April 6, 1954 J. B. MOORE 2,674,361

COIN-CONTROLLED DISPENSING PUMP

Filed Nov. 19, 1945

4 Sheets-Sheet 1

Fig. 1.

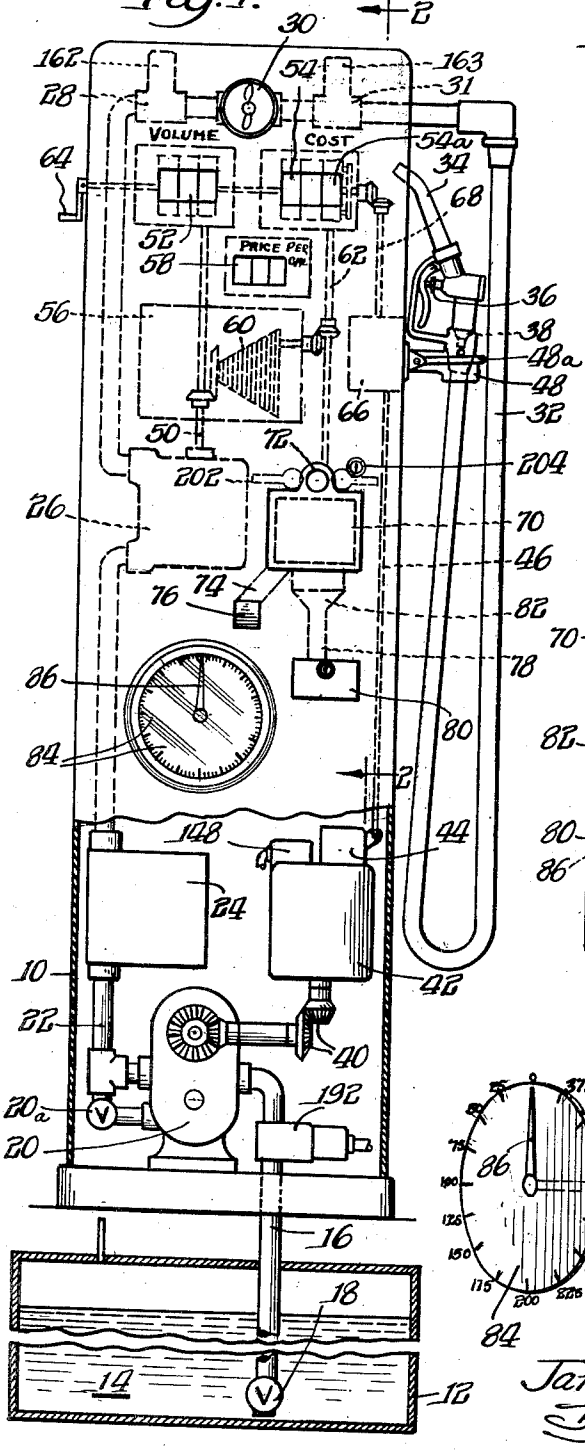


Fig. 2.

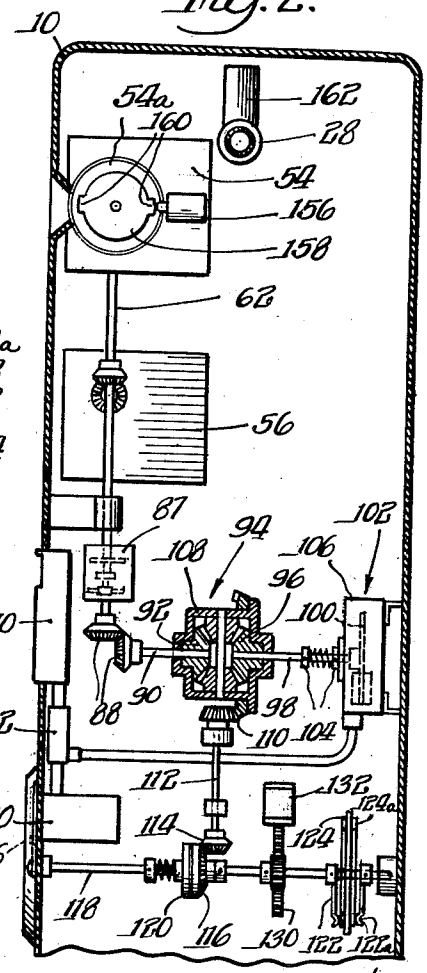
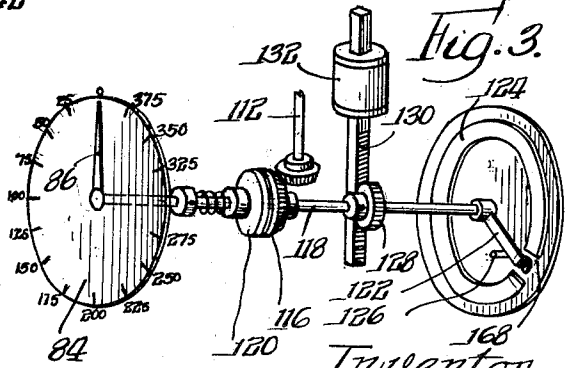


Fig. 3.



Inventor

James Ballard Moore

By: Moore, Olsen & Treder

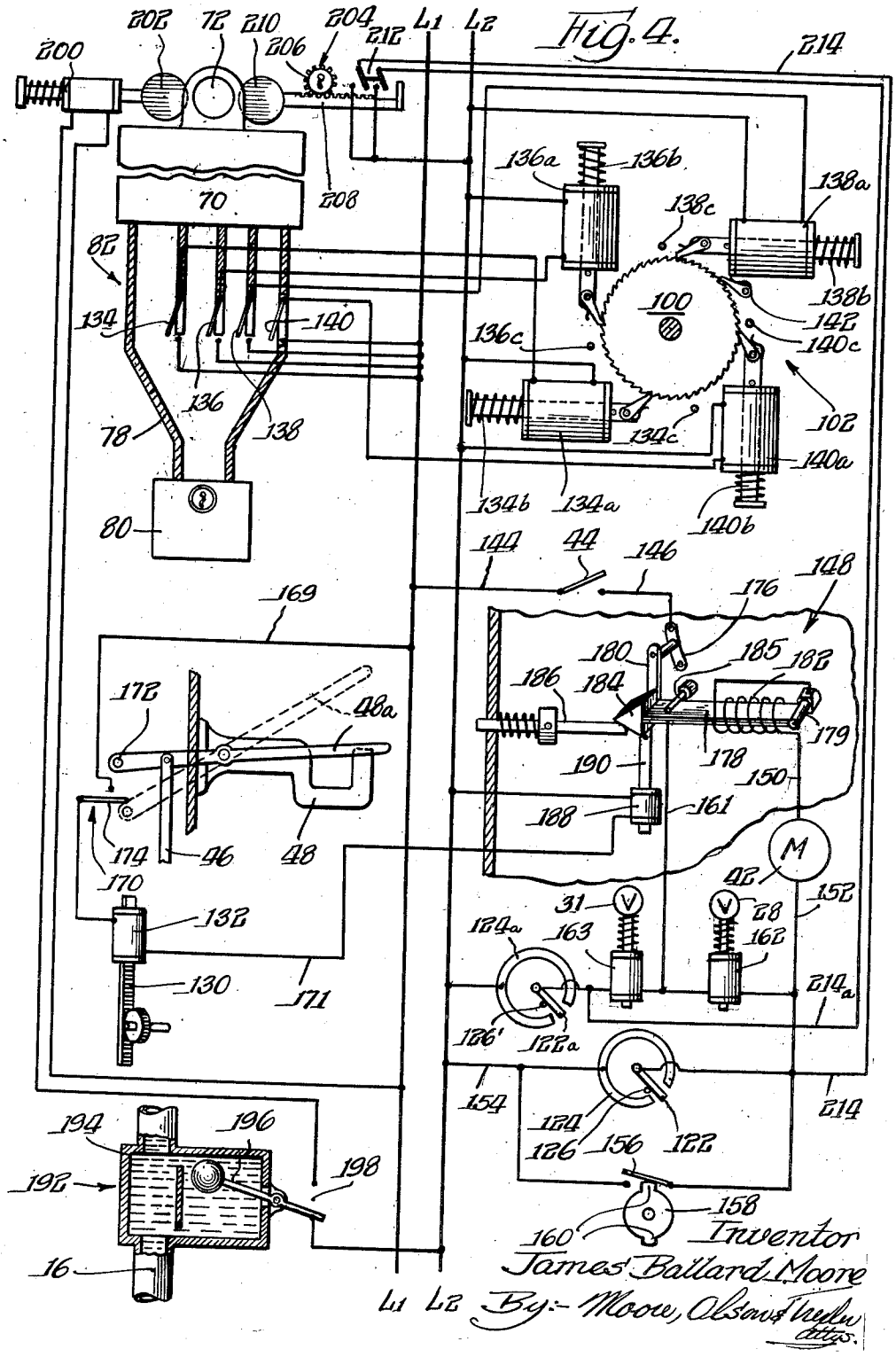
Attys.

