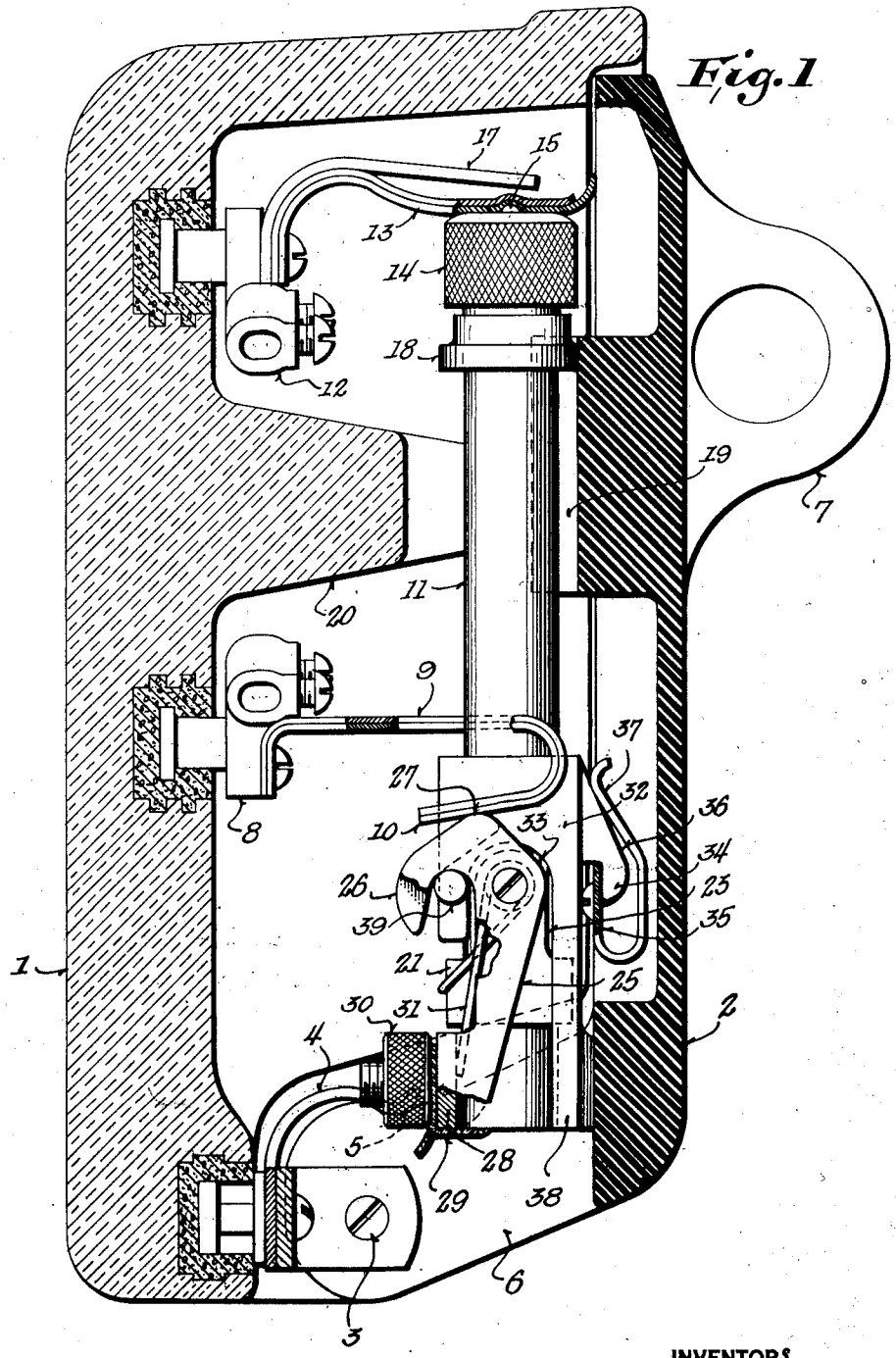
Nov. 29, 1938. W. O. SCHULTZ ET AL 2,138,255

