

May 25, 1954

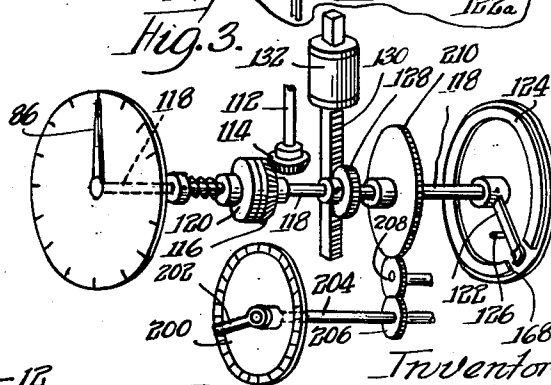
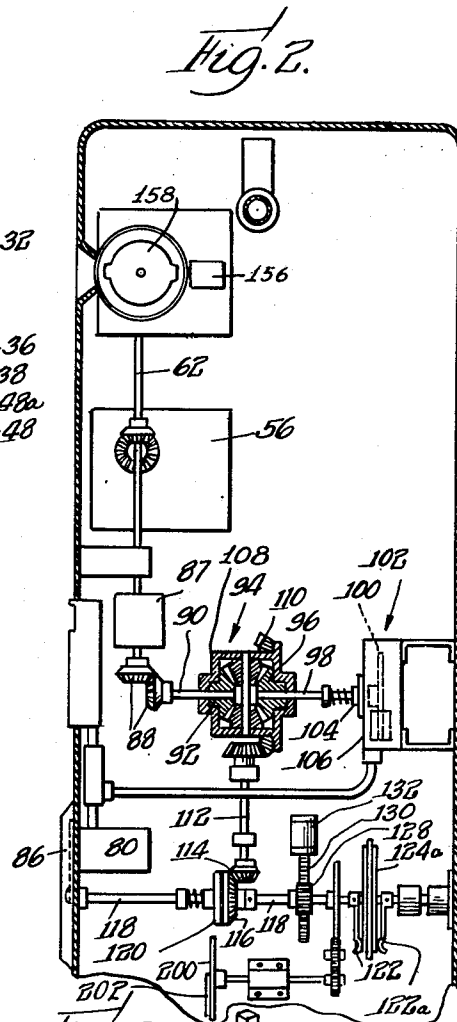
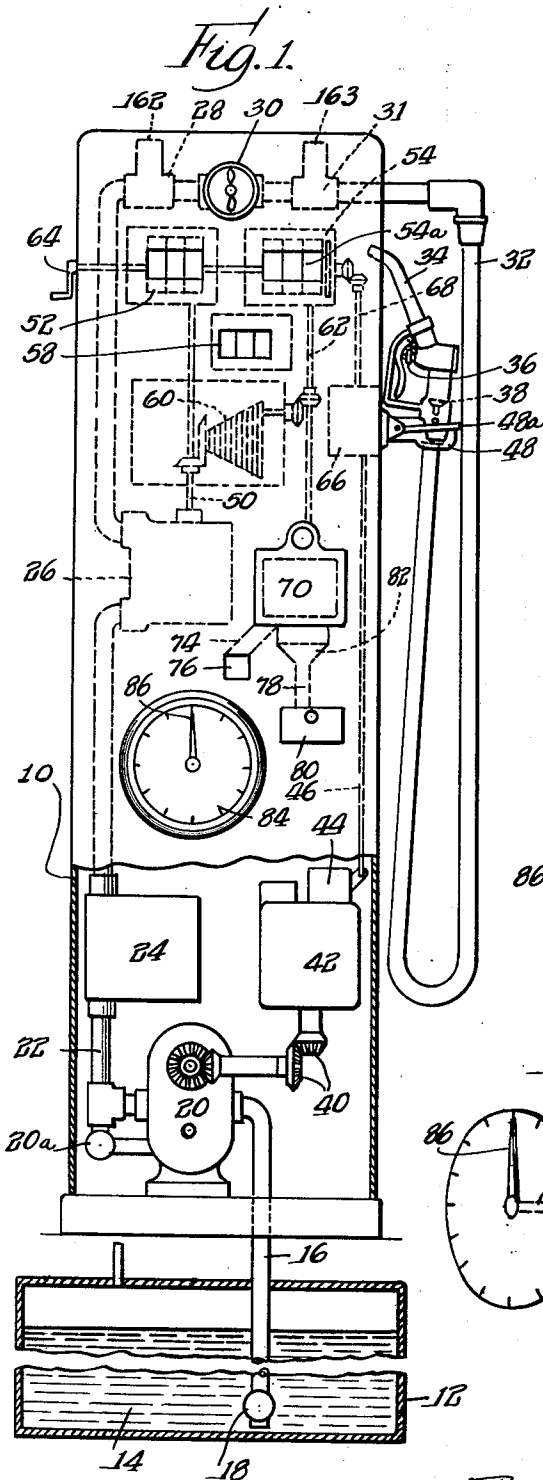
J. B. MOORE ET AL

