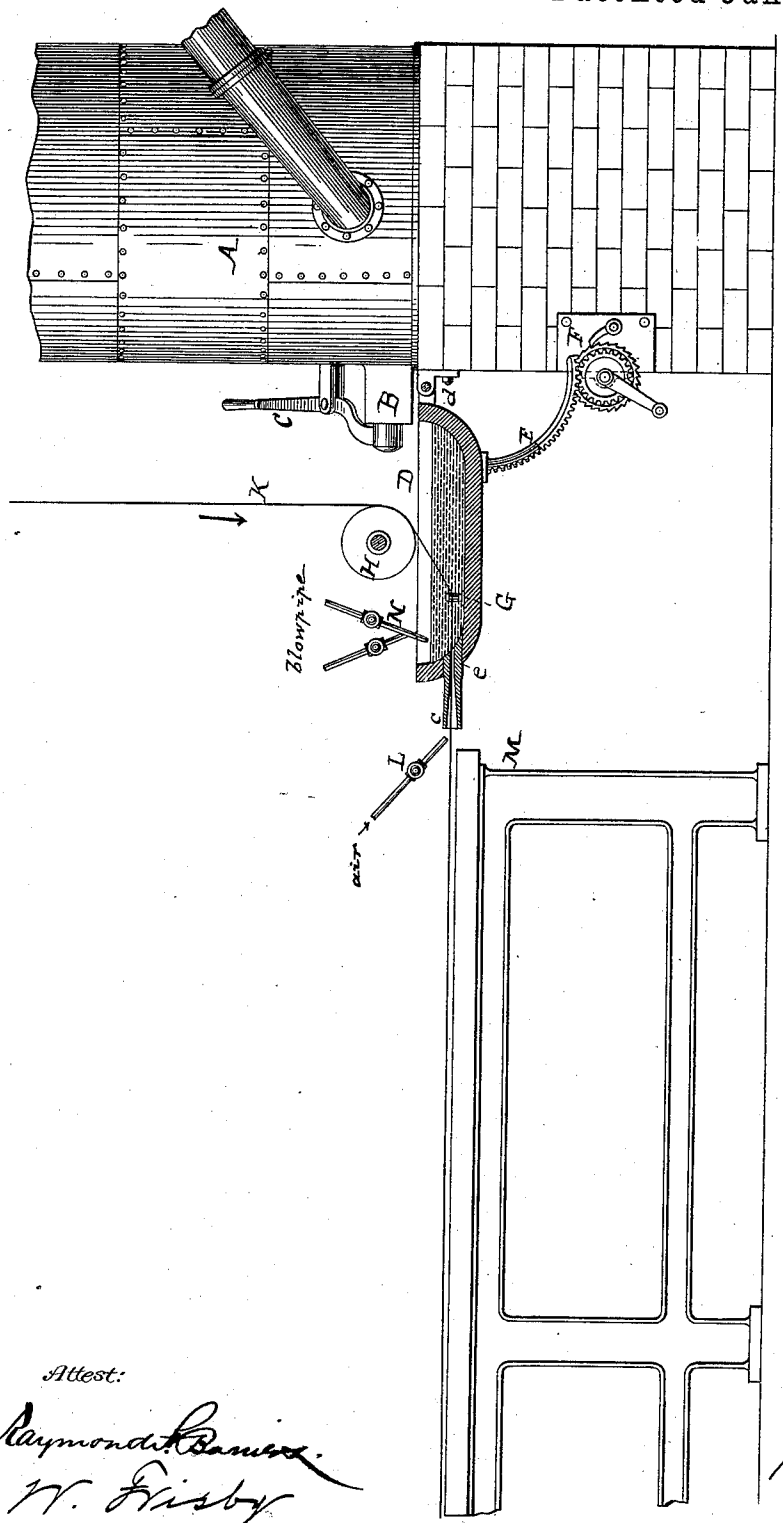
(No Model.)

M. G. FARMER.

PROCESS OF MANUFACTURING COMPOUND TELEGRAPH WIRE.

No. 310,995. Patented Jan. 20, 1885.



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UNITED STATES PATENT OFFICE.

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PROCESS OF MANUFACTURING COMPOUND TELEGRAPH-WIRE.

SPECIFICATION forming part of Letters Patent No. 310,995, dated January 20, 1885.

Application filed September 10, 1884. (No model.)

To all whom it may concern:

Be it known that I, MOSES G. FARMER, a citizen of the United States, and a resident of Newport, in the county of Newport and State of Rhode Island, have invented certain new and useful Improvements in Processes for Manufacturing Compound Telegraph-Wire, of which the following is a specification, reference being had to the drawing accompanying and forming a part of the same.

My invention relates to the manufacture of wire for telegraphic or similar purposes, composed of a steel core in a copper envelope. Wire of this kind, as is well known, possesses many advantages over the ordinary iron or copper wire, from the fact that it combines the tensile strength of the steel with the conductivity of copper, so that when used as a line-wire it is not only capable of sustaining a greater strain, but offers less resistance to the current than an equal length of ordinary telegraph-wire of the same diameter. This wire has heretofore been made by wrapping a copper ribbon around a steel core, by casting a copper tube around a steel center and drawing both down simultaneously, or by heavily electroplating a steel wire; but these methods or processes of manufacture are open to many and well-known objections. Over these methods my present invention is an improvement, as by it I produce not only a superior article, (a wire that is not apt to break or corrode,) but I reduce the actual cost of manufacture.

