

Jan. 9, 1968

F. O. MOODY
DIFFERENTIAL PRESSURE OR TEMPERATURE
OPERATED REFRIGERATOR SWITCH
Filed Oct. 1, 1965

3,363,072

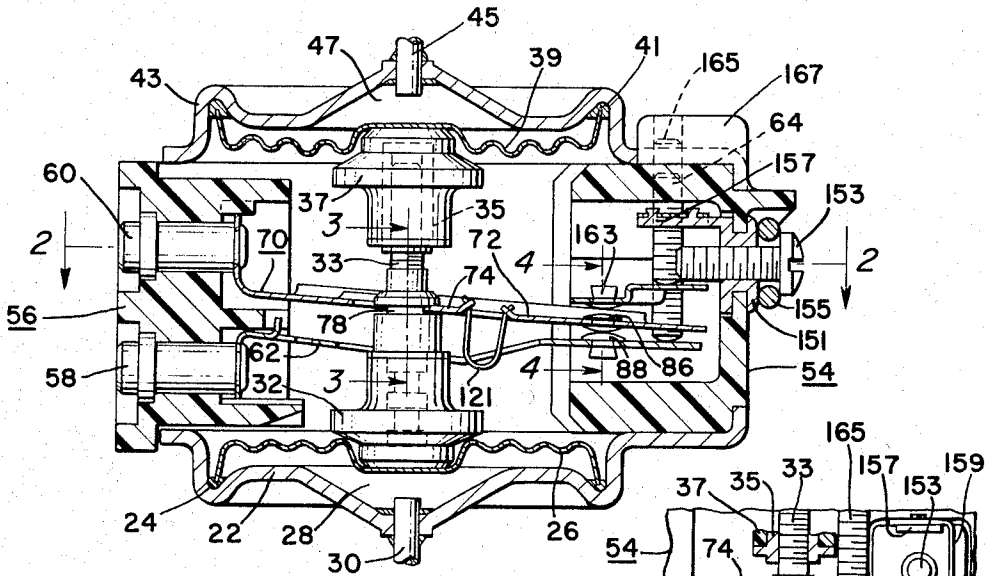


Fig. 1

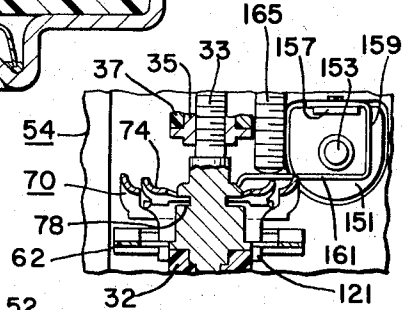


Fig. 3

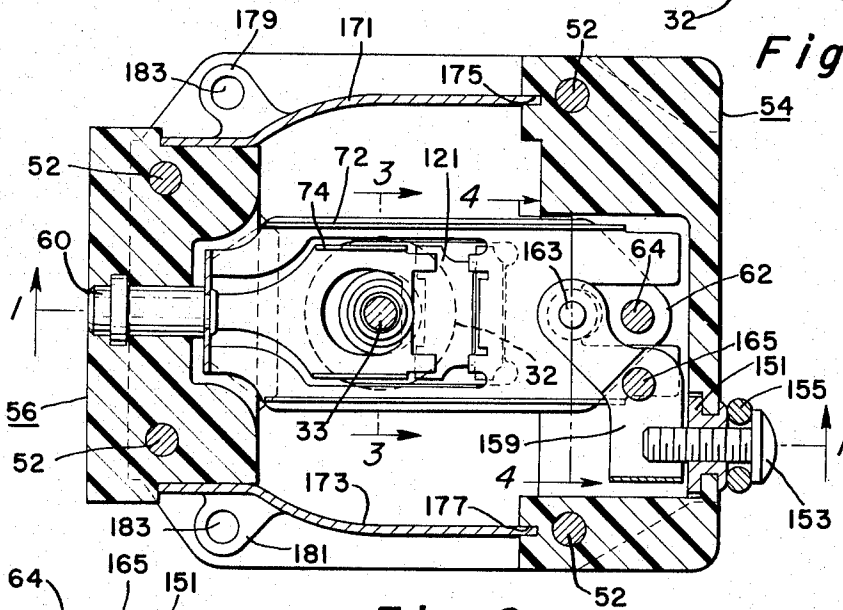


Fig. 2

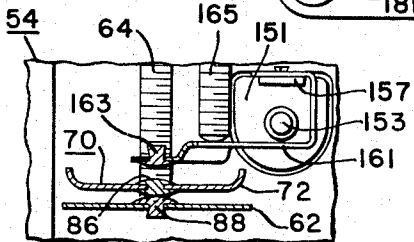


Fig. 4

INVENTOR.
Floyd O. Moody
BY
Carl A. Stichel
His Attorney

1

3,363,072

DIFFERENTIAL PRESSURE OR TEMPERATURE OPERATED REFRIGERATOR SWITCH

Floyd O. Moody, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Oct. 1, 1965, Ser. No. 491,984