2,679,308

COIN CONTROLLED DISPENSING PUMP

Filed Feb. 8, 1946

4 Sheets-Sheet 1



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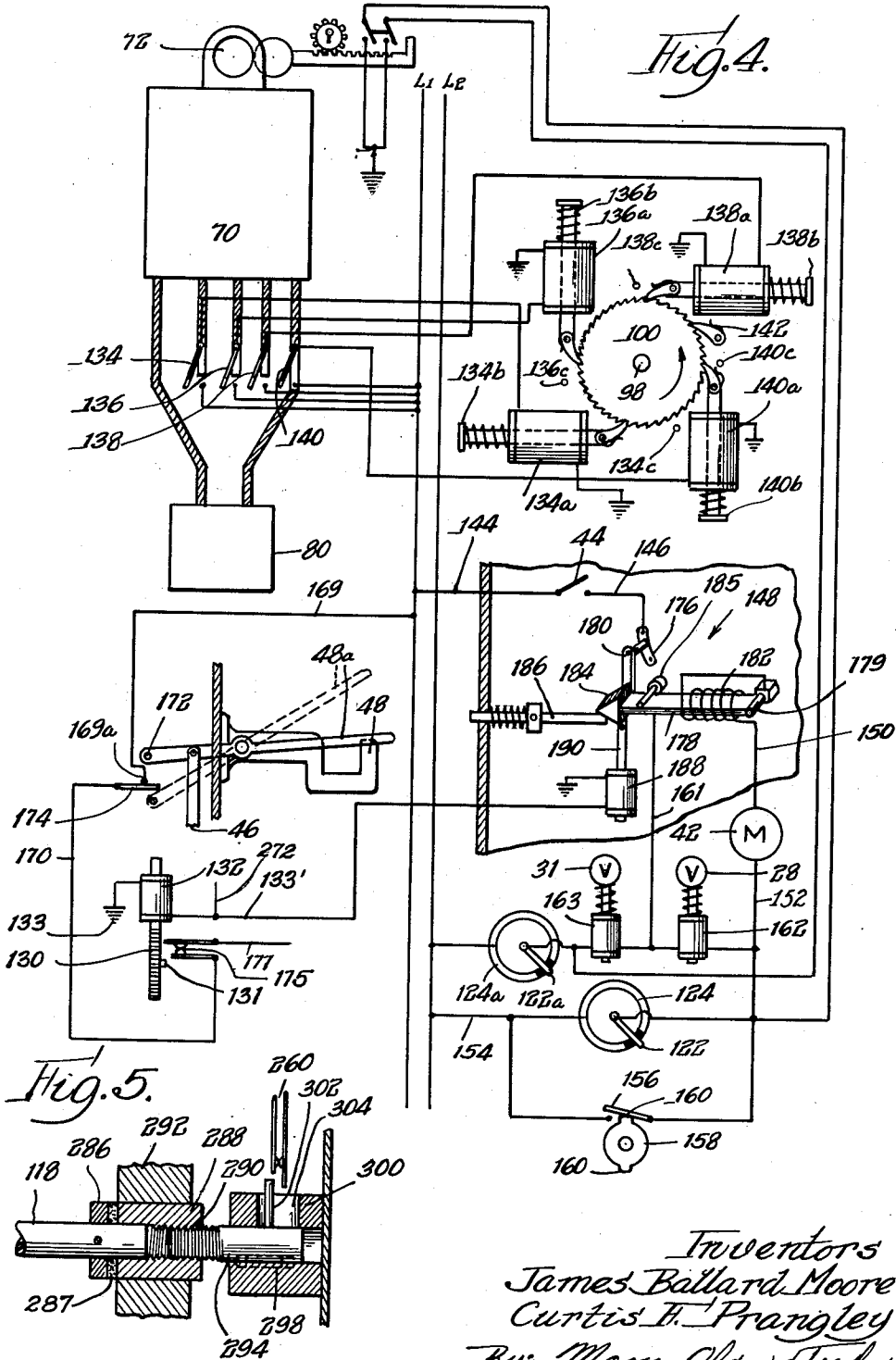
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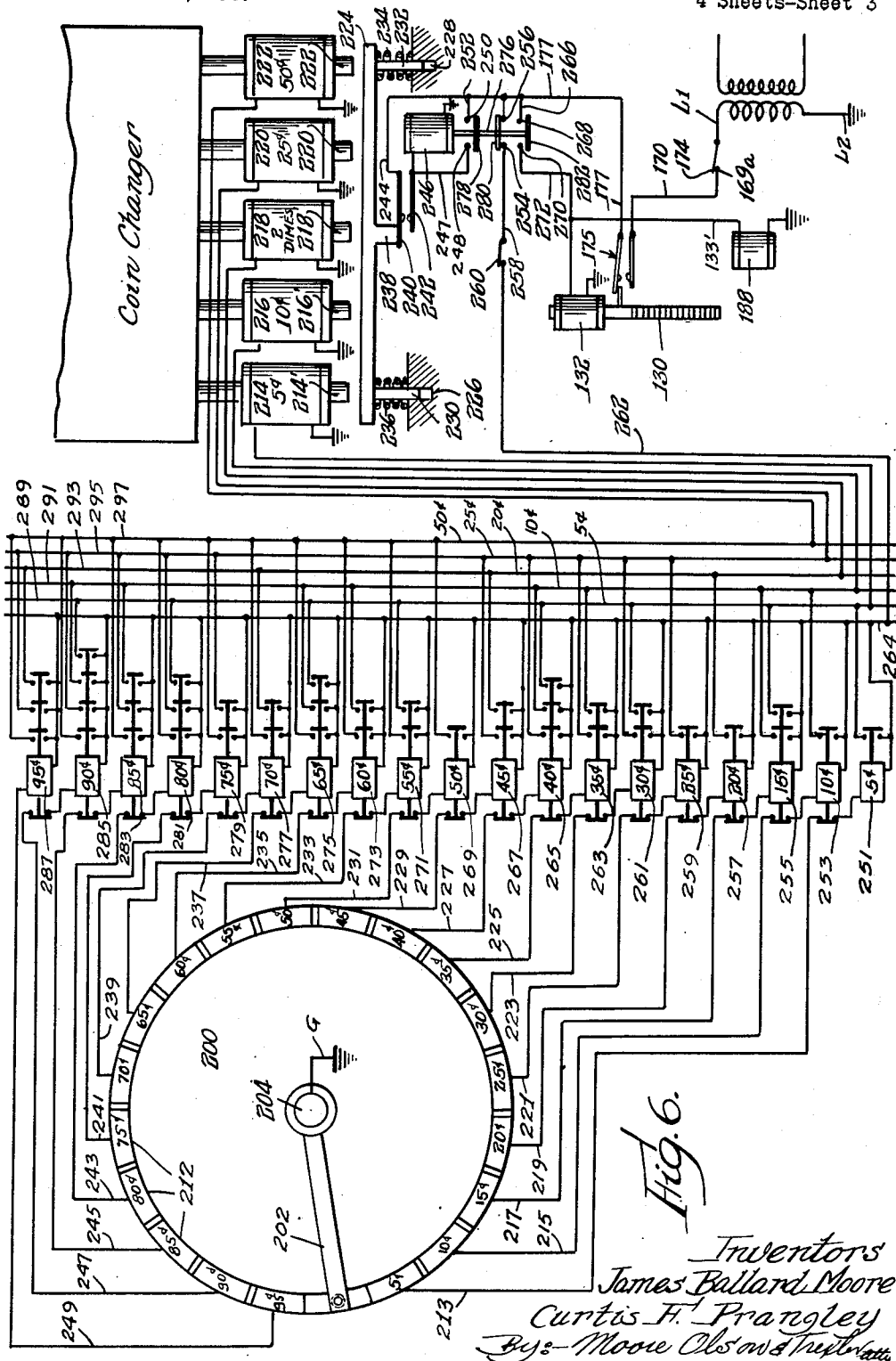
