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Jarvis et al.

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[54] **LIQUID FUEL DISPENSING PUMP**

[75] Inventors: **Robert Jarvis,** Wokingham; **John Francis Croxford,** Basingstoke, both of England

[73] Assignee: **Dresser Europe S.A.,** Brussels, Belgium

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[52] **U.S. Cl.** **222/33,** 222/75

[51] **Int. Cl.** **B67d 5/20**

[58] **Field of Search** 222/74, 75, 26, 33, 35, 222/129

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Primary Examiner—Richard A. Schacher
Assistant Examiner—James M. Slattery
Attorney, Agent, or Firm—Roy L. Van Winkle; John N. Hazelwood

[57] **ABSTRACT**

A liquid fuel blender dispensing pump having a computer to drive price and volume indicator drums and an interlock shaft to switch on the computer. A reset motor is coupled to reset the drums to zero and then switch on the main pump motor at the beginning of a dispensing cycle. The reset motor is also coupled to drive the interlock shaft and is switched on by movement of an actuator in response to or allowed by removal of the dispensing nozzle from the pump housing.

5 Claims, 4 Drawing Figures

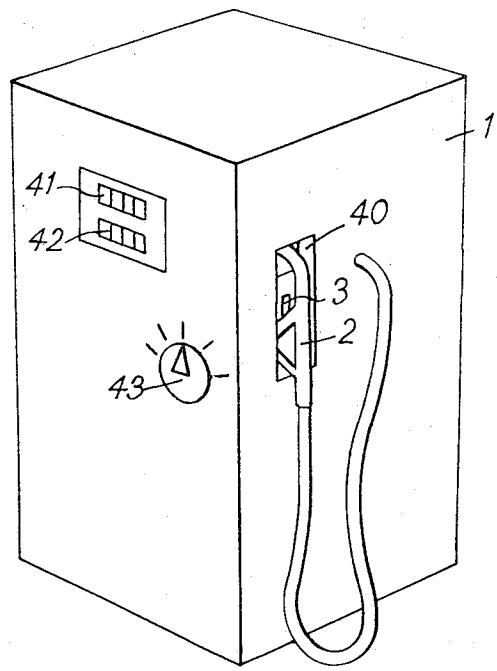


FIG. 1.

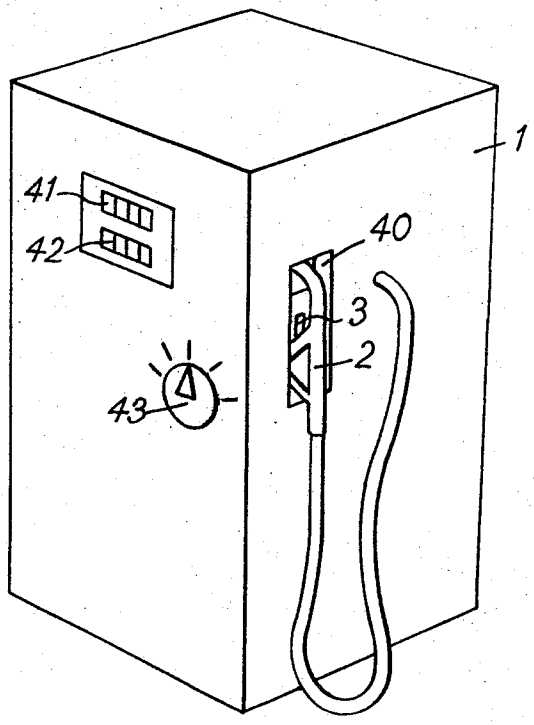


FIG. 3.

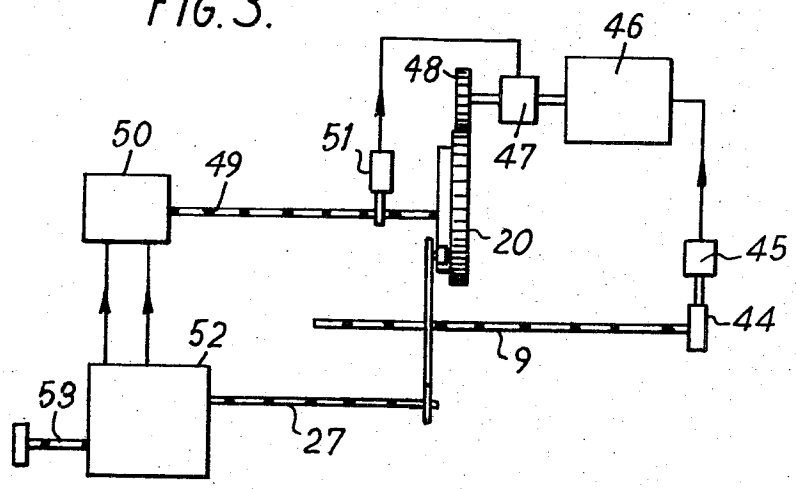


FIG. 2.

