(No Model.)

L. L. BURDON.

SEAMLESS PLATED HOLLOW WIRE.

No. 440,694. Patented Nov. 18, 1890.

FIG. 1.

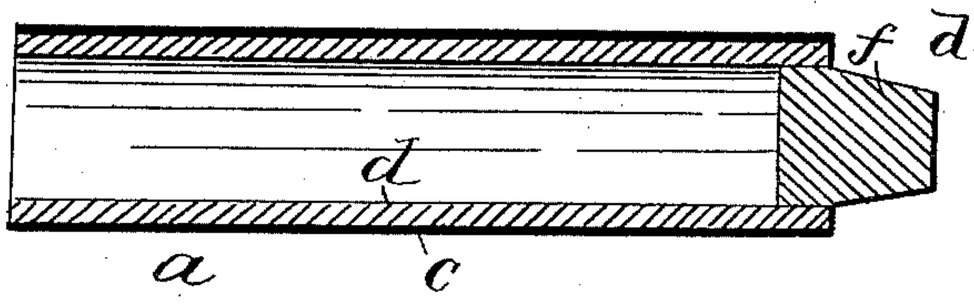


FIG. 2.

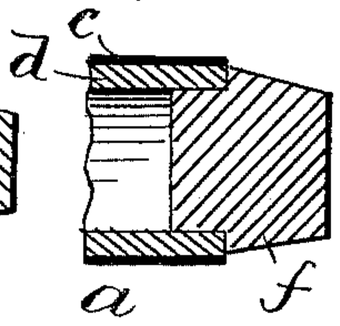
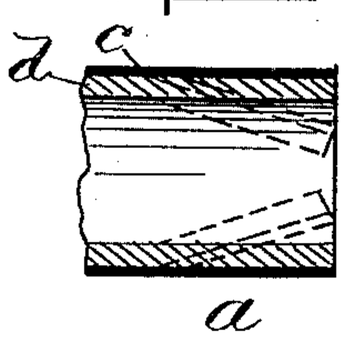


FIG. 3.



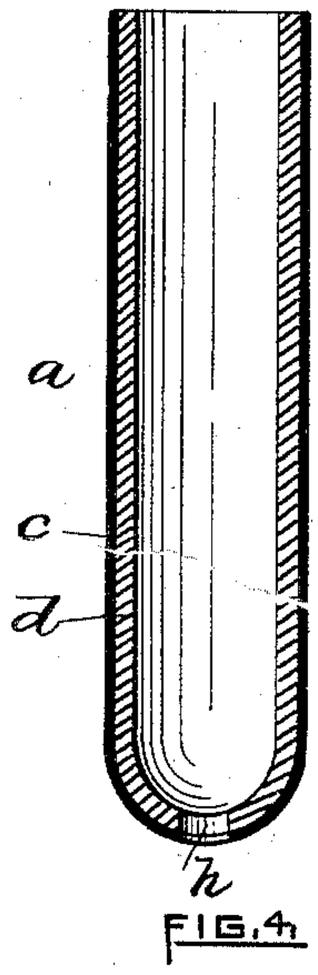


FIG. 4.

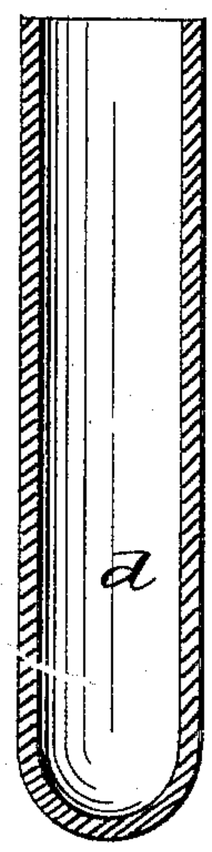


FIG. 5.

