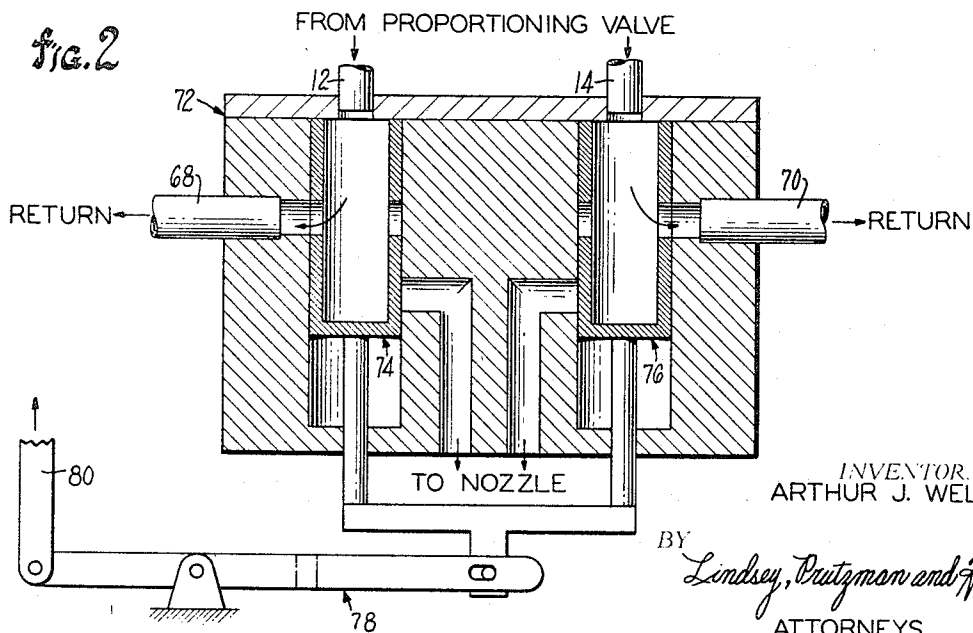
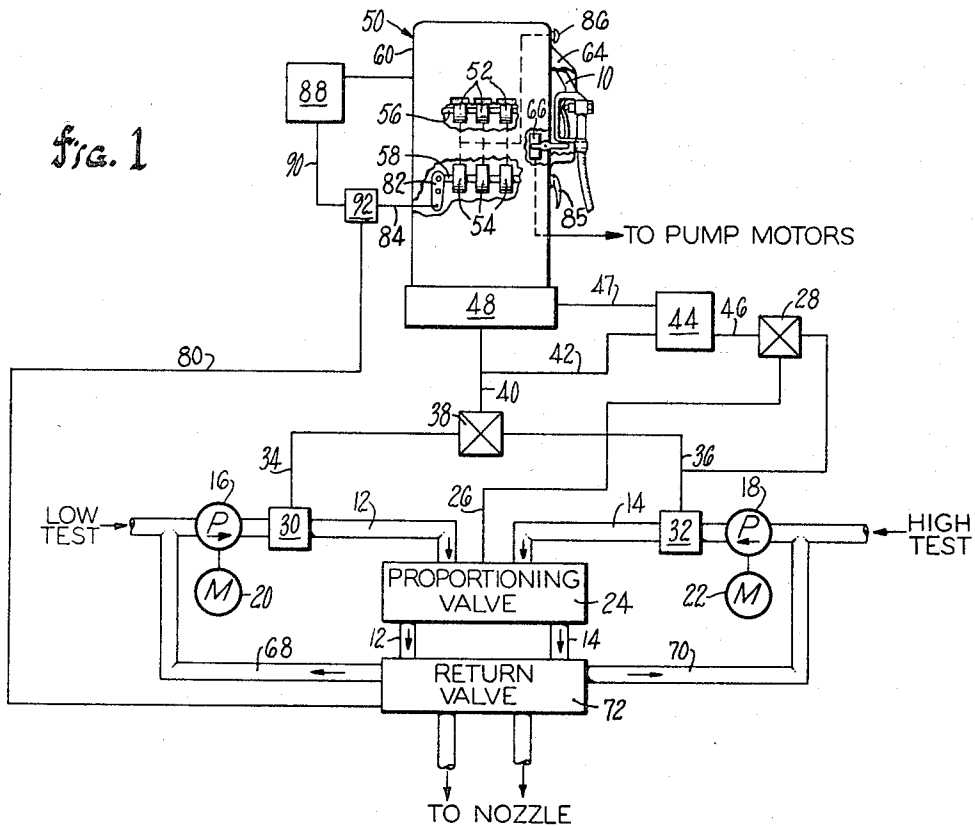


