

Jan. 11, 1938.

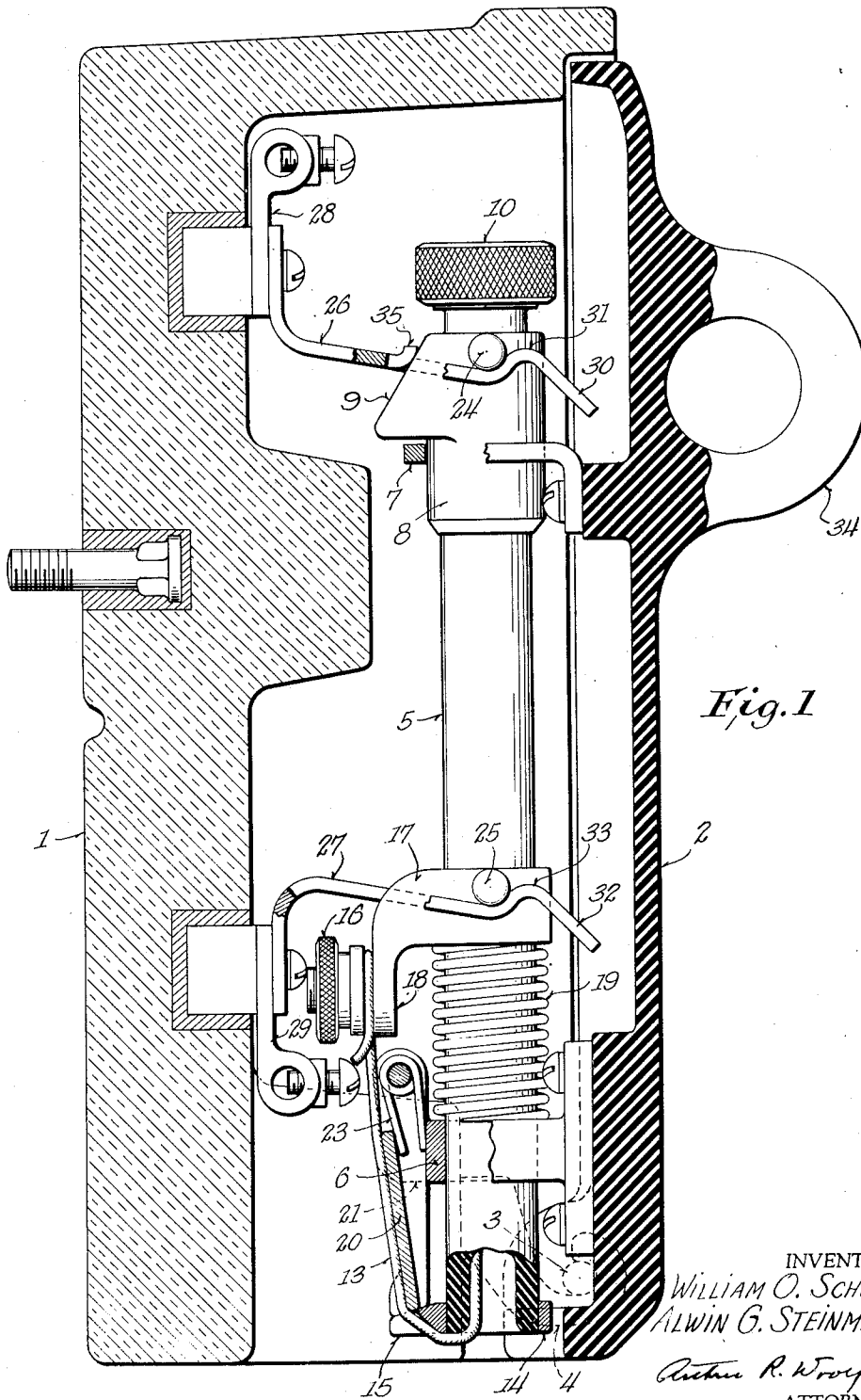
W. O. SCHULTZ ET AL

2,104,933

CUT-OUT

Filed June 15, 1936

2 Sheets-Sheet 1



INVENTORS
WILLIAM O. SCHULTZ
ALWIN G. STEINMAYER
Arthur R. Wrofford
ATTORNEY.

