

Description

The present invention relates to electrical terminals of the type to be connected to electrical conductors and particularly to terminals which are of the type having wire barrels designed to be crimped into interlocking and good electrically conductive engagement with the stripped conductor ends.

Electrical terminals such as shown in US-A-3,390,370 have heretofore been stamped and formed from heavy gauge metal to provide both strength and adequate electrical conductivity.

With regard to the first requirement, it is well known that the contact section, be it a ring tongue or other suitable shape, is subjected to deformation through careless handling, improper installation and other similar abuses. Accordingly, industry has, since the inception of electrical terminals, tended to make such contact sections reasonably sturdy.

Wire barrels, either open or closed, of the crimpable type, also needed to be substantial in order to withstand crimping pressures.

With regard to electrical conductivity, workers in the field have always designed electrical terminals to have more current carrying capability than the size conductor to which it was intended to be attached. In most cases, terminals in fact have much more conductivity than required.

In summary, contemporary electrical terminals are well designed to meet the requirements and are in fact, over designed with a corresponding higher cost.

An object of the present invention is to provide a less expensive electrical terminal without reducing the physical strength and electrical conductivity below that which is required. Accordingly, the invention consists in an electrical terminal comprising a contact section at one end for attaching to an electrical device, and a wire section at another end for crimping around a wire, characterized in that a continuous strengthening rib is coined on the contact section and wire section.

The invention also consists in a method of making an electrical terminal in which a contact section and wire section are stamped and formed from metal stock, characterized by coining a continuous strengthening rib around the contact section adjacent the edge thereof and around the interior surface of the wire section.

In order that the present invention may be more readily understood, reference will now be made to the accompanying drawings, in which:-

FIGURE 1 is a perspective view of an electrical terminal with an insulation sleeve, constructed in accordance with the present invention;

FIGURE 2 is a perspective view of the electrical terminal of Figure 1 with the insulation sleeve

removed therefrom;

FIGURE 3 is a top plan view showing progressions in stamping the electrical terminal from flat stock;

FIGURE 4 is a perspective view showing steps in forming the electrical terminal;

FIGURES 5A and 5B are side sectional views of an electrical terminal to be and being crimped onto an electrical wire;

FIGURE 6 is a perspective view of an alternate embodiment of the electrical terminal; and

FIGURE 7 is a side sectional view of the electrical terminal of Figure 6 crimped onto an electrical wire.

Electrical terminal 10-I shown in Figure 1 and terminal 10 shown in Figure 2 include a contact section 12 at front end 14 and wire section; e.g. a barrel 16 at back end 18. Connecting strap 20 interconnects section 12 and barrel 16. Other types of wire sections 16 can be used with the present invention.

Contact section 12 is in the form of a ring tongue, having hole 22 therethrough to receive binding posts (not shown) or the like. Other types of contact sections 12 can be used with the present invention.

Terminal 10-I in Figure 1 is identical to terminal 10 in Figure 2 except for the presence of insulating sleeve 24 on the former. Sleeve 24, preferably of a thermo-set plastic, is molded over wire barrel 16. In addition to wire barrel 16, sleeve 24 provides a funnel 26 leading into barrel 16 to facilitate inserting a stranded wire (Figures 5A, 5B) therinto.

Terminals 10 further include at least one and preferably two ribs 28 and 30. Rib 28 encircles most of hole 22, extends along strap 20 and around most of the inside surface of wire barrel 16. Rib 30 extends completely around the inside surface of barrel 16 adjacent back end 18. As seen in Figure 2 ribs 28, 30 project inwardly into passage 32 of barrel 16 and define groove 34, corresponding to rib 28 and groove 36, corresponding to rib 30, on exterior surface 38 of barrel 16.

With reference to Figure 3, electrical terminal 10 is stamped out from copper strip 40. For a terminal 10 having a wire barrel 16 sized to receive wire sizes 16, 14, strip 40 will have a thickness of 0.42 mm (0.0167 inches). Electrical terminals 10 for other wire sizes would have similar reduced metal requirements. The presence of rib 28, which increases the rigidity of contact section 12 and provides high crimping pressure points in wire barrel 16, as will be seen below, is a significant factor in achieving the reduced metal thickness.

