Feb. 24, 1953 K. O. HANKS, JR 2,629,795

FUSE CUTOUT

Filed Feb. 12, 1951 3 Sheets-Sheet 1

FIG. 1.

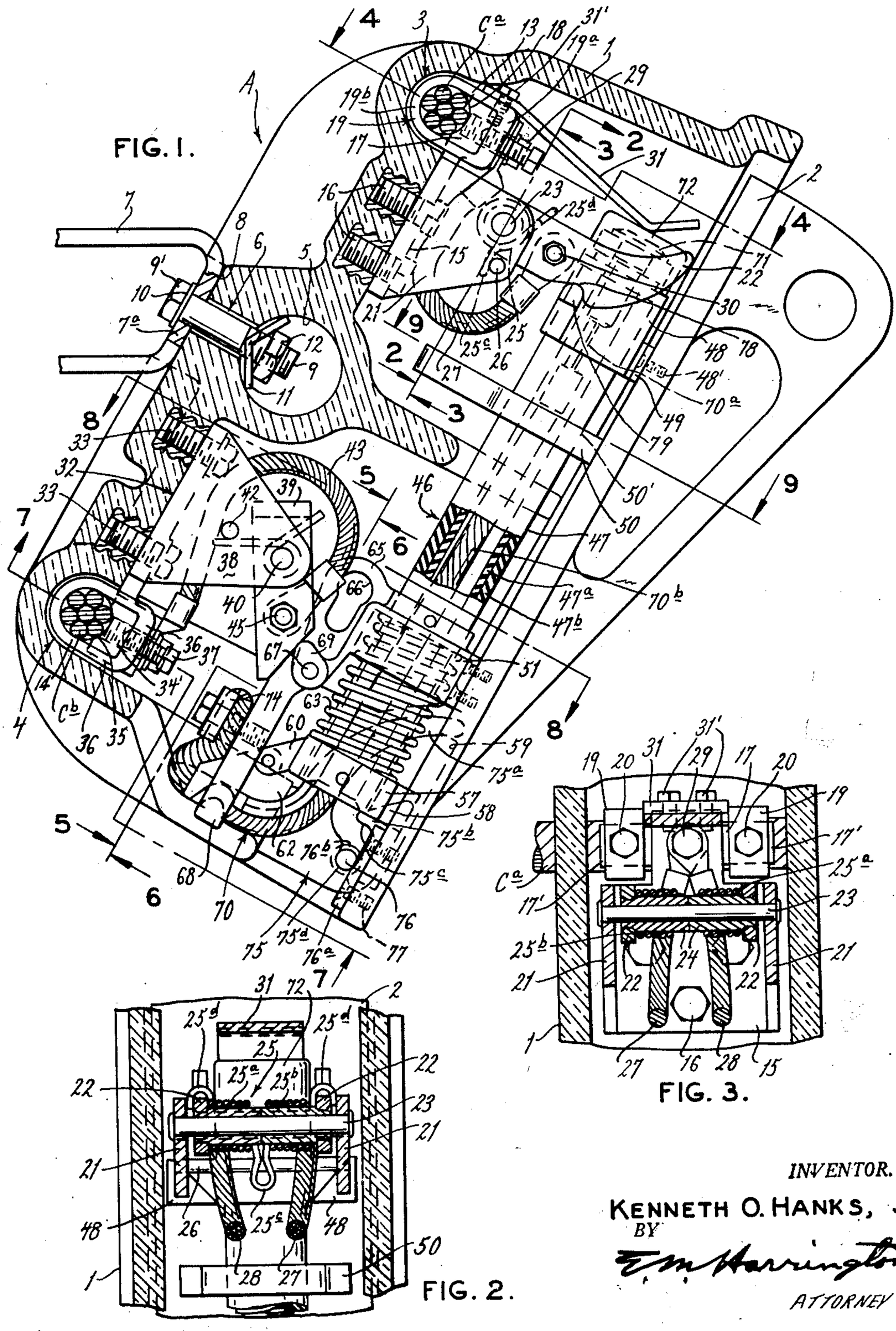


FIG. 3.

FIG. 2.

INVENTOR.

KENNETH O. HANKS, JR.

