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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
No. 07-091975- -00005-0000
Fecha: 2008-09-12 16:56:39 Dep: 2020 NUECRLACIONE
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Señores
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES
E. S. D.

REF.: Expediente No. 07 091.975 - Solicitud de Patente
a nombre de: **WHIRLPOOL S.A.**
Titulada: DISPOSITIVO DE CONTROL QUE RESPONDE A LA PRESIÓN.

JUAN PABLO CADENA SARMIENTO, vecino de Bogotá, portador de la tarjeta profesional No. 57492 del Consejo Superior de la Judicatura, obrando como apoderado de la sociedad **WHIRLPOOL S.A.**, según lo acredita el documento de poder presentado en esa División, de acuerdo con el Artículo 44 de la Decisión 486 de la Comisión de la Comunidad Andina, me permito solicitar que se examine si la invención contenida en la solicitud en referencia es patentable.

De acuerdo con lo anterior, me permito anexar el recibo oficial de caja No. 08-64,634 por valor de $420.000.

De la Señora Jefe atentamente,

JUAN PABLO CADENA SARMIENTO
C.C. No. 80.410.337 de Usaquén
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Bogotá, 12 de septiembre de 2008
MEV/CAG/jpg

Dec. 13, 1966 R. T. MAIN 3,291,932

PRESSURE RESPONSIVE CONTROL RESET STRUCTURE

Filed Dec. 14, 1964 2 Sheets-Sheet 1

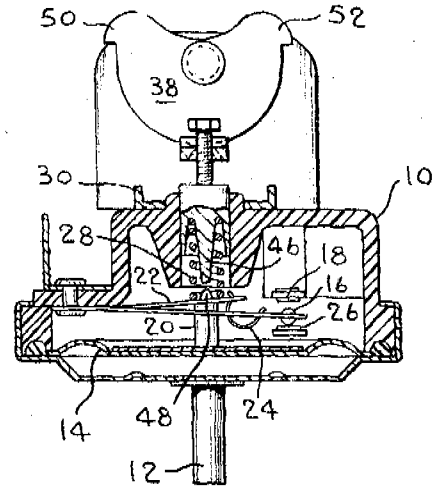

FIG. 2

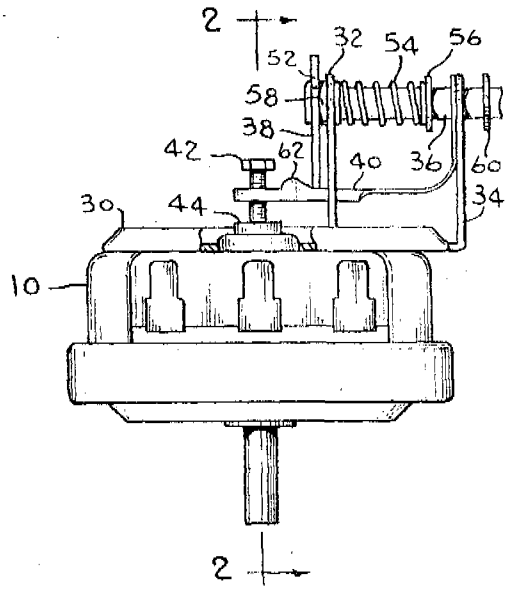

FIG. 1

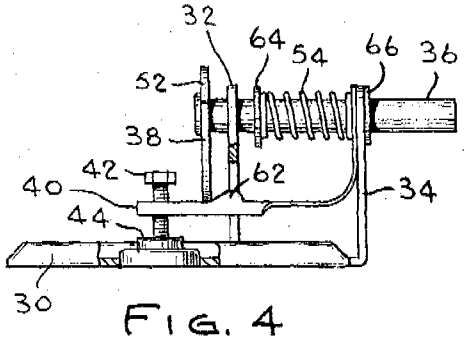

FIG. 4

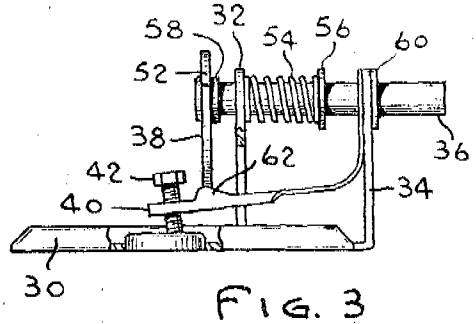

FIG. 3

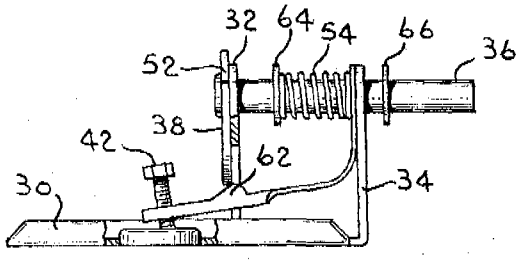

FIG. 5

INVENTOR
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BY Bayard H. Michael
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however, there is no ramp on lever 40 but in lieu thereof a reset link 68 is axially fixed (but not rotationally) on the shaft 36 so as to both serve as a seat for spring 54 and to project downwardly to the left so the knee portion 70 rests on top of lever 40 while the curved left end or pivot portion 72 bears against the right side of leg 32. When the shaft 36 is pushed to the limit determined by engagement of shoulder 74 with leg 34 the link obviously cannot move bodily with the shaft since the upper end of the link is axially fixed with respect to the shaft 36. Therefore, the curved end portion will be forced to slide down the right side of leg 32 which, in turn, will force the knee 70 of the link downwardly against lever 40 to force the lever downwardly to the reset position.

In the form of the invention shown in FIG. 8 the action of FIG. 6 is reversed, that is, here we have a pull-to-reset arrangement where link 68 is reversed so that as the shaft 36 is pulled to the right the curved portion or pivot portion 72 will again have to slide down the bracket leg 34 to force the knee 70 against the lever 40 and force the lever 40 down to the reset position.

From the foregoing it will be appreciated that the present variations all provide means for resetting the pressure switch while affording an infinite selection of levels or pressures between the minimum and maximum available in the pressure switch construction. Throughout this description reference has been made to a pressure switch and the specific form shown is a pressure responsive electric switch but it should be appreciated that this design is fully applicable to any control device accomplishing a switching function, whether it be switching electricity or fluids or the like. Therefore, this terminology is not to be construed as limiting the invention to an electric switch.

Although various embodiments of the present invention have been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. The combination with a control device of the type having a control mechanism movable from one controlling condition to another controlling condition in response to movement of a diaphragm under influence of pressure acting on one side of the diaphragm in opposition to a preselected opposing biasing force, of means for preselecting the biasing force including, cam means rotatable about an axis continuously adjusting the biasing force when rotated, means mounting the cam for rotary and axial movement, and means responsive to axial movement of the cam means to actuate the control mechanism to said one condition.

