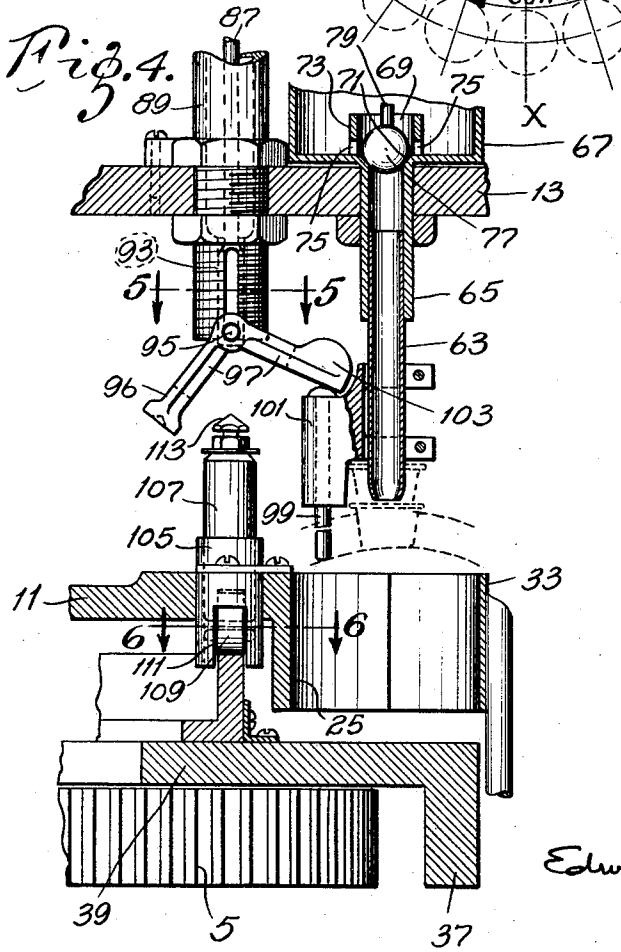


Fig. 5.

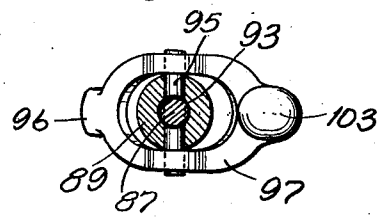
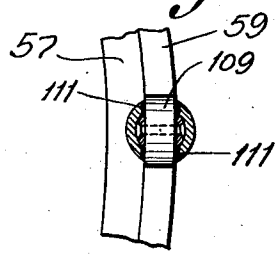


Fig. 6.



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Inventor.
Odon G. Haynes,
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Patented Oct. 11, 1932

1,881,784

UNITED STATES PATENT OFFICE

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FILLER

Application filed January 5, 1928, Serial No. 244,571. Renewed February 29, 1932.

This invention relates to fillers and with regard to certain more specific features, to automatic liquid fillers for containers such as cans.

Among the several objects of the invention may be noted the provision of a rotary pool type of filler of simplified construction, adapted to accurately measure out volatile fluids, such as ether, in successive quantities or charges to successive containers; the provision of improved means for preventing a filling operation from taking place when certain containers are not present in the machine and the provision of simplified means for accurately compensating said charges for changes in temperature. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a side elevation of the filler, certain portions being broken away;

Fig. 2 is a top plan view of the filler, certain portions being also broken away;

Fig. 3 is an enlarged vertical section taken through the liquid supply chamber showing certain associated parts;

Fig. 4 is an enlarged vertical section taken through a safety linkage for preventing the delivery and consequent spilling of liquid when no container is present for receiving a charge;

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 4;

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 4;

Fig. 7 is a substantially horizontal section taken on line 7—7 of Fig. 3;

Fig. 8 is a substantially horizontal section taken on line 8—8 of Fig. 3;

Fig. 9 is a diagrammatic layout illustrating the relative timed action of certain cams; and

Fig. 10 is a substantially horizontal section taken on line 10—10 of Fig. 3, but shows only certain parts connected with said cams.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a frame or table supported by legs 3 and provided with a degree of tilt adapted to provide the functions hereinafter described. The apparatus as a whole is tilted about an axis X—X (Figs. 2 and 9).

