July 13, 1943. H. A. TRIPLETT ET AL 2,324,044

FUSE CUTOUT

Filed May 26, 1938 3 Sheets-Sheet 1

Fig. 1.

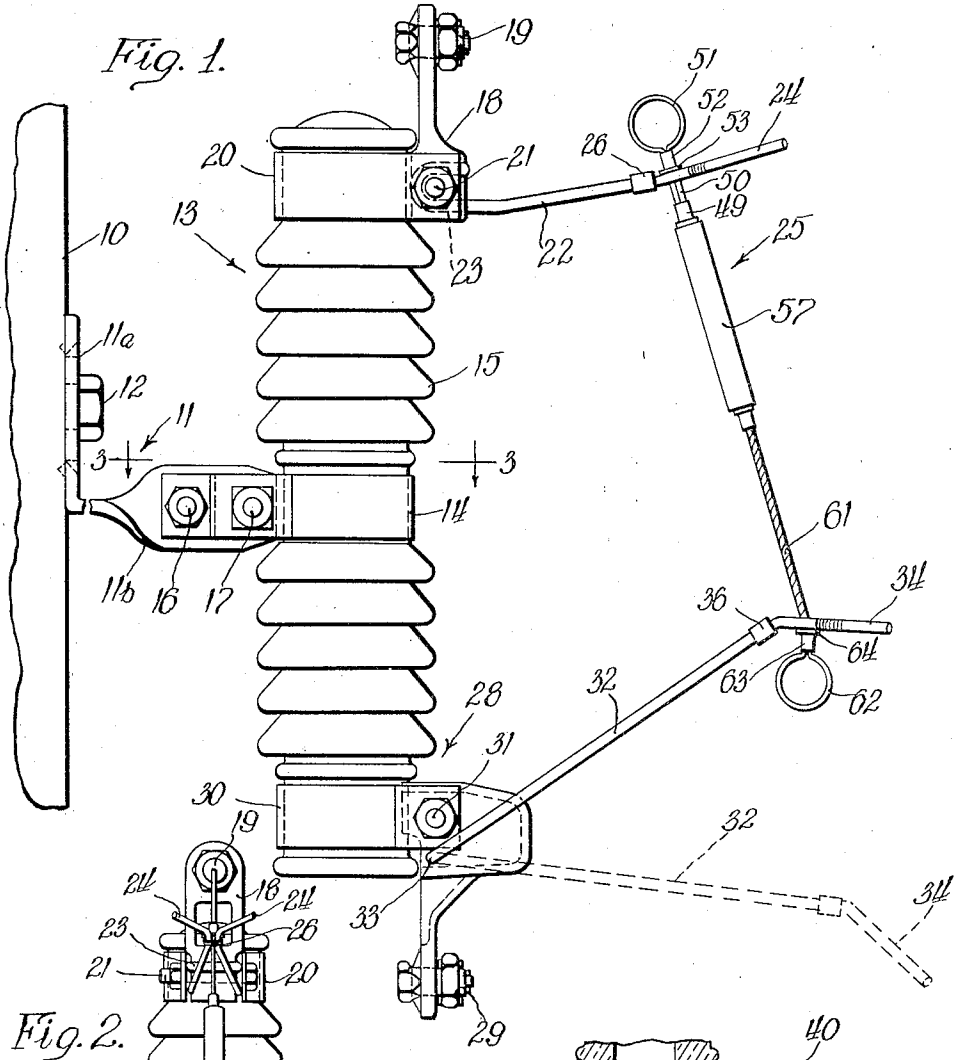


Fig. 2.

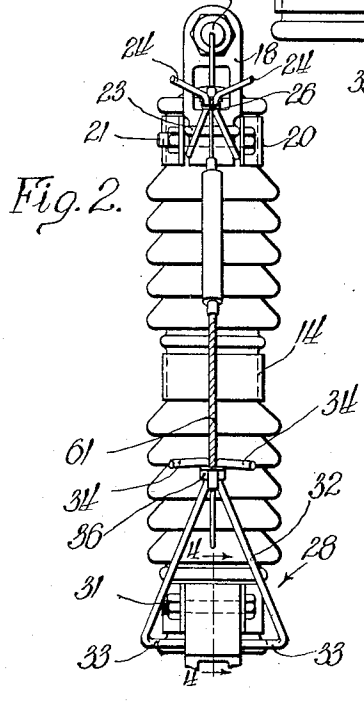
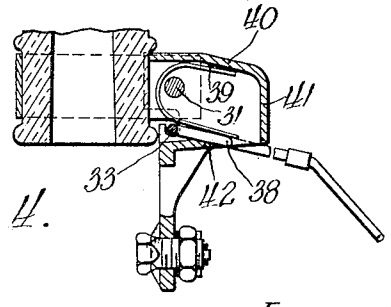


Fig. 4.



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Fig. 5.

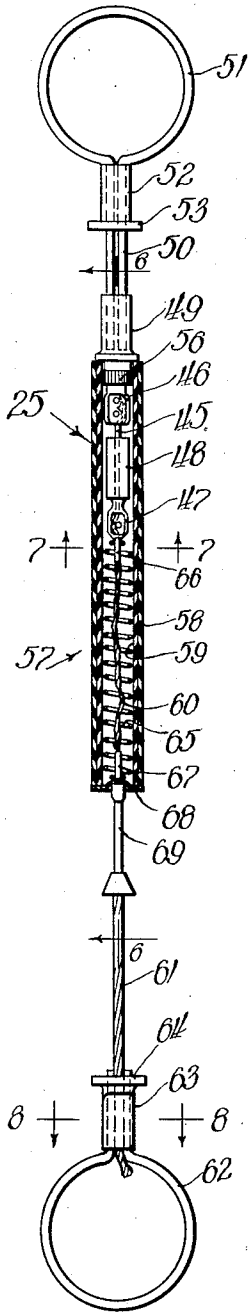


Fig. 6.

