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CONTROL SYSTEM FOR FLUID DELIVERY MECHANISM

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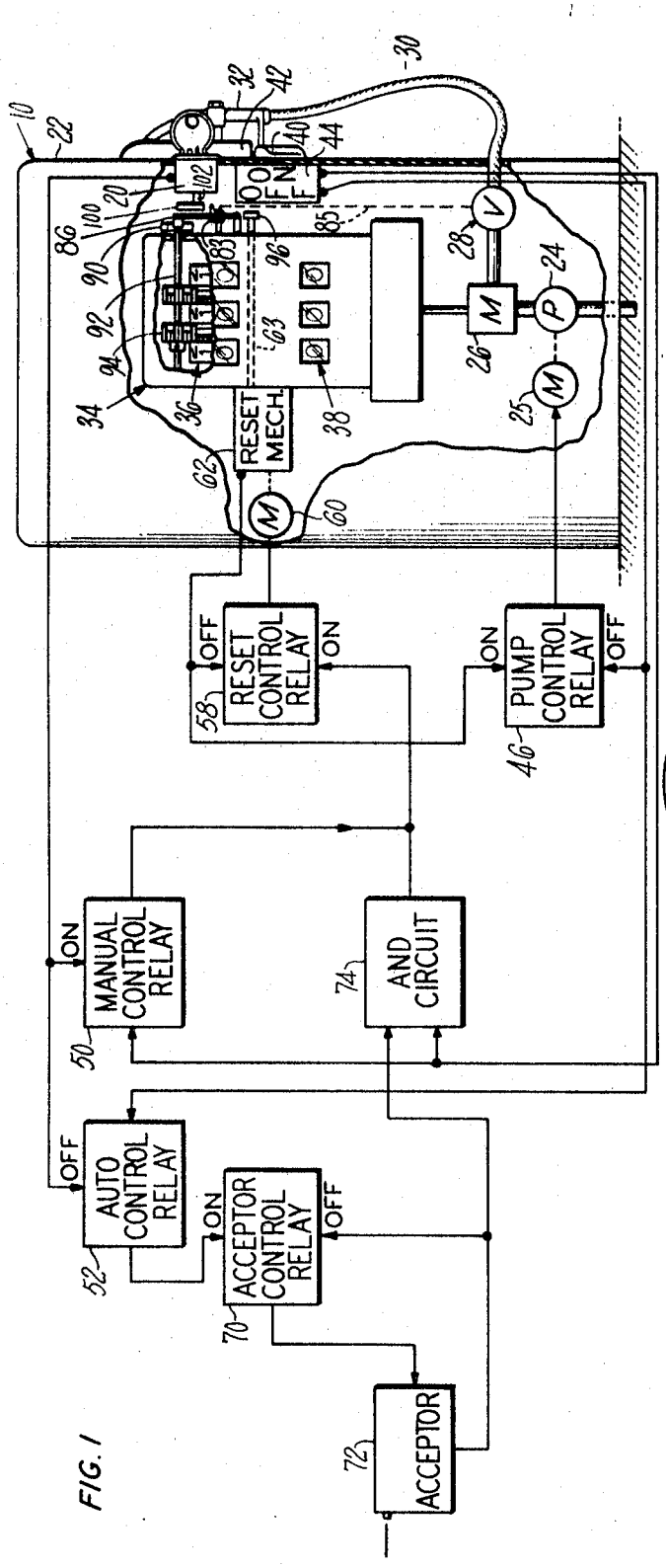