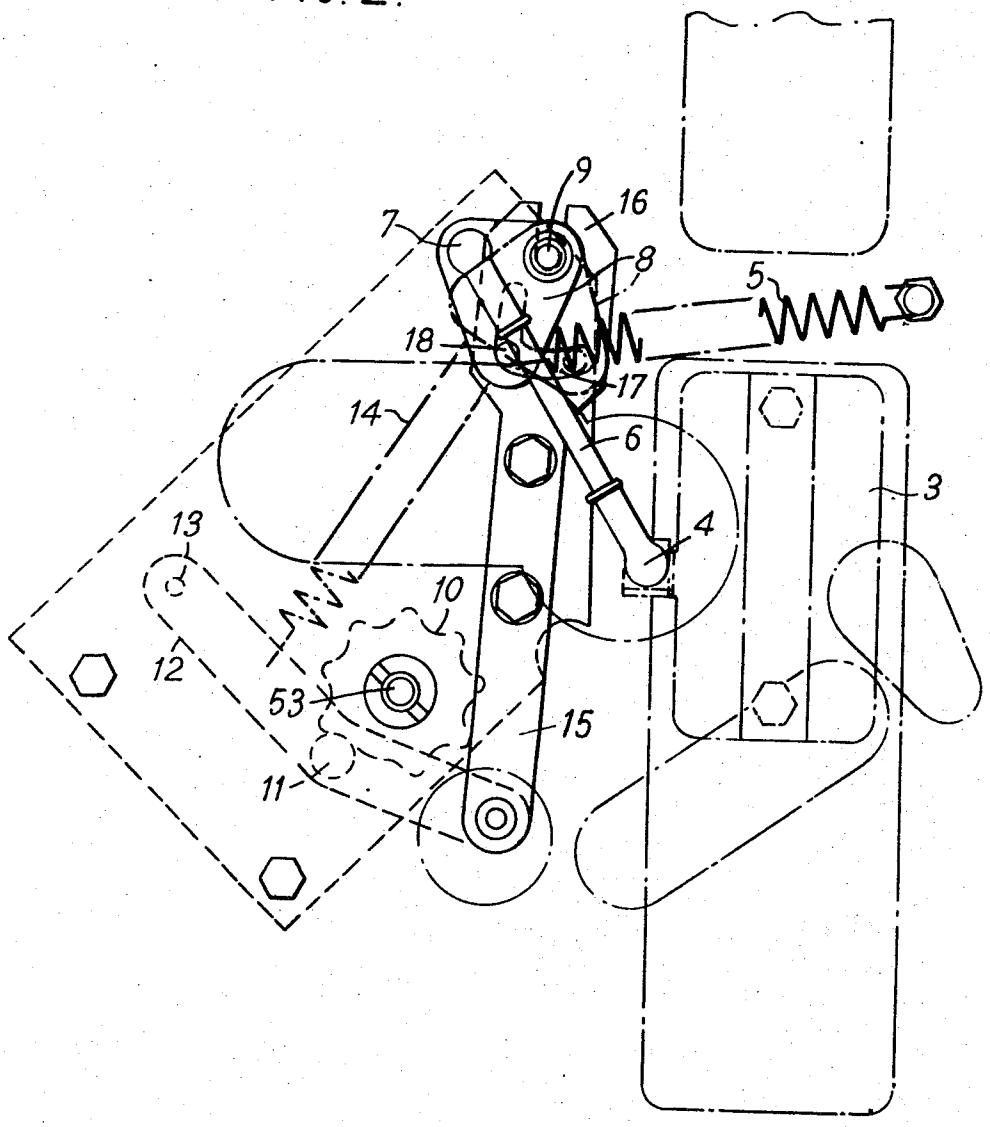