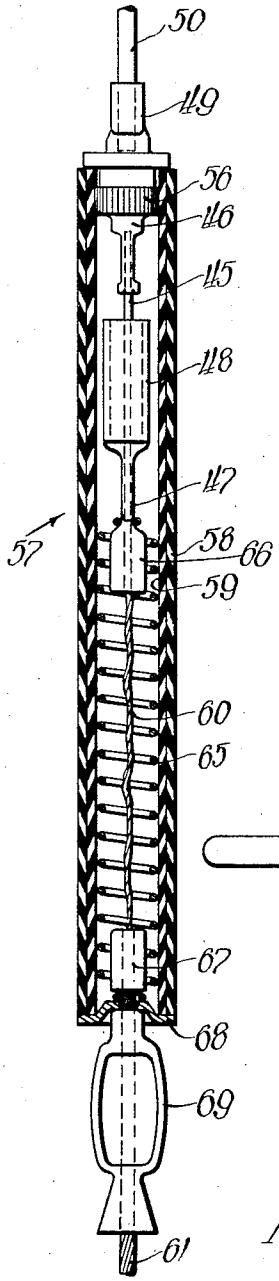


Fig. 7.

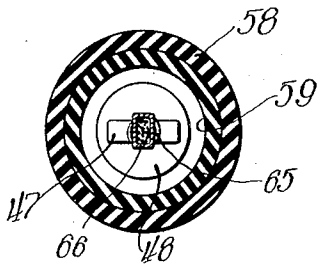
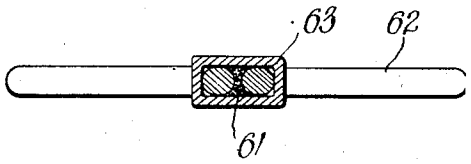


Fig. 8.



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FUSE CUTOUT

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Fig. 9.

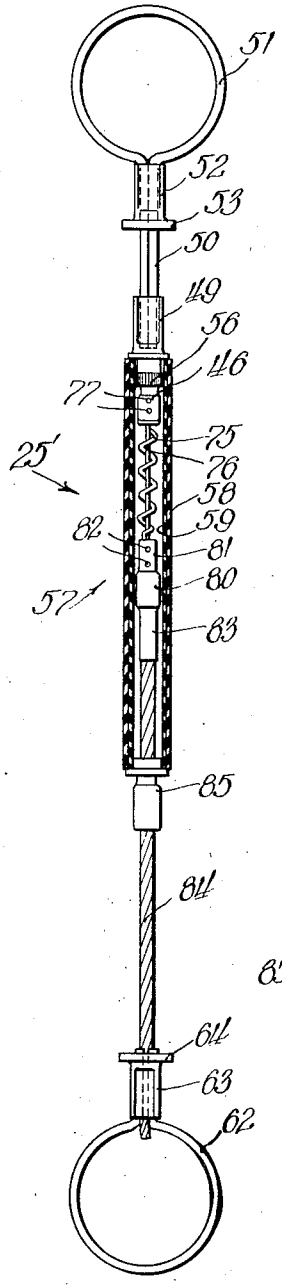


Fig. 3.

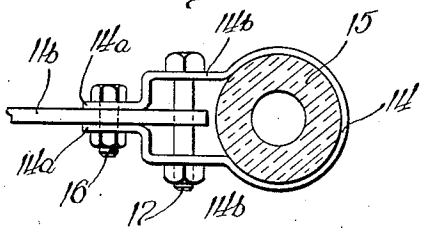


Fig. 10.

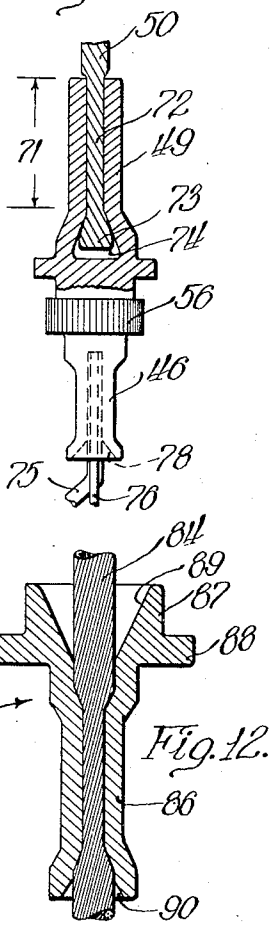


Fig. 12.

Fig. 11.

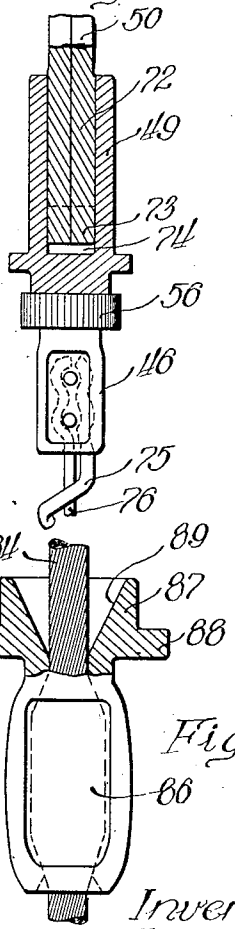


Fig. 13.

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Patented July 13, 1943 2,324,044

UNITED STATES PATENT OFFICE

2,324,044

FUSE CUTOUT

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Application May 26, 1938, Serial No. 210,122

38 Claims. (Cl. 200—117)

This invention relates, generally, to circuit interrupters and it has particular relation to open type fuse cutouts adapted to be mounted out-of-doors on transmission line towers and poles.

The invention disclosed herein constitutes a distinct improvement over fuse switches of the type shown in Patent No. 2,086,028. The fuse switch shown in this patent includes a pair of contact arms which are mounted at the upper and lower ends of an insulator. The upper contact arm is provided at its outer end with rearwardly opening jaw portions, while the lower contact arm has forwardly opening jaw portions. The terminals of a fuse link are positioned in these jaw portions and secured thereto by a wedging action.

The fuse link of this patent comprises a pair of flexible leads interconnected by a fusible element. A tubular housing surrounds the fusible element and the opposite ends of the flexible leads. The flexible lead at the upper end entails a relatively expensive soldered construction and, of course, does not rigidly support the tubular housing. As a result the tubular housing may not be maintained in the most favorable position during the arcing period for extinguishing the arc.

The contact arms of the fuse switch shown in this patent are biased apart to tension the fuse link. The lower contact arm has an integrally formed spiral spring portion which is the principal source of the biasing action. It is often the case that this spiral spring portion becomes coated with ice, for example during a severe sleet storm or when the temperature is such that rain freezes as fast as it falls, with the result that it is no longer free to perform its biasing action. When the fuse link blows under these conditions with the spiral spring bound by ice, the terminals of the fuse link are not biased apart and, consequently, the arc may hang on between the contact arms rather than being extinguished as a result of the movement apart of the contact arms.

