

March 11, 1941.

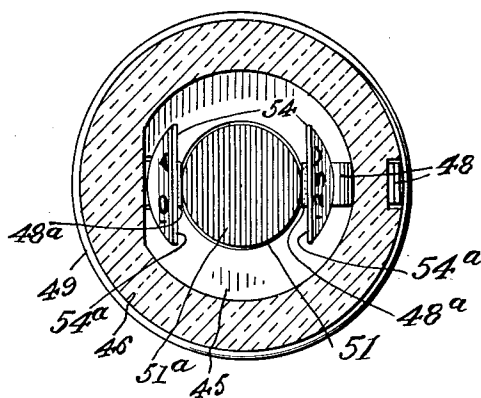
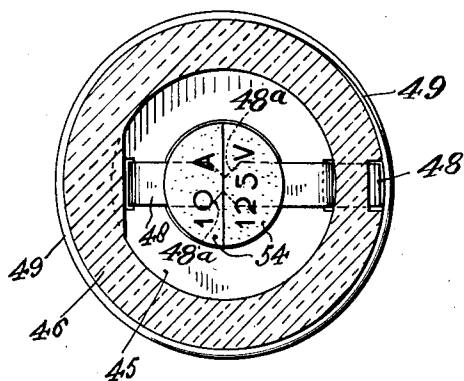
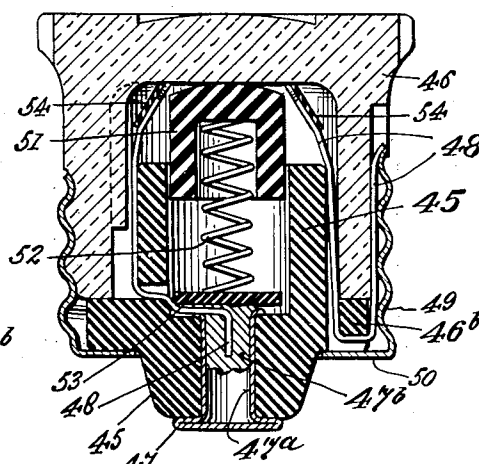
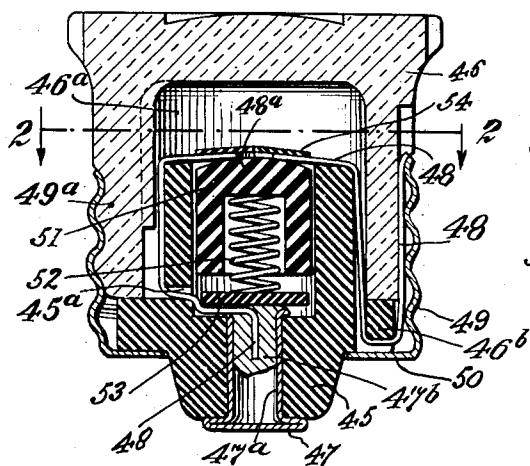
L. SCHMIDT

2,234,480

SAFETY INDICATOR FUSE

Filed March 19, 1938

3 Sheets-Sheet 1



BY

INVENTOR.
Lambert Schmidt
C. P. Joepel
his ATTORNEY.

March 11, 1941.

L SCHMIDT

2,234,480

SAFETY INDICATOR FUSE

Filed March 19, 1938

3 Sheets-Sheet 2

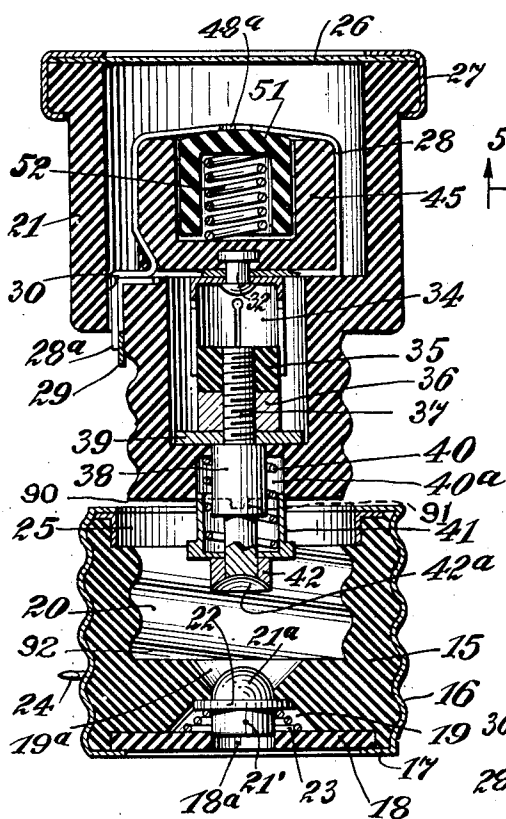


Fig. 5.

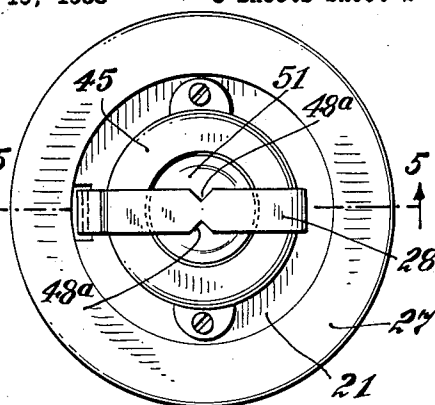


Fig. 6.

