

[54] **MANUAL OVERRIDE PRESSURE OPERATED SWITCH**

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 [58] Field of Search ..... **200/169 PB, 83 R, 83 Z, 81 HO, 200/83 C**

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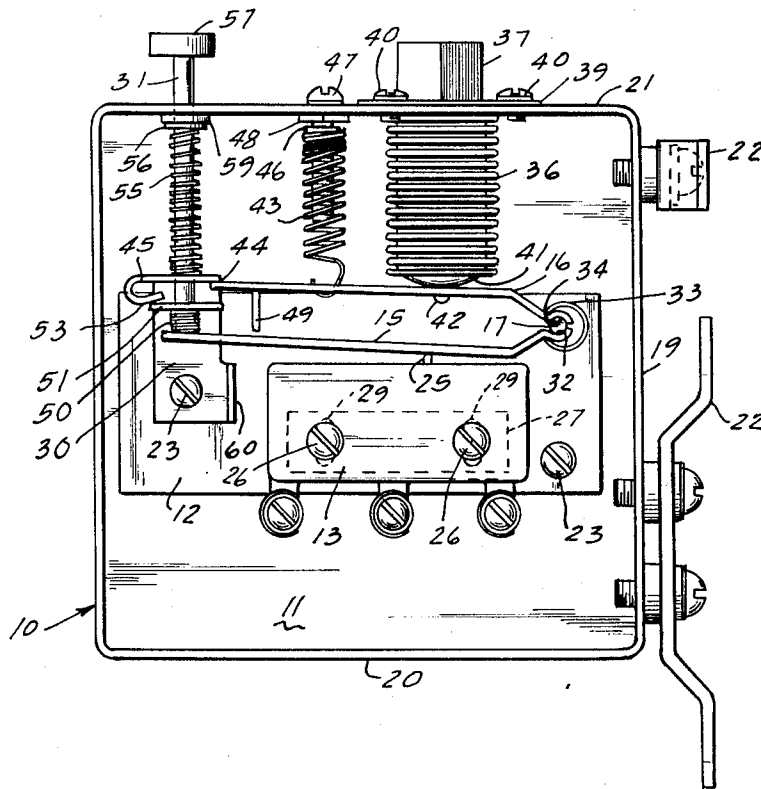
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[57] **ABSTRACT**

Pressure operated switch in which an expansible bellows actuates a switch arm in a switch operating direction upon predetermined pressure conditions and a manually operable plunger is guided to engage and actuate the switch arm independently of the bellows, to effect operation of the switch arm manually. A latching member engaged with the plunger holds the switch arm in a switch closing position and is released by operation of the bellows when moving the switch arm in a switch closing direction.