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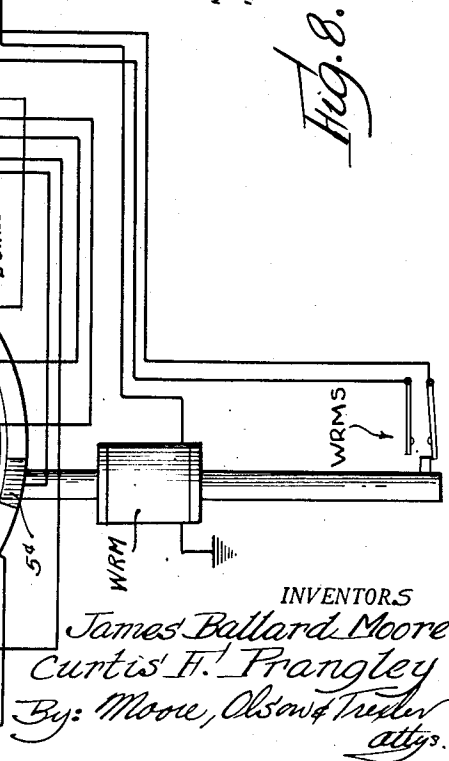
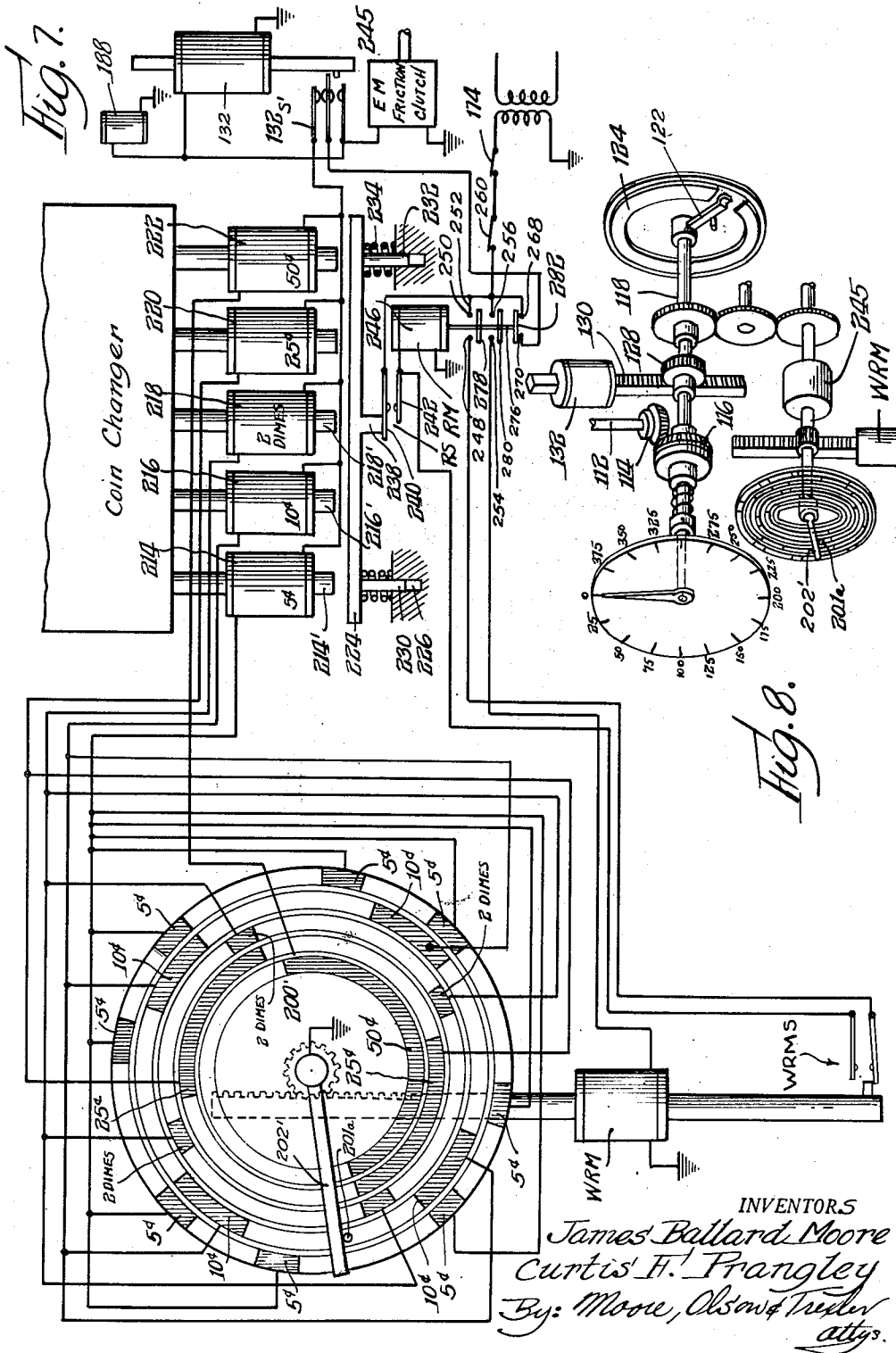
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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COIN-CONTROLLED DISPENSING PUMP

