

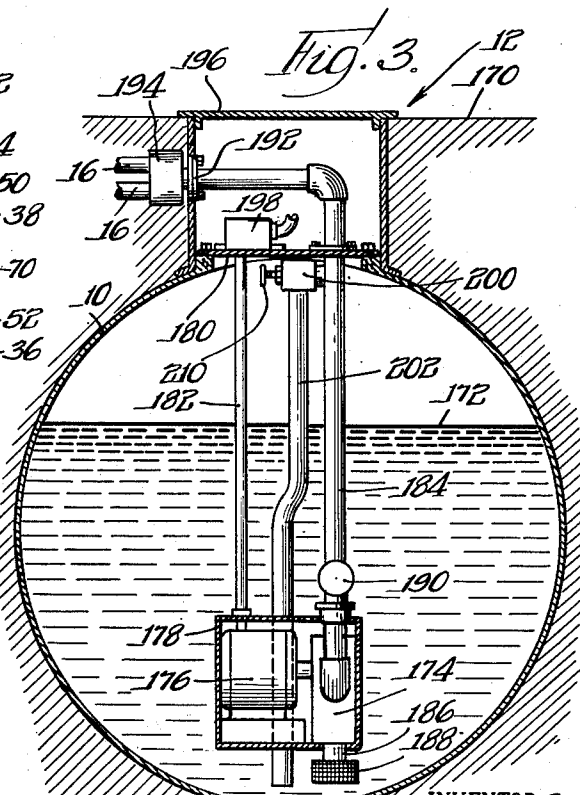
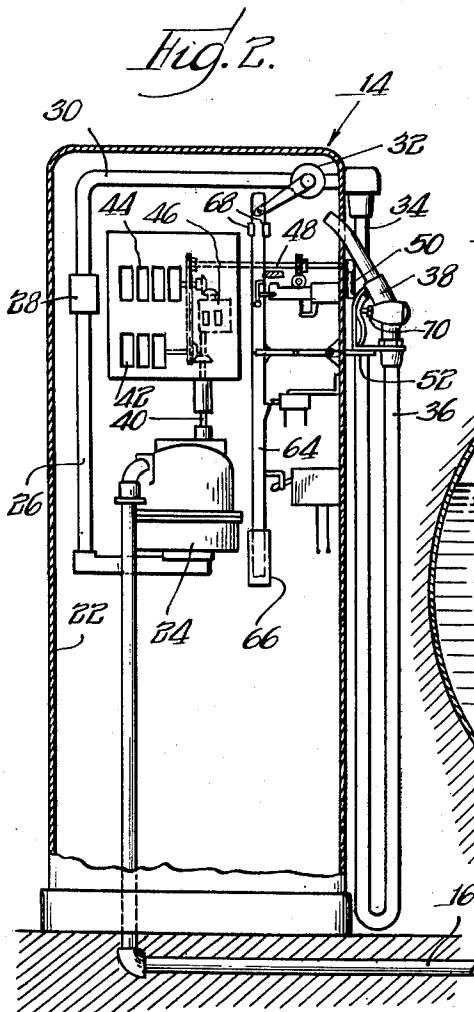
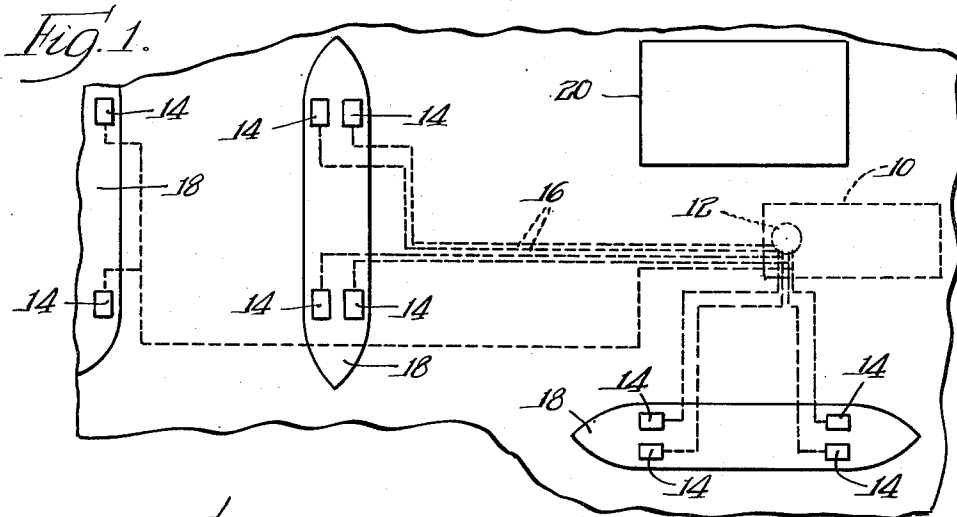
Sept. 22, 1953

J. B. MOORE ET AL
CONTROL SYSTEM FOR PLURALITY
OF LIQUID DISPENSING DEVICES

2,652,948

Filed March 8, 1947

5 Sheets-Sheet 1



INVENTORS,
James Ballard Moore
Richard R. Trexler
By: *Moore, Olson & Trexler*
attys.

Sept. 22, 1953

J. B. MOORE ET AL
CONTROL SYSTEM FOR PLURALITY
OF LIQUID DISPENSING DEVICES

2,652,948

Filed March 8, 1947

5 Sheets-Sheet 2

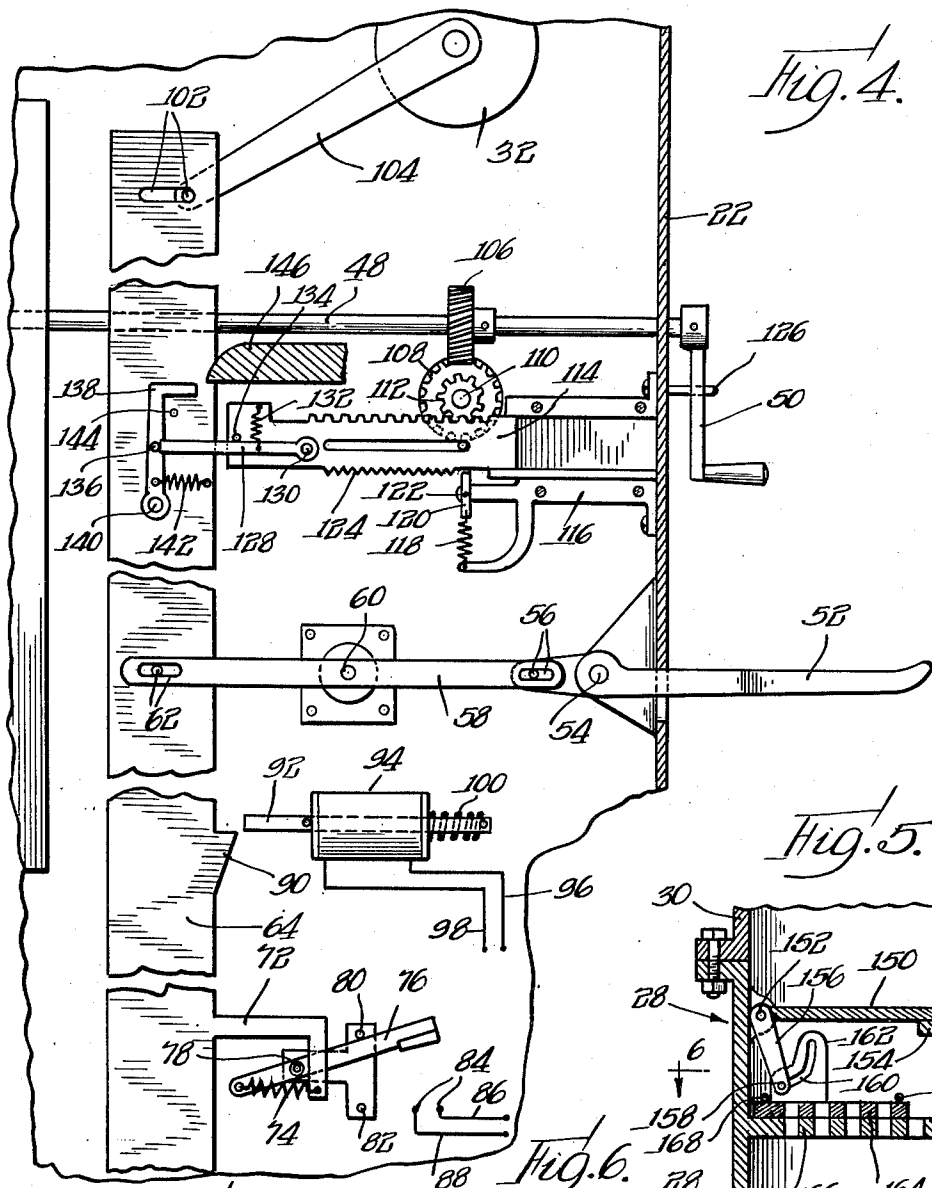


Fig. 5.

