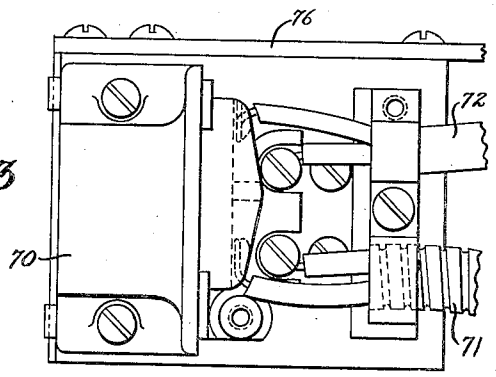
July 13, 1937. C. W. SCHERER 2,087,122

SWITCH FOR REFRIGERATING APPARATUS

Original Filed Dec. 31, 1931 2 Sheets-Sheet 1

Fig. 3



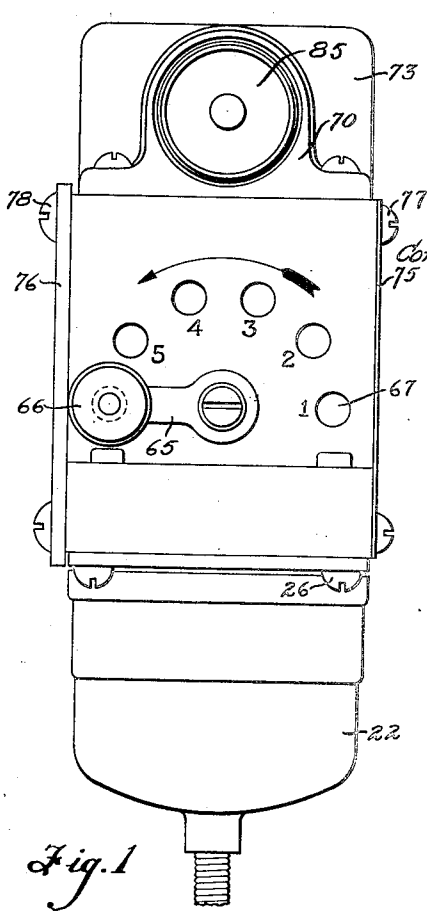


Fig. 1

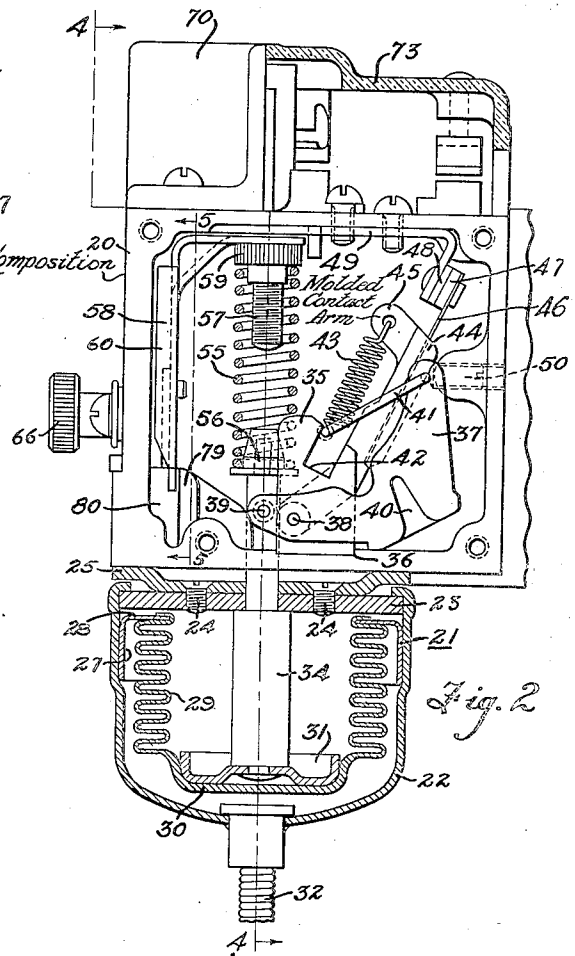


Fig. 2

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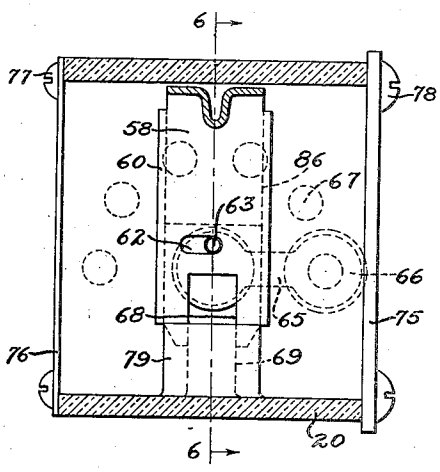


