

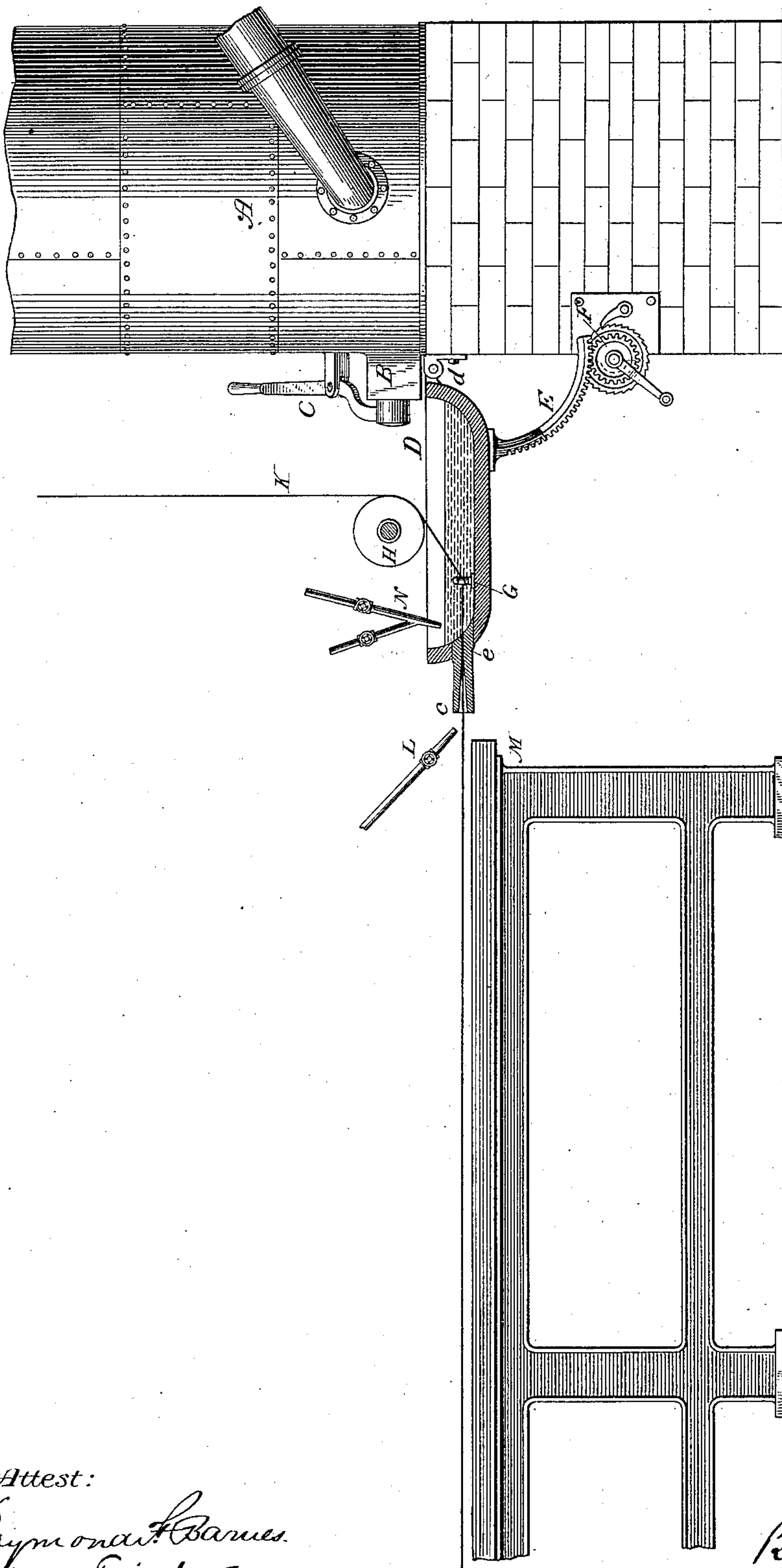
(No Model.)

M. G. FARMER.

APPARATUS FOR MANUFACTURING COMPOUND TELEGRAPH WIRE.

No. 310,993.

Patented Jan. 20, 1885.



Attest:

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att'y



# UNITED STATES PATENT OFFICE.

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APPARATUS FOR MANUFACTURING COMPOUND TELEGRAPH-WIRE.

SPECIFICATION forming part of Letters Patent No. 310,993, dated January 20, 1885.

