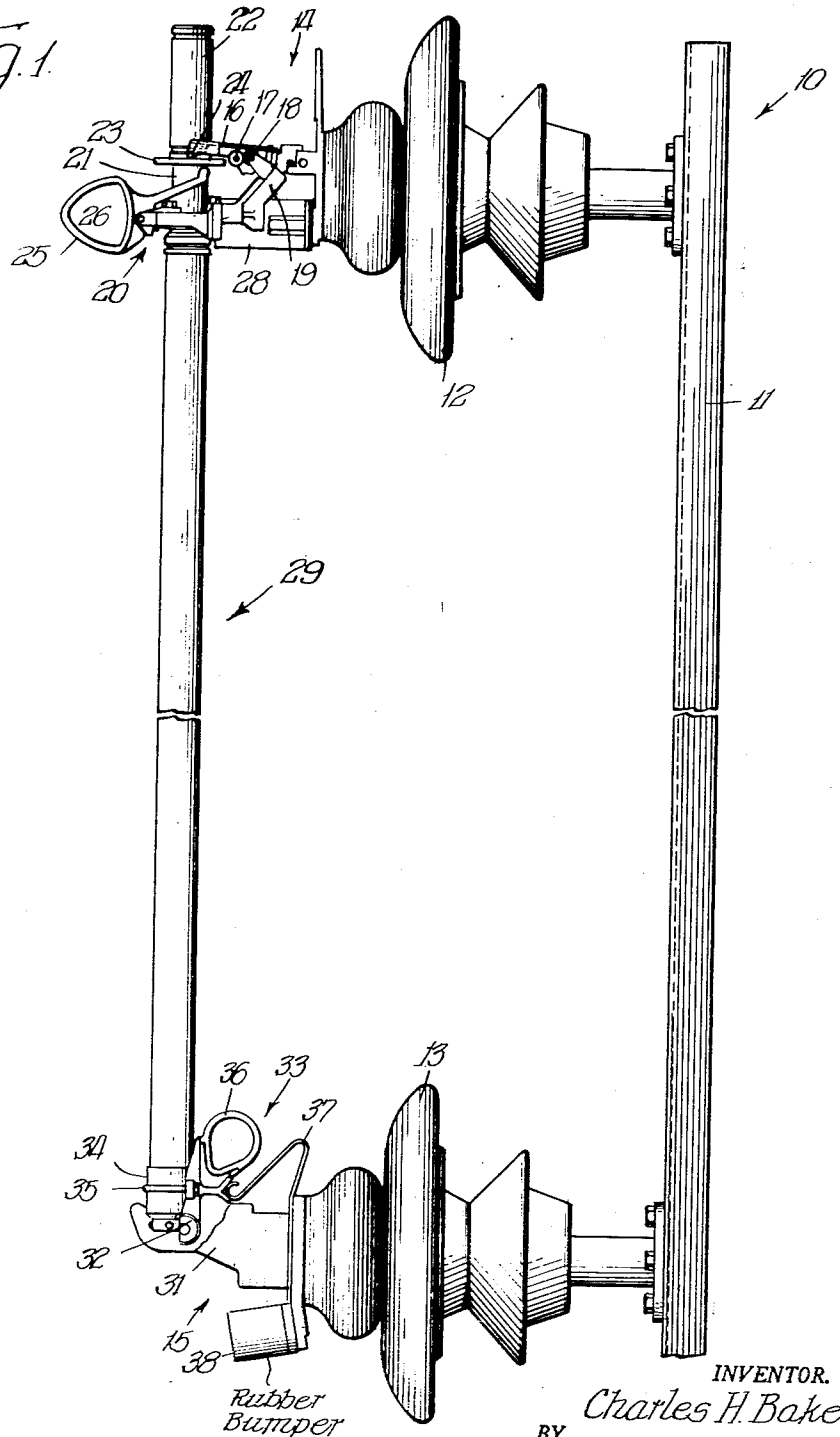
Sept. 8, 1953 C. H. BAKER 2,651,695

CIRCUIT INTERRUPTER

Filed May 22, 1950 4 Sheets-Sheet 1

Fig. 1.



