(No Model.)

C. L. COFFIN.

FURNACE FOR HEATING OR WORKING METALS ELECTRICALLY.

No. 512,602. Patented Jan. 9, 1894.

Fig. 1.

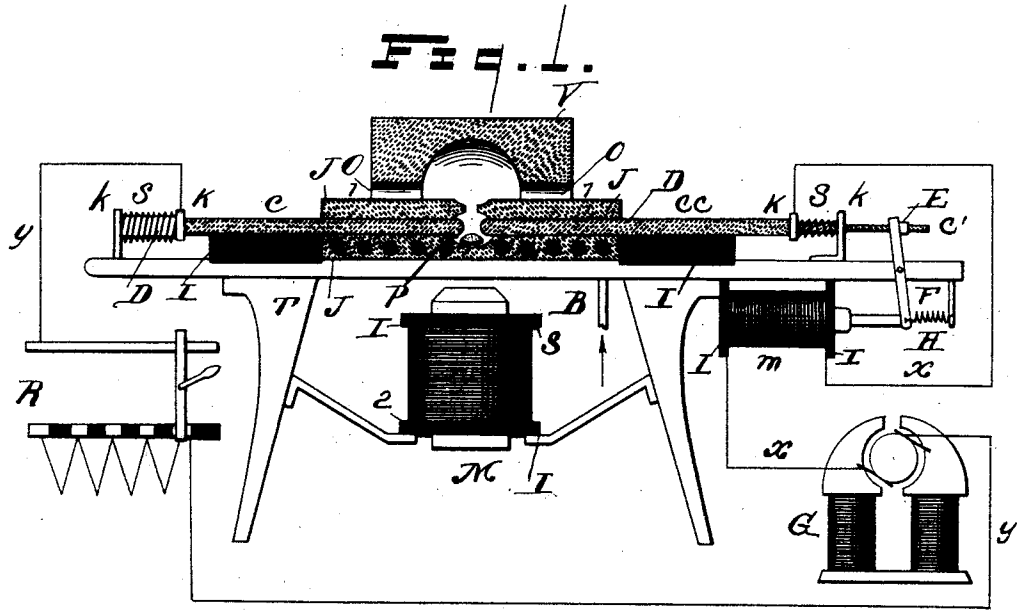


Fig. 2.

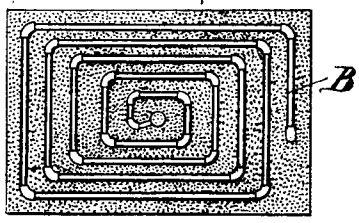


Fig. 4.

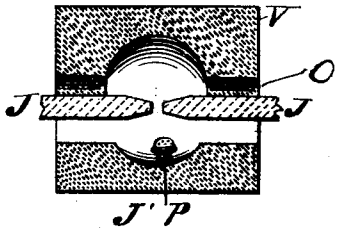
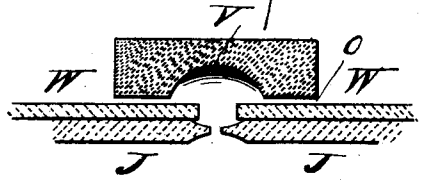


Fig. 3.



WITNESSES

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FURNACE FOR HEATING OR WORKING METALS ELECTRICALLY.

SPECIFICATION forming part of Letters Patent No. 512,602, dated January 9, 1894.

Application filed April 2, 1891. Serial No. 387,463. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. COFFIN, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Forges or Furnaces for Heating or Working Metals Electrically, of which the following is a specification.

My invention consists in an improved forge or furnace for heating or working metals electrically, hereinafter fully described and claimed.

Figure 1 is a side elevation with the upper portion in vertical central section. Fig. 2, is a longitudinal sectional view through the refractory bed J'. Fig. 3, is a detail vertical central sectional view of the upper part like that of Fig. 1, but with the articles to be worked in position, and Fig. 4, is a detail sectional view through the upper part of Fig. 1.

T represents a table having a top and legs.

J' represents a bed of refractory non-conducting material in which may be a coil of pipe B, whose inner end comes up through the center of bed J' as shown in Figs. 1 and 5, while its lower end leads downward through the table for the purpose of being connected to any suitable source of supply of air, gas or vapor.

I represents insulating material, and the bed of refractory material J' is flanked on each side by blocks of insulating material.