2. A control including a housing, a diaphragm in the housing with one side exposed to pressure variations, a control device on the other side of the diaphragm and movable by the diaphragm from one control position to another, spring means acting on the diaphragm in opposition to the pressure to determine the pressure necessary to move the control device to said other position, shaft means carried on the housing for rotary and axial motion, cam means carried on the shaft means and motion transmission means between the shaft and the spring means to continuously adjust the force of the spring means as the cam is rotated, and means responsive to axial motion of the shaft means to reset the control device to said one position.

3. A control according to claim 2 in which the shaft means is biased to one position and is movable against its bias to effect resetting of the control device.

4. A control device according to claim 3 in which the cam means acts on the spring means through lever means and the lever means is actuated in the reset direction when the shaft means is actuated axially.

5. A control according to claim 4 in which the motion imparted to the lever means during resetting is greater than the cam means imparts to the lever means as the cam is rotated whereby the lever means is moved beyond the normal maximum spring loading position during resetting, and including means operative during resetting to positively and mechanically move the control device to said one position.

6. A control according to claim 5 in which the lever means includes a cam surface and the cam means is forced against the cam surface during movement of the shaft during resetting whereby the lever means is forced to move.

7. A control according to claim 5 including a link operatively connected to the shaft means and the lever means and actuated by axial movement of the shaft means to actuate the lever means in the reset direction.

8. A pressure switch comprising, a housing, a diaphragm in the housing having a pressure chamber on one side and a switch chamber on the other side, a spring in the switch chamber opposing the pressure acting on the diaphragm, switch means actuated from a first to a second position in response to a selected pressure, means supporting the spring and movable to an extreme position in which the switch means is reset to said first position, a continuously variable cam engaging motion transmission means between the shaft and the spring support means to adjust the spring load, manually operated means mounted for rotational and axial motion and operative to actuate the cam when manually operated means is rotated, and means operative in response to axial motion of the manual means to actuate the spring support means to said extreme position to reset the switch means.

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BERNARD A. GILHEANY, *Primary Examiner.*

G. MAIER, *Assistant Examiner.*

United States Patent Office 3,291,932 Patented Dec. 13, 1966

3,291,932

PRESSURE RESPONSIVE CONTROL RESET STRUCTURE

Robert T. Main, Arlington Heights, Ill., assignor to Controls Company of America, Melrose Park, Ill., a corporation of Delaware

Filed Dec. 14, 1964, Ser. No. 418,237
8 Claims. (Cl. 200—83)

This invention relates to pressure responsive control devices and particularly to control devices effecting a control function in response to a preselected pressure condition which may, for example, be expressed in terms of the depth of fill of a washing machine. The selecting mechanism for control devices of this type permits selection of a desired fill level in the washing machine and is desirably provided with some means for effecting resetting of the control mechanism when the setting is changed.

The most successful pressure switch in the market place incorporates the so-called positive reset feature of U.S. Patent No. 2,934,618. This patent shows an arrangement whereby one of three levels can be selected by rotation of a selecting cam operated by means of a knob accessible on the exterior of the washing machine. The cam is so shaped that between each of the three level selecting cam portions there is a lobe which will actuate the pressure switch mechanism so as to positively reset the switch. The present invention is concerned with providing a positively resettable pressure switch having provision for selection of any water level between the high and low limits. This, of course requires a continuous cam for actuating the spring loading mechanism on the pressure switch and this, in turn, precludes the use of lobes on the cam for effecting the positive reset when changing from one level to another.

The principal object of this invention is to provide means for resetting a pressure switch having provision for an infinite or continuously variable selection of water level.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the various embodiments shown in the drawings, in which:

FIG. 1 is a side elevation of one form of the pressure switch in which the actuating shaft is pushed to reset the switch;

FIG. 2 is a vertical section taken on line 2—2 of FIG. 1;

FIG. 3 is a partial view comparable to FIG. 1 showing the reset position of the actuator.

FIG. 4 is a modified form in which the shaft is pulled to reset;

FIG. 5 is a view comparable to FIG. 4 but shows the reset position of this version;

FIG. 6 is a modified form of the push-to-reset design;

FIG. 7 is the resetting position of FIG. 6;

FIG. 8 is a modified pull-to-reset construction; and

FIG. 9 is the resetting position of FIG. 8.

The switch mechanism shown in housing 10 is basically the same as that shown in U.S. Patent 2,934,618. In this form pressure variations are fed into inlet or nipple 12 to act on the underside of diaphragm 14 which is flexed upwardly as the pressure increases. Contact 16 will initially be on the upper stationary contact 18 and as the diaphragm post 20 moves upwardly it takes the center tongue 22 of the switch blade upwardly to move the toggle spring 24 overcenter and snap contact 16 to the lower stationary contact 26. As the pressure is relived under the diaphragm the spring 28 will force the diaphragm to move downwardly until the switch snaps overcenter again and the moving contact 16 again rests on the upper contact 18. The force necessary to snap the switch overcenter is determined by

the compressive force of the loading spring 28. Obviously, any such switching arrangement as this must have a switching differential. In other words, it will take one pressure to snap the spring over to the position shown in FIG. 2 and the pressure must then fall off a predetermined amount to snap it back to the initial position. If the selected pressure (level) is to be changed after the switch has snapped overcenter to indicate a full level for the initial selection, the new selection may not be enough to trip the switch back so as to achieve the desired additional fill in the tub, for example. Therefore, it is desirable to provide means for resetting the switch.

Bracket 30 on the top of the housing 10 includes two spaced upright supports or legs 32, 34 which journal shaft 36. This shaft is adapted to carry a knob, not shown, which is to be actuated by the user. The left-hand end of the shaft is provided with a setting cam 38 which acts on the lever 40. This lever is mounted on bracket leg 34 and is fabricated of spring material tending to move the lever upwardly so as to hold the lever against the cam 38. The outer end of the lever is provided with a set screw 42 which is used to calibrate the control. As the shaft 36 is turned the cam 38 is turned and its configuration determines the position of lever 40 and, hence, of screw 42 with respect to the upper end of the plunger or spring support means 44 projecting through the top of housing. The underside of the plunger is provided with a well serving as a seat for loading spring 28 and is also provided with a central nose portion 46 which, when the plunger 44 is moved downwardly far enough, will act against the upper end or nose 48 of the diaphragm pin 20 to force the diaphragm pin downwardly and snap the switch blade overcenter to its initial position.