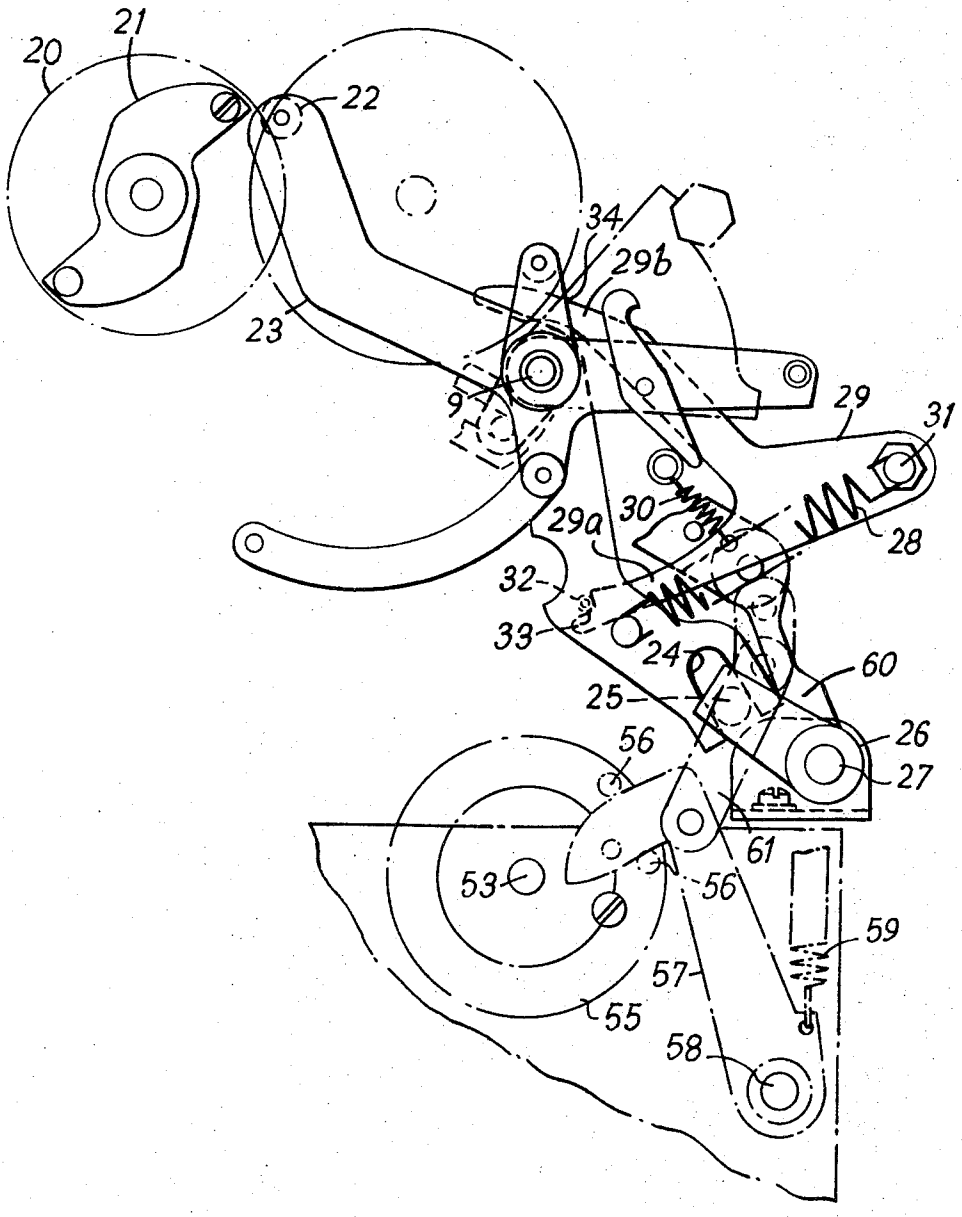


