C. C. WHITTAKER.

CONTROL APPARATUS.

APPLICATION FILED DEC. 2, 1916.

1,361,947. **Patented Dec. 14, 1920.**

Fig. 1.

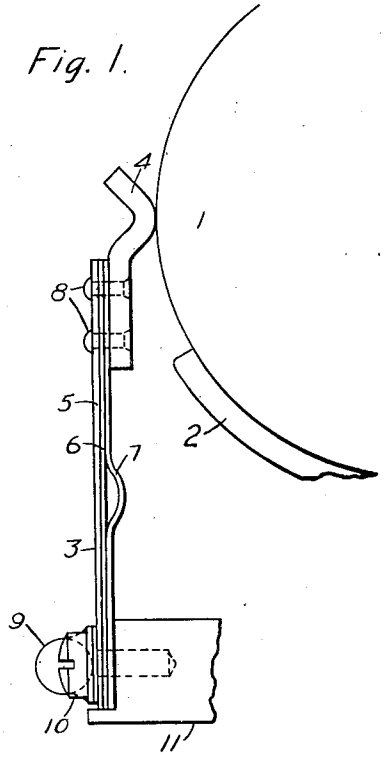
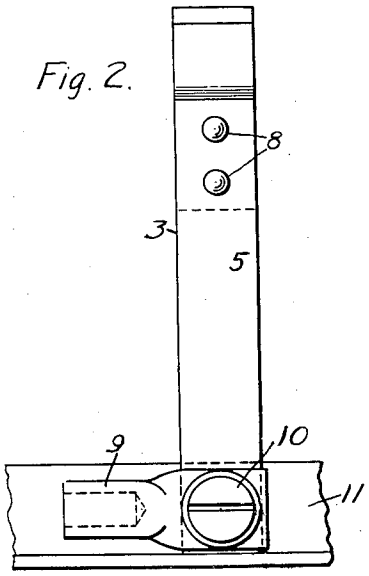


Fig. 2.



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CONTROL APPARATUS.

1,361,947. Specification of Letters Patent. Patented Dec. 14, 1920.

Application filed December 2, 1916. Serial No. 134,763.

To all whom it may concern:

Be it known that I, CHARLES C. WHITTAKER, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Control Apparatus, of which the following is a specification.

My invention relates to control apparatus and especially to contact fingers for drum controllers and the like.

The object of my invention is to provide a contact finger which shall automatically increase its exerted pressure upon a contact surface in accordance with the increase of finger temperature, caused particularly by weakness of biasing springs and temporarily poor contact by the finger.

More specifically stated, it is the object of my invention to provide a contact finger embodying a plurality of flat spring members having materially different temperature co-efficients of expansion, the spring member having the greater co-efficient being located remote from the contact surface to overcome the action of the other spring member in the direction of increasing the contact pressure, upon an increase of finger temperature.

My invention may best be understood by reference to the accompanying drawing, wherein Figure 1 is a view, in side elevation, of a contact finger constructed in accordance with my present invention and also showing the relations of a control drum and a stationary supporting means for the finger; and Fig. 2 is a plan view of the contact finger that is shown in Fig. 1.

Referring to the drawing, the structure shown comprises a control drum 1, or the like, having any suitable number of contact segments 2 of a familiar type upon which a plurality of my control fingers 3 are adapted to bear to complete any desired electrical circuit, as will be understood.

The contact finger 3 comprises a tip 4 of a familiar type, a flat spring member 5 of some material having a relatively great temperature co-efficient of expansion, such as phosphor bronze or spring brass, and a second flat spring member 6 of similar dimensions but having a relatively low temperature co-efficient of expansion, such as steel the spring member 5 being located on the remote side of the finger from the drum contact segment 2, for a purpose to be described.