BY

E. M. Harrington,

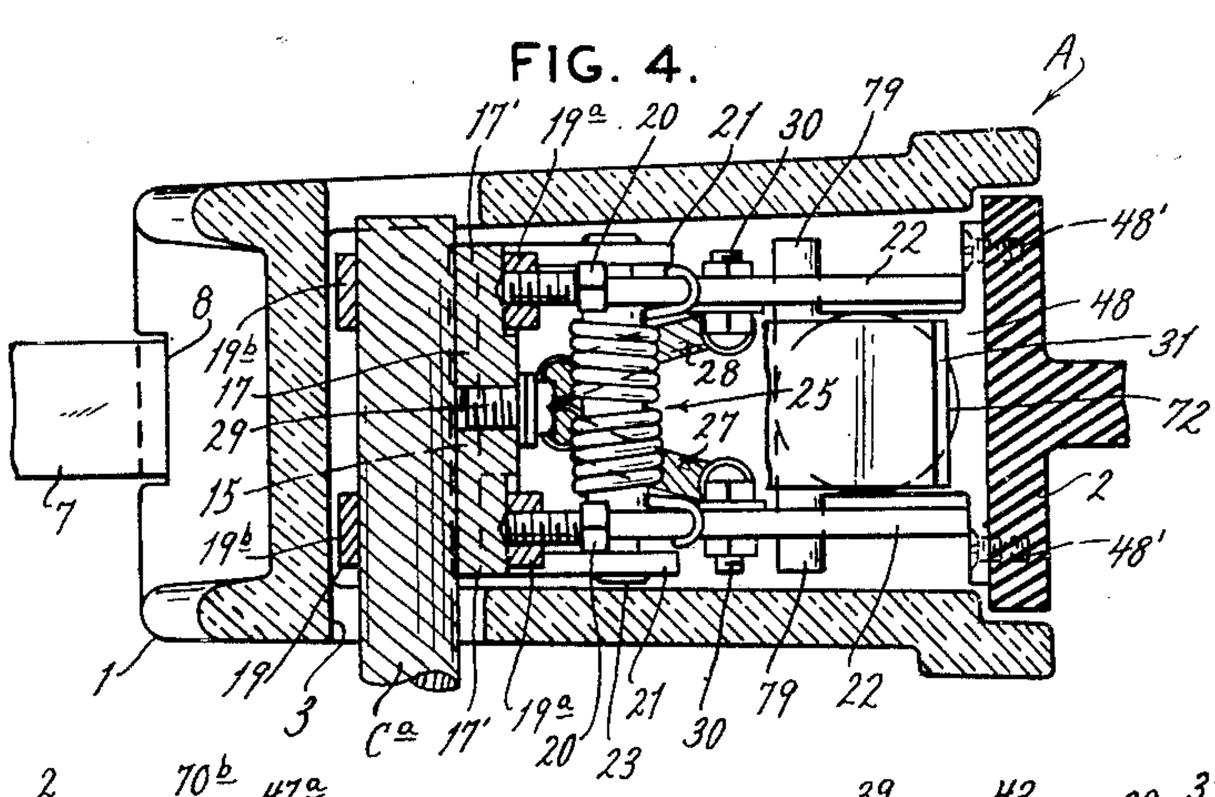
ATTORNEY

Feb. 24, 1953 K. O. HANKS, JR 2,629,795

FUSE CUTOUT

Filed Feb. 12, 1951 3 Sheets-Sheet 2

FIG. 4.



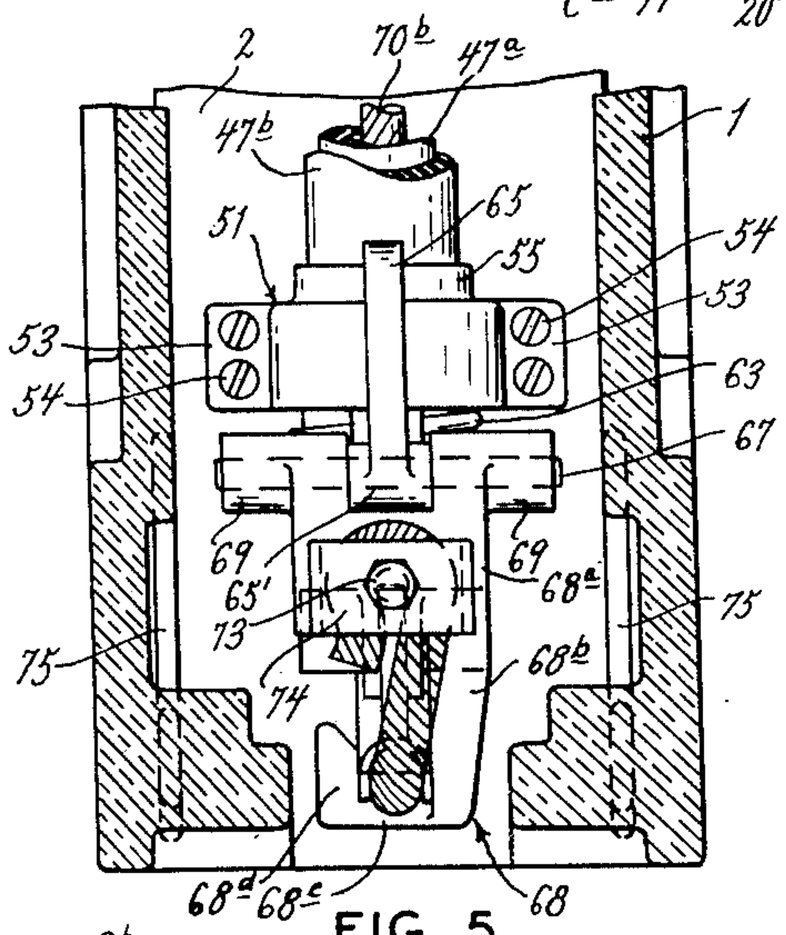


FIG. 5.

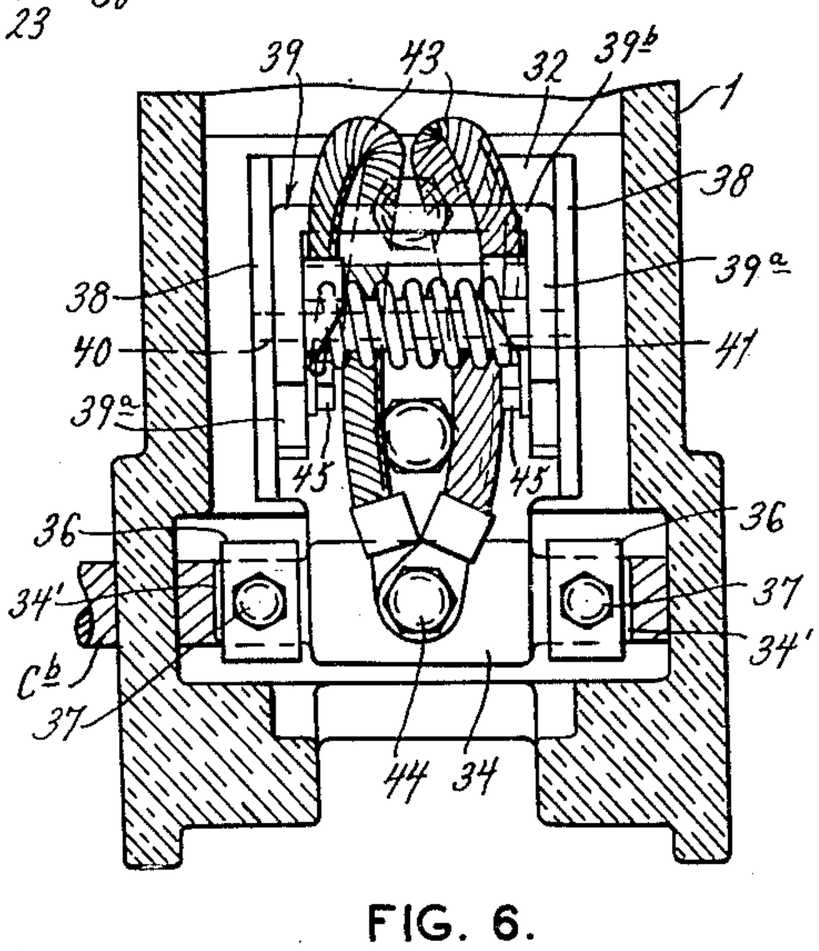


FIG. 6.