In view of the foregoing, the object of the invention, generally stated, is to provide an inexpensive but reliable cutout for use on rural distribution systems where the revenue producing load is very light. The relatively small short circuit currents encountered in such installations make it possible to employ a design of circuit interrupter in which the conventional cutout tube is not required.

An object of the invention is to construct a fuse link for an open type fuse cutout which can be installed with little difficulty by a lineman.

Another object of the invention is to protect the fusible element of a fuse link for an open type fuse cutout from the weather and, at the same time, provide for evolving an arc extinguishing medium on blowing of the fusible element for assisting in extinguishing the arc.

Another object of the invention is to protect the fusible element of a fuse link for an open type cutout so that its time-current characteristics are not materially changed by rain or sleet or snow.

A further object of the invention is to provide in an open type cutout for holding the fuse tube of the fuse link in such position when the fusible element blows that the arc extinguishing material carried thereby can be most efficiently used for extinguishing the arc.

A further object of the invention is to confine the formation of ice about the movable contact arm of an open fuse cutout to certain parts which are arranged in such manner that any ice which may be formed thereon causes no appreciable interference with the intended operation of the cutout when it is required to clear a circuit under such abnormal weather conditions.

Still another object of the invention is to produce a cutout of the type which employs a fuse link mounted in the open and anchored directly to the contacts of the mounting of such design that its performance will not be impaired by adverse weather conditions such as sleet, etc.; in other words a substantially weatherproof open type of cutout having positive mechanical action regardless of the weather conditions.

A still further object of the invention is to provide for securely mounting the insulator of an open type fuse cutout while at the same time permitting angular adjustment of the insulator in an improved manner.

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

The invention, accordingly, is disclosed in the embodiments 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 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 scope of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a view, in side elevation, of the improved form of open type fuse cutout;

Figure 2 is a view, in front elevation at a reduced scale, of the fuse cutout shown in Figure 1;

Figure 3 is a detail sectional view taken along the line 3—3 of Figure 1;

Figure 4 is a detail sectional view, at a slightly enlarged scale, taken along the line 4—4 of Figure 2;

Figure 5 is a longitudinal cross-sectional view,

at an enlarged scale, of the fuse link shown in Figure 1;

Figure 6 is a detail sectional view, at an enlarged scale, taken along the line 6—6 of Figure 5;

Figure 7 is a detail sectional view, at an enlarged scale, taken along the line 7—7 of Figure 5;

Figure 8 is a detail sectional view, at an enlarged scale, taken along the line 8—8 of Figure 5;

Figure 9 is a longitudinal cross-sectional view of another embodiment of fuse link that may be employed;

Figure 10 is an enlarged detail sectional view of the upper terminal of the fuse link shown in Figure 9;

Figure 11 is a view, similar to that shown in Figure 10, but taken at right angles thereto;

Figure 12 is an enlarged detail sectional view of the anchor member of the fuse link shown in Figure 9; and

Figure 13 is a view, similar to that shown in Figure 12, but taken at right angles thereto.

Referring now particularly to Figure 1 of the drawings, it will be observed that the reference character 10 designates any suitable support, such as a cross arm or pole on which a bracket 11 is mounted by a suitable bolt 12 extending through the shank 11*a*. The bracket 11 is provided for carrying the fuse cutout, shown generally at 13, by receiving on its opposite sides the apertured ears of a band 14 which encircles the central part of an insulator 15. Suitable bolts 16 and 17 extend through the apertured ears of the band 14 and apertures in the ear 11*b* of the bracket 11 for securely mounting the insulator 15 in position.

As illustrated more clearly in Figure 3 the apertured end portions 14*a* of the band 14 through which the bolt 16 extends engage the adjacent surfaces of the ear 11*b* while the intermediate apertured portions 14*b* are spaced from the outer end of the ear 11*b*. The bolt 16 holds the fuse cutout 13 firmly to the bracket 11 while angular adjustment of the insulator 15 and parts carried thereby is permitted by loosening the bolt 17. The intermediate portions 14*b* are sufficiently flexible as to prevent rigid clamping of the insulator 15 which usually is formed of porcelain and might be broken if it were clamped too tightly. The band 14 is flexible enough to permit the end portions 14*a* to be spread apart and slipped over the mid-section of the insulator 15 in assembling the device. To facilitate packaging the device the bolt 17 is left slightly slack, thereby permitting the assembled bracket 11 and band 14 to be rotated about 180° from the position shown in the drawings to position the shank 11*a* on the opposite side of the insulator 15. In mounting the device on the support 10, the bracket 11 and band 14 are rotated to permit application of the shank 11*a* to the support and insertion of the bolt 12. The insulator 15 is then positioned as desired and the bolt 17 is tightened.

The foregoing described mounting bracket construction is disclosed and claimed in our copending application, Serial No. 302,986, filed November 6, 1939.

At its upper end, the insulator 15 is provided with a terminal 18 having a connector bolt 19 for receiving one of the line conductors. The terminal 18 is secured in position at the upper end of the insulator 15 by a band 20, the apertured ears of which are positioned on opposite sides of the terminal 18 through which a bolt 21 commonly extends. A contact arm 22 is carried by the terminal 18. It comprises a single length of copper clad steel wire, the inner end 23 of which is suitably shaped to partially encircle the lower portion of the terminal 18 and to provide loops through which the bolt 21 extends. The outer end portions 24 of the contact arm 22 are turned outwardly, Figure 2, for receiving therein one terminal of a fuse link, shown generally at 25, which is described in detail hereinafter. A clip 26 encircles the adjacent portions of the contact arm close to the point where the end portions 24 are bent outwardly in order to definitely space them apart.