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Fig. 2

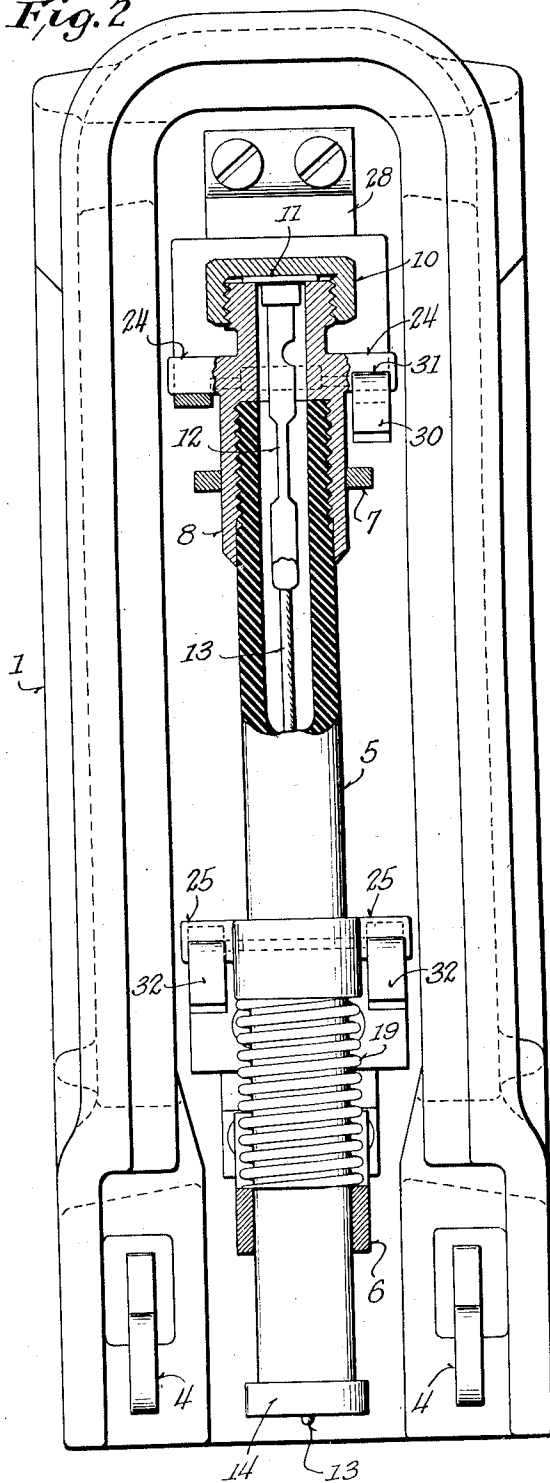


Fig. 3

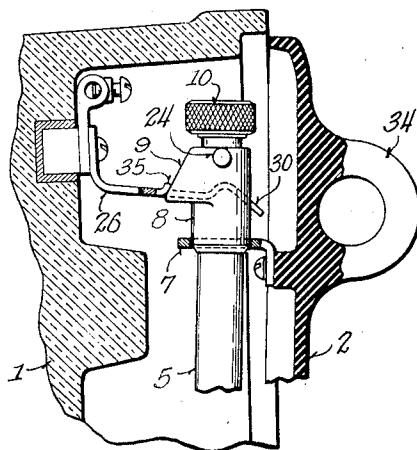
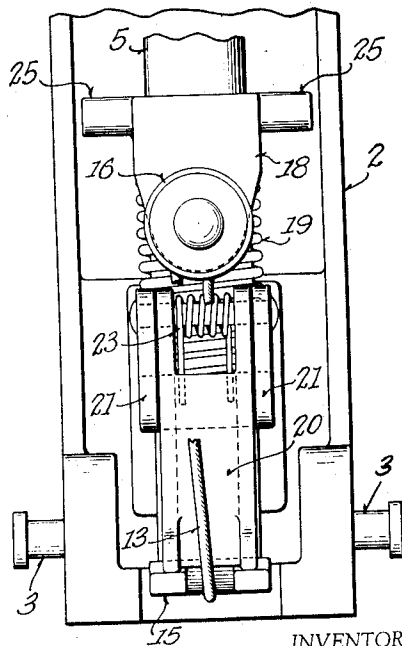