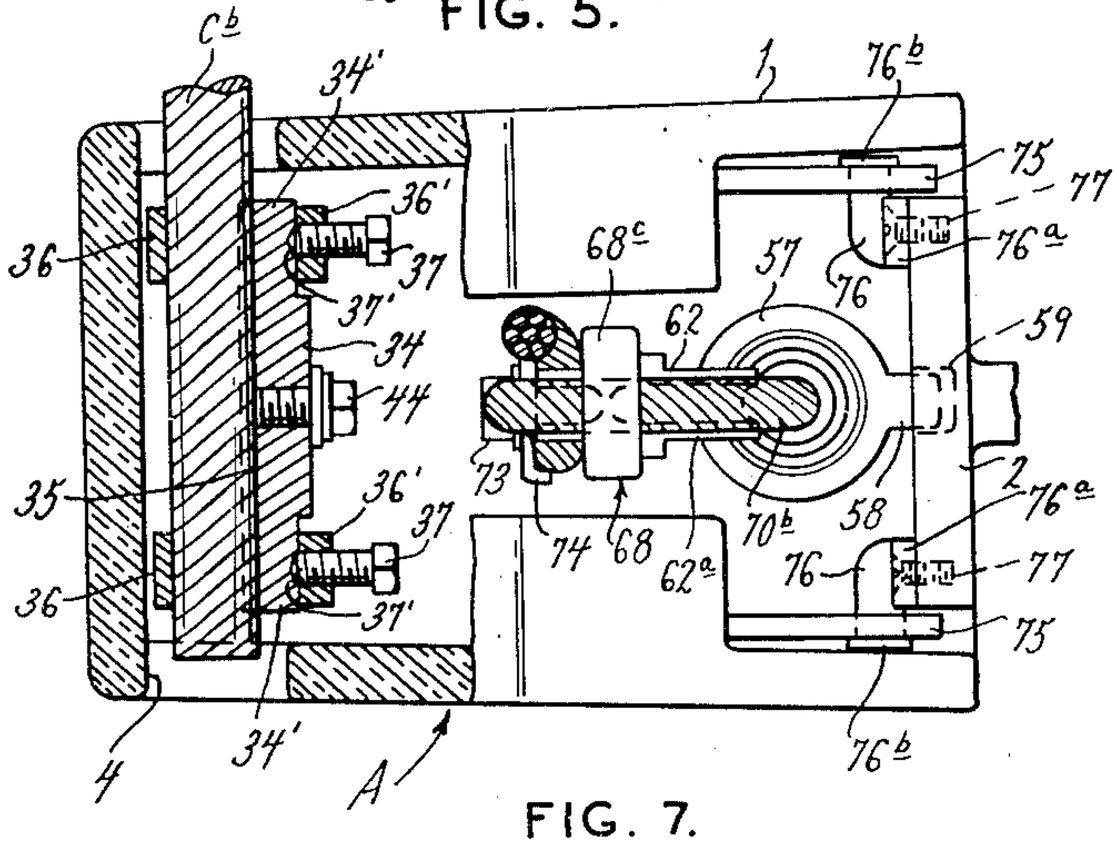


FIG. 7.

