

March 3, 1942.

G. C. THOMAS, JR
ELECTRICAL WIRE CONNECTOR

2,275,163

Filed Aug. 29, 1940

FIG. 1.

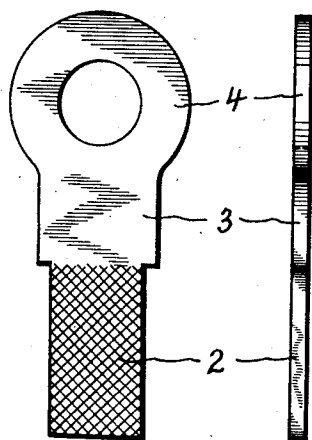


FIG. 2.

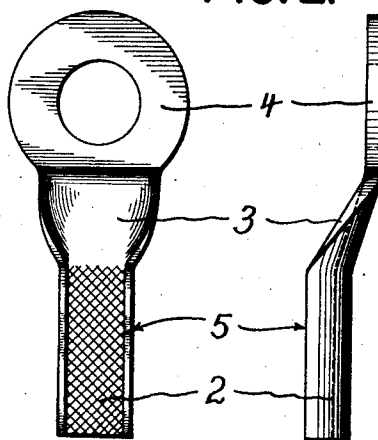


FIG. 3.

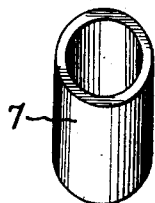


FIG. 4.

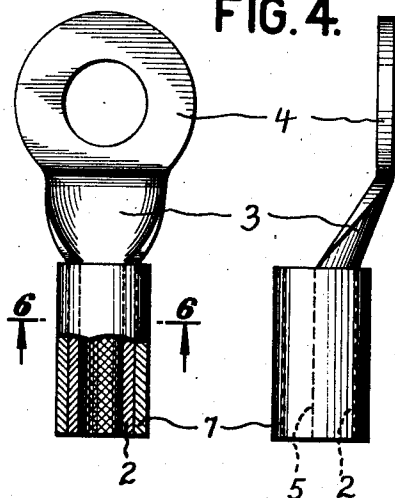


FIG. 6.

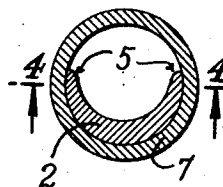


FIG. 7.

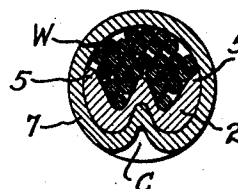


FIG. 8.

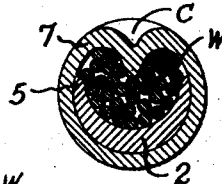
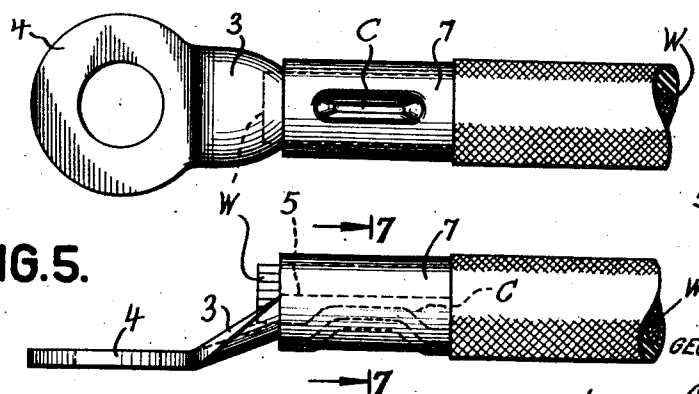


FIG. 5.



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2,275,163

ELECTRICAL WIRE CONNECTOR

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Application August 29, 1940, Serial No. 354,668

3 Claims. (Cl. 173-269)

This invention relates to solderless connecting means for joining the ends of one or more electrical conductors or for installing said conductors or wires in service position, and more particularly appertains to an electrical wire connector.

In general, the solderless electrical-wire connectors now largely in use comprise a plurality of assembled parts which present a number of joints or connections resulting in cumulative resistance to current flow, and it is an object of this invention to produce a solderless electrical-wire connector or terminal which not only has a minimum number of parts in its assembly by reason of my new construction but more particularly employs only one part in the current path, together with other advantages.