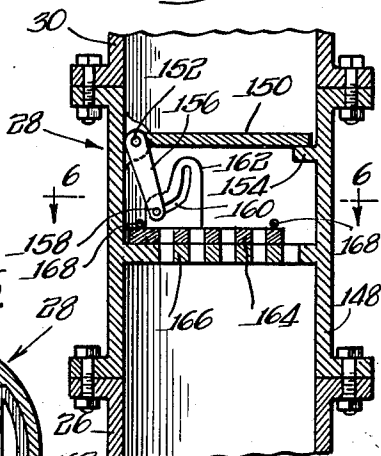


Fig. 6.

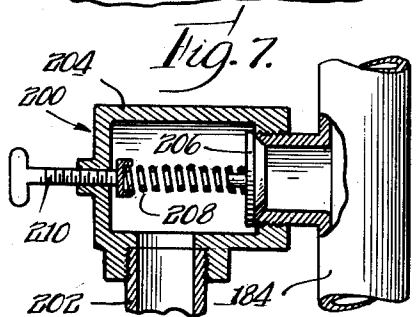


Fig. 7.

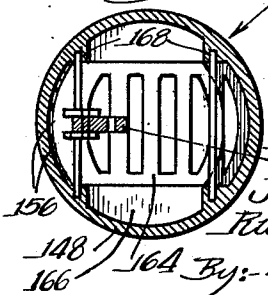


Fig. 8.

INVENTOR.S.

James Ballard Moore
Richard R. Trexler

By: Moore, Olson & Trexler
Attys

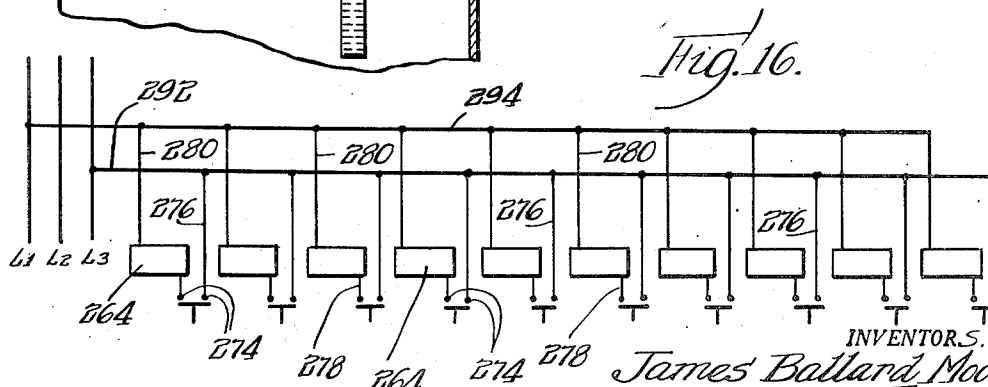
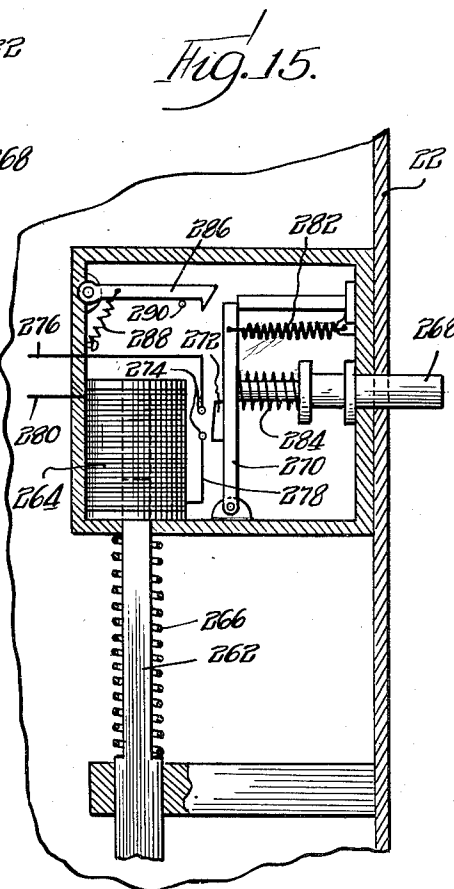
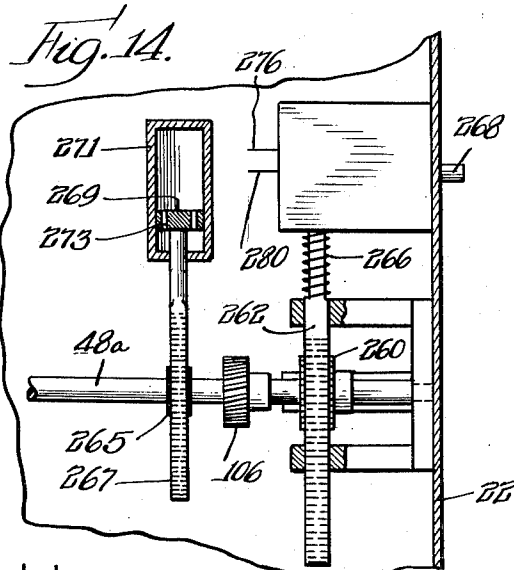
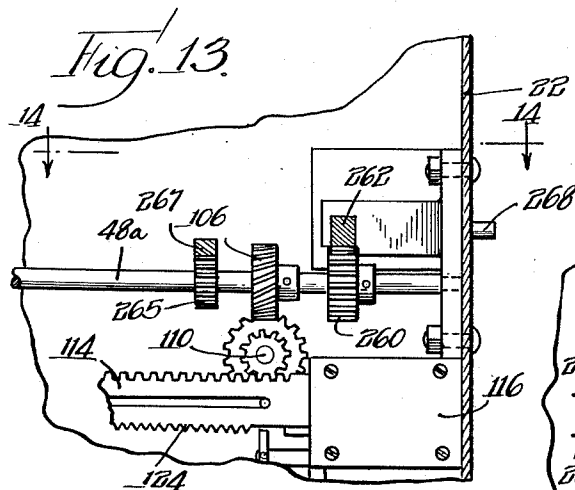
Sept. 22, 1953

J. B. MOORE ET AL
CONTROL SYSTEM FOR PLURALITY
OF LIQUID DISPENSING DEVICES

2,652,948

Filed March 8, 1947

5 Sheets-Sheet 4



INVENTORS.
James Ballard Moore
Richard R. Trexler
By: Moore, Olson & Trexler
attys.