INVENTOR.
KENNETH O. HANKS, JR.
BY
E. M. Harrington,
ATTORNEY

Feb. 24, 1953 K. O. HANKS, JR 2,629,795

FUSE CUTOUT

Filed Feb. 12, 1951 3 Sheets-Sheet 3

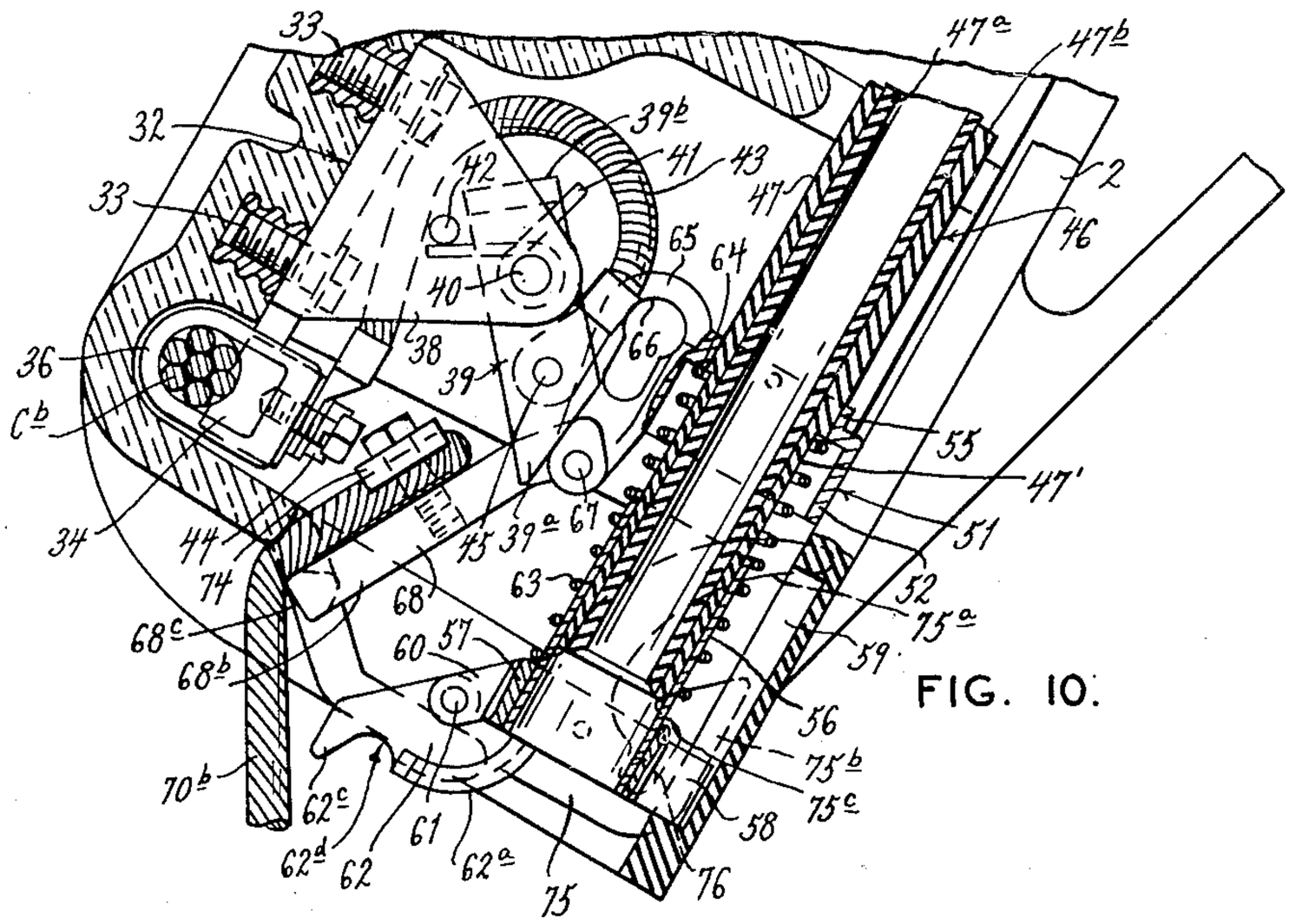


FIG. 10.

FIG. 8.

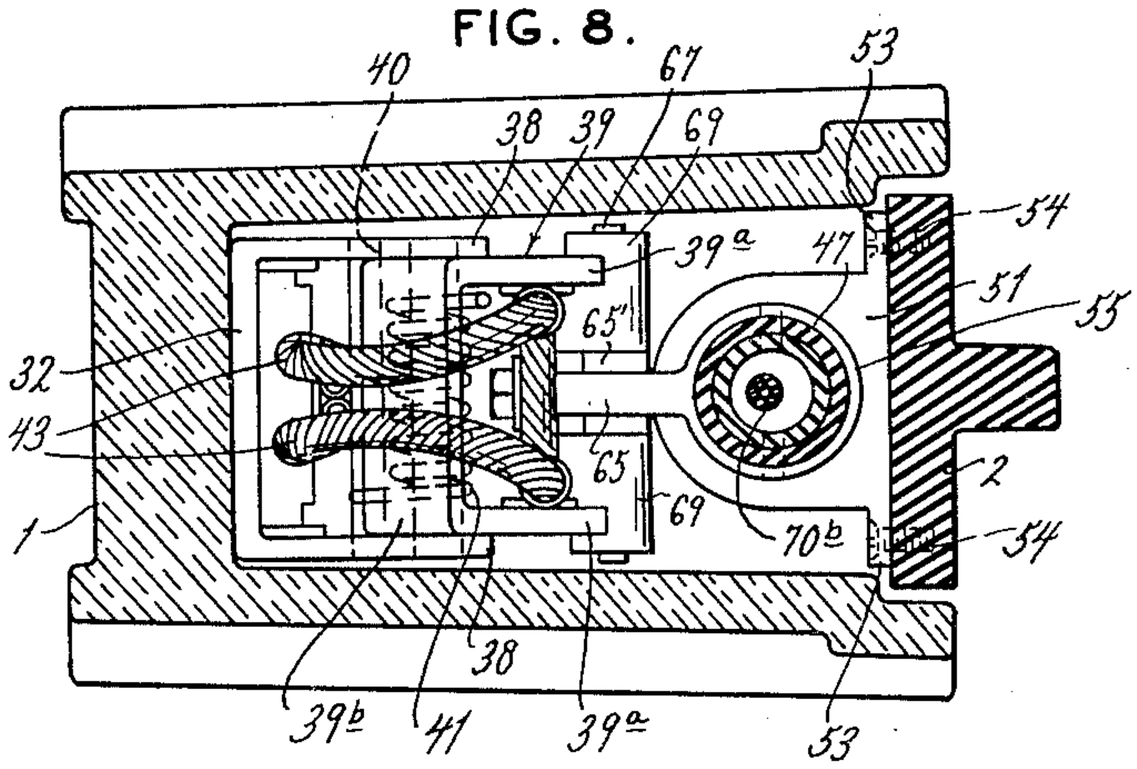
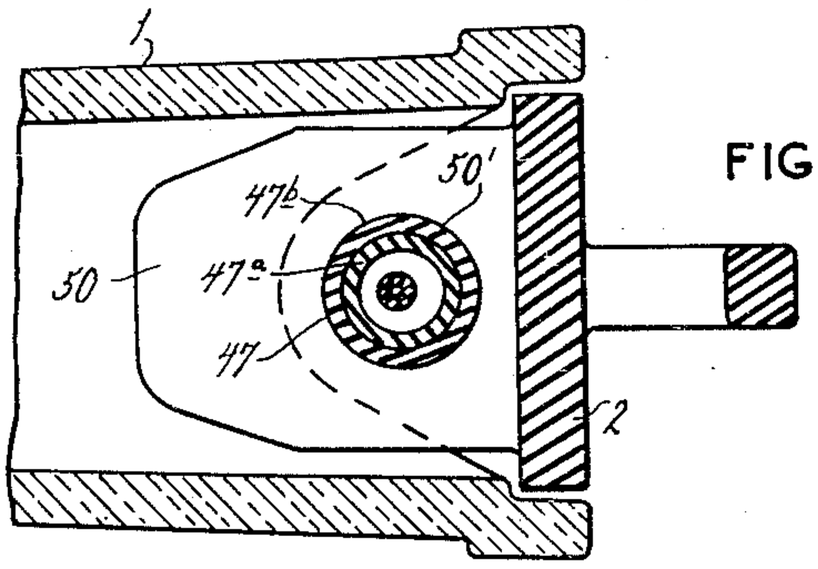


FIG. 9.



INVENTOR.
KENNETH O. HANKS, JR.
BY
E. M. Harrington,
ATTORNEY

Patented Feb. 24, 1953 2,629,795

UNITED STATES PATENT OFFICE

2,629,795

FUSE CUTOUT

Kenneth O. Hanks, Jr., St. Louis, Mo., assignor to James R. Kearney Corporation, St. Louis, Mo., a corporation of Missouri

Application February 12, 1951, Serial No. 210,559

6 Claims. (Cl. 200—114)

1

This invention relates generally to fuse cutouts, and more specifically to an improved housed fuse cutout the housing of which is provided with a door that supports a fuse cartridge, the predominant object of the invention being to provide an improved fuse cutout of this type which, because of its unique construction and the novel arrangement of its parts, is capable of performing its intended function in a highly efficient manner.

The improved fuse cutout disclosed herein is intended particularly for use in circuits carrying relatively high amperages and voltages, and said cutout includes several novel features of construction and arrangement that serve to produce an apparatus which is superior to housed cutouts heretofore known. Among these features is the construction and arrangement of the upper contacts of the cutout that comprises a pair of contact members which are independently spring loaded and are capable of independent movement, and the arrangement of supporting the door of the housing in a closed position so that shocks resulting from rupture of the fuse links may be absorbed in order that damage to the door or parts related thereto, or the housing, may be avoided.

The present invention includes other features of construction and arrangement which will be described in detail herein and which are illustrated in the drawings, in which—

Fig. 1 is a vertical section taken through a housed fuse cutout constructed and arranged in accordance with this invention.

Fig. 2 is a fragmentary, vertical section taken on line 2—2 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 3 is a fragmentary, vertical section taken on line 3—3 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 1, parts thereof being broken away.

Fig. 5 is a fragmentary, vertical section taken on line 5—5 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 6 is a fragmentary, vertical section taken on line 6—6 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 7 is a horizontal section taken on the staggered line 7—7 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 8 is a horizontal section taken on line 8—8 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 9 is a fragmentary, horizontal section taken on line 9—9 of Fig. 1 and looking in the direction indicated by the arrows.

2

Fig. 10 is a fragmentary, vertical section of the lower portion of the cutout of this invention and showing certain parts of the cutout in changed positions.

In the drawings, wherein is shown for purposes of illustration, merely, one embodiment of the invention, A designates in Fig. 1 the improved fuse cutout generally. The cutout A includes a housing 1 which is open at its front and bottom, said housing being provided at its front with a door 2, which is hinged to the body portion of the housing in a manner to be hereinafter set forth. The housing 1 of the cutout A is formed of porcelain, or other suitable material, and the rear wall of the body portion thereof is of varying thicknesses, as is shown in Fig. 1. Formed transversely through the rear wall of the housing 1 adjacent to the top thereof is a recess 3, and formed transversely through said rear wall adjacent to the bottom of the housing is a similar recess 4, said recesses 3 and 4 being open at the outer faces of the opposed side walls of the housing, nd said recesses opening into the interior of the housing, as is shown in Fig. 1. The rear wall of the housing 1 at the approximate vertical center of said housing is of considerably greater thickness than the remainder of said rear wall, and formed transversely through this portion of the rear wall is an opening 5 which is open at the outer faces of the opposed side walls of the housing 1 and is of greater diameter than the openings 3 and 4. Also, an opening 6 of less diameter extends from the opening 5 rearwardly to the rear face of the rear wall of the housing 1.

Arranged in contact with the rear face of the rear wall of the housing 1 is a hanger 7 which serves as means for attaching the fuse cutout A to a support therefor. The hanger 7 includes a portion 7*a* which is disposed in a recess 8 formed in a portion of the rear wall of the housing 1, and said hanger is secured to said housing by a bolt 9 which passes through the opening 6 and through an opening formed through the portion 7*a* of the hanger 7. The bolt 9 is provided with a head 9′ at its outer end at which a washer 10 is arranged and the opposite end portion of said bolt extends into the opening 5, there being a substantially V-shaped element 11 located within said opening 5 in contact with the wall thereof, said V-shaped element having an opening formed therethrough through which the bolt 9 extends, and a nut 12 which is mounted on the inner end portion of the bolt is screwed into close contact

with said V-shaped element so as to securely fix the hanger to the housing 1. Relative rotation of the housing and the hanger about the bolt 9 is prevented because of the fact that the portion 7*a* of said hanger is disposed in the recess 8 of the housing 1 between the opposed side walls thereof (Fig. 4).

Located within the recesses 3 and 4 are terminals 13 and 14 to which are connected sections of conductors C*a* and C*b* that are parts of the electrical circuit with which the cutout A is associated, the terminal 13 being the incoming terminal while the terminal 14 is the outgoing terminal of the cutout. The terminal 13 comprises a plate portion 15 which is secured by fastening devices 16 to the rear wall of the housing 1 at the inner face thereof. Formed integral with the plate portion 15 at the top thereof is a transversely extended bar 17, said bar 17 being provided with a concave seat 18 that receives a portion of the conductor C*a* and having portions 17' at the opposite ends of said bar which are of reduced thickness (Fig. 4). Embracing the portions 17' of the bar 17 and portions of the conductor C*a* is a pair of yokes 19 which are shaped in side elevation as is shown in Fig. 1, each of said yokes being provided with a flat portion 19*a* that is disposed adjacent to the forward face of one of the portions 17' of the bar 17 and a rounded portion 19*b* which engages a portion of the conductor C*a*. Also, each yoke 19 has associated therewith a bolt 20, the shank of which is received in a screwthreaded aperture formed in the portion 19*a* of the yoke, the end of said bolt opposite to the headed end thereof being disposed in a seat formed in the related portion 17' of the bar 17. By rotating the bolts 20 of the terminal 13 in the proper direction it is obvious that the yokes 17 will be moved to the right in Fig. 4 so as to cause portions of the conductor C*a* to be gripped tightly between the portions 19*b* of said yokes and portions of the bar seat 18 of the bar 17.