3,381,855

DISPENSING APPARATUS HAVING FLUID RETURN STAGE

Filed Dec. 22, 1966

2 Sheets-Sheet 1



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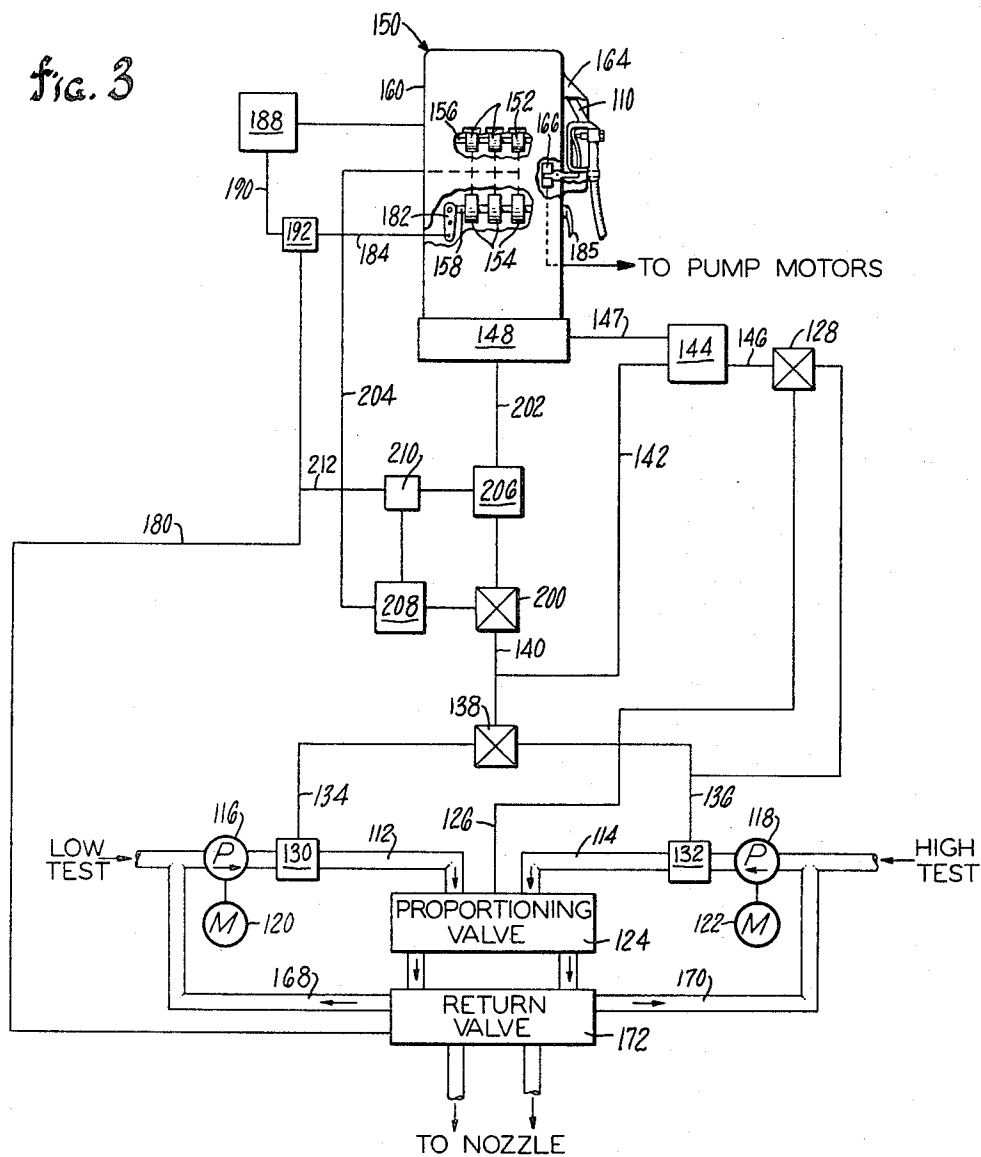
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2 Sheets-Sheet 2

FIG. 3



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DISPENSING APPARATUS HAVING FLUID RETURN STAGE

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8 Claims. (Cl. 222—33)

This invention relates to fluid dispensing apparatus and particularly concerns dispensing apparatus of a blending type used in gasoline service stations for simultaneously dispensing two different grades of fuel in varying proportions.

