

(No Model.)

3 Sheets—Sheet 1.

G. D. BURTON & E. E. ANGELL.  
ELECTRIC FORGE.

No. 486,176.

Patented Nov. 15, 1892.

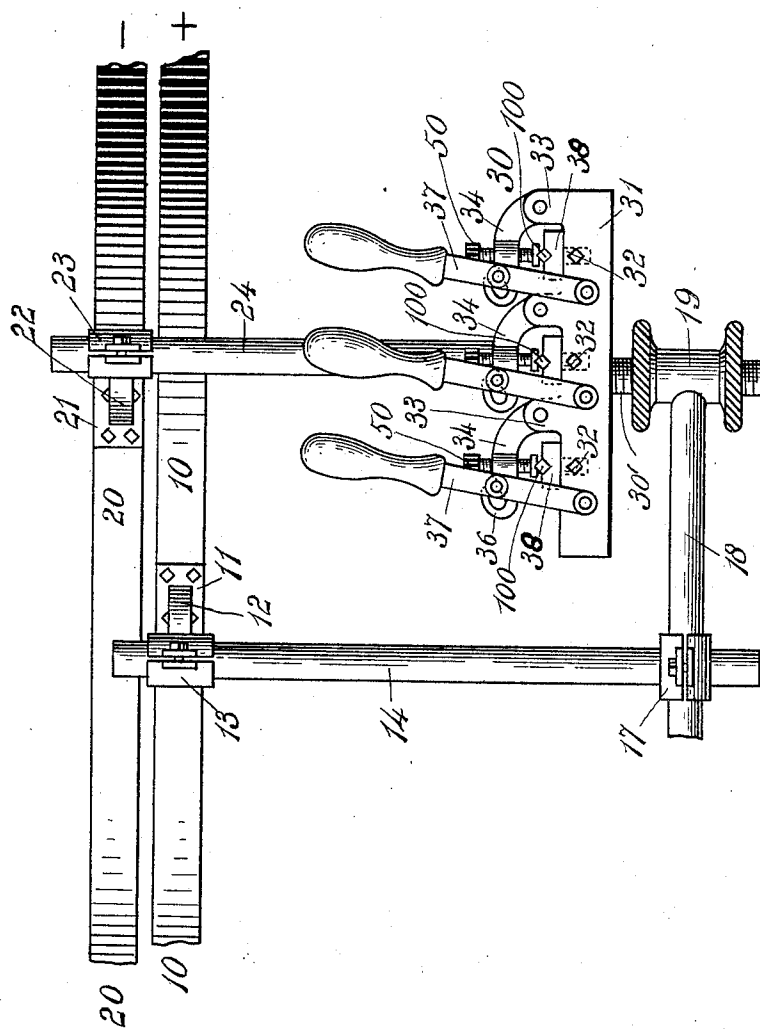


FIG. 1.

WITNESSES  
E. Le Roy  
R. E. Jones.

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

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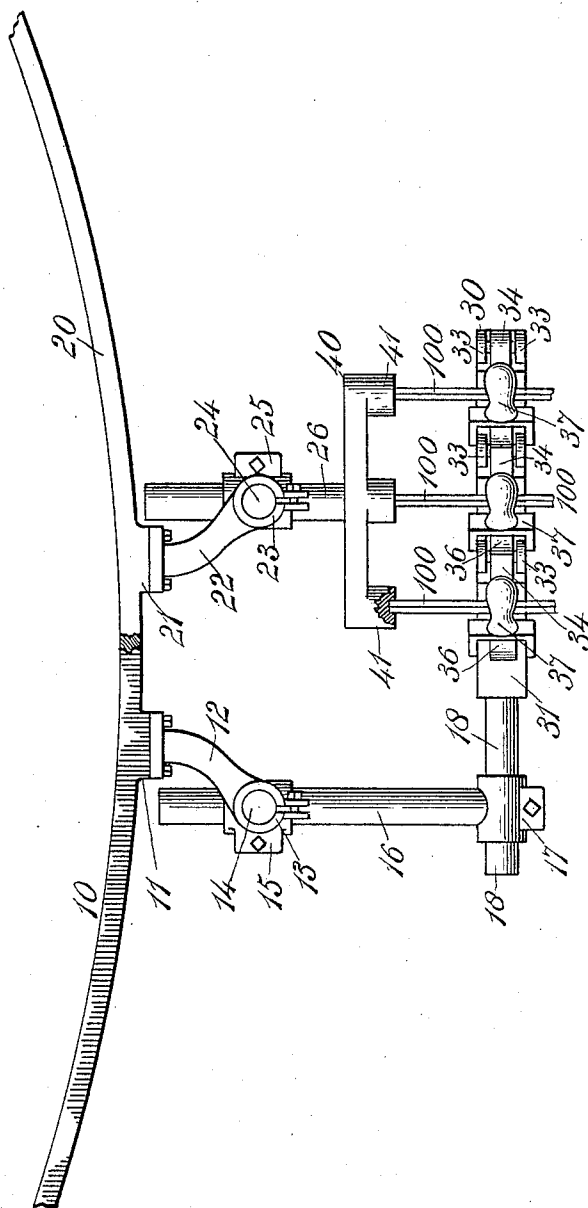


