United States Patent

Lockshaw

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[54] **SOLDERLESS LUG CONNECTOR**

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[52] **U.S. Cl.**.....**339/95 D,** 174/90, 339/265 S, 174/94 R

[51] **Int. Cl.**.....**H02g 15/08**

[58] **Field of Search** .....174/94 R, 94 S, 87, 84 R, 90; 339/95, 97 R, 97 C, 256 S, 258 RR

[56] **References Cited**

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[57] **ABSTRACT**

A solderless lug connector to accommodate various sizes of electrical conductors, comprising an elongated tubular body having a helical slot cut along the longitudinal length thereof to form a substantially spring-like member, with its outer free end band terminating with an outwardly turned-up lip, the opposite end thereof being provided with a connecting tongue adapted to be connected to an appropriate mating electrical component.

5 Claims, 5 Drawing Figures

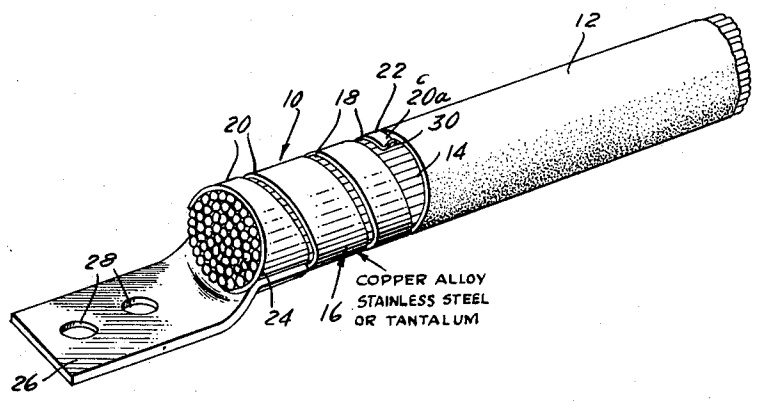


Fig. 1.

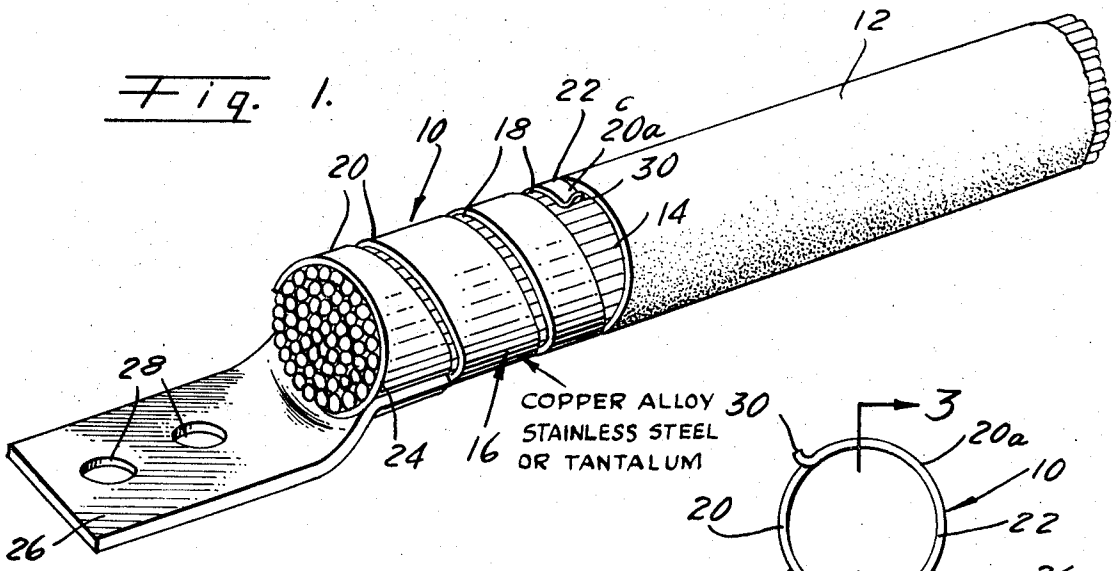


Fig. 2.

Fig. 3.

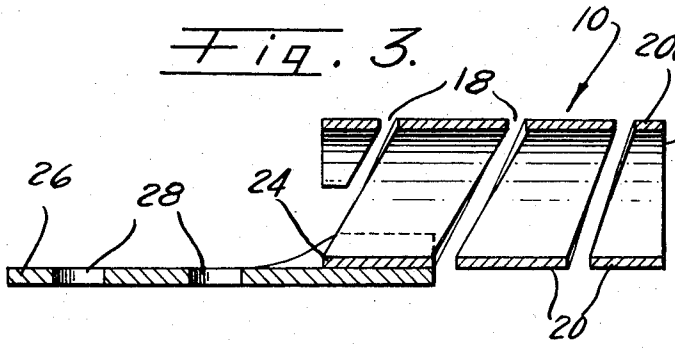


Fig. 4.

