

June 9, 1964

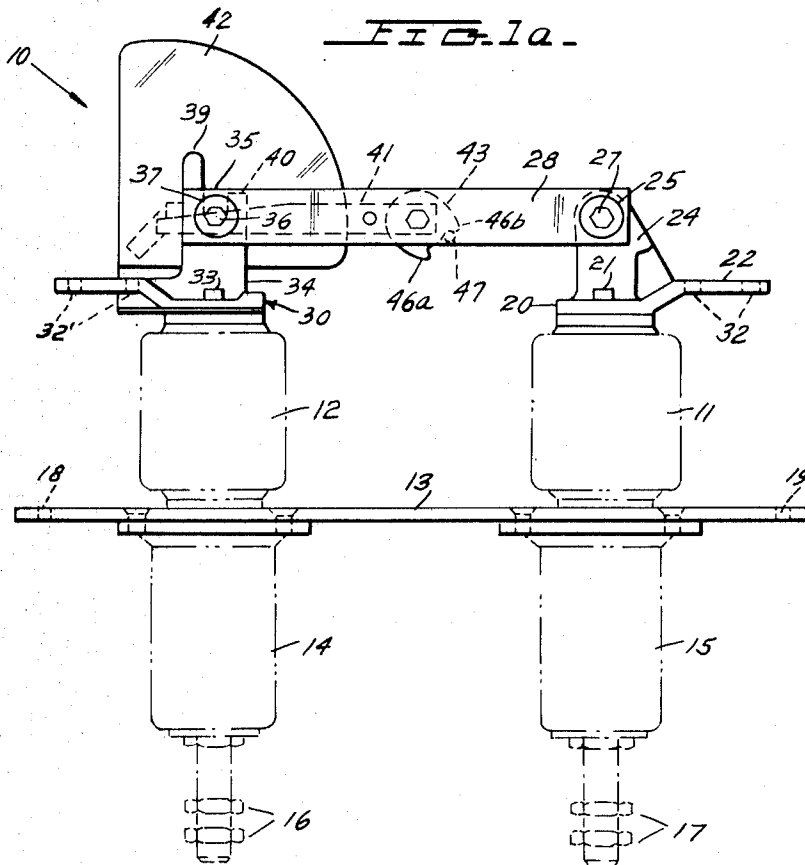
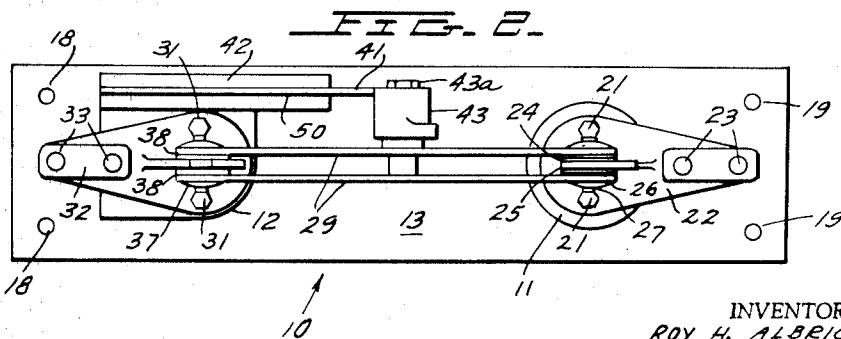
R. H. ALBRIGHT