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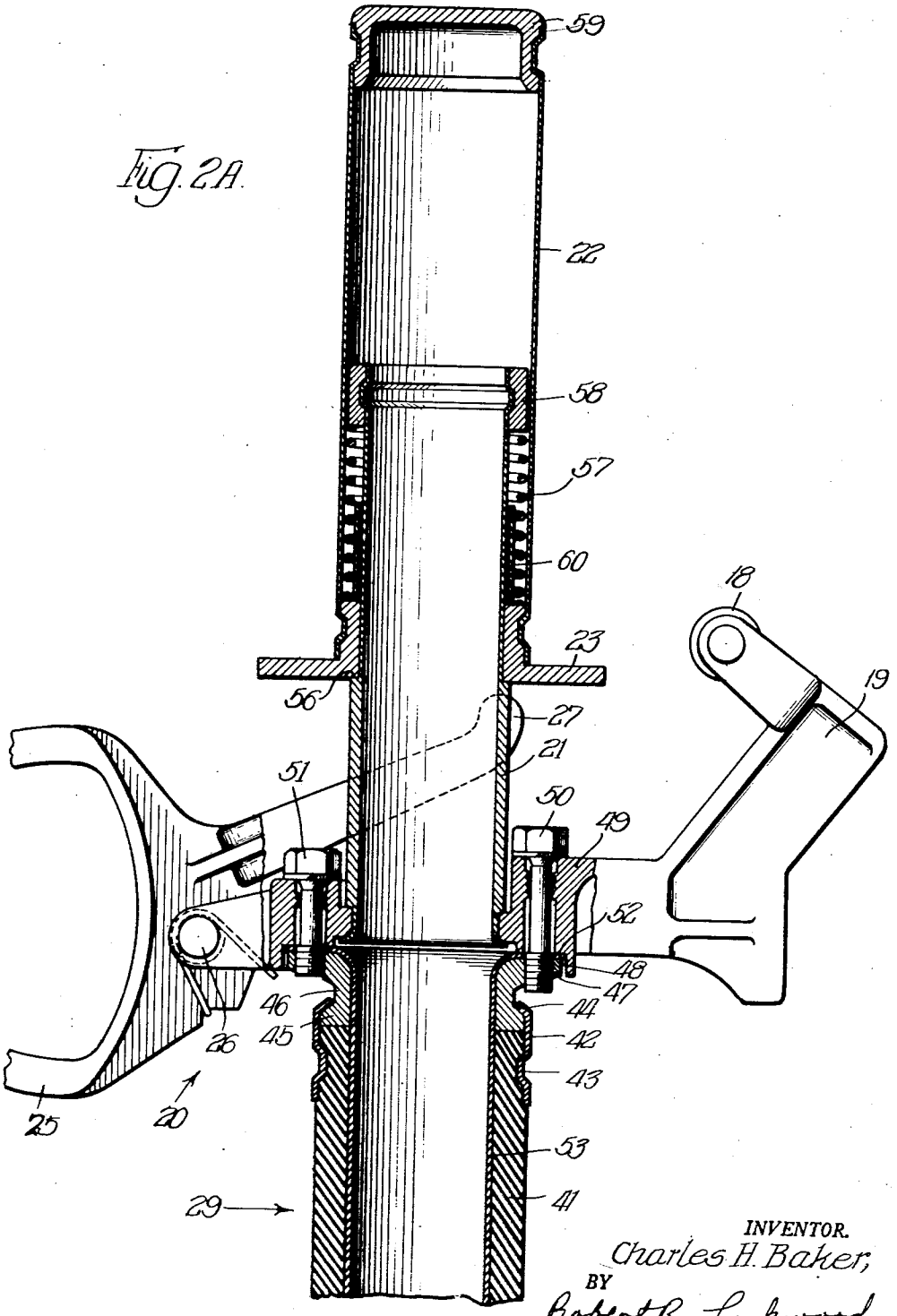
CIRCUIT INTERRUPTER

2,651,695

Filed May 22, 1950

4 Sheets-Sheet 2

Fig. 2A.



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CIRCUIT INTERRUPTER

Filed May 22, 1950 4 Sheets-Sheet 3

Fig. 2B.

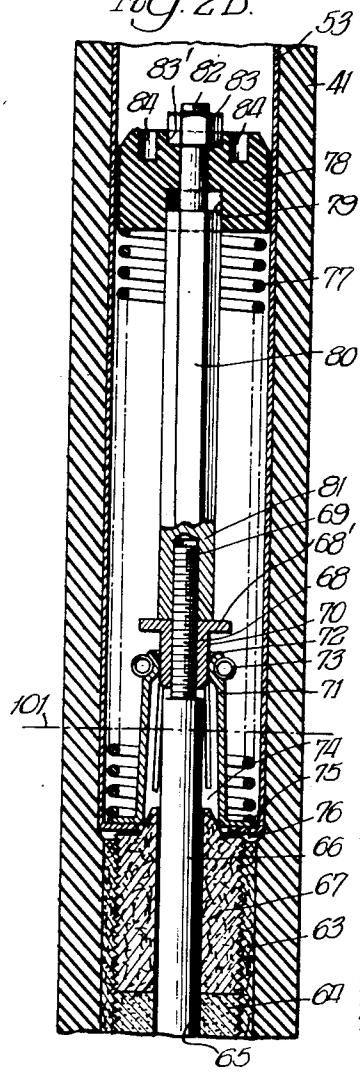


Fig. 3.

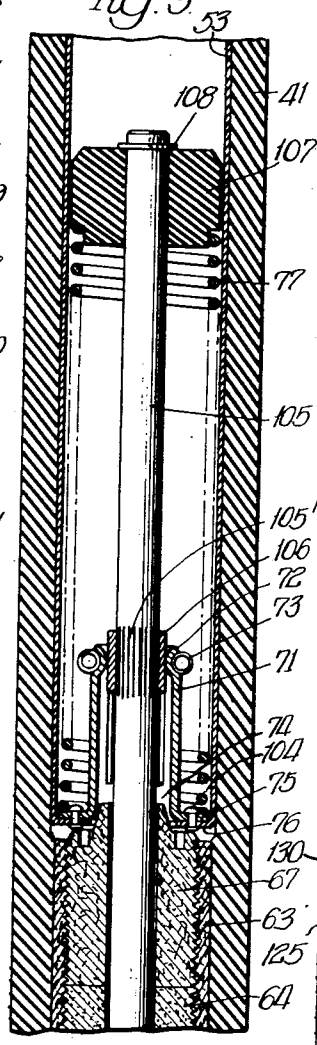


Fig. 5.