A suitable flexible conducting shunt 7 of a well-known type, composed, for example, of braided copper, is located in parallel relation to the spring members 5 and 6, a plurality of rivets 8 serving to suitably electrically and mechanically connect the spring members, the conducting shunt and the contact tip; while, for the purpose of permitting connection of the contact finger to an electrical circuit, a terminal member 9 may be secured to the end of the contact finger that is remote from the contact tip by means of a suitable screw 10, or other circuit-connecting means, that rigidly attaches the contact finger to a finger-base 11 of any suitable insulating material, in accordance with a familiar practice.

Assuming that the drum controller 1 is rotated in any suitable manner to effect contact between the segment or segments 2 thereof and the contact tip or tips 4, my present finger acts similarly to contact fingers of the prior art in that a suitable contact pressure is exerted by the resilient members 5 and 6, acting in conjunction, while the conducting shunt 7 serves to carry practically all of the current and thus prevent injury of the spring members by the traversal therethrough of relatively heavy currents. However, if temporarily poor contact between the tip 4 and the segment 2 obtains, by reason of weakness of the spring members or for any other cause, such poor contact causes heating of the contact surfaces, as is well known, and, consequently, the temperature of the contact finger is correspondingly increased.

Since the outer spring member 5 has a greater temperature co-efficient of expansion than the inner spring member 6, it follows that the contact finger will be arched in a concave sense with respect to the contact segment 2, or, in other words, the joint action of the two spring members will cause greater pressure to be exerted between the contact tip 4 and the segment 2. Such increased pressure will effect a reduction of the finger temperature and, therefore, a balanced condition will be automatically reached, wherein the contact pressure is just sufficient to prevent further rise of finger temperature by reason of poor contact.

I do not wish to be restricted to the

specific structural details, arrangement of parts or materials specified in the foregoing description, since various modifications thereof may be made without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. A control finger for drum controllers embodying means for automatically increasing its exerted contact pressure on the drum, upon an increase in the finger temperature.

2. A contact finger for movable controller members embodying means for automatically varying the pressure exerted upon the controller member in accordance with variations of finger temperature.

3. In a controller, the combination with a contact surface, of a contact finger adapted to bear thereupon and embodying means for automatically increasing the contact pressure, upon a temperature increase of the finger by reason of temporarily poor contact.

4. In a drum controller, the combination with a contact surface, of a contact finger adapted to bear thereupon and embodying means having different temperature co-efficients of expansion for automatically increasing the contact pressure on said surface in accordance with increases of finger temperature.

5. In a controller, the combination with a contact surface, of a contact finger adapted to bear thereupon and embodying resilient members having different temperature co-efficients of expansion, the member having the greater co-efficient tending to overcome the action of the other member in the direction of increasing the contact pressure, upon an increase of finger temperature.

6. In a controller, the combination with a contact surface, of a contact finger adapted to bear thereupon and embodying a contact tip and a plurality of flat spring members secured thereto and having different temperature co-efficients of expansion.

7. In a controller, the combination with a contact surface, of a contact finger adapted to bear thereupon and embodying a contact tip and a plurality of flat spring members secured thereto and having different temperature co-efficients of expansion, the member having the greater co-efficient being located on the side remote from said contact surface.

8. In a controller, the combination with a contact surface, of a contact finger comprising a tip adapted to bear thereupon, a circuit-connecting member, a plurality of flat spring members secured between said tip and said connecting member and having different temperature co-efficients of expansion, the member having the greater co-efficient being located on the side remote from said contact surface, and a conducting shunt secured in parallel relation to said spring members.

9. A contact finger for drum controllers embodying individually resilient means having different temperature co-efficients of expansion for increasing contact pressure upon the controller surface in accordance with temperature increases.

10. A contact finger comprising a tip, a plurality of flat spring members secured thereto and having different temperature co-efficients of expansion, and a conducting shunt secured in parallel relation to said spring members.

In testimony whereof, I have hereunto subscribed my name this 23rd day of Nov., 1916.

CHARLES C. WHITTAKER.