March 12, 1935. A. G. STEINMAYER 1,993,866

FUSE

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Fig. 1

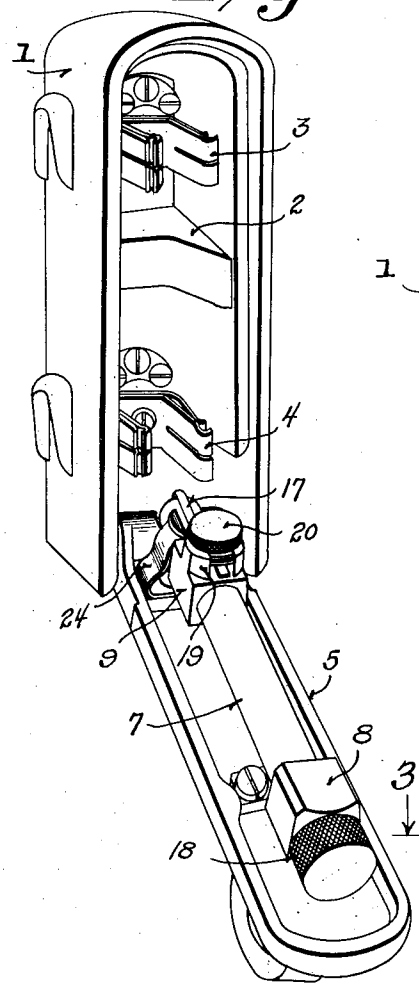


Fig. 2

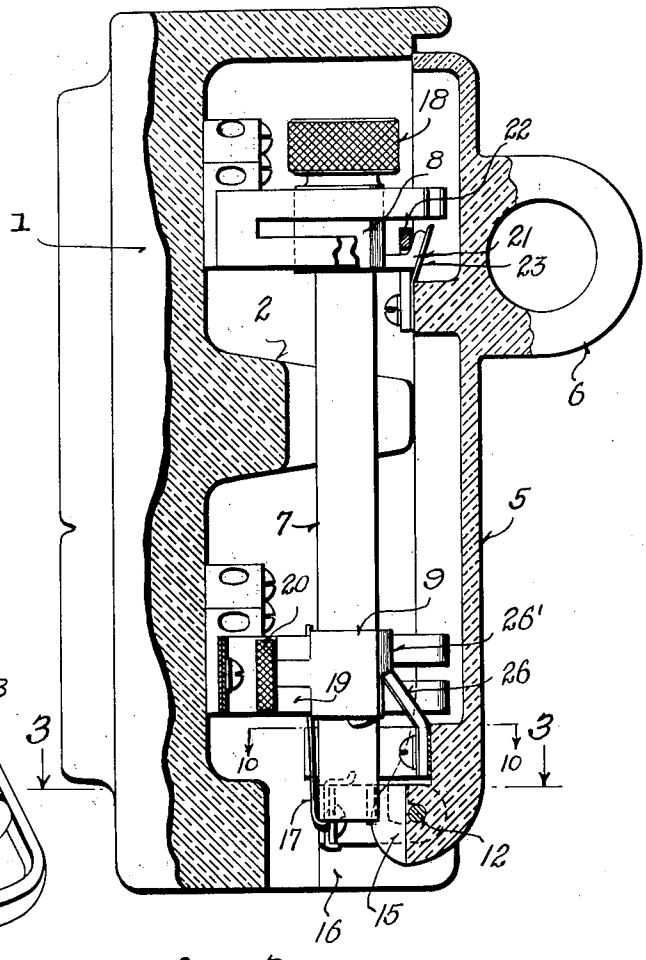
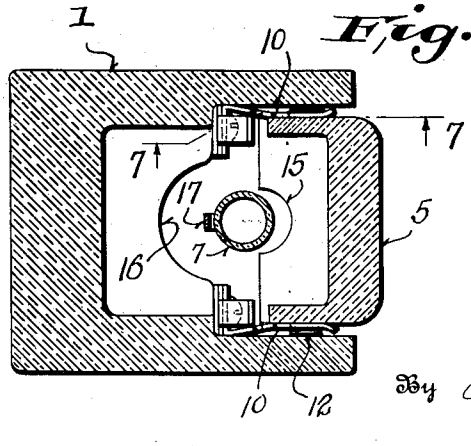


