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ELECTRICAL CIRCUIT CONTROLLING MECHANISM

Original Filed July 9, 1928

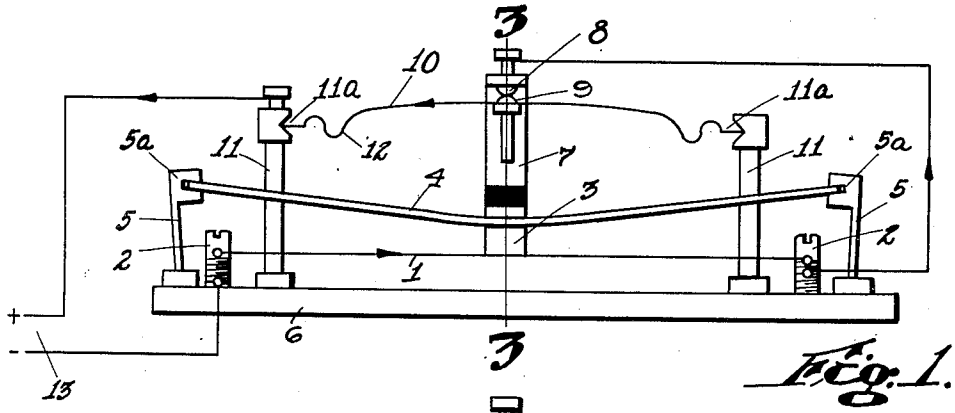

Fig. 1.

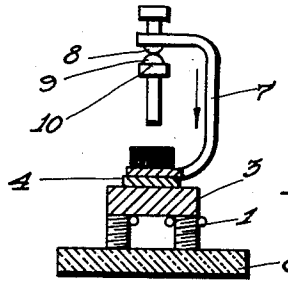

Fig. 3.

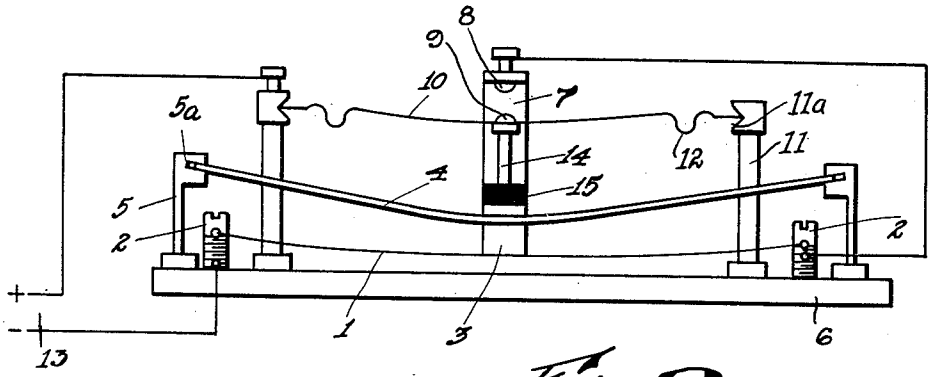

Fig. 2.

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ELECTRICAL CIRCUIT CONTROLLING MECHANISM

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Original application July 9, 1928, Serial No. 291,441. Divided and this application May 23, 1932, Serial No. 612,933

6 Claims. (Cl. 200—113)

The present application is a division of my application Serial No. 291,441 filed July 9, 1928, since issued as Patent No. 1,868,500 for an Electrical circuit controlling mechanism of the type in which the expansion and contraction of an electrical conductor, or filament, due to the passage of current therethrough, is employed to mechanically operate an improved device for making and breaking an electrical circuit.

The object of the invention covered by the present application is to provide a mechanism of the above indicated type, wherein the expansion and contraction of the current carrying filament is employed to effect the movement of a circuit controlling member in a direction transverse to the longitudinal axis of the filament, as distinguished from the mechanism claimed in my aforesaid original application Serial No. 291,441, wherein the expansion and contraction of the current carrying filament is transmitted to the controlling member in the direction of the filament axis. The above and other advantageous features of the invention will hereinafter more fully appear, reference being had to the accompanying drawing, in which:—

Fig. 1 is a view in side elevation of a device embodying the invention.

Fig. 2 is a view similar to Fig. 1, showing the parts in a different position.

Fig. 3 is a vertical sectional view along the line 3—3 of Fig. 1.

Like reference characters refer to like parts in the different figures.

Referring to the drawing, the mechanism consists of an expansible current carrying member, or filament 1, of one or more strands, secured at its ends to anchor posts 2, 2, one post 2 being turnable so as to control the tension of the filament 1, which has several turns wrapped around the adjusting post 2. Normally, the adjustment of the filament 1 is such that when the filament is in a cold condition, with no current flowing therethrough, there is sufficient tension in the filament 1 so that it extends in a substantially horizontal plane between the anchor posts 2, as shown in Fig. 1. The middle portion of the filament 1 has in engagement therewith a block 3, carried by a resilient member 4, the ends of which are received in notched heads 5*a* provided by arms 5 extending above the base 6 preferably of insulating material which carries the anchor posts 2. The resilient member 4 is flexed between the heads 5*a*, so that the block 3 bears upon the taut filament 1 with a pressure, which however is not enough to bend the filament 1 downwardly.