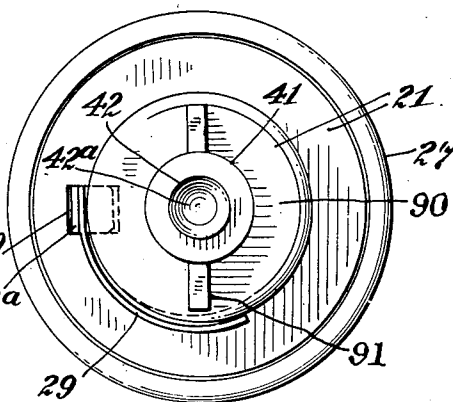


Fig. 7.

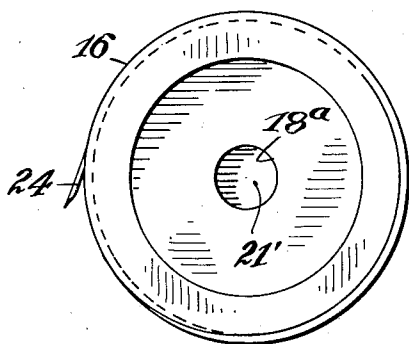


Fig. 8.

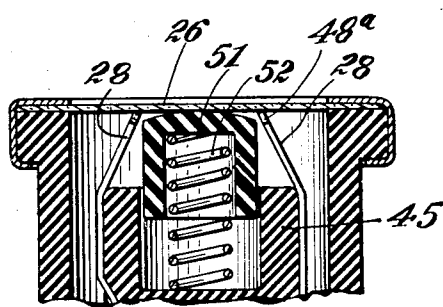


Fig. 9.

INVENTOR.
Lambert Schmidt
BY C. P. Joepel
his ATTORNEY.

March 11, 1941.

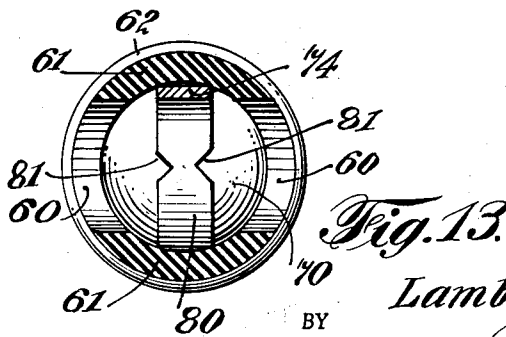
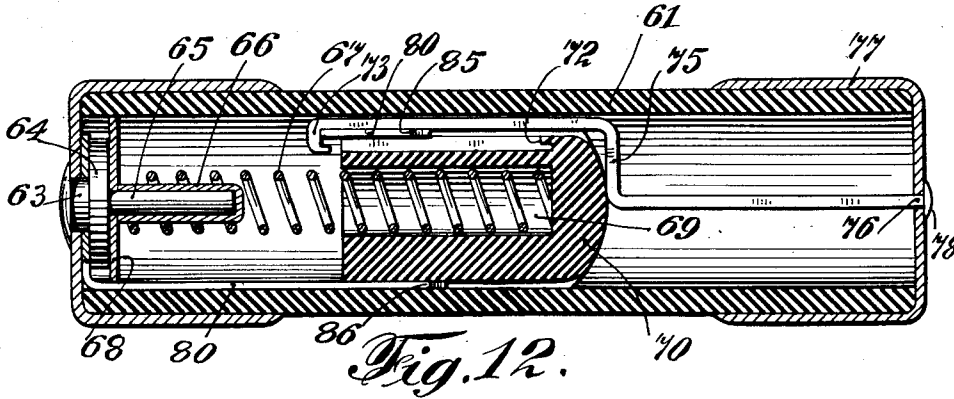
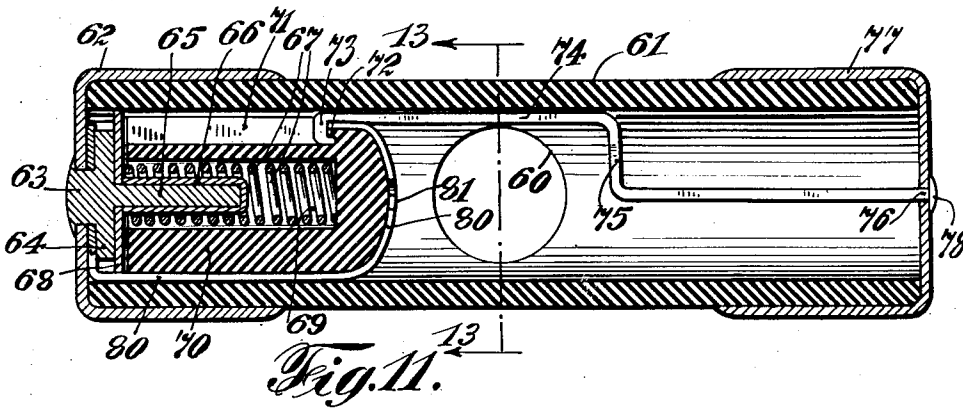
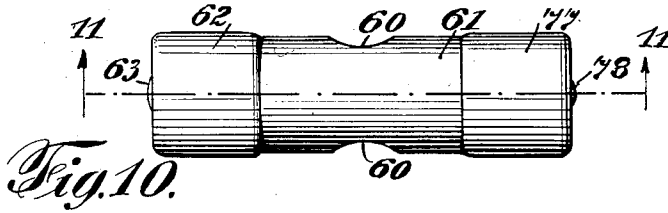
L. SCHMIDT

