

No. 647,694.

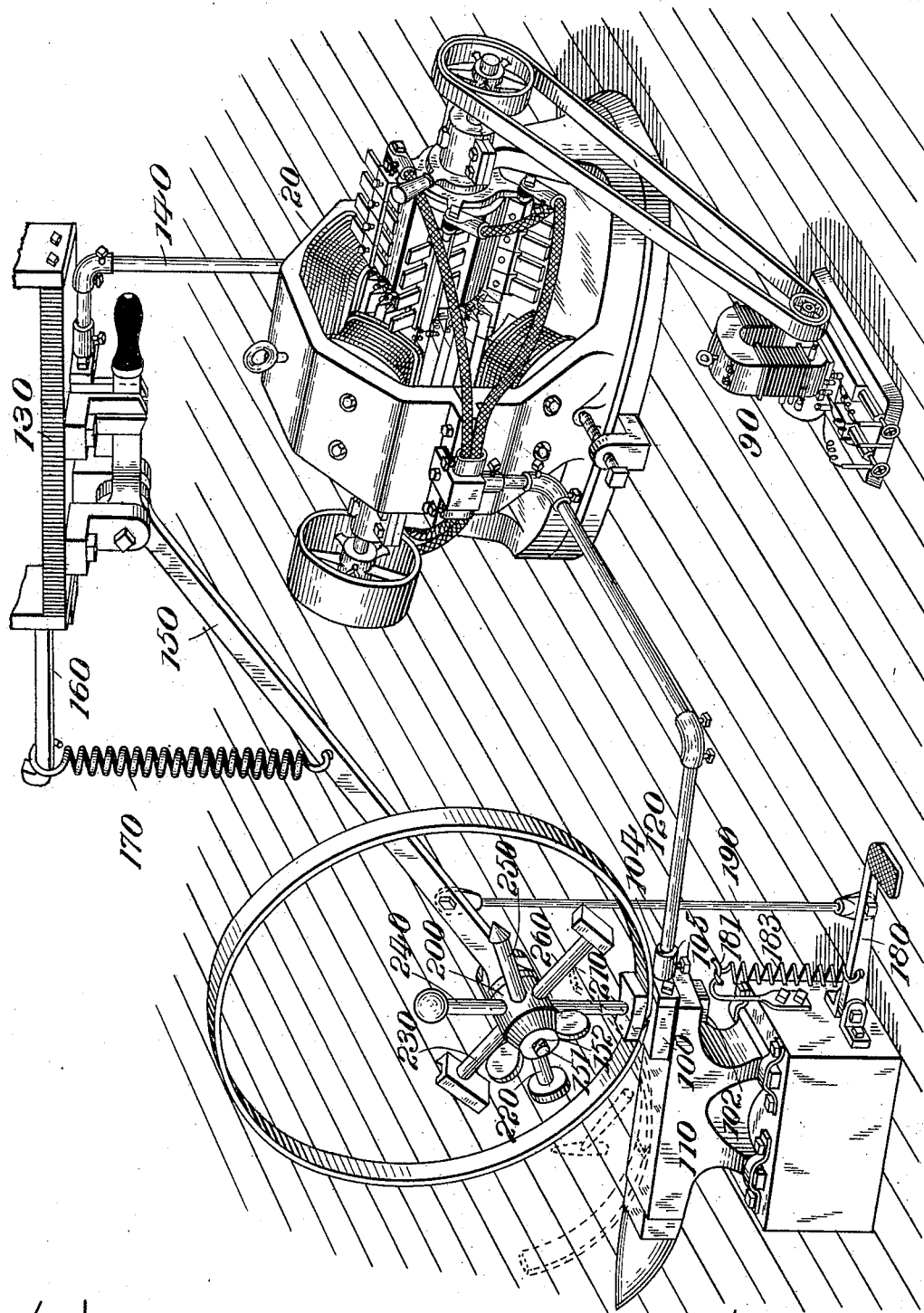
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G. D. BURTON.  
ELECTRIC METAL WORKING APPARATUS.