C and C C represent carbons, each of which is held in a tube D, upon which is a shoulder K, and each tube D is encircled by a spring S, which presses against shoulder K and against a fixed stop *k*, supported on the table, but insulated therefrom, by means of which springs the carbons C and C C are constantly pressed toward each other, but are prevented from coming into contact by a stop P of refractory non-conducting material which is carried on the bed of refractory material J' between the points of said carbons. The carbon C C is hollow and through the bore passes a smaller carbon or pencil C'.

E represents a collar clamped on carbon pencil C', and provided with a pin which engages with a slot in a lever F pivoted to the table. The lower end of this lever is connected to the movable core L of a sucking coil *m*, and also to a spring H, the other end of which spring is fastened to a lug on the table, whereby said lever F is swung, (when the magnet *n* is not energized) in such manner as to project the carbon pencil C' through the hollow carbon C C into contact with the carbon C.

J represents a block of refractory material through the center of which is an opening shown in Figs. 1, 4 and 6, and which lies upon the bed of refractory material J' in such manner as to inclose the carbons, and yet permit them to move between block J and bed J'. The opening in block J is over the upturned end of coil B, and over the space between the carbons C and C C.

V represents a jacket of refractory material, having a chamber formed therein to serve as a furnace, and having openings O O formed therein at opposite sides communicating with the chamber, for the introduction of the article or articles to be heated.

G represents a generator of electricity, one pole of which is connected by conductor *x* through the coil of magnet M with carbon C C, while the other pole is connected by conductor *y* with the carbon C, and in this conductor *y*, I prefer to interpose a resistance switch R of any known type.

M represents an electro magnet carried on suitable supports from legs of the table as shown in Fig. 1, whose terminals 2 and 3 may be either connected with the circuit of generator G by a high resistance shunt, or may be connected with the poles of an independent generator of electricity. The core of magnet M lies directly beneath the space between the carbons C and C C, so that the influence of said magnet when energized deflects the arc formed between said carbons.

W and W represent two metal bars inserted in the openings O O to be heated.

The operation of my invention is as follows: When the generator G is at rest the parts lie in the position shown in Fig. 1. Upon starting the generator a current traverses conductor *x*, part of which is the coil of magnet *m*, and then to carbon C C, carbon pencil C', carbon C and back through conductor *y* to the other pole of the generator. This energizes magnet *m*, drawing in the core L against the resistance of spring H, and drawing carbon pencil C' away from carbon C, thus establishing a voltaic arc between the carbon

C and C C. This arc causes an intense heat, and may be reinforced by forcing air, gas or vapor through the coil B into and through the arc, said air, gas or vapor becoming heated as it traverses said coil, and also by energizing the magnet M, which then deflects said arc by a magnetic blast. Air, gas or vapor through coil B may be used alone, or the magnet M may be used alone, or both may be used together, or neither may be used. One or more articles W may be inserted through the openings O in jacket V into proximity to the arc until heated, when it or they can be withdrawn and welded or worked in any desired manner. As the carbons C and C C consume they are fed forward by the springs S_1 thus keeping said carbons at a constant distance from each other, as they always lie in contact with the stop F. For purposes of illustration I have shown said carbons C and C C as not in contact with stop P, this being merely for the purpose of avoiding confusion of lines.

The heat generated in this forge or furnace is so intense that I have found great difficulty in obtaining refractory material, as I find that the best make of fire brick very soon melts and disintegrates. I have after many experiments discovered a material which will stand the heat to a satisfactory degree, and this material is oxide of calcium, made from well burned dolomite, or limestone, or marble. I prefer to use lime which is but slightly silicious, and, after being well burned I mold or press it into the desired shape. I find that this material when raised to such incandescence does not readily fuse, gives out no vapors or fumes injurious to either the work or the operator, and has little tendency to flux or amalgamate with or form a coat upon the material being worked. Should the intense heat develop cracks in the refractory material, these can be stopped by powdered oxide of calcium, which after a few applications fills the cracks and adds to the life of the refractory jacket.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electric forge the combination of a support, a refractory bed containing a coil of pipe the end of which opens through said bed, means for forcing air, gas or vapor through the coil, and mechanism for maintaining a voltaic arc on said bed over the end of said pipe, substantially as shown and described.

2. In an electric forge the combination of a support, a bed of refractory material, a coil of pipe located in said bed, and one end of which opens through said bed, mechanism for maintaining a voltaic arc on said bed, a jacket of refractory material for inclosing the arc, a magnet for deflecting the arc, and a resistance switch in the arc maintaining mechanism, substantially as shown and described.

CHARLES L. COFFIN.

Witnesses:
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