(No Model.)

S. P. HUTCHINSON.

FURNACE FOR METALLURGICAL PURPOSES.

No. 541,931. Patented July 2, 1895.

FIG-1

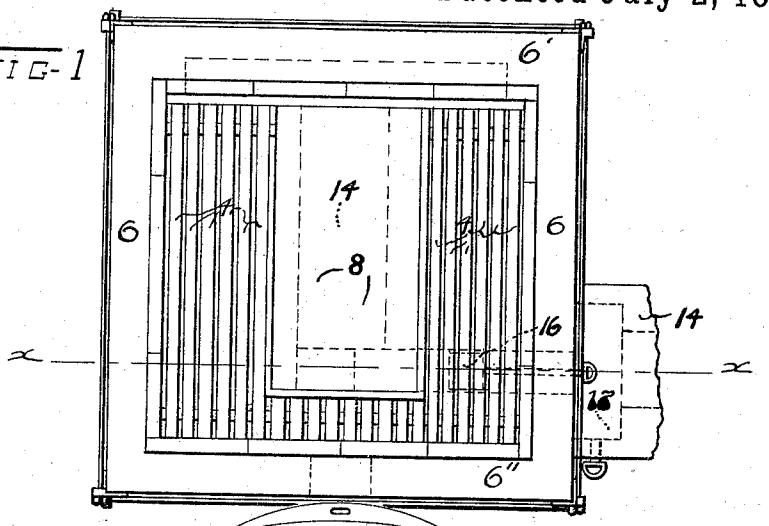


FIG-2-

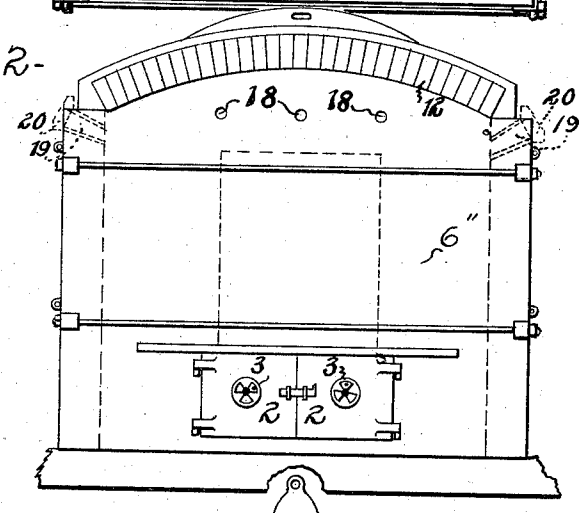
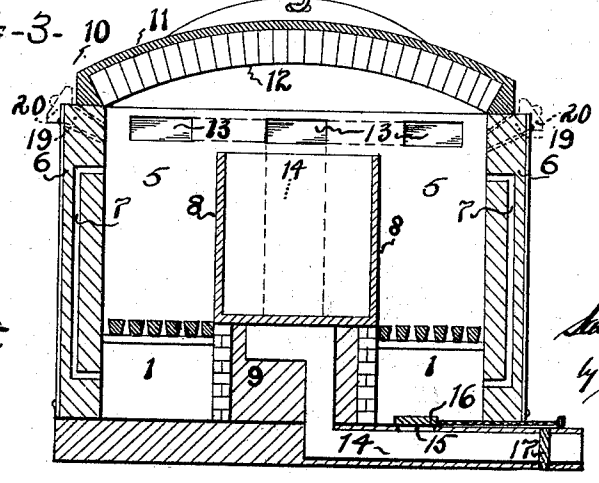


FIG-3-



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UNITED STATES PATENT OFFICE.

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FURNACE FOR METALLURGICAL PURPOSES.

SPECIFICATION forming part of Letters Patent No. 541,931, dated July 2, 1895.

Application filed November 10, 1894. Serial No. 528,436. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. HUTCHINSON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces for Metallurgical Purposes; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof as to enable others skilled in the art to make and use the said invention.

This invention relates to furnaces for metallurgic purposes and has for its objects the economical heating of metals under treatment by long continued heat, and the easy and perfect control of such heating operations with a minimum of attention, and the avoidance of sudden changes of temperature during the cooling of annealing or converting operations.

