

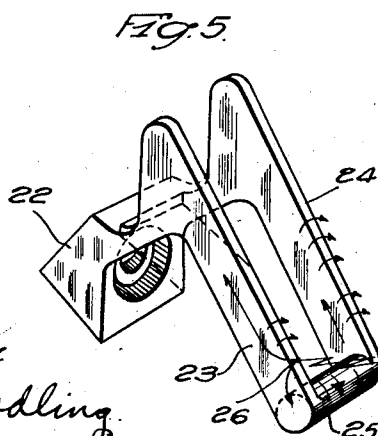
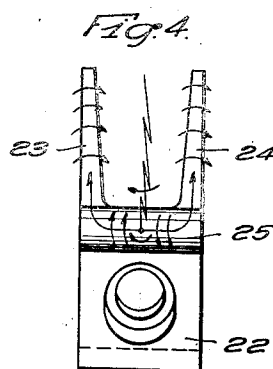
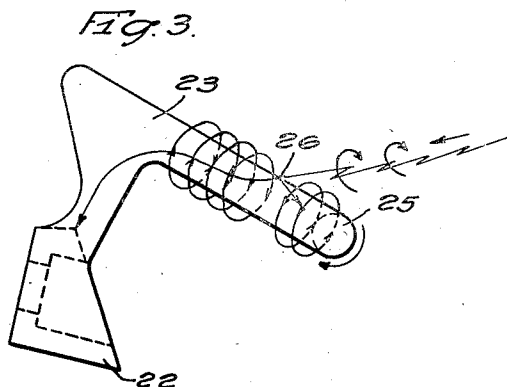
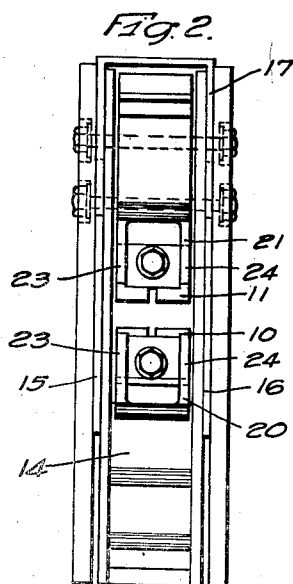
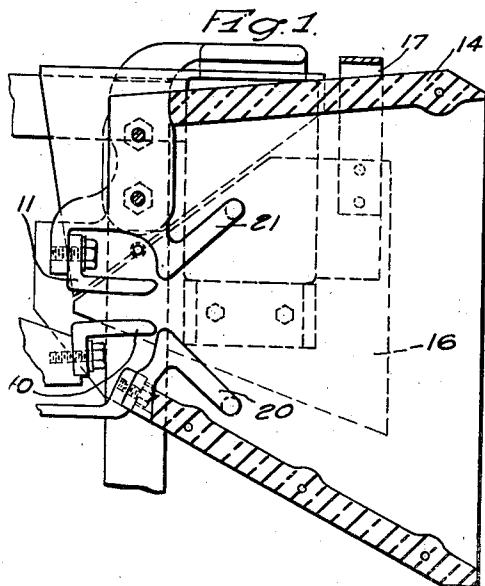
Nov. 7, 1933.

A. O. ANDERSON

1,934,518

ARC HORN

Filed May 6, 1931



WITNESSES

E. A. M. Blakey

George A. Goodling

INVENTOR

Arnold O. Anderson.

BY

Wesley C. Carr
ATTORNEY

UNITED STATES PATENT OFFICE

1,934,518

ARC HORN

Arnold O. Anderson, Wilkensburg, Pa., assignor
to Westinghouse Electric & Manufacturing
Company, a corporation of Pennsylvania

Application May 6, 1931. Serial No. 535,331

4 Claims. (Cl. 200-147)

My invention relates to arc horns and more particularly to arc horns that may be utilized in connection with electric switches.

In practice, it has been found that, when arc horns of the conventional type constructed of one solid member are utilized in connection with an electric switch provided with an arc chute and a magnetic blowout coil, the arc established by the opening of the contact members becomes very much distorted and uncontrolled as it is magnetically blown upon the arc horns. As a result of this distortion the arc is blown into contact with that portion of the arc chute which is adjacent to the sides of the arc horns, and, consequently, causes serious and sometimes destructive burning, which necessitates the frequent replacement of the entire arc chute.

