

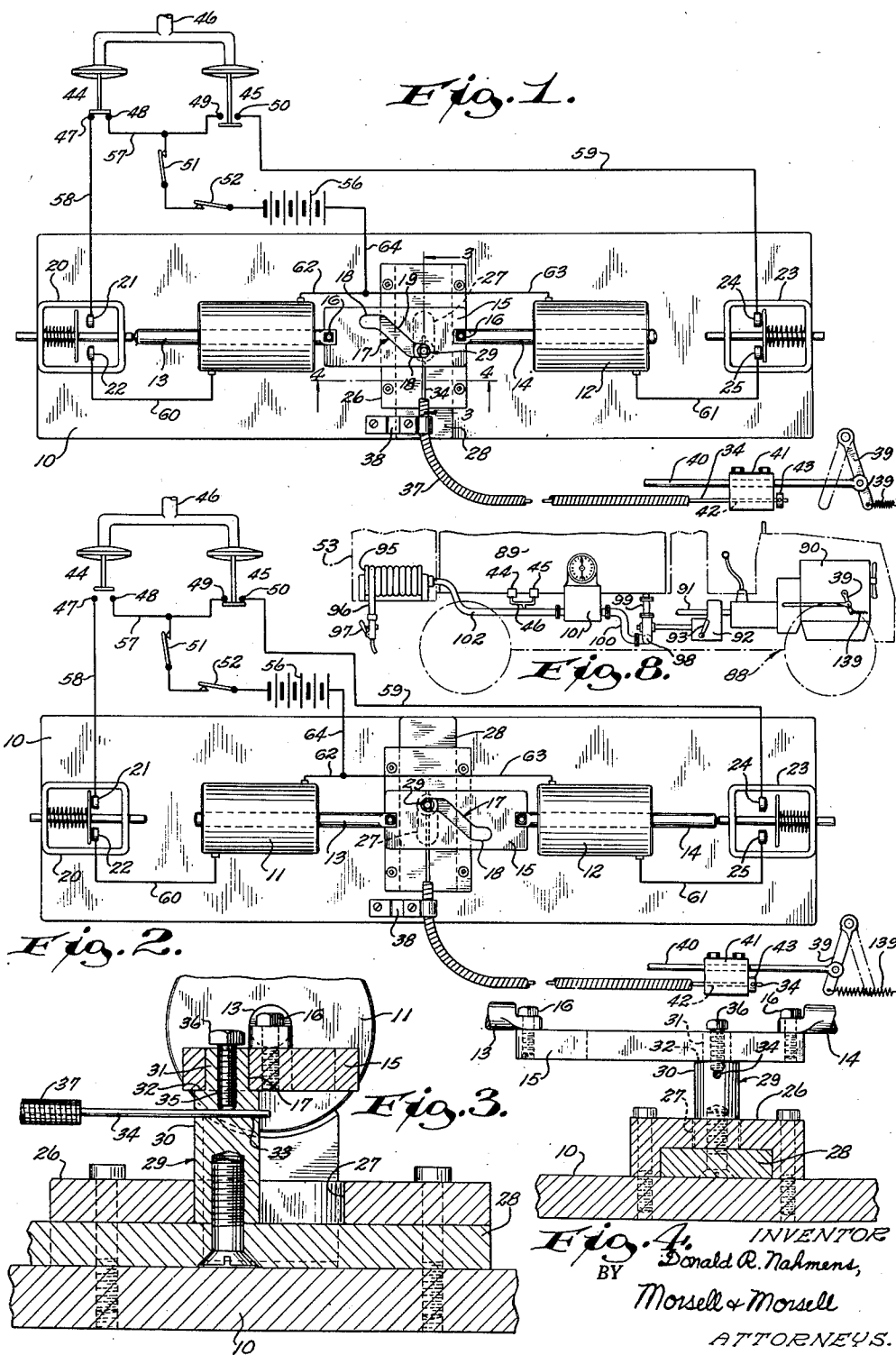
Sept. 15, 1953

D. R. NAHMENS
PUMP MOTOR CONTROLLER

2,651,996

Filed Aug. 18, 1950

2 Sheets-Sheet 1



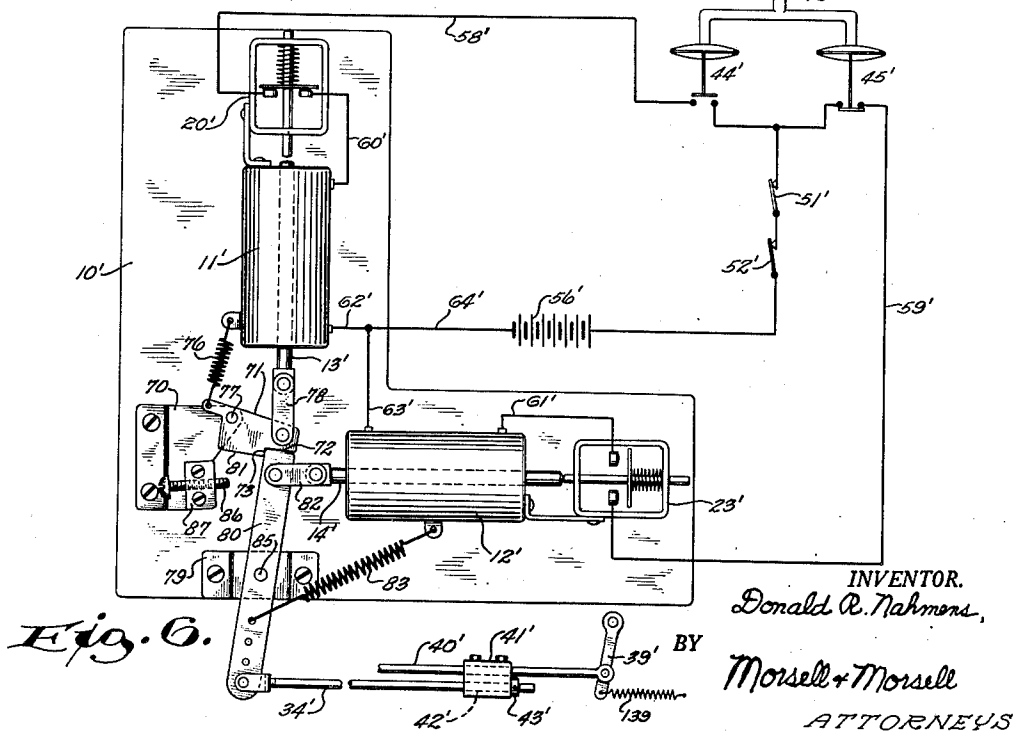
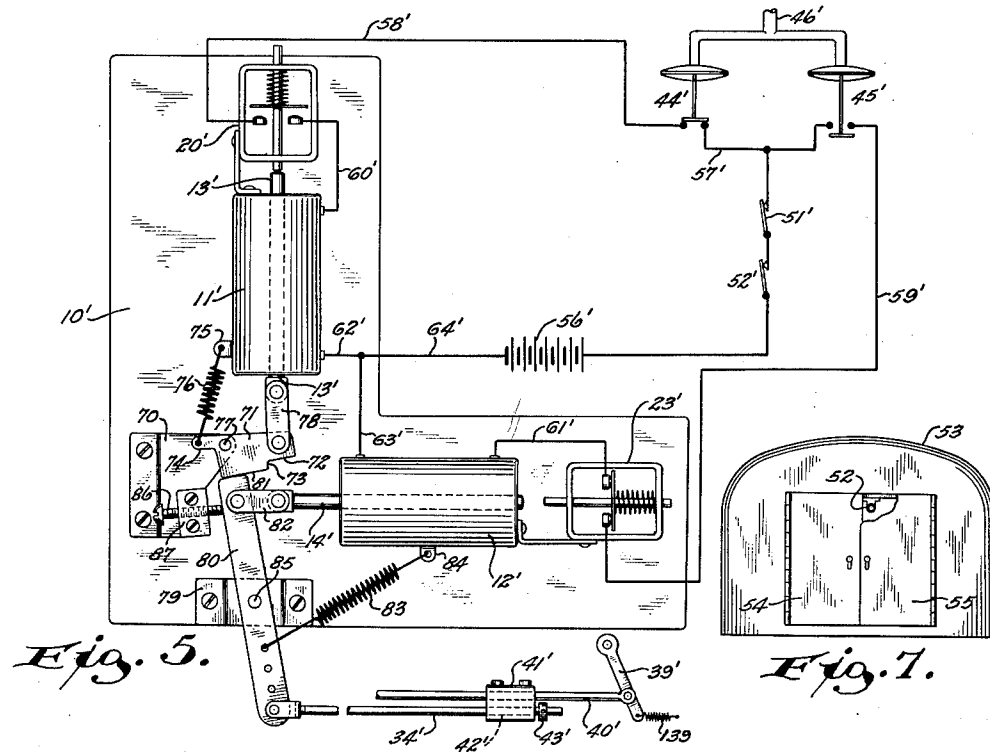
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,651,996

PUMP MOTOR CONTROLLER

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Application August 18, 1950, Serial No. 180,132

15 Claims. (Cl. 103—27)

1 This invention relates to improvements in pump motor controllers and more particularly to motor controllers for oil tank truck pumps.

Oil tank trucks are usually provided with positive displacement gear type pumps for pumping oil from the truck tank, through a flexible hose having a shut-off nozzle valve at the delivery end thereof, and into residence oil storage tanks or the like. These pumps are usually driven directly by the engine of the truck through a power take off, the pumping speed of the engine being considerably higher than the normal idling speed thereof. The speed of the engine is usually controlled by a hand throttle located in the truck cab.