**8 Claims, 3 Drawing Figures**



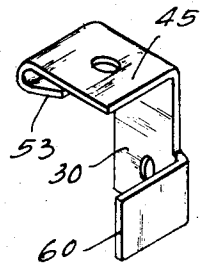
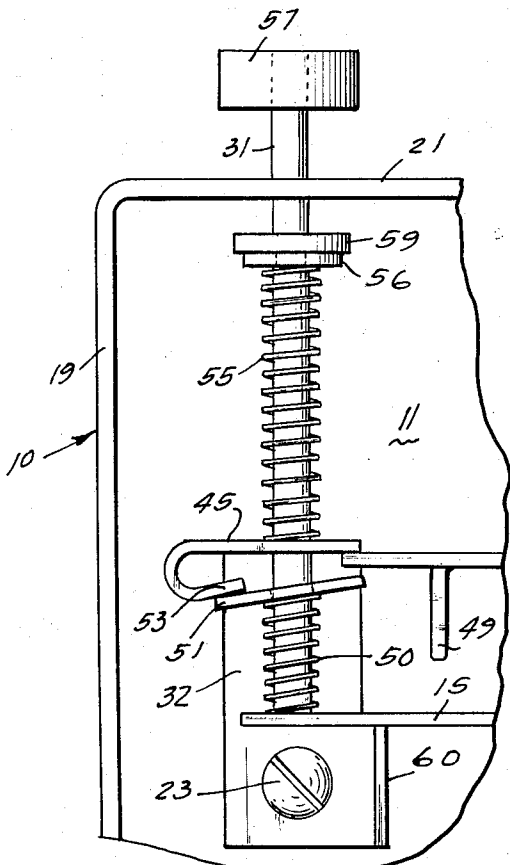
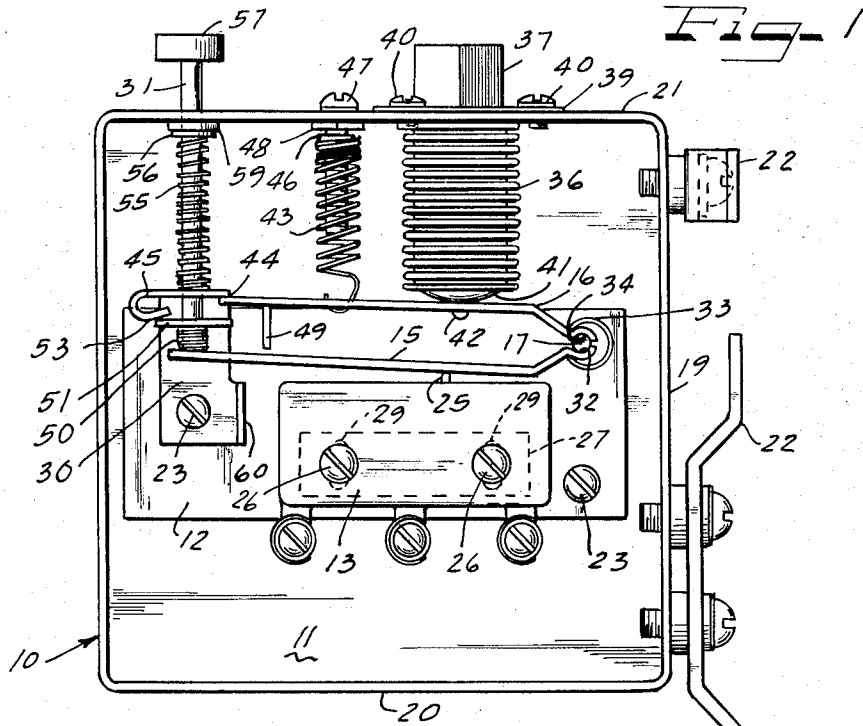


Fig. 2

Fig. 3

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**MANUAL OVERRIDE PRESSURE OPERATED SWITCH****THE FIELD OF THE INVENTION**

Pressure operated switch capable of being closed manually upon lack of pressure.

**BACKGROUND, SUMMARY AND OBJECTS OF THE INVENTION**

Pressure operated switch particularly adapted to control operation of diesel engines by pressure in the lubricating system for the engine.

The switch is in the form of a micro-switch operated by overlying switch and actuating arms. The switch arm engages the button of the microswitch and is engaged by the actuating arm to depress the button and close the switch. A bellows receiving oil under pressure from the lubricating system for the engine operates the actuating arm to actuate the switch arm and close the micro-switch.

The actuating arm is retracted and held in operative engagement with the bellows by a spring, the tension of which may be adjusted. A manually operable plunger is slidably guided in the casing for the switch to engage the switch arm independently of the actuating arm and move the switch arm to manually depress the switch button of a switch. A latch plate loosely extends along the plunger and is biased into engagement with a stop by a spring interposed between the switch arm and latch plate. Upon depression of the plunger and switch arm the spring will cock the latch plate about the stop and hold the plunger in a switch closing position by wedging engagement between the latch plate and plunger. As the bellows operates the actuating arm to hold the switch closed, the actuating arm comes into engagement with the latch plate to move the latch plate out of its cocked position and release the plunger.

A principal object of the present invention, therefore, is to provide a simplified form of pressure switch, in which the pressure actuator for the switch may be overridden by a manually operable switch closing member.

Another object of the invention is to provide a manual override for a pressure switch, together with a simplified and improved form of latch for the manual override, holding the manual override in a switch closing position and releasing the manual override upon operation of the switch by its power actuator.