Moreover, it has been found, under certain conditions, that the arc, as it is magnetically blown upon the arc horns, travels the entire length of the arc horns and thence around their ends along the reverse sides thereof towards the contact members. This, likewise, causes excessive burning not only of the top and bottom portions of the arc chute but also of other parts, such as the adjacent parts of the switch.

An object of my invention is to provide an arc horn that shall be simple and reliable in operation and be readily and economically manufactured and installed.

A more specific object of my invention is to provide an arc horn that controls the arc, as it is magnetically blown from the contact members of the switch by the magnetic blowout coil, thereby preventing excessive burning of the arc chute and of other parts, such as the adjacent parts of the switch.

Another object of my invention is to provide an arc horn, which, when the arc current is flowing through it, shall establish a local flux to direct the arc immediately to the central region of its end portion.

It is also an object of my invention to provide an arc horn, which, when the arc current is flowing through it, establishes a local flux for maintaining the arc in the central region of its end portion as long as the arc continues to flow.

Other objects of my invention will hereinafter become apparent.

For a fuller understanding of the nature and further objects of my invention, reference should be had to the following detailed description, taken in connection with the accompanying drawing, in which:

Figure 1 is a side view of an electric switch pro-

vided with an arc chute, parts being cut away to show the manner in which my invention may be applied thereto.

Fig. 2 is an end view of an electric switch, such as that shown in Fig. 1, to which my invention may be applied.

Fig. 3 is a side view of an arc horn embodying the features of my invention and, in addition, it illustrates the direction of the flux produced by an arc entering one of the spaced members of the arc horn.

Fig. 4 is a front view of an arc horn embodying the features of my invention, and illustrates the direction of the flux produced by an arc entering the central region of the end portion.

Fig. 5 is a perspective view of an arc horn embodying the features of my invention, and illustrates the direction of the flux produced by an arc entering one of the spaced members of the arc horn.

In order to accomplish, broadly, the objects of my invention, I provide an arc-horn construction, such that the arc current, after entering the arc horn, is disposed to travel in multiple paths through the horn, as the arc is magnetically blown from the contact members of the switch. In this manner, a local flux (see Figs. 3, 4 and 5), is established about the arc horn for controlling the arc, and thereby preventing the arc from burning the arc chute or the other adjacent parts of the switch.

Referring now to Figs. 1 and 2 of the drawing, the reference characters 10 and 11 designate contact members of a switch to which my invention may be applied. As shown, a lower and an upper arc horn, embodying the features of my invention and designated, respectively, by the reference characters 20 and 21, are disposed immediately in front of, or adjacent to, the contact members. The switch is also provided with an arc chute 14, having magnetic pole faces 15 and 16 mounted on the opposite sides thereof. The pole faces are connected by means of a yoke 17 and are magnetized of opposite polarity by means of a magnetic blowout coil, (not shown).

As best shown in Fig. 5, the arc horn comprises a unitary structure having two substantially parallel spaced members 23 and 24, supported and integrally joined at one pair of ends by means of a base portion 22 and integrally joined at the other pair of ends by means of a cylindrical portion 25.

In explaining the action of the local flux which controls the arc, it may be assumed that an arc is established between the upper and the lower

arc horns and that it is travelling along one of the spaced members away from the contact members of the switch. Referring to Figs. 3 and 5, which show an arc entering the spaced member 23 at a point designated by the reference character 26 and representing, generally, any point at which the arc may enter the spaced members of the arc horn.

Since the spaced members 23 and 24 constitute a multiple path, the arc current divides when it enters the arc horn, part flowing directly to the base portion through the spaced member 23 and the remaining part flowing indirectly to the base portion, through the cylindrical portion 25 and the opposite spaced member 24. It will be observed that the arc current produces a local flux about the arc itself and also about the spaced members and the cylindrical portion, part of the latter precedes the arc as it travels towards the end portion.

As shown in Figs. 3 and 5, the general direction of the local flux that precedes the arc is upward in the region between the two spaced members 23 and 24 and downward in the region on the outside. Also, the general direction of the flux produced by the arc itself is opposite to that of the local flux in the region between the two spaced members, and is the same as that of the local flux in the region outside of the spaced members.

The effect of this is to produce a weaker field in the region between the spaced members than on the outside, and, consequently, a resultant force is produced that causes the arc to travel along the inner edge of the spaced member as it approaches the cylindrical portion 25.

