June 29, 1926. 1,590,278

A. F. L. BELL

CAN FILLING MACHINE

Filed Nov. 25, 1924 4 Sheets-Sheet 1

Fig. 1.

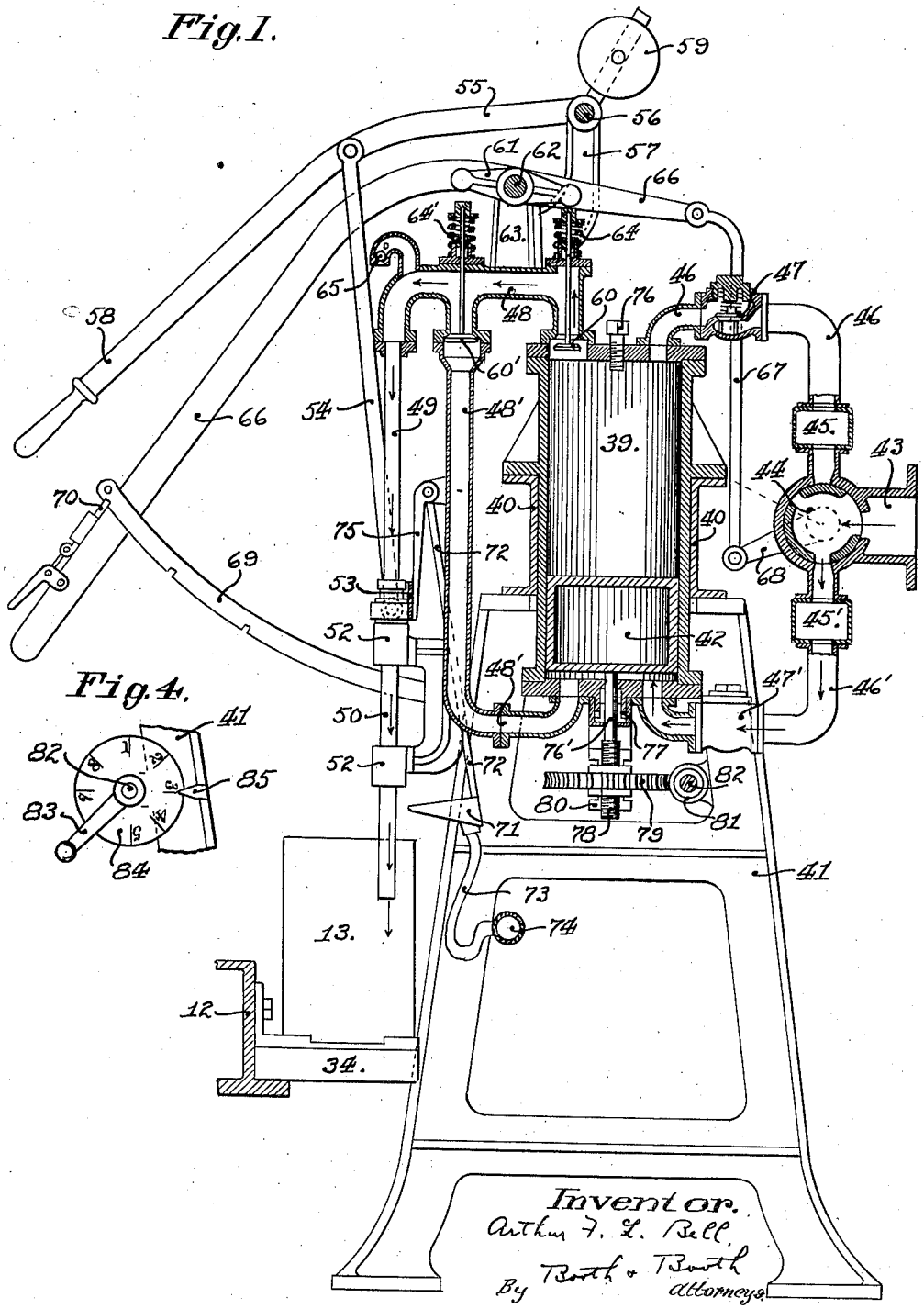


Fig. 4.

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Fig. 2.