The plate portion 15 of the terminal 13 is provided with spaced legs 21 which are projected forwardly from the opposed side edges of said plate portion so as to cause the structure produced by the plate portion 15 and the legs 21 to be of U-shaped formation. The spaced legs support for pivotal movement a pair of spaced contact members 22, the means for connecting said contact members to said spaced legs comprising a pivot rod 23 which is supported at its opposite ends in openings formed through said spaced legs (Fig. 3). The contact members 22 are fixedly mounted on tubular bearing elements 24 that abut against each other at the approximate longitudinal center of the pivot rod 23 and which embrace said pivot rod, there being a torsional coil spring 25 which has coiled portions 25*a* and 25*b* that respectively embrace the tubular bearing elements 24, with an intermediate loop portion 25*c* of said torsional spring engaging a pin 26 supported by the spaced legs 21, and end portions 25*d* thereof overlapping and engaging the contact members 22. The torsional coil spring 25 tends to urge the forward portions of the contact members 22 in a downward direction, and said contact members are capable of independent movement, the torsional coil spring 25 tending to urge said contact members to their downward positions where portions thereof abut against portions of the pin 26.

By referring particularly to Figs. 1 and 3 it will be noted that a pair of shunts 27 and 28 are

provided for conducting current from the upper terminal 13 to the contact members 22. These shunts are both connected by means of a bolt 29 to the bar 17 of the terminal 13, the opposite end of one of said shunts being connected to one of the contact members 22, while the corresponding end of the other shunt is connected to the other contact member 22, the latter connections being made through the instrumentality of bolts 30. Also, the bar 17 of the upper terminal 13 has secured thereto by suitable fastening devices 31' an auxiliary contact 31 which is formed of resilient, electrical conductive material and serves a purpose to be hereinafter set forth.

The lower terminal 14 is constructed substantially in accordance with the upper terminal 13, as hereinafter described; that is to say, said lower terminal comprises a plate portion 32 which is secured by means of suitable fastening devices 33 to the rear wall of the housing 1 of the cutout A. The plate portion 32 is provided at its lower end with a transversely extended bar 34, said bar having portions 34' at opposite ends thereof which are of reduced thickness (Fig. 7), and said bar has formed therein a longitudinally extended seat 35 in which a portion of the conductor C*b* is seated. Portions of the conductor C*b* and the portions 34' of the bar 34 are embraced by yokes 36 with which are associated bolts 37, said bolts being screwthreadedly extended through screwthreaded openings formed through the portions 36' of the yokes 36 and end portions of said bolts are disposed in seats 37' formed in the portions 34' of the bar 34.

The plate portion 32 of the lower terminal 14 is provided with spaced, forwardly projected legs 38 of tapered formation, as is shown to good advantage in Figs. 1 and 8. The spaced legs 38 have disposed therebetween for pivotal movement a member 39 which is of U-shaped formation, there being a pair of opposed side portions 39*a* which are joined by a bridge portion 39*b*. The member 39 is supported for pivotal movement by the spaced legs of the plate portion 32 of the lower terminal 14 through the use of a rod 40 which extends through apertures formed through the spaced portions 39*a* of the member 39 and whose opposite end portions are seated in openings formed in the spaced legs 38, there being a torsional coil spring 41 arranged in embracing relation with respect to said rod 40 with one end portion of said torsional coil spring contacting with the bridge portion 39*b* of the member 31 and the opposite end portion of said torsional coil spring contacting with a pin 42 supported by the spaced leg structure of the plate portion 32 of the lower terminal 14. The lower terminal structure of the cutout A includes a pair of shunts 43 which are connected at corresponding ends thereof to the bar 34 of the lower terminal 14 by means of a bolt 44, and at the opposite ends of said shunts, respectively, to the opposed side portions 39*a* of the member 39 by means of bolts 45.

The door 2 of the cutout A has mounted thereon a fuse cartridge 46, said fuse cartridge including a tube structure 47 comprising an inner tube 47*a* formed of horn fiber, or other material which is characterized by the ability to give off gas in the presence of the heat of an electric arc that tends to extinguish the arc, and an outer tube 47*b* formed of a suitable good weathering material. The upper portion of the tube structure 47 is supported by a sleeve 48 which is secured to the door 2 by suitable fastening devices 48', said

fastening devices being extended through apertured flanges 49 that are projected from the sleeve. The tube structure extends, also, through an opening 50' formed through an extension 50 which projects inwardly of the housing 1 from the door 2 thereof. Adjacent to the lower end of the tube structure 47 a member 51 is secured to the door 2, said member having an inverted cup-shaped portion 52 and being provided with flanges 53 that receive fastening devices 54 for securing said member to the door (Fig. 8). Also, the member 51 is provided at its top with an annular, upstanding portion 55, the tube structure 47 being extended through said portion 55 and through the cup-shaped portion 52 of said member 51.

