

(No Model.)

G. D. BURTON & E. E. ANGELL.
ELECTRIC BATH METAL HEATING APPARATUS.

No. 537,011.

Patented Apr. 9, 1895.

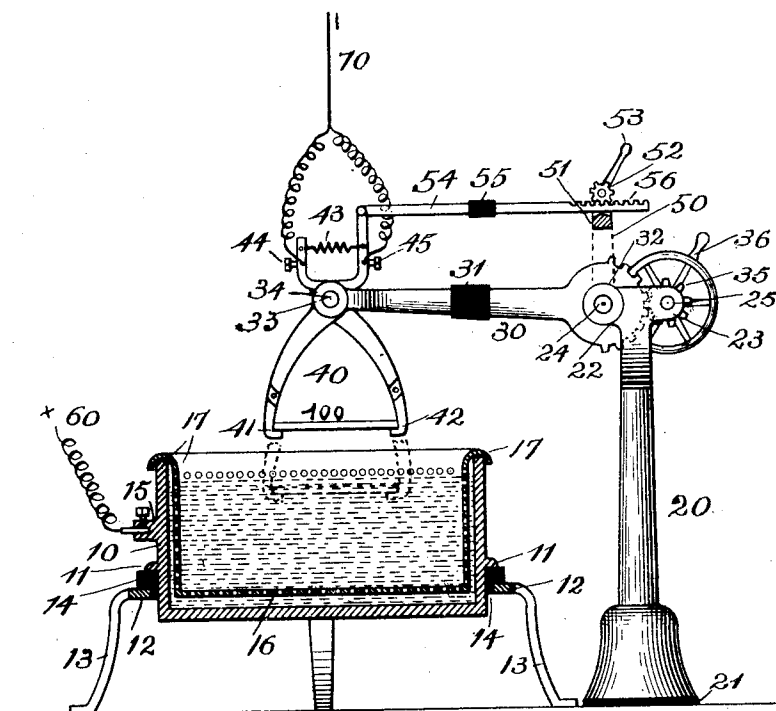


Fig. 1.

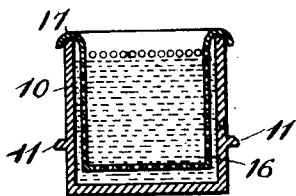


Fig. 2.

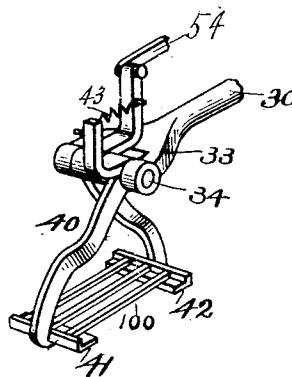


Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE D. BURTON, OF BOSTON, AND EDWIN E. ANGELL, OF SOMERVILLE,
MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO SAID BURTON.

ELECTRIC-BATH METAL-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 537,011, dated April 9, 1895.

Application filed December 7, 1892. Serial No. 454,400. (No model.)

To all whom it may concern:

Be it known that we, GEORGE D. BURTON, residing at Boston, in the county of Suffolk, and EDWIN E. ANGELL, residing at Somerville, in the county of Middlesex, State of Massachusetts, citizens of the United States of America, have invented certain new and useful Improvements in Electric-Bath Metal-Heating Apparatus, of which the following is a specification.

This invention relates to an apparatus for heating blanks, bars or masses of metal by immersing or partially immersing them in a conductive solution and subjecting them to the action of an electric arc formed between them and the solution.

The object of the invention is to provide means for quickly and properly handling the metal to be heated, including the lowering thereof into the solution, the adjustment thereof in the solution, and the prompt and proper withdrawal of the metal from the solution as soon as it attains the desired degree of heat.

Figure 1 represents a side elevation partly in section of this improved metal heating apparatus, the tank for containing the bath being shown in longitudinal vertical section. Fig. 2 represents a transverse section of the tank for containing the bath detached from the apparatus. Fig. 3 represents a perspective view of the adjustable metal holder or clamp for inserting, holding and withdrawing the metal from the bath, and portions of the swinging and sliding arms for supporting and oscillating said holder.