A primary object of the invention is to provide an improved fluid dispensing apparatus for essentially eliminating the well-known blend error encountered at the start of a dispensing operation for a selected blend of fuel which is different from the previously dispensed blend so as to always deliver a desired mixture of two different fuels in a proper total quantity ratio as well as in a proper flow rate ratio.

Another object of the invention is to provide an improved fluid dispensing apparatus of the above-described type which is readily incorporated in both new and existing fluid dispensing systems for significantly minimizing blend error.

A further object of the invention is to provide an improved fluid dispensing apparatus which is quick and easy to operate while yet effecting increased accuracy and efficiency in a dispensing operation.

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 which will be indicated in the appended claims.

In the drawings:

FIG. 1 is a schematic diagram, partly broken away, showing an embodiment of a fluid dispensing apparatus of the invention;

FIG. 2 is a schematic section view, partly broken away, showing valve arrangement of a type which may be employed in the invention; and

FIG. 3 is a schematic diagram, partly broken away, similar to FIG. 1 and showing another embodiment of a fluid dispensing apparatus of the invention.

Referring now to the drawings in detail, a fluid dispensing apparatus is schematically illustrated in FIG. 1, conventional features of which are fully described in United States Patent 2,814,444 issued Nov. 26, 1957 in the name of Bliss, United States Patent 3,087,651 issued Apr. 30, 1963 in the name of Bliss et al. and United States Patent 3,175,414 issued Mar. 30, 1965 in the name of Wells, each of which patents is assigned to the assignee of the present invention.

Although not necessarily limited in use thereto, the apparatus of this invention is of notable utility in connection with the dispensing of two different grades of gasoline in variable proportions from a common discharge nozzle 10. For convenience, the different grades of gasoline will be referred to as "low test" and "high test," and it will be understood that separate storage tanks, not shown, are provided for both grades of gasoline which are drawn through separate flow lines 12, 14 by pumps 16, 18 respectively operated by motors 20, 22. A conventional dual type proportioning valve 24 is preferably provided which upon being moved in a proper direction, diminishes flow in one of the lines 12, 14 and correspondingly in-

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creases that in the other line for dispensing a desired mixture of high and low test gasolines.

The setting of valve 24 is accomplished through an output shaft 26 of a subtracting differential 28 controlled by meters 30, 32 of a conventional volumetric type positioned in flow lines 12, 14 between pumps 16, 18 and the proportioning valve 24. Meters 30, 32 each have an output shaft 34, 36 rotatable in proportion to the flow rate of fluid pumped through lines 12, 14. The output of the two meter shafts 34, 36 is combined by a summing differential 38 and transmitted by an output shaft 40 thereof and a connecting shaft 42 to the subtracting differential 28 via a speed change mechanism 44 having an output shaft 46 connected therebetween. Shaft 46 and meter output shaft 36 each provide an input to the subtracting differential 28 whereby its output shaft 26 is used to set the proportioning valve 24.

The connecting line 47 denotes a shaft whereby the setting of a variator 48, associated with a register 50 of a type particularly adapted for use in gasoline dispensing apparatus, is transmitted to the speed-change mechanism 44 so that both the variator 48 and the speed-change mechanism 44 may be set simultaneously and in unison.

The variator 48 may be of the type disclosed in the referenced Wells Patent 3,175,414. As described in that patent, the output shaft 40 of the summing differential 38 is connected to the variator 48 which in turn effects a proper speed ratio between the drive to cost wheels 52 and to quantity wheels 54 of the register 50 upon setting the variator 48 to a different price corresponding to a different grade, whereupon the speed-change mechanism 44 is also set at the same time to adjust the proportioning valve 24 to provide the selected different grade.

