

Sept. 29, 1936.

O. H. JUNG ET AL

2,055,866

ELECTRIC FUSE

Filed July 1, 1932

2 Sheets-Sheet 1

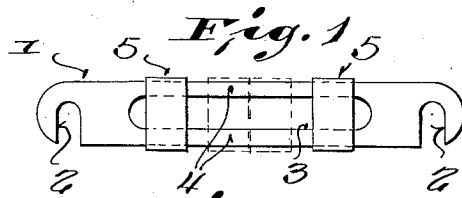


Fig. 1

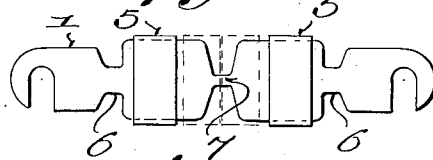


Fig. 3

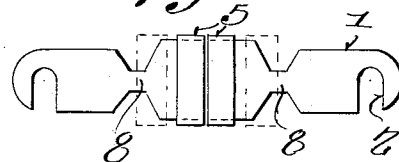


Fig. 5

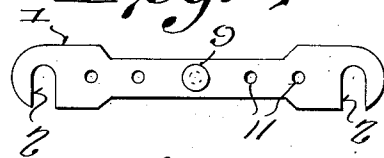


Fig. 7

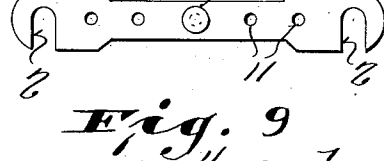


Fig. 9

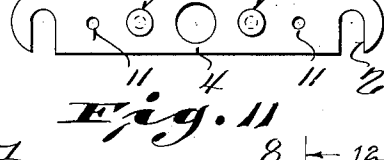


Fig. 11

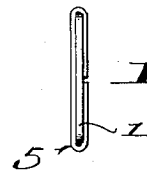


Fig. 2

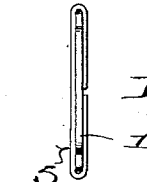


Fig. 4

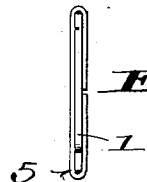


Fig. 6

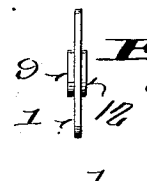


Fig. 8

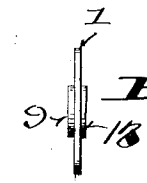


Fig. 10

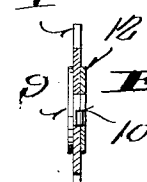


Fig. 12

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Fig. 13

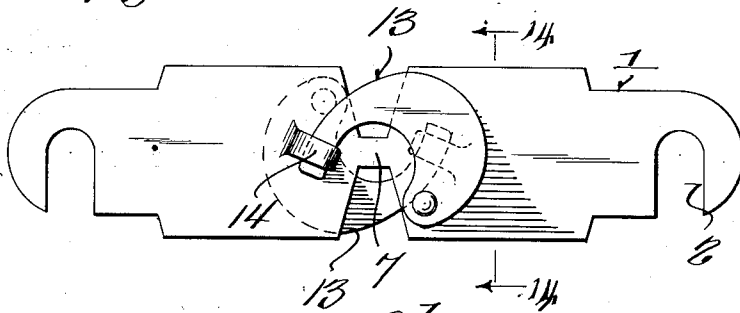


Fig. 14

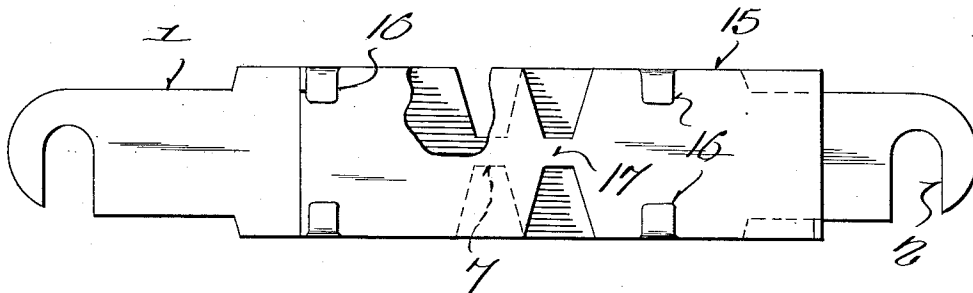
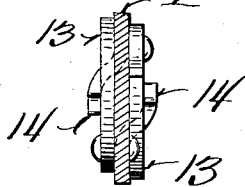


Fig. 15

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2,055,866

ELECTRIC FUSE

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Milwaukee, Wis.

Application July 1, 1932, Serial No. 620,372

9 Claims. (Cl. 200—135)

This invention pertains to electric fuses, and more particularly to a fusible link utilized in electric circuits to protect the same from the effects of momentary excessive current.

