May 8, 1934. A. L. VAN EMDEN 1,957,480

DISCONNECT TYPE FUSE BOX

Filed March 27, 1928

Fig. 1.

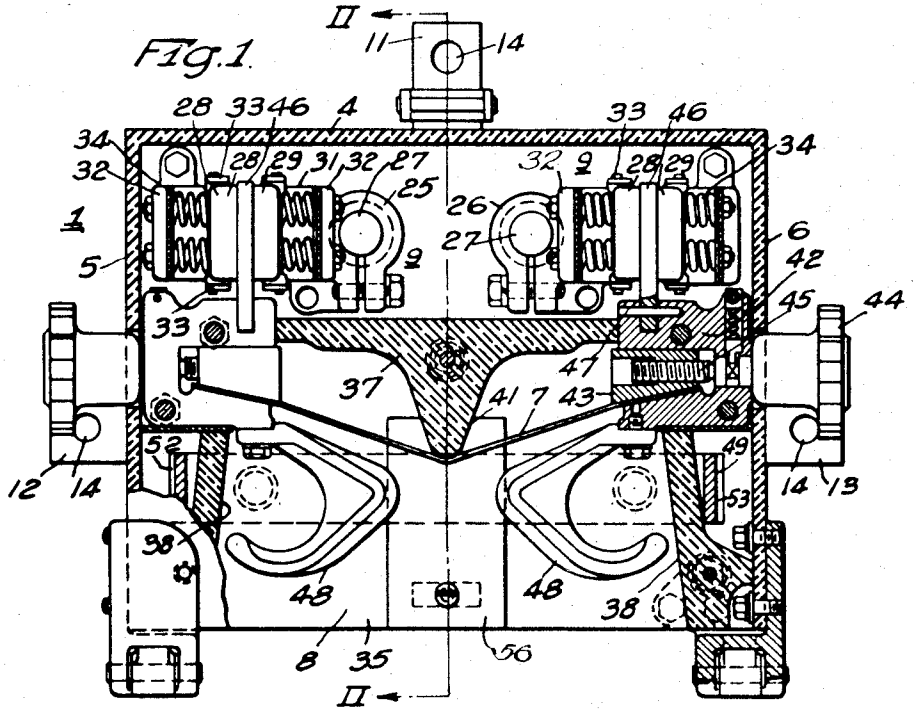


Fig. 2.

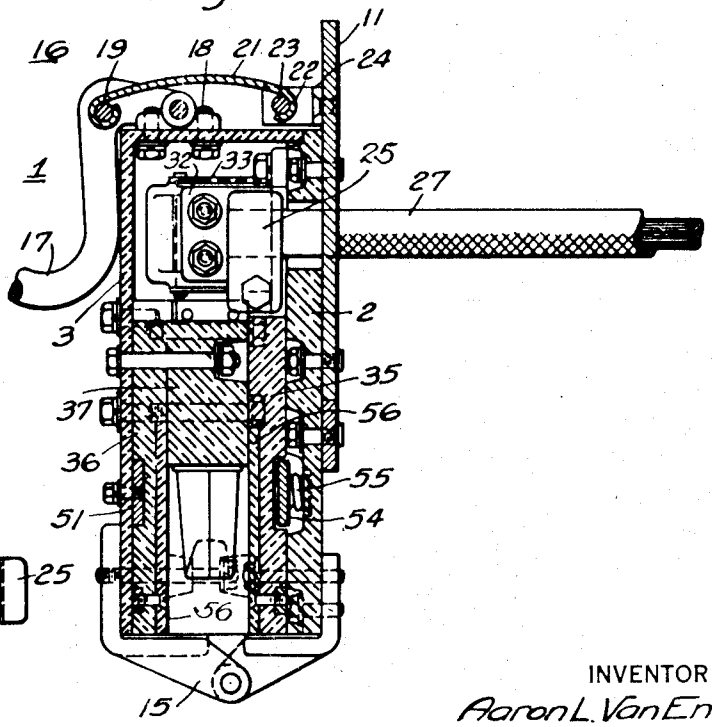
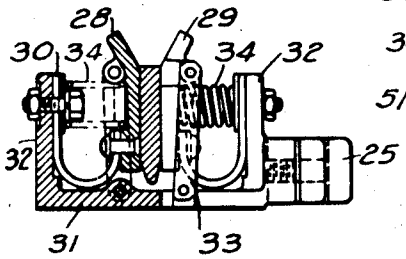


Fig. 3.



