

[72] Inventor **Albert Strobel**
Cherry Hill, N.J.
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 [73] Assignee **I-T-E Imperial Corporation**
Philadelphia, Pa.

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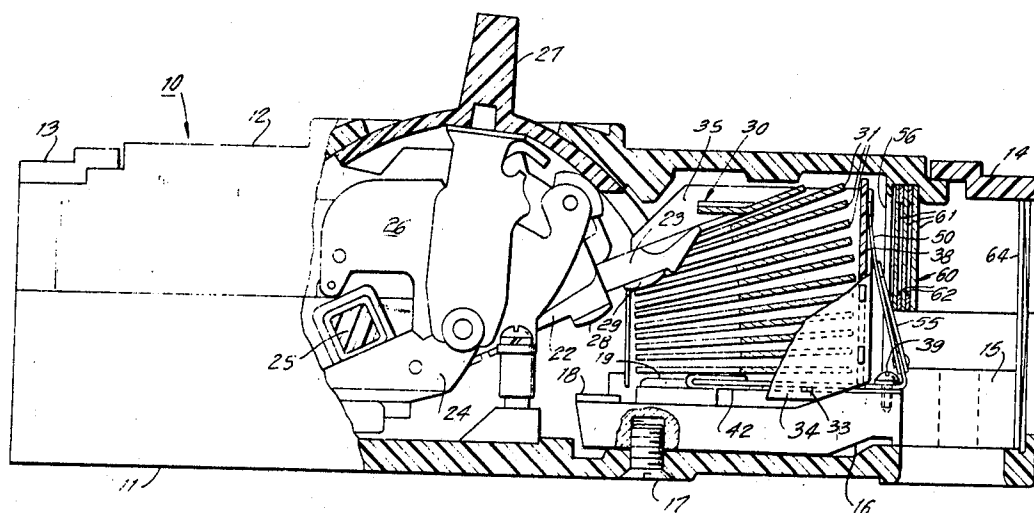
Primary Examiner—H. O. Jones
 Attorney—Ostrolenk, Faber, Gerb & Soffen

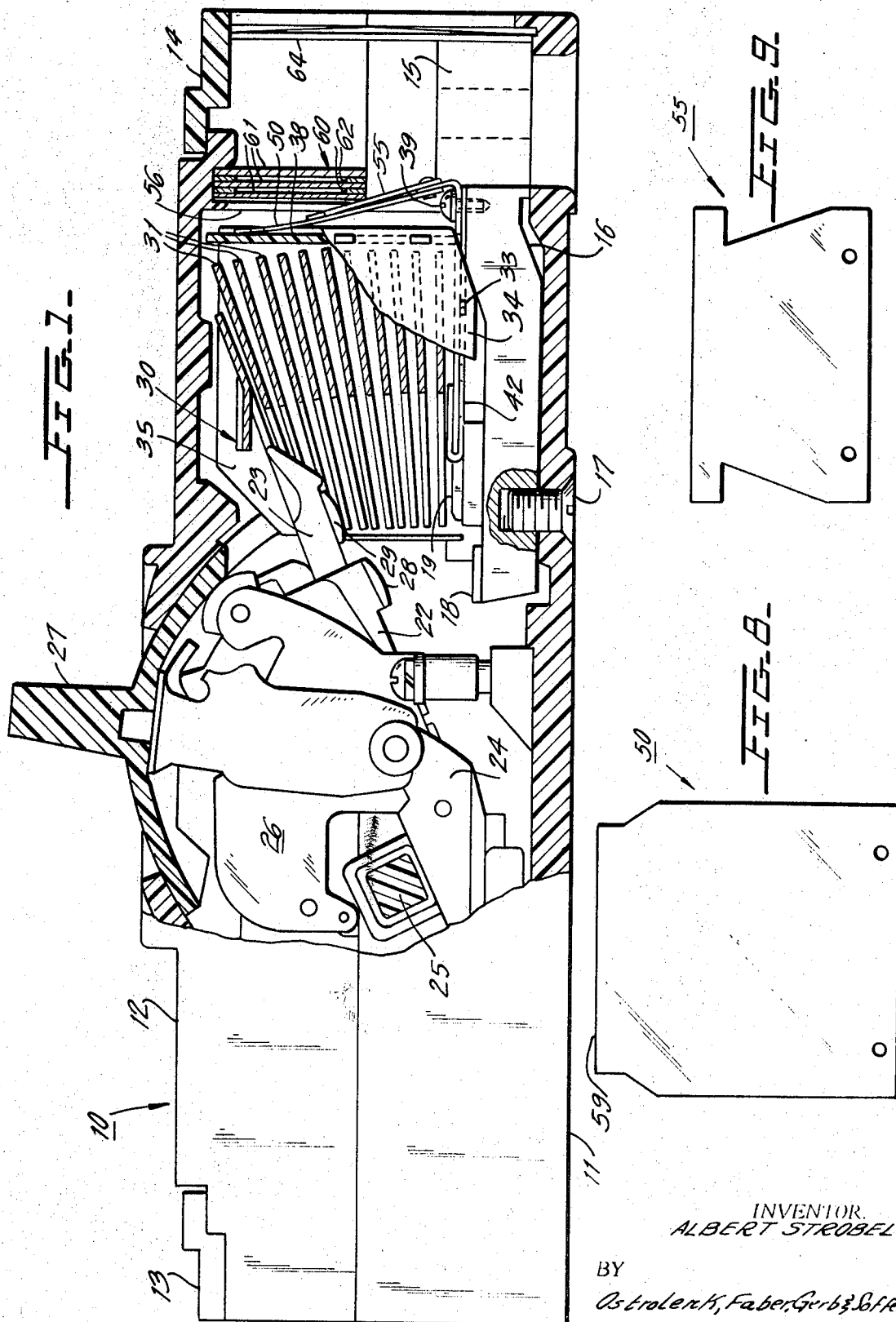
[54] **VENTING MEANS FOR CIRCUIT BREAKER ARC QUENCHER**
10 Claims, 9 Drawing Figs.

