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FUSE CLIP TIGHTENER

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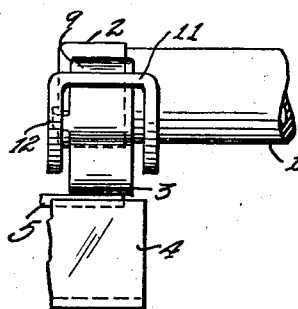


Fig. 1.

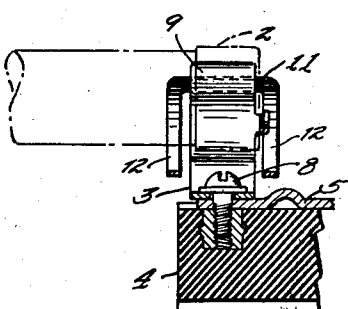


Fig. 1a.

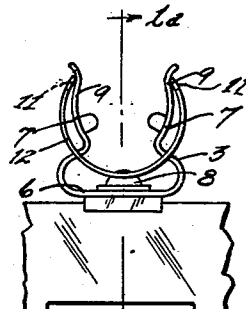


Fig. 2.

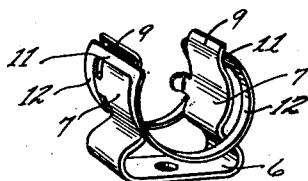


Fig. 3.



Fig. 4.

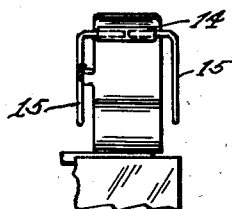


Fig. 5.

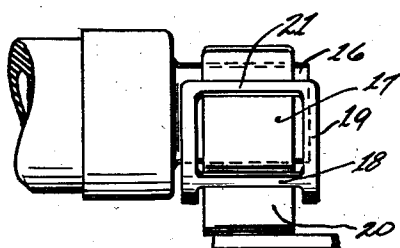


Fig. 6.

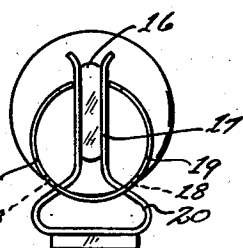


Fig. 7.

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UNITED STATES PATENT OFFICE

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FUSE CLIP TIGHTENER

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6 Claims. (Cl. 200—134)

This invention relates to a fuse clip tightener which may be readily inserted on and detached from the fuse clip while the clip is mounted in its operating position.

A principal object is to provide a fuse tightener in which the tightening pressure applied to the clip is uniformly distributed and most effectively applied and in which the tightening force inherent in the tightener is fully utilized and lines of weakness are eliminated.

Other objects of the present invention are to provide a clip of this character which may be readily installed on the fuse clip by passing the same over the free ends of the clip arms, which will readily assume a proper operating position, in which the fuse may be readily inserted and removed from the clip and which is fully ventilated so that heating and subsequent deterioration of the spring action of the tightener is eliminated.

Other objects and advantages will become apparent from the following specification wherein reference is made to the drawing, in which

Fig. 1 is a side elevation of a fuse and clip combination with a fuse tightener of the present invention installed on the fuse clip;

Fig. 1a is a view complementary to Fig. 1 and is taken on the line 1a—1a of Fig. 2.

Fig. 2 is an end elevation of one of the fuse clips and installed tightener illustrated in Fig. 1, with the fuse removed;

Fig. 3 is a perspective view of one of the clips and the tightener installed with the fuse removed;

Fig. 4 is a perspective view of a modified form of tightener;

Fig. 5 is a side elevation of a clip with the tightener of Fig. 4 installed;

Fig. 6 is a side elevation of a clip and knife contact fuse with a modified form of fuse tightener installed; and

Fig. 7 is an end elevation of the combination illustrated in Fig. 6.

