

Electric Terminal Lug

Field of Invention

[0001] The present invention relates to an electric terminal lug. In particular, the invention relates to a terminal lug that allows an angle of a wire termination at a terminal block to be adjustable.

Background

[0002] A terminal lug is typically used to connect an end of an electrical wire or cable at a binding post in a terminal block. A typical terminal lug has a conducting body and a receptacle body. For some terminal lugs, the conducting body is shaped like a spade with a through-hole for engaging with a screw at the binding post; for other lugs, the conducting body is simply an elongate body. The receptacle body has an open hollow interior; the open hollow interior allows an end of a conductor to be inserted therein and be fixedly connected therewith, for example, by crimping or soldering. With most terminal lugs, the conductor is connected to the terminal block in a perpendicular manner; with other lugs, the conductor is connected to the terminal block in a parallel manner. These convention terminal lugs do not allow an electrical wire to be terminated at a terminal block at any desired angle other than perpendicular or parallel to the terminal block.

[0003] It can thus be seen that there exists a need for a terminal lug for terminating an electric cable at any desired angle to a terminal block. It would also be advantageous if a terminal lug is suitable for use with a range of screw sizes at a binding post of the terminal block.

Summary

[0004] The following presents a simplified summary to provide a basic understanding of the present invention. This summary is not an extensive overview of the invention, and is

not intended to identify key features of the invention. Rather, it is to present some of the inventive concepts of this invention in a generalised form as a prelude to the detailed description that is to follow.

[0005] In one embodiment, the present invention provides a terminal lug. The terminal lug comprises: a planar conducting body having a first end and an open interconnecting aperture at a second end; and a receptacle body having two crimping members and a stirrup joining the two crimping members therebetween; wherein a width of the stirrup is operable to engage with the interconnecting aperture for forming a pivot joint so that electricity is conducted between the conducting body and the receptacle body.

[0006] In another embodiment, the present invention provides a method of terminating an electrical wire at a binding post of a terminal block. The method comprises: forming a planar conducting body with a first end and an open interconnecting aperture at a second end; forming a receptacle body with two crimping members and a stirrup joining the two crimping members therebetween; engaging a width of the stirrup into the open interconnecting aperture to form a pivot joint so that electricity is conducted between the conducting body and the receptacle body.

[0007] In one embodiment of the conducting body, the interconnecting aperture is open to the exterior by a channel. In another embodiment, the interconnecting aperture is substantially smaller than the width of the stirrup. In yet another embodiment, the shape of the interconnecting aperture is circular, polygonal or square.

[0008] In another embodiment of the conducting body, it comprises an aperture formed concentric to and in communication with the interconnecting aperture. In another embodiment, it comprises another aperture in communication with both the channel and the interconnecting aperture. The aperture and the interconnecting aperture form a finger element therebetween; similarly, the another aperture and the interconnecting aperture form a similar finger element therebetween.

[0009] In one embodiment of the conducting body, the first end is spade-shaped. In another embodiment, the first end is formed into a cylindrical body.

[0010] In one embodiment of the receptacle body, the crimping members comprises one or more inward pointing cutting edge and/or spike.

Brief Description of the Drawings

[0011] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0012] FIG. 1A illustrates an assembly of an electrical terminal lug according to an embodiment of the present invention;

FIG. 1B illustrates the terminal lug shown in FIG. 1A being assembled in another orientation;

FIG. 1C illustrates a conducting body of the terminal lug shown in FIG. 1A;

FIG. 1D illustrates a receptacle body of the terminal lug shown in FIG. 1A; and

FIG. 1E illustrates a plan view of the receptacle body.

[0013] FIG. 2A illustrates a conducting body with a polygonal interconnecting aperture according to another embodiment of the present invention;

FIG. 2B illustrates a conducting body with a square interconnecting aperture according to another embodiment of the present invention;

FIG. 2C illustrates a conducting body with spring fingers according to another embodiment of the present invention; and

FIG. 2D illustrates another conducting body with additional spring fingers according to yet another embodiment of the present invention; and

[0014] FIG. 3 illustrates another receptacle body according to a further embodiment of the present invention.