The table 1, by means of a bearing 7, rotatably supports a toothed wheel or container support 5 (Fig. 3). The wheel 5 is made fast to a hollow rotatable spindle 9, to which spindle is also attached a guide spider 11 and a supply container 13, the latter being positioned at the upper end of said spindle. The spindle is rotatably held in a bearing 10 of the table 1.

The wheel 5 meshes at its periphery with a second toothed wheel or container support 15, the latter being fixed on a shaft 17 which also carries affixed thereto a guide spider 19, similar to the guide spider 11. The shaft 17 is driven by way of reduction gears 21 from a power pulley 23, the pulley and gears being mounted on the table 1. Under influence of the rotating pulley 23 and transmission, the wheels 5 and 15 are caused to rotate steadily at an angular velocity ratio of one to one. It is evident that the guide spiders 11 and 19 also move at this angular velocity ratio of one to one.

Examination of Fig. 2 indicates that the peripheries of the spiders 11 and 19 at one point move into a substantially tangential relationship and that said peripheries are provided with recesses 25 arranged to be juxtaposed as said recesses on the two spiders come into this tangential relationship. Each recess is formed substantially as a semi-circular arc adapted to enclose a portion of the upper region of each can or container C fed to the respective recess.

A feeding belt 27 is moved to convey cans

toward the notches 25 in the spider 11 as said notches leave their tangential positions, suitable guides 29 being used to align the incoming cans. A thin sheet metal bridge 31 conveys the cans from the belt 27 to a position on the supporting wheel 5 and within the confines of the proper recess 25. The recess in its peripheral movement then carries the can with it, the can being further guided by a rail 33. It is to be understood that the belt 27 operates at approximately the correct speed for successively supplying containers to the recesses as required, but should it operate too rapidly, the only effect is to continually press the cans against the spider 11, which picks them up as required, while the belt slips beneath the other incoming cans. If the belt operates too slowly, it merely means that a recess 25 now and then fails to receive a can.

Fastened to the table 1 by suitable studs 35, is a compound cam 37 which is formed to partially encircle the wheel 5 and form a mask 39 over a portion thereof (Figs. 1, 3, 4 and 10). The encircling portion 41 has horns or extensions 43 which extend beneath the protruding portions of the cans which are starting their movement on the wheel 5 and in the spider 11 (Figs. 1 and 3).

The form of the cam 37 is such that a gradual rise 45 joins one horn and the mask, and a gradual depression 47 joins the other horn and said mask, said rise and depression being spaced on a circle at somewhat over 180 degrees of an arc (Fig. 10).

One purpose of the cam 37 is to provide means whereby the cans, as they move peripherally, ride freely over the first horn 43, then up the incline 45, and are pushed (in an elevated position) over the surface of the mask 39 until (over 180 degrees later) the depression 47 lowers them back into position on the wheel 5, whereupon they are successively delivered to the recesses 25 in the second spider 19. A second rail 49, reaching beneath the spider 11 guides the cans from the recesses in said spider 11 to the recesses in the spider 19 and holds them in the latter position as they are carried around the periphery of said second spider 19 to a discharge belt 51. A finger 53 reaches beneath the spider 19 and guides the cans out from the recesses 25 to the belt 51. No trouble is encountered in passing the cans from wheel 5 to wheel 15, because these wheels have flush upper surfaces (Fig. 3).

As illustrated in Figs. 3 and 10, the mask 39 has an arcuate member 55 which, with the mask 39, supports a secondary cam 57, the latter having a raised portion 59 subtending an arc somewhat less than the arc of the mask 39 and symmetrical with respect thereto. The purpose of this cam is described hereinafter.

From the above it will be seen that the cans are continually fed to the machine by means of the belt 27 and that they describe an S-shaped path in moving through the machine along the peripheries of the wheels 5 and 15. Thereafter they leave by way of the discharge belt 51. At the region K they are lifted (rise 45) and at the region L they descend (depression 47).

The reason for lifting and lowering the cans is to bring the nozzles 61 thereof into cooperation with filling tubes 63 of said supply container 13, so that a filling operation may be performed.

The filling tubes 63 comprise inserts, being permanently fastened within outlet tubes 65 of measuring cups 67 positioned within the container 13. The method of threading the tubes 65 and holding them (with their cups 67) by means of external nuts is clearly shown in Figs. 3 and 4. Suitable sealing means are used beneath the cups, such as lead gaskets or the like, or the tubes 65 may be tapered and ground to fit.

