

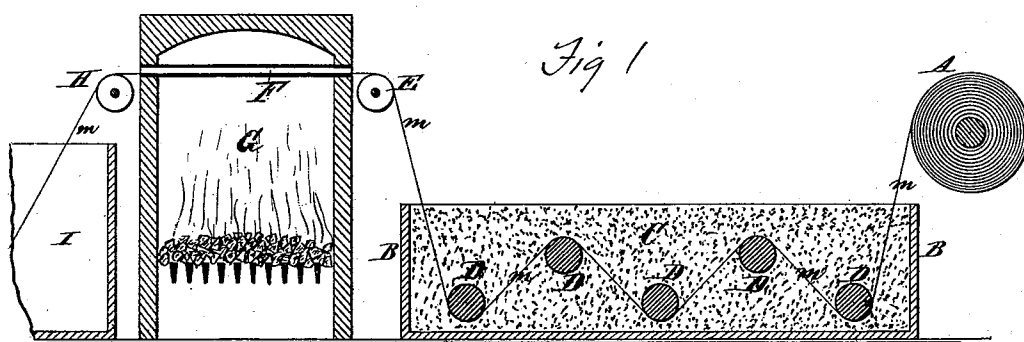
(No Model.)

2 Sheets—Sheet 1.

H. ROBERTS.
COATING METAL WITH ZINC.

No. 244,146.

Patented July 12, 1881.



WITNESSES

Charles C. Stetson
W. Colburn Brooks

INVENTOR

Henry Roberts
by his attorney
J. D. Stetson

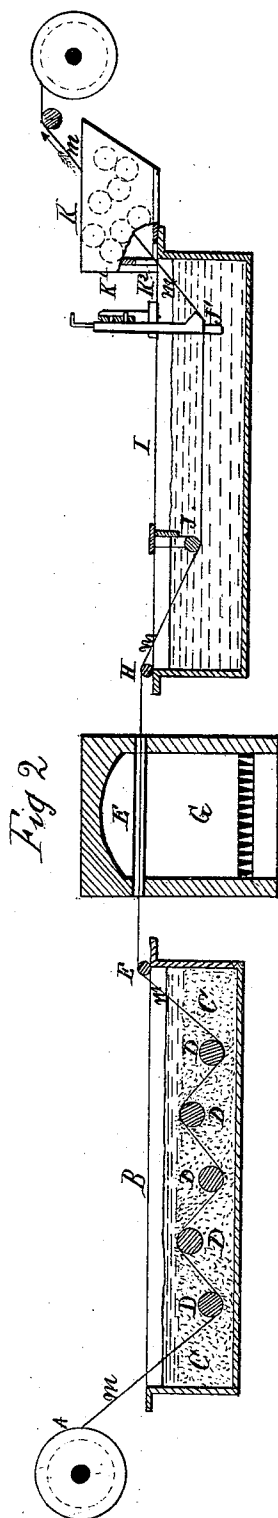
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Matie R. Ackers
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UNITED STATES PATENT OFFICE.

HENRY ROBERTS, OF JOHNSTOWN, PENNSYLVANIA.

COATING METALS WITH ZINC.

SPECIFICATION forming part of Letters Patent No. 244,146, dated July 12, 1881.

Application filed December 9, 1880. (No model.)

To all whom it may concern:

Be it known that I, HENRY ROBERTS, a citizen of the United States, residing at Johnstown, Cambria county, in the State of Pennsylvania, have invented certain new and useful Improvements relating to Coating Metals with Zinc, of which the following is a specification.

The invention applies to the coating of "wires," ordinarily so called, whether round or flat, and also to extended lengths in various other forms, as hoop-iron, &c. I clean the metal very efficiently and cheaply previous to its immersion in the melted zinc.

I will describe the process as applied to the treatment of common round wires, which I will assume are drawn down from rolled rods of Bessemer steel.

For the purposes of wire fencing, telegraph and telephone communication, and most uses for which zinc-coated wire, ordinarily termed "galvanized wire," is used, it is important that it be annealed, and that the coating of black oxide or scale thereby induced be removed. I anneal the wire by treatment in an annealing-furnace in the ordinary way, and after it is cold dip it in sulphuric acid, and afterward thoroughly dry the wire to avoid the possibility of any moisture remaining in the pores. A series of coils of this wire, being placed on a series of corresponding reels, are led through a bath of muriatic acid, and thence out and through a tubular furnace at a moderate heat, sufficient to thoroughly dry them, and to raise the temperature to or near that of the zinc-bath into which they are immediately afterward plunged. My invention relates to this application of the muriatic acid and the subsequent warming.

