No. 638,917. Patented Dec. 12, 1899.

E. EMERSON.

PROCESS OF PRODUCING WIRE BARS.

(Application filed May 4, 1899.)

(No Model.)

Fig. 1.

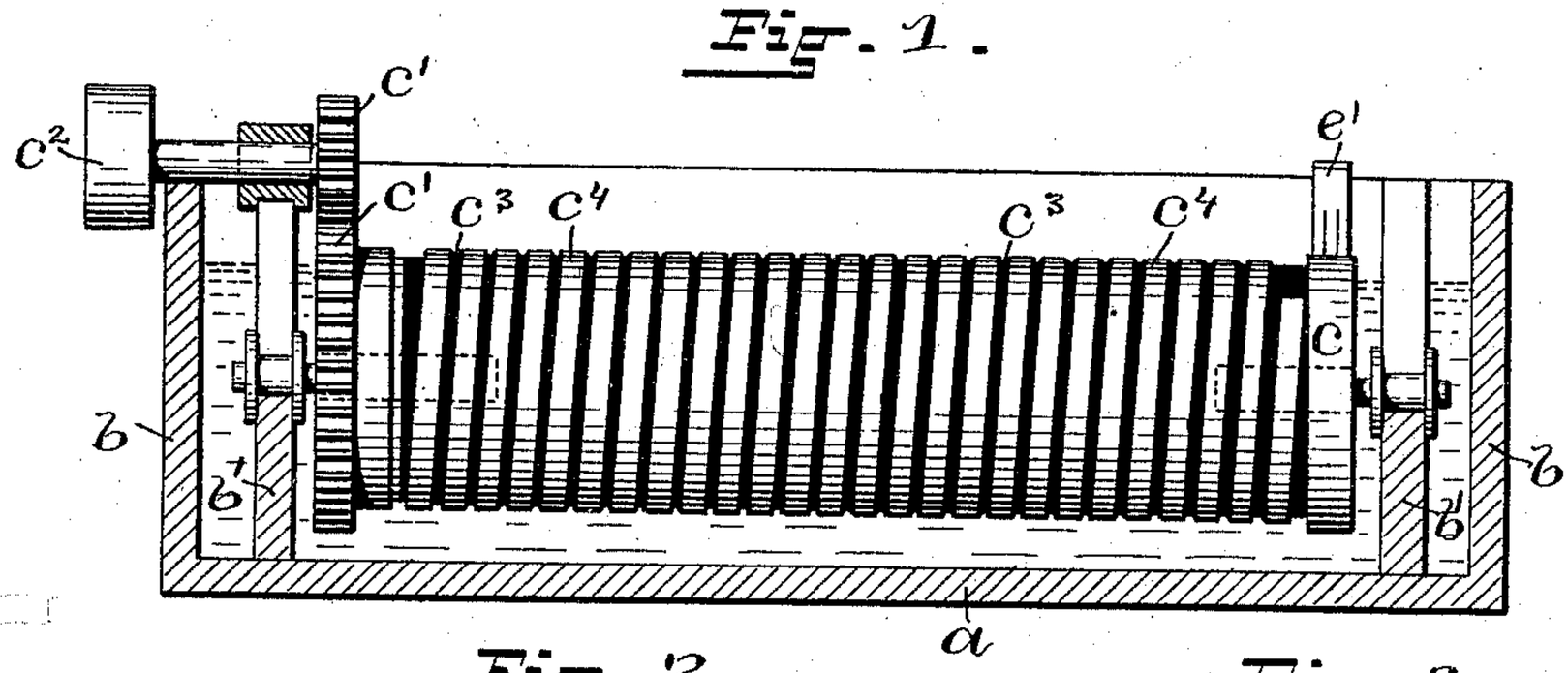
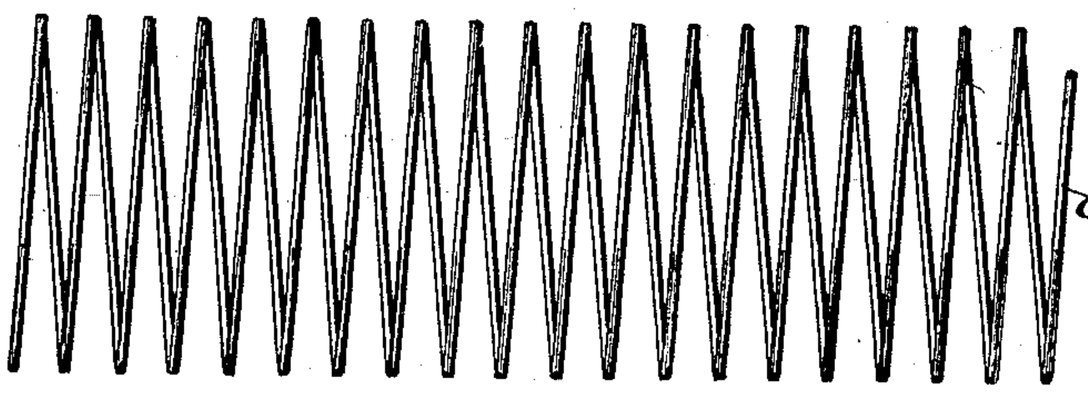