Fig. 4



INVENTOR.
WILLIAM O. SCHULTZ
BY ALWIN G. STEINMAYER
ARTHUR R. WOOLFORD
ATTORNEY.

UNITED STATES PATENT OFFICE

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CUT-OUT

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

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28 Claims. (Cl. 200-114)

This invention relates to cut-outs and is particularly directed to housed fused cut-outs.

Objects of this invention are to provide a housed type of fused cut-out in which the door is hinged independently of any latches or levers pertaining to the fuse operation, in which the fuse operates in a novel manner and utilizes the recoil of the fuse to assist in the rapid withdrawal of any remaining unburned portion of the fuse link when the fuse link has been severed.

Further objects are to provide a construction such that when the fuse or cut-out is in normal position, there are no contact springs tending to force the fuse tube out of contact, thus minimizing the possibility of vibration causing the door and fuse tube to fall open, and to provide a construction in which separate latching means are not required for latching the fuse tube in its normal position.

More specifically, objects of this invention are to provide a housed type of fuse construction in which the fuse tube moves inwardly of the housing and breaks contact with the stationary contacts of the housing, in which the recoil itself is utilized and may be assisted by a spring or other means to separate the contacts of the fuse tube from those of the housing to quickly withdraw any remaining portion of the fuse link and also to positively force the door open at least during the initial portion of the opening motion of the door.

Further objects are to provide a construction in which a pair of stationary contacts are carried by the housing, and in which the recoil of the fuse tube breaks the circuit at both contacts, in which after the fuse tube has recoiled it releases the door and allows the door, by which the fuse tube is carried, to drop open and thus carry the fuse tube bodily outwardly away from the stationary contacts of the housing, thus providing a plurality of means for insuring a complete interruption of the circuit under all conditions of operation.

Further objects are to provide a fuse construction in which the fuse tube is slidably carried by the door, in which latching means are provided for restraining the fuse towards motion in the direction of recoil, in which means are provided tending to move the fuse tube in the direction of recoil, in which the stationary contacts of the housing interlock with contacts carried by the fuse tube and thus normally hold the fuse tube in place and the door closed, and in which the latching means is released upon rupture of the link and the tube is itself yielding-

ly urged towards releasing motion, such releasing motion being assisted by the force exerted by the fuse tube during recoil, the construction being such that a positive and reliable operation is insured.

An embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is a vertical sectional view through the cut-out.

Figure 2 is a view with the door removed and 10 with parts in section.

Figure 3 is a fragmentary detail showing the upper portion of the device just after the fuse has recoiled.

Figure 4 is a fragmentary view taken from the 15 lower inner side of the door showing the latching means and the associated parts with parts of the structure broken away.

Referring to the drawings, it will be seen that the housed cut-out comprises a casing 1 of porcelain or other material and a door 2 which is 20 formed of insulating material such as a phenolic condensation product. The door is preferably provided with outwardly projecting trunnions 3, see Figure 4, which are removably carried in the 25 hook like supports 4. These supports 4 are carried by the housing and are free of any electrical connection whatsoever with any of the live parts of the device. The door may be rocked downwardly and unhooked from the hooks or support- 30 ing means 4.

