United States Patent [19]

Vetter

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[54] BI-METAL TERMINAL LUG

[75] Inventor: **Ottomar H. Vetter,** Minneapolis, Minn.

[73] Assignee: **United Carr Incorporated,** Boston, Mass.

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[52] **U.S. Cl.** .....**339/113 R,** 339/114, 339/276 T, 339/278 C

[51] **Int. Cl.**.....**H01r 11/08,** H01r 11/12

[58] **Field of Search**.....339/248 S, 278 C, 339/114, 276, 113, 255 L, 273 S; 174/87, 79; 151/67

[56] **References Cited**

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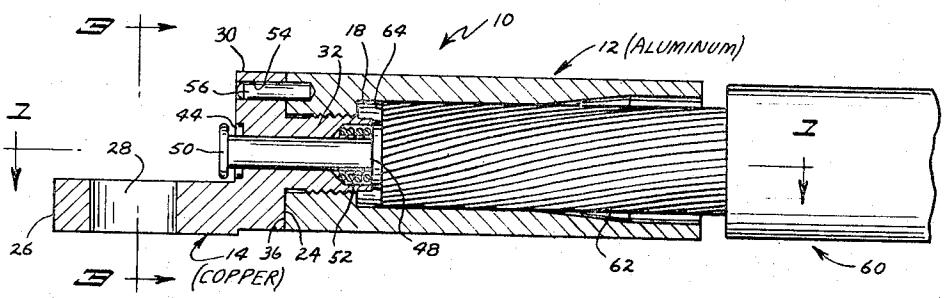
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Primary Examiner—Richard E. Moore
Attorney—Dugger, Peterson, Johnson & Westman

[57] **ABSTRACT**

An aluminum barrel member has an opening at one end into which the bared end of an aluminum cable is inserted. Threaded into the other end of the barrel member is the shank of a copper tongue member having a flat portion circumjacent thereto which provides a relatively broad surface contact with the barrel member. A spring-biased indicator plug extends through the shank and is pushed outwardly when the cable end has been fully inserted. After insertion, the barrel member is crimped tightly against the cable.