Since the local flux about the arc and the local flux about the member 23 of the arc horn precede the arc act in opposition, whereas the opposite is true with reference to the local arc flux and the flux following the arc about member 23, a weak field precedes the arc and a strong field follows the arc, thereby driving the arc, toward the end portion 25, and the arc, in this travel, at all times strikes the inner edge of member 23. From the foregoing considerations, it is apparent that my invented arc horn causes the arc to be extinguished much more promptly than it is normally extinguished by the conventional type of arc horn, because it aids the flux produced by the blowout coils in magnetically blowing the arc from the contact members of the switch.

After the arc stream has reached the central region of the cylindrical portion (see Fig. 4), the local flux becomes balanced; that is, the field strength is the same on each side of the arc. This has the desirable effect of maintaining the arc in the central region of the cylindrical portion as long as the arc continues to flow. If, for instance, the arc, by some external means, is forced to one side of the central region, an unbalanced flux situation is immediately established that forces the arc back until the flux becomes balanced again. By reason of the local flux preceding the arc, in combination with the flux set up by the arc itself and by the magnetic blow-out coil, the arc is constrained to travel at all times, and particularly as the arc approaches the tip of the arc horn, on the top and especially the inner edge of the side members. Also, in the event that the arc is not extinguished before it reaches the cylindrical portion, the arc is constrained to rotate, partially or completely around the cylindrical portion until it is extinguished.

Therefore, it is apparent that I have disclosed

an arc horn which controls the arc as it is blown from the contact members of the switch, thereby preventing excessive burning of the arc chute and other adjacent parts of the switch.

Since certain changes may be made in the above-described construction, and different embodiments of the invention may be made without departing from the scope of the invention, it is intended that all matter contained in the above description, or shown in the accompanying drawing, shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. An arc horn that is disposed to be operated in conjunction with a circuit interrupting device having relatively movable contact members and a magnetic blow-out coil for transferring an arc from the contact members to the arc horn comprising a base portion and projecting spaced members having their forward ends integrally connected together and their rear ends integrally connected to the base portion, said spaced members being disposed in a side-by-side relationship with respect to each other, and the portion where the forward ends of the spaced members are integrally connected together being so shaped and so positioned relatively to the arc that the flux caused by the arc itself, in combination with the flux set up by the magnetic blow-out coil and by the current flowing through the spaced projecting members constrains the arc to travel on the inside portion of the spaced projecting members and to rotate about the portion where the forward ends of the side members are integrally connected together.

2. An arc horn that is disposed to be operated in conjunction with a circuit interrupting device having relatively movable contact members and a magnetic blow-out coil for transferring an arc from the contact members to the arc horn comprising a base portion, a cylindrical portion, and projecting spaced members integrally connected at their forward ends by the cylindrical portion and at the rear ends by the base portion, said spaced members being disposed in a side-by-side relationship with respect to each other, and the cylindrical portion being positioned substantially perpendicularly with respect to the arc so that the flux caused by the arc itself, in combination with the flux set up by the magnetic blow-out coil and by the current flowing through the spaced projecting members, constrains the arc to travel on the inside portion of the spaced projecting members and to rotate about the cylindrical portion.

3. An arc horn that is disposed to be operated in conjunction with a circuit interrupting device having relatively movable contact members and a magnetic blow-out coil for transferring an arc from the contact members to the arc horn comprising a base portion, a cylindrical portion, and projecting substantially parallel spaced members integrally connected at their forward ends by the cylindrical portion and at their rear ends by the base portion, said spaced members being disposed in a side-by-side relationship with respect to each other, and the cylindrical portion being positioned substantially perpendicularly with respect to the arc so that the flux caused by the arc itself, in combination with the flux set up by the magnetic blow-out coil and by the current flowing through the spaced projecting members, constrains the arc to travel on the inside portion of the spaced projecting members and to rotate about the cylindrical portion.

4. An arc horn comprising a relatively massive base portion, a cylindrical portion, and projecting substantially parallel spaced members integrally connected at their forward ends by the cylindrical portion and at their rear ends by the base portion, said spaced members being disposed in a side-by-side relationship with respect to each other, and the cylindrical portion being positioned substantially perpendicularly with respect to the arc, so that the arc may rotate thereabout.

ARNOLD O. ANDERSON.

30

10

35

15

40

20

45

25

100

30

105

35

110

40

115

45

120

50

125

55

130

60

135

65

140

70

145

75

150