A further object is to produce a connector which is self contained, that is, a minimum number of two parts are permanently joined during manufacture of the connector and do not require assembly by the wiring mechanic on the job, and which has a minimum outside diameter for a given maximum-size internal passage to receive a maximum-size electrical conductor thereinto.

With the foregoing and other objects in view, the invention relates to the new construction and combination of parts as shown in the accompanying drawing, wherein:

Figure 1 shows an eyelet-face view and an edgewise view of the internal contact part blanked flat from sheet metal.

Figure 2 shows the part in final form with its electrical contact end pressed into a trough-shaped contact tongue.

Figure 3 is a perspective view of a tubular reinforcing outer shell into which the contact tongue of the other part is pressed and held as an assembled fit.

Figure 4 shows an eyelet-face view and an edgewise view of the completed connector, the eyelet-face view being broken and in section as along the line 4-4 of Figure 6.

Figure 5 also shows an eyelet-face view and an edgewise view of the connector joined with a stranded-wire electrical conductor.

Figure 6 is an enlarged cross section taken on the line 6-6.

Figure 7 is a cross section on the line 7-7 showing the wire strands in the connector with a crimping depression applied through the double-wall side of the connector.

Figure 8 also is a cross section like Figure 7, except the crimping depression is applied to the single-wall side of the connector.

Referring further to the drawing, a current transmitting part, preferably of soft copper, is punched from sheet material and has an electrical contact or wire engaging end portion 2 with an integral neck 3 and an eyelet end 4. The contact end 2 has its inside surface serrated or perforated or otherwise roughened in a known manner to establish an effective bonding and gripping connection with an electrical wire conductor. For small wire, thin soft sheet stock copper or other material is used to make this part, while for larger wire a thicker gauge sheet metal may be used.

The contact end 2 is pressed or stamped into final form (Figure 2) of trough-shape or substantially semi-circular in cross section. In fact, the contact tongue 2 is preferably made initially sufficiently wide as to deform it into final shape with an arcuate body in cross section of a little more than 180°. This makes the sides of the trough-shape contact portion 2 define an arc of slightly more than a half circle.

In addition to the foregoing, the two longitudinal edges of the arcuate portion 2 are preferably reduced in thickness from the center or bottom of the trough outwardly so as to feather-edge down to thin form. This is accomplished when drawing or reducing the portion 2, by a stamping or die-pressing operation, which produces a trough-shaped part of gradually reduced thickness from the bottom thereof outwardly to its upper thin edges 5, thereby forming a crescent shape portion in cross section with a thick center and thin edges.

The semi-circular contact portion 2, and likewise its crescent-shape form as shown, is a feature making for a minimum outside diameter connector with a maximum inside diameter passage adapted to receive a maximum size wire W. The wire W rests within the connector somewhat off-center of an outer shell 7, that is, the wire rests between the inner surface of the crescent contact portion 2 and inner surface of the shell 7.

The trough-shape or crescent contact portion 2 occupies a minimum of space within the shell 7, thus receiving a maximum size wire into the connector. Reduction in overall size of the connector is the result, and it follows that the outside diameter of the insulation on the wire W more nearly equals the outside diameter of the shell, thus making for a neat wiring assembly.

The length of the tubular or cylindrical reinforcing sleeve or shell 7 is about equal to that of the contact portion 2. This shell 7 may be

formed of hard metal, say of hard drawn bronze or copper tubing which has high tensile strength and hence offers substantial resistance against deforming from its crimped shape, as later explained. The inside diameter of the outer shell is substantially the same as the outside diameter defining the arcuate inner contact tongue 2.

The reinforcing bronze or hard copper shell 7 is telescopically pressed upon the arcuate contact member or portion 2 until the inner end of the shell rests against the edges of the enlargement of the eyelet neck 3. The contact member and shell are forced together with a pressed fit so as to permanently join them together and form the completed (Figure 4) connector assembly.

Since the arcuate contact 2 is more than 180° in cross-section it is forced to a firmly fitted seat within the shell 7. In other words, the longitudinal edges 5 reach beyond the diametrical center or more than half-way around the inside of the shell which is an arrangement simulating the interfitted coaction between two complete cylinders, but doing so without actually making the inside part in full-cylindrical form. The reach of slightly more than 180° causes the inner half-round portion 2 to hug its seat against the inside of the shell 7 and form a connector of double-wall thickness on one side and single wall on the other side.

