(No Model.)

L. L. BURDON.

COMPOUND INGOT AND WIRE MADE THEREFROM.

No. 422,713. Patented Mar. 4, 1890.

FIG. 1.

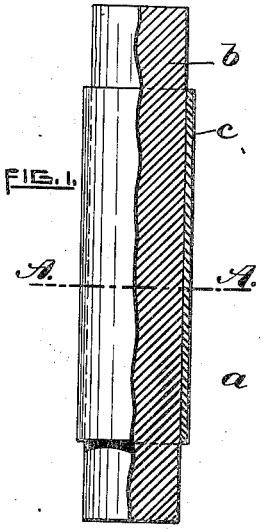


FIG. 3.

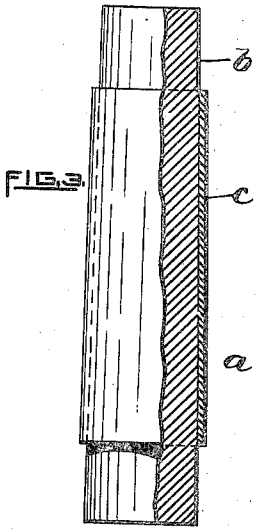


FIG. 4.

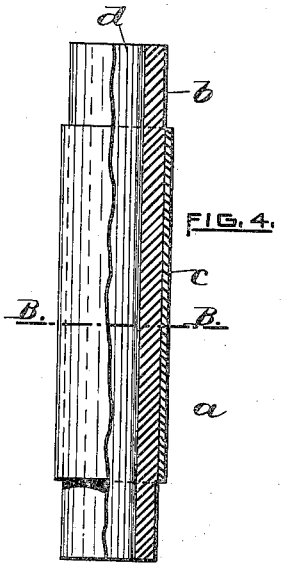


FIG. 2.

FIG. 5.

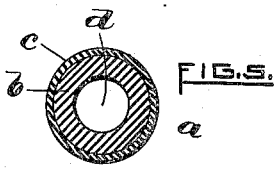


FIG. 6.

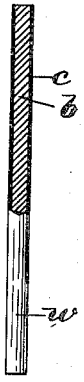
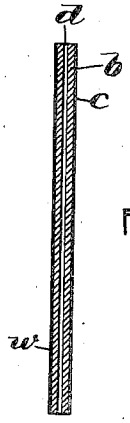


FIG. 7.



WITNESSES.

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by Remington & Henthorn

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UNITED STATES PATENT OFFICE.

LEVI L. BURDON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE BURDON SEAMLESS FILLED WIRE COMPANY, OF SAME PLACE.

COMPOUND INGOT AND WIRE MADE THEREFROM.

SPECIFICATION forming part of Letters Patent No. 422,713, dated March 4, 1890.

Application filed August 24, 1889. Serial No. 321,861. (No model.)

To all whom it may concern:

Be it known that I, LEVI L. BURDON, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Compound Ingots and Wire Made Therefrom; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to seamless compound ingots or wire adapted more particularly to be worked into articles of jewelry—such as watch-chains, bracelets, finger-rings, &c.; and it consists, essentially, of a base-metal core (made, say, of suitably-alloyed copper) having a seamless or unsoldered shell of fine metal, as gold or silver, (also suitably alloyed,) welded or united to the outer surface of the core by the "sweating" process, so called, thereby producing a ductile ingot, which can be reduced to seamless plated unsoldered wire.

My present invention, so far as I am aware, differs from others of this class, some of which I have already patented in the United States, in that the latter have the plating metal united to the baser metal or core by means of an interposed layer of film of solder.

All plated wire heretofore produced by the sweating process, and being round or polygonal in cross-section, has a longitudinal seam extending throughout its length. This seam for many uses for which the wire is employed necessitates that it be soldered, thereby obviously materially increasing the cost of the wire.

The object I have in view is to overcome in wire the longitudinal seam above referred to. To that end my improved wire is drawn or reduced from a substantially cylindrical-shaped ingot having a base-metal core, to which is united a seamless unsoldered exterior shell of fine metal, the parts being united while in a semi-solid state, thereby producing ingots (and consequently wire) possessing a high degree of plasticity and ductility.

