

[54] **DIAPHRAGM SNAP PRESSURE SWITCH** 3,278,704 10/1966 Smith 200/83 Z
3,531,607 9/1970 Donahue 200/83 S

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[52] U.S. Cl. **200/83 P, 200/83 Q, 200/83 S**
[51] Int. Cl. **H01h 35/34**
[58] Field of Search **200/83 R, 83 P, 83 Q, 83 S, 200/83 W, 83 Z, 153 T**

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Primary Examiner—T. E. Lynch
Assistant Examiner—Gerald P. Tolin

[57] **ABSTRACT**
A pressure controlled switch includes a support molded with various passages and guides to facilitate assembly of the switch. Means are provided to operate a pressure relief valve. One embodiment permits manual or automatic operation while another provides for automatic or off conditions.

19 Claims, 19 Drawing Figures

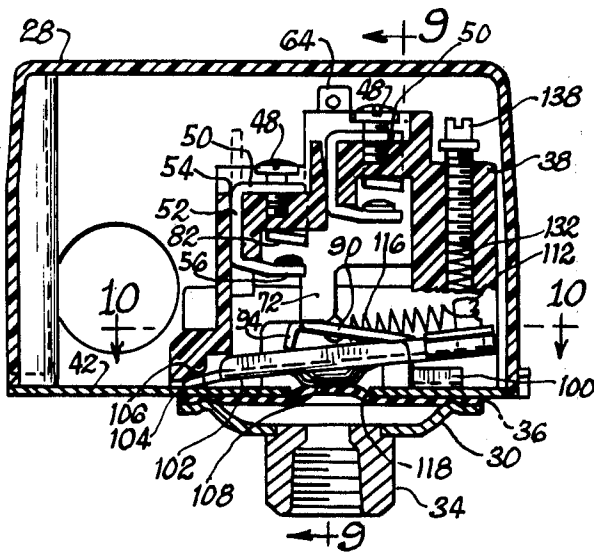


FIG. 1

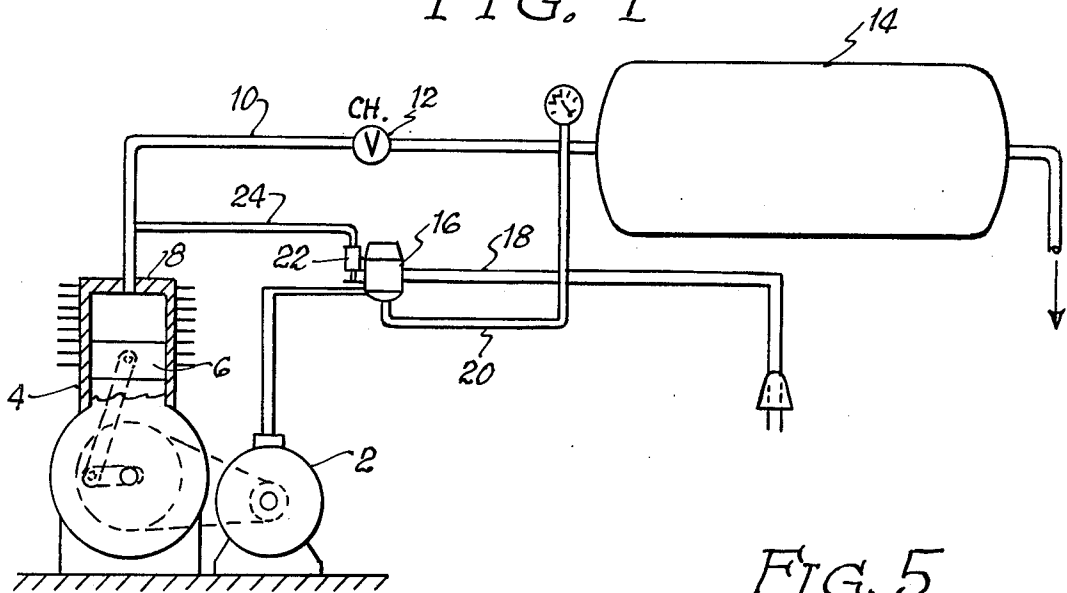


FIG. 5

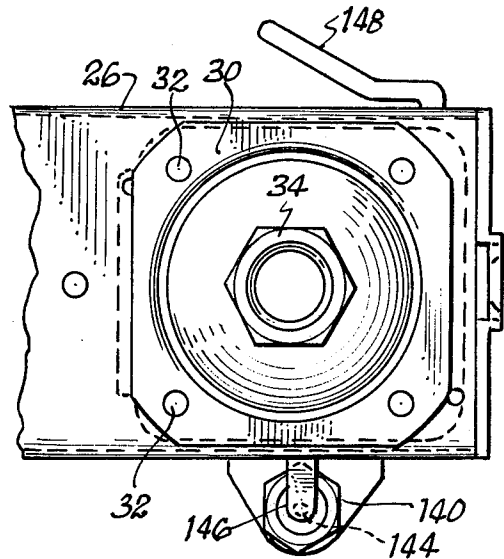
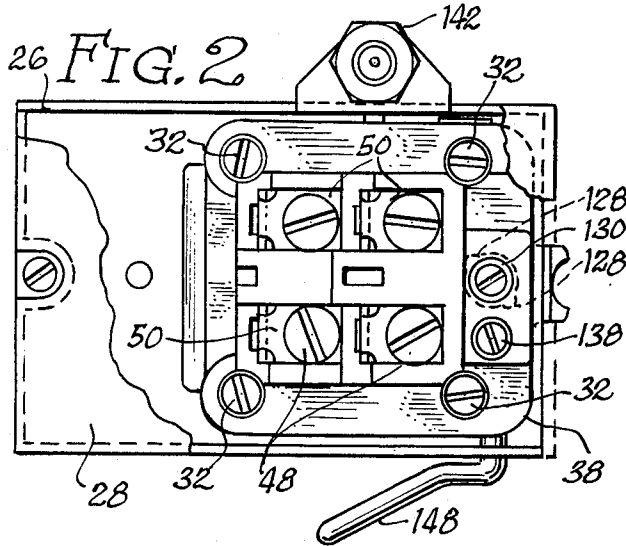