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4 Claims. (Cl. 194-13)

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The present invention relates to coin actuated liquid dispensing pumps for petroleum and other products.

Among the objects of the present invention is to provide this type of pump with coin return mechanism in which only after the dispensing is completed and the motor pump switch lever is thrown to inoperative position, are the coin values returned to the operator in accordance with the undispensed gasoline which the operator has previously paid for by depositing coins into the machine.

A further object of the invention resides in providing automatic means for returning these coins to the operator automatically upon the termination of the dispensing operation and in providing means so that the coins cannot be returned to the operator prior to the completion of the dispensing operation.

Another object of the invention resides in providing automatic means for setting up the money value of the coins to be returned after the completion of the dispensing operation and resetting of the automatic coin mechanism back to zero position, followed by the subsequent automatic actuation of the coin return mechanism to select the proper combinations of coins and discharge them or return them to the operator thereafter and in accordance with the coin value of the undispensed gasoline which the operator had previously paid for by depositing the coins in the machine.

These and other objects of the invention will be apparent from a perusal of the following specification, when taken in connection with the accompany drawings, wherein:

Figure 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;

Figure 2 is an enlarged, somewhat diagrammatic view of a portion of the differential drive of Figure 1;

Figure 3 is a diagrammatic layout of part of the coin control mechanism showing the coin return control wheel;

Figure 4 is a diagrammatic view of the coin control mechanism and part of the electrical circuits controlled by the same;

Figure 5 is a view of the friction clutch and part of the switch mechanism operated from one of the shafts shown in Figure 3;

Figure 6 is an electrical diagrammatic view of the coin changer mechanism and the coin selec-

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tor relays and coin return control wheel mechanism;

Figure 7 is a modified type of coin return mechanism showing the relay circuits and coin return control wheel; and

Figure 8 is a view of the gearing required in the modified form of Figure 7, but a similar showing corresponding to Figure 3 of the first form.

Referring more specifically to the drawings, in Figure 1 there is set forth for illustrative purposes a gasoline dispensing apparatus of the type which may be employed in gasoline filling stations and the like, arranged for selective coin control actuation. The structure comprises a housing 10 in association with an underground tank 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.

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-free 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, 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 be presently 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 at 66 connected with the hose hook switch lever 48a and with the register 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, 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 Figure 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 spring 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 Figure 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 Figure 2, for illustrative purposes, Figure 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 Figure 3. The shaft also carries a duplicate switch arm 122a cooperable with a sector 124a.

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, Figure 3.

The details of the coin switch structure 82 and of the accumulator device 102 are shown in the wiring diagram, Figure 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 L₁ and L₂. 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 Figure 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

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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 Figure 4, it will be seen that the energizing circuit for the motor 42 comprises a line 144 leading from the power line L₁, 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 L₂, 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 mechanism 122—124, between the wires 152 and 154 is a switch 156, which as shown in Figures 2 and 4 is associated with and actuated by the lowest order wheel or cents wheel 54a of the cost register, see Figure 1. 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 28, previously referred to, is provided with an operating solenoid 162, Figures 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 Figure 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, Figures 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 L₂, 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 of the machine 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 Figure 4, corresponding to the money value of the coins deposited. Inasmuch as the shaft 90 is at this time stationary, the meter 26

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being locked against 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 L₂. 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 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 the 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 60. 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, 138a, 139a 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 Figure 3. It will be noted that there is a space 168, Figure 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 and the cam 158 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 43a 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.