April 6, 1954 J. B. MOORE 2,674,361

COIN-CONTROLLED DISPENSING PUMP

Filed Nov. 19, 1945

4 Sheets-Sheet 2



April 6, 1954 J. B. MOORE 2,674,361

COIN-CONTROLLED DISPENSING PUMP

Filed Nov. 19, 1945

4 Sheets-Sheet 3

Fig. 5.

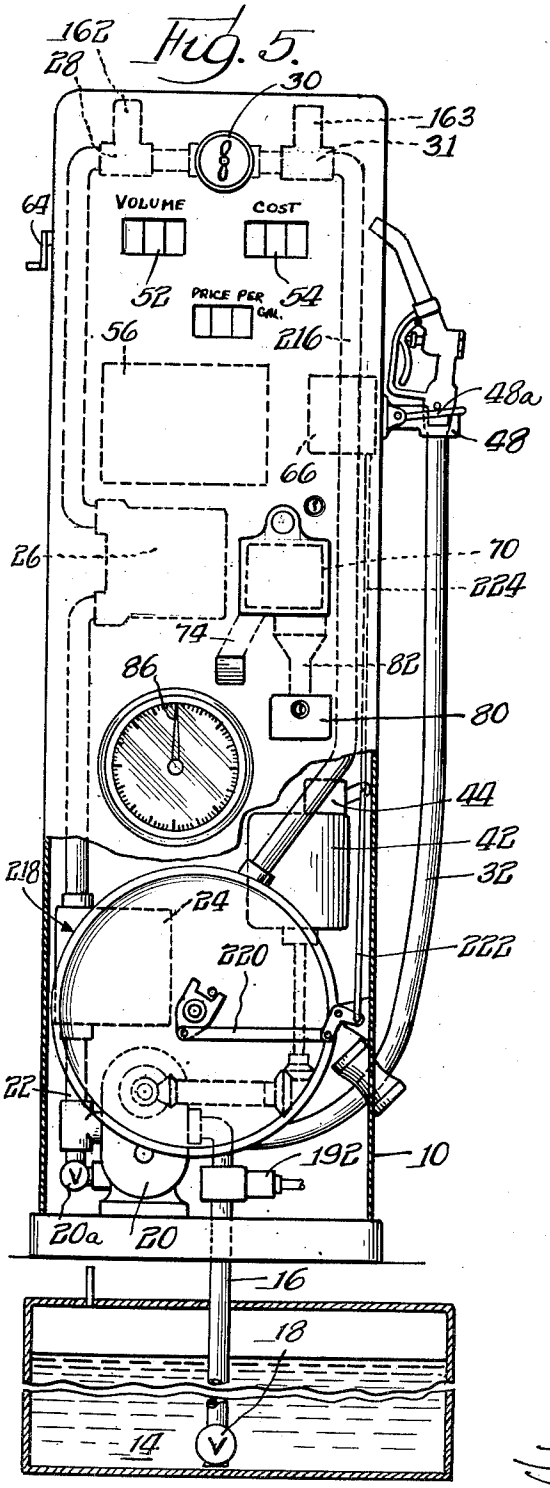
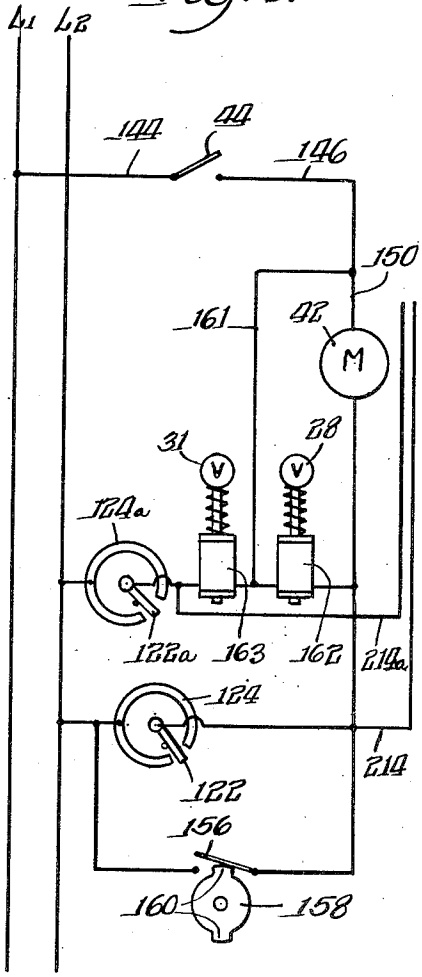


Fig. 6.



Inventor
James Ballard Moore
By: Moore, Olsen & Treyler
Attys.

