June 3, 1969 M. BOTTLING 3,447,719

DISCHARGE NOZZLE CONTROLLED FLUID DISPENSING ARRANGEMENT

Filed Oct. 3, 1967 Sheet 1 of 3

FIG.1

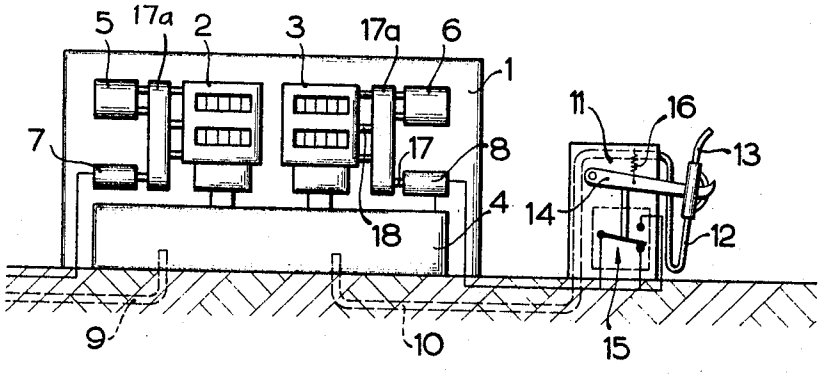

FIG.6

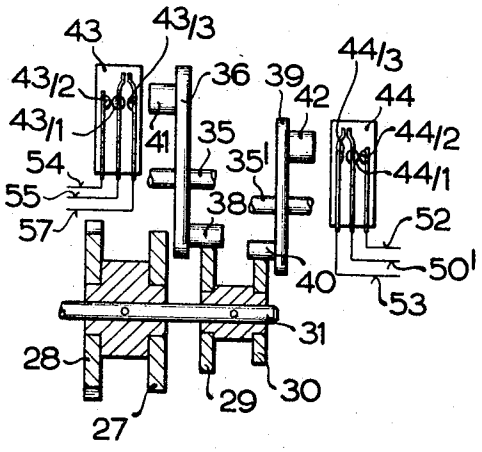

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FIG. 3

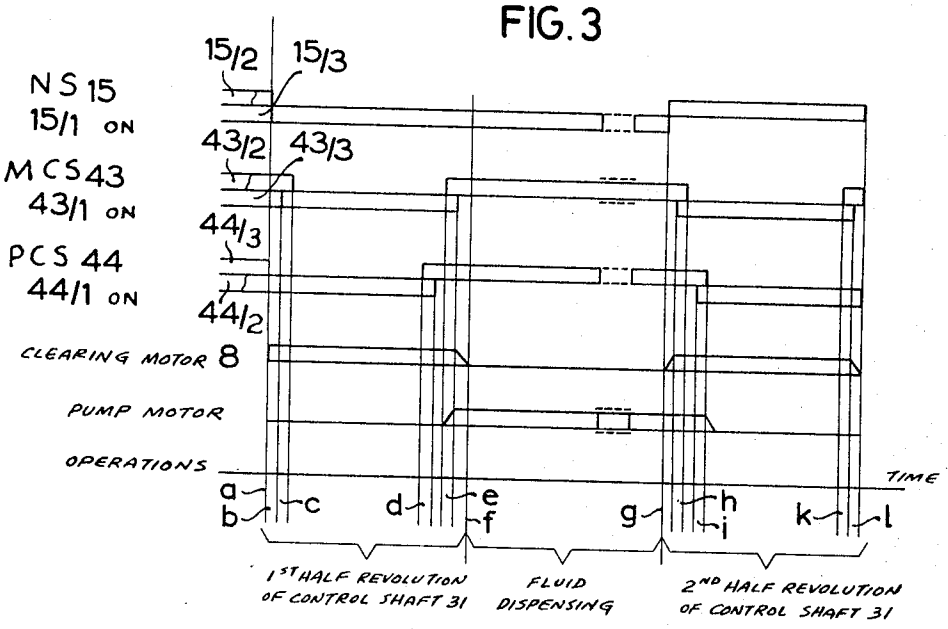
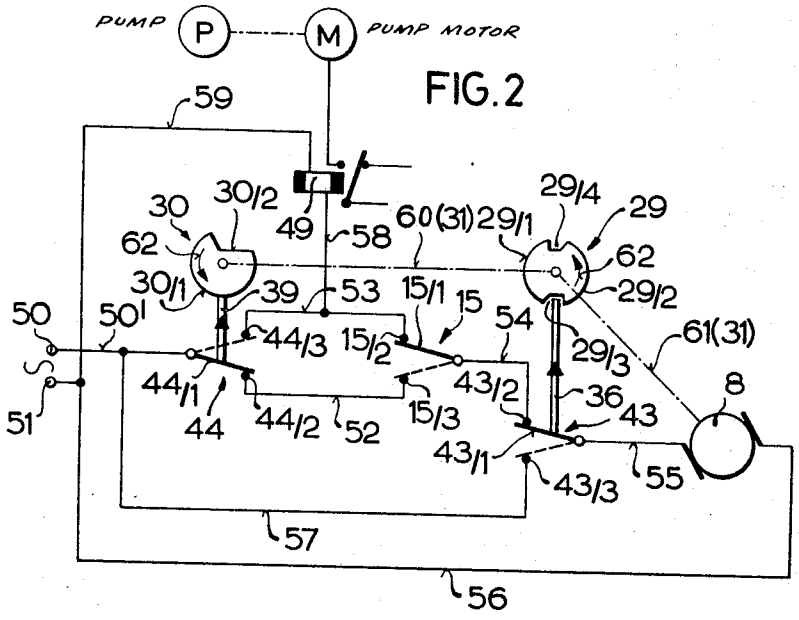


