

W. G. GREY & W. GRIFFITH.  
ELECTROLYTE FOR DEPOSITING COPPER.  
APPLICATION FILED FEB. 23, 1910.

976,454.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

FIG. 1

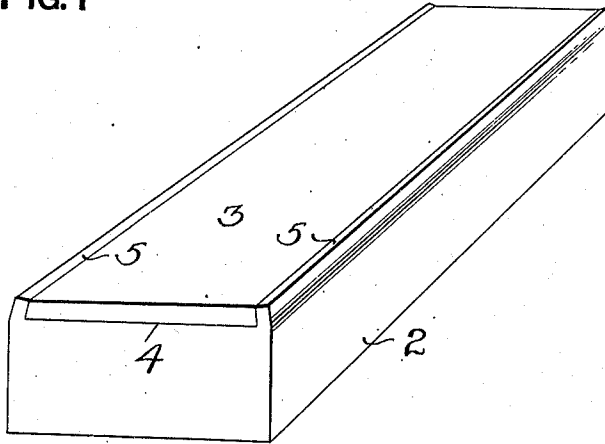
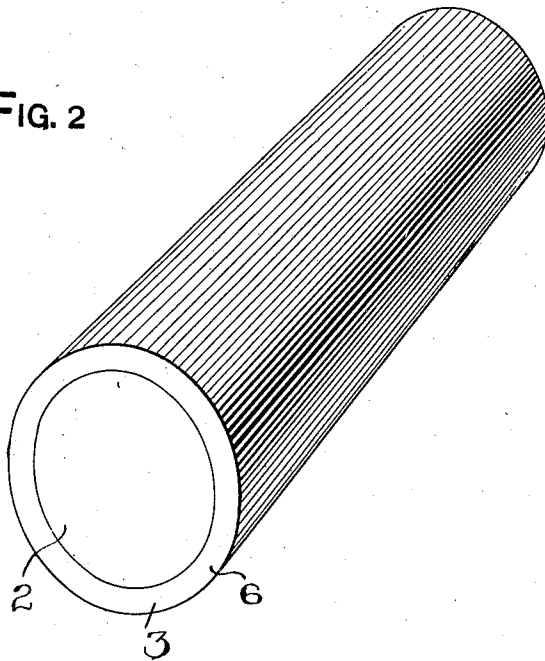


FIG. 2



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 3

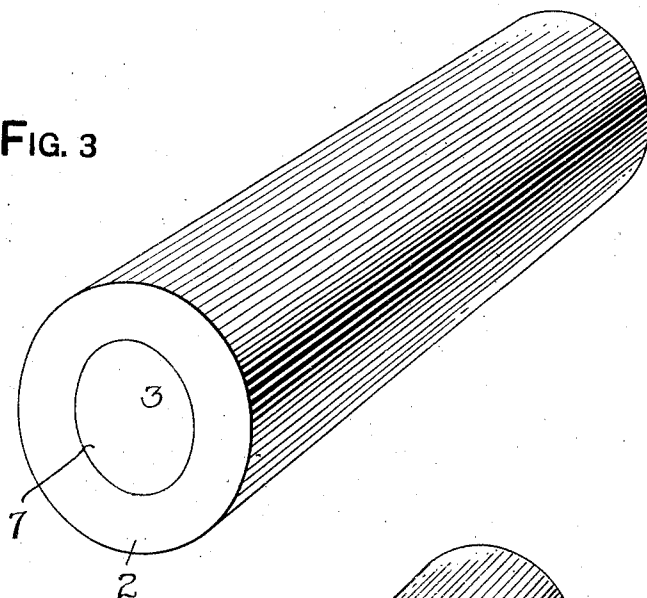
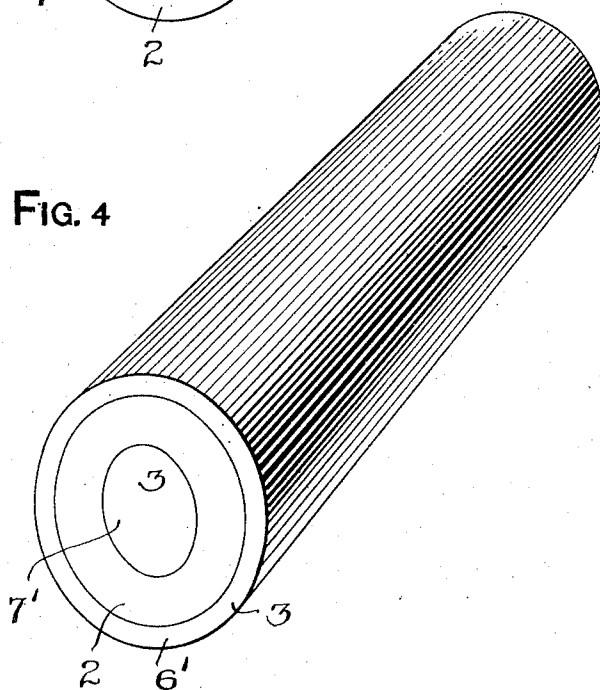


FIG. 4



WITNESSES

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# UNITED STATES PATENT OFFICE.

