March 2, 1971

AL WEINER

3,566,465

FORMING OF CONNECTOR ON A WIRE AND ASSEMBLY THEREWITH

Filed May 16, 1969

Fig. 1

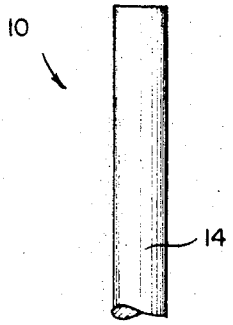


Fig. 2

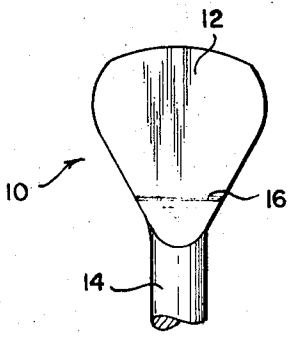


Fig. 3

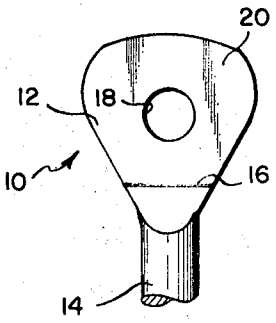
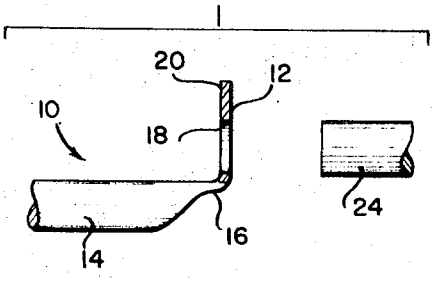


Fig. 4



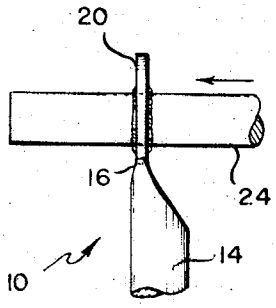


Fig. 5

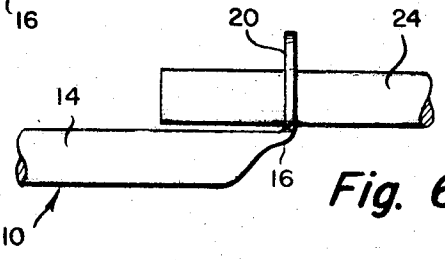


Fig. 6

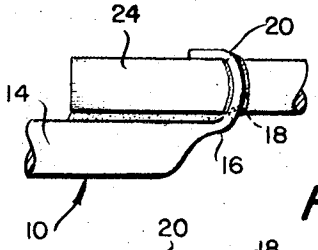


Fig. 7

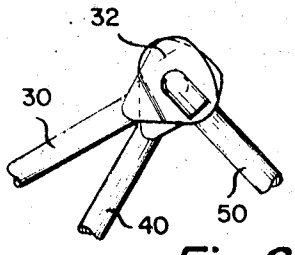


Fig. 9

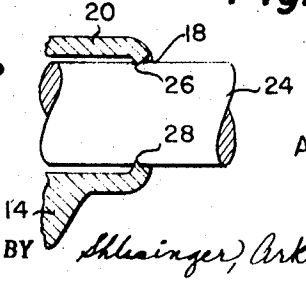


Fig. 8

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FORMING OF CONNECTOR ON A WIRE AND ASSEMBLY THEREWITH

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ABSTRACT OF THE DISCLOSURE

The end portion of a wire is flattened to produce a connector section which then has a hole made therethrough to accommodate a second wire which is secured thereto.

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 principle 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 conductor 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.

It is a still further object of this invention to provide a method for quickly connecting two conductors in a minimum of production time.

Another object of this invention is to provide a method of connecting two conductors in a stronger electrical and mechanical connection than was possible heretofor.

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.

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 end of the wire is placed in a press and flattened resulting in the configuration shown in FIG. 2, wherein an enlarged connector section **12** is formed on the end of the wire **14**. 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 of more thousandths of an inch between the pheriphery 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 edegs **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 electrican to readily connect for most any type of wire size in the field.

The applications of the invention are many and varied, premitting the electrican 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 enlarge circuit boards, and terminal boxes.

It is also application in small wiring jobs where the electrican 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 flatened 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.

It should be noted that it is also possible to provide for a plurality of spaced connections of wires on one length of wire, by pressing out a plurality of spaced connector sections along the length of the wire at desired spaced intervals. Holes are then made through the flattened sections by using a piercing or hole punch resulting in a series of eyelets at the desired spaced intervals along the length of the wire.

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 a certain application such as the wiring of radio and television sets and similar types of electronic equipment, it is possible to predip 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.

Having thus described my invention, what I claim is:

1. The method of forming a strong rigid connection between wires comprising the steps of:

(a) flattening a substantial portion of the end of a plurality of first wires to produce a plurality of flat, enlarged connector sections substantially larger than the diameters of their respective wires;

(b) making a hole through each of said plurality of said connector sections to receive a second wire therethrough, the size of said holes being slightly larger than the size of said second wire;

(c) passing said second wire through said hole in each of said plurality of connector sections, whereby there is a small clearance space provided between the periphery of each of said holes and the surface of said second wire; and

(d) bending the portion of said second wire on one side of said connector sections back onto said connector sections, whereby said second wire clamps said plurality of connector sections forming a strong rigid connection.

2. The method of forming a strong rigid connection between wires comprising the steps of:

(a) flattening a substantial end portion of the ends of a plurality of first wires for producing a plurality of flat, enlarged, integral connector sections substantially larger than the diameter of said plurality of first wires;

(b) making a hole through each of said plurality of connector sections to receive a second wire therethrough, the size of said hole being slightly larger than the size of said second wire;

(c) passing said second wire through said hole in each of said plurality of connector sections, whereby there is a small clearance space provided between the periphery of each of said holes and the surface of said second wire;

(d) spacing said plurality of connector sections at selected intervals along the length of said second wire; and

(e) placing liquid solder on the wires at a point adjacent the periphery of each of said holes, whereby said liquid solder immediately flows into said clearance spaces and around a substantial portion of said second wire forming strong mechanical bonds between said wires when said solder hardens.

3. The method of forming a strong rigid connection between wires as set forth in claim **2** including the step of:

(a) selecting as the first wire a lead wire which is integral with an electrical component.

4. The method of forming a strong rigid connection between wires comprising the steps of:

(a) flattening a plurality of portions along the length of a first wire for producing a plurality of flat, enlarged, integral, connector sections substantially larger than the diameter of said wire;

(b) making a hole through each of said plurality of connector sections for receiving a second wire therethrough, the size of each of said holes being slightly larger than the size of said second wire to be received therethrough;

(c) passing said second wires through said holes, providing a small clearance space between the periphery of each of said holes and the surface of said second wire received therethrough; and

(d) placing liquid solder on the wires at a point adjacent the periphery of each of said holes, whereby said liquid solder immediately flows into each of said clearance spaces and around a substantial portion of each of said second wires forming strong mechanical bonds between the wires when said solder hardens.

5. The method of forming a strong rigid connection between wires as set forth in claim 4 including the step of:

(a) selecting as the second wire a lead wire which is integral with an electrical components.

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U.S. Cl. X.R.

24—27; 29—25.17, 471.1, 602, 619, 621, 624; 174—73; 336—192; 339—162