2,234,480

SAFETY INDICATOR FUSE

Filed March 19, 1938

3 Sheets-Sheet 3



INVENTOR.
Lambert Schmidt
BY *C. P. Goepel*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,234,480

SAFETY INDICATOR FUSE

Lambert Schmidt, Leeds, N. Y., assignor to
Jefferson Electric Company, Bellwood, Ill., a
corporation of Illinois

Application March 19, 1938, Serial No. 196,841

13 Claims. (Cl. 200—119)

The present invention relates to fuses for electrical circuits, and has for an object to provide an improved construction of fuse which will be more efficient in operation and which also may be easily inspected to determine the operative condition of the fuse both when in position for use as also when selecting a new fuse to replace one which has blown out.

Some of the subject matter disclosed, but not claimed herein, is covered by my copending application Serial No. 376,078, filed January 27, 1941.

In the use and development of plug and cartridge type fuses of this character, inventors and manufacturers have constantly endeavored to increase the safety in the operation and use of the fuse and have met with three main faults in prior fuse constructions. The first fault is the possibility of dangerous explosions due to the gases given off by the burning of the fuse metal when subjected to an excessive current. The second fault is that a continuation of the burning of the fuse metal takes place, depending on the excess current going through the fuse metal. The third fault is inadequacy or no indication as to whether the fuse has blown or not.

It is an object of the present invention to improve electrical fuses of the plug and cartridge type along these lines, and to effect, at the critical point of burning of the fuse metal, the quick separation of the ends of the fuse and the isolation of the parted ends so that the burning would immediately cease and there would be no possible chance for continued arcing to form the dangerous gases.

Another object of the invention is to provide a fuse construction which may be quickly and easily inspected to ascertain whether or not the fuse has been blown so that the user will not have to resort to the expedient of trying out different fuses to determine whether or not they are in operative condition.

Another object of the invention is to maintain a cooling effect on the fuse metal in order to cause a time delay, in that the heat accumulating to burn the fuse is first absorbed by the cooling member to a certain extent, and then fuses the link. When 125% of the current goes through the fuse, it will take one hour before the fuse metal link will part, this being permissible by the Underwriters Laboratories.

Another object is to provide means for deadening the spark or arcing at the fusing point of the link.

Another object of the present invention is to

prevent a fuse of larger size being used instead of a permitted fuse, and to provide means to prevent tampering with the fuse, which tampering would close the circuit, even after the fuse is blown.

The invention consists in providing a plug or cartridge type fuse in which the fuse link is quickly disrupted when the part intended to be fused is brought to its fusing point.

Furthermore, the invention consists in separating the parts of the fuse link after it reaches its fusing point, and maintaining its separated parts distant from each other. An insulated barrier under spring or similar pressure quickly separates the link and acts as a barrier between the broken ends of the link to prevent current from passing from end to end of the link.

The invention consists further in the means for indicating from the outside of the fuse whether the fuse link is in operative or inoperative condition.

The invention consists further in disposing at one side of the surface of the link an insulating member of low heat conductivity, so as to absorb heat from the link to a certain extent before the fusing point is reached.

The invention consists further of means in the form of a fuse link cooling member which acts as a spark deadening and gas absorbing member when the fuse point is reached, whereby the arcing is reduced.

The invention consists further in providing a fuse structure including an adapter, which is securely fastened to the cut out, wherein the current is not completed through the fuse until the device is completely set up into operative position, the circuit closing being effected by the final movement of the parts into place. This feature of the invention offsets the tampering with the fuse to close the circuit through it, even after the fuse is blown, as a slight amount of foreign material inserted in the adapter will prevent the fuse parts from making the final necessary movement or adjustment to close the circuit.

Means are provided to prevent a fuse of larger capacity from being used, as this would not be interchangeable with the predetermined sizes of the parts of the adapter. As an embodiment thereof, the adapter has a conical bore which registers only with the fuse member of the correct diameter, and which acts to impede a fuse of larger capacity from contacting with the parts necessary to complete the circuit.

Furthermore, the fuse structure is provided

with means to prevent arcing between the adapter and the cut out, a very serious objection in devices heretofore proposed. The invention embodies means to break the circuit in the fuse member itself before the electrical connection between the adapter and cut out is broken. In the embodiment, a lighter spring, of delayed action, maintains the electrical connection until a heavier spring, or one of quicker action, in the fuse member breaks the circuit. Thus, there cannot be an arc between the adapter and cut out.

