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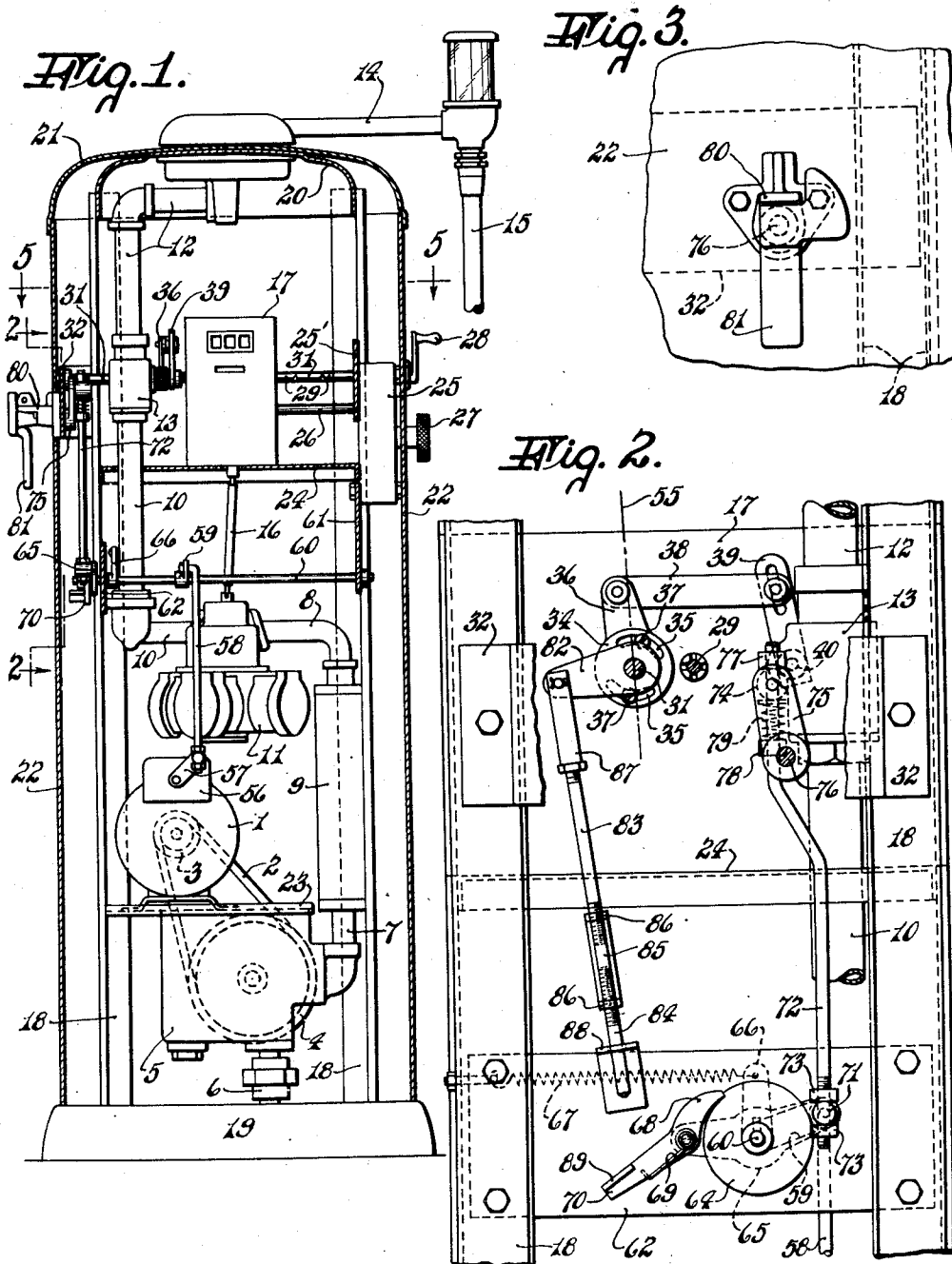
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2,583,483

