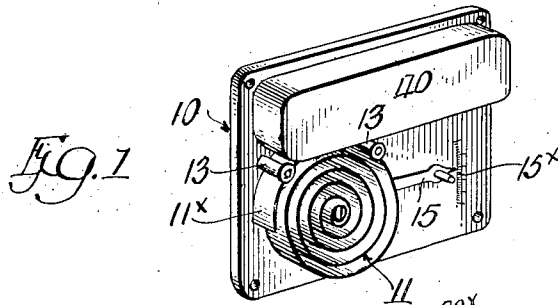
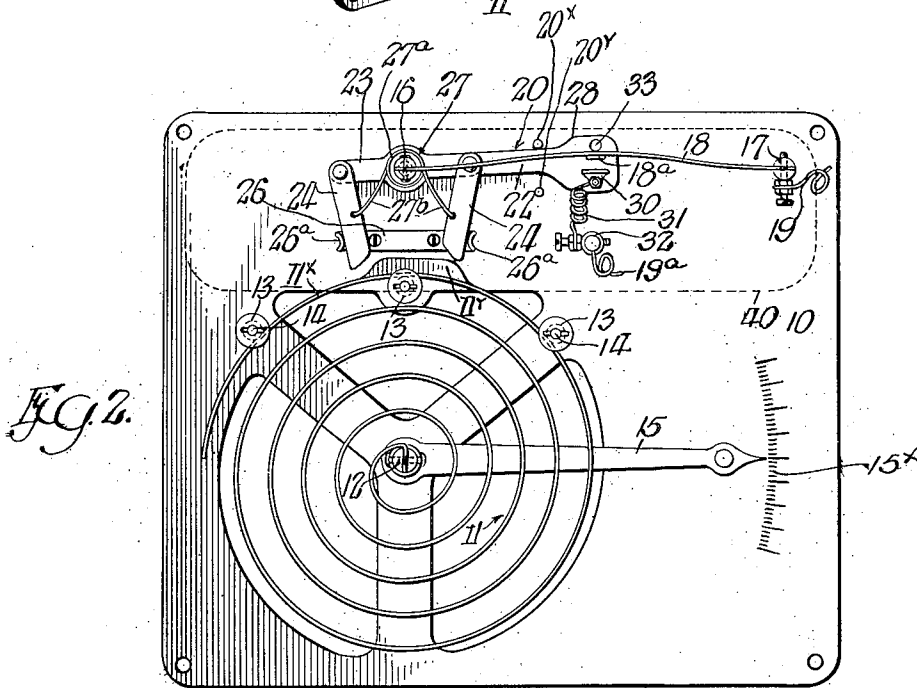
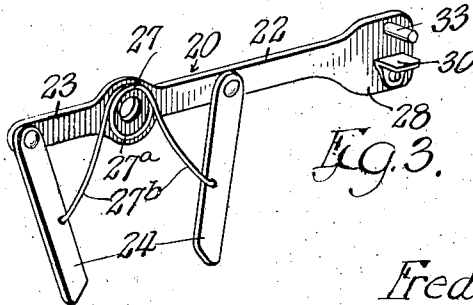


F. W. WOLF.
THERMOSTATIC SWITCH DEVICE.
APPLICATION FILED DEC. 20, 1916.

1,259,577.

Patented Mar. 19, 1918.
2 SHEETS—SHEET 1.



Witnesses:
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Karl W. Dell.

Inventor
Fred W. Wolf
by Brown & Mellick Attys

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2 SHEETS—SHEET 2.

Fig. 4.