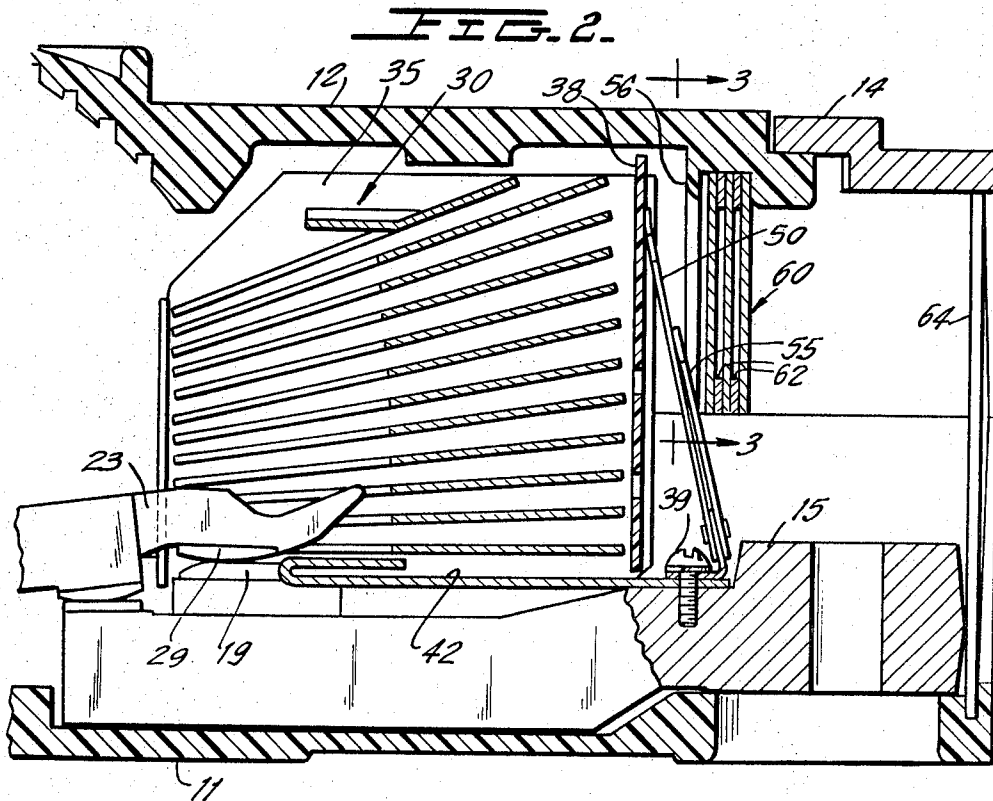
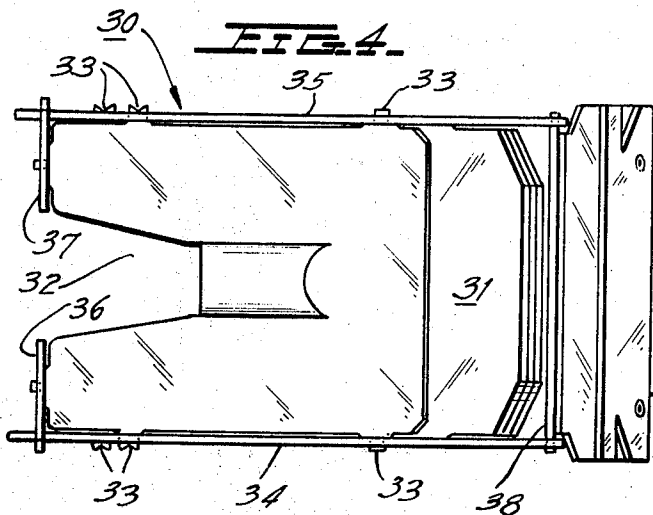
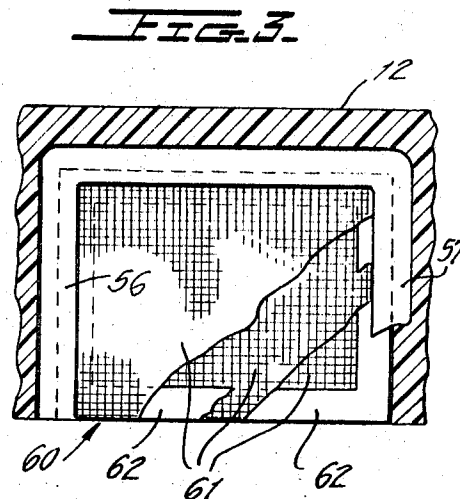
[52] U.S. Cl. **200/144**
 [51] Int. Cl. **H01h 9/30**
 [50] Field of Search **200/144**