FIG. 4.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LIQUID FUEL DISPENSING PUMP

The invention relates to a fuel dispensing pump which blends two base grades of liquid fuel — usually petrol — in adjustable predetermined proportions and delivers a mixture of desired octane rating. Such pumps have a computer which computes and totalises the value of the fuel as it is dispensed. Price and volume indicating drums are controlled by the computer. Usually there is provided an electric reset motor which is switched on at the beginning of each dispensing operation and is effective to reset the indicator drums to zero and then close a switch which allows a circuit for the pump motors to be completed. A reset switch operates the reset motor. Hereinafter, such a pump will be referred to as a "fuel dispensing pump of the kind referred to".

In one form of fuel dispensing pump of the kind referred to the reset switch is operated by turning of a reset shaft. The reset shaft is turned by turning of an interlock shaft which is turned by a manual on/off switch. The interlock shaft is interlocked with the blend selector mechanism so that it is turned by the on/off switch only if an appropriate blend selection has been made. The interlock shaft in such a pump is also effective by a mechanical coupling to switch on the computer. Thus, in a pump of this kind it is generally necessary to select a grade of fuel, remove the pump nozzle and manipulate the on/off switch before fuel can be dispensed. Furthermore, it is necessary to switch off the manual on/off switch at the end of the dispensing operation. It would be convenient, particularly for customer self-service pumps, to reduce the number of operations required. One method is to use the action of removal of the pump nozzle from its housing and/or replacement of the pump nozzle in its housing to effect the function of the on/off switch. However, the force required to switch the computer on and off is such that the weight of the nozzle, or the strength of a spring able to be stressed by the weight of the nozzle, is inadequate. The present invention seeks to provide a solution to this problem.

According to the invention a fuel dispensing pump of the kind referred to has a nozzle normally housed in a nozzle housing; an actuator in the housing which is depressed by the action of pushing the nozzle home in the housing; an interlock shaft coupled to the computer to switch the computer on and off when turned; a mechanical linkage coupling the actuator with the reset switch so that movement of the actuator allowed by removal of the nozzle from the housing switches on the reset switch; and coupling means between the reset motor and the interlock shaft whereby the interlock shaft is turned by the reset motor to switch on the computer. The arrangement does not require additional electric or hydraulic motors to turn the interlock shaft, use being made of available capacity of the reset motor itself.

Preferably the coupling means comprises a cam mounted to be turned by the reset motor, a lever having a cam follower which co-operates with the cam, a spring which urges the lever to press the cam follower on the cam and a crank on the interlock shaft, the end of the lever remote from the cam follower being arranged to engage the crank. Preferably a latch is provided to hold the lever against the spring when the interlock shaft has been turned thereby to the "on" position and the actuator is coupled to release the latch when the nozzle is replaced.

Conveniently the actuator is coupled to the normally provided reset shaft which, however, is not directly coupled to the interlock shaft. The latch may be released by co-operation with a crank on the reset shaft.

Preferably an interlock is provided between the reset shaft and the blend selector so as to prevent rotation of the reset shaft unless the blend selection has been made properly. This interlock may be electromechanical, with a switch and locking solenoid. Preferably, however, the interlock is mechanical.

The invention will further be described with reference to the accompanying drawings, of which:

FIG. 1 is a perspective view of a fuel dispensing pump in accordance with the invention;

FIG. 2 is an end elevation of the mechanism of the pump of FIG. 1 associated with the actuator;

FIG. 3 is a schematic diagram illustrating the interrelationship of the components of the pump of FIGS. 1 and 2; and

FIG. 4 is a diagram illusrating the means for turning the interlock lever of FIG. 3.

Referring to FIG. 1 the pump is a blending petrol pump having a housing 1 with a boot 40 at the side which accommodates the dispensing nozzle 2. At the front of the pump is a display comprising a set of rotatable volume drums 41 which is driven to indicate the volume of fuel dispensed and a set of price drums 42 which is driven to indicate the cost of the fuel dispensed. A blend selector knob 43 is provided for selection of the blend, or grade, of fuel required. In accordance with the selection made, two base grades of fuel are mixed in appropriate proportions as dispensing takes place.

Within boot 40 is an actuator 3 which is spring urged outwardly. In replacing the nozzle in the boot it is necessary to push the actuator against its spring. Removal of the nozzle allows the actuator to assume its outermost position within the boot. FIG. 2 shows the actuator mechanism. The actuator is coupled at 4 to a link 6 the other end of which is pivotally coupled at 7 to a control plate 8. The pump has a reset shaft 9 and the plate 8 is fixed thereto so that the plate is rotatable about the axis of shaft 9. A spring 5 couples the plate 8 to a fixed point on the housing and is the effective to urge actuator 3 outwardly. When the nozzle is in place the link 6 is urged upwardly so that the plate 8 is in its left-hand position as shown. When the nozzle 2 is removed the spring 5 turns the plate 8 to its right-hand limit position as shown in broken line. Since the plate is fixed to the reset shaft 9 this turns the reset shaft, thus operating a reset switch (not shown in FIG. 1) which turns on a reset motor (not shown in FIG. 1).