3,136,874

SEALED ARC CHUTES FOR AN AUXILIARY INTERRUPTING
BLADE OF A CIRCUIT INTERRUPTER

Filed June 28, 1961

3 Sheets-Sheet 1



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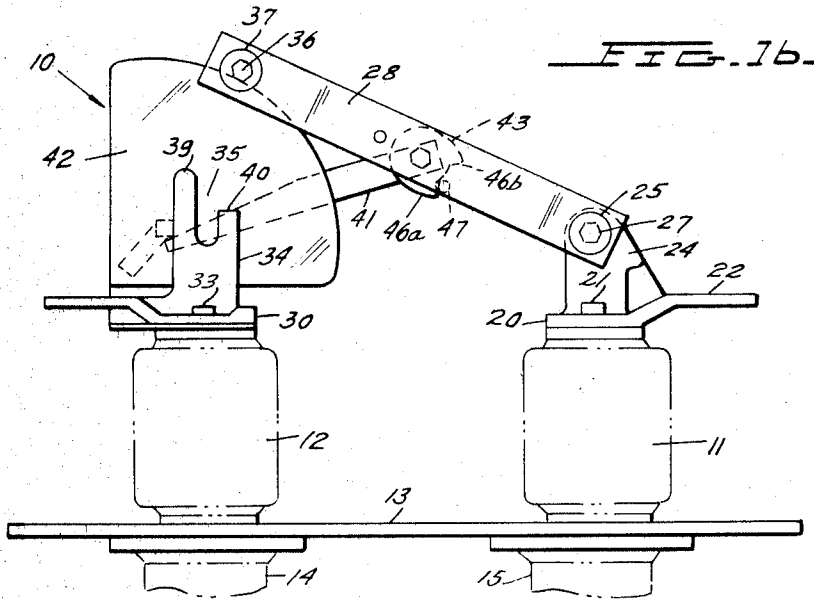
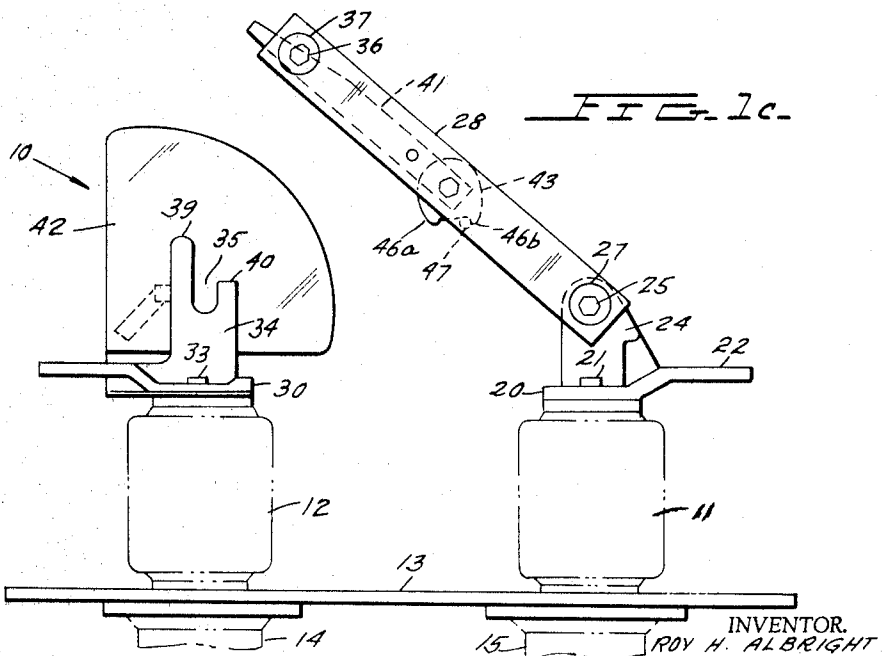
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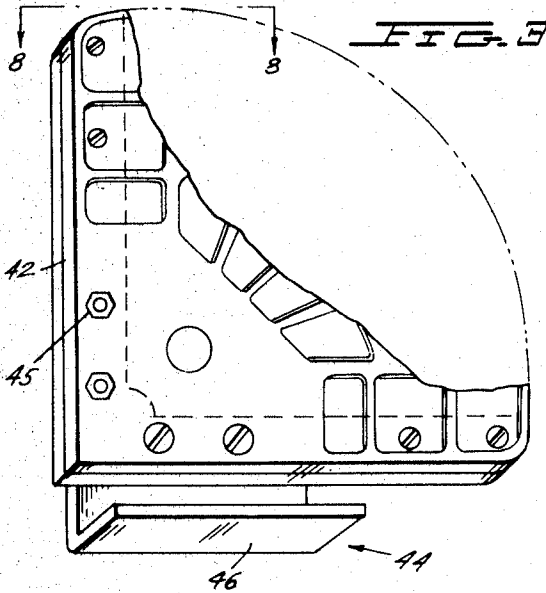
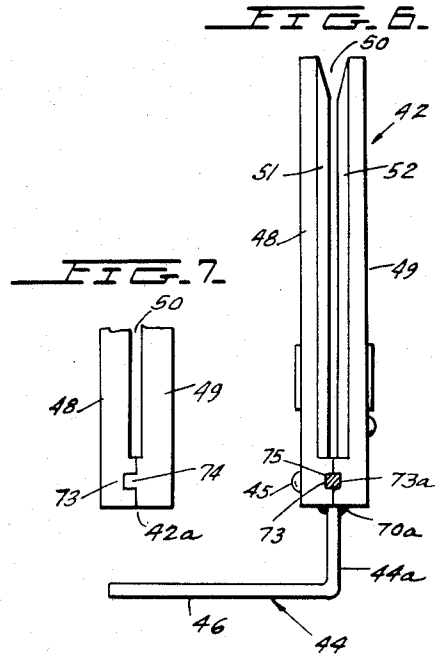
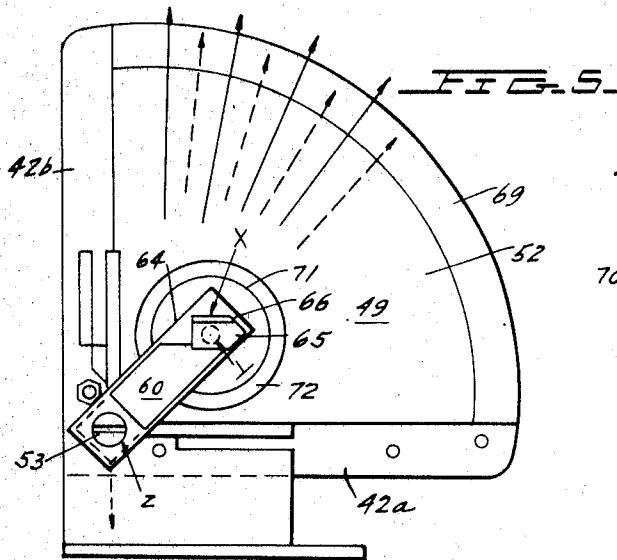
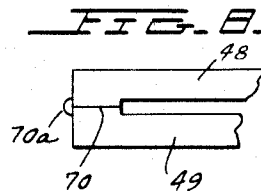
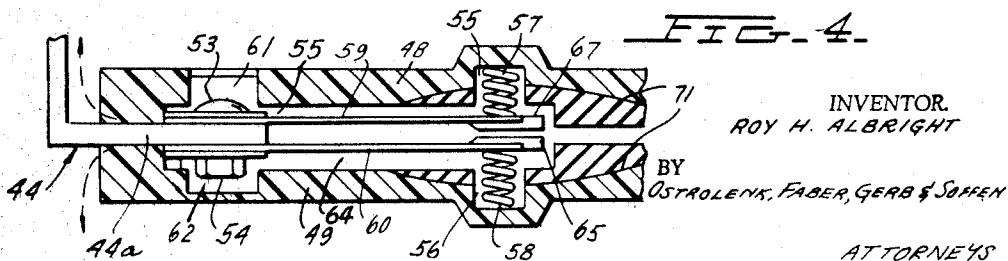
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SEALED ARC CHUTES FOR AN AUXILIARY INTERRUPTING BLADE OF A CIRCUIT INTERRUPTER