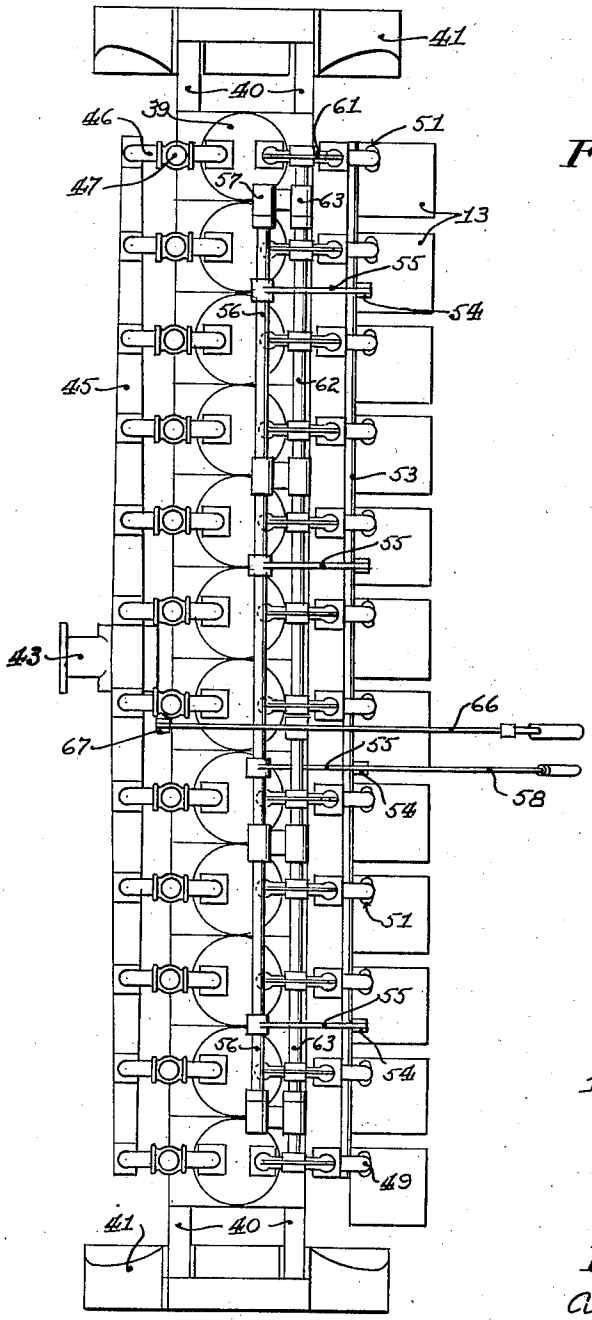
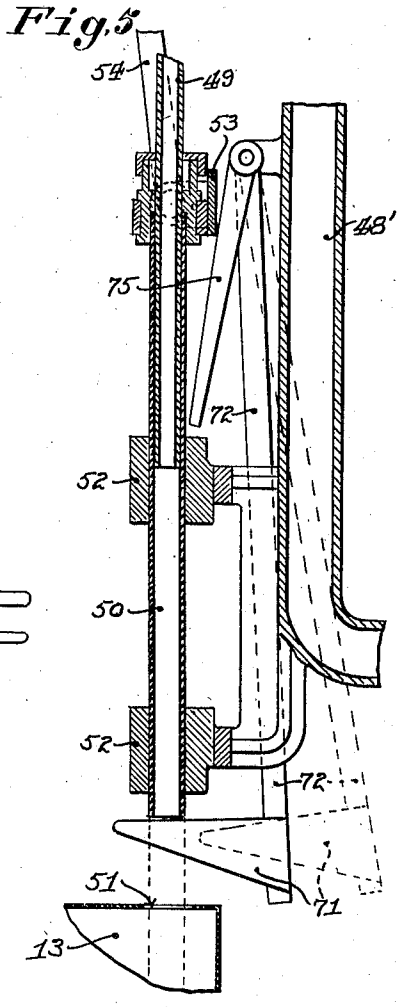


Fig. 3



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CAN FILLING MACHINE

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Fig. 3.

