Dec. 28, 1926. 1,612,318

L. G. RILEY

CONTROL APPARATUS

Filed Feb. 20, 1923

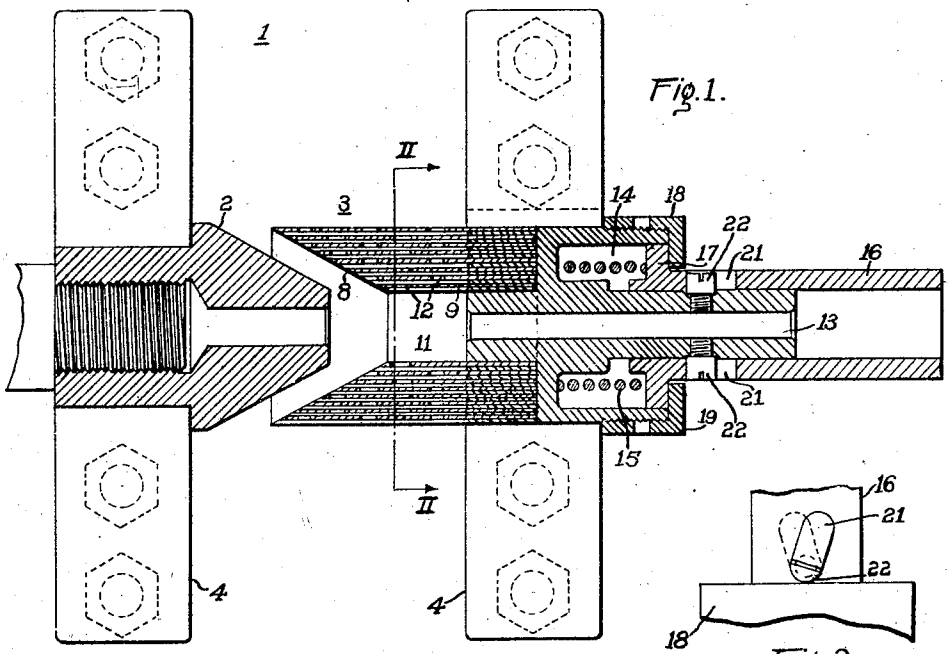


Fig. 1.

Fig. 3.

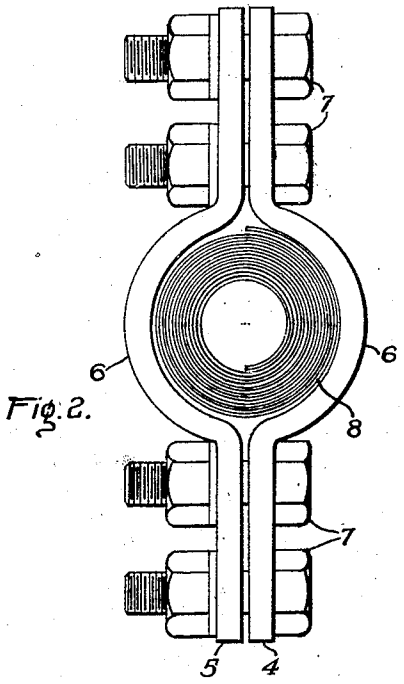


Fig. 2.

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Patented Dec. 28, 1926. 1,612,318

UNITED STATES PATENT OFFICE.

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CONTROL APPARATUS.

Application filed February 20, 1923. Serial No. 620,312.

My invention relates to electrical switches or control apparatus and it has special relation to a terminal or contact member therefor.

An object of my invention is to provide a contact terminal of the character described comprising a continuous ribbon of conducting material that is machined to engage a cone of conducting material and in which the contact surface for a given space is much greater than in prior contact members used for the same purpose.

Another object of my invention is to provide a contact terminal comprising a plurality of layers of a spirally wound continuous ribbon of conducting material and having spacing material between each of the layers.

A further object of my invention is to provide a contact terminal having ventilating means whereby a cooling medium may pursue a tortuous path through the contact member.