FIG. 2.

WITNESSES

*E. Le Roy*  
*R. E. Lomes.*

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(No Model.)

3 Sheets—Sheet 3.

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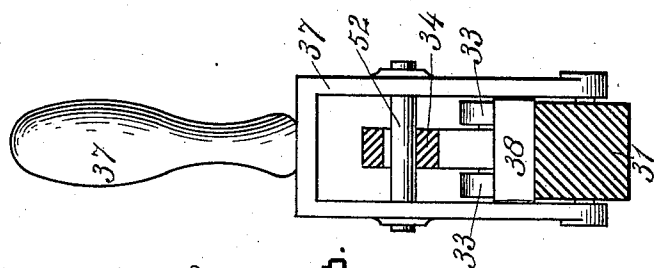


Fig. 5.

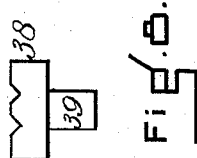


Fig. 6.

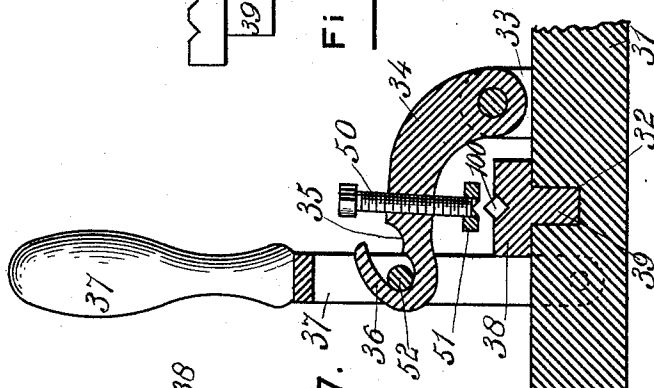


Fig. 7.

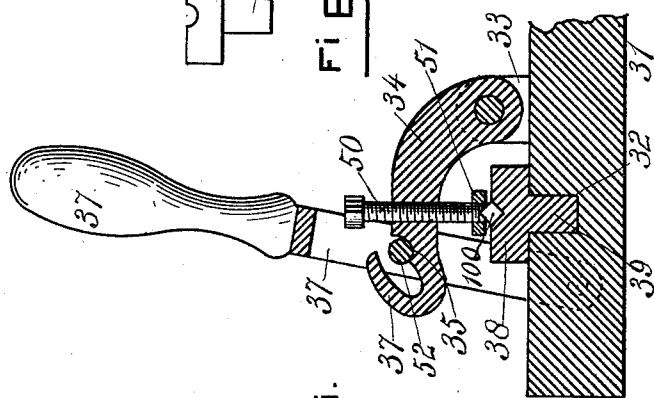


Fig. 8.

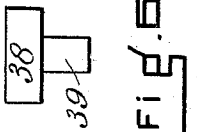


Fig. 9.

WITNESSES.

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By H. C. Somes  
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 FORGE.