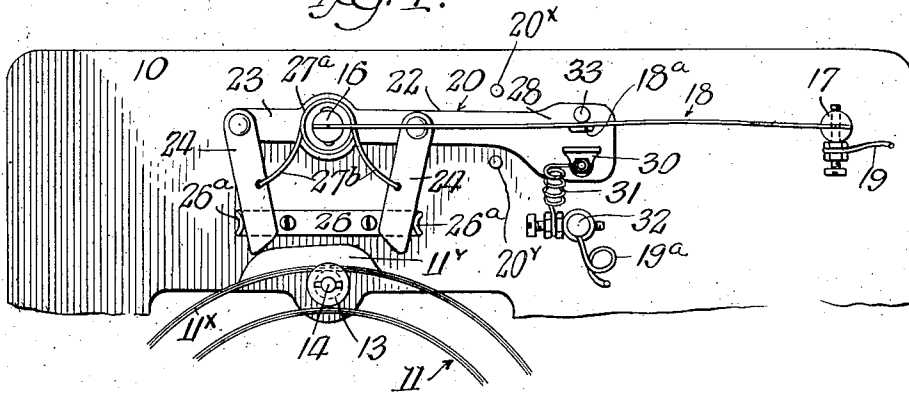


Fig. 5.

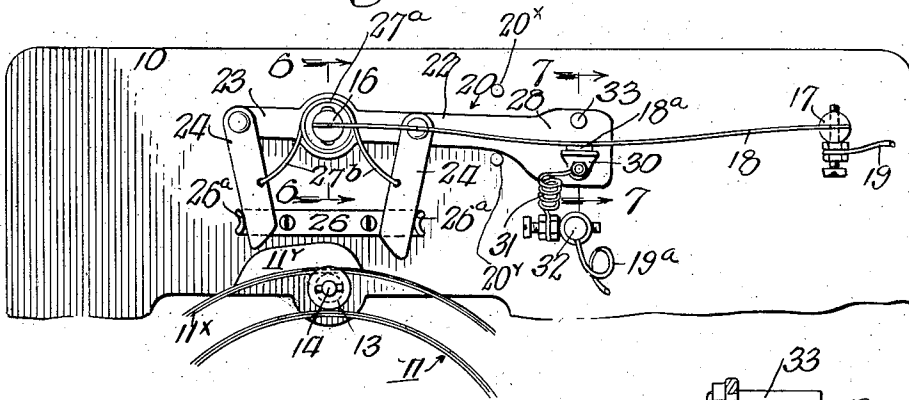


Fig. 6.

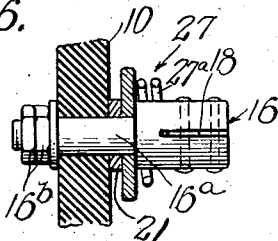
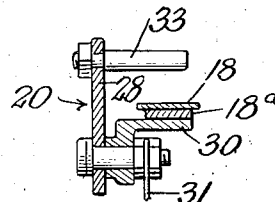


Fig. 7.

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UNITED STATES PATENT OFFICE.

FRED W. WOLF, OF CHICAGO, ILLINOIS.

THERMOSTATIC SWITCH DEVICE.

1,259,577.

Specification of Letters Patent.

Patented Mar. 19, 1918.

Application filed December 20, 1916. Serial No. 137,963.

To all whom it may concern:

Be it known that I, FRED W. WOLF, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Thermostatic Switch Devices; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a thermostatic switch device for controlling an electric circuit, as for example, the circuit which operates a motor, and consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The object of the invention is to provide a thermostatically controlled switch device—primarily intended for use in connection with a refrigerating apparatus—which will act to close the electric circuit of the driving motor and start the operation of the compressor when a certain predetermined high temperature is reached in the refrigerating box to be cooled by the apparatus, and to automatically break said circuit and stop the motor when a predetermined low temperature has been produced in the box by the operation of the apparatus.

Another object of the invention is to produce a thermostatic switch device of the kind described, which will be delicate and sensitive and yet positive in operation, so as to insure the maintenance of the temperature of the refrigerating box at some point between the aforesaid predetermined high and low temperatures.

Another object of my invention is to produce a thermostatic switch device in which the contacts are quickly made and quickly broken, thus reducing arcing and the size and length of the flash when the contact members are separated, to a minimum, thereby preventing carbonizing and burning of said contact members.

The many advantages of my device will appear more clearly as I proceed with my specification.

