

[54] CONNECTOR AND ELECTRICAL COMPONENT ASSEMBLY

[76] Inventor: **Al Weiner**, 2111 Regatta Avenue,
Sunset Island No. 4, Miami Beach,
Fla. 33140

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Related U.S. Application Data

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[52] U.S. Cl. **174/94 R**, 287/20.1, 287/20.5 R,
338/329, 339/275 R, 339/276 R

[51] Int. Cl. **H01r 5/04**, H01r 5/08

[58] Field of Search 174/84 R, 84 C, 94 R,
174/74 R, 75 R, 117 FF, 525; 287/20.1, 20.5,
103; 338/329, 332; 339/275 R, 277 R;
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[56]

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Primary Examiner—Bernard A. Gilheany

Attorney—Shlesinger, Arkwright & Garvey

[57]

ABSTRACT

A connector wire has a flattened lead-receiving section with a hole therethrough, and the end of an electrical lead wire is passed through the hole and secured to the flattened section. The free end section of the flattened portion is bent back to reduce the size of the hole and to press its periphery into biting engagement with the lead.

2 Claims, 14 Drawing Figures

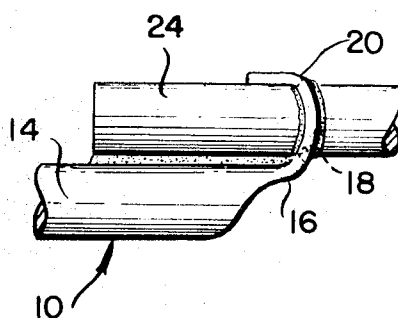


Fig. 1

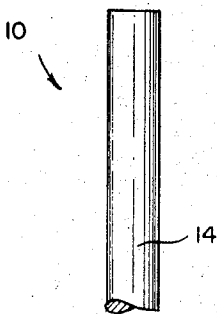


Fig. 2

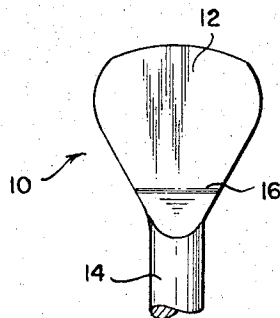


Fig. 3

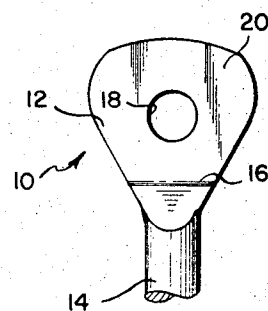


Fig. 4

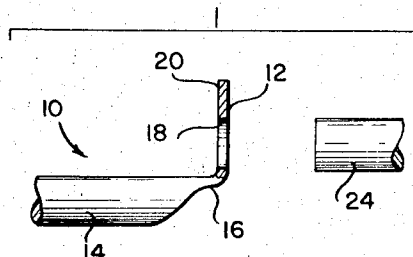
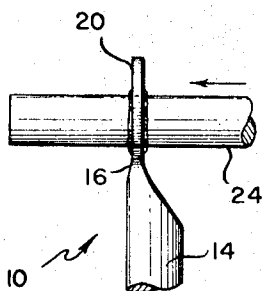


Fig. 5

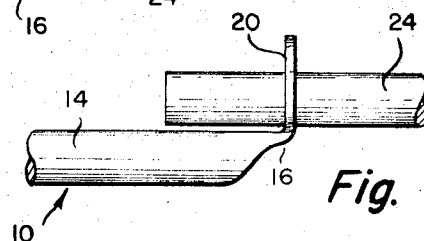


Fig. 6

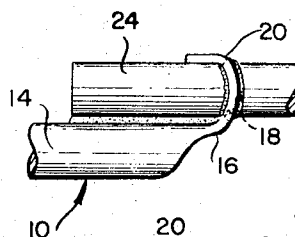


Fig. 7

Fig. 8

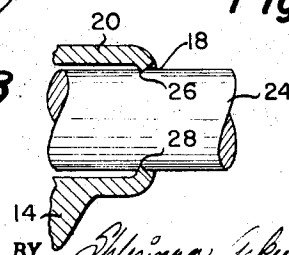
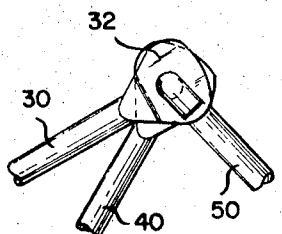