In the use of this connector, a wire W, if covered by insulation, has its end trimmed clean of said insulation and introduced into the tubular shell 7 in engagement with the serrated surface of the soft metal tongue 2, with the shoulder of the cut insulation abutting the end of the connector. Crimping pressure is now applied, as indicated at C pointing to a lengthwise groove or depression forced into the connector. A crimping or pressing tool of any suitable form is used for this purpose.

Preferably, the compressed groove C is applied longitudinally of the connector, hence parallel with the wire W therein, and extends substantially from end to end of the shell 7. By enforcing the crimping depression longitudinally in the connector there is produced a lengthwise gripping of the entire area of the soft metal contact tongue 2 against the wire which affords the maximum area of pressure electrical bonding engagement. It also follows that the thin edges 5 of the contact part act to gather in the wire strands and crowd them into a longitudinally packed cold-flow mass which forms a permanent and effective electrical joint or connection.

The soft metal tongue 2 deforms and squeezes by cold-flow gripping engagement into the strands of the wire W. In fact, the serrated or otherwise roughened surface of the soft copper portion 2 finds its way by pressure into the interstices of the wire strands and establishes a positive electrical cold-flow pressure connection therewith. This function also results when applying the connector to a single wire conductor, except that the gripping pressure exists externally about the cylindrical surface of the single wire.

The internal compression applied to the wire W by the gripping force of the crimping groove C is maintained permanently, whether crimped through the double-thickness wall (Figure 7) or through the single-wall thickness (Figure 8); it is satisfactory to apply the crimp C anywhere around the connector. The outer shell takes a permanent-set crimp C and may be made of cop-

per or preferably of hard drawn material or high tensile bronze tubing. Thus, the crimping groove C forced into the interfitted parts 2 and 7 produce an unusually efficient electrical connection with the electrical wire W because the reinforcing shell maintains the internal cold-flow compression of the parts, and the outer shell 7 likewise grips and engages the wire. This connector is of minimum size for maximum size wire and makes an effective and neat wiring job.

This invention is presented to fill a need for a useful electrical wire connector. It is understood that various modifications in construction, operation, use and method, may and often do occur to those skilled in the art, especially after benefiting from the teachings of an invention, and that this disclosure is exemplary of the principles but not limited to the present embodiment of the invention.

What is claimed is:

1. A solderless electrical-wire connector having positive current transmitting means comprising, in combination, a trough-shaped contact tongue made of soft metal, and a tubular shell surrounding the soft metal trough-shaped tongue with a pressed fit thereon to produce a permanently-joined one-piece connector adapted to receive an electrical conductor thereinto, said soft metal tongue being adapted to lie in engagement with the conductor aforesaid, whereby a crimping force applied to the connector causes the soft metal tongue to cold-flow by internal compression into intimately positive electrical engagement with the conductor and also to act as the current transmitting means, while the tubular shell withstands said crimping force and maintains the internal compression.

2. A solderless electrical-wire connector comprising, in combination, a soft metal contact member of sufficient length to receive and lie alongside and in engagement with an electrical conductor, said contact member being arcuate in cross-section of slightly more than 180° and having its longitudinal edges thinned down to feather-edge crescent shape formation, and a tubular reinforcing shell surrounding the arcuate contact member with a pressure fit thereon thus producing a permanently-joined one-piece connector assembly, the contact member being seated longitudinally against the inner surface of said outer shell, whereby a crimping groove depressed longitudinally into the connector causes the soft metal contact member to cold-flow into gripping connection with the conductor, with the thin edges of the contact member crowding around and tightly packing against the conductor and being maintained under pressure from end to end thereof by said shell, thereby forming a positive and permanent electrical connection.

3. An electrical wire connector comprising, in combination, a cylindrical member of uniform inside diameter, and a contact part of arcuate cross section of slightly more than 180° pressed into the cylindrical member in seated engagement therewith to form a permanent assembly, thereby making a cylindrical connector of minimum-outside diameter with an internal wire passage of maximum size adapted to receive and engage a maximum-size wire, and adapted to be crimped by which to cold-flow the contact part and the wire together in one compact mass within the cylindrical member engaging said wire.

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