July 1, 1941. A. RAMSEY 2,247,702

FUSE CONSTRUCTION

Filed Nov. 13, 1939 4 Sheets-Sheet 1

Fig. 1A.

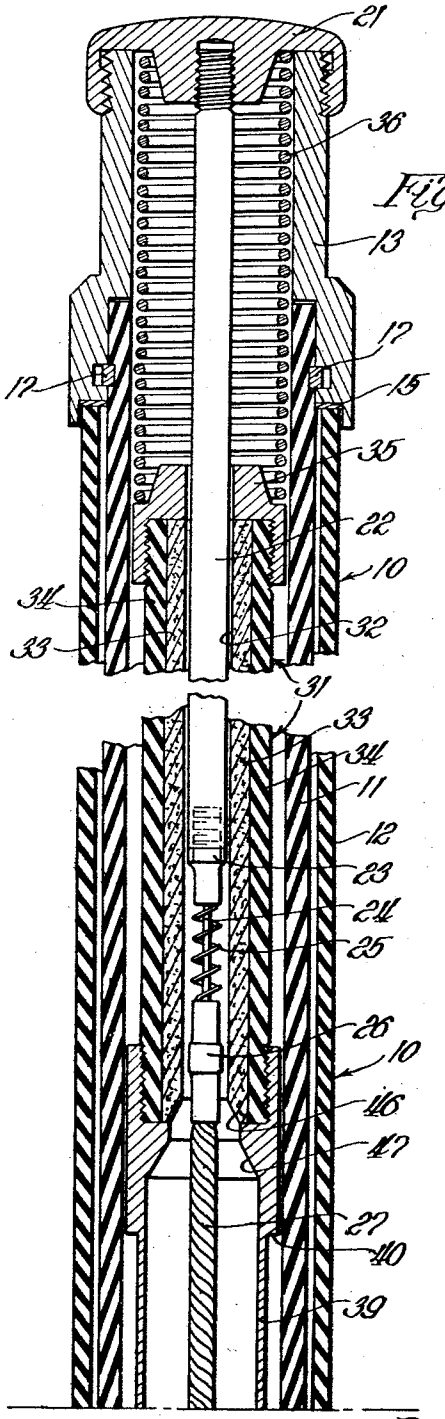


Fig. 1B.

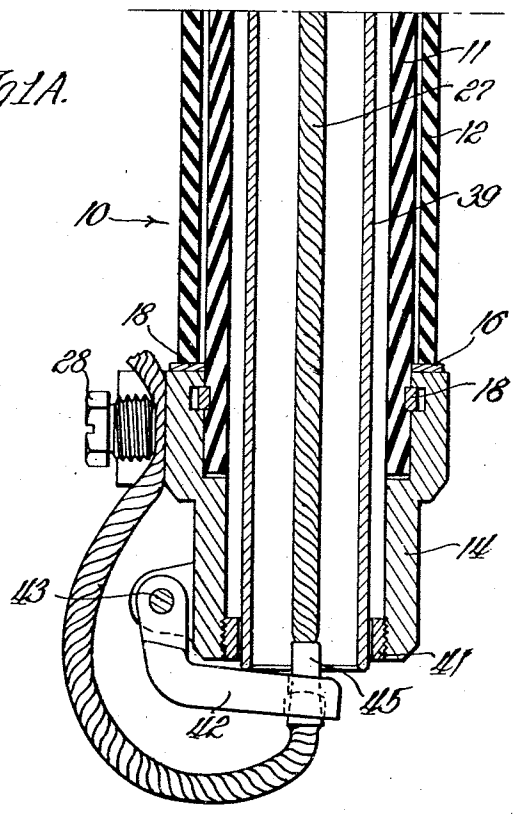
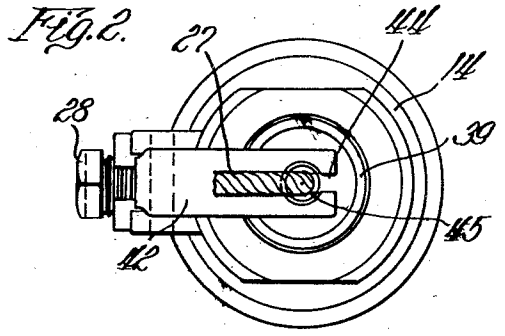


Fig. 2.



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July 1, 1941. A. RAMSEY 2,247,702

FUSE CONSTRUCTION

Filed Nov. 13, 1939 4 Sheets-Sheet 2

Fig. 3A.

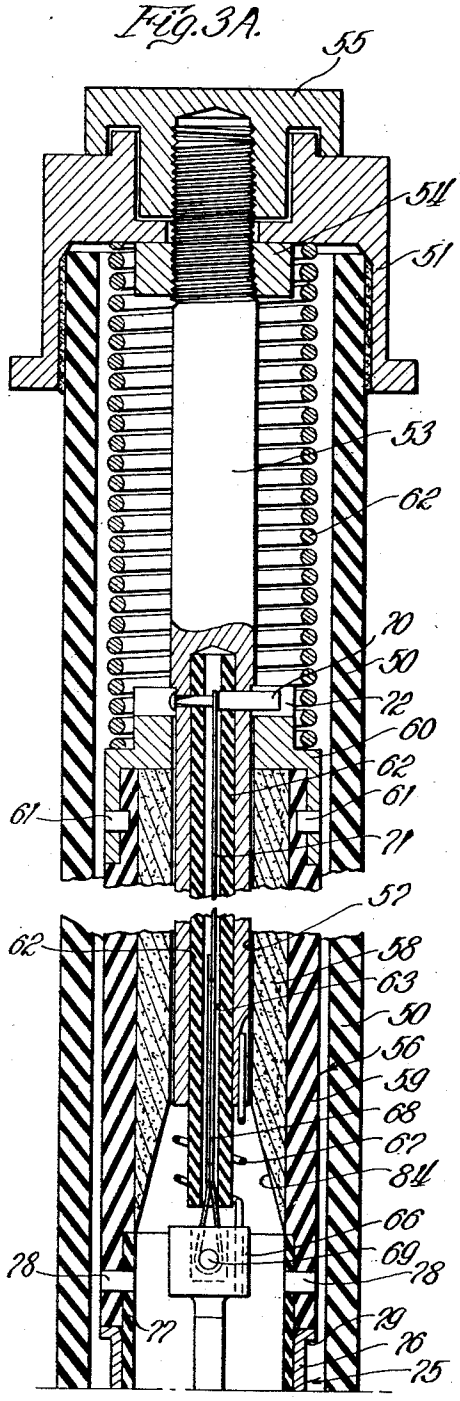
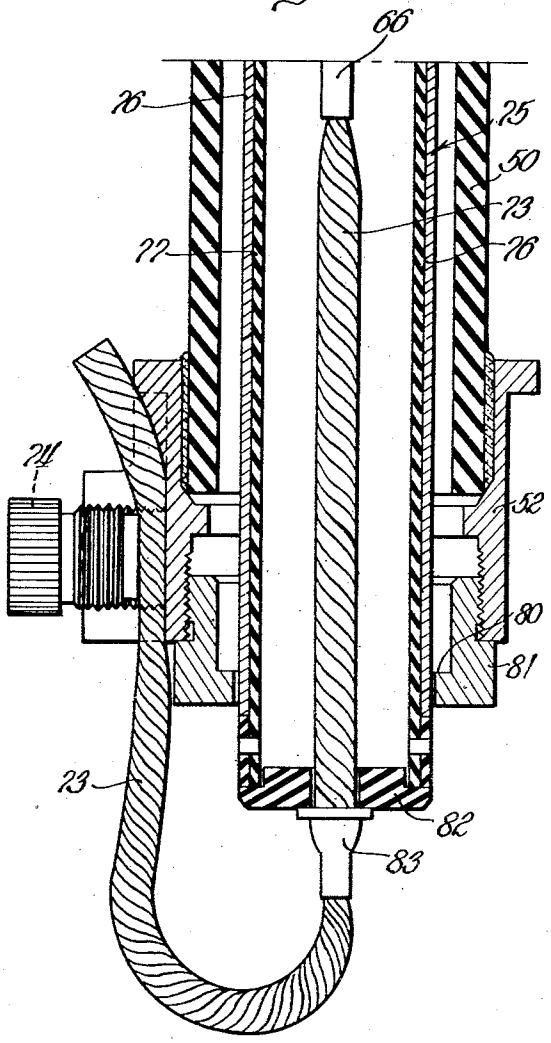


Fig. 3B.