Detailed Description

[0015] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however, that this invention may be practised without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

[0016] FIG. 1A shows an assembly of an electrical terminal lug 100 according to an embodiment of the present invention. As shown in FIG. 1A, the terminal lug 100 is made up of a conducting body 100a and a receptacle body 100b. The conducting body 100a and the receptacle body 100b are connected by a pivot or universal joint 100c. FIG. 1A shows the conducting body 100a being assembled with the receptacle body 100b in a horizontal orientation. FIG. 1B shows another assembly 100 but with the receptacle body 100b being rotated 90 degrees from that shown in FIG. 1A.

[0017] With the present invention, the pivot or universal joint 100c allows an angle between the conducting and receptacle bodies to be adjustable according to the needs of a user. The pivot joint 100c thus provides stress relief to an end of an electrical wire or conductor that is being terminated at a terminal block. In addition, the terminal lug 100 of the present invention allows a user more freedom in bending an end of an electrical wire, for example inside a cable trunk, before the end is terminated. Such freedom in bending electrical wires may be required to maintain a minimum bending radius, to avoid criss-crossing of electrical wires, and so on.

[0018] FIG. 1C shows a conducting body 100a according to an embodiment of the present invention. As shown in FIG. 1C, the conducting body 100a is flat but elongate in a longitudinal direction. A first end 110 of the conducting body 100a is shaped like a spade and a second end 140 has an open interconnecting aperture 142 for forming the pivot/universal joint 100c with the receptacle body 100b.

[0019] As shown in FIG. 1C, the spade-shaped end 110 of the conducting body 100a has an opening 112. The opening 112 is formed through a thickness of the planar conducting body 100a and is flanked by two arms 114. The arms 114 are shaped to form a neck 116 before the opening 112 opens out to the exterior. Between the neck 114 and the exterior, the inside edge of each arm 114 has an oblique edge 118. Two opposed oblique edges 118 mutually form a taper leading to the neck 116; this taper allows easy insertion of the spade end 110 of the terminal lug 100a into a binding post at a terminal block.

[0020] At an inner part of the opening 112 and lying in between the two arms 114 is a slot 120. The slot 120 decreases the area moment of inertia near the base of the arms 114 and allows a user to make some adjustments to the size of the neck 116. The slot 120 therefore allows a user to use one size of the terminal lug 100 with a range of screw sizes at a binding post in a terminal block.

[0021] The open interconnecting aperture 142 is formed through the thickness of the planar connecting body 100a and is open to the exterior by a channel 144. The interconnecting aperture 142 has a substantial opening width $W1$ whilst the channel 144 has a width $T1$. As shown in FIG. 1C, a bridging member 146 opposite the channel 144 acts a spring for maintaining electrical contact at the pivot/universal joint 100c by eliminating any loose contact between edges of the open interconnecting aperture 142 and the receptacle body 100b.

[0022] FIG. 1D shows a receptacle body 100b according to an embodiment of the present invention. FIG. 1E shows a plan view of the receptacle body 100b shown in FIG. 1D. As shown in FIG. 1D, the receptacle body 100b is formed with two crimping members 150 and an interconnecting member 152. As can be seen from FIG. 1E, the crimping members 150 of the receptacle body 100b have a length L , whilst the thickness of the interconnecting member 152 is $T2$.

[0023] As shown in FIG. 1D, the crimping members 150 are curved, and each has an inward cutting edge 156 at its open end 154. The crimping members 150 and the inward cutting edges 156 define a cylinder of diameter D . Diameter D represents a cable size of

appropriate insulation and conductor thicknesses for carrying a current and a voltage through the terminal lug 100.

[0024] Also as shown in FIG. 1D, the interconnecting member 152 forms a stirrup between the crimping members 150. The joints of the stirrup 152 connecting with the crimping member 150 are spaced apart by a width W. The width W is slightly more than the opening W1 of the interconnecting aperture 142, whilst the thickness T2 of the stirrup 152 is slightly less than the width T1 of the channel 144.