A still further object of the invention is to provide a pressure switch and manual override therefor constructed with a view toward utmost simplicity and efficiency in construction and operation.

Other objects, features and advantages of the invention will be readily apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

**DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a view in side elevation of a manual override pressure operated switch constructed in accordance with the principles of the present invention.

FIG. 2 is a partial fragmentary enlarged detail view illustrating the manual override latched in a switch closing position; and

FIG. 3 is a detail view of the guide for the manual override and stop for the latch, switch lever and pressure operated actuating lever.

**DESCRIPTION OF A PREFERRED EMBODIMENT OF INVENTION**

In FIG. 1 of the drawings, I have shown a switch box or housing 10 having a flat back wall 11 forming a mounting for a base plate 12 for a micro-switch 13. I have also shown coaxially pivoted switch and actuator arms 15 and 16, respectively,

mounted for movement about a common pivot pin 17, in a manner which will hereinafter more clearly appear as this specification proceeds. The switch box also includes parallel end walls 19, 19 and a bottom wall 20 and a parallel top wall 21 connecting said end walls together. One end wall is provided with conventional brackets indicated by reference numeral 22 for supporting the switch box in a selected position in a conventional manner. A cover (not shown) may be provided to close the switch box.

The base plate 12 may be spaced from the back wall 11 by suitable spacers (not shown) interposed between said back wall and base plate and encircling machine screws 23, securing said base plate to said back wall. The micro-switch 13 may be a conventional form of single pole double throw switch and has a depressible switch button 25 extending from the top thereof. Said micro-switch is mounted to said base plate by machine screws 26, threaded in a nut 27, which may be a Tinnerman nut, or any other suitable form of securing means, and abuts the back of said base plate. The screws 26 pass through vertically extending slots 29 formed in the base plate 12 to accommodate adjustment of the position of the switch 13 and switch button 25 toward and from the switch arm 15, to set the trip point of the switch in proper relation relative to movement of the switch arm 15.

The switch arm 15 has an elongated plane surface engaging the switch button 25 and extending from said switch button along a bracket member 30 for a depressible plunger 31, to be moved by said plunger in a switch closing direction, as will hereinafter more clearly appear as this specification proceeds. The opposite end portion of the switch arm 15 from the bracket 30 is shown as being upwardly inclined and terminating into an upwardly opening socket 32 engaged with the pivot 17 by a C spring 33.

The actuator arm 16 also has a plane surface overlying the plane surface of the switch arm 15 and having a downwardly inclined end portion terminating into a downwardly opening socket 34 like the socket 32 and pivotally retained to the pivot pin 17 by the C spring 33. A snap washer (not shown) may be provided to hold the arms 15 and 16 to the pin 17.

The C spring 33 cooperating with a snap washer (not shown) thus holds the switch arm 15 and actuating arm 16 to the pivot pin 17 to pivot thereabout, and biases the switch arm 15 in a direction away from the switch button 25 and the actuating arm 16 toward the switch arm 15.

A bellows 36 extends downwardly from a fitting 37 which extends outwardly of the top wall 21. A flange 39 extends radially of the bottom portion of the fitting 37 and abuts the top of said wall 21 and is secured to said top wall as by machine screws 40. The flange 39 thus supports the bellows 36 to depend from said top wall 21 within the switch box.

The bellows 36 may be of any conventional form of pressure extensible bellows and need not necessarily be a bellows but may be any suitable form of extensible member. Said bellows has a closed end 41 having a button 42 depending therefrom and extending through and suitably secured to the actuating arm 16, to pivot said arm in a switch closing direction.

The fitting 37 may be connected to a suitable source of pressure such as an oil line (not shown) leading from the lubricating system of a diesel engine (not shown) to effect expansion of the bellows and closing of the micro-switch upon predetermined engine oil pressures, and to accommodate opening of the switch as the pressure is reduced below a predetermined amount.

The micro-switch 13 may be connected in the energizing circuit of a shut-down solenoid, relay or other control (not shown) for the diesel engine for stopping the engine when the oil pressure drops below a predetermined safe value.