Fig. 3



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FUSE

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Fig. 4

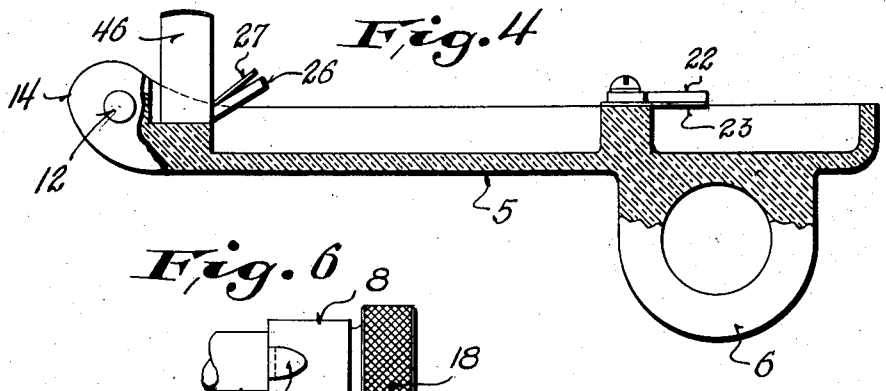


Fig. 6

Fig. 5

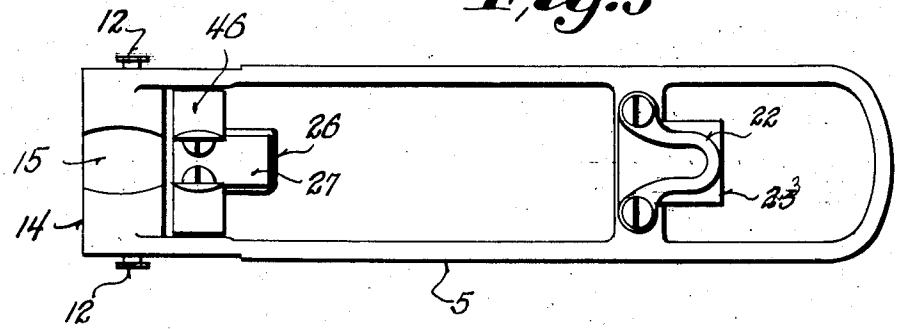


Fig. 7

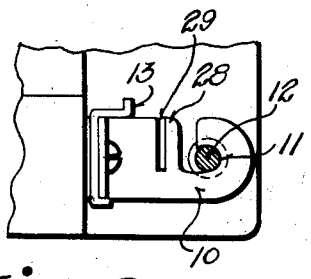


Fig. 10

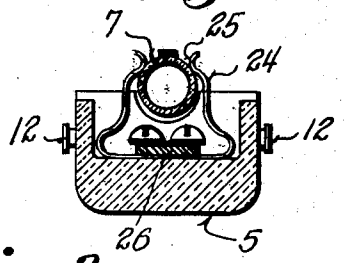


Fig. 9

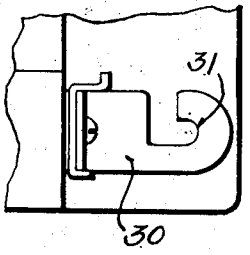
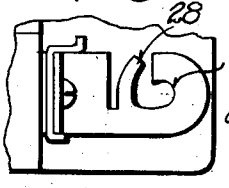