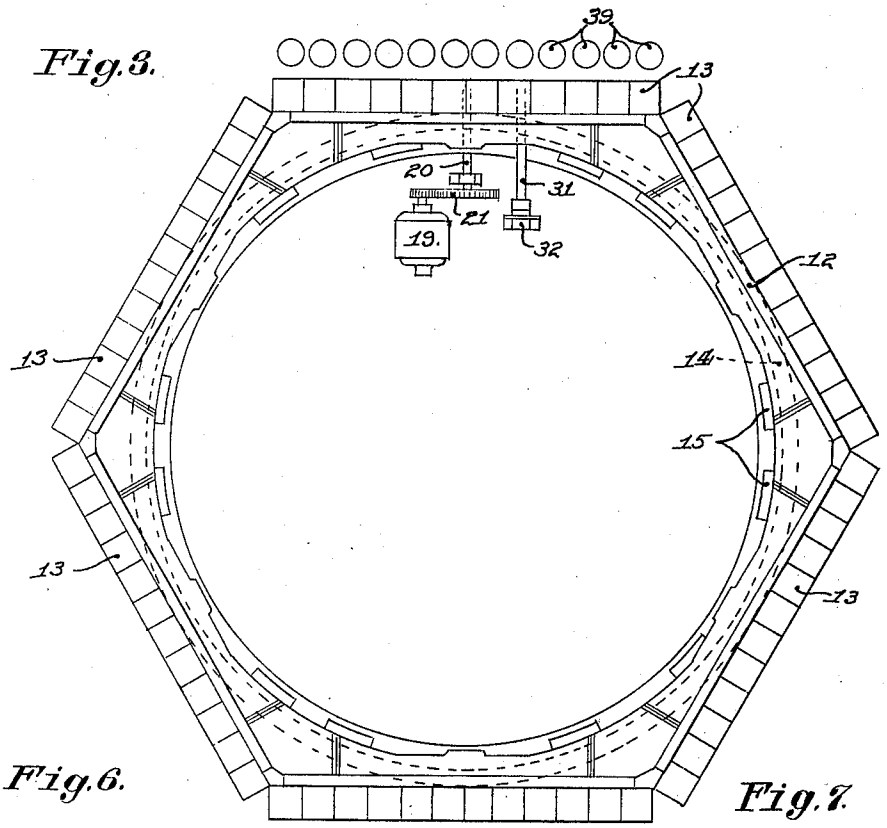
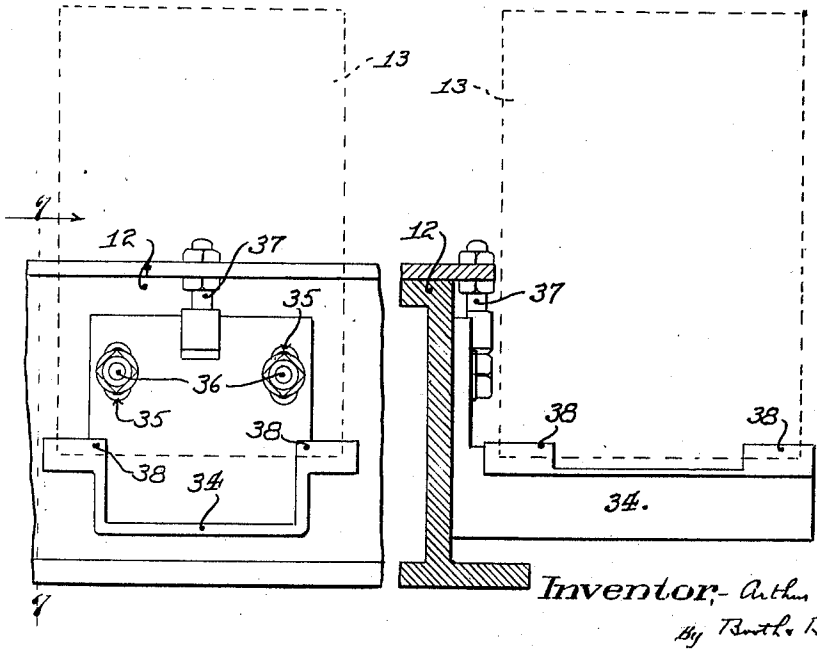


Fig. 6.

