June 29, 1954 S. C. KILLIAN 2,682,591

INTERRUPTER SHIELD

Filed May 24, 1952

Fig. 1.

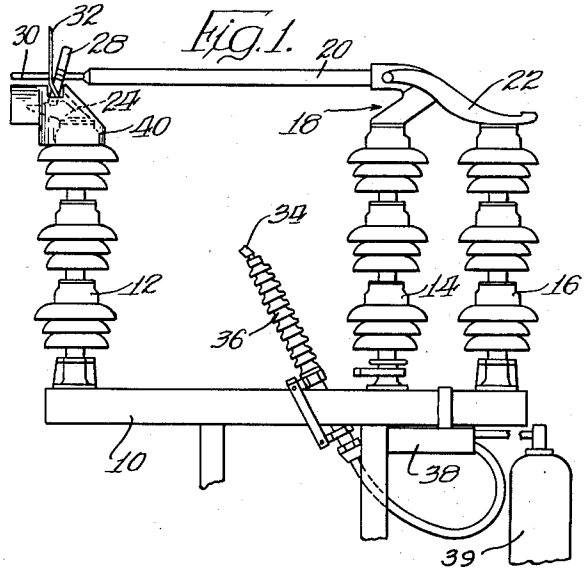


Fig. 3.

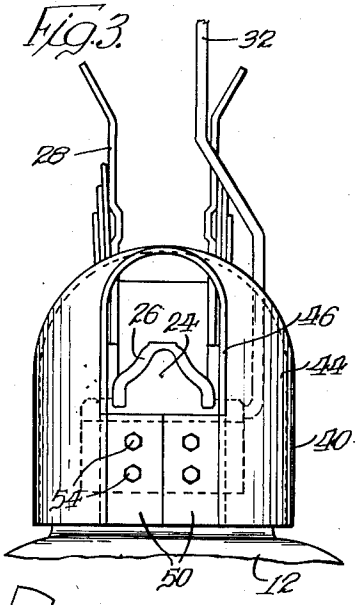


Fig. 2.

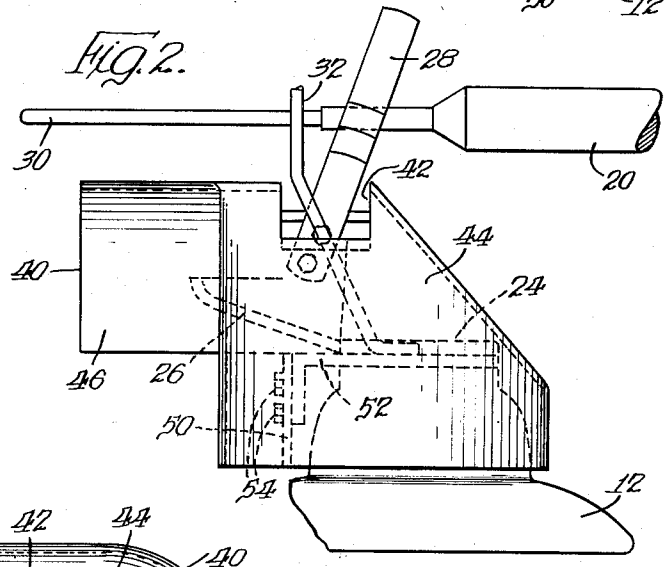
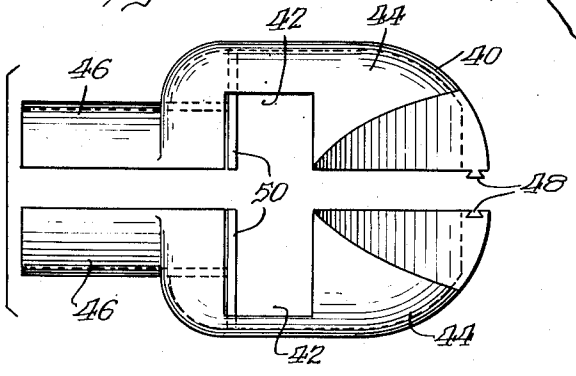


Fig. 4.



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INTERRUPTER SHIELD

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7 Claims. (Cl. 200—148)

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The present invention relates to gas blast air circuit interrupter switches and particularly to shields for such switches to eliminate arcing on incorrect surfaces when the switch is opened.

