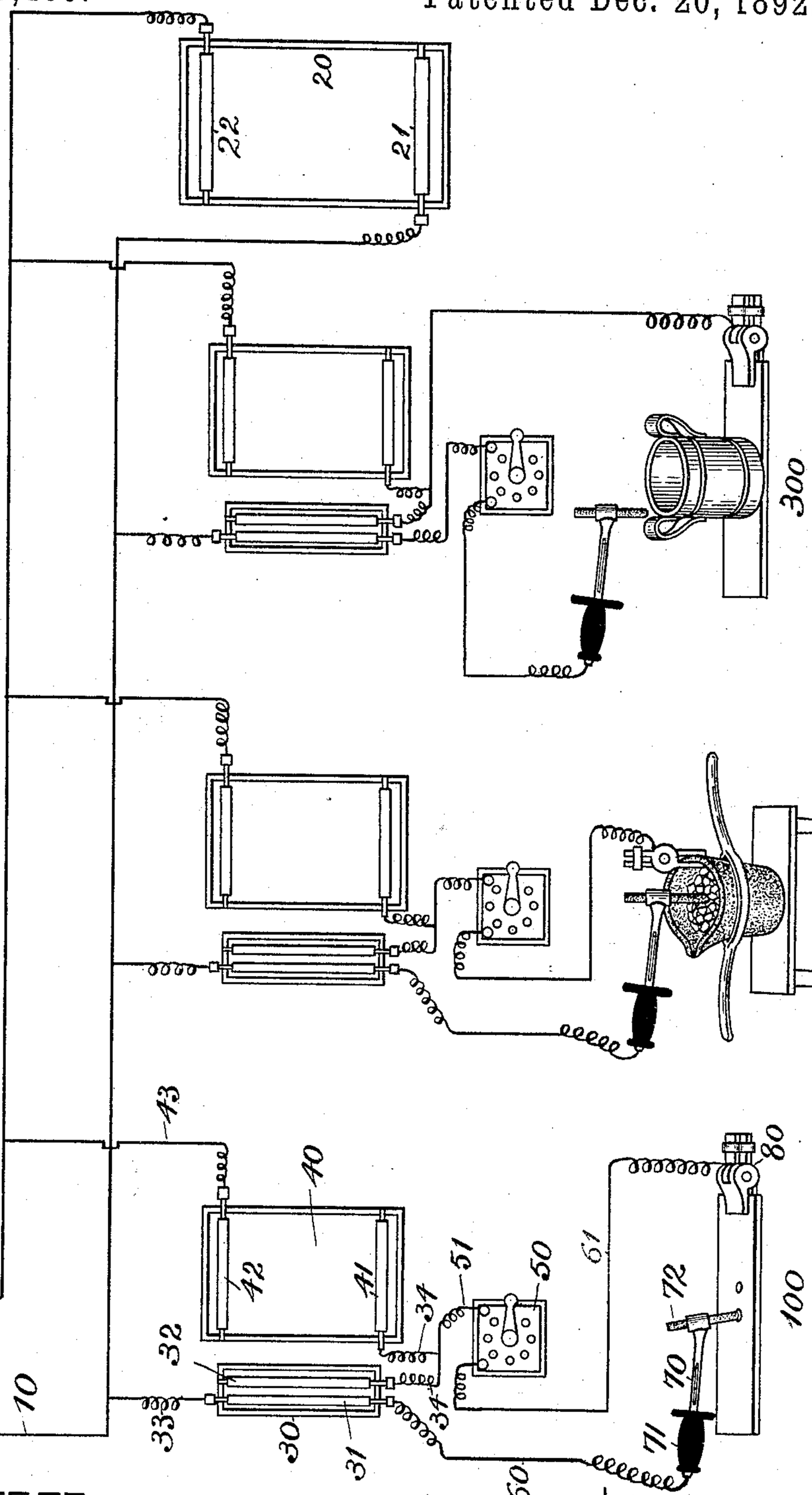
(No Model.)

G. D. BURTON & E. E. ANGELL.

ELECTRIC METAL HEATING APPARATUS.

No. 488,469. Patented Dec. 20, 1892.



WITNESSES.
Chas. F. Adams.
Chester Marr

INVENTORS:
G. D. Burton
E. E. Angell
By F. C. Jones Attorney

UNITED STATES PATENT OFFICE.

GEORGE D. BURTON, OF BOSTON, AND EDWIN E. ANGELL, OF SOMERVILLE, MASSACHUSETTS, ASSIGNORS TO THE ELECTRICAL FORGING COMPANY, OF MAINE.

ELECTRIC METAL-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 488,469, dated December 20, 1892.

Application filed September 22, 1892. Serial No. 446,528. (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 ELLIOT ANGELL, residing at Somerville, in the county of Middlesex, in the State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Electric Metal-Heating Apparatus, of which the following is a specification.

This invention relates to an apparatus embracing one or a number of working circuits for the heating of metals by electricity for forging, shaping or riveting operations and for the electric smelting of ores.

The objects of the invention are to secure a proper distribution of current to the working circuits and to avoid sudden shocks or change of load on the main working circuits.

The accompanying drawing represents a diagram of this improved apparatus embracing three working circuits.