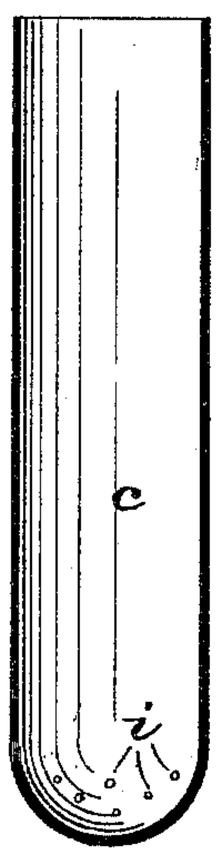


FIG. 6.

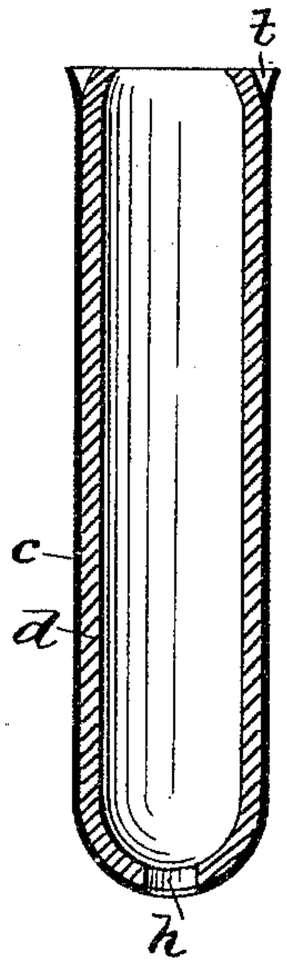


FIG. 7.

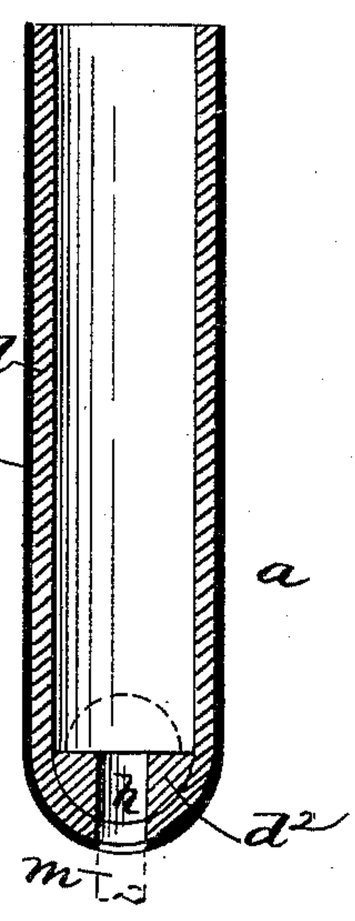


FIG. 8.

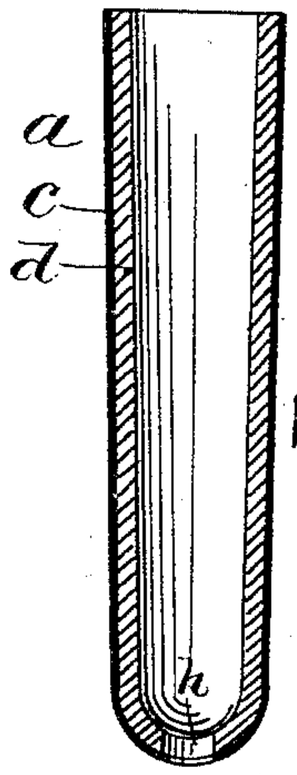


FIG. 10.

FIG. 11.

