

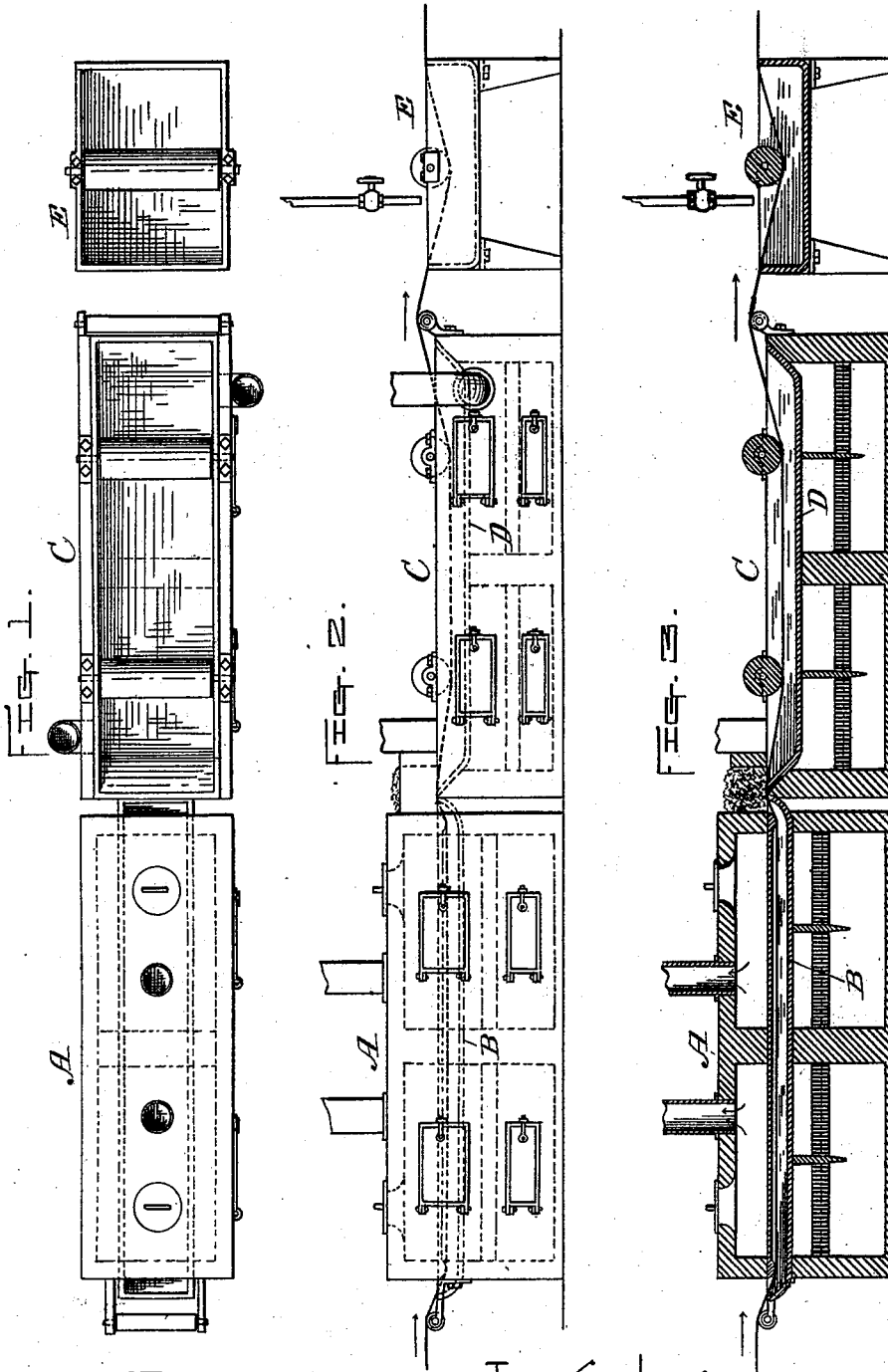
(No Model.)

C. W. BILDT.

ANNEALING AND HARDENING STEEL RODS OR WIRE.

No. 517,020.

Patented Mar. 27, 1894.



Witnesses;
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UNITED STATES PATENT OFFICE.

CARL WILHELM BILDT, OF WORCESTER, MASSACHUSETTS.

ANNEALING AND HARDENING STEEL RODS OR WIRE.

SPECIFICATION forming part of Letters Patent No. 517,020, dated March 27, 1894.

Application filed June 27, 1892. Serial No. 438,095. (No specimens.)

To all whom it may concern:

Be it known that I, CARL WILHELM BILDT, of the city and county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in the Art or Process of Annealing and Hardening Steel Rods or Wire; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a top or plan view of an apparatus for carrying out my aforesaid improved process. Fig. 2 is a front, side view thereof and Fig. 3 is a central, vertical, longitudinal section through the apparatus.

