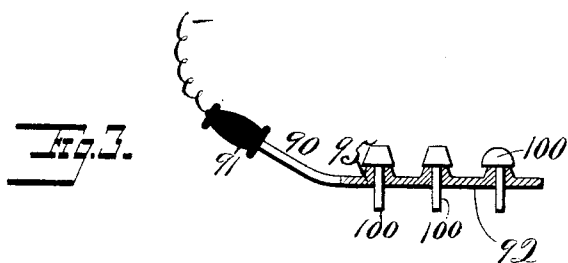
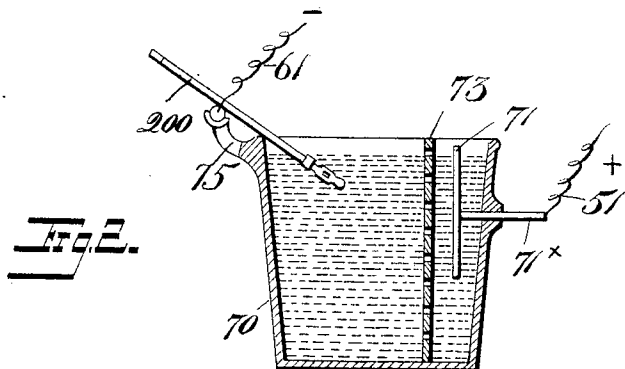
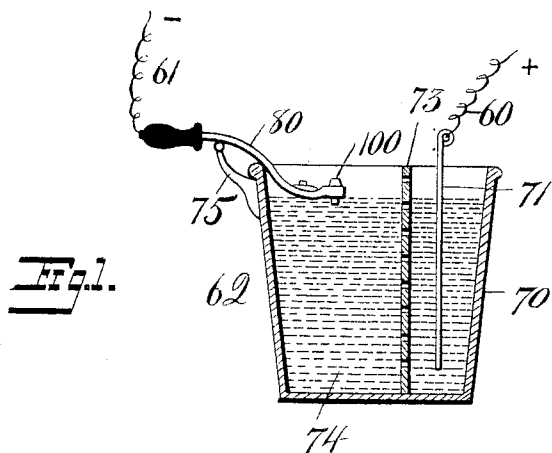


(No Model.)

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

No. 537,402.

Patented Apr. 9, 1895.



Witnesses:

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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. 537,402, dated April 9, 1895.

Original application filed September 5, 1892, Serial No. 445,148. Divided and this application filed October 11, 1894. Serial No. 525,624. (No model.)

To all whom it may concern:

Be it known that we, GEORGE DEXTER BURTON, residing at Boston, in the county of Suffolk, and EDWIN ELLIOTT ANGELL, residing at Somerville, in the county of Middlesex, in the 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 the art of working metal for forging or other metal working operations by immersing the metal or that portion thereof to be heated in a bath and passing therethrough an electric current of such a character as to cause the formation of an incandescent gas envelope or electric arc at or below the surface of the solution and around the metal to be heated, whereby the heating thereof is quickly effected.

The invention consists in certain apparatus substantially as hereinafter described and claimed for the convenient and rapid carrying out of the process.

Figure 1 of the accompanying drawings represents a vertical transverse section of a tank for containing the electric bath and a holder for supporting rivets to be heated therein, said tank and holder constituting a part of this apparatus. Fig. 2 represents a vertical section of a tank constituting a part of this apparatus and containing an electrolytic bath, this figure illustrating a metal bar in the act of being heated in said bath. Fig. 3 represents a longitudinal section of a rivet holder for supporting rivets to be heated by this apparatus.

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

A tank 70 contains a solution 74 of equal parts of sal-soda and cream of tartar of the specific gravity of 1.255 at 77° Fahrenheit, or a solution of any other suitable liquid may be employed, preferably a solution containing a chemical salt. The solution should be one, however, which is capable of developing hydrogen gas around the metal while being heated, either by the accumulation of the gas by decomposition of the fluid by electrolysis

around the heated metal, or by the deposit of the hydrogen from the opposite electrode around it while the heating process is going on. This tank is provided with a vertical porous partition 73 which permits the passage of the electric current and prevents the positive plate from coming into contact with the work. A positive plate 71 is disposed in the tank 70 and connected by conductors 60 with the positive pole of an electric source. The tank is provided on its side with the rest 75 for supporting the work or work-holder, said rests comprising a bar of insulated material attached by brackets to the side of the tank.