Figure 3 shows, from left to right, steps in progressively stamping terminals 10 in a continuous stamping operation. In the first step, indicated by reference numeral 42, hole 22 is punched out.

In second step 44, ribs 28, 30 are formed by embossing or coining. As shown, rib 28 has a keyhole shape with loop 46 encircling most but not all of hole 22. A pair of parallel portions 48 extend rearwardly from loop 46 to free end portions 50 which extend perpendicularly away from parallel portions 48 and in opposite directions relative to each other. In third step 52 metal is removed to completely define terminal profile 54 on the far right hand side and to partially define terminal sub-profile 56 immediately to the left. Connecting tabs 58 extend between adjacent contact sections 12 to form a continuous strip 60 for further handling and reeling (not shown) for storage and shipping. As is well known, tabs 58 are severed from terminals 10 prior to use.

Terminal profile 54 includes formed contact section 12, connecting strap 20 and a pair of ears 62 extending laterally in opposite directions with free end portions 50 of rib 28 thereon as well as rib 30.

Figure 4 shows steps in forming terminal profile 54 into terminal 10. Forming is done progressively by moving strip 60 through forming stations (not shown). In first step 64 on the left hand side, the free ends 66 of ears 62 are curved up slightly. In second step 68 ears 62 are rolled up to form a U. In final step 70 on the right hand side, ears 62 are rolled into a cylindrical shape to form wire barrel 16. Seam 72 may be brazed, particularly if barrel 16 is not provided with an insulating sleeve 24.

Strips 60 of terminals 10 may next be fed through a continuous molding station (not shown) where insulating sleeve 24 is molded directly onto wire barrel 16. Here the molding material will fill in grooves 34, 36 to secure sleeve 24 to barrel 16.

Figures 5A and 5B are cross-sectional views of terminal 10-I. These views clearly show sleeve 24 being secured onto wire barrel 16 by means of grooves 34 and 36 receiving the molding material.

Conductor 74, shown to the left of terminal 10-I in Figure 5A, has insulation jacket 76 removed to bare stranded wire 78 preparatory to termination. In Figure 5B, conductor 74 has been inserted with stranded wire 78 channeled into wire barrel 16 by means of funnel 26 (Figure 5A) and crimped therein to effect an electrical connection.

In the crimping process which is well known in the industry, crimping of wire barrel 16 is through sleeve 24 as shown. Rib 28; i.e., free end portions 50, and rib 30 provide concentrated pressure points on wire 78 to enhance electrical conductivity therebetween and to increase retention of wire 78 against pull-out.

Further, the rear portion 80 of insulating sleeve 24 has been crimped around conductor 74 to provide insulation jacket support against transverse

conductor movement.

An alternative embodiment of the electrical terminal of the present invention is shown in Figures 6 and 7. This terminal profile, indicated by reference numeral 154, differs from terminal profile 54 only with respect to rib 28. In terminal profile 154 rib 128 completely spans ears 162 with link portion 152 connecting free end portions 150 and parallel portions 148. Thus, as shown in Figure 7, rib 128 of terminal 110-I extends around the complete circumference of wire 78. Similarly the presence of groove 134 around the complete periphery of surface 138 of barrel 116 increases the security of sleeve 124 thereon.

Claims

1. An electrical terminal comprising a contact section (12) at one end (14) for attaching to an electrical device, and a wire section at another end (18) crimping around a wire (78), characterized in that a continuous strengthening rib (28;128) is coined on the contact section (12;112) and wire section (16;116).
2. An electrical terminal according to claim 1, characterized in that the electrical terminal (10;110-I) is stamped and formed from relatively thin metal stock (40).
3. An electrical terminal according to claim 1 or 2, characterized in that the rib (28;128) defines a groove (34;134) on the exterior surface (38;138) of the wire section (16;116).
4. An electrical terminal according to claim 3, characterized in that a second rib (30;130) is coined on the wire section (16;116).
5. An electrical terminal according to claim 1, 2, 3 or 4, characterized in that an insulating sleeve (24;124) is molded over the wire section (16;116).
6. A method of making an electrical terminal in which a contact section (12) wire section (16) are stamped and formed from metal stock (40), characterized by coining a continuous strengthening rib (28;128) around the contact section (12;112) adjacent the edge thereof and around the interior surface of the wire section (16;116).
7. A method according to claim 6, characterized by coining a second rib (30;130) around the interior surface of the wire section (16;116).