The invention, as shown in the various embodiments, provides for a high degree of safety, as the tests made have proven the fuse reliable and explosion proof and also non-tamperable.

The invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings:

Figure 1 is a longitudinal section taken through a modified form of fuse embodying the features of the invention and showing the parts in operative position;

Figure 2 is a transverse section taken through the same on the line 2—2 of Figure 1;

Figure 3 is a longitudinal section similar to Figure 1, but showing the fuse in blown position;

Figure 4 is a transverse section taken through the same, similar to Figure 2, but with the fuse in blown position;

Figure 5 is a longitudinal section taken through one form of fuse embodying the features of the present invention, on the line 5—5 of Figure 6, the plug portion of the fuse being shown in position ready for insertion in the adapter;

Figure 6 is a top plan view of the same;

Figure 7 is a bottom plan view of the plug portion of the fuse;

Figure 8 is a fragmentary bottom plan view of the adapter, showing the locking lug or prong for holding the adapter from removal from an electrical socket;

Figure 9 is a partial view in section showing the plunger in a position which it occupies after it has separated from each other the two torn ends of the fuse link;

Figure 10 is a side view of a cartridge fuse embodying this invention;

Figure 11 is a horizontal section taken on line 11—11 of Figure 10, showing the fuse link in operative position and the cartridge ready to be inserted into an electrical circuit;

Figure 12 is a similar section but with the parts shown after the fuse link has reached its fuse point and has been severed;

Figure 13 is a vertical section taken on line 13—13 of Figure 11.

Referring now to the construction of the fuse shown in Figures 1 to 4, the fuse body is in the form of an insulating block 45 which is hollow and which carries thereon a transparent cap 46 of glass or the like and which provides a cavity or chamber 46a within the outer end of the fuse. The inner or lower end of the fuse body 45 is provided with a central contact stud 47 of any suitable construction and which may, as shown, comprise a shell portion 47a of sheet metal, with the filler 47b of other suitable metal in which is embedded one end of a fuse element 48. The fuse element 48, which is in the form of a blank or ribbon having notches 48a, as known, is looped laterally through an opening or slot 45a in one side of the body portion 45 and across the top

thereof, the opposite end of the fuse element being carried downwardly through the opposite side of the body 45 and turned upwardly against the exterior of the cap 46. Preferably a piece of insulating material 46b is disposed on the member 46, over which piece 46b the fuse link extends. A threaded shell 49 is secured to the exterior of the cap 46 by engagement with the threads 49a of the member 46, and is provided with a retaining flange 50 at its lower end overlapping a shoulder portion of the body 45 to hold the cap 46 and body portion 45 together.

Within the upper end of the body 45 is disposed a plunger 51 of non-conducting material of inverted U-shape, which has a spring 52 seated on an insulating disc 53 in the bottom in the body 45 and which spring urges the plunger 51 upwardly against the underside of the fuse strip 48 at its portion resting on the plunger 51. The upper end of the plunger 51 may be provided with a suitable indicator, such as a portion of a red color, as shown by 51a in Figure 4, or other suitable means to indicate that the upper end of the plunger 51 is entirely exposed when the fuse strip 48 is disrupted. The plunger covering portion of the fuse strip 48 is provided with an asbestos disc or layer 54 adapted to bear the data relating to the character of the fuse, such as shown in Figure 2 indicating that the fuse is capable of sustaining 10 amperes with a current of 125 volts. This asbestos layer may be in disc form, and is disposed over the fuse strip 48 and the upper end of the plunger 51. The disc 54 is made up of two halves, separated by the line 54a, and each piece is pasted on the fuse strip, so that the halves abut. When the fuse strip 48 is fused and disrupted, the action takes place at the upper end of the plunger, so that the asbestos strip is disrupted with the fuse strip and the plunger 51 is projected by its spring 52 against the fuse strip to effect the quick separation of its fusing portion when weakened sufficiently to be disrupted by the action of the spring 52. As shown in Figure 3, the plunger 51 not only quickly separates the disrupted ends of the fuse strip, but also forces the ends apart to a considerable distance and serves as an insulator between the ends of the fuse strip to separate the same. The asbestos disc absorbs certain of the gases, and also dampens the arcing, if any. The quick rupture prevents arcing. At the same time, the asbestos covering the strip is disrupted and moved aside by the plunger, and the indicating upper end 51a of the plunger 51 is brought into the upper end of the cap 46. As the cap 46 is of glass or other suitable transparent material, the upper end 51a of the plunger is readily exposed to view so as to determine the operative condition of the fuse.

Referring now to Figures 5 to 9, the fuse link rupture mechanism shown in Figure 5 is substantially like that of Figure 1. In addition to this fuse rupture mechanism, this fuse of Figure 5 has a fuse structure embodying an adapter 15 of suitable insulating material enclosed within a conductor shell 16, the exterior portion of which is provided with coarse screw threads adapted to fit into the usual fuse socket. The bottom or lower end of the shell 16 is turned inwardly to provide a flange 17 for holding the shell to the body 15 and also for holding an insulating disc 18 seated in the bottom of the body 15. The bottom of the body 15 is of considerable thickness and is provided with an opening 19 centrally

therethrough which flares at opposite sides toward the disc 18 and into the interior of the body 15.