(Application filed Aug. 11, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES

S. M. Donnell  
Ph. W. Chew

FIG. 1.

INVENTOR

G. D. Burton  
By J. C. Jones  
Attorney



# UNITED STATES PATENT OFFICE.

GEORGE D. BURTON, OF BOSTON, MASSACHUSETTS.

## ELECTRIC METAL-WORKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 647,694, dated April 17, 1900.

Application filed August 11, 1898. Serial No. 688,382. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE D. BURTON, a citizen of the United States of America, residing at Boston, in the county of Suffolk, in the State of Massachusetts, have invented certain new and useful Improvements in Electric Metal-Working Apparatus, of which the following is a specification.

This invention relates to electric metal-working apparatus for the forging, welding, and brazing of metals and for heating metal articles, such as wheel-tires, for the purpose of setting them.

The invention is especially adapted for lap-welding by the use of a primary transverse current. The lap-weld is superior to the butt-weld. No end pressure is required, and consequently there is no upsetting of the metal and no formation of a bulge or projection at the joint, which is afterward required to be filed or hammered down.

The object of the invention is to provide a simple, convenient, and compact apparatus for the use of a blacksmith or other metal-worker.

Figure 1 of the accompanying drawings represents a perspective view of this apparatus. Fig. 2 represents, on an enlarged scale, a front elevation of the rotary electrode-head, having a plurality of electrodes for a variety of purposes, and a vertical longitudinal section of a portion of an anvil supporting the opposite electrode, a piece of work to be lap-welded being disposed between the electrodes. Fig. 3 represents a longitudinal section of an anvil-electrode and a fragment of one of the wheel-electrodes adapted for countersinking screw-holes. Fig. 4 represents a transverse section thereof. Fig. 5 represents a vertical section of anvil and wheel electrodes, clamping between them a section of a grooved metallic portion of a vehicle-tire adapted for receiving a rubber tire. Fig. 6 represents a perspective view, preparatory to lap welding, of the lapping ends of the metallic portion of a vehicle-tire adapted to receive a rubber tire. Fig. 7 represents a vertical longitudinal section of wheel and anvil electrodes adapted for lapwelding the joint between two pipe-sections of different sizes. Fig. 8 represents a transverse section thereof. Fig. 9 represents a longitudinal vertical section of

wheel and anvil electrodes adapted for brazing or welding a longitudinal slit in a metallic tube. Fig. 10 represents a transverse section thereof. Fig. 11 represents a longitudinal vertical section of anvil and wheel electrodes adapted to form a lap-weld between two bars of metal. Fig. 12 represents a transverse section through the lap-weld joint. Fig. 13 represents a vertical longitudinal section of one end of the anvil and of wheel and anvil electrodes adapted for riveting.

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

The electric current for use in this apparatus may be taken from any suitable source of electricity. I have devised for this purpose a dynamo-electric generator of peculiar construction which has a wide range of current as regards both amperage and voltage and which will supply a primary current of large volume and low voltage, thus avoiding the use of a transformer. The dynamo herein illustrated is of this sort; but as it will constitute the subject-matter for a separate application for a patent it is not deemed necessary to herein describe it in detail.

An exciter-dynamo 90 is employed in connection with the generator-dynamo 20 for exciting the field of the latter, said exciter-dynamo being properly connected with the field-magnets of the generator by wires (not shown) and a rheostat being arranged in the field-circuit of the exciter for regulating the excitation of the field of the generator, as in United States Patent No. 475,232 to Burton, Eddy, and Briggs, dated May 17, 1892.