FIG. 3

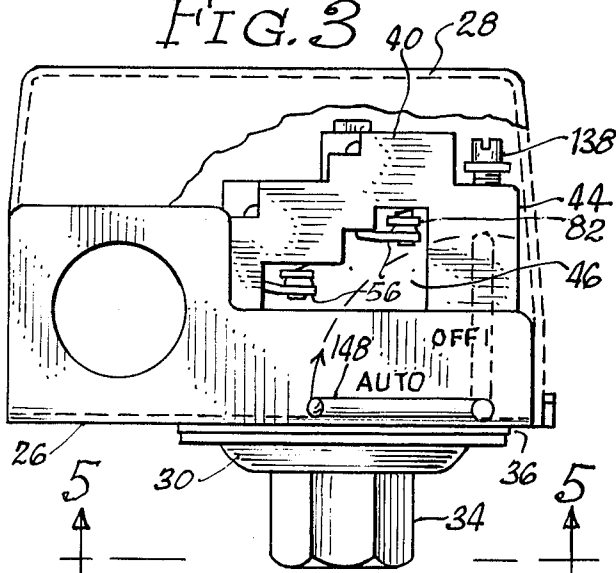
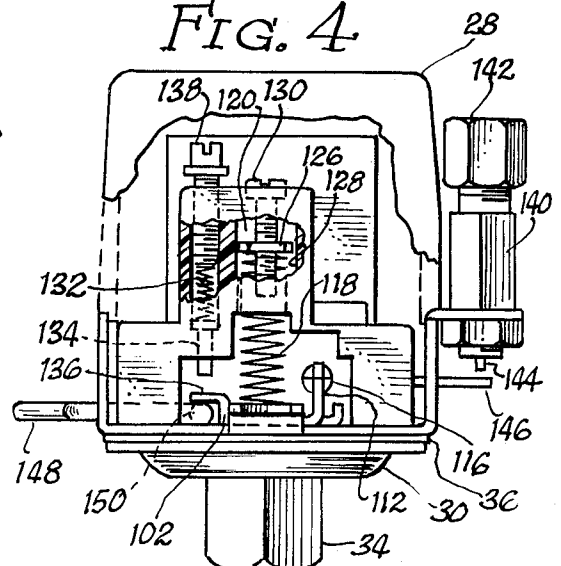


