Aug. 23, 1932. W. L. LINDGREN 1,873,436

THERMOSTATICALLY CONTROLLED SWITCH

Filed June 18, 1930

FIG. 1.

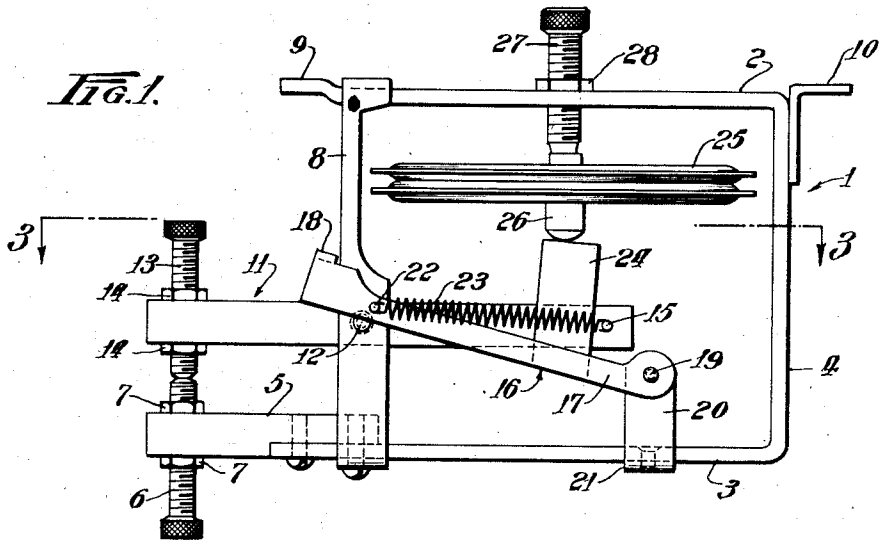


FIG. 2.

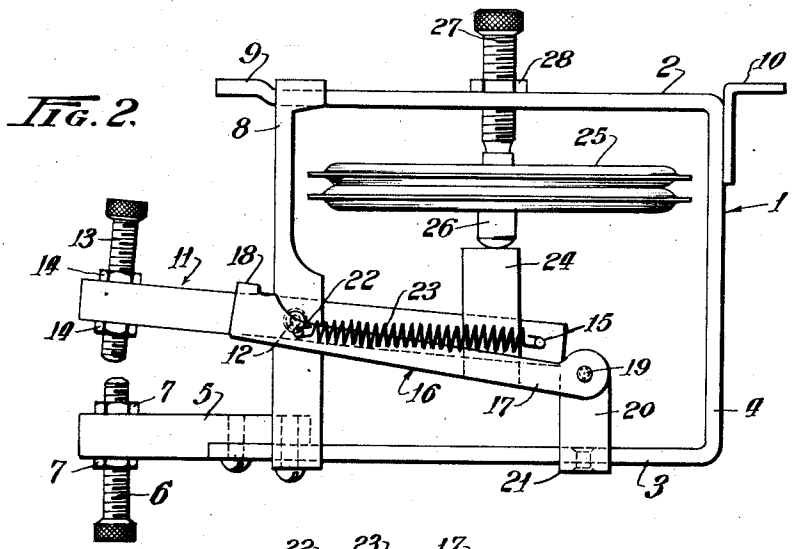
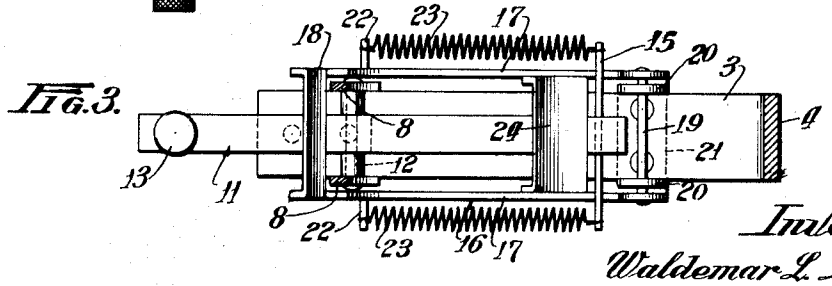


FIG. 3.



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UNITED STATES PATENT OFFICE

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THERMOSTATICALLY CONTROLLED SWITCH

Application filed June 18, 1930. Serial No. 462,232.

This invention relates to improvements in thermostatically controlled switches and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The primary object of the invention is to provide a switch for making and breaking an electric circuit with a quick snap action, at predetermined high and low temperatures, which switch is not only positive in operation but is so simple in construction as to be capable of being produced at a low cost.