The same reference numbers indicate the same parts in all the figures.

This apparatus comprises a tank 10 for containing a bath through which the electric current passes, and into which the metal to be heated is immersed or partially submerged. The bath is composed of water or a weak solution of sal ammoniac, or a weak solution of sal-soda of a specific gravity of 1.080 at 60° Fahrenheit. Any other suitable liquid may be employed for the bath, preferably a solution containing a chemical salt.

The tank 10 is preferably composed of metal or material which serves as a conductor of electricity. It may be composed of lead or

iron lined with lead or of such conductive material as will not decompose under the action of the electric current and the chemical solution. When constructed in the specific form herein illustrated, to which, however, the invention is not limited, it is provided with an exterior flange or lugs 11. A base ring 12, provided with legs 13, serves as a support for the tank 10, said tank being set into said ring and supported therein by means of the lugs or flange 11, an insulating ring 14 of angular cross section being interposed between the tank 10 and its flange and the supporting base ring 12. The tank is provided at one end with a binding post 15. A perforated protector 16, composed of wood or other non-conductive material, and of a shape corresponding with the shape of the tank, or slightly smaller, is disposed within the tank and surrounds the sides thereof to prevent contact therewith of the metal being heated. This protector forms a detachable lining, being preferably provided with an outturned flange 17 at its upper edge, which engages the upper edge of the tank whereby the lining is supported. The perforations in the lining permit the current to pass through it.

A standard 20 is disposed near the tank 10, and insulated from the floor by an insulating sheet 21. This standard is provided at its upper end with lugs 22 and 23 projecting horizontally in opposite directions. The lug 22 is provided with a pivot stud 24, and the lug 23 with a pivot stud 25.

A swinging arm 30 is pivoted on the pivot stud 24, and extends over the tank for containing the bath, the outer portion of this arm being insulated from the inner portion thereof by a block, sleeve or socket 31 of insulating material. The inner end of the arm is provided with a segmental gear 32, and the outer end thereof with a fork 33 having a pivot pin 34 connecting the ends of said fork. A pinion 35 on the stud 25 meshes with the segmental gear 32 for oscillating said arm, and a hand wheel or lever 36 on the sleeve of the pinion serves to actuate the latter.

A metal holder 40 is supported on the pivot pin 34 at the forked end of the swinging arm. This metal holder consists of a pair of clamping tongs composed of copper or other suit-

able highly conductive material, and provided with flanged jaws 41 and 42 at the lower ends, also composed of said material. The upper ends of these jaws above the pivot are
 5 connected by a contractile spring 43 which tends to close the jaws. An upright arm 50 attached to the standard 20 is provided with a rest 51, and above said rest with a pinion 52 having a handle 53. A sliding bar 54 is sup-
 10 ported at its inner end on the rest 51 and connected at its outer end with the upper end of one of the arms of the tongs. This bar is composed of two parts insulated from each other by a socket or a sleeve 55. The inner end of
 15 this bar is provided on its upper face with a rack 56 with which the lever actuated pinion 52 meshes. These devices serve as adjusting mechanism for adjusting the tongs so as to bring the metal carried thereby into proper
 20 position relatively to the surface of the solution in the tank. The tongs are provided with a binding post or posts 44 and 45. By turning the hand wheel 36, the arm 30 is readily raised or lowered to submerge or withdraw
 25 a bar or bars of metal to be heated, and by adjusting the handle 53 of the pinion 52, the position of the bars is regulated.

A conductor 60 leading from the positive pole of a dynamo, transformer, storage bat-
 30 tery or other source of electricity, is connected to the binding part 15 of the tank, and a conductor 70 leading to the negative pole of the source of electricity is connected with the binding post or posts of the tongs.