Oil pumps of the positive displacement type are usually provided with a conventional spring loaded pressure relief bypass valve which, when open, provides communication between the discharge side of the pump and the inlet side of the pump. This communication, however, is ordinarily of considerably smaller cross sectional area than that of the outlet connection of the pump. As a result, when the engine and the pump are run at pumping speed and the hose nozzle is closed, the bypass valve cannot accommodate all of the discharge from the pump without high pressures being built up within the pump which cause much objectionable vibration. This vibration actually shakes loose the fittings on the pump and adjacent equipment, thereby causing leakage, and requiring frequent tightening of said fittings. Because of this vibration the pumping speed of the engine and of the pump must be kept lower than the pump's maximum efficient pumping speed, in order to keep the vibration down below the actual danger point.

A number of control devices have been developed in an attempt to solve the problem presented by this type of pump vibration. Certain of these devices depend upon engine vacuum for operation, and have not been entirely satisfactory because of the fact that engine vacuum is of such a fluctuating nature. Certain of the previous devices also required a fluid conduit extending to the engine carburetor, as well as a vacuum line extending to the intake manifold. These conduits extended from the engine back to the meter compartment of the truck. In addition, the prior control devices are not readily adaptable to all makes of pumps.

With the above in mind it is a principal object of the present invention to provide means for eliminating the objectionable vibration which is set up in a positive displacement pump when the

2 discharge conduit thereof is shut off and while the motor and pump are running at pumping speed.

A further object of the invention is to provide an engine controller which automatically slows a pump motor to idling speed when the delivery nozzle valve of said pump is closed, and which speeds the motor up to pumping speed upon opening of the delivery valve.

A further object of the invention is to provide an improved pump motor controller of the class described which, by reason of the fact that it eliminates objectionable vibration, greatly reduces wear and permits the pump to be run at its maximum efficient speed during pumping, to thereby increase the output of the pump and decrease pumping time.

A further object of the invention is to provide an improved pump motor controller of the class described, the major portion of which can be mounted under the hood of the truck or behind the dashboard thereof and which requires two wires only to extend from this portion of the device to the remainder thereof normally located in the hose reel compartment.

A more specific object of the invention is to provide an improved device of the class described which is responsive to the pressure on the discharge side of the pump, said pressure actuating electrical pressure switches which form part of an electrical control circuit with a pair of motor throttle actuating solenoids.

A further object of the invention is to provide an improved motor controller of the class described which is readily adaptable for use on all oil tank trucks regardless of the type of pumps thereon.

A further object of the invention is to provide an improved electrical motor controller which is economical in its consumption of electrical power.

A further object of the invention is to provide an improved controller of the class described which is relatively simple in construction, which is inexpensive to manufacture, easy to install, and which is otherwise well adapted for the purposes described.

With the above and other objects in view, the invention consists of the improved pump motor controller and all of its parts and combinations as set forth in the claims and all equivalents thereof.

In the drawings accompanying and forming a part of this specification, wherein are shown two embodiments of the invention and wherein

like characters of reference indicate the same parts in all of the views:

Fig. 1 is a semi-diagrammatic plan view of the preferred form of the improved controller in idling position;

Fig. 2 is a view similar to Fig. 1 showing the improved controller in pumping position;

Fig. 3 is a fragmentary view taken through the improved controller approximately along the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary longitudinal vertical sectional view of a portion of the improved controller taken approximately along the line 4—4 of Fig. 1;

Fig. 5 is a semi-diagrammatic plan view of a modified form of the invention in idling position;

Fig. 6 is a view similar to Fig. 5 but showing the modified controller in pumping position;

Fig. 7 is a fragmentary rear end view of a tank truck rear end hose reel compartment showing the door operated switch; and

Fig. 8 is a fragmentary side view on a reduced scale of the oil pumping system of an oil tank truck, the outline of said truck being shown in dotted lines.

Referring more particularly to Fig. 8, the numeral 88 indicates an oil tank truck having mounted thereon an oil tank 89. The truck 88 is provided with an engine 90 having a speed control or throttle arm 39 which may be connected to the engine carburetor. A rod 40 connects the arm 39 to the accelerator (not shown) of the truck 88 and said arm is provided with a tension spring 139 for urging said arm toward idling position. The engine 90 has a drive shaft 91 for driving a power take off unit 92 which may be engaged or disengaged by means of a lever 93. Mounted in a compartment 53 at the rear of the tank 89 is a hose reel 95 on which is normally coiled a flexible delivery hose 96. The hose 96 is provided at its terminus with a manual shut off nozzle valve 97. A positive displacement pump 98 has its inlet connection 99 communicating with the interior of the tank 89 and has its discharge connection 100 communicating with a meter 101. The meter 101 is connected to the hose 96 through a conduit 102 and the reel 95 in the usual manner.