FIG. 4



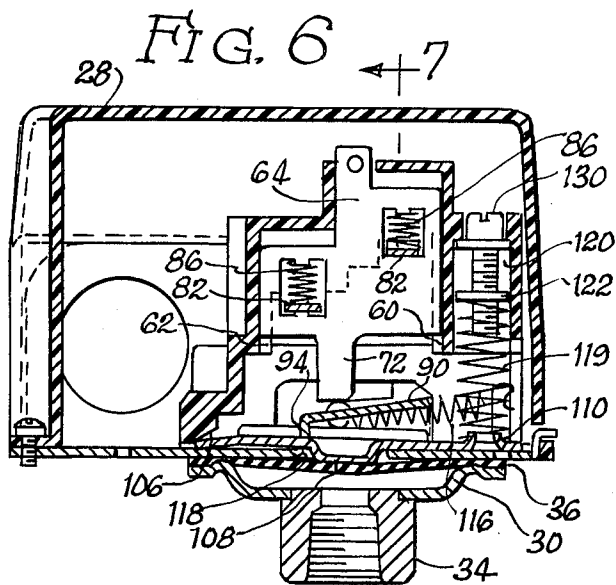
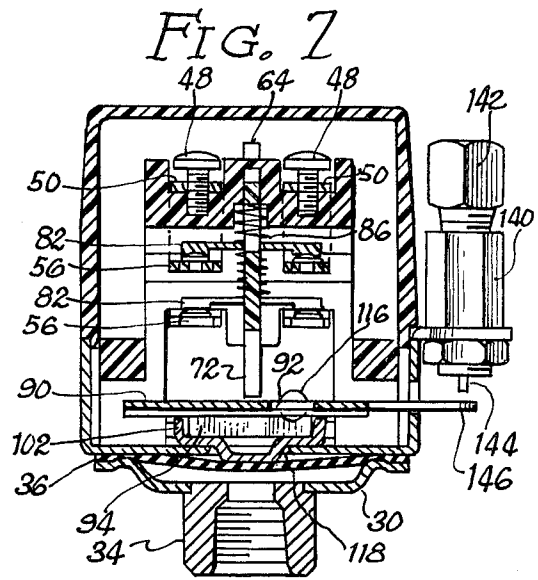
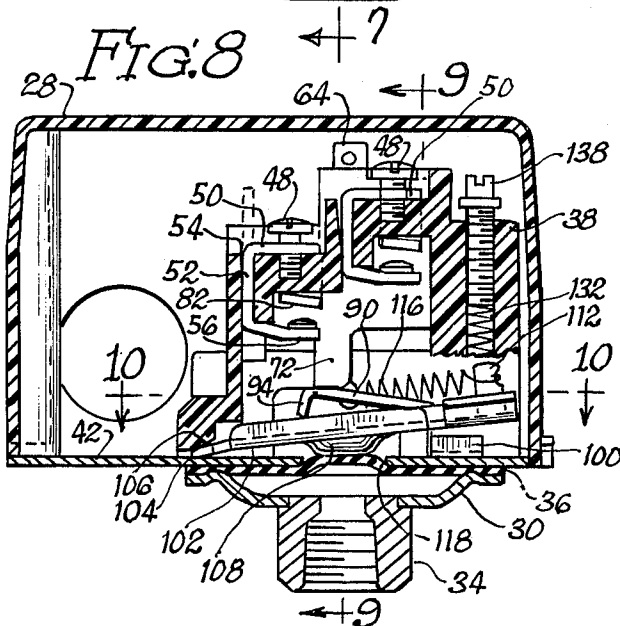
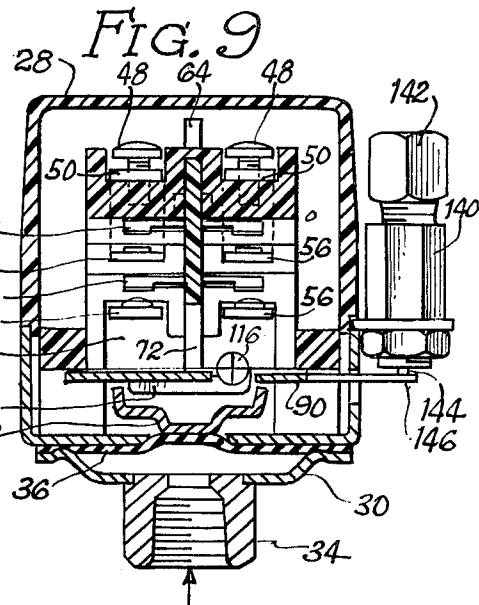
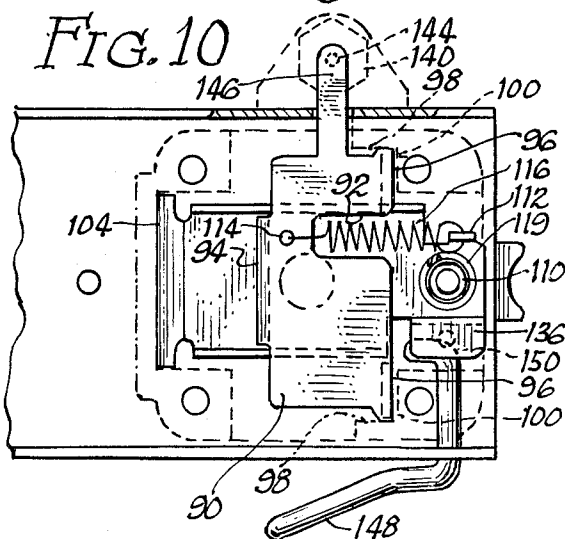
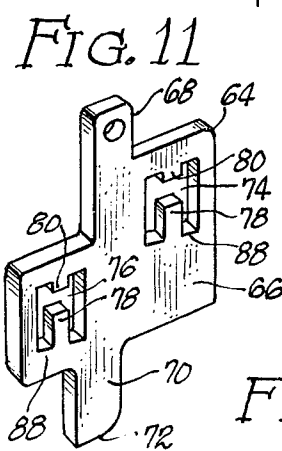
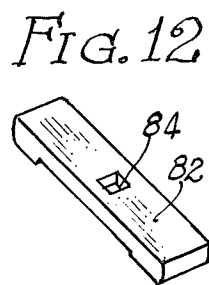
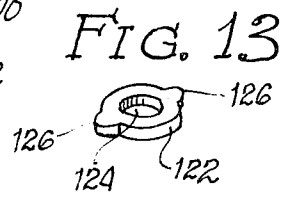