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6 Claims. (Cl. 200—144)

My invention relates to circuit interrupters and more particularly to circuit interrupters having arc chutes which are sealed in such a manner to provide rapid reliable circuit interruption and extremely long interrupting life.

Load interrupter switches presently in use are designed to close into or open up energized lines thereby necessitating an arrangement for the extinguishment of an arc which may be formed during the opening operation.

These requirements led to the development of the load interrupter switch which was comprised of a main and an auxiliary interrupting blade means which is operable to quickly interrupt the circuit after the main disconnecting blade has moved to an open position.

The main blade which is pivotally connected to one terminal of the circuit to be protected is positioned to cooperate with a stationary break contact which is electrically connected to the other terminal associated with said first circuit. The auxiliary switch blade is pivotally connected at one end to the main switch blade in such a manner that the opposite end of the auxiliary switch blade cooperates with a pair of auxiliary contacts electrically connected to the main stationary break contact. Surrounding the auxiliary contacts which cooperate with the auxiliary switch blade is an arc chute which is so designed as to confine any arc formed between the auxiliary switch blade and its associated contacts to the arc chute itself. The arc chute is molded from a plastic material especially selected for its arc extinguishing properties.

When the main switch blade is moved in a direction away from its associated break contact, the pivotally mounted auxiliary switch blade, nevertheless, remains in engagement with its associated contacts. After a predetermined amount of rotation of the main switch blade, a shoulder on the main switch blade prevents further relative movement between the two blades causing the auxiliary switch blade to be disengaged from its associated stationary contacts. Charged biasing means arranged between the main and auxiliary switch blades causes rapid separation of the auxiliary switch blade from its associated contacts, thereby aiding in the extinguishment of an arc formed between the auxiliary blade and its associated contacts.

The arc chute surrounding the auxiliary blade serves to confine the arc within the arc chute and to further deionize the gasses which form due to the presence of the electric arc, thereby serving to extinguish the arc at zero current and prevent re-striking of the same.

Arc interrupters of this nature have been found to be objectionable due to the relatively short life of the gas evolving material employed within the arc chute. The effect of the arc upon the gas evolving material is to cause a gradual erosion of the material. While the amount of erosion is rather minute, load interrupters of this type are called upon for repeated opening and closing operations and the cumulative effects of this erosion creates an appreciable change in the work load of the arc chute passage which is formed at least in part by the gas evolving material. The widening of the arc passage results in a lowering of the arc voltage and a loss in efficiency and speed of the interruption. Also, each successive operation results in a longer arcing time and, consequently, a greater amount of erosion in future operation of the load inter-

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rupter. In tests performed on arc chute type load interrupter switches presently in use it was found that the maximum number of successful interruptions totalled about 100 to 120 at a specific load current, power factor, and voltage.