Revendications



In second step 44, ribs 28, 30 are formed by embossing or coining. As shown, rib 28 has a keyhole shape with loop 46 encircling most but not all of hole 22. A pair of parallel portions 48 extend rearwardly from loop 46 to free end portions 50 which extend perpendicularly away from parallel portions 48 and in opposite directions relative to each other. In third step 52 metal is removed to completely define terminal profile 54 on the far right hand side and to partially define terminal sub-profile 56 immediately to the left. Connecting tabs 58 extend between adjacent contact sections 12 to form a continuous strip 60 for further handling and reeling (not shown) for storage and shipping. As is well known, tabs 58 are severed from terminals 10 prior to use.

Terminal profile 54 includes formed contact section 12, connecting strap 20 and a pair of ears 62 extending laterally in opposite directions with free end portions 50 of rib 28 thereon as well as rib 30.

Figure 4 shows steps in forming terminal profile 54 into terminal 10. Forming is done progressively by moving strip 60 through forming stations (not shown). In first step 64 on the left hand side, the free ends 66 of ears 62 are curved up slightly. In second step 68 ears 62 are rolled up to form a U. In final step 70 on the right hand side, ears 62 are rolled into a cylindrical shape to form wire barrel 16. Seam 72 may be brazed, particularly if barrel 16 is not provided with an insulating sleeve 24.

Strips 60 of terminals 10 may next be fed through a continuous molding station (not shown) where insulating sleeve 24 is molded directly onto wire barrel 16. Here the molding material will fill in grooves 34, 36 to secure sleeve 24 to barrel 16.

Figures 5A and 5B are cross-sectional views of terminal 10-I. These views clearly show sleeve 24 being secured onto wire barrel 16 by means of grooves 34 and 36 receiving the molding material.

Conductor 74, shown to the left of terminal 10-I in Figure 5A, has insulation jacket 76 removed to bare stranded wire 78 preparatory to termination. In Figure 5B, conductor 74 has been inserted with stranded wire 78 channeled into wire barrel 16 by means of funnel 26 (Figure 5A) and crimped therein to effect an electrical connection.

In the crimping process which is well known in the industry, crimping of wire barrel 16 is through sleeve 24 as shown. Rib 28; i.e., free end portions 50, and rib 30 provide concentrated pressure points on wire 78 to enhance electrical conductivity therebetween and to increase retention of wire 78 against pull-out.

Further, the rear portion 80 of insulating sleeve 24 has been crimped around conductor 74 to provide insulation jacket support against transverse

conductor movement.

An alternative embodiment of the electrical terminal of the present invention is shown in Figures 6 and 7. This terminal profile, indicated by reference numeral 154, differs from terminal profile 54 only with respect to rib 28. In terminal profile 154 rib 128 completely spans ears 162 with link portion 152 connecting free end portions 150 and parallel portions 148. Thus, as shown in Figure 7, rib 128 of terminal 110-I extends around the complete circumference of wire 78. Similarly the presence of groove 134 around the complete periphery of surface 138 of barrel 116 increases the security of sleeve 124 thereon.

Claims

1. An electrical terminal comprising a contact section (12) at one end (14) for attaching to an electrical device, and a wire section at another end (18) crimping around a wire (78), characterized in that a continuous strengthening rib (28;128) is coined on the contact section (12;112) and wire section (16;116).
2. An electrical terminal according to claim 1, characterized in that the electrical terminal (10;110-I) is stamped and formed from relatively thin metal stock (40).
3. An electrical terminal according to claim 1 or 2, characterized in that the rib (28;128) defines a groove (34;134) on the exterior surface (38;138) of the wire section (16;116).
4. An electrical terminal according to claim 3, characterized in that a second rib (30;130) is coined on the wire section (16;116).
5. An electrical terminal according to claim 1, 2, 3 or 4, characterized in that an insulating sleeve (24;124) is molded over the wire section (16;116).
6. A method of making an electrical terminal in which a contact section (12) wire section (16) are stamped and formed from metal stock (40), characterized by coining a continuous strengthening rib (28;128) around the contact section (12;112) adjacent the edge thereof and around the interior surface of the wire section (16;116).
7. A method according to claim 6, characterized by coining a second rib (30;130) around the interior surface of the wire section (16;116).