PUMP CONTROL MECHANISM FOR LIQUID DISPENSING
APPARATUS OF THE PREDETERMINER TYPE

Filed June 3, 1950

2 SHEETS—SHEET 1



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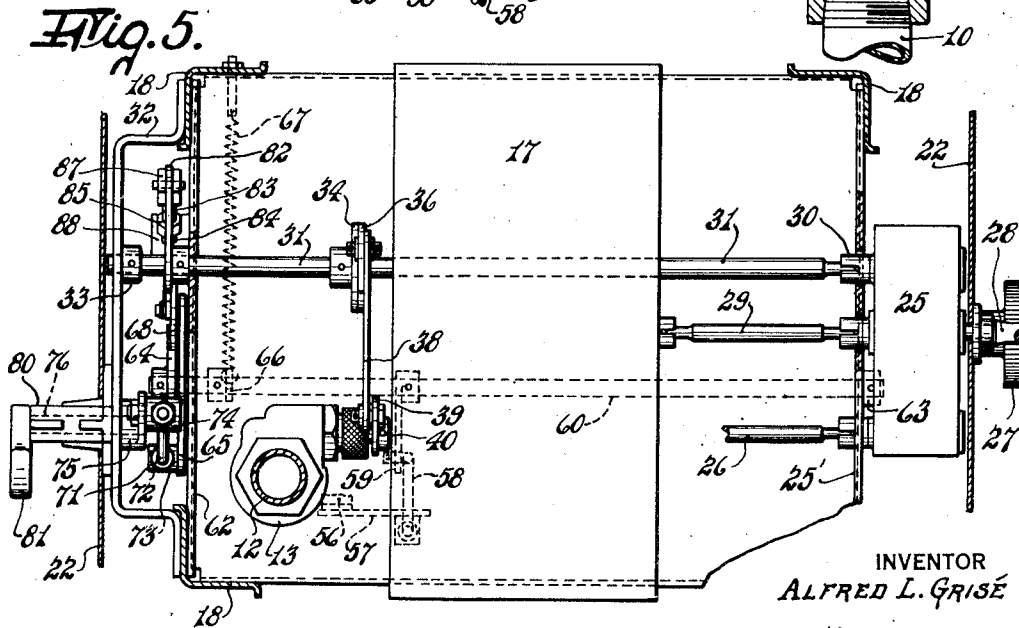
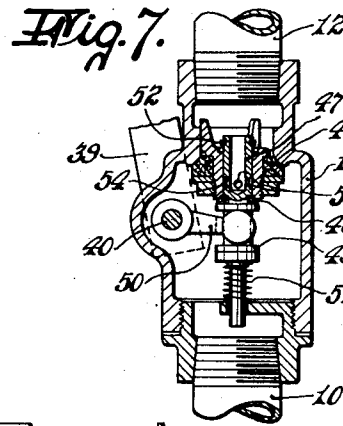
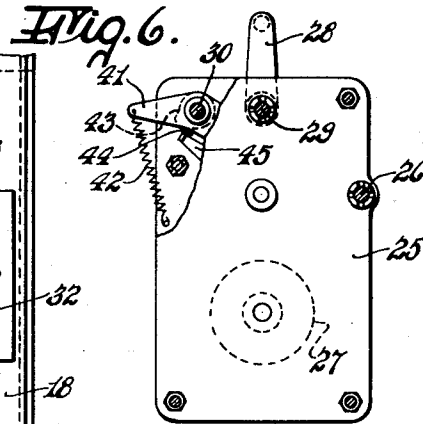
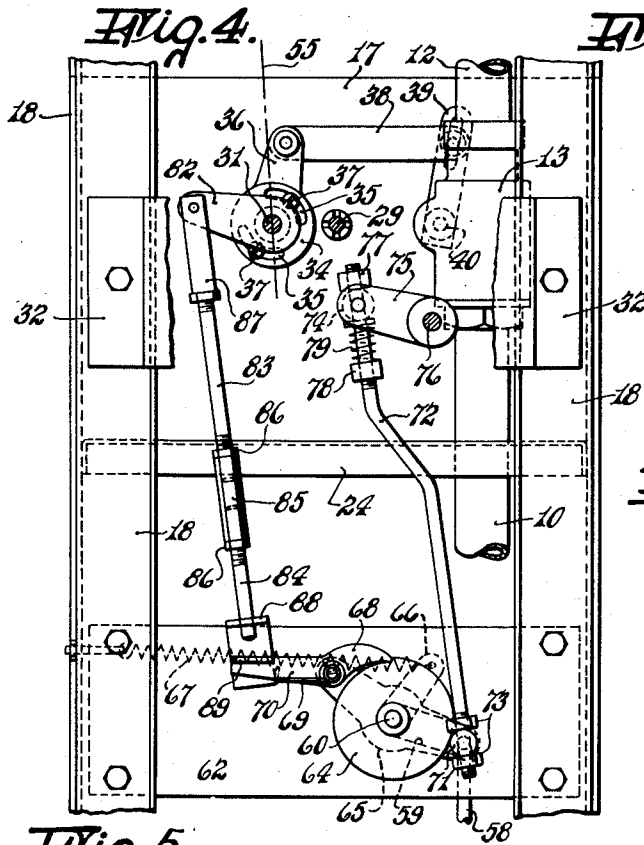
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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PUMP CONTROL MECHANISM FOR LIQUID
DISPENSING APPARATUS OF THE PREDE-
TERMINER TYPE