In high voltage power line installations, considerable difficulty has been encountered heretofore due to arcs playing on wrong points of air circuit interrupter switches. Such arcing results in failure of the switch to break the circuit even though the switch is open and, if winds are blowing across phases, results in phase-to-phase fault. Depending upon the line load, the arcs may be over one hundred feet in length. Various endeavors have been made to eliminate arcing, but none has been entirely successful.

At the present time, air circuit interrupter switches are provided with a contact adapted to be engaged by the switch blade, a horn associated with the contact and adapted to be engaged by the switch blade upon opening and closing movement to prevent arcing at the contact and means for directing a jet or stream of gas over the contact and horn to break any arc that may occur. The provision of a gas stream for quenching the arc has been very successful, but arcing still may occur to incorrect surfaces, thereby defeating the device. For example, the arc can move down the horn onto the contact lug or terminal pad, which is out of the gas stream. Also, if a wind is blowing across phases, the arc tends to lie in a somewhat horizontal plane entirely outside the gas stream. In addition to the foregoing, it has been necessary heretofore to locate the gas nozzle in such position that a part of the stream has been cut off by the contact insulator stack. This has been necessary in order to reduce to a minimum the possibility of arcing in the two manners stated.

It is an object of the present invention to eliminate the possibility of arcing in switches of the character described by providing a shield for insulating all non-insulated parts of the switch that lie outside the gas stream.

Another object of the present invention is to provide an economical insulating shield for interrupter switches that may be conveniently and rapidly associated with the switch to eliminate the possibility of arcing outside the gas stream.

A further object of the invention is the provision of a shield for interrupter switches that accommodates location of the gas nozzle in such position that the full stream of gas may be directed in a wide path over the contact and horn whereby a more efficient interrupter is provided. In other words, the shield of the present invention insulates all parts of the contact and horn mounting to eliminate arcing in the two manners previously defined, so that the gas stream may be played on the contact and horn rather than having to be partially played upon the contact and horn mounting.

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Other objects and advantages of the present invention will become apparent in the following detailed description of a preferred embodiment of the invention, wherein reference is made to the accompanying drawings, in which:

Figure 1 is a side elevation of an air circuit interrupter switch provided with the shield of the present invention;

Figure 2 is a partial side elevation of the contact and horn mounting with the shield of the present invention associated therewith;

Figure 3 is a rear view of the contact mounting and the shield, the view being taken substantially from the left hand side of Figure 2; and

Figure 4 is a top plan view of the shield alone, the view showing the two parts of the shield disassembled.

The switch to which the shield of the present invention is applied is well known in the art. However, reference being had to Figure 1, it is to be briefly pointed out that the switch comprises a channel iron base frame 10, that may be considered as being disposed horizontally. The base or frame 10 carries three insulator stacks 12, 14 and 16, respectively, the middle one, 14, of which carries means, indicated generally at 18, for pivotally mounting a switch blade 20. The insulator stack 16 adjacent the switch blade stack 14 carries a frame support 22 by means of which the switch blade 20 is connected in a high voltage circuit. The third insulator stack 12, at its upper end, carries a terminal bracket 24 including a terminal pad 26 by means of which a contact 28 is connected in the circuit. The contact 28 is preferably U-shaped and adapted for the reception between the legs thereof of a reduced end portion 30 of the switch blade 20. A horn 32 is associated with the contact assembly and extends upwardly above the contact 28 for engagement by the switch blade to prevent or reduce arcing at the contact.

Mounted on the frame 10 between the insulator stacks 12 and 14 is a nozzle 34 for projecting a stream of gas against the contact and the horn. The nozzle 34 is mounted on a porcelain blast tube 36 which is supported on the frame 10 by means of suitable brackets. Associated with the blast tube 36 is a cam and valve box 38

which is also operatively associated with the switch blade **20** for actuation in response to movement of the switch blade to establish communication between the nozzle **34** and a source of gas under pressure, such as the tank **39**. As will be appreciated, the unit **38** includes cam means for actuating a valve or the like at the proper time during movement of the switch blade **20** so that a jet or stream of gas is played over the contact **28** and the horn **32** during opening, or opening and closing, movement of the switch blade.