It will be noted the cam 38 is provided with abrupt lobes 50, 52 at the extremities of the permissible motion. The cam is so shaped as to give a full range of settings to spring 28 so that an ylevel in the washing machine may be selected between the low and high limits. Obviously, with this sort of arrangement there can be no provision for reset lobes on the cam as was done in the above mentioned Patent 2,934,618. With this in mind the shaft 36 has been mounted for axial movement as well as rotary movement. Thus it will be noted that the spring 54, compressed between leg 32 and shoulder 56 fixed on the shaft, will act to bias the shaft towards the right, as seen in FIG. 1. The limit of movement to the right is determined by engagement of spacer 58 with the left side of leg 32. The shaft 36 can move to the left, as seen in FIG. 1, to the limit determined by engagement of shoulder 60, fixed on the right-hand portion of the shaft, with leg 34, as may be seen in FIG. 3. In this position the active surface of the cam rides up the ramp or cam portion 62 on the top of lever 40 to force the lever down to an extreme position in which the switch will be reset. The cam cannot ride over the top of the ramp 62 and whenever the manual pressure to shaft 36 is relieved, the shaft spring 54 will force the shaft back to its normal position in which the cam determines the load on spring 28 and, hence, the setting of the pressure switch.

The form of the invention shown in FIG. 4 incorporates a modification whereby the shaft is now biased to the left by the spring 54 acting against shoulder 64 to normally hold the shoulder 66 against the right side of leg 34. The slope on ramp 62 has now been reversed so that when the shaft 36 is pulled, as shown in FIG. 5, the cam 38 will ride up the ramp to force the lever downwardly. Thus the first form of the invention showed a push-to-reset while this form shows a pull-to-reset structure.

In the form of the invention shown in FIG. 6 the shaft is again biased to the right by means of the spring 54, as indicated with respect to FIGS. 1, 2, and 3. Here,

May 9, 1967 L. D. LAKE ET AL 3,319,023

PRESSURE SWITCH MEANS

Filed June 11, 1965 3 Sheets-Sheet 1

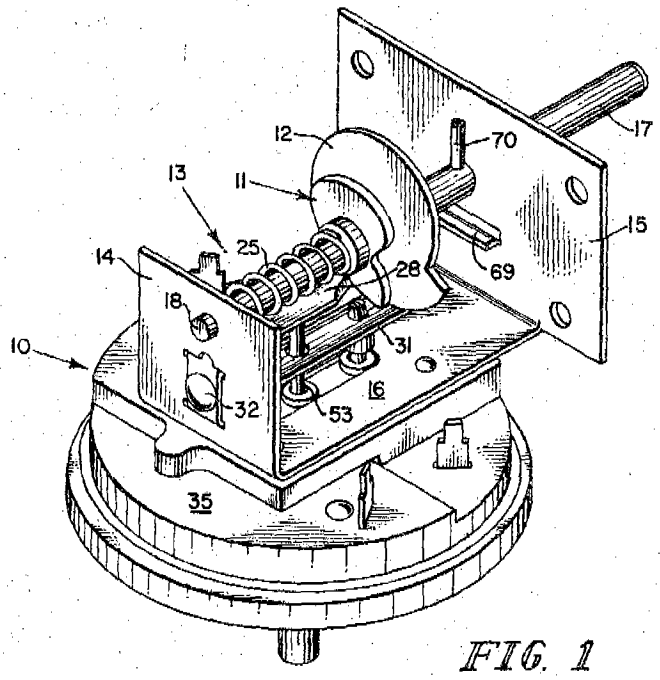

FIG. 1

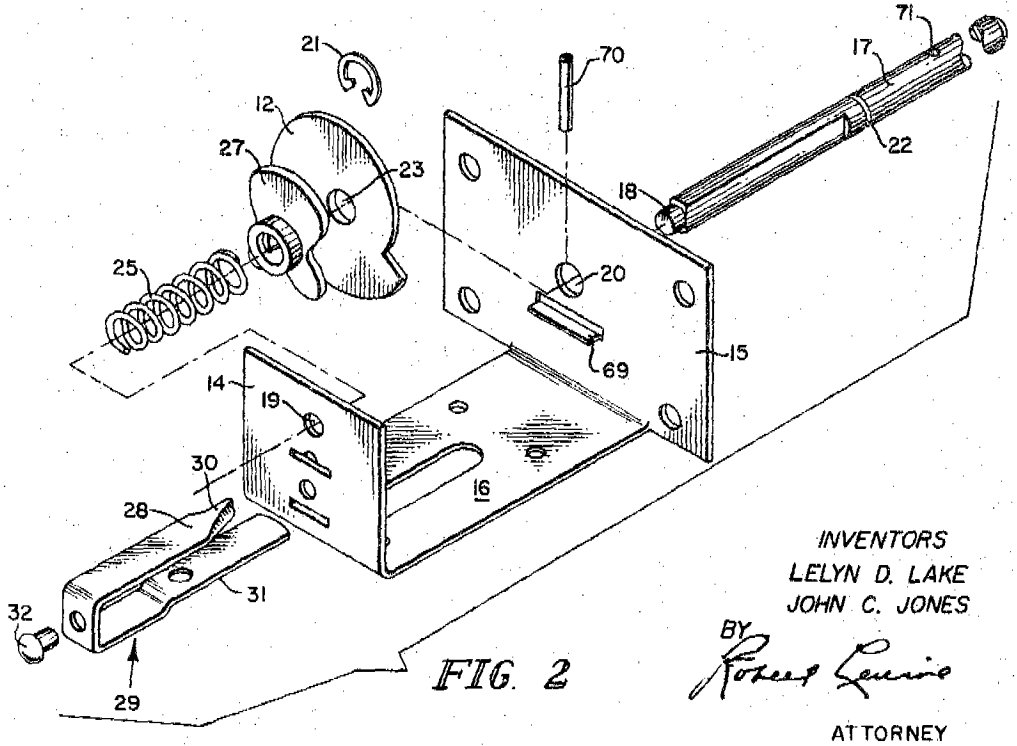

FIG. 2

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May 9, 1967 L. D. LAKE ETAL 3,319,023