Referring to Fig. 1 of the drawing, the numeral 10 indicates a base plate on which are mounted a pair of coaxial spaced solenoids 11 and 12. The solenoids 11 and 12 are provided with plungers 13 and 14 respectively which are axially and non-rotatably movable therein. The adjacent ends of the plungers 13 and 14 are connected to opposite ends of a rectangular cam plate 15, as by bolts 16. The cam plate 15 is formed with a slot 17 having end portions 18 adjacent opposite side edges thereof and extending parallel with the axis of the plungers. The end portions 18 are connected by a diagonally extending intermediate slot portion 19, as shown.

Mounted on the base 10, adjacent the outer end of the solenoid 11 and in a position to be actuated by the outer end of the plunger 13 is a normally closed switch 20 having a pair of contacts 21 and 22. Mounted on the opposite end of the base 10, adjacent the outer end of the solenoid 12 and in a position to be actuated by the plunger 14, is a normally closed electric switch 23 having a pair of contacts 24 and 25.

Bolted onto the base 10 is a transversely extending inverted channel shaped member 26.

The member 26 is formed with a slot 27 extending longitudinally thereof along the center line of its upper wall. The slot 27 is preferably wider than the slot 17. Slidably positioned on the base 10 under the inverted channel member 26 is a slidable bar 28 which is preferably rectangular in cross section, as shown. An upstanding cylindrical pin 29 is bolted to the upper surface of the slide bar 28 and extends through the slot 27 in the member 26. The pin 29 is formed with a portion 30 having a diameter substantially equal to the width of the slot 27 and is formed with a portion of reduced diameter 31, the diameter of which is substantially equal to the width of the slot 17. Between the portions 30 and 31 the pin 29 is provided with a shoulder 32.

The portion 31 of the pin 29 extends through the slot 17, as shown in Fig. 3, and the cam plate 15 rests on the shoulder 32. Below the shoulder 32 the pin 29 is formed with a diametrically extending bore 33 in which is positioned the end of a wire 34. The pin 29 is formed with a tapped axially extending aperture 35 in which is positioned a set screw 36 for locking the wire 34 in the bore 33. The wire 34 is provided with a metallic tubular sheath 37 in which it is slidable, and a bracket 38 securely positions one end of the sheath 37 adjacent an end of the slide member 26, as shown.

The numeral 39 indicates the speed control or throttle arm on the carburetor of the motor of the truck on which the improved controller is shown as being mounted. An accelerator rod 40 is pivotally connected to the arm 39, and depression of the accelerator (not shown) moves the rod 40 axially to thereby pivot the arm 39 in the usual manner from the solid line idle position of Fig. 1 toward the dot and dash line faster running position of Fig. 1. A block 41 may be fixed to the rod 40 and is formed with a bore 42 which is parallel with the rod 40. The wire 34 extends slidably through the bore 42 and has fixed to the end thereof a collar 43. The arm 39 and the rod 40 are normally urged toward the idle position, as shown in Fig. 1, by the spring 139.

Referring to Figs. 1, 2 and 8, the numerals 44 and 45 indicate a pair of pressure switches, said switches communicating with a common T conduit 46 which is in communication with the discharge pressure of the oil pump and may be connected to the conduit 102 of the oil tank truck, as shown in Fig. 8. The pressure switch 44 has a pair of contacts 47 and 48 which are closed when the pressure in the conduits 46 and 102 exceeds a predetermined value, for example 50 pounds. The contacts 47 and 48 are opened when the pressure in the conduits 46 and 102 falls below the predetermined pressure. The pressure switch 45 has a pair of contacts 49 and 50 which are opened by pressure in conduits 46 and 102 above a predetermined value which is preferably less than the pressure setting of the switch 44, for example 40 pounds, and are closed when the pressure in said conduits falls below said predetermined value. The pressure switches 44 and 45 are preferably adjustable so that the pressure of actuation may be varied to suit individual pump characteristics.

The numeral 51 indicates a manually operated single pole single throw switch preferably located in the cab of the truck 88. The numeral 52 indicates a normally closed push button type

switch which is preferably located in the hose reel compartment 53 of the truck 88.

Referring to Fig. 7, the rear end hose reel compartment 53 is provided with hinged doors 54 and 55. The switch 52 is mounted in the compartment 53 in a position to be actuated by the door 55 when said door is closed. The contacts of the switch 52 are opened when the door 55 is in closed position, and the contacts of said switch are closed when the door 55 is opened. This feature prevents operating of the improved controller except when the door 55 is open. The numeral 56 indicates the battery of the truck 88.

The electric circuit of the improved controller will now be described. A wire 57 connects the contacts 43 and 49 with one side of the switch 51. The switches 51 and 52 are connected in series and are connected to one side of the battery 56. A wire 58 connects the contacts 47 and 21, and a wire 59 connects the contacts 50 and 24. One wire 60 of the solenoid 11 is connected to the contact 22, and one wire 61 of the solenoid 12 is connected to the contact 25. The second wire 62 of the solenoid 11 is connected to the second wire 63 of the solenoid 12, and said wires are connected by a wire 64 to the other side of the battery 56.