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July 1, 1941. A. RAMSEY 2,247,702

FUSE CONSTRUCTION

Filed Nov. 13, 1939 4 Sheets-Sheet 3

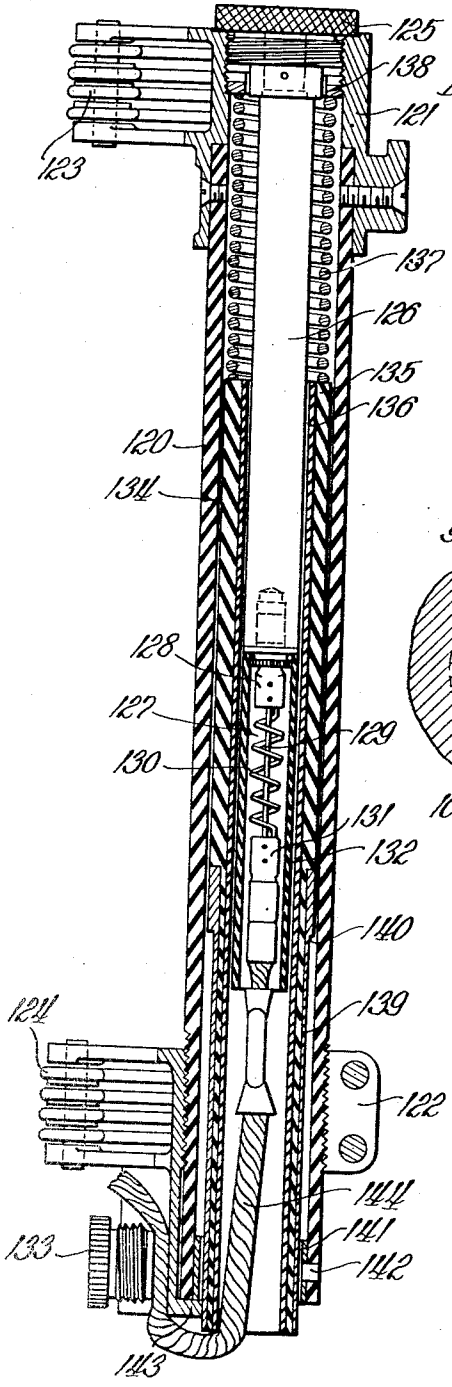

Fig. 6.

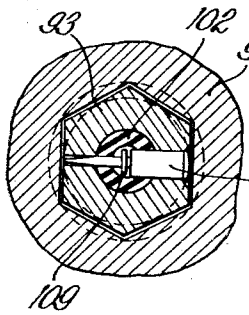

Fig. 5.

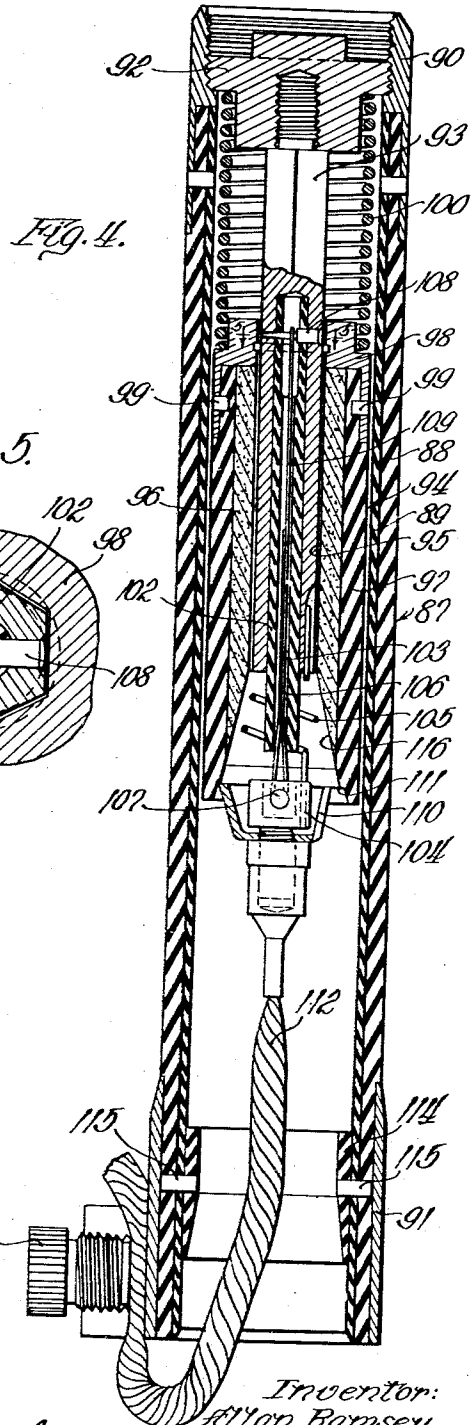

Fig. 4.

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July 1, 1941. A. RAMSEY 2,247,702

FUSE CONSTRUCTION

Filed Nov. 13, 1939 4 Sheets-Sheet 4

Fig. 7.

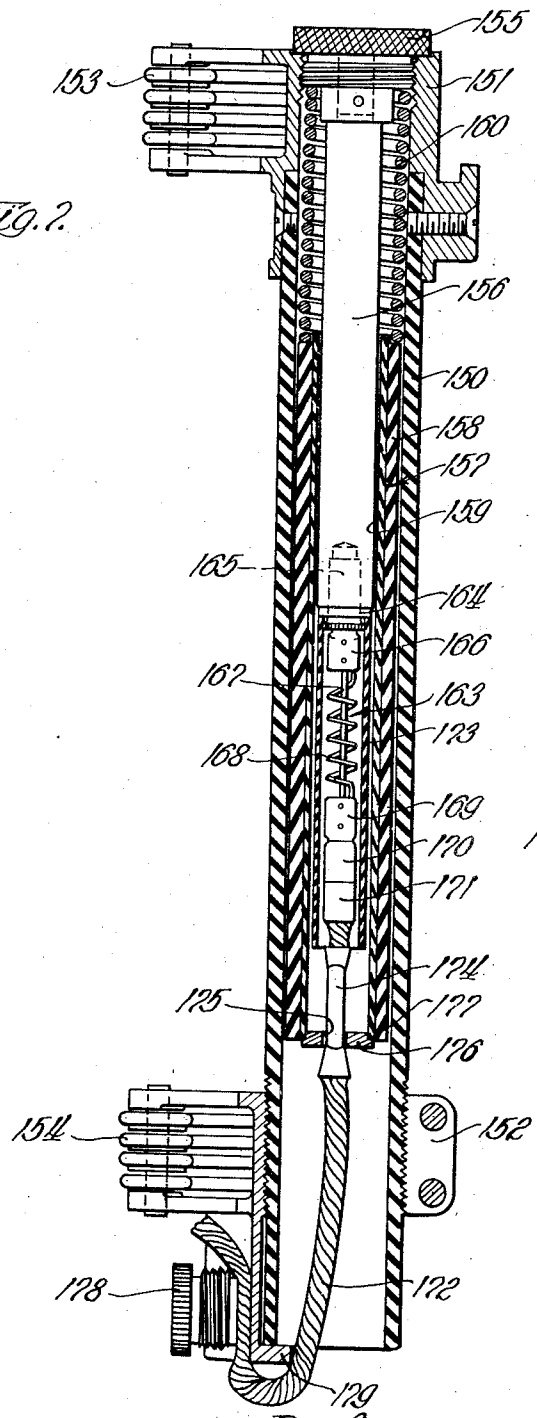
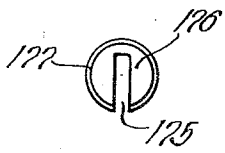


Fig. 8.



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Patented July 1, 1941 2,247,702

UNITED STATES PATENT OFFICE

2,247,702

FUSE CONSTRUCTION

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Application November 13, 1939, Serial No. 304,004

46 Claims. (Cl. 200—117)

This invention relates, generally, to circuit interrupting apparatus and it has particular relation to fuse devices.

An object of the invention is to reduce the pressure that is generated when a high current arc evolves an arc extinguishing medium from an arc extinguishing material.

Another object of the invention is to control the amount of arc extinguishing material that is exposed to the heat of an arc in accordance with the magnitude of the arc.

Still another object of the invention is to control the amount of arc extinguishing material exposed to the heat of an arc inversely in accordance with the magnitude of the arc.