FIG. 2



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DISCHARGE NOZZLE CONTROLLED FLUID DISPENSING ARRANGEMENT

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FIG. 4

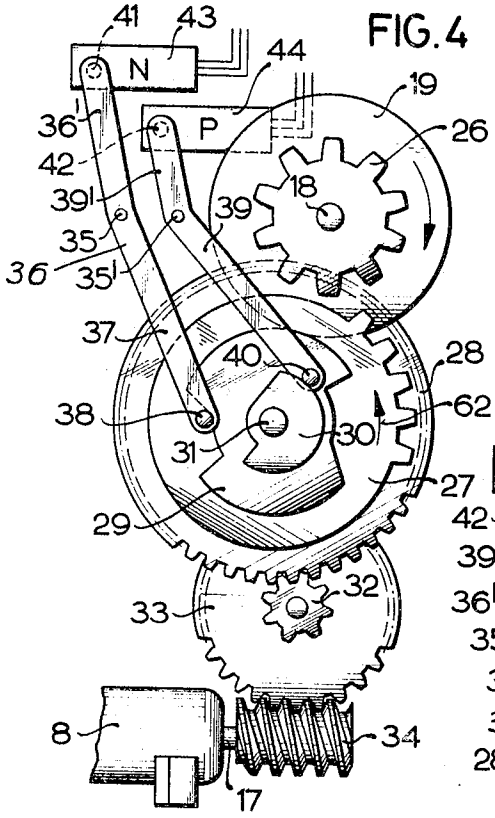
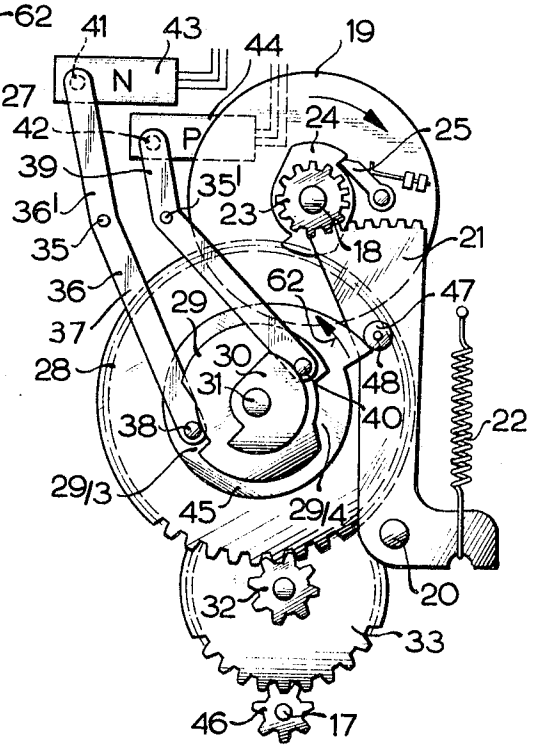


FIG. 5



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DISCHARGE NOZZLE CONTROLLED FLUID DISPENSING ARRANGEMENT

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Int. Cl. B67d 5/26, 5/22
U.S. Cl. 222—33
11 Claims

ABSTRACT OF THE DISCLOSURE

The clearing motor for clearing the price calculator of a gas station is started when the discharge nozzle is removed from its rest. In order to prevent interruption of a clearing operation by return of the discharge nozzle to its rest, a control cam is driven by the started clearing motor to operate a switch which connects the clearing motor directly to the power source whereupon another control cam driven by the clearing motor operates a pump control switch for starting the pump motor so that fuel is dispensed, whereupon the clearing motor is stopped and half of the cycle is completed. During the second half of the cycle which is started by placing the discharge nozzle on its rest, the clearing motor is again started, and the driven control cams disconnect the pump motor, and at the end of the cycle also the clearing motor from the power source.

BACKGROUND OF THE INVENTION

The present invention relates to apparatus in which upon removal of a discharge nozzle from its rest, a series of operations is automatically carried at a gas station.

It is known to provide tank stations with an automatic clearing device for the price calculator. The clearing operation is started when the discharge nozzle is removed from its rest and when the clearing operation has been completed and registers representing the volume and the price of the dispensed fuel indicate zero, a switch is actuated which starts the pump motor which is stopped by return of the discharge nozzle to its rest.

The German Auslegeschrift 1,212,752 discloses an arrangement in which the clearing motor drives a cam controlling a multiple switch which is connected in series with the main switch of the clearing motor, and together with the same connects and disconnects the relay by which the pump motor is energized or deenergized. This known arrangement has the disadvantage that the clearing operation is not completed if the discharge nozzle is returned to its rest before the clearing of the registers has been completed so that numbers are represented by the registers which neither represent a dispensed amount of fuel nor zero. Consequently, the next following dispensing operation may be incorrectly indicated and calculated.