Fig. 9

INVENTOR
Al Weiner

BY *Shlomo L. Kuricht & Govey*
ATTORNEY

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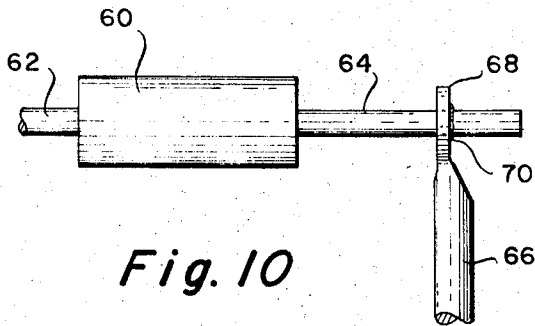


Fig. 10

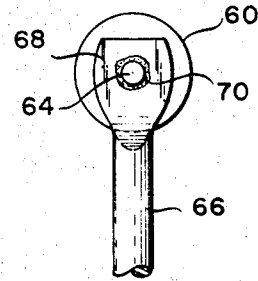


Fig. 11

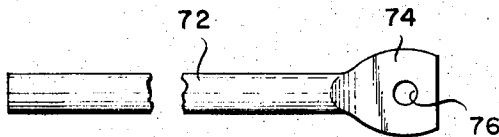


Fig. 12

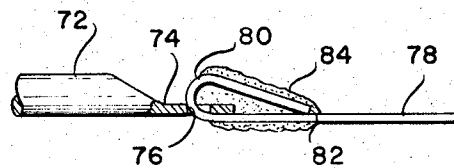


Fig. 13

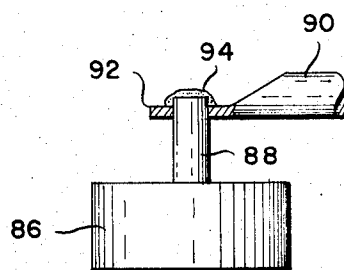


Fig. 14

INVENTORS
Al Weiner

BY *Shlenger, Ackright & Govey*

ATTORNEYS

CONNECTOR AND ELECTRICAL COMPONENT ASSEMBLY

This application is a continuation-in-part of application Ser. No. 825,332, filed May 16, 1969 now U.S. Pat. 3,566,465, issued Mar. 2, 1971.

SUMMARY OF INVENTION

It is a usual practice in connecting two wires together, or in connecting leads of electrical elements, to employ a separately manufactured connector element which is attached to the end of one of the wires to make a good mechanical and electrical connection with a minimum of assembly time. Such connectors are available in many different sizes and shapes, depending upon the type of connection to be made. However, most of such connectors in general use are of the eyelet type, having a circular wire receiving ring at one end, and the other end having a sleeve or similar type structure for grasping the end of the wire to be connected.

This method of making connections has involved the purchase of the connector for a given wire, and the attachment of the connector on the end of the wire, prior to making the desired connection between two electrical conductors.

Both the purchase of the special connector members, and their attachment to the end of the wire required an expenditure of money which will amount to a sizeable sum when a large number of such connections are to be made.

Accordingly, it is a principal object of this invention to provide a simple and relatively inexpensive method of making the desired connection.

It is another object of this invention to eliminate the need for a special connector member.

It is a still further object of this invention to provide a connector integral with the wire, thus obviating a special connector, and the need to affix it to the end of the conductor.

A still further object of this invention is to provide a mechanical and electrical joint which is smaller and neater than previously obtainable.

A still further object of this invention is to provide a connection between conductors which does not require any special connector members.

A still further object of this invention is to make it possible to form a connector at the end of any given wire which can be used to join that wire to another, obviating the need for a stock of connectors of different sizes.

These and other further objects of this invention will become more apparent from a reading of the following specification and claims.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the end of a wire prior to forming of a connector section.

FIG. 2 shows the wire end of FIG. 1 after forming of the connector section.

FIG. 3 shows a completed connector after a wire receiving hole has been made therein.