A further object of the invention is to expose a relatively small amount of arc extinguishing material to the heat of a high current arc and a relatively large amount of arc extinguishing material to the heat of a low current arc.

Another object of the invention is to protect the inner surface of a circuit interrupter housing from the heat of the arc that is drawn at the open end of an arcing chamber which moves from one position to another within the housing to assist in extinguishing the arc.

A further object of the invention is to provide main and auxiliary bores in arc extinguishing material in a circuit interrupter of the moving chamber type in which the arc is first drawn in the auxiliary bore and subsequently in the main bore if it is not extinguished in the auxiliary bore.

Still another object of the invention is to restrain the movement of the moving arcing chamber by an arcing terminal which is connected by flexible conductor means to a line terminal.

A still further object of the invention is to provide for moving an arcing chamber within a fuse housing for elongating and extinguishing the arc formed therein.

Another object of the invention is to directly interconnect the arcing terminal which is movable with the arcing chamber and one line terminal of the fuse housing.

Still another object of the invention is to center the arcing terminal with respect to the movable arcing chamber so that when the arcing chamber moves the arc is elongated axially of it and of the fuse housing.

A further object of the invention is to incorporate in a replaceable unit a moving arcing chamber, a compression spring and a conductor including a rod-like section, a fusible section and a flexible conducting section.

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

The invention, accordingly, is disclosed in the embodiments thereof shown in the accompanying drawings, and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the constructions 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 scope of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figures 1A and 1B constitute a longitudinal sectional view showing one embodiment of the invention;

Figure 2 is a bottom plan view of the circuit interrupter shown in Figure 1;

Figures 3A and 3B constitute a longitudinal sectional view of another embodiment of the invention in which main and auxiliary bores are provided in solid arc extinguishing material;

Figure 4 is a longitudinal sectional view of still another embodiment of the invention in which the movable arcing terminal restrains the movable arcing chamber and is directly connected by flexible conductor means to one line terminal;

Figure 5 is a detail sectional view taken along the line 5—5 of Figure 4;

Figure 6 is a longitudinal sectional view of still another embodiment of the invention and showing how it may be arranged for use in an enclosure such as a fuse box or housing;

Figure 7 is a longitudinal sectional view illustrating another embodiment of the invention; and

Figure 8 is a plan view of a detail of construction employed in the construction shown in Figure 7.

Referring now particularly to Figures 1A and 1B of the drawings, it will be observed that the reference character 10 designates, generally, a tubular insulating housing having an inner sleeve 11 and an outer sleeve 12 that are formed of suitable insulating material such as a phenolic condensation product and glass respectively. Line terminals 13 and 14 are provided at the ends of the tubular insulating housing 10 and they are arranged to be mounted in suitable clips from which they can be readily removed. However, it will be understood that any suitable type of connections can be employed and that the terminals 13 and 14 can be so formed as to per-

mit direct connection thereto of line conductors. Suitable gaskets 15 and 16 are provided between the ends of the outer glass sleeve 12 and the adjacent surfaces of the line terminals 13 and 14. Snap rings 17 and 18 interfit with suitable registering grooves in the ends of the inner sleeves 11 and the line terminals 13 and 14 thereof for securely holding the line terminals in fixed spaced relationship.

A cap 21 is threaded upon the upper end of the line terminal 13 and a rod-like terminal 22 projects downwardly therefrom, as shown, into the interior of the tubular insulating housing 10. At its lower end a terminal 23 is threaded into the rod-like terminal 22. The lower end of the terminal 23 is deformed onto one end of strain and fusible elements 24 and 25 which may be formed respectively of high strength nickel chromium alloy and silver. The other ends of the strain and fusible elements 24 and 25 have deformed thereon one end of an arcing terminal 26 the other end of which is deformed onto a flexible conductor 27 which is of sufficient length to extend out of the lower end of the tubular insulating housing 10 and for connection to the lower line terminal 14 by means of a screw 28.

Mounted for longitudinal movement within the tubular insulating housing 10 is an arcing chamber that is shown generally at 31. The arcing chamber 31 has a longitudinally extending bore 32 within which the rod-like terminal 22 is telescoped, as shown. The bore 32 is formed in a mass 33 of solid arc extinguishing material which is capable of evolving an arc extinguishing medium due to the heat of an arc and it may comprise any suitable material such as magnesium borate, magnesium hydroxide, boric acid, etc. The mass 33 of solid arc extinguishing material is contained within a sleeve 34 of suitable insulating material such as fiber and it is threaded at its upper end into a ferrule 35 of metal, such as brass, which is provided with a centrally located aperture through which the rod-like terminal 22 extends.

The arcing chamber 31 is biased for movement within the tubular insulating housing 10 and along the rod-like terminal 22 by a coil compression spring 36. It will be observed that the coil compression spring 36 is interposed between the underside of the cap 21 and the upper side of the ferrule 35.

When an arc is drawn on blowing of the strain and fusible elements 24 and 25, the intense heat thereof is likely to injure the inner surface of the inner sleeve 11 of the tubular insulating housing. With a view to preventing such injury, a tubular arc chute 39 is threaded onto the lower end of the outer sleeve 34 of the tube or arcing chamber 31 and it extends downwardly and slightly out of the lower line terminal 14. Preferably the arc chute 39 is formed of metal. It is provided with a shoulder 40 which is arranged to engage a ring 41 that is threaded into the lower end of the lower line terminal 14 for limiting the movement of the arcing chamber 31 after it has been released for movement on drawing of the arc resulting from the blowing of the strain and fusible elements 24 and 25.

The movable arcing chamber 31 is restrained in the position shown in the drawings against the biasing force of the coil compression spring 36 by means of a lever 42 that is pivoted at 43 on the lower line terminal 14 and engages the lower end of the arc chute 39. The lever 42 is provided with a suitably shaped slotted opening 44, Figure 2, with which a conical fitting 45, deformed on the flexible lead 27, interfits.

On flow of fault current the strain and fusible elements 24 and 25 are blown and an arc is formed between the terminal 23 attached to the lower end of the rod-like terminal 22 and the arcing terminal 26. This arc is transferred from the terminal 26 to the metallic arc chute 39 as soon as the former moves downwardly sufficiently far because the latter is connected to the lower line terminal 14 through the ring 41. The arc then is confined within the metallic arc chute 39 and does not ordinarily follow the terminal 26 as it is swung outwardly at the end of the flexible lead 27.

Since the arcing chamber 31 is no longer restrained it is moved downwardly under the biasing force of the spring 36. At the same time the lever 42 is rotated about its pivot because of the movement of the arc chute 39 relative to the lower line terminal 14 and the arcing terminal 26 is withdrawn at a speed which is somewhat greater than the speed at which the arcing chamber 31 moves downwardly. This assists in rapidly elongating the arc and facilitates its extinction.

As is well understood the heat of the arc thus formed evolves an arc extinguishing medium from the bore 32 in the solid arc extinguishing material 33 which is of such character as to assist in extinguishing the arc. The amount of arc extinguishing medium that is evolved depends upon the magnitude of the arc current and also upon the amount of arc extinguishing material 33 that is exposed to the heat of the arc. On flow of relatively heavy fault current through the arc and on the exposure thereto of a relatively large amount of the arc extinguishing material 33 relatively great pressures are generated which in some cases result in destruction of the circuit interrupter by it being blown to pieces. Therefore, it is desirable to limit the amount of the arc extinguishing material 33 that is subjected to the heat of the arc on flow of relatively high fault current so that these destructive pressures will not be generated. Obviously, it is desirable to have the amount of arc extinguishing material that is subjected to the heat of the arc controlled automatically in accordance with the magnitude of the arc current. It is for this purpose that the lower end of the bore 32 in the solid arc extinguishing material 33 is flared outwardly as indicated at 46 and for this same purpose that the arc chute 39 is provided with a flared out opening as indicated at 47. The flared out portions 46 and 47 provide a reaction area against which the arc extinguishing medium that is evolved by the heat of the arc can react in a direction which obviously is opposite to the direction of the force exerted by the coil compression spring 36. Therefore, the movement of the arcing chamber 31 is controlled conjointly by the biasing force of the spring 36 acting in one direction and by the reaction force of the arc extinguishing medium on the flared portions 46 and 47 acting in the opposite direction. The latter reaction will vary in accordance with the magnitude of the arc which controls the amount of arc extinguishing medium that is evolved. Thus, the amount of arc extinguishing material 33 that is subjected to the heat of the arc will vary inversely with its mag-

nitude and the destructive pressures mentioned hereinbefore will not be generated.

