

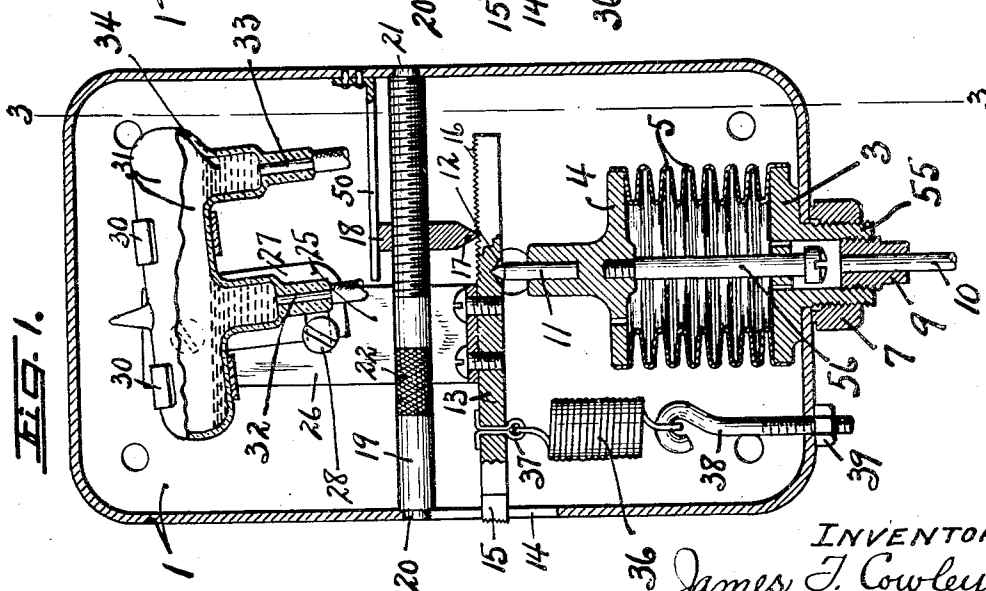
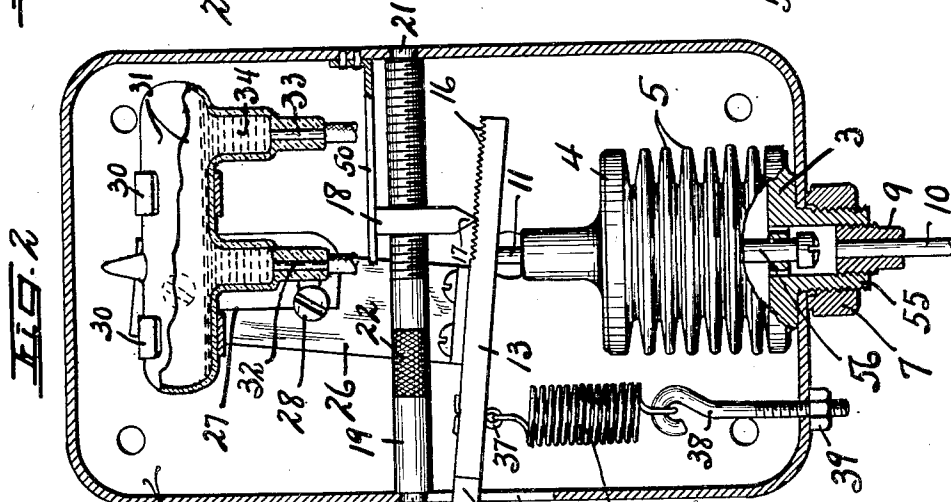
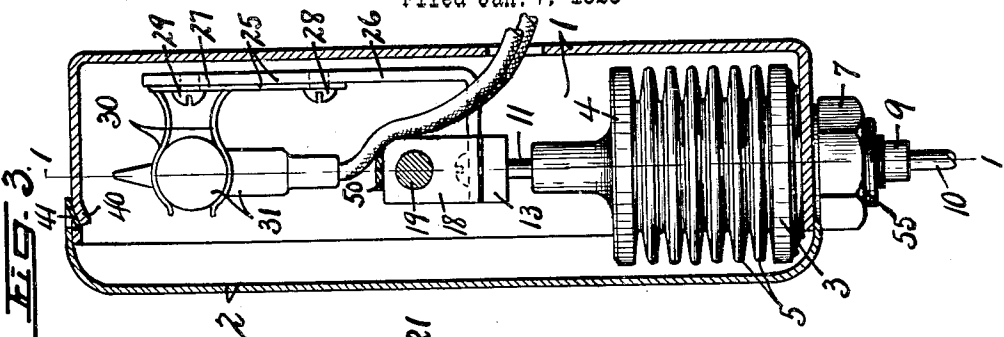
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AUTOMATIC SWITCH

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AUTOMATIC SWITCH.