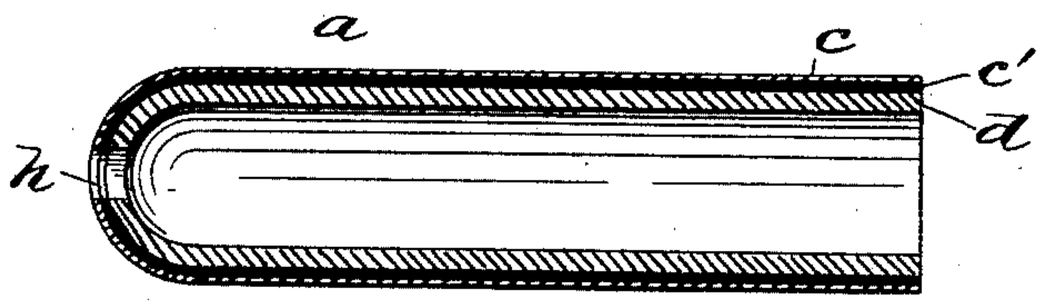


FIG. 9.

WITNESSES.

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Herbert F. Gountett.

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by Remington & Hawthorne

Attys.

UNITED STATES PATENT OFFICE.

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

SEAMLESS PLATED HOLLOW WIRE.

SPECIFICATION forming part of Letters Patent No. 440,694, dated November 18, 1890.

Application filed March 27, 1890. Serial No. 345,568. (No specimens.)

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 the Manufacture of Seamless Plated Hollow Wire; 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 of reference marked thereon, which form a part of this specification.

In the production of seamless plated hollow wire it frequently happens, especially when the gold and base metal are not united, that in reducing the compound ingot to wire the outer or gold surface will break or crack more or less as the reduction is continued, thereby increasing proportionately the amount of waste. Another source of waste is due to the manner in which the hollow compound ingot is produced—that is, the metal, if plated stock is used, has first the form of a flat plate. From this compound plate a disk is cut, which by suitable tools is then transformed into a plated tube or ingot. The waste or "scrap" remaining after the disk is thus cut from the flat piece of stock bears a considerable proportion of the whole, and in order to recover the precious metal such waste must be subjected to refining processes, thereby obviously materially increasing the cost of the product.

The object I seek to attain is to greatly reduce the amount of waste stock in the production of seamless compound hollow ingots and wire. To that end my invention consists, essentially, in drawing or forming two tubes from separate plates or disks of flat stock composed of fine metal and base metal, respectively, the outer or fine-metal tube being larger than the inner or base-metal tube. The latter tube is next inserted into the gold tube, after which the two tubes are attached or united by solder, or they may be united by "flushing," as the sweating process is sometimess termed. After the tubes are united the compound seamless hollow ingot is next reduced to hollow wire by any of the well-known processes.

In the accompanying sheet of drawings illustrating my improvement, Figure 1 is a central longitudinal sectional view of one form of my improved hollow ingot preparatory to being reduced to seamless plated hollow wire. Figs. 2 and 3 are sectional views of one end of a seamless compound ingot having modified forms. Fig. 4 is a longitudinal sectional view of my improved compound seamless hollow ingot having a closed end. Fig. 5 is a longitudinal sectional view of the inner or base-metal tube or shell. Fig. 6 is a similar view of the seamless tube or gold shell adapted to be attached or united to the exterior of the base-metal tube. Fig. 7 is an ingot similar to that shown in Fig. 4, but having a solder-holding chamber at the top. Fig. 8 is a sectional view of the hollow ingot having the lower end reenforced. Fig. 9 is a sectional view showing an outer seamless shell composed of plated stock and an inner shell of baser metal united thereto. Fig. 10 is a sectional view of my improved ingot having a taper form, and Fig. 11 shows a piece of hollow wire reduced from my improved ingot.