The German Patent 1,188,334 discloses a mechanical clearing apparatus which can be applied only to a gas station where the price calculator, the pump motor and the discharge hose with the discharge nozzle are arranged in the same column.

The U.S. Patent No. 3,216,659 discloses a clearing arrangement driven by an electromotor in which the start of the clearing operation is effected by a handle which is mechanically locked until the clearing has been completed whereupon the pump motor is automatically started. Since the locking of the handle is not effected by the pump motor, and the disconnection of the pump motor is carried out by operation of the same handle,

the disadvantage is present that all control elements, the electrical as well as the mechanical, must be mounted on the price calculator so that the apparatus is unsuitable for remote control of the clearing device.

The use of an electromagnet for unlocking the pump motor switch, and of a switch for connecting the pump motor from a distance is possible, but this involves the loss of the advantage that the clearing operation cannot be interrupted. In modern gas stations in which the fuel pumps and the price calculator are separated from the location of the discharge nozzle, it is more advantageous to provide electric controls for the automatic clearing operation due to the distance between the discharge nozzle and the price calculator.

It is known to provide gas stations which are coin-operated vending machines with printers for printing receipts for the inserted money, also stating the amount of fuel bought by the insertion of coins. In order to obtain an automatic operation of the printer for the receipts so that the customer need not manually operate the printer, and particularly in order to avoid wrong operations, it is desirable that the electric drive by which the clearing means of the calculator is controlled, is also used for effecting the printing and discharge of a receipt after the dispensing operation has been completed, whereupon the printing register of the printer has to be cleared and returned to zero position. It is desirable that these additional functions are started by returning the discharge nozzle to its position of rest after the dispensing operation of the fuel has been completed. In this arrangement as well, it is desirable that once a printing, receipt discharging, and clearing operation of the printer has been started, it is not again interrupted when the discharge nozzle is removed from its rest before these operations are completed.

The German Auslegeschrift 1,212,752 discloses an apparatus in which the clearing motor is controlled to drive a cam into half revolutions for controlling a switch. In this apparatus, it is possible to interrupt the first half revolution, during which the price calculator is cleared, as well as the second half of the revolution during which the pump motor is disconnected and the next clearing operation is prepared.

SUMMARY OF THE INVENTION

It is one object of the invention to control a clearing motor in such a manner that the function started by the same cannot be interrupted before completion.

Due to the fact that a gasoline station is highly explosive, all electrical parts must be provided with a special insulation preventing explosions and are consequently much more expensive than standard electrical parts of the same type.

In view of this fact it is another object of the invention to provide an apparatus in which a minimum of electric switches is provided for obtaining the desired functions, and it is particularly desirable to use standard magnetically operated double-throw switches which have the advantage of taking up little space, last for a long time and are easy to operate.

With these objects in view, one embodiment of the invention comprises apparatus for measuring fluid in counted increments, such as gasoline; a motor; operating means driven by the motor and connected with the apparatus for starting and stopping operations of the same, such as clearing operations; a discharge nozzle manually movable between a position of rest and a discharge position; nozzle switch means actuated by the discharge nozzle in the discharge position to connect the motor to a power source, and to disconnect the motor from the power source in said position of rest; control switch means

including a motor control switch for connecting the motor to the power source; and control means for the control switch driven by the started motor to close and open the motor control switch so that the motor continuously drives the operating means of the clearing means irrespective of the position of the discharge nozzle until the control means opens the motor control switch again.

Since the clearing operation is controlled by the clearing motor while the same is directly connected to the power source so that the nozzle switch is no longer in the circuit of the motor, the discharge nozzle may be returned to its rest before the clearing operation is completed and although the nozzle switch is shifted, the operation of the clearing motor is not interrupted.

In a preferred embodiment of the invention, the control means include a cam and cam follower means for operating the motor control switch. It is preferred that the motor control switch has two stationary contacts and one movable central contact and is arranged so that the clearing motor is not disconnected when the switch is shifted.

In the preferred embodiment of the invention, a second control cam driven by the clearing motor operates a cam follower by which a pump motor control switch is actuated to connect a pump motor to a power source. The control cams driven by the clearing motor when the same is directly connected to the power source by the motor control switch, close and open the motor control switch and the pump control switch in a predetermined sequence. The clearing motor connected by the motor control switch to the power source, drives the operating means of the clearing means irrespective of the position of the discharge nozzle during a first half revolution of the control cam and is then stopped. One control cam actuates the pump control switch to control a relay to start the pump motor. The nozzle switch is connected with the pump control switch and the motor control switch in such a manner that shifting of the nozzle switch by return of the discharge nozzle to the position of rest causes starting of the clearing motor so that the control means make the second half revolution during which the motor control switch is again actuated to connect the clearing motor directly to the power source. Therefore, the position of the discharge nozzle and the actuation of the nozzle switch by removing the discharge nozzle from its rest have no influence on the clearing motor. At the end of the second half revolution, the control cam actuates the pump control switch to cause stopping of the pump motor whereupon the other control cam operates the motor control switch to disconnect the clearing motor from the power source.