The mechanism for restoring the apparatus to normal condition for use for the next customer comprises a solenoid 132, see Figure 4, and a rack 130. As shown in Figure 6, the switch 174 is connected to the switch transformer through the two supply lines L₁ and L₂. The stationary contact 169a of the switch 174 is connected by means of a line 176 to a switch 175 which is normally closed. The opposite contact of the switch 175 is connected by means of a line 177 to the three contacts of a reset relay which is operable when the change coins are dropped into the coin chute. The switch 174 is operated by means of a pin 172 on the end of the hose hook lever 48a, see Figure 4, the construction being such that when the hose hook lever 48a is raised to dotted line position, the pin 172 will open and then wipe past the blade 174 without closing the switch, whereas on the downward movement of the switch lever 48a the

pin will raise the switch blade 174 to contact the switch member 169a whereby to close this switch.

The winding of the solenoid 132 has one end connected to ground 133 and the opposite end connects to a supply line 272 and a line 133' which in turn connects the line 272 to one end of the winding of the solenoid 188, the opposite end of which is grounded. The armature of the solenoid 132 comprises a rack 130 which carries the laterally extending switch actuator 131.

It may also 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 remains in operation for an inordinate period of time, considerably in excess of a normal dispensing operation. Such means comprises the thermal safety switch 148, Figure 4.

As shown in Figure 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 178, 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 178 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 Figure 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 winding of the solenoid 132 so that the solenoid 188 will be energized simultaneously with the solenoid 132.

Now referring to Figures 3 and 6 of the drawings, it will be seen that means is provided for returning coins to substantially the amount of the unused gasoline. In explanation, in the operation of the automatic coin actuated dispenser, if a person withdrawing gasoline from the device finds that his tank is suddenly overrunning and is full and he has not yet used up all the money value of the gasoline for which he has inserted coins in the device, some means must be provided for returning to him the coin value of the unused gasoline. When his tank overflows the operator

immediately shuts off the nozzle valve of the hose so that further dispensing ceases. The device for returning coins to the operator of the pump includes a coin return control dial 200 shown in Figures 3 and 6 with which is associated a dial pointer 202 mounted on a shaft 204 which through gears 206 and 208 is driven from a gear 210 on the shaft 118. The gears 210, 208 and 206 provide a predetermined motion reducer and drive the shaft 204 in the same direction as the shaft 118. As shown in Figure 6, the periphery of the dial 200 is divided up into segments 212 representing 95, 90, 85, 80, 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, and 5 cents, and then there is a blank strip of insulation 0. The shaft 204 is grounded as at G, see Figure 6. The segments 212 are separately insulated one from the other and from the dial and are connected by wires 213 to 249 to the coin selector relays 251 to 287 as shown in Figure 6. In Figure 6 the wiper arm 202 of the coin return wheel 200 successively connects the coin selector relays to ground at G and the selection is determined by the setting of the dial arm 202 on the shaft 204 when the nozzle is hung on the hook and before the switch arm 122 is reset by the electromagnet 132. The wiper 202 is wider than the space between the segments 212 of the coin return dial 200. Each of the coin selector relays corresponding to the values of 90¢, 85¢, 80¢, 75¢, 70¢, 65¢, 60¢, 55¢, 50¢, 45¢, 40¢, 35¢, 30¢, 25¢, 20¢, 15¢, 10¢, and 5¢, respectively, is controlled by back contacts of the next higher value coin selector relay so that a lower value relay can be energized when the dial arm 202 has completely left the higher value segment. The front contacts of the coin selector relays are connected in common to a supply wire 254 and to an appropriate one or combination of wires 208, 291, 293, 295 and 297 connected, respectively, to the coin changer operating magnets 214, 216, 218, 220 and 222 which correspond to 5¢, 10¢, 20¢, 25¢ and 50¢. One end of each of these electromagnets is grounded as shown. The armatures of these magnets are shown at 214', 216', 218', 220' and 222' and they are adapted to contact a relatively long yoke 224 which is guided in slots 226 and 228 and the legs 230 and 232 of which yoke are normally pressed outwardly by the coil springs 234 and 236. A central stud 238 of this yoke is adapted to move a leaf spring contact 240 into engagement with leaf spring contact 242. The leaf spring contact 240 is connected by means of wire 244 to the wire 177 previously described. The leaf spring 242 is connected to the solenoid 246 and has a wire connection 247 which terminates in a contact 248 opposite another contact 250 connected to a wire 252 that connects with wire 177. In turn there is another contact 254 and a spaced contact 256, the latter being connected to the wire 177 and the former being connected by means of a wire 258 to a switch 260, see Figure 5, which in turn is connected by means of wire 262 to the wire 264. In addition the wire 177 has a short wire lead 266 running to a contact 268 spaced from another contact 270 which is connected to wire 272 which as previously described is connected to the winding of the solenoid 132 and by wire 133' to the winding of the solenoid 188. The solenoid 246 has an armature 276 carrying switch bars 278, 280 and 282 which are positioned so that when the solenoid is operated the switch bar 282 will close the contacts 268 and 270, the switch bar 280 will break the contacts 254 and 256, and the switch bar 278 will make the con-

