Aug. 8, 1939. W. O. SCHULTZ 2,168,586

FUSE CONSTRUCTION

Filed Sept. 15, 1937 5 Sheets-Sheet 1

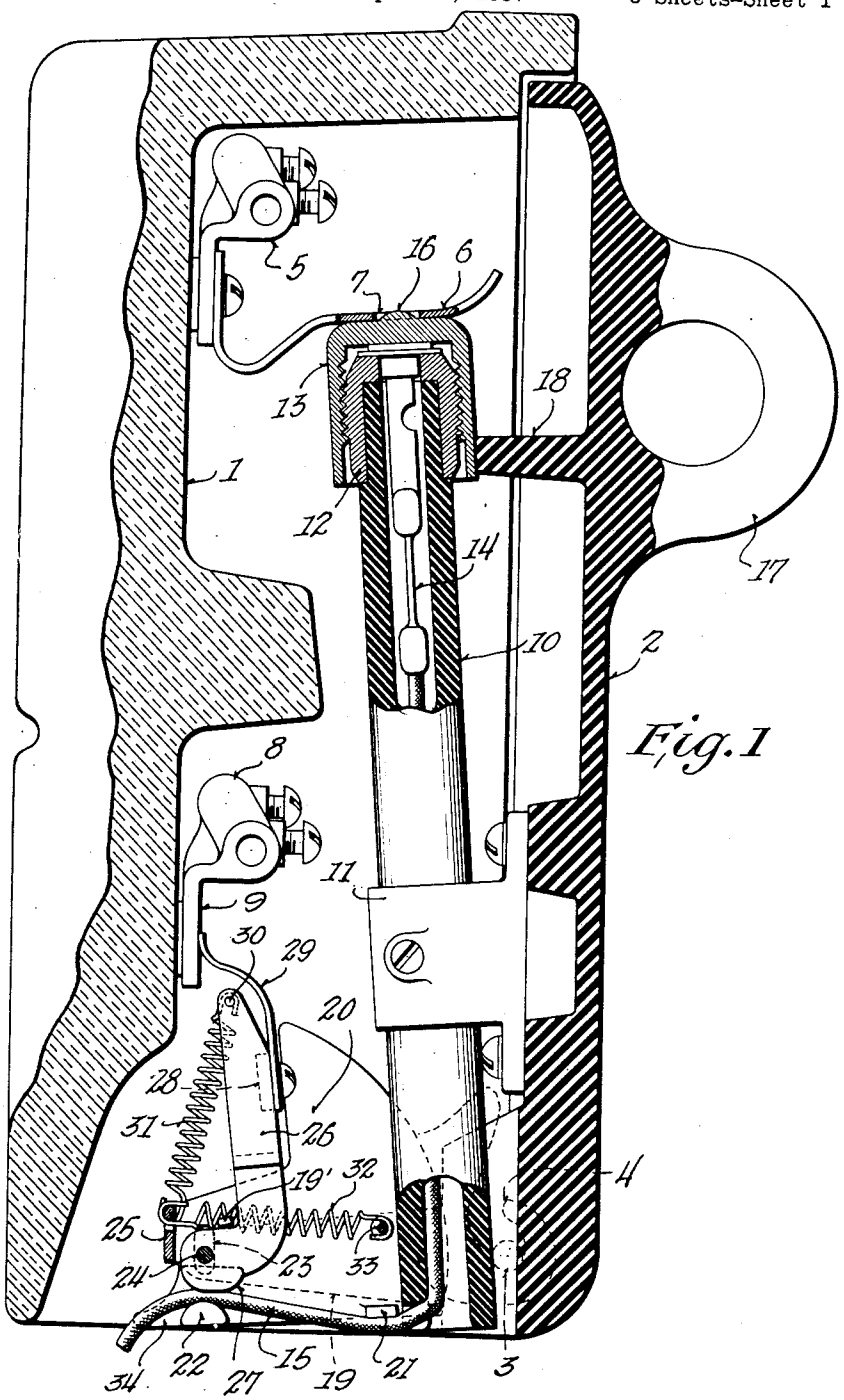


Fig. 1

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FUSE CONSTRUCTION

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Fig. 2