In conventional structures, the nozzle **34** and the blast tube **36** are normally disposed substantially closer to the contact insulator stack **12** than is indicated in Figure 1 so that the entire stream of air is directed as much as possible against the entire upper end of the insulator stack **12**. The object of such disposition of the nozzle **34** is to bathe the contact **28** and the horn **32** and as much as possible of the terminal bracket **24** with gas so as to prevent to the greatest extent possible arcing from the switch blade to the terminal bracket and pad. However, as will be apparent, the terminal pad **26** is disposed outside of the path of the gas stream since the same is shielded by the top flange of the insulator stack. Accordingly, it has been possible heretofore for arcing to occur between the terminal pad and the switch blade along the horn and, when winds are blowing across phases, for arcing to occur between the terminal pad and the switch blade in an arcuate path extending around the stream of gas. According to the present invention, means are provided for insulating the terminal bracket and pad and for this reason, the nozzle **34** and blast tube **36** may be disposed further away from the insulator stack **12** than has been conventional. According to the present invention, the nozzle **34** and blast tube **36** are so disposed that the entire gas stream may be played in a wide path directly upon the contact **28** and the horn **32** so as to provide a highly efficient arc quenching function.

The insulating shield of the present invention is indicated generally at **40** and comprises a hollow cap-like member adapted to be positioned over the terminal bracket **24** and the terminal pad **26**. The shield is provided in the top wall thereof with an aperture or passage **42** through which the contact **28** and the horn **32** are adapted to extend. The front face of the shield **40** is inclined to accommodate free flow of the gas stream to the contact **28** and the horn **32** and the inclined face also serves the purpose of guiding or directing the gas stream against the contact and the horn. As shown in the drawings, the shield preferably comprises a body portion **44** covering the terminal bracket **24** and fitting closely about the upper end of the insulator stack **12** and a reduced tail portion **46** extending over and covering the terminal pad **26**. Since the body portion **44** projects downwardly over the top of the insulator stack **12** and since the shield provides a complete covering for the terminal bracket and pad, insulation of the contact and horn mounting is insured.

The shield **40** may be formed in various manners and of various materials, but is preferably formed in two pieces or parts from porcelain. The shield is preferably split longitudinally into two halves which are substantially identical. At the forward end of the body portion **44**, the two halves of the shield are provided with cooperating dove-tail portions **48** by means of which the two halves may be connected together (see Figure 4). At the rearward edge of the body portion, each shield half is provided with a transverse wall **50** adapted to be secured to a bracket or plate to connect the two shield halves at the rearward end thereof. The transverse walls **50** of the shield halves are of a height extending from the bottom edge of the body portion **44** to the bottom edge of the tail portion **46** so as to accommodate passage of the terminal pad **26** over the top of the walls.

To mount the shield **40** on a switch, an L-shaped bracket **52** is mounted on the insulator stack **12**. One-half of the shield is then placed on one side of the switch and the other half is then positioned on the other side of the switch but with the front portion thereof above the first half so that the cooperating dove-tail portions **48** may be engaged and the two halves of the shields slid into assembled relation, as is shown in Figures 1 to 3. Thereafter, the transverse wall portions **50** of the two halves may be secured to the vertical leg of the bracket **52**, suitably by means of bolts **54**, to secure the shield to the top of the insulator stack **12**.

If desired, the shield **40** may be made in one piece, in which case the shield **40** is lowered over the horn **32** and the contact **28** and then is tilted to accommodate passage of the terminal pad **26** over the top of the wall portions **50** and into the tail portion **46** of the shield. The shield is then rocked forwardly to fit the body portion **44** thereof over the top of the insulator stack **12**.

As will be appreciated, the shield is such as to prevent arcing from the switch blade to the terminal bracket and pad. Accordingly, the shield provides insulation for all non-insulated metallic portions of the blade and horn mounting at the top of the insulator stack **12**. The shield further accommodates the disposition of the contact **28** and the horn **32** directly in the gas stream and assists in directing the gas against the contact and the horn. Accordingly, the shield of the present invention will prevent arcing in paths lying outside of the gas stream. For this reason, the gas stream will be entirely efficient in quenching arcing to provide a highly efficient interrupter switch. Likewise, the present invention accommodates the provision of a more effective and wider gas stream guided by the inclined front wall of the shield. The front wall of the shield is preferably disposed at a slight inclination to the center line of the gas stream or blast, but may be considered as being generally parallel to the center line of the nozzle or gas stream.

While I have described what I regard to be a preferred embodiment of my invention, it will be appreciated that various changes, rearrangements and modifications may be made therein without departing from the scope of the invention, as defined by the appended claims.