My invention consists of the process of tempering and hardening steel rods and wire by passing the same continuously first through a bath of molten metal heated to a high temperature to anneal said strand, and then through a second bath of molten metal heated to a lower temperature than the first bath for hardening said rods and wire:—the latter being protected from the atmosphere in passing from one bath to the other by a body of coke-dust, charcoal or other suitable non-conductor of heat; it also consists in passing the strand through said two lead baths of different temperatures and after leaving the second or hardening bath through a bath of water to clean the same:—said strand being also in this instance protected from the atmosphere in passing from one molten metal bath to the other by a body of coke-dust, charcoal or other suitable non-conductor of heat, as will be hereinafter more fully set forth.

To enable others skilled in the art to which my invention appertains to better understand the nature and purpose thereof, I will now proceed to describe it more in detail.

In the drawings, A represents a furnace having an inclosed trough B for containing a bath of molten lead through which the rods or wire pass to heat the same, the lead therein being kept up to a uniform annealing heat; and C is a furnace having an open trough D for also containing a bath of molten lead through which said rods and wire next pass to reduce the temperature thereof and thereby harden the same; the lead contained in said trough

being kept at a heat just above the melting point, or at such temperature as may be required to properly harden the rods or wire. Said rods or wire after passing through the second or hardening bath is preferably passed through a bath of water contained in tank E. for the purpose of cooling it sufficiently to more conveniently handle the same and also to in a measure, wash off the loose scale or other refuse matter adhering to the surface after passing through the lead baths; but as said water bath is not an essential element to my invention, I reserve the right to employ the same or not, as desired in connection with the two lead baths. The required hardness of the product being treated may be obtained by varying the temperature of the annealing bath or of the hardening bath, or both. In practice, I find that the best results are attained by keeping the annealing bath at a constant temperature, and at a good annealing heat: and varying the hardening bath from a temperature somewhat above the melting point of the lead up to a higher or any degree according to the carbon of the steel, the degree of hardness required and size of the strand. The greater the difference is in temperature between the two lead baths, the harder will be the metal treated, and the duration of its exposure to the influence of the heat in passing through said lead baths, is governed by the size of the rods or wire being treated, that of large diameter of course requiring longer exposure to heat it to the temperature of the lead, than the smaller sizes.

It is very important that the metal being treated is not cooled off in passing from one lead bath to the other, and to prevent this, the troughs or kettles containing the lead, are arranged close together as shown, and the metal at this point is covered with coke dust, charcoal or any other suitable non-conductor of heat.

The hardening lead bath may be covered or open; in the latter case, the surface of the bath is in practice covered with non-conducting material to prevent the lead from cooling and oxidizing; although I prefer to use an inclosed furnace with a covered trough as shown, for heating the rods or wire; this furnace may also be open and covered with non-conduct-

ing material the same as the other, if desired, without departing from the principle of my invention.

By the employment of two lead baths as described for annealing and hardening steel rods and wire, the temperature may be measured by means of a pyrometer and thereby regulated to a nicety, and in consequence said rods and wire are uniform in quality and texture throughout the length of the coils, and are also very tough, pliable, highly conductive and of great tensile strength, and may therefore be drawn to the smallest sizes and still retain the above qualities.

It will of course be understood that several strands may be treated at one time and any suitable fuel may be used for heating the lead baths.

Other metals or alloys of metals by which the required temperature may be maintained may be used in lieu of lead if desired, and flat bands of steel or strands of other shapes in cross-section may be treated by the aforesaid process without departing from the principle of my invention.

Having now described said invention, what I claim therein as new, and desire to secure by Letters Patent, is—

1. In the art of making steel rods and other metal strands, the process of tempering and

hardening the same by passing the strands continuously first through a bath of molten metal heated to a high temperature to anneal said strand, and then through a second bath of molten metal heated to a lower temperature than the first bath for hardening said rods or strands,—the latter being protected from the atmosphere in passing from one bath to the other by a body of coke-dust, charcoal, or other non-conductor of heat, substantially as and for the purpose set forth.

2. In the art of making steel rods and other metal strands, the process of tempering, hardening and cleaning the same by passing the strands continuously first through a bath of molten metal heated to a high temperature to anneal said strands, then through a second bath of molten metal heated to a lower temperature than the first bath, for hardening said rods or strands, and finally through a water bath to clean and further cool the metal,—the rods or strands being protected from the atmosphere in passing from one metal bath to the other by a body of coke-dust, charcoal, or other non-conductor of heat, substantially as and for the purpose set forth.

CARL WILHELM BILDT.

Witnesses:

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