At its lower end, the insulator 15 is provided with a terminal, shown generally at 28. The terminal 28 is provided with a connector bolt 29 for connection to the other line terminal. A band 30 encircles and lower end of the insulator 15, and its apertured ears are positioned on opposite sides of the terminal 28 which is secured in position by a bolt 31 extending commonly therethrough. A lower contact arm 32 is rotatably mounted on the lower terminal 28. At its inner end it is provided with portions 33 which extend at right angles to the lower terminal 28 and serve to rotatably mount the same thereon. At its outer end, Figure 2, the lower contact arm 32 is provided with out-turned portions 34 for receiving the lower terminal of the fuse link 25. A clip 36 encircles the two portions of the lower contact arm 32 and serves to definitely space them apart. Like the upper contact arm 22, the lower contact arm 32 may be formed of copper-clad steel wire, the single length thereof being formed into the desired shape as shown in the drawings. The portions 24 and 34 of the contact arms 22 and 32, respectively, are turned upwardly and downwardly slightly so that the fuse link 25 is securely held in position on their being biased apart.

With a view to biasing the lower contact arm 32 downwardly and tensioning the fuse link 25, the lower contact arm 32 is provided intermediate the portions 33, as shown in Figure 4, with an outwardly extending operating portion 38 that may be generally U-shaped for cooperation with a leaf spring 39, one end of which engages the operating portion 38 while the other end engages the under side of a sleet hood 40. The sleet hood 40 is integrally formed with the lower terminal 28, and its sides 41 extend downwardly to form a complete enclosure for the operating portion 38 and the leaf spring 39. The bottom of the sleet hood 40 may be open as at 42 in order to prevent the collection of water therein.

Since the sleet hood 40 completely encloses the operating portion 38 and the leaf spring 39, the formation of ice thereabout is prevented. It will be observed that the portions 33 space the members forming the lower contact arm 32 a considerable distance apart so that they are not adjacent the sleet hood 40. Therefore ice cannot readily form between these members and the sleet hood 40. Ice can only form about the portions 33 to provide a tubular coating. Since the leaf spring 39 is relatively powerful, any tendency for ice formed in these positions to prevent rotation of the lower contact arm 32 on blowing of the fuse link 25 can be readily overcome since little force is required to break loose these rounded portions from the tubular coating of ice thereon.

The characteristics and arrangement of the leaf spring are important. Since it is not directly in the current path from the lower contact arm

32 to the terminal 28 and, hence, carries little, if any, current, its resiliency is not impaired by the flow of current therethrough as is the case in the spiral spring construction shown in the patent referred to hereinbefore. A flexible shunt is not required between the lower contact arm 32 and the terminal 28, since the leaf spring 39 biases the former into contact engagement with the latter even when the lower contact arm 32 is in its alternate position shown by the broken lines in Figure 1 by being pretensioned. The lower contact arm 32 is prevented from oscillating to any marked extent on blowing of the fuse link 25 by the leaf spring 39.

The details of construction of one embodiment of the fuse link 25 are shown more clearly in Figures 5, 6, 7 and 8 of the drawings. As there shown, the fuse link 25 includes a fusible element 45, the ends of which are secured in terminals 46 and 47 as by deformation of the tubular end portions of the latter onto the ends of the former. A tubular shield 48 may be formed integrally with the terminal 47 for surrounding the major portion of the fusible element 45 to protect the same from corona discharge.

At its upper end, the terminal 46 is provided with a tubular portion 49 into which one end of a rigid terminal 50 is secured by deformation of the end portion 49 thereon. The rigid terminal 50 comprises a length of relatively stiff wire that is bent back on itself and formed at the outer end into a loop 51. A sleeve 52 is deformed onto the rigid terminal 50 at the base of the loop 51 for securely holding the two portions thereof in proper relation to each other. The sleeve 52 is provided with an integrally formed disc portion 53 which engages the upper surface of the outer end portions 24 of the contact arm 22, as shown in Figure 1.

It will be observed that the rigid terminal 50 may be readily placed between the outer end portions 24 of the upper contact arm 22. Since the terminal 50 is rigid with the loop 51 which is carried by a hook stick, it is a comparatively simple matter to guide the fuse link 25 into the proper operating position in engagement with the upper contact arm 22.

As indicated hereinbefore, it is desirable to protect the fusible element 45 from the weather and still provide a source of arc extinguishing material for assisting in putting out the arc on blowing of the fuse link 25. For this purpose the terminal 46 is provided with a knurled portion 56 for receiving a composite housing or sleeve 57. As is more clearly shown in Figures 5 and 6 of the drawings, the housing or sleeve 57 is provided with an outer layer 58 of insulating material and an inner layer 59 of a different type of insulating material. Preferably the outer layer 58 is formed of a phenolic condensation product such as "Bakelite," while the inner layer 59 is formed of fiber. When the layer 58 is formed of this material, it provides an adequate weatherproof construction for the fuse link 25. However, this material does not evolve an arc extinguishing medium. To fulfill this additional requirement, the inner layer 59 is formed, as indicated, of fiber, which, when subjected to the heat of an arc, evolves a certain amount of water vapor that, as is well known, is of material assistance in extinguishing arcs. However, this material does not readily withstand the weather but is likely to warp and distort when subjected to it. By providing the composite housing or sleeve 57 in the manner just described, both the weatherproof and arc extinguishing functions are furnished.

It is desirable that the sleeve 57 be held in substantially the position shown in Figure 1 when the fusible element 45 blows in order to maintain the water vapor evolved from the inner layer 59 in a position where it will be available to most effectively extinguish the arc. If a flexible construction were provided instead of the rigid terminal 50, the reaction from the pressure generated by the arc might immediately blow the sleeve 57 out of position before the arc is extinguished.

Connection to the terminal 47 is made by a flexible lead 60, the lower portion 61 of which has secured thereto a loop 62 formed from a single short length of relatively rigid wire, the ends of which and the lower end of the flexible lead 61 are secured together within a sleeve 63 that is deformed thereon as shown in Figure 8. The sleeve 63 is provided with an integrally formed disc portion 64 for engaging the underside of the out-turned end portions 34 of the lower contact arm 32, as is shown in Figure 1 of the drawings.

