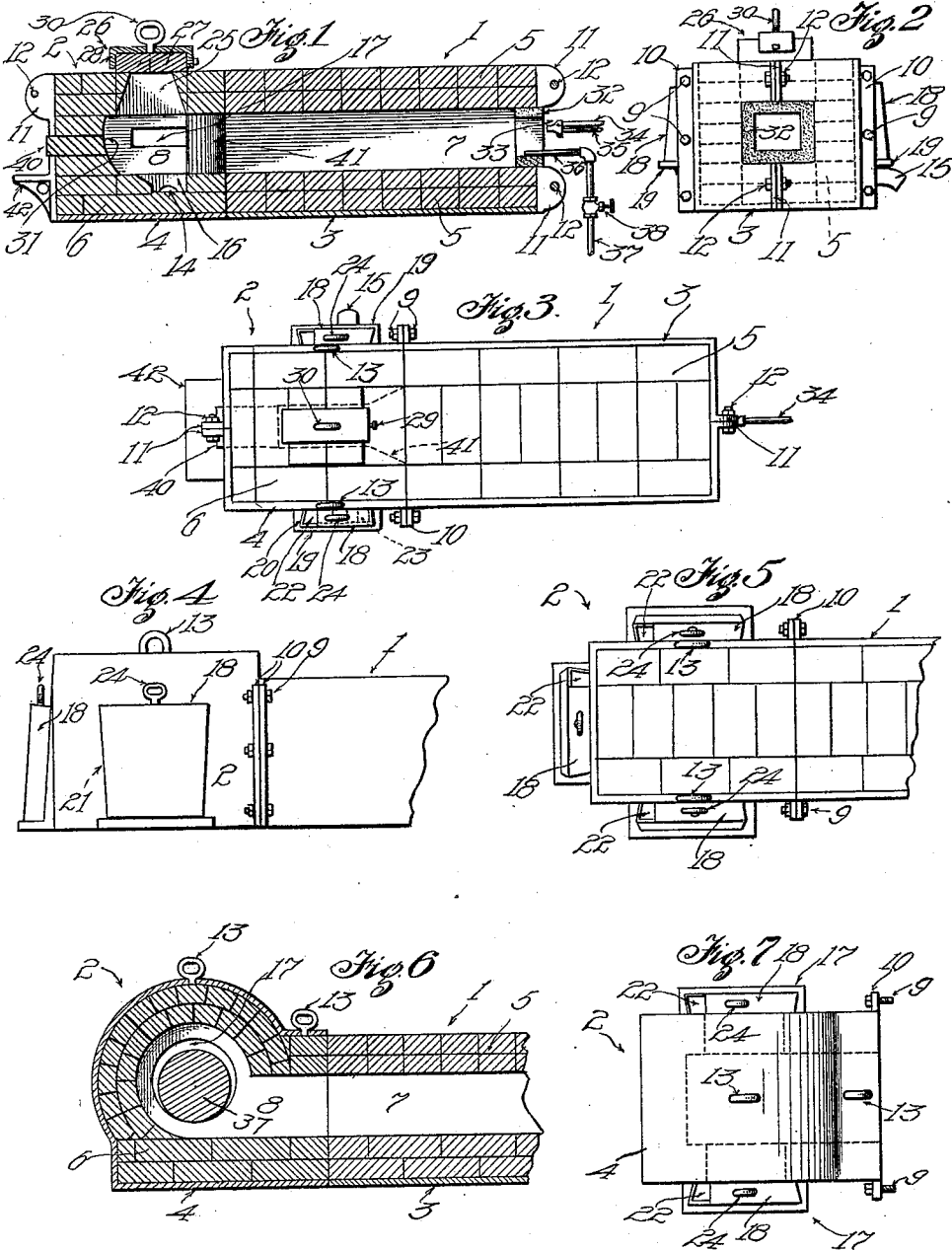


W. N. BEST.
FORGE AND FURNACE.
APPLICATION FILED APR. 11, 1904.

Patented Oct. 26, 1909.

2 SHEETS—SHEET 1.

938,111.