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4 Claims. (Cl. 222—20)

1

This invention relates to improvements in liquid dispensing apparatus of the predeterminer type.

The invention, while capable of general application, finds one advantageous use in the dispensing of gasoline at service stations.

In apparatus of this type, the liquid to be dispensed is forced through a conduit by an electric-motor driven pump and there is interposed in this conduit a meter and a valve. This valve is biased to closed position but can be opened manually and held open against its bias by a latch. This latch is releasable by means actuated by the meter, after a selected predetermined amount of liquid has been delivered. The meter-actuated latch-releasing means can be set to close the valve after any desired amount of liquid within a certain range, has been delivered. It is also usual to provide for the closing of the valve in two stages. For example, when all but one-quarter of a gallon of the selected quantity has been delivered, the first stage of closing of the valve may be effected and the rate of flow of liquid reduced to about one-tenth of normal. The second stage of closing is effected exactly at the end of the delivery of the selected quantity.

This invention has for an object the provision of an improved mechanism for actuating the switch of the pump motor, in part automatically from the valve and in part manually. The mechanism enables the switch to be closed under manual control and automatically opened by the valve only during the final stage of its closing and it also enables manual domination of the automatic control, when it is necessary to open the switch and stop pumping before all of the selected quantity has been delivered in order to prevent overflowing of the tank being serviced.

The invention will be disclosed with reference to the accompanying drawings, in which:

Fig. 1 is a small-scale sectional elevational view of a gasoline measuring and dispensing pump embodying the invention;

Fig. 2 is a fragmentary cross sectional view, taken on the line 2—2 of Fig. 1 and drawn to a larger scale, showing the control for the switch of the pump motor in "off" position;

Fig. 3 is a fragmentary side elevational view taken from the left of Fig. 1 and showing the manual control handle for the switch of the pump motor;

Fig. 4 is a view similar to Fig. 2 but showing the parts in "on" position ready for dispensing;

Fig. 5 is a sectional plan view taken on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary cross sectional view showing the latching means of the predeterminer for holding the flow-control valve open; and

Fig. 7 is a sectional elevational view of the flow control valve.