Fig. 8



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Fig. 11

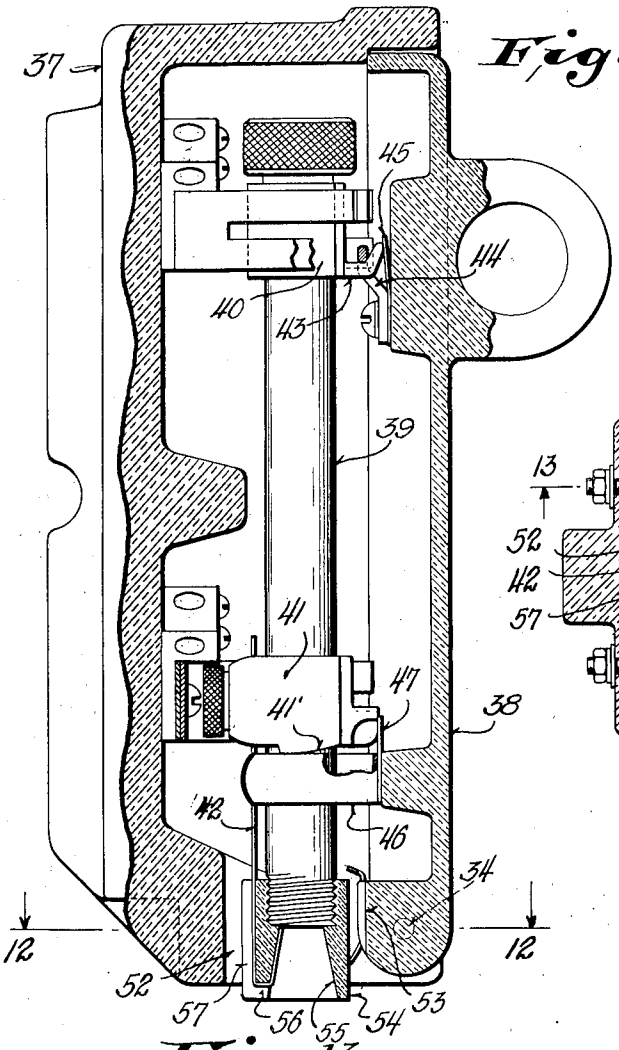


Fig. 12

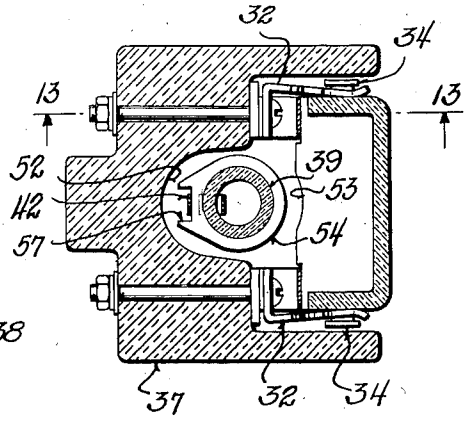


Fig. 13

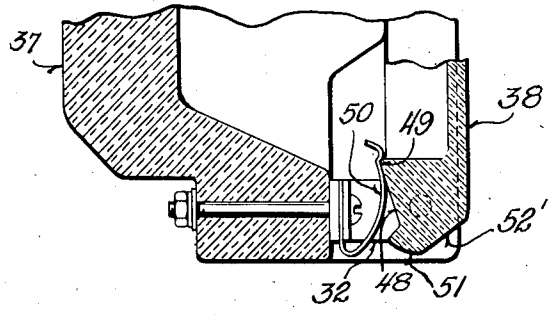
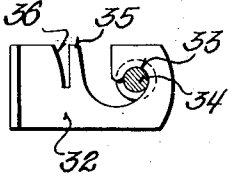


Fig. 14



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Patented Mar. 12, 1935 1,993,866

UNITED STATES PATENT OFFICE

1,993,866

FUSE

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Application June 1, 1931, Serial No. 541,313

12 Claims. (Cl. 200—127)

This invention relates to fuses, such as expulsion fuses, and is particularly directed to a housed type of fuse.

Objects of this invention are to provide a construction in which the fuse tube, or fuse proper, is removable from the door of the housing; in which the door and associated parts are so constructed that the door is removable from the housing, or may be permanently pivotally held to the housing by a slight manipulation or bending of certain parts of the structure; and in which the fuse tube is provided with an insulating extension extending through the bottom of the box or housing.

In greater detail, objects of this invention are to provide a novel form of fuse which may be supplied either as a removable pivotally mounted door type, or which may be changed to a permanently pivotally mounted door type by merely bending up small projections on the hinge clips, and to so construct the device that this change can easily be made, the same construction being furnished for both types.

Further objects are to provide a fuse in which an extension of the fuse tube, or arc chute, projects all conducting gases outwardly away from the housing or box and prevents such conducting gases, formed during the blowing of the fuse, from entering the housing; and to so construct the extension that no metal parts project from the housing.

Further objects are to provide a construction in which the arc chute is so made that no live parts project from the box or housing in which the fuse tube is located, thereby avoiding danger to linemen; which is so made that it protects the fuse link from damage during the opening, closing, or removal of the door; and which also in no way interferes with the free expulsion of the fuse link, but insures clearing of the fuse when the fuse blows.

Further objects are to provide a construction which, in certain forms, although permitting the free removal of the door, yieldingly holds the door against accidental removal; and which secures greater safety as well as greater ease in refusing.

Embodiments of the invention are shown in the accompanying drawings, in which:—

Figure 1 is a perspective view of one form of the invention, showing the fuse box open.

Figure 2 is a view, partly in section and with parts broken away, showing the fuse box closed.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 2.

