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METHOD OF WELDING SOFT METAL TO HARD METAL BODIES.

APPLICATION FILED DEC. 21, 1911.

1,040,606. Patented Oct. 8, 1912.

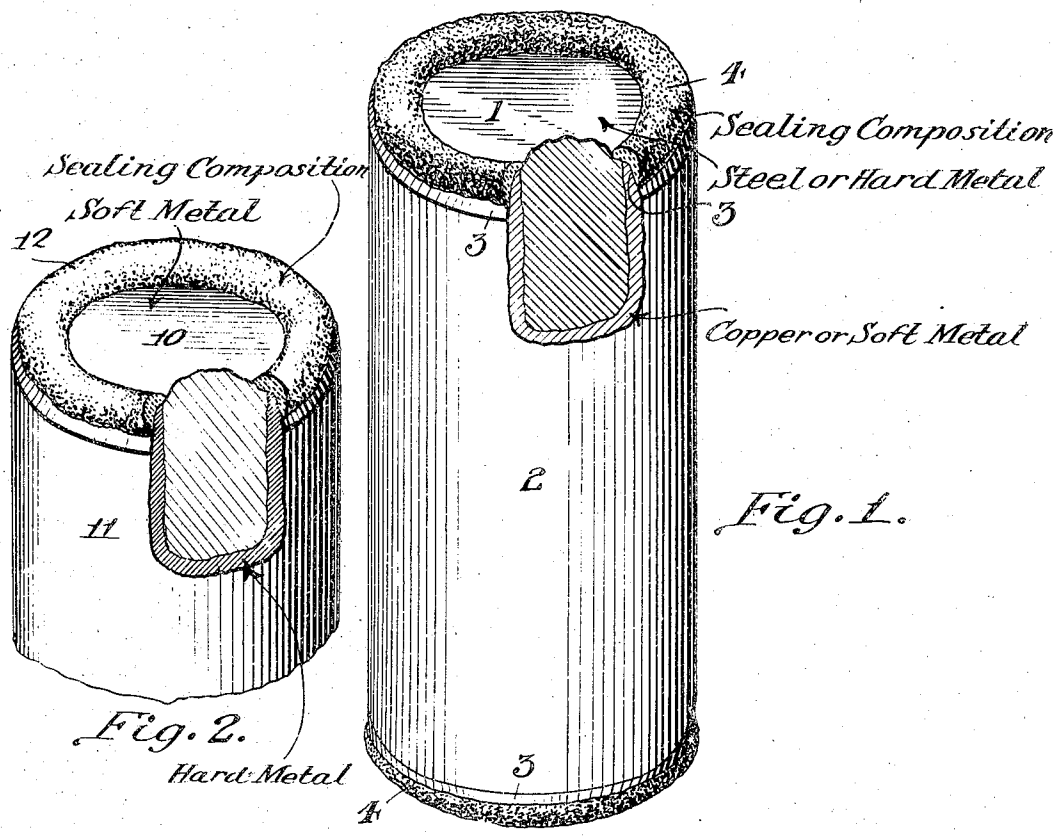

Fig. 2.

Fig. 1.

WITNESSES

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METHOD OF WELDING SOFT-METAL TO HARD-METAL BODIES.

1,040,606. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed December 21, 1911. Serial No. 667,260.

To all whom it may concern:

Be it known that I, JOHN A. AUTH, a citizen of the United States of America, residing at Colonial, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Welding Soft-Metal to Hard-Metal Bodies, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a new and novel method for welding a soft metal body to a hard metal body, more particularly to the welding of copper to steel for use in the manufacture of electrical conductors having a hard metal core and a copper sheath whereby the conductor will be unusually strong and durable and has for its object to provide a method as hereinafter set forth including a step for sealing the ends of the composite bar or ingot to prevent any possibility of the entrance of air between the elements of the bar or ingot thereby overcoming oxidation of the hard metal, such oxidation resulting in the separation of the core from the sheath and further impairing the rolling step when reducing the composite bar or ingot by rolling to a desired diameter, due to the fact that the core is liable to shift with respect to the sheath.