FUSE CONSTRUCTION

Filed Sept. 1, 1934 3 Sheets-Sheet 1

Fig. 1



INVENTORS
William O. Schultz
BY Alvin S. Steinmayer
Arthur R. Woodford
ATTORNEY

Nov. 29, 1938. W. O. SCHULTZ ET AL 2,138,255

FUSE CONSTRUCTION

Filed Sept. 1, 1934 3 Sheets-Sheet 2

Fig. 2

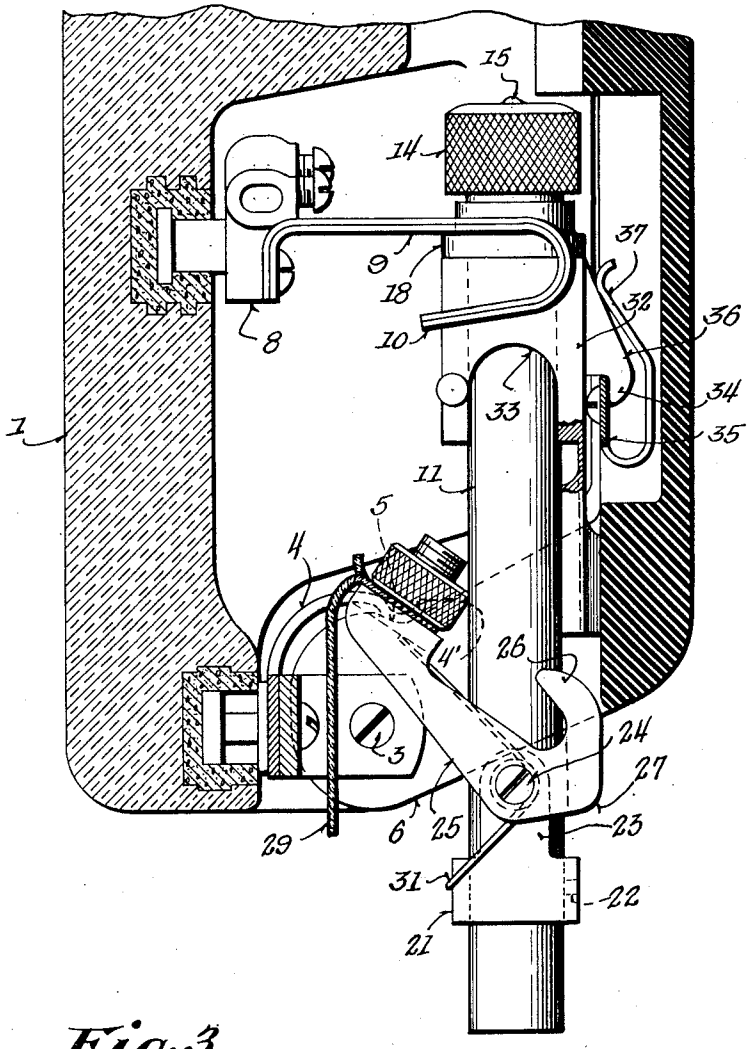
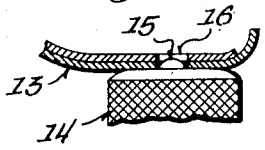


Fig. 3



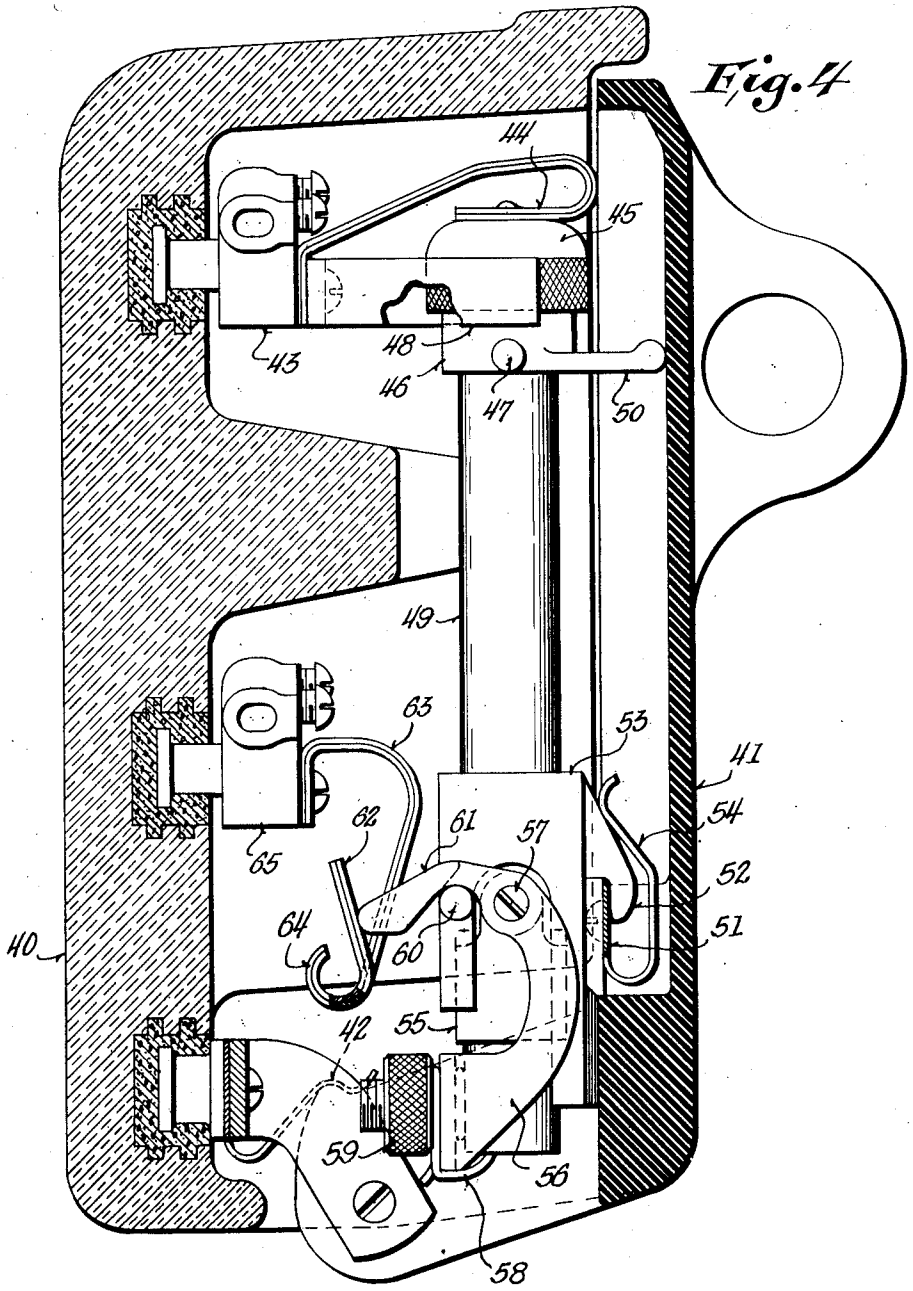
INVENTORS
William O. Schultz
BY Alwin G. Steinmayer
Austin R. Woolfolk
ATTORNEY