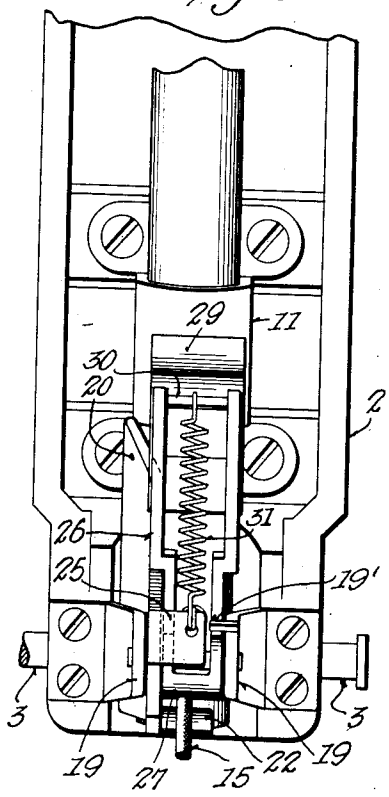


Fig. 4

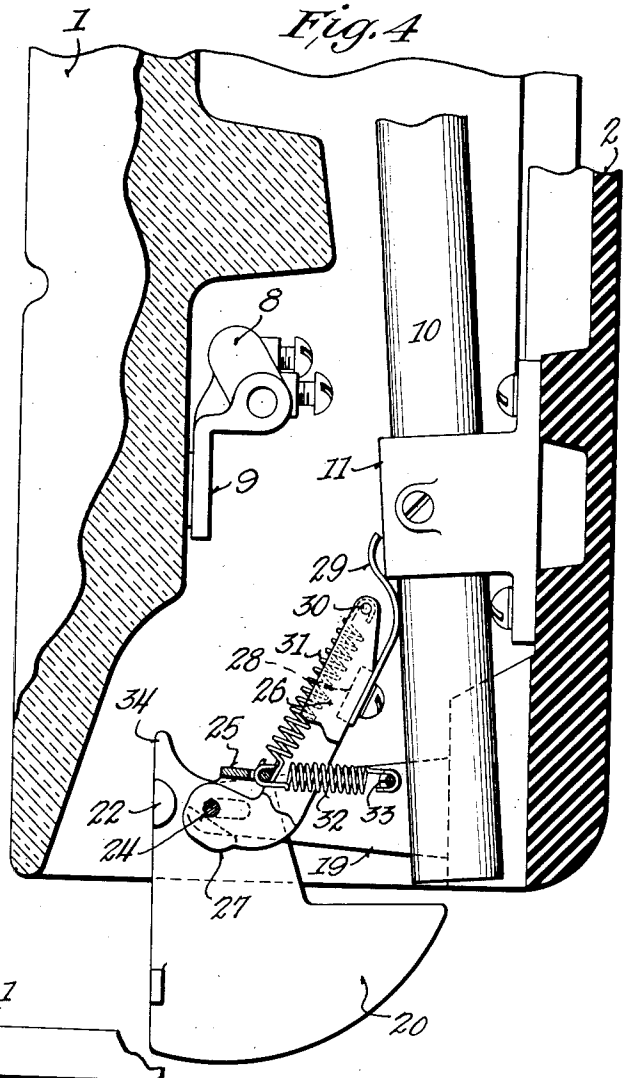
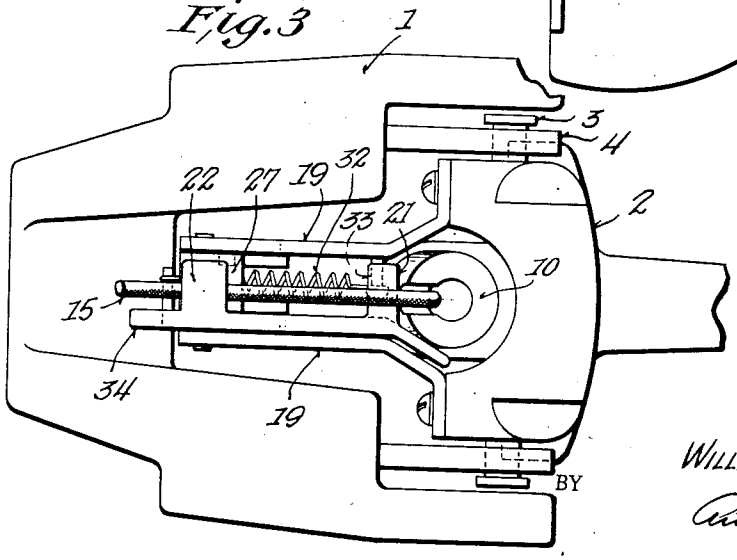


Fig. 3



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FUSE CONSTRUCTION

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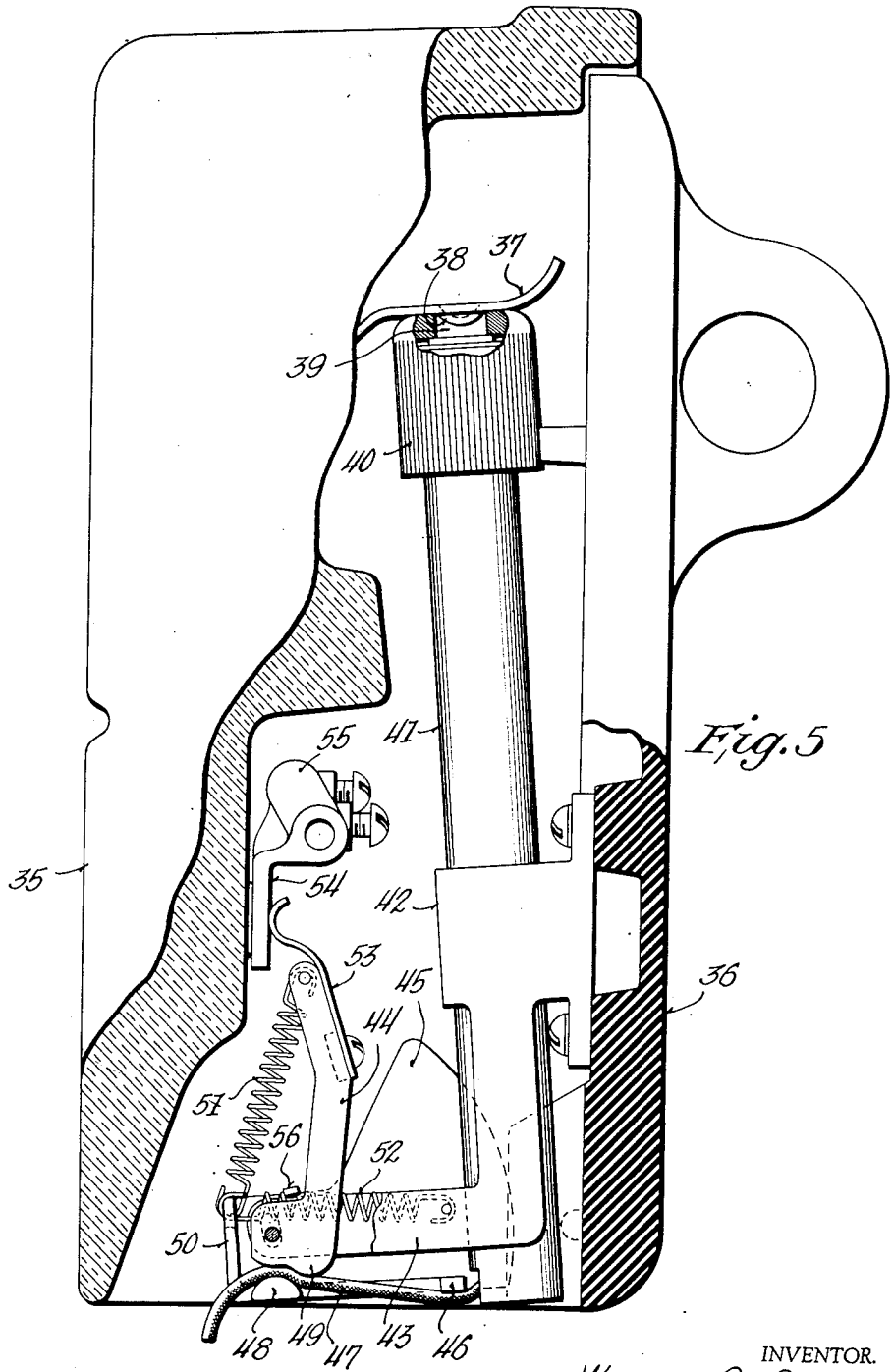