The flexed member 4 carries a yoke 7 extending upwardly in the form of a U and carrying at its upper end a contact 8 which bears on a contact 9 carried by a spring contact plate 10. The contact plate 10 is arched upwardly and is received at its ends in notches 11*a* provided in stationary standards 11 extending upwardly from the base 6. The contact plate 10 provides near its end loop portions 12 which, being under compression, tend to maintain the contact 9 in engagement with the contact 8 in the position shown in Fig. 1.

Current is adapted to be led to one anchor post 2, from which it passes through the filament 1 to the other anchor post 2 and from there to the contact 8 on the yoke 7. With the contacts 8 and 9 in engagement as shown in Fig. 1, current will flow through the plate 10 to one standard 11, and from there back to the source 13. When current flows as indicated by the arrows in Fig. 1, the filament 1 heats up, due to the passage of the current, and the resulting elongation thereof causes the filament 1 to sag, as indicated in Fig. 2. When this occurs, the block 3, carried by the flexed member 4, follows the filament 1, due to the initial flexure of the member 4, the yoke 7 moving downwardly with the member 4, as the filament 1 sags downwardly. As previously pointed out, the contact plate 10 is arched upwardly, and it is apparent from Fig. 1 that when the downward movement of contact 8 carries the contact 9 below a line joining the ends of the contact plate 10, the plate will be suddenly snapped to the position shown in Fig. 2 to separate the contacts 8 and 9. The plate 10 is then arched downwardly and its downward position is limited by the engagement of a pin 14 carried thereby with a stop 15 carried by the member 4, the stop 15 being preferably made of insulating material.

When the contact plate 10 is snapped from the position shown in Fig. 1 to the position shown in Fig. 2, the disengagement of the contacts 8 and 9 interrupts the flow of current through the filament 1, whereupon the latter contracts as it cools, until it again assumes the position shown in Fig. 1. The resulting upward movement at the center of the flexed member 4 causes the stop 15 to raise the pin 14 until the contact 9 moves above the line joining the ends of the contact plate 10, whereupon the contact plate 10 is snapped to its upper position, to cause the

contact 9 to re-engage the contact 8 at the end of a predetermined interval following their disengagement.

It is obvious that as long as current is supplied to the device from the source 13, the intermittent expansion and contraction of the filament 1 will cause the contacts 8 and 9 to be alternately engaged and disengaged, just as in the other embodiments of the invention described in my aforesaid application Serial No. 291,441. The device shown herein is extremely sensitive in its operation, by reason of the fact that a very slight elongation of the filament 1 due to passage of current, will directly result in movement of the yoke 7 followed by separation of the contacts 8 and 9 after a predetermined interval. Furthermore, the device is very reliable in its operation, since the filament 1 itself does not have to develop any mechanical force to operate the contact carrying plate 10, the energy stored up in the member 4, by reason of its initial flexure, being sufficient to operate the contact carrying yoke 7.

I claim,

1. In an electrical circuit controlling device, the combination with a separately movable contacts and a filamentary electrical conductor having its ends fixed and normally maintained in a taut condition, of a member pressing on said filamentary conductor adapted to convey movement to both of said contacts upon expansion or contraction of said conductor due to a change in the temperature thereof and means for separating said contacts after they have moved in unison a predetermined distance.

2. In an electrical circuit controlling device, the combination with separately movable contacts and a filamentary electrical conductor having its ends fixed and normally maintained in a taut condition, of a member pressing on said conductor adapted to move in a direction transverse to the longitudinal axis thereof, upon expansion or contraction of said conductor, and thereby impart movement to both of said contacts for a predetermined period.

3. In an electrical circuit controlling device, the combination with separately movable contacts and a filamentary electrical conductor having its ends fixed and normally maintained in a taut condition, of a flexible element carrying one contact and pressing on said filamentary conductor, sagging of said conductor due to the passage of electric current therethrough permitting movement of said contact and means for causing the other contact to move in unison with the filament controlled contact for a predetermined distance.

4. In an electrical circuit controlling device, the combination with separately movable contacts, means for biasing said contacts toward, or away from, each other and a filamentary electrical conductor having its ends fixed, of means for biasing one of said contacts in the direction of said filamentary conductor, changes in length of said conductor due to the passage of electric current therethrough causing the engagement, or disengagement, of said contacts after current has passed through said conductor for a predetermined period.

5. An electrical circuit controlling device comprising a filamentary electrical conductor having its ends fixed and normally maintained in a taut condition, a contact carried by a flexible element pressing on said filament conductor and a second contact carried by a resilient member adapted to press said contacts together in one position and to hold said contacts apart in another position, expansion of said conductor due to the passage of current therethrough causing said contacts to move in unison a predetermined distance followed by their separation.

6. An electrical circuit controlling device comprising a filamentary electrical conductor having its ends fixed and normally maintained in a taut condition, a contact carried by a flexible element pressing on said filament conductor and a second contact carried by a resilient member adapted to press said contacts together in one position and to hold said contacts apart in another position, expansion of said conductor due to the passage of current therethrough causing said contacts to move in unison a predetermined distance followed by their separation, contraction of said conductor upon cooling causing reengagement of said contacts after a predetermined interval.

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