In certain types of fuse links, particularly in the low current ranges, it is desirable to apply a tension to the fusible element 45 which will be independent of the tension applied to the fuse link 25 as a whole by the force biasing the contact arms 22 and 32 apart, Figure 1. For this purpose, a coil tension spring 65 is positioned within the housing or sleeve 57 with its upper end convolution deformed about the shoulders of the lower end portion 66 of the terminal 47 that is deformed onto the upper end of the section 60 of the flexible lead. The lower end of the spring 65 is deformed about the lower end of a sleeve 67 that is deformed onto the lower end of the section 60 of the flexible lead. An anchor plate 68 bears against the lower end of the housing or sleeve 57, and a wedge shaped terminal member 69, initially in the form of a sleeve, is deformed onto the upper end of the section 61 of the flexible lead. The section 60 of the flexible lead is of sufficient length that there is a certain amount of slack in it, as illustrated in Figures 5 and 6 of the drawings. The tension of the spring 65 is applied directly to the fusible element 45 and is transmitted through the anchor plate 68 to the housing or sleeve 57 at its lower end, thereby placing it under compression and causing it to act as a strut member to resist this force. Now when a tension is applied to the section 61 of the flexible lead, it serves merely to decrease the compressive stress applied to the housing or sleeve 57 through the anchor plate 68. Since the section 60 of the flexible lead is slack, this tension is not applied to the fusible element 45 in addition to the tension applied thereto by the spring 65. Until the tension applied to the section 61 of the flexible lead exceeds the tension applied to the fusible element 45 by the spring 65, there will be no change in the stress applied to fusible element 45. By employing a spring 65 which applies a tension to the fusible element 45 in excess of the force biasing the contact arms 22 and 32, Figure 1, apart, the fusible element 45 will be uniformly tensioned regardless of variations in the force biasing these contact arms apart. Accuracy on blowing of the fusible element 45 is then assured.

When it is desired to install the fuse link 25 in the fuse cutout 13, the loop 51 is positioned over the prong of a hook stick, which is then raised to cause the disc portion 64 to engage the under side of the out-turned portions 34 of the lower con-

tact arms 32 in the position shown by the broken lines in Figure 1 of the drawings. The hook stick is then raised to rotate the lower contact arm upwardly to such position that the disc portion 53 may be positioned above the out-turned end portions 24 of the upper contact arm 22. Because of the provision of the rigid terminal 50, it is a comparatively simple matter to guide the fuse link 25 into its operative position between the contact arms 22 and 32.

When the fuse link 25 blows, the fusible element 45 is destroyed and the lower contact arm 32 is no longer restrained. It moves downwardly under the influence of the leaf spring 39. The lower terminal 47 and associated parts are expelled from the lower end of the sleeve 57. As indicated hereinbefore, the inner layer 59 of the sleeve 57 is formed of a material such as fiber which evolves water vapor due to the heat of the arc resulting from the blowing of the fusible element 45. This water vapor is of material assistance in extinguishing the arc. In order to make its action most efficient, it is necessary that the sleeve 57 be held in position while the arc is being extinguished. The rigid terminal 50 serves to perform this function in holding the sleeve 57 substantially in the direction of the arc which is initially drawn upon blowing of the fusible element 45. If the terminal 50 were formed of flexible material rather than of rigid material as illustrated and described, the pressure created as the result of the blowing of the fusible element might deflect the sleeve 57 from the desired position.

For higher ampere ratings, the link shown generally at 25' in the Figure 9 of the drawings may be employed. The link 25' is somewhat similar in construction to the link 25 illustrated generally in Figure 1 and in detail in Figures 5 and 6 of the drawings and described hereinbefore. In so far as the same elements are employed for the link 25' the same reference characters as were used for the link 25 will be here employed.

The manner in which the lower ends of the rigid terminal member 50 are secured in the tubular portion 49 of the terminal 46 is more clearly shown in Figures 10 and 11 of the drawings. The upper end of the tubular portion 49 is deformed by being flattened along the length as indicated at 71 so that portions 72 of the wire making up the rigid terminal 50 are reduced in section thereby forming at the lower ends a head portion 73 in the space 74 that remains generally in the initial shape of the opening in the tubular portion 49. By thus deforming the tubular portion 49 and forming the head portion 73 the rigid terminal 50 is solidly wedged into place and is capable of withstanding without separation any stress to which the link 25' may be subjected.

For the higher ampere rating link a fusible element 75 in the form of a coil of silver wire is provided, together with a strain element 76 formed preferably of a high strength nickel alloy steel. The lower tubular end portion of the terminal 46 is deformed onto the upper ends of the fusible and strain elements 75 and 76 by flattening of the same as illustrated. To further secure the fusible and strain elements 75 and 76 in position, the flattened surface is further deformed as by prick punch marks 77 in order to cause the metal of the terminal 46 to flow around the enclosed ends of the fusible and strain elements 75 and 76. It will be observed that the lower end of the terminal 46 is provided with an undercut portion 78, Figure 10, in order to avoid subjecting the fusible and strain elements 75 and 76 to the cutting action of the sharp edge. To insure that this undercut portion 78 will be present, the terminal 46 is not flattened entirely to its lower end, as illustrated.

A terminal 80 is provided, the upper tubular end portion 81 of which is deformed onto the lower ends of the fusible and strain elements 75 and 76. The flattened portion is deformed as by prick punch marks 82 in order to secure an intimate connection thereto. The lower tubular end portion 83 of the terminal 80 is deformed onto the upper end of a length of flexible lead 84. The flexible lead 84 corresponds to the flexible lead 61 shown in Figures 5 and 6 of the drawings but is somewhat heavier in order to take care of the higher ampere rating. As described hereinbefore, a ring 62 is secured by the sleeve 63 onto the lower end of the flexible lead 84

Intermediate the ends of the flexible lead 84 a fitting 85 is provided for closing the lower end of the sleeve 57. The details of construction of the fitting 85 are shown more clearly in Figures 12 and 13 of the drawings. As there shown a portion 86 of the fitting 85 is deformed onto the flexible lead 84 as by flattening. The upper end of the fitting 85 is recessed as indicated at 87 in order to fit inside of the lower end of the sleeve 57. A flange 88 fits over the lower end of the sleeve 57.

With a view to avoiding subjecting the flexible lead 84 to a concentration of stress on the movement of the fitting 85 at an angle to the sleeve 57, its upper end is undercut or flared outwardly as indicated at 89. This relative movement of the fitting 85 is likely to take place if the link 25' is dropped and lands on the fitting 85. By providing the undercut or flared-out portion 89 this stress concentration is avoided and the likelihood of severing of the flexible lead 84 just inside of the lower end of the sleeve 57 is obviated. The lower end of the fitting 85 is likewise undercut or flared outwardly, as indicated at 90, for the same purpose.

