June 1, 1965 J. B. CORDER ETAL 3,187,136

MULTIPLE PRESSURE SWITCH CONSTRUCTION

Filed Oct. 16, 1961 3 Sheets-Sheet 1

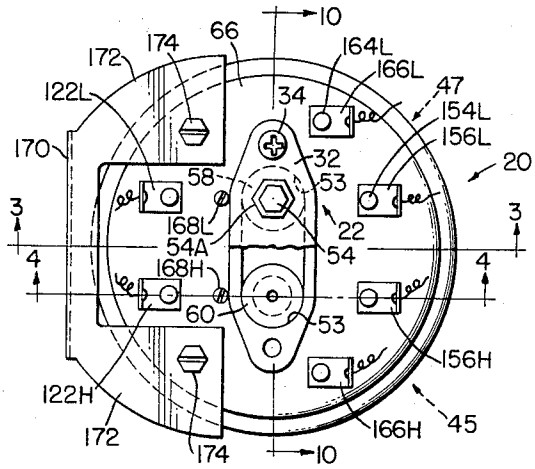


FIG-1

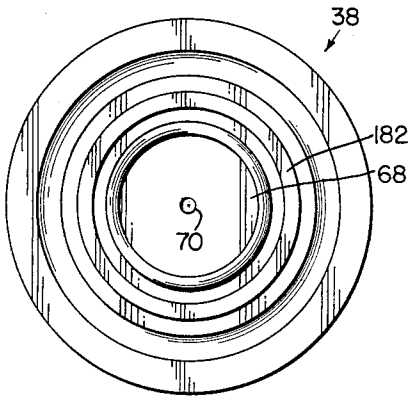


FIG-5

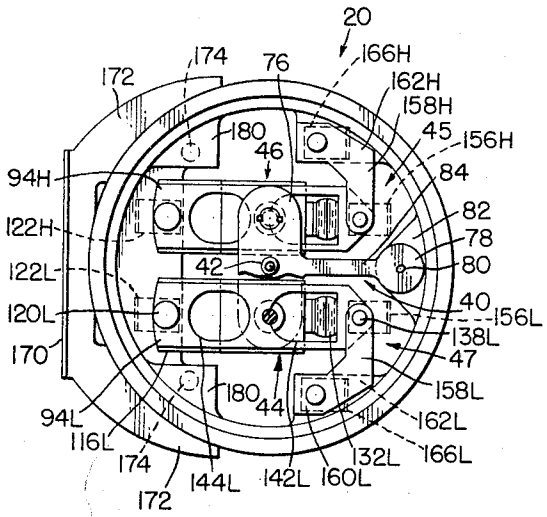


FIG-2

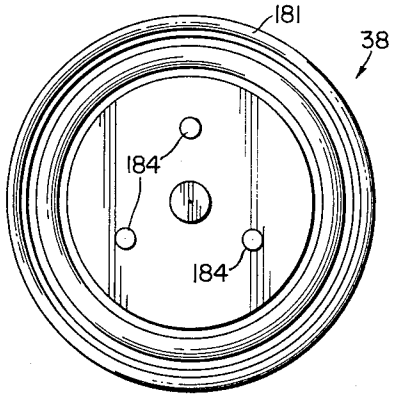


FIG-6

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MULTIPLE PRESSURE SWITCH CONSTRUCTION

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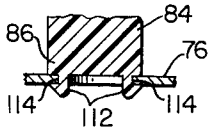


