

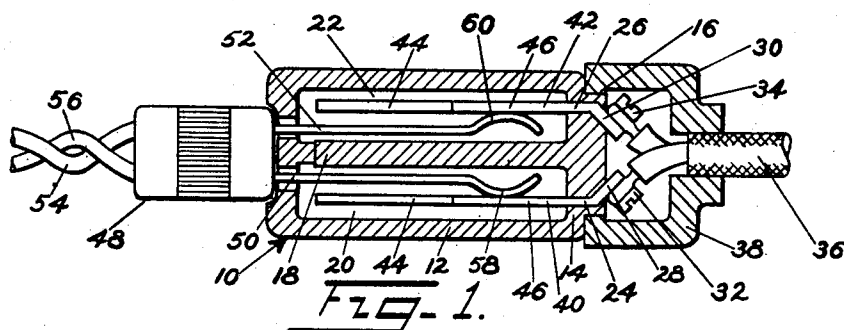
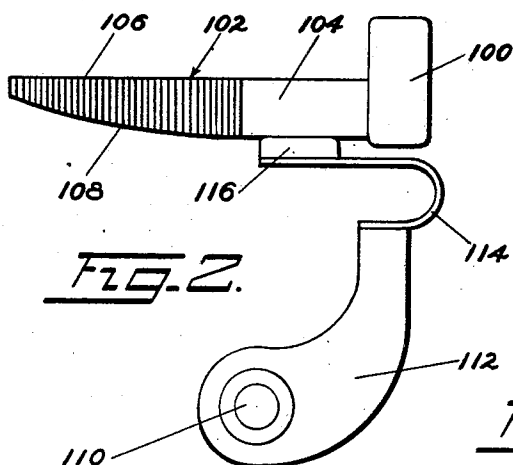
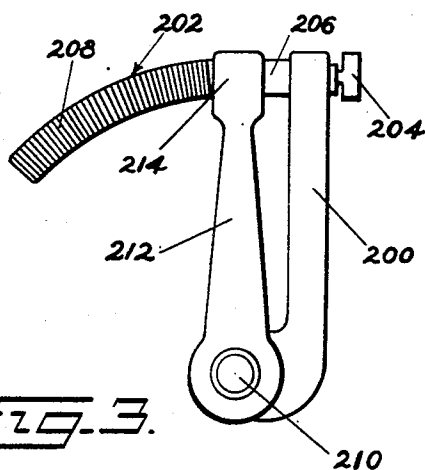
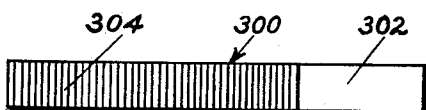
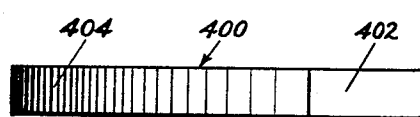
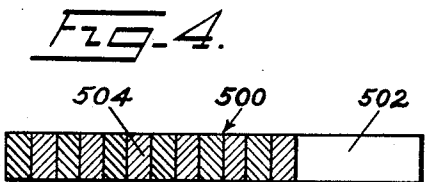
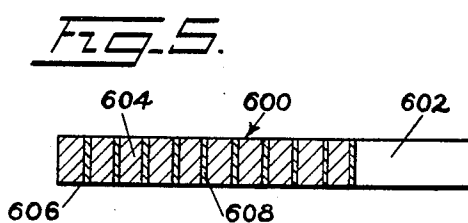
Oct. 9, 1945.

R. J. MILLER

2,386,332

ELECTRICAL CONNECTION

Filed May 31, 1943



INVENTOR.
RAYMOND J. MILLER
BY *O. H. Fowler*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,386,332

ELECTRICAL CONNECTION

Raymond J. Miller, Detroit, Mich., assignor to
Bendix Aviation Corporation, Detroit, Mich., a
corporation of Delaware

Application May 31, 1943, Serial No. 489,216

7 Claims. (Cl. 201-60)

This invention relates to switches for electric circuits, and more particularly to switches for circuits of high voltage.