Operation

When the truck is traveling toward a delivery point, the switches 51 and 52 are both open and the parts of the device are disposed, as shown in Fig. 1, with the exception that the contacts of the switches 44, 51 and 52 are open and the contacts of the switch 45 are closed. Upon reaching the delivery site, the manually operated switch 51 is closed by the operator and the power take off for operating the pump is engaged, the engine accelerator being undepressed so that the engine idles and the rod 40 and lever 39 are positioned by the spring 139 as shown in Fig. 1. Upon opening the door 55 of the hose reel compartment 53, the switch 52 automatically closes to complete the circuit to the battery 56 and render the controller operative. The operator then withdraws the hose 96 from the hose reel compartment 53, the nozzle valve 97 being normally shut off. During this time the engine 90 is driving the oil pump at a slow speed, and even though the hose nozzle valve 97 is shut off, the bypass valve of the pump 98 can accommodate all of the oil being pumped by the pump without vibration. However, the pressure in the hose 96, and consequently also the conduits 46 and 102, is above the predetermined pressure necessary to close the contacts of the switch 44, and to open the contacts of the switch 45, as shown in Fig. 1.

At the instant the delivery nozzle valve is opened, the pressure in the hose and in the conduit 46 drops below the predetermined level of 40 pounds, thereby opening the contacts of the switch 44 and closing the contacts of the switch 45. Electrical current then flows through the switches 52, 51, 45 and 23 and energizes the solenoid 12 causing the plungers 14 and 13, as well as the plate 15, to be moved toward the right, as viewed in Fig. 1, to the position of Fig. 2. As the plate 15 moves toward the right, the pin 29 is moved transversely by the slot 17 to its position shown in Fig. 2. The slide bar 28, of course, moves with the pin 29 and supports the same.

As the pin 29 so moves, it pulls with it the wire 34, thereby causing the collar 43, fixed to the

opposite end of the wire 34, to engage the block 41 and to move said block, along with the rod 40 and the arm 39 to the left to their positions shown in Fig. 2. When the arm 39 is in this position the engine is speeded up so that it drives the oil pump at a predetermined speed which is preferably its maximum efficient pumping speed. As the plungers 13 and 14 are moved toward the right, as described, the contacts of the switch 20 return to their normally closed position and the contacts of the switch 23 are opened by the plunger 14, as shown in Fig. 2. Opening of the contacts of the switch 23 shuts off the current to the solenoid 12, thereby deenergizing the same and preventing it from heating up and from drawing further electricity.

When the hose nozzle valve 97 is closed, shutting off the flow of oil through the discharge hose, a pressure beyond 50 pounds quickly builds up within the hose and the conduits 46 and 102. This causes the contacts of the switch 44 to close and the contacts of the switch 45 to open, thereby permitting current to flow from the battery 56 through the switches 52, 51, 44 and 20 to energize the solenoid 11. The energized solenoid 11 moves the plunger 13 to the left, pulling with it the plate 15 and the plunger 14, to the position of Fig. 1. As the plate 15 is moved toward the left, the slot 17 moves the pin 29 transversely to its position shown in Fig. 1, thereby moving with it the wire 34 and moving the collar 43 on the opposite end of said wire to the right, as viewed in Figs. 1 and 2, to permit the block 41, the rod 40 and the arm 39 to return to their positions of Fig. 1 under the urging of the spring 139. This immediately slows the engine 90 and the pump 98 to idling speed. As shown in Fig. 1, the contacts of the switch 20 are opened when the plunger 13 is moved toward the left to idling position. This deenergizes the solenoid 11, preventing it from heating up and from drawing any further current.

While the slot 17 in the plate 15 is operative to cause transverse movement of the pin 29 in response to longitudinal movement of said plate, the end portions 18 of said slot, being disposed at substantially a right angle to the path of movement of the pin 29, prevent transverse movement of the pin 29 while said pin is positioned in said end portions. The pin 29 is, therefore, locked in position whenever it is disposed in an end portion 18 of the slot 17. Transmission from the block 40 to the wire 34 of any force acting to the left, as viewed in Figs. 1 and 2, is prevented by the slidable engagement of the wire 34 in the bore 42 of said block.

It is thus apparent that the speed of the engine 90 and of the oil pump 98 is instantly adjusted by the improved controller in response to pressure changes on the discharge side of the pump 98 resulting from opening or closing of the delivery nozzle valve 97. As a result, the oil pump 98 at all times runs without any of the objectionable vibration which normally occurs when said pump is run at pumping speed with the discharge nozzle closed. The elimination of this vibration greatly reduces leakage at the fittings on and adjacent to the pump, and by greatly reducing the wear on the pump it greatly increases its life.

The improved controller permits the pump to be run at a greater pumping speed, since no vibration occurs when the delivery nozzle valve is shut off, and hence no allowance need be made for it. In addition to the increased pumping

gallons per minute permitted by the improved controller, a substantial amount of the operator's time is saved, due to the fact that no manual throttle adjustments need be made by the operator from the time he leaves the cab of the truck on arrival at the delivery site until he returns to the cab on completion of the delivery. It is apparent, therefore, that the improved controller provides a double time saving feature.