Fig. 5

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FUSE CONSTRUCTION

Filed Sept. 15, 1937 5 Sheets-Sheet 4

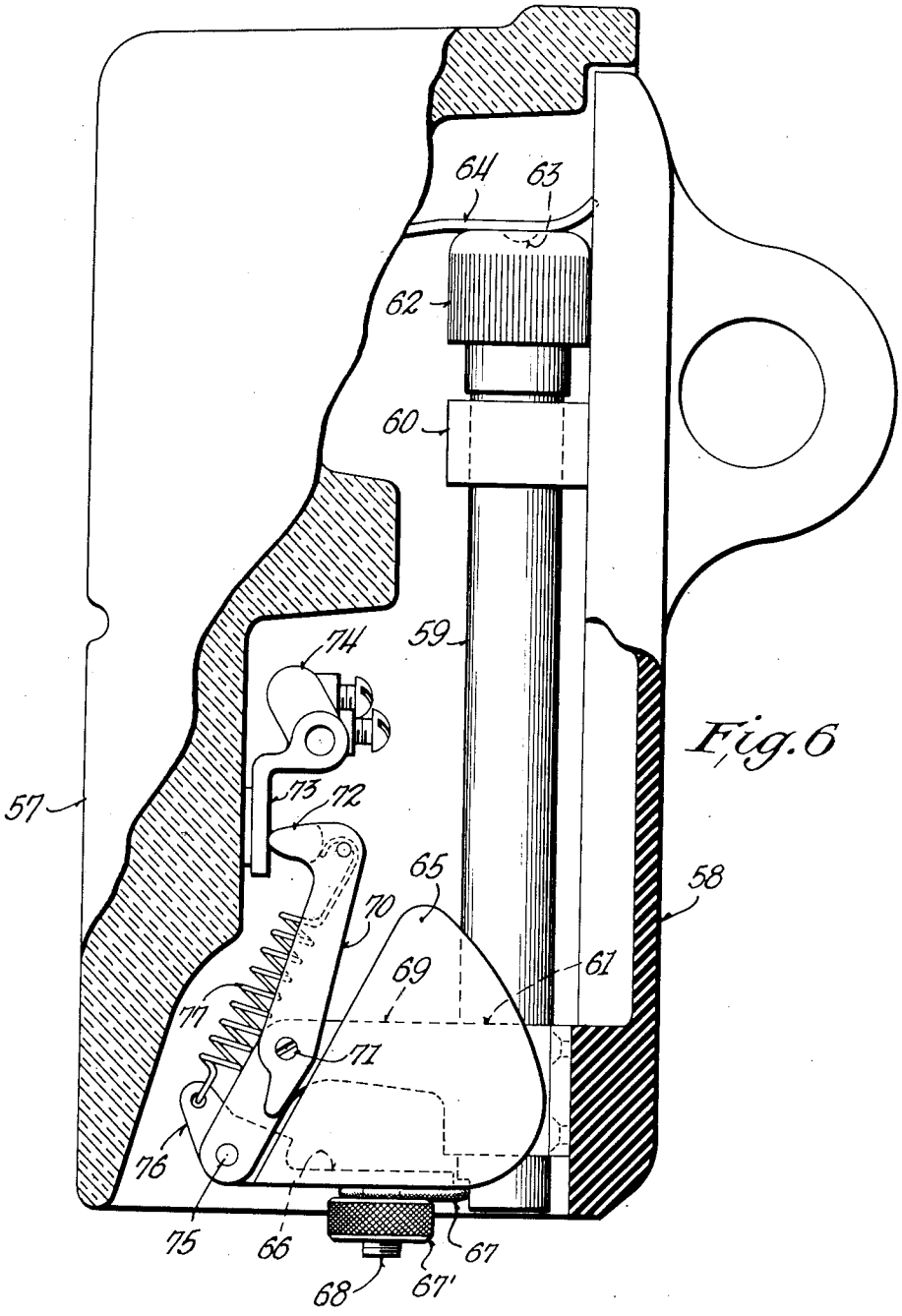


Fig. 6

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FUSE CONSTRUCTION

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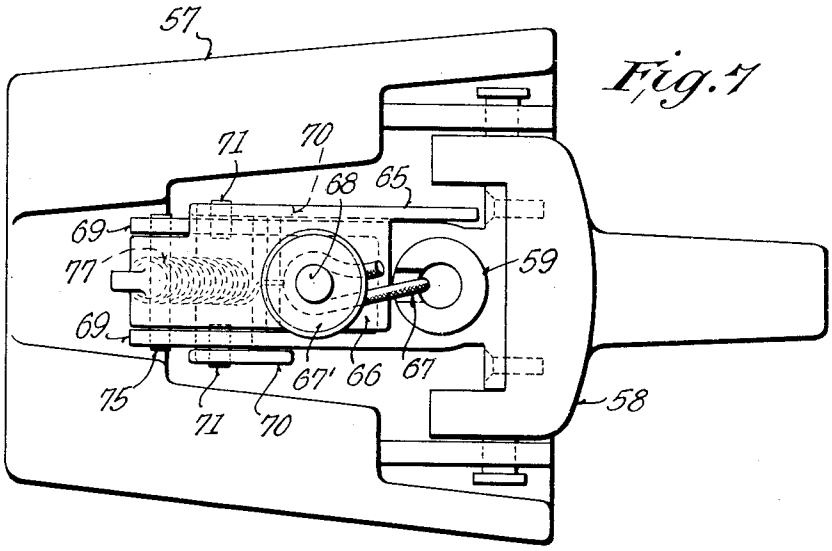