Another object of my invention is to provide a switch having a plurality of relatively movable contact members and means providing a rotary wiping movement after engagement has been effected.

These and other objects, as well as details of construction, whereby my invention may be utilized, will be apparent from the following description taken in conjunction with the accompanying drawing, wherein—

Figure 1 is a sectional view in side elevation of a switch according to my invention,

Fig. 2 is a view taken on the line II—II of Fig. 1 looking in the direction indicated by the arrows, and

Fig. 3 is a detail view of a part of the apparatus shown in Fig. 1.

Referring to the drawing, a switch 1 is shown comprising a stationary contact member or terminal 2 of frusto-conical shape and a co-operating movable contact member 3. A pair of metal straps 4 and 5, each having a semi-circular portion 6, are secured by means of bolts 7 to contact terminals 2 and 3, respectively. The contact terminal 3 comprises a plurality of layers 8 of conducting material spaced apart by alternate layers 9 of a suitable spacing material. The contact member 3 may be formed by rolling two continuous strips of conducting metal of different widths about a tubular core 11 until the desired thickness is obtained. The strip of spacing material need only be of sufficient width to lie substantially flush with the outer end of the core 11.

A plurality of apertures 12 are punched in the strips in staggered relation, prior to assembly in the switch, for a purpose to be hereinafter set forth. The outer end of the contact member 3 may be inwardly tapered, after such assembly, to conform to the outer surface of the frusto-conical contact member 2. A longitudinal opening 13 is formed in the core 11 throughout its length. An annular chamber 14 is formed in the main body of the core 11 and a spring 15 is placed therein.

A sleeve 16 is slidably fitted over the outer end of the core 11 and has an annular flange 17 that is adapted to close the open end of the chamber 14 and to engage one end of the spring 15. A closure member or ferrule 18 is threaded on the outer wall of the core 11 and is provided with an inwardly extending annular shoulder 19, which engages with the flange 17 to limit movement of the sleeve 16 by reason of pressure exerted thereon by the spring 15.

A pair of slots 21 are cut through diametrically opposite sides of the sleeve 16 and are angularly disposed with respect to the axis thereof. (See Fig. 3.) A pair of machine screws 22, the heads of which are respectively disposed within the slots 21, are threaded into diametrically opposite sides of one end of the core 11, for a purpose to be hereinafter set forth. The switch 1 may be secured in any convenient manner to a panel board or other means of support, (not shown). The metal strips 4 and 5 are adapted, by means of bolts 7, to receive the terminals of a plurality of conductors.

When it is desired to close the switch 1, pressure is exerted in any suitable manner on the sleeve 16 and is transmitted through spring 15 to core 11, thus causing contact member 3 to move toward stationary contact member 2. Upon engagement of the contact members 2 and 3, the ends of the spiral layers 8 will aline or adjust themselves on the conical surface of contact member 2 in such manner as to provide a continuous contact from end to end of the spiral. Slight variations in the individual turns will be equalized by pressure on adjacent turns.

Continued pressure on the sleeve 16 will compress the spring 15 and by reason of the screw heads 22 being forced to travel in the

angularly related slots 21, a slight rotary movement is imparted to the contact member 3, which tends to more thoroughly seat the contact member and, at the same time, provide a desirable wiping action. For cooling the contact members, a blower or other ventilating means may be connected in any convenient manner to force a cooling medium through sleeve 16. The medium will pass through the longitudinal opening 13 of the core 11 and a portion will escape therefrom following a tortuous path through the respective layers 8 of the contact member 3 by reason of the apertures 12 being disposed in staggered relation. The entire surface of each layer 8 is thus cooled.

It will be seen that I have provided a contact terminal that is simple in construction and which provides a maximum contact surface in a minimum space. One advantage of a contact terminal according to my invention, is that perfect alinement of the contact surfaces is assured at all times. Another advantage is that expansion and consequent loss of pressure caused by heating is eliminated. An added advantage is that by actual tests it has been found that the voltage drop across the terminals of a switch constructed according to my invention is much lower than that in the switches used heretofore.