It will be understood that the fitting 85 may be substituted for the anchor plate 66 and the wedge-shaped terminal member 69 as shown in Figures 5 and 6 of the drawings.

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

We claim as our invention:

1. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator disposed to be mounted in an upright position, a contact arm fixedly mounted on the upper end of said insulator, a contact arm pivotally mounted on the lower end of said insulator, a fuse link interconnecting said contact arms, spring means cooperating with said pivotally mounted contact arm for biasing the same away from said fixedly mounted contact arm and tensioning said fuse link, and sleet hood means enclosing said spring means for protecting the same from the weather.

2. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator disposed to be mounted in an upright position, a contact arm fixedly mounted on the upper end of said insulator, a contact arm pivotally mounted on

the lower end of said insulator, a fuse link interconnecting said contact arms, a generally U-shaped leaf spring member cooperating with said pivotally mounted contact arm and tensioning said fuse link, and a sleet hood opening downwardly and enclosing said leaf spring member for preventing the formation of ice about the same likely to otherwise interfere with the rotation of said pivotally mounted contact arm on blowing of said fuse link.

3. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator disposed to be mounted in an upright position, upper and lower terminal members at the corresponding ends of said insulator, a bifurcated contact arm looped around said upper terminal member and fixedly secured thereto with the outer ends spreading outwardly, clip means holding said outer ends in spaced apart relation, a bifurcated contact arm having a portion at one end extending through said lower terminal member for pivotally mounting thereon and having the outer ends spreading outwardly, clip means holding the last named outer ends in spaced apart relation, a fuse link having its ends disposed between said spaced apart ends of said contact arms, said portion of said pivotally mounted contact arm having an outwardly extending operating portion, a generally U-shaped leaf spring member reacting against said operating portion for biasing said pivotally mounted contact arm away from said fixedly mounted contact arm and tensioning said fuse link, and a sleet hood opening downwardly and integral with said lower terminal member for enclosing said leaf spring and said operating portion for preventing the formation of ice about the same likely to otherwise interfere with the rotation of said pivotally mounted contact arm on blowing of said fuse link.

4. A fuse cutout for out-of-doors mounting comprising, in combination, insulating support means, a pair of terminals carried by said support means, a fuse link interconnecting said terminals, means rockably mounting one of said terminals, and small radius means extending from the last named means and spacing said one terminal therefrom whereby the likelihood of the formation of ice sufficient to prevent rocking of said one terminal is minimized.

5. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator disposed to be mounted in an upright position, contact means at the upper end of said insulator, support means at the lower end of said insulator, an arm rockably mounted on said support means, said arm having a portion extending horizontally a substantial distance from said support means and being rockable about the longitudinal axis of said portion whereby the likelihood of the formation of ice sufficient to prevent rocking of said arm is minimized, contact means carried by said arm, and a fuse link interconnecting said contact means.

6. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator, a contact arm fixedly mounted on one end of said insulator, a contact arm mounted for rotary movement on the other end of said insulator, a fuse link including a fusible section interconnecting said contact arms, an inner sleeve surrounding said fusible section the inner surface of which is capable of evolving an arc extinguishing medium due to the heat of the arc formed on blowing of said fusible section, an outer sleeve surrounding said inner sleeve and formed of weatherproof material for protecting said inner sleeve from the weather, closure means at the ends of said sleeves, means for holding said sleeves substantially in alignment with the arc formed on blowing of said fusible section, and spring means cooperating with said rotatably mounted contact arm for biasing the same away from said fixedly mounted contact arm and tensioning said fuse link.

7. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator disposed to be mounted in an upright position, a contact arm fixedly mounted on the upper end of said insulator, a contact arm pivotally mounted on the lower end of said insulator, a fuse link including a fusible section interconnecting said contact arms, an inner sleeve surrounding said fusible section the inner surface of which is capable of evolving an arc extinguishing medium due to the heat of the arc formed on blowing of said fusible section, an outer sleeve surrounding said inner sleeve and formed of weatherproof material for protecting said inner sleeve from the weather, closure means at the ends of said sleeves, spring means cooperating with said pivotally mounted contact arm for biasing the same away from said fixedly mounted contact arm and tensioning said fuse link, and sleet hood means enclosing said spring means for protecting the same from the weather.

8. A fuse cutout for out-of-doors mounting comprising, in combination, an insulator disposed to be mounted in an upright position, a contact arm fixedly mounted on the upper end of said insulator, a contact arm pivotally mounted on the lower end of said insulator, a fuse link including a fusible section interconnecting said contact arms, an inner sleeve surrounding said fusible section the inner surface of which is capable of evolving an arc extinguishing medium due to the heat of the arc formed on blowing of said fusible section, an outer sleeve surrounding said inner sleeve and formed of weatherproof material for protecting said inner sleeve from the weather, closure means at the ends of said sleeves, a generally U-shaped leaf spring member cooperating with said pivotally mounted contact arm and tensioning said fuse link, and a sleet hood opening downwardly and enclosing said leaf spring member for preventing the formation of ice about the same likely to otherwise interfere with the rotation of said pivotally mounted contact arm on blowing of said fuse link.

9. A fuse cutout comprising, in combination, an insulator, a contact arm having a bifurcated outer end portion fixedly mounted on one end of said insulator, a contact arm having a bifurcated outer end portion mounted for rotary movement on the other end of said insulator, a fuse link having a rigid terminal member at one end disposed to engage the bifurcated outer end portion of one of said contact arms and a flexible terminal member at the other end disposed to engage the bifurcated outer end portion of the other of said contact arms, and spring means cooperating with said rotatably mounted contact arm for biasing the same away from said fixedly mounted contact arm and tensioning said fuse link, said bifurcated outer end portions of said contact arms being so shaped as to retain said rigid and flexible terminal members in contact engagement therewith.

10. A fuse cutout comprising, in combination, an insulator, a contact arm having a bifurcated outer end portion fixedly mounted on one end of said insulator, a contact arm having a bifur-

cated outer end portion mounted for rotary movement on the other end of said insulator, a fuse link having a rigid terminal member at one end and a flexible terminal member at the other end with an abutment member on each terminal member for engaging the outside portions of said bifurcated outer end portions of said contact arms, and spring means cooperating with said rotatably mounted contact arm for biasing the same away from said fixedly mounted contact arm and tensioning said fuse link, said bifurcated outer end portions of said contact arms being so shaped as to retain said abutment members on said rigid and flexible terminal members in contact engagement therewith.