PRESSURE SWITCH MEANS

Filed June 11, 1965 3 Sheets-Sheet 2

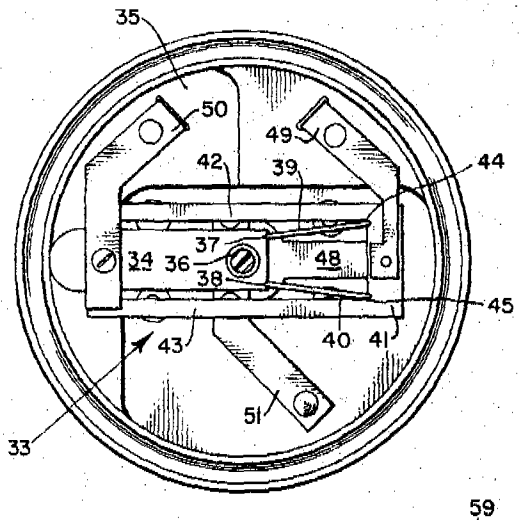

FIG. 3

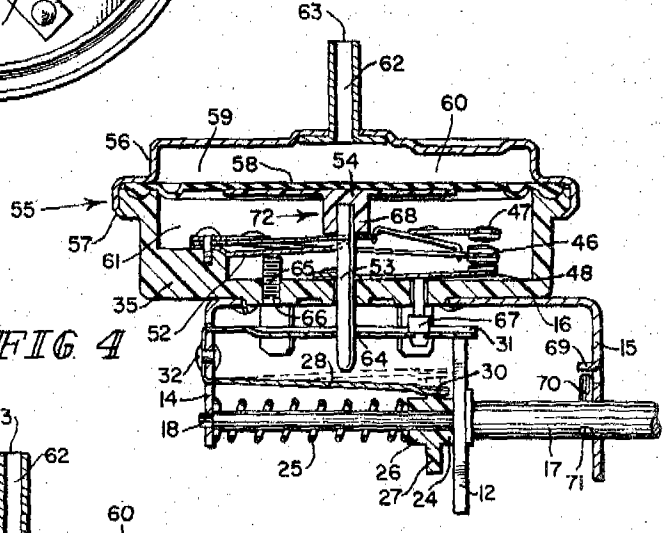

FIG. 4

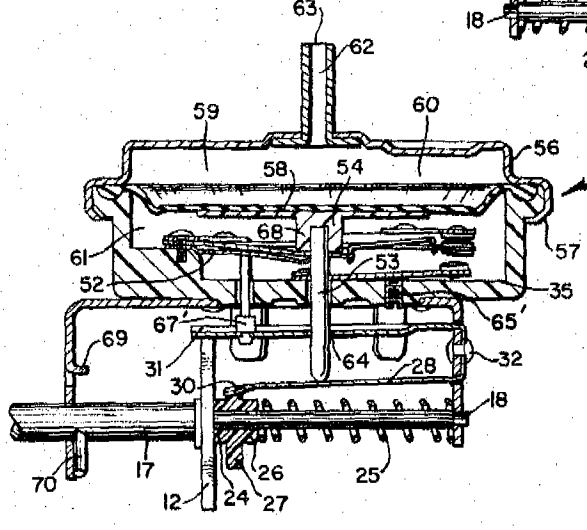

FIG. 5

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JOHN C. JONES
BY Robert Lewis
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United States Patent Office

3,319,023
Patented May 9, 1967

3,319,023

PRESSURE SWITCH MEANS

Lelyn D. Lake, Carmel, and John C. Jones, Indianapolis, Ind., assignors to P. R. Mallory & Co. Inc., Indianapolis, Ind., a corporation of Delaware

Filed June 11, 1965, Ser. No. 463,195
20 Claims. (Cl. 200—81)

The present invention relates to a condition responsive means, more particularly to a fluid pressure responsive means incorporating a novel control means and novel overcenter snap action switch means that is a self contained unit particularly useful in regulating the crest level of a fluid retained within a fluid container.

In pressure switches cooperatively associated with electrical appliances, it is desirable that the pressure switch be capable of being responsive to a plurality of predetermined fluid pressures such that the operator may select a desired fluid fill level from a plurality of possible fluid fill levels. It is also desirable that the fluid pressure responsive means also includes means that compensates for variations in the mechanical components as a result of mass production of the switches. The variations may introduce variations in fluid fill level of several different fluid pressure responsive means. It is necessary that the fluid pressure responsive means be inherently capable of resetting itself if the fluid container is connected with other means which cycles the fluid into and out of the fluid container.

The pressure sensitive means for the present invention is particularly useful when utilized with an electrical agitating means such as a washing machine or the like. However, it is not intended that the utility of the present invention be restricted to use only with devices such as a washing machine. It will be apparent to those possessing ordinary skill in the art that the present invention would have utility when used in conjunction with many other devices wherein it is desirable to actuate an operatively associated device when a predetermined pressure is exceeded. However, since the use of the present invention is adequately illustrated when coupled with a washing machine, and in order to facilitate the structural and functional description of the present invention, the present invention will be described in conjunction with a washing machine.

It is known in the fluid pressure sensing art that a flexible sheet means such as a diaphragm pressure responsive device may be used as a responsive means to actuate cooperatively associated means when a particular pressure is altered. Such devices have been used to actuate cooperatively associated means when a determined fluid crest level has been exceeded in a fluid container. However, when the diaphragm pressure responsive device is cooperatively associated with the known snap switches, the height of the fluid level in a fluid container may be regulated with only a fair degree of accuracy.

A more accurate means of controlling the fluid level in a fluid container is by use of either a control valve or a float arm that are sensitive to the fluid crest level within the fluid container. However, these means are unsatisfactory in accurately controlling fluid level when exposed to the violent agitation of the fluid contained within a device such as an agitating washing machine.

We have found that a control means that is capable of accurately regulating the fluid pressure at which the cooperatively associated diaphragm means is activated from a first position to a second position may be used to accurately control the crest level of fluid contained within the fluid container. In addition, if a calibration means was incorporated into the control means, the activation of the diaphragm means could be more accurately controlled in that the calibration means would compensate for minor

mechanical, non-linear variations of the diaphragm means and the other components of the control means.

In addition the control means of the present invention includes a novel overcenter snap action switch that has a novel return spring and has a plurality of substantially straight line springs in lieu of the conventional U-shaped spring. The use of the novel return spring and the novel plurality of straight line springs permits the control means to achieve a more positive action than possible to achieve with the conventional U-shaped spring commonly associated with snap action switches.

Therefore, it is an object of the present invention to provide an adjustable condition responsive means including a novel control means that permits a flexible sheet means to be responsive to one of a plurality of condition levels.

Another object of the present invention is to provide an adjustable fluid pressure responsive means having a novel control means including a calibrating means that accurately controls the fluid pressure level of a plurality of available fluid pressures to which the diaphragm means is responsive.

Still another object of the present invention is to provide an adjustable fluid pressure responsive means as hereinafter described which is of sturdy construction and so composed as to be a self-contained device that is characterized by its accuracy of operation.

Yet still another object of the present invention is to provide an adjustable fluid pressure responsive means that is efficient, inexpensive, simple, accurate, and effective in operation.

A further object of the present invention is to provide a manually adjustable condition responsive means inherently possessing an infinite number of predetermined condition responsive settings.

Another object of the present invention is to provide a manually adjustable fluid pressure responsive means including a control means responsive to a plurality of fluid pressure levels and having a fixed reset pressure level.

Yet another object of the present invention is to provide a manually adjustable fluid pressure responsive means including a control means responsive to a plurality of fluid pressure levels and having a plurality of fixed differential reset pressure levels.

Yet still another object of the present invention is to provide a control means having an overcenter snap switch that includes a plurality of straight line springs and a return spring.

Still another object of the present invention is to provide a manually adjustable fluid pressure responsive means including a control means that resets itself after a predetermined point in a cycle has been attained.