FIG. 4 shows a wire having the integral connector prior to receiving the end of a second wire.

FIG. 5 is a side view of a completed joint.

FIG. 6 shows the two elements of FIG. 4, in position for joining.

FIG. 7 shows the members of FIG. 6 after the joint has been completed.

FIG. 8 is a cross-sectional view illustrating the mechanical grip obtainable when the terminal member is folded over.

FIG. 9 shows a plurality of terminal ended wires connected to a single wire.

FIG. 10 is a side view of the integral connector wire connected to a resistor or capacitor lead.

FIG. 11 is an end view of the assembly of FIG. 10.

FIG. 12 is a top view of an elongated connector wire.

FIG. 13 is a side view of an end portion of the integral connector, showing in cross-section the manner in which a thin wire can be connected thereto.

FIG. 14 shows the manner in which the integral connector wire can be connected to a diode.

DESCRIPTION OF THE DRAWINGS

Referring to the drawings, FIG. 1 shows a wire generally indicated at 10 from which an integral connector section is formed. The wire is made of conventional conductor material and is solid in cross section. The end of the wire is placed in a press and flattened resulting in the configuration shown in FIG. 2, wherein an enlarged flat end connector section 12 is formed on the end of the wire 14 and has a width and a length greater than twice the diameter of the conductor wire and a thickness substantially less than the wire diameter. The junction between the flattened end on the flattened sections 12 and 14 is indicated at 16. A side view of the flattened section can be seen in FIG. 5.

The final step in forming the completed connector section involves the making of the hole 18 in the widened connector section 12. This hole is slightly greater in size than the size of the wire which is to be received therethrough. In practice there is a clearance of from two to five thousandths allowed for between the wire and the periphery of the hole. It will be noted that the hole is centrally disposed in the enlarged connector section 12, and that a substantial free end 20 is allowed for between the tip of the connector and the periphery of the hole 18.

The wire 10 with the completed connector section as shown in FIG. 3 is now ready for joining with the end of the second wire which is to be attached thereto.

The connector section can be bent up as shown in FIG. 4 along the juncture line 16 to permit end to end joint of two wire ends that are disposed parallel to each other.

FIG. 5 shows the joinder of the connector section bearing wire 10 with a second wire 24 where the wires to be connected are disposed perpendicular to one another.

The end line connection of two wires such as those shown in FIG. 4 are illustrated in FIGS. 6 and 7. The wire 24, as shown in FIG. 4, is inserted through the opening 18 of the upturned terminal section 12 of wire 10 and moved a substantial distance as illustrated in FIG. 6 at which point it can be soldered to complete the connection of the two wires. However, if a firm mechanical bond is desired, the upturned section 20 can be folded down on the wire 24 which is illustrated in FIG. 7, and thereafter solder can be applied to the adjacent surfaces of each of the wires.

It has been found that with only a small clearance of several or more thousandths of an inch between the periphery of the opening 18 and the wire inserted therethrough, a solder bond is usually satisfactory to

complete the connection. For example, the construction of FIG. 5 is complete with the application of solder, and in most instances this bond is sufficiently strong to hold the wires together.

In some instances, it may be desirable to obtain a very strong mechanical bond prior to application of the solder. FIG. 8 illustrates this mechanical lock, and shows an enlarged cross-sectional view of the connector wherein the peripheral edges 26 and 28 are forced inwardly to bite into the outer peripheral surface of the wire 24 when the upstanding outer free end 20 is bent down against the wire in the manner indicated in FIG. 7. This results in a strong mechanical bond prior to application of the solder, wherein the two pieces are mechanically locked together and cannot be moved relative to one another. Solder is applied to the wires as the final step, as shown in FIG. 7.

The connection of the plurality of wires is illustrated in FIG. 9, wherein the wire 30 having the integral connector member 32 and a similar wire with an integral connector 40 are joined together with the wire 50 which is passed through the openings of the connector sections of wires 30 and 40.

METHOD

It can be seen that this simplified integral terminal or connector structure has a wide application of uses, permitting the electrician to readily connect for most any type of wire size in the field.