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This invention relates to certain new and useful improvements in automatic switches, and altho designed particularly for use in connection with refrigerating machines for controlling the operation of the driving motor in accordance with the temperature of the refrigerating chamber, yet the switch is adapted for quite general application.

The main object of the invention is the production of an efficient switch of comparatively simple and permanent construction that is adapted for automatic operation at substantially the predetermined temperature for which the switch may be adjusted, such adjustment to provide for operation at desired temperature being readily and easily effected by the means provided. A further object resides in the provisions of adjustable means for controlling the range within which the maximum and minimum temperatures will operate.

Other objects and advantages relate to the details of the structure, all as will more fully appear from the following description taken in connection with the accompanying drawings in which:—

Figure 1 is a vertical section on line 1—1, Figure 3.

Figure 2 is a section similar to Figure 1 showing the switch in a different position.

Figure 3 is a vertical section taken on line 3—3, Fig. 1.

As shown, the switch includes an enclosing and supporting casing —1— open at the front and adapted to be closed by a suitable door or cover —2— as perhaps best shown in Figure 3.

The switch includes a sylphon comprising a sylphon bottom —3—, a sylphon top —4— and an interposed bellows member —5—. The sylphon bottom —3— includes a reduced tubular portion —55— extending through an opening in the bottom of the casing —1— and externally threaded for the reception of a nut —7— whereby the sylphon bottom is rigidly secured to the casing. The sylphon bottom —3— is formed with drilled openings or passageways leading from the interior of the bellows —5— to the tubular portion —55— within which is arranged a tubular plug —9— in the bore of which is secured pipe —10— which may lead to a suitable bulb located in the cooling chamber in the ice-box, which bulb in the usual manner is filled with a fluid which expands and con-

tracts in accordance with the changes in the temperature of the box, thereby effecting a corresponding expansion or contraction of the sylphon bellows —5— causing an elevation or permitting depression of the sylphon top —4—. A sylphon adjusting or limiting screw —56— is provided which has its head positioned in the tubular part —6— and its upper reduced threaded end screwed into an interiorly threaded recess in the lower surface of the sylphon top —4—, whereby the upward expansion movement of the sylphon is limited. The sylphon top —4— carries an actuating member, in this illustration in the form of a pin —11— formed at its upper end with a pivot point adapted to seat in a tapered or cone recess —12— in the lower surface of a balance bar or lever —13—, the angle at the apex of said recess being greater than the angle at the apex of the pivot point to permit free tilting of the balance bar upon the point.

The balance bar —12— is formed with a laterally reduced end portion —15— adapted to substantially fit the width of a vertical slot —14— formed in the wall of casing —1— whereby lateral movement of the reduced end of the bar is substantially prohibited, while permitting a vertical sliding movement within the limits of the slot —14—. At times it may be desirable to manually operate the switch to start or stop the motor and this projecting end constitutes a hand piece operable from outside the casing to actuate the switch, and means as a hook may be provided, if desirable for engaging the exposed end to maintain the switch in desired position regardless of temperature conditions.

The upper surface of the balance bar —12— at the end opposite the reduced portion —15— is formed with a series of lateral grooves or corrugations —16— in any one of which lateral grooves the knife edge —17— is adapted to be seated. This knife edge —17— is formed upon a pivot member in this illustration in the form of a blade —18— provided with a threaded passageway or opening at right angles to the blade whereby the blade is adjustably mounted upon an adjusting rod —19— which has its opposite reduced ends —20— and —21— respectively journaled in openings in the opposite sides of the casing —1—. The adjusting rod —19— may be formed with a

knurled part —22— whereby it may be gripped for the purpose of rotating it to adjust the blade —18—. The pitch of the threads upon the threaded part —23— of the adjusting rod —19— is so predetermined with respect to the width of the grooves of corrugations —16— on the balanced bar —13— that one complete rotation of the adjusting rod —19— will move the blade —18— just a sufficient distance so as to seat it in one of the next adjacent corrugations dependent upon the direction of rotation of the adjusting rod.