Referring now to Figures 3A and 3B of the drawings, it will be observed that the reference character **50** designates a tubular insulating housing that may be formed of any suitable insulating material, such as glass. Secured by a suitable alloy to the ends of the tubular insulating housing **50** are line terminals **51** and **52**. It will be understood that the line terminals **51** and **52** are arranged to be mounted in fuse clips but that they may be arranged to be directly connected to the line conductors.

A rod-like terminal **53** extends through a suitable aperture in the line terminal **51** into the tubular insulating housing **50**. A nut **54** is threaded, as shown, on to the upper end of the rod-like terminal **53** for engaging the under surface of the line terminal **51** against which it is held by a nut **55** that is threaded on to the upper end of the rod-like terminal **53**.

An arcing chamber, shown generally at **56**, is movably mounted within the tubular insulating housing **50** and it has a longitudinally extending main bore **57** which is telescoped with the rod-like terminal **53**. The main bore **57** is formed in a mass **58** of solid arc extinguishing material which is capable of evolving an arc extinguishing medium under the heat of an arc. It may comprise any suitable arc extinguishing material as previously indicated. The mass **58** of arc extinguishing material is positioned within a sleeve **59** of suitable insulating material such as a phenolic condensation product to the upper end of which a metallic ferrule **60** is secured by any suitable means such as the pins **61**.

It will be observed that the lower end of the rod-like terminal **53** is tubular in construction and that it has positioned therein a liner **62** which may be formed of any suitable insulating material, such as fiber, that is capable of evolving an arc extinguishing medium under the heat of an arc and which is provided with a longitudinally extending auxiliary bore **63**. It will be understood that the liner **62** is stationarily mounted with respect to the rod-like terminal **53** while the arcing chamber **56** is movable with respect thereto.

Spaced from the lower end of the rod-like terminal **53** is an arcing terminal **66** which is connected to the lower end of the rod-like terminal **53** by a fusible element **67**, preferably in the form of a silver wire, and also by a strain element **68** one end of which is looped, as shown, over a pin **69** which extends transversely through the arcing terminal **66**. The other end of the strain element **68** is looped over a pin **70** which extends transversely through the rod-like terminal **53** and also through the liner **62**. The looped ends of the strain element **68** are so arranged that a calibrated section **71** is provided between them, the current carrying capacity of which is of course less than at any other portion of the strain element. As a result of this construction the strain element **68** fuses first at the section **71** and the arc is formed adjacent the inner end of the auxiliary bore **63**.

It will be observed that the pin **70**, which extends transversely through the rod-like terminal **53**, extends into a slot **72** in the ferrule **60**, thereby preventing relative rotary movement between the rod-like terminal **53** and the movable arcing chamber **56** as long as the fusible and strain elements **67** and **68** remain intact.

The arcing terminal **66** is connected by a flexible lead **73** through the lower line terminal **52** and is securely clamped thereto by a suitable screw **74**.

With a view to protecting the inner surface of the glass housing **50** from the heat of the arc that is formed on blowing of the fusible and strain elements **67** and **68** an arc chute, shown generally at **75**, is provided on the lower end of the movable arcing chamber **56**. The arc chute **75** comprises preferably an outer sleeve **76** of metal, such as brass, and an inner sleeve or liner **77** of insulating material such as fiber. Pins **78** are provided for securing the arc chute **75** to the outer sleeve **59** of the movable arcing chamber **56**. A shoulder **79** is formed by the outer sleeve **76** of the arc chute **75** and it is arranged to engage an inwardly extending flange **80** of a nut **81** that is threaded into the lower end of the lower line terminal **52** for limiting the movement of the movable arcing chamber **56** after the fusible and strain elements **67** and **68** have blown.

It will be observed that the flexible lead **73** extends through a suitable aperture in a centering element **82**, preferably formed of suitable insulating material such as a phenolic condensation product, that interfits with the lower end of the arc chute **75**. A metallic fitting **83**, deformed on to the flexible lead **73** reacts against the underside of the centering element **82** and serves to restrain the movable arcing chamber **56** from movement as long as the fusible and strain elements **67** and **68** remain intact. When they blow the arcing terminal **66** will be withdrawn from the rod-like terminal **53** substantially axially thereof thereby keeping the arc centered with respect to the main and auxiliary bores **57** and **63**. After the terminal **66** leaves the arc chute **75**, the arc is transferred to the lower end of the outer metallic sleeve **76** and does not spread outwardly as would be the case if it were maintained from the terminal **66** as it swings from the flexible lead **73**.

With a view to providing a reaction area on the movable arcing chamber **56** so that the movement thereof may be controlled mostly in accordance with the magnitude of the arc current, the lower end of the main bore **57** is flared outwardly as indicated at **84**. This provides an area against which the arc extinguishing medium can react in a direction opposite to the biasing force of the coil compression spring **62**.

Referring now particularly to Figure 4 of the drawings, it will be observed that the reference character **87** designates, generally, a tubular insulating housing having an outer sleeve **88** formed preferably of a phenolic condensation product and an inner sleeve **89** formed preferably of fiber. Suitably secured to the ends of the housing **87** are line terminals **90** and **91**.

A nut **92** is threaded into the upper line terminal **90** and it carries a rod-like terminal **93** which, as shown, projects into the tubular insulating housing **87**.

Movable mounted within the tubular insulating housing **87** is a movable arcing chamber **94** having a main bore **95** within which the lower end of the rod-like terminal **93** is telescoped and which is formed by a mass **96** of solid arc extinguishing material. The mass **96** of solid arc extinguishing material may be formed of any of the materials mentioned hereinbefore. The mass **96** of solid arc extinguishing material is confined within a sleeve **97** that is secured to a metallic ferrule **98** at its upper end by suitable pins **99**.

As shown more clearly in Figure 5 of the drawings the upper portion of the rod-like terminal 93 is hexagonal in section and interfits with a correspondingly shaped aperture in the ferrule 98. This construction prevents relative rotary movement between the movable arcing chamber 94 and the rod-like terminal 93.

A coil compression spring 100 is interposed between the underside of the nut 92 and the upper side of the ferrule 98 for biasing the movable arcing chamber 94 downwardly.

It will be observed that the lower end of the rod-like terminal 93 is tubular in construction and that it has positioned therein a liner 102 of insulating material, such as fiber, which provides an auxiliary bore 103 from the surface of which an arc extinguishing medium is evolved due to the heat of an arc.

An arcing terminal 104 is spaced from the lower end of the rod-like terminal 93 and it is connected thereto by a fusible element 105, preferably in the form of a silver wire, and a strain element 106 which extends through the auxiliary bore 103. At its lower end the strain element 106 is looped over a pin 107 in the arcing terminal 104 and at its upper end it is looped over a pin 108 which extends transversely through the rod-like terminal 93 and the fiber liner 102. The construction of the strain element 106 is such that a calibrated portion 109 is provided adjacent the upper end of the auxiliary bore 103, the current carrying capacity of which is less than any other portion. As a result when the strain element 106 blows, an arc will be formed within the auxiliary bore 103 adjacent the upper end.

It will be noted that the arcing terminal 104 has a spider 110 mounted thereon and that its arms are arranged to engage a suitable shoulder 111 formed in the outer sleeve 97 of the movable arcing chamber 94. As long as the fusible and strain elements 105 and 106 remain intact, the movable arcing chamber 94 is restrained from movement under the influence of the coil compression spring 100 by this construction.

A flexible lead 112 is connected, as shown, to the arcing terminal 104 and is of sufficient length to extend out of the lower open end of the tubular insulating housing 87 where it is clamped to the lower line terminal 91 by any suitable means such as by a screw 113. A cylindrical stop member 114, secured to the lower end of the tubular insulating housing 87 by pins 115 serves to limit the downward movement of the arcing chamber 94 after it has been released by blowing of the fusible and strain elements 105 and 106.

With a view to providing a reaction area for the arc extinguishing medium that is evolved on the blowing of the fusible and strain elements 105 and 106, the lower end of the main bore 95 is flared outwardly as indicated at 116. The reaction of the arc extinguishing medium on this area is in opposition to the biasing force of the coil compression spring 100 and serves to control the movement of the arcing chamber 94 inversely in accordance with the magnitude of the arc current.