A fuse tube 5 of the expulsion type is carried by the door and slidably passes through a lower guide 6 secured to the lower portion of the door and an upper guide 7 secured adjacent the upper portion 35 of the door. The fuse tube is provided with an upper contact which includes the cylindrical portion 8, the cam like bevelled portion 9 and the cap 10 which clamps the upper button head of the fuse link in place, the fuse link comprising such 40 upper button head 11, a fusible section having a reduced portion 12, and a leader 13 extending downwardly through the fuse tube and projecting outwardly through the open lower end of the fuse tube, as shown particularly in Figure 1. The 45 fuse tube is provided with a lower collar 14, see Figure 1, which has a projecting lug 15 notched to allow the leader 13 of the fuse link to pass there-through. The free end of the fuse link is clamped by means of a thumb nut 16 to the lower contact 50 17 of the fuse tube. This lower contact is secured to the fuse tube and preferably is of L shape to provide the downwardly hanging portion 18 spaced a material distance from the fuse tube body.

Between the contact 17 of the fuse tube and the bracket or guide 6 carried by the door a helical spring 19 is positioned and loosely surrounds the fuse tube and bears upwardly against the contact 17, thus tending to force the fuse tube upwardly in the direction of recoil of the fuse tube. This upward motion of the fuse tube is resisted by the latching lever 20 which is pivoted between a pair of arms 21 integral with the bracket or guide 6, as shown most clearly in Figures 1 and 4.

The lower portion of the latching member 20 is bevelled and engages the upper bevelled face of the projecting lug 15 of the collar 14. Thus it will be seen that the upward motion of the fuse tube under the influence of recoil or the spring 19 tends to rock the latching member 20 towards releasing position due to the cam like action of the bevelled faces of the lug 15 and the lower end of the latching member 20. Further than this, the upward motion of the fuse tube inwardly of the housing assists in quickly extracting any remaining unburned portion of the fuse link after the fuse link has been ruptured. If desired, a spring 23 may be provided tending to swing the latching member 20 towards releasing position.

The upper and lower contacts of the fuse tube are each provided with a pair of outwardly projecting pins or ears which are indicated at 24 and 25, see Figures 1 and 2. These projecting ears engage the upper and lower contacts 26 and 27 which are respectively secured to the upper and lower terminal members 28 and 29. In each case the contact members 26 and 27 are bifurcated. For example, the upper stationary contact member 26 is provided with a pair of arms 30 which are positioned on opposite sides of the fuse tube and have a downwardly inclined front or outer portion and an upwardly curved latching portion. The latching portion is indicated at 31 in Figure 1. Similarly the lower contact member has the pair of arms 32 positioned on opposite sides of the fuse tube and provided with the upwardly projecting latching portion 33.

The pins or ears 24 and 25 normally are positioned rearwardly of the latching portions 31 and 33, although these contact members are resilient and yield when the door is pulled open by means of the switch stick or fuse stick eye 34, see Figure 1. When the door is rocked closed, the pins 24 and 25 ride on the cam shaped free ends of the contact members 26 and 27 and the pins 24 and 25 finally latch back of the portions 31 and 33, as described. Thus it is possible to open and close the door without breaking the fuse link.

The operation of the apparatus is as follows: When the fuse link is severed, the latching member 20 is released and the recoil of the fuse tube carries the fuse tube upwardly. This motion is assisted by the spring 19. The upward motion of the fuse tube as well as the action of the spring 23 causes the latch member 20, which also constitutes a fuse link extracting member, to quickly extract any remaining unburned portion of the fuse link. The construction is such that it is effective in extracting the fuse link for large or small overloads.

When the fuse tube moves upwardly, the pins 24 and 25 detach themselves from their latching engagement with the corresponding stationary contacts 26 and 27 and thus release the assembled unit, consisting of the door and fuse tube, so that the door is now free to rock open.

This opening motion of the door is assisted by the upward motion of the fuse tube for from an examination of Figures 1 and 3 it will be seen

that the cam face of the portion 9 of the upper contact of the fuse tube rides upwardly and bears against the abutment 35 of the upper contact 26 and this forces the fuse tube and door towards open position, as may be seen from Figure 3.