FIG-14

FIG-3

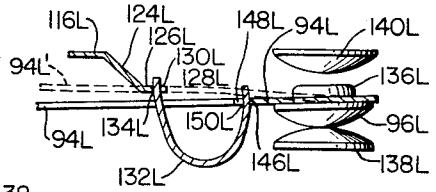


FIG-13

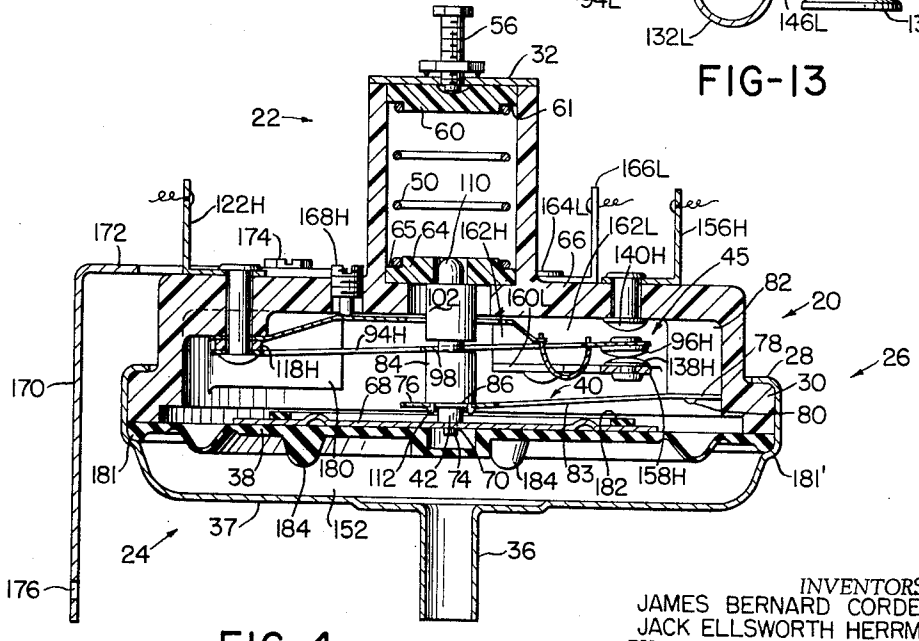


FIG-4

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MULTIPLE PRESSURE SWITCH CONSTRUCTION

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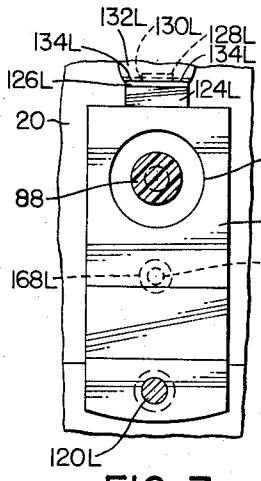


