A. E. WEED.

THERMOSTATIC SWITCH.

APPLICATION FILED MAR. 7, 1911.

1,052,987.

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Fig. 1.

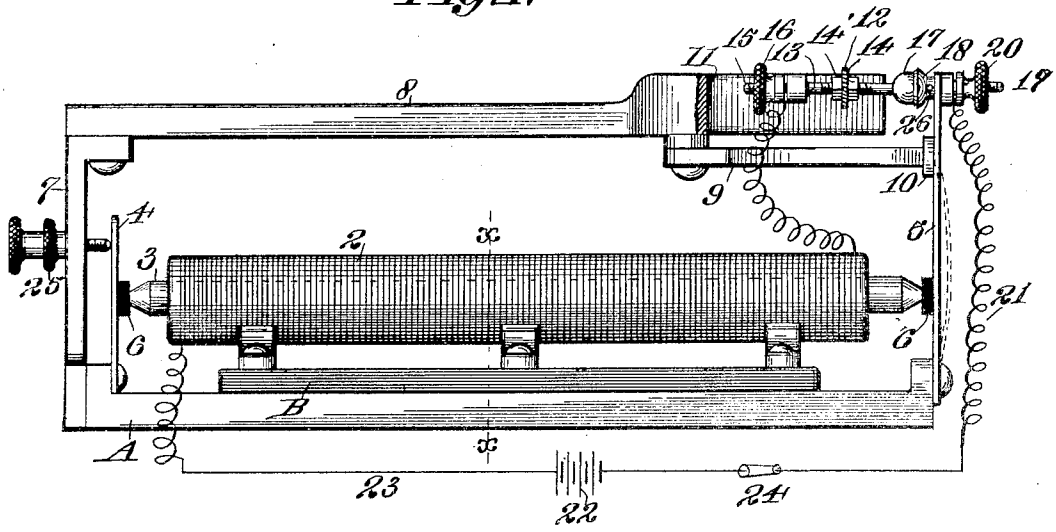


Fig. 2.

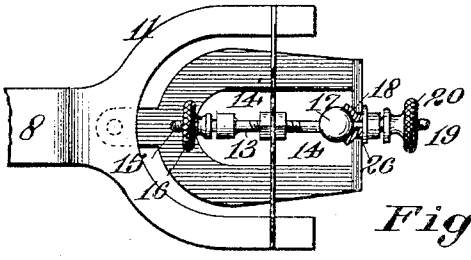


Fig. 3.

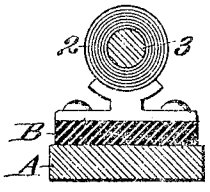
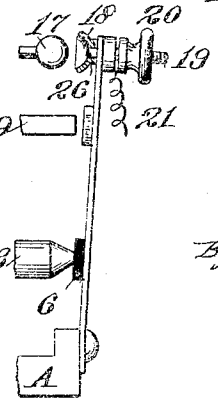


Fig. 4.



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THERMOSTATIC SWITCH.

1,052,987. Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed March 7, 1911. Serial No. 612,827.

To all whom it may concern:

Be it known that I, ARTHUR E. WEED, citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Thermostatic Switches, of which the following is a specification.

This invention relates to an automatic electric switch and particularly pertains to a thermostatic make and break device for controlling the flow of an electric current through a resistance coil.

It is the object of this invention to provide an automatic switch for breaking an electric circuit so as to control the heating power of a resistance coil, and to provide means by which the switch will be automatically operated by the rise and fall of the temperature induced by the coil.

A further object is to provide means by which the short and slow movement of an expanding thermostatic member will be transmitted to a switch in such a manner as to impart a sudden or instantaneous motion, or impulse, thereto, in order to break the circuit with a minimum of sparking.

Another object is to provide means for automatically breaking the flow of current to a heating element at the moment a predetermined temperature is reached so as to conserve the electric energy and thus prevent the useless waste of electric power.

The invention consists of the parts and the combination and construction of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings in which—

Figure 1 is a side elevation of the invention with parts broken away. Fig. 2 is a detail plan view, partly in section, of the switch. Fig. 3 is a cross section on the lines *x*—*x*, Fig. 1. Fig. 4 is a detail elevation, partly in section, showing the switch in the open position.