11. A fuse cutout comprising, in combination, an insulator, a contact arm having a bifurcated outer end portion fixedly mounted on one end of said insulator, a contact arm having a bifurcated outer end portion mounted for rotary movement on the other end of said insulator, a fuse link having a rigid terminal member at one end and a flexible terminal member at the other end with an abutment member on each terminal member for engaging the outside portions of said bifurcated outer end portions of said contact arms and a loop member on the ends of each terminal member for receiving hook stick means for placing the fuse link in operative position, and spring means cooperating with said rotatably mounted contact arm for biasing the same away from said fixedly mounted contact arm and tensioning said fuse link, said bifurcated outer end portions of said contact arms being so shaped as to retain said abutment members on said rigid and flexible terminal members in contact engagement therewith.

12. A fuse cutout comprising, in combination, an insulator, contact arms mounted on the ends of said insulator and biased apart, a fuse link interconnecting said contact arms and tensioned thereby, said fuse link having a fusible section, a strut member paralleling said fusible section, and spring means tensioning said fusible section through said strut member to an extent greater than the tension applied to said fuse link by said contact arms whereby a predetermined tension is applied to said fusible section regardless of the tension applied to said fuse link.

13. A fuse cutout comprising, in combination, an insulator, a contact arm fixedly mounted on one end of said insulator, a contact arm pivotally mounted on the other end of said insulator, spring means cooperating with said pivotally mounted contact arm for biasing the same away from said fixedly mounted contact arm, a fuse link interconnecting said contact arms and tensioned by said spring means, said fuse link having a fusible section, a strut member paralleling said fusible section, and additional spring means tensioning said fusible section through said strut member to an extent greater than the tension applied to said fuse link by said first mentioned spring means whereby a predetermined tension is applied to said fusible section regardless of the tension applied to said fuse link.

14. A fuse link comprising, in combination, a fusible section, a rigid terminal extending from one end of said fusible section, a flexible lead extending from the other end of said fusible section, loop members carried by said rigid terminal and said flexible lead adapted to be engaged by a hook stick for placing the fuse link in operative position on a fuse mounting, and abutment means on said rigid terminal and said flexible lead for engaging the terminals of said fuse mounting.

15. A fuse link for out-of-doors mounting comprising, in combination, a fusible section, an inner sleeve surrounding said fusible section the inner surface of which is capable of evolving an arc extinguishing medium due to the heat of the arc formed on blowing of said fusible section, an outer sleeve surrounding said inner sleeve and formed of weatherproof material for protecting said inner sleeve from the weather, a rigid terminal extending from one end of said fusible section, a flexible lead extending from the other end of said fusible section, loop members carried by said rigid terminal and said flexible lead adapted to be engaged by a hook stick for placing the fuse link in operative position on a fuse mounting, and abutment means on said rigid terminal and said flexible lead for engaging the terminals of said fuse mounting.

16. A fuse link comprising, in combination, fusible means, a sleeve of insulation surrounding said fusible means, terminal means connected to said fusible means and closing one end of said sleeve, a flexible lead connected to said fusible means and extending out of the other end of said sleeve, and a tubular metal fitting deformed onto said flexible lead and having a portion extending into the other end of said sleeve and having a flange abutting the same, said portion of said fitting being flared outwardly to avoid concentration of stress on said flexible lead.

17. A fuse link comprising, in combination, fusible means, a terminal having tubular end portions one of which is deformed onto one end of said fusible means, and conductor means in the other tubular end portion extending outwardly therefrom, said other end portion being deformed onto a portion of said conductor means therein in such manner that an enlarged part thereof is provided whereby said conductor means is wedged therein.

18. A terminal for a fusible element comprising, a metal member adapted at one end to be secured to the fusible element and having a tubular portion at the other end, and conductor means extending into said tubular portion, said tubular portion being deformed onto said conductor means in such manner that an enlarged part thereof is provided whereby said conductor means is wedged therein.

19. A fuse cutout for out-of-doors mounting comprising, in combination, a pair of contact arms one of which, at least, is pivotally mounted, means for supporting said contact arms in insulated spaced relation, said contact arms being adapted to be interconnected by fuse link means, spring means biasing the pivotally mounted contact arm and tensioning said fuse link means, and sleet hood means enclosing said spring means for protecting the same from the weather.

20. A fuse cutout for out-of-doors mounting comprising, in combination, a pair of contact members positioned in insulated spaced relation, said contact members being relatively movable apart and adapted to be interconnected by fuse link means, means rockably mounting one of said contact members, and small radius rockable means extending from the last named means and spacing said one contact member therefrom whereby the likelihood of the formation of ice sufficient to prevent rocking of said one contact member is minimized.

21. A fuse link for out-of-doors mounting between line terminals disposed in insulated spaced

relation comprising, in combination, a fusible section, relatively infusible terminals at the ends of said fusible section, an inner sleeve surrounding said fusible section and formed of material capable of evolving an arc extinguishing medium due to the heat of the arc formed on blowing of said fusible section, an outer sleeve surrounding said inner sleeve and formed of weatherproof material for protecting the inner sleeve from the weather, conductor means extending from each of said relatively infusible terminals at least one of which comprises flexible conducting means, fittings on said conductor means for contact engagement with said line terminals, and a loop on at least one of said conductor means for receiving a hook stick for placing the fuse link in operative position between said line terminals.

22. A replaceable fuse link comprising, in combination, a composite sleeve of insulating material the inner portion of which is formed of material capable of evolving an arc extinguishing medium due to the heat of an arc and the outer portion of which is formed of material capable of protecting the inner portion, fusible means within said composite sleeve, a relatively infusible rodlike terminal at one end of said composite sleeve and connected to one end of said fusible means, a loop attached to said rodlike terminal for receiving a hook stick for placing the fuse link in operative position, conductor means including a flexible lead attached to the other end of said fusible means and extending out of the other end of said composite sleeve, said conductor means being free to move entirely out of said composite sleeve on blowing of said fusible means, and abutment means on said rodlike terminal and on said conductor means for engagement with line terminals.