At the regions where the tubes 65 join the cups 67 there are interposed valves 69, comprising valve seats 71, guide tubes 73, and inlets 75. The closing members of the valve comprise balls 77 adapted to rest in the seats 71 and be guided in their motions by said tubes 73.

Each ball 77 is provided with a stem 79 leading upwardly and fastened to an overhanging arm 81. Each stem 79 is slidably mounted in and guided by an upper adjustable bracket 83 threaded to the top of its respective cup 67. A valve closing spring 85 reacts between the bracket 83 and said ball 77.

The overhanging arm 81 is fastened to a vertically movable follower or push rod 87 slidably positioned within a hollow tube 89, the latter being fastened to the bottom of the container 13. The upper end of each tube, formed as a bearing 91, is at all times positioned above the liquid level in the container, thereby eliminating the necessity for tight stuffing glands adapted to resist the pressure of a liquid head. The lower end of each tube 89 is fastened to the bottom of the container in the manner clearly shown in Figs. 3 and 4.

The lower end of each tube 89 is formed as a bearing 93 for the lower end of the respective push rod 87, and is slotted sidewardly to function as a guide for a cross pin 95 placed through said lower end of the push rod (Figs. 3, 4 and 5). Each pin 95 oscillatively carries a yoked bell crank 97, the function of which is to act as a throw-out link for preventing a valve opening when no can is present to be filled beneath the respective tube 63.

Figs. 3 and 4 show how the position of each bell crank 97 is controlled by the operation of a substantially vertically movable

feeler pin 99 borne in a bracket 101, the latter being clamped to its respective fill tube 63. The clamping arrangement permits of adjusting the initial elevation of each feeler pin 99. Each pin 99 engages a weighted head 103 of one lateral arm of the bell crank 97. The other arm 96 of each bell crank 97 is adapted to swing into a substantially vertical position when the respective feeler pin 99 is raised (as when a can is in position for filling) and is adapted to swing into a non-vertical position when its respective feeler pin is depressed (such as when a can is not in position for filling).

Fastened in the spider 11 are bushings 105 which reciprocally support tappets 107, the latter, each carrying a follower wheel 109 at its lower end. Each follower wheel 109 has a greater diameter than its respective tappet 107 (see Fig. 6), whereby it may ride in lateral slots 111 formed in a downward projecting portion of the bushing 105. By this means the tappet 107 may be raised and lowered without its twisting. The means for raising and lowering the tappets 107 comprises the portion 59 of said cam 57.

It is evident from Fig. 4 that when a can is missing in a particular recess 25, that the feeler pin 99 is not raised, because no can is present to raise it, and that therefore the arm 96 of the bell crank 97 fails to interpose any connection between the adjustable head 113 of the tappet 107 and the push rod 87, and hence the action of the raised portion 59 of the cam 57 is effective only to move the tappet 107 which cannot transmit movement to the ball 77 of the valve 69.

However, whenever a can is in proper position within its recess 25 and reaches the rise 45, the rising can lifts the feeler pin 99 and thereby puts the arm 96 of the bell crank 97 in a substantially vertical position above its respective tappet. Hence, when the tappet is subsequently forced up by the portion 59 of the cam 57, its movement is transmitted to the ball 77, thereby permitting flow of the contents of the respective cup 67 to the properly positioned can C.

It should here be noted that the described slope of the machine causes a relative liquid level Y—Y to be maintained in the container 13 and that this liquid level is such that during the periods that the valves 69 are opened, that the open upper mouths 115 of the measuring cups 67 are above said liquid level. The valves 69 open and close during the emerged period, that is, preferably at the beginning and end thereof, respectively. During most of the period that the valves 69 are closed, the mouths 115 of the cups 67 are moving beneath said liquid Y—Y thereby effecting filling of said cups 67 by gravity.

The liquid level Y—Y is maintained substantially constant by means of an inlet line 117 leading to a header 119 for supplying ether to a plurality of supply pipes 121, the latter leading into the container 13 by way of a relatively rotatable seal 123 in the cover 125. This ether line 117 is provided with an air-operable diaphragm valve 126. Air, under a suitable pressure is led from a source 127, through a separator 129 and strainer 131 to said diaphragm valve 126. A control valve 133 is interposed in the line leading from the source 127 to the diaphragm valve 126. This valve 133 is controlled in its operation from a stem 135 leading to a float 137 within the container 13. The stem 135 also leads through said seal 123.