In the drawings:

Figure 1 is a perspective view illustrating the new thermostatic switch device as a whole.

Fig. 2 is a front view in elevation of the device with the box or casing which incloses the switch proper, removed.

Fig. 3 is a perspective view, on an enlarged scale, of a part of the switch mechanism.

Figs. 4 and 5 are detail, front elevational views, showing the switch device in different positions.

Fig. 6 is a view representing a section through Fig. 5 in the plane indicated by the line 6—6 of Fig. 5.

Fig. 7 is a view representing a vertical section through Fig. 5, in a plane indicated by the line 7—7 of Fig. 5.

Referring now to that embodiment of my invention illustrated in the accompanying drawings: 10 indicates the base or board upon which the parts of my improved thermostatic switch are mounted. This base is made of suitable insulating material and as shown, is of rectangular form, suitable holes being provided at the corners for receiving the screws by means of which the device as a whole is attached in place.

11 indicates a thermostatic member, which, as shown, is in the form of a spiral band, fixed at its center or innermost end, to a post 12 mounted on the base. Said thermostatic member is of familiar construction, comprising two strips of metal of different coefficients of expansion. The outermost or free end of the spiral band is engaged and supported by rollers 13 mounted on studs 14 fixed to the base. One of the said rollers engages the bottom side of the outer convolution 11^a of said band at a point in vertical alinement above the post 12, while the other two rollers 13 engage the top side of said convolution at points equally spaced at either side of the first mentioned roller. As the spiral band tends to wind or to unwind under changes of temperature, the convolution 11^a of said band will be caused to travel to the left or to the right and will be guided by the rollers 13 so as to travel in a certain definite path. A cam 11^b is fixed to this convolution 11^a of the band and moves therewith in the winding or unwinding movement of the spiral band 11.

The base 10 is cut away in the vicinity of the thermostatic, spiral band 11 to provide for a free circulation of air about it. A pointer arm 15 is fixed to the post 12 and is

associated with a graduated arc 15* marked upon the base 10.

16 and 17 indicate posts which are fixed to the base 10 in a horizontal line located above the spring 11. One post 16 is placed in vertical alinement above the post 12 to which the center of the spring 11 is attached. Both posts are slotted at their outer ends to receive the ends of a flat spring switch member 18. This switch member is of a length somewhat greater than the distance between the posts 16 and 17 so that it is normally buckled between said posts as shown in Figs. 2, 4 and 5. The post 17 also provides a terminal for one wire 19 of the electric circuit to be controlled. The post 16 has a reduced part 16^a, which extends through a suitable opening in the base, to which it is attached by nuts and a washer 16^b.

A switch lever 20 (see Fig. 3) is fulcrumed on the reduced part 16^a of the post 16, so as to swing in a plane between the spring switch member 18 and the front face of the base 10. A spacing washer 21 is mounted on the reduced part of the post 16 and the shoulder formed by the larger part of the post engages the front face of the lever 20. The switch lever 20 has a long arm 22 and a short arm 23. 24, 24, indicate pawls, one of which is pivotally carried at the end of the short arm 23 of the lever and the other of which is carried by the long arm 22 at a distance from its fulcrum equal to the length of the short arm. Said pawls are held in a position substantially radial to the thermostatic member 11 by means of a guide plate 26 fixed to the base 10, a short distance above said member, said plate having lugs 26^a—26^a which engage the outer edges of said pawls. A spring 27 comprising a coil 27^a mounted upon the post 16 and two depending arms 27^b act to hold the pawls 24 in yielding engagement with the said lugs 26^a. The pawls 24 depend into the path of the heretofore mentioned cam 11^v carried by the spiral thermostatic member.