Revendications



1. Cosse électrique comprenant une section de contact (12) à une extrémité (14) destinée à être attachée à un dispositif électrique, et une section à fil (16) à l'autre extrémité (18) destinée à être sertie autour d'un fil (78), caractérisée en ce qu'une nervure de renforcement continue (28; 128) est emboutie dans la section de contact (12; 112) et dans la section à fil (16; 116). 5
2. Cosse électrique suivant la revendication 1, caractérisée en ce que la cosse électrique (10; 110-I) est estampée et façonnée en une matière métallique relativement mince (40). 10
3. Cosse électrique suivant la revendication 1 ou 2, caractérisée en ce que la nervure (28; 128) délimite une gorge (34; 134) sur la surface extérieure (38; 138) de la section à fil (16; 116). 15
4. Cosse électrique suivant la revendication 3, caractérisée en ce qu'une seconde nervure (30; 130) est emboutie dans la section à fil (16; 116). 20
5. Cosse électrique suivant la revendication 1, 2, 3 ou 4, caractérisée en ce qu'un manchon isolant (24; 124) est moulé par-dessus la section à fil (16; 116). 25
6. Procédé de fabrication d'une cosse électrique dans lequel une section de contact (12) et une section à fil (16) sont estampées et façonnées en une matière métallique (40), caractérisé en ce qu'une nervure de renforcement continue (28; 128) est emboutie autour de la section de contact (12; 112), à proximité de son bord, et autour de la surface intérieure de la section à fil (16; 116). 30
7. Procédé suivant la revendication 6, caractérisé en ce qu'une seconde nervure (30; 130) est emboutie autour de la surface intérieure de la section à fil (16; 116). 35
2. Elektrischer Anschluß nach Anspruch 1, dadurch gekennzeichnet, daß der elektrische Anschluß (10; 110-I) aus relativ dünnen Metallblech (40) gestanzt und geformt ist. 40
3. Elektrischer Anschluß nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Rippe (28; 128) eine Rille (34; 134) auf der äußeren Oberfläche (38; 138) des Drahtabschnitts (16; 116) bildet. 45
4. Elektrischer Anschluß nach Anspruch 3, dadurch gekennzeichnet, daß eine zweite Rippe (30; 130) in den Drahtabschnitt (16; 116) geprägt ist. 50
5. Elektrischer Anschluß nach Anspruch 1, 2, 3 oder 4, dadurch gekennzeichnet, daß eine isolierende Hülse (24; 124) über dem Drahtabschnitt (16; 116) aufgeformt ist. 55
6. Verfahren zum Herstellen eines elektrischen Anschlusses bei welchem ein Kontaktabschnitt (12) und ein Drahtabschnitt (16) aus Metallblech (40) gestanzt und umgeformt werden, gekennzeichnet durch Prägen einer durchgehenden Verstärkungsrippe (28; 128) um den Kontaktabschnitt (12; 112) herum in der Nachbarschaft von dessen Kante und um die innen liegende Oberfläche des Drahtabschnitts (16; 116) herum. 60
7. Verfahren nach Anspruch 6, gekennzeichnet durch Prägen einer zweiten Rippe (30; 130) um die innenliegende Oberfläche des Drahtabschnitts (16; 116) herum. 65

Patentansprüche

1. Elektrischer Anschluß mit einem Kontaktabschnitt (12) an einem Ende (14) zum Befestigen an einer elektrischen Vorrichtung und mit einem Drahtabschnitt (16) am anderen Ende zum Herumcrimpen um einen Draht (78), dadurch gekennzeichnet, daß eine durchgehende Verstärkungsrippe (28; 128) in den Kontaktabschnitt (12; 112) und den Drahtabschnitt (16; 116) geprägt ist. 70