In the drawings, *a* indicates my improved seamless hollow compound ingot and the hollow wire reduced therefrom. The ingot is composed of an outer seamless shell or tube *c*, of gold or other suitable metal, attached wholly or in part to an inner shell or tube *d* of baser metal. The seamless outer shell *c* may be produced from a disk of gold or any other suitable metal, the same being gradually transformed by suitable dies, &c., into a tubular shape. If desired, the bottom end of the tube need not be removed, thereby leaving it closed, substantially as shown in Fig. 6. A few small holes *i* may be drilled in said end to facilitate the soldering operation. I would state that the outer seamless shell itself may be made from a compound or plated disk, the gold *c*, which in this case can be very thin, being on the outside and the thicker or plating metal *c'* on the inside, as shown in Fig. 9. The inner shell *d* is made of base metal. The manner of its production may be similar to that just described relative to the gold shell, or it can be rolled up from a flat piece of stock, thereby producing a longitudinal seam, which should be closed. The thick-

ness of the base-metal shell is usually much greater than that of the outer seamless gold shell. After the two shells or tubes *c d* are made the smaller or base-metal tube or core portion is inserted into the seamless fine metal tube, the two contiguous surfaces having first been properly prepared and covered, say, with borax, to promote the fusion of the solder, and the whole subjected to a high degree of heat, thereby soldering or welding the parts together. The solder may be applied in various ways—as, for example, in the form of a very thin sheet inserted between the core portion and outer shell, or the tubular core *d* may have its outer surface covered with thin solder before it is inserted into the seamless gold shell, or the gold shell itself may be lined with thin solder in lieu of covering the core *d* with solder.

Instead of the foregoing manner of applying the solder, a small chamber, as *t*, or even a larger one, may be formed at the upper end of the ingot, in which to place loose solder, or the chamber can be used as an auxiliary reservoir from which solder is supplied. Sometimes it may be best to unite the parts together by the sweating process—that is, by a fusion of one or more of the low-grade metals with which the outer and inner shells are alloyed. I make no claim herewith to any particular way of attaching or uniting the seamless outer shell *c* with the inner shell *d* of baser metal.

While the parts are being soldered together by the action of heat, the presence of solder through the small holes *i*, formed in the base of the gold shell, Fig. 6, indicates to the workman that the fusion of the solder is practically effected. After the now united compound exteriorly-seamless hollow ingot has been withdrawn from the influence of said heat a hole *h* may be drilled in its lower end, through which a headed rod or bar *m* (shown by dotted lines in Fig. 8) is inserted, the rod serving as a "leader," to which the reducing mechanism may be firmly secured. The hollow ingot may be re-enforced by soldering a piece of metal d^2 to the bottom end of the chamber, the hole *h* then extending through the whole, as shown in said Fig 8.

In some cases the cap or closed-end portion of the tubes (shown in Figs. 4 to 10, inclusive) may be left off and a plug or reducing end *f* inserted and soldered therein, substantially as shown in Fig. 1, or the hollow ingot may be open at both ends, one end being contracted, as shown by dotted lines, Fig. 3, by swaging or other means, thereby adapting the ingot to enter the reducing mechanism and convert it into hollow wire. I would add that the two shells of the hollow ingot *a* need not be united throughout their length in order to produce hollow wire, as they may be soldered or attached simply at the end which first enters the reducing mechanism, although I prefer in most cases that the union of the two shells shall be continuous throughout.

In Fig. 9 the hollow ingot is represented as consisting of a plated or compound outer seamless shell composed of thin gold *c*, united to base metal *c'*, and an inner tube *d* of base metal united to the outer shell. This ingot is adapted to be reduced to hollow wire, substantially as before described. By this latter arrangement the proportion of gold used may be reduced, thereby correspondingly reducing the quality of the product.

I claim as my invention and desire to secure by United States Letters Patent—

1. The improvement in the manufacture of compound seamless hollow ingots and wire, consisting in forming a seamless tube of suitably-composed metal and a smaller tube of baser metal, then inserting the said smaller tube into the larger one, next attaching or uniting the two tubes, and finally drawing or reducing the ingot to seamless hollow wire, substantially as hereinbefore described.

2. An ingot for the manufacture of seamless compound hollow wire, consisting of a compound tube having an end adapted to engage reducing appliances, said tube being composed of an inner tube or shell of base metal and a seamless exterior shell of finer metal attached or united thereto, 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.