Referring to Figs. 1 to 3, a fuse 1 having ferrule ends 2 is shown mounted in the usual fuse clips 3, each of which, in turn, is secured on a suitable insulating base 4 and connected to conductors, such as indicated at 5. The clips of this type are usually in the form of a metal strip formed into U-shape to provide a base portion 6 and resilient arms 7, adapted to receive the fuse ends therebetween. The base portion is provided with a hole through which extends a screw 8 for securing the clip firmly against the face of the conductor 5 and to the base 4. The fuse may be inserted readily between the free end portions 9 of the clip

which spring apart consequent upon movement of the fuse thereinto transversely of its axis. Since the arms 7 of the clip are secured only at one end to the base portion and furthermore since the metal from which they are formed does not have a high degree of resiliency and soon becomes weakened by insertion and removal of the fuse, it is necessary to tighten the clip more firmly about the end of the fuse so as to insure a better contact and eliminate vibration and heating. For accomplishing this purpose the tightener illustrated in Figs. 1 to 3 may be used.

In its preferred form, the tightener comprises a frame having side members 11 and end members 12, the frame being receivable onto the clip over the free ends 9 of the clip arms. The side members are sufficiently rigid so that force applied to their ends will not tend to warp them out of shape but will be distributed comparatively uniformly longitudinally along the outer portions of the clip arms 9. In order to draw the side frame members 11 firmly in place and insure substantially uniform contact between the side frame members and the outer surfaces of the clip arms, the end frame members 12 of the tightener are formed of spring metal and are preferably arcuate so as to define a surface concave toward the fuse. The side frame members 11 each protrudes longitudinally of the fuse axis beyond the longitudinal edges of the arms 7 at both ends. Corresponding protruding ends of the two side frame members are connected to the end frame members 12 so that the end frame members 12 do not come in contact with the edges of the clip arms. The end frame member 12 nearer the longitudinal center of the fuse, does not engage the fuse but surrounds the same in spaced relation thereto. The end frame members are preferably so arranged that they do not engage the base 4 or any portion of the clip or conductors connected to the clip. As a result, the entire effect of the end frame members 12, including that portion lying within the transverse limits of the clip, are fully utilized and all of the force thereof is directed into the side frame members 11. Furthermore, the stresses in the end frame members are not concentrated at any points intermediate the ends and consequently no line of weakness results but a constant strength beam action with uniform stress results.

Since one of the members 12 is arranged at each end of the members 11, there is no tendency for the members 11 to rock away from the surface of the arms 7 about either end of the members 11, but instead, the force of the spring end frame members 12 is uniformly distributed along the

side frame members 11. It is apparent therefore that not only is the entire force of the spring utilized but it is applied in the most efficient manner and at the most efficient location.

5 Referring to Figs. 4 and 5, a similar tightener made of spring wire is illustrated, the ends of the wires preferably being secured together by a small sleeve 14, so that the entire force of the spring and frame members 15 may be applied to the clip. If desired, the wire ends may be se-
10 cured by spot welding so as to form a unitary structure but it is more difficult to provide an accurate surface which will properly engage the clip arms.

15 Referring to Figs. 6 and 7, a fuse having a knife end contact 16 instead of a ferrule contact is illustrated and is received in the usual knife receiving clip 17. The tightener for use in connection with a knife clip may be similar in
20 all respects to those described above with the addition of some abutment means for retaining the tightener in the proper operating position. A convenient means for accomplishing this result and permitting the use of the standard straight
25 edge knife clip may comprise bridges 18 connected to the spring end frame members 19 of the clip, the bridges 18 being so positioned relative to the free ends of the clip that they will form abutments which engage the base 20 of the clip when
30 the side frame members 21 of the tightener are in engagement with the clip arms near their free ends. Since the pressure of the tightener is effectively applied and the tightener is spaced so
35 as to be readily ventilated, no heating results which would have a deleterious effect on the resiliency of the end frame members. In the forms illustrated in Figs. 1 to 5 inclusive, the side frame members themselves and the bowed configuration of the arms of the fuse clip provide the abutment
40 means corresponding to the bridges 18.