Fig. 5

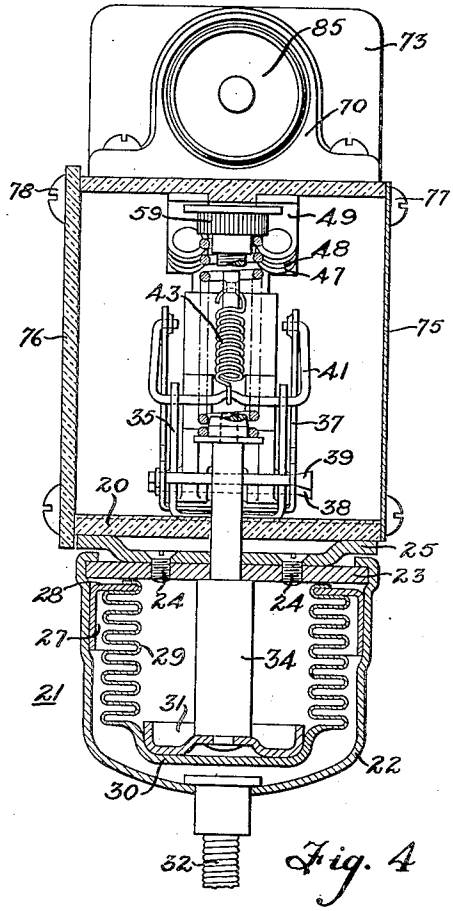


Fig. 4

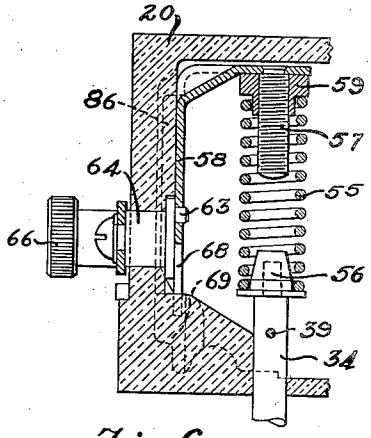


Fig. 6

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UNITED STATES PATENT OFFICE

2,087,122

SWITCH FOR REFRIGERATING APPARATUS

Charles W. Scherer, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corporation, a corporation of Delaware

Application December 31, 1931, Serial No. 584,177
Renewed July 18, 1934

9 Claims. (Cl. 200—83)

This invention relates to refrigerating apparatus and more particularly to control switches therefor. The objects of my invention include the provision of an improved simplified control switch for refrigerating apparatus having an improved and simplified manual control means and constructed so as to be easily assembled and repaired.

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

In the drawings:

Fig. 1 is a front view of my improved control switch;

Fig. 2 is a side view partly in section with one of the side plates removed;

Fig. 3 is a top view of my control switch;

Fig. 4 is a sectional view along the line 4—4 of Fig. 2;

Fig. 5 is a sectional view along the line 5—5 of Fig. 2; and

Fig. 6 is a section along the line 6—6 of Fig. 5.

Referring to the drawings, there is shown a box-like rectangular frame 20 with opposite open sides made of a suitable molded composition such as a phenol condensation product. Upon the bottom portion of this rectangular frame there is attached a bellows assembly 21 having a cup-shaped bellows housing 22 with its upper rim spun over a plate 23 which is fastened by means of the screws 24 to a base plate 25 which is in turn fastened by means of the screws 26 to the lower wall of the rectangular frame 20. A sheet metal ring 27 fits tightly in the bellows housing 22 and has a flange 28 thereon which supports one end of a bellows 29. A suitable solder is used to seal these joints. The lower end of the bellows 29 is provided with a thickened end wall 30 against which a follower 31 is pressed. The bellows housing 22 has a fluid conduit 32 connected to its bottom portion which conduit connects the interior of the bellows housing with a suitable thermostatic bulb, not shown. It will thus be seen that there is provided an expansible chamber between the bellows 29 and the bellows housing 22 which is connected through the fluid conduit 32 with the thermostatic bulb. The thermostatic bulb is charged with a suitable volatile fluid such as a refrigerant. It is evident that when these spaces are charged with a suitable volatile fluid, that upon a rise in temperature, the volatile liquid in the thermostatic bulb will vaporize and cause an increase in pressure within the spaces causing a pressure to be exerted upon the end wall 30 of the bellows 29 which will cause the bellows to collapse a certain amount.