Fig. 2.

Fig. 3.



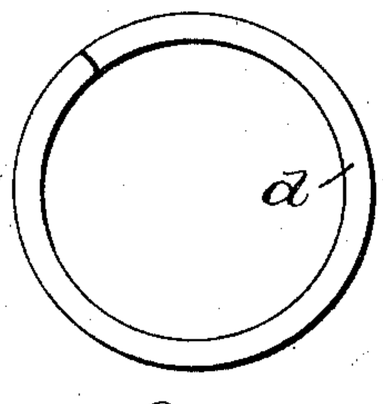


Fig. 4.

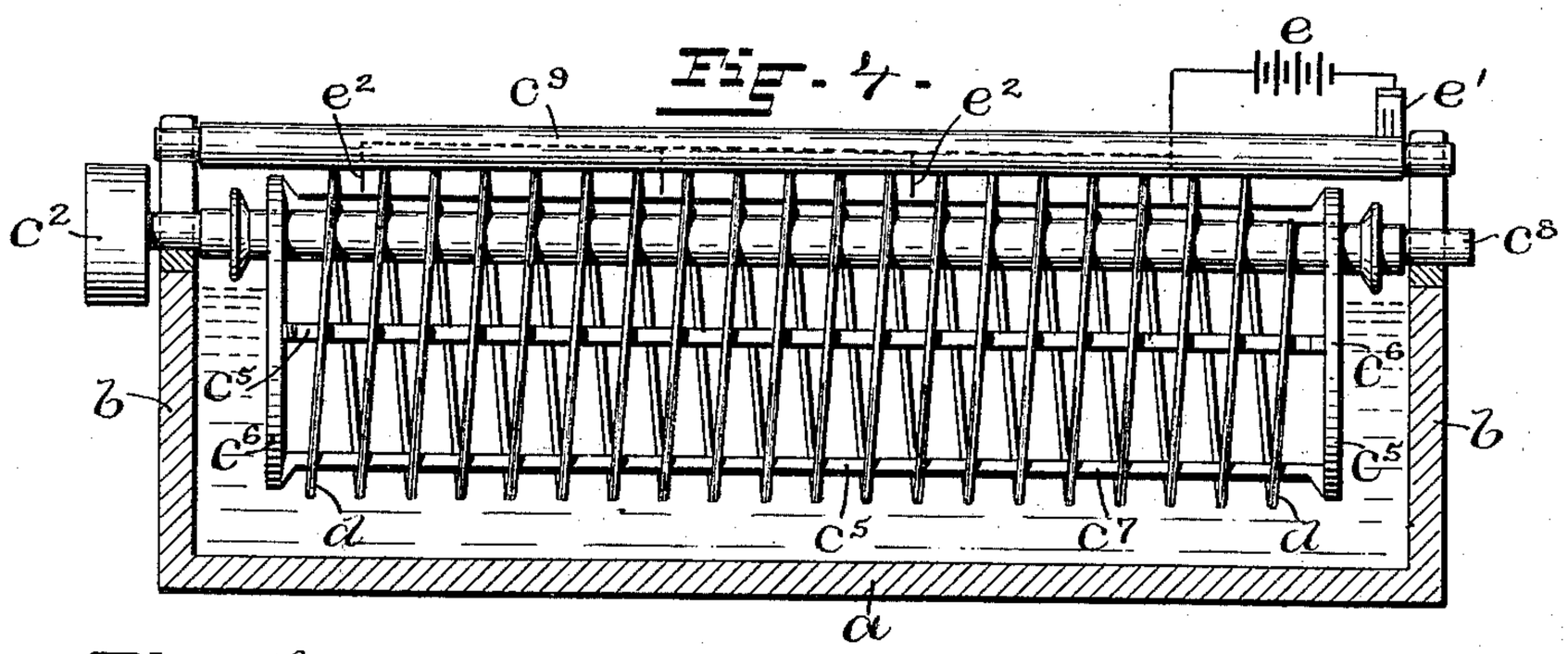


Fig. 5.

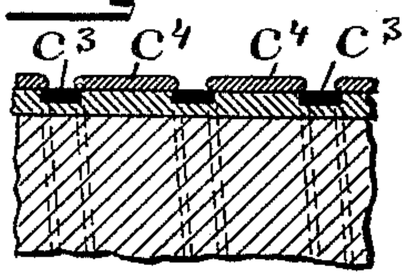
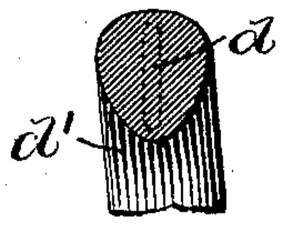


Fig. 6.

Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

ELISHA EMERSON, OF PROVIDENCE, RHODE ISLAND.

PROCESS OF PRODUCING WIRE-BARS.

SPECIFICATION forming part of Letters Patent No. 638,917, dated December 12, 1899.

Application filed May 4, 1899. Serial No. 715,520. (No specimens.)

To all whom it may concern:

Be it known that I, ELISHA EMERSON, of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Processes of Producing Wire-Bars; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to an improved process for manufacturing wire-bars by electrodeposition adapted for the manufacture of wire.

In the manufacture of copper wire adapted for use as conductors of electricity it is necessary to smelt the ore, refine the metal, and cast the refined metal into bars, to be afterward drawn out by the usual processes into wire. Wire so produced contains more or less impurities, which acting as resistances restrict the conducting capacity of the wire.

It has been found in practice that copper wire drawn from bars made by electrodeposition of the metal has a higher capacity for conducting electric currents than wire made from bars produced by melting the metal. The process for making bars by electrodeposition of the metal as heretofore practiced is slow and expensive.

The object of my invention is to produce bars adapted to be drawn into wire directly from the unrefined metal by electrolysis more rapidly and at less cost than was heretofore possible.