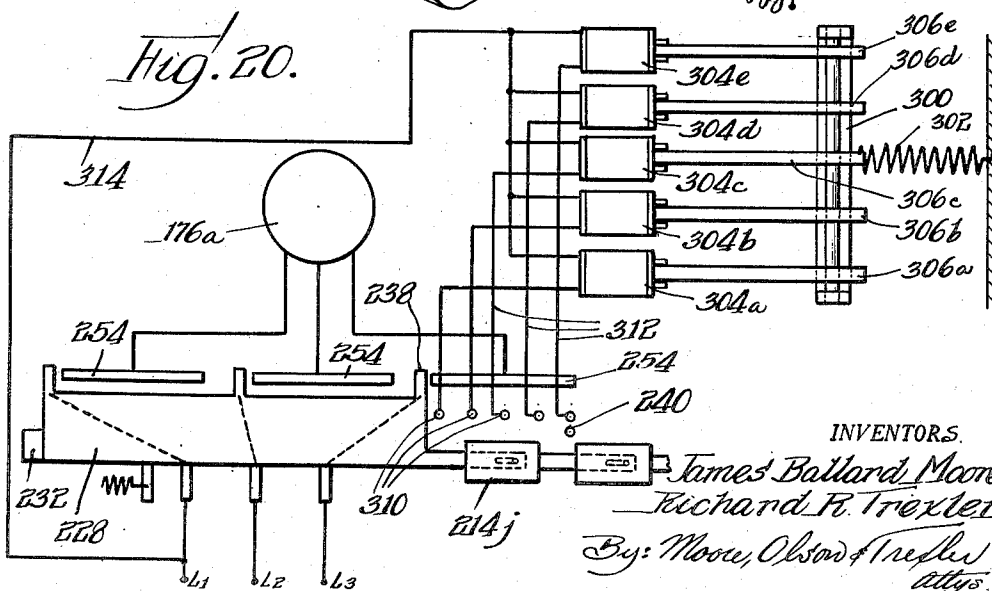
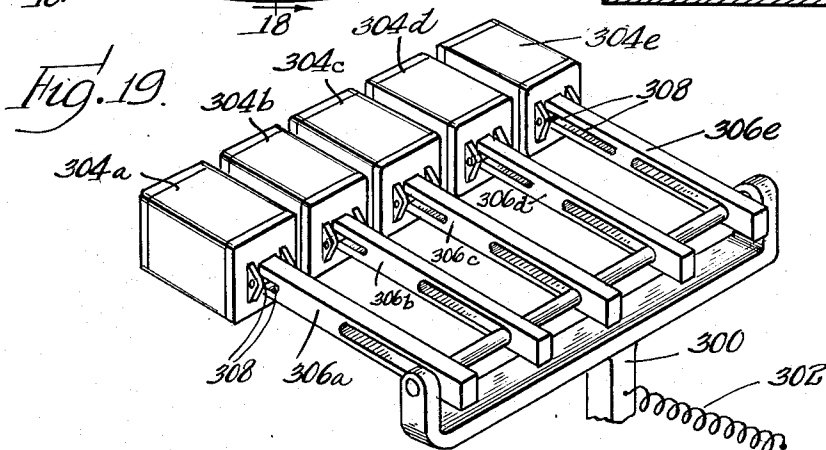
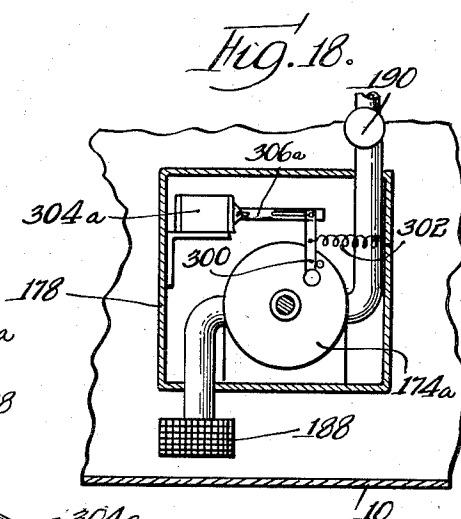
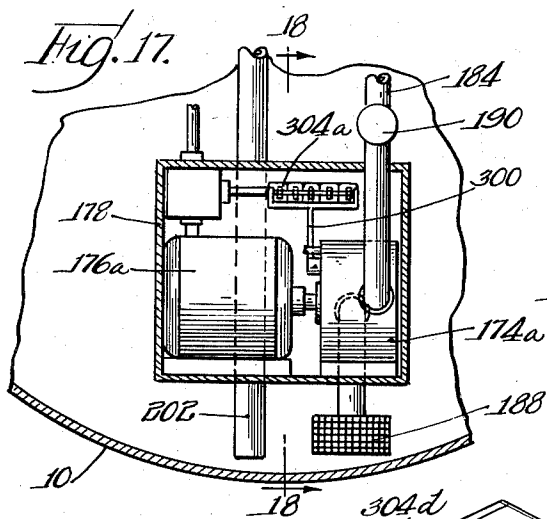
Sept. 22, 1953

J. B. MOORE ET AL
CONTROL SYSTEM FOR PLURALITY
OF LIQUID DISPENSING DEVICES

2,652,948

Filed March 8, 1947

5 Sheets-Sheet 5



INVENTORS

James Ballard Moore
Richard F. Trexler

By: Moore, Olson & Trexler
Attys.

UNITED STATES PATENT OFFICE

2,652,948

CONTROL SYSTEM FOR PLURALITY OF
LIQUID DISPENSING DEVICESJames Ballard Moore, Chicago, and Richard R.
Trexler, Evanston, Ill., assignors to James Bal-
lard Moore, Chicago, Ill., as trustee

Application March 8, 1947, Serial No. 733,348

31 Claims. (Cl. 222-26)

1

This invention relates to liquid dispensing apparatus, and concerns more particularly systems and apparatus for dispensing liquids such as gasoline from a central pumping station to a plurality of individual and selectively operable outlets.

It is an object of the invention to provide an apparatus and system of the foregoing type, of improved construction and improved operating characteristics.

More specifically stated it is an object of the invention to provide an improved pumping apparatus and system of the foregoing type of simplified construction; minimized power consumption; and incorporating improved control means for effecting the control of a common pumping means from any of a plurality of delivery stations, without interference from other stations, and in accordance with the desired prerequisite conditions of operation existing at such station.

A further object of the invention is to provide in a system and apparatus of the foregoing type, an improved arrangement of parts for reducing costs, and for simplifying operations of replacement and repair, as may be required.

Various other objects, advantages and features of the invention will be apparent from the following specification wherein certain preferred embodiments are set forth for illustrative purposes.

In the drawings, wherein like reference numerals refer to like parts throughout:

Fig. 1 is a general assembly view, schematic in form, of a gasoline dispensing system or apparatus constructed in accordance with and embodying the principles of the present invention;

Fig. 2 is a side elevation, with parts broken away, of the apparatus at one of the delivery stations;

Fig. 3 is a view of the pumping unit, and associated parts;

Fig. 4 is an enlarged illustrative view of a part of the control apparatus incorporated in each of the delivery stations or units;

Fig. 5 is an illustrative view of a flow control apparatus, also incorporated as a part of each delivery unit;

Fig. 6 is a transverse sectional view of the structure of Fig. 5 taken as indicated by the line 6-6 thereof;

Fig. 7 is a view of a control device or relief valve, incorporated as a part of the pumping unit;

Fig. 8 is an electrical diagram for the circuit; Figs. 9 and 10 are detail views showing the

2

mounting of certain control electromagnets, incorporated as a part of the electrical circuit, Fig. 10 being a sectional view taken on the line 10-10 of Fig. 9;

Figs. 11 and 12 are views generally similar to a part of Fig. 8, but illustrating modified embodiments of the invention;

Figs. 13-16 are views illustrating an automatic register reset mechanism, for use in the structure; Fig. 14 being a sectional view on the line 14-14 of Fig. 13; Fig. 15 being an enlarged detail of a part of the mechanism of Fig. 14, and Fig. 16 being an electric circuit diagram; and

Figs. 17-20 are views illustrating a modified arrangement for varying the volumetric pumping capacity of the system; Fig. 17 being a partial view similar to Fig. 3; Fig. 18 being a sectional view on the line 18-18 of Fig. 17; Fig. 19 being an enlarged detail view of certain electromagnets forming a part of this structure, and Fig. 20 being a wiring diagram thereof.

In the drawings the invention has been illustrated in connection with a system for dispensing gasoline, for use with automobiles or the like, as the invention in certain of its aspects is particularly adapted to such use. It is to be understood, however, that the invention, in various of its aspects and principles, may be adapted for other uses and purposes including the dispensing of other types of liquids for various uses and purposes as may be required.