Fig. 7

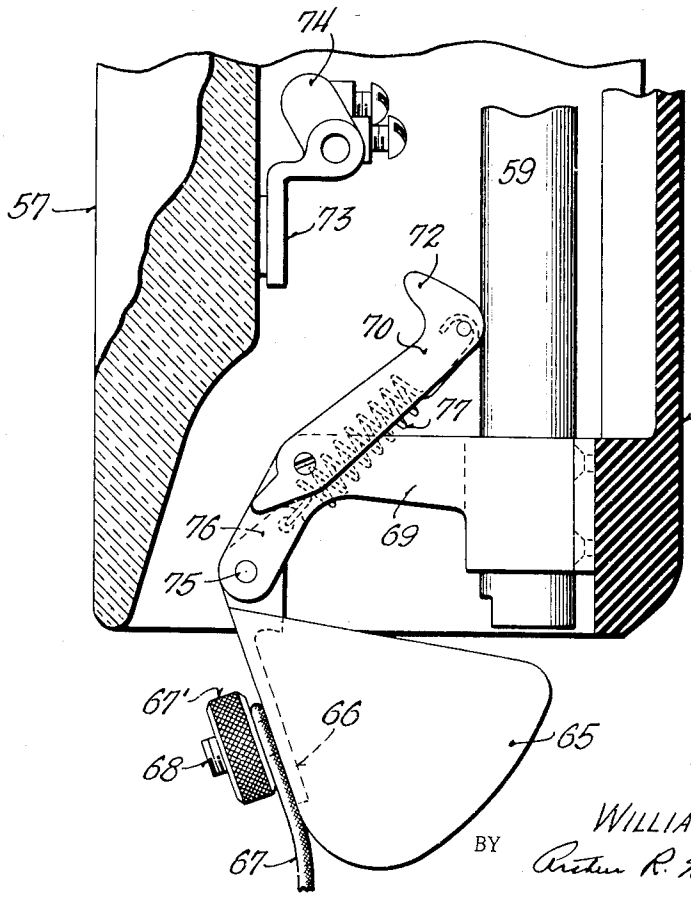


Fig. 8

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2,168,586

UNITED STATES PATENT OFFICE

2,168,586

FUSE CONSTRUCTION

William O. Schultz, South Milwaukee, Wis., assignor to Line Material Company, South Milwaukee, Wis., a corporation of Delaware

Application September 15, 1937, Serial No. 163,975

33 Claims. (Cl. 200—114)

This invention relates to fuse constructions.

Objects of this invention are to provide a novel form of fuse, preferably a housed type of expulsion fuse, in which the fuse tube remains stationary after it has blown and the door remains closed, and in which the fuse tube is relieved of potential stress between the contacts after it has blown so that there is no danger of burning the fuse tube or the door even though the fuse tube may be left in an unfused condition for a material length of time.

Further objects are to provide a construction in which an indicator or semaphore is provided and is displayed when the fuse has blown, thereby giving an indication that the fuse has blown, and to provide means for mechanically withdrawing the fuse link, such means acting in a direction substantially in line with the fuse tube at the initial portion of its stroke as distinguished from pulling the link around the end of the tube, whereby links of less flexibility may be used and whereby a positive extraction of any remaining portion of the fuse link is provided by mechanical means so that in addition to the expulsion action of the fuse tube there is a mechanical clearing of the fuse tube.

Further objects are to provide, in certain forms of the invention, means for releasing any remaining portion of the fuse link after the fusible element has melted and after such remaining portion of the fuse link has been withdrawn, and, in one form of the invention, to provide means for retaining any remaining portion of the fuse link in the event such is necessary, both constructions, however, having the same general objects as hereinabove set forth.

Further objects are to provide means for further interrupting the circuit in addition to that produced by the fusing of the fuse link, such means coming into operation only after the fuse link has melted and has been expelled or withdrawn from the fuse tube, such additional means operating although the fuse tube remains stationary.

Further objects are to provide a construction in which the mechanical means for withdrawing any remaining portion of the fuse link and the auxiliary means for further interrupting the circuit, in addition to that provided by the melting of the fuse link, are supported from the door, in which the entire assembly of fuse tube, door and mechanical link extracting means and circuit interrupting means may be removed from the housing as a unit for refusing so that the device may be refused while it is completely detached from the remaining portion of the apparatus.

Further objects are to provide a novel form of construction in which the refusing may be done in a very simple manner, a portion of the mechanical fuse link withdrawing means acting, in certain forms of the invention, to clamp the free end of the fuse link in place, and in which this automatic clamping action is removed after any remaining portion of the fuse link is withdrawn.

In greater detail, a further object of this invention is to provide an automatically acting switch preferably located adjacent the lower end of the fuse tube and controlled by the fuse link, the semaphore indicating means and the fuse extracting means being also controlled by the fuse link, the switch being held closed until the interruption of the circuit has been effected in the fuse tube and thereafter the switch moving to open position with a quick break and remaining in open position, thus providing an additional point of interruption in the circuit and relieving the fuse tube of potential stresses.

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

Figure 1 is a view, partly in vertical section, showing one form of the device with the parts in operative position.

Figure 2 is a fragmentary view of the lower portion of the door with the parts in their operative positions and with the door removed from the housing.

Figure 3 is a bottom plan view of the construction shown in Figure 1, with parts broken away.

Figure 4 is a view corresponding to the lower portion of Figure 1 showing the device after the fuse has blown and with the automatic switch in the position it occupies after it has moved to open position.

Figure 5 is a view corresponding to Figure 1 showing a modified form of the invention.

Figure 6 is a view corresponding to Figure 1 showing a still further form of the invention.

Figure 7 is a bottom plan view of the construction shown in Figure 6.

Figure 8 is a fragmentary view corresponding to the lower portion of Figure 6 showing the parts after the fuse has blown and after the automatic switch has moved to open position.

Referring to the first form of the invention shown in Figures 1 to 4 inclusive, it will be seen that an insulating housing 1 has been indicated and is provided with a door 2 formed of insulating material and provided with trunnions 3 which

removably fit into hooklike supporting members 4 carried by the housing in a well known manner.

The housing is provided with an upper terminal 5 having an upper contact spring 6 provided with an aperture 7, and with a lower terminal 8 having a contact plate or face 9, the terminals being adapted to be connected to the line wires in the usual manner.

An expulsion fuse tube 10 is rigidly carried by a casting or fuse supporting member 11 which in turn is rigidly attached to the door. The upper portion of the fuse tube is provided with the threaded contact ferrule 12 and with the upper contact cap 13 screwed thereon and adapted to clamp the button head of the fuse link in place, such fuse link being of any suitable construction such as that provided with a reduced fusible section 14 and the flexible leader 15 extending therefrom and projecting through the open lower bottom of the fuse tube, preferably a slot being provided in the bottom of the fuse tube, as shown at the bottom portion of Figure 1, through which the leader passes.