I do not wish to be restricted to the specific structural details or arrangements of parts herein set forth, as various modifications thereof may be made within 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 terminal member comprising a plurality of layers of a continuous spirally wound ribbon of conducting material having spacing means between each of said layers.

2. A terminal member comprising a plurality of eccentric layers of conducting material provided with spacing material between said layers and having an inwardly tapering open end.

3. A tubular terminal member comprising a plurality of spaced continuous layers of conducting material and having an inwardly tapering open end.

4. A switch comprising a stationary conical contact member and a movable tubular contact member co-operating therewith, said tubular contact member comprising a plurality of spaced layers of conducting material and having an inwardly tapering open end thereby to permit the setting of each layer independently to engage throughout its length the conical member.

5. A switch comprising a plurality of co-operating contact members, one of said contact members comprising a plurality of spaced layers of conducting material arranged to present a conical contacting face, means for actuating the contact members into engagement and means for imparting a rotative movement to one of said contact members relative to the other of said contact members after engagement has been effected to set the layers independently for the making of electrical contact.

6. A terminal member comprising a plurality of spaced layers of conducting material, said layers having a plurality of apertures disposed in staggered relation.

7. A terminal member of tubular form comprising a plurality of layers of a spirally wound ribbon of conducting material, said ribbon having a plurality of apertures disposed in staggered relation.

8. A terminal member comprising a plurality of spaced layers of conducting material and ventilating means whereby a cooling medium may be forced to follow a tortuous path between said layers.

9. A switch comprising a plurality of relatively movable contact members, one of said contact members comprising a plurality of layers of a spirally wound continuous ribbon of conducting material and adapted, upon engagement of said contact members, to equalize variations in pressure on individual layers by pressure on adjacent layers.

10. A switch comprising a plurality of relatively movable contact members, one of said contact members comprising a plurality of spaced layers of a spirally wound continuous ribbon of conducting material, whereby the initial pressure on the individual layers will be equalized by pressure on adjacent layers upon final engagement of said contact members.

11. A switch comprising a plurality of relatively movable contact members, one of said contact members comprising a spirally wound continuous ribbon of conducting material and having a contact surface whereby a continuous contact is formed from end to end of said spiral upon engagement of said contact members.

12. A switch comprising, in combination, a plurality of contact members, one of said contact members including spaced layers of conducting material disposed to present a contact face whereby each layer may be moved laterally and independently to conform to the contour of the active face of the other contact member.

13. A switch comprising, in combination, a plurality of contact members, one of said contact members including spaced layers of conducting material disposed to present a contact face substantially conforming to the contour of the active face of the other contact member and to permit each layer to be set independently, said contact face being formed by the edges of said layers.

14. A switch comprising, in combination,

a plurality of contact members, one of said contact members including spaced layers of conducting material disposed to present a contact face substantially conforming to the contour of the active face of the other contact member, said contact face being formed by the edges of said layers, each layer being adapted thereby to permit distortion by the other contact member independently of the other layers whereby contact is established throughout the circumferential length of the layers.

15. A switch comprising, in combination, a plurality of contact members, one of said contact members including spaced layers of conducting material disposed to present a contact face substantially conforming to the contour of the active face of the other contact member, said contact face being formed by the edges of said layers, said layers being perforated to permit the circulation of a cooling fluid between the layers.

16. In a switch, a contact member comprising a plurality of superimposed layers of conducting material, some of said layers being longer than other layers, thereby providing, at one end, a plurality of spaced layers each layer thereby being disposed to be set independently for the making of contact.

17. In a switch, a contact member comprising a plurality of superimposed layers of conducting material, some of said layers being longer than other layers, thereby providing, at one end, a plurality of spaced continuous layers, said spaced layers being perforated to permit the circulation of a cooling fluid between the layers.