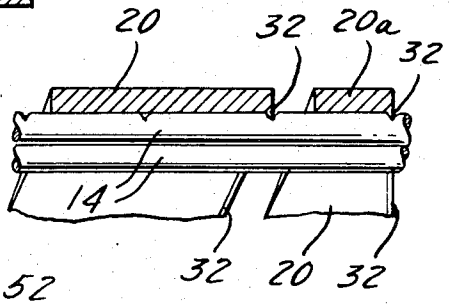
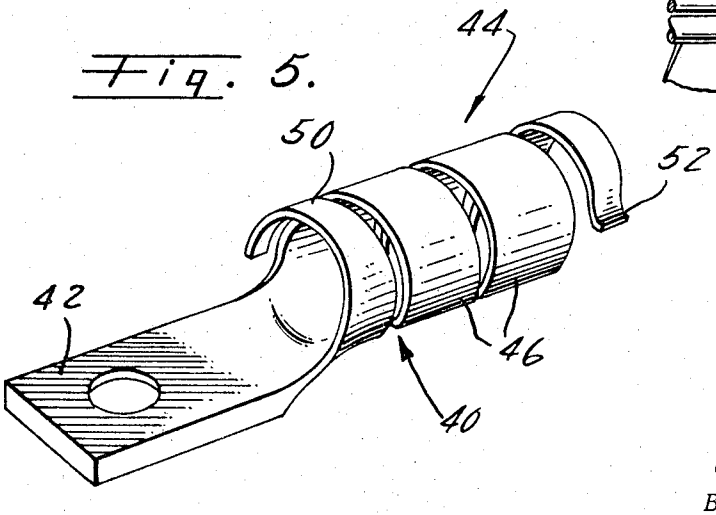


Fig. 5.



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SOLDERLESS LUG CONNECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a solderless lug connector and, more particularly, to a solderless lug connector with a self-securing action when the lug is positioned on the end of a conductor cable.

2. Description of the Prior Art

There are various known types of solderless connectors in the prior art and each takes various shapes and forms, as well as using various methods, for securing the connectors to the proper electrical conductor cables. Some of these devices are so formed as to be complicated to work with and expensive. Others are so simple that they are not capable of withstanding hard usage. Two methods are used for securing the standard solderless lug to an electrical cable. One is the use of a set screw and the other is tension contact by squeezing the ends of the lug about the end of the cable. However, each of these methods has inherent problems which, so far as I am aware, have not been solved.

Until now, the above methods were affected by vibration, temperature changes, or a loose connection on the conductor, which can cause poor continuity and electrical breakdown due to overheating at the point of the poor connection. These problems are multiplied when aluminum conductor cables are used, whether they be the solid or the multi-strand type.

SUMMARY OF THE INVENTION

The invention comprises a tubular body made from a spring-tension metal or alloy that is compatible to the conductor cable on which it is to be used. This body is formed somewhat similar to that of a flat coil spring by providing within the tubular body a helical slot starting at one end of the body and terminating at the opposite end thereof.

One end of the tubular body is formed with a substantially flat tongue-like member which is adapted to be attached to a compatible electrical component, such as a junction box, in which the electrical power system is housed.

The opposite free end of the spring-like body, however, is formed with an outwardly turned-up lip member on the terminating end of the last flat coil. This lip member is adapted to provide ease in securing the lug to a cable as the lug is rotated clockwise about the exposed cable strand or strands for mounting thereon.

For a more positive connection and screwing action, the leading edges of the first few strands can be provided with tooth-like edges. The tooth-like edges and the constant spring tension about the cable cause positive connection and continuity therebetween, regardless of the effects of temperature changes or vibrations.

OBJECTS AND ADVANTAGES OF THE INVENTION

It is an object of the present invention to provide a solderless lug connector, particularly for large diameter conductor cables, that places a constant positive tension on the cable, regardless of adverse conditions.

It is another object of the invention to provide a solderless lug that can be made from a spring-tension metal or alloy.

It is still another object of the invention to provide a device of this character that is simple to install without the use of special tools.

Still another object of the present invention is to provide a solderless electrical lug connector that is capable of a positive contact over the entire surface of the conductor, for better continuity.

A further object of the invention is to provide a device of this character that is relatively inexpensive to manufacture and use.

A still further object of the invention is to provide a device of this character that comprises a minimum number of parts or members.

Other characteristics, advantages and objects of this invention can be more readily appreciated from the following description and appended claims. When taken in conjunction with the accompanying drawings, this description forms a part of the specification wherein like references and characters designate corresponding parts in several views which are as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings, which are for illustrative purposes only:

FIG. **1** is a perspective view of one embodiment of the invention shown secured to a conductor cable;

FIG. **2** is an end elevational view of the lug connector;

FIG. **3** is a sectional view taken on line **3—3** of FIG. **2**;

FIG. **4** is an enlarged partial sectional view; and

FIG. **5** is a perspective view of an alternative embodiment showing a single-piece unit.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and, more particularly, to FIG. **1**, in which there is illustrated an electrical solderless lug device or apparatus, generally indicated at **10**, secured to a conductor cable **12**, the conductor cable **12** is shown having a plurality of strands **14**. However, it should be understood that a solid strand cable is also adaptable for receiving said lug device **10**.