In the drawings A represents a base plate of any suitable material and construction on which the various elements constituting my present invention are supported. Mounted on the upper face of the base plate A is an insulating plate B, on which is supported a heating unit or resistance coil 2, of any suitable construction. Extending longitudinally through the center of the resistance coil 2 is a core bar 3, which bar is formed of a metal which possesses a high expansible or elastic quality and is susceptible to slight variations and changes in temperature. This core bar 3 constitutes a thermostatic element and may be movable within the resistance coil 2, or the latter may be wound thereon. The outer ends or terminals of the expansible bar 3 are adapted to bear against plate springs 4—5, which springs are vertically disposed and are mounted at their lower ends on the base plate A, the bar 3 being separated from the springs 4—5 by means of insulating members 6 mounted on the springs 4—5, as shown in Fig. 1. Mounted on the base plate A adjacent the plate spring 4, is a standard 7, on the upper end of which is mounted a bracket 8 which extends over the resistance coil 2 and parallel thereto. Mounted on the outer end of the bracket 8 on the under side thereof, and insulated therefrom, is a permanent magnet 9, of the horse-shoe type, the terminals of which are adapted to attract an armature 10, mounted on the plate spring 5. The outer end of the bracket 8 is bifurcated or forked, as at 11, upon which a horizontally disposed plate spring 12 is mounted, this spring being attached at each end to the forked member 11, as shown in Fig. 2. Mounted centrally of the spring 12 and extending horizontally therethrough, is a threaded rod 13, which is held in place and adapted to be adjusted on the spring 12 by means of jam-nuts 14—14′, which are threaded on the stem 13 and bear against the opposite side of the spring 12. This rod 13 is formed of a suitable conducting material, and has a binding post 15, with the usual thumb nut 16 threaded thereon, formed on one end thereof, to which binding post one of the terminals of the resistance coil 2 is connected. The outer end of the rod 13 carries a spherical or ball-shaped contact member 17, which is designed to normally bear against the inner surface of a cup-shaped contact member 18, mounted on and insulated from the upper end of the spring 5, the contact members 17 and 18 forming a ball and socket connection. The contact member 18 has a binding post 19, on which a thumb screw 20 is threaded, formed on its outer end, to which is attached the terminal of an electric conductor 21 leading to one terminal of any suitable source of electric energy indicated at 22. A conduc-

tor 23 leads from the other terminal of the source of electric energy 22 to, and connects with, the other terminal of the resistance coil 2, so that a constant flow of current will pass through the resistance coil 2 during such time as the switch contacts 17—18 are connected, as shown in Fig. 1. The members 17—18 constitute, in fact, a ball and socket switch controlled automatically, as will be shortly described, by the thermostatic core member 3. Another switch 24 may be disposed in the conductors 21 or 23 to cut off the flow of current to the resistance coil 2 when the device is not in use.

From the foregoing it will be seen that, when the parts are in their normal position shown in Fig. 1, with no current passing through the resistance coil 2, the bar 3 will contact with the springs 4—5, the armature 10 will be engaged by the magnet 9, and the switch contacts 17 and 18 will be closed.

The operation of the invention is as follows:—A flow of current being directed through the resistance coil 2 by closing the switch 24, the coil is caused to be intensely heated, as is well known in devices of this character. The heat thus generated acts upon the expansible bar 3 to cause it to expand longitudinally, and thereby exert a pressure upon the springs 4 and 5. The spring 4 acts as an abutment to prevent movement of the bar 3 in that direction, a thumb screw 25 threaded in the standard 7 being provided to prevent backward movement of the spring 4. As the bar 3 becomes elongated by its longitudinal expansion, due to the gradual rise in the temperature of the coil 2, the spring 5 is caused to bow outward, as indicated in dotted lines in Fig. 1, the magnet 9 by exerting a pull on the armature 10 resisting the outward pressure on the upper portion of the spring 5. This pull of the magnet 9 converts it into a fulcrum so that the upper end of the spring 5 will tend to move backward against the contact 17 on the rod 13 to insure a close contact, as the lower portion of the spring bends outwardly. The moment the bar 3 reaches a certain extent of elongation, the outward pressure upon the spring 5 becomes great enough to break the connection between the armature 10 thereon and the magnet 9, which permits the spring 5 to instantaneously move away from the magnet 9, which movement is engendered by reason of the normal tendency of the spring 5 to assume a straight position. This action separates the socket contact 18 from the ball contact 17, as shown in Fig. 4, to form a wide air gap therebetween, thus breaking the circuit at this point and preventing the flow of electricity through the resistance coil. The temperature of the resistance coil will now fall by reason of the current being cut off, which will permit the bar 3 to cool and contract, thus allowing the spring 5 to return to normal position.