FIG. 1

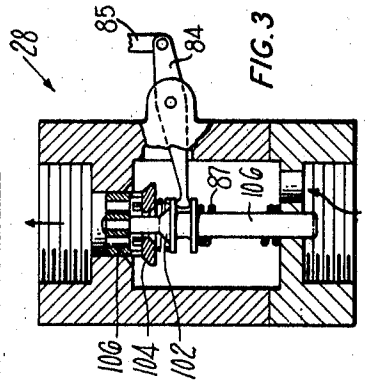


FIG. 3

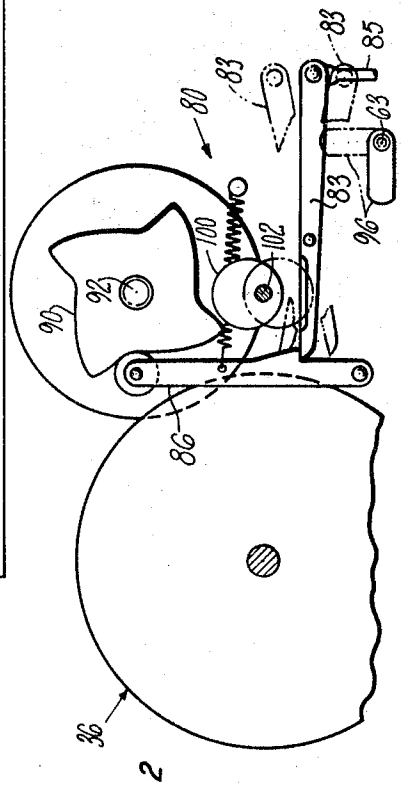


FIG. 2

INVENTORS
JOHN H. BICKFORD
IGOR BLINOW

BY Lindsey, Prutzman and Hayes
ATTORNEYS

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CONTROL SYSTEM FOR FLUID DELIVERY MECHANISM

John H. Bickford, Middletown, and Igor Blinow, Hebron, Conn., assignors to Veeder Industries Inc., Hartford, Conn., a corporation of Connecticut

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U.S. Cl. 222—2 10 Claims

ABSTRACT OF THE DISCLOSURE

A fuel dispensing system having a fuel delivery pump which may be conditioned for "manual" delivery for delivering any desired amount of fuel or for "automatic" delivery controlled by an acceptor adapted for collecting a predetermined monetary deposit and/or for accepting a "credit" card and which is adapted for activating the pump for delivering a fixed monetary amount of fuel. A two-stage shut-off valve in the delivery line is held in its fully open position by a key-operated selector when "manual" operation is selected, and a preset mechanism provides for holding the valve in its partially open or throttled position during "automatic" operation and for closing the valve when the appropriate monetary amount of fuel is delivered. The preset mechanism is operated by a cam on the transfer pinion shaft of the cost counter of the pump, and the cam is indexed by the transfer pinion between the ten-cent and dollar number wheels of the cost counter to close the shut-off valve. The reset mechanism is reset to re-open the valve to its throttle position by the pump reset mechanism at the end of the reset cycle.

BRIEF SUMMARY OF THE INVENTION

The present invention relates to fluid dispensing apparatus and in particular to a fluid delivery control system having notable utility with fuel dispensing equipment for providing self-service delivery of fuel.

It is a principal aim of the present invention to provide a new and improved fuel dispensing system which is useful for delivering a predetermined monetary amount of fuel and which provides for accurately discontinuing the delivery after such amount is dispensed.

It is another aim of the present invention to provide a new and improved preset mechanism for accurately discontinuing the delivery of fuel after a predetermined amount of fuel has been delivered.

It is a still further aim of the present invention to provide a self-service fuel dispensing system which may be activated by a predetermined deposit, for example, a one-dollar bill, and/or by insertion of a suitable credit card and which provides for accurately discontinuing the delivery after the predetermined monetary amount of fuel has been delivered.

It is another aim of the present invention to provide a new and improved fuel dispensing system which may be conditioned for delivering any desired amount of fuel or be conditioned for discontinuing the delivery after a predetermined amount of fuel is dispensed.

It is a still further aim of the present invention to provide a new and improved fuel dispensing system which may be conditioned for delivering a preset amount of fuel or conditioned for a manually controlled delivery and in which the manual delivery may be made at a relatively high rate and the preset delivery made at a relatively low rate.