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ABSTRACT: A flexible arc shield or baffle at the rear of the arc chute in a circuit breaker is provided with a support for controlling baffle deflection during arc interruption. The circuit breaker cover in the region adjacent to the arc chute is provided with riblike formations that limit the deflection of the baffle so that it does not block the cover openings covered by deionizing screens. This function is aided by a support plate which limits deflection of the baffle in the direction of arcing gas flow as the gas leaves the arc chute at the rear thereof.







INVENTOR.
ALBERT STROBEL

BY
Ostrolenk, Faber, Gerb & Solfer
ATTORNEYS

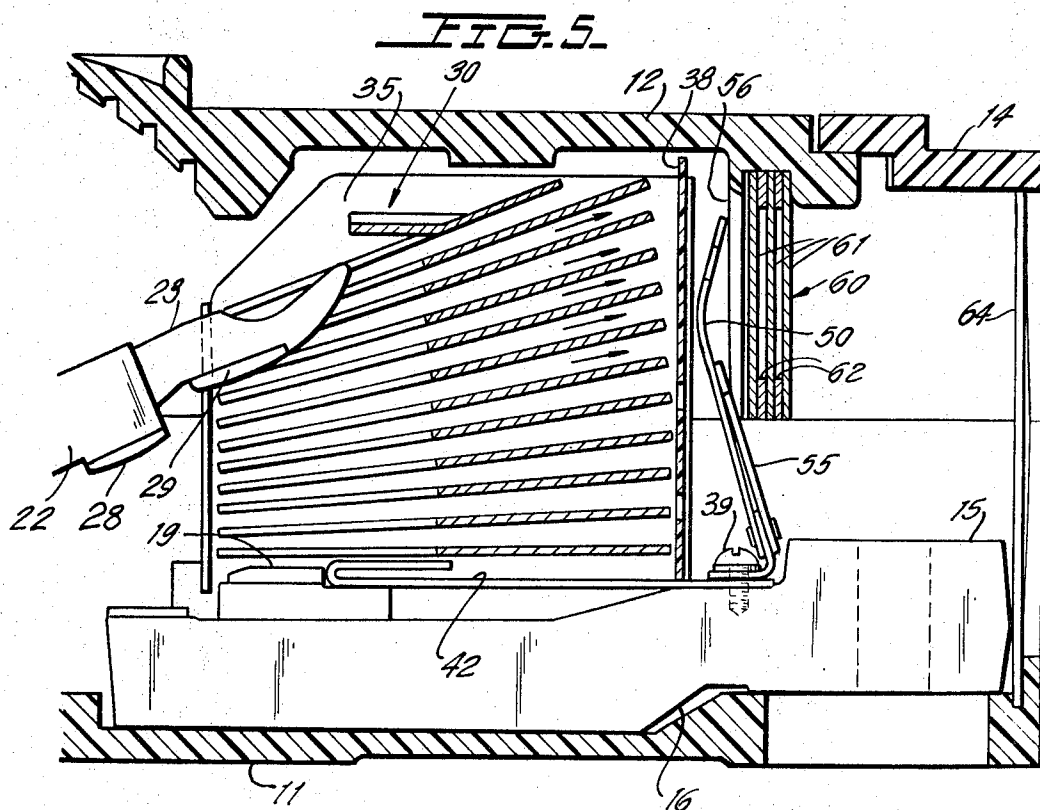
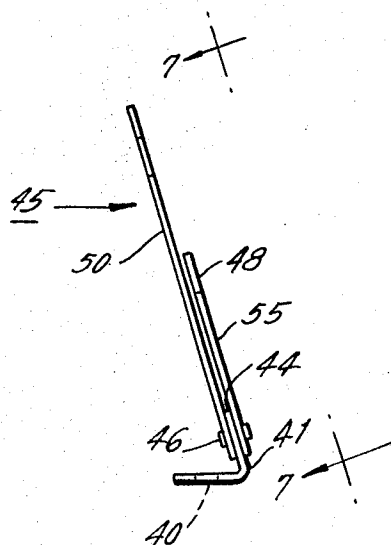
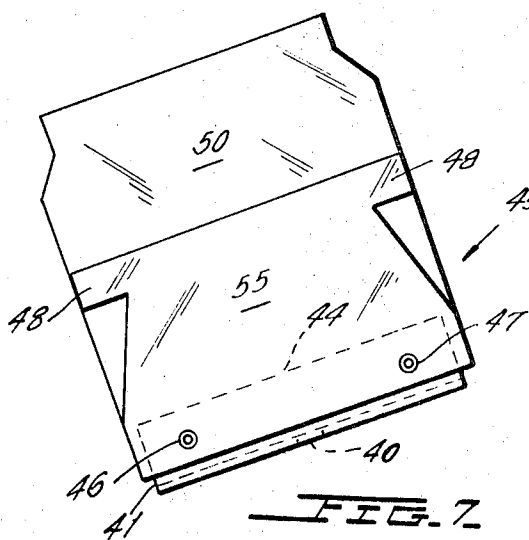


FIG. 6.



INVENTOR.
ALBERT STROBEL

BY

Ostrolenk, Faber, Gerbely & Soffen
ATTORNEYS

VENTING MEANS FOR CIRCUIT BREAKER ARC QUENCHER

This invention relates to circuit breakers in general, and more particularly relates to means for controlling deflection of a flexible arc shield which normally blocks gases from leaving the arc chute.

U.S. Pat. No. 2,839,641 to W. H. Edmunds for An Arc Shield for Circuit Breaker Arc Quencher discloses a flexible arc shield which is normally urged against the rear wall of the arc chute housing which is normally urged against the rear wall of the arc chute housing to block vent openings therein. During high current interruption, the pressure of the gases developed in the arc chute causes the shield to flex away from the rear wall to create some openings around the arc shield edges thereby relieving some of the pressure within the arc chute. However, this without flexing of the shield does not permit a sufficient quantity of ionized gases to escape and cause a rotating to the line terminal.

While the construction set forth in the aforesaid U.S. Pat. No. 2,839,641 proved satisfactory for interruption at the current and voltage limits set forth in the patent, such construction has proven inadequate when interrupting as much as 50,000 amperes at 600 volts. Under these conditions, failure appears to result from the fact that deflection of the arc shield blocks the vent opening in the housing to prevent relief of pressure buildup within the arc chamber. Blocking of the cover vent openings resulting in failures appears to be caused by the fact that in U.S. Pat. No. 2,839,641 the arc shield assumes a slightly curved configuration around the arc chute and retains somewhat of a permanent set in that configuration.

In order to overcome the above-noted problem, the instant invention provides a support plate or strip to prevent transverse curving of the arc shield so that deflection thereof is essentially in the direction of movement of arcing gases as they leave the arc chute through openings in the backwall thereof. The support plate acting in conjunction with ribs in the cover adjacent to the cover vent openings prevents the arc shield from blocking the vent openings even under conditions of extremely high current interruption.

Accordingly, a primary object of this invention is to provide novel means for controlling deflection of an arc shield during current interruption to prevent such shield from closing off vent openings in the housing adjacent to the arc chute.

