

- [54] FUSE CLIP
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- [73] Assignee: Marathon Electric Manufacturing Corporation, Wausau, Wis.
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- [52] U.S. Cl. 337/215, 339/219 F, 339/253 F, 339/256 C
- [51] Int. Cl. H01h 85/50
- [58] Field of Search 337/214, 215, 252; 339/256 F, 219 F, 253 F, 252 F, 259 F

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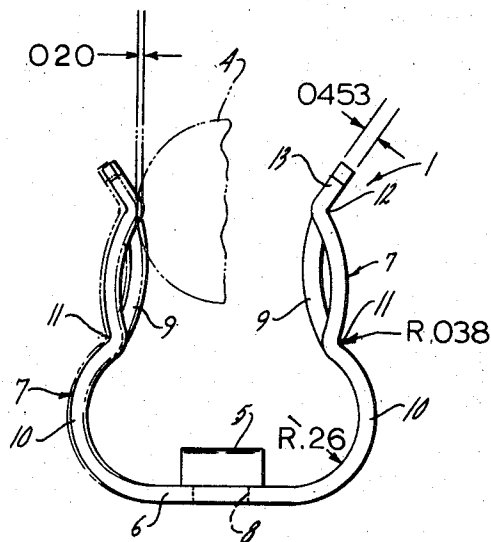
UNITED STATES PATENTS

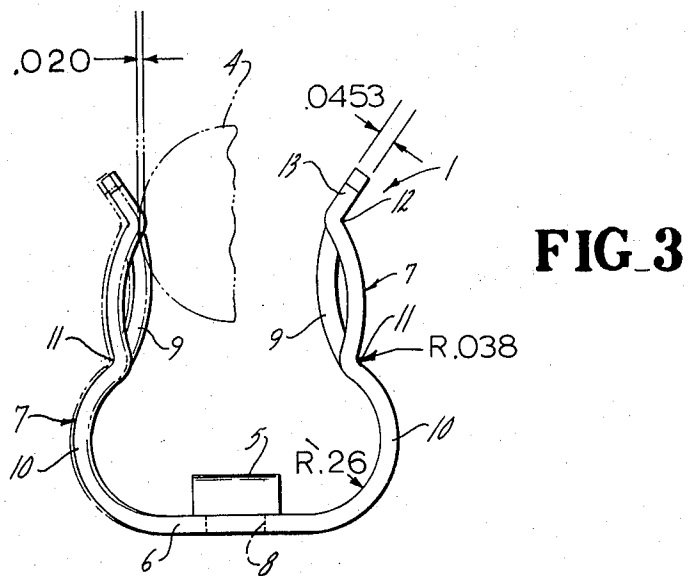
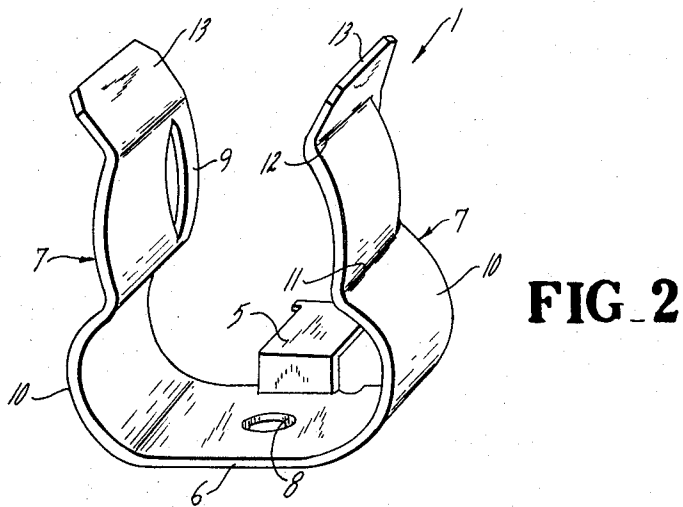
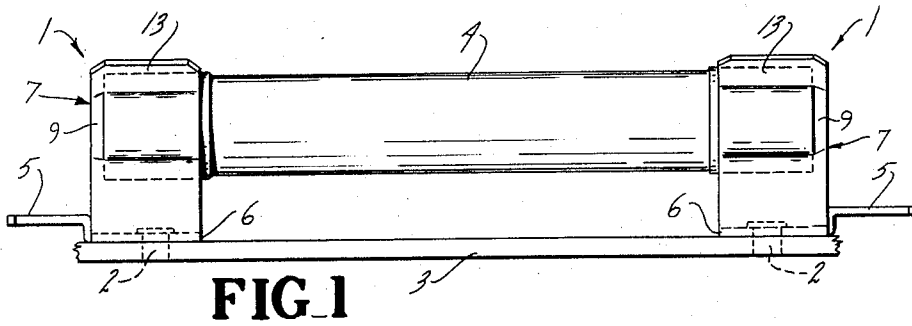
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[57] **ABSTRACT**