In the preferred embodiment of the invention, the pump control switch, the motor control switch and the nozzle switch each has a movable first contact and second and third stationary contacts. The first contact of the nozzle switch is connected with the second contact of the motor control switch, the second contact thereof is connected with the third contact of the pump control switch, and the third contact thereof is connected with the second contact of the pump control switch. The first contact of the pump control switch and the third contact of the motor control switch are connected to each other and to one terminal of the power source. The first contact of the motor control switch is connected with one terminal of the clearing motor and the other terminal of the clearing motor is connected with the other terminal of the power source. The winding of the relay which controls the pump motor has one end connected with the other terminal of the power source and another end connected with the third contact of the pump control switch. Due to this circuit the proper sequence of operations can be obtained during a first half of the cycle which is followed by the dispensing of fuel, whereupon the second half of the cycle causes return of all parts to the initial position.

During the first half cycle, the price calculator is cleared and returned to the zero position, while during the second half of the cycle, the pump motor is stopped, a receipt is printed and discharged, and the printing register of the printer cleared and returned to zero position. At the same time, the next cycle is prepared.

The control cam which operates the motor control switch has twice as many lobes as the control cam which operates the pump control switch to start and stop the fuel pump. However, in a modified arrangement, the two control cams may have the same shape, and the first control cam is rotated at twice the rotary speed than the second control cam.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic front view illustrating a gas station including a first housing for the measuring and price calculating devices and for the pump motor and the fuel pump, and a second housing for the discharge hose;

FIG. 2 is a diagram illustrating the electric circuit of the preferred embodiment of the invention;

FIG. 3 is a diagram illustrating the sequence of operations during a cycle comprising two half revolutions of the control cams, and the intermediate fuel pumping and discharging operation;

FIG. 4 is a fragmentary front view illustrating the switch control means and operating means for clearing means in accordance with one embodiment of the invention;

FIG. 5 is a fragmentary front view illustrating control means and operating means for the clearing means according to another embodiment of the invention; and

FIG. 6 is a fragmentary schematic side view of the embodiment of FIG. 4, partially in section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to the schematic FIG. 1, price calculators **2** and **3** are disposed in a housing **1** above pumps, not shown, located in a housing **4**. Each of the price calculators **2** and **3** is connected with a printer **5**, **6** and through a transmission **17***a* with a clearing motor **7** or **8**, respectively. The price calculators **2** and **3** are driven by flow meters through which the pumped fluid, for example gasoline, passes before being discharged through discharge pipes **9** and **10**, respectively. The fluid pumped through pipes **10** is supplied to tank columns, of which only one tank column **11** is shown connected to pipe **10**, and a second column, not shown, of identical construction is supplied by pipe **9**. The fluid, such as a liquid fuel, passes through a discharge hose **12** and a discharge nozzle **13** which has a position of rest depressing a lever **14** which is urged to a higher position by spring **16**. Lever **14** operates a switch **15** under the manual control of discharge nozzle **13**, lever **14**, and switch **15** being shown on an exaggerated, enlarged scale in FIG. 1 for the sake of clarity. Switch **15** is a double-throw switch, and assumes a first position when lever **14** is moved downward by the weight of discharge nozzle **13**, and assumes a higher position engaging another contact when discharge nozzle **13** is manually removed from the rest lever **14** and the same is raised by spring **16**. Switch **15** causes start of the clearing motor **8** whose shaft **17** drives operating means for the clearing means of the price calculator **3** and for the printer **6** which prints receipt for the amount of the price of the discharged fluid. In addition to the operating means, control means are located in the transmission housing **17***a* for controlling the functions of the clearing motor **8**, and the control and operating means

will now be described with reference to FIGS. 4 and 5 which show different embodiments of the operating means for the clearing means, but substantially the same control means, see also FIG. 6, for controlling the operations of the clearing motor.

In the embodiment of FIG. 4, clearing motor 8 drives through shaft 17 a worm 34 meshing with a gear 33 secured to a pinion 32 meshing with a gear 28, which is secured to a shaft 31 to which a gear segment 27 and two cams 29 and 30 are fixed. When motor 8 is started, it rotates shaft 31 with gear segment 27 whose five teeth mesh with ten teeth of a gear 26 secured to a disk 19 which are both fixed to the clearing shaft 18, which together with disk 19 effects the clearing of the price calculator 3 and of the printing means of printer 6 in a manner which is known and not an object of the invention.

In addition to the operating means 27, 26, 18, 19 by which the clearing means are operated, control means are driven by shaft 31 and include cams 29, 30, cam follower levers 36 and 39, and double-throw switches 43 and 44 controlled by cam follower levers 36 and 39, respectively.

Lever 36 is mounted for pivotal movement on a pin 35 and has an arm provided with a follower pin 38 sliding on the peripheral cam track of control cam 29. Lever 39 has a follower pin 40 sliding on the peripheral cam track of cam 30, and is mounted on a pivot pin 35'. Springs, not shown, urge levers 36 and 39 into engagement with the cam tracks of cams 29 and 30. Permanent magnets 41 and 42 are secured to the other ends of levers 36 and 39 and cooperate with magnetically operating tubular switches 43 and 44 whose construction is best seen in FIG. 6. Switch 43 has a movable contact 43/1 controlled by the permanent magnet 41 to move from a normal position engaging the stationary switch contact 43 to a working position engaging the stationary contact 43/3 when cam follower lever 36 with permanent magnet 41 is displaced by cam 29. The three contacts are respectively connected to lines 54, 55 and 57, see also FIG. 2, in which cam 29 and lever 36 are schematically illustrated. As shown in FIG. 2 line 55 is connected with clearing motor 8 whose other terminal is connected to the terminal 51 of a power source whose other terminal 50 is connected by a line 50' and by line 57 to contact 43/3.