The upper contact cap 13 is preferably provided with a projecting portion or small rounded knob 16 which fits into the aperture 7, the upper contact spring 6 bearing downwardly so that when the door is pushed closed, the projection 16 rides beneath the upturned outer end of the spring 6 and finally enters the aperture 7, thus retaining the door closed. The door stays closed after the fuse tube has operated.

The fuse tube, which is rigidly held within the support 11, also stays in its initial position after operation. However, the door may be opened at any time without breaking the fuse link. It may be merely pulled open by means of the eyelet or manipulating handle 17. Also after the fuse has blown, the door may be pulled open and detached from its pivot support adjacent the lower end for refusing. Preferably a bracing web or projection 18 is formed integral with the door and bears against the contact cap 13 to provide a brace therefor.

The lower portion of the door is provided with a pair of inwardly projecting arms 19 between which a combined indicator and fuse link extracting member is pivoted together with an automatically actuated switch arm or lever. The indicating member is provided with an indicating semaphorelike disk 20 which is normally housed within the casing or housing 1 and which is provided with a lug 21 acting as a fuse link extracting member and beneath which the fuse link is passed. This composite member, consisting of the indicator or semaphore and the fuse extracting portion, is also provided with a lug 22. It has an elongated slotlike aperture 23 which receives the pivot pin 24 carried by the arms 19. The combined indicator and fuse link extracting member is provided with a transverse rear portion 25.

A switch arm 26 is also pivoted upon the pivot pin 24 and is preferably bifurcated and provided with a lower connecting web 27 joining the arms and positioned immediately above the lug 22 of the fuse link extracting and indicating member. The switch arms 26 are also joined by a transverse web 28 to which a removable contact finger 29 is attached, the contact finger 29 normally bearing against the stationary lower terminal or contact 9. Preferably a pin 30 extends between the two portions of the switch arm 26 adjacent the upper end of the switch arm, and a spring 31 is attached to such pin and to the portion 25 of the combined indicator and fuse link extracting member.

If desired, a second spring 32 is attached at one end to the member 25 and at its other end to a pin 33 carried by one of the arms 19, as most clearly shown in Figure 3. If desired, the indicating member 20 may be painted with a distinctive color to give a more pronounced indication when the indicating member has rocked in a clockwise direction about the pivot pin 24 and projects from the casing 1 after the fuse has blown, as will hereinafter be described.

It is to be noted that the lugs or members 22 and 27 have rounded opposed faces and that the spring 31 tends to pull the lug 22 upwardly towards the member or lug 27. These two members constitute the fuse link clamping means which clamp the leader 15 between them.

In refusing the device, the operator, after removing the door and the associated parts from the casing, places his thumb on the projecting foot or ear 34 of the combined fuse link extracting and indicating member and presses it downwardly, thus separating the member 22 from the member 27. Thereafter he inserts the leader between such members and removes his thumb, allowing the spring 31 to cause the leader to be clamped in place.

The operation of the apparatus is as follows: When the fuse link is ruptured, it releases the fuse link extracting and indicating member and the lug 21 thereof moves downwardly at least through a portion of its stroke in substantially a direction parallel to the axis of the fuse tube and thus withdraws any remaining portion of the fuse link outwardly substantially in line with the fuse tube, thus permitting the use of less flexible fuse leaders if desired. Also as the fuse link extracting and indicating member moves towards the completion of its stroke, the lug 22 rocks away from the member 27 and releases the fuse link and allows it to fall from the device.

The momentum of the combined fuse link extracting and indicating member causes the lower point of the spring 31 to move past dead center and as this spring is still in tension, this causes the switch arm 26 to execute a quick opening or quick break movement.

The momentum of the combined indicating and fuse link extracting member will carry the lower point of the spring 31 below dead center, but if it is desired to insure this action, the additional spring 32 is employed and this spring insures the complete rocking of the member 20 so as to move the lower end of the spring 31 past dead center.

It is to be noted, however, that the automatic switch does not break contact until after the circuit has been interrupted within the fuse tube. However, after the switch has opened, it is apparent that no potential stress is imposed on the fuse tube and consequently there is no danger of burning either the fuse tube or the door, even though it may not be refused for a prolonged period. Additionally it is to be noted that the semaphore or indicating member 20 projects downwardly below the bottom of the casing and gives a very distinct indication that the fuse has blown.

The position of the parts after the fuse has blown is shown in Figure 4.

After the fuse has blown, it will be noted that the door stays in its closed position and the fuse tube also remains in its initial position.

In refusing, the door is merely pulled open and detached from the casing and thereafter the op-

erator may easily refuse it by removing the cap 13, inserting a new fuse, and replacing the cap. Thereafter he places his thumb against the ear or foot 34, as described, and forces the lug 22 away from the member 27 and inserts the leader therebetween, thereafter removing his thumb and allowing the spring 31 to cause the leader to be clamped in place, the leader of course being positioned beneath the lug 21, as shown in Figure 1.

It is preferable to provide a lug 19' on one of the arms 19, as shown in Figures 1 and 2, to limit the outward rocking motion of the automatic switch 26 when the door is either pulled open or removed from the casing.

Referring to Figure 5, it will be seen that substantially the same type of construction has been disclosed as that previously described. The casing is indicated by the reference character 35 and the door by the reference character 36. The construction of these parts is the same as that previously described.

The upper contact or contact spring 37, however, may be provided with a downwardly projecting depressed portion 38 which fits within an aperture 39 formed in the upper contact cap 40 of the fuse tube 41.

The fuse tube is rigidly carried by the support or metallic block 42 secured to the door 36 and in this respect is the same type of construction as that shown in Figure 1. However, the supporting arms 43, upon which the automatic switch arm 44 and the combined indicating and fuse link extracting member 45 are pivoted, are formed integrally with the block or casting 42 and may be of L-shape.