Fig. 7.



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CAN FILLING MACHINE

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Fig. 8.

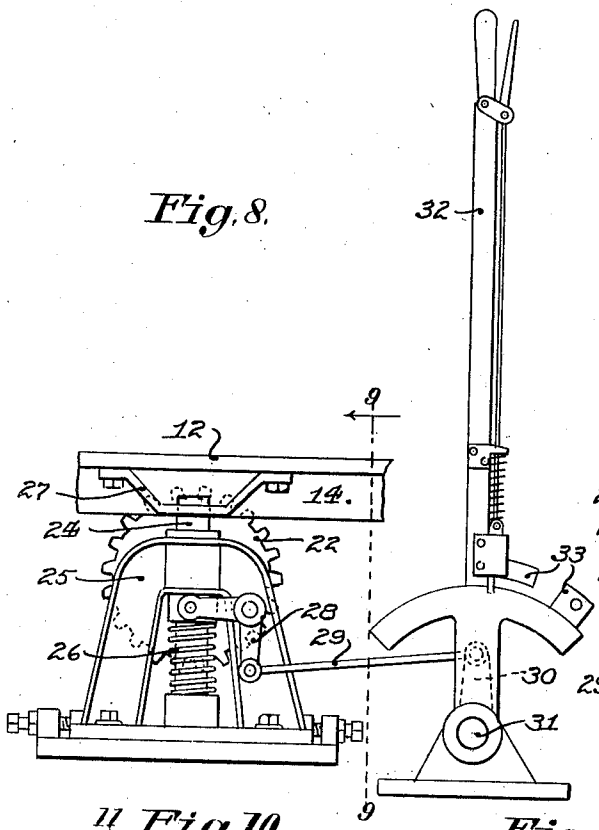
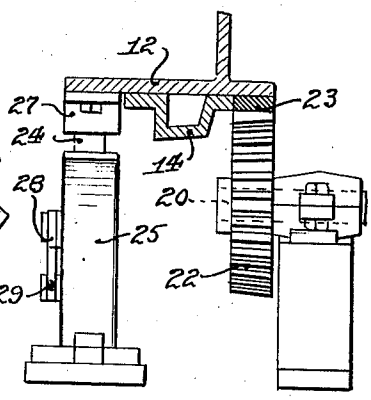


Fig. 9.



11 Fig. 10

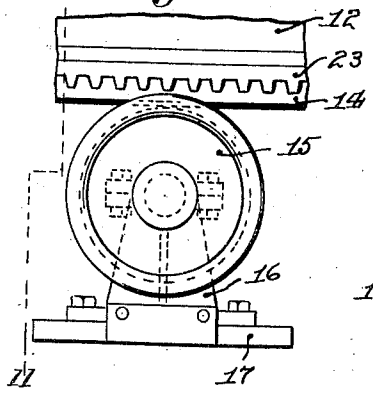
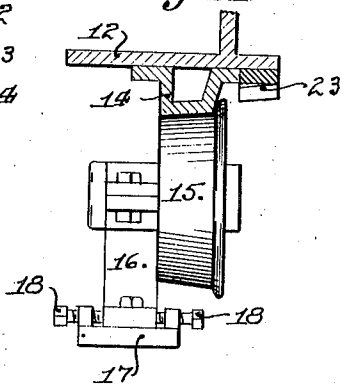


Fig. 11.



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Patented June 29, 1926. 1,590,278

UNITED STATES PATENT OFFICE.

ARTHUR F. L. BELL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO ASSOCIATED OIL COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

CAN-FILLING MACHINE.

Application filed November 25, 1924. Serial No. 752,090.

My invention relates to can filling machines and is particularly adapted for filling cans with liquids.

The principal objects of my invention are to provide means for preventing waste, either by spilling or evaporation, of the material being filled; to provide means for accurately and positively measuring the quantity of material filled into each can; and to provide means for quickly varying or adjusting such quantity of material, either for compensating for the volumetric effect of temperature changes or for any other purposes. These and other objects and advantages of my invention will become apparent from the following description of a machine embodying the principles thereof.