It is another aim of the present invention to provide a new and improved preset mechanism which is of economical construction and which provides reliable operation over a long service life.

It is a still further aim of the present invention to provide an inexpensive self-service dispensing system which may be employed with conventional fuel dispensing equipment.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth, and the scope of the application of which will be indicated in the appended claims.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a schematic illustration partly broken away and partly in section of a fuel dispensing system employing an embodiment of the present invention;

FIG. 2 is an enlarged generally diagrammatic elevational view partly broken away and partly in section showing a preset mechanism employed in the fuel dispensing system; and

FIG. 3 is an enlarged generally diagrammatic view of a two-stage shut-off valve of the fuel dispensing system.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, a fuel dispensing system which includes a fuel delivery pump **10** is shown incorporating an embodiment of a fluid delivery control system of the present invention which enables the pump **10** to be set for either "manual" or "automatic" operation with a key-operated selector **20** mounted on the pump housing **22**.

The pump **10** in a conventional manner includes a fluid pump **24** driven by a motor **25** for supplying fuel via a meter **26**, a two-stage shut-off valve **28** and a fuel delivery hose **30** to the usual fuel dispensing nozzle **32**. The meter **26** is adapted to drive a register **34** having cost and volume counters **36**, **38** for registering the cost and volume of fuel delivered. A manually operable control handle **40** is shown mounted adjacent the usual nozzle storage boot or receptacle **42** such that before the nozzle can be returned to its storage receptacle, the handle **40** must be manually rotated to actuate a control switch **44** and thereby actuate a pump control relay **46** to turn off the pump motor **25**. And the handle **40** may not thereafter be operated to actuate the switch **44** to its "on" position until after the nozzle **32** is removed from its storage receptacle.

For "manual" operation of the pump **10** the key-operated selector **20** is turned to its "manual" position to actuate a "manual" control relay **50** to its "on" position and an "auto" control relay **52** to its "off" position. Accordingly when the handle **40** is turned to its "off" position at the end of a fuel delivery, the pump control relay **46** is actuated to de-energize the pump motor **25** and to thereby deactivate the pump **10**. And when the handle **40** is subsequently turned to its "on" position to commence a succeeding delivery, a reset control relay **58** is actuated to energize a reset motor **60** for a register reset mechanism **62** having a reset shaft **63** which is rotated to reset the register in a known manner. (Alternatively the system could employ a conventional manual reset mechanism of the type shown in U.S. Patent No. 2,814,444 of H. N. Bliss dated Nov. 26, 1957 and entitled Register, so that when the handle **40** is rotated to its "on" position the reset mechanism is tripped to rotate the reset shaft **63** to reset the register.)

At the end of the reset cycle the reset mechanism actuates the reset control relay **58** to de-energize the reset

motor 60 and the pump control relay 46 to energize the pump motor 25. Fuel may then be delivered with the nozzle 32 in the amount desired, and the pump may thereafter be deactivated as desired by turning the handle 40 to its "off" position and returning the nozzle 32 to its storage receptacle 42.

For "automatic" operation, the key-operated selector 20 is rotated to its "automatic" position to actuate the "manual" control relay 50 and the "auto" control relay 52 to disconnect the switch 44 from the reset control relay 58 and to connect the switch 44 to an acceptor control relay 70. Accordingly, when the handle 40 is placed in its "off" position the acceptor control relay 70 is actuated to energize an acceptor 72. In addition the pump control relay 46 is actuated to de-energize the pump motor 25.

The acceptor 72 provides for collecting a predetermined deposit, which may be in coin but which is preferably a one-dollar bill, and/or for accepting a suitable "credit" card or key (in which instance the acceptor may incorporate a suitable validator and means such as a printer or punching device for recording the operation of the pump by the credit card or key) and upon the deposit and collection of the predetermined deposit or insertion of a credit card or key the acceptor control relay 70 is actuated to de-energize the acceptor 72 (and to thereby prevent collecting any subsequent deposit or use of another credit card or key) and for providing a first input to a suitable AND circuit 74. The handle 40 may then be manually rotated to its "on" position to provide the second input to the AND circuit 74 for actuating the reset control relay 58. The reset motor 60 is then energized to reset the register 34 and the pump control relay 46 is actuated to energize the pump motor 25 at the end of the reset cycle. Fuel may then be delivered with the dispensing nozzle 32.