FIG. 14

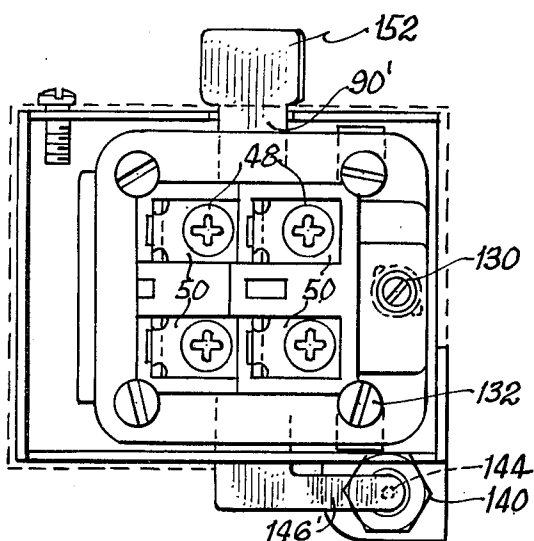


FIG. 15

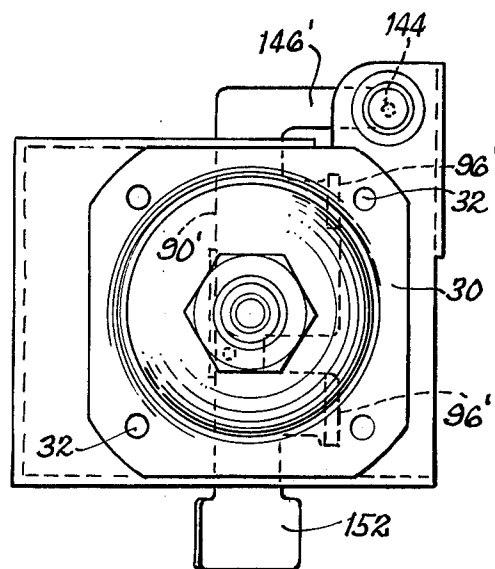


FIG. 16

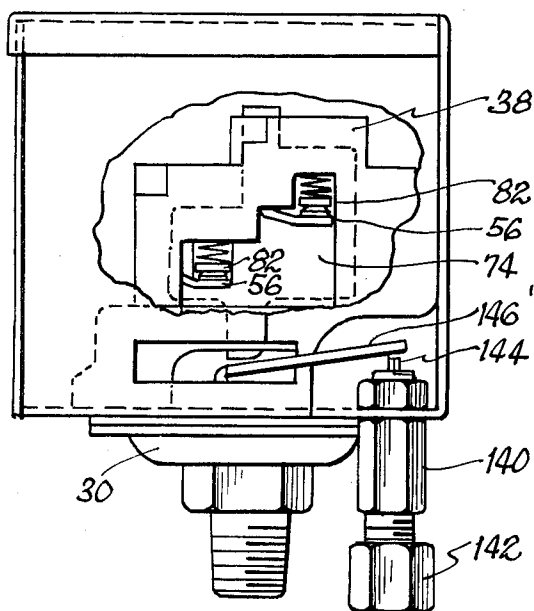


FIG. 17

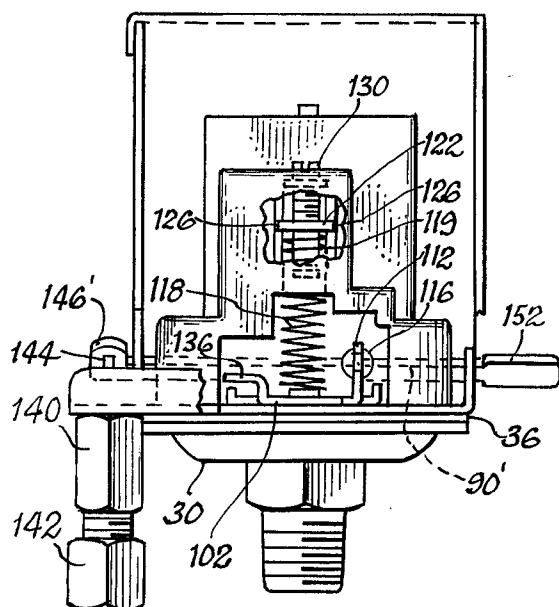


FIG. 18

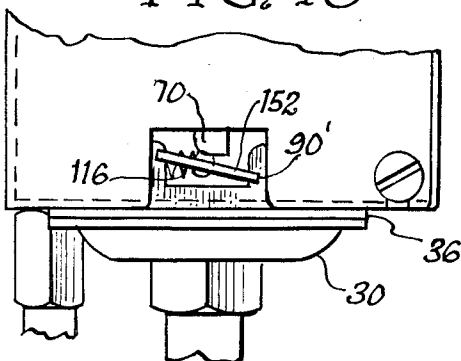
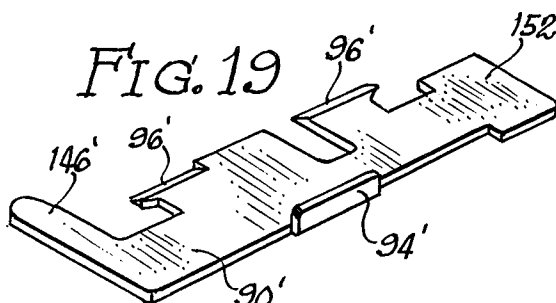


FIG. 19



DIAPHRAGM SNAP PRESSURE SWITCH**BACKGROUND OF THE INVENTION**

This invention relates generally to automatic control devices. More specifically it relates to electric switches for controlling fluid systems.

There are numerous situations where it is desired to control systems in which fluids or gases are flowing, and to interrupt the system when the pressure is in excess of a predetermined value. One such system, in which the invention disclosed herein has particular utility, is a compressed air storage system used in a wide variety of commercial and industrial applications. In such systems an electric motor drives a compressor which is connected to a storage tank for holding the compressed air. During operation of the compressor it is desired (to stop the compressor) as the air reaches a pressure determined by the system parameters, and to turn it on again as the compressor air is used.

An electrical switch for controlling such a system should be reliable, and consistent with that objective it is desirable to be able to provide such a switch which is economical to make.

Therefore, it is an object of this invention to provide a novel pressure control switch which is constructed in such a way as to permit the switch to be relatively economically manufactured.

It is another object of this invention to provide a novel pressure control switch, the construction of which permits the various components thereof to be accurately assembled and held in their operating positions so as to provide a reliable and durable device.

It is a still further object of this invention to provide a novel pressure control switch in which the operating contacts thereof are mounted in such a way so that when the switch operates a good wiping action is provided.

Another object of this invention is to provide a novel pressure control switch wherein the operating force is distributed evenly over the operating diaphragm.

A further object of the invention is to provide a novel pressure control switch which may be operated automatically in response to variations of pressure in the fluid system and may also be operated manually when desired.

A still further object of this invention is to provide a novel pressure control switch in which the automatic operation of the switch may be disabled if desired.

A still further object of this invention is to provide a novel pressure control switch which may be easily adjusted to vary the pressure at which the switch operates.

In connection with a compressed air system as described above, a particular problem arises after the compressor has operated to store air at the desired pressure and is turned off and the air is then consumed causing the pressure to drop so that it is desired to restart the system. When the motor is energized and the piston in the compressor begins its travel excessive pressure may exist on the piston head imposing a substantial load on the motor. In order to provide for easier starting it is desired to relieve that pressure.

Therefore, it is an object of this invention to provide a novel pressure control switch which also includes a relief valve which is operated simultaneously with the operation of the switch, and which may be connected

to the fluid system to relieve undesired pressures in a portion thereof.