As best seen in FIG. 6, switch 44 has a movable central contact 44/1 normally engaging stationary contact 44/2 and being operable by a magnet 42 of cam follower lever 39 to move to a working position in which contact 44/1 engages contact 44/3. As best seen in FIG. 2, the three contacts of switch 44 are respectively connected to lines 50', 52 and 53. Line 53 is connected with contact 15/2, and line 52 is connected with contact 15/3 of switch 15, which is operated by the discharge nozzle 13, as explained above, and is also connected by line 54 to switch contact 43/2 of switch 43.

Cam 29 has two high circular cam track portions 29/1 and 29/2, and two recessed cam track portions 29/3 and 29/4, as shown in FIG. 2. Cam 30 has a high circular portion 30/1, and a recessed cam track portion 30/2. When cam follower pin 38 is in one of the recessed cam track portions 29/3, 29/4, magnet 41 holds switch 43 in its normal position, while switch 44 is in its normal position when cam follower pin 40 engages the high circular cam track portion of cam 30.

The construction of the control means shown in FIG. 5 is the same as described with reference to FIG. 4, and cams 29 and 30 control cam follower levers 36 and 39 whose magnets 41 and 44 control switches 43 and 44, as described above with reference to FIG. 2. The clearing shaft 18 and the clearing disk 19 by which the price calculator 3 and the printer 6 are cleared, are not driven through meshing gears as described with reference to FIG. 4. Shaft 31, which is driven through gears 46, 33, 32 and 28 from clearing motor 8, carries a cam 45 having a high portion bonded by a shoulder and normally engaging a cam follower roller 47 on a pin 48 secured to an angular lever 21 which is pivotally mounted on a pivot 20 and biassed by spring 22 against cam 45. Lever 21 has at one end a gear segment meshing with a pinion 23 on clearing shaft 18 which drives a coupling member 24 cooperating with a coupling pawl 25 pivotally mounted on clearing control disk 19. When wind-up cam 45 is driven from motor 8, lever 21 is displaced and spring 22 tensioned so that when cam follower roller 47 passes over the shoulder of cam 45, spring 22 turns lever 21 in counterclockwise direction to transmit driving motion to the clearing means of the apparatus.

While in the construction of FIG. 4, the clearing function is terminated when during a revolution of gear segment 27 the teeth of the same no longer mesh with the gear 26, in the embodiment of FIG. 5, the angular displacement of clearing lever 21 is limited by the shape of cam 45.

Referring again to the electric circuit diagram of FIG. 2, which is valid for both constructions shown in FIGS. 4 and 5, the terminal 51 of the power source is connected by a line 59 to a relay 49 whose contacts control the starting and stopping of the pump motor by which fluid is pumped through the flow meter of the price calculator 3, and is charged through pipe 10, hose 12, and discharge nozzle 13. The other terminal of relay 49 is connected by line 58 to line 53 which connects contacts 44/3 and 15/2. Chain lines 61 indicate the driving connection between cams 30, 29 and motor 8 by shaft 31. Arrows 62 indicate the direction of rotation of cams 29 and 30, when the same are driven by motor 8.

When the apparatus for controlling and measuring the discharge of fluid is in the normal inoperative position of rest, with discharge nozzle 13 resting on lever 14, nozzle switch 13 is in a position in which its movable contact 15/1 engages contact 15/2. Follower pin 38 is located in recess 29/3 of cam 29 so that movable switch contact 43/1 engages stationary switch contact 43/2 of motor switch 43. Cam follower 40 engages the high cam track portion 30/1 of cam 30 so that movable contact 44/1 engages stationary contact 44/2. Consequently, motor 8 is disconnected from the voltage source since switch 44 interrupts the connection through line 43, and switch 15 interrupts the connection through line 52, with the power source 50, 51. Switch 44 interrupts the connection of the relay 49 for the pump motor with the power source. The indicating means of price calculator 3 and the printing means of printer 6 are are in a position indicating the price of last discharged amount of fluid.

Referring now to FIG. 3, the first three horizontal lines respectively indicate the positions of switches 15, 43 and 44 assumed during a time period required for one complete revolution of control shaft 31. The fourth and fifth lines illustrate the time periods during which the clearing motor 8 and the pump motor are running. The entire time of an operation includes a half turn of control shaft 31, the time required for the dispensing of the sold amount of fuel, and the time required for the second half turn of control shaft 31. The vertical lines *a* to *l* indicate the moments of switching operations.

In order to start a new dispensing operation, discharge nozzle 13 is removed from the rest lever 14 so that spring 16 raises rest lever 14 which shifts switch contact 15/1 from switch contact 15/2 to switch contact 15/3 so that motor 8 is connected to the power source 50, 51 through the circuit 50—44/1—44/2—52—15/3—15/1—54—43/2—43/1—55—8—56—51.