The machine herein described and illustrated is particularly adapted for filling five-gallon cans with gasoline or kerosene, and belongs to a well-known type in which a plurality of cans are simultaneously filled from a battery of measuring and filling devices. The cans are positioned in rows upon a polygonal table, which is revolved to carry the rows of cans successively to and from the sphere of operation of the battery of filling devices. It will be obvious, however, that my invention may be embodied in machines adapted for filling other types of cans with other fluid substances, and that the form and construction herein shown may be varied, within the limits of the claims hereto appended, without departing from the essential principles of the said invention.

With this in view a preferred embodiment of my invention will now be fully described with reference to the accompanying drawings, wherein—

Fig. 1 is a vertical transverse view, partly in section, of the measuring and filling battery.

Fig. 2 is a plan view of the measuring and filling battery, showing a row of cans positioned in filling relation thereto.

Fig. 3 is a diagrammatic plan of the entire machine.

Fig. 4 is a detailed end elevation of the volume adjusting means.

Fig. 5 is a vertical section, enlarged, of one of the filling nozzles and the drip cup therefor, the latter being shown in elevation.

Fig. 6 is a detailed front elevation, enlarged, of one of the can supporting brackets.

Fig. 7 is a side view of the same, taken on the line 7—7 of Fig. 6.

Fig. 8 is a front elevation, enlarged, of the can table drive and lock mechanisms.

Fig. 9 is a transverse section of the same, taken on the line 9—9 of Fig. 8.

Fig. 10 is a front elevation, enlarged, of one of the table supporting rollers.

Fig. 11 is a side view of the same, taken on the line 11—11 of Fig. 10.

In the drawings, the reference numeral 12 designates a table of polygonal form, which may have any desired number of sides, six such sides being shown in Fig. 3. Each side is adapted to support a row of any desired number of cans 13, there being twelve cans in each row in the machine illustrated. The table 12 is revolubly mounted in any suitable manner, as for example, by being provided with a circular track 14, Figs. 3, 10 and 11, upon its under side, which rests upon flanged rollers 15. Said rollers are mounted upon brackets 16, Figs. 10 and 11, which are preferably adjustable, radially of the table, in fixed supports 17, as indicated by the adjusting screws shown at 18 in Fig. 11.

The table 12 may be revolved by any suitable means to carry the rows of cans 13 successively to and from the sphere of operation of the filling devices. For example, I have shown an electric motor 19, Fig. 3, driving a shaft 20 through suitable gearing indicated at 21, and said shaft is provided with a pinion 22, Figs. 8 and 9, adapted to engage a circular rack 23, Figs. 9 and 10, upon the under side of said table. To insure the correct positioning of the table at each of its periods of rest, I provide a suitable latch or locking device, which preferably comprises a vertically slidable bolt 24, Figs. 8 and 9, mounted in a fixed guide 25, and pressed upwardly by a spring 26 into engagement with a suitably formed socket member 27 secured to the under side of the table, there being one such socket member for each can supporting side of said table. The bolt 24 is withdrawn, to permit movement of the table, by a bell-crank 28, Fig. 8, connected by a link 29 and an arm 30 with the shaft 31 of a conveniently located hand lever 32, Figs. 3 and 8. Said hand lever may also control the motor 19 in any suitable

manner, as for example, by means of switch contacts indicated at 33, Fig. 8, so that, when the bolt 24 is withdrawn from its socket member 27, the motor is started, and vice versa, but as such construction is obvious to those skilled in the art, its details have been omitted from the drawings for the sake of clearness.

The cans 13 are supported preferably by means of removable brackets 34, Figs. 6 and 7, secured to the straight sides of the table 12 and provided with means for limited vertical adjustment. For this purpose each bracket 34 is provided with slots 35, Fig. 6, through which pass its fastening bolts or studs 36, and with an adjusting screw 37 for moving it vertically with respect to the table. Flanges 38 may be provided upon each bracket 34 to suitably locate the can 13 thereupon. By this construction, the machine may be adapted for receiving cans of other sizes and shapes than those shown, the brackets 34 being easily removed and replaced by others of suitable form to support the desired cans.