April 6, 1954 J. B. MOORE 2,674,361

COIN-CONTROLLED DISPENSING PUMP

Filed Nov. 19, 1945 4 Sheets-Sheet 4

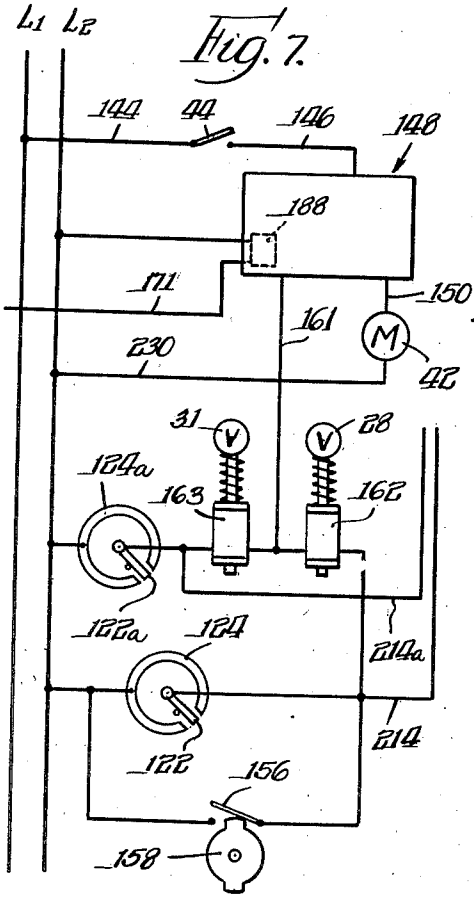


Fig. 7.

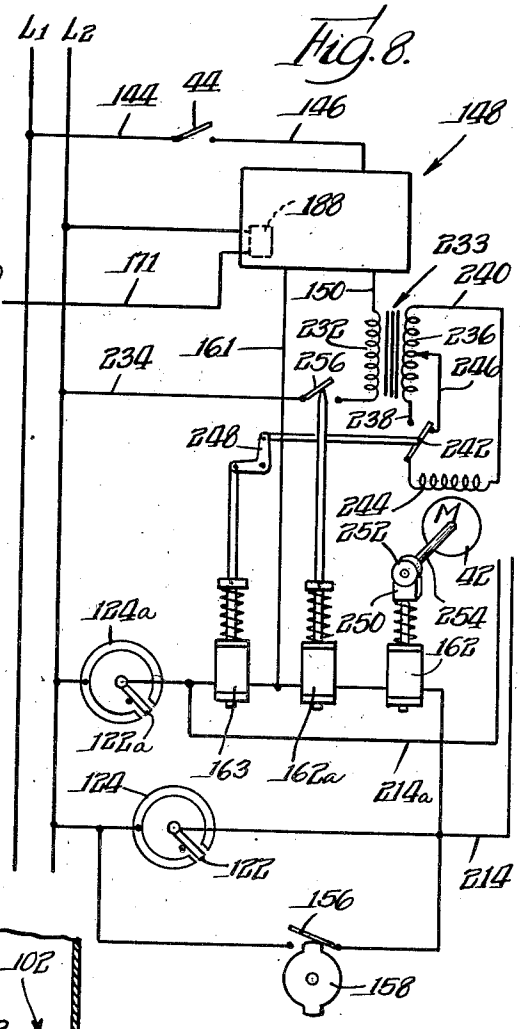


Fig. 8.

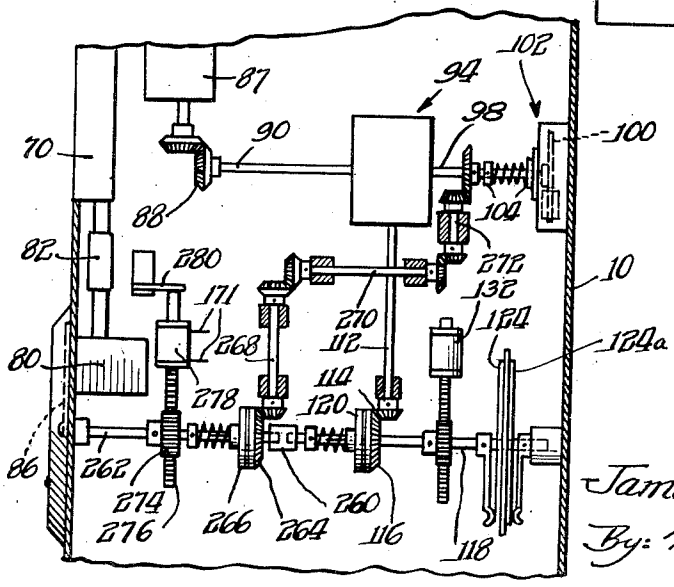


Fig. 9.

Inventor
James Ballard Moore
By: Moore, Olson & Treyler
attys.

Patented Apr. 6, 1954

2,674,361

UNITED STATES PATENT OFFICE

2,674,361

COIN CONTROLLED DISPENSING PUMP

James Ballard Moore, Chicago, Ill.

Application November 19, 1945, Serial No. 629,612

7 Claims. (Cl. 194—13)

1

This invention relates to fluid dispensing apparatus, and concerns specifically coin controlled gasoline dispensing pumps.

It is an object of the invention to provide an improved fluid dispensing apparatus of the type defined. More specifically, it is an object of the invention to provide a coin controlled gasoline dispensing apparatus of simplified construction, and of improved operating characteristics.

Further objects of the invention are to provide an improved coin controlled gasoline dispensing apparatus which may be used selectively as a coin controlled mechanism or as an operator controlled structure, as may be required; and which when adapted for coin controlled operation may be readily actuated, in a simplified and insured manner, by the customer.

Various other advantages, objects and features of the invention will be understood from the preferred illustrative embodiments hereinafter set forth.

In the drawings:

Fig. 1 is a front view, partly diagrammatic in form, of a gasoline dispensing apparatus adapted for coin controlled actuation, and embodying the features of the invention in accordance with one preferred form thereof;

Fig. 2 is an enlarged side sectional view of the structure of Fig. 1, on the line 2—2 thereof;

Fig. 3 is a diagrammatic perspective view of a part of the coin control mechanism;

Fig. 4 is an electrical circuit diagram of the device shown in Figures 1 to 3;

Fig. 5 is a view similar to Fig. 1, but illustrating a modified embodiment of the invention incorporating a hose reel structure;

Fig. 6 is a partial electrical diagram for use with the modified form of structure shown in the embodiment of Fig. 5; and

Figs. 7, 8 and 9 are illustrative views of further modified embodiments.

Referring more specifically to the drawings, in Fig. 1 there is set forth for illustrative purposes a gasoline dispensing apparatus of the type which may be employed in automobile filling stations and the like, arranged for selective coin controlled actuation. The structure comprises a housing 10 associated with an underground tank structure 12 provided with the usual supply of gasoline to be dispensed, as indicated at 14. A supply pipe 16 provided with a foot valve 18 at its lower end leads from the underground tank to the inlet of the main dispensing pump 20. The foot valve 18 comprises a check valve for preventing reverse or downward flow of the gasoline through the pipe 16, as will be understood.

2

The outlet pipe 22 of the pump leads to an air eliminator 24, which may be of standard design and construction, the air and gas-freed liquid then passing to a meter 26 operated in accordance with the volumetric rate of flow. From the meter the gasoline passes through a delivery valve 28, through the usual sight gauge, as indicated at 30, through a metering valve 31, and thence through a flexible hose 32, and dispensing nozzle 34, which may be of conventional design and construction. The delivery valve 28 when open permits unrestricted fluid flow in the dispensing line and when closed stops fluid flow. The metering valve 31 is operative when open to permit unrestricted fluid flow, and when closed to meter the flow to a predetermined slow rate. The operation of these valves will be later described.