BRIEF SUMMARY OF THE INVENTION

Briefly, this invention comprises a molded support having formed therein a number of passages and cavities for receiving and mounting the operating elements of the switch. A diaphragm connected to respond to pressure in a system operates an actuating lever which in turn operates a snap action mechanism to cause a contact carrier to interrupt a circuit between stationary and movable contacts. In one embodiment means are provided for conditioning the switch to operate in an automatic mode or to permit it to be turned off. In another embodiment manual and automatic operation are provided. A relief valve forming a part of the switch mechanism is operated simultaneously with the switch.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention itself is set forth in the claims which are appended hereto and form a part of this specification, while an understanding of different embodiments thereof may be had by reference to the detailed description in conjunction with the drawings in which:

FIG. 1 is a schematic illustration of an air compressor system in which a switch according to the invention may have particular utility;

FIG. 2 is a plan view of a first embodiment of a switch in accordance with the invention;

FIG. 3 is a side view partially cut away;

FIG. 4 is an end view partially cut away of the switch of FIG. 2;

FIG. 5 is a view along the line 5—5 of FIG. 3;

FIG. 6 is a side view in section of the switch of FIG. 2;

FIG. 7 is a view along the line 7—7 of FIG. 6;

FIG. 8 is a sectional view of the switch of FIG. 1;

FIG. 9 is a view along the line 9—9 of FIG. 8;

FIG. 10 is a view along the line 10—10 of FIG. 8;

FIG. 11 is an illustration of a contact carrier forming a part of the invention;

FIG. 12 is an illustration of a movable contact forming a part of the invention;

FIG. 13 is an illustration of the means provided for calibrating a switch in accordance with the invention;

FIG. 14 is a plan view of an alternative embodiment of the invention;

FIG. 15 is a bottom view of the embodiment of FIG. 14;

FIG. 16 is a side view partially cut away of the embodiment of FIG. 14;

FIG. 17 is an end view partially cut away of the embodiment of FIG. 14;

FIG. 18 is a partial side view of the embodiment of FIG. 14; and

FIG. 19 is an illustration of a flipper forming part of the embodiment of FIG. 14.

DETAILED DESCRIPTION

As stated above, the invention disclosed herein may find particular utility in an apparatus for providing compressed air for use in industrial and commercial applications. Generally speaking, such a system would include an electric motor 2 driving an air compressor 4. As may be seen, the air compressor would include a piston 6 moving in a cylinder 8. A conduit 10 connects the output of the cylinder via a check valve 12 to a stor-

age tank 14. A switch 16 in accordance with the invention is connected between an electrical source represented symbolically at 18 and the motor 2. In order that the switch 16 may control the system a conduit 20 is connected to an appropriate point in the system so that means are provided for exposing the initial operating element of the switch, a diaphragm, to the system pressure. Included as an element of the switch is a relief valve 22, the input of which is connected via a conduit 24 to the output of the cylinder 8.

In this application of a switch in accordance with the invention as the system operates and the pressure therein reaches a predetermined value the switch 16 will operate to open the circuit between the motor 2 and the source 18 to stop the compressor. At the same time the relief valve 22 is operated to reduce pressure of the air remaining in the cylinder and on the compressor side of the check valve 12 to a value equaling or approaching ambient so that when the pressure in the storage tank 14 is reduced permitting the switch to close and restart the motor 2, there is no excessive load imposed on the motor because of air trapped between the check valve 12 and the head of the piston 6. It should be understood that the above description of a switch in accordance with the invention in conjunction with an air compressor system is provided by way of exemplification only, for it is believed that other applications exist or will be found for such a switch.

Turning now to the embodiment of the invention disclosed in FIGS. 2 through 13, this embodiment of the switch includes a frame or housing 26 which may be provided with a removable cover 28 to permit access to the switch itself. Mounted on the bottom of the frame is a diaphragm enclosure assembly 30 which is held thereto by means of screws 32. Formed as part of the diaphragm enclosure is means 34 for attaching a conduit such as 20 in order to permit fluid in the system being admitted to the switch to thereby control it.

A diaphragm 36 is mounted between the diaphragm enclosure assembly 30 and the frame 26 so that when assembled an enclosed space is provided on the bottom of the diaphragm which, as stated, is connected to the system being controlled.

The switch includes a support structure 38 molded out of any plastic material having suitable mechanical and electrical insulating properties. The support includes an upper surface 40 and a lower surface mounted on the frame 26. It is to be noted that the screws 32 in addition to securing the diaphragm 36, and diaphragm enclosure assembly, also secure the support 38 to the frame. Side walls 44 connect the upper surface 40 to the lower surface 42 and encompass an interior space 46 in which the various operating elements of the switch are mounted. Also included in the support 38 are a number of passages and openings, the purposes of which will be hereinafter described.

Provided on the upper surface 40 are a plurality of terminals 48 to which electrical conductors may be connected when it is desired to mount the switch in a system to be controlled. In the embodiment illustrated four such terminals are shown. Electrically and mechanically connected to each terminal are the first portions 50 of generally U-shaped stationary contacts. As is best seen in FIG. 8, each stationary contact includes second portions 52 which extend through passages 54 molded in the support 38 from the upper surface 40 to the interior space 46. Each stationary contact is also

provided with third portions 56 which extend into the interior space at substantially right angles to the second portions 52. A contact button 58 is provided on each third portion 56.

Molded into the support, an opening into the interior space 46 thereof, are a pair of oppositely disposed guide slots 60 and 62 (FIG. 6). Movably mounted in the guide slots 60 and 62 is a contact carrier 64 which may be molded out of the same material as the support itself. FIG. 11 illustrates in detail the contact carrier 64. As may be seen, it is constituted as a generally rectangular shaped central body portion 66 having an upper tab 68 and a lower tab 70 provided with a generally rounded bottom 72. A pair of openings 74 and 76 are provided in the central body portion 66 and extending into the openings 74 and 76 are confronting bosses or projections 78 and 80.