Referring more specifically to the drawings, and first to the embodiment of the invention illustrated in Figs. 1-10, in Fig. 1 there is shown a gasoline dispensing system or apparatus comprising, in general, a supply source or underground tank 10 having a pumping unit 12 for supplying gasoline to a plurality of delivery outlets or units 14 by means of a series of conduits as indicated at 16, there being ten such delivery outlet stations or units provided in the particular embodiment shown. As will be understood, the outlets 14 may be associated with the usual delivery islands 18 juxtaposed to an attendant's building 20, as in the usual automobile service or filling station.

Each of the several delivery units 14 may be of the same construction, the apparatus incorporated in each of such units being illustrated in Figs. 2, 4, 5 and 6. As shown, each delivery unit comprises a housing 22 into which is directed the discharge end of the gasoline supply pipe or conduit 16. The pipe 16 leads to a meter 24 of any suitable construction, the discharge from the meter passing through a pipe 26, a flow controller 28, a pipe 30, a shut-off control valve 32, and a

3

pipe 34 to the usual dispensing hose 36 and associated delivery nozzle as indicated at 38. The meter 24 is provided with the usual fluid propelled drive shaft 40 arranged to actuate a volume register 42 and a cost register as indicated at 44, the latter being actuated through the intermediary of a variator or price change mechanism as indicated at 46. The details of the register and variator form no part of the present invention except in so far as they enter into combination with the other elements of the apparatus shown; it being noted, however, that both registers are arranged to be simultaneously reset by means of a reset shaft 48 provided with an operating handle 50, certain interlock connections for which will be subsequently described.

As best shown in Figs. 2 and 4, the nozzle 38 is adapted to be supported upon a hose hook 52 mounted upon the frame or housing 22 by means of a pivot pin 54, and arranged by means of a pin and slot connection 56 to effect the actuation of a lever 58 pivoted to the housing as indicated at 60. One end of the lever 58 is arranged by means of a pin and slot connection 62 to effect the actuation of a vertically reciprocable control and interlock member or bar 64. As shown in Fig. 2, this bar is guided for vertical reciprocation by means of suitable guides as indicated at 66 and 68, carried as a part of the main frame or casing structure.

In operation, to effect the dispensing operation, the attendant removes the nozzle 38 from its support hook 52, and then raises the hook or a lever associated therewith in the usual manner. It will be seen that by reason of the connections described, as the hook 52 is raised, the arm or lever 58 will be shifted clockwise a predetermined distance thus imparting a predetermined lifting movement to the control bar 64. At the end of the dispensing operation, as the nozzle is restored to its hook support, the control bar 64 will be restored downwardly to normal position. The nozzle 38 is supplied with the usual manually operated control valve 70 by means of which the flow of the gasoline outwardly through the nozzle may be regulated and controlled in the usual manner, as will be understood.

Referring further to Fig. 4, it will be seen that the lower end of the control bar 64 is provided with an extension or arm 72 connected at its lower end to one end of a tension spring 74 the opposite end of which is connected to one end of a motor switch arm 76 suitably pivoted upon the frame or casing 22 by means of a pivot pin as indicated at 78. As the control bar 64 is raised and lowered, the spring 74 effects the snap shifting of the switch arm 76 between a pair of abutment pins 80 and 82, the switch arm being adapted, when in lowered position, to effect the closing of a pair of switch contacts 84 associated, respectively, with electrical conductors or wires 86 and 88. The closing of switch contacts 84 effects the energization of the pump motor by means of connections later to be described. The arrangement of the spring 74 is such that the switch arm 76 is not moved to switch closing position until the control bar 64 has moved upwardly a substantial distance of its travel. Similarly the switch is not opened until the control bar has been restored downwardly a substantial distance of its travel, at the end of the dispensing operation. It will thus be seen that one function of the control bar 64 is to effect the opening and closing of the motor control switch 84, in predetermined manner.

4

As also shown in Fig. 4, the control bar 64 is provided with a notch or projection 90 adapted for cooperation with the plunger armature 92 of a repulsion electromagnet 94 which is arranged to be energized from a pair of electrical conductors or wires as indicated at 96 and 98. Normally the armature 92 is urged by a compression spring 100 into the position shown wherein it is withdrawn from engagement with the bar projection 90, thus permitting the control bar 64 to be raised upon the lifting of the hose hook 52, as previously described. However, upon energization of the electromagnet 94 its armature 92 is projected into overlying position over the projection 90 so that the control bar 64 cannot be raised. It will thus be seen that a second function for the control bar 64 is to prevent the lifting of the nozzle hook, and the actuation of switch 84, whenever the electromagnet 94 is energized. The function and purpose of the electromagnet, and the means for effecting its controlled energization will be later described.

As further shown in Fig. 4, the upper end of the control bar 64 is arranged by means of a pin and slot connection 102 to effect the operation of a valve arm 104 associated with the shut-off valve 32, previously described. This shut-off valve may be of any suitable construction, suffice to say that the valve will be moved to fully open position so as to permit liquid fluid through the associated pipes 30-34 whenever the control bar 64 is raised sufficiently to close the switch structure 84. Normally, when the parts are in the position shown in Fig. 4, the valve is closed and liquid flow through the dispensing hose is prevented unless and until the control bar 64 is raised. It will thus be seen that a third function of the control bar is to preclude the dispensing of the liquid gasoline, unless the bar is raised by actuation of the hose hook, in the proper manner.

As still further shown in Fig. 4, means is provided for preventing the raising of the control bar 64 unless and until the register mechanism has been reset, after each dispensing operation. More particularly, the register reset shaft 48 is provided with a gear as indicated at 106 having meshing engagement with a gear 108 fixed to a cross shaft 110 suitably journaled in the frame casing 22. The shaft 110 also carries a gear 112 having meshing engagement with a rack 114 which is longitudinally slidable through a guide bracket as shown at 116. A depending arm or projection of the bracket is fastened to one end of a tension spring 118, the opposite end of which is connected to one end of a pawl 120 pivoted upon the frame as indicated at 122, the upper end of this pawl having engagement with a series of ratchet-like teeth 124 provided on the lower edge of the rack 114 along a predetermined portion of the length thereof.

The register reset mechanism may be of any suitable approved type, and in the embodiment illustrated may for example be of the notched shaft type wherein the register wheels are reset by imparting substantially one revolution of movement to the reset crank 50, after which the crank is restored to normal position against a stop pin as indicated at 126. By reason of the gear connections provided, as the crank 50 is operated forwardly to reset the register wheels, the rack 114 is shifted to the right from the position shown in Fig. 4 a predetermined distance, the rack being then restored leftwardly to the position shown as the reset crank 50 is restored to normal position after the resetting operation.

5

The pawl 120 and cooperative rack teeth 124 act as a full stroke mechanism compelling a complete stroke of travel of the rack to the right before it can be restored, after movement of the rack has once been initiated, as will be understood.

The inner end of the rack 114 carries an abutment arm 128 pivoted to the rack as indicated at 130 and normally urged upwardly by a tension spring 132 into engagement with a rack carried stop pin 134. The end of the arm 128 is arranged to abut a pin 136 carried by a locking arm 138 which is pivotally mounted upon the control bar 64 as indicated at 140, and which is urged in a clockwise direction by a tension spring as indicated at 142, there being a stop pin 144 carried by the control bar for limiting such clockwise movement of the locking arm. When the locking arm 138 is held by the abutment arm 128 against the action of spring 142 and away from the stop pin 144, in the position shown in Fig. 4, the arm 138 is disposed remote from a fixed frame abutment 146 so that the control bar 64 may be raised. It will be seen that this position of the parts is assumed as the resetting of the register is completed, and as the rack 114 is shifted leftwardly into the position shown.

As the control bar 64 is raised, and after the upper end of the locking arm 138 has passed the frame abutment 146, pin 136 is raised above the end of the abutment arm 128, whereupon the locking arm 138 moves clockwise a predetermined distance into contact with the stop pin 144. As the control bar 64 is lowered at the end of the dispensing operation the pin 136 engages the upper surface of the abutment arm 128 moving it downwardly, thereby rendering the abutment arm ineffective, and permitting the locking arm 138 to engage underneath the frame ledge 146. By this means the control bar 64 is prevented from being again raised until the register has been reset, whereupon the abutment arm 128 again becomes operative to move the locking arm 138 to non-locking position. It will thus be seen that at the end of a dispensing operation, when the control bar 64 has been lowered, it cannot be again raised to close switch 34 or open valve 32, until the associated register mechanism has been reset.