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DISCONNECT TYPE FUSE BOX

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19 Claims. (Cl. 200—120)

My invention relates to fuse mechanisms and more particularly to fuse mechanisms for high potential circuits such as are employed on electric locomotives and the like.

One object of my invention is to provide an enclosing case for a fuse that shall disconnect the said fuse from the main circuit when the enclosing casing is opened.

Another object of my invention is to provide a fuse casing that shall contain an arc chute adjacent to a fuse which when electrically ruptured will establish an arc that will be magnetically blown into the said arc chute.

A further object of my invention is to provide an arc chute of the above-described type that shall contain arcing horns whereon the arc is blown when the fuse is ruptured.

A still further object of my invention is to provide an arc chute of the above-described type containing arcing horns that shall have a magnetic circuit associated therewith which shall cooperate with the arcing horns to facilitate extinction of the arc which follows when the fuse blows.

A still further object of my invention is to provide an arc chute constructed of fire-proof material that shall have a material inlaid in the walls thereof adapted to be consumed by the arc and to thus carry away the metal deposited by an arc incident to operation of a circuit-interrupting device.

These and other objects that will be made apparent throughout the further description of the invention are attained by the fuse holder hereinafter described and illustrated in the drawing, wherein

Figure 1 is a view, partly in section and partly in elevation illustrating my improved switch mechanism;

Fig. 2 is a sectional view taken through the plane II—II of the structure in Fig. 1; and

Fig. 3 is a view partly in section and partly in elevation of the contact member of my invention.

My invention comprises, in general, a fuse box 1 having a base member 2, constructed of insulating material, and a cover member 3 having a top 4 and side walls 5 and 6. The fuse box 1 is the means of supporting a fuse 7, an arc chute 8 and a disconnecting switch 9 which will be described hereinafter in more detail.

The base member 2 supports the mounting straps 11, 12 and 13 having holes 14 therein by which they are attached by bolts to a supporting structure. A hinge 15 is attached at each end of the base member 2 and the cover member 3 at the bottom, whereon the cover member 3 may be swung to open position and when in closed position, a latch 16 locks the cover member in place. The latch 16 comprises a handle 17 that is pivoted to a support member 18 on the top 4 of the cover member 3, and a pin 19 to which a latching member 21 is pivotally supported. A hook 22 on the end of latch member 21 passes over and engages a pin 23 on block 24, the latter being riveted to a supporting strap 11. After the hook member 21 is moved into engagement with the pin 23, a downward movement of the handle 17 draws the cover 3 tightly against the base 2 and latches it securely in this position.

The base member 2 supports terminal blocks 25 and 26 to which main conductors 27 are connected. Joined to the terminal blocks 25 and 26 are the jaw members 28 and 29 of the disconnecting switch 9. The jaw members comprise a conducting block 31 having walls 32 at each of its ends between which the contact jaws 28 and 29 are hingedly supported by the links 33 and biased toward each other by the springs 34. A shunt 30 is provided between the contact jaws 28 and 29 and the walls 32 of the blocks 31 to assure a good conducting path for the current and is insulated from the springs 34 to prevent the current that would otherwise pass therethrough from heating them and weakening them. This construction enables the contact jaws 28 and 29 to engage the blade 46 over their entire surfaces, as the springs 34 and the links 33 permit the jaw members 28 and 29 to automatically adjust themselves against the surface of the blade member.

This construction provides a contact member for a disconnect switch that has self-aligning jaw members and which is no higher than the jaw members of the prior art which lacked the self-aligning features of my invention. The base member 2 also supports one side wall 35 of the arc chute 8 and is constructed to form a tight joint with the other portion of the arc chute 8 contained in the cover member 3 in the manner now to be described.

The arc chute 8 is formed of two parts, the one 35, being attached to the base member 2, the other portion comprising the opposite side wall 36 having a top 37 and end portions 38, all constructed of molded fire-proof material and designed to fit within the cover member 3. The top portion 37 has a centrally located extended portion 41 against which the fuse element 7 is drawn taut for a purpose that will be described below.