By forming the contacts 17 and 18 as described, a minimum of spark is produced when the contacts are suddenly separated, which spark is further prevented by forming a vent 26 in the socket 18. The object of preventing the spark is to reduce the fusion or scorching of the faces of the contacts 17—18.

If it is desired to adjust the device to operate at various temperatures, the thumb screw 25 is adjusted so as to reduce or increase the pressure of the bar 3 upon the spring 5.

While I have shown my invention as applied to a single resistance coil 2, it is obvious that as many coils may be employed as desired, and that an expansible member of any shape may be employed in lieu of the straight bar 3, shown in the drawings, this feature being subject to many modifications not necessary to be here shown.

The principal feature is the thermostatic regulation of the circuit breaking switch with the means for delaying action of the switch until such temperature is reached as makes it desirable to rupture the circuit, whereupon the break takes place suddenly, and an air gap is opened up which will not be bridged by a spark.

Having thus described my invention, what I claim and desire to secure by Letters-Patent, is—

1. The combination with an electric circuit, of a heating unit therein having an expansible core, spring plates extending across the outer ends of the core said plates having insulating members against which the terminals of the core bear, a supporting base for the core said base having a standard disposed substantially parallel with one of the spring plates, a bracket fixed to the standard and extending substantially parallel with the core, a permanent magnet fixed to the bracket having its outer end adjacent the other of said spring plates, said last named spring plate having an armature adapted to be attracted by said magnet, said core adapted to bear on the same side of the last-named spring plate that carries the armature, and contact members in the circuit, one carried by the last named spring plate, and the other carried by the bracket.

2. The combination with an electric circuit of a heating unit therein having an expansible core, spring plates crossing the ends of said core and having insulated members against which the terminals of the core bear, one of said plates having an armature fixed to it, a fixed permanent magnet having its outer end adjacent said armature, a spring plate crossing the magnet, a rod adjustably mounted on the last-named plate

having a contact member on its outer end, and a contact member on one of the first-named spring plates opposing the other contact member, one of said contact members having a concaved socket to receive a corresponding convex surface on the other contact member.

3. The combination with an electric circuit of a heating unit therein having an expansible core, spring plates crossing the ends of said core and having insulated members against which the terminals of the core bear, one of said plates having an armature fixed to it, a fixed permanent magnet having its outer end adjacent said armature, a spring plate crossing the magnet, a rod adjustably mounted on the last-named plate having a contact member on its outer end, and a contact member on one of the first-named spring plates opposing the other contact member, one of said contact members having a concaved socket to receive a corresponding convex surface on the other contact member, and means for adjusting the contact members toward and from each other.

4. The combination with an electric circuit, of a heating unit therein having an expansible core, spring plates extending across the outer ends of the core, said plates having insulating members against which the terminals of the core bear, a supporting base for the core said base having a standard disposed substantially parallel with one of the spring plates, a bracket fixed to the standard and extending substantially parallel with the core, a permanent magnet fixed to the bracket having its outer end adjacent the other of said spring plates, said last-named spring plate having an armature adapted to be attracted by said magnet, said core adapted to bear on the same side of the last-named spring plate that carries the armature, and contact members in the circuit, one carried by the last-named spring plate, and the other carried by the bracket, said bracket having a forked outer end and said magnet being of a horseshoe form, a spring plate fixed to the forks of the bracket and crossing above the magnet, a rod adjustable on said last-named spring plate, and contact members, one on the rod and the other on the armature-carrying spring plate, one of said contacts forming a socket and the other a ball to fit said socket.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ARTHUR E. WEED.

Witnesses:
JOHN H. HERRING,
F. E. MAYNARD.