The nozzle 34 is provided with a nozzle valve, as indicated at 36, and with the usual non-drain valve as indicated at 38. As will be understood, the non-drain valve is spring urged by a light spring pressure into closed position, sufficient to withstand the weight of the column of liquid within the hose, whereby to prevent draining of the hose, but insufficient to prevent outward flow of liquid through the hose under the propelling pressure of the pump 20 during dispensing operations.

The dispensing pump 20, provided with the usual by-pass valve 20a, is arranged to be driven through gearing 40 by means of an electric motor 42. The motor is provided with a starting switch 44 actuated by means of a rod 46 operatively connected with the hose hook switch lever 48a of the hose hook 48, the arrangement being such that motor switch 44 is closed as the hose hook lever is raised after the hose nozzle 34 has been removed from the hose hook support.

The meter is provided with a drive shaft 50, operated in accordance with the movements of the meter. The meter shaft is arranged to effect the direct drive of the volume register 52, for indicating the volume of the liquid dispensed. The meter shaft is also arranged to effect the driving of a cost register 54, for indicating the cost of the dispensed liquid, the cost register drive being effected through the intermediary of a variator, or change speed gearing adjustable in accordance with unit price, as indicated generally at 56, and having the unit price indicator 58. The variator mechanism may, for example, be of the type shown in the patent to Slye et al. No. 2,151,239, the variator cone gearing being indicated diagrammatically at 60. The variator drives the cost register through the intermediary of a shaft 62, which shaft is also connected to

the coin control mechanism, as will presently be described.

The volume and cost registers may be reset by means of the resetting crank 64. Also, the structure is preferably provided with interlock mechanism, as indicated diagrammatically at 66, connected with the hose hook switch lever 48a and with the registers by means of shaft 68 in a manner so that after the hose hook lever has been lowered, and the hose nozzle hung on the hose hook, after a dispensing operation, the hose hook lever cannot again be raised to actuate the switch 44 and start the motor for a subsequent dispensing operation until the registers have been reset to zero, viz., cleared of the registrations from the previous dispensing operation. This register reset and switch interlock mechanism may, for example, be of the type shown in the patent to Bechtold No. 2,108,028.

The coin control mechanism comprises a coin selector, as shown at 70 (see Figure 4), provided with a slot 72 through which the actuating coins may be introduced, the selector in this particular instance being arranged to receive and separate 50¢, 25¢, 10¢ and 5¢ coins, and to eliminate slugs. The selector is provided with the usual separating and slug rejecting devices, and may be of any suitable standard structure. The rejected slugs pass from the selector through a chute 74 to a return cup 76 (see Figure 1), whereas the good coins pass through a chute structure 78 to a key controlled coin storage box 80, the good coin chute including therein suitable coin switch mechanism 82 actuated by the coins, and later to be described. A window covered register dial 84 and associated pointer 86 are arranged to indicate the money value total of the coins deposited, to effect any given dispensing operation, as will also presently be described.

As best shown in Fig. 2, the cost register drive shaft 62 is arranged at its lower end by means of suitable reduction gearing 87 and a pair of bevel gears 88 to effect the drive of a shaft 90 which drives one of the side gears 92 of a differential gearing generally indicated by the numeral 94. The other side gear 96 of the differential gearing is fixed to a shaft 98 which is in turn secured to and adapted to be driven from the ratchet wheel 100 of an accumulator device 102, presently to be described. A spring pressed friction collar mechanism 104 is carried by the shaft 98 and comprises a collar splined to the shaft and resiliently urged against the housing 106 of the accumulator device, the arrangement being such as to apply a predetermined light frictional resistance to rotation of the shaft 98.

The differential housing 108 carries a ring gear 110 arranged to drive a shaft 112. This shaft is arranged by means of gears 114 and 116 to drive a shaft 118 shown in enlarged perspective detail in Fig. 3. The gear 116 is loosely mounted on the shaft 118, but is adapted to be frictionally engaged by a collar 120 splined to the shaft, the arrangement thus providing a frictional driving connection between the gear 116 and the shaft 118; the frictional strength of the device 116—120 being greater than the light frictional resistance imparted by the device 104 to the shaft 98.

As will be understood, the differential 94 may be of the side gear type, as shown, or the planetary type, as may be desired. Inasmuch as the forces transmitted through the differential are relatively small, relatively light gears such as clock gears may be employed. The differential gears and associated parts are shown relatively large in Fig. 2, for illustrative purposes, Fig. 2 thus being somewhat diagrammatic in this respect.

Shaft 118 carries the register pointer 86 at its forward end. At its rear end the shaft carries a switch arm 122 adapted for cooperation with a contact sector 124. The stop pin 126 limits the retrograde movement of the switch arm and the shaft 118, in the clockwise direction as seen in Fig. 3. The shaft also carries a duplicate switch arm 122a (see Figure 2), cooperable with with a sector 124a and stop 126' so as to form a double duplicate switch structure.

Shaft 118 also has fixed thereon a gear 128 cooperable with rack 130, the end of which forms the armature of an electromagnet 132, the arrangement being such that as the electromagnet 132 is energized the rack 130 is pulled upwardly to rotate the shaft 118 in a reverse or clockwise direction, Fig. 3.

The details of the coin switch structure 82 and of the accumulator device 102 are shown in the wiring diagram, Fig. 4. It will be seen that a series of switches 134, 136, 138 and 140 are associated, respectively, with the 50¢, 25¢, 10¢ and 5¢ chutes from the coin selector 70, these switches being individually and selectively operable by a coin of the associated denomination, as it passes from the coin selector 70 through the chute 78 to the coin storage box 80. The switches 134, 136, 138 and 140 are associated, respectively, with electromagnets 134a, 136a, 138a and 140a by wiring connections, the arrangement being such that when any switch is closed the associated electromagnet will be energized by circuit connections between the power lines as diagrammatically indicated at L_1 and L_2. Each of the electromagnet armatures 134b, 136b, 138b and 140b carries a pawl that is spring urged into engagement with the ratchet wheel 100, the arrangement being such that as the electromagnets are energized the ratchet wheel is propelled in a forward or counterclockwise direction as seen in Fig. 4. A stop pin 134c is so positioned that the armature 134b will impart ten steps of movement to the ratchet wheel, the armature pawl also becoming wedged against the stop pin to prevent overthrow. Similarly a stop pin 136c is positioned so that the armature 136b when actuated imparts five steps of movement to the ratchet wheel. A stop pin 138c is arranged so that the armature 138b imparts two steps of movement to the ratchet wheel, and a stop pin 140c is arranged so that the armature 140b imparts one step of movement to the ratchet wheel. The armatures thus selectively actuate the ratchet wheel distances determined by their respective money values. A holding pawl 142 is spring urged into engagement with the ratchet wheel 100 and precludes operation thereof reversely or in a clockwise direction.

Referring further to Fig. 4, it will be seen that the energizing circuit for the motor 42 comprises a line 144 leading from the power line L_1, the hose hook lever motor switch 44, a line 146, a thermal safety device 148, the function of which will be presently described, a line 150, the motor 42, a line 152, the coin switch mechanism 122—124, and a line 154 returning to the power line L_2, the arrangement thus being such that the motor circuit is energized whenever both the hose hook lever switch 44 and the coin switch mechanism 122—124 are closed.