The member 45 is provided with a lug 46 similar to the lug 21 and is normally positioned above the leader 47 of the fuse link. This leader is clamped between a lug 48 formed on the member 45 and a lug or projecting portion 49 formed on the switch lever. The rear portion 50 of the indicating member 45 is attached to the springs 51 and 52 corresponding to the springs 31 and 32 of Figure 1.

Similarly to Figure 1, the switch 44 is provided with a removable contact finger 53 which normally bears against the contact portion 54 of the lower terminal 55. A lug 56 is formed on one of the arms 43 and corresponds to the lug 19', see Figure 2. It acts to prevent the switch arm 44 from rocking outwardly beyond a predetermined point when the door is either pulled open or removed from the casing. The door is supported from the casing in identically the same manner as in Figure 1.

In the form of the invention shown in Figure 6, the casing is indicated by the reference character 57 and the door by the reference character 58. The door is removably hinged to the casing exactly as previously described in connection with Figures 1 and 2, though the indication of this construction has been omitted for the sake of clearness.

The fuse tube 59 is rigidly carried in an upper casting 60 and a lower casting 61 secured to the door. The upper contact cap 62 is preferably indented and receives the depressed portion 63 of the upper contact or contact spring 64. In this connection it is obvious that in any form of the invention, either a depression formed on the spring and a recess formed in the cap may be used or the projection may be formed in the cap and the aperture formed in the spring.

In this construction the combined indicating and fuse extracting member comprises the semaphorelike member or indicating member 65 which is provided with a lower transverse web 66. Either the form of fuse clamping means previously described or a clamp thumb nut 67' carried by a threaded stud 68 secured to the bottom flange 66 may be used to receive the leader 67 of the fuse link. In this connection it is to be understood that the clamping thumb nut may replace the fuse clamping means shown in the other forms of this invention if desired.

The bottom casting 61 is provided with inwardly and downwardly extending arms 69 to which an automatic switch arm 70 is pivoted, as indicated at 71. This switch arm is in reality bifurcated, as shown most clearly in Figure 7, and has a web or solid portion 72 at its upper end which may have a rounded inwardly directed point normally contacting with the terminal contact 73 of the lower terminal 74.

The combined fuse link extracting and indicating member 65 is pivoted between the arms 69 as indicated at 75 and is provided with a rearwardly projecting portion 76. A spring 77 is attached to such portion and to the upper part of the switch arm 70 and acts in exactly the same manner as the spring 31 of Figure 1.

Although it has not been shown, it is obviously within the province of this invention to have an additional spring corresponding to the spring 32 of Figure 1, if desired. However, the momentum as well as the weight of the combined fuse link extracting and indicating member will carry it to the position shown in Figure 8 when the fuse link is ruptured and when in this position, it will be seen that the lower end of the spring 77 has been carried past dead center with reference to the switch arm 70. The switch arm 70 thereafter moves open very quickly, giving a quick break, but this opening of the switch does not occur until after the circuit has been interrupted within the tube 59.

The form of the invention shown in Figures 6, 7 and 8 is particularly useful where it is desired to retain any remaining portion of the fuse link and prevent it from dropping from the device. This feature of the construction, of course, may be applied to the other forms of the invention, or if desired, the fuse link clamping means could be applied to the construction shown in Figure 6 in accordance with that described in connection with the other forms of the invention.

Similarly to the other forms, means are provided for preventing the automatic switch arm 70 from moving outwardly too far when the fuse link is intact and when the door is removed from the housing. This may be readily accomplished by merely extending one of the side arms of the switch 70 downwardly, as shown in Figure 6, so that a small lug is positioned and is adapted to contact the semaphore 65 to prevent excessive outward motion of the switch arm.

In each of the several forms of the invention it is, of course, to be understood that if desired the semaphore or indicating member may be painted a distinctive color so that when it projects from the lower portion of the casing, it is readily visible and gives a distinct indication of the condition of the fuse.

In the form of the invention shown in Figure 6 the door is hinged to the casing as previously described and is removable therefrom for refusing.

In all forms of the invention it will be seen that an automatic switch has been provided which comes into play and makes a quick open-

ing stroke after the circuit has been interrupted in the fuse tube.

It will also be seen that the switch electrically isolates the signaling means and any remaining portion of the fuse link that may be connected to the switch from any live portion of the apparatus.

Also it is to be noted that in each form of the invention a very distinct indicating means has been provided to show that the fuse has blown, although neither the fuse tube moves outwardly nor does the door open upon rupture of the fuse link.

Further it will be seen that no potential stresses are imposed on the fuse tube after the device has operated and consequently there is no danger of burning either the fuse tube or door even though the device remains unfused after blowing for a long period of time.

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. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said tube connected to one of said contacts and projecting from one end of said tube, a switch movable to open position independently of any motion of said fuse tube, said switch normally electrically connected to the other of said contacts and electrically connected to the projecting portion of said fuse link, and means biasing said switch towards open position after said fuse link has been ruptured.

2. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said tube connected to one of said contacts and projecting from one end of said tube, a switch movable to open position independently of any motion of said fuse tube, said switch normally electrically connected to the other of said contacts and electrically connected to the projecting portion of said fuse link, means biasing said switch towards open position after said fuse link has been ruptured, and fuse link extracting means preventing the operation of said switch until said fuse link extracting means has operated.

3. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said tube and having one end projecting from one end of said tube, said fuse link having its other end electrically connected to one of said contacts, a switch normally electrically connected to the projecting portion of said fuse link and to the other of said contacts, movable indicating means distinct and separate from said fuse tube and biased towards indicating position and normally held from motion by said fuse link, and means for moving said switch to open position when said fuse link is ruptured.

4. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said tube and having one end projecting from one end of said tube, said fuse link having its other end electrically connected to one of said contacts, a switch normally electrically connected to the projecting portion of said fuse link and to the other of said contacts, and movable indicating means distinct and separate from said fuse tube and biased towards indicating position and normally held from motion by said fuse link, said switch being controlled from said indicating means and being moved to open position when said fuse link is ruptured.

5. In a fuse construction, a pair of contacts, a relatively stationary fuse tube, a fuse link within said tube having one end electrically connected to one of said contacts and having its other end projecting from said tube, a switch electrically connected to the projecting end of said fuse link and to the other of said contacts, and fuse link extracting means controlled by said fuse link and moving said switch to open position when said fuse link extracting means has operated, said fuse tube remaining in place when said fuse link is ruptured.