Referring now particularly to Figure 6 of the drawings, it will be observed that the reference character 120 designates a tubular insulating housing having line terminals 121 and 122 at its ends. The line terminals 121 and 122 are provided, respectively, with contact fingers 123 and 124 which are arranged to engage suitable stationary line terminals which may be carried on the rear wall of a fuse box as shown in Ramsey Patent No. 2,091,452, issued August 31, 1937.

A cap 125 is threaded into the upper line terminal 121 and it has depending therefrom a rod-like terminal 126 to the lower end of which is secured a fuse link, shown generally at 127. The fuse link 127 may comprise a terminal 128 that is threaded into the lower end of the rod-like terminal 126 and which may be deformed on to one end of strain and fusible elements 129 and 130. The other ends of the strain and fusible elements 129 and 130 have deformed thereon an arcing terminal 131. A sleeve 132, carried by the terminal 128, extends over the strain and fusible elements 129 and 130 and also telescopes with the arcing terminal 131. The arcing terminal 131 is deformed on to a flexible conductor 144 which is of sufficient length to extend out of the lower end of the tubular insulating housing 120 and which is clamped to the lower line terminal 122 by any suitable means such as the screw 133.

An arcing chamber 134 is movably mounted within the tubular insulating housing 120 and it telescopes with the rod-like terminal 126. It comprises an outer sleeve 135 of suitable insulating material such as a phenolic condensation product and an inner sleeve 136, preferably formed of fiber.

A coil compression spring 137 reacts between the underside of a washer 138 which is threaded into the upper line terminal 121 and the upper end of the movable arcing chamber 134 to bias the latter downwardly.

At its lower end the arcing chamber 134 is provided with a metallic sleeve 139 having a shoulder 140 which is arranged to abut a metallic bushing 141 that is secured to the lower end of the tubular insulating housing 120 by any suitable means such as the pin 142 and the inwardly extending portion 143 of the lower line terminal 122. This construction serves to limit the downward movement of the arcing chamber 134 after the fuse link 127 has blown.

The movable arcing chamber 134 is restrained against the biasing force of the coil compression spring 137 in the position shown in the drawings by the flexible lead 144 which extends over one side of the lower projecting end of the movable arcing chamber 134. When the fuse link 127 blows, the arcing chamber 134 is no longer restrained and it is free to move downwardly under the influence of the coil compression spring 137. It will be understood that, after the arcing terminal 131 leaves the lower end of the arcing chamber 134, the arc will be transferred to the metallic sleeve 139 rather than following the terminal 131.

Referring now to Figure 7 of the drawings, it will be observed that a construction is illustrated which is similar to that shown in Figure 6 and described hereinbefore. The reference character 150 designates a tubular fuse housing that may be formed of any suitable insulating material, such as a phenolic condensation product. Line terminals 151 and 152 are provided at the ends of the housing 150 and they may be provided with contact fingers, such as the flexible contact fingers 153 and 154 for engaging suitable stationary line terminals. It will be noted that the housing 150 and line terminals 151 and 152 are generally of the same construction as shown in Ramsey Patent No. 2,091,452, issued August 31, 1937.

A flanged head 155 is secured by any suitable means, such as by threads as shown, to the upper line terminal 151 and it has depending there-

from a rod-like terminal 156. Telescoped with the rod-like terminal 156 is a movable arcing chamber 157 that is formed of suitable insulating material. For example, the movable arcing chamber 157 may comprise an outer tube or sheath 158 of phenolic condensation product and an inner tube or liner 159 of fiber. The movable arcing chamber 157 is biased downwardly for movement relative to the rod-like terminal 156 by means of a coil compression spring 160 that is interposed between the underside of the flanged head 155 and the upper end of the movable arcing chamber 157.

A renewable fuse link, shown generally at 163, is detachably secured to the lower end of the rod-like terminal 156. The fuse link 163 may be of the type shown in Ramsey Patent No. 2,144,707, issued January 24, 1939. It may comprise a relatively infusible terminal 164 that is provided with an extension 165 which may be threaded or otherwise secured to the lower end of the rod-like terminal 156. The lower end 166 of the terminal 164 is tubular in shape and is deformed onto the upper ends of strain and fusible elements 167 and 168. The lower ends of the strain and fusible elements 167 and 168 are secured by having the tubular upper end portion 169 of a movable arcing terminal 170 deformed thereon. The lower end 171 of the movable arcing terminal 170 is deformed on to a flexible conductor 172 which extends out of the arcing chamber 157 and is of sufficient length to extend out of the tubular housing 150, as shown. A sleeve 173 of insulation, such as fiber, may be secured to the upper terminal 164 and extends downwardly over the strain and fusible elements 167 and 168 and also over the movable arcing terminal 170.

With a view to holding the movable arcing chamber 157 against the biasing force of the compression spring 160, a tubular fitting 174 having a conical lower end portion, as illustrated, is deformed on to the flexible lead 172 below the movable arcing terminal 170. The fitting 174 is arranged to fit into a slot 175 in a centering member 176 which, as shown in Figure 8 of the drawings, comprises a flat washer having a peripheral recess 177 for interfitting with the lower end of the movable arcing chamber 157. As long as the strain and fusible elements 167 and 168 remain intact, the movable arcing chamber 157 is restrained from movement downwardly under the influence of the coil compression spring 160. However, as soon as the strain and fusible elements blow on the occurrence of a predetermined overload, this restraining force is no longer present and the arcing chamber 157 moves downwardly carrying with it the movable arcing terminal 170 and elongating the arc formed between it and the infusible terminal 164 at the lower end of the stationary rod-like terminal 156. The arc is thus extended axially of the rod-like terminal 156 and of the movable arcing chamber 157 and of the housing 150, since the movable arcing terminal 170 is held substantially centrally of the movable arcing chamber 157. In some instances under extreme short circuit conditions sufficient pressure may be generated on blowing of the strain and fusible elements 167 and 168 as to expel the arcing terminal 170 out of the housing 150 at a speed which is higher than it would otherwise be moved by the arcing chamber 157 under the influence of the coil compression spring 160.

The lower end of the flexible lead 172 may be connected by any suitable means to the lower line terminal 152. For example, the clamp screw 178 threaded in a suitable boss integrally formed with the line terminal 152 may be used as shown.

It is desirable to prevent the movable arcing chamber 157 from moving out of the housing 150. For this purpose the lower line terminal 152 may be provided with an extension 179 which projects into the bore of the housing 150 and into the path of the movable arcing chamber 157. When the latter engages the stop 179 further outward movement thereof is of course prevented.

It will be observed that the rod-like terminal 156, movable arcing chamber 157, coil compression spring 160 and removable fuse link 163 comprise a unit which is replaceable as such in the housing 150. It will also be apparent that of this unit it is only necessary to renew the fuse link 163 after it has blown in order to place it again in operating condition.

It will be understood that the heat of the arc formed on blowing of the strain and fusible elements 167 and 168 causes the evolution of an arc extinguishing medium from the inner walls of the tube 173 of the fuse link 163 and also from the inner wall of the fiber liner 159. If desired the tube or sleeve 173 on the fuse link 163 may be omitted and reliance placed solely upon the arc extinguishing medium that is evolved from the fiber liner 159.

Since certain further changes may be made in the above constructions and different embodiments of the invention may be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In a circuit interrupter, in combination, support means, a tubular arcing chamber biased for movement relative to said support means and substantially closed at one end and open at the other end and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, and means for drawing an arc within the bore of said chamber adjacent its open end, said chamber being released for movement when the arc is drawn and movement thereof being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing the arcing chamber and the other being the reaction force of the arc extinguishing medium on the arcing chamber.

2. In a circuit interrupter, in combination, support means, a tubular arcing chamber biased for movement relative to said support means and substantially closed at one end and open at the other end and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, spring means biasing said chamber for said movement, and means for drawing an arc within the bore of said chamber adjacent its open end, said chamber being released for movement when the arc is drawn and said movement being controlled in accordance with the opposing actions of said spring means and of the arc blast.

3. In a circuit interrupter, in combination, a pair of line terminals in insulated spaced relation, a tubular arcing chamber having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc,

spring means biasing said chamber for movement; and conductor means extending through the bore of said chamber and substantially filling the same for preventing said relative movement and for interconnecting said line terminals, said conductor means including a rod-like terminal extending from one line terminal, an infusible arcing terminal connected to the other line terminal, and fusible means interconnecting said rod-like and infusible terminals; said chamber being released for movement on blowing of said fusible means resulting in the formation of an arc between said rod-like and arcing terminals and its movement being controlled conjointly by the biasing force of said spring means acting in one direction and the reaction force due to pressure generated by the arc blast acting in the opposite direction.