Referring particularly to FIGS. 2 and 3, a valve operating mechanism 80 associated with the cost counter 36 is adapted for operating the two-stage shut-off valve 28 to discontinue the delivery of fuel after the predetermined monetary amount of fuel is delivered. Specifically with the system designed for a predetermined monetary delivery of one dollar, the preset mechanism 80 is adapted to close the valve 28 after a dollar's worth of fuel has been delivered. Also, although a two-stage shut-off could be provided for "automatic" delivery in any conventional manner, in the shown embodiment the two-stage shut-off valve is held in its partially closed or throttled position so as to deliver fuel at a reduced rate during "automatic delivery" and so that the preset mechanism 80 can provide for accurately terminating the fuel delivery with a one-stage shut-off phase merely by timely closing the valve 28. (However, during "manual" operation of the pump 10 when the delivery is discontinued as desired, the valve 28 is preferably held fully open to provide a more rapid delivery rate.)

The shown valve operating mechanism includes a valve control lever 83 which is connected to a valve operating lever 84 (FIG. 3) by a rod 85, and a detent lever 86 which in its active or detent position shown in FIG. 2 is adapted to retain the control lever 83 in an intermediate pivotal position for holding the two-stage shut-off valve 28 in its partially closed or throttled position against the bias of the valve closing spring 87.

A release or trip cam 90 is mounted on the usual transfer pinion shaft 92 of the cost counter 36 to which is also affixed the transfer pinion 94 (FIG. 1) between the ten-cent and dollar number wheels of the cost counter 36. Thus, as a transfer is generated to the dollar number wheel the cam 90 will be indexed (one quarter of a revolution in the usual counter) to pivot the detent lever 86 outwardly to release the control lever 83 and close the valve 28.

The delivery is thereby terminated and a succeeding delivery may not thereafter be made until the handle 40 is returned to its "off" position to re-energize the acceptor. An additional dollar may then be deposited in the acceptor 72 (or in the case of a credit card or key-operatedy acceptor, the credit card or key may be reinserted or left in the acceptor) and the handle 40 may be returned to its "on" position to reset the register 34, and during the resetting cycle of the reset mechanism 62 the valve control lever 83 will be pivoted to open the valve 28 by a cam 96 driven by the reset shaft 63 (preferably after the register 34 and therefore after the transfer pinion 94 and number wheels of the cost counter 36 have been fully reset). Once the reset cycle is completed and the pump motor 25 is re-energized, an additional one dollar's worth of fuel may be dispensed.

When the key-operated selector 20 is rotated to its "manual" position a cam 100 on the key-operated shaft 102 is rotated to hold the valve control lever 83 in its fully withdrawn position partially shown in broken lines in FIG. 2 and to thereby deactivate the preset mechanism 80 and hold the valve 28 in its fully open position while the pump 10 is being used for "manual" operation.

Referring to FIG. 3 a conventional two-stage shut-off valve 28 is shown comprising a secondary or throttle valve 102 which is adapted to be held open when the valve control lever 83 is held by the detent lever 86 as shown in FIG. 2, and a primary valve 104 mounted in parallel with the secondary valve 102 and adapted to be opened by the valve stem 106 when the key-operated selector 20 is placed in its "manual" position.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departure from the spirit and scope of the invention, the scope of which is defined in the appended claims.