tacts 250 and 248. When any one of the solenoids 214 to 222 is operated the armature thereof will force the cross bar 224 downwardly against the tension of the springs 234 and 236 to make the switch contacts 240 and 242. The switch 260 is operated from an extension of the shaft 118 which carries a friction clutch plate 286, Fig. 5. The friction clutch plate 286, through the friction material 287, drives a sleeve 288 internally threaded as at 290. This sleeve 288 is rotatable in the stationary bearing 292. The internal threads of the sleeve threadedly engage the threads of a pin or stub shaft 294 which extends outwardly in registration with the shaft 118. This stub shaft is provided with a keyway that accommodates a key 298 which is affixed to the hub or bushing member 300. The keyway in the stub shaft 294 is elongated to permit the shaft to shift longitudinally with respect to the bushing 300 and the outer end of the stub shaft 294 is provided with an upstanding, laterally projecting pin 302 passing through a slot 304 in the bushing 300 to open and close the switch 260 upon turning of the shaft 118 and depending upon which way the shaft 118 is turned. The key prevents the shaft 294 from turning but permits the pin 302 to move along the slot 304 to open and close the switch 260.

The operation of the device is as follows. When coins are deposited, switch 260, see Figure 6, is opened by the first few degrees of counterclockwise rotation of the shaft 118 by ratchet wheel 100. Hence no coin selector relay can be energized while coins are being deposited and while the hose is on the hook. The switch 260 is closed by the first few degrees of clockwise rotation of the shaft 118, the pin 302 and slot 304 limiting axial motion of the stub shaft 294 and the clutch plate 286 and friction material 287 allowing the sleeve 288 to stall after the first few degrees of rotation of the shaft 118.

When, after a dispensing operation, the hose is put on the hook, the switch 174 is closed thereby, and the switch 260 having already been closed by the clockwise movement of the shaft 118 during the dispensing operation, the selector relay which is then connected to the dial arm 202 is operated to connect, through its front contacts, the proper money changer magnet or magnets to the line 264. When a coin magnet, such as 214, 216, 218, 220 or 222 operates, its plunger depresses the bar 224 below it and operates the reset switch 240, 242 to energize the reset relay 246. This relay locks itself in through its now closed contacts 248 and 250; opens circuits to the coin selector relays and coin magnets 214, 216, 218, 220 and 222 through its now open contacts 254 and 256, and through its now closed contacts 268 and 270 closes circuits to the reset solenoid 132 and the reset magnet 188. When the solenoid 132 has returned the wiper arms 122, 122a and 202 to zero positions, it opens the switch 175 to break the holding circuit, to the reset solenoid 246 and disconnects the wire 264 from the line L₁ and thereby deenergizes the coin selector relays and the coin magnets 214 to 222, inclusive.

The 90¢ relay 285 will not be energized until after the wiper 202 has completely left the 95¢ segment. Each one of the coin selector relay magnets and its front switches provides a different combination of the coin changer magnets, shown to the right in Figure 6. For instance, the 95¢ relay 287 will connect the 50¢ coin changer magnet 222, the 25¢ magnet 220 and the 20¢ or two dimes magnet 218 through wires 297,

295, and 293 to the supply wire 264. The operation of the coin changer mechanism is such that when the appropriate magnets 218, 220 and 222 are simultaneously energized the armatures will operate the coin changer, which may be of any well known construction, to eject into a discharge coin chute a 50¢ piece, a 25¢ piece and two dimes. Simultaneously, the armatures of the magnets will actuate the bar 224 against the pressure of the spring to close the switch to energize the reset relay 246 which locks itself in through its contact bar 278 and contacts 248 and 250.

When the nozzle is taken off the hook and the switch lever is thrown up the rod 46 actuates the switch 44 to start the pump motor which bypasses until the nozzle valve is open. As soon as the nozzle valve is open, the meter starts running and the meter then drives the shaft 118 reversely from the direction in which it was driven when the coins were deposited in the coin box 70.

As the shaft 118 is driven reversely, by the differential gearing, it turns the wiper arms 122, 122a and 202 in synchronism back toward zero position.

Now if for any reason the nozzle valve is closed before an amount of gasoline equal to the money value deposited is delivered the meter will stop and the arms 202, 122 and 122a will rest at predetermined angular positions dependent upon the difference between the sum deposited and the cost of the gasoline delivered. Now when, and only when, the control lever 48a, see Figure 4, is returned to full line position, thereby stopping the pump motor, is the coin change mechanism put in operation. This is due to the fact that the lever 48a in being so returned closes switch 174 for the first time, it being remembered that upon the upward movement of the lever to dotted line position, this switch was opened. However, on the depression of the lever 48a the switch 174 is closed for the first time and this now completes the circuit from the A. C. power source through the circuits already described, to the particular coin selector relay corresponding to the money segment, upon which the pointer 202 happened to rest at the moment the switch 174 was closed. The selected coin selector relay in turn renders the proper combination of coin changer magnets effective to return the proper selection of coins to the operator.

Inasmuch as the present device is arranged to return as the lowest denomination 5¢ pieces, and not pennies, it will be noted that in certain positions of the wiper 202 it will return two and one half cents more than is due the operator, while in other positions it will return two and one half cents less than is due the operator. However this averages out after a number of operations of the device, so that for all practical purposes the operator is not defrauded, and furthermore, by putting additional front contacts on the coin selector relays and making the gradations on the dial 200 in one cent increments instead of five cent increments and providing also additional coin changer magnets, all in accordance with the foregoing, the device can be made to return money value to the exact cents. It is to be understood that in this case there would be 1¢, 2¢, 3¢, 4¢ coin changer magnets, one of which would deliver 1¢, one 2¢, one 3¢, and one 4¢, in combination with any combination of 50¢, 25¢, 2 dimes, single dime or a nickel.