4. In a circuit interrupter, in combination, support means, a tubular arcing chamber biased for movement relative to said support means and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, a rod-like terminal extending into the bore of said chamber and substantially filling the same, and means for drawing an arc from the end of said rod-like terminal within said bore, said chamber being released for movement when the arc is drawn and the movement thereof being controlled in accordance with the opposing actions of the force biasing it and the reaction force due to the evolution of the arc extinguishing medium whereby the quantity of said material subjected to the heat of the arc varies inversely with the magnitude of the arc.

5. In a circuit interrupter, in combination, an axially movable arcing chamber substantially closed at one end and having a relatively large reaction area at the other end, support means for said arcing chamber, means biasing said arcing chamber for movement in the direction in which said reaction area faces, and means whereby an arc is formed adjacent said other end of said arcing chamber and the same is released for movement at a speed which depends upon the force of said biasing means acting in one direction and the pressure due to the arc blast acting on said reaction area in the opposite direction.

6. In a circuit interrupter, in combination, a tubular arcing chamber, means movably mounting said arcing chamber, rod-like terminal means extending into the bore of said chamber from one end, the other end of said chamber being flared outwardly, means biasing said chamber for movement relative to said rod-like terminal means, and means for drawing an arc from said rod-like terminal means adjacent the flared out end of said chamber and for releasing said chamber for movement the speed of which is governed by the force of said biasing means acting in one direction and the pressure due to the arc blast acting on the surface of said flared out end of said chamber acting in the opposite direction.

7. In a circuit interrupter, in combination, a tubular arcing chamber having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, means movably mounting said arcing chamber, relatively stationary rod-like terminal means extending into the bore of said chamber from one end, the other end of said chamber being flared outwardly, spring means biasing said chamber for movement along said rod-like terminal means, and means for drawing an arc from said rod-like terminal means adjacent the flared out end of said chamber and for releasing said chamber for movement at a speed which is governed by the force of said biasing means acting in one direction and the pressure due to the evolution of arc extinguishing medium acting on the surface of said flared out end of said chamber acting in the opposite direction whereby the quantity of said material subjected to the heat of the arc varies inversely with its magnitude.

8. A replaceable circuit interrupter unit for interconnecting a pair of line terminals comprising, in combination, a rod-like terminal having a flanged head at one end adapted to be clamped to one line terminal, an arcing chamber telescoped with said rod-like terminal, a coil compression spring reacting between said flanged head and one end of said arcing chamber for biasing the latter for movement relative to said rod-like terminal, the other end of said arcing chamber being flared outwardly to provide a reaction area, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, means interconnecting said arcing chamber and said fusible means whereby movement of the former is restrained as long as the latter remains intact, and flexible conductor means connected to said arcing terminal and adapted to be connected to the other line terminal of said housing, the pressure generated by the arc blast on blowing of said fusible means acting against said reaction area and opposing the movement of said arcing chamber by said spring.

9. A replaceable circuit interrupter unit for mounting in a tubular housing having a line terminal at each end comprising, in combination, a rod-like terminal having a flanged head at one end adapted to be clamped to one line terminal, an arcing chamber telescoped with said rod-like terminal, a coil compression spring reacting between said flanged head and one end of said arcing chamber for biasing the latter for movement relative to said rod-like terminal, the other end of said arcing chamber being flared outwardly to provide a reaction area, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, a centering member interfitting with said arcing chamber for holding said arcing terminal centrally thereof and restraining said arcing chamber from movement and for causing said arcing terminal to be withdrawn substantially axially of said rod-like terminal on blowing of said fusible means, and flexible conductor means connected to said arcing terminal and adapted to be connected to the other line terminal of said housing, the pressure generated by the arc blast on blowing of said fusible means acting against said reaction area and opposing the movement of said arcing chamber by said spring.

10. In a circuit interrupter, in combination, a tubular housing of insulating material having line terminals at its ends, a tubular arcing chamber biased for movement within said housing, means whereby an arc is drawn at one end of said arcing chamber and the same is released for movement, and a shield carried by said arcing chamber at said one end thereof for protecting the inner surface of said housing from the heat of the arc.

11. In a circuit interrupter, in combination, a tubular housing of insulating material having line terminals at its ends, a tubular arcing chamber biased for movement within said housing, means whereby an arc is drawn at one end of

said arcing chamber and the same is released for movement, and a metallic arc chute carried by said arcing chamber at said one end thereof for protecting the inner surface of said housing from the heat of the arc.

12. In a circuit interrupter, in combination, a tubular housing of insulating material having line terminals at its ends, a tubular arcing chamber biased for movement within said housing, means including a movable arcing terminal whereby an arc is drawn at one end of said arcing chamber and the same is released for movement, and an arc chute including a metallic section electrically connected to one line terminal and carried by said arcing chamber at said one end thereof for protecting the inner surface of said housing from the heat of the arc and to which said arc is transferred when said arcing terminal reaches a predetermined position with respect thereto.

13. In a circuit interrupter, in combination, a tubular housing of insulating material closed at one end and open at the other and having line terminals at its ends, a rod-like terminal extending from the line terminal at the closed end of said housing, an arcing chamber telescoped with said rod-like terminal and biased for movement relative thereto in the direction of the open end of said housing, means whereby an arc is drawn from said rod-like terminal at one end of said arcing chamber and the same is released for movement toward the open end of said housing, and an arc chute carried by said arcing chamber at said one end thereof for protecting the inner surface of said housing from the heat of the arc.

14. In a circuit interrupter, in combination, a tubular housing of insulating material closed at one end and open at the other and having line terminals at its ends, a rod-like terminal extending from the line terminal at the closed end of said housing, an arcing chamber telescoped with said rod-like terminal and biased for movement relative thereto in the direction of the open end of said housing, means whereby an arc is drawn from said rod-like terminal at one end of said arcing chamber and the same is released for movement toward the open end of said housing, and an arc chute carried by said arcing chamber at said one end thereof and extending to said open end of said housing and movable out of the same for protecting the inner surface of said housing from the heat of the arc.

15. In a circuit interrupter, in combination, a tubular housing of insulating material closed at one end and open at the other and having line terminals at its ends, a rod-like terminal extending from the line terminal at the closed end of said housing, an arcing chamber telescoped with said rod-like terminal and biased for movement relative thereto in the direction of the open end of said housing, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, an arc chute carried by said arcing chamber for protecting the inner surface of said housing from the heat of the arc formed on blowing of said fusible means, flexible conductor means interconnecting said arcing terminal and the other line terminal, and means cooperating with said arc chute for holding said arcing terminal centrally thereof and restraining said arcing chamber from movement and for causing said arcing terminal to be withdrawn substantially axially of said rod-like terminal when said fusible means blows.

16. In a circuit interrupter, in combination, a tubular insulating housing, a tubular arcing chamber within said housing biased for movement relative thereto and substantially closed at one end and open at the other and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, means for drawing an arc within the bore of said chamber adjacent its open end, said chamber being released for movement when the arc is drawn and movement thereof being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing the arcing chamber and the other being the reaction force of the arc extinguishing medium on the arcing chamber, and a shield carried by said arcing chamber at the end where the arc is drawn for protecting the inner surface of said housing from the heat of the arc.

17. In a circuit interrupter, in combination, a tubular insulating housing, a tubular arcing chamber within said housing biased for movement relative thereto and substantially closed at one end and open at the other and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, spring means biasing said chamber for movement relative to said housing, means for drawing an arc within the bore of said chamber adjacent its open end, said chamber being released for movement when the arc is drawn and said movement being controlled in accordance with the opposing actions of said spring means and of the arc blast, and a metallic arc chute carried by said arcing chamber at the end where the arc is drawn for protecting the inner surface of said housing from the heat of the arc.

18. In a circuit interrupter, in combination, a tubular insulating housing, a pair of line terminals for said housing, a tubular arcing chamber within said housing having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, spring means biasing said chamber for movement relative to said housing; conductor means extending through the bore of said chamber and substantially filling the same for preventing said relative movement and for interconnecting said line terminals, said conductor means including a rod-like terminal extending from one line terminal, an arcing terminal connected to the other line terminal, and fusible means interconnecting said rod-like and infusible terminals; said chamber being released for movement on blowing of said fusible means resulting in the formation of an arc between said rod-like and arcing terminals and its movement being controlled conjointly by the biasing force of said spring means acting in one direction and the reaction force due to pressure generated by the arc blast acting in the opposite direction; and an arc chute carried by said arcing chamber at the end where the arc is formed between said rod-like and arcing terminals for protecting the inner surface of said housing from the heat of the arc.