23. A replaceable fuse link comprising, in combination, a composite sleeve of insulating material the inner portion of which is formed of material capable of evolving an arc extinguishing medium due to the heat of an arc and the outer portion of which is formed of material capable of protecting the inner portion, fusible means within said composite sleeve, rodlike terminal means closing one end of said composite sleeve and connected to one end of said fusible means, a loop attached to said rodlike terminal means for receiving a hook stick for placing the fuse link in operative position, conductor means including a flexible lead attached to the other end of said fusible means and extending out of the other end of said composite sleeve, said conductor means being free to move entirely out of said composite sleeve on blowing of said fusible means, means for closing said other end of said sleeve, and abutment means on said rodlike terminal means and on said conductor means for engagement with line terminals.

24. Circuit interrupting means comprising, in combination, upper and lower circuit terminals mounted in insulated spaced relation, a stationary contact arm carried by said upper circuit terminal, a movable contact arm rotatably mounted on said lower circuit terminal, spring means acting between said lower circuit terminal and said movable contact arm to bias the latter downwardly, housing means covering said spring means to protect the same from the weather, and fusible means interconnecting said stationary and movable contact arms and restraining movement of the latter.

25. A fuse link comprising, in combination, a weather proof sleeve of insulation, a fusible section within said sleeve, conductor means interconnected by said fusible section and extending from the ends of said sleeve and at least one of said conductor means being rod-like in character, loop members at the ends of said conductor means adapted to be engaged by a hook stick for placing the fuse link in operative position on a fuse mounting, and abutment means between each loop member and the associated end of said sleeve for engagement with the terminals of said mounting.

26. A fuse link comprising, in combination, a weatherproof sleeve of insulation, a fusible section within said sleeve, conductor means interconnected by said fusible section and extending from the ends of said sleeve and at least one of said conductor means being rod-like in character, closure means at the ends of said sleeve, a wire loop at the outer end of each conductor means at least one of which is adapted to be engaged by a hook stick for placing the fuse link in operative position on a fuse mounting, and abutment means at the base of each loop for engaging the terminals of said fuse mounting.

27. A fuse link comprising, in combination, a weatherproof sleeve of insulation, a fusible section within said sleeve, conductor means interconnected by said fusible section and extending from the ends of said sleeve and at least one of said conductor means being rod-like in character, a wire loop at the outer end of each conductor means adapted to be engaged by a hook stick for placing the fuse link between the contact members of a fuse mounting, and flange means associated with each wire loop against which said contact members can react.

28. A fuse link comprising endwise eyes composed of conducting material, a fusible portion and a loose flexible portion connected in series and between said conducting eyes, and a tension spring which is shunted by said loose flexible conducting portion.

29. A fuse comprising line terminals curved away from one another, fingers on the ends of said line terminals forming V-shaped notches which open away from one another, a fuse link comprising end means for hooking into said notches respectively, fusible means between said hooking portions, a tension spring in said fuse link, and a loose flexible conducting portion shunting said spring.

30. A fuse comprising line terminals, said terminals being oppositely located, a fuse link comprising endwise eyes of a conducting material, said eyes being respectively applicable to said line terminals, a fusible portion and a loose flexible portion serially connected between said conducting eyes, and a tension spring shunted by said loose flexible conducting portion.

31. A fuse device comprising an insulator support; a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relation thereto; a fuse link holding means associated with the ends of said arms; and a fuse link assembly including a pair of conductors, a current responsive means electrically connecting said conductors, and a biasing means secured to one of said conductors and adapted to tension said assembly between said holding means.

32. A fuse device comprising an insulator support; a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relation thereto; a fuse

link holding means associated with the ends of said arms; and a fuse link assembly including a pair of conductors, a current responsive means electrically connecting said conductors, and a biasing means secured to one of said conductors and adapted to tension said assembly between said holding means, said last mentioned conductor acting to shunt the current around said biasing means and limit the expansion of said biasing means.

33. A fuse device comprising an insulator support, a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relation thereto, a fuse link holding means associated with the ends of said arms, and a fuse link assembly including a pair of conductors and a comparatively heavy spring secured to one of said conductors and adapted to tension said assembly between said holding means.

34. A fuse device comprising an insulator support; a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relationship thereto; a fuse link holding means associated with the ends of said arms; and a fuse link assembly including a pair of conductors, one of which is flexible, a tool receiving member associated with each conductor and adapted to mount said fuse link in operating position relative to said means, a current responsive means electrically connecting said conductors, and a biasing means secured to one of said conductors and adapted to tension said assembly between said holding means.

35. A fuse device comprising an insulator support; a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relationship thereto; a fuse link holding means associated with the ends of said arms; and a fuse link assembly including a pair of conductors, one of which is flexible, a current responsive means electrically connecting said conductors, a loop-shaped attaching member associated with each conductor and adapted to mount said assembly in non-gripping relationship with said means, and a biasing means secured to one of said conductors and adapted to tension said assembly between said holding means.

36. A fuse device comprising an insulator support; a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relationship thereto; a fuse link holding means associated with the ends of said arms; and a fuse link assembly including a pair of conductors, one of which is flexible, a current responsive means electrically connecting said conductors, an insulating tubular member surrounding said current responsive means, and a biasing means secured to one of said conductors and adapted to tension said assembly between said holding means.

37. A fuse device comprising an insulator support; a pair of rigid conductor arms mounted adjacent the ends of said support and extending in substantially normal relationship thereto; a fuse link holding means associated with each of said arms; and a fuse link mounted in releasable relationship with said holding means, said link being biased by means of a spring carried by said link and tensioned into operating position by the mounting of said link.

38. A fuse cutout for out-of-doors mounting comprising, in combination, insulated support means, a contact arm fixedly mounted on said support means, a contact arm mounted for rotary movement on said support means and spaced from said fixedly mounted contact arm, a fuse link including a fusible section interconnecting said contact arms, a sleeve surrounding said fusible section the inner surface of which is capable of evolving an arc extinguishing medium due to the heat of the arc formed on blowing of said fusible section and the outer surface of which is weatherproofed, and means cooperating with said rotatably mounted contact arm for biasing the same away from said fixedly mounted contact arm.

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