18. A switch comprising, in combination, a plurality of contact members, one of said contact members comprising a plurality of superimposed layers of conducting material, some of said layers being longer than the others, thereby providing, at one end, a plurality of spaced continuous layers, the spaced layers having their ends disposed to conform substantially to the shape of the active face of the other contact member.

19. A switch comprising, in combination, a plurality of contact members, one of said contact members comprising a plurality of superimposed layers of conducting material, some of said layers being longer than the others, thereby providing at one end, a plurality of spaced layers, the spaced layers having their ends disposed to conform substantially to the shape of the active face of the other contact member, the spaced layers being perforated to permit the circulation of a cooling fluid between the spaces defined by said layers of conducting material.

20. A switch comprising, in combination, a plurality of relatively movable contact members, one of said contact members comprising a plurality of superimposed layers of conducting material, some of said layers being longer than others, thereby providing, at one end, a plurality of spaced layers, the ends of said spaced layers being disposed to form a contact surface conforming substantially to the contour of the active face of the other contact member and means cooperative to effect a relative angular movement of the contact members as they are brought into engagement, thereby to aid in the setting of the spaced layers to engage the other contact member throughout the length of the edges forming the contact face.

21. A switch comprising, in combination, a plurality of relatively movable contact members, one of said contact members comprising a plurality of superimposed layers of conducting material, some of said layers being longer than others, thereby providing, at one end, a plurality of spaced layers, the ends of said spaced layers being disposed to form a contact surface conforming substantially to the contour of the active face of the other contact member and means cooperative to effect a relative angular movement of the contact members as they are brought into engagement, thereby to aid in the setting of the spaced layers to engage the other contact member throughout their length, the layers being perforated to permit the circulation of a cooling fluid.

22. A switch comprising, in combination, a plurality of contact members, one of said contact members comprising a plurality of superimposed layers of conducting material, some of said layers being longer than others, thereby providing, at one end, a plurality of spaced layers, the ends of said spaced layers being disposed to conform to the shape of the active face of the other contact member and a tubular core extending into the cylindrical contact member, thereby to provide for the introduction of a cooling fluid.

23. A switch comprising, in combination, a plurality of contact members, one of said contact members comprising a plurality of superimposed layers of conducting material, some of said layers being longer than others, thereby providing, at one end, a plurality of spaced layers, the ends of said spaced layers being disposed to conform to the shape of the active face of the other contact member and a tubular core extending into the cylindrical contact member, thereby to provide for the introduction of a cooling fluid, said spaced layers being perforated to permit the circulation of a cooling fluid between the layers.

24. In a switch, a contact member comprising a plurality of superimposed spirally-wound layers of conducting material, some of said layers being longer than others, thereby to provide, at one end, a plurality of spaced layers, the ends of said spaced layers being disposed to provide a contact face

for the reception of another contact member.

25. In a switch, a contact member comprising a plurality of superimposed spirally-wound layers of conducting material, some of said layers being longer than others, thereby to provide, at one end, a plurality of spaced layers, the ends of said spaced layers being disposed to provide a contact face for the reception of another contact member, and means for retaining said spirally-wound layers in position to form a contact member substantially the shape of a hollow cylinder, said retaining means being adapted to establish electrical contact with said layers, whereby said contact member may be connected to any conductor.

26. A switch comprising, in combination, a plurality of contact members, one of said contact members including a plurality of spaced continuous layers of conducting material disposed to present a contact face consisting of the ends of said layers, and resilient means operable to force said contact members into engagement.

27. A switch comprising, in combination, a plurality of contact members, one of said contact members including a plurality of spaced layers of conducting material disposed to present a contact face consisting of the ends of said layers, resilient means operable to force said contact members into engagement and means cooperative to give the contact members a relative angular movement as they are moved into contact thereby to set each layer independently for the making of contact.

In testimony whereof, I have hereunto subscribed my name this 14th day of February 1923.

LYNN G. RILEY.