[0025] In use, the interconnecting member or stirrup 152 of the receptacle body 100b is inserted through the channel 144 and into the interconnecting aperture 142 of the conducting body 100a such that the width W is rotatable in the interconnecting aperture 142. As the width W of the stirrup 152 is slightly larger than the opening W1 of the interconnecting aperture 142, the interconnecting aperture 142 is deformed outwardly by the width W of the stirrup 152. The deformation is accommodated by resilience of the bridging member 146. The contact between the interconnecting aperture 142 and the width W of the stirrup 152 forms the pivot or universal joint 100c. The pivot/universal joint 100c thus allows electricity to pass through the conducting body 100a and receptacle body 100a. The pivot/universal joint 100c also allows an angle of a wire termination with respect to a terminal block to be varied according to the needs of a user. In use, the contact area between the conducting body 100a and the receptacle body 100b is defined by the thickness of the conducting body 100a and the thickness T2 of the stirrup 152; the contact area is selected to carry a predetermined current density.

[0026] In addition, an end of an electrical wire to be terminated need not be stripped of its conductor with the use of the terminal lug 100. By inserting the end of the electric wire through the diameter D and deforming the crimping members 150, the knife-edges 156 of the receptacle body 100b cut through the insulation to form electrical contact with the conductor in the electric wire.

[0027] FIG. 2A shows a conducting body 200 according to another embodiment of the present invention. As shown in FIG. 2A, the conducting body 200 has a first end 210 formed into a substantially cylindrical end 212 and a flat second end formed with a

polygonal interconnecting aperture 242. The polygonal interconnecting aperture 242 has a corner-to-corner distance W_2 to match with the width W of the stirrup 152. In another embodiment, W_2 defines a circle circumscribing the corners of the polygonal interconnecting aperture 242. As in the previous embodiment, the polygonal interconnecting aperture 242 is open to the exterior by a channel 244 of width T_1 .

[0028] FIG. 2B shows a conducting body 300 according to another embodiment of the present invention. As shown in FIG. 2B, the conducting body 200 is similar to the previous conducting body 100a, except that an interconnecting aperture 342 in the second end 340 is substantially square. As shown in FIG. 2B, the corners of the square interconnecting aperture 342 are rounded and the distance across the rounded corners is defined by W_3 ; distance W_3 matches the width W of the stirrup 152.

[0029] FIG. 2C shows a conducting body 400 according to another embodiment of the present invention. As shown in FIG. 2C, the conducting body 400 is similar to the previous conducting body 100a, except that the conducting body 400 has an additional aperture 450. The additional aperture 450 is in communication into an interconnecting aperture 442 and is formed in a concentric manner with respect to the interconnecting aperture 442 so that in between the apertures are formed two fingers 452. The interconnecting aperture 442 is defined by substantially a diameter W_4 . The diameter W_4 is slightly smaller than the width W of the stirrup 152 of the receptacle body 100b. In use, the diameter W_4 is slightly expanded by the width W of the stirrup 152. In addition to the bridging member 446, the fingers 452 act as additional spring elements on the stirrup 152 to maintain positive electric contact between the conducting body 400 and the receptacle body 100b.

[0030] FIG. 2D shows a conducting body 400a according to another embodiment of the present invention. As shown in FIG. 2D, the conducting body 400a is similar to the conducting body 400, except that the conducting body 400a has a further aperture 460. The further aperture 460 is in communication with the channel 444 and is formed concentric with the interconnecting aperture 442 in a manner similar to that between the aperture 450 and the interconnecting aperture 442. Similarly, spring fingers 452 are formed between the further aperture 460 and the interconnecting aperture 442.

[0031] FIG. 3 shows a receptacle body 100bb according to another embodiment of the present invention. As shown in FIG. 3, the receptacle body 100bb is similar to the receptacle body 100b, except that the receptacle body 100bb has additional cutting edges 158 along the inside edges of the crimping members 150. In another embodiment of the receptacle body 100bb, a spike 159 or more are formed over each front and/or rear edge of the crimping member 150.