Another object is to provide an arc chute having vent openings at the rear thereof, with an arc shield normally closing the vent opening region and a support positioned to limit bending of the shield generally in the direction of flow of arcing gases leaving the arc chute through the openings in the rear wall thereof.

Another object is to provide an arc shield of this type, and means to limit deflection thereof under conditions of circuit interruption such that the arcing gases are directed through the housing openings adjacent to the arc chute.

These objects as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIG. 1 is a side elevation of a circuit breaker partially cross sectioned to show the operative position of the baffle assembly constructed in accordance with the instant invention.

FIG. 2 is an enlarged fragmentary portion of FIG. 1, showing the baffle in its normal position.

FIG. 3 is a partial cross section of the cover taken through line 3-3 of FIG. 2, looking in the direction of arrows 3-3.

FIG. 4 is a plan view of the arc chute and baffle assembly.

FIG. 5 is a view similar to that of FIG. 2, showing the baffle deflected during current interruption.

FIG. 6 is a side elevation of the baffle assembly.

FIG. 7 is a front elevation of the baffle assembly, looking in the direction of arrows 7-7 of FIG. 6.

FIG. 8 is a front elevation of the baffle.

FIG. 9 is a front elevation of the baffle support.

Now referring to the figures, FIG. 1 is a partially sectioned view of a molded case circuit breaker 10 which, except for the arc shield means and its cooperating elements of the instant

invention, is of a construction well known to the art. Circuit breaker 10 includes a housing comprising base 11 and removable cover 12 having auxiliary covers 13, 14 at opposite ends thereof.

Circuit breaker 10 is a three-phase unit, only one pole of which is partially shown in FIG. 1. In the pole illustrated, line terminal portion 15 of conducting strap 16 is fixedly secured to base 11 by screw 17. Stationary contacts 18, 19 are mounted to the upper surface of strap 16 at the end thereof remote from line terminal 15. Movable contacts 28, 29, engageable with the respective stationary contacts 18, 19, are mounted to contact arms 22, 23, respectively, carried by bracket 24 secured to interphase tie bar 25. In a manner well known to the art, tie bar 25 is connected to operating mechanism 26 which is manually operable by handle 27 to operate the pairs of cooperating contacts 18, 28 and 19, 29 into and out of engagement. In addition, a fault responsive means (not shown) is provided for automatic operation mechanism 26 to separate the pairs of contacts 18, 28 and 19, 29.

In a manner well known to the art, circuit breaker 10 also includes arc chute 30 disposed above strap 16. Chute 30 comprises a series of generally horizontal spaced metal plates 31, 31, etc. each having a notch 32 (FIG. 4) at its forward end, to provide a passage through which contact arm 23 moves for engagement and disengagement of movable arcing contact 29 with stationary arcing contact 19. Edge projections 33 from the sides of each arc plate 31 extend into notches in the insulating sidewalls 34, 35 of the arc chute housing for positioning of plates 31. The arc chute housing is generally rectangular and also includes front wall sections 36, 37 and rear wall 38, each constructed of insulating material.

Screw 39 extends through clearance aperture 40 in the horizontal leg metal bracket 41 of baffle assembly 45 (FIGS. 6 and 7) and a clearance aperture in the bottom plate or arc runner 42 of arc chute 30, and is received by a threaded aperture in strap 16 to secure baffle assembly 45 and arc chute 30 with baffle assembly 45 operatively positioned to the rear of arc chute 30 and forward of line terminal 15. Baffle assembly 45 also includes arc shield or baffle 50, constructed of relatively flexible insulating sheet material (FIG. 8) and baffle support 55 (FIG. 9) constructed of relatively stiff insulating material. The lower ends of both shield 50 and support 55 are secured to the upwardly extending leg 44 of bracket 41 by a pair of rivets 46, 47. As best seen in FIGS. 6 and 7, support 55 is positioned immediately behind baffle 50, with the former being only slightly more than half the height of the latter.

With cover 12 installed on base 11, cover ribs 56, 57 (FIGS. 2 and 3) engage oppositely extending ears 48 of baffle support 55 to deflect the upper edge thereof slightly in a forward direction into engagement with the midportion of baffle 50. This causes the upper edge 59 of baffle 50 to bear against the rear surface of the rear wall 38 of the arc chute housing to deflect the upper portion of baffle 50 slightly in the rearward direction.