In order to prevent any rotary movement of the pivot member —18— a bar —50— is provided having one end secured to casing —1— and a portion extending across the upper end of the pivot member. In the illustration the bar is flat and the upper end of the pivot member is also flat so that the latter slides along the former but cannot rotate. The balance bar —13— carries a bracket —25—, which as here illustrated is formed in two parts —26— and —27— connected adjustably together by screws —28— and —29— and the upper bracket part —27— carrying suitable spring clamps —30— which tightly grip the mercury bulb —31—. This mercury bulb —31— includes terminals —32— and —33— and a suitable body of mercury —34— so that upon movement of the bulb in accordance with the tilting movement of the balance bar —13—, contact is made or broken between the terminals —32— and —33— by movement of the mercury —34—.

The terminals —32— and —33— may be portions of wires that lead in the ordinary way to an electric motor, as for instance an electric motor operating a refrigerating machine, and preferably these wires should in the usual manner lead through suitable fuses and a snap switch.

A tension spring —36— is provided having its upper end connected to the balance bar —13— as by cotter pin —37— and its lower end connected to the lower end of the casing —1— by means of hook —38—, the lower end of which is threaded and extends through the lower wall of casing —1— for engagement with nut —39—. Rotation of the nut —39— will effect desired tension adjustment of the spring —36— and the tension of this spring will be adjusted to exert desired tension on the balance bar resisting its upward movement to close the switch. Increased tension will require increased pressure within the sylphon to operate the balance bar and therefore permits a higher maximum temperature in the ice-box.

The distance between the pivot point upon the pin or actuating member —11— or the point of application of power to the balance bar and the knife edge —17— constituting a pivotal axis about which the balance bar

rocks determines the maximum or minimum temperatures in the icebox, i. e. the farther these points are apart the farther the sylphon will have to move to make or break the contact in the mercury bulb, and the greater the range through which fluctuation of temperature may take place. The adjustment to fix a desired predetermined temperature of operation of the switch is readily effected by merely pressing down on the right hand end of balance bar —13— so as to disengage the knife edge —17— from the corrugated surface —16— and then rotating the adjusting rod —19— one or more complete rotations as may be desired.

The cover —2— may be secured in place in any suitable manner, as for instance by seating its lower edge in the recessed upper portion of nut —7— so as to confine the edge between the portion of the nut and the casing —1—. The upper wall of casing —1— may be formed with a partially cut out depressed portion —40— and the cover —2— may be formed with a similarly partially cut-out depressed portion —41— forming a lip which engages the cover to lock the parts together.

The operation of the structure will be easily understood. As the liquid in the bulb connected to the sylphon rises, the sylphon will expand from the condition shown in Figure 1 (under which condition the circuit is closed) to the position shown in Figure 2, thereby tilting balance bar about the knife edge —17— against the action of spring —36— until the position shown in Figure 2 is reached (under which condition the circuit is broken). As the temperature decreases, the sylphon will again contract until the condition of Figure 1 is again reached.

Altho I have shown and described a specific construction as illustrative of a preferred embodiment of the invention, I do not desire to restrict myself to the details of the structure disclosed or the parts thereof, as various changes and modifications may be made within the scope of the appended claims.

I claim:

1. An automatic switch comprising a balance bar, means for moving said bar in accordance with temperature conditions, a two-part bracket carried by said bar, means for holding the parts of said bracket in various adjusted positions, and a mercury tube carried by said bracket.

2. An automatic switch comprising a balance bar, a blade about which said balance bar is adapted to rock, means for moving said bar about said blade in accordance with temperature conditions, means for adjusting said blade longitudinally of the bar, and a switch actuated in accordance with the movement of said balance bar.

3. An automatic switch comprising a bal-

ance bar, a blade about which said balance bar is adapted to rock, means for moving said bar about said blade in accordance with temperature conditions, means for adjusting said blade longitudinally of the bar, a switch actuated in accordance with the movement of said balance bar, and spring means tending to maintain said balance bar against rocking movement as actuated by said moving means.

4. An automatic switch comprising a balance bar formed with a series of lateral grooves, a blade having a knife edge adapted to seat in one of said grooves and constituting a fulcrum for the balance bar, and means for adjusting the blade to seat its knife edge in the desired lateral groove.