Heretofore make-and-break switches and connections for high voltage circuits have not proved entirely satisfactory, due to electric arcing incident to closing the circuit. This arcing frequently results in serious injury to the contact and/or contactor in that the cooperative parts are badly burned, and thus the efficiency of the unit is destroyed. It is the aim of the instant invention to overcome this objection.

An object of this invention is to provide a make-and-break connection for an electric circuit wherein the possibility of arcing upon making and breaking the circuit is avoided.

Another object of the invention is to provide a make-and-break switch for an electric circuit so constructed and manipulated that actual physical contact between the cooperative elements is made in advance of electrical contact.

Another object of the invention is to provide a make-and-break switch for an electric circuit so constructed that the flow of current through the switch may be efficiently controlled at all times.

Yet another object of the invention is to provide a make-and-break switch for an electric circuit wherein the contact and contactor of the switch cooperate with one another to constantly increase the flow of current through the switch from substantially nil to maximum current.

A further object of the invention is to provide a make-and-break switch for an electric circuit wherein actual electrical contact between the cooperative elements of the switch may be regulated in successive steps.

Still a further object of the invention is to provide a make-and-break switch for an electric circuit wherein the contact or contactor constitutes a variable resistance.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawing forming a part of this specification, and in which,

Fig. 1 is a sectional view of a connection embodying the invention;

Fig. 2 is a side elevation of one type of switch embodying the invention;

Fig. 3 is a side elevation of another type of switch embodying the invention;

Fig. 4 is a side elevation of an electrical contact composed of a low-conductive material and a high conductive material;

Fig. 5 is a side elevation of an electrical contact including a variable resistance;

Fig. 6 is a side elevation of an electrical contact composed of laminated metal of decreasing resistance; and

Fig. 7 is a side elevation of an electrical contact composed of laminated metal with high resistance inserts.

Referring to the drawing for more specific details of the invention, 10 represents generally an electrical connector including a shell or case 12 open at one end and closed at its other end as by a head 14 having a reduced portion 16. The shell has therein a partition 18 dividing the shell into two compartments 20 and 22, and the partition extends into the open end of the shell to provide independent openings for the compartments.

Corresponding terminals 24 and 26 are supported in the head 14. The terminals include shanks 28 and 30 extended beyond the reduced portion 16 of the head, and binding or set screws 32 and 34 mounted in the shanks serve to secure the respective leads of a cable 36 to the terminals, and a cap 38 slipped over the cable and fitted on the reduced portion 16 of the head serves to house the terminals and the leads.

The terminals have stationary contacts 40 and 42 extended into the respective compartments 20 and 22. As shown, each of these contacts has a free end portion 44 of high or variable electrical resistance material terminating in a low electrical resistance material 46 adjacent the shanks.

A plug indicated generally at 48 has mounted therein contacts 50 and 52 connected to leads 54 and 56 in the conventional manner, and the contacts 50 and 52 have curved end portions 58 and 60, adapted to slidably engage the stationary contacts 40 and 42.

In making the connection, the plug 48 is so manipulated as to place the free ends of the contacts 50 and 52 in the respective compartments 20 and 22 of the shell or case 12 in engagement with the portions 44 of the stationary contacts 40 and 42 having high or variable electrical resistance. When the contacts 50 and 52 engage the extreme free ends of the stationary contacts 40 and 42, the voltage or flow of current is practically nil. However, as the plug 48 is forced to its seat on the shell, the contacts 50 and 52 slide on the fixed contacts 40 and 42 and the flow of current gradually increases until the contacts 50 and 52 engage those portions 46 of the fixed contacts having low electrical resist-

ance, in which position maximum current flow through the connection is attained.

In another embodiment of the invention illustrated in Fig. 2, a terminal 100 has a stationary contact 102 elongated to provide a portion 104 immediately adjacent the terminal having low electrical resistance, and a free end portion 106 having high or variable electrical resistance decreasing gradually from the extreme free end to that portion of the contact having low electrical resistance, and curved as indicated at 108. A terminal 110 has mounted thereon a lever 112 adapted to be moved angularly by a conventional handle, not shown, and connected to the lever as by a spring 114 is a contact 116 of low electrical resistance having slidable engagement with the stationary contact 102.