WILLIAM G. GREY AND WILLIAM GRIFFITH, OF PITTSBURG, PENNSYLVANIA.

## ELECTROLYTE FOR DEPOSITING COPPER.

976,454.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed February 23, 1910. Serial No. 545,324.

*To all whom it may concern:*

Be it known that we, WILLIAM G. GREY and WILLIAM GRIFFITH, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Electrolytes for Depositing Copper, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification.

Our invention relates to the method of uniting metals of different kinds, such as iron and steel, with copper, brass, bronze, aluminum, or other metal or alloy, which consists, generally stated, in first subjecting the harder metal to a cleaning and other preparatory treatment, applying the softer metal, bringing the two metals to a heat, and then uniting by pressure, as will be hereinafter more fully described.

We will now describe our invention, referring to the accompanying drawings, so that others skilled in the art to which it appertains may understand and practice the same.

While in the accompanying drawings we have shown our invention as applied to the preparation of an ingot, billet, or bar, it will be understood that we do not desire to limit ourselves to any particular shape, as it will be apparent that our invention may be carried out in a preparation of tubing and other shapes. For convenience of description, however, we will hereinafter refer to the iron or steel shape as the "harder" body of metal.

Figure 1 is a perspective view of an ingot, billet, or bar of hard metal, having a body of softer metal united thereto in accordance with our invention; and Figs. 2, 3 and 4 are similar views showing modified forms or shapes to be hereinafter more fully referred to.

In carrying out our invention, the body of harder metal 2 is first subjected to a cleaning or preparatory bath to remove the scale and oxid from the surface or surfaces to which the softer metal is to be united. This cleaning bath may be the ordinary acid solution used for this purpose. After the above treatment, the body 2 may be given a coating of alkali solution, such as chromate potassium or chromate sodium, so

as to prevent ready oxidation of the surface or surfaces thus cleaned.

After the body 2 of harder metal has received the above treatment, it is placed in a solution of copper sulfate, cyanid of potassium, and bi-sulfite of soda, from which a coating of copper on the cleaned surface or surfaces of the body of harder metal is caused to be precipitated electrolytically. This solution is prepared and proportioned preferably as follows, although it may be proportionately varied without departing from our invention, and we do not desire therefore, to limit ourselves to the specific amounts stated: one gallon of water,  $2\frac{1}{2}$  ounces copper red compound, 3 ounces cyanid potassium, 1 ounce bi-sulfite of soda. The "copper red compound" spoken of above is composed of about 60% sulfate of copper and 40% of bi-sulfite of soda. This compound is placed in one gallon of water, and the three ounces of cyanid of potassium is added. To this solution is then added about one ounce of bi-sulfite of soda. Electrolytical deposition of the copper from the solution to the body of harder metal immersed therein, is effected in the manner well known in the art of electroplating, and need not be here described in detail.

After the shape of harder metal has received the copper deposition in the manner above described, the body 3 of softer metal is then applied to the copper coated surface or surfaces, and the metals are heated to a temperature slightly below the fusing point of the softer metal, in which state the two metals are united by subjecting to suitable pressure device, such as rolls or presses. The metals having been welded, may then be rolled or otherwise worked as desired.

Any suitable manner of attaching the body of softer metal to the body of harder metal may be employed. In Fig. 1 the bar or body 2 of harder metal is shown as having the recess 4, in which is placed the body of softer metal 3, which is to be united thereto. In this construction the edges or flanges formed by this depressed surface, serve, when pressed against the edge of the body of softer metal 3, to rigidly hold the body 3 in position on the shape 2.

In Fig. 2 the body of softer metal 3 is shown in the form of a shell or continuous

coating 6. It will be seen that the shell 6 may be readily placed in position on the body 2 preparatory to being united therewith. A further form or shape of the body 2 is shown in Figs. 3 and 4. In the former, Fig. 3, the body of softer metal is shown in the form of the core 7, while in the latter, Fig. 4, it is shown as having both a core 7', and an outside shell or coating 6'. These latter shapes, that is, the shapes shown in Figs. 2, 3 and 4, are such as may be employed in the production of wire rods and the like. The advantages of our invention will be appreciated by those skilled in the art. The bi-sulfite of soda conduces to clarity and homogeneity of the copper coating precipitated to the surface or surfaces of the iron or steel shape, resulting in a perfect union of the metals when subsequently united in the manner above described.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. An electrolyte for depositing a metallic coating, comprising a solution of copper sulfate, cyanid of potassium, and bisulfite of soda.
2. An electrolyte for depositing a metallic coating, comprising a solution of one gallon of water,  $2\frac{1}{2}$  ounces copper red compound, 3 ounces cyanid of potassium, and 1 ounce bisulfite of soda.

In testimony whereof, we have hereunto set our hands.

WILLIAM G. GREY.  
WILLIAM GRIFFITH.

Witnesses:

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