The blend selector knob 43 is coupled to a blend selector cam 10 and a cam follower roller 11 co-operates therewith. The roller 11 is mounted on a lever 12 which is pivoted at 13 and urged in an anti-clockwise direction by a spring 14. The spring thus urges the cam follower 11 into contact with the cam and the arrangement is effectively a strong indexing mechanism. If the blend selector knob is in a position appropriate to an obtainable blend then the lever 12 is in its upper-most position as shown. On the other hand, if the blend selector knob is left in an intermediate position then the

arm 12 will be urged downwardly by one of the cam projections.

Mounted on the end of lever 12 is a leg 15 which carries an interlock plate 16. Plate 16 is forked at its upper end to be guided by shaft 9 and has an L-shaped slot 17 which accommodates a peg 18 projecting from the control plate 8. If a blend has been properly selected and plate 16 is in its upper-most position then the slot 17 presents no obstruction to movement of peg 18 to the right when the nozzle 2 is removed. However, if a blend has not been properly selected then the movement of plate 8 is prevented by engagement of peg 18 with the slot, since the plate 16 will then be in a lower position than that shown. Furthermore, an additional interlock facility is provided by this arrangement since once the plate 8 has been moved to the right to switch on the reset motor then co-operation of peg 18 in the slot 17 prevents vertical movement of plate 16 and thus prevents rotation of the blend selector knob. This inhibits reselection of a blend during a dispensing operation.

Referring now to FIG. 3 there is shown schematically the relationship of the parts of the pump. The reset shaft 9 has at its end a crank 44 which, when the shaft is turned by the actuator 3, operates a reset switch 45. This applies current to an electric reset motor 46 which drives a gear wheel 48. Meshed with gear-wheel 48 is another gear wheel 20 which drives a shaft 49 which resets to zero drums 41 and 42 in the display shown generally at 50. In each operation the reset motor turns gear wheel 20 half a revolution and then actuates a switch 51 which allows the main pump motor to be energised. Furthermore, switch 51 actuates an electric clutch 47 in the drive between the reset motor and the gear wheel 48. Actuation of the clutch disengaged the gear wheel 48 from the motor and shaft 44 therefore the gear wheels 48 and 20 and the shaft 49 stop turning while the reset motor continues to run.

The display drums 41 and 42 are driven by a mechanical computer 52 which is driven by fuel meters in the two fuel supply lines. The computer is set to adjust the proportion of the base grades and the price displayed by a linkage from a shaft 53 on which the blend selector cam is fixed. The computer 52 is switched on by rotation of an interlock shaft 27. In a manner to be described with reference to FIG. 4 the interlock shaft 27 is turned by the reset motor.

Referring now to FIG. 4 the modification made to the reset motor is to screw to the face of gear wheel 20 a cam 21. This does not interfere with the normal operation of the gear or the motor and provides the additional function to be described below. The cam 21 co-operates with a cam follower roller 22 mounted on a lever 23 which is free to turn on shaft 9. The other end of the lever 23 is forked at 24 and co-operates with a peg 25 on a crank 26. The crank 26 is fixed on the interlock shaft 27 of the pump. When the crank 26 is in its left limit position as shown then the computer is switched on.

The lever 23 is urged anti-clockwise by a spring 28 so that the roller 22 is urged into contact with cam 21 and a force is provided from the spring 28 to urge the shaft 27 into the "off" position. This tendency is prevented by a latch arrangement when the computer has been switched on. The latch arrangement comprises a latch lever 29 which is urged to rotate clockwise by a spring 30. The lever is pivoted at 31. A roller 32 is fixed on lever 23 and is free to rotate. As lever 23 is turned clockwise by movement of the reset motor the roller 32 rolls up a surface 29*a* of the arm 29 until it lodges as shown in a detent 33. This latches the lever 23 in the "on" position shown. At the end of the dispensing cycle when the pump nozzle is replaced in the housing 1, and operates the actuator 3 (FIG. 1) the reset shaft is turned anti-clockwise (as seen in FIG. 4) and a crank 34 which is fixed to the reset shaft rotates with it and co-operates with a branch 29*b* of arm 29 to move the arm anti-clockwise and thus release the latch.

It will be seen that in a typical dispensing operation, the operator selects a required grade of fuel with the blend selector knob and lifts the nozzle ready to deliver fuel. This has the effect of turning the reset shaft 9, switching on the reset motor and thereby turning the cam 21 so as to bring lever 23 into the position shown, where it is latched. This movement is effective to switch the interlock shaft to the "on" position and thereby switch the computer on. In each operation the output gear turns through 180° and when this cycle is completed the reset motor operates the switch 51 which allows the dispensing pump motors to be switched on. Dispensing can then proceed.