19. In a circuit interrupter, in combination, a tubular insulating housing, a pair of line terminals for said housing, a tubular arcing chamber within said housing having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, spring means biasing said chamber for movement relative to said housing; conductor means extending through the bore of said chamber and substantially filling the same for interconnecting said

line terminals, said conductor means including a rod-like terminal extending from one line terminal, an arcing terminal connected to the other line terminal, and fusible means interconnecting said rod-like and infusible terminals; and a lever pivoted on said housing and operatively connected to said arcing terminal and cooperating with said arcing chamber for holding the same in place as long as said fusible means remains intact, said chamber being released by said lever for movement on blowing of said fusible means resulting in the formation of an arc between said rod-like and arcing terminals and its movement being controlled conjointly by the biasing force of said spring means acting in one direction and the reaction force due to pressure generated by the arc blast acting in the opposite direction.

20. In a circuit interrupter, in combination, a tubular insulating housing, a tubular arcing chamber within said housing biased for movement relative thereto and substantially closed at one end and open at the other and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, means for drawing an arc within the bore of said chamber adjacent its open end, said chamber being released for movement when the arc is drawn and movement thereof being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing the arcing chamber and the other being the reaction force of the arc extinguishing medium on the arcing chamber, and a shield carried by said arcing chamber at the end where the arc is drawn for protecting the inner surface of said housing from the heat of the arc, said shield comprising an outer tube of metal having a liner of insulating material.

21. In a circuit interrupter, in combination, a tubular insulating housing, a tubular arcing chamber within said housing biased for movement relative thereto and substantially closed at one end and open at the other and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, means for drawing an arc within the bore of said chamber adjacent its open end, said chamber being released for movement when the arc is drawn and movement thereof being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing the arcing chamber and the other being the reaction force of the arc extinguishing medium on the arcing chamber, and a shield carried by said arcing chamber at the end where the arc is drawn for protecting the inner surface of said housing from the heat of the arc, said shield comprising an outer tube of metal having a liner of material capable of evolving an arc extinguishing medium due to the heat of the arc and providing a bore from which the medium is evolved.

22. In a circuit interrupter, in combination, support means, solid arc extinguishing material providing main and auxiliary bores from the surfaces of which an arc extinguishing medium is evolved due to the heat of an arc, and means for drawing an arc first in said auxiliary bore and subsequently in said main bore if the arc in the auxiliary bore is not extinguished, the portion of said arc extinguishing material providing said main bore being biased for movement with respect to said support means and released for such movement when the arc is drawn in said auxiliary bore.

23. In a circuit interrupter, in combination, support means, solid arc extinguishing material providing main and auxiliary bores from the surfaces of which an arc extinguishing medium is evolved due to the heat of an arc, and means for drawing an arc first in said auxiliary bore and subsequently in said main bore if the arc in the auxiliary bore is not extinguished, the portion of said arc extinguishing material providing said main bore being biased for movement with respect to said support means and released for such movement when the arc is drawn in said auxiliary bore, said movement being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing said portion of the arc extinguishing material providing said main bore and the other being the reaction force thereon of the arc extinguishing medium.

24. In a circuit interrupter, in combination, support means, solid arc extinguishing material providing main and auxiliary bores from the surfaces of which an arc extinguishing medium is evolved due to the heat of an arc, one end of said main bore being flared outwardly thereby providing a reaction area, means for drawing an arc first in said auxiliary bore and subsequently in said main bore if the arc in the auxiliary bore is not extinguished, and means biasing the portion of said arc extinguishing material providing said main bore for movement with respect to said support means in the direction faced by said reaction area and the same being released for such movement when the arc is drawn in said auxiliary bore, said movement being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing said portion of the arc extinguishing material providing said main bore and the other being the force exerted on said reaction area by the arc extinguishing medium.

25. In a circuit interrupter, in combination, a tubular insulating housing, solid arc extinguishing material within said housing providing main and auxiliary bores from the surfaces of which an arc extinguishing medium is evolved due to the heat of an arc, one end of said main bore being flared outwardly thereby providing a reaction area, means for drawing an arc first in said auxiliary bore and subsequently in said main bore if the arc in the auxiliary bore is not extinguished, means biasing the portion of arc extinguishing material providing said main bore for movement with respect to said housing in the direction faced by said reaction area and the same being released for such movement when the arc is drawn in said auxiliary bore, said movement being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing said portion of the arc extinguishing material providing said main bore and the other being the force exerted on said reaction area by the arc extinguishing medium, and a shield movable with said main bore for protecting the inner surface of said housing from the heat of the arc.

26. In a circuit interrupter, in combination, line terminals in insulated spaced relation, solid arc extinguishing material providing main and auxiliary bores from the surfaces of which an arc extinguishing medium is evolved due to the heat of an arc, a rod-like terminal extending from one line terminal into said main bore, and an arcing terminal connected to the other line terminal and spaced from said rod-like terminal and connected thereto by fusible means arranged

on blowing to draw an arc first in said auxiliary bore and subsequently in said main bore if the arc in the auxiliary bore is not extinguished, the portion of said arc extinguishing material providing said main bore being biased for movement along said rod-like terminal toward said other line terminal and released for such movement when the arc is drawn in said auxiliary bore.

27. In a circuit interrupter, in combination, line terminals in insulated spaced relation, solid arc extinguishing material providing main and auxiliary bores from the surfaces of which an arc extinguishing medium is evolved due to the heat of an arc, a rod-like terminal extending from one line terminal into said main bore, and an arcing terminal connected to the other line terminal and spaced from said rod-like terminal and connected thereto by fusible means arranged on blowing to draw an arc first in said auxiliary bore and subsequently in said main bore if the arc in the auxiliary bore is not extinguished, the portion of said arc extinguishing material providing said main bore being biased for movement along said rod-like terminal toward said other line terminal and released for such movement when the arc is drawn in said auxiliary bore, said movement being controlled in accordance with the resultant effect of two opposing forces, one being the force biasing said portion of the arc extinguishing material providing said main bore and the other being the reaction force thereon of the arc extinguishing medium.

28. In a circuit interrupter, in combination, a pair of line terminals in insulated spaced relation, a rod-like terminal extending from one line terminal, a tubular arcing chamber movably mounted on said rod-like terminal, spring means biasing said arcing chamber to effect movement thereof, arcing terminal means spaced from said rod-like terminal and connected thereto by fusible means and reacting against said arcing chamber to hold the same against the biasing force of said spring means, and flexible conductor means interconnecting said arcing terminal and the other line terminal.

29. In a circuit interrupter, in combination, a pair of line terminals in insulated spaced relation, a rod-like terminal extending from one line terminal, a tubular arcing chamber movably mounted on said rod-like terminal and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of an arc and a reaction area against which the arc extinguishing medium can react, spring means biasing said arcing chamber to effect movement thereof, arcing terminal means spaced from said rod-like terminal and connected thereto by fusible means and reacting against said arcing chamber to hold the same against the biasing force of said spring means, and flexible conductor means interconnecting said arcing terminal and the other line terminal, said arcing chamber being released for movement on blowing of said fusible means and said movement being controlled in accordance with the resultant effect of two opposing forces, one being the force of said spring means biasing said arcing chamber in one direction and the other being the reaction force of said arc extinguishing medium on said reaction area acting in the opposite direction whereby the amount of said material exposed to the heat of the arc varies inversely with the magnitude of the arc.

30. A circuit interrupter comprising, in combination, a tubular insulating housing, an arcing chamber wholly within said housing and biased for movement relative thereto, means for drawing an arc within said chamber adjacent its open end, said chamber being released for movement when the arc is drawn, and means for limiting the movement of said chamber after the arc is drawn to prevent it from moving substantially out of said housing.

31. A circuit interrupter comprising, in combination, a tubular insulating housing, an arcing chamber having its inner surface formed by material capable of evolving an arc extinguishing medium due to the heat of an arc wholly within said housing and biased for movement relative thereto, means for drawing an arc within said chamber adjacent its open end, said chamber being released for movement when the arc is drawn, and means for limiting the movement of said chamber after the arc is drawn to prevent it from moving substantially out of said housing.