2

Referring to these drawings, there is shown in Fig. 1 a well known form of gasoline measuring and dispensing pump in which the invention is embodied. An electric motor 1 drives by a belt 2 and pulleys 3 and 4 a pump 5, which draws up gasoline through a suction pipe 6 from an underground supply tank (not shown) and forces it through a delivery conduit. As shown, this conduit includes pipes 7 and 8, between which is interposed the usual air separator 9; a pipe 10 between which and pipe 8 a suitable displacement meter 11 is interposed; a pipe 12 between which and pipe 10 a valve 13 is interposed; an outer swinging pipe 14, and a flexible hose shown in part at 15 and terminating with the usual nozzle (not shown). The meter 11 drives by a shaft 16 a suitable register 17 for indicating the measured quantities of liquid dispensed.

The dispensing pump has a supporting frame comprising four angle iron columns 18 upstanding from a base 19 and connected together at their upper ends by a member 20 which also supports the cap 21 of the pump casing. This casing includes panels, such as 22, which enclose the space between the base and cap 21 in the usual way. The pump and motor are supported by a shelf 23 from the columns 18 and in turn support the separator 9 and meter 11 and the pipes connected thereto. A floor 24, secured to the columns 18, supports the register 17.

The dispensing apparatus is of the predeterminer type. It has a mechanism, designated generally by 25, which is driven by the meter (in this case through the register 17 by means of a shaft 26) and which can be set, as by a knob 27, to close valve 13, when a selected predetermined quantity has been delivered. The valve 13 is biased to closed position and is manually opened, in this case by turning the handle 28, which is used to reset the register 17 to zero in the usual way through a shaft 29 after a dispensing operation. This predeterminer is suitably fixed to a plate 25' which extends between and is secured at its ends to a pair of columns 18. The predeterminer has a shaft 30 (Fig. 6) for actuating the valve 13. Shaft 30 (Fig. 5) drives a shaft 31, which extends through and is suitably mounted in register 17 and extends beyond the latter, having its outer end supported in a plate 32. The latter extends between a pair of the columns 18 and is fixed at its ends thereto. A collar 33 on shaft 31 abuts the inner face of the plate 32 to hold the shaft against axial displacement. Shaft 31 has fixed thereto a disk 34 having two curved slots 35 therein. A lever 36, loose on shaft 31, is fixed to disk 34 by screws 37 extending through the slots 35, whereby the angular position of lever 36 on shaft 31 may be adjusted. Lever 36 is connected by a link 38 to a lever 39 fixed to the shaft 40

3

of valve 13. The connection of link 38 to lever 39 is preferably of the bolt and slot type for the purpose of adjustment. Referring now to Fig. 6, valve-actuating shaft 30 has fixed thereto an arm 41, which is connected by a spring 42 to the frame of the predeterminer 25 and which tends to swing shaft 30 counterclockwise and close valve 13. The shaft 30 also has fixed thereto a latch member 43 having a tooth 44 adapted to be engaged by a pawl 45. When the handle 23 is manually turned the shaft 30 is turned in a clockwise direction and shaft 31 is turned with it to open valve 13. The spring 42 will be stressed and member 43 will be turned until pawl 45 is able to engage the tooth 44, thereby latching the shafts 30 and 31 and valve 13 in open position. The operation of the meter, during delivery of gasoline, will drive register 17 in the usual way and the latter will drive shaft 26 and thus the predeterminer 25. The latter is arranged to release pawl 45 and allow spring 42 to turn shafts 30 and 31 and close valve 13. Predeterminers of the general type, above referred to, are old and well known in the art and detailed illustration and description of it is unnecessary to an understanding of the present invention, which is concerned with control of the pump motor by a particular form of mechanism, actuated automatically from the valve 13 and manually as will be later described. One illustrative example of a predeterminer of the kind described will be found in Granberg Patent No. 1,759,396, dated May 20, 1930, to which reference may be had for a complete disclosure of a structure operating in the manner set forth.