Disposed in parallel with the coin switch mech-

anism 122—124, between the wires 152 and 154 is a switch 156, which as shown in Figs. 2 and 4 is associated with and actuated by the lowest order wheel or cents wheel 54a, see Figure 1, of the cost register. More particularly, the cents register wheel has fixed thereto a cam 158 provided with a pair of operating projections 160 at diametrically spaced points, the arrangement being such that the cam projections open the switch 156 twice during each revolution of the cents wheel, precisely as the cents wheel reaches its "5" and "0" positions as the cents wheel rotates in its forward or recording direction during a dispensing operation. It will thus be seen that circuit connections between the wires 152 and 154 will be closed when either the register switch 156 or the coin mechanism switch 122—124 is closed, and broken only when both switches are open.

The delivery valve 29, previously referred to, is provided with an operating solenoid 162, Figs. 1 and 4, the arrangement being such that the delivery valve is opened whenever the solenoid is energized, and spring urged to closed position when the solenoid is deenergized. The delivery valve may be of any suitable construction, operative as previously described to preclude fluid flow through the dispensing line when the valve is closed. As shown in Fig. 4, the solenoid 162 is interconnected between a line 161 leading from the thermal safety device, and the line 152.

The metering valve 31 is provided with an operating solenoid 163, Figs. 1 and 4, the arrangement being such that the metering valve is opened whenever the solenoid is energized, as in the case of the delivery valve. The metering valve solenoid 163 is disposed between the lines 161 and the power line L_2, under control of the coin switch 122a—124a.

In the operation of the structure, to effect a coin controlled dispensing operation, the customer may drop coins to any aggregate value within the limits set by the dial and contact switches of Figure 3, into the coin selector 70. The coins must be introduced one at a time inasmuch as there is only one coin opening 72. As the coins are accepted and passed to the coin box 80, the appropriate switches 134, 136, 138 or 140 will be actuated, thereby imparting an aggregate movement to the ratchet wheel 100, in a forward or counterclockwise direction, as seen in Fig. 4, corresponding to the money value of the coins deposited. Inasmuch as the shaft 90 is at this time stationary, the meter 26 being locked from movement by the stationary liquid column within the dispensing line, the movement of the ratchet wheel 100 and its connected shaft 98 causes the differential 94 to impart a corresponding increment of movement to the shaft 112 and the shaft 118, thereby moving the register pointer 86 to a position indicating the total value of the coins deposited, and simultaneously moving the switch arms 122 and 122a onto the contact sectors 124 and 124a to establish circuit connections between the lines 152 and 154, and between the lines 161 and L_2. Inasmuch as the hose hook lever motor switch 44 is at this time open, the motor and the delivery valve and metering valve solenoids 162 and 163 are not energized, regardless of the movement of the coin switches 122—124 and 122a—124a, and regardless of the position of the register switch 156.

The appropriate coins having been deposited, the customer next resets the volume and cost

registers 52 and 54, from the previous dispensing operation by means of the resetting crank 64. In view of the interlock mechanism 66 provided, this resetting operation must be effected before the hose hook lever 48a can be raised. During the resetting, the cost register switch 156 may be opened and closed a number of times, the hose lever switch 44 however still remaining open to preclude the establishing of the motor circuit or the energizing circuits to the solenoids. After resetting the registers, the customer removes the hose nozzle from its support hook and raises the hose hook lever 48a, thus closing the motor switch 44, and completing the motor circuit through the closed coin switch 122—124 and the motor thereupon starts. Simultaneously, the solenoid 162 for the delivery valve is energized through coin switch 122—124, and solenoid 163 for the metering valve is energized through coin switch 122a—124a, and both the delivery valve and the metering valve open.

The dispensing now may be effected in the usual manner at full or partial flow rates by the appropriate opening and closing of the nozzle valve 36. At any time during the dispensing the customer may deposit additional coins into the coin slot, adding to the amount of gasoline to be received, such additional coin value being immediately registered by the pointer 86 and also effecting the appropriate additional movement of the switch arms 122 and 122a.

During the dispensing, the rotation of the meter effects the movement of the shaft 62, the movement of the shaft being proportional to the cost of the fluid dispensed, due to the action of the variator mechanism 56. Movement of the shaft 62 effects the corresponding movement of the differential shaft 90. The movement of the shaft 90 is transmitted through the differential to the shaft 112, the arrangement being such that movement of the meter 26 in a forward or dispensing direction rotates the shaft 112 in a reverse direction in respect to the direction of movement imparted to shaft 112 by the rotation of the ratchet wheel 100. The differential shaft 98 does not move, except upon energization of one or more of the electromagnets 134a, 136a, 138a and 140a, due to the presence of the friction mechanism 104.

The reverse rotation of the shaft 112 and connected shaft 118 during dispensing restores the pointer 86 to zero and the switch arms 122 and 122a to open circuit position, as shown in Fig. 3. It will be noted that there is a space 168, Fig. 3, between the end of the contact sector 124 and the switch arm 122, when the switch arm is in home position, the arrangement being such that the switch arm leaves contact with the sector when approximately 3¢ worth of gasoline still remains to be dispensed. Similar spacing is provided in the case of switch 122a—124a, as will be understood. During the dispensing, the cost register switch 156 is intermittently opened each time the units order register wheel 54a passes its "5" and "0" positions. So long as the coin switches remain closed this is immaterial. However, when only 3¢ worth of gasoline remains to be dispensed, coin switches 122—124 and 122a—124a are opened. The opening of switch 122a—124a deenergizes the metering valve solenoid 163 and the metering valve 31 closes to slow down the dispensing flow rate. At this time the cost register switch 156 is closed so the opening of switch 122—124 is immaterial and the delivery valve solenoid 162 and the

motor 42 remain energized; but when the register wheel 54a next reaches its "5" or "0" position, both switches 156 and 122—124 will now be open, and the circuit between lines 152 and 154 will be broken, deenergizing the motor and closing the delivery valve 28. By this means the termination of the dispensing operation is slowed down and then accurately controlled by the position of the cents wheel 54a insuring accurate registration and measurement. It is to be noted that the cents wheel always will stop in either its "5" or "0" position, due to the fact that the coin selector 70 receives only 5¢, 10¢, 25¢ and 50¢ coins.

Should the customer decide that he wants additional gasoline, he need merely deposit further coins whereupon the coin switches will be shifted the appropriate distance, energizing the motor and opening the valves, as will be understood.

To complete the operation, the customer merely restores the nozzle to its support hook, simultaneously actuating the nozzle switch lever 48a to open the switch 44 in the usual manner. The non-drain valve 38 prevents draining of the hose.

It may happen that after depositing coins to a certain value, the customer finds that his automobile tank will not hold gasoline to the full amount of the coins deposited. In such event, when his tank is full, he merely closes the nozzle valve 36, and restores the hose nozzle to its support hook. This restoring movement operates the hose switch lever 48a, breaking the motor circuit. Additionally, in accordance with the invention, means is provided in such event for automatically restoring the apparatus to normal condition, for use by the next customer.