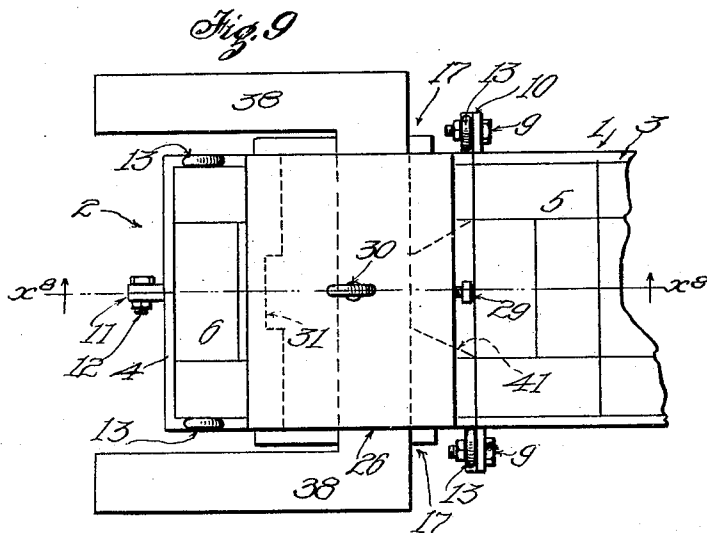
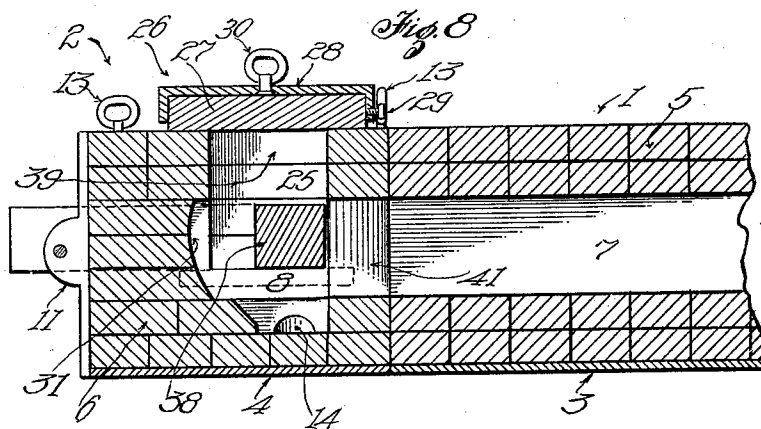
WITNESSES
H. A. Knight
A. P. Knight

INVENTOR
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by Townsend Bros
his attys

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UNITED STATES PATENT OFFICE.

WILLIAM N. BEST, OF NEW YORK, N. Y., ASSIGNOR TO JOHN H. BEST AND EZRA BEST,
OF QUINCY, ILLINOIS.

FORGE AND FURNACE.

938,111.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed April 11, 1904. Serial No. 202,581.

To all whom it may concern:

Be it known that I, WILLIAM N. BEST, a citizen of the United States, a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, formerly residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and Improved Forge and Furnace, of which the following is a specification.

This invention relates to an oil burning forge or furnace capable of heating comparatively small articles or bars. It has been a matter of some difficulty to obtain a furnace of this character which is capable of burning petroleum, particularly heavy or crude petroleum, with efficiency, and in such manner as to heat the articles perfectly and evenly without burning the same or causing deposition of carbon thereon.

According to my invention, the combustion of the hydrocarbon or oil is effected in a special combustion and superheating chamber so that the combustion is practically complete before the flame enters the heating chamber proper of the furnace or forge.

Another object of my invention relates to the construction of the combustion and heating chambers in such manner that different forms of heating chambers may be used with the same combustion chamber.

Other objects of the invention relate to provision for inspection or access to the various parts of the furnace and for renewal of the same.

The accompanying drawings illustrate the invention.

Figure 1 is a vertical longitudinal section of the forge or furnace. Fig. 2 is an end view thereof. Fig. 3 is a plan view. Fig. 4 is a side elevation showing a part of the combustion chamber with a heating chamber attached thereto of different form than that shown in Fig. 1. Fig. 5 is a plan view of Fig. 4. Fig. 6 is a sectional view of a part of the combustion chamber with an attached heating chamber of still another form. Fig. 7 is a plan of the form of heating chamber shown in Fig. 6. Fig. 8 is a vertical section showing another form of the heating chamber, on the line X^s—X^s, Fig. 9. Fig. 9 is a plan thereof.