The long arm 22 of the lever 20 terminates in a head 28 located approximately at the middle of the length of the flat spring switch member 18. Near the bottom edge of said head 28 is pivoted an angle plate 30 which forms a contact member adapted to be engaged by a contact piece 18^a fixed to the under side of the flat spring switch member 18. The engagement and disengagement respectively of the contacts 30 and 18^a produces the "make" and "break" of the switch device. The angle plate 30 is connected by a coiled, flexible conductor wire 31 to a binding post 32 which forms a terminal for a wire 19^a of the electric circuit. A stud 33 is fixed to the head 28 of the lever 20 above the contact angle plate 30 and acts as a stop to limit the upward bending movement of the flat spring switch 18 after it has been

actuated to break the contact engagement between the contacts 18^a and 30. Stops 20^x and 20^y are provided above and below the lever 20 respectively to limit the movement of said lever, and prevent such movement of said lever under the tension of the buckled spring switch member 18 as will remove the buckle therein and permit the said spring to assume the position of a bent bow.

A removable cover or casing 40, fixed to the base 10 in any suitable manner, covers and incloses the moving parts of the switch mechanism proper, protecting said parts against breakage and tampering with by unauthorized parties.

The operation of the device is as follows:

Assume the device as a whole suitably fixed in a compartment to be refrigerated and with the line wires 19, 19^a suitably attached to the circuit line wires of the electric motor of the refrigerating apparatus and with the parts in the position shown in Fig. 2, wherein the engagement between the contact members 18^a and 30 has been broken and the motor is at rest.

As the air in the refrigerating compartment becomes warmer, the spiral, thermostatic band 11 will tend to wind upon itself, thus imparting a movement to the left of its convolution 11^x that carries the cam 11^v. In this movement, the approaching end of said cam will engage the end of the pawl 24 pivoted to the short arm 23 of the switch lever 20 (see Fig. 4) and will, as it continues to move, impart an upward movement to said short arm, thus depressing the long arm 22. As this long arm swings downwardly, the stud 33 on the head 28 of said lever will first tend to straighten out the switch spring 18 and will finally cause said spring to snap through an intermediate, straight line position, which it is unable to assume, to a reversed, opposing, buckled position, with the contact 18^a in engagement with the angle plate 30, as is shown in Fig. 5. This final snap movement by reason of the engagement with the angle plate 30, depresses the long arm of the lever, raises the short arm and frees the pawl 24 on said short lever arm 23 from engagement with the cam 11^v and brings the other pawl 24 into the path of said cam, when upon its reverse movement.

The closing of the circuit through the wires 19, 19^a starts the motor and the refrigerating apparatus into operation. As the temperature in the box is reduced, the spiral, thermostatic band 11 tends to unwind and to move its convolution 11^x toward the right. As the predetermined low temperature of the box is approached, this movement of the convolution 11^x carries the cam 11^v toward the right until the end of said cam finally engages the bottom end of the pawl 24 on the long arm 22 of the switch lever, and as it continues to move, raises said

pawl and with it, the long arm 22 of the said lever. This movement of the cam reverses the movement of the spring switch member 18 already described and finally returns the same to the initial position shown in Fig. 1.

It is thus apparent that a quick make and break of contacts is made, reducing the arcing between the contacts to a minimum and eliminating corrosion and burning of said contacts, which would otherwise arise from arcing. Furthermore this make and break of contacts occur while said contacts are in motion, so that the space or gap between said contacts is not slowly bridged, as would be the case if the contact member was fixed to the base 10. The contact member 30 being fixed to the lever as before described, permits said contact to float or rock on its pivot so that it will always present a broad flat contact surface for engagement by the other contact member.

By means of the pointer arm 15, the spiral band may be shifted so as to adjust the position of the cam 11' to the required position to operate at the desired predetermined temperatures.

I claim as my invention:

1. A thermostatic switch device of the kind described, comprising a thermostatic member, a cam carried by said thermostatic member, a lever fulcrumed adjacent to said thermostatic member, devices carried by said lever on each side of its fulcrum and depending into the path of said cam, a buckled spring switch member having one end fixed at or near the fulcrum of said lever and its other end fixed at a point beyond the longer end of said lever, said spring switch member being connected to one terminal of an electric circuit and being adapted to be engaged at or near its middle by means of a fixed part on said lever, and a contact member connected with the other terminal of said electric circuit, placed to one side of the right line connecting the fixed ends of said spring switch member.