A pair of movable contacts 82 are mounted in each of the openings 74 and 76 by engaging an opening 84 in each movable contact over a rectangular boss 78 (FIG. 6). When so mounted, each movable contact extends essentially perpendicular from the contact carrier 64 and one end of each overlies a third portion 56 of a stationary contact so as to complete an electrical circuit between a pair of such third portions when the movable contacts engage the stationary contacts (FIG. 7). Contact springs 86 are provided engaging over the bosses 78 and 80 and bearing on the upper surface of the movable contacts 82 to urge them downwardly in the openings 74.

In order to provide for good wiping action, as the switch is operated the bottom 88 of each opening 74 and 76 is formed so as to be at a slight angle to the planes containing the contact buttons 58 and the relative dimension of the parts are such that as the contact carrier moves downwardly the bottoms 88 of the contact carrier openings lie in a plane below the upper surface of the stationary contact buttons 58. By virtue of this construction, as the contact carrier moves down the fixed contacts engage the stationary contact initially with essentially a line contact, and as the contact carrier moves further downwardly a rolling action is imparted to the movable contacts to thereby provide good wiping action. At the completion of the downward movement to the contact carrier, the movable contacts 82 are raised off of the bottoms 88 and so are supported completely by the stationary contact buttons 58 and are held in their engaged positions by virtue of the action of the springs 86.

Motion is imparted to the contact carrier, and consequently the movable contacts through a flipper 90. The flipper 90 is constructed as essentially elongated flat member having a slot 92 formed therein to accommodate a snap spring, to be described, and a downwardly depending projection 94 (FIG. 10). Provided on the flipper opposite from the projection 94 are a pair of beveled fulcrum points 96 engaging in corners 98 molded into the interior space 46 of the support 38. The fulcrums are retained in their assembled position by means of retaining clips 100 which engage between the bottom of the support 38 and the frame 26 and themselves are held in position by the screws 32. Thus, the flipper is mounted so as to pivot or rotate about its beveled edges 98 which are held in position by means of the retaining clips 100.

Mounted beneath the flipper 90 is a lever 102. When assembled one end 104 of the lever is trapped between

a beveled recess 106 formed in the bottom of the support 38 and the bottom of the frame 26 so that the lever is free to rotate in a counterclockwise direction as shown in FIG. 8. Formed on the bottom of the lever is a pad 108 which projects toward the diaphragm 36 and is provided with a bottom surface which normally extends at a slight angle to the upper surface of the diaphragm. At the end of the lever 102 opposite its pivot end is a raised boss 110 for a purpose to be hereinafter described. Provided at that same end is an upwardly extending arm 112 having a notch formed therein. Connected to the arm 112 and to an opening 114 in the flipper 90 is a snap spring 116 extending through the slot 92.

As may be seen in FIG. 6, in the normal condition of the switch the angle between the spring 116 and the flipper 90 is such to cause the flipper to be urged in the counterclockwise direction. When the fluid pressure in an associated system increases causing the diaphragm 36 to deflect upwardly through an opening 118 provided in the bottom of the frame 26, the lever 102 is rotated counterclockwise about its pivot 104 and by virtue of engagement of the upper surface of the lever with the projection 94 the flipper is caused to rotate clockwise about its fulcrums 96. This action continues solely due to the pressure of the diaphragm until the angle of the center line of the spring 116 with respect to the flipper changes to cause the spring to exert a clockwise force on the flipper, thereby imparting a snap action to its movement. The clockwise motion of the flipper 90 causes it to engage the bottom 72 of the contact carrier 64, thereby moving the contact carrier in an upward direction as shown in the various figures of the drawing, thus effecting disengagement of the movable contacts 82 from the stationary contact buttons 58.

The operating pressure for the switch is determined by the downward force exerted on the free end of the lever 102 by a main spring 119. One end of the spring engages the lever around the boss 110 while the other end is disposed in an opening 120 in the support 38. Mounted in the opening 120 is a spring pad 122 (FIG. 13) having a threaded interior opening 124 and a pair of oppositely disposed ears 126. Each ear 126 is movable in a slot 128 formed in the sides of the opening 120 to prevent the rotation of the spring pad. A screw 130 engages in the threaded opening 124 and by adjusting the screw 130 the spring pad 128 may be caused to move up and down, whereby greater or lesser amounts of force are exerted by the main spring 119 on the free end of the lever 102. In this manner the device may be adjusted to operate at a selected pressure in the system being controlled.

Frequently it is desired in such systems to permit the device to operate at different pressures. That is to say, it might be desired to open the circuit at a first and higher value of pressure but to permit the circuit to be closed at a somewhat lower value. To this end a switch in accordance with the invention may provide a differential adjustment. This is constituted by a differential spring 132 urging a plunger 134 downwardly toward an extension 136 of the lever 102. The amount of downward force exerted by the plunger 134 is determined by a differential screw 138 extending through the top surface of the housing and bearing on the spring 132. As may best be seen in FIG. 4, in the normal position of the device the plunger 134 is not in contact with the

lever 102, but as the switch is operated in response to increased pressure and the lever 102 operates (upwardly as shown in FIG. 4) the extension 136 will contact the plunger 134 and a restoring force equal to the sum of the forces exerted by the main spring 119 and the spring 132 will be applied to return the lever to its original and normal position.

In order that a controlled device in accordance with the invention may operate to relieve pressure in a system at the same time the drive to the system is interrupted, a relief valve 140 (FIGS. 7 and 9) is mounted on the side of the frame. The relief valve is provided at one end with a fitting 142 suitable for connecting the valve to an appropriate part of the fluid system, and is provided at its other end with an actuating plunger 144 to operate the valve and bleed the fluid under pressure. In order to operate the valve, the flipper is provided with an arm 146 extending outwardly therefrom and disposed beneath the actuating plunger 144. Thus, when the flipper 90 is operated so as to move from its normal position shown in FIG. 7 to its upper position shown in FIG. 9, the actuating plunger 144 is depressed opening the valve 140.