6. In a fuse construction, a pair of contacts, a relatively stationary fuse tube, a fuse link within said fuse tube, said fuse tube having an open end from which said fuse link projects, and a switch connected in series with said fuse link between said contacts, said switch being controlled by said fuse link and being released and biased towards open position when said fuse link is ruptured, said fuse tube remaining in place when said fuse link is ruptured.

7. In a fuse construction, a pair of contacts, a relatively stationary fuse tube, a fuse link within said fuse tube, said fuse tube having an open end from which said fuse link projects, a switch connected in series with said fuse link between said contacts, and fuse link extracting means connected to the projecting portion of said fuse link and controlled by said fuse link, said switch being controlled from said fuse link extracting means and moving to open position when said fuse link extracting means has operated, said fuse tube remaining in place after said fuse link is ruptured.

8. In a fuse construction, a pair of contacts, a relatively stationary fuse tube having an open end, a fuse link within said fuse tube having one end projecting from the open end of said fuse tube, fuse link extracting means connected to the projecting end of said fuse link and controlled by said fuse link, a switch connected in series with said fuse link between said contacts, and means biasing said switch towards open position after said fuse link has been ruptured, said switch being controlled by said fuse link extracting means, said fuse tube remaining in place after said fuse link is ruptured.

9. In a fuse construction, a housing having a pair of contacts, a door for said housing, a fuse tube carried by said door, a fuse link in said tube, a switch, said switch and said fuse link being connected in series between said contacts, said switch being normally held in closed position, and means controlled by said fuse link for opening said switch when said fuse link is ruptured.

10. In a fuse construction, a housing having a pair of contacts, a door for said housing, a fuse tube carried by said door, a fuse link in said tube, a switch, said switch and said fuse link being connected in series between said contacts, said switch being normally held in closed position, and means controlled by said fuse link for opening said switch when said fuse link is ruptured, said means, switch, fuse tube and door constituting an assembly removable as a unit from said housing.

11. In a fuse construction, a housing having a pair of contacts, a door for said housing, a fuse tube rigidly carried by said door, a fuse link in said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, said switch being normally held in closed posi-

tion, and means controlled by said fuse link for opening said switch when said fuse link is ruptured.

12. In a fuse construction, a housing having a pair of contacts, a door for said housing, a fuse tube carried by said door, a fuse link in said tube, a switch, said switch and said fuse link being connected in series between said contacts, said switch being normally held in closed position, and means controlled by said fuse link for opening said switch when said fuse link is ruptured, said fuse tube remaining in its initial position and said door remaining closed after said fuse link has been ruptured.

13. In a fuse construction, a housing having a pair of contacts, a door for said housing, a fuse tube carried by said door, a fuse link in said fuse tube, a switch connected in series with said fuse link between said contacts, said switch being normally held in closed position, and indicating means controlled by said fuse link and biased towards motion outwardly from said housing, said indicating means causing said switch to open when said fuse link is ruptured, whereby upon rupture of said fuse link said indicating means projects outwardly from said housing and said switch is opened.

14. In a fuse construction, a housing having contacts, a door for said housing, a relatively stationary fuse tube mounted within said housing and having a fuse link, a switch, said switch and fuse link being connected in series between said contacts, fuse link extracting means controlled by said fuse link, and means for opening said switch when said fuse link extracting means is operated.

15. In a fuse construction, a housing having contacts, a door for said housing, a fuse tube mounted within said housing and having a fuse link, a switch, said switch and fuse link being connected in series between said contacts, fuse link extracting means controlled by said fuse link, and means for opening said switch when said fuse link extracting means is operated, said fuse link extracting means extracting any remaining portion of said fuse link upon rupture thereof in a direction substantially in line with said fuse tube.

16. A fuse construction comprising a housing having an open bottom, a fuse tube mounted within said housing, a pair of contacts within said housing, a fuse link within said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, and indicating means distinct and separate from said fuse tube and biased towards motion downwardly through the open bottom of said housing, said indicating means controlling the operation of said switch and being controlled by said fuse link.

17. A fuse construction comprising a housing having an open bottom, a fuse tube mounted within said housing, a pair of contacts within said housing, a fuse link within said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, and indicating means biased towards motion downwardly through the open bottom of said housing, said indicating means controlling the operation of said switch and being controlled by said fuse link, said indicating means being pivotally mounted within said housing and having fuse link extracting means.

18. A fuse construction comprising a housing having an open bottom, a fuse tube mounted within said housing, a pair of contacts within said housing, a fuse link within said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, indicating means biased towards motion downwardly through the open bottom of said housing, said indicating means controlling the operation of said switch and being controlled by said fuse link, and a spring joining said indicating means and said switch, said spring urging said indicating means towards indicating position and normally biasing said switch towards closed position and biasing said switch towards open position after said indicating means has operated.

19. A fuse construction comprising a housing having an open bottom and an open front, a door for said open front, a fuse tube carried by said door and having an open end adjacent the open bottom of said housing, a pair of stationary contacts carried by said housing, a fuse link within said fuse tube projecting outwardly through the open end thereof, a switch, said switch and said fuse link being connected in series between said contacts, combined fuse link extracting and indicating means biased towards outward motion through the bottom of said housing and controlled by said fuse link, and biasing means controlled by said combined fuse link extracting and indicating means for normally biasing said switch towards closed position, said means biasing said switch towards open position when said combined indicating and fuse link extracting means has operated.

20. A fuse construction comprising a housing having an open bottom and an open front, a door for said open front, a fuse tube carried by said door and having an open end adjacent the open bottom of said housing, a pair of stationary contacts carried by said housing, a fuse link within said fuse tube projecting outwardly through the open bottom thereof, a switch, said switch and said fuse link being connected in series between said contacts, combined fuse link extracting and indicating means biased towards outward motion through the bottom of said housing and controlled by said fuse link, and biasing means controlled by said combined fuse link extracting and indicating means for normally biasing said switch towards closed position, said means biasing said switch towards open position when said combined indicating and fuse link extracting means has operated, said door and said fuse tube remaining in their initial positions after said fuse link has ruptured.