Means is provided for preventing the volumetric flow through the dispensing line of any delivery unit 14 from exceeding a predetermined value. Such means comprises the flow controller 28 and is illustrated in Figs. 5 and 6. The flow controller comprises a pipe-like body 148 interposed between the pipes 26 and 30, this body carrying a gate valve 150 which is suitably pivotally mounted upon the body as indicated at 152. The gate valve is normally urged by gravity into engagement with a support ledge as indicated at 154, and the arrangement is such that the valve is moved upwardly or counterclockwise as shown in Fig. 5 in proportion to the volumetric liquid flow through the flow controller structure. An arm 156 is connected for movement with the gate valve, this arm having a pin 158 operable within a slot 160 formed in the upstanding ear 162 of a perforated slide valve 164. This slide valve is shiftable laterally within the body 148 between predetermined limits, the slide valve lying upon and being shiftable over a perforated transversely extending wall 166 formed as a part of the body 148. The slide valve 164 is further guided in its movements by reason of its engage-

6

ment under a pair of guide pins or other suitable guide means, as indicated at 168.

When the parts are in normal position, as shown in Fig. 5, the perforations of wall 166 and of the slide valve 164 are in alignment, so that relatively unrestricted fluid flow through the controller is permitted. Slot 160 is so shaped that as the gate valve 150 and associated arm 156 are shifted counterclockwise up to a predetermined distance, no movement is imparted to the slide valve 164. However, when the volumetric liquid flow through the controller exceeds a predetermined value, resulting in an excessive opening of the gate valve 150, the slide valve 164 is shifted so that its perforations are out of alignment with those of the fixed wall 166, thus throttling the fluid flow and preventing such flow beyond the preset or predetermined value. The purpose of the flow controller structure will more particularly appear hereinafter.

The pump structure, and associated parts, are illustrated in Figs. 3 and 7. The supply tank or reservoir 10 as illustrated in Fig. 3, is suitably disposed beneath the ground level 170, the tank being adapted to contain a supply of gasoline to a level for example as indicated at 172.

A positive displacement pump 174, such as a gear pump or the like, which may be of any suitable construction, is arranged to be driven by an electric driving motor 176. The pump and motor are disposed within an explosion-proof housing 178, this housing being hung from a support plate 180 by means of a conduit 182 through which the electric wires to the motor may extend and a pipe 184 which forms the outlet conduit from the pump. The support plate 180 is suitably bolted to the top of the tank 10, as shown.

The pump inlet pipe or conduit is illustrated at 186, said pipe having an associated strainer 188, the length of the pipes 182 and 184 being such that the inlet end of the intake pipe extends substantially to the bottom of the reservoir. A check valve 190, of suitable construction, is disposed in the discharge line 184 leading from the pump.

The upper end of the discharge pipe 184 is connected by means of a flange structure 192 to a header or distributor 194 by which the pumped liquid is delivered to the several delivery unit supply conduits 16. Upon removal of the cover 196, and disconnection of the flange 192, it will be seen that the support plate 180 together with the housing 178 and the parts associated therewith may be withdrawn as a unit from the tank 10, for purposes of replacement and repair. The plate 180 carries a switch box 198 for the various motor associated electrical controls, presently to be described.

The upper end of the pump discharge conduit 184 has a relief valve 200 associated therewith, this relief valve being arranged to discharge into a discharge conduit 202 which empties back into the bottom of the underground tank. Referring to Fig. 7, the relief valve 200 more specifically comprises a casing 204 having a relief valve member 206 therein urged by a compression spring 208 into seating position so as to normally tend to block liquid discharge from the conduit 184. A manual adjustment screw is provided, as indicated at 210, so as to adjust the tension of the spring, and thus the relief pressure of the valve.

The speed of the driving motor 176 and the volumetric displacement of the pump 174 are such, in respect to the capacities of the several flow controllers 28, that under all conditions of

operation when the pump is in motion, more liquid is pumped thereby than passes outwardly through the one or more delivery units 14 which may be in operation. Accordingly whenever the pump is in operation the relief valve 206 is open, to divert the fluid differential, for a purpose as will subsequently appear. Preferably the spring 208 is sufficiently long and is of such structure so that its tension is not materially changed by the various shifted positions of the relief valve 206. By this means the relief pressure of the valve, as adjusted by the screw 210, remains substantially constant regardless of the quantity of liquid which is diverted through the relief valve structure.

Referring to Fig. 8, the several switch structures 84 previously described, for the several delivery units 14, are shown connected by means of their supply wires 85 to a common supply line 212 adapted for connection to one of the supply lines of a suitable source of 3-phase A. C. power supply. The switch connected wires 88 lead respectively to electromagnets as indicated at 214a, 214b, 214c, et cetera, there being one electromagnet for each switch structure, and each electromagnet being provided with a return wire 216 leading to a common line 218 returning to the source of supply. It will be seen that by reason of the connections provided the closing of any switch 84 results in the energization of its associated electromagnet.

The several electromagnets are all mechanically interconnected in a manner as best indicated in Figs. 9 and 10. More particularly, the end electromagnet 214a is bolted or otherwise fixed to a track frame 220, the remaining electromagnets 214b, 214c, et cetera, being slidably mounted upon the track structure as shown. The armature 222a operable by the electromagnet 214a is fixed to or formed as a part of the electromagnet body 214b. Similarly the armature 222b actuated by the electromagnet 214b is formed as a part of the electromagnet body 214c, this arrangement being duplicated along the entire line of electromagnet structures. Each electromagnet body carries a pin as indicated at 224 and each electromagnet armature is provided with a cooperable slot as indicated at 226, the arrangement thus being such that upon the energization of any electromagnet, its associated armature is drawn into the magnet or shifted to the right as seen in Fig. 8 a distance equal to the length of the slot 226. If several electromagnets are simultaneously energized the armature movements will be cumulative, as will be understood.

The armature 222j of the end electromagnet 214j is formed as an extension of a switch block 228 which is normally urged by means of a tension spring 230 against a stop 232, as shown in Fig. 8. When the switch block is in such position, all of the electromagnets 214 are deenergized, and the several pin and slot connections are in their extended or release positions, as shown. It will be seen that by reason of the structures described, the energization of any one electromagnet 214 will impart one step of movement to the switch block 228 against the action of spring 230. The simultaneous energization of two electromagnets will impart two steps of movement to the switch block, et cetera, regardless of which of the electromagnets may be energized.

The switch block 228 carries three contact fingers 234, 236 and 238 individually electrically connected to the 3-phase power line, and adapted, respectively, for cooperation with a plurality of

contacts 234a-d, 236a-d, and 238a-d associated with the windings of the pump drive motor 176. This motor may for example be a multi-speed polyphase squirrel-cage motor of the type referred to in the "Standard Handbook for Electrical Engineers," seventh edition, 1941, section 7-241 (page 717). Such motors, as commercially available, may have two windings, and two speeds for each winding, giving four definite speeds of operation in predetermined speed ratio. The motor wiring is diagrammatically indicated in Fig. 8, suffice to say that when the contacts 234a, 236a and 238a are energized the motor is given its first or lowest speed of operation; when the contacts 234b, 236b and 238b are energized the motor is given its next higher or second speed of operation; when the contacts 234c, 236c and 238c are energized the motor is given its next higher or third speed of operation; and when the contacts 234d, 236d and 238d are energized the motor is given its highest or fourth speed of operation. It will thus be seen that energization of any one electromagnet 214 (regardless of which one) energizes the pump motor 176 and imparts thereto a first speed of operation. Energization of any two electromagnets 214 causes the motor to operate at its second speed, energization of any three electromagnets causes the motor to operate at its third speed, and energization of any four electromagnets causes the motor to operate at its fourth or highest speed, with resulting variations in the volumetric delivery of the pump.