In summary, in the operation of a controlled device in accordance with the invention, the fitting 34 on the diaphragm housing 30 is connected to the system to be controlled while the fitting 142 is connected to the point in the system wherein it is desired to relieve pressure at the appropriate time. The electrical connections are made to the terminals 48 and the main spring screw 130, and the differential spring screws 138, if not previously adjusted, are then adjusted to give desired operating values. As the pressure in the system increases the diaphragm 36 is deflected upwardly against the pad 108 which, by virtue of having a surface slightly inclined to the upper surface of the diaphragm maintains a substantially flat contact with the diaphragm so as to evenly distribute the pressure over the surface of the diaphragm. Upon a further increase in pressure in the system the diaphragm causes the lever 102 to rotate counterclockwise as shown in FIG. 8 while the flipper 90 rotates clockwise with a snap action, moving the contact carrier 64 upwardly to interrupt the circuit between the stationary contacts and the movable contacts. Upon a decrease of pressure the main spring 119 forces the lever 102 back to its normal position, causing the contacts to once again close. Concurrently with this operation the relief valve 140 was opened and closed by the engagement and disengagement of the extension 146 with its actuating plunger 144.

In the embodiment of the invention illustrated in FIGS. 2 through 10, a means is provided to set the device for either automatic operation or in an off position. This means is constituted by an actuating lever 148 extending through the frame 26 and the bottom of the support 38, and having a bent end 150 normally disposed in a horizontal position, as is best shown in FIG. 4, under the lever extension 136. When the lever 148 is in its solid line position as shown in FIG. 3 the lever end 150 does not affect the operation of the device and it functions in the automatic fashion as described above. If the lever 148 is rotated clockwise to the dotted line position shown in FIG. 3, its end 150 engages the extension 136 of the lever 102, causing that lever 102 to rotate counterclockwise, thereby operating the flipper 90 to cause the contacts to open in the manner described above.

In the embodiment of the invention illustrated in FIGS. 14 through 19, means are provided for either automatic or manual operation of the device. In this embodiment those elements which correspond to elements in the embodiment described previously have been given the same reference numerals and will not be described again. In this embodiment a flipper 90' is constructed somewhat similar to the flipper 90 and includes an extension 94', a pair of fulcrum points 96' and an arm 146'. Each of these elements operates in the same fashion as their counterparts in the previously described embodiment. However, as is best seen in FIGS. 14, 15 and 19, the flipper 90' extends through the support 38 and on its end opposite the arm 146' it is provided with a tab 152.

When it is desired to effect manual operation of the device the tab 152 may be manipulated to rotate the flipper clockwise about its fulcrums 96', as shown in FIG. 16, to move the carrier 74 upward in its guide slots 62, thereby disengaging the movable contacts from the stationary contacts.

As may be seen, the device described is one in which a support is molded with passages, openings, guide and retaining means to permit the relatively easy and accurate assembly of the operating elements of the device. The construction of the contact carrier permits the movable contacts to engage the stationary contacts with good wiping action. In addition, readily accessible means are provided whereby the device may be inspected and adjusted.

It is obvious that various modifications may be made in the details of design without departing from the spirit of the invention, and it is intended by the claims appended hereto to cover all such modifications as fall within their scope.

What is claimed as new and desired to be secured by Letters Patent is:

1. A pressure controlled switch comprising a molded support having an upper surface and a lower surface with spaced side walls extending therebetween to form an interior space, a pair of terminals mounted on said upper surface, a pair of stationary contacts having each one a first portion electrically and mechanically connected to each terminal, a pair of spaced passages opening in said upper surface and extending to said interior space, each stationary contact having a second portion extending through one of said spaced passages into said interior space and having a third portion extending into said interior space at an angle to said second portion, guide slots formed in said side walls of said support between said stationary contacts and opening into said interior space thereof, a contact carrier having edges slidable in said guide slots whereby said contact carrier may move within said interior space, a movable contact mounted on said contact carrier and extending perpendicular thereto to overlay said stationary contacts to engage and disengage from the same upon movement of said contact carrier, a flipper pivotally mounted in said side walls and engageable with said contact carrier, a first lever pivotally mounted under said flipper and having an arm extending upwardly therefrom, a main spring mounted in said support and bearing on the free end of said lever to urge said free end in a first direction, a snap spring connected between said arm and said flipper normally biasing said flipper toward said first lever, a diaphragm having one surface in engagement with said lever, and a diaphragm

housing covering the other surface of said diaphragm and having an opening where fluid from a source may be connected to said diaphragm having to cause said diaphragm to urge said lever in a second direction against the force of said main spring thereby causing said flipper to rotate about its pivot moving said contact carrier and said movable contacts.

2. A pressure controlled switch as set forth in claim 1 in combination with a pressure relief valve having an actuating plunger, said flipper having a portion extending toward said actuating plunger to engage said plunger when said flipper is rotated to open said valve.

3. A pressure controlled switch as set forth in claim 1, including a second lever rotatably mounted in one of said side walls and having a portion extending under said first lever to cause said first lever to pivot against the force of said main spring as said second lever is rotated to disengage said first lever from said diaphragm and thereby prevent operation of switch in response to variations of fluid pressure in said diaphragm housing.

4. A pressure controlled switch as set forth in claim 1, wherein said support has an opening therein extending from said upper surface, said main spring being mounted in said support opening and extending therefrom to bear against said first lever, and first screw adjusting means in said opening engaging said main spring to vary the spring pressure on said free end of said first lever.