The follower 31, which rests against the end wall 30 of the bellows 29, has an operating shaft 34 riveted to it which extends upwardly into the interior of the box-like rectangular frame 20. A snap acting switch mechanism is connected to the upper end of this operating shaft 34. This snap acting mechanism is supported by a U-shaped sheet metal bracket 35 which is seated in a recess 36 upon the lower wall of the rectangular frame 20. A primary lever 37 is pivoted to the U-shaped bracket 35 by means of a pin 38 and is operatively connected to the operating shaft 34 by means of a pin 39. The primary lever 37 is formed of a piece of sheet metal bent up into a channel-shape and provided with a hollow strengthening and stiffening rib 40 at either side. A secondary lever 41, formed by bending a piece of wire into a U-shape, is pivoted to the primary lever 37 at the end opposite to the pivot pin 38. The opposite end of the secondary lever 41 is held between the jaws of a notch 42 formed in the upper end of the U-shaped bracket 35. A coil spring 43 is also connected at one end to this lower end of a secondary lever 41 and is connected at its opposite end to a molded contact arm or lever 44 which is provided with an integral molded boss 45 for this purpose. The molded contact arm or lever 44 is pivoted at its lower end upon the pivot pin 38 and carries by means of a flexible tongue 46 a pair of switch contacts 47 which are connected to the flexible tongue 46 by means of a swivel joint. The contacts 47 are adapted to engage a pair of fixed contacts 48 which are mounted at the end of a bracket 49 fastened to the upper wall of the rectangular frame 20. A set screw 50 is threaded into the side wall of the rectangular frame member 20 for the purpose of limiting the movement of the contacts 47 away from the contacts 48. After the proper adjustment for this purpose is made the cavity adjacent the end of the set screw is sealed to prevent tampering.

Upon the upper end of the operating shaft 34 there is provided a coil spring 55 which is seated upon a removable cap member 56 which in turn is seated upon the end of the operating shaft 34. The cap member 56 is provided with a recess which fits over the upper end of the operating shaft 34. The upper end of the coil spring 55 surrounds a threaded pin 57 which has its upper end riveted to the top portion of an inverted L-shaped carriage 58. An adjusting nut 59 is

threaded upon the threaded pin **57** and is provided with a seat which holds the upper end of the coil spring **55**. The coil spring **55** opposes the collapse of the bellows **29**. The carriage **59** is slidably mounted upon a slideway **86** which is formed upon the inside of the front wall of the rectangular frame **20**. The carriage **58** is formed of sheet metal and has turned down sides **60** which fit over the slideway **86**. A notch **68** is formed in the lower end of the carriage **58** which fits over a heavy rib **69** which is provided with wings **79** which cooperate with the front wall of the frame **20** to form a pair of guiding grooves **80**. These guiding grooves receive the forked lower end of the carriage **58** and in this way retain the carriage upon the slideway **86** with the aid of the coil spring **55**.

The carriage **58** is moved by manual adjustment device commonly known as a cold control. For this purpose a slot **62** is provided in the face of the carriage which receives a pin **63** fixed to the inner end of a stub shaft **64** which is rotatably mounted in the front wall of the frame **20**. An arm **65** is fastened to the outer end of the stud shaft **64** and is provided with a combined knob and latch **66** which is provided with a removable pin adapted to be seated within the recesses **67** marked **1** to **6** upon the outside of the front wall of the rectangular frame **20**. In Fig. 1, the numeral **6** is covered by the arm **65**. By moving the arm **65** from the position **6** to the position **1**, the carriage **58** is moved downwardly compressing the coil spring **55** requiring a higher pressure to be generated within the thermostatic bulb in order to cause the bellows to cause the closing of the switch contacts **47**. When the manual control arm **65** is in position **6** the switch contacts will open and close at lower temperatures than when the manual adjusting arm is in positions **1** to **5** inclusive since the tension of the coil spring is varied.

Upon the top of the rectangular frame **20** there is provided a housing **70** which has a threaded socket **85** adapted to receive a fuse of the ordinary plug type. The electrical wires **71** from the power source are connected to the rear end of the housing **70** at one side while electric wires **72** which supply electric current to the motor of the refrigerating system are connected to the rear end of the housing **70** upon the other side. A removable housing **73** is provided for enclosing these wires.

In order to enclose the switch mechanism, removable plates **75** and **76** are fastened at opposite sides to the rectangular frame **20** by means of screws **77** and **78**. These plates may be removed at any time for inspection or repair.