The outer tube 47*b* of the tube structure 47 is provided with a lower portion 47' which is of reduced thickness, as is shown to good advantage in Fig. 10, and embracing said portion 47' of said outer tube is a tubular element 56. At the lower end thereof the tubular element 56 has fixedly mounted thereon a collar 57 provided with a forwardly extended lug 58 that projects into a groove 59 formed in the door 2. Also, at the opposite side of the collar 57 a rearwardly projected, bifurcated extension 60 is provided, and pivotally attached to said extension by means of a pivot element 61 is a toggle member 62. The toggle member 62 is provided with an arcuate portion 62*a* of channel-shaped cross-section, said toggle member 62 also being provided with an end portion 62*c* in which a notch 62*d* is formed. The lower portion 47' of the outer tube 47*b* of the tube structure 47 of the fuse cartridge 46 is embraced by a coil spring 63 which contacts at its upper end with the wall 64 of the member 51 and at its lower end with the top face of the collar 57, said coil spring tending to move the tubular element 56, and the parts related thereto, in a downward direction. The member 51 has an extension 65 formed thereon in which is formed a key-hole shaped slot 66, and pivotally secured to the lower end portion of said extension 65 through the instrumentality of a pivot element 67 is an arm 68. The arm 68 is bifurcated at its upper end, as is shown in Fig. 5, and a bearing portion 65' of said extension 65 is received between spaced parts 69 of said arm, the pivot element 67 being extending through alined openings formed through said bearing portion and said spaced parts. The upper portion 68*a* of the arm 68 is relatively wide, as is shown in Fig. 5, there being an arm portion 68*b* extended downwardly from said wide arm portion 68*a*, a portion 68*c* extended laterally from the lower end of said arm portion 68*b*, and an arm portion 68*d* extended upwardly from the arm portion 68*c*. The spaced parts 69 of the arm 68 are shaped as is shown in Fig. 10 for a reason to be hereinafter set forth.

The tube structure 47 of the fuse cartridge 46 receives a fuse link 70 which is extended therethrough, said fuse link having a button 71 at its upper end which is engaged by a cap 72 that is screwthreadedly applied to the upper end of the tube structure. The fuse link 70 is provided with a fusible section 70*a* and a cable section 70*b*, said cable section being extended out of the lower end of the tube structure 47 and a portion thereof being disposed in the channel-shaped portion 62*a* of the toggle member 62. Also, a portion of the fuse link 70 is gripped between the wall of the notch 62*d* of the toggle member 62 and the upper tapered part of the

portion 68*c* of the arm 68, said fuse link then extending upwardly to a point where it is secured by a bolt 73 and a plate 74 to the portion 68*a* of the arm 68.

The housing 1 is provided within the lower portion thereof with a pair of opposed hinge plates 75 which are fixedly secured in place within said housing. Each of the plates 75 is shaped as is shown in Fig. 1; that is to say, each plate includes a lower part from the rear portion of which an upwardly and outwardly projected portion 75*a* is extended. Also, extended upwardly from the forward portion of the lower part of each plate 75 is a portion 75*b* which is provided with a shoulder 75*c*, the inner edges of the portions 75*a* and 75*b* of each plate 75 merging into a circular opening 75*d* which is at the bottom of an irregular shaped slot that is open at the forward edge of the plate. The door 2 has fixed thereto at opposite sides of the lower portion thereof a pair of hinge pins 76, said hinge pins being provided with flanges 76*a* through apertures of which fastening devices 77 extend for securing said hinge pins to the door and said hinge pins being provided with heads 76*b*. In the normal position of the door 2 the hinge pins 76 thereof are disposed in the circular openings 75*d* of the hinge plates and as a result thereof said door may be moved outwardly and downwardly about the axes of the hinge pins. Also, when the door is in its normal closed position the auxiliary contact 31 contacts with the upper face of the cap 72 at the top of the fuse cartridge 46 and serves to dissipate heat generated during operation of the cutout. Likewise, in the normal closed position of the door 2 the notches 78 of the spaced side portions of the contacts 22 engage projections 79 which extend outwardly in opposite directions from the sleeve 48 so as to retain the door in its closed position.

When the improved cutout of this invention is arranged for use, the tubular element 56, and the parts related to said tubular element, are elevated against the downward force exerted by the coil spring 63, the intact fuse link 70 holding said tubular element and its related parts in such elevated position. The lower portions of the toggle member 62 and the arm 68 are held in their cooperative forward positions by the intact fuse link which, as heretofore explained, passes between and is gripped by portions of said toggle member and arm. Thus, the substantially vertically disposed arm 68 in cooperation with the toggle member 62 holds the tubular element 56, and the parts related thereto in elevated positions against the action of the coil spring 63, and the fuse link prevents the toggle connection between extension 65 and the collar 57 produced by the toggle member 62 and the arm 68 from breaking inwardly of the housing 1 to permit the tubular element 56, and the parts related thereto, to move downwardly in response to force exerted by the coil spring 63. It is obvious that because the downward exertion of the coil spring 63 tends to break the toggle connection inwardly of the housing, the fuse link which resists such toggle-breaking movement is placed under tension by said coil spring.

When an electrical fault of sufficient magnitude occurs in the circuit in which the cutout is interposed, the fusible section of the fuse link 70 is ruptured and as a result the force which restrains the toggle connection between the extension 65 and the collar 57 from breaking is removed, and inward breaking movement of said

toggle connection immediately takes place. Thus, the coil spring **63** moves the tubular element **56**, and the parts related thereto, downwardly relative to the tube structure **47** of the fuse cartridge **46** and the lower section of the ruptured fuse link is pulled downwardly out of the open lower end of said tube structure as the toggle member swings about its pivot, the downwardly moved parts referred to serving as a signal which indicates to a lineman on the ground that the fuse link of the cutout is ruptured and that the circuit is out of service. It is important to note that the arcuate, channel-shaped portion **62***a* of the toggle member **62** causes the lower portion of the ruptured fuse link to be pulled downwardly in such manner that said fuse link portion does not drag against the lower edge of the inner tube **47***a* of the tube structure **46**, said arcuate portion holding said fuse link portion away from said lower edge of said inner tube. Also, it is to be noted that the cam-shaped parts **69** of the arm **68**, which contact with edge portions of the opposed side portions **39***a* of the spring-loaded member **39**, serve to accelerate rearward movement of the arm **68** and hold said arm in its rearward position after rupture of the fuse link, as is shown in Fig. 10. The keyhole-shaped slot **66** in the extension **65** is adapted to receive a portion of a switch stick when the combined door and fuse cartridge is being applied to or removed from the housing **1**.

