April 5, 1938. W. H. BASSETT, JR., ET AL 2,113,228

METHOD OF JOINING WIRES

Filed Nov. 16, 1935

Fig. 1.

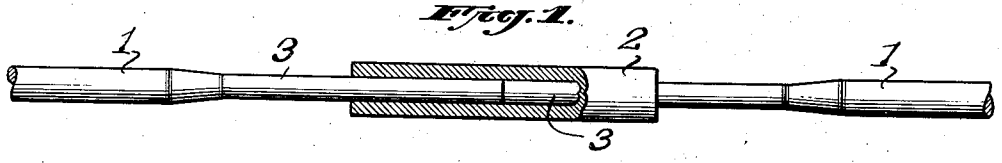


Fig. 2.

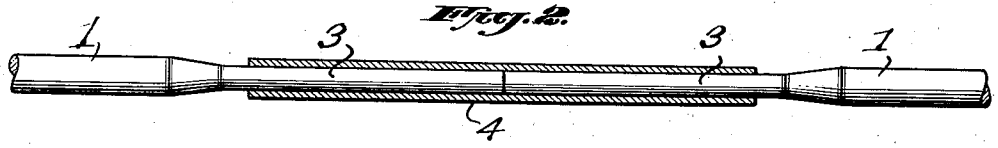


Fig. 3.

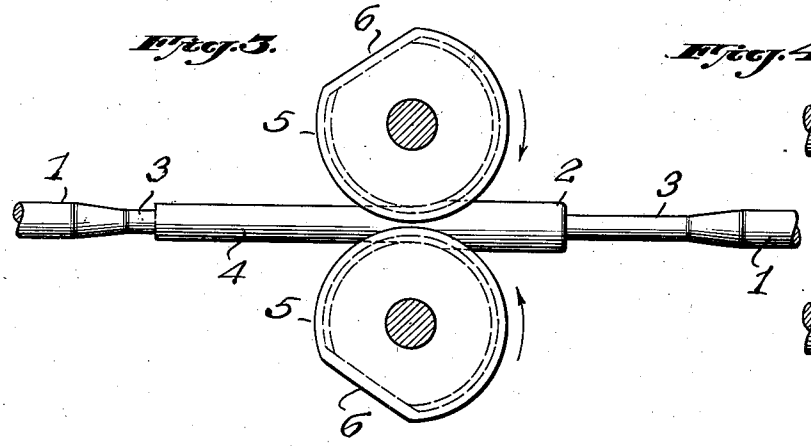


Fig. 4.

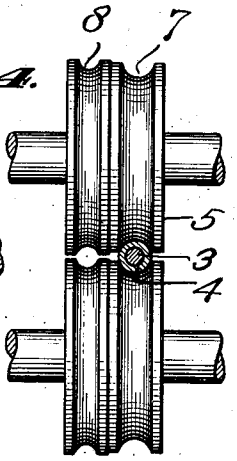


Fig. 5.

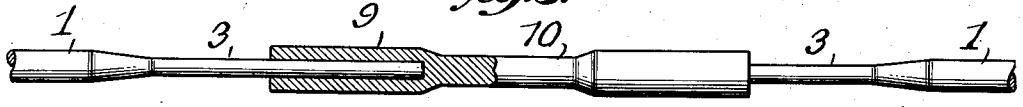
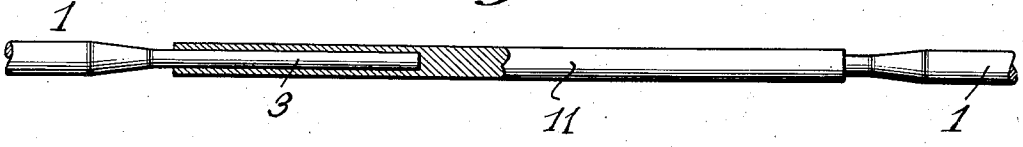


Fig. 6.



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METHOD OF JOINING WIRES

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5 Claims. (Cl. 29—148)

This invention relates to a method of joining soft non-ferrous wires by the use of metallic sleeves so as to form a bond of excellent mechanical and electrical characteristics with the wires.

The advantages of employing sleeves as a means of connecting hard non-ferrous wires are well known. It is possible in this manner to form joints which will resist the penetration of moisture and which may be conveniently fabricated in a short time with portable tools. However, in the past the application of these sleeves has been limited to use with hard wires and the chief object of this invention is to provide a method whereby soft copper wires may be joined by sleeves.