It is well-known that the starting current of all motors manufactured at the present time varies considerably between wide limits. Due to this characteristic, all fuse links used at the present time are not adaptable to the starting current, or characteristics of various types of conventional motors. Because of this existing condition, motor circuits must be over-fused, and therefore do not have 100% fuse protection.

Conventional fuse links in use at the present time make provision for a time lag in the fusing period of the link to prevent overload of brief duration from fusing the link, as for instance, when an alternating current motor is thrown into the line. This is accomplished by so proportioning certain parts of the link as to absorb sufficient heat to delay the period of fusing until such time as the normal operation of the motor reduces the current to its normal stage. Such fuse links are satisfactory only insofar as the amount of excessive current generated is predetermined, and in instances where additional loads or motors are connected in the line, the fuse links must necessarily be changed to compensate for various time lags in order to prevent premature fusing. This requires a large stock of fuses to be kept on hand for frequent changing.

The present invention has primarily for its object to overcome the foregoing objections by the provision of a fuse link designed to normally fuse at a predetermined load and provided with means for regulating the fusing period to compensate for various initial excessive overloads.

Incidental to the foregoing, a more specific object of the present invention resides in providing a fusible link with shiftable metallic or non-metallic members, whereby the period of fusing may be reduced or increased as desired.

Another object of the invention results from the ability to cause the fusible link to selectively fuse at either one point in the link or at spaced points, the latter being sometimes desirable to cause a substantial portion of the link to drop out upon fusing, thus preventing subsequent arcing.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more par-

ticularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings is illustrated one complete example of the physical embodiment of the present invention constructed according to the best mode so far devised for the practical application of the principles thereof.

In the drawings, Figure 1 is an elevation of a conventional type of fuse link with the present invention applied thereto;

Figure 2 is an end elevation;

Figures 3, 5, 7, 9, 11, 13 and 15, are elevational views of modified forms of the invention;

Figure 4 is an end elevation of the form shown in Figure 3;

Figure 6 is an end elevation of the form shown in Figure 5;

Figure 8 is an end elevation of the form shown in Figure 7;

Figure 10 is an end elevation of the form shown in Figure 9;

Figure 12 is a transverse section taken on the line 12—12 of Figure 11; and

Figure 14 is a transverse section taken on the line 14—14 of Figure 13.

Referring now more particularly to the accompanying drawings, wherein the fusible strips of the various forms illustrated are designated by the numeral 1, the same are provided adjacent their ends with transverse slots 2 for attachment to suitable terminals, not shown, it being understood that the invention can be applied to any type of fusible strip, although the same is most applicable to what are commonly termed renewable links.

Referring to the structure shown in Figures 1 and 2, the link 1, formed of fusible metal, is provided with an elongated longitudinal slot 3, which serves to provide restricted intermediate portions 4, wherein the fusing occurs as the link becomes heated through excessive current.

The link thus far described is conventional, and as heretofore explained, under ordinary conditions when the same is subjected to initial excessive current, the link would quickly fuse to break the circuit, although the excessive current may be present for only a brief period in starting a motor or similar devices. Therefore, in order to increase the period of fusing of the restricted portions 4, to thus provide a time lag, the strip or link 1 is provided with shiftable metal clips 5, the ends of which are folded over the

link to retain the clips thereon and provide for longitudinal shifting of the same.

In normal use of the fuse, the clips 5 are positioned adjacent the extremities of the link and thus have little or no effect upon the intermediate restricted portions 4, inasmuch as they are sufficiently spaced therefrom as to absorb practically no heat from those portions. Therefore, the restricted portions 4 will quickly fuse at a predetermined current.

In order to increase the period of fusing, it is merely necessary to shift the clips 5 toward each other, and naturally as they approach the central or intermediate part of the restricted portions 4, they will absorb heat therefrom and thus increase the period of fusing. In the event that the clips are shifted toward the center of the link into engagement with each other, as shown in dotted lines in Figure 1, it will be quite obvious that they will act to absorb heat from the central area of the restricted portions, thus causing the restricted portions to fuse in two places upon opposite sides of the clips, resulting in the intermediate portions dropping out to provide a substantial gap which eliminates any possibility of arcing.

From the foregoing explanation, it will be quite apparent that exceedingly simple and inexpensive means has been provided for varying the period of fusing of the link and for selectively causing the link to be fused either at an intermediate portion or at spaced portions.

As heretofore explained, it is old and well-known to either proportion certain portions of a link so as to provide a time lag, or to accomplish the same by adding metallic plates for the purpose of absorbing heat from the fusible portion of the link. However, such links do not provide for varying the fusing period, and therefore frequent changes and a large stock of links are required.

Obviously, the present invention overcomes the foregoing and provides for considerable variation in the period of fusing within a substantial range, thus enabling a single link to be readily accommodated to various conditions, and also enabling the link to be readily converted from a conventional fuse link to what is commonly termed a "drop-out" link.