Each row of cans 13 upon the table 12 is treated as a unit, all the cans in one such row being filled simultaneously by a battery of measuring and filling devices. The essential feature of this battery of measuring and filling devices comprises a row of cylinders 39, preferably, although not necessarily, vertically disposed, there being one such cylinder for each can 13 in the row, or twelve in all in the machine illustrated. The position of said row or battery of cylinders 39 with respect to the cans to be filled is indicated in Figs. 1, 2 and 3, and one of said cylinders, all of which are identical, is shown in section in Fig. 1.

The battery of cylinders 39 is suitably supported, as for example, by means of longitudinal bars 40 resting upon end standards 41, Figs. 1 and 2. Each cylinder has closed ends, as shown in Fig. 1, and is provided with a freely movable piston 42. The fluid is supplied to the entire battery of cylinders through a common connection 43 from any desired source not shown, and is controlled by a three-way valve 44, which may shut off said fluid entirely, or may admit it to either of two horizontal manifolds 45 and 45′ respectively, extending the entire length of the battery. From said upper and lower manifolds 45 and 45′ respective inlet pipes 46 and 46′ lead to the upper and lower ends of each cylinder, said pipes being provided with check valves 47 and 47′, respectively, to prevent back flow of the fluid from the cylinders into the manifolds.

Outlet pipes 48 and 48′ lead respectively from the upper and lower ends of each cylinder, and unite in a downwardly directed discharge pipe 49, upon which is slidably mounted a telescoping extension 50 forming a filling nozzle adapted to enter the can 13, through its filling aperture 51, Fig. 2, to prevent spilling, and to be withdrawn out of said can to permit the latter to be moved into and out of filling position. Said filling nozzles 50 are slidably mounted in guides 52, Figs. 1 and 5, and are all connected together, to operate in unison, by a horizontal bar 53, Figs. 1, 2 and 5, which is connected by links 54 and levers 55, Figs. 1 and 2, with a shaft 56 mounted for oscillation in fixed brackets 57 above the cylinders 39. One of the levers 55 is extended to form an operating handle 58, by which the entire series of filling nozzles 50 may be raised and lowered. Counter weights, one of which is shown at 59 in Fig. 1, are preferably provided upon the shaft 56 to balance the weight of the filling nozzles 50 and their connecting bar 53.

The outlet pipes 48 and 48′ of each cylinder are provided with valves 60 and 60′ respectively, Fig. 1, which are alternately opened by a rocking lever 61 secured upon a horizontal shaft 62, said shaft being common to all cylinders and being mounted for oscillation in fixed brackets 63. Springs 64 and 64′ normally hold the valves 60 and 60′ closed. An air check valve 65 is provided at the upper end of each discharge pipe 49 to permit the fluid to drain therefrom when the valves 60 and 60′ are both closed. The shaft 62 is provided with a hand lever 66, by which it may be oscillated, and said lever is extended rearwardly and connected by a link 67 with the arm 68 of the three-way inlet valve 44. A suitable quadrant 69 and a latch 70 may be provided to retain said lever 66 in any one of three positions.

Each filling nozzle 50 is provided with a swinging drip cup 71, Fig. 1, penduously suspended by a hanger 72, and connected by a flexible tube 73 with a common horizontal pipe 74; by which the recovered fluid may be led to any desired place of deposit not shown. The weight of the drip cup 71 normally retains it beneath the end of the filling nozzle 50 when the latter is elevated, as shown in full lines in Fig. 5, and in order to move said cup out of the way, to permit said nozzle to descend into the can 13, a finger 75 is connected with the hanger 72 and extends into the path of the nozzle connecting bar 53, so that when the latter moves downwardly, the fingers 75 and the drip cups 71 are moved rearwardly to the position shown in Fig. 1 and in dotted lines in Fig. 5, and when said bar moves upwardly, said cups return to their normal positions to catch the drip from the nozzles 50.