To this end this invention consists of an ash-pit, a grate, a fuel chamber having a concave cover of refractory material and surrounding the heating chamber, flues leading from the upper part of the fuel chamber and thence downwardly and under the heating chamber and thence outwardly to the chimney, a branch flue and dampers whereby the products of combustion may be shut off from the chimney and passed into the ash-pit whence they rise and pass through the fuel repeatedly, and air flues leading, through the refractory lining of the fuel chamber, from the ash-pit to the fuel chamber, above the fuel, for supplying heated air to the combustible gases above the fuel.

The construction and operation of this furnace are hereinafter fully described and shown in the accompanying drawings, in which—

Figure 1 shows a plan of the furnace with the cover removed; Fig. 2, a front elevation, with the outlines of the interior walls of the fuel-chamber and heating-chamber shown in dotted lines, and Fig. 3 a section in the vertical plane indicated by the dotted line *x x* in Fig. 1.

Referring to the drawings, 1 represents the ash-pit, having doors 2, for removing ashes, with registers 3 in them for regulating and stopping the admission of air.

4 are the grate bars.

5 is the fuel chamber having side walls 6, a rear wall 6′ and a front wall 6″ all of refractory material in which are channels 7 leading from the ash-pit 1, to the upper part of the fuel chamber 5.

18 are sight holes through which to observe the interior of the furnace and may have mica plates inserted in them.

8 is a heating chamber, formed of refractory material, resting upon a pier 9 of like material.

10 is a cover made of a metallic shell or frame 11, concave on the under side, and lined with refractory material 12 in like concave form so that heat, reflected or radiated from the inner surface of the cover, will be concentrated in the heating chamber 8, and on material placed therein. The cover 10 is provided with means for easily removing it and replacing it, such as a counterbalancing weight or hoisting tackle.

13 are openings into a flue 14, leading from the upper part of the rear of the fuel chamber 5, downwardly in the rear wall 6′, horizontally under the heating chamber 8, thence toward the front, thence downwardly through the pier 9 and horizontally outward beneath the ash-pit 1 to a chimney. A branch flue or opening 15 leads from the flue 14 into the ash-pit 1, to which opening a damper 16 is fitted. A second damper 17 is fitted to the flue 14, so as to open or close communication with the chimney. The chimney is not shown in the drawings, but may be of any usual construction.

Openings 19 (as indicated by dotted lines in Figs. 2 and 3) may be made, to supply fuel without uncovering the furnace top, and may be closed by plugs 20, or by connected fuel magazines or hoppers.

The operation of the furnace is as follows: A fire is kindled upon the grate 4, the damper 16 being closed, and the damper 17 opened and the cover 10 placed on the furnace. Fuel is added until the fuel chamber is filled with ignited fuel nearly to the level of the top of the chamber 8. Air is admitted through the doors 2, until the fuel becomes ignited. The doors 2 are then closed, and the further supply of air is through the registers 3. The refractory lining of the furnace becomes heated, and air passing from the ash-pit 1, through the channels 7 becomes highly heated and burns with the gases evolved from the fuel. The lining of the cover becomes highly heated

and from its form concentrates the heat on the chamber 8. At the same time, the burning gas in the flue 14 heats the under side and rear side of the chamber 8. When the desired temperature is attained the registers 3 are closed. When it is desired to maintain the temperature of the chamber 8 for a length of time, the damper 17 is closed and the damper 16 is opened. The products of combustion then pass from the flue 14 into the ash-pit and further and more complete combustion ensues, so that a very slow and gradual reduction of temperature is effected, which condition is highly useful in cementing and annealing operations, and in converting forgings or castings into steel or ductile metal.

Having described my invention, what I claim is—

1. In a furnace for metallurgic purposes a fuel chamber, a heating chamber located in said fuel chamber, a grate, an ash-pit with means of excluding, admitting and regulating air supply thereto, and a concave refractory cover fitted to said fuel chamber, in combination with a flue leading from the upper part of said fuel chamber under said heating chamber, and dampers arranged to alternatively connect said flue with the ash-pit or with the chimney substantially as set forth.

2. In a furnace for metallurgic purposes, a fuel chamber having refractory walls provided with channels leading from an ash-pit to the upper part of said fuel chamber, a grate, an ash-pit provided with means of regulating and excluding air supply thereto, a refractory cover fitted to said fuel chamber, in combination with a heating chamber located within said fuel chamber, a flue leading from the upper part of said fuel chamber under said heating chamber to said ash-pit, and to a chimney, and dampers, arranged to close communication between said flue and said ash-pit and chimney, substantially as set forth.

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