FIG-7

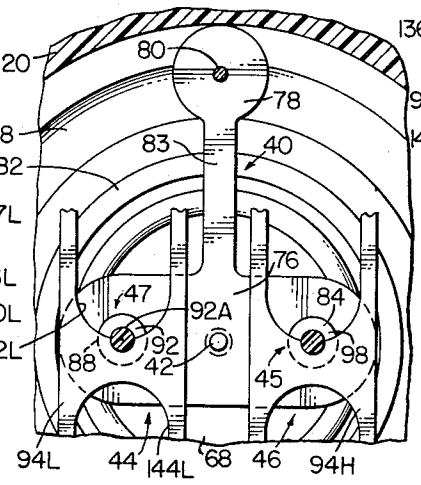


FIG-8

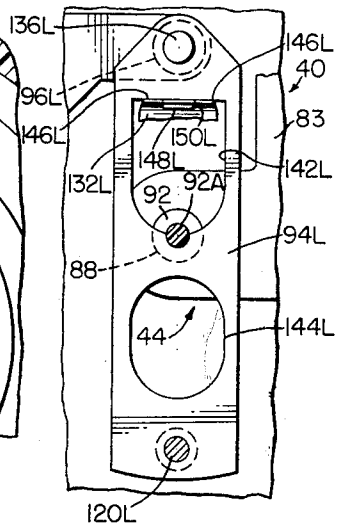


FIG-9

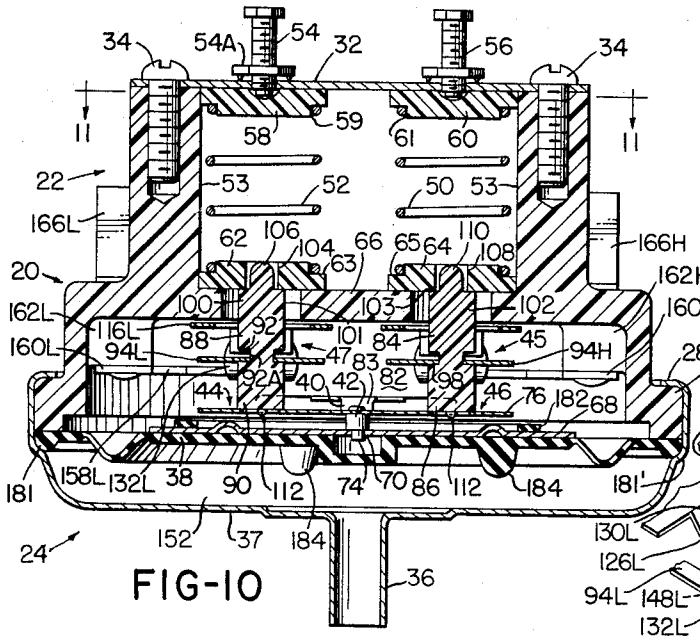


FIG-10

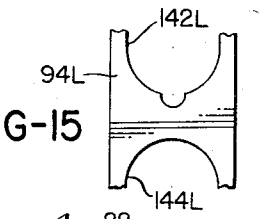


FIG-15

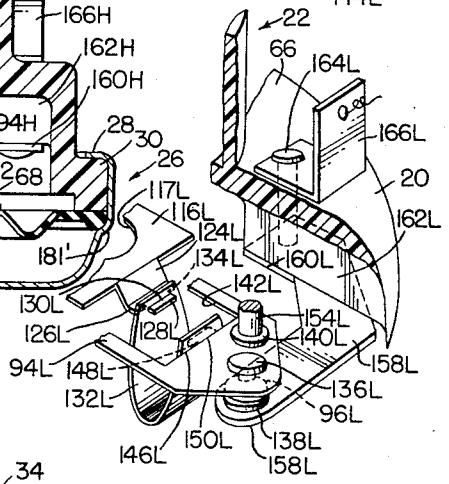


FIG-12

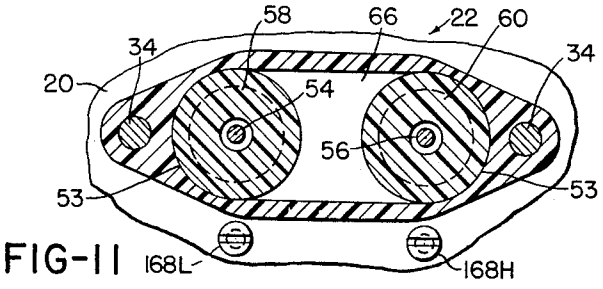


FIG-11

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3,187,136

MULTIPLE PRESSURE SWITCH CONSTRUCTION

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Filed Oct. 16, 1961, Ser. No. 145,076
15 Claims. (Cl. 200—83)

This invention relates to a multiple pressure switch construction and method.

One feature of this invention includes an integral casing which may be formed of moldable insulating material and the like. This integral casing may have a downward cup part with a downward rim and an upper tubular part with an upward opening. Multiple pressure switch parts are assembled in the cup and tubular parts. A flexible diaphragm may be secured against the downward rim by means of an upward rigid cup which has a diaphragm engaging shoulder to seal and hold the diaphragm against the downward rim. The rigid cup has a fluid passageway and forms a pressure chamber between the diaphragm and said rigid cup. The switch parts are actuated in response to multiple pressures produced in the pressure chamber.

Another feature of this invention includes a method of producing a multiple pressure switch construction. Such method may include the assembly of switch parts in said downward and upward cups and in said tubular part. The method may also include securing the flexible diaphragm between said cups.

Another feature of this invention includes a method and/or apparatus for controlling electric currents passing through the multiple pressure switch construction in which a diaphragm is moved in response to multiple fluid pressures. The diaphragm moves a central fulcrum part of a flexible balance member. Switch parts of separate switches are moved to open and closed positions by opposed sides of the balance member, which are on opposite sides of said central fulcrum part.

Another feature may include resistance to movement of the switch parts by opposing parallel springs in the immediately foregoing feature.

According to another feature fulcrum snap actions may be provided in the switch parts of the immediately foregoing feature and, if desired, the spring tensions of the opposing parallel springs may be individually adjusted and the fulcrum snap actions of the switch parts may also be individually adjusted, as desired.

Another feature of this invention is that a unitary balance member may be actuated by a flexible diaphragm at an intermediate fulcrum and in which a first switch is actuated by said balance member on one side of said fulcrum, and a second switch is actuated on the other side of said fulcrum. If desired, spring means may regulate the action of the first switch and other spring means may regulate the actuation of the second switch. In addition, the balance member may be flexible. One or both of the spring means may be adjustable. The switches may be of the snap switch type and the snapping point of one or both of the switches may be individually adjusted.

According to another feature, the balance member may be a T-shaped flexible balance member having a cross member and a foot member. The foot member may be attached to the casing. A fulcrum action may be provided at the central part of the cross member and separate switches may be actuated on opposite sides of the cross member, and on opposite sides of the fulcrum.

Accordingly, one of the objects of this invention is to provide a multiple pressure switch construction having one or more of the features herein disclosed.

Another object of this invention is to provide a method

of manufacturing such multiple pressure switch, and having one or more of the features herein disclosed.

Another object of this invention is to provide a method of controlling currents in response to multiple pressures and having features herein disclosed.

Other objects become apparent from this description and from the accompanying drawings, in which:

FIGURE 1 is a plan view of the switch, taken from line 1—1 of FIGURE 3 in smaller scale, with one-half of the plane view showing the rigid plate removed.