Thus means are provided for positively opening the door upon recoil of the fuse tube. The door now completes its opening motion and swings outwardly from the housing bodily carrying the fuse tube away from the stationary contacts. It will be seen, however, that the fuse tube, due to its upward motion inwardly of the housing, has already interrupted the circuit at both the upper and lower contacts, in addition to the interruption occurring within the fuse tube itself. This action, as described, is supplemented by the door opening outwardly and bodily carrying the fuse tube away from the stationary contacts.

It will be seen that a novel form of cut-out has been provided in which the recoil motion of the fuse tube is utilized to quickly extract the fuse link, to separate the contacts of the fuse tube from the stationary contacts of the housing, and to positively open the door.

It will be noted further that the fuse tube moves inwardly of the housing towards open circuit position and that this motion is in the direction of the recoil motion of the fuse tube.

It will be seen further that the door is supported independently of any of the mechanism pertaining to the operation of the fuse tube itself.

It will be seen further that the device is relatively simple in construction and may be readily refused while the door is detached from the housing, and that thereafter the door may be rocked closed, and that no extra latching means need be provided for retaining the door in closed position.

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 support, a pair of vertically spaced stationary contacts, a substantially vertically positioned fuse tube normally connecting said contacts and subject to upward recoil to disconnect said fuse tube from said stationary contacts and movably supported from said support, and a fuse link carried by said fuse tube and normally restraining said fuse tube from upward motion, said fuse tube having at least one stationary contact normally electrically engaging a stationary contact, the recoil motion of said fuse tube moving the contact of said fuse tube away from the corresponding stationary contact.

2. A fuse construction comprising a pair of stationary contacts, a fuse tube having a pair of spaced contacts normally engaging said stationary contacts, a fuse link within said fuse tube electrically connecting said spaced contacts, said fuse tube being subject to recoil, and means for movably holding said fuse tube with respect to said support, whereby when said fuse tube recoils said spaced contacts are moved away from said stationary contacts.

3. A fuse construction comprising a pair of stationary contacts, a fuse tube having a pair of spaced contacts normally engaging said stationary contacts, a fuse link within said fuse tube electrically connecting said spaced contacts, and guiding means for slidably guiding said fuse tube,

said fuse tube sliding within said guiding means during recoil, whereby when said fuse tube recoils said spaced contacts are moved away from said stationary contacts.

4. In a fuse construction, the combination of a support, a fuse tube subject to recoil slidable with respect to said support, means movably supporting said fuse tube from said support, a fuse link within said fuse tube, and means assisted by the recoil motion of said fuse tube for extracting the fuse link upon rupturing of said fuse link.

5. In a fuse construction, the combination of a support, a fuse tube subject to recoil slidable with respect to said support, means movably supporting said fuse tube from said support, means urging said fuse tube in the direction of recoil, a fuse link within said fuse tube, and means assisted by the recoil motion of said fuse tube for extracting the fuse link upon rupturing of said fuse link.

6. In a fuse construction, the combination of a support, a fuse tube subject to recoil slidable with respect to said support, guiding means for said fuse tube, a spring urging said fuse tube in the direction of recoil, movable restraining means normally restraining said fuse tube against motion, and a fuse link carried within said fuse tube and holding said restraining means against releasing motion.

7. In a fuse construction, the combination of a support, a fuse tube subject to recoil slidable with respect to said support, guiding means for said fuse tube, a spring urging said fuse tube in the direction of recoil, movable restraining means normally restraining said fuse tube against motion, a fuse link carried within said fuse tube and holding said restraining means against releasing motion, and means urging said restraining means towards releasing motion.

8. In a fuse construction, the combination of a support, a fuse tube subject to recoil slidable with respect to said support, guiding means for said fuse tube, a spring urging said fuse tube in the direction of recoil, movable restraining means normally restraining said fuse tube against motion, and a fuse link carried within said fuse tube and holding said restraining means against releasing motion, said restraining means being assisted in its releasing movement by the force of recoil when said fuse link is severed.

9. A fuse construction comprising a housing, a door for said housing, a fuse tube carried within said housing and being subject to recoil, means movably supporting said fuse tube, and means actuated by the motion of recoil of said fuse tube for opening said door.