Another object of the invention is to provide a switch of this kind wherein the parts are so correlated that it is impossible for the movable contact carrying arm thereof ever maintaining a point in its movement wherein it will have a vibrating or fluttering action with respect to its associated fixed contact, with resulting quick burning out and disturbance to neighborhood radio receiving sets.

These objects of the invention as well as others together with the many advantages thereof will more fully appear as I proceed with my specification.

In the drawing:—

Fig. 1 is a view in side elevation of my improved switch with the parts in the relative position wherein they have made contact to close an electric circuit.

Fig. 2 is a view similar to Fig. 1 with the parts in the position they occupy to break contact to open said circuit.

Fig. 3 is a horizontal sectional view through the switch as taken on the line 3—3 of Fig. 1.

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawing:—1 indicates as a whole the frame or support for the various parts of the switch, which frame is substantially U-shaped and comprises parallel top and bottom members 2 and 3 respectively connected together at one end by an end member 4. The switch is operative in any position and is shown in Figs. 1 and 2 with the top and bottom members 2 and 3 arranged horizontally. Preferably said frame is made from a strip of flat stock bent into the U-shape shown.

On the free end of the bottom member 3 of the frame and extending there beyond is secured a bar 5 of insulation, carrying a fixed contact member 6 to which one terminal of a current conductor (not shown) may be secured in any suitable manner. Said contact member 6 is in the form of a screw and on the same are lock nuts 7 whereby the said contact member may be quickly and accurately adjusted.

The free ends of the members 2 and 3 are connected together by laterally spaced members 8—8 and the free end of the member 2 has an extension 9 which together with a bracket 10 on the other end of said member provides suitable means whereby the frame as a whole may be secured to any suitable supporting member.

11 indicates as a whole a bar made of suitable insulating material and which is located between and is pivoted at a point intermediate its ends as at 12 to the members 8—8 for a rocking movement. On the outer end of said bar is secured a contact member 13 to coact with the fixed contact 6 and to said contact member 13, the terminal of a second current conductor (not shown) may be secured in any suitable manner. The contact member 13 is also in the form of a screw and on the same are lock nuts 14 whereby the said contact may be quickly and accurately adjusted with respect to the associated fixed contact member 6. On the other or inner end of the bar 11 is fixed a cross pin 15 that projects laterally beyond each side of said bar and the purpose thereof will soon appear.

16 indicates a swinging lever comprising laterally spaced arms 17—17 connected together at their outer ends as by a cross member 18 and pivoted at their inner ends as at 19 to the arms 20 of an upstanding bracket 21 rising from the bottom member 3 of the frame 1. The outer end of this lever straddles the members 8—8 as well as the rocking member 11 and secured to each arm 17 near said outer end is a laterally extending pin 22. Springs 23, connect the pins 22 on the lever arms 17 with the extensions of the pin 15 on the member 11. Near their inner ends the arms 17 are connected together by a bridge piece

24 that straddles the inner end of rocking member 11.

25 indicates a temperature responsive device in the form of a pair of expansible and contractible bellows like wafers and axially secured to the bottom wafer is a stud 26 to engage the bridge piece 24 before mentioned and axially secured to the top wafer is a screw 27 that has threaded engagement in the top member 2 of the frame. By means of this screw the wafers may be accurately adjusted toward and away from the bridge piece and when once adjusted may be secured in position by a lock nut 28 on said screw. It is apparent that when the wafers expand and contract under changes in temperature of the surrounding atmosphere, the stud 26 is caused to move in one direction or the other therewith.

When the wafers are contracted the contacts 6 and 13 are engaged and the pins 22 on the lever arm 17—17 are disposed in a plane above that of the pivot 12 for the member 11 with the result that the springs 23 tend to swing the inner end of the member 11 upwardly and the outer end of said member downwardly so that the contacts are thus maintained engaged and the associated circuit is held closed.

So soon as the wafers 25 start to expand under the action of a higher temperature, the stud 26 starts to depress the bridge piece 24 and with it the lever 16. In the downward swing of said lever, there is no movement imparted to the member 11 until the pins 22 pass through the plane of the pivot 12 when the springs 23 will tend to swing the inner end of said member downwardly and the other end upwardly, thus breaking engagement of the contact 6 and 13 with a snap action and opening the circuit.

In the movement of the lever 16 as described the spring 23 is being expanded until the pins enter and pass through the plane of the pivot 12 so that it is impossible for the pins 22 to remain in said plane which is the critical point where if a balance were attained a fluttering or vibrating action would result between the contacts which is objectionable, as apparent.