Ribs 56, 57 are parts of the cover formation which positions arc quenching screen assembly 60 over the arcing gas exhaust vent in cover 12 adjacent to the rear of arc chute 30. Assembly 60 consists of three rectangular metal screens 61, separated by insulating rectangular frames 62.

When arcing contacts 19, 29 are separated under normal current conditions, the arcing gases are confined, essentially, within the housing 34-38 of arc chute 30. These gases seep slowly out of arc chute 30 at the upper end thereof and escape from circuit breaker 10 through screen assembly 60 and the holes in insulating sheet 64 at the rear of circuit breaker 10.

When arcing contacts 19, 29 separate under extremely high current conditions, the arcing gases generated cause large pressures to be built up within arc chute housing 34-38. The arcing gases leave arc chute 30 through holes in wall 38 and force the upper portion of baffle 50 to deflect to the rear. If the gas pressure is high enough, baffle 50, in its fully deflected position, engages cover ribs 56, 57 (FIG. 5). The construction

and positioning of cover ribs 56, 57 limits rearward deflection of baffle 50 to a point spaced from screen assembly 60, so that a substantial passage remains open for arcing gases to pass from arc chute 30 to and through screen assembly 60, to be exhausted from circuit breaker 10 through the openings in insulating sheet 64.

It is noted that relatively stiff baffle support 55 limits deflection of baffle 50 in the direction of gas flow leaving arc chute 30. That is, support 55 prevents baffle 50 from curving or bending about a generally vertical axis. If baffle 50 were to bend about a generally vertical axis, cover ribs 56, 57 would be ineffective in preventing baffle 50 from blocking off substantial portions of screen assembly 60 and current interruption would be interfered with.

Thus, the instant invention provides a novel construction for a baffle assembly positioned at the rear of an arc chute. The assembly is so constructed that deflection of the baffle is controlled in a manner such that during high current interruption the baffle does not block off the deionizing screen assembly.

It is noted that the use of terms such as "above" and "horizontal" is intended only as a device to simplify the description and claims. Such terms have been used in their relative senses and are not to be deemed as strict limitations.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited not by the specific disclosure herein, but only by the appending claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows.

I claim:

1. A circuit interrupter comprising cooperating relatively movable and relatively stationary contacts; operating means to open and close said contacts; an arc chute including a plurality of spaced plates constructed and positioned to receive electric current arcs drawn between said contacts upon separation thereof and assist in extinguishing such arc; a first vent means at the rear of said arc chute to permit gases created by said arcs to escape from said arc chute; housing means wherein said contacts, said operating means and said arc chute are disposed; second vent means formed in said housing and operatively positioned at the rear of said chute to exhaust said gases from said housing; a flexible baffle means interposed between said first and said second vent means to

control flow of said gases therebetween; control means cooperating with said baffle means to direct deflection of said baffle means and limit said deflection to a fully deflected position wherein said baffle means does not close off said second vent means.

2. A circuit interrupter as set forth in claim 1, in which said control means includes internal formations of said housing positioned forward of said second vent means to engage and limit deflection of said baffle means to said fully deflected position.

3. A circuit interrupter as set forth in claim 1, in which said baffle means comprises a sheet member in a plane generally perpendicular to flow of said gases as they exit from said first vent means; means anchoring the lower end of said sheet member; said control means engageable with said baffle means to limit deflection thereof to a direction parallel to direction of said flow.

4. A circuit interrupter as set forth in claim 3, in which said control means includes a relatively stiff member positioned to engage said sheet member at a region intermediate the ends thereof.

5. A circuit interrupter as set forth in claim 4, in which said stiff member comprises a sheet at the rear of said sheet member in juxtaposition with substantially the lower half thereof.

6. A circuit interrupter as set forth in claim 5, in which the arc chute is provided with a generally flat rear wall; said first vent means comprising apertures in said rear wall; the upper edge of said sheet member normally engages said rear wall.

7. A circuit interrupter as set forth in claim 6, in which said control means includes internal formations of said housing positioned forward of said second vent means to engage and limit deflection of said baffle means to said fully deflected position.

8. A circuit interrupter as set forth in claim 7, also including deionizing screen means over said second vent means.

9. A circuit interrupter as set forth in claim 8, in which there is a subassembly comprising said sheet member, said stiff member, a bracket, and means fixedly securing the lower edges of said members to said bracket, said bracket constructed of metal and said members constructed of insulating material.

10. A circuit breaker as set forth in claim 9, in which there is a common means operatively positioning said arc chute and said baffle means.

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