July 10, 1951 L. H. BURNS 2,560,411

METHOD FOR MAKING WIRE CONNECTING DEVICE

Original Filed Sept. 7, 1942

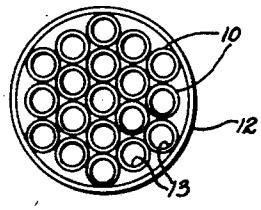


Fig. 1

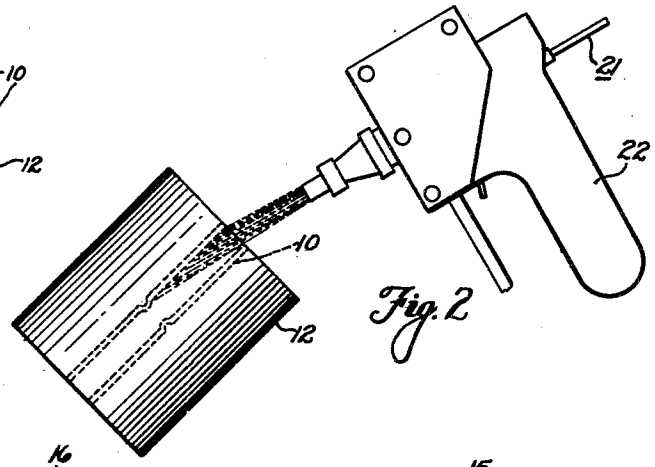


Fig. 2



Fig. 3

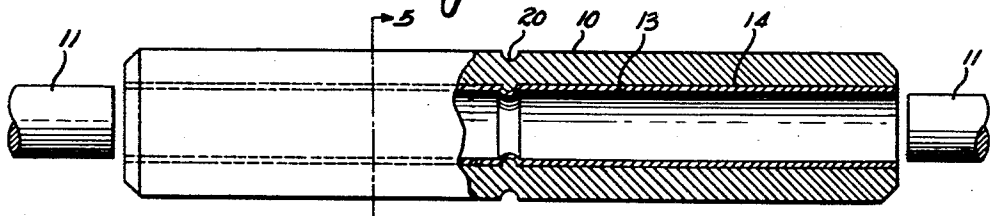


Fig. 4

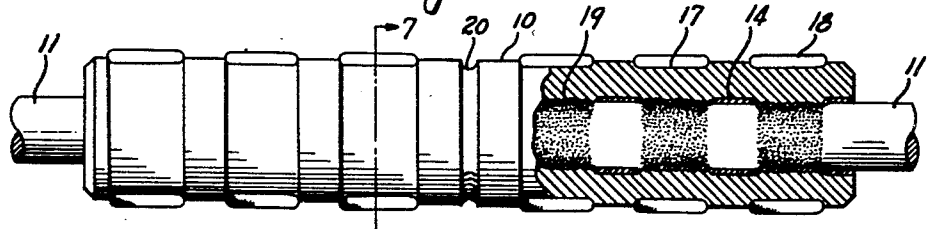


Fig. 6

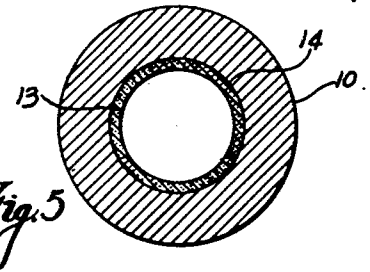


Fig. 5

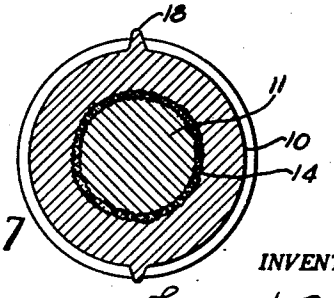


Fig. 7

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2,560,411

METHOD FOR MAKING WIRE CONNECTING DEVICES

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Original application September 7, 1942, Serial No. 457,607, now Patent No. 2,347,540, April 25, 1944. Divided and this application November 22, 1943, Serial No. 511,254

5 Claims. (Cl. 29—148)

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This application is a division of my pending application Serial No. 457,607, filed September 7, 1942, for Wire Connecting Device, now Patent No. 2,347,540.

My invention relates to improvements in wire connecting devices and more particularly to wire connecting devices in the form of a sleeve for making joints in wires by compressing the sleeve upon the wires to be joined.

An object of my invention is to provide for coating the inside wall of a sleeve with a hard material which has the property of penetrating the inner wall of the sleeve and the outside surface of the wires to be joined.

Another object of my invention is the method of coating the inner wall of a wire connecting sleeve with a layer of wire engaging material composed of a mixture of metal and glass, so that when the sleeve is compressed upon the wires to be joined the glass acts as an abrasive between the wire and the sleeve to produce a high holding power for joining the wires together.