So long as the wafers are expanded the pressure thereof through the stud 26, because of its engagement with the bridge piece 24, will hold the parts with the contacts engaged. However, so soon as the wafers contract, the spring 23 will tend to swing the lever 16 upwardly but no movement of the member 11 occurs until the pins again swing through and beyond the plane of the pivot 12 when the contact 13 swings away from the contact 6 with a quick snap action so that there is no arcing between the contacts on their breaking or separating.

The parts are few in number and are strong and rugged and may be quickly assembled and adjusted for their intended purpose. The contacts make and break with a quick snap action so that arcing is eliminated and there is no chance for any vibrating or fluttering action with consequential ether disturbance and burning out of contacts.

While in describing my invention, I have referred in detail to the form and arrangement of the various parts thereof, the same is to be considered merely as illustrative so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:—

1. A switch of the kind described embodying therein a U-shaped frame comprising top and bottom bars connected together at one end, a pair of laterally spaced members connecting the other ends of said bars, a contact fixed to one end of the bottom bar, a rockable member disposed between and pivoted to said laterally spaced members, a contact on one end of said rockable member to coact with the fixed contact member, a pair of lever arms pivoted to the frame at one end and connected together at the other end and arranged one on each side of said pair of laterally spaced members, a bridge connecting said levers near their other ends and straddling the other end of said rockable member, pins extending from opposite ends of said rockable member, pins on said levers near their connected together ends, springs connecting said pins on said rockable member with the pins on said lever arm ends and a device capable of changing its dimension under temperature changes and engaged with the bridge of said levers for actuating the same in one direction to change the position of the pins on the lever ends with respect to the pivotal axis of said rockable member.

2. A switch of the kind described embodying therein a U-shaped frame comprising top and bottom bars connected together at one end, a pair of laterally spaced members connecting the other ends of said bars, a contact fixed to one end of the bottom bar, a rockable member disposed between and pivoted to said laterally spaced members, a contact on one end of said rockable member to coact with the fixed contact member, a pair of lever arms pivoted to the frame at one end and connected together at the other end and arranged one on each side of said pair of laterally spaced members, a bridge connecting said lever arms near their other ends and straddling the other end of said rockable member, pins extending from opposite ends of said rockable lever, pins on said lever arms near their connected together ends, springs connecting said pins on said rockable member with the pins on said lever arm ends, a temperature responsive bellows wafer depending from the top bar of the frame and engaged with the bridge part of the lever and

acting upon expansion to swing said lever to move the pins thereon through the plane of the pivotal axis of said rockable member.

3. A switch of the kind described embodying therein a frame including top and bottom frame members connected together at one end, a rockable member pivoted at a point between its ends to said frame and carrying a contact device, a swingable lever pivoted to the frame near its bottom member, a spring connected at one end to the other end of said rockable member and connected at its other end to said lever, the last mentioned connection for said spring being normally arranged to one side of the plane of the pivotal connection for said rockable member and a temperature responsive expansible and contractible member depending from the top member of the frame and operatively arranged to engage said lever to swing the same to bring its connection with the spring to the other side of the plane of said pivotal connection for said rockable member when said temperature responsive member expands.

4. A switch of the kind described embodying therein a frame including top and bottom frame members connected together at one end, a rockable member pivoted at a point between its ends to said frame and carrying a contact device, a bracket secured to the bottom member of the frame and comprising upstanding laterally spaced arms, a swingable lever comprising laterally spaced lever members and a bridge piece connecting the same and which lever members are pivoted to the upstanding spaced arms of the bracket, springs each connected at one end to the other end of the rockable member and each connected at its other end to said lever members, the last mentioned connections for said springs being normally arranged to one side of the plane of the pivotal connection for said rockable member and a temperature responsive expansible and contractible member depending from the top member of the frame and normally engaged with the bridge connecting the lever members to swing said lever members to bring their connections with the springs to the other side of the plane of said pivotal connection of said rockable member when said temperature responsive member expands.

5. A switch of the kind described embodying therein a frame including top and bottom frame members connected together at one end, a rockable member pivoted at a point between its ends to said frame and carrying a contact device, a swingable lever pivoted to said frame near its bottom member, a spring connected at one end to the other end of said rockable member and connected at its other end to said lever and a temperature responsive member depending from and adjustably secured to the top member of the frame and engaged with a part of said lever and acting in the change of dimensions therein to swing said lever to rock the rockable member in one direction or the other through the agency of the spring.

In testimony whereof, I have hereunto set my hand, this 16th day of June, 1930.

WALDEMAR L. LINDGREN.