Since load interrupters of this type are sometimes called upon to operate on a daily basis, the operating life of the prior art load interrupter switches prohibits the use of these switches in such systems.

The instant invention provides an interrupter switch arrangement which has an operating life which is 3 to 4 times that of similar interrupter switches of the prior art while still providing safe reliable operation throughout its long operating life.

My interrupter switch is comprised of an arc chute formed of insulating material and having its inner passage formed of a material having a high degree of gas evolving arc quenching ability. The arc chute is provided with an opening which is of sufficient size so as to permit the auxiliary switch blade to be inserted and removed therefrom with a high degree of freedom. The remaining sides of the arc chute are sealed in such a manner as to prevent the escape of any gases formed in the arc chute other than through the opening provided for the auxiliary switch blade.

The seal can be effected by means of an epoxy seal or an insulating liner placed between the two sides of the arc chute or the arc chute may be molded as a unitary structure devoid of seams. The sealing method is immaterial since all of the above methods have been found equally successful. The important aspect of the seal is that it be a perfect gas-tight seal except for the auxiliary blade entrance since even the most minute openings other than for the auxiliary blade entrance permit escape of a certain amount of gas which tends to reduce the number of successful interruptions.

A number of arc chute gas evolving materials were employed and it was found that a composition formed of urea formaldehyde having an alpha cellulose filler when utilized in combination with the gas-tight arc chute seal, produced an arc chute for the load interrupter switch which has an interruption life three to four times greater than that of like switches of the prior art. However, arc chutes formed of material other than urea have been found to have substantially increased longevities when incorporated with my novel gastight construction.

The arc chute is formed of two sidewalls of molded urea formaldehyde with alpha cellulose filler. The sidewalls are then joined and fastened to form the unitary arc chute. An alternative arc chute construction consists of fabricating the arc chute side walls from bonded plates which are comprised of heavy Bakelite section and a thinner section of urea formaldehyde, wherein the sidewalls are joined so that the urea formaldehyde sections face each other. It was found that the sidewalls molded entirely of urea formaldehyde exhibited sufficient mechanical strength and superior gas evolving characteristics.

It is, therefore, one object of my invention to provide an arc chute for a load interrupter switch which is so arranged as to prevent the escape of arc extinguishing gas in all but the desired direction.

Another object of my invention is to provide a load interrupting switch having an arc chute with a novel gas-tight seal along the arc chute seams.

Another object of my invention is to provide a novel arc chute arrangement for a load interrupter switch wherein said arc chute is comprised of two cooperating sides having an epoxy seal along the arc chute seams.

Still another object of my invention is to provide an arc chute for a load interrupter switch which is comprised of a gas-tight filler along the arc chute seams and a gas

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evolving liner for quenching an arc formed in the arc chute during circuit interruption.

These and other objects will become apparent upon reading the accompanying descriptions and drawings in which:

FIGURES 1a, 1b and 1c are side elevation views of an interrupter switch arranged in accordance with this invention showing the interrupter switch in the closed, tripping and fully tripped positions respectively.

FIGURE 2 is a top view of the load interrupter shown in FIGURE 1.

FIGURE 3 is a partial perspective view of the arc chute shown in FIGURES 1a-1c and 2.

FIGURE 4 is a cross-sectional view of the arc chute shown in FIGURE 3 taken along the line 4-4'.

FIGURE 5 is a side view of the arc chute shown in FIGURES 1a-1c with one of the arc chute sides removed.

FIGURE 6 is an end view of the arc chute shown in FIGURE 1a looking in the direction from the bottom towards the top of FIGURE 1a.

FIGURES 7 and 8 are partial end views of the arc chute shown in FIGURE 1a wherein two different gas-tight seals are shown along the arc chute seam.

Referring now to the drawings wherein like numerals define like elements, FIGURES 1a and 2 illustrate the load interrupter switch 10 which is comprised of a pair of supporting insulators 11 and 12, such as porcelain insulators or the like onto which the load interrupter is mounted. The insulators 11 and 12 are mounted to a base or support means 13 in any suitable manner. Back connected insulators 14 and 15 are secured to base 13 when the situation requires, the insulators 14 and 15 being provided with contact nuts 16 and 17 respectively for mounting to the circuit to be protected. When the back connected mode of FIGURE 1a is not utilized, then the terminals 22 and 33 are electrically connected to the circuit to be protected. Terminals 22 and 33 may be removed when back connections A and B are employed. Base 13 is provided with apertures 18 and 19 for mounting to a support means.