Having thus described my invention,
I claim:

1. In a fuse and fuse clip combination, a tightener comprising a frame having side frame mem-
45 bers and spring end frame members and being receivable over the free ends of the clip arms, the side members of the frame engaging the outer surfaces of opposite clip arms respectively near the free ends of the arms and extending longi-
50 tudinally of the fuse axis along the clip arms and protruding beyond the edges of the arms, the said spring end frame members connecting corresponding protruding ends of the side mem-
55 bers and operable to yieldably draw said side members firmly against the clip arms, and abutment means on said frame cooperable with the clip arms to maintain the frame in operating position on the clip arms.

2. In a fuse and fuse clip combination, a tightener comprising parallel spaced side frame mem-
60 bers and spring end frame members rigidly connected to the ends of the side frame members and forming therewith a frame defining a central passage of sufficient size to accommodate the
65 passage of the free ends of the fuse clip arms therethrough when the tightener is moved over the free ends of the clip arms while the end frame members are disposed toward the base of the clip, said side frame members being movable rel-
70 atively apart and yieldably urged together by the end frame members for engaging the outer end portions of the free ends of the clip when the tightener is mounted thereon, and said tightener
75 being detachably held in operating position on

the clip solely by engagement of the tightener and outer side faces of the clip.

3. In a fuse and fuse clip combination, a tightener comprising parallel spaced side frame mem-
5 bers and spring end frame members rigidly connected to the ends of the side frame members and forming therewith a frame, the side frame members of said frame being engageable with the outer portions of the free ends of the clip arms, said
10 end frame members being substantially continuously and uniformly arcuate for substantially their entire length, whereby the spring effect of substantially the entire length thereof is effective on the side frame members and in a direction
15 normal to the surface to be engaged by the side frame members.

4. In a fuse and fuse clip combination, a tightener comprising parallel spaced side frame mem-
20 bers and arcuate spring end frame members rigidly connected to the ends of the side frame members and forming therewith a frame defining a central passage of sufficient size to accommo-
25 date the passage of the fuse clip arms therethrough when the tightener is moved bodily over the free ends of the clip arms with the end frame members disposed to define a surface convex to-
30 ward the base of the clip, and said side frame members being movable relatively apart and yieldably urged together by the end frame members for engaging the outer end portions of the
35 free ends of the clip when the tightener is mounted thereon with the end frame members so disposed.

5. In a fuse and fuse clip combination, a tightener comprising parallel spaced side frame mem-
35 bers and arcuate spring end frame members rigidly connected at their ends to corresponding ends of the side frame members and forming therewith a frame defining a central passage of
40 sufficient size to accommodate the passage of the free ends of the clip arms therethrough when the tightener is moved bodily over the free ends of the clip arms with the end frame members
45 disposed toward the base of the clip, said end frame members defining an arcuate surface concave toward the free end of the clip, said side frame members being yieldably urged toward each
50 other by the end frame members for yieldably engaging the outer end portions of the free ends of the clip arms when the tightener is mounted thereon, and the arcuate end frame member
55 nearer the longitudinal center of the fuse associated with the clip passing around beneath the surface defined by the fuse while the fuse end is mounted in the clip.

6. As an article of manufacture, a fuse clip tightener comprising a generally rectangular
60 frame or spring metal of integral side frame and end frame members, defining a large central opening, said end frame members being spaced from each other a distance greater than the
65 length, parallel to the fuse axis, of the fuse clip with which it is to be associated, and being curved for substantially their entire length to dispose the side frame members closer together
70 and to form arcuate spring arms for moving the side frame members relatively together, whereby the tightener can be moved with the end frame members foremost, over the free ends of the
75 fuse clip arms and the side frame members sprung apart to pass over said free ends and yieldably engage the outer surfaces of said free ends of the clip arms for urging them relatively together.