2 Claims. (Cl. 200—81.5)

ABSTRACT OF THE DISCLOSURE

In the preferred form, a snap acting toggle switch mechanism is supported at one end by a first insulating terminal block and extends between two diaphragms provided in upper and lower housing members located on opposite sides of this terminal block. The snap acting toggle mechanism straddles the adjustable follower extending between the diaphragm and is operatively connected thereto. A second insulating terminal block between the housing members at the opposite end provides an additional adjustable second spring contact for the toggle switch mechanism while the other spring mounted contact is supported by the first terminal block.

This invention pertains to electrical apparatus and more particularly to a double-throw switch responsive to the difference between two pressures or temperatures.

In certain types of defrosting controls for refrigerators the determination when there is a sufficient frost coating on the evaporator is measured by a predetermined difference in the temperatures of a part of the refrigerating system and the air being cooled. To provide a simple electrical system it is desirable that the switch mechanism be of the double-throw type.

It is an object of this invention to provide a differential pressure or temperature double throw switch which will use as many parts as possible of a temperature or pressure operated refrigerator switch used for many household refrigerators.

It is another object of this invention to provide a differential pressure or temperature switch which is simple, accurate, reliable and has all the necessary adjustments to accurately set the switch to achieve the desired operation.

These and other objects are attained in the form shown in the drawings in which upper and lower housing members are provided with inwardly facing diaphragms providing opposing pressure chambers. A follower having its ends connected by an adjustable threaded connection, extends between the two diaphragms to provide a response to the difference in pressures. A snap acting toggle switch mechanism is supported by an insulating terminal block at one end between the diaphragms. The snap acting toggle mechanism straddles the follower and is operatively connected thereto for its operation. An insulating terminal block at the opposite end that provides an additional adjustable contact to provide the double throw arrangement for the toggle switch mechanism. This second terminal block also includes the two remaining switch adjustments. The diaphragm chambers may be separately connected to separate pressures or to separate thermosensitive tubes charged with the same or different volatile liquids.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is an irregular vertical sectional view taken along the lines 1—1 of FIGURE 2 of a differential

2

double-throw switch embodying one form of my invention;

FIGURE 2 is an irregular horizontal sectional view taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary vertical sectional view taken along the lines 3—3 of FIGURES 1 and 2; and

FIGURE 4 is a fragmentary vertical sectional view taken along the lines 4—4 of FIGURES 1 and 2.

Referring now to the drawings and more particularly to FIGURE 1, there is shown a switch having a bottom housing member 22 of brass having an annular groove filled with solder 24 in which there is embedded the flanged rim of a lower diaphragm 26. This housing member 22 includes a thermostatic tube connection 30 opening into the diaphragm chamber 28 and may be identical to the corresponding housing and diaphragm member shown in Patent 2,906,132 issued Sept. 29, 1959. The thermostatic tube connection 30 may have a vapor charge of 125 lbs./sq. in. The diaphragm 26 has a central depression supporting the lower end of a follower 32 having an upper threaded extension 33 threading into a metal sleeve 35 in the upper follower member 37 of the electrical insulating material.

The upper follower 37 fits into an upward central depression in an upper diaphragm 39 having its flanged rim embedded in the solder 41 in the annular groove provided in the brass upper housing member 43. This upper housing member 43 is provided with a thermostatic tube connection 45 to the diaphragm chamber 47, which for example, may have a vapor charge of 60 lb./sq. in. This upper housing member and diaphragm 43 and 39 are similar to the lower housing member 22 and the diaphragm 26. However, if desired to obtain the different characteristics, the diaphragms 26 and 39 may be of different thicknesses of metal such as beryllium copper and may have different effective areas. For example, the diaphragms 26 and 39 may have thicknesses of .0105" and .0037" respectively and effective areas of $\frac{9}{10}$ sq. in.