The present invention in another of its aspects relates to novel features of the instrumentalities of the invention described herein for teaching the principal object of the invention and to the novel principles employed in the instrumentalities whether or not these features and principles may be used in the said object and/or in the said field.

With the aforementioned objects enumerated, other objects will be apparent to those persons possessing ordinary skill in the art. Also other objects will appear in the following description, appended claims, and appended drawings. The invention resides in the novel construction, combination, arrangement, and cooperation of elements as hereinafter described and more particularly as defined in the appended claims.

The appended drawings illustrate several novel and different embodiments of the present invention constructed to function in the most advantageous modes devised for the practical application of the basic principles involved in the hereinafter described invention.

In the drawings:

FIGURE 1 is a perspective view of the manually adjustable condition responsive means illustrating the cam means and the calibration means of the control means of the present invention.

FIGURE 2 is an exploded perspective view of the various components of the control means illustrating the relative position of each component within the control means.

FIGURE 3 is a top view of the overcenter snap switch means illustrating the cooperative relationship between the various components of the overcenter snap switch.

FIGURE 4 is a cross-sectional view of the manually adjustable fluid pressure responsive means illustrating the overcenter snap switch and the cooperatively associated control means having provision for a plurality of fluid pressure levels and a fixed reset fluid pressure level.

FIGURE 5 is a cross-sectional view of an embodiment of the manually adjustable fluid pressure responsive means illustrating the overcenter snap switch and the cooperatively associated control means having provision for a plurality of fluid pressure levels having a constant differential reset fluid pressure level.

FIGURE 6 is an exploded perspective view illustrating the novel overcenter snap switch means of the present invention.

Generally speaking, the means and methods of the present invention relate to a novel manually adjustable condition responsive sensitive means for accurately controlling the condition present in a condition container.

The device is manually adjustable and responsive when a predetermined condition is exceeded. The device comprises a movable means that is responsible to a condition such as fluid pressure. A switch is responsive to the displacement of the movable means after a predetermined condition is exceeded. A means couples the switch to the movable means. An adjustable control means engages the switch so as to prevent actuation of the switch until the predetermined condition is exceeded.

More particularly, the device of the present invention is an adjustable fluid pressure responsive means actuated when a predetermined fluid pressure is exceeded. The device includes a housing and a flexible sheet such as a diaphragm means mounted in the housing so as to define a first compartment and a second compartment. The flexible sheet is substantially smooth on both faces thereof. A first aperture in the housing is to the first compartment so that the compartment communicates with a fluid pressure. A second aperture in the housing goes to the second compartment. A movable means extends through the second aperture and engages a substantially smooth face of the sheet so that the movable means is displaced by the sheet as the sheet responds to the fluid pressure. A switch is responsive to the displacement of the movable arm after a predetermined fluid pressure is exceeded. The switch comprises a displaceable contact carrying blade means, a movable contact means underlaying and normally engaging the contact carrying blade means, a fixed contact means overlaying and normally disengaged with the contact carrying blade means, an actuator arm for displacing the blade means to an engaged position with said fixed contact after the predetermined fluid pressure is exceeded, a straight line spring means coupling the actuator arm to the blade means, the spring means storing energy as the actuator arm is displaced and releasing the stored energy when the actuator arm exceeds the predetermined fluid pressure, means for coupling the movable means to the actuator arm, and a return spring means for snapping back the blade means to engagement with the movable contact when the predetermined fluid pressure no longer exists.

An adjustable control means is mounted in proximity with the switch so as to prevent actuation of the switch until the predetermined fluid pressure is exceeded. The control means includes a cam carrying shaft carrying thereon a detent cam means having rise and fall contours and a calibration means having a floating characteristic on the shaft. A spring means biases the detent cam into frictional engagement with the calibration means so that rotational displacement of the cam means rotationally displaces the calibration means. The calibration means may also be rotationally displaced independent of the cam means and the shaft to thereby position the calibration means independently of the cam means. A U-shaped means including a cam follower arm riding on the contours of the detent cam. The cam follower are and the detent cam cooperate to locate a predetermined position on the calibration means. A member of said U-shaped means rides on the contour of the calibration means and is displaced in accordance with the contour thereof. A pin is connected to the member and displaceable therewith. The pin biases the movable contact of the switch to one of a plurality of positions thereby determining the predetermined fluid pressure to which the switch is responsive. An adjustable means is utilized for determining the fluid pressure at which the switch is reset. The adjustable means includes a means for biasing the return spring to one of a plurality of positions thereby regulating the rest position of the switch.

The embodiment of the manually adjustable fluid pressure responsive means is similar except that the adjustable means is utilized to bias the movable contact of the switch to one of a plurality of positions thereby determining the predetermined fluid pressure to which the switch is responsive. In addition the pin of the control means is utilized to bias the return spring of the switch to one of a plurality of positions thereby determining the fluid pressure at which the switch is reset.

Referring now to the drawings, which illustrate the preferred embodiments of the present invention, the fluid pressure responsive means is generally indicated by the numeral **10**. A cam means **11** and a calibration means **12** of control means **13** are shown to be located between end plate **14** and end plate **15** of mounting bracket **16**. It is seen that the respective end plates of the mounting bracket are in spaced, parallel relationship. The cam means **11** and the calibration cam means **12** are located between the end plates by means of cam shaft means **17** that is journalled in the respective end plates. It is seen that extremity **18** of the cam shaft interfits with aperture **19** of end plate **14** and that the opposite extremity of the cam shaft interfits with and projects through aperture **20** of end plate **15**.

A C-ring **21** interfits with and is substantially locked to circumferential groove **22** of the cam shaft. It is seen that the outer periphery of the C-ring has a substantially greater radial extent than the radial extent of the periphery of the cam shaft. The reason therefore will be enumerated hereinlater.

The cam shaft means includes a double D-shaped configuration that traverses substantially the entire longitudinal length of the shaft means from the vicinity of the circumferential groove **22** to extremity **18** of the shaft means. Aperture **23** in the calibration means **12** interfits with the cam shaft in such a manner so that a face of the calibration means abuts the C-shaped ring. The aperture of the calibration means is sufficiently large so that the calibration means may be rotationally displaced independent of the cam shaft if so desired, yet the aperture **23** is sufficiently small so as to substantially eliminate deleterious wobbling of the calibration means as the calibration means is rotationally displaced independent of the cam shaft and of cam means **11**. The characteristic of the calibration means to be able to rotate independent of the shaft and the cam means permits the calibration means to compensate for variations in mechanical components generally resulting when switches are mass produced.