2. A thermostatic switch device of the kind described, comprising a thermostatic member, a cam carried by said thermostatic member, a lever fulcrumed adjacent to said thermostatic member and having a short and a long arm, pawls carried by said lever, one by the short arm of said lever, and one by its long arm, at a distance from the fulcrum equal to the length of its short arm, said pawls depending into the path of said cam, a buckled spring switch member having one end fixed at or near the fulcrum of said lever, and its other end fixed at a point beyond the end of the long arm of said lever, the long arm of said lever being provided with a lug adapted to be engaged by said spring switch member when buckled on one side of the right line connecting its

fixed ends, said spring switch member being connected to one terminal of an electric circuit, and a contact member connected with the other terminal of the electric circuit, carried by the long arm of said lever and adapted to be engaged by said spring member when it is buckled on the other side of the right line connecting its fixed ends.

3. A thermostatic switch device of the kind described, comprising a base, a thermostatic member mounted on said base, a cam carried by said thermostatic member, a lever fulcrumed on said base adjacent to said thermostatic member, said lever having a short and a long arm, spring controlled pawls carried by said lever and being adapted to depend into the path of said cam, one of said pawls being carried by the short arm of said lever and the other being carried by the long arm of said lever and being connected thereto at a distance from the fulcrum equal to the length of its short arm, guide devices engaging said pawls mounted on said base, a buckled spring switch member having one end fixed at or near said fulcrum and its other end fixed at a point beyond the long arm of said lever, said lever being provided with a lug on one side of the right line connecting the fixed ends of said spring switch member and adapted for engagement therewith, and with a contact member connected with the other terminal of said electric circuit placed on the other side of the right line connecting the fixed ends of said spring switch member.

4. A thermostatic switch device of the kind described, comprising a base, a spiral thermostatic member mounted on said base, a cam carried by the outer convolution of said thermostatic member, devices mounted on the base and engaged with the outer convolution to guide the movement of said cam, a lever fulcrumed on said base adjacent to said thermostatic member, said lever having a short and a long arm, spring controlled pawls carried by said lever and being adapted to depend into the path of said cam, one of said pawls being carried by the short arm of said lever and the other being carried by the long arm of said lever and being connected thereto at a distance from the fulcrum equal to the length of its short arm, guide devices engaging said pawls mounted on said base, a buckled spring switch member having one end fixed at or near said fulcrum and its other end fixed at a point beyond the long arm of said lever, said lever being provided with a lug on one side of the right line connecting the fixed ends of said spring switch member and adapted for engagement therewith, and with a contact member connected with the other terminal of said electric circuit placed on the other side of the right line connecting the fixed ends of said spring switch member.

5 5. A thermostatic switch device of the kind described, comprising a base, a spiral thermostatic member mounted on said base, a cam carried by the outer convolution of
10 said thermostatic member, devices mounted on the base and engaged with the outer convolution to guide the movement of said cam, a lever fulcrumed on said base adjacent to said thermostatic member, said lever having
15 a short and a long arm, spring controlled pawls carried by said lever and being adapted to depend into the path of said cam, one of said pawls being carried by the short arm of said lever and the other being carried by
20 the long arm of said lever and being connected thereto at a distance from the fulcrum equal to the length of its short arm, guide devices engaging said pawls mounted on said base, a buckled spring switch member having one end fixed at or near said ful-

crum and its other end fixed at a point beyond the long arm of said lever, said lever being provided with a lug on one side of the right line connecting the fixed ends of said spring switch member and adapted for engagement therewith, and a contact member pivotally carried by the long arm of said lever on the other side of the right line connecting the fixed ends of said spring switch member, said contact member being connected to the other terminal of the said electric circuit.

In testimony that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 13th day of December, A. D. 1916.

FRED W. WOLF.

Witnesses:

T. H. ALFREDS,
KARL W. DOLL.