This mechanism comprises the solenoid 132 and rack 130, Figs. 2 and 4. As shown in the wiring diagram, Fig. 4, the solenoid 132 is interconnected between the lines L_1 and L_2 through lines 169 and 171 and a switch 170 associated with the nozzle hook lever 48a, for control thereby. More particularly, the lever 48a at its inner end carries a pin 172 arranged to engage the shiftable contact arm 174 of the switch 170. The arrangement is such that the pin wipes past the switch arm 174 as the lever 48a is raised, without closing the switch, but engages the switch arm to actuate the switch to closed position as the hose hook lever 48a is restored downwardly from its dotted line to its full line position as the hose nozzle is rehung upon its support hook. Accordingly the solenoid 132 will be energized each time the nozzle is returned to its support hook. Such solenoid energization draws the armature end of the rack 130 upwardly, restoring the pointer 86 and the switch arms 122 and 122a to home position, as shown in Fig. 3. During such restoring movement of the shaft 118 the friction device 116—120 operates, and no movement is imparted to the differential shaft 112, the differential shaft 90 being locked by the stationary meter, and the differential shaft 98 being precluded from movement by the holding pawl 142 in engagement with the ratchet wheel 100. As will be understood, the solenoid 132 will be energized each time the nozzle is restored to its support hook, but unless an undispensed quantity of gasoline remains, the shaft 118 will already be in its home position with the switch arm 122 in engagement with the stop pin 126, Fig. 3.

The use of the foregoing restoring mechanism including the solenoid 132 and switch structure 170 is, of course, optional.

It also may happen, either through inadvertence or by design, that the customer may fail to dispense the full quantity of gasoline for which coins have been deposited, and may also fail to restore the nozzle to its support hook, in which event the pump motor 42 would continue to operate were safety means not provided. In accordance with the present invention means is provided for cutting out the motor if it remain in operation for an inordinate period of time, considerably in excess of a normal dispensing operation. Such means comprises the thermal safety switch 148, Figs. 1 and 4, previously referred to.

As shown in Fig. 4, this safety switch comprises a contact sector 176 connected to the wire 146 of the motor circuit, and a bimetallic arm 178 fixed at one end 179 and connected to the wire 150. The bimetallic arm carries an upstanding switch contact portion 180 normally in engagement with the switch sector 176, the energizing current for the motor thus passing through the contact sector 176, the contact 180, and the arm 176, between the wires 146 and 150. A heating coil 182 is arranged in series in the circuit, the arrangement being such that the heating coil is energized continuously during energization of the motor circuit.

If the motor remains in operation for an inordinate period of time, the heating coil 182 will be heated sufficiently to cause the V-shaped head portion 184 of the bimetallic arm 178 to move downwardly away from the stop pin 185. A spring pressed plunger 186 engages the wedge-shaped head 184 in such a manner that when the head is moved downwardly a predetermined distance the point of the head moves past the plunger 186, whereupon the plunger causes the arm 178 to move downwardly sharply, breaking the motor control circuit between the switch sector 176 and the switch contact 180.

The plunger 186 will hold the motor circuit broken until the energization of solenoid 188, the armature of which comprises a link 190 connected to the head portion of the bimetallic arm. The arrangement is such that energization of the solenoid 188 projects its armature upwardly as seen in Fig. 4, whereby to restore the bimetallic arm 178 upwardly against pin 185 and past the dead center of the plunger 186, restoring the motor circuit. As previously indicated, the solenoid 188 is arranged in the circuit of the hose hook lever switch 170 so that the solenoid 188 will be energized simultaneously with the solenoid 132 each time the hose hook lever is moved downwardly as the hose nozzle is restored to its support hook.

Accordingly in the event that the motor should remain in operation an inordinate length of time, the bimetallic arm 178 will operate to break the motor circuit, and the motor circuit will thereupon remain broken, but the circuit will be automatically restored to normal merely by the placing of the hose nozzle back upon its support. The restoring of the hose will thus restore the thermal switch mechanism 148, but will simultaneously open the motor switch 44 so that the motor will not again be energized until the next dispensing operation.

It may happen that the supply of gasoline will run out in the underground tank while the dispensing apparatus is unattended and set for coin operation. In such event means is provided for protecting the customer from the non-productive deposit of coins. This means comprises a float mechanism 192, Figs. 1 and 4, disposed in the pump supply pipe 16 previously described.

As best shown in Fig. 4, the float mechanism 192 comprises a casing 194 within which is disposed a float lever 196 pivotally mounted on the casing, in a fluid tight manner, the arrangement being such that the float end of the lever is maintained upwardly, as shown in Fig. 4, when the chamber 194 is full of gasoline. The chamber 194 remains filled with gasoline during normal dispensing, and between dispensing operations, due to the foot valve 16; but in the event that the supply of gasoline becomes depleted in the underground tank, the chamber 194 will become empty and the float will drop.

This movement of the float lever will close a switch 198, thereby energizing the solenoid 200, the switch 198 and the solenoid 200 being interconnected between the lines L_1 and L_2 as shown. Energization of the solenoid 200 projects a flag member 202 over the coin slot 72 so that the dropping of coins into the selector 70 is prevented.

The mechanism may be readily converted from coin operation to operation by means of an attendant or operator, merely by actuating a conventional key controlled lock mechanism 204, Figs. 1 and 4. As the lock barrel 206, Fig. 4, is rotated upon the insertion of the attendant's key, a rack member 208 geared thereto is projected to the right or left. The rack member is shown in the position adapting the apparatus for coin controlled operation in Fig. 4. When the rack member is projected to the left from the position shown, the flag portion 210 thereof covers the coin slot 72, and a projection on the rack member effects the closing of a switch 212 which shunts out the coin switches 122—124 and 122*a*—124*a*. More particularly, lines 214 and 214*a* interconnect the motor control and solenoid circuit to the line L_2 through the switch 212, the arrangement being such that when the switch is closed the motor control circuit is controlled by the hose hook lever switch 44, in conventional manner.

In Figs. 5 and 6 an embodiment is illustrated adapting the principles of the invention to a gasoline dispensing apparatus of the hose reel type.

As will be understood, the major elements of the apparatus are the same as in the embodiment previously described, and detailed description is therefore believed to be unnecessary. Also, the hose reel mechanism, the hose hook mechanism, and the register reset interlocking mechanism are preferably of the type shown in the patent to F. B. Eilers No. 2,340,871, to which reference may be made for details.

As shown in Fig. 5, in adapting the structure for hose reel operation, the dispensing line after leaving the sight glass 30 and metering valve 31 passes downwardly inside the housing through a rigid pipe 216 which connects with the hose reel mechanism generally indicated by the numeral 218, and corresponding to the hose reel 20 of said Eilers patent. The flexible dispensing hose 32 connects with the hose reel, the arrangement being such that the hose may be pulled to any desired length and still receive the flow of gasoline from the pipe 216 through the hose reel structure.

As in said Eilers patent, a link 220 actuated by movement of the hose reel is connected to the motor switch 44 through the intermediary of a link 222. Similarly the lever 48*a* associated with the hose nozzle support connects with the motor switch through a downwardly extending link 224 corresponding to the link 52 of the Eilers patent, and differing from the link 46 previously described in that the link 224 and the hose hook lever 48*a* are not positively connected.

