

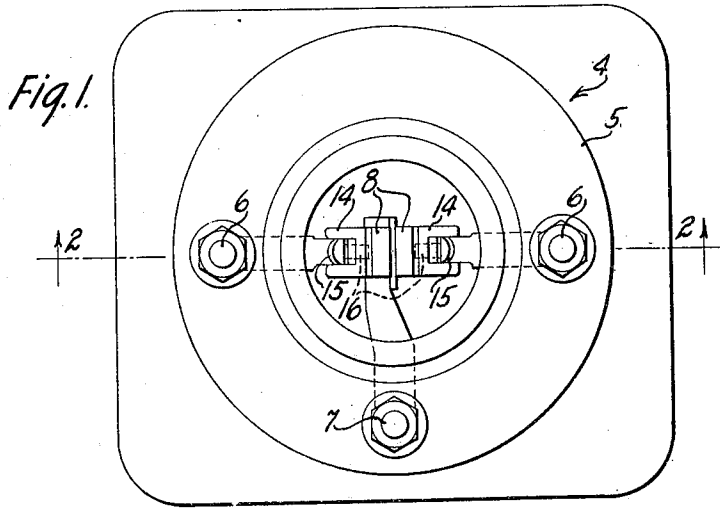
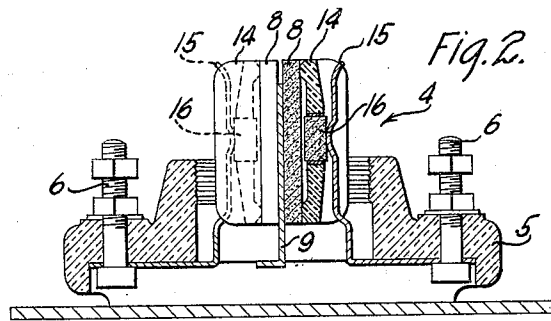
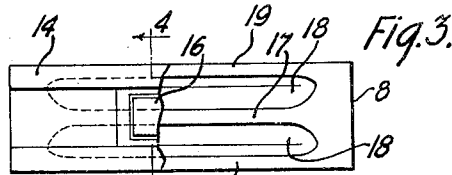
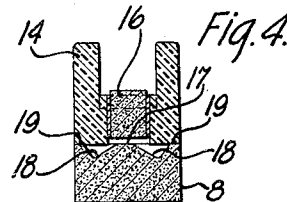
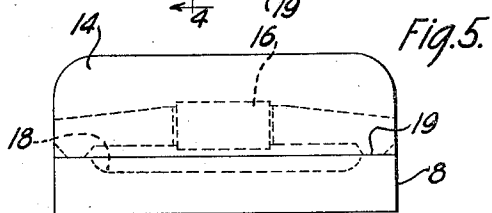
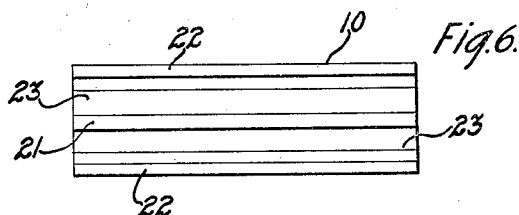
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R. S. HOWARD ET AL

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PROTECTIVE DEVICE

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# UNITED STATES PATENT OFFICE

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## PROTECTIVE DEVICE

Application filed March 31, 1927. Serial No. 179,844.

This invention relates to protective devices, and more particularly to protector blocks or electrodes employed in carbon protective devices.

Protective devices to which this invention is particularly applicable comprise a block of non-conducting material, such as porcelain, having an aperture in which is fixed an insert of conducting material, for example carbon. The insert is depressed a few thousandths of an inch below the surface of the porcelain block to provide a clearance or air gap between its surface and the surface of an opposed block of similar material to which this invention is particularly directed.

An object of the present invention is to provide a protective device which is capable of withstanding a large number of electric discharges before the elements thereof become unserviceable.

The invention contemplates the provision of a pair of protector blocks in which the opposing parallel surfaces are made of a small area compared to the effective arcing area. In accordance with one embodiment of the invention, a block of a large area is provided with a number of grooves to reduce the parallel plane surface presented to a plane surface of an opposing block.

It is believed that a complete understanding of the invention may be had by reference to the following description taken in conjunction with the accompanying drawings, in which

Fig. 1 is a plan view of a protective device embodying features of the invention;

Fig. 2 is a view partly in section taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged plan view partly in section of one form of the electrodes and the holder for one of the electrodes showing the relative positions they occupy when placed in the protector;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a side elevation of the electrodes and the holder shown in Fig. 3, and

Fig. 6 is an enlarged plan view of a modified form of the electrode.

Referring to the drawings in which the

same reference characters designate similar parts in these views, and particularly to Figs. 1 and 2, a protective device is designated generally by the reference numeral 4 and comprises a base member 5 which is provided with a pair of terminals 6—6 by which the protector may be attached to a communicating line (not shown) and a terminal 7 which is connected to ground. A pair of blocks or electrodes, preferably composed of carbon, 8—8 are mounted in contact with an upright metallic member 9 which is electrically connected with the ground terminal 7. A pair of holders 14, preferably composed of porcelain, are pressed against the carbon electrodes by means of springs 15 which contact with inserts or electrodes 16 also preferably composed of carbon carried by the porcelain holders. The springs 15 are conductively connected to the line terminals 6 and therefore serve as electrical conductors in addition to affording resilient holding means for the carbon electrodes. In one specific form of the apparatus, the distance between the carbon inserts 16 and the electrodes 8 is approximately .003 inches so that the line terminals 6 will be normally insulated from the common ground terminal 7. However, when an abnormal surge of energy occurs, such as may be due to a lightning discharge in the vicinity of the associated line, the gap between a carbon insert 16 and an electrode 8 will be bridged by an arc until the abnormal condition has passed when the arc across the gap will be extinguished by reason of the fact that the voltage is no longer sufficient to sustain the arc and the line terminals will again be insulated from the ground.