As the lever 112 is swung to engage the contact 116 with the stationary contact 102, the contact 116 initially engages the free end of the portion 106 having high resistance, and hence admits of but little if any flow of current through the connection. As the contact 116 travels on the curved face 108 of the portion 106 having high electrical resistance, the flow of current gradually increases until the contact 116 engages the portion 104 of the contact 102 where the maximum voltage or flow of current through the connection is attained.

In a further modification of the invention illustrated in Fig. 3, a bracket 200 of suitable insulating material has mounted thereon a stationary contact 202 held against displacement by a terminal 204. The contact has a portion 206 of low electrical resistance and a curved free end portion 208 of high or variable electrical resistance, decreasing gradually from its extreme free end to that portion having low resistance.

A terminal 210 has pivoted thereon an arm 212 movable through an angle in any desirable manner, and the arm has a shoe 214 adapted to travel on the contact 202. The operation of this embodiment of the invention is the same as that of the preceding embodiment.

Various types of contacts are illustrated in Figs. 4, 5, 6 and 7. In the embodiment shown in Fig. 4, a contact 300 has a portion 302 of low electrical resistance, and a portion 304 of high electrical resistance, and the portion 304 is preferably elongated.

In the embodiment illustrated in Fig. 5, a contact 400 has a portion 402 of low electrical resistance, and a portion 404 of variable electrical resistance. The variable resistance is preferably formed of sintered metal more or less porous at one end and relatively dense at its other end adjacent the portion 402 of low electrical resistance.

In the embodiment illustrated in Fig. 6, a contact 500 has a portion 502 of low electrical resistance, and a portion 504 of variable electrical resistance built up by laminated metals of varying electrical resistance.

In the embodiment of the invention illustrated in Fig. 7, a contact 600 includes a portion 602 of low electrical resistance and a portion 604 of

variable electrical resistance. The portion 604 is made of laminated metals comprising a plurality of low electrical resistance portions 606 interleaved with relatively small sections 608 of high electrical resistance. This provides means for gradually stepping up the voltage or flow of current.

While this invention has been described in connection with certain specific embodiments, the principle involved is susceptible of numerous other applications that will readily occur to persons skilled in the art. The invention is, therefore, to be limited only as indicated by the scope of the appended claims.

Having thus described the various features of the invention, what I claim as new and desire to secure by Letters Patent is:

1. An electrical contact comprising a member having a section of low electrical resistance and a section of laminated metals each of different electrical resistance.

2. An electrical contact comprising a member having a short metallic section of low electrical resistance and a relatively long section of sintered metal porous at its free end and dense at its juncture with the section of low electrical resistance.

3. An electrical contact comprising a member having a short metallic section of low electrical resistance, and a section composed of a plurality of varying electrical resistance elements interleaved with metallic sections of high electrical resistance.

4. An electrical connector comprising a shell open at one end and closed at its other end as by a head, a partition dividing the shell into two compartments, terminals mounted in the head, a removable cap on the head for enclosing the terminals, corresponding fixed contacts on the terminals extended into the compartments, each contact having a part adjacent the terminal of low electrical resistance and a free end part of high electrical resistance, and a plug having contacts adapted to be inserted in the compartments in sliding engagement with the stationary contacts.

5. An electrical connection comprising a shell having compartments therein, fixed variable contacts in the compartments, and a plug having contacts adapted to slidably engage the variable contacts.

6. An electrical connection comprising a shell having individual compartments, a fixed variable contact in each of the compartments, and a plug having contacts adapted to slidably engage the fixed contacts.

7. An electrical connection comprising a shell having an open end, a partition in the shell extending into the open end providing individual compartments within the shell, a fixed contact in each compartment varying in density from its free end inwardly, and a plug having contacts adapted to be inserted in the compartments in sliding engagement with the fixed contacts.

RAYMOND J. MILLER.