The bottom portion of the arc chute 8 is open

and means are provided whereby the arc is caused to be moved downward and out through the opening in the bottom of the arc chute. Clamping members 42 are provided in the side walls 5 and 6 of the cover member 3 and comprise wedge-shaped clamps 43 that are drawn against the clamping member 42 by the knob 44 and screw 45. On the upper portion of the clamping member 42, a blade member 46 is fixed by the rivet 47 and is aligned with the contact jaws 28 and 29 with which an electrical circuit is completed when the cover member 3 is in closed position. The blade members 46 are employed to disconnect the entire fuse structure from the line 27 at the jaw members 28 and 29 when the cover member 3 is in its open position. By this construction, the fuse 7 may be renewed without disturbing the circuit at any point other than the fuse.

On the lower side of the clamping members 42, arcing horns 48 are provided to which the arc is transferred upon the rupturing of the fuse 7. The arc is elongated by being moved along the horns in the presence of a magnetic field and is thereby extinguished.

The magnetic field which effects arc movement along the arcing horns 48 comprises an iron ring or magnetic circuit 49 surrounding the arcing horns 48 and the center portion of the fuse 7. The iron ring 49 is in two portions, a U-shape portion 51 supported by the cover 3, the sides 52 and 53 thereof abutting against the straight portion 54 which is mounted on the base member 2. In order to assure a low reluctance contact between the U-shape portion 51 and the bar portion 54, springs 55 are located between the base 2 and the rear portion of the bar member 54 that press this member against the ends 52 and 53 of the U-shape portion 51.

The arcing horns 48 are of such shape and located in such a position relative to the magnetic circuit 49 that each functions as a single turn coil when the arc has been transferred thereto. In order to energize the magnetic circuit 49 before the fuse is ruptured, the fuse element 7 is looped between the members 51 and 54 by reason of its engagement with the projection 41 extending therebetween. This current path provides a magnetic field for transferring the arc, drawn when the fuse blows, to the arcing horns 48. By means of the foregoing relation of the arcing horns 48 with the magnetic circuit 49, the arc is blown toward the outer ends of the horns 48, and is thereby elongated, and extinguished.

The arc chute 8, which is constructed of fireproof material, contains an inlaid portion 56 in each of its sides 35 and 36 in a position adjacent to the arc when blown onto the arcing horns 48. These inlaid portions are formed from organic material such as fibre or other slowly combustible substance, as a result of which the deposits of metal vaporized by the arc will be loosened by the consumption of the material and will fall out of the arc chute 8. This construction provides a clean surface on the walls of the arc chute so that the latter is always free from metallic deposits. It has been found that these deposits produce a conductive path for the arc between the contact members, and that they sustain the arc and prevent it from being extinguished. This difficulty is eliminated by my invention.

It will thus be seen that I have invented a composite fuse box that comprises a disconnecting switch and an arc chute, wherein a fuse and arcing horns are positioned, and which provides a magnetic circuit for forcing the arc onto and along the said arcing horns. This apparatus will be disconnected from the conductors by the opening of the cover member of the fuse box which will thereby permit the fuse being renewed without opening the circuit at any other place. My invention is further novel in providing a material in the wall of the arc chute that prevents a deposit of metal forming thereon that might prevent the arc from being readily extinguished.

While I have described and illustrated but one embodiment of my invention, it will be apparent to those skilled in the art that various modifications, substitutions, changes, omissions and additions may be made in the apparatus described and illustrated without departing from the spirit and scope of the invention set forth in the appended claims.

I claim as my invention:

1. The combination of a fuse box comprising a base member and a cover member hingedly supported on the base member, the fuse box having a separable arc chute therein, a pair of arcing horns within the arc chute, and a fuse element within the arc chute above the said arcing horns.

2. The combination of a fuse box comprising a base member and a cover member hingedly supported on the base member, the fuse box having a separable arc chute therein, a pair of arcing horns within the arc chute, a fuse element within the arc chute above the said arcing horn and a magnetic circuit about the arc chute adjacent the arcing horns.

3. The combination with an arc chute having a fuse element and arcing horns mounted therein, of a hinged casing at least partially enclosing said arc chute, and a disconnect switch associated with the casing and the arc chute and actuated by the movement of the said hinged casing.

4. A fuse mechanism comprising a support, a pair of contact terminals secured thereto, a jaw member conductively connected to each of the said terminals, a casing hingedly associated with the said support, a pair of clamping members for a fuse element mounted on the casing, an arc chute associated with the fuse, and a blade member conductively connected to each of the clamping members associated with the said jaw member.

5. A composite fuse structure comprising a separable arc-chute associated with a hinged casing, of a pair of wedge shaped clamp members for supporting a fuse element in one member of the hinged casing and an arcing horn and a blade member conductively connected to each of the said clamp members.

6. A composite fuse structure comprising a separable arc-chute associated with a hinged casing, of a pair of wedge shaped clamp members for supporting a fuse element in one member of the hinged casing and an arcing horn conductively connected to each of the clamp members.

7. A composite fuse structure comprising a separable arc-chute associated with a hinged casing, of a pair of wedge shaped clamp members for supporting a fuse element in one portion of the hinged casing, an arcing horn electrically connected to each of the clamp members and magnetic means associated with the arc-chute for forcing the arc onto and along the arcing horns.

8. The combination in a hinged casing comprising a hinged portion and a base portion, of a pair of terminal members on the base portion,

a switch jaw on each of the terminals conductively connected thereto, an arc chute associated with said casing, a pair of fuse clamp members associated with the arc chute and a blade member conductively connected to each of the said clamp members and aligned with the said switch jaw.

9. The combination with an arc chute having clamping means for a fuse element associated therewith, of a fuse element within the arc chute conductively connected to the clamping means and a fibre block inlaid in the walls of the arc chute opposite to the rupturing portion of said fuse element.

10. The combination with an arc chute having clamping means for a fuse element associated therewith, of a fuse element within the arc chute connected to the clamping means, arcing horns conductively associated with each of the clamping means, magnetic means surrounding the arc chute for forcing the arc onto and along the arcing horns and a fibre block inlaid in the walls of the arc chute adjacent to the rupturing portion of said fuse element.

11. The combination in an arc chute constructed of fire proof material, of a pair of arcing horns located within the arc chute, means for transferring an arc to the arcing horns and a fibre block inlaid in the sides of the arc chute in the vicinity of the arcing horns.

12. The combination in an arc chute having a pair of arcing horns associated therein, of means inlaid in the wall of the arc chute in the vicinity of the arcing horns adapted to prevent metallic deposits from forming thereon.

13. The combination with an arc chute constructed of fire proof material, of means for drawing an arc therein, and a material inlaid in the walls of the arc chute adapted to be charred by the arc causing the metallic deposits to be loosened therefrom.

14. The combination with a disconnect switch in a fuse box, of a contact jaw base comprising a single casting including a cable terminal and means for mounting the base in said box, a pair of jaw members, links loosely supporting the jaw members to the said casting, a shunt conductively connected to the casting and to the jaw member, and springs for biasing the jaw members toward each other, the assembled jaw having a dimension less than the inner dimensions of the box when closed.

15. The combination with a disconnect switch in a fuse box, of a contact jaw base comprising a single casting having end walls and including a cable terminal and means for mounting the base in said box, jaw members between the end walls, links loosely supporting the jaw members to the said casting, a shunt conductively connected to the end walls and the jaw members, insulating means on the end of the shunts and springs between the insulating means and the jaw members to bias them toward each other, the assembled jaw having a height less than the inner thickness of the box when closed.

16. An arc chute having means for drawing an arc therein, the inner surfaces of the arc chute being composed partly of fire-proof material and partly of a consumable material adapted to be charred by the arc, causing the metallic deposits to be loosened therefrom.

17. An arc chute having spaced arcing members between which an arc occurs upon circuit interruption, the inner surfaces of the arc chute being composed partly of fire-proof material and partly of a consumable material adapted to be charred by the arc, causing the metallic deposits to be loosened therefrom, the consumable material being disposed along the path of the arc between said members.

18. A circuit-interrupting structure comprising an arc chute having separable parts, spaced arcing members in said arc chute between which an arc occurs upon circuit interruption, a magnetic circuit about the arc chute opposite the arcing members and comprising a plurality of portions carried by said separable parts, respectively, and means for biasing said portions of the magnetic circuit toward each other to provide low reluctance contact when said separable parts are brought together to form the arc chute.

19. The combination of a fuse box comprising a base member and a cover member therefor, the fuse box having a separable arc chute carried partly by the base member and partly by the cover member, a fuse element within the arc chute, a magnetic circuit about the arc chute adjacent the fuse element and comprising separable portions carried by the base member and the cover member, respectively, and means for biasing one portion of the magnetic circuit against the other portion to provide low reluctance contact when the cover member is in closed position on the base member.

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