Insulator 11 has a unitary molded terminal 20 secured thereon by fasteners 21. The integral terminal portion 22 of terminal member 20, having apertures 23 therethrough, provides the means for connecting the line conductor thereto. The integral hinge tongue 24 of terminal member 20 pivotally supports the load interrupter main switch blade 28 which is secured to an aperture in hinge tongue 24 by means of fasteners 27. Electrical contact pressure is supplied at the hinge by stop nuts 26 and washers 25 which cooperate with fasteners 27 which provide a uniform contact pressure between blade 28 and tongue 24.

As appears more clearly in FIGURE 2, the switch blade 28 is of a split construction and includes the spaced blade sides 29. The blade sides 29 are pivotally mounted on the hinge tongue 24 with the sides located on opposite sides of the hinge tongue respectively.

The insulator 12 located at the disconnect end of the load interrupter is also provided with a unitary terminal member 30 which is secured to insulator 12 by fasteners 31. Apertures 33 are provided in the terminal portion 32 of unitary terminal member 30 for connection of a line thereto. The unitary terminal 30 is provided with an integral upstanding break tongue 34 which is slotted at its outer end as shown at 35 to receive a bolt 36 which serves to secure the break ends of blade sides 29. The bolt 36 extends through the blade sides 29 at stop nuts 37 and washers 38 to maintain the break sides together. A spacing sleeve (not shown) is provided on fastener 36 between blade sides 29 for preventing undue movement of the blade sides towards each other. The projections 39 and 40 which form the slot 35 of tongue 34 are arranged so that projection 39 is longer than projection 40 for a purpose to be more fully described.

Auxiliary switch blade 41 has its outer end tapered

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with the inner end thereof being secured by fastening means 43a to a connecting means 43, the other end of which is pivotally mounted to switch blades 29. Connecting member 46 has two extending ears or shoulders, 46a and 46b, which are engageable with stop pin 47 carried by blades 29. A torsion spring (not shown) is carried within connecting member 43 and coaxially with fastener 43a and has a first end secured to connecting member 43 and a second end secured to the non-rotating fastening means 42. Connecting member 43 in cooperation with stop pin 47, serves to move auxiliary blade 41 rapidly out of engagement with arc chute 42 in a manner to be more fully described.

Arc chute 42 has an L-shaped arm 44 (see FIGURE 6) which is secured to arc chute 42 by fastening means 45. The other leg 46 of member 44 which is positioned between unitary terminal member 30 and insulator 12 is secured to insulator 12 by fastening means 33. Arc chute 42 may be a unitary molded plastic material, or may be formed of two sides 48 and 49 of molded plastic material which are secured to one another by fastening means 45, as shown in FIGURE 3. Arc chute 42 is provided with a narrow passageway 50 for receiving auxiliary blade 41. The inner walls facing the narrow passageway 50 are lined with a material having high gas evolving arc extinguishing properties, liner 51 being secured to wall 48 and liner 52 being secured to wall 49 in any well known manner. The gases which are evolved in the presence of an electric arc act to extinguish the arc in a manner to be more fully described.

As an alternative to the arc chute construction shown in FIGURE 6, arc chute may be formed entirely of the gas evolving material thereby avoiding the necessity of providing a liner formed of the gas evolving material and also reducing the number of parts required to form the arc chute. This structure is shown in FIGURE 4.

Referring now to FIGURES 4 and 5, FIGURE 5 shows the interior wall 52 of arc chute 42 shown in FIGURE 6 having a recess 64 which is arranged to receive contact member 60. Inner wall 51 has a like recess 55 for receiving a contact 59 (see FIGURE 4) which is the mirror image of contact member 60. The contact members 59 and 60 are secured to one another and to leg 44a of L-shaped member 44 by means of bolt 53 and nut 54 which are received by recesses 61 and 62 in arc chute walls 48 and 49, respectively. A contact 65 is secured to contact member 60 at its upper end in any suitable manner such as by welding or brazing. The upper edge 66 of contact 65 is bevelled and cooperates with bevelled edge (not shown) of contact 67 (see FIGURE 4) which serve as a V-shaped opening for the auxiliary blade 41 permitting the blade to enter between contacts 65 and 67. The spring member 57, which is received by recess 55 in arc chute side wall 48, acts to urge contact 67 away from side wall 48. A spring 58 received by recess 56 urges contacts 65 away from side wall 49, the resultant efforts of springs 57 and 58 being to urge contacts 65 and 67 into rigid engagement for a purpose to be more fully described.