Another object of my invention is to provide for coating the inner wall of a wire connecting sleeve with a thin layer of wire engaging material comprising metal and small pieces of glass embedded therein.

Another object of my invention is the method of coating the inner wall of a wire connecting sleeve which comprises metal and granules or small pieces of glass embedded therein, wherein the metal may be selected to correspond substantially with the metal of the wires to be joined to prevent electrolytic action of the metal at the joint. In the case of electric conducting wires, I provide for using in combination with the glass particles, metal of good electrical conductivity, so that the joint is of low resistance.

Other objects and a fuller understanding of my invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 is an end view of a plurality of my connecting sleeves arranged in a holding device preparatory to coating the inside wall thereof;

Figure 2 is a side view of the sleeve in Figure 1 with one connecting sleeve being more predominantly shown than the others, together with a spray gun for coating the sleeve;

Figure 3 is a fragmentary view of a wire having glass on the outside thereof which may be used in the spray gun for spraying molten metal and glass on the inner surfaces of the sleeve;

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Figure 4 is a longitudinal cross-sectional view of a sleeve having the inner wall thereof coated with metal and glass embedded therein;

Figure 5 is a cross-sectional view of the sleeve in Figure 4, taken along the line 5—5 thereof;

Figure 6 is a longitudinal cross-sectional view showing the wires inside the sleeve and after compression has been applied to the outside of the sleeve; and

Figure 7 is a cross-sectional view of Figure 6 taken along the line 7—7 thereof.

With reference to the drawing, my invention comprises coating the inner surface of a hollow metal sleeve 10 with a layer of wire engaging material indicated by the reference character 13 and comprising metal and small pieces of glass embedded therein. The finished sleeve is shown in Figure 4 and comprises a tubular body of sufficient length to receive the ends of the wires 11 to be joined. The center portion of the sleeve may be rolled as indicated at 20 in order to provide a restriction in the internal diameter of the sleeve to act as a stop for the insertion of the wires from opposite ends of the sleeve. In other words, the internal stop afforded by the external rolling of the sleeve prevents one wire from going beyond the longitudinal center of the sleeve in which event the other wire would not have the full benefit of the engagement by the sleeve. Prior to the application or the spraying of the mixture of metal and glass to the inner wall 14 of the sleeve, I preferably provide for sand blasting the inner wall 14 to give a roughened and clean surface free of oxidation and other constituents.

One manner of coating the inner wall 14 of the sleeve is illustrated in Figures 1 and 2 of the drawing and consists of grouping together a plurality of the sleeves to be coated and spraying them with a wire having glass on the outside thereof. Such a wire is indicated generally by the reference character 21, wherein the wire is designated by the reference character 15 and the glass on the outside thereof is indicated by the reference character 16, see Figure 3. The glass 16 may be in the form of fiber glass woven or otherwise wound about the wire 15 to give a good

covering. The glass may be shellacked or treated with any other suitable material to bind the glass to the wire 15 so that as the end of the wire is melted the fiber glass does not unravel but remains permanently attached to the wire at the point where the wire and the glass is fused.

For convenience, I employ a hollow container 12 which has an open top and bottom to hold the group of sleeves while spraying them but other means such as any suitable fastening device may be used. After grouping the plurality of sleeves 10 in the container 12, the container is tilted at a slight angle for the operator's convenience and a spray of metal and glass is directed down the inside of the sleeve. The spray is projected by a spray gun 22 and the direction of the spray is at a slight angle to the axial direction of the sleeve within the container 12. By directing the spray at a slight angle with respect to the sleeve the operator assures that the material which is being sprayed strikes the inner wall surface of the sleeve. The operator sprays all of the sleeve within the container 12 at this slight angle by sweeping the spray over the entire end surfaces of the plurality of sleeves within the container. The spray impinges the sleeves for substantially one-half of their longitudinal length. After spraying the upper end of the sleeves 10, the operator turns the container 12 end for end and repeats the spraying process. The tubular body of the sleeve is made of malleable metal and may be pressed about the wires to be joined by any suitable means or other arrangement of dies for rolling tools. In actual practice, I preferably compress the sleeve about the wires to be joined by means of a constant movement toggle clamping tool having clamping dies for engaging the sleeve at spaced intervals. A constant movement toggle type of compression tool is arranged to move the dies inwardly during the compression of the sleeve about the wires a definite amount as determined by the adjustment of setting of the tool. I am not limiting myself to the type of tool for compressing the sleeve about the wires to be joined as a screw or cam actuated press, or a hydraulic ram can be used and are even more desirable on the larger sizes than a constant movement toggle tool. Other tools which can be used are the impact tool and the rolling tool. The Figure 6 shows a sleeve which has been compressed by a constant movement toggle tool and the reference character 17 represents the compressed portions along the sleeve as effected by the die of the constant movement toggle tool. The flashes or the flow of excess metal between the mating edges of the dies of the tool are indicated by the reference character 18. When the sleeve is compressed, the small pieces of glass which are embedded into the thin coating on the inner wall of the sleeve act as an abrasive between the wire and the sleeve to give a good gripping engagement between the sleeve and the wire. The small pieces of glass which penetrate the wire is indicated by the reference character 19.