Figure 4 is a sectional view of the door.

Figure 5 is an inside view of the door.

Figure 6 is a fragmentary view of the upper end of the fuse.

Figure 7 is a sectional view on the line 7—7 of Figure 3, showing one of the hinge clips as it appears when the door is removable.

Figure 8 is a view similar to Figure 7 showing the hinge clip adjusted to prevent removal of the door.

Figure 9 is a view of a further form of hinge clip.

Figure 10 is a sectional view through the lower part of the door, such view being taken on the line 10—10 of Figure 2.

Figure 11 is a sectional view corresponding to Figure 2 showing a further form of the invention.

Figure 12 is a sectional view on the line 12—12 of Figure 11.

Figure 13 is a sectional view on the line 13—13 of Figure 12.

Figure 14 is a view of a further form of hinge clip.

Referring to the form of the invention shown in Figures 1 to 7, it will be seen that the fuse comprises a housing 1, of porcelain or other suitable material provided with a barrier 2, and having upper and lower stationary contacts 3 and 4, respectively, to which the lead in wires, (not shown) are electrically connected.

A door 5, of bakelite or other insulating material is detachably and hingedly joined adjacent its lower end to the housing, and is preferably provided with an integral eyelet, or manipulating member 6 by means of which the door may be opened or closed.

A fuse consisting of a fuse tube 7 provided with upper and lower contacts or terminals 8 and 9, respectively, is removably carried by the door. When the door is closed, as shown in Figure 2, the fuse contacts 8 and 9 are received by the stationary contacts 3 and 4 of the housing. When the door is swung open, it swings free and clear of all live parts, completely removing the fuse from proximity to either side of the line, the construction being such that the door is designed to swing through 180°. The fuse may be readily removed from the door for refusing, or if desired, the door may be detached and bodily removed from the housing prior to the removal of the fuse.

It is preferable to provide a pair of hinge clips 10, see Figure 7, which are secured to the housing 1 and are provided with bayonet slots 11 for the reception of headed trunnions 12 projecting from opposite sides of the lower portion of the door 5.

Further, outwardly projecting members 13 are secured to the hinge clips 11 and to the housing and prevent removal of the door, due to the rearwardly or downwardly projecting portion 14 of the door, until the door is swung downwardly through approximately 180°.

The inner bottom portion of the door 5 is cut away, as indicated at 15, see Figure 2, and the bottom wall of the housing is cut away, as indicated at 16, to provide an opening in the lower wall of the housing, through which, or into which the lower end of the fuse passes, so that the gases from the expulsion fuse are blown clear of the housing.

The fuse is provided with a fuse link 17, see Figures 1 and 2, which is located within the fuse tube 7, clamped to the upper contact 8 by means of the screw cap 18, in the usual manner, and which extends downwardly through the fuse tube 7 and is looped around the lower end of the fuse tube and extends upwardly to the lower contact 9. The lower contact 9 may be provided with a boss 19 which is slotted for the reception of the end of the fuse link, the boss being internally threaded to receive the clamping screw 20 that holds the fuse link.

The fuse is removably held to the door by providing a tongue 21 on the upper contact 8, see Figures 2 and 6, which hooks into a metal loop 22. It is to be noted from Figure 5 that a spring metal clip or plate 23 is secured beneath the metal loop 22 so as to insure intimate contact between the tongue 21 and the metal loop 22. This construction is to prevent radio interference which frequently results when an imperfect or uncertain contact exists between a metal member and a high tension contact.

The lower end of the fuse is held by means of a U-shaped spring clip 24, see Figures 1 and 10. This U-shaped spring metal clip is secured to the door 5 and is so made that the inturned rounded portions 25 of the clip arms engage the tubular portion 7 of the fuse on the side opposite that adjacent the door so as to tend to urge the fuse inwardly towards the door. The inward motion of the fuse towards the door is limited by a metal prong or stop 26, see Figures 2, 4 and 5, and a spring metal plate 27 similar to the plate 23 is provided which insures good electrical contact with the bottom live contact 9 of the fuse, thereby avoiding radio interference in the manner hereinbefore described. The stop 26, as will be seen from Figure 2, engages beneath a projecting portion 26' formed on the lower contact 9 and prevents downward shifting of the fuse.

From Figure 7, it will be seen that a tongue 28 is provided as an integral portion of the hinge clip 10. This tongue is conveniently formed by cutting a slot 29 downwardly into the hinge clip.