Nov. 29, 1938. W. O. SCHULTZ ET AL 2,138,255

FUSE CONSTRUCTION

Filed Sept. 1, 1934 3 Sheets-Sheet 3

Fig. 4



INVENTORS
William O. Schultz
Alwin J. Steinmayer
BY
Arthur R. Woolford
ATTORNEY

Patented Nov. 29, 1938 2,138,255

UNITED STATES PATENT OFFICE

2,138,255

FUSE CONSTRUCTION

William O. Schultz, South Milwaukee, and Alwin G. Steinmayer, Milwaukee, Wis., assignors to Line Material Company, South Milwaukee, Wis., a corporation of Delaware

Application September 1, 1934, Serial No. 742,442

31 Claims. (Cl. 200—114)

This invention relates to fuse constructions and is particularly directed to a drop-out type of fuse. In general, this invention is an improvement over that disclosed in the copending application of William O. Schultz for Fuse constructions, Serial No. 727,250, filed May 24, 1934.

Objects of this invention are to provide a novel form of fuse, preferably a housed type of expulsion fuse, for example, in which the fuse tube is biased towards motion axially thereof downwardly and outwardly from the housing and is normally restrained from such motion by the fuse link, but which, upon blowing of the fuse, first acts in the manner of an expulsion fuse, thereafter moves downwardly and projects from the lower portion of the housing, thus increasing the gap in the circuit as the contacts of the fuse tube move away from the stationary contacts carried by the housing.

Further objects are to provide a construction in which the lower fastening means for the fuse link is carried by the fuse tube itself and moves downwardly with the fuse tube when it is released by the rupturing of the fuse link, this lower contact member being biased towards outward motion and withdrawing any of the lower portion of the fuse link that may remain intact from the fuse tube in a very quick and positive manner, such discharge of the fragment of the link being, of course, assisted by the gas pressure.

It is a practical feature of this invention that this lower contact member, which is carried by the fuse tube, is electrically dead after the fuse blows, and that any portion of the fuse link hanging therefrom is consequently electrically dead, so that although if only one leg of a transformer setup blows, or if there is a back feed from the transformer, there is still no danger from accidental contact with this hanging fragment of the fuse link.

Further objects are to provide a construction in which a stop is carried by the housing and resists the upward recoil of the fuse tube during blowing of the fuse, in which the contacts of the fuse tube are held in positive tight engagement with the stationary contacts of the housing, but which nevertheless permits the free sliding or moving of the fuse tube downwardly from such stationary contacts, the stationary contacts being preferably made of spring contact material and assisting in the withdrawing of the fuse link as well as in the downward motion of the fuse tube.

Further objects are to provide a novel means of anchoring the fuse tube to the door, the door and housing being provided with latching means for the upper end of the cartridge which tends to hold the fuse cartridge or fuse tube in place, and in which latching means are provided for latching the door closed so that the door will remain closed after the fuse blows, and, if desired, even after the fuse has been removed from the door.

Further objects are to provide a construction in which the fuse tube is carried by the door, and in which the upper portion of the fuse tube bears directly against the door during closing motion so as to take the strain incident to forcing the upper contact of the fuse tube into binding engagement with the upper stationary contact of the housing, and in which secure and adequate means are provided for locking the fuse tube to the door, such latter means, however, permitting the free and ready detaching of the fuse tube from the door when desired.

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

Figure 1 is a sectional view through one form of fuse construction with parts broken away and with parts in section.

Figure 2 is a fragmentary view of the lower portion of Figure 1 showing the parts in the position they assume after the fuse has blown.