A work-holder 90, shown in Fig. 3, as adapted for holding rivets to be heated, comprises an insulated handle 91 and a bar 92 having holes for receiving the rivets, said holes being surrounded by collars or rims 95.

In the use of the apparatus shown in Fig. 1, the current passes from the positive pole of the electric source through the conductor 60 to the positive plate 71 in the tank 70, thence into the solution in said tank and through the porous partition 73, thence from said solution to the work, as 100, supported in the work-holder 80. In passing from the liquid to the work, an arc is formed below the level of the solution around said work, or the portion thereof to be heated. The current then passes through the work-holder and thence through the conductor 61 to the negative pole of the electric source. The voltaic arc formed around the work, tends to quickly heat said work, and when the forging temperature is reached, the work-holder is withdrawn from the tank.

The partition 73 in the working tank serves to prevent contact of the work or work-holder with the positive plate 71 and avoids a short circuiting of the current. The polarity may be reversed in this case if desired.

In the process of electric bath metal working carried out by this apparatus, the solution itself may be said to constitute one of the electrodes, and being flexible it surrounds the bar to be heated and an arc or luminous film is formed around all the submerged parts thereof, whereby said bar is uniformly heated

throughout. The work, constituting the negative electrode, offers a much higher resistance than the other metallic electrode or anode and while the arc is formed between the work 5 and the liquid electrode, the current passes from the liquid electrode to the positive metallic electrode without incandescence or luminosity.

The advantages of heating the metal by this 10 means are its entire exclusion from oxygen or other deleterious gases during the operation, whereby the metal is left in a clean state ready for forging and welding without the use of fluxes to counteract the effects of oxidation. 15 If the process of heating is conducted with a proper current and with the electrodes at the proper distance apart, the hydrogen set free at the electrodes accumulates around the metal being heated, and opposes the passage of the current with such resistance as to 20 itself become incandescent as may be readily seen by looking down into the fluid, while a constant stream of these hydrogen bubbles should be visible passing between the electrodes and surrounding the metal. The incandescent hydrogen is thus made to reinforce the direct action of the heating current and it will even be found that the heating of the metal in this way will clean off the oxidation on the surface of the metal when the process 30 began. This, for example with the rivets shown, enables them to make a better and closer job of riveting than otherwise.

Fig. 2 shows a tank in which the work-rest 35 constitutes the negative terminal, the bar of said rest being composed of conductive instead of insulated material and being connected with the conductor 61. This conductive rest is adapted for heating bars or pieces of metal, as 200, which are held in contact 40 with or permitted to lie against said conductive rest, with their lower ends projecting into the liquid in the tank. In this case the current passes from the tank liquid into the ends 45 of the bars submerged therein forming an arc around the same. The arc formed quickly

heats the bars to a forging temperature. The current passes up through the bar into the rest and thence through the conductor 61 to the negative conductor of the electric source. 50 In this case the positive plate is shown as provided with a shank 71 which projects through the wall of the tank being connected with the conductor 51 outside of the tank.

The tank 70 is preferably portable, and is 55 very convenient for the heating of rivets for boiler makers and for other purposes, as it can be quickly and easily moved about where the work is being done.

This application is a division of our application, Serial No. 445,148, filed September 5, 1892. 60

We claim as our invention—

1. A portable tank for heating metals provided with a porous partition and with a 65 bracket at one side serving as a rest for the work or work-holder.

2. A portable tank for heating metals provided with a porous partition and with a bracket at one side serving as a rest for the 70 work-holder, said rest constituting one terminal of the tank.

3. A movable work-holder connected with an electric conductor and provided with an insulated handle and with holes for holding 75 the metal to be heated.

4. A movable work-holder connected with an electric conductor and provided with an insulated handle and with holes for heating 80 the metal to be heated, said holes being surrounded by raised rims.

5. A portable tank for heating metals provided with electric connections and with a bracket at one side which serves as a rest for the work said rest constituting one of the 85 electric terminals of the tank.

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