Spring biased against the calibration means **12** is a first shoulder **24** of the cam means **11**. The cam means has

a double D-shaped aperture (not shown) which is in a slide fit with the double D-shaped section of the cam shaft. It is seen that the shoulder of the cam means predeterminately spaces detent cam 27 of the cam means from the calibration means. A spiral spring 25 is carried by the cam shaft and is positioned between the end plate 14 and second shoulder 26 under compression so that the cam means has its first shoulder 24 spring biased against the face of the calibration means. It is seen that the calibration means is carried by the cam shaft means between the first shoulder of the cam means and the C-shaped ring. The first shoulder includes a friction surface fabricated so that rotational displacement of the cam means by rotational displacement of the cam shaft causes a like rotational displacement of the calibration means.

The contour of the calibration means 12 is that of a gradual but constantly rising rise contour that traverses substantially 360 degrees of the periphery of the calibration means. The fall contour is distinct and is shown to be an abrupt fall contour, however, the fall contour may be sloping if so desired. The purpose of the gradual but constantly rising rise contour of the calibration means will be disclosed hereinlater.

The cam means 11 includes the detent cam 27 as described hereinbefore. The cam 27 has a periphery of alternate rise and fall contours. The detent cam 27 is illustrated as having three rise contours and three fall contours. These contours are utilized to determine three separate and distinct pressures to which the manually adjustable pressure responsive means will respond depending on which of the three positions the contours of the cam is cooperatively associated with cam follower arm 28 of U-shaped means 29. It is seen that the rise and fall contours are separated by approximately 90 degrees so that the aforementioned three fluid level positions may be obtained within a maximum 180 degree rotation of the cam shaft means. If additional fluid level positions are desired, additional contours may be formed on the periphery of the cam corresponding to the desired pressure levels at which the manually adjustable pressure responsive means is to actuate cooperatively associated electrical circuit. The three positions of the cam illustrated in the drawings are merely illustrative and not limiting in scope.

As shown in FIGURE 2, the U-shaped means 29 includes a follower arm 28 having a V-shaped extremity 30 that rides on the contours of detent cam 27. The valley of the contours of the detent cam 27 are such that the cam follower arm is biased thereagainst. The use of the rise contours of the detent cam 27 displaces the follower arm toward member 31 of the U-shaped means thereby storing energy in the follower arm. As the follower arm falls along the fall contours of the cam, the energy stored by the follower arm is thereby released. It will be noted that the U-shaped means 29 is fixedly connected to end plate 14 by any suitable means such as by rivet 32 or the like.

End plate 15 of the mounting bracket includes a projection 69 that underlies the cam shaft and that is substantially perpendicular to the end plate 15. A pin 70 is in an interfitting relationship with recess 71 of the cam shaft. It will be noted that as the cam shaft is rotationally displaced in the clockwise direction that at a predetermined point during the clockwise rotation of the cam shaft, the pin 70 will engage the projection 69 thereby prevent further clockwise rotational displacement of the cam shaft. If the cam shaft is thereafter displaced in the counterclockwise direction, after the cam shaft has been predeterminately displaced, the pin again engages the projection 69 thereafter preventing further displacement of the cam shaft in the counterclockwise direction.

Referring now to FIGURE 3 which illustrates a novel overcenter snap switch 33 including an actuator arm 34 having one extremity thereof fixedly coupled to cup-

shaped body section 35. The opposite extremity of the actuator arm includes an aperture 36 centrally located therein. The purpose of the centrally located aperture will appear hereinlater. A notch 37 and a notch 38 are formed in the latter mentioned extremity of the actuator arm and serve respectively as a seat for an extremity of straight line spring means 39 and as a seat for an extremity of straight line spring means 40.

A contact carrying blade means 41 has leg 42 and leg 43 fixedly coupled to the cup-shaped body section 35. It is seen that a C-shaped aperture is formed in the contact carrying blade. The C-shaped aperture forms the actuator arm and is the aperture through which the actuator arm moves. FIGURE 6 illustrates that the contact carrying blade means and the actuator arm are fabricated from a unitary piece of electrically conductive metal.

It is seen that the straight line springs are utilized to cooperatively couple the actuator arm 34 to the contact carrying blade. As disclosed hereinbefore straight line spring 39 has one extremity thereof coupled to notch 37 of the actuator arm, it is seen that the opposite extremity of the straight line spring is coupled to corner 44 of the contact carrying blade. Straight line spring 40 has one extremity thereof coupled to notch 38 of the actuator arm and the opposite extremity of the spring is coupled to corner 45 of the contact carrying blade 41. The respective straight line springs are under compression when positioned between the actuator arm and the contact carrying blade as indicated in FIGURE 3.

A contact 46 is carried by the contact carrying blade. Overlaying the contact 46 is a second or fixed contact 47 and underlaying the contact 46 is first or movable contact 48. The fixed contact 47 is integral with terminal means 49 which projects outside of the cup-shaped body section 35. A second terminal means 50 projects outside of the cup-shaped body section and is used to electrically couple the actuator arm to an external means such as an electrical conduit means. The movable contact 48 is electrically connected to a third terminal means 51 as shown in FIGURE 3.

Underlaying the actuator arm 34 is return spring 52. The return spring is utilized to bias actuator arm 34 to the position illustrated in FIGURE 4 or the upward direction. With the actuator arm biased in the upward direction, it is seen that the contact carrying blade is biased to such a position that contact 46 carried by said blade engages movable contact 48. An electrical circuit may be traced from the second terminal means 50 through contact 46 and contact 48 to the third terminal means 51.

FIGURE 5 illustrates that a movable means 72 including a center plastic rod 53 and a substantially flat molded plastic backing means 54 has been displaced downward thereby displacing the actuator arm of the overcenter snap switch downwardly causing the contact 46 of the contact carrying blade means to disengage movable contact 48 with a snap action motion and engage fixed contact 47.

A housing or casing 55 incorporates an upper cup-like body section 56, open at its lower extremity, and an interfitting lower cup-like body section 35, open at its upper extremity, thus effectively closing the open lower extremity of the upper cup-like body section.

The upper body section includes an edge 57 circumjacent its outer periphery which is crimped or rolled over an annular of the lower body section so as to clinch both the upper body section and the lower body section securely in position with respect each to the other. The housing may be manufactured from any suitable material, but it is preferred that the upper body section 63 be fabricated from a sheet metal stamping and that the lower body section be fabricated from a suitable molded plastic.

A flexible sheet means such as a resilient diaphragm

58 is positioned within chamber 59 formed by the joining of the body sections so as to extend laterally thartwise the interior cross section of the housing. The resilient diaphragm has substantially smooth faces. It is seen that the chamber 59 is effectively partitioned into two separate and distinct compartments, that is, a first compartment or pressure compartment 60 and a second compartment or switch compartment 61.

A pressure orifice 62 is fixedly interfitted with the upper cup-like body section 56. The pressure orifice may be either pressure fitted, welded, or soldered in position of the lower body section. The pressure orifice has an aperture 63 extending its entire cross sectional length. A suitable tubing (not shown) is coupled to the orifice thereby permitting a fluid pressure present, if any, in the tubing to be transmitted through the tubing to the pressure compartment of the housing.