A bed-electrode 100, constituting one of the working terminals of the circuit, is supported on an anvil, as the blacksmith is accustomed to the use of the anvil and this arrangement suits his convenience, and the loss of heat incident to the transferring of the work from the ordinary forge to the anvil is avoided. The anvil herein shown consists of an ordinary anvil 110, which is provided at its rear end with a square vertical slot 111 and a round vertical slot 112. In this instance the round slot is shown as the one utilized for connecting the bed-electrode with the anvil. For this purpose the bed-electrode 100, as shown in Figs. 1 and 2, comprises a block of highly-conductive material, such as copper,

provided with a downwardly-projecting stud 101, which extends through the hole in the anvil. The lower end of this stud is screw-threaded, and the nut 102 operates to clamp the electrode to the anvil. Any other suitable means may be employed for fastening the electrode to the anvil. The electrode is preferably insulated from the anvil by any suitable insulating material 103, such as fiber board or mica; but it is not absolutely necessary to provide this insulation, as the current used is low in voltage and the conductivity of the electrode is much higher than that of the anvil. This electrode is provided with a socket 104, having a binding-screw 105, and a conductor 120, which may consist of a bar of copper, connects said electrode with one pole of the generator-dynamo. A switch-block 130 is connected by conductor 140, also preferably composed of a bar of copper, to the other pole of the generator-dynamo.

An arm 150 is hinged to the switch-block 130 and carries at its free end a rotary electrode-head 200, having a plurality of radial arms, as 210, 220, 230, 240, 250, and 260, said arms carrying electrodes of different shapes adapted for different purposes. The electrode-head 200 is clamped to the hinged arm 150. The arm, as shown, is provided with a lateral stud 151, on which the hub of the electrode-head is adjusted, and a clamping-nut 152 on said stud holds said electrode-head in place. The electrode-head may therefore be readily removed, and another having electrodes of different shapes may be substituted therefor. An elastic support is provided for said arm, preferably in the form of a spring 170, having one end connected with a bar 160, extending from the switch-block, and connected at its other end with the hinged arm 150. This spring serves to normally support the hinged arm in such position that the electrodes of the electrode-head 200 will be above the electrode 100 on the anvil. The hinged arm is composed of conductive material, and the spring is insulated therefrom. A foot-lever 180 is hinged to the anvil or at any suitable point, and a connecting-rod 190 is connected at its upper end with the conductive hinged arm 150 and at its lower end with the foot-lever. This connecting-rod is insulated from the hinged arm. A spring 183, connected with a bracket 181 and with the foot-lever, tends to hold the foot-lever in elevated position. The spring 170 for supporting the hinged arm 150 is preferably so adjusted as to hold the arm in such position that the electrodes on the rotary head are held normally out of contact with the bed-

electrode 100 on the anvil and to lift said electrode out of contact with the work when the foot-lever is released.

The bed-electrodes 100 are made in a variety of shapes and are interchangeable to correspond with the electrodes of the electrode-head 200 for different kinds of work.

In the use of this apparatus the pieces to be lapwelded are adjusted or placed with their ends overlapping on the bed-electrode 100. Then the foot-lever is depressed, and one of the electrodes of the electrode-head is brought into contact with the work, whereby the circuit is closed and the current passes through the work in transverse direction across the overlapping ends of the parts to be heated. The current may pass in either direction from the generator and effect the result equally well. As soon as the piece is heated to the proper temperature, which may be ascertained by inspection thereof, the operator releases the foot-lever and the spring 170 lifts the hinged lever 150 and takes the upper electrode out of contact with the work, whereby the circuit is broken. Then the operator may shove the work forward on the anvil and hammer the joint or otherwise finish it, as desired. In this way the heating can be quickly and conveniently effected on the anvil without loss of time and heat and without forming an objectionable bulge in the work.

Any suitable block or bench capable of use in hammering, forging, or finishing metal may be considered as the anvil.

I claim as my invention—

1. In an electric metal-working apparatus, the combination of an anvil provided with a slot, a bed-electrode supported on said anvil and provided with a stud engaging said slot, said electrode being connected with one electric pole, and a swinging electrode supported above said bed-electrode and connected with the other electric pole.

2. In an electric metal-working apparatus, the combination of an anvil, a bed-electrode supported on said anvil and connected with one electric pole, a swinging arm carrying an electrode connected to the other electric pole, a rigid arm supported above said swinging arm, a spring connecting said rigid arm with said swinging arm and imparting an elastic support thereto, and a foot-lever connected with said swinging arm for swinging it into operative position.

GEO. D. BURTON.

Witnesses:

E. F. PHILIPSON,  
GEO. STEINER.