A modified form of the invention, which is adapted for use on larger trucks, is shown in Figs. 5 and 6. The numeral 10' indicates an L-shaped base upon which is mounted a pair of solenoids 11' and 12' disposed in spaced relation at substantially a right angle with respect to each other. A normally closed switch 20' is mounted adjacent one end of the solenoid 11' in a position to be actuated by the plunger 13' of said solenoid. A normally closed switch 23' is mounted adjacent an end of the solenoid 12' in a position to be actuated by the plunger 14' of said solenoid. A pair of pressure switches 44' and 45', preferably identical with the pressure switches 44 and 45 of the preferred form of the invention, are connected to a common T conduit 46' which may communicate with the conduit 102 of the truck 88. The switches 51' and 52' are identical with the switches 51 and 52 of the preferred form of the invention. The wiring diagram of the modified form of the invention is preferably identical with that of the preferred form, and the electric conductors indicated by primed numerals in Figs. 5 and 6 are identical with those indicated by the same numbers unprimed in Figs. 1 and 2.

Fixed to the base 10' and spaced from the adjacent ends of the solenoids 11' and 12' is a bracket 70 on which is pivotally mounted, for movement in a plane parallel with the base 10', a pawl or detent 71. The pawl 71 is formed along one edge 81, at the end thereof adjacent the solenoid 12', with a notched out portion 72 forming a shoulder 73. At its opposite end the pawl 71 is formed with an apertured ear 74. The ear 74 is connected to an ear 75 on the solenoid 11' by a coiled tension spring 76 which normally urges the pawl 71 in a clockwise direction about its pivot 77. The plunger 13' of the solenoid 11' is linked to the end portion of the pawl 71 adjacent the notch 72 by means of a link 78.

A second bracket 79 is mounted on the base 10', and pivotally mounted on the bracket 79 for movement coplanar with the pawl 71 is a lever 80. The lever 80 is positioned so that one end thereof is engageable with the edge 81 of the pawl 71. This end of the lever 80 is linked to the adjacent end of the plunger 14' of the solenoid 12' by means of a link 82. A coil tension spring 83 connects the opposite end portion of the lever 80 with an ear 84 on the solenoid 12' and normally urges the lever 80 in a counter-clockwise direction about its pivot 85. Counter-clockwise movement of the lever 80 is limited by a set screw 86 extending through a block 87 carried by the bracket 70.

The end of the lever 80 adjacent the spring 83 is pivotally connected to a throttle rod 34' which slidably extends through a bore 42' in a block 41' in the same manner that the wire 34 extends through the bore 42 in the block 41 in the preferred form of the invention. The rod 34' has fixed thereto a collar 43', and movement is transmitted from the rod 34' to the accelerator rod 40' and the throttle arm 39' in the same

manner that movement is transmitted from the wire 34 to the arm 39 in the preferred form.

Fig. 5 shows the parts of the modified form of the invention disposed in idle position. At the instant the delivery nozzle valve is opened, the pressure in the conduit 102 and in the delivery hose 96 drops below 40 pounds, causing the switch 44' to open and the switch 45' to close. Current then flows from the battery 56' through the switches 52', 51', 45' and 23' to energize the solenoid 12', which in turn pulls the plunger 14' to the right to the position thereof shown in Fig. 6. This movement of the plunger 14' pivots the lever 80 in a counter-clockwise direction against the tension of the spring 83 and moves the throttle rod 34' to the left thereby causing the throttle arm 39' to be swung to the left to pumping position shown in Fig. 2. The truck engine 90 is thereby speeded up to pumping speed. As the lever 80 moves in the clockwise direction, the pawl 71 is pivoted in a clockwise direction by the tension spring 76 to thereby move the shoulder 73 and the notch 72 into engagement with the end of the lever 80, as shown in Fig. 6, thereby locking said lever in this position. Simultaneously with the pivoting of the pawl 71, the plunger 13' of the solenoid 11' is moved toward said pawl and away from the switch 20', permitting the contacts of said switch to close. As the plunger 14' of the solenoid 12' is moved to the right by the energization of said solenoid, said plunger opens the contacts of the switch 23', thereby de-energizing the solenoid 12' to prevent it from heating up and from drawing further electricity.