10. A fuse construction comprising a housing, a door for said housing, a fuse tube carried within said housing and being subject to recoil, means movably supporting said fuse tube, separable contacts, at least one of said contacts being carried by said fuse tube, and means actuated by the motion of recoil of said fuse tube for opening said door.

11. A fuse construction comprising a housing, a door movably supported from said housing, a fuse tube subject to recoil movably supported from said door and having a pair of spaced contacts, said housing having a pair of stationary contacts normally engaging said spaced contacts, a fuse link within said fuse tube, said fuse tube upon recoil moving said spaced contacts from said stationary contacts, and means effective upon recoil movement of said fuse tube for producing an opening movement of said door.

12. A fuse construction comprising a housing, a door movably supported from said housing, a fuse tube subject to recoil movably supported from said door and having a pair of spaced contacts, said housing having a pair of stationary contacts normally engaging said spaced contacts, a fuse link within said fuse tube, said fuse tube upon recoil moving said spaced contacts from said stationary contacts, a spring urging said fuse tube in the direction of recoil, means controlled by said fuse link for normally restraining said fuse tube against recoil motion, and means effective upon recoil movement of said fuse tube for producing an opening movement of said door.

13. A fuse construction comprising a housing, a door movably supported from said housing, latching means normally holding said door closed, a fuse tube within said housing subject to bodily recoil, a fuse link within said fuse tube, and means movably supporting said fuse tube, said latch means being operatively related to said fuse tube and being released upon recoil of said fuse tube.

14. A fuse construction comprising a housing, a door movably supported from said housing, latching means normally holding said door closed, a fuse tube within said housing subject to bodily recoil, a fuse link within said fuse tube, means movably supporting said fuse tube, and means actuated by the recoil motion of said fuse tube for forcing said door open, said latch means being operatively related to said fuse tube and being released upon recoil of said fuse tube.

15. A fuse construction comprising a housing, a fuse tube movably supported within said housing, separable contacts located within said housing, at least one of said contacts being carried by said fuse tube, a fuse link within said fuse tube, said fuse tube being movable inwardly of said housing upon rupture of said fuse link to contact-separating position, and means controlled by said fuse link for restraining said fuse tube against motion.

16. A fuse construction comprising a housing, a fuse tube movably supported within said housing, separable contacts located within said housing, at least one of said contacts being carried by said fuse tube, a fuse link within said fuse tube, said fuse tube being movable inwardly of said housing upon rupture of said fuse link to contact-separating position, a spring urging said fuse tube towards motion inwardly of said housing, and means controlled by said fuse link for restraining said fuse tube against motion.

17. A fuse construction comprising a housing, a door movably supported from said housing, a fuse tube movably supported within said housing, separable contacts located within said housing, at least one of said contacts being carried by said fuse tube, a fuse link within said fuse tube, said fuse tube being movable inwardly of said housing upon rupture of said fuse link to contact-separating position, a spring urging said fuse tube towards motion inwardly of said housing, means for opening said door upon motion of said fuse tube, and means controlled by said fuse link for restraining said fuse tube against motion.

18. A fuse construction comprising a housing, a door movably supported from said housing, stationary contacts carried by said housing, a fuse tube carried by said door and movable with respect to said door, said fuse tube being subject to recoil, a fuse link within said fuse tube electrically connecting said stationary contacts, and means

operated by the recoil movement of said fuse tube for opening said door, whereby upon rupture of said fuse link said door opens and carries said fuse tube away from said stationary contacts.

19. A fuse construction comprising a housing having stationary contacts, a door movably supported from said housing, a fuse tube movably carried by said door and having a fuse link electrically connecting said stationary contacts, and latch means holding said door closed, said fuse tube being movable inwardly of said housing upon rupture of said fuse link and detaching said latch means.