FIGURE 2 is a rear view of FIGURE 1 with the rigid cup and the flexible diaphragm removed, and taken along line 2—2 of FIGURE 3, in smaller scale.

FIGURE 3 is a cross-sectional view, in enlarged scale, taken along the line 3—3 of FIGURE 1.

FIGURE 4 is a view similar to FIGURE 3, but taken along the line 4—4 of FIGURE 1.

FIGURE 5 is a plan view of the flexible diaphragm, with the metal disc and the insulating ring attached thereto.

FIGURE 6 is a view of the flexible diaphragm taken from the opposite side of FIGURE 5.

FIGURE 7 is a view substantially along the line 7—7 of FIGURE 3.

FIGURE 8 is a view taken substantially along the line 8—8 of FIGURE 3.

FIGURE 9 is a view taken substantially along the line 9—9 of FIGURE 3.

FIGURE 10 is a cross section taken substantially along the line 10—10 of FIGURES 1 and 3.

FIGURE 11 is a cross-sectional view taken substantially along the line 11—11 of FIGURE 10.

FIGURE 12 is a view in perspective, with parts broken away, of a portion of the switch which is located in the upper right-hand corner of FIGURE 1.

FIGURE 13 is an enlarged cross section showing a detail of the snap spring construction.

FIGURE 14 is an enlarged view showing the attachment of a connector rod to the cross member of the balance member.

FIGURE 15 is a detail view of part of one of the switch blades.

Certain words, such as adjectives of direction or position, are used herein for the sake of clearness and brevity, such as "upper," "lower," "horizontal," etc., and such words apply generally to the positions of the switch as shown, for example, in FIGURES 3, 4, and 10. However, it is to be understood that such words are used merely for descriptive purposes, and that the positions of the elements so described may actually have different directions, depending on the location of the switch, etc.

A switch construction according to this invention may include a casing, which may be formed by a central, circular, downward cup part 20 and a relatively oblong upward tubular extension 22. The parts 20 and 22 may be made integral with each other, and may be made of insulating molding material, such as Bakelite and the like.

A rigid cup 24, of metal or rigid plastic material, for example, may be circular and may have a rim 26 enclosing and overlapping the central, circular part 20, and may be secured thereto by the flange 28, which may be spun or otherwise formed around the flange 30 of the circular construction 20.

A rigid central plate 32, of metal or rigid plastic material, for example, encloses and is secured to the open-ended tubular extension 22, at its open end, in any suitable manner, such as by screws 34.

The cup 24 may have a fluid passageway 36, which may be placed on the "bottom" of the cup and may be axially disposed with respect to the general construction of the

switch, if desired. Fluid may flow into or out of the cup 24 through the passageway 36.

A circular flexible diaphragm 38 may be secured between the central circular part 20 and the rim 26 of the cup 24.

A unitary balanced member, or T-shaped member, 40 may have an intermediate fulcrum 42 actuated by the diaphragm 38 and has opposite actuating sides 44 and 46 adjacent to the fulcrum 42.

A high pressure switch 45 and a low pressure switch 47, FIGURES 1 and 2, are actuated respectively by said opposite actuating sides 46 and 44, respectively.

A high pressure opposition spring 50, in the tubular extension 22, pushes down on the high pressure switch 45 and bears upwardly against the rigid plate 32. A low pressure opposition spring 52 is located in the tubular extension 22 and pushes down on the low pressure switch member 47, and bears upwardly against the rigid plate 32.

The opposition springs 50 and 52 may be coil and compression springs. They may be laterally spaced and parallel with respect to each other, and fit along the rounded edges 53 of the oblong extension 22.

Adjusting means are provided for the opposition springs 50 and 52. For example, screws 54 and 56 threadedly engage the plate 32 and push downwardly on the discs or washers 58 and 60, respectively. These washers have circular shoulders 59 and 61 respectively which receive the ends of the springs 50 and 52, as shown in FIGURES 3, 4 and 10.

The lower ends of the springs 50 and 52 bear against discs or washers 62 and 64, respectively. These washers 62 and 64 are provided with circular shoulders 63 and 65, respectively, to receive the lower ends of the springs 52 and 50.

A horizontal wall 66 connects the circular part 20 with the relatively oblong tubular extension 22, and unifies the construction and makes it entirely integral and rigid.

A rigid disc 68, of metal or rigid plastic material, may be attached to the diaphragm 38 by any suitable means, such as by adhesive, or vulcanization. The disc 68 has a central part 70 which may be an opening to receive an actuating member or pin or fulcrum 42 which has a reduced diameter extension 74, which is received in the central part or opening 70 of the disc 68.