A feature of this switch is that the entire bellows mechanism may be renewed as a unit merely by removing the pin **39** and the screws **26**. Another feature of the invention is that the rectangular box-like frame with the sides open is used for supporting various parts of the switch mechanism. The open sides make it easy to inspect, assemble, and repair the switch mechanism.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A switch having a molded four-walled rectangular one-piece frame of insulating material with open sides, a bellows and a snap-acting mechanism connected thereto carrying a movable contact, said bellows and snap-acting mechanism being mounted upon one of said walls of said frame, a stationary contact mounted upon another wall of said frame and positioned to cooperate with said movable contact, a manual adjusting means mounted upon another wall of said frame and having means cooperating with said bellows for varying the operation of the bellows and the snap-acting mechanism connected thereto.

2. A switch having a molded four-walled rectangular one-piece frame of insulating material with open sides, a bellows and a snap-acting mechanism mounted upon one of said walls of said frame, said bellows being connected to operate said snap-acting mechanism, said snap-acting mechanism carrying a movable contact, a stationary contact mounted on another wall of said frame and positioned to cooperate with said movable contact, a spring for controlling the movement of said bellows, a movable carriage movably mounted upon another wall of said frame, said carriage supporting one end of said spring, a movable handle operatively connected to said carriage to move said carriage for varying the tension of said spring, said movable handle being mounted upon one wall of said rectangular frame and having latch means for retaining said handle in any one of a plurality of operative positions.

3. A switch having a one-piece four-walled rectangular frame with opposite open sides, a bellows and a snap-acting mechanism mounted upon one of said walls of said frame, said bellows being connected to operate said snap-acting mechanism, said snap-acting mechanism carrying a movable contact, a stationary contact mounted upon a wall of said frame and positioned to contact with said movable contact, a coil spring operatively connected with said bellows for controlling the movement of said bellows, said coil spring extending parallel to one wall of said frame, a carriage slidably mounted on said wall, said carriage having means engaging one end of said coil spring, a pivoted handle having means engaging said carriage to move said carriage to vary the tension on said coil spring, said pivoted handle being mounted on a wall of said frame and having latch means for holding the handle in any one of a plurality of selective positions.

4. A control means including pressure operated means for controlling a medium, spring means for modifying the operation of the pressure operated means, a trackway, a carriage slidably supported upon the trackway and operatively associated with the spring means, a manual operating member having a plurality of selective positions, said manual operating member having means connecting with the carriage for moving the carriage along the trackway for varying the effect of the spring means upon the pressure responsive means.

5. A switch including pressure operated means for opening and closing an electric circuit, spring means for modifying the operation of the pressure operated means, a trackway, a carriage slidably supported upon the trackway and operatively associated with the spring means, a manual operating member having a plurality of selective positions, said manual operating member having means connecting with the carriage for moving the carriage along the trackway for varying the effect of the spring means upon the pressure responsive means and latch means for holding

the operating member in the selective positions.

6. A switch including pressure responsive means for opening and closing an electric circuit, a coil spring for modifying the operation of the pressure responsive means, a trackway parallel to the axis of the coil spring, a carriage slidably mounted upon the trackway, said carriage having a projection extending therefrom supporting one end of the coil spring, a manually operable lever means operably connected to the carriage for moving the carriage along the trackway, said manually operable lever means having a plurality of selective positions for selectively varying the force of the coil spring.

7. A switch including pressure responsive means for opening and closing an electric circuit, a coil spring for modifying the operation of the pressure responsive means, a trackway parallel to the axis of the coil spring, a carriage slidably mounted upon the trackway, said carriage having a projection extending therefrom supporting one end of the coil spring, a manually operable lever means operably connected to the carriage for moving the carriage along the trackway, said manually operable lever means having a plurality of selective positions for selectively varying the force of the coil spring, and latch means for holding the manually operable lever means in one of the selective positions.

8. A control means including pressure operated means for controlling a medium, spring means operably connected to said pressure operated means for controlling the pressure operated means, means movable in the direction of movement of said spring means for varying the force of said spring means, and manual manipulating means having a pin and slot connection with said movable means for varying the force applied by said spring means to the pressure operated means.

9. Control means including a pressure operated means for controlling a medium, spring means operably connected to said pressure operated means for controlling the pressure operated means, means for varying the force of said spring means, and manipulating means having a pin and slot connection with said movable means for varying the force applied by said spring means to the pressure operated means.

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