Regarding the modification shown in Figure 7,

the purpose of this modification is to eliminate the nineteen coin selector relays by providing a composite set of segments for cooperation with the wiper 202'. This modification works on the principle that the coins are not returned until after the switch arms 122 and 122a have been reset, and the movement of the wiper is governed by the movement of the shaft 118 after the hose has been hung on the hook and the switch lever 48a has closed the switch 174. The wiper 202' in this form does not move with the shaft 118 when that shaft is being set up by the deposit of the coins nor does it move with that shaft when it is rotated in a clockwise direction during the dispensing of the gasoline. When the hose is hung on the hook and switch 174 is therefore closed, an electro-magnetic friction clutch 245 is energized and connects the shaft which drives the wiper 202' to the shaft 118. Hence, as the shaft 118 is thereafter driven in a clockwise direction by the resetting magnet 132 the wiper 202' is driven in a clockwise direction. Assuming that the wiper 122 for the disc 124, after the dispensing operation, rests at a point which corresponds to 35¢ worth of undispensed gasoline, then obviously the shaft 118 will be driven by the reset magnet 132 to the extent of 35¢ and correspondingly the wiper 202' will be set in the position that engages a 25¢ segment and a 10¢ segment. This means that while the wiper 122 is driven back to zero, the wiper 202' in Figure 7 will be advanced, through the electric friction clutch mechanism, from zero to the 35¢ position. When the magnet 132 has completely reset the shaft 118 an abutment on the rack 130 closes the upper contacts of the switch 132S₁ and thereby completes the circuit to the 25¢ magnet and the 10¢ magnet. The plungers of the coin magnets in being pulled down to operate the coin changer again contact the bar beneath the magnets and close the reset switch RS to energize the reset relay RM. This relay through its upper contacts completes a self-locking circuit through the switch WRMS controlled by the wiper reset magnet WRM. At the same time through the second or middle contacts of the relay RM, the wiper reset magnet WRM is energized, and through the bottom contacts of the relay RM the circuit to the coin magnets is broken so that none of the coin changer magnets can be energized during the resetting movements of the wiper 202'. When the wiper magnet WRM has reset the wiper 202' to zero or home position, the resetting rack operated by that wiper magnet opens the switch WRMS and thereby breaks the holding circuit to the relay RM, and all parts are thus restored to home position and ready for the next operation.

In the device shown in Figure 6, it is only after the coins have been returned that the various wiper arms 122 and 122a and the coin changer control disc wiper arm 202 are reset or restored to zero or home position so that they are ready for the next dispensing operation of another customer, or by the same customer, if necessary. In Figure 7 the wiper arms 122 and 122a are reset to zero or home position immediately upon the hanging of the hose and it is the resetting of these which sets up the coin changer control wiper arm 202' which is restored to its zero or home position automatically after the coins have been returned.

In this connection it is to be understood that the circuits are arranged so that when the oper-

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ator dispenses all of the gasoline that he has paid for, no money will be returned to him because the wiper arms 122, 122a and 202 (Fig. 6) or 202' (Fig. 7) will be returned to, or left in, a zero position at the end of the dispensing operation, whereas when the operator has not dispensed gasoline to the value for which he has paid at the end of the dispensing operation, the wiper arms 122, 122a and 202 (Fig. 6) or 202' (Fig. 7) will be left in, or subsequently moved to an angular position dependent upon the sum of money due the operator. In Figure 6 the wiper 202 controls the return of coins, dependent upon the position which it occupies at the instant when the hose is hung on the hook and before the resetting operation takes place. In the form shown in Figure 7, however, the wiper 202' is set by the resetting operation of the shaft 118 and no coins are returned until after that shaft has been reset to zero or home position. The coins are then returned and thereafter the wiper 202' is automatically reset to zero. Stated in another way, in Figure 6, if the arm 202 rests on the 35¢ segment, when the hose is hung on the hook and the switch 174 closed, the coin selector relays will be energized immediately to shuck out or discharge 35¢ in coins. When the coins have been discharged, then the reset magnet 132 is energized and resets both the shaft 118 and the wiper 202 to their zero or home positions. On the other hand, in Figure 7 the wiper 202' is in zero or home position at the instant that the dispensing operation is concluded, and when the nozzle is hung on the hook, the reset magnet 132 is energized and the subsequent resetting movement of the shaft 118 sets the wiper arm 202' to the proper coin position, i. e., the 35¢ position, to which it arrives when the shaft 118 has been completely reset to zero position. Thereafter the 35¢ magnets are energized, the coins are discharged, and the wiper resetting magnet WRM automatically energized, after release of the coins, to reset the wiper arm 202' to its zero or home position.

Wherever the words "coin actuated" or "coin" are used in the specification, it is to be understood that the words are broadly used to cover a check or any device the equivalent of a coin.

It is to be understood that the coin change magazines, viz: the 50¢ compartment, the 25¢ compartment, the dime compartment, and the nickel compartment, may be arranged directly under the corresponding coin chute compartments of the coin receiving means so that when a particular coin has passed the switch actuator in a coin receiving chute, it will then be deposited in the corresponding compartment of the coin change mechanism, so as to continuously replenish the particular coin change compartments as they are depleted by making change. In connection with the dime and 20¢ chutes, a tilting device of well known form may be interposed so that the ten cent pieces are discharged alternately into the single dime chute and the double dime or 20¢ chute. The top portion of the coin change compartments may be open so that when they are full of coins of their particular value, any surplus coins may spill down below into a general coin receiving receptacle which is generally locked, but which may be unlocked to receive surplus coins.