Surfaces 42a and 42b engage the associated surfaces (not shown) of arc chute side wall 48 such that arc chute 42 is sealed everywhere but along curved side 69 of arc chute 42 which opening or passageway permits the insertion of auxiliary blade 41. Prior to securing arc chute side 48 to side 49 by fastening means 45, an epoxy cement is placed along surfaces 42a and 42b of side 49 and along the associated surfaces 42a and 42b of side 48 so that when the arc chute side walls are secured to one another, an air and gas-tight seal results therefrom for a purpose to be more fully described.

The opening operation of load interrupter 10 is as follows:

As shown in FIGURE 1a, the load interrupter 10 is in

its normal closed position with the main switch blade 28 in engagement with its break contact tongue 34 and with the auxiliary switch blade 41 being received between the contacts 65 and 67 in arc chute 42. When it is desired to interrupt the circuit protected by the load interrupter 10, switch blade 28 is moved by means not shown in a direction to move the main blade 28 clockwise about hinge 24 moving the blade 28 from the position shown in FIGURE 1a to that shown in FIGURE 1b. This rotation separates main blade 28 from contact tongue 54 and causes slight movement of the outer end of auxiliary blade 41 from the position shown in FIGURE 1a to a position where it engages the contacts 65 and 67 which are connected to contact members 60 and 59 respectively as shown in FIGURE 1a. The outer end of auxiliary blade is retained in this position for a substantial amount of the opening movement of the main switch blade thereby providing a current path between terminals 22 and 32 even though the main switch blade 28 has severed its engagement with contact tongue 34.

Due to the movement of main switch blade 28 from the position shown in FIGURE 1a to the position shown in FIGURE 1b, the auxiliary blade 41 moves relatively counter-clockwise about its fastening means 43a with respect to the main switch blade 28. The relative movement between the main switch blade and the auxiliary switch blade 41 acts to charge the torsion spring contained in connecting member 43 when main 28 and auxiliary 41 blades assume the positions shown in FIGURE 1b. At this instant, the extending ear 46a abuts stop pin 47 preventing further relative movement between the main and auxiliary blades. Relative movement between the two blades, therefore, is prevented upon continued rotation of the main switching blades 48 in the disconnected direction and upon such continuation of rotation, the auxiliary blade 41 is clear of the contact 65 and 67 attached to contact members 60 and 59 respectively, thereby permitting energized torsion spring (not shown) to rapidly move auxiliary blade 41 with a snap action out through the slot in the arc chute to a position in which it is again substantially adjacent and parallel to main switch blade 28. The rapid movement of auxiliary blade 41 through the arc chute 42 acts to extinguish an arc formed due to the separation of auxiliary blade 41 from contacts 65 and 67 which are electrically connected to terminal 32 through the path consisting of terminal 32', fastening means 33, L-shaped member 44, fastening means 53, and contact members 59 and 60.

To close the load interrupter, the main break 28 is moved in a counter-clockwise direction from its open position shown in FIGURE 1c. Projection 39 makes first contact with main blade 28. Projection 39 has a ball-shaped tip which serves to protect the load interrupter from high current, if the switch is inadvertently closed into a fault, thereby removing the arcing stress from main contact projection 40 and from auxiliary blade 41 and contacts 65 and 67 contained in arc chute 42. In the closing operation, the main and auxiliary breaks are constrained to move as one due to the engagement of stop pin 47 on main blade 28 with ear 46b of connecting member 43. When auxiliary blade 41 engages the outer edges of contacts 65 and 67, it is enabled to supply force sufficient to provide an entrance between contacts 65 and 67 by means of an engagement with bevelled edges such as the bevelled edge 66 shown in FIGURE 5. Separation of the contacts 65 and 67 is permitted by the yielding of bias or spring members 57 and 58. As appears in FIGURE 1a, the free end of auxiliary switch blade 41 lies beneath the lower edges of contacts 65 and 67 and may be entirely out of engagement with contact members 59 and 60 since the only time it is necessary that auxiliary blade 41 be in electrical engagement with contacts 65 and 67 is during the opening movement of

the switch, in order to shut the circuit therethrough as described above.

The passageway provided between arc chute walls 48 and 49 is made just slightly larger than the thickness of auxiliary blade 41 allowing only a small clearance between the blade and the insulating members 48 and 49. As a result, when auxiliary blade 41 is moved rapidly towards disengagement with arc chute 42, the arc, in addition to being attenuated due to the movement of auxiliary blade 41 with respect to contacts 65 and 67, is confined in the narrow passageway which serves to increase the arc voltage which arc voltage generates heat acting upon the gas evolving material causing it to emit arc-quenching gases which serve to extinguish the arc at zero current and to prevent re-striking of the same by acting to de-ionize the arc gases which are needed to sustain the arc. FIGURE 5 shows the direction which the gases generated by the arc take during the opening operation of the load interrupter wherein the dotted lines indicate the direction which the gases of prior art arc chutes escape while the solid lines show the direction in which the gases of my novel arc chute may escape. It should be understood that in my novel arc chute no gases may escape in the direction through the seams as shown by the dotted lines of FIGURE 5.