The balanced member 40 may be a T-shaped flexible balance member which may be made of flexible sheet metal and has a cross member 76 and a foot member 78. The cross member 76 has the central fulcrum part or pin 42 secured thereto and opposite pushing or actuating sides 44 and 46. The foot member 78 may be attached to the casing part 20 by a pin 80 or the like, which is inserted into the lug 82, which is a part of the Bakelite or circular part 20 of the casing. The foot member 78 and the cross member 76 may be joined by the main connector member 83.

A high pressure connector, pin or rod 84 has one end 86 secured to, engaged and actuated by the pushing side 46 of the cross member 76. A low pressure connector, rod or pin 88 has one end 90 secured to, engaged and actuated by the opposite pushing side 44 of the cross member 76.

The low pressure switch 47 is connected with and actuated by the low pressure connector or rod 88. To this end, the rod 88 has a groove 92 which engages the switch blade 94L. The blade 94L carries the movable contact 96L of the low pressure switch 47.

Likewise, the high pressure switch 45 is connected with and actuated by the high pressure connector or rod 84. The connector 84 has a groove 98 which engages the switch blade 94H, which carries the movable contact 96H of the high pressure switch 45.

The low pressure switch 47 and the high pressure switch 45 are substantially identical insofar as the construction and shape of the various components of the

switches are concerned. The description of the operation of any of these components with respect to one of the switches 45 or 47 is equally applicable to the corresponding components of the other switch, and it is to be understood that switch construction and operation may be identical, except insofar as one switch may be actuated at one set of selected pressures, while the other switch may be actuated in response to other selected pressures and that the contacts of each of the switches are connected to different electric lines, as desired. Hence, any omission of description with respect to one of the switches is understood to be described in connection with the other switch and such descriptions are interchangeable where appropriate, as is obvious, to avoid repetition in the description of these switches.

The terms "high pressure" and "low pressure," etc., are used for convenience and brevity of description. It is to be understood that the switches 45 and 47 may actually be responsive to pressure zones which overlap. That is, one switch may open at a lower pressure than the other switch, but may close at a higher pressure. Alternatively, one switch may open and close at pressures which are lower than the opening and closing pressures of the other switch, etc.

The low pressure opposition spring 52 produces an opposing thrust on the other or upper end 100 of the low pressure connector 88. The high pressure opposition spring 50 produces an opposing thrust on the other or upper end 102 of the high pressure connector 84.

The disc 62 has an opening 104 which receives the extension 106 of the connector or pin 88. The disc 62 receives the thrust of the shoulder 101 produced by the thicker end 100 and in turn receives the thrust or transmits the thrust from the spring 52 to the connector 88. In a like manner, the disc 64 has an opening 108 which receives the extension 110 of the connector or rod 84. Thus, the disc 64 transmits the thrust from the spring 50 to the rod 84 through the medium of the shoulder 103 formed by the larger diameter of the end 102.

The high pressure connector or rod 84 and the low pressure connector rod 88 may each be connected to the T-shaped member 40 at the cross member 76 so the rods cannot normally be separated from the cross member 76. To this end, the rod 84, for example (and, similarly, the rod 88) may have barbed extensions 112, FIGURE 14, which are resilient enough to yield inwardly when they are being pushed through the opening 114 in the member 76. These barbed extensions 112 spring outwardly after being inserted in opening 114 to secure the rod 84 (and, similarly, the rod 88) to the cross member 76.

The members 84 and 88 may be made of any suitable insulating material of sufficient strength, such as nylon or the like.

The switches 45 and 47 may be snap switches and, if desired, also may be double pole switches. Details of a suitable snap switch construction are described in connection with low pressure switch 47, and it is to be understood that the high pressure switch 45 is similarly constructed, and, hence, description of such switch 45 is not given in as much detail to avoid needless repetition.

The snap switch 47 may include the contact carrying blade 94L and the fulcrum carrying blade 116L. (Similar components of switch 45 are sometimes indicated with reference numerals having suffix H instead of L.) These blades are connected together rigidly at one end, with an interposed spacer or washer 118L which may be metallic, if desired. A rivet or the like 120L passes through the blades 94L, 116L, and the washer 118L and also through the casing portion 20 and through one leg of the electric connector 120L, to rivet all of these parts together in electrically conductive, stationary and firmly held condition, and in such a manner that the

blades **94L** and **116L** may be flexed to the desired condition.

The fulcrum-carrying blade **116L** has a downward extension **124L**, FIGURES 3, 7 and 12, and a small horizontal extension **126L**, which has a fulcrum tongue **128L**, which passes through an opening **130L** in a C-shaped spring **132L**. The horizontal extension **126L** has edges **134L** on either side of the tongue **128L** which engage the side surface of the C-spring **132L** with a rocking movement, due to a rounded or dull shaped edge **134L**.