The inner wall of the body 15 is provided with coarse screw threads 20 adapted to receive in threaded engagement therein the threaded plug 21 of the fuse body. A contact stud 21' is slidably mounted in the opening 19 and has an intermediate shoulder 22 disposed in the lower flaring portion of the opening 19 and adapted to seat in the opening to limit the upward or inward movement of the stud 21'. The upper portion of the stud 21' may be rounded and is of less height than the upper flaring portion 19a of the opening 19, so that to engage the stud it is essential to project a contact or the like a short distance downwardly into the opening 19a before the stud 21' can be moved. If such a contact is too large, it will be blocked by the conical walls of the bore 19a. Such an operative contact fits upon the ball 21a. A helical spring 23, or the like, is disposed about the stud 21' between the disc 18 and the shoulder 22 for normally urging the stud into retracted position, and the lower end of the stud is of such length that it normally is disposed in retracted position inwardly of the bottom face of the disc 18, and the latter is provided with a central opening 18a, forming a guide for the lower end of the stud and through which the latter may project to engage the central contact of the usual fuse socket. Thus when the stud 21' extends, contact can be made.

At a suitable point upon the exterior of the adapter shell 16 is disposed a locking prong 24 which extends circumferentially backward with respect to the direction of turning of the adapter in turning the same into the socket, prong 24 being sprung outwardly at its free end to engage the wall of the socket and hold the adapter from removal after it has been turned into the socket. No claim is made thereto.

The upper or outer end of the adapter is provided at its inner wall with a contact ring 25 held within the socket by overturned flanges on the upper ends of the ring and the shell 16.

The upper end of the fuse plug 21 is enlarged and chambered and is closed at its upper outer end by a transparent disc 26 of mica or the like which may be held in place by a flanged ring 27 secured about the upper shouldered end of the plug 21. Within the upper end of the plug 21 is disposed a fuse element 28 which is looped upwardly within the plug and has one end 28a anchored through the bottom wall of the chamber against a contact brush 29 which is exposed at the upper end of the threaded portion of the plug and extends downwardly through the bottom of the chambered portion of the plug. The brush 29, as shown in Figures 5 and 7, is anchored at one end to the end 28a of the fuse element 28, and at its other end extends circumferentially in a slot 30 provided in the upper threaded portion of the plug and in line with the contact ring 25 of the adapter so that when the plug is turned into the adapter the final turning of the plug brings the brush 29 into electrical contact with the ring 25 to complete one side of the circuit from the fuse element 28 through the exterior shell 16 of the adapter and to the shell of the socket.

The fuse element 28 is of any suitable fusing metal of the required resistance of the plug, and has lateral notches as shown in Figure 2, as known. A contact cup or guide cylinder 34 is se-

cured at its closed end to the lower end of the stud 32 and receives therein a plunger having an upper insulating portion 35 and a lower contact portion 36 mounted upon a central contact stem 37, the upper end of which is substantially flush with the insulating portion 35 and adapted to engage the stud 32 when the plunger is moved upwardly in the guide cylinder 34. The lower contact portion of the plunger is also adapted, upon the upward movement of the plunger, to engage the side walls of the guide cylinder 34 for completing that portion of the circuit. The stem 37 may be threaded and the plunger sections 35 and 36 may be in the form of nuts which are threaded in locked relation upon the stem. The stem 37 has an intermediate enlarged cylindrical portion 38 slidable through the lower portion of the plug 21, and carries at its upper end a stop disc 39 seating in the bottom of the plug cavity and held thereto by the plunger sections 35 and 36. The lower extremity of the plug 21 is recessed to provide an annular space 40a about the enlarged portion 38 of the stem to accommodate a coil spring 40 seating within the lower end of the plug at one end and at its other end engaging in a guide cap 41 slidably disposed in the recess of the plug and normally urged outwardly or downwardly therefrom by the spring 40. The lower end of the guide cap 41 is provided with a contact projection 42 which may be suitably recessed, as shown by 42a, to engage with the upper end of the stud 21a in the bottom of the adapter so as to project the stud 21' sufficiently through the opening 18a to engage the socket contact as the plug 21 is finally seated in the adapter. The circuit is thus closed through the stud 21' making electrical contact with the cut out. In the drawings, projection 42 is separate from cap 41 secured thereto by solder or fusing, making it for all purposes integral in action. In Figure 6 is shown the end 90 of the fuse member which has diametrically disposed ridges 91, which cooperate with the wall 92 of the adaptor. On rotation of the fuse member, the ridges 91 clean the wall 92. As shown in Fig. 5 one of the ridges 91 is indicated in dotted lines.