Due to the presence of the perfect gastight seal which is provided by the epoxy cement 70 which is applied along the adjacent surfaces of walls 48 and 49 and also along the track between the arc chute side plates as shown at 70a, no gases are permitted to escape along the sides 42a and 42b of the arc chute 42 as shown in FIGURE 5. This perfect gas-tight seal was found to prolong the life of the load interrupter so that its useful life was three to four times greater than load interrupters of the prior art. For example, in experimenting with a sealed arc chute of the type set forth in the figures which were employed in a circuit of 15,000 volts, 600 amps., and 80% power factor, the sealed arc chute interrupted successfully over 350 times.

It was found upon inspection of the interior side walls 51 and 52 of arc chute 42 that a certain amount of the insulating material is eroded during each interruption. The erosion caused a large cavity of the approximate shape as shown by numeral 71 in FIGURES 4 and 5. Employing unsealed arc chutes of the prior art under the same experimental circuit conditions, the successful interruptions numbered less than 100 and the cavity which was formed was found to be smaller and of the shape shown by numeral 71 in FIGURE 5. Although the cavity 72 formed in my novel arc chute after 350 interruptions is greater than the cavity 71 of prior art arc chutes, this phenomenon has no effect on the number of successful interruptions. Actually it is an indication of greater utilization of the arc chute material.

Also, in the unsealed arc chutes the springs 57 and 58 were found to be partially melted away whereas in sealed chutes of the instant invention the springs remain in excellent shape. Also, the nut 54 and bolt 53 and contact arms or members 59 and 60 remain clean in a sealed arc chute after over 350 interrupting operations whereas in an unsealed arc chute the same members were found to have blackened appreciably after only 100 interrupting operations.

The sealing of the arc chute seams 42a and 42b may be performed as shown in FIGURE 7 by providing side wall 48 with a groove 73 and side wall 49 with a cooperating tongue 74 so that a gas-tight seal is effected between the narrow passage 50 and the outer edges of seams 42a and 42b (not shown). In order to further insure the gas-tight seal of FIGURE 7 is satisfactory, epoxy cement may be applied in groove 73 and on tongue 74 in the same manner as set forth with respect to FIGURE 8.

Another matter of sealing the seams of arc chute 42 is shown in FIGURE 6 wherein side wall 48 is provided

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with a groove 73 and side wall 49 is provided with an adjacent cooperating groove 73a. The cooperating grooves 73 and 73a receive a liner 75 of insulating material similar to the material used to form arc chute side walls 48 and 49, the width of liner 75 being slightly greater than the opposite edges of grooves 73 and 73a to thereby form a perfect fit between liner or gasket 75 and cooperating grooves 73—73a. As further insurance epoxy cement 70a may be applied along the cracks defined by the joinder of arc chute side walls 48 and 49.

The arc chute 42 can also be molded as a one-piece assembly with an opening for the auxiliary blade similar to that provided in the arc chute having the two halves bolted together. Although it would be rather costly and would make the insertion of contacts 65 and 67 into arc chute 42 difficult, nevertheless a positive gas-tight seal is provided in areas where it is not desirable to have gas exhaust.

Although the present invention has been set forth with the exemplary embodiments, it is to be understood that variations and modifications as to the forms, arrangements and applications it may assume in practice will present themselves to those skilled in the art, and that it is not intended to be limited except as set forth in the following claims.

I claim:

1. An arc chute for a load interrupter switch having an auxiliary switch blade, said arc chute comprising first and second arc chute sidewalls parallel to each other, each of said sidewalls having at least one recess along the surface adjacent the opposite sidewall and being positioned in spatial alignment with one another to form a narrow passageway for receiving said auxiliary switch blade, the remaining portion of said first and second sidewall adjacent surfaces being positioned to engage each other; sealing means between said engaging surfaces for creating a gas-tight seal along said engaging surfaces to limit the exit path of gases formed during the opening operation to said narrow passageway, said sealing means including a gasket means formed of an insulating material, each of said engaging sidewall surfaces having cooperating grooves adjacent the perimeter of said sidewalls, said gasket being inserted into both of said grooves to create a gas tight seal along the arc chute means.

2. An arc chute for a load interrupter switch having an auxiliary switch blade, said arc chute comprising first and second arc chute sidewalls parallel to each other, each of said sidewalls having at least one recess along the surface adjacent the opposite sidewall and being positioned in spatial alignment with one another to form a narrow passageway for receiving said auxiliary switch blade, the remaining portion of said first and second sidewall adjacent surfaces being positioned to engage each other; sealing means between said engaging surfaces for creating a gas-tight seal along said engaging surfaces to limit the exit path of gases formed during the opening operation to said narrow passageway, said sealing means comprising an epoxy cement placed between said engaging sidewall surfaces.