The operation of the machine is as fol-

lows. It may be assumed that a row of empty cans have been placed upon one side of the table 12. Said table is then revolved, by means of its motor 19 and is controlled by the hand lever 32, to bring the row of empty cans in front of the battery of filling and measuring devices, in which position the table is brought to rest. The filling nozzles 50 are then moved downwardly into the cans 13 by means of the hand lever 58. Assuming the cylinders 39 to be empty, the valve lever 66 is moved to the position shown in Fig. 1, thereby connecting the lower manifold 45′ with the fluid inlet 43, and also opening the discharge valves 60, the discharge valves 60′ being closed as shown. Fluid then passes into the lower ends of the cylinders 39 through the manifold 45′ and the pipes 46′, raising the pistons 42 to the upper limits of their travel. The flow then stops, there being no outlet open for the fluid from the lower end of the cylinders. The valve lever 66 is then shifted to the opposite limit of its movement, thereby admitting fluid from the supply connection 43 to the upper manifold 45, closing the discharge valves 60, and opening the discharge valves 60′. Fluid thereupon flows into the upper ends of the cylinders through the manifold 45 and the pipes 46, forcing the pistons 42 downwardly, and expelling the fluid from below said pistons through the pipes 48′, the open valves 60′, the discharge pipes 49, and the filling nozzles 50 into the cans 13. When the pistons 42 reach the lower limits of their travel, the inflow to the upper end of the cylinders ceases, and the air vents 65 permit the fluid within the vertical pipes 49 and filling nozzles 50 to drain out into the cans. The valve lever 66 is then moved to its midway position, in which all valves are closed, the filling nozzles 50 are raised out of the cans by means of the hand lever 58, and the table 12 is revolved to carry the line of filled cans away from the filling battery and to bring a fresh line of empty cans thereto.

The cylinders 39 now being filled (above the pistons 42) with fluid, all that need be done is to lower the filling nozzles 50 into the empty cans, and move the valve lever 66 from its midway position to the position shown in Fig. 1, whereupon fluid again enters the lower ends of said cylinders, forcing the pistons 42 upwardly, and expelling the fluid from above said pistons through the discharge valves 60, the pipes 48 and 49 and the nozzles 50 into the cans. This flow, as before, ceases when the pistons 42 reach the upper limits of their travel.

The check valves 47 and 47′ in the inlet pipes 46 and 46′ leading from the manifolds 45 and 45′ to the respective upper and lower ends of the cylinders prevent back flow of the fluid from said cylinders. Such back flow, which might be caused by unequal friction of the pistons 42 or by accidental stoppage in one or more delivery pipes, would cause the fluid from the cylinder or cylinders so affected to be partially discharged through said manifolds and the other cylinders, thereby resulting in unequal filling of the cans.

Obviously, the quantity of fluid supplied to each can is equal to the effective capacity of each cylinder 39, and this in turn is determined by the displacement of the piston 42. The cylinders are of such a size that one charge from each will fill the largest can for which the machine is designed, and in order to reduce or regulate this charge accurately, I provide adjustable stops for limiting the piston travel within each cylinder. Said stops comprise threaded studs 76, Fig. 1, screwed through the upper ends of the cylinders, and vertically movable pins 76′ inserted through suitable packing glands 77 into the lower ends of said cylinders. The upper stops 76 can be independently adjusted, to equalize the effective capacity of all the cylinders, but the lower stops 76′ are preferably connected together by some suitable means for simultaneous adjustment, so that the effective capacity of all the cylinders may be changed together.

To accomplish this latter purpose I prefer to provide each lower stop 76′ with a threaded portion 78, upon which is screwed a worm wheel 79, said worm wheel being suitably mounted in a bracket 80 to prevent vertical movement, while any well known means, not shown, may be employed to prevent the rotation of the pin 76′. The several worm wheels 79 are engaged by worms 81 fixed upon a common horizontal shaft 82, and said shaft is provided with a crank handle 83, Fig. 4, by means of which it may be rotated, and with some suitable indicating device, which, for the sake of simplicity, I have shown as comprising a disk 84, suitably marked or inscribed, and a cooperating fixed pointer 85. Thus by rotating the shaft 82, the lower stops 76′ are all raised or lowered an equal distance, thereby simultaneously changing the effective capacity, and hence the amount of delivered charge, of all the cylinders.