It has been found that a sleeve, though initially dead soft, will become hardened to an appreciable extent when subjected to the cold working incident to drawing, swaging or rolling. On the other hand, the hardness of the included wires will not be increased to any material extent since they are protected by the outer sleeve. As a result, the completed joint will not be homogeneous, the yield point of the sleeve being far higher than that of the enclosed wires. Under such conditions, a stress placed upon the joint will result in a decrease in cross-section of the wire without a corresponding reduction in the sleeve thus destroying the bond.

To overcome this and other difficulties that have been encountered in practice, we have devised a method of forming a joint which involves hardening the ends of the wires to be joined by cold working them prior to their insertion in the connecting sleeve. The completed joint will then be of substantially equal hardness throughout, and the ultimate strength of the connection will be greatly increased. The inventions will be fully apparent from the following detailed disclosure when read in connection with the accompanying drawing in which—

Fig. 1 is a view, partially in cross-section, showing the relationship of the wires and connector sleeve before working the sleeve; Fig. 2 shows the completed joint made in accordance with this invention; Fig. 3 illustrates one method of bringing the sleeve into intimate contact with the wires; Fig. 4 shows the essential elements of one form of tool which may be employed in practicing this invention; Fig. 5 illustrates a modification of this invention in which the sleeve is adapted to be subjected to a drawing operation; Fig. 6 illustrates a completed joint in which the sleeve has been drawn upon the wires.

In the practice of our improved method, we deem it important to harden the ends of the wires which are to be joined by cold working. Preferably, this is effected by the same tool, which is used to deform the connector sleeve and may be accomplished by rolling, drawing or swaging. In Fig. 1, two wires, 1, with hardened ends, 3, are shown with a sleeve 2, prior to forming the joint. The completed joint is illustrated in Fig. 2 with hardened sleeve, 4, in contact with the prepared wire ends 3.

As stated, rolling is a method which lends itself to this type of cold working and a set of coacting rolls 5 are preferably employed for this purpose. Portions 6 of the rolls are flattened, as shown, so that they may be slipped off the joint after completion. Preferably, the rolls have two grooves, as shown in Fig. 4, one groove 7 being utilized to work the connector sleeve and the other 8 for cold working the corresponding wire.

It is also possible to practice the method of this invention by drawing or swaging, the former method being particularly desirable when the conductors to be joined are of considerable size. Fig. 5 illustrates a sleeve 9 of the type usually employed when using drawing dies. The middle portion 10 of the connector is constricted to accommodate the dies before drawing. A completed drawn joint connecting two soft wires 1 with ends 3 and sleeve 11 of uniform hardness is illustrated in Fig. 6.

While the steps to be followed in the practice of this improved method have been precisely described, it is to be understood that the description and drawing are to be interpreted in an illustrative rather than a limiting sense and the appended claims are to be construed as broadly as is consistent with the prior art.

What we claim is:—

1. A method of connecting soft metal wires which comprises hardening a short length of the end of each wire by cold rolling and constricting a sleeve about the said contiguous hardened lengths of said ends to join them to one another.

2. The method of forming a wire joint of uniform hardness throughout which comprises cold rolling the ends only of the wires to harden them, engaging a sleeve with said hardened ends and cold rolling the sleeve while in engagement with said hardened ends of the wire.

3. The method of connecting soft wires of non-ferrous metal which comprises hardening short lengths at the contiguous ends thereof by cold rolling, and thereafter mechanically constricting

a sleeve of soft, non-ferrous metal about the thus hardened short lengths of the wire to harden said sleeve and cause it to grip said lengths of the wire.

4. The method of connecting soft copper wires which comprises hardening short lengths of said wire at the contiguous ends thereof by rolling, and mechanically constricting a soft copper sleeve about said ends to join the wires to one another and to harden said sleeve.

5. The method of uniting non-ferrous wires which comprises mechanically hardening a length of each wire near the ends to be joined, applying a soft, non-ferrous sleeve over said hardened wires, placing said hardened ends end to end with the sleeve of soft, non-ferrous metal enclosing and spanning said ends, and simultaneously hardening and constricting said sleeve onto said hardened ends.

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