The clearing motor 8 is thus started and rotates shaft 31 through transmisison 34, 33, 32, 28 or 46, 33, 32, 28 so that cams 29 and 30 rotate in counterclockwise direction of arrow 62.

Lever 36 is immedaitely displaced by the shoulder of the high cam track portion 29/1 so that permanent magnet 41 is shifted along switch 43 and moves switch con-

tact 43/1 from stationary contact 43/2 to a position engaging stationary contact 43/3 so that motor 8 is no longer connected through switches 15 and 44 to the power source, but directly connected through line 57 and 50' to terminal 50 of the power source.

Referring to FIG. 3, the first switching operation *a* involves the shifting of switch 15 and the start of motor 8. The second switching operation involves the shifting of switch 43. Since switch 43 is constructed so that the connection between movable contact 43/1 with contact 43/3 is established before the connection between movable contact 43/1 and stationary contact 43/2 is interrupted, motor 8 continues its rotation without interruption as indicated in the fourth horizontal line of FIG. 3.

In the embodiment of FIG. 4, the gear segment 27 starts meshing with gear 26 of the operating means for the clearing means as soon as the shifting of switch 43 is completed. In the embodiment of FIG. 5, cam follower roller 47 drops from the high cam track portion to the low cam track portion immediately when the shifting of switch 43 is completed, so that spring 22 turns lever 21 in counterclockwise direction so that the gear segment turns pinion 43 and the clearing operation is started. In both constructions, the clearing operation is carried out while clearing motor 8 is connected by switch 43, and not by switch 15, to the power source 50, 51.

Motor 8 runs until cam follower 38 has moved over the high cam track portion 29/1 and moves into the recessed cam track portion 29/4. In the latter position, permanent magnet 41 is shifted back to the position shown in FIGS. 4 and 5, and switch 43 is actuated so that movable switch contact 43/1 moves into engagement with switch contact 43/2, which is shown in FIG. 3 as switching operation *e*. Before cam follower 38 moves into the recessed cam track portion 29/4 and causes switching operation *e*, cam follower 40 drops into the recessed cam track portion 30/2 of cam 30 so that lever 39 is shifted and the movable contact 44/1 of switch 44 is moved from contact 44/2 to contact 44/3 which is indicated as switching operation *d* in FIG. 3. Consequently at the moment of switch operation *e*, switching operation *d* has interrupted the connection of motor 8 with the power source which would have been established by switch 43 if switch 44 had remained in its initial position. When switching operation *e* takes place motor 8 is disconnected from the power source, runs out and stops as indicated by operation *f* in FIG. 3.

When switch 44 was shifted by switching operation *d*, the winding of relay 49 was connected to the power source by the following circuit 50—50'—44/1—44/3—53—58—49—59—51. The switch contacts controlled by relay 49 start the motor of the pump by which the fluid is dispensed through pipe 10 and discharge nozzle 15 which is still in the discharge position removed from rest lever 16. Discharge nozzle is manually operated to open so that the fluid, such as gasoline is discharged into the tank of a motor car. The pump motor is running, and the fuel is discharged, its volume is measured by apparatus 3 which also calculates and indicates the price of the discharged fuel, while the printing means of printer 6 continuously moves to positions representing the price of the discharged fuel. While the embodiment of FIG. 5, the clearing operation of the price indicating register takes place directly upon start of rotation of shaft 31, the clearing operation is started in the embodiment of FIG. 5 when the teeth of segment 27 engage gear 26 which takes place when cam follower 38 is substantially in the middle of the high cam track 29/1.

When the desired amount of fuel is dispensed, the operator places the discharge nozzle 13 on lever 14 so that switch 15 is shifted to its normal position of rest shown in FIG. 2, in which movable contact 15/1 engages stationary contact 15/2, see FIG. 3 switching operation *g*. Since switch contact 44/1 still engages switch contact 44/3 motor 8 is connected to the power source by

the circuit 50—50'—44/1—44/3—53—15/2—15/1—54—43/2—43/1—52—8—56—51. When motor 8 is started by the switching operation *g* it drives shaft 31 and cams 29 and 30 which now turn the second half of one revolution. The shoulder of the high cam track portion 29/2 angularly displaces lever 36 so that switch 43 is shifted by permanent magnet 41 in the switching operation *h* so that movable switch contact 43/1 engages stationary switch contact 43/3 and motor 8 is directly connected with the power source and independent of the position of switch 15, so that it is not possible to stop motor 8 by removing discharge nozzle 13 from rest lever 14. Motor 8 continues its rotation until shaft 31 has completed the second half of the revolution so that cam follower 38 engages the recessed cam track portion 29/3 and switch 43 is shifted to its initial position in which movable switch contact 43/1 engages switch contact 43/2, as shown in FIG. 3 as operation *k*.

Already before the termination of the second half of the revolution of shaft 31, cam follower 40 of lever 39 arrives at the high cam track portion 30/1 of cam 30 so that movable contact 44/1 of switch 44 is shifted by magnet 42 to the position engaging switch contacts 44/2 so that relay 49 is disconnected from the power source and the pump motor stops as indicated as operation *i* in FIG. 3.

Switching operation *g* causes the beginning of the control operations of motor 8, and operation 1 indicates the stopping of motor 8.