As is pointed out in said Eilers patent, to effect a dispensing operation the hose nozzle is removed from its support and the hose hook lever 48*a* thereupon raised. This conditions the link 224 so that it can be raised as the hose reel is rotated by the outward pulling of the hose, the link 224 being thus raised by the raising of the hose reel link 222 as the hose reel is shifted, resulting in the closing of the motor switch 44 which is in this instance moved to closed position by the upward movement of the links.

As further pointed out in said Eilers patent, reverse rotation of the hose reel upon retraction of the hose effects the opening of the motor switch after the hose has been retracted a predetermined distance. Register reset interlock mechanism is also provided so that after the hose has been hung upon its nozzle support and the lever 48*a* lowered, the lever cannot again be raised to permit the reclosing of the motor switch until the register mechanism 52 and 54 has been reset.

The motor and the metering and delivery valve energizing circuit for the structural embodiment of Fig. 5 is illustrated in Fig. 6. It will be seen that the energizing circuit in this instance comprises the wire 144 and the motor switch 44 as previously described. However, in this instance the wire 146 leading from the motor switch is directly connected to the wire 150 and the motor, the thermal safety mechanism 148 being eliminated. The thermal safety mechanism is unnecessary in Fig. 5, inasmuch as the spring return for the hose reel 218 will insure the retraction of the hose and the automatic opening of the motor switch 44, even if the customer should inadvertently or designedly drop the hose nozzle on the ground and leave it. It is, of course, to be understood however that the thermal safety mechanism may be employed in the structure of Fig. 5, if desired.

In the event the thermal safety mechanism is eliminated, as will be understood, the solenoid 132, Fig. 4, will be directly connected to the line L_2, the solenoid 188 in such instance not being provided.

In certain instances it may be desirable to retain the motor in operation until after the hose nozzle is restored to its support, the motor thus being exclusively under the control of the hose nozzle lever 48*a*, Fig. 1, and its associated switch 44. An electrical wiring arrangement for effecting this operation is shown in Fig. 7.

It will be seen that the motor circuit in this instance is essentially similar to Fig. 4, except that the motor energizing circuit is independent of the coin switches, and under control exclusively of the switch 44 and the thermal safety device 148. More particularly, as shown in Fig. 7, the motor 62 is in this instance connected directly to the line L_2 by means of a wire 230. It will thus be seen that the motor will be energized and deenergized as the switch 44 is closed and opened, the thermal safety mechanism operating as in the structure of Fig. 4. The delivery valve and metering valve solenoids 182 and 183 are under the control of the coin switches, and operate in the same manner as previously described in reference to Fig. 4.

In Fig. 8 an embodiment is illustrated, also generally similar to the embodiment of Figs. 1–4, but wherein the dispensing is effected by

controlling the starting and stopping of the motor, the delivery and metering valves in this instance being eliminated.

More particularly, referring to Fig. 8, the energizing circuit for the motor in this instance comprises the line 144 leading from the line L_1, the switch 44, the line 146, the thermal safety device 148, and the line 150 leading to one end of the primary coil 232 of a suitable transformer 233. The other end of the primary coil connects to the power line L_2 through a return wire 234.

The opposite ends of the secondary coil 236 of the transformer are connected to wires 238 and 240 which when the switch 242 is in one position interconnect said wires with the motor coil 244. When the switch 242 is in its other position, as shown in Fig. 8, it interconnects the motor coil 244 between the wire 240 and a central tap wire 246 of the transformer, whereby to energize the motor coil at reduced voltage.

The switch 242 is operated through the intermediary of a bell-crank 248 actuated by the solenoid 163 which is connected in the circuit in the same manner as the metering valve solenoid 163, Fig. 4, previously described. The arrangement is such that when the solenoid 163 is energized the switch 242 is actuated to a position opposite from that shown in Fig. 8, to apply full voltage to the motor, the switch being normally spring urged into the reduced voltage position, as shown.

The solenoid 162, connected in the circuit in the same manner as the delivery valve solenoid 162, previously described, actuates a brake 250 cooperable with a wheel 252 carried by the motor shaft, as indicated at 254. The arrangement is such that when the solenoid 162 is energized, the brake is withdrawn, the brake being normally spring urged into engagement with the wheel 252 to hold the motor shaft in stationary position. An additional solenoid 162*a* is connected in series with the solenoid 162, for actuation therewith. This solenoid is connected to a switch 256 arranged in the power line 234, the arrangement being such that the switch is normally spring urged to open position, and closed upon the energization of solenoid 162*a*.

In the operation of the structure of Fig. 8, the deposit of coins closes the coin switches 122—124 and 122*a*—124*a*, which however, does not effect energization of the solenoids 162, 162*a* and 163 until the motor control switch 44 is closed. As the switch 44 is closed, current is applied to the line 161 energizing solenoid 162 to release the brake, energizing solenoid 162*a* to close the switch 256, and energizing solenoid 163 to shift the switch 242 to apply full voltage to the motor. As the switch 250 closes, the power circuit for the transformer is energized and the motor starts.

When only 3¢ worth of gasoline remains to be dispensed, solenoid 163 is deenergized, as previously described, actuating the switch 242 to apply a reduced voltage to the motor, thus slowing down the motor to a suitable reduced speed. Upon the opening of switch 150, as the full quantity of gasoline to be dispensed has been delivered, the solenoids 162 and 162*a* are deenergized opening the transformer power circuit and applying the brake to the motor to effect an accurate and quick stopping thereof.

In Fig. 9 a modified embodiment is illustrated wherein the money value indicator 86 is not returned progressively during the dispensing operation, but remains at a position indicating the total value of the inserted coins until the hose is restored to its nozzle support.

Referring to Fig. 9, the structure illustrated is essentially similar to that shown in Fig. 2 except that the shaft 118 which operates the coin switches is cut short and terminates within a suitable support bearing 260. The shaft 262 which carries the indicator pointer 86 on its forward end is coaxial with the shaft 118, and independent thereof. The shaft 262 is operated through a friction device 264—266, similar to the friction device 116—120, previously described. The gear 264 of this friction device is driven by a series of shafts 268, 270 and 272, and associated bevel gears, directly from the differential shaft 98 to which the ratchet wheel 100 is secured, as previously described.

In the arrangement thus provided it will be seen that as coins are deposited and the ratchet wheel 100 operated, corresponding increments of movement will be imparted to the shaft 262 and the associated pointer 86, so that the pointer indicates the value of the deposited coins. During dispensing the shaft 98 and accordingly the pointer 86 remain stationary unless further coins are deposited whereupon the indicator will be advanced the corresponding additional amount.

The shaft 262 carries a gear 274 cooperable with the rack 276, the upper end of which is formed as the armature of a solenoid 278 inserted in the control line 171, Fig. 4. It will be recalled that this control line is energized by the switch 170, Fig. 4, as the nozzle support lever 48*a* is moved downwardly as the nozzle is restored to its hose hook support. The arrangement is such that as the solenoid 278 is energized the rack 276 is drawn upwardly, the upward movement of the rack being limited by its engagement with a stop pin 280.