As previously stated, the four motor speeds are so arranged in reference to the volumetric capacity of the pump, that the pump delivers more gasoline when operating at its lowest speed than may be passed through one flow controller 28. At second motor speed the pump delivers more gasoline than can be passed through any two controllers 28. At third motor speed the pump delivers more gasoline than can be passed through any three flow controllers 28; and at fourth motor speed the pump delivers more gasoline than can be passed through any four flow controllers 28, even if the four associated nozzle valves are fully open. By this means it is insured, as previously set forth, that the relief valve 206 shall be open at all times during pump operation.

Referring further to Fig. 8, it will be seen that when the switch 228 has moved four steps the arm 238 thereof engages a contact 240 which is connected by means of the wire 96 with the several electromagnets 94 associated with the several delivery units, as previously described. The electromagnets are all connected in parallel between the supply wire 96 and the return wire 98 leading back to the power source, so that upon closure of the switch 238-240 all of the electromagnets 94 are simultaneously energized. Accordingly it will be seen that after any four electromagnets 214 have been energized operation of the control bars 64 associated with the remainder of the delivery units 14 is prevented.

It is believed that the operation of the system will be apparent from what has heretofore been set forth. It will be seen that provided the associated register has been properly reset from the preceding dispensing operation, the hose hook 52 of any delivery unit may be raised so as to close the switch 34 associated therewith, resulting in the energization of the associated electromagnet 214. Simultaneously, as the hose hook is lifted, the control valve 32 associated with the delivery unit is opened. The raising of one hose hook imparts a first speed of operation to the pump,

the raising of two hose hooks imparts a second speed of operation to the pump, et cetera, until four hose hooks may have been raised. Thereafter, the raising of further hose hooks is prevented, and the valves 32 associated with such units preclude the delivery of gasoline therefrom even though the pump motor is in operation. At all motor speeds, and under all conditions of operation, the relief valve 200 remains open, as has been previously described. Accordingly a constant pressure, corresponding to the setting of the control handle 210, is maintained in the pump line 184 and in the associated header 194 regardless of variations in the amount of gasoline which the attendant may permit to pass through the nozzle valve of any delivery unit. More particularly, as the attendant at one delivery unit may open or close or otherwise vary the position of his nozzle discharge valve, the relief valve 200 merely diverts more or less of the pump delivery, but without changing the pressure in the header 194 so that variations in flow through other delivery units is avoided. By this means there will be no pressure surge in the dispensing hose of any delivery unit, regardless of what is taking place at the other units in the system. At the same time the power consumed by the pump motor is maintained at a minimum, depending upon the demands of the system. Due to the positioning of the pump at the base of the storage reservoir vacuum conditions upon the gasoline are avoided and the presence of air and gas eliminators is unnecessary. It is to be understood, however, that the pump may be variously positioned and that air and gas eliminators may be provided in the usual manner, if desired. For example, if the pump and its drive motor were disposed externally of the supply reservoir, a single air eliminator of conventional type could be disposed on the outlet side thereof to eliminate and return vapor and accumulated air to the suction side of the pump; or individual air eliminators with appropriate return lines could be arranged in each delivery unit, in advance of the meter thereof.

While the flow controllers 23 have been heretofore described, for controlling the maximum flow rates through the several delivery units, it is to be understood that in certain instances such controllers may not be needed, the pipe sizing and like factors being relied upon to limit the maximum rates of flow.

In Fig. 11 an embodiment is illustrated substantially similar to that previously described except that in this instance the energization of two of the electromagnets 214 is required to effect a change of motor speed, and further delivery units are blocked from actuation only after eight of such units have been placed into operation. The structures are the same as previously described except that the motor switch contacts are in this instance in the form of slightly elongated segments or blocks 250. The first set of switch blocks is engaged upon the energization of one electromagnet 214, such engagement being maintained when two electromagnets are energized. The energization of three electromagnets causes the second set of switch blocks to be engaged, which engagement is maintained if four electromagnets are energized. The energization of either five or six electromagnets causes the third set of switch blocks to be engaged, and the energization of seven or eight switch blocks causes the fourth set of switch blocks to be engaged. The energization of more than eight

electromagnets is precluded by the switch contact 249, and associated parts, as previously described.

As will be understood, the motor speeds and pump capacity are such that at all times the pump delivers more gasoline than can pass through the flow controllers of the maximum number of delivery units operative corresponding to each pump speed, so as to maintain the pump relief valve open at all times. The arrangement of Fig. 11 may result in slightly higher power consumption, as for example when one, three, five or seven delivery units are in operation. The arrangement of Fig. 11, however, permits a greater number of delivery units to be operative at one time.

In Fig. 12 an arrangement is shown wherein a single speed motor 176a is employed, energized by means of switch blocks as indicated at 254 which are sufficiently elongated so that the fingers of the switch member 228 are caused to engage therewith upon the energization of any one electromagnet 214, and to be maintained in engagement therewith regardless of the energization of additional electromagnets. In this instance the motor size and speed and the capacity of the pump are such as to cause excess gasoline to be pumped for diversion through the relief valve, regardless of the number of delivery units in operation up to the limit of the cutout switch 249. The position of this switch determines the maximum number of delivery units which may be simultaneously energized, as in the embodiments previously described.

In Figs. 13-16 an automatic means for effecting the resetting of the register is set forth, in substitution for the manual hand crank previously described. As shown, the reset shaft 48a, corresponding to the shaft 48 previously described, is somewhat shortened and journaled at its end in the casing 22, as shown.

In addition to the gear 106, shaft 48a is also provided with a spur gear 260 adapted to mesh with a rack 262 suitably supported for reciprocatory movement by the frame casing. The end of the rack is formed as the armature for a solenoid 264, the arrangement being such that as the solenoid is energized, the rack 262 is drawn upwardly as seen in Fig. 14, against the action of a compression spring as indicated at 266.

Referring more particularly to Fig. 15, it will be seen that there is provided a switch push button 268 arranged when depressed to pivot a switch arm 270 in a counter-clockwise direction, this switch arm carrying a switch block 272 co-operable with switch contacts as indicated at 274 in such manner that as the switch arm is depressed the switch contacts are closed. A supply line 276 is connected to one of the switch contacts, the other switch contact being interconnected by means of a wire 278 with one end of the winding of the electromagnet 264. The other end of the electromagnet winding is connected to a wire 280, the supply connections for which will be later described.

The switch arm 270 is normally urged outwardly or in a clockwise direction by means of a tension spring 282, there also being a compression spring as indicated at 284 interposed between the switch arm and a flange of the push button shaft, so as to normally hold the parts in the position shown in Fig. 15. The spring 282 is stronger than the spring 284 so that the end of the push button and the switch arm are normally maintained in engagement as shown.

A pawl 286, suitably pivotally mounted upon

the support casing, is normally urged by a tension spring 233 against a frame stop pin 230. The pawl is arranged to catch the switch arm 270, when the latter is depressed, as as to maintain the switch contacts 274 closed, until the pawl is released by being engaged by the end of the rack armature 262 as the latter is projected through a full stroke of travel by the electromagnet, or upwardly as seen in Fig. 15.

It will be seen that by reason of the connections described, as the push button 250 is depressed, the switch arm 270 will be correspondingly shifted to close the switch contact 274. As will presently appear, the closing of these switch contacts effects the energization of electromagnet 234 which thereupon draws the rack armature 262 upwardly as seen in Fig. 15. The latch pawl 236 maintains the switch closed until such time as the rack has completed its full stroke of movement. More particularly, if the operator only momentarily depresses the push button 250, the latter will be restored upon release by the compression spring 234, but the switch arm 270 will remain actuated until the pawl 236 is engaged by the rack armature, as described. By this means it is insured that the electromagnet, when once energized, will not be deenergized until the rack armature has completed its full stroke of movement. As the pawl 236 is engaged, and assuming that the attendant has released the push button, the switch arm 270 will be returned by its restoring spring 232, opening the switch and deenergizing the electromagnet. The rack armature thereupon returns to normal position under actuation of its restoring spring 265.