**SPECIFICATION** forming part of Letters Patent No. 486,176, dated November 15, 1892.

Application filed January 12, 1892. Serial No. 417,850. (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, have invented certain new and useful Improvements in Electric Forges, of which the following is a specification.

10 This invention relates to an electric forge for heating and softening bars of metal preparatory to forging, shaping, or tempering them.

The object of this invention is to provide  
15 an electric forge having an electrode adapted to be easily manipulated for grasping and releasing the bars to be heated, and in which the faces of the clamping-jaws are adjustable and interchangeable to suit bars of different  
20 shapes and easily removable when worn out.

Figure 1 of the accompanying drawings represents a front elevation of this improved electric forge attached to an electric-current converter. Fig. 2 represents a plan thereof.  
25 Fig. 3 represents a longitudinal section of one of the clamps of one of the electrodes in closed position. Fig. 4 represents a longitudinal section of said clamp in open position. Fig. 5 represents a transverse section  
30 of said clamp. Fig. 6 represents an end elevation of one of the stationary detachable jaws of the electrode-clamp, having a flat face adapted for clamping a flat bar. Fig. 7 represents an end elevation of one of said jaws  
35 provided with a curved groove adapted to receive a bar having a curved face. Fig. 8 represents one of said stationary detachable jaws provided with two angular grooves adapted to receive bars which are angular in cross-  
40 section.

Similar numerals of reference indicate corresponding parts of the different figures.

A current-converter for transforming an electric current of small volume, measured in  
45 ampères, and of high tension, measured in volts, into a current of low tension or voltage and large amprage or volume is employed

in connection with this electric forge to furnish the heating-current therefor. The converter which we have used for this purpose  
50 comprises an annular core, preferably composed of different lengths of uninsulated or partially-insulated heavy wire disposed side by side and arranged to break joints; primary  
55 coils, composed of comparatively-fine wire, disposed at intervals around the annulus of the core and insulated therefrom; secondary  
coils composed of plates or sheets of copper disposed around said annulus between the  
60 primary coils and insulated therefrom and from the core, and two exterior heavy copper rings surrounding the structure. The primary  
coils are arranged in pairs, the coils of each pair being connected in series with each  
65 other and in parallel with every other pair and to the terminals of the primary circuit by binding-posts mounted on a central support. The secondary coils are composed of  
copper plates, and all the positive terminals  
70 thereof are connected with one of the exterior rings and all the negative terminals with the other exterior ring, said rings thus constituting the positive and negative terminals of the converter.

An illustration of the construction of the  
75 converter, which is the subject of other applications for patents, is deemed unnecessary for the purposes of this case.

Any converter capable of furnishing the required current may be used in connection  
80 with this improved forge.

In the drawings segments of the exterior converter-rings are represented. The lower  
converter-ring 10 may be considered for the purposes of this description as the positive  
85 terminal, and the upper converter-ring 20 as the negative terminal, of the converter. The ring 10 is provided with a boss 11 and the ring 20 with a boss 21, said bosses being disposed apart on the circumference of the converter.  
90 A short bracket 12 is attached to the boss 11 and provided at its outer end with a clamp 13, and a short bracket 22 is attached to the boss 21 of the ring 20 and provided with a