We claim:

1. In a self-service fluid dispensing system having a resettable register for registering the amount of fluid delivered, valve means adapted to be opened for permitting the delivery of fluid and to be closed for terminating the fluid delivery, preset means adapted to be set to a preset condition for closing the valve means after a preset amount of fluid has been delivered; and delivery control means operable to be conditioned for resetting the register, setting the preset means and opening the valve means; the improvement wherein the preset means is settable by the delivery control means to a single preset condition for uniformly closing the valve means after a fixed predetermined monetary amount of fluid has been delivered thereafter and wherein the dispensing system further comprises money acceptor means adapted only upon the deposit of at least said fixed predetermined monetary amount for conditioning the delivery control means for resetting the register, setting the preset means to said single preset condition and opening the valve means.

2. In the self-service dispensing system of claim 1 wherein the fixed predetermined monetary amount is one dollar and wherein the money acceptor means comprises a dollar bill acceptor adapted only upon the deposit of a one-dollar bill for conditioning the delivery control means for resetting the register, setting the preset means to said single preset condition and opening the valve means.

3. In the self-service dispensing system of claim 2 wherein the register comprises a cost counter for registering the cost of the fuel delivered in dollars and cents and having a plurality of coaxial counter wheels of ascending order including cent, ten-cent and dollar wheels and transfer pinions between counter wheels for generating transfers from lower order to higher order wheels; and wherein the preset means is connected to be operated by the dollar wheel transfer pinion between the ten-cent and dollar counter wheels to close the valve means when a transfer is generated from the ten-cent number wheel to the dollar number wheel.

4. In a self-service fluid dispensing system having valve means with closed and partially and fully open positions providing separate flow rates, valve operating means operable for closing the valve means and to be conditioned for holding the valve means in each of its partially and fully closed positions, preset means adapted to be conditioned for being operative for automatically operating the valve operating means for closing the valve means to terminate the fluid delivery after a preset amount of fluid has been delivered and to be conditioned for being inoperative for operating the valve operating means for closing the valve means for terminating the fuel delivery, and selector means adapted to be operated for conditioning the preset means for being operative for automatically operating the valve operating means for closing the valve means after said preset amount is delivered and to be operated for conditioning the preset means for being inoperative for automatically operating the valve operating means for closing the valve means after said preset amount is delivered, the improvement wherein the valve operating means, when the preset means is conditioned by the selector means for being operative for automatically closing the valve means, is conditioned for holding the valve means in its partially open position during the delivery until said preset amount has been delivered; and wherein the valve operating means, when the selector means is operated for conditioning the preset means for being inoperative, is conditioned for holding the valve means in its fully open position.

5. In a fluid dispensing system having a resettable register with a plurality of coaxial counter wheels of ascending order adapted for registering the amount of fluid delivered and transfer means interconnecting each pair of adjacent lower and higher order wheels for generating transfers therebetween, a reset mechanism for resetting the register between deliveries, valve means for controlling the fluid delivery, and preset means adapted to be operated in accordance with the delivery of fluid for closing the valve means after a predetermined amount of fluid has been delivered, the improvement wherein the preset means is connected to be operated by one of the transfer means of the register for closing the valve means in accordance with the operation of said transfer means by the adjacent lower order wheel.

6. In a self-service fluid dispensing system having a resettable register for registering the amount of fluid delivered, valve means adapted to be opened for permitting the delivery of fluid and to be closed for terminating the fluid delivery, preset means adapted to be set for closing the valve means after a preset amount of fluid has been delivered; and delivery control means operable to be conditioned for resetting the register, setting the preset means and opening the valve means; the improvement wherein the preset means is adapted to close the valve means after a fixed predetermined monetary amount of fluid has been delivered; wherein the dispensing system further comprises money acceptor means adapted upon the deposit of said fixed predetermined monetary amount for conditioning the delivery control means for resetting the register, setting the preset means and opening the valve means; wherein the fixed predetermined monetary amount is one dollar and the money acceptor means comprises a dollar bill acceptor adapted upon the deposit of a one-dollar bill for conditioning the delivery control means for resetting the register, setting the preset means and opening the valve means; wherein the register comprises a cost counter for registering the cost of the fuel delivered in dollars and cents and having a plurality of coaxial counter wheels of ascending order including cent, ten-cent and dollar wheels and transfer pinions between counter wheels for generating transfers from lower order to higher order wheels; wherein the preset means is connected to be operated by the dollar wheel transfer pinion between the ten-cent and dollar counter wheels to close the valve means when a transfer is generated from the ten-cent number wheel to the dollar number wheel; wherein the preset means comprises lever means connected to the valve means and adapted to be pivoted in a first pivotal direction to a first pivotal position for holding the valve means open, releasable detent means for retaining the lever means in its first pivotal position, and cam means connected for rotation coaxially with the dollar wheel transfer pinion for releasing the detent means; and wherein the delivery control means provides for pivoting the lever means to its said first pivotal position for retention by the detent means.