Although the method is designed primarily for welding a hard metal core to a soft metal sheath, yet it is to be understood that, if desired, the core can be of soft metal and the sheath of hard metal.

In the drawings, Figure 1 illustrates a cylindrical composite bar or ingot having a hard metal core and a soft metal sheath, said bar or ingot being made in accordance with the method. Fig. 2 illustrates a portion of a cylindrical composite bar or ingot consisting of a soft metal core and a hard metal sheath, said bar or ingot being made in accordance with this invention.

Referring to Fig. 1 of the drawings, the composite bar or ingot is cylindrical in contour and includes a hard metal core 1 and a soft metal sheath 2. The core 1 is formed of steel and the sheath 2 of copper. Each end of the bar or ingot has the copper sheath at each terminus thereof bent inwardly as at 3 whereby each end is tightly closed. To prevent entrance of air between the sheath and the core, each end of the bar or ingot is sealed by a composition 4, said composition will be presently referred to. The composition prevents the entrance of air and overcomes the oxidation of the hard metal core.

In Fig. 2 is illustrated a portion of a cylindrical bar having a soft metal core 10, a hard metal sheath 11, inclosing the bar, and with the joint at the end of the bar and sheath, sealed by a composition as indicated at 12.

In carrying the invention into effect, the hard metal element or bar is cleaned in any suitable manner, preferably by sand blast or pickling in a bath of sulfuric acid. After the hard metal bar is cleaned by pickling in the known manner, it is washed with fresh water, after which it is submerged in a bath of hot water for heating it. The heated bar is removed from the hot water bath and placed on a rack to dry, the heat of the bar rapidly drying the moisture upon the periphery thereof. When the bar is cleaned by a sand blast, it is not submerged in the fresh water or the hot water bath. The bar, after being cleaned in the foregoing manner, is then placed under a drop hammer and a soft metal tube, of the same length as the bar, placed over one end of the bar. The soft metal tube is then driven over the bar. The diameter of the tube is full, while the diameter of the bar is scant, that is to say, it will be assumed that the inner diameter of the tube is three and one-quarter inches, this diameter is full, while the diameter of the bar is three and one-quarter inches, yet this diameter is scant. Such arrangement makes an unusually snug fit between the tube and bar when the tube is driven over the bar. The soft metal tube may be of any desired thickness. The driving of the tube over the bar forms what is termed an ingot, or in other words, a composite bar having a hard metal core and a soft metal sheath. The composite bar is then stood on end and a conical shaped cap mounted upon said end, the cap is struck with a hammer whereby the end of the bar is closed, the end of the tube being contracted, due to the fact that the cap is conical in contour. The bending in of the tube is clearly shown in Fig. 1. The other end of the composite bar is subjected to a like operation. After the ends of the bar have been turned in or contracted, the bar is laid on a rack and each end coated with a liquid composition which readily hardens to prevent entrance of air between

the sheath and the core so as to overcome any possibility of oxidation of the hard metal core. Preferably the liquid composition employed consists of water silicate of sodium and pulverized asbestos, the latter and soda being in equal proportions. After the composition has set, the bar is heated and then while hot rolled to the desired diameter and the pressure of the rolls completes the weld. The composition is such that when the bar is heated, it will expand with the soft metal whereby the seal at each end of the bar will not be broken.

What I claim is:—

A method of welding hard and soft metal bodies together consisting of driving a cold metallic sheath tightly upon a cold metallic body to snugly fit said body and to completely inclose the same to form a composite bar, then contracting each of the ends of the sheath while cold by compression, then applying a sealing composition against the joints at the tapered ends of the bar to prevent entrance of air between the bodies to overcome oxidation, then heating the bar while the joints remain sealed, and then rolling the bar under pressure while hot and while the joints remain sealed thereby completing the weld and reducing the diameter of the bar.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN A. AUTH.

Witnesses:
N. L. BOQUN,
CHRISTINA T. HOOD.