[0032] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the invention. For example, the numbers of partially concentric apertures 450 or the numbers of slots 120,320,420 described above are not so limited by their numbers. Further, the channel opening 144,244,etc may be at other angular positions with respect to the interconnecting aperture 142,242,etc.

CLAIMS:

1. A terminal lug comprising:
 - a planar conducting body having a first end and an open interconnecting aperture at a second end; and
 - a receptacle body having two crimping members and a stirrup joining the two crimping members therebetween;
 - wherein a width of the stirrup is operable to engage with the interconnecting aperture to form a pivot joint such that electricity is conducted between the conducting body and the receptacle body, and said pivot joint allows an angle the terminal lug makes with a binding post to be varied so as to reduce any bending stress on a wire carrying electricity at the terminal lug.
2. A terminal lug according to claim 1, wherein the interconnecting aperture is substantially smaller than the width of the stirrup.
3. A terminal lug according to claim 1 or 2, wherein the interconnecting aperture is selected from the following shapes: circular, polygonal, and square.
4. A terminal lug according to any one of the preceding claims, further comprising a channel for making the interconnecting aperture open to the exterior and thereby defining a bridging member.
5. A terminal lug according to claim 4, wherein a width of the channel is substantially larger than a thickness of the stirrup.
6. A terminal lug according to claim 5, further comprising an aperture being formed concentric to and in communication with the interconnecting aperture.
7. A terminal lug according to claim 6, wherein the aperture and the interconnecting aperture form a finger element therebetween.

8. A terminal lug according to any one of the preceding claims, wherein the first end of the conducting body is spade-shaped and comprises an opening for a screw at a binding post.
9. A terminal lug according to claim 8, further comprising a slot in the opening.
10. A terminal lug according to any one of claims 1-7, wherein the first end of the conducting body is formed into a cylindrical body.
11. A terminal lug according to any one of the preceding claims, wherein each crimping member comprises an inward pointing cutting edge and/or a spike.
12. A method of terminating an electrical wire at a binding post of a terminal block, the method comprising:
 - forming a planar conducting body with a first end and an open interconnecting aperture at a second end;
 - forming a receptacle body with two crimping members and a stirrup joining the two crimping members therebetween;
 - engaging a width of the stirrup into the open interconnecting aperture to form a pivot joint such that electricity is conducted between the conducting body and the receptacle body, and said pivot joint allows an angle the terminal lug makes with a binding post to be varied so as to reduce any bending stress on a wire carrying electricity at the terminal lug.
13. A method according to claim 12, wherein the interconnecting aperture is substantially smaller than the width of the stirrup.
14. A method according to claim 12 or 13, wherein the interconnecting aperture is selected from the following shapes: circular, polygonal, and square.
15. A method according to any one of claims 12-14, further comprising a channel for making the interconnecting aperture open to the exterior and thereby defining a bridging member.

16. A method according to claim 15, wherein the bridging member acts like a spring for maintaining positive contact between the width of the stirrup and a thickness of the interconnecting aperture.

17. A method according to claim 15, wherein a width of the channel is substantially larger than a thickness of the stirrup and the engaging step comprises slotting the thickness of the stirrup through the width of the channel.

18. A method according to claim 17, further comprising an aperture being formed concentric to and in communication with the interconnecting aperture.

19. A method according to claim 18, wherein the aperture and the interconnecting aperture form a finger element therebetween.

20. A method according to claim 19, wherein the finger element acts like a spring in addition to the bridging member for maintaining positive electrical contact between the width of the stirrup and the thickness of the interconnecting aperture.

21. A method according to any one of claims 12-20, wherein the first end of the conducting body is spade-shaped and comprises an opening for a screw at a binding post.

22. A method according to claim 21, further comprising a slot in the opening.

23. A method according to claim 22, wherein the slot reduces the area moment of inertia near the slot and allows the screw opening to be adjustable.

24. A method according to any one of claims 12-20, wherein the first end of the conducting body is formed into a cylindrical body.