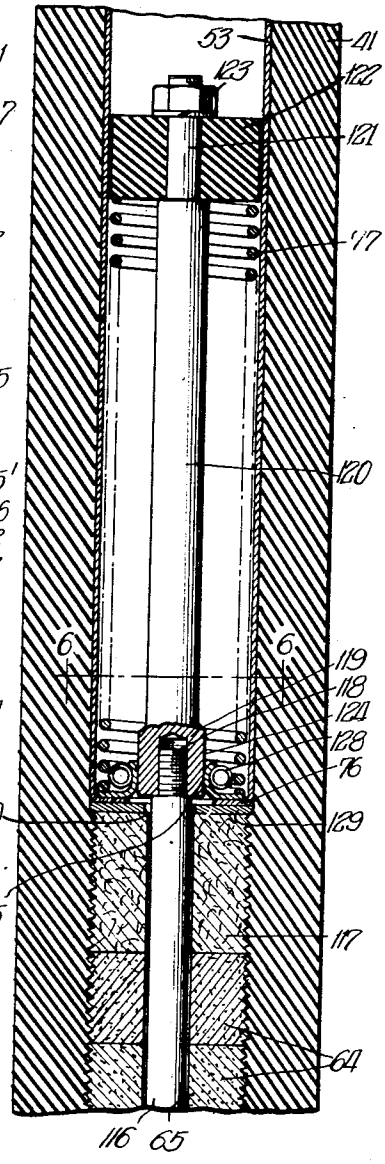
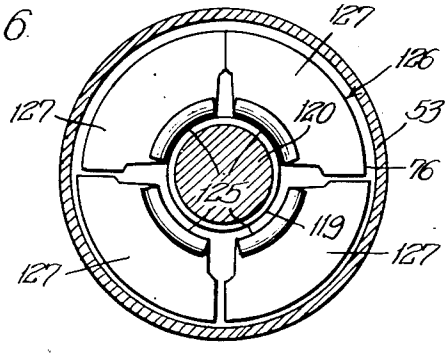


Fig. 6.



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CIRCUIT INTERRUPTER

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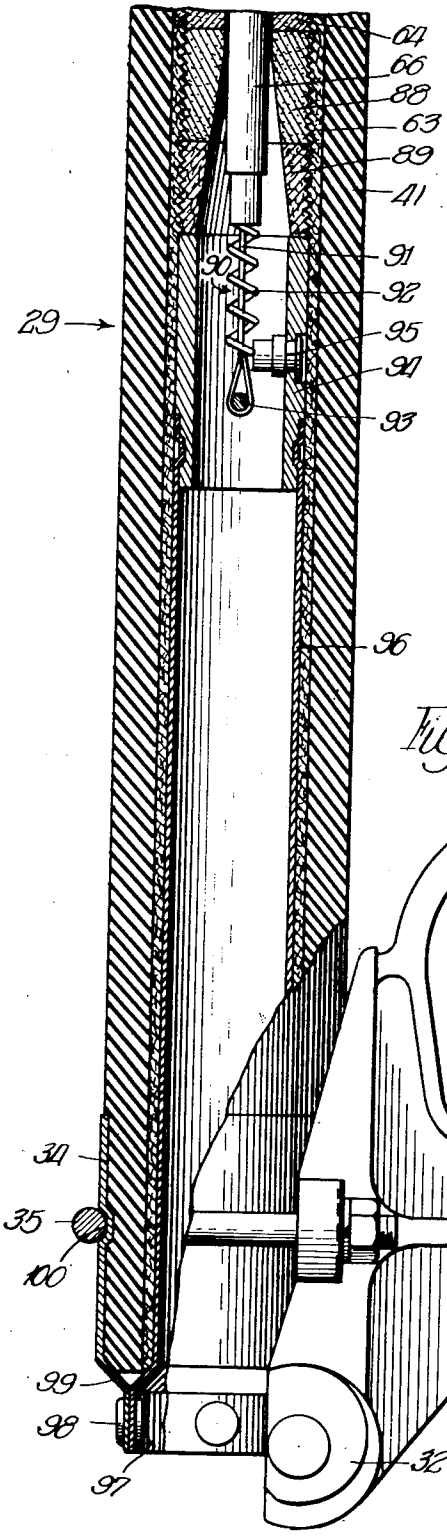
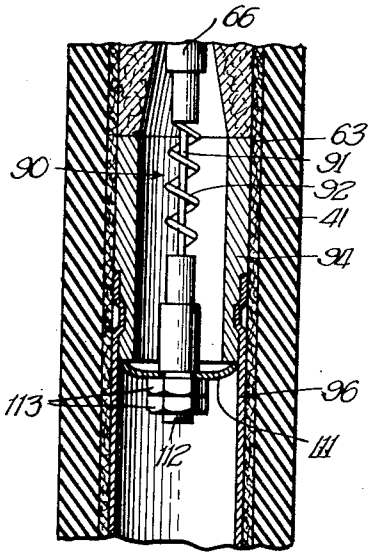


Fig. 2C.

Fig. 4.



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2,651,695

UNITED STATES PATENT OFFICE

2,651,695

CIRCUIT INTERRUPTER

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Application May 22, 1950, Serial No. 163,511

16 Claims. (Cl. 200—114)

1

This invention relates, generally, to circuit interrupters and it has particular relation to dropout fuses.