A tension spring 43 serves as a return spring for the actuator arm 16 and bellows 36 and biases said arm into engagement with a stop surface 44 on the underside of a guide plate 45 for the plunger 31 and extending horizontally from the bracket member 30. As shown in FIG. 1, the tension spring 43 is hooked to the actuator arm 16 intermediate the ends of said

arm and is welded or otherwise secured to a nut 46, threaded on an adjustment screw 47 extending through the top wall 21 of the switch box 10, and depending therefrom. Turning of the screw 47 relative to the nut 46, by a screwdriver or the like, serves to adjust the tension of the spring 43 and the pressure range of operation of the actuator arm 16. A lock nut 48 threaded on the screw 47 and abutting the underside of the top side 21 of the box 10, is provided to lock said screw from turning movement, and thereby hold the spring 43 at the desired tension. The actuator arm 16 has a leg 49 depending therefrom, adjacent the outer end thereof, and engageable with the switch arm 15 upon downward pivotal movement of said actuator arm about the axis of the pivot pin 17 to move said switch arm in a direction to depress the switch button 25.

Referring now in particular to the reset plunger 31 and the latching means therefor, holding said plunger in position when in a reset position, the plunger 31 extends through and is slidably guided in the top wall 21 and guide plate 45. The lower end of said plunger extends within a spring 50, seated on and suitably secured to the upper face of the plane face of the switch arm 15, adjacent its outer end. The spring 50 is engageable with a latch plate 51 carried by the plunger 31 and biased by said spring into engagement with the inclined face of a stop 53, formed from an inwardly turned outer end portion of the guide 30. A spring 55 encircles the plunger 31 and is interposed between the top surface of the guide plate 45 and a snap ring 56 abutting the underside of a washer 59.

The plunger 31 has a button 57 on its outer end adapted to be engaged by the finger to depress said plunger and actuate the switch 25 and thereby override the bellows 36.

The latch member 51 is shown in FIGS. 1 and 2 as being in the form of a cockable latch plate having a central apertured portion, through which the plunger 31 extends. Said latch plate is disposed between the stop 53 and switch arm 15 and is biased by the spring 50 to engage the stop 53 and generally conform to the angle of the undersurface of said stop when in a latching position. The latch plate 51 has a rectangular perimeter, although it need not be rectangular, but may be round or of any other shape. One face of the rectangle of the perimeter of the latch plate engages the plane face of the bracket member 30, which holds said latch plate from turning about the axis of the plunger 31.

As the head 57 of the plunger 31 is depressed, the switch arm 15 will be moved downwardly about the axis of the pivot shaft 17, and the compression spring 50, extending about the plunger 31, and seated on the top surface of the switch arm, will cock the latch plate 51 to generally conform to the inclined surface of the stop 53. This will frictionally or wedgingly engage the latch plate 51 with the plunger 31 and hold said plunger in its depressed position shown in FIG. 2. The arm 15 will then have depressed the switch button 25 to complete a circuit through the micro-switch 13 to effect energization of a solenoid, relay or other control (not shown) in the starting circuit for the diesel engine. Downward movement of the switch arm 15 is limited by a leg 60 extending at right angles of the plane face of the bracket 30 underneath the switch arm 15.

As the engine is started, and the oil pressure builds up, the bellows 36 will be extended by pressure and pivot the actuator arm 16 against the tension of the tension spring 43, to bring the leg 49 of said actuator arm into engagement with the switch arm 15, and hold the switch button 25 depressed. During this movement of the actuator arm, the undersurface thereof will engage the opposite side of the latch plate 51 from the stop 53 and move said latch plate into position where it is generally parallel to the axis of the plunger 31. This will release the latching connection between said latch plate and plunger and accommodate the compression spring 55 to return the plunger to the release position shown in FIG. 1. The engine may then be operated entirely under the control of engine lubricating oil pressure, and will remain on except upon a predetermined drop in oil pressure.