The valve 13 may be of any suitable type but preferably is arranged to close in two stages. For this purpose, the construction shown in Fig. 7 may be employed. A primary valve 46 has a central bore therethrough in which is slidable the hollow tubular stem 47 of a secondary valve 48. The latter is secured to a clutch collar 49, movable by a forked lever 50, fixed on the valve shaft 40. A spring 51 tends to press the secondary valve to its seat on the primary valve and the primary valve to its seat in casing 13. The hollow stem carries a ring 52 adapted to engage the upper face of valve 46 and move it downwardly when stem 47 is lowered sufficiently. This stem has holes 53 through its periphery connecting its interior to a circumferential groove 54 in the outer periphery of the stem. When shaft 40 is turned clockwise, the secondary valve 48 is lowered, which first causes the groove 54 to communicate with the space below valve 46 and then causes the lowering of the latter. When the shaft 40 is turned counterclockwise the valve 46 will first be closed. It will be held by liquid pressure against ring 52 and will move upwardly to closed position, while valve 48 remains open. By this means, the flow is thus reduced to a trickling flow, say about one tenth of normal flow. Finally, valve 48 closes to completely stop the flow. The predeterminer is usually arranged to allow the primary valve to close after all but the last quarter gallon of the selected predetermined quantity has been delivered, leaving only the secondary valve 48 to be closed exactly when the exact selected quantity has been delivered. In Fig. 2, the lever 36 is shown in the position it occupies when the primary and secondary valves are both closed. In Fig. 4, lever 36 is shown in the position it occupies when both valves are fully open. The center line 55 in Figs. 2 and 4 indicates the position of lever 36, when

4

the primary valve is closed and the secondary valve is open.

The pump motor 1 is controlled by a switch 56 (Fig. 1), having a pivoted actuating lever 57, which is connected by a link 58 to a lever 59, fixed to a shaft 60. The latter (Fig. 5) is rotatably supported at one end in a plate 61, which extends between and is fixed at its ends to one pair of columns 18, and at the other end in a plate 62, which extends between and is secured at its ends to the other pair of columns 18. A collar 63 fixed on one end of shaft 26 abuts the outer face of plate 61. Fixed on the other end of shaft 60 is a one tooth ratchet 64 (see also Fig. 2) and between the ratchet and plate 62, a lever 65 is loosely mounted at a point intermediate its ends on this shaft. The shaft 60 (Fig. 5) is held against endwise displacement by the ratchet and lever 65 at one end and the collar 63 at the other end. Fixed on shaft 60 (Figs. 2 and 5) is an arm 66 which is connected by a spring 67 to one of the columns 18. This spring tends to turn shaft 60 and levers 59 and 57 into, and hold them in, the positions illustrated in which switch 56 is open and the pump motor 1 is at rest.

The motor switch 56 (Fig. 2) is manually controlled by the lever 65 which has pivotally connected to one end a pawl 68 pressed by a torsion spring 69 against the periphery of the one-tooth ratchet 64. This pawl has an extension 70 for releasing it from the ratchet in a manner later to be described. The other end of lever 65 has swivelled thereon a cylindrical member 71 through which the lower, and screw threaded, end of a rod 72 passes, this rod being held to the member by nuts 73. The upper end of rod 72 is also screw threaded and passes through a member 74 swivelled to the outer end of a lever 75, which is fixed at its other end to a shaft 76. A nut 77 threaded on rod 72 engages the upper end of member 74. Another nut 78 is threaded on rod 72 below member 74 and a spring 79, coiled around rod 72, acts between nut 78 and the lower part of member 74 to hold nut 77 against the upper part of member 74. The shaft 76 (Figs. 3 and 5) is mounted in a bracket 80 fixed at its inner end to plate 32 and extending outwardly through the pump casing 22 to support the nozzle of the dispensing hose when not in use. Fixed to the outer end of shaft 76 is a handle 81, by means of which the shaft 76 may be turned from outside the casing of the dispensing pump to actuate the switch 56 of the pump motor. The handle 81 is free to turn through a limited angle in a counterclockwise direction as viewed in Fig. 3 from the "off" position shown to an "on" position. When the handle is turned from "off" to "on" position, lever 65 is rocked on shaft 60 to turn pawl 68 clockwise and, by engagement with the tooth of ratchet 65, to turn the latter and shaft 60 from the position shown in Fig. 2 to that shown in Fig. 4, in which the motor switch 56 is closed and the pump 5 is driven by the motor 1. It is to be noted that the spring 67, while stressed by the operation of closing switch 56, does not have sufficient force to turn lever 65 and the connections 72, 75, 76 and 81 backwards. The lever 65 remains in either of the two positions to which it is adapted to be moved by handle 81. It will also be noted that the motor switch 56 may be opened to stop the pump motor 1 by manually moving handle 81 back into the illustrated position. This will move pawl 68 counterclockwise and allow the ratchet and shaft 60 to be turned