7 Claims, 3 Drawing Figures



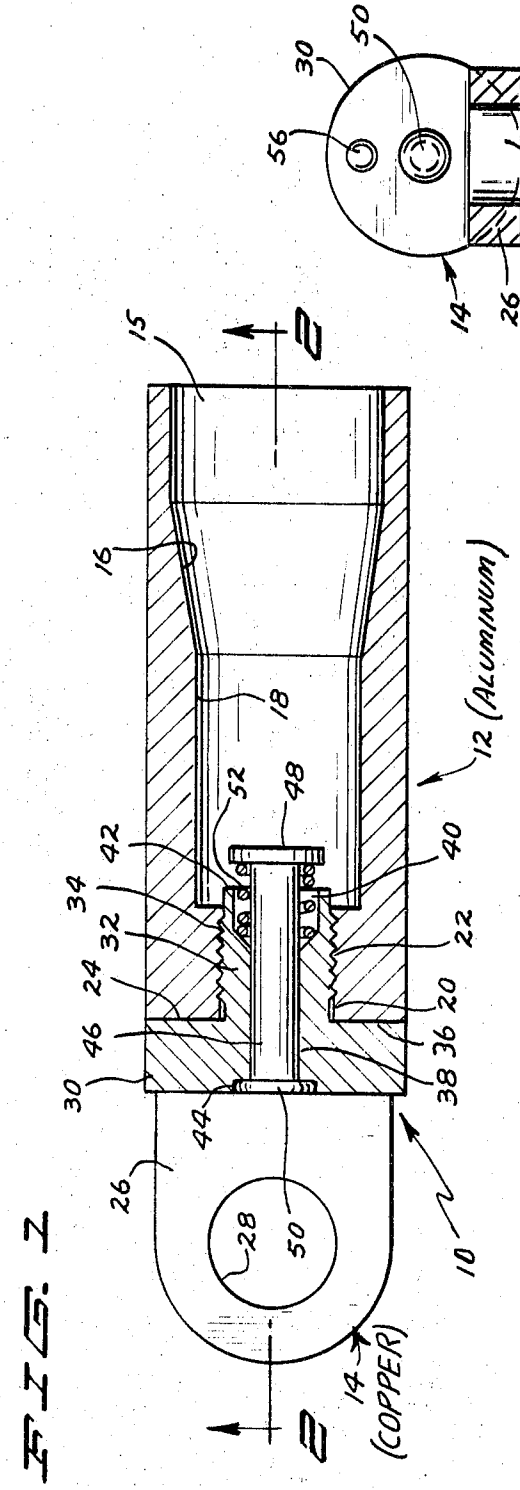


FIG. 2

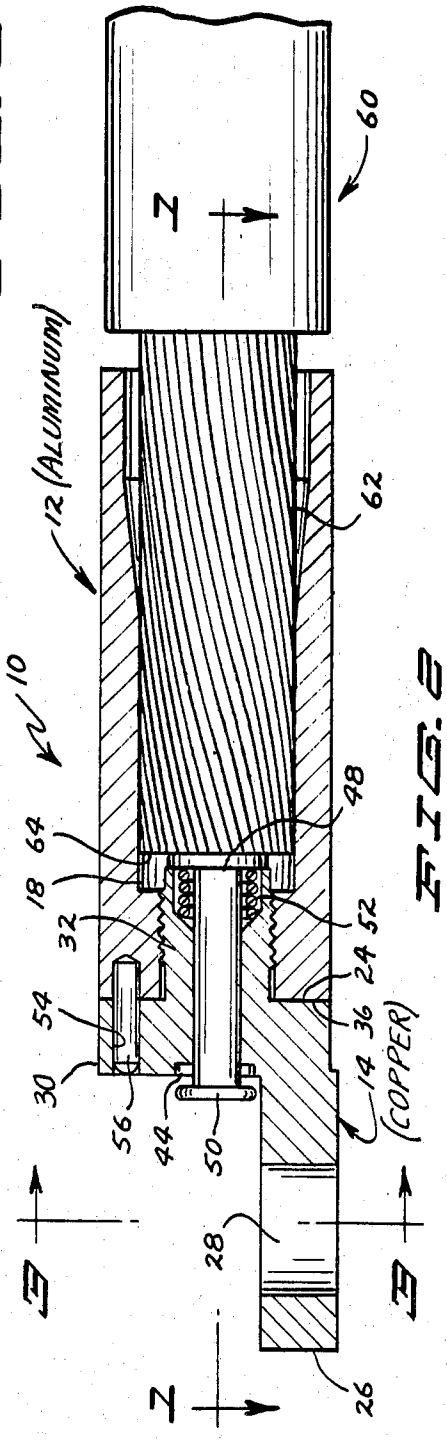


FIG. 3

INVENTOR.

BY OTTOMAR H. VETTER

Dugger Peterson Johnson & Westman

ATTORNEYS

BI-METAL TERMINAL LUG

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to terminal lugs, and pertains more particularly to a bi-metal lug having one part of aluminum and the other of copper or brass.

2. Description of the Prior Art

The problem of galvanic corrosion in the electrical connector art where two dissimilar conductors must be joined is well known and a number of attempts have been made to provide a terminal lug that reduces the amount of corrosive action that takes place. These various prior art lugs have met with varying degrees of success. Some have been quite complex and costly to manufacture, and others have not performed as admirably as they should for the particular task to which they are assigned. For example, in aircraft installations it is imperative that good electrical contact be provided and that it be maintained for prolonged periods for safety reasons.

One prior art effort with which I am acquainted involves the welding of aluminum to copper in the fabrication of the terminal; see U.S. Pat. No. 2,806,215 granted on Sept. 10, 1957, for instance. Of course, this procedure requires fairly sophisticated welding equipment. Also, it necessitates the utilization of relatively thin stock with a concomitant reduction in the current carrying capacity of the terminal lug. The present invention is believed to be an improvement over the welded construction.