20. A fuse construction comprising a housing having stationary contacts, a door movably supported from said housing, a fuse tube movably carried by said door and having a fuse link electrically connecting said stationary contacts, latch means holding said door closed, and means biasing said fuse tube towards motion inwardly of said housing, means controlled by said fuse link for restraining said fuse tube against motion with respect to said door, said latch means being released upon inward motion of said fuse tube.

21. A fuse construction comprising a housing having stationary contacts, a door movably supported from said housing, a fuse tube movably carried by said door and having a fuse link electrically connecting said stationary contacts, latch means holding said door closed, means biasing said fuse tube towards motion inwardly of said housing, means controlled by said fuse link for restraining said fuse tube against motion with respect to said door, said latch means being released upon inward motion of said fuse tube, and means for opening said door by the inward motion of said fuse tube, whereby when said fuse link is ruptured said door is opened and bodily carries said fuse tube away from said stationary contacts.

22. A cut-out construction comprising a support, contacts carried by said support, a tube subject to recoil slidably supported from said support, guiding means for said tube, an expulsive conductor within said tube normally electrically connecting said contacts and forming a portion of an electric circuit through said cut-out, means responsive to overload for interrupting the electric circuit within said tube, and means assisted by the recoil motion of said tube for extracting said conductor from said tube.

23. A cut-out construction comprising a support, a tube slidably supported from said support, cooperating contact means carried jointly by said support and said tube, an expulsive conductor within said tube and forming with said contact means a portion of an electric circuit through said cut-out, means responsive to overload for interrupting the electric circuit within said tube, and means assisted by the recoil of said tube for extracting said conductor from said tube, said tube upon recoil separating said contact means.

24. A cut-out construction comprising a housing, a door movably supported from said housing, a tube subject to recoil located within said housing and movably carried by said door, a conductor within said tube normally forming a part of an electric circuit through said cut-out,

means responsive to overload for interrupting the electric circuit within said tube, contact means carried jointly by said tube and said housing, and means assisted by the recoil of said tube for opening said door, said tube upon rupture of the electric circuit therein being bodily carried by said door away from the contact means carried by said housing.

25. A cut-out construction comprising a housing, a door movably supported from said housing, a tube subject to recoil located within said housing and movably carried by said door, a conductor within said tube normally forming a part of an electric circuit through said cut-out, means responsive to overload for interrupting the electric circuit within said tube, contact means carried jointly by said tube and said housing, said tube upon recoil separating the contact means carried by said tube from the contact means carried by said housing, and means assisted by the recoil of said tube for opening said door, said tube upon rupture of the electric circuit therein being bodily carried by said door away from the contact means carried by said housing.

26. In a fuse construction, the combination of a main support, a pair of vertically spaced stationary contacts, a fuse tube subject to upward recoil and releasably connecting said contacts, intermediate supporting means for supporting said fuse tube, said fuse tube having bodily motion with respect to said intermediate supporting means, said intermediate means being pivoted with respect to said main support, and a fuse link within said fuse tube normally restraining said fuse tube from upward recoil and releasing said fuse tube for upward recoil upon blowing of said fuse link.

27. In a fuse construction, the combination of a main support, a pair of vertically spaced stationary contacts, a fuse tube subject to upward recoil and releasably connecting said contacts, intermediate supporting means for supporting said fuse tube, said fuse tube having bodily motion with respect to said intermediate supporting means, said intermediate means being pivoted with respect to said main support, releasable latching means for restraining said fuse tube against upward recoil, and a fuse link in said fuse tube normally holding said latching means in latching position.

28. In a fuse construction, the combination of a main support, a pair of vertically spaced stationary contacts, a fuse tube subject to upward recoil and releasably connecting said contacts, intermediate supporting means for supporting said fuse tube, said fuse tube having bodily motion with respect to said intermediate supporting means, said intermediate means being pivoted with respect to said main support, spring means urging said fuse tube bodily upwardly with respect to said intermediate supporting means, releasable latching means for restraining said fuse tube against upward recoil, and a fuse link in said fuse tube normally holding said latching means in latching position.

WILLIAM O. SCHULTZ.
ALWIN G. STEINMAYER.