35 In the use of this improved metal heating apparatus, the bars of metal as 100 to be heated are placed endwise between the jaws of the tongs and clamped therein. The hand lever or wheel 36 is then turned downward
 40 whereby the arm 30 is swung downward by the action of the pinion 35 on the segmental gear 32 until the tongs are lowered sufficiently to immerse their jaws and the bars supported thereon in the conductive liquid within the
 45 tank 10. On the near approach of the bars to the surface of the liquid the circuit is closed and an electric arc is formed, and as the bars are immersed in the bath the arc surrounds them and quickly heats them to a forging
 50 temperature or other desired working heat. By adjusting the bars at an angle to the surface of the bath, the upper portions may be heated to a higher degree than the lower portions as desired, and by adjusting them par-
 55 allel with the surface, they will be heated uniformly throughout. The adjustment of the tongs so as to bring the bars parallel with the surface of the solution or at an angle thereto is effected by the manipulation of the
 60 handle 53, as before described. The current passes from the conductor 60 to the body of the tank 10, thence to and through the solution therein, thence to the bars clamped between the tongs, thence through the tongs to
 65 the negative conductor 70. Even copper bars may be heated to a fusing or softening tem-

perature without the heating or over-heating of the jaws of the electrodes, notwithstanding the immersion of the latter in the solution.

We claim as our invention—

70 1. In a metal heating apparatus, the combination of a vessel containing a conductive watery liquid connected with one electric pole, a work holder connected with the other electric pole for holding the work to be heated in
 75 said liquid, and means for moving the work holder to adjust the work relatively to the surface of the liquid, whereby the current may be rendered uniform throughout the work or varied in different parts thereof to produce a
 80 uniform or varied heating effect in the work, substantially as set forth.

2. In an electric metal heating apparatus, the combination of a tank containing a conductive watery liquid connected with one
 85 electric pole, a swinging arm extending over said tank, and a work holder supported by said arm and connected with the other electric pole, whereby the metal to be heated is adjusted in said liquid with relation to the
 90 surface thereof to increase, diminish or vary the current passing through the work, substantially as set forth.

3. In an electric metal heating apparatus, the combination of a tank containing a con-
 95 ductive watery liquid connected with one electric pole, a swinging arm extending over said tank, a work holder supported by said arm and connected with the other electric pole, and means for tilting said holder,
 100 whereby the work supported therein may be adjusted at different angles within the liquid for varying the current in different parts of the work, substantially as set forth.

4. The combination of a tank containing a
 105 conductive solution connected with one electric pole, a pivoted arm extending over said tank and provided with a segmental gear at its inner end, a pinion meshing with said gear, means for actuating said pinion, and a
 110 metal holder supported at the outer end of said arm over said tank, and connected with the other electric pole.

5. The combination of a tank containing a conductive solution connected with one elec-
 115 tric pole, a swinging arm extending over said tank, tongs pivoted to the outer end of said arm over said tank and connected with the other electric pole, a sliding rod connected with said tongs for adjusting the position
 120 thereof, and means for raising and lowering said arm.

6. The combination of a tank containing a conductive solution connected with one elec-
 125 tric pole, a swinging arm extending over said tank, a pair of tongs pivoted to the outer end of said arm over said tank, and connected with the other electric pole, said tongs being provided with flanged jaws, and means for
 130 adjusting the position of said tongs.

7. In a metal heating apparatus, the combination of a vessel containing a conductive

watery liquid connected with one electric pole, a work-holder connected with the other electric pole for holding the work to be heated in said liquid, and the mechanical means for
5 tilting the work-holder to adjust the work relatively to the surface of the liquid, whereby the current may be varied in different parts thereof to produce a varied heating effect therein.

10 8. In an electric metal heating apparatus, the combination of a tank containing a conductive watery liquid connected with one electric pole, an arm extending over said tank, a work-holder supported by said arm and connected with the other electric pole, and mechanism for adjusting the arm, whereby the metal to be heated is adjusted in said liquid in relation to the surface thereof to increase, diminish or vary the current passing through the work, substantially as set forth.

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