Among the objects of this invention are: To provide a simple and economical dropout fuse construction of the solid material type; to construct the unlatching mechanism of a dropout fuse in such manner that a coil compression spring therein is not distorted when the device is automatically unlatched on blowing of the fuse; to secure a detachable hinge fitting to the lower ferrule of a dropout fuse tube by a U-bolt; to secure a detachable latch terminal fitting to a radial flange at the upper end of the dropout fuse tube; to utilize both ends of the power spring to perform useful functions; to maintain contact engagement between contact fingers within the fuse tube arranged to engage a movable rod-like terminal and a conducting tube therein by means of the spring that retracts the rod-like terminal when the fuse blows; to insulate the spring from the rod-like terminal so that no current flows therethrough; to maintain a fixed air gap between the conducting tube and the movable rod-like terminal while the latter is being withdrawn; to provide for assembling the aforesaid internal mechanism in a fuse tube; and to provide for connecting fusible means to the upper end of a conducting tube which is located at the lower end of the fuse tube.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

The invention is disclosed in the embodiment thereof as shown in the accompanying drawings and it comprises features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and the scope of this invention reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

Fig. 1 is a view, in side elevation, of a dropout fuse construction in which the present invention is embodied, certain parts being broken away and other parts being shown in section in order to illustrate more clearly the details of construction;

Figs. 2A–2B–2C placed one above the other show at an enlarged scale a longitudinal section of the fuse construction shown in Fig. 1, certain parts being shown in elevation;

Fig. 3 is a view, similar to Fig. 2B, and showing a modified construction;

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Fig. 4 is a view, which shows a modified form of anchorage for the fusible means which can be substituted for that illustrated in Fig. 2C and which may be used in conjunction with the modification illustrated in Fig. 3;

Fig. 5 is a view, similar to Fig. 2B, and showing a still further modification; and

Fig. 6 is a detailed sectional view taken generally along the lines 6—6 of Fig. 5 and showing at an enlarged scale a modified form of contact construction.

The construction of the fuse tube and operating mechanism is somewhat similar to that disclosed in the copending application of Lindell and Baker, Serial No. 663,832, filed April 22, 1946, now abandoned, and assigned to the assignee of this application. Certain of the dropout features disclosed in the co-pending application of Lindell, Serial No. 663,834, filed April 22, 1946, now U. S. Patent No. 2,599,186, dated June 3, 1952, and assigned to the assignee of this application are employed. The features of the contact construction and mounting therefor shown in the co-pending application of Lindell, Serial No. 57,346, filed October 29, 1948, now U. S. Patent No. 2,578,255, dated December 11, 1951, and assigned to the assignee of this application also are used in conjunction with the present invention.

Referring now particularly to Fig. 1 of the drawings it will be observed that the reference character 10 designates, generally, a dropout fuse construction which is intended for use on circuits energized at a voltage of 69 k. v. This voltage is mentioned for illustrative purposes since the present invention can be adapted for use on systems operating at higher or lower voltages. The dropout fuse construction 10 is mounted on a channel base 11 which carries upper and lower insulator stacks 12 and 13 near its ends. A latch terminal construction, shown generally at 14, is carried by the upper insulator stack 12 while a hinge terminal construction, shown generally at 15, is carried by the lower insulator stack 13. The latch and hinge terminal constructions 14 and 15 preferably are constructed as disclosed in the aforesaid co-pending U. S. Patent No. 2,578,255 so that the fuse tube described hereinafter can be employed in conjunction therewith in lieu of the fuse tube disclosed in this co-pending application.

The latch terminal construction 14 includes a pivotally mounted latch 16 which carries a roller 17. The roller 17 is arranged to cooperate with a roller 18 that is carried by a latch arm 19 for the purpose of holding the fuse tube in opera-

tive position. The latch arm 19 constitutes a part of a detachable latch terminal fitting that is shown, generally, at 20. Extending upwardly from the fitting 20 is a guide tube 21 on which is telescoped an unlatching tube 22. This construction is illustrated in more detail in Fig. 2A. The tube 22 has an outwardly extending radial flange 23 at its lower end which is arranged to engage the bifurcated forward end 24 of the latch 16 for raising the roller 17 out of the path of the roller 18 to permit the fuse tube to swing to the open circuit position. As will be described hereinafter, this action takes place when the tube 22 is moved upwardly on blowing of the fusible element and after the current flow has been interrupted. At the forward end of the fitting 20 an eye 25 is rockably mounted at 26 and a pair of arms 27 extend therefrom underneath the flange 23. The purpose of this construction is to provide for receiving the prong of a live line tool for swinging the fuse tube to the closed position or for manually unlatching it if desired. A contact member 28, forming a part of the latch terminal construction 14 is arranged to have contact engagement with the fitting 20 for conducting current thereto. Preferably the contact member 28 is constructed as disclosed in the co-pending U. S. Patent No. 2,578,255.

The detachable latch terminal fitting 20 and parts carried thereby are mounted on the upper end of a fuse tube that is indicated, generally, at 29. Except as described herein, the fuse tube 29 preferably is constructed as disclosed in the co-pending application of Lindell and Baker, Serial No. 663,832, now abandoned. However, other constructions can be employed if desired without departing from the scope of the present invention.

At its lower end the fuse tube 29 is rockably mounted on a hinge member 31 which forms a part of the hinge terminal construction 15. For this purpose trunnions 32 project from opposite sides of a detachable hinge fitting that is indicated, generally, at 33. The detachable hinge fitting 33 has an arcuate seat portion for receiving a cylindrical lower ferrule 34 to which it is clamped by means of a U-bolt 35. Suitable dowel pin means are provided for insuring proper alignment of the hinge fitting 33 on the ferrule 34 with the fitting 20 at the upper end of the fuse tube 29. The hinge fitting 33 includes an eye 36 for receiving the prong of a live line tool to permit handling of the fuse tube 29. A contact member 37, preferably constructed as disclosed in the aforesaid co-pending U. S. Patent No. 2,578,255, provides contact engagement with the hinge fitting 33. Also included with the hinge member 31 is a rubber bumper 38 for partly absorbing the shock incident to the stopping of the fuse tube 29 when it swings downwardly.