As the float 137 descends below a predetermined level the valve 133 is opened to admit air to and open the diaphragm valve 126. The result is that ether flows from the line 117 into the container 13, thereby increasing the elevation of the level Y—Y until the float 137 again rises slightly and recloses the valve 133, thereby shutting off the ether supply. By this means the level Y—Y can be kept within close limits.

The details of valves 133 and 126 are not here shown, because said valves are not new per se but are well known.

It will be seen from the above that the volume of liquid delivered to each can C is always the same, because the volume of liquid dipped up by each cup 67 is the same. All of the cups 67 are preferably of the same capacity. However, a desirable feature is to deliver substantially equal weights of liquid at all times, and this is not possible unless compensation is made for the effect of variable temperatures on the liquid volume.

Compensation for temperature change is accomplished in this machine by making the spindle 9 hollow and placing therein a slidable control rod 139 which engages a cross bolt 141 held in the hub of a four armed spider 143. The bolt 141 fits loosely through a slot 145 in the spindle 9 and the hub of the spider fits the surface of the spindle 9 loosely. The spider and its appurtenances virtually rest on the control pin 139 and their elevations are governed by the elevations of said pin.

Each of four arms 147 of the spider 143 reaches out to and supports a vertical rod 149 which loosely passes through an open tube 151 held in a liquid-tight manner to the bottom of the container 13, the upper mouth of which is at all times above said liquid level Y—Y.

The four vertical rods 149 support a ring 153 within the container 13. The ring 153 in turn supports a plurality of depending compensators 155, one for each cup 67. The respective compensators are preferably each a mass of lead or other suitable metal, which functions by displacement to change the weight of liquid which it is possible for a

cup 67 to receive. The amount of displacement depends upon the elevation of the respective compensator 55.

Control of the elevation of the compensators is improvedly accomplished in this machine from below, whereby interference and complication in the described ether supply mechanism is avoided. This is done by providing a box 157 on the lower end of the spindle 9, through which the lower end of the control rod 139 passes. The box 157 is split sidewardly at 159 to slidably receive a cross head 161 pinned to the rod 139. By this means the rod 139, although vertically movable, is not permitted to rotate.

The lower end of the rod 139 is threaded into the hub of a hand wheel 163. The hub of said wheel 163 is recessed at 165 to be engaged by a flange 167 of the box 157, whereby rotation of the wheel 163 is permitted without longitudinal movement.

A trapped spring-pressed ball detent 169, engaging one of six recesses 171 in the bottom of a box 157, resiliently holds the wheel 163 in any of a plurality of positions with respect to said box. However, the wheel 163 may be manually turned when desired, thereby adjusting the elevation of the rod 139 and hence the elevation of the spider 147, including its appurtenances within the container 13, such as the compensators 155 which control the volume of liquid which the cups 167 are adapted to receive during their descent entirely below the level Y—Y.

In Fig. 3 is shown a portion of a lower support 173 and a bearing 175 for guiding the lower end of the spindle 9. The support 173 is fastened to the framework including the table 1 and legs 3. It is to be understood that the box 157 with the wheel 163 rotates with said spindle 9. Adjustments at the wheel 163 may be made while the machine is in movement or while stationary.

The operation of the machine as a whole is as follows:

The pulley 23 is turned, thereby steadily moving the meshed wheels 5, 15 and associated spiders 11, 19 respectively. Inasmuch as the wheel 5 is fastened to the spindle 9, the container 13 rotates, as well as the spider 143, box 157 and rod 139.

The pipes 129 are stationary and the float 137 does not rotate. These parts pass through a leather gasket 177 which is loosely held within a flange 179, thereby permitting the container 13 to move independently.

The table 1, legs 3, support 173, compound cam 37, rail 33 and rail 49 are stationary.

The belts 27 and 51 respectively deliver cans to the machine and take them away at the proper rate.