The fulcrum blade **116L** has a cut out opening **117L** which permits rod **88** to pass freely through opening **117L**.

The contact carrying blade **94L** may carry the movable contacts **96L** and **136L**, which are movable to engage the stationary contacts **138L** and **140L**.

The contact carrying blade **94L** has cutout openings **142L** and **144L**. The cutout **142L** has straight fulcrum edges **146L** and a tongue **148L** which passes through an opening **150L** in the C-spring **132L**. The fulcrum edges **146L** permits the C-spring **132L** to rock against such edges as the blade **94L** is flexed by the connector rod **88**. The groove **92** of the rod **88** receives the edge **142L**, which has a rounded notch, FIGURE 15, which passes adjacent the narrow portion **92A** of the rod **88**.

As the rod **88** is pushed upward by the diaphragm **38**, the groove construction **92** pushes the blade **94L** upwardly and flexes the same to and past the dotted line position **94L'**, which is diagrammatically indicated in FIGURES 3 and 13. When the blade **94L** crosses the position **94L'**, which passes through the fulcrum point **134L**, the blade **94L** snaps upwardly to bring the movable contact **136L** into engagement with the stationary contact **140L**. The fulcrum blade **116L** is relatively strong so that the fulcrum **134L** snaps down a very small distance during the snap. This action takes place as the fluid pressure in pressure chamber **152** has risen to the pressure at which it is desired to change the circuit which is passing through the blade **94L** from the contact **138L** to the contact **140L**. When the pressure in chamber **152** later falls after having moved the blade **94L** upwardly, then a converse action takes place which causes the contacts **136L** and **96L** to move downwardly to bring contact **96L** into engagement with the contact **138L**. This reverse snap action takes place when the blade **94L** crosses the fulcrum point **134L** while being downwardly flexed by the connector or rod **88**.

The blade **94L** flexes back and forth with the contacts **96L** and/or **136L** moving back and forth with a snap action because the spring strength of the C-spring **132L** is greater than the flexing strength of the blade **94L**. The C-spring **132L** firmly holds the contact **96L** in down position until such time as the blade **94L** flexes upwardly at or infinitesimally above the fulcrum point **134L**, at which time the spring strength of the C-spring **132L** is thrown on the opposite side of the fulcrum point **134L** and causes the upward snap to engage the contacts **136L** and **140L**. The converse action occurs on the downward movement of blade **94L**. It is to be noted that the contacts **96L** and **136L** are held firmly against the stationary contacts **138L** and **140L** until the very moment when the snap action takes place. Because of this, the current carrying capacity of the switch construction is unusually high.

The stationary contact **140L** is part of a metal rivet **154L** which passes through casing wall **66** and engages the horizontal leg of electric connector **156L**.

The stationary contact **138L** is mounted on a bracket **158L**, FIGURE 12, which has an arm **160L** which passes under a lug **162L**, which is part of the insulating casing **20**. A metal rivet **164L** secures the branch or leg **160L**, the insulating lug **162L**, and an electric connector **166L** together.

Two adjustments are provided respectively for each of

the switches **45** and **47** to cause them to be responsive to selected pressures which are produced in the pressure chamber **152** by the passage of fluid into or out of the passageway **36** and the consequent movement of the diaphragm **38** up or down. One of these adjustments is produced by the spring **52** in the case of switch **47**, and the spring **50** in the case of the switch **45**. Limiting the description to the switch **47** as exemplary of both switches, the screw **54** may be threaded inward or outward past the rigid plate **32** to move the disc **58** up or down to produce the desired compressing spring strength by the upward and downward movement of the disc **58**. A lock washer **54A** is provided to lock the adjustment of the screw **54** at the desired position. This type of adjustment determines the pressure, in general, to which the switch **47** is responsive. A modifying adjustment is provided by the upward or downward adjustment of the fulcrum point **134L**, FIGURE 13, which may be adjusted by the turning of an adjusting screw **168L**, FIGURES 3 and 4. This screw passes through the wall **66** of the circular part **20** of the casing and has an extension **170L** which engages the top of the blade **116L** and moves the fulcrum point **134L** upward or downward to vary the snapping pressure of the blade **94L**, as the blade is flexed back and forth past the fulcrum point **134L**. If desired, the screw **168L** may be made partly or completely of insulating material to prevent accidental shorting or grounding of the circuit when the screw **168L** is being actuated by a screw driver or the like. The screw **168L** is in threaded engagement with a suitable threaded opening in the wall **66** of the part **20** of the casing.