5

in the same direction by spring 67 to open switch 56.

For automatically opening switch 56 when a predetermined quantity of liquid has been delivered, a lever 82 is fixed on the described valve-actuating-shaft 31. Pivotaly connected to and depending from the outer end of lever 82 is a push rod which in the form shown consists of upper and lower sections 83 and 84 having their adjacent ends provided with right hand and left hand screw threads and interconnected by a turn buckle 85, which provides for a fine adjustment of the effective length of the push rod. Check nuts 86 on the two sections hold the turn buckle in its various positions of adjustment. The upper end of upper section 83 has fixed thereon a fork 87, which straddles the lever 82 and provides for the pivotal connection described. The lower section 84 of the push rod is slidable in and guided by, the horizontal leg of an angle iron 88, the vertical leg of which is suitably fixed to the plate 62, described. The outer end of the pawl extension 70 has fixed thereto a foot 89 which, when moved to the Fig. 4 position, is located in the path of reciprocation of the lower end of the push rod. When valve 13 is open, as shown, there is considerable clearance between the lower end of the push rod and foot 89, this clearance being made such, by adjustment of the length of the push rod and/or by adjustment of lever 82 relatively to levers 37, 35, as not to move the foot and its pawl during the first stage of valve closing movement, that is, during the closing movement of the primary valve 46. The final valve-closing movement, the closing of secondary valve 48, will cause the push rod to move foot 89 and release pawl 68 from ratchet 64 so that shaft 60 will be turned by spring 67 to open switch 56 simultaneously with the closing of valve 48. The ratchet 64 moves back from the Fig. 4 to the Fig 2 position but pawl 68 remains in the Fig. 4 position, until the handle 81 is moved back to its "off" position which is usually necessary in order for the operator to hang up the nozzle of the dispensing hose on support 80. When handle 81 is thus moved back, lever 65 will be rocked to move pawl 68 counterclockwise into the Fig. 2 position bringing the pawl into position to engage the tooth of ratchet 64 in readiness for a subsequent clockwise movement of the latter.

In the above identified Granberg patent is shown one specific form of mechanism controlling the closing of the flow control valve in two stages in the general manner herein described.

It will be understood that in practice there will be the customary interlock of any suitable form between the resetting shaft 29 and the switch shaft 76, whereby the pump cannot be actuated during resetting of the register and the register cannot be reset during pumping. Such interlock has not been shown because it is unnecessary to an understanding of the present invention.