3. An arc chute for a load interrupter switch having an auxiliary switch blade, said arc chute comprising first and second arc chute sidewalls parallel to each other, each of said sidewalls having at least one recess along the surface adjacent the opposite sidewall and being positioned in spatial alignment with one another to form a narrow passageway for receiving said auxiliary switch blade, the remaining portion of said first and second sidewall adjacent surfaces being positioned to engage each other; sealing means between said engaging surfaces for creating a gas-tight seal along said engaging surfaces to limit the exit path of gases formed during the opening operation to said narrow passageway, said sealing means comprising an elongated projection along said engaging surface and adjacent the perimeter of said first sidewall, a cooperating groove along the engaging surface of and adjacent the perimeter of said second sidewall for receiving said co-

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operating projection to form a gas tight seal along the arc chute perimeter; an epoxy cement placed between said engaging sidewall surfaces.

4. In combination, first and second terminals, main blade means, pivotally connected to said first terminal for movement into and out of engagement with said second terminal, auxiliary blade means pivotally mounted to said main blade means, an arc chute having a passageway for receiving said auxiliary blade means mounted adjacent said second terminal, said auxiliary blade means including bias means and shoulder means, said bias means operatively connected to said main blade means for urging said auxiliary blade in a first direction out of engagement with said arc chute, said main blade means including a stop pin, said shoulder means being positioned to abut said stop pin to prevent rotation of said auxiliary blade means in a direction opposite to said first direction, said arc chute comprising first and second arc chute sidewalls parallel to each other, each of said sidewalls having at least one recess along the surface adjacent the opposite sidewall, said recesses being positioned in spatial alignment with one another to form a narrow passageway for receiving said auxiliary switch blade, the remaining portion of said first and second sidewall adjacent surfaces being positioned to engage each other, epoxy sealing means between said engaging surfaces for creating a gas-tight seal along said engaging surfaces to limit the exit path of gases formed during the opening operation to said narrow passageway.

5. In combination, first and second terminals, main blade means, pivotally connected to said first terminal for movement into and out of engagement with said second terminal, auxiliary blade means pivotally mounted to said main blade means, an arc chute having a passageway for receiving said auxiliary blade means mounted adjacent said second terminal, said auxiliary blade means including bias means and shoulder means, said bias means operatively connected to said main blade means for urging said auxiliary blade in a first direction out of engagement with said arc chute, said main blade means including a stop pin, said shoulder means being positioned to abut said stop pin to prevent rotation of said auxiliary blade means in a direction opposite to said first direction, said arc chute comprising first and second arc chute sidewalls parallel to each other, each of said sidewalls having at least one recess along the surface adjacent the opposite sidewall, said recesses being positioned in spatial alignment with one another to form a narrow passageway for receiving said auxiliary switch blade, the remaining portion of said first and second sidewall adjacent surfaces being positioned to engage each other, sealing means between said engaging surfaces for creating a gas-tight seal along said engaging surfaces to limit the exit path of gases formed during the opening operation to said narrow passageway, said sealing means including a gasket means formed of an insulating material, each of said engaging sidewall surfaces having cooperating grooves adjacent the perimeter of said sidewalls, said gasket being inserted in said grooves to create a gas-tight seal along the arc chute means; an epoxy cement placed between said engaging sidewall surfaces.

6. In combination, first and second terminals, main blade means, pivotally connected to said first terminal for movement into and out of engagement with said second terminal, auxiliary blade means pivotally mounted to said main blade means, an arc chute having a passageway for receiving said auxiliary blade means mounted adjacent said second terminal, said auxiliary blade means including bias means and shoulder means, said bias means operatively connected to said main blade means for urging said auxiliary blade in a first direction out of engagement with said arc chute, said main blade means including a stop pin, said shoulder means being positioned to abut said stop pin to prevent rotation of said auxiliary blade means

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in a direction opposite to said first direction, said arc chute comprising first and second arc chute sidewalls parallel to each other, each of said sidewalls having at least one recess along the surface adjacent the opposite sidewall, said recesses being positioned in spatial alignment with one another to form a narrow passageway for receiving said auxiliary switch blade, the remaining portion of said first and second sidewall adjacent surfaces being positioned to engage each other, sealing means between said engaging surfaces for creating a gas-tight seal along said engaging surfaces to limit the exit path of gases formed during the opening operation to said narrow passageway,

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said sealing means comprising an epoxy cement placed between said engaging sidewall surfaces.

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