Application filed February 20, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, MOSES G. FARMER, a citizen of the United States, and resident of Newport, in the county of Newport and State of Rhode Island, have invented certain new and useful Improvements in Apparatus 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. In another application I have described a process for manufacturing this wire by depositing or forming on the steel core an adherent coating of copper before inclosing it in the copper sheathing. This method, while preventing the corrosion of the steel core and avoiding the expense necessary for operating and maintaining the plant required in electroplating the steel wire on a large scale, involves a number of steps which it is now mainly my object to avoid.

According to my present invention I employ a receptacle somewhat similar in construction and composition to an ordinary smelting-crucible. This I support under the tap-hole of a furnace adapted for melting copper, preferably by a hinge and some device by which its position can be readily adjusted. In the side of the receptacle is an orifice with a slightly-conical nozzle, and within the receptacle is a standard or post of some refrac-

tory metal—such as platinum or iridium—in which is an eye directly in line with the orifice.

In conjunction with this apparatus I use a blow-pipe for directing a flame into the receptacle near the orifice, and also an apparatus without the receptacle for forcing a blast of cool air into the nozzle.

In using this apparatus I pass a steel wire, which is first coated with copper by electro-deposition, through the eye and orifice. Melted copper is then run into the receptacle until it rises above the orifice. The wire is then drawn through the nozzle, cool air being forced into the latter in order that the copper which is drawn out with the steel core may harden at once. When the copper is not sufficiently soft, the flame of the compound blow-pipe is directed upon it, so that it may flow more freely. After issuing from the nozzle the coated wire is drawn out onto a long table or into a tank of water and allowed to cool.

Though a simple steel or iron wire may be used, I prefer, as above stated, to first cleanse it and then electroplate it with copper, in order that the melted copper may adhere to the core more readily and perfectly. It is obvious that a very thin film of electro-deposited copper will be sufficient for insuring this result.

I will now describe my invention more in detail by reference to the accompanying drawing, which illustrates in elevation and part section the parts or elements essential to the combination, constructed and arranged in a convenient manner.

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 nickel 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, *e*, of the same or similar metal, the perforation through the same being slightly conical, so  
5 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  
10 receptacle is a roller, *H*, in stationary or adjustable bearings.

In using the apparatus a wire, *K*, of small diameter and composed, by preference, of steel or tough iron electro-coated with copper, is  
15 passed under the roller *H* through the eye in post *G*, and taken out through the orifice and nozzle *e*. The receptacle *D* is then filled with melted copper from the furnace, and the wire drawn through the nozzle. As it issues with  
20 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  
25 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  
30 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  
35 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.

40 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.

45 The preliminary coating of copper on the steel core is applied by immersing a coil of the steel wire in an electroplating-bath, or by passing the wire slowly through the bath while in connection with the negative pole of a gener-

ator of electricity, any of the well-known 50 methods being followed for accomplishing this result.

The mechanical construction and arrangement of the parts now described may obviously be varied to a considerable extent without de- 55 parture from the invention.

Having, however, described the best means of which I am at present aware in which the invention may be carried into effect, what I claim is— 60

1. The combination, in an apparatus for coating wire with metal, of a receptacle for containing the molten metal, and provided with a die or an orifice for limiting the amount of metal carried out through it by the wire, 65 and thus forming the coats, a nozzle with a conical passage extending outward from the orifice, and means for guiding a wire centrally through the orifice, all as set forth.

2. The combination, in an apparatus for 70 coating wire with metal, of a hinged or adjustable receptacle for holding the molten metal, and provided with an orifice, a nozzle with conical passage extending from the orifice, and means for guiding a wire centrally 75 through the orifice, all as set forth.

3. The combination, with a receptacle for containing molten copper, of a block embedded in its side and provided with an orifice, a nozzle with conical passage extending from 80 the block, means for guiding a wire through the orifice, and means for directing a blast of air upon the same as it issues therefrom, all as set forth.

4. The combination, in an apparatus of the 85 kind described, of a receptacle for containing molten metal, a perforated block, *e*, and nozzle *e*, a post, *G*, having an eye in line with the perforation in block *e*, a roller, *H*, blow-pipe *N*, and nozzle *L*, for directing an air- 90 blast into the nozzle, all as set forth.

In testimony whereof I have hereunto set my hand this 16th day of February, 1884.

MOSES G. FARMER.

Witnesses:

JAS. L. McCAHILL,

WILLIAM B. HEATHERTON.