It will accordingly be seen that at the end of a dispensing operation, as the hose hook lever 48*a* is restored, solenoid 278 will be momentarily energized, restoring the shaft 262 and the pointer 86 to home position. This movement of the shaft tends to rotate the ratchet wheel 100 clockwise as seen in Fig. 4, which motion of the ratchet wheel is prevented by holding pawl 142. Accordingly the friction device 264—266 yields to permit the restoring movement of the shaft 262 without corresponding actuation of the differential shaft 98 and its associated parts. In the structure of Fig. 9, at the end of the dispensing operation the pointer 86 and the register 54 will both indicate the total value of the dispensed gasoline, the pointer 86 then being restored as the nozzle is restored to supported position upon the hose hook structure.

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.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A liquid dispensing mechanism including a dispensing line having a manually operable dispensing control valve, a pump in said line for developing pressure on liquid in said line and causing dispensing flow when the manually operable dispensing control valve is open, and a meter actuated by the flow of liquid through the line, in combination with an electric motor for operating said pump, a manually operable control for said electric motor, a register controlled by the meter, coin-set means, control means

settable by said coin set means and operated by the meter driven register for automatically stopping the electric motor when a predetermined value of the register is reached for stopping the dispensing flow independently of the operation of said manually operable dispensing control valve, and a thermal cut-out switch for said motor operable after a predetermined inordinately continuous operation of said motor for automatically stopping said motor independently of the automatic stopping of said motor by said coin-set means, and means for closing said thermal cut-out switch in response to operation of said manually operable control.

2. The combination comprising a liquid dispensing mechanism including a dispensing line having a manually operable dispensing control valve, a pump in said line for developing pressure on liquid in said line and causing dispensing flow when the manually operable dispensing control valve is open, a meter actuated by the dispensing flow, an electric motor for operating said pump, a manually operable control for said electric motor, a register driven in timed relation by the meter, coin set means, control means settable by said coin set means and operated by the meter driven register for automatically stopping the electric motor when a predetermined value of the register is reached for stopping the dispensing flow independently of the operation of said manually operable dispensing control valve, and means automatically operable when said motor has run continuously for a predetermined length of time for automatically stopping said motor, and means operable upon the manual actuation of said manually operable control member of said motor for re-establishing said automatically operable means to condition said motor for subsequent automatic operation.

3. In combination with a liquid dispensing line, liquid measuring means in said line, register means, mechanism controlled by said liquid measuring means for operating said register means in accordance with the actuation of the liquid measuring means, dispensing control means for controlling dispensing of liquid through said line, check control means, gearing having one part constantly connected to the register means and another part constantly connected to the check control means and a third part constantly connected to the dispensing control means, and means including said gearing for successively driving said third part in reverse directions by said check control means and by said register means, clutch means between said dispensing control means and the third part of said gearing, and means for returning the dispensing control means to initial position independently of said register means without operating said gearing, said clutch means slipping during such returning.

4. In combination with a liquid dispensing line, liquid measuring means in said line, register means, mechanism controlled by said liquid measuring means for operating said register means in accordance with the actuation of the liquid measuring means, dispensing control means for controlling dispensing of liquid through said line, and shiftable to any one of a plurality of positions, check control mechanism, means controlled by the actuation of said liquid measuring means and including gearing constantly interconnecting the register means, the check control mechanism and the shiftable dispensing control means, a portion of said interconnecting means being driven in one direction by the operation of the check control means and in the reverse direction by the operation of the register means and clutch means between said dispensing control means and said interconnecting means, and means for returning the dispensing control means to initial position independently of said register means without operating said gearing, said clutch means slipping during such returning.

5. In combination with a liquid dispensing line, liquid measuring means connected to said dispensing line, a register, means controlled by the actuation of the liquid measuring means for actuating said register, dispensing control means for controlling dispensing of liquid through said line, check control means, clutch means, a differential gearing having one part connected to the register, and another part connected to the check control means, and a third part connected to the dispensing control means by said clutch means, and reset means for conditioning said dispensing control means for another operation independently of said register, said clutch means slipping during such conditioning.

6. The combination comprising a liquid dispensing mechanism including a dispensing line having a manually operable dispensing control valve, a pump in said line for developing pressure on liquid in said line and causing dispensing flow when the manually operable dispensing control valve is open, electrically controlled means for stopping flow in said line, an electric motor for operating said pump, a manually operable control for said electric motor, a meter actuated by the dispensing flow, a register controlled by the meter and driven in timed relation therewith, coin set means, control means settable by said coin set means and operated by the meter driven register for automatically actuating said electrically controlled means when a predetermined value of the register is reached for stopping the dispensing flow independently of the operation of said manually operable dispensing control valve, a thermal cut-out switch adapted to be automatically opened upon excessive continuous operation of said motor to stop said motor, and means operated by the control means for the motor for resetting said coin settable control means and for closing said thermal cut-out switch to ensure subsequent operation of the motor.

7. A liquid dispensing apparatus comprising a dispensing line adapted to be connected to a source of liquid supply, means for propelling liquid through the dispensing line, power means for operating the propelling means, cost registering means, liquid measuring means connected to said dispensing line, means controlled by said liquid measuring means for actuating said registering means, coin controlled mechanism, means for reducing liquid flow within the dispensing line, means for terminating liquid flow within the dispensing line, means for operating both said flow terminating means and said flow reducing means under conjoint control of said registering means and the coin controlled mechanism, and independent means for operating said flow terminating means under control of the register.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
648,335	Beaumont	Apr. 24, 1900

(Other references on following page)

UNITED STATES PATENTS

Number	Name	Date
649,511	Glass	May 15, 1900
663,338	Glass	Dec. 4, 1900
755,206	Aron	Mar. 22, 1904
757,439	Conrad	Apr. 19, 1904
1,075,943	Rucker	Oct. 14, 1913
1,318,918	Pratt	Oct. 14, 1919
1,650,882	Starkey	Nov. 29, 1927
1,690,730	Jones	Nov. 6, 1928
1,834,765	Brahy	Dec. 1, 1931
1,866,523	Alexander	July 12, 1932
1,868,222	Sandberg	July 19, 1932
1,924,618	Mills	Aug. 29, 1933
1,957,901	Nehls	May 8, 1934
2,069,180	Erbe	Jan. 26, 1937
2,075,989	Jonneret et al.	Apr. 6, 1937
2,106,042	Stark	Jan. 18, 1938
2,106,582	Wall	Jan. 25, 1938
2,132,204	Davis et al.	Oct. 4, 1938
2,193,108	Mettler	Mar. 12, 1940
2,223,146	Yeomans	Nov. 26, 1940
2,265,256	Wickham	Dec. 9, 1941
2,269,937	Hart	Jan. 13, 1942
2,282,269	Tone	May 5, 1942
2,287,363	Weston	June 23, 1942
2,336,383	Alexander	Dec. 7, 1943
2,358,771	Hinds	Sept. 19, 1944
2,370,466	Hinds	Feb. 27, 1945
2,384,585	Alexander	Sept. 11, 1945
2,394,528	Alexander	Feb. 12, 1946
2,564,015	Lillig	Aug. 14, 1951
2,573,112	Schneckenburger	Oct. 30, 1951

FOREIGN PATENTS

Number	Country	Date
405,468	Great Britain	Feb. 8, 1934
410,587	Great Britain	May 24, 1934
608,924	Germany	Feb. 4, 1935