In operation, when a delivery of liquid is to be made, the register 17 is first reset to zero by turning the handle 28. Actuation of this handle for resetting serves to turn shafts 30 and 31 and cause valves 46 and 48 to be opened. This will stress spring 42 and the latch 45 will engage tooth 44 and hold the valves open against the bias afforded by the spring. Pumping, however, does not commence until the handle 81 has

6

been turned counterclockwise to its "on" position. Such turning of handle 81 causes lever 65 to be turned clockwise which will cause pawl 68 to turn the one tooth ratchet 64 from the Fig. 2 to the Fig. 4 position. This will swing the foot 89 on the extension 70 of pawl 68 into position where it can be actuated by the push rod 83, 84, 85, during the final stages of the valve-closing movement. The motor 1, having been started, pumping commences and the meter 11 is driven by the liquid flow and in turn drives register 17 and the latter through shaft 26 drives the predeterminer mechanism 25. This mechanism operates to release shaft 30 and allow valve 46 to close when all but the last one-quarter of a gallon of the quantity ordered has been delivered. The closing of valve 46 reduces the rate of flow of liquid to about one-tenth of the normal rate. Closing of valve 46 will also cause the push rod 83, 84, 85 to be moved downwardly but not far enough to move the foot 89 and pawl 68. Pumping continues at the low rate until the predeterminer 25 releases shaft 30 which occurs at the very end of the delivery of the last quarter of a gallon of the selected quantity, whereupon valve 48 closes to stop all delivery of liquid. The final closing movement of shafts 30 and 31 will move the push rod downwardly far enough to depress foot 89 and move pawl 68 out of engagement with the tooth of ratchet 64. Then, spring 67 will turn shaft 60 counterclockwise to open the motor switch 56. The ratchet 64 will be moved from the Fig. 4 to the Fig. 2 position but the pawl 68 remains in the angular position shown in Fig. 4 and pressed against a smooth portion of its periphery. The handle 81 will eventually be turned back to "off" position. Generally, this is necessary in order for the operator to hang up the nozzle of the hose on the support 80. In any case, the motor cannot again be started until the operator moves the handle 81 to "off" position because, only by so doing, can he reengage the pawl 68 with the tooth of ratchet 64 as is necessary in order to effect a closing of the motor switch. If during the delivery of liquid, it is necessary to stop the delivery of liquid before all of the selected amount has been delivered, this may be done by manually moving handle 81 back to its "off" position. This will move pawl 68 in a counterclockwise direction from the Fig. 4 position to the Fig. 2 position and enable spring 67 to cause opening of switch 56.

The invention thus provides an improved control for the switch of the motor which drives the pump of the predetermining type dispenser, whereby the switch has to be manually closed but can be opened automatically when the selected quantity of liquid has been delivered or prior to this time by manual operation if necessary or desired.

What is claimed is:

1. In liquid dispensing apparatus, of the type wherein a pump driven by an electric motor, which is controlled by a switch, forces liquid through a conduit, having a meter and a manually-openable valve interposed therein, and means controlled by the meter closes said valve after a predetermined quantity of liquid has been delivered; a control shaft connected to said switch to actuate the same, spring means tending to turn the shaft in a direction to open said switch, a one-tooth ratchet fixed to said shaft, a lever fulcrumed on said shaft, a pawl pivoted on the lever and engaged with the tooth of the ratchet,

manually-operable means for swinging said lever from one position to and holding it in a second position, whereby to turn said shaft through said pawl and ratchet in a direction to close said switch and hold the same closed against the force of said spring means, and a member movable with the opening and closing of the valve and operable on closing of the valve to move said pawl out of engagement with the tooth of the ratchet and allow said spring means to turn said shaft and open said switch, said lever being movable by said manually-operable means from the second to the first position to reengage the pawl with the tooth of the ratchet after the latter has been released by said member and moved to open said switch and also to open said switch independently of and prior to the valve-closing operation of said member when desired.