A single piece metal fuse clip having a flat base and a pair of longitudinally spaced resilient arms having an outwardly curved upper portion and outwardly curved lower portion both of which extend inwardly to meet at a juncture at which the radius is of lesser thickness than the metal of the clip and to effect holding of a fuse in the upper portion of the clip. The lower portion of each arm of the clip curves gradually outwardly from the base of the clip on a radius greater than at least three times the thickness of the metal of the clip. The overtravel of the clip at the fuse entry end of the clip is less than 0.030 inches.

2 Claims, 3 Drawing Figures





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FUSE CLIP

BACKGROUND OF THE INVENTION

In previous fuse clips the inside bottom radius bend in the lower portion of each clip was of lesser radius than the same radius bend in the lower portion of the clip of the invention which has a radius in the bend at least three times greater than the thickness of the metal of the clip. This increases the amount of metal in the base of the clip so that more surface area is exposed to the air to remove the heat generated in the clip in service and decreases the heat rise in the clip to prevent false tripping of a fuse held by a pair of clips in service. In addition this permits a gradual approach of the arms of the clip to the base so that stresses between the arms and base are decreased because sharp corners between the base and clip are eliminated. The arms of the clip tend to roll out in service from the flat base of the clip which braces the clip at the high stress line in the area between the arms and base of the clip. Furthermore, a large radius bend in the lower portion of the clip of the invention results in utilizing the maximum total force of the clip on a fuse when the clip is in holding position. The radius bend of the arms at the junction in the clip between the upper and lower portion thereof is substantially less than the radius bend in the lower portion of the clip and this provides a short spring length in the clip to establish a greater holding pressure on a fuse inserted in the clip. In addition the non-holding movement of the clip is decreased over clips in the prior art to an amount of travel at the fuse entry end of not in excess of .030 inches which further increases the holding force of the clip.

BRIEF DESCRIPTION OF THE INVENTION

The invention comprises a fuse clip construction wherein a pair of clips such as of the ferrule type are assembled in cooperating relationship to receive a fuse inserted into them and are provided with means to connect the clips into an electrical circuit. In general, the clip of the invention comprises a flat base which on opposite sides blends gradually into resilient upstanding arms.

Each arm consists of a lower portion which curves outwardly and then inwardly on a generally large radius to provide a radius bend of the order of at least three times the thickness of the metal of the clip and an upper portion which curves outwardly from the upper end portion and then inwardly and downwardly to meet the arms of the lower portion of the clip at a radius bend preferably less than the thickness of the metal of the clip.

Ears on the upper end of each arm flare outwardly to provide a substantially long lead at the fuse receiving end of the clip. The construction of the lower portion of the clip on a radius bend as large as possible and yet make the clip acceptable for use in service in confined quarters provides a large heat sink at the bottom of the clip for dissipation of heat to the surrounding air and the long lead on the ears likewise provides additional heat sink characteristics to the clip. In addition, the large radius in the lower portion of the clip yields a maximum total force on the fuse in the clip holding position and eliminates any sharp corners or high stress area between the base and resilient arms.

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Furthermore, the non-holding movement or over travel of the clip at the fuse entry end is held below 0.030 inches and preferably to less than 0.020 inches and minimization of this travel allows approach to the large radius in the lower portion of the clip to obtain a maximum total force on a fuse inserted in the clip. By increasing the holding pressure of the clip on the fuse, the electrical contact resistance between the clip and fuse is reduced to effectively control the heat rise of the clip in service.

Each arm of the clip of the invention is slit at the outer side to provide segments within the space between the arms which prevent endwise movement of a fuse inserted between two clip members. In addition, each clip has a hole in the base to connect it to a support and means thereon for connection into an electrical circuit.

DESCRIPTION OF THE DRAWING

The drawing illustrates the best mode presently contemplated by the inventor for carrying out the invention.

In the drawing:

FIG. 1 is a front elevational view illustrating a pair of spaced clips in place with a fuse held in place by the clips;

FIG. 2 is a perspective view of the clip of the invention; and

FIG. 3 is an end elevational view of the clip of the invention.

DESCRIPTION

Referring to the drawing, there is shown a pair of spaced fused clips 1 which are secured by screws 2 to a support 3 and clamp therebetween the fuse 4. Connecting means 5 are provided on the outer end of each clip 1 for connecting the clips and fuse into an electrical circuit.