SUMMARY OF THE INVENTION

One object of the present invention is to provide a bi-metal terminal lug that will possess a broad surface contact between the dissimilar materials of which it is composed, thereby minimizing the likelihood of objectionable corrosion occurring and additionally providing a terminal lug that will be relatively long lasting.

Another object of the invention is to provide a terminal lug of the foregoing character that can be fabricated quite inexpensively and which can be assembled without resort to special equipment or techniques.

Still further, the invention has for an object the facile provision of an indicator that signifies when the bared cable end has been fully inserted into the barrel part of the lug, the insertion of the cable pushing a plug outwardly so that it becomes noticable.

Briefly, my invention involves the forming of an aluminum barrel member having an opening at one end into which the bared aluminum cable is inserted and thereafter crimped in place. At the other end, the opening is threaded for the accommodation of a similarly threaded shank that is integral with a copper (or brass) tongue member. A plug extends through the shank and is forced outwardly when the aluminum cable has been fully inserted, the plug being both visible and readily felt by a person's fingers. In this way, the crimping will not be performed until a check has been made as to the position of the indicating plug. A pin prevents the inadvertent unthreading of the two parts constituting the terminal lug.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a horizontal sectional view of my terminal lug, the view being taken in the direction of line 1—1 of FIG. 2 prior to the insertion of a bared aluminum cable end therein;

FIG. 2 is a vertical sectional view in the direction of line 2—2 of FIG. 1 but with the cable end fully inserted and the indicator plug forced outwardly to signify that the full degree of cable insertion has been achieved, and

FIG. 3 is a view in the direction of line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The terminal lug exemplifying my invention has been denoted generally by the reference numeral 10. More specifically, the terminal lug 10 includes a barrel member 12 of aluminum and a tongue member 14 of copper. Actually, my invention will find utility wherever dissimilar metals are employed and the likelihood of objectionable galvanic or electrolytic corrosion occurring. For instance, the tongue member 14 might very well be of brass in certain situations.

Describing now in detail the aluminum barrel member 12, it will be seen from FIG. 1 that an opening 15 is provided at the right. An intermediate tapered bore 16 extends from the opening 15 to a cylindrical inner bore 18. An opening 20 is provided at the left and has internal threads 22 formed therein. The end of the barrel member 12 circumjacent the opening 20 provides a relatively broad surface designated 24 which is important in reducing the density of the current flowing between the dissimilar metals constituting the members 12 and 14.

With reference to the copper tongue member 14, it will be seen that it includes a tongue portion 26 having the usual aperture 28 therein which is intended to encircle a terminal post (not shown). Extending upwardly from the tongue portion 26 is a wall or flange 30. Projecting from the wall or flange 30 is a shank 32 having external threads 34 which engage the internal threads 22 of the opening 20. Circumjacent the shank 32 is a surface 36 that is coextensive with the previously referred to surface 24. In this way, the confronting surfaces 24, 36 provide a relatively large area through which the current passes when flowing between the members 12, 14.

At this time, attention is directed to a passage 38 drilled through the flange 30 and the shank 32. The passage 38 is counterbored at 40 to provide a recess for a purpose presently to be made manifest. It will be observed that the recess or counterbore 40 provides an annular shoulder 42 that extends into the bore 18. The passage 38 has at its other end a rather shallow counterbore 44.

Reciprocally disposed in the passage 38 is an elongated plug 46 having an enlarged head 48 at its left end and a second enlarged head 50 at its other end. The plug 46 is sufficiently long so that one of the heads 48, 50 projects from the passage 38. Actually, a coil spring 52 circumscribes the plug 46, being contained for the most part in the counterbore or recess 40. The spring 52 bears against the head 48 and is instrumental in nor-

mally biasing the plug 46 to the right as viewed in FIG. 1.

It will be understood from the foregoing description that the copper tongue member 14, by reason of its shank 32, can be threaded into the aluminum barrel member 12 and the surface 36 thereby brought into pressural contact with the surface 24. After this is done, then a hole 54 is drilled through the well or flange 30 of the tongue member 14 into the barrel member 12. Thereafter, a pin 56 is press fitted into the hole 54 which prevents inadvertent disengagement of the members 12, 14. Consequently, when my terminal lug 10 is employed in environments where a considerable amount of vibration occurs, the pin 56 prevents any counter-rotation of the parts which would result in an unwanted disengagement thereof.