5. An automatic switch comprising a balance bar formed with a series of lateral grooves, a blade having a knife edge adapted to seat in one of said grooves and constituting a fulcrum for the balance bar, a rotary adjusting rod having a threaded relation with said blade whereby rotation of said rod will adjust said blade to seat in the desired lateral groove, and a circuit closing device carried by said balance bar.

6. An automatic switch comprising a casing, a sylphon bellows within the casing, an actuating member carried by the upper end of the sylphon bellows, a balance bar having a recess in its lower side for receiving the said actuating member, and its upper surface formed with a plurality of lateral grooves, an adjusting rod rotatably mounted in said casing, a blade carried by and having a threaded relation with said adjusting rod and adapted to be seated in a desired one of the lateral grooves in said balance bar, and a circuit closing device carried by the balance bar.

7. An automatic switch comprising a casing, a sylphon bellows within the casing, an actuating member carried by the upper end of the sylphon bellows, a balance bar having a recess in its lower side for receiving the said actuating member, and its upper surface formed with a plurality of lateral grooves, an adjusting rod rotatably mounted in said casing, a blade carried by and having a threaded relation with said adjusting rod and adapted to be seated in a desired one of the lateral grooves in said balance bar, a circuit closing device carried by the balance bar, and spring means tending to prevent movement of the balance bar as actuated by the said actuating member.

8. An automatic switch comprising a casing, a sylphon bellows within the casing, an actuating member carried by the upper end of the sylphon bellows, a balance bar having a recess in its lower side for receiving the said actuating member, and its upper surface formed with a plurality of lateral grooves, an adjusting rod rotatably mounted in said casing, a blade carried by and having

a threaded relation with said adjusting rod and adapted to be seated in a desired one of the lateral grooves in said balance bar, a circuit closing device carried by the balance bar, spring means tending to prevent movement of the balance bar as actuated by the said actuating member, and said casing formed with a slot and the balance bar having a portion movable in one direction in the slot but confined from movement in the opposite direction by the slot.

9. An automatic switch comprising a casing, a sylphon bellows within the casing, an actuating member carried by the upper end of the sylphon bellows, a balance bar actuated by the said actuating member and its upper surface formed with a plurality of lateral grooves, an adjusting rod rotatably mounted in said casing, a blade separated by and having a threaded relation with said adjusting rod and adapted to be seated in a desired one of the lateral grooves in said balance bar, and a circuit closing device carried by the balance bar.

10. An automatic switch comprising a casing, a sylphon bellows within the casing, an actuating member carried by the upper end of the sylphon bellows, a balance bar actuated by the contact pin, and its upper surface formed with a plurality of lateral grooves, an adjusting rod rotatably mounted in said casing, a blade carried by and having a threaded relation with said adjusting rod and adapted to be seated in a desired one of the lateral grooves in said balance bar, a circuit closing device carried by the balance bar, and spring means tending to prevent movement of the balance bar as actuated by the said actuating member.

11. An automatic switch comprising a rocking member, a switch carried thereby, a blade disposed upon one side of said rocking member and about which it rocks, a sylphon bellows, an actuating member carried by the sylphon bellows and contacting with the rocking member on the side opposite the blade, a spring tending to prevent rocking of said member as moved by said actuating member, and the distance between the blade and the point of application of power by said actuating member being adjustable lengthwise of the rocking member.

12. An automatic switch comprising a rocking member, a switch carried thereby, a blade disposed upon one side of said rocking member and about which it rocks, a sylphon bellows, an actuating member carried by the sylphon bellows and contacting with the rocking member on the side opposite the blade, a spring tending to prevent rocking of said member as moved by said actuating member, and rotary means for adjusting the distance between the blade and the point of application of power by said actuating member lengthwise of the rocking member.

13. An automatic switch comprising a rocking member, a switch carried thereby, a blade disposed upon one side of said rocking member and about which it rocks, a sylphon bellows, an actuating member carried by the sylphon bellows and contacting with the rocking member on the side opposite the blade, a spring tending to prevent rocking of said member as moved by said actuating member, rotary means for adjusting the distance between the blade and the point of application of power by said actuating member lengthwise of the rocking member, and means for preventing rotation of said blade upon rotation of said rotary means.

In witness whereof I have hereunto set my hand this 29th day of December 1925.

JAMES T. COWLEY.