The detailed construction of the high pressure switch **45** is substantially identical with the detailed description which has heretofore been given of the low pressure switch **47**. Since the parts used in the two switches are substantially identical, it is deemed unnecessary to repeat at length the description of these parts as applied to the high pressure switch **45**. A few of the parts of switch **45** have been shown with reference characters with the suffix "H" instead of "L," with or without specific description of these parts. Wherever applied, these parts with a suffix "H" are intended to operate substantially the same as in the corresponding description which has been given with respect to the switch **47**. The main difference is that the switch **45** may be responsive to different pressures than the switch **47**, and this difference is produced merely in the adjustment of the springs or the strength of the springs as originally used, as is obvious. The switch **47** transmits current from the common connector **122L**, FIGURE 1, either to the connector **156L** or the connector **166L**, depending upon the position of the contact blade **94L**. Likewise, the pressure switch **45** transmits current from the common connector **122H**, either to the connector **156H** or to the connector **166H**, depending upon the position of the contact blade **94H**. It is deemed unnecessary specifically to repeat the same description as it applies to the switch **45**, which has previously been applied to the switch **47**, since the analogy is obvious.

If desired, an attaching bracket **170** may be provided to mount the switch construction on any desired support. For example, a bracket **170** may have a horizontal forked leg **172** which is secured to the casing **20** by means of the screws **174**. The vertical leg **170** may have one or more openings **176** for attachment of the bracket **170** to the desired support by screws or the like.

The diaphragm **38** may be provided with a circumferential bead **181** for hermetic securement between the diaphragm engaging shoulder **181'** of the cup **37** and the rim **30** of the casing portion **20**. A suitable insulating ring **182** may be placed near the outer edge of the metal disc **68** and may be secured thereto by any suitable means such as adhesively or by vulcanization. Such insulating ring **182** is for the purpose of preventing accidental electrical connection of the C-springs by the metal disc **68**.

The diaphragm **38** may be provided with knobs **184**

to prevent the downward collapse of the diaphragm 38 beyond a desired lower limit, so the parts may not become disengaged or unduly strained by an excessive downward movement of diaphragm 38.

Suitable lugs are provided in the casing portion 20 to receive the various screws, rivets, and the like and they are apparent from an inspection of the "underside" as shown in FIGURE 2, where the lugs 180, for example, are provided to receive the screws 174, the lug 82 is provided to receive the screw or rivet 80. Lugs 162L and 162H, FIGURE 2, support parts of the brackets 158L and 158 H for stationary contacts 138L and 138H, etc.

The blade constructions and the C-spring constructions have an inherent firm contact action between the cooperating electrical contacts which actually is increased practically to the point where the snap action takes place. This action is described in connection with the low pressure switch 47, but the same action takes place in the switch 45, and description with regard to switch 45 is not specifically included to avoid repetition.

When the blade 94L moves from the full line position of FIGURE 3 to the dotted line 94L' of FIGURE 3, the flexing action of blade 94L which takes place tends slightly to shorten the distance from the center of the rivet 120L to the contact surfaces 146L of FIGURES 13 and 12. This slight shortening of this distance slightly contracts the distance between the arms of the C-spring 132L and thus slightly increases the spring tension of C-spring 132L. In view of this, the force exerted by spring 132L actually tends to maintain firm contact between contacts 96L and 138L up to the moment of the snap action. When the snap action takes place, the blade 94L snaps upwardly, and the blade 116L, with its fulcrum point 134L snaps downwardly only a slight distance because of the strength of blade 116L in a substantially instantaneous manner, to produce a firm and tight contact between the contact points 136L and 140L. A reverse procedure is then produced on the downward flexing action of the blade 94L as the pressures drop in the pressure chamber 152. This type of construction insures tight contact to be maintained in the cooperating electrical contacts both in the up and down positions of the blade 94L to the very moment of the snap action. This produces a very high current carrying capacity for the switch construction.

It is thus to be seen that an efficient and effective multiple pressure switch has been provided which is adapted to be made from simple parts in an efficient manner. The switch construction lends itself to the production of parts with relatively simple tools and lends itself to accurate assembly in a relatively rapid assembly line. The current carrying capacity of the switch construction is relatively high. Other advantages are evident from the foregoing description, which has brought out many advantages which are not here repeated.