Referring now particularly to Fig. 2A, it will be observed that the fuse tube 29 comprises a tube 41 of insulating material, preferably a phenolic condensation product. At its upper end the tube 41 has an upper metallic ferrule 42 which is secured in position by having its intermediate portion 43 rolled into a suitable annular groove in periphery with the upper end of the tube 41. The upper end 44 is spun over a flange 45 which forms a part of an upper terminal ring 46. The ring 46 has a radial flange 47 at its upper end that projects into a recess 48 on the underside of the central portion 49 of the detachable latch terminal fitting 20. Bolts 50 and 51, extending parallel to the longitudinal axis of the fuse tube 29, project through the central portion 49 into threaded engagement with the radial flange 47. This construction permits the fitting 20 and parts attached thereto to be reused with another fuse tube 29 once the fuse has blown or it is desired to use another fuse tube for some reason. The bolts 50 and 51 also serve to clamp a flange 52 between the central portion 49 and the upper surface of flange 47 and provide alignment of the fitting 20 with the hinge fitting 33 and axial alignment with the fuse tube 29. The flange 52 constitutes an integral extension of a conducting tube 53 which extends downwardly into the tube 41 for the purpose of providing a current conducting path to the mechanism that is illustrated more clearly in Fig. 2B of the drawings.

Still referring to Fig. 2A of the drawings, it will be observed that a shoulder 56 is formed on the guide tube 21 and that the radial flange 23 is held in engagement therewith by a coil compression spring 57. The lower end of the spring 57 bears against an upstanding part of the flange 23, as shown, and its upper end bears against the under side of a collar 58 which is secured to the upper end of the guide tube 21. As described hereinafter, when the fuse blows, a member moves upwardly through the guide tube 21 and engages a cap 59 which is carried at the upper end of the unlatching tube 22. This lifts the flange 23 for raising the latch 16 in a manner previously described. It is desirable to prevent the spring 57 from being distorted which might be the case when the unlatching tube 22 is moved upwardly under considerable force. Unless means are provided for preventing such distortion, the spring 57 may go solid and may be permanently distorted so that it would not be reusable. For this purpose a stop sleeve 60 is located in the space between the telescoped tubes 21 and 22. The length of the stop sleeve 60 is such that the tubes 21 and 22 cannot be moved far enough apart to permit the spring 57 to go solid.

Referring now to the portion of the construction illustrated in Fig. 2B, it will be observed that the tube 41 is provided with a liner 63 for reinforcing the same. Preferably the liner 63 is formed of fiber. Within the liner 63 cakes 64 of arc extinguishing material, such as boric acid, are inserted, preferably as disclosed in the co-pending application of Lindell and Baker, Serial No. 663,832, now abandoned. The cakes 64 of arc extinguishing material are apertured to provide a longitudinally extending bore 65 through which a rod-like terminal 66 is longitudinally movable. At the upper end of the liner 63 a reinforcing ring 67 is located. Preferably it is formed of fiber and is threaded into the liner 63. At its upper end the rod-like terminal 66 has a nut 68 on a threaded extension 69. The purpose of this construction will be described presently. The nut 68 has a cylindrical contact surface 70 that is arranged to be engaged by contact fingers 71. The diameter of the cylindrical contact surface 70 is greater than that of the rod-like terminal 66 to permit free movement of the latter past the contact fingers 71. The upper ends 72 of the contact fingers 71 are curved to provide a convex contact surface for engaging the cylindrical contact surface 70 on the nut 69 while the other side is concave for receiving a garter spring 73 which urges the upper ends of the contact fingers 71

into good contact engagement with the contact surface 70. The contact fingers 71 are formed in a tubular member of good conducting material which has resilient characteristics. The contact fingers 71 extend upwardly from a cylindrical base portion 74 which has an outstanding radial flange 75 that overlies and is in contact engagement with the upper surface of a radially inwardly extending flange 76 formed integrally with the conducting tube 53 at its lower end.

The flange 75 is loosely mounted on the flange 76 and they are held in good contact engagement by means of a coil compression spring 77 which also acts to move the rod-like terminal 66 upwardly when the fuse blows. At its lower end the spring 77 reacts against the upper side of the flange 75 and at its upper end it bears against the under side of an insulating washer or head member 78. Preferably the washer 78 is formed of good insulating material such as a phenolic condensation product. It is provided to prevent any current flowing through the spring 77 which, particularly under short circuit conditions, might be sufficient to anneal the convolutions thereof and prevent it from biasing the rod-like terminal 66 in the manner described. The insulating washer 78 has a hexagonal opening 79 in its under side for telescoping with the upper end of a hexagonally shaped arcing rod extension 80. The lower end 81 of the arcing rod extension 80 is threaded on the extension 69 and locked against the upper side of a hexagonal head or flange 68' which is formed integrally with the nut 68. At its upper end the arcing rod extension 80 has a threaded shank 82 on which a hexagonal nut 83 can be threaded for holding the insulating washer 78 in position. The nut 83 interfits with a hexagonal opening 83' in the upper side of the washer 78 to prevent relative turning. Openings 84 are provided in the upper surface of the insulating washer 78 for receiving a spanner wrench. The manner in which the mechanism within the tube 41 is assembled will be described hereinafter.