Mounted between the left ends of the lower and upper housing members 22 and 43 is a terminal block 56 of electric insulating material having lower and upper terminal members 58 and 60. Fastened to the inner end of the terminal member 58 is a spring contact member 62 having a center aperture receiving the follower 32 and having at its opposite end the contact 88. The upper terminal member 60 has fastened to its inner end a toggle switch blade 70 having an inner tongue 74 provided with a D-shaped aperture having its straight edge portion fitting into notch 78 of the follower 32 whereby it moves upwardly and downwardly with the follower 32. The tongue 74 cooperates with the toggle spring 121 which in turn cooperates with the outer tongue 72 to cause snap action of the movable double-throw contact 86 which is provided thereon. The terminal block 56 as well as the members 62 and 70 connected thereto may be identical to the corresponding parts in Patent 2,906,132.

To make this a double-throw type switch there is provided between the right ends of the lower and upper housing members 22 and 43 a second terminal block 54 carrying the third electrical terminal 151 provided with a binding screw 153 for connection to an electrical conductor 155. The terminal 151 is provided with a flat projection 157 having bonded thereto the upper portion of a leaf spring member 159 bent into the shape of three sides of a rectangle with its lower arm 161 extending over the contact 86 and being provided with a cooperating contact 163. The contact 86 therefore operates with a snap action in between the lower contact 88 and upper contact 163. The location of the upper contact 163 is controlled and adjusted by the adjusting screw 165 extending through the upper portion 167 of the terminal

3

block 54 and into engagement with the lower arm 161 of the leaf spring member 159 as illustrated in FIGURE 3. The lower contact 88 is adjusted by the adjusting screw 64 which threads through the upper portion 167 into engagement with the end portion of the spring contact member 62 as illustrated in FIGURES 1, 2 and 4.

The housing members 22 and 43 and the terminal blocks 56 and 54 are assembled together by four bolts or screws 52 which extend through them as illustrated in FIGURE 2. The sides of the housing are enclosed by the bent plates 171 and 173 which fit into the notches 175 and 177 in the terminal block 54 and which have upper and lower ears 179 and 181, each provided with a dimple 183 which snaps into an adjacent aperture in the upper and lower housing members 43 and 22.

The details of the toggle blades and spring and toggle mechanism are identical to that of the aforesaid patent so that the reliability and accuracy which has been established through the manufacture of millions of switches with such blades and spring, is readily attainable for this type of adjustable differential double throw switch at a very low cost. The switch is readily adjusted by the use of the threaded connection 33, 35 in the follower member 32, 37 and by the adjusting screws 64 and 165. These adjustments together with the selection of diaphragms 26, 39 of suitable metal and thickness makes the switch adaptable to many applications.

While the embodiments of the present invention as here disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A switch including a housing provided with a diaphragm means and having ends, insulating means located at opposite ends of said housing, a toggle switch blade anchored to said insulating means at one end of said housing and extending toward said insulating means at the opposite end of said housing, a follower extending between said diaphragm means and said toggle switch blade for operating said toggle switch blade, a spring contact member on one side of said toggle switch blade anchored to said insulating means at one end of said housing, a leaf spring located on the opposite side of said toggle switch

4

blade and anchored to the insulating means at the opposite end of said housing, separate electrical terminal means extending through said insulating means to said toggle switch blade and said spring contact member and said leaf spring, wherein the improvement comprises a second housing member provided with a second diaphragm means located on the opposite side of said insulating means from said first mentioned housing and diaphragm means, and a connection between said second diaphragm means and said follower.

2. A switch including a housing provided with a diaphragm means and having ends, insulating means located at opposite ends of said housing, a toggle switch blade anchored to said insulating means at one end of said housing and extending toward said insulating means at the opposite end of said housing, a follower extending between said diaphragm means and said toggle switch blade for operating said toggle switch blade, a spring contact member on one side of said toggle switch blade anchored to said insulating means at one end of said housing, a leaf spring located on the opposite side of said toggle switch blade and anchored to the insulating means at the opposite end of said housing, separate electrical terminal means extending through said insulating means to said toggle switch blade and said spring contact member and said leaf spring wherein the improvement comprises a second housing member provided with a second diaphragm means located on the opposite side of said insulating means from said first mentioned housing and diaphragm means, and an adjustable threaded connection between said second diaphragm means and said follower.

References Cited

UNITED STATES PATENTS

2,941,055	6/1960	Sussin	200—81.5
2,537,474	1/1951	Mejean	200—81.5
2,648,732	8/1953	Starbird	200—81.5
2,755,362	7/1956	Jacobs	200—83.9

BERNARD A. GILHEANY, *Primary Examiner*.

H. BROOME, *Assistant Examiner*.