5. A pressure controlled switch as set forth in claim 4, including a further opening in said support, a plunger mounted in said further opening and overlaying said first lever and normally out of contact therewith, a differential spring in said further opening urging said plunger toward said first lever, and second screw adjusting means in said further opening engaging said differential spring for varying the force on said plunger, said first lever engaging said plunger upon its rotation in response to an increase in fluid pressure so that upon a decrease in fluid pressure said plunger and said main spring together act to restore said first lever to its normal position.

6. A pressure controlled switch as set forth in claim 1, including a tab extending from said flipper whereby said flipper may be rotated by hand to actuate said switch.

7. A pressure controlled switch as set forth in claim 1, including a pair of second terminals mounted on said upper surface, a stationary contact having a first portion electrically and mechanically connected to each of said second terminals, a second pair of spaced passages opening in said upper surface and extending to said interior space, each stationary contact having a second portion extending through one of said second spaced passages into said interior space and having a third portion extending into said interior space at an angle to said second portion, a second movable contact mounted on said contact carrier and extending perpendicular thereto to overlay said second stationary contacts to engage any disengage the same upon movement of said contact carrier.

8. A pressure controlled switch as set forth in claim 7, wherein said contact carrier has a pair of spaced openings therein and said movable contacts extend through said openings, a spring mounted in each opening and bearing on said contact carrier to urge its associated movable contact toward the bottom of the opening, the bottom of each contact carrier opening being

inclined at an angle to the planes containing the third portions of said stationary contacts and lying in a plane below an associated stationary contact when said contact carrier is at one limit of its movement so that said movable contacts are lifted off the bottoms of said contact carrier openings and are urged against said stationary contacts by said springs.

9. A pressure controlled switch as set forth in claim 1, wherein said first lever is provided with a pad extending toward said diaphragm, the surface of said pad confronting said diaphragm being normally at an angle to surface of said diaphragm and become parallel thereto as said first lever is rotated from its normal position.

10. A pressure controlled switch as set forth in claim 9 in combination with a pressure relief valve having an actuating plunger, said flipper having a portion extending toward said actuating plunger to engage said plunger when said flipper is rotated to open said valve.

11. A pressure controlled switch as set forth in claim 10, including a second lever rotatably mounted in one of said side walls and having a portion extending under said first lever to cause said first lever to pivot against the force of said main spring as said second lever is rotated to disengage said first lever from said diaphragm and thereby prevent operation of the switch in response to variations in fluid pressure.

12. A pressure switch as set forth in claim 11, wherein said support has an opening therein extending from said upper surface, said main spring being mounted in said support opening and extending therefrom to bear against said first lever and first screw adjusting means in said opening to engage said main spring to vary the spring pressure on the free end of said first lever.

13. A pressure controlled switch as set forth in claim 12, including a further opening in said support, a plunger mounted in said further opening and overlaying said first lever and normally out of contact therewith, a differential spring in said further opening urging said plunger toward said first lever, and second screw adjusting means in said further opening engaging said differential spring for varying the force on said plunger, said first lever engaging said plunger upon its rotation in response to an increase in fluid pressure so that upon a decrease in fluid pressure said plunger and said main spring together act to restore said first lever to its normal position.

14. A pressure controlled switch as set forth in claim 13, including a pair of second terminals mounted on said upper surface, a stationary contact having a first portion electrically and mechanically connected to each of said second terminals, a second pair of spaced passages opening in said upper surface and extending to said interior space, each stationary contact having a second portion extending through one of said second space passages into said interior space and having a third portion extending into said interior space at an angle to said second portion, a second movable contact mounted on said contact carrier and extending perpen-

dicular thereto to overlay said second stationary contacts to engage and disengage the same upon movement of said contact carrier.

15. A pressure controlled switch as set forth in claim 14, wherein said contact carrier has a pair of spaced openings therein and said movable contacts extend through said openings, a spring mounted in each opening and bearing on said contact carrier to move its associated movable contact toward the bottom of the opening, the bottom of each contact carrier being inclined at an angle to the planes containing the third portions of said stationary contacts and lying in a plane below an associated stationary contact when said contact carrier is at one limit of its movement so that movable contacts are lifted off the bottoms of said contact carrier openings and are urged against said stationary contacts by said springs.

16. A pressure controlled switch as set forth in claim 15, wherein said first lever is provided with a pad extending toward said diaphragm, the surface of said pad confronting said diaphragm being normally at an angle to the surface of said diaphragm and becoming parallel thereto as said first lever is rotated from its normal position.

17. A pressure controlled switch as set forth in claim 10, including a tab extending from said flipper whereby said flipper may be rotated by hand to actuate said switch.

18. A pressure controlled switch as set forth in claim 17, including a pair of second terminals mounted on said upper surface, a stationary contact having a first portion electrically and mechanically connected to each of said second terminals, a pair of space passages opening in said upper surface and extending to said interior space, each stationary contact having a second portion extending through one of said second spaced passages into said interior space and having a third portion extending into said interior space at an angle to said second portion, a second movable contact mounted on said contact carrier and extending perpendicular thereto to overlay said second stationary contact to engage and disengage the same upon movement of said contact carrier.

19. A pressure controlled switch as set forth in claim 18, wherein said contact carrier has a pair of space openings therein and said movable contacts extend through said openings, a spring mounted in each opening and bearing on said contact carrier to urge its associated movable contact toward the bottom of the opening, the bottom of each carrier contact opening being inclined at an angle to the planes containing the third portions of said stationary contacts and lying in a plane below an associated stationary contact when said contact carrier is at one limit of its movement so that said movable contacts are lifted off the bottoms of said contact carrier openings and are urged against said stationary contacts by said springs.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,875,358 Dated April 1, 1975

Inventor(s) Dale F. Willcox

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 7, line 42, delete "each"; same line, after "contacts" insert --each one--; line 43, delete "one".

Signed and Sealed this

ninth Day of September 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks