

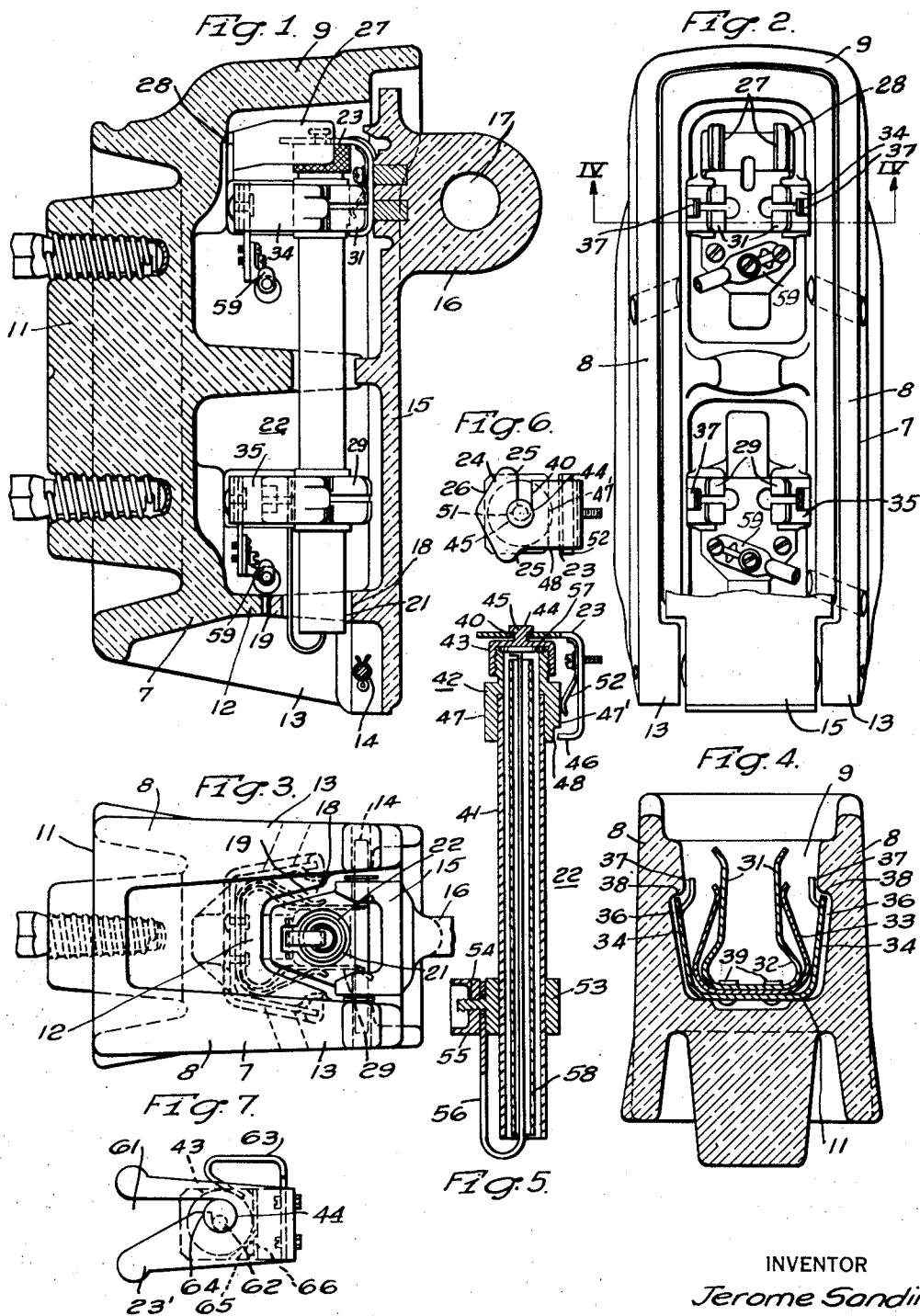
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FUSE MECHANISM

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FUSE MECHANISM

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My invention relates to fuse mechanism and particularly to enclosed fuses of the expulsion type for outdoor service in relatively high-potential circuits.

5 An object of my invention is to provide an outdoor expulsion-type fuse wherein the fuse cartridge comprises an insulating tube closed at one end by a terminal and provided, intermediate its ends, with a contact terminal for the fuse and detachably mounted upon the door 10 of the housing in such manner that it may be removed by a displacement of the closed end of the fuse in a direction transverse to that of the movement of the door, in order to prevent the premature detachment of the fuse from the door 15 by reason of its frictional engagement with the terminal contact within the housing.

A further object of my invention is to provide an expulsion-type fuse having the above-noted characteristics, wherein the fuse cartridge is supported upon a hinged door and wherein means are provided on the door and the fuse cartridge for preventing insertion of the fuse except in an operative position.

A further object of my invention is to provide an expulsion-type fuse wherein the terminal contacts, which are engaged by the fuse when the door is in closed position, are retained in substantially fixed relation with respect to the housing by means of yielding metal clips that are adapted to expand into recesses in the side walls of the housing and prevent outward displacement thereof.

A further object of my invention is to provide an enclosed expulsion-fuse assembly wherein the various elements constituting the fuse and contact terminals therefor are particularly adapted for application and operation in a housing made of porcelain or other molded insulating material.

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

Figure 1 is a vertical sectional view of an enclosed expulsion fuse embodying features of my invention,

Fig. 2 is an elevational view of the fuse mechanism disclosed in Fig. 1, a portion of the door being broken away to expose interior parts of the apparatus,

Fig. 3 is a bottom plan view of the fuse device shown in Fig. 1,

Fig. 4 is a transverse sectional view of the fuse device, viewed in the direction of the arrows and taken on the line IV—IV of Fig. 2,

Fig. 5 is a longitudinal sectional view of a fuse cartridge and a mounting clip embodying features of my invention,

Fig. 6 is a top plan view of the fuse device shown in Fig. 5, and

Fig. 7 is a top plan view of a modified form of a fuse-supporting clip.

Referring to the drawing, the fuse device comprises a housing 7 made of molded insulating material, such as porcelain, the housing comprising side walls 8, a top wall 9, a rear wall 11 and a bottom wall 12, from which a pair of downwardly extending flanges 13 extends to constitute a hinge bracket for supporting a hinged pin 14 upon which a porcelain door 15 is hinged at its lower end.

The door 15 is provided with a lug 16 having an opening 17 therein and constituting a handle in which a hook stick may be inserted for the purpose of pulling the door to open position.

The door, adjacent to its lower extremity, is provided with an inwardly extending web 18 that fits within a notch 19 of V-shape in the bottom wall 12 in such manner that the web substantially closes the notch and constitutes a part of the bottom wall of the housing when the cover is in closed position. The web 18 is provided with an opening 21 for receiving the open end of an expulsion-fuse cartridge 22, such as is shown in Fig. 5 and will hereinafter be described. The upper end of the door 15 is provided with a metal clip 23, shown in Figs. 1, 5, and 6, which serves to support the upper end of the fuse cartridge, in a manner to be hereinafter described.

The clip 23 is provided with an enlarged end portion 24, as illustrated clearly in Fig. 6, the enlarged portion having shoulders 25 and inclined end edges 26 which serve to separate the yielding latch jaws 27 of a latch clip 28 that is mounted within the upper end of the housing 7 and serves to yieldingly engage the shoulders 25 of the clip 23 when the door is in closed position and releasably retain the door in that position.

Within the housing, a pair of contact jaws 29 and 31 are mounted, the jaws being of similar construction and each comprising a yielding metal strap 32 of U-shape that is partially surrounded by a spring-metal jaw 33 of U-shape, the ends of which are normally biased toward each other and serve to press the contact jaws inwardly for affording a good conductive contact between the jaws and the terminals of the expulsion-fuse cartridge. The contact jaws 29

and 31 are retained within the housing by means of anchor clips 34 and 35, respectively, both of which comprise yielding sheet-metal clips of U-shape that are adapted to be compressed while being inserted within the housing and permitted to expand into recesses 36 disposed in opposite relation in the side walls 8 of the housing, in the manner clearly illustrated in Fig. 4.

The clips are provided with tongues 37 that serve to position the ends of the clips within the recesses and may be engaged by a tool for the purpose of compressing the ends of the clips when it is desired to withdraw them from the housing. By reference to Fig. 4, it will be noted that the free ends of the clips 34 engage shoulders 38, constituting the front walls of the recesses 36, and prevent outward displacement of the clips and the contact jaws 31 to which they are secured by means of rivets 39. The latching clip 28 may be an integral part of the anchor clip 34 or may be a separate part attached to the anchor clip in any preferred manner, as by welding or riveting.

The expulsion-fuse cartridge comprises an insulating tube 41 that is closed at one end by a contact terminal 42 upon which a closure cap 43 is threaded. The cap 43 is provided with an under-cut lug or button 44 having a reduced neck portion 45 that is adapted to fit within a slot 40 in the latch clip 23, as indicated in Figs. 1, 5, and 6, and serves to prevent displacement of the fuse cartridge in an axial direction or in the direction of movement of the door about its hinge pin 14, it being understood that the enlarged portion of the button 44 is of greater diameter than the width of the slot and, therefore, prevents downward displacement of the fuse cartridge.

The clip 23 is provided with a flange 46 which extends in the direction of the fuse and beyond the flat surfaces 47' of the contact terminal 47 which is square in shape. One side of the contact terminal 42 is cut away at 48 to clear the end of the flange 46 on the clip 23. By reason of this construction, the clip 23 and the contact terminal 42 cooperate to prevent improper positioning of the fuse upon the door, since, if the side of the contact terminal 42, containing the cut-away portion 48, is turned away from the flange 46 when the fuse is being inserted in the clip, the flange will engage an uncut surface 47 of the contact terminal and prevent insertion of the fuse within the clip.

It will be noted that the notch 40 terminates in an offset end portion 51 and that a spring 52 is provided on the clip for normally biasing the button 44 into the offset portion of the notch 40 for preventing accidental displacement of the fuse in a lateral direction which might disengage it from the clip.

A square contact terminal 53 is mounted upon the lower end of the fuse tube 41 and is provided with a threaded stud 54 upon which a knurled contact nut or knob 55 is mounted for clamping the free end of the fuse strip 56 into conductive engagement with the contact terminal 53. The fuse strip 56 constitutes a refill fuse element having a contact disc 57 connected to its inner end that is clamped between the screw cap 43 and the threaded end of the contact terminal 42, as shown in Fig. 5. The fuse element 56 is surrounded by an insulating tube 58 which is of service in extinguishing the arc incident to the rupture of a fuse.

In order that the fuse tube may properly fit within the contact jaws 29 and 31 when the door is in closed position, it is necessary to so position the fuse upon the door that the contact knob 55 is in position to enter between the jaws of the terminal contact 29. The proper positioning of the tube with respect to the door is insured by the interlock constituted by the flange 46 and the cut-away portion 48 of the contact terminal 42.

In operation, the door is pulled to open position, wherein the fuse cartridge 22 may be attached by first inserting the open end of the fuse tube through the opening 21 in the web 18 of the door by a substantially axial movement of the fuse in a direction toward the hinge of the door. The closed end of the fuse tube is then moved laterally so that the button 44 on the fuse cap 43 may enter the notch 40 in the clip 23. When the fuse is securely in position upon the door, the door may be closed thus moving the contact terminals 42 and 53 into the contact jaws 31 and 29, respectively, it being understood that the contact jaws are connected to the feed conductors through the medium of terminals 59 connected thereto.

Since the notch 40 in the clip 23 extends transversely of the direction of movement of the door, the frictional engagement of the contact jaws 31 with the contact faces 47 of the contact terminal 42 cannot exert any force tending to detach the fuse from the door.

In Fig. 7, I have shown a modified form of clip for retaining the upper end of the fuse cartridge 22. The clip 23' is provided with a slot 61 of V-shape which terminates in a transverse slot 62 for receiving the neck 45 of the fuse terminal button 44. A spring 63 engages the cap 43 and retains the terminal in operative position. The fuse must first be moved transversely clear of the shoulder 64 before the fuse can be removed. A triangular lug 65 on the clip 23', corresponding to the lug 46 on the clip 23, prevents improper positioning of the fuse cartridge 22, one corner of the surface terminal 47 being cut away at 66 to permit proper positioning of the cartridge.

By reason of the fuse construction above disclosed, simple and inexpensive means are provided for mounting the fuse and terminals within a porcelain housing, and, by reason of the simplicity of construction, the cost of manufacture is materially reduced and the construction is rendered relatively compact.

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

I claim as my invention:

1. Fuse mechanism comprising a housing, a door hinged to the housing and having a fuse-receiving socket at its hinged end, a clip at its free end provided with a fuse-receiving slot disposed substantially transverse to the direction of movement of the door and a fuse member fitting within the socket by a substantially axial movement thereof and fitting within the slot in the clip by a transverse movement of the end of the fuse.

2. Fuse mechanism comprising a housing, a door hinged to the housing and having a fuse-receiving socket at its hinged end, a clip at its

free end provided with a fuse-receiving slot disposed substantially transverse to the direction of movement of the door and having a terminal provided with an under cut knob for fitting within the slot in the clip by a transverse movement and for retaining the fuse against axial displacement and lateral displacement in the direction of movement of the door.

3. Fuse mechanism comprising a housing, a door hinged to the housing and having a fuse-receiving socket at its hinged end, a clip at its free end provided with a fuse-receiving slot disposed substantially transverse to the direction of movement of the door, a fuse member fitting within the socket by substantially axial movement thereof and fitting within the slot in the clip by a transverse movement of the end of the fuse and yielding means carried within the housing for releasably engaging the said clip for retaining the door in closed position.

4. Fuse mechanism comprising a housing, a movable door therefor, spaced contact terminals within the housing, a fuse tube mounted on the door and having terminals thereon, said terminals on the fuse tube having contact surfaces for engaging the contact terminals in the housing when the door is closed, a clip electrically connected to one of said terminals for releasably securing the fuse tube upon the door and means carried by the housing for releasably engaging the clip at a point spaced along the length of the fuse tube from the contact surface of the terminal to which the clip is electrically connected for retaining the door in closed position.

5. A fuse mounting for a cartridge fuse having a terminal for operatively engaging a contact clip comprising a movable base having a socket for receiving one end of a cartridge fuse by movement of the fuse in an axial direction and a clip for receiving the other end of the fuse and having a socket in which the fuse may be inserted, only by a lateral movement transverse to the direction of movement of the base substantially parallel to the plane of the base.

6. A fuse mounting for a cartridge fuse having a pair of terminals on the outer side thereof for engaging contact clips comprising a base having a socket for receiving one end portion of the cartridge fuse by movement of the fuse in an axial direction and a clip having a slot extending in a plane parallel to that of the base for receiving the terminal at the other end of the fuse by lateral movement thereof, the last said clip and the last said terminal having cooperating means to prevent placing the fuse in the clip in an inoperative position for operatively engaging the contact clip.

7. In a fuse device, a housing comprising a box and a lid hinged on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, the lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse terminal contacts with the box contacts when the lid is closed, one of said anchorages comprising a recoil block to sustain the recoil of the fuse upon blowing of the same, and the other comprising means preventing movement of the end of the fuse secured thereby directly away from the lid but permitting movement of the other end of the fuse in a plane generally parallel to the plane of the lid to permit disengagement of the fuse from the first said anchorage.

8. In a fuse device, a housing comprising a box and a lid hinged on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse contacts with the box contacts when the lid is closed, one of said anchorages being releasable only by movement of the fuse in a plane generally parallel to the plane of the lid, said one anchorage including means forming a recoil block and the other anchorage including means preventing movement of the end of the fuse secured thereby in a plane generally perpendicular to the plane of the lid when the fuse is in its final position on the lid but permitting movement of the other end of the fuse in a plane generally parallel to the plane of the lid to disengage the fuse from the first said anchorage.

9. In a fuse device, a housing comprising a box and a lid hinged on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse contacts with the box contacts when the lid is closed, one of said anchorages being releasable only by movement of the fuse in a plane generally parallel to the plane of the lid, said one anchorage including means forming a recoil block and the other anchorage including means preventing movement of the end of the fuse secured thereby in a plane generally perpendicular to the plane of the lid when the fuse is in its final position on the lid but permitting movement of the other end of the fuse in a plane generally parallel to the plane of the lid, and said fuse being disengageable from the first said anchorage prior to its final disengagement from the other anchorage and being disengageable from the other anchorage by a movement longitudinally of the fuse.

10. In a fuse device, a housing comprising a box and a lid hinged on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse contacts with the box contacts, said anchorages lying endwise beyond the corresponding fuse contacts, one of said anchorages comprising a recoil block, and the other of said anchorages comprising means for holding the other end of the fuse.

11. In a fuse device, a housing comprising a box and a lid hinged on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, the lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse terminal contacts with the box contacts when the lid is closed, said anchorages comprising a projection and a socket registering by movement of the fuse longitudinally relative to its axis, and a hook and shoulder registering by lateral movement of the fuse relative to its axis, and both of said anchorages preventing said fuse from being directly moved away from the lid in a direction

generally perpendicular to the plane of the lid after the fuse has been secured to the lid.

12. In a fuse device, a housing including a box and a door therefor, a fuse including a tube of insulating material having a pair of spaced terminals of conducting material thereon, a pair of spaced terminals in the box for receiving the terminals on the fuse, said door having a pair of spaced quick detachable anchorages for mechanically holding the fuse tube on the door, and said anchorages both engaging the fuse adjacent the ends thereof at points outside of the space between the conducting parts of said terminals on the fuse.

13. In a fuse device, a housing including a box and a door therefor, a fuse including a tube of insulating material having a pair of spaced terminals of conducting material thereon, a pair of spaced terminals in the box for receiving the terminals on the fuse, said door having a pair of spaced quick detachable anchorages for mechanically holding the fuse tube on the door, one of said anchorages for holding one end of the fuse including means engageable by movement of the fuse longitudinally, said means when engaged preventing said end of the fuse from moving laterally, and the other of said anchorages including means engageable by a lateral movement of the fuse, and the last said means when engaged preventing movement of its end of the fuse in a direction generally perpendicular to the plane of the door.

14. In a fuse device, a housing comprising a box and a lid on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, the lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse terminal contacts with the box contacts when the lid is closed, one of said anchorages comprising means for holding one end of the fuse, and the other comprising means preventing movement of the other end of the fuse secured thereby directly away from the lid but permitting movement of the first said end of the fuse in a plane generally parallel to the plane of the lid to permit disengagement of the fuse from the first said anchorage.

15. In a fuse device, a housing comprising a box and a lid hinged on the box, a fuse comprising a tube having a pair of spaced terminal contacts, the box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of spaced quick detachable anchorages for mechanically holding the fuse to register the fuse contacts with the box contacts when the lid is closed, one of said anchorages being releasable only by movement of the fuse in a plane generally parallel to the plane of the lid, said one anchorage including means for holding one end of the fuse and the other anchorage including means preventing movement of the other end of the fuse secured thereby in a plane generally perpendicular to the plane of the lid when the fuse is in its final position on the lid but permitting movement of the first said end of the fuse in a plane generally parallel to the plane of the lid to disengage the fuse from the first said anchorage.

16. In a fuse device, a housing comprising a box and a lid for the box, a fuse comprising a tube having a pair of spaced terminal contacts with a fuse link connected therebetween,

said box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having quick detachable anchorage means for mechanically holding the fuse on the lid with the fuse terminal contacts in engagement with the contacts in the box when the lid is closed, said anchorage means comprising means engageable by movement of one end of the fuse tube only in a direction generally along the axis of the fuse tube and of the other end of the fuse tube in a direction generally perpendicular to the direction of movement of the lid in opening and closing.

17. In a fuse device, a housing comprising a box and a lid for the box, a fuse comprising a tube having a pair of spaced terminal contacts with a fuse link connected therebetween, said box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of quick detachable anchorages for mechanically holding the fuse on the lid with the fuse terminal contacts in engagement with the contacts in the box when the lid is closed, one of said anchorages being engageable by a movement of the fuse tube in a direction generally along its longitudinal axis and the other of said anchorages when engaged positively preventing movement of said fuse along its longitudinal axis in either direction.

18. In a fuse device, a housing of insulating material, a door of insulating material for the housing, a fuse comprising a tube having a pair of spaced terminal contacts with a fuse link connected therebetween, said box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said door of insulating material having a pair of quick detachable anchorages for mechanically holding the fuse on the door with the fuse terminal contacts in engagement with the contacts in the box when the door is closed, one of said anchorages comprising means of insulating material integral with the insulating material of the door for holding one end of the fuse to the door and the other of said anchorages including a metal member secured on the door and engageable with the fuse.

19. In a fuse device, a housing comprising a box and a lid for the box, a fuse comprising a tube having a pair of spaced terminal contacts with a fuse link connected therebetween, said box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of anchorages for mechanically holding the fuse on the lid with the fuse terminal contacts in engagement with the contacts in the box when the lid is closed, one of said anchorages being engageable by a movement of the fuse tube in a direction generally along its longitudinal axis and the other of said anchorages when engaged positively preventing movement of said fuse along its longitudinal axis in either direction and both of said anchorages when engaged by the fuse permitting movement of the fuse relative to the lid to cause disengagement of the fuse from said anchorages.

20. In a fuse device, a housing comprising a box and a lid hinged to the box, a fuse comprising a tube having a pair of spaced terminal contacts with a fuse link connected therebetween, said box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said lid having a pair of quick detachable anchorages for mechanically holding the fuse on the lid with the fuse terminal contacts in en-

gagement with the contacts in the box when the lid is closed, one of said anchorages being engageable by a movement of the fuse tube in one direction generally along its longitudinal axis and the other of said anchorages when engaged positively preventing movement of said fuse along its longitudinal axis in the opposite direction to disengage the first said anchorage and both of said anchorages when engaged by the fuse permitting movement of the fuse relative to the lid to cause disengagement of the fuse from said anchorages.

21. In a fuse device, a housing of insulating material, a door of insulating material for the housing, a fuse comprising a tube having a pair of spaced terminal contacts with a fuse link

connected therebetween, said box having a pair of spaced circuit contacts for receiving said fuse terminal contacts, said door of insulating material having a pair of anchorages for mechanically holding the fuse on the door with the fuse terminal contacts in engagement with the contacts in the box when the door is closed, one of said anchorages comprising means of insulating material integral with the insulating material of the door for holding one end of the fuse to the door and the other of said anchorages including a metal member secured on the door and engageable with the fuse and both of said anchorages releasing said fuse upon movement only of the fuse relative to the door.

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