Assuming that discharge nozzle 13 was not removed from lever 14 of tank column 11 in the meantime, cams 29 and 30, double-throw switches 15, 43 and 44 are in the position illustrated in FIGS. 2, 4 and 5 when shaft 31 has completed the second half of its single revolution. The gear segment 27 of the operating means of the clearing means shown in FIG. 4 has been turned to the normal position of rest shown in FIG. 4 during the second half of the revolution of shaft 31. The cam 45 of the construction of FIG. 5 has also returned lever 21 to its initial position in which spring 22 is tensioned as shown in FIG. 5, while the locking pawls 55 has engaged the second lug of the coupling disk 24.

The ordinal printing wheels of the printer 6 are driven from the price calculator so that they assume a position representing the price of the dispensed fuel. The second half revolution of shaft 31 is used for producing an imprint of the numbers of the printing wheels on a sheet which represents a receipt for the money paid for the dispensed fuel, and for then discharging the receipt.

During the first and second half revolutions of shaft 31 with cams 29 and 30 with gear segment 27 or cam 45, switch 15, which is operated by the discharge nozzle, has no influence on the energization of motor 8 which is connected to the power source by switch 43. If the discharge nozzle is placed on rest lever 14 and switch 15 interrupts during the clearing operation, motor 8 will continue its rotation and complete the clearing of the calculator and printer from the values stored during the preceding dispensing operation since its circuit is completed by switch 43 and completely independent of switch 15. This is required for the first half revolution of shaft 31 only in the embodiment of FIG. 4, so that the clearing operation of price calculator 3 is not interrupted by premature return of the discharge nozzle to rest lever 14. In the embodiment of FIG. 5, it is not absolutely necessary to connect motor 8 by switch 43 instead of switch 15 during the first half revolution of shaft 31, since the clearing of the price calculator 3 is effected by the power of spring 22, and not by motor 8.

As explained above, shaft 31 is driven by motor 8 to perform the second half revolution after the fuel has been dispensed, and this half revolution is started when discharge nozzle 13 is returned to lever 11, and switch 15 is shifted back to its normal position of rest. During the second half revolution, it is necessary to connect motor 8 to power source 50, 51 by switch 43 independently

of discharge nozzle switch **15**, since if discharge nozzle is quickly picked up again, lever **14** would shift switch **15** again and the command for clearing the price calculator **3** would be given without first disconnecting and stopping the pump motor. Since switches **44** and **43** would not be in the initial required position, the clearing motor **8** would not be connected to the power source, and finally a receipt for the amount calculated by the price calculator **3** would not be printed by printer **6**. Moreover, segment gear **27** of the embodiment of FIG. 4 and segment lever **21** of the embodiment of FIG. 5 would not be in the initial position required for a clearing operation.

Summarizing, when the discharge nozzle **13** is picked up by the operator, nozzle switch **15** connects motor **8** through motor switch **43** to the power source so that the same starts to rotate and turns control cam **29** whereby lever **36** shifts motor switch **43** so that motor **8** remains connected to the power source and drives the clearing means through the operating means, **27, 26, 18, 19** even if nozzle **13** is immediately returned to its rest.

Motor **8** not only drives the clearing means, the price calculator and cam **29**, but also control cam **30** which after a certain time shifts pump control switch **44** and energized relay **49** so that the pump motor starts. Thereupon, cam **24** has turned to a position in which its other recess is engaged by cam follower **36, 38** so that switch **43** is shifted and clearing motor **8** disconnected from the power source.

The pump motor operates the pump and discharges fuel through nozzle **13** until the desired volume is discharged, and the price of the volume is automtaically calculated by the calculator **3** whose indicator wheels assume a corresponding position. The volume of the discharged fuel is also indicated, and when the desired volume has been dispensed, the operator replaces the discharge nozzle **13** on its rest so that switch **15** is shifted to contact **15/2** and since contact **44/1** still engages contact **44/3**, clearing motor **8** is connected to the power source by switches **44, 15, 43** and starts rotating. The cam **29** shifts switch **43** so that motor **8** is directly connected to the power source and continues its rotation. When the high cam portion of cam **30** again engages cam follower **40, 39**, switch **44** is shifted, and relay **49** is deenergized so that the pump motor stops. Thereupon, cam **29** compleses its second half revolution and when cam follower **38, 36** arrives in the recessed cam track portion **29/3**, switch **43** is shifted back to the initial position and clearing motor **8** stops. During the second half revolution, clearing motor **8** is connected by switch contacts **43/1** and **43/2** to the power source so that discharge nozzle **13** can be removed from its rest and switch **15** shifted without any influence on the operations performed under the control of motor **8**.

The apparatus of the present invention performs five functions, namely clearing of the price calculator, starting of the pump motor, winding up of the clearing motor **21, 22** in the embodiment of FIG. 5, disconnection of the pump motor, and printing of the receipt, automatically carried out by manually removing the discharge nozzle, and placing the same again on its rest while only three switch means **15, 43** and **44** are required. Although the structure of the apparatus is extremely simple, faulty operations due to human error are completely eliminated.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of fluid dispensing apparatus, differing from the types described above.