2. In a liquid dispensing apparatus, of the type wherein a pump driven by an electric motor, which is controlled by a switch, forces liquid through a conduit, having a meter and a manually-openable valve interposed therein, and means controlled by the meter closes said valve after a predetermined quantity of liquid has been delivered; a control shaft connected to said switch to actuate the same, spring means tending to turn the shaft in a direction to open said switch, a one-tooth ratchet fixed to said shaft, a pivoted lever, a pawl pivoted intermediate its ends to said lever and having one end engageable with said tooth and the other end extending away from the ratchet, manually-operable means for swinging said lever from one position to and holding it in a second position, whereby to turn said shaft through said pawl and ratchet in a direction to close said switch and hold the same closed against the force of said spring means, a second pivoted lever connected to the valve to move from a first to a second position when the valve moves from open to closed position, a reciprocable member connected at one end to the last-named lever and having its other end reciprocable in a predetermined path, the second-named end of said pawl being located in said path when the ratchet and pawl are in switch-closing position, said member being engageable with the second-named end of said pawl to disengage the same from the ratchet when the valve closes, whereby the shaft is turned by its spring means to open said switch, said first lever being movable by said manually-operable means from the second to the first position to reengage the pawl with the tooth of the ratchet after the latter has been released by said member and moved to open said switch and also to open said switch independently of and prior to the valve-closing operation of said member when desired.

3. In a liquid dispensing apparatus, of the type wherein a pump driven by an electric motor, which is controlled by a switch, forces liquid through a conduit, having a meter and a manually-openable valve interposed therein, and means controlled by the meter closes said valve after a predetermined quantity of liquid has been delivered; a control shaft connected to said switch to actuate the same, spring means tending to turn the shaft in a direction to open said switch, a one-tooth ratchet fixed to said shaft, a pivoted lever, a pawl pivoted intermediate its ends to said lever and having one end engageable with said tooth and the other end extending away from the ratchet, manually-operable means for swinging said lever from one position to and holding it in a second position, whereby to turn said shaft

through said pawl and ratchet in a direction to close said switch and hold the same closed against the force of said spring means, a second pivoted lever connected to the valve to move from a first to a second position when the valve moves from open to closed position, a push rod pivotally connected at one end to the last-named lever, a stationary guide slidably engaged with said push rod near its other end to guide the reciprocating movement of such last-named end in a predetermined path, the second-named end of said pawl being located in said path when the ratchet and pawl are in switch-closing position, said push-rod being engageable with the second-named end of said pawl to disengage the same from the ratchet when the valve closes, whereby the shaft is turned by its spring means to open said switch, said first lever being movable by said manually-operable means from the second to the first position to reengage the pawl with the tooth of the ratchet after the latter has been released by said push-rod and moved to open said switch and also to open said switch independently of and prior to the valve-closing operation of said push-rod when desired.

4. In a liquid dispensing apparatus, of the type wherein a pump driven by an electric motor, which is controlled by a switch, forces liquid through a conduit, having a meter and a manually-openable valve interposed therein, and means controlled by the meter closes said valve after a predetermined quantity of liquid has been delivered; a control shaft connected to said switch to actuate the same, spring means tending to turn the shaft in a direction to open said switch, a one-tooth ratchet fixed to said shaft, a pivoted lever, a pawl pivoted intermediate its ends to said lever and having one end engageable with said tooth and the other end extending away from the ratchet, manually-operable means for swinging said lever from one position to and holding it in a second position, whereby to turn said shaft through said pawl and ratchet in a direction to close said switch and hold the same closed against the force of said spring means, a second pivoted lever connected to the valve to move from a first to a second position when the valve moves from open to closed position, a push rod composed of two sections having their adjacent ends oppositely threaded and a turn buckle with oppositely threaded holes engaged with such ends, the other end of one section of said push rod being pivotally connected to the last-named lever, a stationary guide slidably engaged with the other section of push rod near its other end to guide the reciprocating movement of such end in a predetermined path, the second-named end of said pawl being located in said path when the ratchet and pawl are in switch-closing position, said pin-rod being engageable with the second-named end of said pawl to disengage the same from the ratchet when the valve closes, whereby the shaft is turned by its spring means to open said switch, said first lever being movable by said manually-operable means from the second to the first position to reengage the pawl with the tooth of the ratchet after the latter has been released by said pin-rod and moved to open said switch and also to open said switch independently of and prior to the valve-closing operation of said pin-rod when desired.

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No references cited.