Experience shows that glass alone when sprayed upon the inner wall of a sleeve does not remain securely anchored to the sleeve. In my invention I embed thin pieces of glass in metal which holds the small pieces of glass to the inner surface of the sleeve. In this manner I am able to use glass as a good gripping material. Another feature arising from the use of metal to hold the glass to the inner wall of the sleeve is that the metal may be selected to correspond

substantially with outer surface of the wire to be joined to prevent electrolytic action between the joint connection. Thus, for example, if the wires to be joined are copper, then I preferably use a copper sleeve with copper and glass as the spraying combination. If the wire is covered with a galvanized coating, then I preferably use a zinc coated sleeve with zinc and the glass as the spraying combination. If the wire is a bare steel wire then I preferably use a steel sleeve with steel and glass as the spraying combination.

When an electrolytic action takes place, the metal of the joint is eaten away, which may eventually result in a bad joint. In my invention, this action is avoided. Thus, in the case of a galvanized or zinc coated steel wire, should the zinc be eaten away by the electrolytic action, the steel surface of the wire is then exposed which is subject to rusting. By using zinc in combination with the glass as a spray, I add zinc to the joint which serves as sacrificial zinc to further protect the joint against electrolytic deterioration.

In the case of copper electrical conductor, I use copper in combination with the glass as a spray, and in this manner I am able to obtain a joint of good electrical conductivity as well as one with a strong holding power as afforded by the glass particles or granules. The proportion of glass to metal in the spray may be varied to suit the nature of the joint. For a joint requiring high holding power, the glass content may be large. Where good conductivity is important, the metal content may be large.

The terms "wire" and "tubular body" as used herein are not limited to the showings in the drawing, as obvious variations may be employed. The end-to-end disposition of the joined wires to give a butt connection is not necessarily restricted to the arrangement illustrated in the drawings, as such variations may be made that fall within the scope of the invention as claimed.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim as my invention:

1. The method of making a wire connecting sleeve which comprises constructing a tubular body of malleable metal and spraying the inner wall of the tubular body with molten metal and glass, the step of spraying the metal and glass including the melting of a wire having glass on the out side thereof and then blowing the melted wire and glass on the inner wall of the tubular body.

2. The method of making a wire connecting sleeve which comprises constructing a tubular body of malleable metal and spraying the inner wall of the tubular body with molten metal and glass, the step of spraying metal and glass including the melting of a wire having fiber glass on the outside thereof and then blowing the melted wire and glass on the inner wall of the tubular body.

3. In a wire connecting sleeve having an inner wall to encompass a wire inserted therein, the method of making an improved interconnecting surface for the inner wall of said sleeve to interconnect with the wire, said method comprising

spraying the inner wall with molten metal and glass, the step of spraying the metal and glass including the melting of a wire having fiber glass on the outside thereof and then blowing the melted wire and glass on the inner wall of the tubular body.

4. The method of making a wire union with the inner wall of a sleeve, said method comprising the steps of spraying said inner wall of the sleeve with metal and glass, the step of spraying the metal and glass including the melting of a wire having glass on the outside thereof and then blowing the melted wire and glass on the inner wall of the tubular body, inserting a wire into the sleeve, and compressing the sleeve upon the wire, whereby the said glass and metal coating is shattered with the shattered particles of the glass embedding into both the sleeve and the wire to form a gripping action therebetween, and whereby the metal particles form an electrical path between the sleeve and the wire.

5. In a wire connecting sleeve having an inner wall to encompass a wire inserted therein, the method of making an improved interconnecting surface for the inner wall of said sleeve to interconnect with the wire, said method comprising

spraying the inner wall with molten metal and glass, the step of spraying the metal and glass including the melting of an elongated member comprising metal and glass and then blowing the melted wire and glass on the inner wall of the tubular body.

LEROY H. BURNS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,827,297	Moore	Oct. 13, 1931
2,038,535	Brenizer	Apr. 28, 1936
2,231,247	Bleakley	Feb. 11, 1941
2,244,109	Klein	June 3, 1941
2,279,677	Heinrich	Apr. 14, 1942
2,342,788	Burns	Feb. 29, 1944

FOREIGN PATENTS

Number	Country	Date
102,908	Australia	Jan. 20, 1938

(Also Great Britain Jan. 8, 1936)