When the delivery nozzle valve is closed, the pressure in the hose and in the conduits 46 and 102 builds up beyond 50 pounds, to thereby cause the switch 44' to close and the switch 45' to open. This energizes the solenoid 11' by causing current to flow from the battery 56' through the switches 52', 51', 44' and 20'. Energization of the solenoid 11' causes the plunger 13' thereof to be retracted and to rotate the pawl 71 in a counter-clockwise direction against the tension of the spring 76. This rotation of the pawl 71 releases the lever 80 which, under the urging of the tension spring 83, snaps back to the position thereof shown in Fig. 5 in engagement with the edge 81 of the pawl 71. As the lever 80 is so pivoted, the plunger 14' is moved therewith to permit the contacts of the switch 23' to close. Retraction of the plunger 13' opens the contacts of the switch 20', as shown, and deenergizes the solenoid 11' to thereby prevent it from heating up and from drawing further current. As the lever 80 pivots in a counter-clockwise direction, the accelerator rod 40' and the throttle arm 39' are permitted to return to idle position under the urging of the spring 139. This slows down the engine 90 and the pump 98 to idling speed, and the parts of the improved controller will remain as shown in Fig. 1 until the discharge nozzle 97 is again opened, at which time the improved controller will again automatically speed up the truck engine 90 and the pump 98 to pumping speed.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is op-

erating; a motor drivingly connected to said pump and having a speed control lever normally in idling position, said lever being movable between idling and pumping positions; a source of electrical current; a solenoid connected to said speed control lever in a manner to move said lever to pumping position when said solenoid is energized; a first pressure switch connected to said source of current and to said solenoid and responsive to a predetermined pressure in said discharge line to cause energization of said solenoid and movement of the speed control lever to pumping position; mechanism actuated by a second solenoid connected to said source of current for moving said speed control lever to idling position when said second solenoid is energized; and a second pressure switch responsive to a predetermined higher pressure in said discharge line to cause energization of said second solenoid and movement of the speed control lever to idling position.

2. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operating; a motor drivingly connected to said pump and having a speed control lever normally in idling position, said lever being movable between idling and pumping positions; a source of electrical current; a solenoid connected to said speed control lever in a manner to move said lever to pumping position when said solenoid is energized; a first pressure switch connected to said source of current and to said solenoid and responsive to a predetermined pressure in said discharge line to cause energization of said solenoid and movement of the speed control lever to pumping position; mechanism actuated by a second solenoid connected to said source of current for moving said speed control lever to idling position when said second solenoid is energized; a second pressure switch responsive to a predetermined higher pressure in said discharge line to cause energization of said second solenoid and movement of the speed control lever to idling position; a third switch responsive to movement of the control lever to pumping position for stopping the flow of current to the first solenoid; and a fourth switch responsive to movement of the control lever to idling position for stopping the flow of current to the second solenoid.

3. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operating; a motor drivingly connected to said pump and having a speed control lever normally in idling position, said lever being movable between idling and pumping positions; a source of electrical current; a solenoid connected to said speed control lever in a manner to move said lever to pumping position when said solenoid is energized; a first pressure switch connected to said source of current and to said solenoid and responsive to a predetermined pressure in said discharge line to cause energization of said solenoid and movement of the speed control lever to pumping position; mechanism actuated by a second solenoid connected to said source of current for moving said speed control lever to idling position when said second solenoid is energized; a second pressure switch responsive to a predetermined higher pressure in said discharge line to cause energization of said second solenoid and movement of the speed control lever to idling position; a third switch responsive to movement of the control

lever to pumping position for stopping the flow of current to the first solenoid; a fourth switch responsive to movement of the control lever to idling position for stopping the flow of current to the second solenoid; and releasable means for holding said speed control lever in pumping position after said first solenoid is deenergized.

4. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric current; a first electric power means connected to said speed control member in a manner to move the latter to pumping position when said power means is energized; a second electric power means; mechanism including said second electric power means for moving said speed control member to idling position when said second power means is energized; and pressure responsive switch means connected to said source and to said first and second electric power means for providing alternative electrical connection of said source with either said first or second power means, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first power means to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second power means to energize said second power means and move the speed control member to idling position.

5. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric current; a first solenoid connected to said speed control member in a manner to move the latter to pumping position when said solenoid is energized; a second solenoid; mechanism including said second solenoid for moving said speed control member to idling position when said second solenoid is energized; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoids, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and move the speed control member to idling position.

6. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric

current; a first electric power means connected to said speed control member in a manner to move the latter to pumping position when said power means is energized; a second electric power means; mechanism including said second electric power means for moving said speed control member to idling position when said second power means is energized; pressure responsive switch means connected to said source and to said first and second electric power means for providing alternative electrical connection of said source with either said first or second power means, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first power means to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to connect said source with the second power means to energize said second power means and move the speed control member to idling position; a switch responsive to movement of the control member to pumping position for stopping the flow of current to the first electric power means; and a second switch responsive to movement of the control member to idling position for stopping the flow of current to the second electric power means.

7. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric current; a first solenoid connected to said speed control member in a manner to move the latter to pumping position when said solenoid is energized; a second solenoid; mechanism including said second solenoid for moving said speed control member to idling position when said second solenoid is energized; pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoids, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and move the speed control member to idling position; a switch responsive to movement of the control member to pumping position for stopping the flow of current to the first solenoid; and a second switch responsive to movement of the control member to idling position for stopping the flow of current to the second solenoid.

8. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric current; a first solenoid connected to said speed control member in a manner to move the latter to pumping position when said solenoid is energized; a second solenoid connected to said speed

control member in a manner to move the latter to idling position when said second solenoid is energized; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoids, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and move the speed control member to idling position.

9. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a movable cam; a cam follower connected to said speed control member in a manner to move the latter between idling and running positions in response to movement of said cam; a first solenoid connected to said cam in a manner to move the latter in a direction to cause movement of the speed control member toward pumping position upon energization of said solenoid; a second solenoid connected to said cam in a manner to move the latter in a direction to cause movement of the speed control member toward idling position upon energization of said second solenoid; a source of electric current; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoid, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and move the speed control member to idling position.

10. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a movable cam plate formed with a diagonally extending cam slot; a cam follower positioned in said slot and movable transversely in response to longitudinal movement of said plate, said follower being connected to said speed control member in a manner to move the latter between idling and running positions in response to longitudinal movement of said cam plate; a first solenoid connected to said cam in a manner to move the latter in one longitudinal direction to cause movement of the speed control member toward pumping position upon energization of said solenoid; a second solenoid connected to said cam in a manner to move the latter in the opposite longitudinal direction to cause movement of the speed control member

toward idling position upon energization of said second solenoid; a source of electric current; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoid, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and move the speed control member to idling position.

11. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a movable cam plate formed with a cam slot having substantially parallel longitudinally extending end portions and a diagonal intermediate portion; a cam follower positioned in said slot and movable transversely in response to longitudinal movement of said plate, said follower being connected to said speed control member in a manner to move the latter between idling and running positions in response to longitudinal movement of said cam plate, the longitudinally extending end portions of said cam plate slot preventing transverse movement of said follower when said follower is positioned in either of said end portions; a first solenoid connected to said cam in a manner to move the latter in one longitudinal direction to cause movement of the speed control member toward pumping position upon energization of said solenoid; a second solenoid connected to said cam in a manner to move the latter in the opposite longitudinal direction to cause movement of the speed control member toward idling position upon energization of said second solenoid; a source of electric current; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoids, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and move the speed control member to idling position.

12. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a lever connected to said speed control member and movable therewith between idling and pumping positions; a source of electric current; a first solenoid connected to said lever in a manner to move the latter to pumping position upon energization of said solenoid; movable detent means engageable with

said lever upon movement of said lever to pumping position to hold said lever and hence the speed control member, in pumping position; a second solenoid connected to said detent means in a manner to release said detent means and permit movement of said lever and speed control member to idling position upon energization of said second solenoid; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoids, said switch means being responsive to a predetermined pressure in the discharge line to connect the source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and permit movement of the lever and speed control member to idling position.

13. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a lever connected to said speed control member and movable therewith between idling and pumping positions and being spring urged toward idling position; a source of electric current; a first solenoid connected to said lever in a manner to move the latter to pumping position upon energization of said solenoid; a spring loaded detent mounted for engagement with said lever upon movement of said lever to pumping position to hold said lever, and hence the speed control member, in pumping position; a second solenoid connected to said detent in a manner to release said detent and permit movement of said lever and speed control member to idling position upon energization of said second solenoid; and pressure responsive switch means connected to said source and to said first and second solenoids for providing alternative electrical connection of said source with either said first or second solenoids, said switch means being responsive to a predetermined pressure in the discharge line to connect the source with the first solenoid to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second solenoid to energize said second solenoid and permit movement of the lever and speed control member to idling position.

14. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric current; a first electric power means connected to said speed control member in a manner to move the latter to pumping position when said power means is energized; a second electric power means; mechanism including said second electric power means for moving said speed control member to idling position when said second power means is energized; pressure responsive switch

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means connected to said source and to said first and second electric power means for providing alternative electrical connection of said source with either said first or second power means, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first power means to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second power means to energize said second power means and move the speed control member to idling position; and a normally closed shut-off switch in the line between said source and said pressure responsive switch means for preventing the flow of current to said switch means and to said first and second power means when said switch is opened.

15. In combination: a fluid pump having a discharge line provided with a normally closed shut-off valve, said discharge line normally containing fluid under pressure when said pump is operated; a motor drivingly connected to said pump and having a speed control member movable between idling and pumping positions, said member being normally in idling position; a source of electric current; a first electric power means connected to said speed control member in a manner to move the latter to pumping position when said power means is energized; a second electric power means; mechanism including said second electric power means for moving said speed control mem-

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ber to idling position when said second power means is energized; pressure responsive switch means connected to said source and to said first and second electric power means for providing alternative electrical connection of said source with either said first or second power means, said switch means being responsive to a predetermined pressure in the discharge line to connect said source with the first power means to energize the latter and move the speed control member to pumping position, and said switch means also being responsive to a predetermined higher pressure in the discharge line to alternatively connect said source with the second power means to energize said second power means and move the speed control member to idling position; and a door-operated normally closed shut-off switch in the line between said source and said pressure responsive switch means for preventing the flow of current to said switch means and to said first and second power means when said switch is opened.

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