In Fig. 2C of the drawings the details of construction of the lower end of the fuse tube 29 are illustrated more clearly. It will be observed that the liner 63 extends to the extreme lower end of the tube 41. Below the lowermost cake 64 of arc extinguishing material throat members 88 and 89 are positioned. The member 88 is formed preferably of boric acid and the member 89 of fiber.

At the lower end of the rod-like terminal 66 fusible means, shown generally at 90, are connected. The fusible means 90 includes a strain element 91 and a fusible element 92. Where the fuse is to be employed in a circuit in which the normal current flow is of the order of only a few amperes, then the strain element 91 only need be employed. Where the fuse is intended to conduct higher currents the fusible element 92, which may be formed of silver, also is employed. The strain element 91 is looped over a transverse pin 93 which is carried by a relatively thick walled metallic terminal tube 94. A stud 95 projects radially inwardly from the terminal tube 94 for receiving one end of the fusible element 92 if the same is used.

The terminal tube 94 is located at and carried by the upper end of a conducting tube 96 the purpose of which is described in the co-pending application of Lindell and Baker, Serial No. 663,832, now abandoned. The lower end 97 of the conducting tube 96 is flared outwardly and is secured by rivets 98 to the inwardly flared lower

end 99 of the lower ferrule 34. It will be observed that the ferrule 34 has an annular groove 100 intermediate its ends for securing it to the tube 41 and for locating and centering the U-bolt 35.

The manner in which the fuse tube 29 and parts associated therewith are assembled will now be described. The lower and upper ferrules 34 and 42 are secured to the ends of the tube 41 by a rolling operation. Next the cakes 64 of arc extinguishing material are inserted. Thereafter the reinforcing ring 67 and the throat members 88 and 89 are placed in position.

Prior to assembly with the tube 41 the lower conducting tube 96 is attached to the metallic terminal tube 94.

The transverse pin 93 is inserted in the tube 94 through the loop in the strain wire 91. The stud 95, with one end of the fusible element 92 attached thereto, is riveted in position in the wall of the tube 94. The lower end of the rod-like terminal 66 is secured to the upper ends of the strain wire 91 and the fusible element 92. This complete assembly then is dropped into the tube 41 in the upsidedown position. The lower end 97 of the conducting tube 96 is secured by the rivets 98 to the lower end 99 of the lower ferrule 34.

Outside of the tube 41 the upper terminal ring 46 is assembled with the upper end of the conducting tube 53. This assembly is then inserted in the upper end of the tube 41 and the upper end 44 of the upper ferrule 42 is spun over the flange 45. The contact fingers 71 now are placed in the lower end of the upper conducting tube 53. Then the nut 68 is threaded onto the extension 69 by means of a tubular socket wrench which is large enough to accommodate the hexagonal head 68'. The threads on the nut 68 and extension 69 are free running so that there is no tendency to twist the rod-like terminal 66 while the nut 68 is being turned down. It is undesirable to twist the rod-like terminal 66 in order that any undue stress on the strain element 91 and the fusible element 92 is avoided. Now the hexagonally shaped arcing rod extension 80 is inserted through the tubular wrench which is holding the head 68' of the nut 68. The area of the wrench holding the hexagonal head 68' is such that another socket wrench can be telescoped therewith for the purpose of threading the free running extension 80 onto the threaded extension 69. Initially the nut 68 is screwed down so that its lower end lightly abuts the upper end of the large diameter portion of the rod-like terminal 66. After the arcing rod extension 80 has been threaded into position, where its threaded opening bottoms on the upper end of the extension 69, the nut 68 is backed off until it is locked in engagement with the lower end of the arcing rod extension 80. This is accomplished by holding stationary the wrench which grips the arcing rod extension 80 and rotating the wrench which grips the head 68' of the nut 68.

Now the coil compression spring 77 is inserted so that its lower end engages the upper surface of the flange 75. The spring 77 is compressed by inserting the insulating washer 78 until it is stopped by the upper end of the arcing rod extension 80 with the shank 82 projecting therethrough. A spanner wrench is inserted in the openings 84 to hold the washer 78 stationary while the nut 83 is applied to the threaded end of the shank 82 by a tubular socket wrench. This avoids turning of the rod-like terminal 66 and parts attached thereto. On release of the washer

78, the spring 77 moves it upwardly slightly so that the nut 83 interfits with the hexagonal socket 83'. This completes the assembly of the fuse tube 29. When assembled as described equal forces at the ends of the power spring 77 are applied through the rod-like terminal 66 to the strain element 91 at one end and to the flange 75 of the contact fingers 71 at the other end, thereby providing contact pressure with the flange 76. Now it will be understood that it can be assembled with the latch terminal fitting 26 at the upper end and the hinge fitting 33 at the lower end for mounting in a dropout fuse mounting.

In operation, when the fusible means 90 blows, the rod-like terminal 66 no longer is restrained. Since the pin 93 and the stud 95 are secured to the tube 94, there are no parts which are expellable downwardly. The coil compression spring 77 expands and withdraws the rod-like terminal 66 upwardly to a position where its lower end may be located along the broken line 101 in Fig. 2B. Before the lower end of the rod-like terminal 66 reaches this position the upper end of the shank 82 engages the underside of the cap 59 and moves the unlatching tube 22 upwardly. This moves the radial flange 23 in the same direction and lifts the latch 16. The roller 17 is moved out of the path of the roller 13, whereupon the fuse tube 29 can swing about the hinge member 31 downwardly to provide an air gap in the circuit in addition to the gap which is provided within the fuse tube 29.