Attention is directed to the fact that when rupture of a fuse link subjects the door **2** of the cutout **A** to a heavy, upwardly-directed shock as is frequently the case, the slots of the hinge plates **75** which receive the hinge pins **76** are so shaped that the door may move upwardly, upward movement of the door being limited by contact of the hinge pins **76** with the shoulders **75***c* of the hinge plates **75** (Fig. 1). In this manner the shock will be absorbed without the door or the housing being subjected to damage resulting from the shock.

I claim:

1. A fuse cutout comprising a housing, a door for said housing movably supported thereby, a fuse cartridge rigidly supported by said door and having latch elements extended from a portion thereof, a fuse link extended through said fuse cartridge, means within said housing for latching said door in its closed position, said latching means comprising a pair of pivotally supported forwardly extended and independently movable contact elements which engage said latch elements of said fuse cartridge, said pivoted elements being formed of rigid material, and spring means for urging the forward portions of said contact elements downwardly, means supported for sliding movement by a portion of said fuse cartridge in response to force exerted thereagainst by a spring associated with said slidably supported means, and releasable means held in restraint by said fuse link for preventing movement of said slidably supported means in response to force exerted thereagainst by said spring, said releasable means being adapted on rupture of said fuse link to permit said slidably supported means to move downwardly so as to withdraw a portion of the ruptured fuse link from said fuse cartridge.

2. A fuse cutout comprising a housing, a door for said housing movably supported thereby, a fuse cartridge rigidly supported by said door and having latch elements extended from a portion thereof, a fuse link extended through said fuse cartridge, means within said housing for latching

said door in its closed position, said latching means comprising a pair of pivotally supported forwardly extended and independently movable contact elements which engage said latch elements of said fuse cartridge, said pivoted elements being formed of rigid material, and torsional spring means for urging the forward portions of said contact elements downwardly, means supported for sliding movement by a portion of said fuse cartridge in response to force exerted thereagainst by a spring associated with said slidably supported means, and releasable means held in restraint by said fuse link for preventing movement of said slidably supported means in response to force exerted thereagainst by said spring, said releasable means being adapted on rupture of said fuse link to permit said slidably supported means to move downwardly so as to withdraw a portion of the ruptured fuse link from said fuse cartridge.

3. A fuse cutout comprising a housing, a door for said housing movably supported thereby, a fuse cartridge rigidly supported by said door and having latch elements extended from a portion thereof, a fuse link extended through said fuse cartridge, means within said housing for latching said door in its closed position, said latching means comprising a pair of pivotally supported forwardly extended and independently movable contact elements which engage said latch elements of said fuse cartridge, said pivoted elements being formed of rigid material, and torsional spring means common to both of said contact elements for urigng the forward portions of said contact elements downwardly, means supported for sliding movement by a portion of said fuse cartridge in response to force exerted thereagainst by a spring associated with said slidably supported means, and releasable means held in restraint by said fuse link for preventing movement of said slidably supported means in response to force exerted thereagainst by said spring, said releasable means being adapted on rupture of said fuse link to permit said slidably supported means to move downwardly so as to withdraw a portion of the ruptured fuse link from said fuse cartridge.

4. A fuse cutout comprising a housing, a door for said housing movably supported thereby, a fuse cartridge rigidly supported by said door, a fuse link extended through said fuse cartridge, means within said housing for latching said door in its closed position, means supported for sliding movement by a lower portion of said fuse cartridge in response to force exerted thereagainst by a spring associated with said slidably supported means, and releasable means held in restraint by said fuse link for preventing movement of said slidably supported means in response to force exerted by said spring, said releasable means comprising a toggle member pivotally supported by said slidably supported means, an arm pivotally supported by a portion of said fuse cartridge, and a spring loaded pivotally supported member which engages opposed cam-shaped portions of said arm and tends to rotate said arm about its pivot, said releasable means being adapted on rupture of said fuse link to permit said slidably supported means to move downwardly so as to withdraw a portion of the ruptured fuse link from said fuse cartridge.

5. A fuse cutout comprising a housing, a door for said housing movably supported thereby, a fuse cartridge rigidly supported by said door, a fuse link extended through said fuse cartridge,

means within said housing for latching said door in its closed position, means supported for sliding movement by a lower portion of said fuse cartridge in response to force exerted thereagainst by a spring associated with said slidably supported means, and releasable means held in restraint by said fuse link for preventing movement of said slidably supported means in response to force exerted by said spring, said releasable means comprising a toggle member pivotally supported by said slidably supported means, an arm pivotally supported by a portion of said fuse cartridge, and a spring loaded pivotally supported U-shaped member which engages opposed cam-shaped portions of said arm and tends to rotate said arm about its pivot, said releasable means being adapted on rupture of said fuse link to permit said slidably supported means to move downwardly so as to withdraw a portion of the ruptured fuse link from said fuse cartridge.

6. A fuse cutout comprising a housing, a door for said housing movably supported thereby, a fuse cartridge rigidly supported by said door, a fuse link extended through said fuse cartridge, means within said housing for latching said door in its closed position, means supported for sliding movement by a lower portion of said fuse cartridge in response to force exerted thereagainst by a spring associated with said slidably

supported means, and releasable means held in restraint by said fuse link for preventing movement of said slidably supported means in response to force exerted by said spring, said releasable means comprising a toggle member pivotally supported by said slidably supported means, an arm pivotally supported by a portion of said fuse cartridge, a spring loaded pivotally supported U-shaped member which engages opposed cam-shaped portions of said arm and tends to rotate said arm about its pivot, and a terminal by which said spring loaded member is supported, said releasable means being adapted on rupture of said fuse link to permit said slidably supported means to move downwardly so as to withdraw a portion of the ruptured fuse link from said fuse cartridge.

KENNETH O. HANKS, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,077,207	Birkenmaier	Apr. 13, 1937
2,176,227	Schultz et al.	Oct. 17, 1939
2,203,330	Goldner	June 4, 1940
2,246,807	McCluskey et al.	June 24, 1941
2,563,558	Schultheiss	Aug. 7, 1951