In filling the standard gasoline or kerosene cans, for which purpose the machine illustrated is particularly designed, it is frequently necessary to change the amount of each charge from five United States gallons to four British imperial gallons, as when filling cans for export, and this change can be quickly made by the proper operation of the crank 83. In like manner the effective

capacity of the cylinders may be changed to compensate for the volumetric effects of temperature changes upon the fluid.

It is to be noted that the entire measuring and delivery system is fully inclosed from the intake 43 to the filling nozzles 50, so that there can be no loss by evaporation in the case of volatile liquids such as gasoline, and that there is no necessity for overflow or return of any considerable quantities of the fluid, which may cause waste through spilling and evaporation, as in the usual forms of can filling machines. Even the small amount of drip from the nozzles 50 is effectively caught by the swinging cups 71, thereby preventing waste from this source.

The function of the revolving table 12 is to successively present rows of empty cans to the filling battery, and to successively remove the rows of filled cans therefrom, with the least possible loss of time. The operation of the machine is therefore very nearly continuous, a fresh row of empty cans being placed upon the table while a preceding row is being filled. The previously filled cans may also be acted upon, during this interval of time, in any desired manner not indicated in the drawings, as for example, by being sealed, and the row of sealed cans may be removed from said table during a succeeding period of rest thereof.

I claim:

1. A can filling machine comprising means for receiving and holding a plurality of cans to be filled; a plurality of closed cylinders, each having an inlet and an outlet at each end; a plurality of filling nozzles, each communicating with the two outlets of a respective cylinder; a piston freely movable in each cylinder; a plurality of outlet valves for controlling the discharge of fluid from said cylinders to their corresponding nozzles; a pair of fluid supply manifolds connected respectively with the opposite end inlets of all said cylinders; a single inlet valve for admitting fluid selectively to said manifolds; and means for operating said outlet valves and said inlet valve in timed relation to admit fluid to one end of all said cylinders and to discharge fluid simultaneously from the other end.

2. A can filling machine comprising means for receiving and holding a plurality of cans to be filled; a plurality of closed cylinders, each having an inlet and an outlet at each end; means for conducting fluid from the outlets of each cylinder to a respective can; a piston freely movable within each cylinder; an adjustable stop extending through one end of each cylinder for limiting the travel of its piston; connecting means for adjusting all said stops simultaneously; and means for controlling the admission and discharge of fluid to and from said cylinders.

3. A can filling machine comprising means for receiving and holding a plurality of cans to be filled; a plurality of closed cylinders, each having an inlet and an outlet at each end; means for conducting fluid from the outlets of each cylinder to a respective can; a piston freely movable within each cylinder; an adjustable threaded stop extending through one end of each cylinder for limiting the travel of its piston; a rotatable shaft common and exterior to all said cylinders; connecting means between each stop and said shaft whereby all said stops are adjusted simultaneonusly by the rotation of said shaft; and means for controlling the admission and discharge of fluid to and from said cylinders.

4. A can filling machine comprising means for receiving and holding a plurality of cans; a plurality of closed cylinders, each having an inlet and outlet at each end; means for conducting fluid from the outlets of each cylinder to a respective can; a piston movable within each cylinder; means for adjustably limiting the travel of all said pistons simultaneously; and means for controlling the admission and discharge of fluid to and from said cylinders.

5. A can filling machine comprising means for receiving and holding a plurality of cans; a plurality of closed cylinders, each having an inlet and outlet at each end; means for conducting fluid from the outlets of each cylinder to a respective can; a piston movable within each cylinder; means for adjustably limiting the travel of each piston independently; means for adjustably limting the travel of all said pistons simultaneously; and means for controlling the admission and discharge of fluid to and from said cylinders.

6. A can filling machine comprising means for receiving and holding a plurality of cans; a plurality of closed cylinders; each having an inlet and outlet at each end; a piston movable within each cylinder; means for conducting fluid from the outlets of each cylinder to a respective can; a pair of fluid supply manifolds connected respectively with the opposite end inlets of all said cylinders; means for admitting fluid to either of said manifolds; means for simultaneously discharging fluid from the ends of said cylinders opposite to the inflow; and means for preventing back flow of fluid from said cylinders into said manifolds.

In testimony whereof I have signed my name to this specification.

ARTHUR F. L. BELL.