I claim as my invention:

1. In a manual override pressure switch,

- a housing,  
 a switch base in said housing,  
 a switch mounted on said base and including a casing having a depressible switch button extending therefrom,  
 a switch arm movably mounted on said base and extending over said switch button and operable to depress said button and effect a circuit connection,  
 an actuating arm overlying said switch arm and adapted to have engagement therewith,  
 an extensible pressure member mounted in said housing and having engagement with said actuator arm for moving said actuator arm and switch arm in a direction to depress said switch button upon predetermined pressure conditions,  
 yieldable means having connection with said actuating arm for retracting said actuating arm and said extensible pressure member upon predetermined reductions in pressure,  
 a manually operable override plunger having direct engaging connection with said switch arm and guided for movement toward and from said switch arm and operable to manually move said switch arm to depress said switch button independently of said extensible pressure member,  
 spring means biasing said plunger into a release position relative to said switch arm,  
 a latch member locking said manual override plunger in position to hold said switch arm to maintain said switch button depressed,  
 yieldable means having connection with said actuating arm for retracting said actuating arm and said extensible pressure member upon predetermined reductions in pressure,  
 and said actuating arm having engagement with said latch member when moving in a switch button depressing direction, to effect release of said latch member and retractable movement of said plunger, as said switch button is depressed by pressure.
2. The manual override pressure switch of claim 1, wherein a latching member extends along said plunger and has a loose connection with said plunger, to accommodate tilting of said latching member relative to said plunger,  
 wherein a stop engages said latching member at one side thereof, and  
 wherein a spring connected between said switch arm and latch member and biases said latch member into engagement with said stop, and effects cocking thereof about said stop to wedgingly engage said plunger upon movement of said switch arm by said plunger in a direction to depress said switch button.
3. The manual override pressure switch of claim 2, wherein the latch member is in the form of a rectangular plate having a central opening therein extending along said plunger, and  
 wherein guide means are slidably engaged by said plate, to hold said plate from rotation about said plunger.
4. The manual override pressure switch of claim 1, wherein the switch arm and actuating arm are pivotally movable about a common pivot pin,  
 wherein a C spring retains said arms to said pin and biases said switch arm in a direction to release said plunger,  
 wherein the extensible pressure member is a bellows,  
 wherein spring means bias said actuating arm into engagement with said bellows to retractably move said bellows and actuating arm to a return position.
5. The manual override pressure switch of claim 4, wherein the latch member extends along said plunger and has loose connection therewith, accommodating tilting of said latch member relative to said plunger,  
 wherein a stop is provided in position to engage one side of said latch member, and  
 wherein spring means interposed between said switch arm and latch member bias said latch member into engagement with said stop, to tilt said latch member relative to said plunger and retain said plunger in a switch closing position until positive release of said latch member by said actuating arm.

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6. The manual override pressure switch of claim 5,  
 wherein the latch member is in the form of a rectangular  
 plate having a central opening therein through which said  
 plunger extends and of a larger diameter than the diame-  
 5 ter of said plunger, and  
 wherein the spring means encircle said plunger and bias said  
 plate into engagement with said stop and effect cocking  
 of said plate relative to said stop to frictionally engage  
 said plunger and hold said plunger in a switch closing  
 10 position until released by movement of said actuating arm  
 in a direction to close said switch by power.  
 7. The manual override pressure switch of claim 6,  
 wherein the means guiding the override plunger comprises a  
 guide member having an open portion through which said  
 plunger slidably extends, and having  
 15 one end portion extending over said actuating arm and

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forming a stop therefor limiting movement of said actuat-  
 ing arm in a release direction, and  
 another portion extending from its end opposite said actuat-  
 ing arm downwardly and inwardly and having an end por-  
 5 tion disposed beneath the plane of said guide member and  
 forming a stop for said latch member.  
 8. The manual override pressure switch of claim 7,  
 wherein a leg extending from said guide member underlies  
 said switch arm and is positioned to limit movement of  
 said switch arm in a switch closing direction upon opera-  
 10 tion of said actuating member by said bellows,  
 wherein the spring biasing said actuating member into en-  
 gagement with said bellows is a tension spring, and  
 wherein means are provided for adjusting the tension of said  
 spring.

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