The description will only be directed to a single clip 1 as illustrated in FIGS. 2 and 3, because the spaced clips 1 in FIG. 1 are of the same construction.

Clip 1 is formed from a single piece of sheet metal and consists of a base 6 from each side of which upwardly extends the relatively resilient arms 7, and to the rear of which projects the electrical connecting means 5. An aperture 8 is provided in base 6 to receive the screw 2 to secure the clip to the support 3, and the segments 9 are struck out from the rear portion of the arms 7 of the clip to prevent endwise movement of fuse 4 when clamped in place as in FIG. 1.

The base 6 of the clip is generally flat and on either side blends into each respective arm 7 in a gradual path as the arms 7 curve outwardly and thence inwardly in the lower portion of the clip on a relatively large radius which is greater than at least three times the thickness of the metal of the clip to provide the radius bend 10. To illustrate this important feature of the invention, by way of example as shown in FIG. 3 of the drawing, the radius of the lower portion of the clip is shown as 0.260 inches and the thickness of the metal of the clip as 0.0453 inches. The radius bend 10 of the lower portion of clip 1 is made as large as possible within the limits of the available space in which the clip will be used in service.

The inwardly curved upper part of each arm 7 in the lower portion of the clip blends into each arm 7 of the upper portion of the clip 1 on a much smaller radius

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bend 11 than bend 10, which for purposes of illustration is shown in FIG. 3 as a radius of 0.038 inches. Preferably the radius of bend 11 is less than the thickness of the metal of the clip 1. The employment of the small radius bend 11 at the meeting area between the upper and lower portion of the clip and of the large radius bend 10 in the lower portion of the clip increases the holding force of the clip because the effective spring length of the clip is shortened.

The arms 7 upwardly from radius bend 11 curve outwardly and then inwardly to another radius bend 12 from which the ears 13 flare outwardly on an angle at the fuse entry end of clip 1. The angular extent of ears 13 is preferable about 35° taken on a center line through clip 1, and the ears are of a length to act as a heat sink to discharge heat from clip 1 to the air.

Another important feature of clip 1 is the low non-holding movement in receiving fuse 4 to be held therein. The non-holding movement or over travel is not in excess of 0.030 inches on each arm at the entry area of fuse 4. Preferably the non-holding movement is approximately 0.020 inches. In FIG. 3 there is illustrated in phantom a half of fuse 4 in connection with one of the clip arms 7 and the movement of the arm at the fuse entry end is also illustrated in phantom and shown as 0.020 inches. By keeping the non-holding or retraction travel of the arms 7 of the clip 1 at a minimum, the holding pressure of the clips 1 on fuse 4 is increased to thereby reduce the electrical contact resistance between the clips and fuse and the subsequent heat rise of the fuse.

The utilization of the unused movement of the clip permits approach to an optimum radius in the lower portion of the clip which will yield a maximum or increased total force which is applied to clamp the fuse 4. Furthermore by employing a large radius in the lower portion of the clip, the stress factor is lowered in the area of the clip which is subjected to the highest stresses when fuse 4 is inserted in clips 1.

The use of a series of adjacent curves in the spring area of the clip arms with the radius bend of the lower portion of the clip being considerable greater than the radius bend between the upper and lower portions of the clip permits an effective short spring length in the clip resulting in higher pressure which is applied to hold fuse 4 in service.

Furthermore, the larger radius bend in the lower portion of the clip 1 provides more metal in that area and this improves the heat sink characteristics of the clip so that the heat will dissipate to the air and false tripping of the fuse is eliminated.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. A single piece metal fuse clip, comprising a generally flat base, a pair of longitudinally spaced resilient arms extending upwardly from the base with each arm having an outwardly curved upper portion for receiving a fuse and an outwardly curved lower portion both of which then extend inwardly to meet at a juncture forming a radius bend, the radius of the bend being less than the thickness of the metal of the clip, and said lower portions of the arms extending from the base in a gradual path on a radius greater than at least three times the thickness of the metal of the arms to provide a substantial amount of metal in the lower portion of the clip and simultaneously eliminate sharp corners at the high stress area between the base and arms.

2. The structure of claim 1, and ears flaring outwardly from the arms at the upper portion of the clip for effecting ready insertion of a fuse into the clip with the overtravel of the ears at the fuse entry of the clip upon insertion of a fuse into the clip being no greater than 0.030 inches to provide a generally low non-holding movement in the clip.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,815,071 Dated June 4, 1974

Inventor(s) Michael Roy Sleeter

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 4 line 29 After "clip" insert ---for
(Claim 1) heat distribution---

Signed and sealed this 17th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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