A single can has the following action: It is delivered from the belt 27 to one of the recesses 25. The can actually rests on the wheel 5 and projects over its edge, this position being maintained by reason of the rail 33. The nozzle is then positioned directly below a filling tube 63. It will be noted that the positioning of the can below a fill tube 63 is not interfered with by any safety mechanisms, such as is ordinarily the case. The can does not move its pin 99 as the can is delivered to the machine.

The valve 69 is at this time closed and the respective cup 67 has filled or is being filled with ether because it is below the level Y—Y. The tappet 107 is in lowered position.

Steady movement of the can brings it to the region K, where it is caused to rise, because the projecting portion thereof engages the elevator 45. This action results in the nozzle 61 of the can moving up to engage the lower end of the fill tube 63, while the body of the can pushes up the feeler pin 99. The raised pin 99 puts the bell crank 97 in position to make the tappet 107 operative to raise the push rod 87, that is, when the time for the operation of the tappet arrives. As the can rises into position for filling, it is preferable that the respective measuring cup 67 have its mouth substantially emerged from the ether.

After the mouth of the cup 67 has completely emerged from the ether, the roller of the tappet 107 rides up on the raised portion 59 of the cam 57, thereby pressing the tappet against the now properly positioned leg 96 of the bell crank 97. Thus the push rod 87 is lifted and the ball 77 raised from its seat against the reaction of the spring 88. Ether immediately drains from the cup 67 to the can C as the can is pushed over the mask 39 by the spider 11.

By the time that the ether has all flowed from the cup 67 to the can C, the roller 109 rides down from the elevation 59 of cam 57, thereby closing the valve 69. Next, the can reaches the end of the mask 39 and rides down the incline 47 to be re-positioned on the wheel 5. The feeler pin 99 again descends, thereby re-positioning the bell crank 97 for its action in respect to the next cycle of operation. At this stage the cup 67 passes below the liquid level Y—Y to become refilled.

The can C passes on to the tangent region between the spiders 11 and 19 and, by the guiding action of the rail 49 is carried around with the second wheel 15. The purpose of the second wheel is to provide means for positively moving the series of cans along a line where they may have manual operations performed thereon, such as applying and soldering caps or the like.

The guiding action of the finger 53 forces the cans to the belt 51, whence they are carried away for storage or other purposes.

It is evident that if no can is delivered to a particular recess 25, that the respective feeler pin 99 is not raised and that therefore

there is no connection between the respective tappet and the respective push rod 87. Hence, the valve 69 in question does not open and the charge of ether is merely held in the cup 67 without spilling. This charge commingles with the original supply when the cup next passes beneath the level Y—Y.

Whenever the temperature rises or falls it is only necessary to turn the hand wheel 163 a suitable amount, as determined by calibrations, in order to maintain a substantially constant weight of ether delivery.

The liquid level Y—Y is maintained as above described.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a filler including compensating means, the combination of a substantially upright rotatable spindle, a container at the upper end of said spindle, liquid measuring and delivery cups within said container, a spider located externally of the container, movable compensators within said cups adapted to be moved by said spider and adjustable means located on and within said spindle for moving said spider.

2. In a filler including compensating means, the combination of a substantially upright rotatable spindle, a container at the upper end of said spindle, adapted to contain liquid to a level therein, liquid measuring and delivery cups within said container, a spider located externally and below the container, movable compensators within said cups adapted to be moved by said spider adjustable means movable on and within said spindle for moving said spider, means for controlling said adjustable means from the lower end of said spindle and tubular portions through the bottom of said container connecting said spider and said adjusters at least where said mechanism passes through the liquid.

3. In a filler including compensating means, the combination of a rotatable spindle, a container at one end of said spindle adapted to contain liquid to a level therein, liquid measuring and delivery means within the container, movable compensators for said last-named means, external adjusting means located below the container for moving said compensators, tubes formed through the bottom of said container and extending above said liquid, and linkages for operatively connecting said external adjusting means with the compensators, portions of said linkages passing through said tubes.

4. In a filler including compensating means, the combination of a rotatable spindle, a container at one end of said spindle adapted to contain liquid to a predetermined level therein, liquid measuring and delivery means within the container, movable compensators for said last-named means, external adjusting means located below the container for moving said compensators, tubes formed through the bottom of said container and extending above said liquid, a linkage, portions of said linkage connecting said external adjusting means with the compensators, said connecting portions passing through said tubes and means located within and adjustable from below said spindle for controlling said external adjusting means.