Although it is believed evident as to how my terminal lug 10 is to be used, nonetheless it will be observed from FIG. 2 that a cable 60 has been fragmentarily depicted which has a bared aluminum cable end 62 providing a tip at 64. It will be assumed that the threaded connection of the members 12, 14 has been completed and the pin 56 is in its locking position as illustrated in FIG. 2. When the surface or tip 64 abuts against the head 48 on the indicator plug 46, the continued advancement of the bared end 62 pushes the indicator plug 46 from the position in which it appears in in FIG. 1 into the position in which it appears in FIG. 2. The coil spring 52 readily yields as the insertion progresses until the head 48 engages the shoulder 42. Consequently, when the aluminum end 62 is fully inserted, then the opposite head 50 will project as illustrated in FIG. 2. The head 50 is readily visible but it can also be felt or touched, and the assemblyman will immediately know that the aluminum end 62 has been completely inserted into the barrel member 12. The terminal lug 10 is then ready for crimping and a suitable crimping tool is used to force inwardly a portion of the barrel member 12 so that the cable end 62 is securely held therein.

It is important to appreciate that a relatively broad area of electrical contact is provided when practicing the present invention. The surfaces providing this contact have been identified by the reference numerals 24 and 36. Owing to the broad contact surface that is made available, the current concentration is reduced considerably and the low current density where the dissimilar metals engage each other eliminates any objectionable amount of corrosion between the dissimilar metals. It will be further recognized that no welding or soldering, either with respect to retaining the members 12 and 14 together or in retaining the cable end 62 in the aluminum barrel 12, is needed. Thus, my terminal lug 10 is completely weld-free and solderless.

I claim:

1. A bi-metal terminal lug comprising a barrel member of one metal having a cable-receiving opening at one end and a threaded opening at its other end, said other end having a flat surface circumjacent said threaded opening, a tongue member of a dissimilar metal provided with a threaded shank engaged in said threaded opening and a flat surface circumjacent said shank for contacting the flat surface at said other end, whereby threaded advancement of said shank into said threaded opening causes the flat surface circumjacent said shank to pressurally bear against the flat surface at said other end, said shank having a passage extending therethrough, and indicating means extending through said passage for signifying when a cable end has been fully inserted into said cable-receiving opening.

2. A bi-metal terminal lug in accordance with claim 1 in which said barrel member is of aluminum and said tongue is of copper or brass.

3. A bi-metal terminal lug in accordance with claim 1 in which said indicating means includes a plug slidably disposed in said passage having a greater length than said passage, and a coil spring normally biasing said plug inwardly, the cable end when sufficiently inserted pushing said plug outwardly.

4. A bi-metal terminal lug in accordance with claim 3 in which the inner end of said shank is counterbored to accommodate at least a portion of said spring.

5. A bi-metal terminal lug in accordance with claim 4 in which said plug has an enlarged head formed on its inner end which confronts one end of said spring and abuts the inner end of said shank when the cable end is fully inserted.

6. A bi-metal terminal lug in accordance with claim 5 in which said plug has an enlarged head at its outer end and said passage is counterbored at its opposite end so that said last-mentioned head is received therein prior to the insertion of the cable end and said last-mentioned head is forced out of said last-mentioned counterbore when the cable end abuts said first-mentioned head to overcome the biasing action of said coil spring.

7. A bi-metal terminal lug comprising a barrel member of one metal having a cable-receiving opening at one end and a threaded opening at its other end, said other end having a flat surface circumjacent said threaded opening, a tongue member of a dissimilar metal provided with a threaded shank engaged in said threaded opening and provided with a flange forming a flat surface circumjacent said shank for contacting the flat surface at said other end, whereby threaded advancement of said shank into said threaded opening causes the flat surface circumjacent said shank to pressurally bear against the flat surface at said other end, and a pin extending through said flange into said barrel member to prevent inadvertent unthreading of said members.

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