While the invention has been illustrated and described as embodied in an arrangement for automatically controlling apparatus discharging and measuring a fluid under the control of a discharge nozzle, it is not intended to be limited to the details shown since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. Discharge nozzle controlled fluid dispensing arrangement, comprising, in combination, apparatus for pumping and measuring fluid; an electric control motor; operating means driven by said control motor and connected with said apparatus for starting and stopping clearing operations of the same; a discharge nozzle for discharged fluid manually movable between a position of rest and a discharge position; a power source, a circuit means connected with said power source and with said control motor and including nozzle switch means actuated by said discharge nozzle in said discharge position to connect said control motor with said power source so that said control motor starts, and in said position of rest to interrupt said circuit means between said power source and said control motor, and control switch means including a normally open motor control switch means between said control motor and said power source; and control means for said control switch driven by said control motor to close and then open said motor control switch means so that said control motor is connected to said power source by said motor control switch until said control means opens said motor control switch means, and continues to drive said operating means to conclude the clearing operation irrespective of the position of said discharge nozzle.

2. A fluid dispensing arrangement as claimed in claim **1**, wherein said control means include a control shaft driven by said control motor, control cam means secured to said control shaft and having actuating cam portions, and cam follower means cooperating with said control cam means and being operatively connected with said motor control switch means to open and close the same when said cam follower means engage said actuating cam portions.

3. A fluid dispensing arrangement as claimed in claim **2** wherein said motor control switch means has two stationary contacts respectively connected to a power source and to said nozzle switch, and a movable contact connected with said control motor and shifted by said cam follower means between end positions engaging said stationary contacts, respectively, and having an intermediate position connecting all three contacts

4. A fluid dispensing arrangement as claimed in claim **1** wherein said apparatus includes measuring and price calculating means, and clearing means for the same; and wherein said operating means are connected with said clearing means for operating the same and being driven by said motor while said motor is connected to the power source by said closed motor control switch means.

5. Discharge nozzle controlled fluid dispensing arrangement comprising, in combination, a pump motor for driving a pump dispensing fluid; means for measuring the dispensed fluid having clearing means; a clearing motor; operating means driven by said clearing motor and connected with said clearing means for automatically starting and stopping clearing operations of the same; a discharge nozzle for discharged fluid manually movable between a position of rest and a discharge position; electric circuit means including a power source, relay means for starting and stopping said pump motor, pump control switch

means connected with said relay means, nozzle switch means actuated by said discharge nozzle in said discharge position to connect said clearing motor through said pump control switch means with said power source, so that said clearing motor starts, and to disconnect said clearing motor from said power source in said position of rest, and motor control switch means for connecting said clearing motor directly with said power source; and rotary control means for said motor control switch means driven by said started clearing motor to close and open said motor and pump control switch means in a predetermined sequence so that said clearing motor drives said operating means irrespective of the position of said discharge nozzle during a first half revolution of said control means and is then stopped, so that said control means actuate said pump control switch to control said relay means to start said pump motor, said nozzle switch means being connected with said pump control switch means and said motor control switch means in such a manner that shifting of said nozzle switch means by return of said discharge nozzle to said position of rest causes starting of said clearing motor so that said control means make the second half revolution, and actuate said motor control switch means to connect said clearing motor directly to said power source so that said discharge nozzle and said nozzle switch have no influence on said clearing motor, said control means actuating said pump control switch means to cause stopping of said pump motor whereupon said control means operates said motor control switch means to disconnect said clearing motor from said power source.

6. Fluid dispensing arrangement as claimed in claim **5** wherein said pump control switch means, said motor control switch means and said nozzle switch means each has a movable first contact and a second and third stationary contacts; wherein said nozzle switch means has said first contact connected with said second contact of said motor control switch means, said second contact thereof connected with said third contact of said pump control switch means, and said third contact thereof connected with second contact of the same, wherein said first contact of said pump control switch means and said third contact of said motor control switch means are connected to each other and to one terminal of said power source, wherein said first contact of said motor control switch means is connected with one terminal of said clearing motor, and wherein the other terminal of said clearing motor is connected with the other terminal of said power source.

7. Fluid dispensing arrangement as claimed in claim **6** wherein said relay means include a winding having one end connected with said other terminal of said power source, and the other end connected with said third contact of said pump control switch means.

8. Fluid dispensing arrangement as claimed in claim **7** wherein said rotary control means include a control shaft driven by said clearing motor, and driving said operating means; and first and second control cams driven by said control shaft and first and second cam followers for actuating said motor control switch means and said pump control switch means, respectively.

9. Fluid dispensing arrangement as claimed in claim **8** wherein said first control cam has two recessed and two high cam track portions for operating said first cam follower; and wherein said second control cam has one recessed and one high cam track portion for operating said second cam follower.

10. Fluid dispensing arrangement as claimed in claim **5** wherein said control means include a first rotary control cam and a first cam follower for actuating said motor control switch means four times during each operational cycle, and a second rotary control cam and second can follower for actuating said pump control switch twice for starting and stopping said pump motor during the same operational cycle.

11. A fluid dispensing arrangement as claimed in claim **1**, wherein said motor control switch means has two first contacts respectively connected with said power source and said nozzle switch means, and a second contact connected with said control motor; and wherein said motor control switch means is moved by said control means between two positions in which said second contact engages said first contacts, respectively, and an intermediate position in which all said first and second contacts are connected.

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