As shown in Fig. 14, shaft 48a is preferably provided with a further gear 265 engageable with a rack 267, the end of which carries a piston 269 operable within an oil filled cylinder 271 suitably carried by the frame. Piston 239 is provided with orifices as indicated at 273, the piston thus constituting a dash pot to limit the speed of operation of shaft 48a in its rotative movements in both directions.

The rack 262, being in geared engagement with the reset shaft, effects the actuation thereof in the same manner as previously described in reference to hand crank operation. The full stroke mechanism 120—124, previously described, insures a full stroke of movement of the rack in both directions; and as has been previously described, the control bar 54 cannot be raised to effect a dispensing operation until the resetting has been completed. As previously mentioned, any suitable reset means for the register wheels may be provided, such for example as set forth in the copending application of Richard R. Trexler, Serial No. 659,299, filed April 3, 1946, now Patent No. 2,592,622, issued April 15, 1952, entitled "Liquid Dispensing Apparatus," the rack 262 herein being functionally similar to the rack 286 illustrated in Fig. 10 of said case.

In Fig. 16 the circuit for energizing the solenoid 264, at each delivery unit, upon closing of the associated switch 274 is illustrated. It will be seen that the wire 275 for each unit is connected with a common supply wire 292 interconnected with the power line L₃; whereas the wire 280 for each unit is connected to a common supply line 294 interconnected with a power line L₁. By this means, as each switch 274 is closed the associated electromagnet 264 is energized.

Referring to Figs. 17—20, an arrangement is illustrated for varying the volumetric output

of the pump by changing the pump displacement, rather than by varying the speed of the driving motor as previously set forth.

Referring to Fig. 17, in this instance the pump drive motor as indicated at 176a is preferably a single speed motor, as previously described in reference to Fig. 12; whereas the pump structure as indicated at 174a is of the variable displacement type.

Any suitable form of variable displacement pump may be employed. For convenience, the pump structure is illustrated as being of the type shown in the patent to Ernst No. 1,719,693, dated July 2, 1929, and designated therein by the reference character S. As explained in said patent, this pump is of the multiple piston type, the pump displacement being variable by the manipulation of a manual control handle extending externally of the pump casing, and designated in the patent by the reference numeral 26. Such control handle is designated in Figs. 17 and 18 herein by the reference numeral 300.

In accordance with the present invention the manual control lever 300 is normally urged by a tension spring 292 in a clockwise direction as seen in Fig. 18 against a suitable stop pin, in which position the pump has zero delivery displacement. The shifting of the control lever in a counterclockwise direction progressively increases the pump displacement, in accordance with the magnitude of the shifting movement.

A series of electromagnets as indicated at 304a, 304b, 304c, et cetera, is provided, there being five such electromagnets in the particular embodiment shown, arranged when energized to actuate the lever 300 through different distances of travel. More particularly, as shown in Fig. 19, each electromagnet is provided with an armature as indicated at 306a, et cetera, each armature being interconnected with the lever 300 by means of a pin and slot connection as shown. Each electromagnet when energized is adapted to pull upon its associated armature, so as to project the lever 300 to the left, as seen in Fig. 19. By means of a pin and slot connection as indicated at 308 the armature 306a is limited to a distance of movement one-fifth that of the armature 306e; the armature 306b is limited to a distance of movement two-fifths that of the armature 306e; the armature 306c is limited to a distance of movement three-fifths that of armature 306e; and armature 306d is limited to a movement equal to four-fifths that of armature 306e. Accordingly it will be seen that each armature may be actuated independently of the others, and each armature effects a magnitude of movement of the lever 300, dependent upon the length of its pin and slot connection 308.

Referring to Fig. 20, it will be seen that the switch contactor 228 is arranged with respect to the motor contacts 254 so that the motor is energized upon the actuation of any one or more of the electromagnets 214. There is further provided a series of contacts as indicated at 310 individually connected by means of wires 312 to the electromagnets 304, in such manner that each electromagnet is individually energized as the contacts 310 are successively engaged by the switch finger 238 upon the shifting of the switch block 228, as previously described. The electromagnets 304 are individually connected to the power lines by means of the wires 312 and by means of a common return line 314, as will be understood.

By reason of the arrangements thus provided, it will be seen that the energization of any one

electromagnet 214 will energize the electromagnet 304a whereby to impart one increment of movement to the pump displacement control lever 300. The energization of any two electromagnets 214 will result in the energization of the electromagnet 304b whereby to impart two increments of movement to the pump displacement control lever, and so on for the five displacement control electromagnets provided. Any number of different volumetric displacements may be provided, as desired, up to the maximum permissible controlled by the position of the switch contact 240. In each position, the displacement of the pump exceeds the requirements of the system at all times so that the relief valve 200 is maintained open.

It is obvious that various changes may be made in the specific embodiments set forth without departing from the spirit of the invention. The invention is accordingly not to be limited to the specific embodiments shown and described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means controlled by the dispensing of the liquid through a predetermined number of said outlets for inhibiting the dispensing of liquid through additional outlets.

2. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means including an electromagnet associated with each outlet operative while liquid is being dispensed from a predetermined number of said outlets for inhibiting the dispensing of liquid through additional outlets.

3. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means including a control valve associated with each outlet operative while liquid is being dispensed from a plurality of said outlets for preventing the dispensing of liquid through additional outlets.

4. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, a meter associated with each outlet, a register driven by each meter, means for resetting each register, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means,

and means for inhibiting the dispensing of liquid from an outlet until the register resetting means provided therewith has been actuated to reset the register from a preceding dispensing operation, said inhibiting means being operative while the pump is in operation.

5. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, a meter associated with each outlet, a register driven by each meter, means for resetting each register, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means including a shut-off valve for inhibiting the dispensing of liquid from an outlet until the register resetting means provided therewith has been actuated to clear the register from a preceding dispensing operation.

6. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply for delivering a volume of liquid in excess of the volume of liquid being dispensed at any one time, means for continuously driving the pump during dispensing operations, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and relief valve means for maintaining the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets.

7. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means comprising a relief valve associated with the pump for maintaining the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets, said relief valve being constantly open when said pump is operating and when liquid is being dispensed through any of said outlets.

8. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means including a controller for limiting the maximum flow rate at each outlet for maintaining the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets.

9. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control

15

the operation of the pump driving means, and means comprising a relief valve associated with the pump and a controller for limiting the maximum liquid flow at each outlet for maintaining the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets, said relief valve being constantly open when said pump is operating.

10. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the volumetric delivery of liquid from the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means.

11. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the volumetric delivery of liquid from the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, said delivery varying means being controlled in accordance with the number of actuated control means.

12. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the speed of operation of the pump driving means to thereby vary the volumetric delivery of liquid from the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means.

13. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the speed of operation of the pump driving means to thereby vary the volumetric delivery of liquid from the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, said speed varying means being operable in accordance with the number of control means actuated.

14. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the volumetric delivery of liquid from the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means for maintaining the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets.

15. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means

16

for varying the speed of operation of the pump driving means to thereby vary the volumetric delivery of liquid from the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means for maintaining the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets.

16. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, a relief valve associated with the pump, said relief valve being constantly open when said pump is operating, and a controller at each outlet for limiting the maximum liquid flow at each outlet, said relief valve and controllers cooperatively and cumulatively acting to maintain the liquid pressure at one outlet substantially constant during variations in liquid flow through other outlets.

17. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the volumetric delivery of liquid from the pump in a step-wise manner, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, said delivery varying means being controlled in accordance with the number of actuated control means.

18. A liquid dispensing apparatus comprising a variable displacement pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, each of said control means being operative to control the operation of the pump driving means, and means for controlling the displacement of said pump to provide step-wise increases in the volumetric delivery of liquid from the pump in accordance with the number of actuated control means.