The invention consists in the peculiar and novel method whereby a spiral strip of metal is produced by electrodeposition on a cathode, removed from the cathode and wound spirally at right angles to the position occupied on the cathode, placing the same on a cage suspended in a depositing-tank, so as to expose all the surfaces of the strip of metal, and increasing the sectional area of the strip by electrodeposition of the copper on the strip until a bar of sufficient size is produced, which may be rolled or drawn into wire, as will be more fully set forth hereinafter.

Figure 1 is a longitudinal sectional view of a tank provided with a cylindrical cathode adapted to produce a spiral strip of metal by electrodeposition. Fig. 2 is a side view of a strip of metal wound spirally. Fig. 3 is an end view of the same. Fig. 4 is a longitudinal sectional view of a tank provided with a rotatable shaft supporting a cage on which the spirally-wound wire shown in Fig. 2 is placed and showing the electric connection from the dynamo to the shaft and to the anodes in the tank. Fig. 5 is a sectional view of part of the cathode, showing the insulating-strip flush with the surface of the cathode and the strip of deposited metal. Fig. 6 is a side view, partly in section, of the strip of deposited metal as it is taken off from the cathode. Fig. 7 is an edge view, partly in section, of the strip shown in Fig. 6. Fig. 8 is a side view, partly in section, of the bar of metal produced by electrodeposition.