Figure 3 is a fragmentary detail of a further form of upper latching means for latching the upper end of the upper contact of the fuse tube to the upper stationary contact of the housing.

Figure 4 is a view corresponding to Figure 1, showing a modified form of the invention.

Referring to the drawings, it will be seen that a housing 1 has been shown provided with a door 2 hinged thereto, as indicated at 3. The housing and door are made of insulating material, such, for instance, as porcelain and a phenol condensate product respectively.

It is to be noted that the hinge means at the lower portion of the door and housing is electrically dead, as it is not connected to any contact of the device. It is to be noted also from reference to both Figures 1 and 2 of the drawings that spring clips 4 are associated with the pivot means and are provided with inturned rounded ends 4'. These rounded ends seat within notches 5 formed in the two arms 6 of the door when the door is in closed position, see Figures 1 and 2.

However, due to the fact that the ends 4' are rounded, it is apparent that they will ride out of these notches when the door is forcibly pulled open, as by means of the eye or handle 7, see Figure 1, such eye or handle receiving the finger of the operator or the hook of a switch stick.

It will be seen from the construction thus far described that the door is held in closed position whether the fuse is in its initial position or has blown. Also, the door will be held closed even if the fuse is removed therefrom due to the construction described hereinabove.

The housing is provided with a lower terminal member 8 provided with a pair of outwardly projecting spring arms or contact members 9 which terminate in inwardly directed portions 10, thus forming a bowed spring loop on opposite sides of the fuse tube 11. The upper terminal member of the housing is indicated at 12 and is provided with spring contact arms 13 which bear against the upper cap 14 of the upper contact member of the fuse tube.

If desired, the upper end of the contact of the fuse tube may be provided with a projecting nib or rounded portion 15 which seats within a correspondingly depressed portion of the spring arms 13, as shown in Figure 1, although an alternative form of construction would be to provide a hole, as indicated at 16 in Figure 3, for the reception of the projecting portion 15.

This upper terminal member also carries a recoil resisting stop 17 which is preferably relatively sturdy and resists the upward recoil of the fuse tube when the fuse blows. It is to be noted that the upper contact includes a rounded flange 18 which seats within a correspondingly shaped portion 19 formed integrally with the door and thus bears against the door when the door is closed and the upper contact forced beneath the upper spring arms 13.

In accordance with the usual construction, a barrier 20 may be formed integral with the housing and located between the upper and lower terminal members thereof.

The lower portion of the fuse tube is provided with a contact collar member 21, see Figures 1 and 2, which is locked to the fuse tube by means of a set screw indicated at 22, in Figure 2. This collar contact member is provided with upstanding arms 23 on opposite sides of the fuse tube to which a bell crank lever is pivotally attached by means of screws or other pivot pins 24.

This bell crank lever comprises a main contact arm 25 and a hooklike arm 26 having a heel or contact shoulder 27. Under normal conditions, this contact shoulder 27 of the contact lever 25 bears against the lower portion 10 of the spring contact arms 9, as shown in Figure 1. It is to be noted that this lever is bifurcated and has a transverse yoke portion 28, see Figure 1, over which the fuse link 29 is passed and to which it is clamped by means of the thumb nut 30. If desired, the lever may be urged in a clockwise direction, as viewed in Figure 1, or, in other words, in a releasing direction, as will hereinafter appear, by means of the spring 31. This spring extends across the contact collar 21, as shown in Figures 1 and 2, and has a pair of arms bearing against the inner side of the yoke portion 28 of the contact lever 25.

A guiding sleeve 32 slidably receives the fuse tube and is located intermediate the ends thereof. If desired, it may be provided with cut out portions 33 to accommodate the upwardly directed arms 23 of the contact collar 21, when the parts are in their initial position, as shown in Figure 1.

This guiding sleeve 32 is provided with a hooklike portion 34 which hooks over a strap 35 carried rigidly by the door, the strap and hook constituting latching means to detachably latch the fuse tube to the door.

The hooklike member 34 is preferably provided with a bevelled face 36 which bears against the spring 37 and thus tends to hold the fuse tube locked to the door. However, it is obvious that when the door is opened, the fuse tube may be readily withdrawn by merely sliding it upwardly a slight distance to disengage the hook 34 from the member 35. The guiding sleeve or fuse carrying sleeve 32 has a downwardly projecting extension 38 which bears against the lower inner face of the door, as shown in Figure 1.

It is to be noted also that the guiding sleeve or member 32 is also provided with outwardly projecting pins 39 which are normally engaged by the hook arms 26 of the bell crank contact lever.

This contact lever is held in the position shown in Figure 1 by means of the fuse link. However, when the fuse link blows, the contact lever is released and swings to the position shown in Figure 2, thus releasing the fuse and allowing it to slide downwardly into the position shown in Figure 2. The spring pressure due to the upper and lower spring arms of the stationary contacts of the housing assist in the downward motion of the fuse tube and in the releasing thereof, as they tend to tension the fuse link in addition to that provided by the spring 31.