7. In a self-service fluid dispensing system having valve means which closed and partially and fully open positiosn providing a two-stage shut-off of the fluid delivery, preset means adapted to be conditioned for being operative for automatically closing the valve means to terminate the fluid delivery after a preset amount of fluid has been delivered and to be conditioned for being inoperative for terminating the fuel delivery, and selector means adapted to be operated for conditioning the preset means for being operative for automatically closing the valve means after said preset amount is delivered and to be operated for conditioning the preset means for being inoperative for automatically closing the valve means after said preset amount is delivered, the improvement wherein the preset means provides, when conditioned for automatically closing the valve means, for retaining the valve means in its partially open position until said preset amount has been delivered; wherein the selector means, when operated for conditioning the preset means for being inoperative, provides for retaining the valve means in its fully open position; wherein the preset mechanism comprises a pivotal lever adapted to be pivoted in one pivotal direction to a first pivotal position to open the valve means to its patrially open position and to be pivoted in said one pivotal direction beyond said first pivotal position to a second pivotal position to open the valve means to its fully open position, and releasable means for retaining the lever in its first pivotal position; and wherein the selector means, when operated for conditioning the preset means for being inoperative, pivots the lever to its second pivotal position.

8. In the self-service dispensing system of claim 6 wherein the valve means has partially open and fully open positions providing a two-stage termination of the fuel delivery; wherein the lever means is connected to be pivoted in its said first pivotal direction to its first pivotal position to retain the valve means in its partially open position and further in the first pivotal direction to a second pivotal position to retain the valve means in its fully open position; and wherein the dispensing system comprises selector means for alternatively pivoting the lever means to its second pivotal position for opening the valve means to its fully open position and for thereby deactivating the preset means and for releasing the lever means for retention by the detent means and to be pivoted by the delivery control means.

9. In a fluid dispensing system having a resettable register with a plurality of coaxial counter wheels of ascending order adapted for registering the amount of fluid delivered and transfer means operable for generating transfers between adjacent lower and higher order wheels, a reset mechanism for resetting the register between deliveries, valve means for controlling the fluid delivery, and preset means adapted to be operated in accordance with the delivery of fluid for closing the valve means after a predetermined amount of fluid has been delivered, the improvement wherein the preset means is connected to be operated by the transfer means of the register for closing the valve means in accordance with the operation of said transfer means; and wherein the preset means comprises a pivotal valve control lever connected to the valve means and having a first pivotal position for holding the valve means open, releasable latching means for retaining the lever in its first pivotal position, and release

means operated by the transfer means for releasing the latching means.

10. In a fluid dispensing system of claim **9** wherein the transfer means comprises a transfer pinion shaft and coaxial transfer pinions on the shaft mounted intermediate the counter wheels for generating transfers between adjacent lower and higher order wheels, one of the transfer pinions being fixed to the pinion shaft for rotation therewith and the remaining transfer pinions being rotatable on the pinion shaft; and wherein the release means comprises a cam fixed to the pinion shaft for rotation with said one transfer pinion.

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U.S. Cl. X.R.

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