The applications of the invention are many and varied, permitting the electrician to readily obtain a joint connecting one wire to another, or connecting electrical components such as condensers, resistors, diodes, or other elements. The handiness of such an arrangement can be seen where a large number of connections are to be made, such as enlarged circuit boards, and terminal boxes.

It also has application in small wiring jobs where the electrician must make connections such as in the home, electrical machinery, and other types of field applications.

With the use of a small punch, or a manual flattening plier or crimper, the first step of flattening the end of the wire is readily accomplished.

The small punch is in use to make the hole through the flattened connectors section at the end of the wire.

Where a large number of wires are involved, it is preferable to use power punch presses in the shop to flatten the end of the wire and to punch the hole through the connector section, since a large number of wires can be provided with the integral connector section in a very short period of time.

The connection of the wires is made by inserting the plain ended wire through the hole of the wire having the connector section, and subsequently soldering the adjacent surfaces of the wires together. For most purposes this joint will be sufficient, but where it is desired to obtain the very strong joint, the terminal free end portion is folded back on the plain ended wire with a plier or similar tool prior to soldering as described above with regard to FIGS. 7 and 8.

In certain application such as the wiring of radio and television sets and similar types of electronic equipment, it is possible to pre-dip the end of the wire in solder prior to putting the pieces together, so that no additional solder for the joint is required.

It should be noted that where the free end 20 of the terminal section is to be bent over on the plain wire end, the central hole should be positioned close enough to the junction line 16 to permit the end to readily be folded over by use of pliers or other types of crimping tool.

In FIG. 10, an electrical component such as a resistor, capacitor, or inductance, generally indicated at 60 having leads 62 and 64 is shown connected to the connector wire 66. The lead 64 is shown extended through the flattened section 68 and soldered in position by the solder bead 70.

The specific arrangement shown in FIG. 7 illustrates the manner in which the solder bead 70 is placed around the periphery of the lead 64.

In FIG. 12, the connector wire 72 is shown with a partial section cut away, inasmuch as in this modification the wire is an elongated piece with the flattened end portions 74 having the holes 76 therethrough. The wire in this instance has the head section 74 formed as previously described, and the connector wire is used as a separate individual piece. The midportion of the connector wire is shown cut-away, and the length of wire can be of any length desired.

In FIG. 13, a simple application of the use of the connector wire with regard to thin wire connections is shown. The connector wire 72 has flattened end portion 74, with an opening 76 therethrough. The elongated thin wire 78, to be connected, is passed through the opening 76 and has a looped portion 80 which is doubled back on the wire and has its end 82 brought into abutment with the main portion of the wire 78. The junction is completed by covering the joint with a solder glob 84, as shown in partial section in FIG. 13.

In FIG. 14, an electrical component, such as a diode, as used in alternator construction is shown, with its input conductor lead 88 connected to the connector wire 90 by being passed through the flat connector section 92 and fixed in position by the solder connection 94.

While this invention has been described in connection with different embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains, and as may be applied to the essential features hereinbefore set forth and fall within the scope of the invention or the limits of the appended claims.

What is claimed is:

1. An electrical connector-wire assembly, comprising:
 - a. a circular cross-section solid metal wire lead having a free end and having an electrical component at the other end thereof,
 - b. a connector-wire unit formed from an ordinary length of circular solid wire and including an elongated section of circular cross-section metal conductor wire having approximately the same diameter as the solid wire lead,
 - c. a flat end connector section integrally formed from one end of the connector-wire,

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- d. the flat end connector section having a width and a length greater than the diameter of the conductor wire and a thickness substantially less than the wire diameter;
- e. the central portion of the flat end connector section having a circular opening through which the free end of the solid metal wire lead is received,
- f. the cross-sectional size of the circular opening in the flat end connector section being greater than the solid metal wire lead diameter to provide an annular peripheral clearance space having a width of from two to five thousandths of an inch,

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- g. the free end of the end connector section being bent back on the wire lead to reduce the effective size of the opening in the end connector section and to press its periphery into biting engagement with the lead to provide both a rigid mechanical connection and an electrical contact between the wire lead and the connector wire unit.
2. The electrical connector-wire assembly as set forth in claim 1, wherein:
- a. solder is applied between adjacent surfaces of the wire lead and the connector-wire unit.

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