In operation, the adapter 15 is screwed into a fuse socket or cut out, not shown, as well known, and is held locked therein by the prong 24. A fuse member in accordance with the foregoing invention is selected and is screwed into the adapter with the result that the plunger structure of the fuse is retracted after engagement with the stud 21' and the latter is projected to close the circuit through the central contact of the fuse socket. During the final stages of turning the plug into the adapter, the contact brush 29 is brought into engagement with the contact ring 25 so as to complete the circuit through the shell portion of the fuse socket. Upon the short circuiting or overloading of the circuit, the fuse 28 is melted at its notched portion over the plunger, and at the instant that the fuse is weakened by melting to the extent where the spring 52 has sufficient pressure to break the fuse 28, the latter is quickly disrupted by the upward movement of the plunger 51, and the latter is of such size or diameter as to spread apart the disrupted ends of the fuse, as shown in Figure 3, so that the free ends of the fuse are quickly separated and snapped into isolated or spaced apart portions and prevented from contacting with each other. This quick action of the spring pressed plunger 51 prevents arcing of the current between the free ends of the disrupted fuse, and

consequently prevents the slow burning of the fuse end and the generation of the gases which create explosions and thus become dangerous in the use of the fuse.

5 In Figures 10 to 13, embodiments of my invention as applied to a cartridge fuse are shown.

In Figure 10 the exterior of the cartridge appears, and shows two openings 60 which may be either entirely open, or closed, with a layer of mica or the like, these being observation openings to see whether or not the fuse is active or inactive.

In Figure 11 the usual form of cartridge made of paper or the like is indicated by 61, and has an exterior cap 62, which cap 62 holds a member 63 having a shoulder 64 and a stem 65 extending inwardly of the cartridge 61. This stem 65 has a covering sleeve 66.

Surrounding the stem 65 and its covering sleeve 66, a helical spring 67 is provided which seats upon the plate 68 at one end thereof, and which has its other end seated at the inside of a tubular recess 69 in a plunger 70 of insulating material. This plunger 70 has a lateral slot or recess 71 and also a hook-shaped portion 72. This hook-shaped portion 72 engages the hook-shaped portion 73 of an electrical conductor 74 which is bent at 75 and terminates at 76 at the other cap 77 of the cartridge where the electrical conductor 78 is upset, as shown by 79.

This electrical conductor 74 is rigid and is substantially of rectangular cross section, as shown in Figure 13. This electrical conductor 74 serves to conduct the current from one end of the cartridge fuse to the other when the fuse link itself is in proper position. A further function of this member 74 is to hold the end of the fuse link on to the plunger. A third function of this member 74 is to provide a barrier to the further movement of the plunger 70, as shown in Figure 11, the bent portion 75 acting as a barrier.

The fuse link 80 has the usual cut out portion, as shown in the other embodiments, this cut out portion 81 being placed directly on the summit of the curved plunger 70, and one end of the fuse link extends downwardly over the plunger and is secured to the plunger by the pressure of the member 74 when its hook-shaped portion 73 engages the hook-shaped portion 72 of the plunger. The other end of the fuse link is provided with an opening, and this opening is passed through by the portion 63 before it has been upset upon the cap 62, and the fuse link makes a good electrical connection between the shoulder 64 of the member 63 and also the cap 62, and then the fuse link 80 extends along the side of the insulated plunger 70 until, as before stated, it reaches its summit. When the parts are locked in the position shown in Figure 11, the fuse cartridge is ready to be inserted in an electrical circuit and is ready for use. Should an electrical current pass through the fuse link of such an excessive amount as to cause the fuse link at 81 to reach the fuse point, the pressure of the spring 67 will immediately tear the two parts of the fuse link apart and separate the same, Figure 12 showing the two separated ends 85 and 86 of the fuse link 80.

By having the fuse link huggingly engaging the insulated plunger 70, a certain amount of the heat of the plunger will be absorbed by the insulating material, and thereby a certain amount of the excess current can pass through the fuse link without the fuse link reaching its fusing point. When, however, the fuse link

reaches its melting or fusing point, the action of the spring will tear the two parts of the fuse link apart, and the spring will press the plunger 70 longitudinally in the cartridge 61 until the plunger strikes the bent portion 75 of the member 70, as shown in Figure 12.

It will be thus seen that in the various forms of the invention, a member is yieldingly urged against one side of a fuse strip and that as soon as the fuse strip is weakened sufficiently by fusing, the insulator effects the quick disruption of the fuse strip and quickly separates the disrupted ends apart to offset arcing. Also, the fuse link, in contacting before rupture with the insulated member 45, gives up a certain amount of heat thereto, thereby permitting the flow of excess current before rupture.

From the foregoing description and reference to the drawings, it will be understood that in one aspect, the present invention comprises a body portion 45 carrying a contact 47 for one side of an electrical circuit and having an opening therein, a piston or plunger 51 of insulating material fitting into said opening and biased in one direction in said opening by a spring 52, a fuse link 48 having a portion 48a of reduced section adjacent the piston or plunger 51 and extending from said contact 47 over the end of the piston 51 to subject the link 48 to the pressure of the spring 52 on the piston 51 and hold the piston 51 in said opening, said link 48 being anchored to means 49 exterior of the body portion 45 to form a second contact of the electrical circuit, and a hollow cap 46 fitting over the body portion 45 to provide a closed chamber 46a of predetermined volume over the ends of the body portion 45 and piston 51 within which the piston 51 may move upon rupture of the fuse link 48, the end wall of the hollow cap 46 being spaced from the piston 51 and fuse link 48 whereby excessive heating of the fuse link 48 enables the spring pressed piston 51 to rupture the link 48 and separate the ends thereof as shown in Fig. 3 and to form an insulating barrier between the ends of the ruptured link 48 as shown in Fig. 3.