The manner in which the wheels 52, 54 are driven to register the cost and quantity of the fuel dispensed is fully described in the referenced Bliss Patent 2,814,444 which patent also completely describes one manner in which these number wheels may be reset to zero after the completion of one dispensing operation and before the start of the next dispensing operation. It will be sufficient for a proper understanding of the invention to state that number wheels 52, 54 are rotatably supported on axially shiftable shafts 56, 58 extending across the register 50 between the end of its frame 60. After a dispensing operation, shafts 56, 58 are axially shifted to an inoperative resetting position for the purpose of zeroizing the number wheels, and the wheel supporting shafts 56, 58 are then returned to a registering position whereupon the register 50 is reconditioned for the next dispensing operation.

In the preferred embodiment, pumping of both high test and low test fuel is started when the operator removes the nozzle 10 from its storage receptacle 64 thereby to close a pump motor switch 66 which is in electrical connection with the motors 20, 22 of the pumps 16, 18. If the flow rates and thus the meter output shaft speeds are not exactly in the proper ratio for the selected blend, the output shaft 26 of the subtracting differential 28 will rotate in a proper direction to cause repositioning of the proportioning valve 24 to provide the desired flow rate ratio.

Such adjustment of the proportioning valve 24 normally results in an error in the total quantity ratio of the two fluids being dispensed through lines 12, 14 which occurs at the beginning of a dispensing operation during the time required to adjust the proportioning valve 24 to the proper flow rate ratio of a newly selected blend.

In accordance with the present invention, the objectionable blend error is essentially eliminated by the provision of a return line 68 and 70 associated with each flow line

12 and 14, and a return valve 72 is disposed in lines 12, 14 between the proportioning valve 24 and the nozzle 10.

More specifically, the return valve 72 is illustrated in FIG. 2 as comprising a pair of valve members 74, 76 coupled together for simultaneous movement by suitable linkage 78. Each valve member 74, 76 is movable between a RETURN position shown in FIG. 2 wherein the flow lines 12, 14 are closed to the nozzle 10 while the return lines 68, 70 are open to their respective flow lines, and ON position wherein the return lines 68, 70 are closed and each flow line 12, 14 is open to the nozzle. It is contemplated that valve members 74, 76 could also be movable between three positions, i.e., a RETURN position and an ON position as described above, and an additional OFF position wherein the return lines 68, 70, and the flow lines 12, 14 to the nozzle 10 are each closed to the passage of fuel.

The connecting line 80 to the return valve 72 denotes actuating linkage whereby its position is controlled, e.g., in response to axial movement of the number wheel supporting shaft 58 via a pivotable lever 82 secured to shaft 58 and to an attached connector 84 drivingly connected to the valve control linkage 80.

Thus, at the end of a dispensing operation, a handle 85 may be turned by an operator into a vertical OFF position, e.g., causing the wheel supporting shafts 56, 58 to be shifted into their resetting position as described in the referenced Bliss patent 2,814,444, and such movement of the wheel supporting shafts 56, 58 causes the return valve 72 to be moved into RETURN position (FIG. 2) to connect lines 12, 14 to their respective return lines 68, 70 thereby shutting off the flow of fuel to the nozzle 10. The number wheels 52, 54 of the register 50 may then be reset to zero by actuating a push button 86 as fully described in the above-mentioned patent, to complete the resetting operation and thereby recondition the register 50 for a registering operation. Upon replacing the nozzle 10 in its storage receptacle 64, the pump motor switch 66 will be opened to turn off the pumps 16, 18.

When the nozzle 10 is next removed from its storage receptacle 64, the pump motors 20, 22 will be energized, and the low test and high test fuels will be pumped through lines 12, 14 causing operation of the meters 30, 32. Since the return valve 72 is in its RETURN position, fuel will be initially returned through each of the return lines 68, 70 and the operation of the meters 30, 32 will provide the driving force to effect any necessary adjustment of the proportioning valve 24 for a newly selected blend while the flow lines 12, 14 remain closed to the nozzle 10. The adjustment of the proportioning valve 24 requires only a moment, and the handle 85 is then turned by an operator into a horizontal ON position causing the wheel supporting shafts 56, 58 to be reshifted from their resetting position into registering position. This return movement of the wheel supporting shafts 56, 58 causes the return valve 72 to be moved into its ON position closing each return line 68, 70 and opening lines 12, 14 to the nozzle 10, thereby conditioning the apparatus to start a dispensing operation such that fuel will be delivered in a proper total quantity ratio as well as in the proper flow rate ratio.