Referring to Figure 3, the link 1 is provided with spaced restricted portions 6 and an intermediate restricted portion 7 of less cross-sectional area than the restricted portion 6. Normally, such link would fuse at the intermediate portion 7 and by shifting the clips 5, the period of fusing can be varied, as heretofore explained. In the event that the clips 5 are shifted to engage each other, as shown in dotted lines, then the link 1 will fuse at the restricted portion 6, causing the intermediate portion of the link to drop out.

The link shown in Figure 5 is a conventional drop-out link provided with only two spaced restricted portions 8. In this form, when the clips 5 are shifted to central position, as shown, they will have little or no effect in absorbing heat from the restricted portions, and therefore the link will fuse in a minimum period of time. However, by shifting the clips apart to the position indicated in dotted lines, they would then serve to absorb heat from the restricted portions and increase the fusing period.

In the forms shown in Figures 7, 9, and 11, instead of providing slidable clips, it is proposed to utilize shiftable metallic buttons 9, the same being provided with threaded shanks 10 for in-

section in the spaced recesses 11, and reception of nuts 12 to secure the buttons to the link. Obviously, any other suitable form of attachment may be utilized, the essential feature of the structure residing in the shiftable of the metallic buttons to effect the absorption of heat from the fusible portion of the link, thus varying the period of fusing.

In the form illustrated in Figures 13 and 14, instead of slidable or shiftable metallic members, the link 1 is provided with either one or two rotatable metallic plates 13, pivotally secured to the link upon opposite sides of the restricted intermediate portion 7. In order to insure proper contact between the rotatable plates 13 and the link 1, lips 14 are preferably provided for engagement with the plates, the lips being formed out of the body of the link.

In operation, when the plates 13 are rotated to one side of the restricted portion 7, they will have little or no effect in absorbing heat from the restricted portion. Therefore, the same will fuse within the minimum predetermined period. However, by rotating the plates 13 across the restricted portion, the same will absorb sufficient heat from the restricted portion to prolong the period of fusing, and inasmuch as the plates 13 are flared from their free ends, the period of fusing can be varied to a high degree of nicety.

In Figure 15, a single slidable plate 15 is provided, held in sliding engagement with the link 1, by means of the lips 16 bent over from the opposite longitudinal edges of the link into engagement with the plate 15. As will be noted, the plate 15 is provided with an intermediate restricted portion 17 conforming to the restricted portion 7 in the link.

In operation, when the plate 15 is shifted to that position illustrated, heat will be dissipated from the restricted portion 7 and absorbed by the plate 15 to provide for a maximum period of fusing. When shifted in the opposite direction, so that the restricted portions 7 and 17 are aligned, the portions 7 and 17 will fuse in the minimum period of time.

In the forms shown in both Figures 13 and 15, obviously when the metallic plates are shifted to provide a greater cross-sectional area at the central portion of the links than at the ends, the links will fuse at the ends, causing the intermediate portion to drop out, as heretofore explained.

Thus, in all forms of the invention described, both salient features are present, namely, the ability to vary the period of fusing or selectively cause the link to fuse at an intermediate portion, or at spaced points, causing the intermediate portion to drop out, relieving strain upon the restricted portions of the link, thus eliminating objectionable stretching and centering of the link, and, in instances where more than one link is bolted across the terminals or blades, to cause the unrestricted portions of the links to be bent outwardly or away from each other, thus increasing the distance between the two points and rendering arcing more difficult.

Having thus illustrated and described the invention in considerable detail, it is to be understood that various modifications are contemplated as coming within the scope of the same.

We claim:

1. A fuse link comprising a fusible strip for connecting a pair of electric terminals, and movable means carried by said strip for varying the fusible period of said strip.

2. A fuse link comprising a fusible strip for connecting a pair of electric terminals, and movable means carried by said strip for absorbing heat from desired portions thereof.
- 5 3. A fuse link comprising a fusible link for connecting a pair of electric terminals, a pair of movable members carried by said strip for absorbing heat from certain portions of said strip to vary the fusible period of said portions.
- 10 4. A fuse link comprising a fusible strip for connecting a pair of electric terminals and provided with a contracted fusible portion, a pair of movable members carried by said strip for affecting the dissipation of heat from said restricted portions to vary the fusible period of said portions.
- 15 5. A fusible link comprising a fusible strip for connecting a pair of terminals, a pair of slidable heat dissipating members carried by said strip for adjustment toward or away from each other.
- 20 6. A fusible link comprising a fusible strip for connecting a pair of electric terminals, and means carried by said strip for selectively causing the same to fuse at either one or two places.
7. A fuse link comprising a fusible strip for connecting a pair of electric terminals, and movable means carried by said strip for selectively causing the same to fuse at an intermediate portion or at spaced portions.
8. A fuse link comprising a fusible strip for connecting a pair of electric terminals, and means carried by said strip for varying the fusible period of said strip, and selectively causing said strip to fuse at either one or two places.
- 10 9. A fuse link comprising a fusible strip for connecting a pair of electric terminals, and a pair of metallic clips engaging said strip for slidable movement thereon to vary the fusible period of said strip.
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