In another aspect, the present invention includes a fuse having a body 21 of insulating material which has exterior threads, exterior electrical contact means 29 and a central opening therein, a stationary central contact 34 mounted in said opening within the body 21, a movable central contact 36 and 37 carried in said opening by the body 21 and movable into and out of engagement with the stationary central contact 34, said movable contact 36 and 37 having an exposed contact portion 42 exposed at the end of said opening, a spring 40 normally biasing the movable contact 36 and 37 away from the stationary central contact 34 to prevent electrical contact between the stationary central contact 34 and the movable contact 36 and 37 until the movable contact 36 and 37 has been moved a predetermined distance against the biasing force of the spring 40. A fusible element 28 electrically connects the exterior electrical contact 29 and the central stationary contact 34. In the disclosure of Fig. 5, an adapter 15 has an outer contact 25 adapted to cooperate with the contact 29 and a central contact 21 adapted to cooperate with the central contact 42. This adapter is provided in sizes dependent upon the current rating of the fuse and thereby prevents a fuse of the wrong size from being utilized in a particular socket.

It is obvious that various changes and modifi-

cations may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

What is claimed is:

1. A fuse comprising a body portion having a hollow upper end and a screw threaded lower end, an adapter adapted to be seated in a fuse socket and having a threaded opening for receiving the threaded end of the fuse body, a yielding contact carried by the fuse body portion for engagement in the adapter to close one side of the circuit therethrough with the fuse socket, cooperating contact elements carried by the upper portion of the fuse body and the adapter for closing the other side of the circuit as the fuse body is turned into full operative position within the adapter, and a tensioned fuse strip mounted in the hollow upper portion of the body between the opposite sides of the circuit for quick disruption and spacing apart of the ends of the fuse strip when weakened sufficiently by fusing.

2. A fuse comprising an adapter having an insulated body portion with a central movable contact and an outer shell contact for permanent engagement in a cut-out, a plug having an insulated threaded portion for engagement in the adapter and provided with a central contact to make connection with the movable contact of the adapter, an opposite side contact carried by the plug for engagement with the threaded shell portion of the adapter when the plug is turned completely into position, a movable plunger for the central contact of the plug, a fixed contact, a fuse connected at one end with the fixed contact and at the other end with the side contact, said movable plunger adapted to engage and disengage said fixed contact for closing and opening the circuit, and a spring disposed between plug contact and the plug to normally move the plunger into circuit breaking position, whereby when the plug is screwed into the adapter, the central adapter contact, plug contact and fixed contact are electrically in circuit, and when the plug is partially unscrewed, the spring holds the plug contact in engagement with the central adapter contact and disconnects the plunger from the fixed contact, to break the circuit prior to the breaking of the connections between central and plug contacts and opposite side contacts.

3. A fuse comprising an adapter having exterior threads for engagement in a cut out, and having interior threads, a spring actuated central contact mounted in the bottom of the adapter and normally closing an opening in the bottom wall thereof away from the exterior surface of the bottom wall, a fuse body having an insulated exterior threaded plug portion for engaging the interior threads in the adapter, said plug portion having a contact to contact with the contact of the adapter and move the latter contact exterior of the adapter to close one side of the circuit with the cut out contact to which the adapter is permanently secured, a fuse strip mounted in the upper end of the fuse body and having its first end electrically connected with the plug contact, a brush connected with the other end of the fuse strip, a contact ring carried upon the upper end of the adapter for receiving said brush thereagainst and connected to the exterior threads of the adapter for completing the other side of the circuit when the plug is turned fully into position into the adapter, and

a spring for said plug contact, stronger than the adapter contact spring, for moving the plug contact out of electrical connection with the fuse strip upon the unscrewing of the plug in the adapter, whereby the circuit is opened in the fuse body before its opening at the adapter contact, thereby preventing arcing between the adapter and cut out contact.

4. A fuse, comprising an insulating body open at its top and having a central contact in its lower end, a fuse strip connected at one end to the contact and extending over the open top of the body, a transparent cap fitted over the body and having an exterior contact shell connected to the other end of the fuse strip and adapted for insertion into the usual fuse socket, a frangible cover carried by the fuse strip over the open top of the body, and a spring pressed plunger in the body normally urged through the open top thereof against the fuse strip disrupting the same when weakened by fusing and for quickly spreading apart the ends of the fuse strip to prevent arcing, said plunger having an indicating upper end normally covered by the cover and adapted to be exposed in the cap when the fuse strip is disrupted.

5. In a fuse, the combination of an adapter having a conical bore, a spring pressed member movable in said bore, and having a curved surface of definite curvature, said member adapted to extend through an opening in the adapter when pressed against the action of the spring, and to extend exterior to the exterior surface of the adapter when so pressed, with a yieldable contact member of substantially the same curvature as the spring-pressed member and of a certain diameter and adapted to fit over the spring pressed member and push the same, without said yieldable member contacting with the conical bore whereby when yieldable contact members of different larger diameters are attempted to be used to operate the spring-pressed member, impingement of the sides with the conical bore takes place.