As soon as the nut 83 moves upwardly so that its contact surface 79 no longer engages the upper ends 72 of the contact fingers 71, an arc is drawn between the contact fingers 71 and the rod-like terminal 66 unless it so happens that the surface of the rod-like terminal 66 bears against one of the contact fingers 71. As will appear hereinafter provision is made for fixing the length of such an arc so that it is not left as a somewhat indeterminate matter as is the case when the construction illustrated in Fig. 2B is employed.

Referring now particularly to Fig. 3 of the drawings there is illustrated a construction which may be employed in lieu of that illustrated in Figure 2B. If it is desired to fasten the flange 75 at the lower end of the contact fingers 71 to the flange 76 to take care of higher current ratings, this may be accomplished by means of rivets 104, which, as illustrated, extend through the flanges 75 and 76 and hold them securely together. Instead of employing the rod-like terminal 66 with the arcing rod extension 86, a single continuous rod-like terminal 105 is employed. It has a contact sleeve 106 having a press fit with a knurled portion 105' of the rod-like terminal 105 as shown, for engaging the upper ends 72 of the contact fingers 71. The rod-like terminal 105 projects through an insulating washer 107 which holds the spring 77 in compressed condition. A snap ring 108 interfits with the upper end of the rod-like terminal 105 and holds the insulating washer 107 in the position shown.

In Fig. 4 of the drawings there is shown a construction which can be employed for fastening to the lower end of the fusible means in lieu of that illustrated in Fig. 2C. As shown in Fig. 4 a bridge member 111 bears against the lower end of the metallic terminal tube 94. It carries a stud 112 to the upper end of which the lower ends of the strain element 91 and fusible element 92 are secured. Nuts 113 are threaded on the lower end of the stud 112 to secure it in position on the bridge member 111. It will be understood that the alternate construction illustrated in Fig. 4 can be employed in conjunction with the alternate construction shown in Fig. 3 or that it can be employed in lieu of the construction illustrated in Fig. 2C in conjunction with the construction illustrated in Fig. 2B.

In Fig. 5 of the drawings an alternate construction is illustrated which may be employed in lieu of those illustrated in Figs. 2B and 3. As there shown, a rod-like terminal 116 is arranged to be moved endwise through the bore 65 formed in the cakes 64 of arc extinguishing material. Also it moves through a reinforcing ring 117. At its upper end the rod-like terminal 116 has a threaded extension 118 which is screwed into the lower enlarged end 119 of an arcing rod extension 120. At its upper end the arcing rod extension 120 has a threaded shank 121 which projects through an insulating washer 122 against which the upper end of the coil compression spring 77 reacts. A nut 123 is threaded on the shank 121 for securing the washer 122 in position. The lower end 119 of the arcing rod extension 120 has a cylindrical contact surface 124 that is arranged to have contact engagement with annularly curved portions 125 of generally sector shaped contact members 126 shown more clearly in Fig. 6 of the drawings. The contact members 126, four in number, have flange portions 127 which slide radially over the flange 76 at the lower end of the conducting tube 53. As shown by the upper two contact members 126 in Fig. 6, their radial inward movement is limited by their engaging radial sides to provide ample clearance for the rod-like terminal 116. A garter spring 128, surrounding the annularly curved portions 125, acts to bias the inner surfaces thereof into good contact engagement with the cylindrical contact surface 124. As described hereinbefore in connection with Fig. 2B, the spring 77 provides contact pressure between the flange portions 127 and the flange 76.

It is desirable, as pointed out previously, to provide a fixed gap for the arc which is formed when the rod-like terminal, such as the terminal 116, moves out of engagement with the contact members, such as the annularly curved portions 125 of the contact members 126. For this purpose a metallic washer 129 is positioned on the upper end of the reinforcing ring 117 underneath the flange 76 and in contact engagement therewith. Now, when the contact surface 124 moves out of engagement with the curved portions 125, a fixed gap 130 will be maintained with the rod-like terminal 116 as it is withdrawn through the bore 65 by the coil compression spring 77.

Since certain further changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In a fuse construction, in combination, a fuse tube, ferrules at the ends of said fuse tube, fusible means within said fuse tube connected to one ferrule, a movable rod-like terminal connected to said fusible means and extending toward the other ferrule, a conducting tube connected at one end to the other ferrule and extending into said fuse tube past said rod-like terminal, a flange extending radially inwardly

from the other end of said conducting tube, contact finger means loosely fitting against said flange and biased into contact engagement with said rod-like terminal, and a coil compression spring reacting between said rod-like terminal and said contact finger means for holding the latter in contact engagement with said flange and retracting the former on blowing of said fusible means.

2. The invention, as set forth in claim 1, wherein the contact finger means comprises a longitudinally slotted sleeve of resilient conducting material with the free ends of the fingers biased inwardly for contact engagement with the rod-like terminal, said sleeve having a radially outwardly extending flange overlying the radially inwardly extending flange of the conducting tube.

3. The invention, as set forth in claim 1, wherein the contact finger means comprises a plurality of sector shaped contact members radially slidable on the inwardly extending flange of the conducting tube each having an annularly curved portion for engaging the rod-like terminal on one side and for receiving a garter spring on the other, and a garter spring surrounding said curved portions and biasing them inwardly.

4. The invention, as set forth in claim 1, wherein the coil compression spring is insulated from the rod-like terminal so that no current flows through said spring while it is withdrawing said rod-like terminal.