Connected to the register 50 is a presettable control mechanism 88 of a conventional type for automatically terminating the delivery of fuel when a preselected amount has been dispensed, as fully described in the referenced Bliss et al. Patent 3,087,651. The presettable control mechanism 88 is shown as being operatively connected such as at 90 to the return valve 72 through the valve control linkage 80 to effect automatic shut-off to the nozzle 10. A suitable operator 92 is provided between connectors 84 and 90 to the valve control linkage 80 whereby the desired advantage of moving the return valve 72 into its RETURN position may be provided by the presettable control mechanism 88 without interference with the operation of the valve control linkage 80 by means of the wheel supporting shaft 58, when it is desired to dispense

fuel without making use of the presettable control mechanism 88.

In the embodiment of the invention illustrated in FIG. 3, the same numerals preceded by the number 1 have been utilized to identify like parts.

In general, the apparatus of FIG. 3 is similar to that of FIG. 1 and is particularly suited to minimize blend error as well as to effect automatic shut-off by the presettable control mechanism 188 when a preselected amount of fuel has been dispensed, as previously described in connection with the first embodiment.

However, in this second embodiment, it will be noted that a selectively operable drive arrangement, responsive to operation of the output shaft 140 of the summing differential 138, is provided comprising a differential 200 for alternately applying an input to the variator 148 and to the register 150 when the meters 130 and 132 are operated by the pumping of low test and high test fuel through lines 112 and 114.

The differential 200 is driven by the output shaft 140, and the output of the differential 200 is transmitted to the variator 148 and to the register 150 by drive shafts 202 and 204 respectively. A variator brake 206 and a register brake 208 are shown connected to drive shafts 202 and 204. The brakes 206, 208 are operatively connected to a common brake control 210 of any suitable type for engaging one of the brakes 206, 208 and simultaneously releasing the other whereby drive shafts 202 and 204 of the differential 200 are alternately operable for effecting an input to the variator 148 while the register brake 208 is engaged, e.g., and then transmitting a drive motion to the register 150 while the variator brake 206 is engaged. As shown, the brake control 210 is operated simultaneously upon operation of the return valve control linkage 180 through a suitable connection 212.

In operation, the handle 185 is turned OFF by the operator at the end of a dispensing operation, causing the wheel supporting shafts 156, 158 to shift into resetting position to condition the number wheels 152, 154 to be zeroized, and the movement of wheel supporting shaft 158 operates the valve control linkage 180 causing the return valve 172 to be moved into RETURN position shutting off the delivery of fuel to the nozzle 110, and also causing the brake control 210 to be actuated. (As described in connection with the first embodiment, the presettable control mechanism 188 may also be used at the end of a dispensing operation to actuate the valve control linkage 180 and, in this case, the brake control 210.) Upon actuation of the brake control 210 with the return valve 172 in its RETURN position, the variator brake 206 is set and the register brake 208 is released whereupon the output of the meters 130, 132 due to the passage of fuel through the closed loops 112, 168 and 114, 170, is transmitted to the differential 200 to effect zeroizing of the number wheels 152, 154 through drive shaft 204 and to recondition the register 150 for the next dispensing operation just before the nozzle 110 is replaced in its storage receptacle 164 to open the pump motor switch 166, turning off the pumps 116, 118.