Referring to Figs. 1 to 3, 1 designates a superheating combustion tunnel or chamber, the same being part of the furnace and 2 the

heating or forge portion proper, these parts being provided respectively with external casings or shells 3, 4, and with linings or walls 5, 6, of fire-brick or other highly refractory material, forming the combustion or superheating chamber or tunnel 7, and the heating or welding chamber 8 which communicate end to end and may, in fact, be of the same diameter and form a continuous tubular chamber, as shown in Fig. 1. The top of both members 1, 2, are formed of two courses of brick placed transversely to one another or breaking joint. The combustion chamber 7 is preferably sufficiently elongated to enable the combustion to be completely effected before the gases reach the heating and welding chamber.

The shells or casings 3, 4, of the respective chambers are desirably made in sections clamped together, as shown, each of these casings 3, 4, being, for example, made in two sections, one for each side of the furnace member 1, and said sections being connected by bolts 12 through flanges 11 in the casing sections. In addition each of the casings 3, 4, is provided with flanges 10 along the line or plane of junction of the members 1, 2, said flanges abutting together when the said members are placed end to end, and being secured together by bolts 9, so as to hold the members 1 and 2 together. In this manner each casing is closed at the sides, bottom and at the outer end, but is open on top and at the inner end so that the two inner ends register or correspond when they are placed adjacent to each other. Eyes or eyebolts 13 are provided on the casing 4 of member 2, to enable said member to be lifted bodily by a crane or other means, to raise the member 2 against or away from member 1.

An opening 14 at the side of chamber 8, serves to discharge the slag into a spout 15, the bottom of said chamber desirably having a cross-gutter 16 leading to this opening. Openings 17 are provided at each side of chamber 8 through which the metal to be heated can be passed, doors 18 being provided for closing these openings. Said doors rest on brackets 19 on the sides of member 2 and are perfectly constructed to tip or incline against the walls of the furnace, so as to remain in position by their own weight. The construction of these doors may be similar to that of the doors shown in my application No. 201,830, filed

April 6th, 1904, said doors having an external shell 20 with inwardly and downwardly inclined flanges 21, and an opening 22 at the top to facilitate insertion of the last or key member of the sectional lining 23. Eyebolts 24 on the doors enable them to be lifted bodily away from the furnace when not in use. An opening 25 is provided at the top of chamber 8 through which the heat can be directed to heat a piece of metal extending in, below or above this opening. A cover 26 for this opening is provided, consisting of one, two or more bricks 27, of refractory material, with an iron holder 28 with downturned ends between which said bricks are clamped by a clamp screw 29, said holder having an eyebolt 30 by which this cover may be lifted. The end of heating chamber 8 which is opposite this combustion chamber 7, is lined with refractory brick 31, which is concaved as shown, to direct or deflect the hot gases inwardly to the top of the chamber 8, in case the latter is opened at 25.

At the inlet end of combustion chamber 7, a collar or inwardly projecting flange 32 of refractory material, may be provided to effect a partial closure or reduction of area at the inlet, thus preventing blowing back of the flame and confining and retaining the heat more effectively within said chamber.

At the extreme end of the furnace or heating chamber 8, one of the lining bricks, as indicated at 40, may be made loose or removable, projecting beyond the furnace wall sufficiently to enable it to be pulled out when desired, so that an iron or rod may be inserted for manipulation of the object within. 42 designates a bracket on which said brick may be placed or which may receive an article to be heated through the opening.

33 designates the oil burner with oil and steam supply pipes 34, 35, said burner being desirably of the form shown in my Patent Number 752155, dated February 16, 1904, although other forms of burners may be used, adapted to direct atomized hydrocarbon into the combustion chamber.

Adjacent to and preferably below the burner 33 is an air delivery nozzle 36, supplied with compressed air from a pipe 37, a valve 38 controlling such air pressure supply. The pressure of the air should be such as to give a forced draft or current of air below and adjacent to the flame, which tends to concentrate the heat on the bottom of the combustion chamber 7 and of the heating chamber 8. The heating chamber 8 is preferably narrower than the combustion chamber, the side walls tapering or being shouldered, as indicated at 41, to confine the heat directly upon the object being heated.