The upward recoil, as stated, is resisted by means of the stop 17.

The withdrawing of the link from the fuse tube is very quick as it is assisted not only by the gas pressure, as in the normal expulsion fuse action, but also by the action of the mechanism herein described, namely, the contact lever 25. This contact lever, under the influence of the spring urge hereinabove described, quickly pulls any remaining fragment of the fuse link from the fuse tube.

A particularly important feature to be noted is that after the fuse has blown, if any fragment of the fuse link remains, for instance as indicated in Figure 2, this fragment is electrically dead as the contact lever 25 is now disconnected from any live part of the device.

Referring to the form of the invention shown in Figure 4, it will be seen that a substantially similar type of housing has been indicated by the reference character 40 and carries a pivotally mounted door 41 and the spring latching fingers 42 therefor substantially as previously described.

The upper terminal member 43 is provided with the inturned spring contact portion 44 which cooperates with the upper cap 45 of the upper contact 46, as previously described. The portion 46 is provided with outwardly projecting pins 47 which are adapted to engage a bifurcated stop 48 carried by the upper terminal member 43 upon the upward recoil of the fuse tube 49 when the fuse blows.

An arm 50 may be formed integrally with the contact 46 and may bear against the door 41 during closing motion of the door. The door is provided with a lower strap 51 which cooperates with the hook member 52 of the guiding sleeve 53, as previously described, a spring 54 being provided to releasably hold the latching members 51 and 52 in interlocking relation. The lower contact collar is indicated at 55 and is substantially similar to that previously described. It carries the lower contact lever 56 which is pivoted, as indicated at 57, to the collar 55 and which receives the lower end of the fuse link 58, such lower end being clamped by the thumb nut 59.

The sleeve 53 is provided with pins 60 projecting from opposite sides thereof which are received

by the hooklike portions 61 formed integrally with the lever 56. These portions are extended and bear against arms 62 of the lower contact spring fingers 63 of the housing. As shown in Figure 4, these spring fingers are preferably somewhat coiled, as indicated at 64, and the arms 62 are located on opposite sides of the main body portion 63 of these spring fingers.

This construction increases the resiliency of the lower spring member as will be apparent. These spring members bear against the extended arms 61 of the contact lever 56 and in view of the fact that the line of pressure is above the pivot point of this lever, it is obvious that this spring construction tends to rotate the lever towards opening position.

Additionally, the fuse tube, as it is urged downwardly by the upper spring contact 44, places a tension on the link 58. The spring member or lower contact member 63 is carried by the lower terminal member 65.

The operation of this apparatus is substantially similar to the form previously described. When the fuse blows, the lever 56 is released and, due to the combined action of the spring members, the lever is quickly rotated in a clockwise direction, as viewed in Figure 4, thus assisting in the expulsion of the fuse link and quickly withdrawing any remaining lower portion of the fuse link from the fuse tube. A very quick extinguishing action within the fuse tube thus takes place.

After the lever is rotated so as to clear the pin 60, the fuse tube drops downwardly as previously described.

In both forms of the invention the fuse tube has been shown as biased towards downward motion by gravity. Obviously other means could be employed if desired.

It is apparent that in order to have the fuse tube dead at both contacts, that it is desirable to have the spring arms 9 of Figures 1 and 2 spaced sufficiently far apart so that they will not contact with the guiding sleeve 32. Further than this, in the form shown in Figure 4, it is preferable for the same reasons to have the contact spring 63 move only a limited extent outwardly when the fuse blows and when the arms 61 have moved out of contact with the spring. In other words, the lower contact springs engage the levers of the fuse tubes and do not bind or engage against the guiding sleeves, thus accomplishing the objects sought.

Further than this, it is clear that an additional spring could be added directly to the contact lever 56 in the form of the invention shown in Figure 4 in accordance with that previously described in connection with the first form of the invention.

It is clear that after the fuse has moved downwardly subsequent to the rupturing of the fuse link, that any remaining portion of the fuse link which hangs from the lever 56 is electrically dead, as previously described.

It will be seen that a novel form of fuse construction has been provided by this invention which allows the dropping outwardly or sliding outwardly of the fuse assembly after the blowing of the fuse and which also provides means for quickly withdrawing any remaining lower portion of the fuse link from the fuse tube, the remaining portion of the fuse link even if it hangs from the housing being electrically dead.

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.

We claim:

1. A fuse construction comprising a stationary portion having stationary contacts, a fuse tube slidably supported from said stationary portion and having spaced contacts normally electrically connected to said stationary contacts, a fuse link joining said spaced contacts, means restraining said fuse tube against sliding motion, said means being controlled by said fuse link and being electrically dead after said fuse link has been ruptured and said fuse tube has slid outwardly from its normal position.