6. In a fuse, the combination of an adapter having a movable contact and a bore having a conical wall surrounding the contact, and a fuse plug having a contact for contacting with the adapter contact for moving the same to complete the circuit with the contact in the cut out, without the plug contact contacting with said conical wall, said conical wall obstructing any larger-sized contact of a different load fuse plug from moving the contact of the adapter.

7. In a fuse, a fuse plug having a screw threaded extension with an exposed face, projections upon said exposed face, and an adapter having a screw threaded socket engaging the screw threads of a plug, and having a flat surface engaged by said projections whereby rotary movement of the projections upon the rotation of the plug cleans said flat surface of the adapter of any foreign material thereon.

8. In a fuse, a cap member having a transparent wall, a spring-pressed plunger enclosed by said cap member and having an indicating surface visible through the transparent wall when said surface is pressed against the wall, and a fuse link passing over the plunger and its indicating surface and holding the plunger against its spring pressure, the severance of the fuse link by excess heat and by the movement of the plunger under its spring pressure separating the ends of the fuse link to uncover the indicating surface visible through the transparent wall.

9. In a fuse, the combination of a cap member, a spring-pressed plunger, a flat fuse link having a portion likely to break first on fusing passing over said plunger, and a flat asbestos disc indicative of the load of the fuse, formed of abutting semi-circular portions, disposed over said portion of the fuse link at its said fusing point, the semi-circular portions separating from each other upon the fuse being ruptured by excess heat and the spring pressure of the plunger.

10. In a fuse comprising a body portion having a contact for one end of the circuit, and having a cylindrically bored portion, a spring-pressed cylindrical piston within said bore and having a surface extending beyond the bore, a fuse link extending from the first contact of the circuit over the ends of the cylindrically bored portion and over the extended surface of the piston therein to subject the link to the pressure of the piston, said link extending exterior of the body portion to form the second contact of the circuit, the combination therewith of a closed cap having an interior top wall to enable the cylindrically bored portion, piston and fuse passing over the same to fit therein, the interior top wall being spaced from the fuse link passing over the extended end of the piston, to permit when the excess heat reduces the cohesion of the link, the piston to move against the interior top wall and separate the ends of the ruptured link and form a central barrier dividing said space into a circular compartment with the ruptured ends in diametrically opposed ends of said compartment.

11. In a time delay fuse comprising a body portion having a contact for one end of the circuit, and having a cylindrically bored portion, a cylindrical piston of insulating material within said bore and having a curved surface, a spring for said piston, a fuse link extending from the first contact of the circuit over the ends of the cylindrically bored portion and over the curved surface of the piston therein, and extending exterior of the body portion to form the second contact of the circuit, the heat of the fuse link when subjected towards the fusing point being absorbed by the insulating member to permit excess current to pass through the fuse link before reaching its fusing point, the combination therewith of a closed cap having a transparent top with an inner wall, and an interior bore to enable the cylindrically bored portion and the piston to fit therein, the interior of the cap and the fuse link passing over the bored portion and piston and forming a space in which the distance between the inner wall and that part of the fuse

is such that when the piston has separated the ends of the ruptured link, the piston under its spring pressure forms a central barrier between the ruptured ends of the fuse and a circular compartment around said barrier, in which the ruptured ends of the fuse are enclosed diametrically opposite to each other.

12. A fuse comprising an adapter having exterior ferrule threads for engagement in a cut-out, and having interior insulated threads, a spring actuated central contact mounted in an opening in the bottom of the adapter and normally closing the opening, a fuse body having an exterior threaded insulated plug portion for engaging the interior insulated threads in the adapter, a central contact carried by the threaded plug portion of the fuse body for engagement with the spring actuated contact in the bottom wall of the adapter to advance the latter contact into position protruding through the opening of the adapter to engage a center contact of the cut-out to complete one side of the circuit through the contacts, a spring actuated plunger for said central plug contact for normally moving said contact to the adapter contact when the fuse plug is turned fully into position into the adapter for closing the circuit, and an insulating member operated by the plunger, whereby upon partial unscrewing of the fuse body from the adapter, the spring operates the plunger to move said insulating member into a position to open the circuit.

13. In a fuse comprising a body portion carrying a contact for one side of an electrical circuit and having an opening therein, a spring-pressed piston of insulating material slidably fitting into said opening, a fuse link having a portion of reduced section adjacent the piston and extending from said contact over the end of the piston to subject the link to the pressure of the spring-pressed piston and hold the piston in the said opening, said link being anchored to means exterior of the body portion to form a second contact of the electrical circuit, and a hollow cap fitting over the body portion to provide a closed chamber of predetermined volume over the ends of the body portion and piston within which the piston may move upon rupture of the fuse link, the end wall of the hollow cap being spaced from the piston and fuse link whereby excessive heating of the fuse link enables the spring-pressed piston to rupture the link and separate the ends thereof and to form an insulating barrier between the ruptured link ends.

LAMBERT SCHMIDT.