5. The invention, as set forth in claim 1, wherein conducting means extend radially inwardly from the flange on the conducting tube into close proximity to the rod-like terminal during its movement to provide an arcing point at a fixed distance therefrom during such movement.

6. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, fusible means within said fuse tube connected at one end to one terminal, a movable rod-like terminal connected at one end to the other end of said fusible means and having a threaded extension on its other end and extending toward the other terminal, a conducting tube connected at one end to said other terminal and extending into said fuse tube past said threaded extension, a nut threaded on said extension having a wrench receiving flange at one end and a body portion providing a cylindrical contact surface, contact means slidably interconnecting said contact surface and the other end of said conducting tube, an arcing rod extension threaded at one end onto said extension into locked engagement with said nut, a head at the other end of said arcing rod extension, and a coil compression spring reacting between said head and said other end of said conducting tube and biasing said rod-like terminal for movement on blowing of said fusible means.

7. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, a thin walled conducting tube connected at one end to one of said terminals and extending therefrom into said fuse tube, a relatively thick walled and short metallic terminal tube telescoped within and secured to the other end of said conducting tube, fusible means connected at one end to said metallic terminal tube, a movable rod-like terminal connected at one end to the other end of said fusible means, conducting means interconnecting the other end of said rod-like terminal to the other terminal, and spring means

biasing said rod-like terminal toward said other terminal.

8. The invention, as set forth in claim 7, wherein the fusible means comprises a strain wire and the same is connected to a pin extending transversely of the metallic arcing tube.

9. The invention, as set forth in claim 7, wherein the fusible means comprises a fusible element and a strain wire, a conducting stud extends radially inwardly from the metallic terminal tube and is connected to said fusible element, and a rod extends transversely of said metallic terminal tube and is connected to said strain wire.

10. The invention, as set forth in claim 7, wherein the fusible means comprises a strain wire, a metallic bridge member bears against the end of the metallic arcing tube within the thin walled conducting tube, and a conducting stud is carried by said bridge member and is secured to said strain wire.

11. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, fusible means within said fuse tube connected to one terminal, a movable rod-like terminal connected at one end to said fusible means and extending toward the other terminal, a conducting tube connected to said other terminal and extending into said fuse tube and connected to the other end of said rod-like terminal, and a fiber liner within said fuse tube extending from said one terminal into said fuse tube and juxtaposed to the inner end of said conducting tube.

12. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, one of said terminals comprising a ferrule surrounding one end of said fuse tube and projecting therebeyond, the projecting portion of said ferrule having one portion extending inwardly to overlie said end of said fuse tube and another portion of cylindrical shape having a diameter less than the outer diameter of said end of said fuse tube, a conducting tube extending into said one end of said fuse tube for a distance several times its diameter and having its outer end secured to said cylindrical portion of said ferrule, fusible means within said fuse tube connected to the inner end of said conducting tube, and a movable rod-like terminal connected to said fusible means at one end and extending toward and connected to the other terminal.

13. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, one of said terminals comprising a ferrule surrounding one end of said fuse tube and projecting therebeyond, the projecting portion of said ferrule being offset inwardly to provide a cylindrical outer end portion having a diameter intermediate the inner and outer diameters of said fuse tube, a conducting tube extending into said one end of said fuse tube for a distance several times its diameter and having its outer end offset outwardly and secured to said cylindrical portion of said ferrule, fusible means within said fuse tube connected to the inner end of said conducting tube, and a movable rod-like terminal connected to said fusible means at one end and extending toward and connected to the other terminal.

14. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, fusible means within said fuse tube connected to one terminal, a movable rod-like terminal connected at one end to said fusible means and extending toward the other terminal, a conducting tube connected to said other terminal and ex-

tending into said fuse tube and connected to the other end of said rod-like terminal, an extension from said other end of said rod-like terminal, an insulating head at the outer end of said extension, and a coil compression spring within said fuse tube reacting against said insulating head to tension said fusible means and withdraw said rod-like terminal when said fusible means blows.

15. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, fusible means within said fuse tube connected to one terminal, a movable rod-like terminal connected at one end to said fusible means and extending toward the other terminal, a conducting tube connected to said other terminal and extending into said fuse tube coextensive with a portion of said rod-like terminal, separable contact means interconnecting the inner end of said conducting tube and said rod-like terminal between which an arc may be drawn on operation of the fuse, an insulating head on the other end of said rod-like terminal, and a coil compression spring reacting between said insulating head and the inner end of said conducting tube to tension said fusible means and withdraw said rod-like terminal when said fusible means blows, said insulating head preventing the transfer of said arc to said other end of said rod-like terminal.

16. In a fuse construction, in combination, a fuse tube, terminals at the ends of said fuse tube, fusible means within said fuse tube connected to one terminal, a one-piece movable rod-like terminal connected at one end to said fusible means and extending toward the other terminal, a contact sleeve carried by said rod-like terminal intermediate its ends, a conducting tube connected to said other terminal and extending into said fuse tube in telescoping relation with said rod-like terminal and beyond said contact sleeve carried thereby, a contact assembly connected to the inner end of said conducting tube and engaging said contact sleeve between which an arc may be drawn on operation of the fuse, an insulating head on the other end of said rod-like terminal, and a coil compression spring reacting between said insulating head and the inner end of said conducting tube to tension said fusible means and withdraw said rod-like terminal when said fusible means blows, said insulating head preventing the transfer of said arc to said other end of said rod-like terminal.

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