clamp 23. A vertical conductive rod 14 is supported in and depends from the clamp 13, and a vertical rod 24 is supported in and depends from the clamp 23, said rods being provided, respectively, at their lower ends with horizontal clamps 15 and 25. A horizontal arm 16 is adjustable in the clamp 15 and provided at its outer end with a clamp 17, and a short horizontal arm 26 is adjustable in the clamp 25. A horizontal arm 18 is supported in the clamp 17 and projects at an angle to the arm 16, being provided at its outer end with a vertical screw-threaded sleeve 19. An electrode 30 is supported in the vertical sleeve 19, and an electrode 40 is attached to or forms a part of the arm 26. The electrode 30 consists of a bed 31, provided with a screw-threaded spindle 30', which fits in the vertical sleeve 19, whereby the electrode is adjustable vertically. The bed 31 is provided with a number of sockets 32 and with several pairs of lugs 33. Arms 34 are hinged to said lugs and provided at their free ends with cams 35 and hooks 36. Forked hand-levers 37 are pivoted to opposite sides of the bed in front of the lugs 33. Detachable jaws 38, composed of copper or other highly-conductive material, are disposed on the bed and provided with tangs 39, which extend into the sockets in said bed. The upper faces of these jaws are plain, as shown in Fig. 6, or provided with curved grooves, as shown in Fig. 7, or provided with V-shaped grooves, as shown in Fig. 8, or otherwise shaped on their face to conform to the shape of the metal to be heated. Screw-rods 50 pass through threaded holes in the arms 34, being adjustable thereon. The lower end of each of said rods is recessed and provided with a nut or flange 51, said end and nut serving as a movable jaw. Each of the hand-levers 37 is provided with a stud 52, which engages the cam 35 and hook 36 of one of the arms 34. When the hand-lever 37 is swung toward the right, said stud 52 rides into the cam 35 and serves to depress said arm 34 and bring the movable jaw 51 into operative connection with the fixed jaw 38. When the hand-lever 37 is swung to the left, said stud, as shown in Fig. 3, comes in contact with the inclined cam-face 36 of the hook at the outer end of said arm 34, whereby the arm is lifted and the jaw 51 retracted.

The electrodes and the brackets and arms which serve as conductors for connecting them with the converter are composed of copper or other highly-conductive material.

In the use of this improved electric forge the clamps of the electrode 30 are opened by swinging the hand-levers 37 toward the left. The bars 100 to be heated are then passed between the jaws 38 and 51 of said clamps and their inner ends made to enter the sockets 41 of the electrode 40. The hand-levers 37 are then swung toward the right, and the

studs thereof engage the cams 35 of the bars 34 and depress said arms, whereby the movable jaws 51, carried by said arms, are brought into contact with the bars 100, resting on the stationery detachable jaws 38. The bars 100, spanning the space between the two electrodes 30 and 40, serve as conductors for the current, and being of higher resistance than the electrodes and their connections heat is developed, and in a few seconds said bars are brought to a forging temperature from their inner extremities resting in the sockets 41 of the electrode 40 to their points of contact with the clamping-jaws of the electrode 30. When they are sufficiently heated, the hand-levers are swung toward the left, and the studs 52 engage the cam-faces 36 of the hooks of the arms 34 and lift said arms and their movable jaws, whereby the bars 100 are released. The bars are then forged by an ordinary hammer and anvil or by a forging-machine, or they may be subjected to a bending or shaping operation.

We claim as our invention—

1. An electrode for an electric forge, consisting of a base, a fixed jaw supported thereon, an arm pivoted to said base and provided with a hook at its outer end having a depressing cam-face and a lifting cam-face, a movable jaw supported by said arm, and a lever pivoted to said base and provided with a stud engaging said cam-faces when the lever is oscillated.

2. In an electric forge, the combination of an adjustable electrode provided with sockets for receiving the ends of bars to be heated, an electrode disposed in a plane with the first electrode and consisting of a base provided with detachable conductive fixed clamping-jaws, arms pivoted to said base and provided with depressing and lifting cam-faces, movable jaws supported in said arms, hand-levers pivoted on said base and provided with studs engaging the hooked arms for clamping or releasing the jaws, and conductors connecting said electrodes with the source of a heating-current.

3. In an electric forge, the combination of a converter provided with exterior rings constituting the positive and negative poles, an electrode provided with a socket for receiving the end of a bar to be heated, a conductor connecting said electrode with one of said rings, a second electrode and a conductor connecting said second electrode with the other ring, said second electrode being provided with a fixed conductive jaw, a hinged arm provided with a hook at its outer end, having a depressing and a lifting cam, an adjustable spindle in said arm carrying the movable conductive jaw, and a hand-lever pivoted to said base and provided with a stud for engaging said cams.

4. An electrode for an electric forge, comprising a base, a detachable conductive jaw

supported in said base, a movable arm, a spindle supported therein and provided with a groove at its lower end and with a nut which serves, in conjunction with the grooved  
5 end of said spindle, as a conductive clamping-jaw, and means for actuating said arm, substantially as set forth.

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:

CHAS. F. ADAMS,  
CHESTER MARR.