32. A circuit interrupter comprising, in combination, a tubular insulating housing, a rod-like terminal extending inwardly from one end of said housing, a tubular arcing chamber wholly within said housing and telescoped with said rod-like terminal and biased for movement relative thereto, means cooperating with said rod-like terminal for restraining said movement of said arcing chamber, the restraint being terminated on the drawing of an arc between said rod-like terminal and said means, and means for limiting the movement of said chamber after the arc is drawn to prevent it from moving substantially out of said housing.

33. A circuit interrupter comprising, in combination, a tubular insulating housing, a rod-like terminal extending inwardly from one end of said housing, a tubular arcing chamber wholly within said housing and telescoped with said rod-like terminal, a compression spring surrounding said rod-like terminal and biasing said tubular arcing chamber for movement relative thereto, means cooperating with said rod-like terminal for restraining said movement of said arcing chamber, the restraint being terminated on the drawing of an arc between said rod-like terminal and said means, and means for limiting the movement of said chamber after the arc is drawn to prevent it from moving substantially out of said housing.

34. A circuit interrupter comprising, in combination, a tubular insulating housing, a rod-like terminal extending inwardly from one end of said housing, a tubular arcing chamber wholly within said housing and telescoped with said rod-like terminal and biased for movement relative thereto toward the other end of said housing, means cooperating with said rod-like terminal for restraining said movement of said arcing chamber, the restraint being terminated on the drawing of an arc between said rod-like terminal and said means, and means at said other end of said housing disposed to cooperate with the end of said arcing chamber adjacent thereto for limiting the movement of said arcing chamber after the arc is drawn.

35. A circuit interrupter comprising, in combination, a tubular insulating housing having line terminals at its ends; conducting means within said housing interconnecting said line terminals and including a rod-like section connected to one line terminal, a flexible conducting section connected to the other line terminal, and a fusible section interconnecting said sections; a tubular arcing chamber telescoped with said rod-like section for movement relative thereto toward

said other line terminal, and means interconnecting said conducting means and said arcing chamber for restraining the latter from movement as long as said fusible section remains intact.

36. A circuit interrupter comprising, in combination, a tubular insulating housing having line terminals at its ends; conducting means within said housing interconnecting said line terminals and including a rod-like section connected to one line terminal, a flexible conducting section connected to the other line terminal, and a fusible section interconnecting said sections; a tubular arcing chamber telescoped with said rod-like section for movement relative thereto toward said other line terminal, and means interconnecting said conducting means and said arcing chamber for restraining the latter from movement as long as said fusible section remains intact, said interconnecting means also serving to move said flexible conducting section relative to said insulating housing on movement of said arcing chamber.

37. A circuit interrupter comprising, in combination, a tubular insulating housing having line terminals at its ends; conducting means within said housing interconnecting said line terminals and including a rod-like section connected to one line terminal, a flexible conducting section for connection to the other line terminal, and a fusible section interconnecting said sections; means positively clamping said flexible conducting section to said other line terminal, a tubular arcing chamber telescoped with said rod-like section for movement relative thereto toward said other line terminal, and means interconnecting said conducting means and said arcing chamber for restraining the latter from movement as long as said fusible section remains intact.

38. A circuit interrupter comprising, in combination, a tubular insulating housing having line terminals at its ends, a rod-like terminal extending inwardly of said housing from one of said line terminals, a tubular arcing chamber telescoped with said rod-like terminal, compression spring means biasing said arcing chamber away from said one line terminal toward the other line terminal, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, flexible conductor means interconnecting said arcing terminal and said other line terminal, and means interconnecting said arcing chamber and said fusible means whereby movement of the former is restrained as long as the latter remains intact.

39. A circuit interrupter comprising, in combination, a tubular insulating housing having line terminals at its ends; conducting means within said housing interconnecting said line terminals and including a rod-like section connected to one line terminal, a flexible conducting section connected to the other line terminal, and a fusible section interconnecting said sections; a tubular arcing chamber telescoped with said rod-like section for movement relative thereto toward said other line terminal, and a centering member interfitting with the end of said arcing chamber adjacent said other line terminal and cooperating with said conducting means for restraining said arcing chamber as long as said fusible section remains intact and for lengthening the arc formed on blowing of said fusible section substantially axially of said arcing chamber.

40. A circuit interrupter comprising, in combination, a tubular insulating housing having line terminals at its ends, a rod-like terminal extending inwardly of said housing from one of said line terminals, a tubular arcing chamber telescoped with said rod-like terminal, compression spring means biasing said arcing chamber away from said one line terminal toward the other line terminal, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, flexible conductor means interconnecting said arcing terminal and said other line terminal, and means centering said arcing terminal with respect to said arcing chamber and interconnecting them whereby movement of said arcing chamber is restrained as long as said fusible means remains intact and on blowing thereof said arcing terminal is moved axially outwardly of said housing.

41. A replaceable circuit interrupter unit for mounting in a tubular housing having a line terminal at each end comprising, in combination, a rod-like terminal having a flanged head at one end adapted to be clamped to one line terminal, an arcing chamber telescoped with said rod-like terminal, a coil compression spring reacting between said flanged head and said arcing chamber for biasing the latter for movement relative to said rod-like terminal, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, means interconnecting said arcing chamber and said fusible means whereby movement of the former is restrained as long as the latter remains intact, and flexible conductor means connected to said arcing terminal and adapted to be connected to the other line terminal of said housing.

42. A replaceable circuit interrupter unit for mounting in a tubular housing having a line terminal at each end comprising, in combination, a rod-like terminal having a flanged head at one end adapted to be clamped to one line terminal, and arcing chamber telescoped with said rod-like terminal, a coil compression spring reacting between said flanged head and said arcing chamber for biasing the latter for movement relative to said rod-like terminal, an arcing terminal spaced from said rod-like terminal and connected thereto by fusible means, a centering member interfitting with said arcing chamber for holding said arcing terminal centrally thereof and restraining said arcing chamber from movement and for causing said arcing terminal to be withdrawn substantially axially of said rod-like terminal on blowing of said fusible means, and flexible conductor means connected to said arcing terminal and adapted to be connected to the other line terminal of said housing.

43. A replaceable circuit interrupter unit for mounting in a tubular housing having a line terminal at each end comprising, in combination, a rod-like terminal having a flanged head at one end adapted to be clamped to one line terminal, an arcing chamber telescoped with said rod-like terminal, a coil compression spring reacting between said flanged head and said arcing chamber for biasing the latter for movement relative to said rod-like terminal; a renewable fuse link including a coupling member removably coupled to the other end of said rod-like terminal, an arcing terminal, fusible means interconnecting said coupling member and said arcing terminal, and flexible conductor means extending from said arcing terminal for connection to the other line terminal of said housing; and means interconnecting said arcing chamber and said flexible conductor means whereby movement of the former

is restrained as long as said fusible means remains intact.

44. In a circuit interrupter, in combination, support means, a tubular arcing chamber biased for movement relative to said support means and releasably held in place, said chamber being substantially closed at one end and open at the other end and having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of the arc, and means for drawing an arc within the bore of said chamber adjacent its open end, the movement of said chamber after its release being controlled in accordance with the resultant of two opposing forces, one being the force biasing the arcing chamber and the other being the reaction force of the arc extinguishing medium on the arcing chamber.

45. In a circuit interrupter, in combination, support means, a tubular arcing chamber biased for movement relative to said support means and releasably held in place, said chamber being substantially closed at one end and open at the other end having its bore formed by material capable of evolving an arc extinguishing medium due to the heat of the arc, spring means biasing said chamber for said movement, and means for drawing an arc within the bore of said chamber adjacent its open end, the movement of said chamber after its release being controlled in accordance with the opposing actions of said spring means and of the arc blast.

46. In a circuit interrupter, in combination, support means, a tubular arcing chamber biased for movement relative to said support means and releasably held in place, the bore of said chamber being formed by material capable of evolving an arc extinguishing medium due to the heat of an arc, a rod-like terminal extending into the bore of said chamber and substantially filling the same, and means for drawing an arc from the end of said rod-like terminal within said bore, the movement of said chamber after its release being controlled in accordance with the opposing actions of the force biasing it and the reaction force due to the evolution of the arc extinguishing medium whereby the quantity of said material subjected to the heat of the arc varies inversely with the magnitude of the arc.

ALLAN RAMSEY.