2. A fuse construction comprising a stationary supporting portion having stationary contacts, a fuse tube slidably supported from said stationary portion and having spaced contacts normally electrically connected to said first mentioned contacts, said fuse tube being biased towards sliding motion to separate at least one of said spaced contacts from the corresponding stationary contact, a fuse link within said fuse tube electrically joining said spaced contacts, and means controlled by said fuse link for restraining said fuse tube against sliding motion, said means being electrically dead after the blowing of said fuse link and after said fuse tube has slid from its normal position.

3. A fuse construction comprising a housing having stationary contacts, a fuse tube slidably supported within said housing and biased towards sliding motion outwardly from said housing, said tube having spaced contacts normally electrically connected to said stationary contacts, a fuse link electrically joining said spaced contacts, and mechanism for restraining the outward sliding motion of said fuse tube from said housing, said mechanism being controlled by said fuse link and being electrically dead after said fuse link has been ruptured and said fuse tube has slid outwardly from its normal position.

4. A fuse construction comprising a housing having stationary contacts, a fuse tube slidably supported within said housing and biased towards sliding motion outwardly from said housing, said tube having spaced contacts normally electrically connected to said stationary contacts, a fuse link electrically joining said spaced contacts, mechanism, and relatively stationary means normally engaged by said mechanism, said mechanism normally restraining the outward sliding motion of said fuse tube from said housing, said mechanism being controlled by said fuse link and being electrically dead after said fuse link has been ruptured and said fuse tube has slid outwardly from its normal position, said mechanism being carried by said fuse tube and being slidable as a unit with said fuse tube.

5. A fuse construction comprising a housing having a door, stationary contacts carried by said housing, a fuse tube slidably supported by said door and biased towards outward motion from said housing, said fuse tube having spaced contacts normally engaging said stationary contacts, a fuse link within said fuse tube electrically joining said spaced contacts, and mechanism controlled by said fuse link for holding said fuse tube against sliding motion, said mechanism tending to pull said fuse link from said fuse tube and being electrically dead upon rupture of said fuse link after said fuse tube has slid outwardly from normal position.

6. A fuse construction comprising a housing having stationary contacts, a fuse tube slidably

mounted within said housing and having spaced contacts normally engaging said stationary contacts, a fuse link electrically joining said spaced contacts, said fuse tube being biased towards outward sliding motion, means normally stationary with reference to said housing, and mechanism releasably interlocking with said relatively stationary means and normally restraining said fuse tube from sliding motion, said mechanism being controlled by said fuse link and being carried by said fuse tube and movable outwardly as a unit with said fuse tube.

7. A fuse construction comprising a housing having stationary contacts, a guiding means mounted within said housing, a fuse tube slidably supported within said guiding means and biased towards outward sliding motion, said fuse tube having spaced contacts normally engaging said stationary contacts, a fuse link electrically joining said spaced contacts, and mechanism carried by said fuse tube and detachably interlocking with said guiding means for restraining said fuse tube against sliding motion, said mechanism being controlled by said fuse link.

8. A fuse construction comprising a housing, a door for said housing, said housing having stationary contacts, a fuse tube having spaced contacts normally electrically connected to said stationary contacts, a guiding member detachably interlocking with said door and slidably guiding said fuse tube, said fuse tube being biased towards outward sliding motion from said housing to separate said stationary and spaced contacts, a fuse link electrically joining said spaced contacts, and mechanism carried by said fuse tube and interlocking with said guiding means to restrain the outward sliding motion of said fuse tube, said mechanism being controlled by said fuse link and moving bodily with said fuse tube outwardly when said fuse link is ruptured.

9. A fuse construction comprising a housing, a door for said housing, said housing having stationary contacts, a fuse tube having spaced contacts normally electrically connected to said stationary contacts, a guiding member detachably interlocking with said door and slidably guiding said fuse tube, said fuse tube being biased towards outward sliding motion from said housing to separate said stationary and spaced contacts, a fuse link electrically joining said spaced contacts, and a lever pivotally mounted upon said fuse tube and interlocking with said guiding means, said lever being connected to the lower end of said fuse link whereby when said fuse link is ruptured, said lever is free to release said fuse tube to allow outward sliding motion thereof.

10. In a fuse construction, a housing, a door for said housing, upper and lower stationary contacts carried by said housing, guiding means releasably interlocked with said door, a fuse tube slidably carried by said guiding means, said fuse tube having an upper contact normally engaging the upper stationary contact and having a lower lever pivotally mounted upon said fuse tube and normally engaging said lower stationary contact, and a fuse link extending from the upper contact of said fuse tube to said lever, said lever detachably interlocking with said guiding means.

11. In a fuse construction, a housing, a door for said housing, upper and lower stationary contacts carried by said housing, guiding means releasably interlocked with said door, a fuse tube slidably carried by said guiding means, said fuse tube having an upper contact normally engaging the upper stationary contact and having a lower lever pivotally mounted upon said fuse tube and normally engaging said lower stationary contact, and a fuse link extending from the upper contact of said fuse tube to said lever, said lever detachably interlocking with said guiding means, said lever being biased towards releasing motion.