19. A liquid dispensing apparatus comprising a variable displacement pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the displacement of said pump, an electromagnetically controlled switch means for said pump displacement varying means, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, any one of said control means being operative to actuate said electromagnetically controlled switch means thereby actuating said pump displacement varying means to permit a volumetric delivery of liquid from the pump necessary to supply one outlet, the concurrent operation of more than one of said control means being operative to actuate said pump displacement varying means to increase step-wise the volu-

17

18

metric delivery of liquid from the pump as the number of control means actuated is increased.

20. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, a multiple speed motor for said pump, electromagnetically controlled switch means for said multiple speed motor, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, any one of said control means being operative to actuate said electromagnetically controlled switch means to initiate operation of said multiple speed motor; the concurrent operation of more than one of said control means being operative to increase step-wise the speed of said multiple speed motor to increase incrementally the volumetric delivery of liquid from the pump in accordance with the number of control means actuated.

21. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, a single speed motor for driving said pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, a relief valve constantly open when said pump is operating, said relief valve controlling the volume of liquid available for dispensing through said outlets, an electromagnetically controlled switch means, control means individually associated with each of the dispensing outlets, each of said control means being operative to actuate said switch means, solenoid means associated with each of said control means for locking the control means in a non-dispensing position, said switch means actuating said solenoid means upon the operation of a predetermined number of said control means to lock and prevent operation of additional control means.

22. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, a plurality of electromagnets mechanically interconnected in series, said electromagnets being positioned in track means, one of the end electromagnets being fixed at one end of said track means, the remaining electromagnets being slidably movable in said track means, each of said control means controlling an associated electromagnet, and a multiple position switch means controlled by the electromagnets, each position of said switch means corresponding to an incremental increase in the volumetric delivery of liquid, any one of said control means being operative to actuate an electromagnet to move said switch means to a position corresponding to a volumetric delivery of liquid for a single dispensing outlet, the concurrent operation of more than one of said control means actuating an equal number of said electromagnets, the actuated electromagnets combining to move said switch means to a position of increased volumetric delivery corresponding to the number of control means actuated.

23. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually as-

sociated with each of the dispensing outlets, a plurality of electromagnets mechanically interconnected in series, said electromagnets being positioned in track means, one of the end electromagnets being fixed at one end of said track means, the remaining electromagnets being slidably movable in said track means, each of said control means controlling an associated electromagnet, and means for varying the volumetric delivery of liquid from the pump, said delivery varying means being controlled by said electromagnets, any one of said control means being operative to actuate an electromagnet to operate said delivery varying means thereby providing a volumetric delivery of liquid for a single dispensing outlet, the concurrent operation of more than one of said control means actuating an equal number of said electromagnets to cause step-wise increases in the volumetric delivery corresponding to the number of control means actuated.

24. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, a variable speed motor for driving said pump, a plurality of dispensing outlets, conduits for interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, a plurality of electromagnets, said electromagnets being mechanically interconnected in series and slidably mounted in track means, each of said control means being associated with an individual electromagnet, switch means controlled by the electromagnets, said switch means having a plurality of contacts, each of said contacts corresponding to an increased speed of said motor, said switch means actuating said variable speed motor upon the operation of any one of said control means, the concurrent operation of more than one of said control means causing simultaneous actuation of the associated electromagnets, the actuated electromagnets combining to move said switch means, into engagement with one of said contacts to increase the speed of said motor thereby causing an increased volumetric delivery of liquid corresponding to the number of electromagnets actuated.

25. A liquid dispensing apparatus comprising a variable displacement pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the displacement of said pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, and a plurality of electromagnets, said electromagnets being mechanically interconnected in series and slidably mounted in track means, said electromagnets controlling said pump displacement varying means, each of said control means controlling an associated electromagnet thereby actuating said pump displacement varying means to provide a volumetric delivery of liquid for one outlet, the concurrent operation of more than one control means actuating the associated electromagnets, the actuated electromagnets cumulatively acting to move said pump displacement varying means to increase the displacement of said pump to provide a volumetric delivery of liquid from the pump in accordance with the number of control means actuated.

26. A liquid dispensing apparatus comprising a variable displacement pump, means for driving said pump, a plurality of solenoids each cor-

responding to a different displacement of said pump, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, a plurality of electromagnets, said electromagnets being mechanically inter-
 5 connected in series and slidably mounted in track means, control means individually associated with each of the dispensing outlets, a multiple position switch means connected to said electro-
 magnets, the positions of said multiple position switch means each controlling a different pump displacement solenoid, each of said control
 10 means actuating an associated electromagnet, the concurrent operation of more than one of said control means actuating an equal number
 15 of said electromagnets, the electromagnets cumulatively acting to move said multiple position switch means to a position to actuate one of said
 pump displacement solenoids corresponding to the number of control means actuated, the dis-
 20 placement of said pump thereby being changed to step-wise increase the volumetric delivery of liquid from the pump in accordance with the
 number of control means actuated.

27. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, means for varying the volumetric delivery of liquid from the pump, a multiple position switch means for controlling the operation of said delivery varying
 25 means, a plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being operative to control the position of said multiple position
 30 switch means, the position of said multiple position switch means being determined by the number of control means actuated, the multiple position switch means operating said delivery
 35 varying means to step-wise increase the volumetric delivery of liquid in accordance with increases in the number of control means actuated.

28. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, means for driving the pump, a
 40 plurality of dispensing outlets, conduits interconnecting the pump with said plurality of dispensing outlets, control means individually associated with each of the dispensing outlets, first
 45 means for varying the volumetric delivery of liquid from said pump, and second means controlling said delivery varying means, said second means being controlled by said control means and in accordance with the number of control means actuated, said first and second means combining to step-wise increase the volumetric delivery of liquid in accordance with increases in the number of control means actuated.

29. A liquid dispensing apparatus comprising a pump adapted to be connected to a source of liquid supply, a variable speed motor for driving said pump, a multiple position switch means for controlling said motor, a plurality of dispensing outlets, conduits interconnecting the pump with
 50 said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, said multiple position switch

means being controlled by said control means and in accordance with the number of control means actuated, said switch means step-wise in-
 5 creasing the speed of said motor in accordance with increases in the number of actuated control means to cause corresponding incremental increases in the volumetric delivery of liquid from the pump.

30. A liquid dispensing apparatus comprising a variable displacement pump adapted to be connected to a source of liquid supply, means for driving said pump, means for varying the displacement of said pump, a multiple position switch means for controlling the operation of said
 10 displacement varying means, a plurality of dispensing outlets, conduits interconnecting said pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control
 15 means being operative to control the position of said switch means, the position of said multiple position switch means being determined by the number of control means actuated, the multiple position switch means thereby operating the displacement varying means to provide step-wise
 20 increases in the volumetric delivery of liquid from the pump in accordance with increases in the number of control means actuated.

31. A liquid dispensing apparatus comprising a variable displacement pump adapted to be connected to a source of liquid supply, means for driving said pump, a plurality of solenoids each controlling the displacement of said pump, a multiple position switch means for controlling
 30 said solenoids, a plurality of dispensing outlets, conduits interconnecting said pump with said plurality of dispensing outlets, and control means individually associated with each of the dispensing outlets, each of said control means being op-
 35 erative to control the position of said switch means, the position of said multiple position switch means being determined by the number of control means actuated, the multiple position switch means thereby actuating a solenoid to in-
 40 crease the displacement of said pump to provide an increase in the volumetric delivery of liquid from the pump in accordance with increases in the number of control means actuated.

JAMES BALLARD MOORE.
 RICHARD R. TREXLER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
55 793,536	McCormick	June 27, 1905
1,612,424	Farr	Dec. 28, 1926
1,742,208	Hawthurst	Jan. 7, 1930
1,960,389	McFerran	May 29, 1934
2,051,597	Head	Aug. 18, 1936
2,102,140	Ungar	Dec. 14, 1937
2,109,352	Hazard	Feb. 22, 1938
2,109,353	Hazard	Feb. 22, 1938
2,126,447	Brouse et al.	Aug. 9, 1938
2,289,003	Foss	July 7, 1942
2,319,444	Crosby	May 18, 1943
2,352,958	Lauer et al.	July 4, 1944
2,427,551	De Lancey	Sept. 16, 1947
2,500,834	Korte	Mar. 14, 1950