5. In a filler including compensating means, the combination of a rotatable spindle, a container at one end of said spindle adapted to contain liquid to a predetermined level therein, liquid measuring and delivery means within the container, movable compensators for said last-named means, external adjusting means located below the container for moving said compensators, tubes formed through the bottom of said container and extending above said liquid, a linkage, portions of said linkage connecting said external adjusting means with the compensators, said connecting portions passing through said tubes and means located above the container for maintaining said level of liquid.

6. In a safety control for fillers the combination of a fill tube, valved means controlling the flow of liquid from said tube, means for moving containers up to and away from said fill tube, said last-named means carrying a tappet, a cam for controlling the action of said tappet, a push rod operable to cause opening and closing of said valved means, interposing means comprising a bell crank attached to the push rod for normally not to transmit movement from the tappet to said rod, and a feeler associated with said fill tube adapted to be engaged and moved by the containers as they move up whereby said interposing means is positioned so as to transmit movement from said tappet to said rod.

7. In a safety control for fillers the combination of a fill tube leading from a liquid supply, valved means controlling the flow of liquid from said tube, means for moving containers up to and away from said fill tube, said last-named means carrying a tappet, a cam for controlling the action of said tappet, a push rod operable to cause opening and closing of said valved means, a tube surrounding said rod at least where the rod passes through the liquid supply, a bell crank attached to the push rod, means associated with said tube for preventing rotation of the rod and bell crank, said bell crank adapted

normally not to transmit movement from the tappet to said rod, and a feeler associated with said fill tube adapted to be engaged and moved by the containers as they move up whereby said interposing bell crank is positioned so as to transmit movement from said tappet to said rod.

8. In a filler, means for moving containers in a predetermined path, filling tubes above said containers and movable therewith in said path, means for vertically moving the containers to approach the tubes for filling, valved means for controlling the flow of liquid from the tubes, actuating means for said valve controlling means including followers movable with the containers, a cam for operating said followers, links for transmitting motion from the followers to the valve operating means when in a predetermined position and means for placing the links in said predetermined positions comprising feeler pieces which are adapted to be operated by vertical movement of the containers but not horizontal movement thereof, whereby the containers may be readily fed horizontally into the machine.

9. In a filler, means for moving containers in a predetermined path, filling tubes above said containers and movable therewith in said path, means for vertically moving the containers to approach the tubes for filling, valved means for controlling the flow of liquid from the tubes, actuating means for said valve controlling means including followers movable with the containers, a cam for operating said followers, links for transmitting motion from the followers to the valve operating means when in a predetermined position and means for placing the links in said predetermined positions comprising feeler pieces which are adapted to be operated by vertical movement of the containers but not horizontal movement thereof, whereby the containers may be readily fed horizontally into the machine, a spider for positioning the containers during movement and driving said followers and a belt for feeding containers against the spider frictionally driving upon the bottoms of the containers.

10. A safety filler comprising a can elevating and follower elevating means, a filler tube for the can, said can being laterally movable into position beneath the filler tube when not elevated and being then subject to no interference in lateral movement, valved means for controlling flow through the tube including a linkage extending to the follower, a member in said linkage adapted in one position to be acted upon by the follower so as to effect opening of the valve and in another position not to be so acted upon, and a feeler piece adapted to be engaged by upward movement of the can to place said member in said valve opening position, said feeler piece being operable only upon upward movement of the can and not upon lateral movement thereon.

11. A safety filler comprising a can elevating and follower elevating means, a filler tube for the can, said can being laterally movable in position beneath the filler tube, valved means for controlling flow through the tube into the can including a linkage extending to the follower, a member in said linkage adapted in one position to be acted upon by the follower so as to effect opening of the valve and in another position not to be so acted upon, and a feeler piece adapted to be engaged only by upward movement of the can to place said member in said valve opening position.

12. In a filler including compensating means, the combination of a rotatable spindle, a container at one end of said spindle, liquid measuring and delivery cups within the container, a spider located externally of the container, and movable compensators within said cups adapted to be moved by said spider, and adjustable means located on and within said spindle for moving said spider.

In testimony whereof, I have signed my name to this specification this 31st day of December, 1927.

EDWARD MALLINCKRODT, JR.