The tank for the acid is long. I prefer a length of about twelve (12) feet, with a roller near each end of the bath, under which the wires pass. I mount one or more rollers in intermediate positions, causing the wire to make gentle bends in passing. In passing each roller the wire is slightly bent, which, without being sufficiently severe to injure the texture of the metal, insures that its surface is very thoroughly presented thereto. In the passage of the wire between the several rollers it is subjected not only to the chemical action of the

acid, but to the severe mechanical action of gentle scraping or rasping surfaces. This is effected by filling the tank with broken stone, gravel, or sand. Either of these materials may serve, and perhaps many others, as broken cinder from the iron or steel manufacture. In practice the material may be in all these conditions at the same time. There is a tendency of the action to disintegrate the stone. A portion of the material in the tank may be finely abraded or pulverized stone, another portion a little less fine, as sand, and another considerably coarser, as gravel or broken stone. On emerging from the bath the wire is more than usually clean. Its surface has been uniformly and thoroughly rubbed in direct longitudinal lines by the repeated contacts with the flinty matter, and at the same time chemically acted on by the muriatic acid. The muriatic acid has usually nearly all the zinc in it with which it will combine; but I do not esteem that feature particularly essential. The wire thus thoroughly acted on both mechanically and chemically is next dried and heated by passing through tubes exposed to moderate heat in a furnace. In my experiments I have used a furnace about five (5) feet wide, having tubes one and one-fourth ($1\frac{1}{4}$) inch diameter leading through it. One wire passes through each tube, and at the rate the wires move—a little more than one (1) foot per second—the wires become in this passage thoroughly dried, and raised to a temperature closely approximating that of the melted zinc. Emerging from this they dip into the melted zinc, pass along a considerable distance beneath the surface, thence are emerged, and are thoroughly wiped and wound into suitable coils in the ordinary manner, for transportation and use.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a central vertical section through the acid-tank and furnace and the immediately-adjacent parts. Fig. 2 is a central vertical section through the entire apparatus.

Referring to the drawings, *m* is the wire delivered from a reel, *A*, into the tank *B*, which is filled with broken stone, *C*, and also with muriatic acid. *D D* are the rollers around

which the wires are bent. E is a guide-sheave, and F a series of tubes in a furnace, G. After passing through these tubes and over a sheave, H, it descends into a bath of zinc, I. The subsequent treatment may be of the ordinary character.

Modifications may be made in many of the details.

The depth of the tank B and the number of rolls D may be varied. The rolls D may be left to turn freely on small bearings, (not represented,) in the ordinary manner, or power may be applied to aid in turning one or more of them. The latter is preferable, owing to the liability of the stony material to engender resistance to the motion.

There may be considerable space between the acid-tank B and the furnace G; but I esteem it important that there be but little space between this furnace G and the bath I of melted zinc. The width of the furnace G may be greater than here shown.

The tubes F may stand in a single series, side by side, as indicated, or they may be joggled, having alternate tubes higher than the adjacent ones. They may stand level, as shown, or they may be inclined in either direction. I propose in some cases to place the tubes F at such an inclination that the delivery end will be close to the surface of the melted zinc I. In such case the wire will traverse directly through the tubes F and instantly into the zinc without passing over any sheave H.

I have referred to the extended article *m*, which is subjected to the treatment as an ordinary round steel wire. It will be understood

that any metal capable of receiving a coating of zinc or analogous metal may be substituted, whether in a round form or in various other conditions.

I claim as my improvement in the treatment of wires and analogous articles preparatory to galvanizing or coating with metal—

1. The process described of subjecting the wires to a simultaneous pickling and abrasion by leading them through a tank containing acid and broken stone or other small masses of hard material, as herein specified.

2. The process described, consisting of first treating with acid and with broken stone or other abrasive material, then heating and drying the wire in the air, and then immersing it in the hot bath of melted metal, as herein specified.

3. The apparatus described, having the vessel provided with rollers or guides D, and adapted to contain broken stone or other abrasive material and acid, in combination with the means A for supplying wire in continuous lengths, and the furnace G, with tubes F, for rapidly heating and drying the wire, and with the metal-coating bath I and means for traversing the wire continuously through the apparatus, all substantially as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 7th day of December, 1880, in the presence of two subscribing witnesses.

HENRY ROBERTS.

Witnesses:

THOMAS D. STETSON,
CHARLES C. STETSON.