I claim:

1. A shield for air circuit interrupter switches having a contact insulator stack, a terminal bracket and pad carried thereby, and a contact carried by the bracket, said shield comprising a hollow cap-like member formed of insulating material, said member including a body portion adapted to be positioned over the top of the insulator stack, said body portion having an aperture in the top wall thereof for the passage of the contact, said body portion providing an insulated cover for the terminal bracket, said member including a tail portion providing an insulated cover for the terminal pad, and means for securing said member to the insulator stack.

2. A shield for air circuit interrupter switches having a contact insulator stack, a terminal bracket and pad carried thereby, and a contact carried by the bracket, said shield comprising a hollow cap-like member formed of insulating material, said member including a body portion adapted to be positioned over the top of the insulator stack, said body portion having an aperture in the top wall thereof for the passage of the contact, said body portion providing an insulated cover for the terminal bracket, said member including a tail portion providing an insulated cover for the terminal pad, and a bracket adapted to be secured to the stack, said body portion including wall means adjacent the stack adapted to be secured to said bracket.

3. A shield for air circuit interrupter switches having a contact insulator stack, a terminal bracket and pad carried thereby, and a contact carried by the bracket, said shield comprising a hollow cap-like member formed of insulating material, said member including a body portion adapted to be positioned over the top of the insulator stack, said body portion having an aperture in the top wall thereof for the passage of the contact, said body portion providing an insulated cover for the terminal bracket, said member including a tail portion providing an insulated cover for the terminal pad, said member being split into two parts, said two parts having cooperating interengaging portions by means of which said two parts may be connected.

4. An air circuit interrupter switch comprising a pair of insulator stacks, a switch blade movably supported by one of said stacks, a terminal bracket and pad carried by the other of said stacks, a contact carried by said terminal bracket, said blade being adapted for movement toward and away from said contact, a horn associated with said contact in the path of movement of said blade, a nozzle directed toward said contact and said horn, a hollow cap-like insulating member positioned over said other stack, said member having an aperture therein through which said contact and said horn extend, said member providing an insulated cover for said terminal bracket and pad and the mounting of said horn, said member having an inclined face adjacent said nozzle, said face being disposed generally parallel to the axis of said nozzle.

5. An air circuit interrupter switch comprising a pair of insulator stacks, a switch blade movably supported by one of said stacks, a terminal bracket and pad carried by the other of said stacks, a contact carried by said terminal bracket, said blade being adapted for movement toward and away from said contact, a horn associated with said contact in the path of movement of said blade, a nozzle directed toward said contact and said horn, and a hollow cap-like insulating member positioned over said other stack, said member comprising a body portion adapted to be positioned over the top of said other insulator stack, said body portion having an aperture in the top wall thereof through which said contact and said horn extend, said body portion providing an insulated cover for said terminal bracket, said member including a tail portion providing an insulated cover for the terminal pad, and means for securing said member to the insulator stack, said member having an inclined face adjacent said nozzle, said face being disposed to direct flow from said nozzle toward said contact and said horn.

6. An air circuit interrupter switch comprising a pair of insulator stacks, a switch blade movably supported by one of said stacks, a terminal bracket and pad carried by the other of said stacks, a contact carried by said terminal bracket, said blade being adapted for movement toward and away from said contact, a nozzle directed toward said contact, a hollow cap-like insulating member positioned over said other stack, said member including a body portion positioned over the top of the insulator stack, said body portion having an aperture in the top wall thereof through which said contact extends, said body portion providing an insulated cover for said terminal bracket, said body portion having an inclined front face adjacent said nozzle, said face being disposed at an inclination to the axis of said nozzle for directing flow from said nozzle towards said contact, said member including a tail portion providing an insulated cover for the terminal pad, said member being split longitudinally into two parts, the body portions of said two parts adjacent said inclined face having cooperating dove-tail portions by means of which said two parts may be connected, and a bracket secured to said other stack, said body portion including transverse wall means adjacent said stack but spaced from said inclined face, said transverse wall portions being secured to said bracket.

7. A shield for gas blast air circuit interrupter switches comprising a hollow cap of insulating material adapted to be positioned over the fixed switch contact mounting, said cap having an aperture in one wall thereof through which the fixed contact is adapted to extend outwardly of said cap, said cap further having an outside surface adapted to direct gas toward the outwardly extending portion of the contact.

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