The furnace shown in Figs. 1 to 3 is especially adapted for use as a forge, the elongated combustion chamber enabling complete combustion of the fuel even with a

comparatively small furnace. The object to be heated will be inserted through one or another of the openings 17, 25, and any one or more of the doors 18 and cover 26, 27 will be put in place according to the manner in which it is desired to confine or direct the heat. The burner and the air blast will be started in operation and the flame will burn within the combustion chamber 7, the hot gases resulting from the combustion passing into the chamber 8 and heating said chamber and the object therein contained.

In case the object to be heated cannot be readily inserted in the heating chamber shown, the latter can be removed by first removing the bolts 9 and then lifting away the member 2 by a crane, and another form of heating chamber such as that shown in Figs. 4 and 5, that shown in Figs. 6 and 7, or that shown in Figs. 8 and 9, may be substituted therefor, being lifted into place against member 1 and fastened thereto by bolts 9. The heating chamber shown in Figs. 4 and 5 has three doors 18, one at each side and one at the end, thus allowing either straight or bent bars to be inserted. In this form no top opening is needed.

The form of heating chamber shown in Figs. 6 and 7 is adapted for heating shafts and similar objects, the heating chamber 8 being cylindrical with its axis transverse to the axis of the combustion chamber 7, and with openings 17 at each end, which may be closed by doors 18. The shaft, indicated at 37, being placed through one or both of the openings 17, the hot gases from the combustion chamber are directed tangentially under the shaft and are deflected by the circular walls of the chamber so as to pass around the shaft and heat the same equally all around.

Some articles which have a double bend cannot be inserted in any of the forms shown, and in that case the heating chamber shown in Figs. 8 and 9 may be substituted, this chamber having an opening 25 at the top extending across from side to side of the furnace, forming a slot through which the article indicated at 38 may be inserted, the openings 17 at each side of the furnace which are extended up to meet the top opening 25, being closed when the article is in position, by bricks or other filling 39.

The shape and construction of the several parts of the furnace may be variously modified, according to the special requirements of the work in hand, without departing from the principles of my invention; for example, the heating chamber may be constructed in any desired manner to accommodate any special shape and size of the article to be heated.

I may make the refractory lining of required form from molds, the said lining may be incased in an iron or steel frame or shell

3 and 4 and may be made of such proportions as to be portable.

The heating chambers taper down to substantially as small cross sectional area as the portion of the combustion chamber adjacent thereto, and the main difference in the cross-sectional area of the combustion and heating chambers is owing merely to the recesses 25 and 16 in the top and bottom, respectively of the heating chamber. Owing to this fact and to the greater length of the combustion chamber, making the latter the heaviest, I make the heating chambers, rather than the combustion chambers, removable. I am aware that removable flues and the like have been employed leading to a combustion chamber, but so far, as I am aware the idea of supplying a set of heating chambers to be removably fastened to, and used one at a time in connection with, a combustion chamber approaching them in size, is new in the furnace making art.

What I claim is:—

1. A forge and furnace comprising a combustion-chamber consisting of a casing and a lining of refractory material, perforated flanges extending from the casing at the discharge end of the combustion-chamber, a heating-chamber comprising a casing and a lining of refractory material, perforated flanges extending from the casing at the receiving end of the heating-chamber, and bolts for removably connecting the flanges of the heating-chamber to the flanges of the combustion-chamber.

2. The combination, with a combustion-chamber, of a heating chamber, the top of which, the sides and the end opposite the combustion chamber, are each provided with

an opening, and the exterior is provided with a support below each of said openings in the sides and in the end, and a removable closure for each of said openings, the ones at the sides resting on their supports when the openings are closed and the one at the end resting on its support when the opening is not closed.

3. The combination with a highly-refractory superheating combustion-chamber and a casing inclosing the bottom and three sides of the combustion-chamber, of a heating-chamber of refractory material, and a casing inclosing the bottom and three sides of the heating-chamber, said combustion-chamber and said heating-chamber being together at their uncased sides, and means for removably connecting the casings together.

4. The combination, with a highly refractory superheating combustion chamber, of a heating chamber, each chamber being inclosed in a casing at its sides, bottom and outer ends, and both uninclosed at their adjacent ends, and there engaged with each other, the sides of the casings at said adjacent ends being provided with perforated flanges, and bolts through said flanges for holding said chambers in contact with each other.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 4th day of April, 1904.

WILLIAM N. BEST.

In the presence of—
ARTHUR P. KNIGHT,
JULIA TOWNSEND.