The present application is an improvement on the prior application filed by James Ballard Moore, Serial No. 629,612, filed November 19, 1945,

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for Coin Controlled Dispensing Pump. It is to be understood that the present invention can be utilized in connection with the subject matter disclosed in said prior application and may be used in connection with the hose reel type of device. It is also to be understood that the present device of the instant application may be used in connection with the construction shown in Figure 9 of said prior application of James Ballard Moore, Serial No. 629,612, filed November 19, 1945, wherein the coin indicator dial 36 remains stationary after being set to the money value of the coins deposited, and remains stationary while the rotatable switch arms 122 and 122a of said Figure 9 are rotated back to zero or home position during the dispensing operation. In fact it is preferred to use the present invention with the construction shown in Figure 9 of said prior application Serial No. 629,612, filed November 19, 1945. So also in the present application it may be preferred not to use the thermal relay mechanism 148, and in lieu thereof or in addition thereto, if desired, we may utilize the hose reel construction shown in Figures 5 and 6 of the prior application Serial No. 629,612. These are minor points and do not affect the operativeness of the coin return mechanism.

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 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, a meter associated with the liquid dispensing line and operable in accordance with the liquid flow there-through, cost registering means associated with said meter, coin control means shiftable above a zero position by the insertion of coins to any of a plurality of predetermined positions according to the value of the coins inserted to establish a predetermined value of liquid to be dispensed, said coin control means being returned to zero by the movement of said cost registering means for terminating the dispensing flow after said predetermined value of liquid has been dispensed, manually operable means for terminating the dispensing flow independently of said means controlled by the cost registering means and with the coin control means remaining at a position above zero corresponding to the value of the liquid preselected and not dispensed, and means actuated by said manually operable means for discharging a number of coins to the customer equal in value to the position at which the preselecting means remains at the time the dispensing operation is terminated by said manually operable means, and means operated by manipulation of said manually operable means for also reconditioning said coin control means and said means actuated by manually controlled means for a subsequent unrelated dispensing operation.

2. In a device of the class described, in combination with a liquid flow line, pumping means for propelling liquid through the flow line and a motor for the pumping means, said flow line having a nozzle with a manually actuatable valve therein, a meter associated with the line and

operable in accordance with the liquid flow therethrough, a register operable in accordance with the movement of the meter, said register having a cost indicator, a coin actuated mechanism, a turnable device having an initial position and adapted to be driven away from said position by the coin actuated mechanism and to be driven toward said initial position by the cost indicator actuating mechanism of the register, mechanism including a dispensing control means actuated by the turnable device on returning to said initial position for terminating dispensing through said line, a manually actuatable switch control means for the motor for stopping and starting the same, coin change discharge means, means operated by said manually actuatable switch control means when actuated to motor stopping position for returning the turnable device to said initial position if the latter is in a position removed therefrom and for operating said coin change discharge means for returning coins to the customer, said coin change discharge means being controlled in part by said turnable device and operable to discharge coins only when said turnable device is away from initial position.

3. In a device of the class described, in combination with a liquid flow line, pumping means for propelling liquid through the flow line and a motor for the pumping means, said flow line having a nozzle with a manually actuatable valve therein, a meter associated with the line and operable in accordance with the liquid flow therethrough, a register operable in accordance with the movement of the meter, said register having a cost indicator, a coin actuated mechanism, a turntable device having an initial position and adapted to be driven away from said position by the coin actuated mechanism and to be driven toward said initial position by the cost indicator actuating mechanism of the register, mechanism including dispensing control means actuated by the turnable device on returning to said initial position for terminating dispensing through said line independently of said manually actuatable valve, a manually actuatable switch control means for the motor for stopping and starting the same, coin change discharge means, means operated by said manually actuatable switch control means when actuated to motor stopping position and by said turnable device for operating said coin change discharge means for returning coins to the customer upon actuation of said manually actuatable switch means to motor stopping position with said turnable device in a position removed from said initial position, and means responsive to operation of said coin change discharge means for returning the turnable device to said initial position and

for restoring the coin change discharge means to position for another unrelated dispensing operation.

4. In a device of the class described, in combination with a liquid flow line, means for causing liquid flow therethrough, said line having dispensing control means, a meter associated with said line and actuated in accordance with liquid flow therethrough, a register actuated in accordance with the dispensing movement of the meter and including a cost indicator, coin actuated mechanism and coin change discharging mechanism, a device driven from an initial position in one direction by the coin actuated means in accordance with the value of coins inserted therein, means for reversely driving said device from the register in synchronism with the cost indicator during dispensing toward initial position, means operable by said device upon return to initial position to render said dispensing control means effective to terminate dispensing, means operable for terminating said dispensing flow independently of said device, manually operable means for returning said driven device to initial position, means interconnecting said device and said coin change discharging mechanism for moving the coin change discharging mechanism to a predetermined position controlled by the return of said driven device to initial position and for discharging change corresponding in value to said predetermined position, and means responsive to the discharging of change for returning said coin change discharging mechanism to its initial position for a subsequent operation.

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