If the next desired blend is different from that previously dispensed, the variator 148 is set and the nozzle 110 is removed from its storage receptacle 164 to turn on the pumps 116, 118. With the return valve 172 in its RETURN position, the proportioning valve 124 is zeroed in on the proper flow rate ratio as previously described to substantially eliminate blend error before any fuel is delivered to the nozzle 110. The handle 185 is then turned ON to shift the wheel supporting shafts 156, 158 into the registering position whereby the valve control linkage 180 is actuated to move the return valve 172 into its ON position, connecting flow lines 112, 114 to the nozzle 110 and to simultaneously operate the brake control 210 thereby to engage the register brake 208 and release the variator brake 206 for applying a driving force to the variator 148 through the drive shaft

202. The apparatus is now conditioned for the dispensing of fuel.

Subsequently, when the return valve 172 is moved into its RETURN position by turning the handle 185 OFF, or alternatively by operation of the presettable control apparatus 188, lines 112 and 114 are closed to the nozzle 110 and fuel is once again directed through the return lines 168, 170 to automatically reset the register 150, for upon operation of the valve control linkage 180, the brake control 210 is simultaneously actuated to render the variator drive shaft 202 nonoperative and at the same time operate the register drive shaft 204. When the nozzle 110 is replaced in its storage receptacle 164, turning off the pump motors 120, 122, the cycle is completed.

A dispensing apparatus of the above-described type is adapted to provide for automatic resetting of the register by virtue of the disclosed fuel return stage of the invention. Moreover, the subject invention is of notable utility in conjunction with a presettable control mechanism for automatically terminating delivery when a preselected amount of fuel has been dispensed, in addition to being particularly suited to minimize blend error when incorporated in a system having separate flow lines for simultaneously dispensing fluid in varying proportions.

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.

I claim:

1. In an apparatus for dispensing preselected blends of two fluids having a separate flow line for each fluid and a common discharge nozzle in communication therewith, each flow line including a pump and a flow meter downstream of the pump, and an adjustable proportioning valve operated by the meters for controlling the delivery of each fluid to the nozzle in variable proportions in accordance with a predetermined flow rate ratio, the improvement comprising a fluid return stage in communication with each flow line and having flow control means for closing off fluid to the nozzle and returning the same upstream of the pumps to permit adjustment of the proportioning valve effecting said predetermined flow rate ratio before fluid is delivered to the nozzle in a dispensing operation.

2. The improvement as recited in claim 1 wherein said flow control means includes valve means in each flow line between the meters and the nozzle, and wherein said fluid return stage further includes a return line connected to said valve means and to each flow line upstream of the pump.

3. The improvement as recited in claim 2 wherein said fluid return stage further includes a valve control operable for moving said valve means between a first position closing each said return line and opening the flow lines to the nozzle, and a second position closing the flow lines to the nozzle and opening each said return line.

4. The improvement as recited in claim 2 wherein said

valve means is positioned downstream of the proportioning valve.

5. The improvement as recited in claim 2 wherein said valve means includes a return valve member in each flow line, each said return valve member being coupled to the other for simultaneous movement in unison between a first position closing each said return line and opening the flow lines to the nozzle, and a second position closing the flow lines to the nozzle and opening each said return line.

6. The apparatus of claim 3 further including a register having a resetting mechanism, the improvement further comprising a driving connection between the resetting mechanism and said valve control for moving said valve means into said first position and said second position respectively at the start and upon the completion of a dispensing operation.

7. An apparatus for dispensing preselected blends of two fluids comprising a separate flow line for each fluid and a common discharge nozzle in communication with each flow line, each flow line including a pump, a flow meter and return valve means between the meter and the nozzle, a separate return line associated with each flow line connected to the return valve means and to its respective flow line upstream of its pump, the return valve means being movable between a first position closing each return line and opening each flow line to the nozzle, and a second position closing each flow line to the nozzle and opening each return line, an adjustable proportioning valve for controlling the dispensing of fluid from each line in variable proportions in accordance with a predetermined flow rate ratio, meter operated means connected to the proportioning valve and movable in response to a variance between the ratio of flow rates through the meters and said predetermined flow rate ratio for adjusting the proportioning valve, and control means connected to the return means for moving the same into said first position and said second position respectively at the start and upon the completion of a dispensing operation.

8. The apparatus of claim 7 further comprising a frame having a receptacle for the nozzle and a pump motor switch operable for simultaneously energizing each pump, the pump motor switch being closed and opened respectively upon removal of the nozzle from and its replacement in its receptacle whereby each fluid is initially pumped through its return line before the start of a dispensing operation to permit prior adjustment of the proportioning valve for ensuring delivery of a fluid blend in a proper total quantity ratio as well as in a proper flow rate ratio.

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