If it is desired to have the door freely removable from the housing, the tongue 28 is left in the position shown in Figure 7. However, if it is desired to permanently hingedly retain the door, the tongue 28 is bent forwardly toward the bayonet slot 11. This is readily accomplished by inserting a screw driver or other similar tool in the slot 29 and forcing the tongue 28 over, as shown in Figure 8.

The hinge clip may take other forms. For example, as shown in Figure 9, a simple form of clip 30 may be provided. This clip has a bayonet slot 31 and is generally of the type previously described.

A still further form of hinge clip may be provided, as shown for example in Figure 14. This hinge clip 32 is very similar to that illustrated in Figures 7 and 8. However, the bayonet slot 33 extends upwardly so as to provide an even more secure engagement with the trunnions 34, as shown in Figure 14. The hinge clip 32 may also be provided with a tongue 35, and, if desired, the slot 36 may be formed with an upwardly widening throat to facilitate the entrance of a screw driver or other instrument when it is desired to bend the tongue 35 forwardly, as previously described.

A further form of the invention is shown in Figures 11, 12 and 13. This form of the invention follows generally that previously described. The housing is indicated by the reference character 37 and is provided with a door 38 equipped with the trunnions 34 pivotally supported by means of the hinge clips 32 previously described, or with any form of hinge clips desired. This door obviously may be either removably hingedly held or permanently hingedly held to the housing 37. The fuse tube 39 is provided with upper and lower contacts 40 and 41 normally joined by a fuse link 42 in the manner previously described. This fuse is removably held to the door by means of a prong 43 engaging a metal loop 44 and contacting with the radio interference preventing spring clip 45 in the manner previously described. Similarly the lower portion of the fuse tube is engaged by the U-shaped spring clip 46 in the same manner as illustrated in Figure 10. The lower contact 41 is provided with a somewhat rounding projecting bottom portion 41' which bears against the spring clip 46 and prevents downward shifting of the fuse tube. Also a spring clip or plate 47 is held in contact with the spring fingers 46 and engages the lower contact 41, thereby preventing radio interference.

The lower portion of the door 38 is shaped to provide a slanting face 48 terminating in an upper corner portion 49. A spring 50, see Figure 13, is carried adjacent each hinge clip 32 and is provided with an indentation into which the projection 49 fits to thereby give somewhat of a snap action to the door during closing and opening movement. Further, the door is provided with a bottom portion 51 which compresses the springs 50 during the opening of the door. The lower outer bottom portion of the door is provided with plane faces 52' which are engaged by the springs 50 and aid in holding the door in its completely opened position, as is obvious from an inspection of Figure 13.

It will be seen that the bottom portion of the door is cam-shaped to aid in securing a snap action and also to aid in holding the door in opened position when the door is extended downwardly, as is obvious from an inspection of Figure 13.

Attention is directed particularly to Figure 11 from which it will be seen that the bottom of the casing is provided with an opening 52 and that the door is provided with a small recess 53. This opening provides a space through which the bottom of the fuse projects.

The fuse tube is provided with an arc chute 54 which is of insulating material, such as a phenolic condensation product, fiber, or other material. This arc chute is provided with a flaring opening 55 which discharges the highly heated gases and insures the passage of these gases completely away from the housing. Difficulty has been experienced in certain types of arc chutes due to the fact that a free discharge of the fuse link is often prevented by the heretofore known types of arc chutes. This invention overcomes

these defects and provides for the free and unrestricted discharge of the fuse link, the arc chute in no way interfering with the whipping or bending action at the lower looped portion of the fuse link.

This free discharge of the fuse link is accomplished by looping the bottom portion of the fuse link around the bottom portion of the arc chute and in no way binding the fuse link to the arc chute. This result is obtained by providing a notch 56 in the lower portion of the arc chute and by providing a slot 57 in the outer rear side of the arc chute, as viewed in Figure 11. The fuse link is freely looped into position, as shown in Figure 11, lying within the notch 56 and the slot 57. This construction is also shown in Figure 12, and it will be seen that a free whipping action of the fuse link is provided by this construction, thereby insuring clearing of the fuse.

In addition to these desirable features it is to be noted that there is no projecting portion of the fuse link which extends outwardly and which may be inadvertently engaged by the hand of the lineman or by an instrument carried by him. In other words, all live portions are completely housed. Even the lower portion of the fuse link is housed within the notch 56 and slot 57 and does not project outwardly from the insulating portions of the structure.