12. In a fuse construction, a housing, a door for said housing, upper and lower stationary contacts carried by said housing, guiding means releasably interlocked with said door, a fuse tube slidably carried by said guiding means, said fuse tube having an upper contact normally engaging the upper stationary contact and having a lower lever pivotally mounted upon said fuse tube and normally engaging said lower stationary contact, and a fuse link extending from the upper contact of said fuse tube to said lever, said lever detachably interlocking with said guiding means, said lever being electrically dead after the rupturing of said fuse link and after the outward sliding motion of said fuse tube.

13. In a fuse construction, a housing having stationary contacts, a door for said housing, said door having a transverse straplike portion, a guiding sleeve provided with a hooklike portion interlocking with the transverse portion of said door, resilient means for releasably holding said hooklike portion and said transverse portion in interlocking engagement, a fuse tube slidably carried by said guiding means and having spaced upper and lower contacts, the upper contact of said fuse tube having detachable interlocking engagement with the corresponding stationary contact, a fuse link electrically joining the spaced contacts of said fuse tube, and means controlled by said fuse link for detachably locking said fuse tube to said sliding means, whereby upon rupture of said fuse link, said fuse tube is released and slides outwardly with respect to said housing.

14. A fuse construction comprising a housing having stationary contacts, a guiding means mounted within said housing, a fuse tube slidably supported within said guiding means and biased towards outward sliding motion, said fuse tube having spaced contacts normally engaging said stationary contacts, a fuse link electrically joining said spaced contacts, mechanism carried by said fuse tube and detachably interlocking with said guiding means for restraining said fuse tube against sliding motion, said mechanism being controlled by said fuse link, and a stop carried by said housing and adapted to arrest the upward recoil of said fuse tube, said stop being normally spaced from the upper end of said fuse tube.

15. A fuse construction comprising a housing having spaced contacts, a door for said housing, guiding means detachably interlocking with said door, a fuse tube slidably carried by said guiding means and having spaced upper and lower contacts, means carried by said fuse tube and detachably interlocking with said guiding means for restraining the sliding motion of said fuse tube, a fuse link joining said spaced contacts and restraining the interlocking means from motion, said fuse tube having a projecting portion adjacent its upper end contacting the said door.

16. In a fuse construction, a housing, a door for said housing, said door having spaced lower arms pivotally carried by said housing, yielding means detachably interlocking with said arms to hold said door in closed position, said housing

having stationary contacts, guiding means detachably interlocking with said door, a fuse tube slidably carried by said guiding means, said fuse tube having spaced contacts normally engaging said stationary contacts, a fuse link carried by said fuse tube and electrically joining said spaced contacts, and means controlled by said fuse link for restraining said fuse tube from outward sliding motion.

17. In a fuse construction, a housing, a door for said housing, said door having spaced lower arms provided with indentations and pivotally carried by said housing, yielding means having portions adapted to enter said indentations to detachably interlock with said arms to hold said door in closed position, said housing having stationary contacts, guiding means detachably interlocking with said door, a fuse tube slidably carried by said guiding means, said fuse tube having spaced contacts normally engaging said stationary contacts, a fuse link carried by said fuse tube and electrically joining said spaced contacts, and means controlled by said fuse link for restraining said fuse tube from outward sliding motion.

18. A fuse construction comprising a body portion having stationary contacts, a guiding means carried by said body portion, a fuse tube slidably supported within said guiding means and biased towards outward sliding motion, said fuse tube having spaced contacts normally engaging said stationary contacts, a fuse link electrically joining said spaced contacts, and mechanism carried by said fuse tube and detachably interlocking with said guiding means for restraining said fuse tube against sliding motion, said mechanism being controlled by said fuse link.

19. In a fuse construction a stationary body portion having upper and lower stationary contacts, guiding means carried by said body portion, a fuse tube slidably carried by said guiding means and biased towards outward sliding motion, said fuse tube having an upper contact normally engaging said upper stationary contact and having a lower lever pivotally mounted upon said fuse tube, said lower contact including a contact spring normally directly contacting with said lever, said lever detachably interlocking with said guiding means and releasable therefrom to allow said fuse tube to slide outwardly, and a fuse link extending from the upper contact of said fuse tube to said lever and normally restraining said lever from unlocking movement.

20. A fuse construction comprising a housing having an open bottom and having stationary contacts, a fuse tube slidably supported within said housing and biased slidably towards said open bottom, said tube having spaced contacts normally electrically connected to said stationary contacts, a fuse link electrically joining said spaced contacts, and mechanism for restraining the sliding motion of said fuse tube towards said open bottom, said mechanism being controlled by said fuse link and being electrically dead after said fuse link has been ruptured and said fuse tube has slid towards said open bottom.