The positive conductor 10 and negative conductor 11 of the main circuit are connected with a dynamo, storage battery, central station, or other source of an electric current, preferably furnishing a direct current. A resistance tank 20, for containing a liquid resistance, having terminal plates 21 and 22, is disposed in the main circuit, the outer end of the conductor 10 being connected with the plate 21 and the outer end of the conductor 11 being connected with the plate 22. These terminal plates are composed of lead or other suitable conductive material, preferably such as will not be affected by the solution and the current. This tank contains a solution which will serve as a conductor of electricity and preferably one which will not dissolve the terminal plates 21 and 22. For this purpose we have used water with sufficient sal soda to bring the specific gravity to 1.08 at 70° Fahrenheit. The resistance of this tank may be varied, to keep up the proper current pressure in the main circuit, by moving the plates nearer to or farther from each other. The liquid serves as a cushion to absorb the shocks due to a change of load. Three working circuits, 100—200 and 300, are represented in this case as connected with the main conductors 10 and 11.

The circuit 100 includes a high resistance tank 30, a low resistance tank 40 and an adjustable metallic resistance or rheostat 50. The high resistance tank 30 may contain plain water or any suitable conductive solution, such, for instance, as that described for tank 20. Adjustable terminal plates 31 and 32 are disposed in said tank and are composed of lead or other suitable conductive material, preferably of a character which will not be dissolved or affected by the liquid and the current. The outer terminal plate 31 is connected by a conductor 33 with the positive main conductor 10 and the inner or intermediate terminal plate 32 of the tank 30 is connected with the inner or intermediate terminal plate 41 of the tank 40 by a short circuit conductor 34. The rheostat 50 is connected by a conductor 51 and said short circuit conductor 34 with the inner plate 41 of said tank 40. The tank 40 contains a conductive solution, which may be similar to that described for the other tanks, or of any suitable composition. A conductor 60 is connected at its inner end to the opposite end of the terminal plate 31 of the high resistance tank 30, and at its outer end with a movable carbon holder 70 having an insulated flanged handle 71 and carrying a carbon pencil 72. A conductor 61 is connected at its inner end to the rheostat 50 and at its outer end to a work-holder 80, which may be in the form of a clamp or other terminal connecting device for holding the work. In the use of this working circuit the carbon pencil 72 is brought into contact with the work, as plate 100, to close the circuit and then withdrawn therefrom to establish a voltaic arc. The arc heats the work at the desired point and the carbon pencil may be moved about at will by the operator who grasps the insulated handle 71. When work is being done the current passes from the main conductor 10 through the conductor 33, through the plate 31 of the high resistance tank 30, (said tank being cut out) through the conductor 60 and through the holder 70 and carbon pencil 72 to the work.

The current passes from the work through the work-holder 80, conductor 61, rheostat 50, conductor 51 and through a portion of the short circuit conductor 34 to the plate 41 of the low resistance tank 40, through the liquid in said tank to the terminal plate 42 thereof, and from said plate through the conductor 43 to the negative conductor 11 of the main circuit. The polarity of the current may be reversed if desired. When the arc is broken the current will pass through the high resistance tank 30, through the short circuit conductor 34 connecting the inner terminals 32 and 41 of the tanks 30 and 40 respectively, and through said tank 40, and through the conductor 43 to the negative main 11. The aggregate resistance of the tanks is equal, or approximately equal, to the resistance of the arc, so that there is little or no change of load on the main circuit when the arc is established or broken. The rheostat 50 serves to regulate the current desired in the working circuit.

Each of the other working circuits embraces the same elements as the working circuit above described. The working circuit 200 is illustrated as applied to the heating of ore or metals in a crucible, and the working circuit 300 is illustrated as applied to an iron or steel barrel.

The apparatus above described affords a convenient and effective distribution of the current through the different working circuits. Each of the working circuits may be used independently or they may be all worked simultaneously.

We claim as our invention:

1. The combination of the main circuit conductors, a high resistance tank having two terminal plates, one of which is connected with one of said conductors, a low resistance tank having two terminal plates, one of which is connected with the other main conductor, a short circuit conductor connecting the intermediate terminal plates of said tanks, and a working circuit having one of its conductors connected with the outer plate of one of said tanks and its other conductor connected with the inner plate of the other tank.

2. The combination of the main circuit conductors, a high resistance tank having two terminal plates, one of which is connected with one of said conductors, a low resistance tank having two terminal plates, one of which is connected with the other main conductor, a short circuit conductor connecting the intermediates of said tanks, a working circuit having one of its conductors connected with the outer plate of one of said tanks and its other conductor connected with the inner plate of the other tank, and a rheostat disposed in said working circuit.

3. The combination of the main circuit conductors, a resistance tank for containing a liquid resistance connected with said conductors and two or more working circuits connected with said conductors, each of said working circuits embracing a high resistance tank, a working conductor connected with the outer plate of the high resistance tank, a working conductor connected with the inner plate of the low resistance tank, and a short circuit conductor connecting the intermediate plates of said high and low resistance tanks.

In testimony that we claim the invention above set forth we affix our signatures in presence of two witnesses.

GEO. D. BURTON.
EDWIN E. ANGELL.

Witnesses:
E. F. PHILIPSON,
CHAS. F. ADAMS.