The molded plastic backing means 54 is substantially disc-shaped and underlies the central portion of the resilient diaphragm. The movable means includes the backing means 54 which is biased against the diaphragm by the cam follower arm 28 through the center plastic rod 53 which is integral with the backing means when it is desired to reset the overcenter snap switch. This will be more completely disclosed hereinlater. The purpose of the disc-shaped backing means is to maintain the center portion of the diaphragm substantially flat and to serve as a means and method of transmitting fluid pressure from the pressure compartment to the overcenter snap switch 33. It will be noted that no nodes are required on the diaphragm which interfit with apertures, if any, on the plastic backing means, if the means and methods of the present invention are utilized.

The overcenter snap switch means is mounted in the switch compartment of the housing in the manner described hereinbefore. The center plastic rod projects through aperture 36 of the actuator arm 34, through a centrally located aperture 63 of the lower cup-like body section, through an aperture 64 to come to ride on the cam follower arm 28. It will be noted that the rod 53 is free to move through the aforementioned apertures without frictionally engaging said apertures. A shoulder 65 of the dsic-like backing means is shown engaged with the actuator arm 34 in FIGURE 4 and in FIGURE 5. It is the shoulder 65 that displaces the actuator arm so as to activate the overcenter snap switch of the present invention.

FIGURE 4 illustrates that the vertical distance between the actuator arm and the contact carrying blade may be varied by means of pin 67 which is connected to member 31 of the U-shaped means 29. Vertical displacement of the pin 67 vertically displaces the movable contact either further from the fixed contact 47 or closer to the fixed contact. It will be noted that in the initial position, the contact of the contact carrying blade is engaged with the movable contact. Vertical displacement of the movable contact will cause a like vertical displacement of the contact of the contact carrying blade. The vertical distance between the contact carrying blade and the actuator arm 34 substantially taken at notches 37 and 38 of the contact carrying blade varies thereby varying the vertical distance the actuator arm must traverse prior to actuation of the overcenter snap switch. The aforementioned variance in distance is directly proportional to a variance in fluid pressure required to be exerted on the actuator arm from the pressure compartment before the snap switch will be actuated from its initial position. It will be noted that the greater the vertical distance between the contact carrying blade and the actuator arm, the greater is the fluid pressure required to actuate the snap switch. The converse is also true, that is, the less the vertical distance between the actuator arm and the contact carrying blade the less fluid pressure required to actuate the snap switch. The ability of an operator to use the variable settings of the pin 67 affords a manually adjustable fluid pressure responsive means that may be made responsive to any one of a plurality of pressures contained within the pressure compartment.

The pressure level at which the snap switch will reset itself may be regulated by means of set screw means 65 being turned into or out of threaded aperture 66. FIGURE 4 clearly shows that the tip of the set screw means rides against the return spring 52 and the return spring rides against the actuator arm. The position of the set screw means within the threaded aperture determines the position of the return spring and hence the vertical distance separating the actuator arm and the contact carrying blade after the contact carrying arm has been displaced from its initial position. It is seen that the reset fluid pressure required to reset the overcenter snap switch will be the same regardless of the fluid pressure required to actuate the switch in the first instance.

The embodiment of FIGURE 5 illustrates substantially the same structure as FIGURE 4 except that the pin 67 is now pin 67′ and engages the return spring 52 of the overcenter snap switch and set screw means 65 is now set screw means 65′ and engages the movable contact 48. The set screw engaging the movable contact 48 is used for the setting of the differential pressure required between actuation and reset of the snap switch. The pin 67′ is used to set the fluid pressure at which the overcenter switch will activate.

Having thus described the structure of the present invention, the cooperation between the described structural elements will be disclosed.

The cam shaft of FIGURE 4 is rotated until the desired fluid pressure level is indicated on a coded indicia means (not shown) attached to the cam shaft. The follower arm 28 of the U-shaped means interfits with the appropriate valley portion of the cam means 11. The frictional engagement of the cam means with the calibration means 12 arcuately displaces the calibration means 12 through substantially the same arcuate displacement as the cam means was displaced by the shaft. The contours of the calibration means are substantially constantly rising. The calibration means will displace the member 31 of the U-shaped means in the vertical direction thereby displacing the movable contact of the overcenter snap switch in the vertical direction. As disclosed hereinbefore, the movable contact 48 will displace the contact of the contact carrying blade 41 thereby regulating the vertical distance between the notches of the actuator arm and the contact carrying blade 46 thereby varying the distance required to displace the actuator arm before the contact carrying blade disengages movable contact 48 and engages fixed contact 47. The snap action is about to occur when the actuator arm is displaced to a horizontal line that substantially coincides with the horizontal line of the contact carrying blade drawn so as to pass through the notches of the actuator arm and the contact carrying blade. The initial displacement of the actuator arm by the vertical displacement of shoulder 68 due to the increase in pressure in the pressure chamber causes the gradual displacement of the actuator arm and the compression of the straight line springs between the actuator arm and the contact carrying blade. The overcenter snap switch does not actuate with a snap action motion until the actuator arm drops immediately beneath the horizontal line disclosed hereinabove. The forces of the switch are now such that the forces stored in the straight line springs are now released displacing the contact carrying blade upwardly with a snap motion so that the contact carrying blade disengages contact 48 and engages contact 47.

The return spring 52 governs at what fluid pressure the contact carrying blade will disengage contact 47 and engage contact 48. The magnitude of bias exerted against the return spring by the set screw is determined by the position of the set screw means 65 within the threaded aperture. The fluid pressure at which the diaphragm and the cooperatively associated shoulder 68 return to their

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado:
JUAN PABLO CADENA SARMIENTO

ASUNTO	Radicación	07-91975
	Trámite	002
	Evento	003
	Actuación	430
	Oficio	10318
	Folios	009

Patente de Invención ■ Patente de Modelo de Utilidad ☐

Vía Nacional ■

Vía PCT (fase nacional) ☐ Cap.I ☐ Cap. II ☐

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

Descripción: Folios: 6 a 23 como se radicó inicialmente

Reivindicaciones: Folios: 24 a 30 como se radicó inicialmente

Dibujos: Folios: 71 a 75 como se radicó inicialmente

Prioridad: Folios: 32 a 66
(2006-09-13, BR, PI 0604052-7)

2. Objeto de la invención

La presente solicitud se titula "DISPOSITIVO DE CONTROL QUE RESPONDE A LA PRESIÓN" Folio Nº 1.

El objeto de la presente solicitud se relaciona con un dispositivo de control que responde a la presión, que tiene una llave de accionamiento mecánico con medios eléctricos que puede ser ajustada para operar a una presión seleccionada y que es capaz de ser re-ajustada para operar en diferentes presiones seleccionadas.