It is to be noted that the arc chute constitutes an enlarged portion of the fuse tube. The arc chute may, therefore, be screwed upon the end of the fuse tube, as shown in Figure 11. The result of this is that existing types of fuse tubes may be equipped with arc chutes with a minimum of expense. Also by forming the arc chute as shown in Figure 11, it is possible to provide the enlarging or flaring opening 55 which aids in the effective discharge of the highly heated gases.

It will be seen that a novel form of expulsion fuse has been provided by this invention which is eminently practical, which is reliable in operation, and which is inexpensive to manufacture.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A fuse comprising a box-like housing having a door hinged thereto, a fuse tube carried by said door, said housing having an opening in its lower portion and said fuse tube having an extension at its lower end projecting into said opening and having a slot at its lower end extending towards said housing, said extension being a distinct and separate member from said fuse tube, said fuse tube having upper and lower contacts, and a fuse link located within said tube and joining said contacts and looped outwardly around said extension and lying within said slot.

2. A fuse comprising a box-like housing having a door hinged thereto, a fuse tube carried by said door, said housing having an opening in its lower portion and said fuse tube having an extension at its lower end projecting into said opening, said fuse tube having upper and lower contacts, and a fuse link located within said tube and joining said contacts and looped outwardly around said extension, said extension being larger than the main body of said tube and having a slot in its lower end receiving the looped portion of the link.

3. A fuse comprising a housing having a door and having an opening through its lower portion, a fuse tube located within said housing and having an open lower end located within said opening and projecting from said housing, said fuse tube having spaced contacts, and a fuse link located within said tube, joining said contacts, and looped downwardly around the lower end of said tube, the lower end of said fuse tube having means for guiding said fuse link, said fuse link being free and unrestricted by said guiding means, said guiding means being directed away from said door.

4. A fuse comprising a housing having a door and having an opening through its lower portion, a fuse tube located within said housing and having an open lower end located within said opening, said fuse tube having spaced contacts, and a fuse link located within said tube, joining said contacts, and looped downwardly around the extreme lower end of said tube, the lower end of said fuse tube having an externally located longitudinal groove for the reception of said fuse link.

5. In an expulsion fuse, a fuse tube having an upper and a lower contact, and having an open lower end provided with an externally located groove in the side of said tube, and a fuse link joining said contacts, extending through said tube and outwardly from the lower end of said tube, said fuse link being looped upwardly about the lower end of said tube and lying within said groove.

6. In an expulsion fuse, a fuse tube having upper and lower contacts and having an open lower end provided with a separate and distinct arc chute, and a fuse link within said tube extending downwardly from the upper contact, outwardly from the lower end of said tube, and looped around said arc chute to said lower contact.

7. In an expulsion fuse, a fuse tube having upper and lower contacts and having an open lower end provided with an arc chute, and a fuse link within said tube extending downwardly from the upper contact, outwardly from the lower end of said tube, and looped around said arc chute to said lower contact, said arc chute having a notch in its lower edge within which the looped portion of said fuse link is located and having a groove in its side for the reception of said fuse link.

8. A fuse comprising a housing having a door, a fuse tube, means carried by said door for detachably holding one end of said tube, and spring fingers carried by said door and spaced from said means for engaging said tube, said spring fingers engaging said tube on the side away from said door and being spaced from said tube on the side towards said door, whereby said tube is yieldingly urged towards said door.

9. A fuse comprising a housing having a door, a fuse tube having a hook adjacent one end thereof, said door having a member for detachable engagement by said hook, said hook and said means being located between said fuse and said door, and a pair of spring fingers carried by said door for gripping said tube and holding said hook in engagement with said means.

10. A fuse comprising a housing having a door, a fuse carried by said door, said door having a pair of projecting trunnions, a pair of hinge clips having bayonet slots for the reception of said trunnions, and spring means bearing against said door tending to hold said trunnions within said bayonet slots.

11. A fuse comprising a housing having a door, a fuse carried by said door, and means hingedly

joining said door and housing, said means including trunnions and hinge clips having recesses for the reception of said trunnions, said clips having bendable portions for retaining said trunnions within said recesses.

12. A fuse comprising a housing having a door provided with trunnions, a fuse carried by said door, and a pair of hinge clips carried by said housing and having bayonet slots for the reception of said trunnions, said clips having tongues adapted to be bent towards the bayonet slots to prevent said trunnions from passing from said slots.

ALWIN G. STEINMAYER.