While the form of the invention now preferred has been disclosed as required by statute, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. A combination comprising: a casing having a fluid passage opening; a flexible diaphragm secured to said casing; a rigid disc having a central part and being attached to one side of said diaphragm; a T-shaped flexible balance member having a cross member and a foot member, said cross member having a central fulcrum part and opposite pushing sides, said foot member being secured to said casing; an actuating member spacing and forming actuating means between said central part of said disc and said central fulcrum part of said cross member; a first pressure connector and a second pressure connector each having one end engaged and actuated respectively by said opposite pushing sides of said cross member; a first pressure switch connected with and actuated by said first pressure connector; a second pressure switch connected with and actuated by said second pressure connector; a first pressure opposition spring producing an opposing thrust on the other end of said first pressure connector; and a second pressure opposition spring producing an opposing thrust on the other end of said second pressure connector.

2. A combination comprising: a casing having a fluid passage opening; a flexible diaphragm secured to said casing to form a pressure chamber for fluid flowing through said opening; a unitary balance member having an intermediate fulcrum; means transmitting movement from said diaphragm to said fulcrum; a first pressure connector actuated by said balance member on one side of said fulcrum; a second pressure connector actuated by said balance member on the other side of said fulcrum; a first switch actuated by said first connector; a second switch actuated by said second connector; first spring means regulating the actuation of said first switch; and second spring means regulating the actuation of said second switch.

3. A combination according to claim 2 in which said balance member is flexible.

4. A combination according to claim 2 in which one of said spring means has adjusting means to adjust the actuation of one of said switches.

5. A combination according to claim 2 in which one of said switches is a snap switch and has means to adjust the snapping point of said last named switch.

6. A combination comprising: a casing including a central generally circular part and an integral, oblong cross-sectional, open ended, tubular extension made of insulating molded material, and a generally circular, rigid cup having a rim enclosing and overlapping said central circular part, said cup having a bottom part with a fluid passage opening; a rigid plate closing the open end of said open ended tubular extension; a circular flexible diaphragm secured between said central circular part and said rim of said cup; a unitary balance transmission member having an intermediate fulcrum and opposite actuating sides adjacent said fulcrum; means transmitting movement from said diaphragm to said fulcrum; a first pressure switch and a second pressure switch connected respectively with and actuated respectively by said oposite actuating sides; a first pressure opposition spring in said tubular extension acting on said first pressure switch and bearing against said rigid plate; a second pressure opposition spring in said tubular extension acting on said second pressure switch and bearing on said rigid plate.

7. A combination according to claim 6 in which said opposition springs are parallel coil springs.

8. A combination according to claim 6 in which an adjusting means is carried by said rigid plate for one of said opposition springs.

9. A unitary switch construction comprising: a wall construction forming a contractible and expandable fluid containing pressure chamber; a balance member having a central fulcrum part and opposite actuating sides; means transmitting movement from said wall construction to said fulcrum part; a first pressure switch connected with and actuated by one of said opposite actuating sides; a second pressure switch connected with and actuated by the other of said opposite actuating sides; a first pressure opposition spring producing an opposing thrust on said first pressure switch; and a second pressure opposition spring laterally spaced from said first pressure opposition spring and producing an opposing thrust on said second pressure switch.

10. A construction according to claim 9 in which at least one of said opposition springs has an adjustment for its spring tension.

11. A unitary switch construction comprising: a wall construction forming a contractable and expandable fluid containing pressure chamber; a balance member having a central fulcrum part and opposite actuating sides; means transmissing movement from said wall construction to said fulcrum part; a first switch construction having a

blade connected with and actuated by one of said actuating sides; and a second switch construction having a blade connected with and actuated by the other of said opposite actuating sides, in which said switches are snap switches.

12. A unitary switch construction comprising: a wall construction forming a contractable and expandable fluid containing pressure chamber; a balance member having a central fulcrum part and opposite actuating sides; means transmitting movement from said wall construction to said fulcrum part; a first switch construction having a blade connected with and actuated by one of said actuating sides; and a second switch construction having a blade connected with and actuated by the other of said opposite actuating sides, in which said blades each has a movable contact.

13. A unitary switch construction comprising: a wall construction forming a contractable and expandable fluid containing pressure chamber; a balance member having a central fulcrum part and opposite actuating sides; means transmissing movement from said wall construction to said fulcrum part; a first switch construction having a blade connected with and actuated by one of said actuating sides; and a second switch construction having a blade connected with and actuated by the other of said opposite actuating sides, in which said blades each has a movable

contact and in which each switch has a fulcrum and a snap spring extending from said fulcrum to each respective blade.

14. A construction according to claim **13** in which one of said fulcrums is adjustable to vary the pressure responsiveness of its respective switch.

15. A construction according to claim **13** in which each snap spring is a C-shaped spring.

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