The lug device **10** comprises an elongated, circular tubular body, indicated generally at **16**. This body may be of any suitable spring-tension metal or alloy that is compatible to the particular conductor cable on which it is used, such as indicated at **12** in FIG. **1**. The body **14** is formed somewhat like that of a coil spring by means of a helical slot **18** that is cut about the body **16**. As the slot **18** is cut into body **16**, a plurality of flat coils **20** are thereby formed.

Referring to FIG. **3**, it can be more clearly seen that each flat coil, starting from the outer free end **22**, progressively increases in width as the coils extend to the opposite end **24** thereof. The end **24** of the body **16** is secured to a tongue-like member **26** which is adapted to be attached to an electrical junction box or outlet, not shown. Due to the various types of connections within these components, the tongue **26** is provided with openings or holes **28** for receiving securing means that might be required in any given junction box or outlet. The tongue **26** may be fixedly attached to the body **16** in any positive manner, such as welding, riveting, or by metallurgical bonding of the two parts.

As can be seen in FIGS. 1 and 2, the outer free end 22 of body 16 is provided with a narrow coil 22*a*, so as to acquire a more flexible movement at this point, which is the starting point for receiving the conductor cable. The coils 20 are arranged to coil in a clockwise direction, whereby the lug 10 is forced over the exposed free end of the cable 12 at the same time the lug is twisted in a clockwise direction, causing the coils 20 to flex radially outwardly, thereby providing ease of reception for the exposed cable end. To accommodate a more smooth reception of the cable end, there is provided an up-turned lip member 30 at the terminating end of the flat coil 20*a*. Thus, when the free end 22 of the lug 10 is placed against the free end of the cable and the clockwise rotation is started, the lip 30 facilitates the reception of said cable end by allowing the lip to ride over the strand or strands without the chance of binding in the generally soft metal of the cable, particularly when aluminum is used.

Therefore, it can be understood that when the body 16 is twisted in a clockwise direction the coils 20 will expand slightly and when the free end of the cable 12 is completely positioned within the lug 10 the coils, due to their spring tension, recoil tightly about the outer circumference of the cable, creating a positive engagement therewith.

Referring now to FIG. 4, an additional element for creating a positive threading action with relation to the cable is shown in the form of a tooth 32 along the inner leading edge of at least the first two forwardly arranged coils 20 and 20*a*. Not only does the inwardly projecting radial tooth 26 provide a more positive threading and securing action, but in addition it provides a more positive electrical connection between the lug 10 and cable 12.

ALTERNATIVE EMBODIMENT

An alternative arrangement of the solderless lug connector is shown in FIG. 5 and generally indicated at 40. The lug device 40 comprises a one-piece unit formed from a single sheet of spring metal having a tongue member 42 at one end thereof and an elongated flat strip 44 coiled outwardly from the rear side of the tongue member 42 in a clockwise direction. Each succeeding coil 46 has a larger width than the preceding coil. That is, the elongated flat strip is slightly tapered so that the outer free end coil 48 is smaller in width than the coil adjacent the tongue 42. A second flat strip 50 is formed from the opposite side of the tongue 42 and is coiled one half a revolution in a counterclockwise direction, said strip 50 being tapered, whereby the outer free end of the strip is smaller in width than the area integral with the tongue 42.

The free end of the strip 44 is also provided with a lip 52 similar to lip 30 and is used in the same manner as hereinbefore described for lip 30.

The invention and its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangement hereinbefore described being merely by way of example, and I do not wish to be restricted to the specific form shown or used mentioned, except as defined in the accompanying claims.

I claim:

1. An electrical solderless lug device for attachment to the free end of a conductor cable, comprising:
   - A. a circular tubular body having a helical slot therein and an outer free end thereon;
   - B. flat strip coils formed by said slot in said tubular body, said flat strip coils having progressively enlarged widths providing a tapered strip from said outer free end of said body;
   - C. a lip member projecting upwardly from the free end of said body; and
   - D. a tongue member projecting longitudinally outwardly from the opposite end of the tubular body.

2. An electrical solderless lug as recited in claim 1, wherein at least one edge of said coils is provided with a downward-projecting tooth for positive engagement with said conductor cable.

3. An electrical solderless lug as recited in claim 2, wherein said tongue is provided with an attaching means, said means comprising at least one hole through said tongue.

4. An electrical solderless lug as recited in claim 3, wherein said circular tubular body and said tongue member are formed from a one-piece resilient, conductive metal.

5. An electrical solderless lug as recited in claim 4, wherein said resilient, conductive metal is selected from the group consisting of copper alloy, stainless steel and tantalum.

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