21. A fuse construction comprising a housing having an open bottom and having stationary contacts, a fuse tube slidably supported within said housing and biased slidably towards said open bottom, said tube having spaced contacts normally electrically connected to said stationary contacts, a fuse link electrically joining said spaced contacts, and mechanism for restraining the sliding motion of said fuse tube towards said open bottom, said mechanism being controlled by said fuse link and being electrically dead after said fuse link has been ruptured and said fuse tube has slid towards said open bottom, said fuse tube projecting downwardly below said open bottom after said fuse link has been ruptured, whereby a visible signal is given after said fuse has blown.

22. An automatic current interrupting switch comprising a housing having contacts and having an opening through its bottom, a door for said housing, guiding means carried by said door, an arcing tube slidably carried by said guiding means and biased towards the opening in the bottom of said housing, an expulsible conductor within said tube normally electrically joining said contacts, a relatively stationary member, latch mechanism controlled by said conductor and carried by said tube and normally engaging said relatively stationary member for restraining said tube against sliding motion, and current responsive means for releasing said conductor.

23. A housed type drop-out switch comprising an insulating housing having an opening in its bottom and having spaced terminals therein, an arcing tube including contacts engageable with said terminals and a conductor connecting the contacts, relatively stationary guiding means for said arcing tube, said arcing tube being slidably carried within said guiding means, latch mechanism controlled by said conductor for normally restraining said tube against sliding motion, said latch mechanism being carried by said tube, and current responsive means for releasing said conductor and mechanism.

24. An automatic current interrupting switch comprising a housing having contacts and having an opening through its bottom, a door for said housing, guiding means carried by said door, an arcing tube slidably carried by said guiding means and biased towards the opening in the bottom of said housing, an expulsible conductor within said tube normally electrically joining said contacts, a relatively stationary member, latch mechanism controlled by said conductor and carried by said tube and normally engaging said relatively stationary member for restraining said tube against sliding motion, current responsive means for releasing said conductor, and stop means for resisting recoil movement of said tube upon upward recoil of said tube, said stop means being normally spaced from the upper end of said arcing tube.

25. A housed type drop-out switch comprising an insulating housing having an opening in its bottom and having spaced terminals therein, an arcing tube including contacts engageable with said terminals and a conductor connecting the contacts, relatively stationary guiding means for said arcing tube, said arcing tube being slidably carried within said guiding means, latch mechanism controlled by said conductor for normally restraining said tube against sliding motion, said latch mechanism being carried by said tube, current responsive means for releasing said conductor and mechanism, and stop means for resisting recoil movement of said tube upon upward recoil of said tube, said stop means being normally spaced from the upper end of said arcing tube.

26. A fuse construction comprising an insulating tube, a ferrule on one end of the tube, a collar surrounding the tube adjacent the opposite end thereof, a lug on the collar, a sleeve slidable over the tube between the ferrule and collar, said sleeve having a notch to receive the lug of the

collar, means releasably holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and moving the tube slidably through the sleeve.

27. A fuse tube comprising an insulating tube, a ferrule on one end of the tube, a collar surrounding the tube and spaced from the opposite end thereof, a sleeve slidable over the tube between the ferrule and collar, spring released means holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and moving the tube slidably through the sleeve.

28. A fuse tube comprising an insulating tube, a ferrule on one end of the tube, a collar surrounding the tube and spaced from the opposite end thereof, a sleeve slidable over the tube between the ferrule and collar; spring means for separating the collar and sleeve, and a spring released latch holding the collar and sleeve in engagement.

29. A fuse construction comprising a housing having contacts, a fuse tube having spaced contacts normally electrically connected to the contacts of said housing, a portion at least of said fuse tube being slidably guided to slide outwardly from said housing and being biased towards such outward sliding motion, that portion of said fuse tube which slides outwardly with respect to said housing having a contact electrically dead after said portion has slid outwardly with respect to said housing, and a fuse link electrically connecting the contacts of said fuse tube and normally restraining the said portion of said fuse tube from moving outwardly from said housing.

30. A fuse construction comprising a housing having contacts, a fuse tube having spaced contacts normally electrically connected to the contacts of said housing, a portion at least of said fuse tube being slidably guided to slide outwardly from said housing and being biased towards such outward sliding motion, that portion of said fuse tube which slides outwardly with respect to said housing having a contact electrically dead after said portion has slid outwardly with respect to said housing, and a fuse link electrically connecting the contacts of said fuse tube and normally restraining the said portion of said fuse tube from moving outwardly from said housing, said fuse link being also mechanically secured to the contact that becomes electrically dead when said contact has moved outwardly from said housing, whereby any remaining portion of the fuse link projecting from said fuse tube will be electrically dead.

31. In a housed dropout fuse structure, a housing having upper and lower terminals, a door for said housing, a fuse cartridge electrically connected with the upper terminal and mounted on said door, said cartridge including a tube slidable relative to said door and through the open bottom, said tube having a contact normally electrically connected with the lower terminal and movable with the tube to be electrically disconnected from said lower terminal, and a fuse link projecting from said tube and secured to said contact, said link normally restraining said tube against motion.

WILLIAM O. SCHULTZ.
ALWIN G. STEINMAYER.