De otra parte, el pliego reclama: un dispositivo de control que responde a la presión, relacionado en las reivindicaciones 1 a 16.

El objeto de la solicitud definido anteriormente se clasificó en la IPC F15B 15/00.

3. De la solicitud de Patente

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3.1. Reivindicaciones (artículo 30 D 486)

El pliego reivindicatorio calificado presenta una gran cantidad de reivindicaciones repetidas, lo cual afecta negativamente la concisión del pliego. Así por ejemplo las reivindicaciones 5 y 6 se refieren a la misma materia, la reivindicación 7 es exactamente igual a la reivindicación 4, Las reivindicaciones 8 y 9 son iguales, lo mismo que las reivindicaciones 10 y 11.

Por último, se conoce que una solicitud solo puede contener una reivindicación independiente por categoría (producto o procedimiento), cada una seguida por varias reivindicaciones dependientes. Se pueden presentar varias reivindicaciones de la misma categoría, cuando el objeto de la invención no puede se cubierto fácilmente por una sola reivindicación independiente y deben caer dentro de una de las categorías siguientes:

- Dos objetos concebidos uno en función del otro, tal como el caso de un emisor y un receptor.

- Un compuesto activo y una preparación que lo contiene.

- Dos procedimientos que, por caminos análogos permitan llegar a un mismo producto final.

Las reivindicaciones 1 y 12 no se encuentran cubiertas por ninguna de las categorías anteriores, de manera que el pliego no es conciso.

En conclusión, el pliego reivindicatorio calificado no cumple los requisitos exigidos en el Art. 30 de la Decisión 486.

4. Determinación del Estado de la Técnica

Considerando que la solicitud reclama prioridad del 21 de julio de 2006, se buscaron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta. Se realizo búsqueda de documentos relevantes dentro del estado de la técnica, entendiendo como estado de la técnica la definición provista en el Art. 16 D 486, y las excepciones fijadas en el Art. 17 de la misma.

No obstante la solicitud presenta problemas de claridad, se realizo una búsqueda de anterioridades parcial que se completará una vez se realicen los ajustes a la solicitud.

Se encontró como anterioridades los documentos relacionados a continuación que afectan la patentabilidad del objeto de la presente solicitud

N°	Documento*	Título	Fecha de publicación
D1	US3291932	PRESSURE RESPONSIVE CONTROL RESET STRUCTURE	1966-12-13
D2	US3319023	PRESSURE SWITCH MEANS	1967-05-09

*El documento se anexa con el requerimiento.

5. Análisis de patentabilidad (artículo 14 D486)

En cumplimiento del Art. 14 D486 se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicabilidad industrial, con el fin de establecer la patentabilidad de

la invención reivindicada de la solicitud en estudio.

5.1. Nivel Inventivo (artículo 18 D486)

El problema técnico planteado en la solicitud se refiere a las desventajas que presenta los controles de presión del estado del arte entre estas que la llave debe ser reajustada antes que el nivel de presión para el accionamiento de la llave sea cambiado y además que el eje de control podría ser girado para seleccionar un nivel de presión diferente, sin realizar primero un reajuste de la llave.

Para dar solución al problema anterior la solicitud presenta un dispositivo de control que responde a la presión que comprende los siguientes elementos:

- Una carcasa
- Una llave eléctrica del tipo de acción de resorte mecánico
- Un elemento accionador montado en la carcasa
- Un diafragma montado en la carcasa que tiene un elemento expansible
- Un cabezal móvil que confronta el otro lado del elemento accionador
- Un seguidor de leva que se extiende transversal a la dirección de desplazamiento
- Un resorte de carga que ejerce fuerza opuesta a la fuerza ejercida por el diafragma
- Un eje de control que se desplaza de forma rotativa y axial
- Una leva que se asienta sobre el seguidor de leva del cabezal
- Dientes que engranan mutuamente para evitar que el control sea girado sin ser previamente dislocado.

La anterioridad D1 se refiere a un dispositivo de control de presión que efectúa una función de control en respuesta a una condición de presión preseleccionada. Esta anterioridad comprende las siguientes características comunes con el dispositivo de control de la solicitud:

- Una carcasa **10** (Fig. 1)
- Una llave eléctrica del tipo de acción de resorte mecánico **22** (Fig. 2)
- Un elemento accionador **16** montado en la carcasa **10** (Fig. 2)
- Un diafragma montado **14** en la carcasa
- Un cabezal móvil **42** que confronta el otro lado del elemento accionador **16**
- Un seguidor de leva **40** que se extiende transversal a la dirección de desplazamiento
- Un resorte de carga **28** que ejerce fuerza opuesta a la fuerza ejercida por el diafragma
- Un eje de control **36**
- Una leva **50** que se asienta sobre el seguidor de leva **40** del cabezal

Como se puede observar, la anterioridad D1 comprende las mismas características reclamadas en la solicitud, a excepción de un eje de control que se desplaza de forma rotativa y axial que permita cambiar el nivel de presión, y los dientes que se engranan mutuamente que evitan que el control sea girado sin ser previamente dislocado.

La anterioridad D2 se refiere a unos medios de control y a un interruptor de acción de resorte mecánico que están contenidos en una misma unidad para regular el nivel de fluido retenido dentro de un contenedor. El dispositivo presenta un mecanismo de levas **11** compuesto por una leva **27** asociada con un brazo seguidor **28** para regular manualmente el nivel de presión (col. 5 líneas 25 a 45) y un pin **70** para evitar el desplazamiento rotacional del eje de levas **17** (col. 5 líneas 65 a 72)

Como se puede ver, el problema técnico planteado se puede resolver tomando la llave presentada en la anterioridad D1, con los mecanismos de levas **11** para cambiar el nivel de presión, y el pin **70** para evitar el giro del eje de levas sin realizar el reajuste de la llave, que sugiere el documento D2.

Como se puede ver, la materia reclamada se puede derivar de los documentos del estado del arte, motivo por el cual se considera que las reivindicaciones presentadas no cumplen con el requisito de nivel inventivo de acuerdo a lo establecido en el artículo 18 de la Decisión 486.

6. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

N°	Documento N°	Reivindicaciones afectadas	Requisito que afecta
D1	US3291932	1 a 16	Nivel Inventivo
D2	US3319023	1 a 16	Nivel Inventivo

Se recomienda, que tenga en cuenta que el replanteamiento de esos apartes NO podrá implicar una ampliación de la protección que correspondería a la divulgación contenida en la solicitud inicial, de acuerdo a lo que establece el artículo 34 de la Decisión 486.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.

ALIX CARMENZA CÉSPEDES DE VERGEL
Directora Nuevas Creaciones (C)

El anterior requerimiento fue notificado por fijación en lista, de fecha 12 AGO. 2016

CONCEPTO TÉCNICO No. 2382	**EXAMINADOR TÉCNICO** Código No. 202082