21. A fuse construction comprising a housing having an open bottom and an open front and having an upper contact and a lower contact, a door for the open front of said housing, said door being removably supported from said housing, a fuse tube carried by said door and having an upper contact engaging the upper contact of said housing and having a lower open end located adjacent the open bottom of said housing, a switch normally engaging the lower contact of said housing and mounted adjacent the lower end of said fuse tube, a fuse link extending from the upper contact of said fuse tube through said fuse tube and projecting from the open bottom thereof, said fuse link being connected to said switch, combined fuse link extracting and indicating means pivotally mounted adjacent the lower portion of said fuse tube and biased towards rocking motion outwardly through the open bottom of said housing, said combined fuse link extracting and indicating means being controlled by said

fuse link, and spring means controlled by said combined fuse link extracting and indicating means for opening said switch when said combined fuse link extracting and indicating means has operated.

22. In a fuse construction, a pair of contacts, a relatively stationary fuse tube, a fuse link within said tube electrically connected to one of said contacts and projecting from one end of said fuse tube, a switch normally electrically connected to the other of said contacts and electrically connected to the projecting portion of said fuse link, and automatically acting means for opening said switch after said fuse link has been ruptured, said fuse tube remaining in place after said fuse link is ruptured.

23. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said fuse tube having one end electrically connected to one of said contacts and having its other end projecting from said fuse tube, a switch electrically connected to the projecting end of said fuse link and to the other of said contacts, and a fuse link extracting means distinct and separate from said switch and controlled by said fuse link and moving said switch to open position when said fuse link extracting means has operated.

24. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said fuse tube, said fuse tube having an open end from which said fuse link projects, a switch electrically connected in series with said fuse link between said contacts, a fuse link extracting means connected to the projecting portion of said fuse link and controlled by said fuse link, said fuse link extracting means being distinct and separate from said switch, said switch being controlled from said fuse link extracting means and moving to open position when said fuse link extracting means has operated.

25. A fuse construction comprising a fuse tube, a pair of spaced contacts, a fuse link within said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, and indicating means biased towards motion outwardly from said fuse construction, said indicating means controlling the operation of said switch and being controlled by said fuse link, said indicating means being pivotally mounted and having fuse link extracting means.

26. A fuse construction comprising a fuse tube, a pair of contacts, a fuse link within said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, indicating means biased towards motion outwardly from said fuse construction, said indicating means controlling the operation of said switch and being controlled by said fuse link, and a spring joining said indicating means and said switch, said spring urging said indicating means towards indicating position and normally biasing said switch towards closed position and biasing said switch towards open position after said indicating means has operated.

27. A fuse construction comprising a fuse tube having an open end, a pair of stationary contacts, a fuse link within said fuse tube projecting outwardly through the open end thereof, a switch, said switch and fuse link being connected in series between said contacts, combined fuse link extracting and indicating means biased towards outward motion away from said fuse construction and controlled by said fuse link, and biasing means controlled by said combined fuse link extracting and indicating means for normally biasing said switch towards closed position, said means biasing said switch toward open position when said combined indicating and fuse link extracting means has operated.

28. A fuse construction comprising a fuse tube having an open end, a pair of stationary contacts, a fuse link within said fuse tube projecting outwardly through the open end thereof, a switch, said switch and said fuse link being connected in series between said contacts, combined fuse link extracting and indicating means biased towards motion away from said fuse construction, and biasing means controlled by said combined fuse link extracting and indicating means for normally biasing said switch towards closed position, said means biasing said switch towards open position when said combined indicating and fuse link extracting means has operated, said fuse tube remaining in its initial position after said fuse link has ruptured.

29. A fuse construction comprising upper and lower stationary contacts, a fuse tube having an upper contact engaging the upper stationary contact and having a lower open end, a switch normally engaging said lower stationary contact and mounted adjacent the lower end of said fuse tube, a fuse link extending from the upper contact of said fuse tube through said fuse tube and projecting from the open lower end thereof, said fuse link being connected to said switch, combined fuse link extracting and indicating means pivotally mounted adjacent the lower portion of said fuse tube and biased towards rocking motion outwardly from said fuse construction, said combined fuse link extracting and indicating means being controlled by said fuse link, and spring means controlled by said combined fuse link extracting and indicating means for opening said switch when said combined fuse link extracting and indicating means has operated.

30. A cutout comprising a housing of insulating material, spaced conducting line and load terminals mounted in said housing, a removable door of insulating material on said housing, a fuse tube rigidly secured to said door, a movable fuse terminal member having an open and a closed circuit position between said terminals pivotally mounted at the lower end of said fuse tube for movement independent of movement of said door, a tensioned fuse link which when unfused prevents movement of said fuse terminal member from closed circuit position, and means responsive to rupture of said tensioned fuse link for actuating said movable fuse terminal to the open circuit position.

31. A cutout comprising a housing of insulating material having an open lower end, spaced conducting line and load terminals mounted in said housing, a removable door of insulatng material on said housing, a fuse tube rigidly secured to said door, a movable fuse terminal member having an open and a closed circuit position between said terminals pivotally mounted at the lower end of said fuse tube for movement independent of movement of said door, a tensioned fuse link which when unfused prevents movement of said fuse terminal member from closed circuit position, semaphore means at one end of said fuse terminal, said semaphore means including a semaphore concealed in said housing when said fuse link is intact, and means responsive to the rupture of said fuse link for swingably moving said semaphore through the open lower end of said housing.

32. A fuse construction comprising a housing having an open bottom, a fuse tube mounted

within said housing, a pair of contacts within said housing, a fuse link within said fuse tube, a switch, said switch and fuse link being connected in series between said contacts, and indicating means distinct and separate from said fuse tube and biased towards motion downwardly through the open bottom of said housing, said indicating means controlling the operation of said switch and being controlled by said fuse link, said switch electrically isolating said indicating means from any live portion of the construction when said switch has moved to open position.

33. In a fuse construction, a pair of contacts, a fuse tube, a fuse link within said tube connected to one of said contacts and projecting from one end of said tube, a switch movable to open position independently of any motion of said fuse tube, said switch normally electrically connected to the other of said contacts and electrically connected to the projecting portion of said fuse link, and means biasing said switch towards open position after said fuse link has been ruptured, said switch when in open position isolating any remaining portion of said fuse link connected to said switch from any live portion of the construction.

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