My invention consists in first applying to a steel wire as a core an adherent coating of copper by electro-deposition, and then drawing the coated wire through molten copper, shaping the coat, which it by this means acquires, by passing the wire through a suitable die. As my object in this process is chiefly to obtain a molecular adhesion or perfect union between the steel and the enveloping sheathing of copper, I coat the steel wire by immersing it in an electrolytic bath of a neutral or non-acid solution of copper, by which a thin but perfectly-adherent coating is applied. When subsequently this wire is drawn through the molten copper, it takes up a sufficient quantity of the same to form a conductor of low resistance with small diameter and great tensile strength.

The principle of the construction of the apparatus by which this process is or may be carried out I have described in an application filed February 20, 1884, No. 121,372, of which said application this forms a division. A description of this apparatus I will here repeat so far as may be necessary to an understanding of the present invention.

Referring to the drawing, which illustrates the apparatus in elevation and part section, A is a portion of a cupola or other furnace suitable for melting copper; B, the tap-hole, and C a lever carrying a conical plug of refractory material for closing the tap-hole.

D is the crucible or receptacle, of refractory material. It is supported by a hinge, *d*, under the tap-hole B, and provided with a rack, E, meshing with a gear-wheel, F, by which its position or angle may be changed at will. Any other means may be used for adjusting its position.

In the side of the receptacle D is embedded a block, *e*, of metal—such as nickle or platinum—in which is an orifice of a diameter equal to that of the compound wire to be made. Extending from this block is a nozzle, *c*, of the same or similar metal, the perforation through the same being slightly conical, so that the coated wire, which is drawn through it, may not bind or stick to the sides.

In the receptacle D is a post, G, of nickel or platinum, having an eye directly in line with the orifice in the block *e*. Above the receptacle is a roller, H, in stationary or adjustable bearings.

In carrying out the process which I have invented by means of this or a similar apparatus, I first apply to a steel or iron wire, by any known electrical process, a thin coating of copper. This coat, as I have before stated, I prefer to apply by electro-deposition from a neutral or non-acid solution—such as a solution of cyanide of copper—as I have found greatly-improved results to follow from the use of a solution of this character. After the wire is thus coated it is passed under the roller H, through the eye in post G, and taken out through the orifice and nozzle *c*. The receptacle D is then filled with melted copper from the furnace, and the wire drawn through the nozzle. As it issues with the coating of copper

which it takes up, a blast of cool air is directed upon it from a nozzle, L, by which means the copper coating is set. The wire is then drawn out on a long table, M, and allowed to cool; or it may be coiled in a tank of water.

By making the receptacle adjustable the level of the molten copper with reference to the orifice may be more readily adjusted than by the admission of metal. So, too, when the wire is not passing through the orifice, the receptacle may be tilted so that no melted copper will run out.

To prevent hardening of the copper in the receptacle and around the orifice, or to soften it when starting the apparatus after disuse for any length of time, I mount a compound blow-pipe, N, or some similar means for generating an intense heat above the crucible, near the orifice.

It is not necessary that the coating of copper formed on the steel wire should be as thin as that desired for the finished wire, as it may be passed through rolls or drawn down to the required diameter after cooling.

It is desirable that before the steel or iron core is electrically coated that it be thoroughly cleansed in some of the ordinary ways, so that it may present a clean metallic surface for the deposition of the copper. It is then passed slowly through the bath, or a coil of it is immersed in the bath and connected with the negative pole of a battery or electrical generator.

I am aware that a metallic film has heretofore been precipitated upon the surface of metallic bodies as a preliminary to immersing them in a solution of molten metal in the operation of bronzing.

I am also aware that wire has been electroplated and subsequently enveloped in a metal sheathing, and also that wire has been drawn through molten metal for the purpose of coating the same. I do not claim, therefore, broadly, forming a thin coating or film on a wire and then surrounding it by a second coating.

What I claim is—

1. The method herein described, of manufacturing compound telegraph-wire, which consists in electroplating a steel or iron wire with a thin film of copper, then drawing the same through molten copper and shaping the coating in substantially the manner set forth.

2. The method herein described of manufacturing compound telegraph-wire, which consists in electroplating a steel or iron wire with a film of copper from a non-acid or neutral solution, then drawing the same through molten copper and shaping by a die the coating as the wire issues from the receptacle containing the copper in substantially the manner described.

3. The method herein described of manufacturing compound telegraph-wire, which consists in electroplating a steel or iron wire with a film of copper, then drawing the same through molten copper, shaping the coating by drawing the wire through a die or orifice in the receptacle containing the copper, and cooling it as it issues from the die or orifice, all substantially as herein set forth.

In testimony whereof I have hereunto set my hand this 5th day of September, 1884.

MOSES G. FARMER.

Witnesses:
W. FRISBY,
PARKER W. PAGE.