Experience has shown that after a number of discharges have occurred across the gap between the carbon electrodes they sometimes become permanently connected to ground, thereby rendering the associated circuit inoperative. When a discharge occurs across the gap between the carbon electrodes, particles of carbon which are sometimes of sufficient size and quantity to permanently bridge the gap, are projected from the surface of the electrodes. Also, a raising or heaving of the surfaces is sometimes noticeable

which is in many cases of such proportions as to permanently bridge the gap.

In order to minimize the permanent bridging of the gap as described above and increase the arcing life of the electrodes, the carbon electrode 8 is provided with a narrow plane surface 17 (Figs. 3, 4, 5 and 6) of a reduced area which is parallel to the plane surface of the opposed electrode 16, and sloping away from the surface 17 on either side, is an inclined surface 18 forming an angle of approximately 30 degrees with the plane of the surface 17. In this manner a sufficiently large area remains in close spacial relation to the electrode 16 to start an arc, and the area which is apt to become bridged is greatly reduced. It has been found that by sloping the surfaces 18 as described above, the effective arcing area of the electrode 8 is greater than the area of the surface 17 and is substantially the same as it would be if the entire arcing area of the electrode 8 remained in the same plane as the surface 17, while by sloping the surfaces 18 with respect to the surface 17 a greater distance intervenes between the sloping surfaces and the opposing electrode, which greatly reduces the liability of the gap becoming bridged by an arc resulting in a considerable increase in the arcing life of the electrodes. It appears that when the electrode 8 is provided with a surface 17 of approximately one-third of the width of the arcing surface of the electrode 16, it will provide sufficient area in close proximity to the electrode 16 to start an arc which after starting will spread to the inclined surfaces 18. In cases where it is desirable to employ the enclosed arc type of protector, a ridge 19 in the same plane as the surface 17 is provided around the entire periphery of the face of the electrode 8 as illustrated in Figs. 3, 4 and 5, giving the electrode the appearance of a rectangular block with two longitudinal grooves.

A modified form of electrode 10 having a plane surface 21 is shown in Fig. 6 in which ridges 22 are located only along two sides of the electrode and inclined surfaces 23 extend the full length of the electrode forming grooves completely across the entire block. This type of block is somewhat simpler to manufacture in large quantities.

It will be understood that the embodiment of the invention herein described and illustrated is merely a convenient and useful form of the invention which is capable of many other modifications without departing from the spirit and scope of the invention.

What is claimed is:

1. In a protector, an electrode having a plane arcing surface for starting an arc and a plane surface inclined with respect to the first surface for increasing the effective arcing area of the electrode.

2. In a protector, an electrode having a plane arcing surface for starting an arc and

areas inclined with respect to said surface for increasing the effective arcing area of the electrode.

3. In a protector, an electrode having a plane arcing surface, and a second electrode having a plurality of plane arcing surfaces, one of which is parallel to the surface of the first electrode and another of which is inclined thereto at such an angle as to cause an arc formed between the first mentioned electrode and the parallel arcing surface to extend over the inclined arcing surface.

4. In a protector, an electrode, a second electrode having a plane arcing surface in close proximity to the first electrode and another arcing surface inclined to said plane surface at such an angle as to cause an arc formed between the first mentioned electrode and the arcing surface to extend over the inclined arcing surface.

5. In a protector, an electrode having a plane arcing surface, a second electrode having a plane arcing surface narrower than the plane arcing surface of the first electrode and parallel therewith, and an arcing surface inclined to said narrow surface at such an angle as to cause an arc formed between the arcing surface of the first mentioned electrode and the said narrow surface to extend over the last mentioned arcing surface.

6. In a protector, an insulating block provided with an insert, and a carbon block provided with a peripheral ridge for contacting with the insulating block, said carbon block being provided with a plane arcing surface opposed and parallel to the arcing surface of the insert and an arcing surface inclined to said plane surface at such an angle as to cause an arc formed between the insert and the plane arcing surface to extend over the inclined arcing surface.

7. In a protector, an electrode having a plane arcing surface, a second electrode having a plane arcing surface parallel to the first mentioned surface and in close proximity thereto, and a plane arcing surface inclined to the parallel arcing surface of the second electrode at an angle of substantially thirty degrees.

8. In an electrical protective device, an electrode having a plane arcing surface, and a second electrode having a cooperating arcing surface adjacent the plane arcing surface and having oppositely disposed arcing surfaces adjacent said cooperating arcing surface and inclined thereto at such angles as to cause an arc formed between the first mentioned arcing surfaces to extend over the inclined arcing surfaces.

9. In an electrical protective device, a pair of electrodes having arcing surfaces spaced uniformly from each other, one of said electrodes having in addition an arcing surface inclined with respect to the first mentioned

surfaces at such an angle as to cause an arc formed therebetween to extend over the inclined arcing surface.

In witness whereof, we hereunto subscribe  
5 our names this 19th day of March, A. D. 1927.

RUSSELL SAMUEL HOWARD.

GEORGE HENDRIE BRODIE.

TERRENCE ONAS WESTHAFFER.

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