A further interlock is provided to supplement the action of peg 18 in slot 17 in preventing re-selection of the fuel grade during a dispensing operation. This further interlock comprises a wheel 55 fixed on the blend selector shaft 53 and having a number of parallel pins 56 projecting therefrom. An interlock pawl 57 is pivoted at 58 and is urged in the anti-clockwise direction by a spring 59. When the computer is switched on the pawl is allowed to assume the position shown in FIG. 4 where the nose of the pawl is situated between two pins and the blend selector shaft is thereby prevented from being rotated. When the interlock shaft 27 is turned clockwise by release of the latch 29 at the end of a dispensing operation a crank 60 fixed on shaft 27 pulls a link 61 coupling the crank 60 to pawl and withdraws the pawl to leave the blend shaft free to be rotated.

The above described embodiment of the invention makes use of the fact that the reset motor has power to spare during its cycle of operation. This is because the first and last parts of the reset cycle completed by the motor are used to disengage and re-engage indicator drums, and switch on the pump motors. This requires a large effort. During the middle portion of the reset cycle the indicator drums require little power to turn them. It is during this part of the reset cycle that the rotation of the reset motor is used to turn the interlock shaft. The cam 21 is shaped appropriately to achieve this function, the cam surface being circular at the beginning and end of each 180° portion so that when the roller 22 is in engagement therewith the resistance to motion is small. Between these portions the cam shape is such as to move the roller radially.

The invention is not restricted to the details of the foregoing description made with reference to the drawings. For example, to satisfy certain local regulations, it may be necessary to ensure that the pump motors are not switched on merely by removal of the nozzle from the housing, but an additional switching operation is required. In order to allow this function with the apparatus described, the spring 5 is simply removed, the remainder of the mechanism being unchanged. Thus, when the nozzle is removed from the housing, the actu-

ator 3 will not automatically move to switch the pump motors on — it will be pulled by hand to do so. However, the advantages remain that the switching effort required is small and switching off is effected, as before, by pushing the actuator with the pump nozzle in a single operation as the nozzle is replaced.

We claim:

1. A liquid fuel dispensing pump of the blending kind which blends two base grades of liquid fuel, the pump comprising: a computer which computes and totalizes the value of fuel as it is dispensed; price and volume indicating drums controlled by the computer; an electric reset motor coupled to reset, when energised, the indicating drums to zero; a reset switch for energising the reset motor; a housing for the pump; a nozzle normally housed in the pump housing; an actuator in the housing which is depressed by the action of pushing the nozzle home in the housing; an interlock shaft coupled to the computer to switch the computer on and off when turned; a mechanical linkage coupling the actuator with the reset switch so that movement of the actuator allowed by removal of the nozzle from the housing switches on the reset switch; and coupling means between the reset motor and the interlock shaft whereby the interlock shaft is turned by the reset motor to switch on the computer, said coupling means comprises a cam mounted to be turned, by the reset motor; a lever having a cam follower which co-operates with the cam; a spring which urges the lever to press the cam follower on the cam and a crank on the interlock shaft, the end of the lever remote from the cam follower being arranged to engage the crank.

2. A liquid fuel dispensing pump as claimed in claim 1 wherein there is provided a latch to hold the lever against the spring when the interlock shaft has been turned thereby to the "on" position and means coupling the actuator is to release the latch when the nozzle is replaced.

3. A liquid fuel dispensing pump as claimed in claim 2 wherein the actuator is coupled to a reset shaft and the reset shaft is coupled to the reset switch and also to the latch to release the latch when the nozzle is replaced.

4. A liquid fuel dispensing pump as claimed in claim 3 wherein a manual blend selector knob is provided for selecting a required blend, and there is an interlock between the blend selector and the reset shaft effective to prevent rotations of the reset shaft unless a blend has been selected properly.

5. A liquid fuel dispensing pump as claimed in claim 4 wherein the interlock comprises a first plate fixed on the reset shaft, which plate has a peg therein and a link carrying a second plate, the second plate having an 'L'-shaped slot therein in which the peg rides the link being coupled to a detent wheel which raises and lowers the slot with respect to the peg as the blend selector is moved from one grade position to the next, the first plate and thus the reset shaft being prevented from turning when the second plate is raised, namely when the blend selector is between grade positions and the second plate being prevented from being raised by co-operation with the peg when the first plate has been turned to switch the reset switch on.

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