In the drawings, a indicates the bottom of the tank; b b, the ends of the tank; b' b', the bearing-blocks on which the cathode c is journaled; c' c', gears for rotating the cathode c; c^2 a pulley connected by a shaft with one of the gears c', by which the cathode may be rotated from some prime motor; c^3 c^3, spirally-placed insulating material preferably inserted into a groove formed spirally on the cylindrical surface of the cathode, and c^4 a spiral strip of metal deposited on the cylindrical surface of the cathode.

The exposed cylindrical surface of the cathode is prepared in the usual manner by coating the surface with a solution of iodine in turpentine or by first silvering the surface of the cathode and then treating the same with a solution of iodine in alcohol before the metal is deposited, so that the strip c^4 may be removed. I prefer the construction described, in which the insulating material c^3 is shown flush with the cylindrical surface of the cathode, because I find in practice that on depositing the strip c^4 the edges of the same are built up, slightly rounded in cross-section, by the electrodeposition of the metal. This makes the strip c^4 somewhat wider than it would be if formed between projecting insulating material. As soon as a spiral strip of sufficient thickness to be safely handled is formed on the cathode I remove the strip c^4 from the cathode and wind the same spirally with the flat surface at right angles to the

axis of the spiral, as shown in Figs. 2 and 3, in which the edges of the strip extend along the inner side and the outer side of the spiral.

For convenience of identification the spirally-wound strip shown in Figs. 2, 3 and 4 is indicated by the letter d.

The cage c^5 is preferably formed of wood coated with an acid-proof material, but may be formed of rubber or even of metal covered with rubber or other acid-proof and non-conducting material.

The edgewise spirally-wound strip d is placed upon the cage c^5, having circular rings c^6 at the opposite ends connected by lengthwise-extending bars c^7. As shown in Fig. 4, the cage c^5 is supported on the shaft c^8, journaled in the ends b b of the tank and provided with a pulley by which it can be rotated. The dynamo e or other source of electric energy is connected with the brush e', which is in contact with the rod c^9, supported by the strip d and revolved by it, and the dynamo is also connected by wires e^2 with the series of anodes in the tank. The spirally-wound strip d now becomes the cathode. All parts of its surface are exposed and all parts receive additions of metal by electrodeposition. The contact of the rod c^9 with the spiral strip d completes the connection with the source of electric energy. As the shaft c^8 revolves the cage c^5 revolves at practically the surface speed of the shaft, and as the strip d passes through the liquid in the tank the electrodeposition of the metal proceeds.

In practice I find that the electrodeposition of the metal on the spiral strip d is greater near the outer edge of the spiral on the opposite sides of the flat strip d than it is near the inner edge, so that the bar d' produced is oval or egg-shaped in cross-section, as is shown in Fig. 8. The bar d' may be rolled or drawn out in the usual manner to produce wires of any desired diameter or cross-section, which wires, being formed of pure metal produced by electrodeposition, are especially adapted for electric conductors.

By this improved process the production of wire rods by electrodeposition is greatly facilitated and the cost of the plant is greatly reduced, because one cylindrical cathode will produce a series of thin strips adapted to be wound edgewise into the spiral strip d, while a number of these strips d are being subjected to the electrodeposition of the metal to form the bars d'.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process herein described for producing bars by the electrodeposition of metal, the same consisting in forming electrically a spiral strip of metal on a cylindrical cathode, removing the strip from the cathode, winding the so-removed strip spirally with its broad sides at right angles to the axis of the spiral, mounting the so-wound spiral strip on a supporting cage or base, immersing the strip with its support to form a cathode, rotating the spiral strip and electrodepositing metal on the spiral strip, as described.

2. The steps in the process herein described, the same consisting in winding a flat strip of electrodeposited metal into a spiral having the broad sides of the strip practically at right angles to the axis of the spiral to form a cathode; supporting the cathode in a tank and depositing additional metal on the spiral strip by electrodeposition, as described.

In witness whereof I have hereunto set my hand.

ELISHA EMERSON.

Witnesses:
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