In the accompanying drawings, Figure 1 represents a side elevation (in partial section) of my improved ingot, in which the outer shell of fine metal is united to the core by "sweating." Fig. 2 is a cross-sectional view taken on line A A of Fig. 1. Fig. 3 is a view similar to Fig. 1, the ingot being slightly larger at one end than the other, or tapering. Fig. 4 is a side elevation, also in partial section, of my improved ingot having a hollow core. Fig. 5 is a transverse sectional view of the same, taken on line B B; and Figs. 6 and 7 represent pieces of seamless unsoldered plated wire drawn down from the ingots, shown by Figs. 1 and 4, respectively.

A manner of producing my improved ingot *a* and the wire *w*, drawn therefrom, is as follows:

b indicates the cylindrical base-metal core portion, made substantially as shown in Figs. 1 and 2, (or annular, as represented in Figs. 4 and 5—that is, having a central hole *d* extending throughout the length of the ingot.) The core may be made of an alloy composed of copper, zinc, and tin in the usual proportions for the base of plating metal.

c designates the fine metal, as suitably-alloyed gold. The same is tubular in form and seamless throughout.

The shell can be produced as follows: The metal is first reduced to a plate form having the designed thickness. A disk is cut from the gold plate, and by means of a series of suitably-operating dies and plungers the disk is gradually transformed into a tube of the proper diameter and having a closed end. During the making of the tube it is frequently annealed, as usual, to facilitate its reduction, thereby producing an unsoldered seamless shell or tube *c*. Assuming now that the interior diameter of the tube is the same as the outer diameter of the core *b*, the closed end portion of the tube is then cut off, leaving it somewhat shorter than the core. The two surfaces which are to be united are next thoroughly cleaned and covered with borax. The shell is forced to its position on the core, the ends of the latter projecting beyond the shell. The whole, or more especially the said end portions, is then subjected to a comparatively high temperature, at the same time directing a series of flame-jets against the gold

shell *c*. The heat by conduction raises the temperature of the core lying within the shell until a point is reached equal to the fusing-point of the zinc or other low-fusing metal forming a part of the core, the heat upon the exterior of the shell at the same time transforming the low-fusing metal, as silver, with which the gold shell is alloyed, into a semi-solid state, and by means of the flux (borax) readily unites or commingles with the zinc of the core, the union being effected without the employment of solder. The workman must possess considerable skill and experience to successfully "sweat" the surfaces together, so that when the ingot is reduced to wire it shall be free from "blisters"—*i. e.*, portions of the surface which are disunited. The fusing of the zinc, &c., can be somewhat facilitated by the employment of a core having a central hole *d* therein, as in Figs. 4 and 5. In this form the heat is applied both to the interior and exterior of the ingot. After the shell is thus sweated to the core the ingot can be reduced to wire by first repeatedly passing it through a suitable swaging-press until it is reduced in size to enter a "draw-plate," which latter finally reduces it to the desired size, the stock meanwhile being frequently annealed, as usual, in the process of wire-drawing.

From experiments which I have made in producing wire *w* from my sweated ingot *a*, I have found that the fine metal is firmly welded to the core, the two parts retaining the same relative proportions they possessed in the ingot.

I claim as my invention—

1. As an improved article of manufacture, plated or compound wire having a seamless exterior surface of fine metal united to the core by the fusion of the metal or metals forming a part of the alloys of the inner and outer portions of the wire, substantially as hereinbefore described.

2. Plated or compound solid wire having an unsoldered seamless surface of fine metal united to the center or core portion of baser metal by sweating, substantially as hereinbefore described.

3. The compound ingot *a*, hereinbefore described, consisting of the center or base metal core portion *b* and the seamless shell portion *c* of fine metal united to said core by sweating—*i. e.*, a union without solder of the more easily-fused metal or metals forming a part of the alloys of the said core and shell—substantially as set forth, and for the purpose specified.

4. The compound hollow wire *w*, hereinbefore described, consisting of the central hollow base-metal core *b*, and an unsoldered or seamless exterior surface *c* of fine metal sweated to the said center or core portion, substantially as hereinbefore described.

In testimony whereof I have affixed my signature in presence of two witnesses.

LEVI L. BURDON.

Witnesses:
CHARLES HANNIGAN,
GEO. H. REMINGTON.