

1,148,468.

2 SHEETS—SHEET 1.



Maurice Gledberger.  
Hanna Shilling

INVENTOR

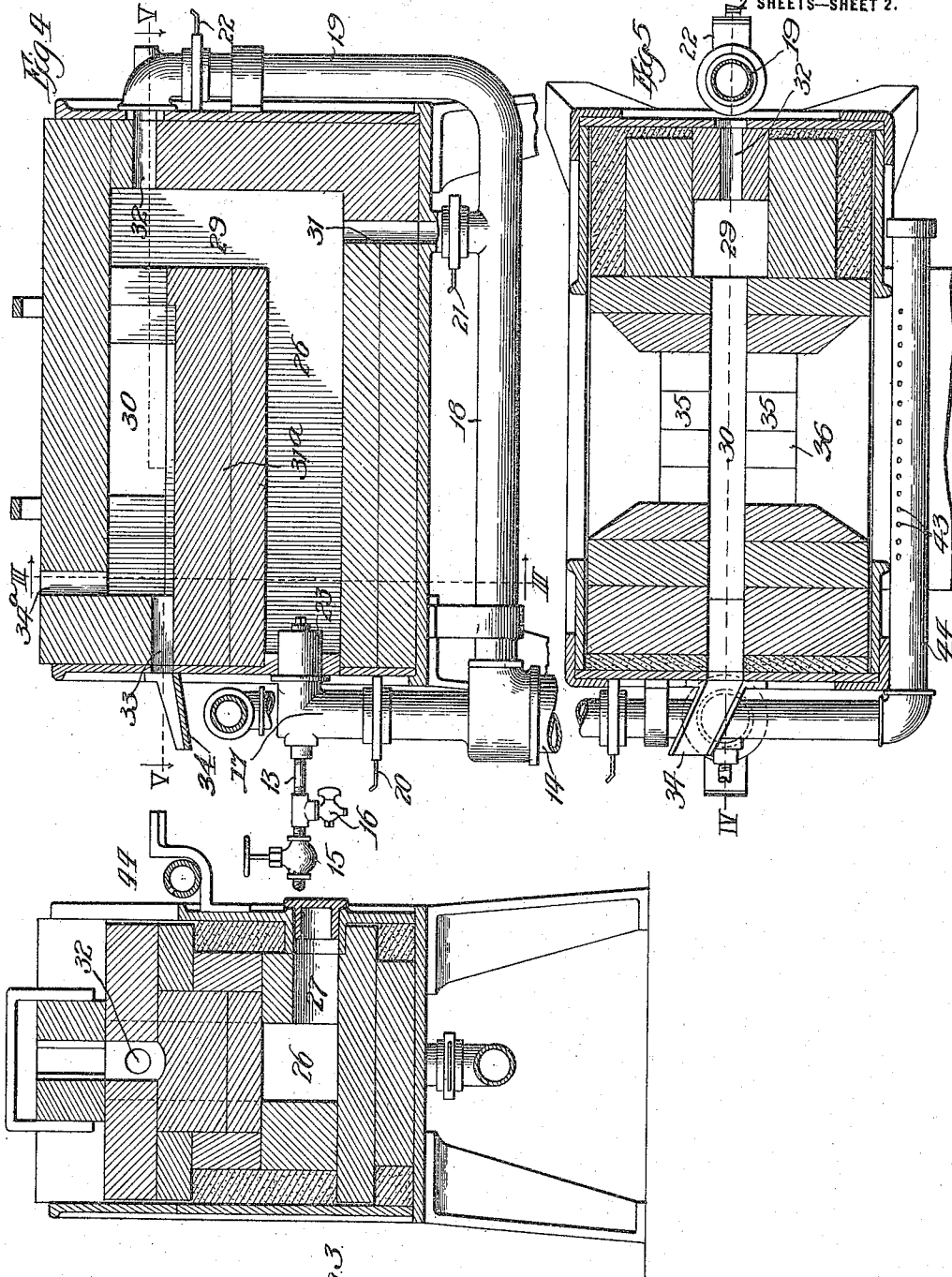
James Shields Thompson  
by his attorney  
Paul Carpenter

J. S. THOMPSON.  
HYDROCARBON FURNACE.  
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2 SHEETS—SHEET 2.



WITNESSES  
Maurice Goebberger  
Anna Shilling

INVENTOR  
James Shields Thompson  
By his attorney  
Paul Carpenter

# UNITED STATES PATENT OFFICE.

JAMES SHIELDS THOMPSON, OF CHICAGO, ILLINOIS.

## HYDROCARBON-FURNACE.

1,148,468.

Specification of Letters Patent.

Patented July 27, 1915.

Application filed September 21, 1910. Serial No. 583,120.

*To all whom it may concern:*

Be it known that I, JAMES SHIELDS THOMPSON, a citizen of the United States, and a resident of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Hydrocarbon-Furnaces, of which the following is a specification.

My invention relates in general to furnaces and to processes of producing combustion therein, and more particularly to furnaces utilizing fuel oil as fuel and has special reference to the provision of an improved type of furnace better adapted than others known to me for effecting a more perfect combustion of the oil with a consequent greater degree of heat.

The principal objects of my present invention are the provision of a furnace characterized as above wherein there is attained a most thorough and complete vaporization of the oil, and mixture of the gas thus produced and air at the time of ignition; one wherein the ignited mixture is subjected to successive jets of air in order to attain the highest degree of combustion and consequent heat; one wherein the conduits of the several air supplies are independently regulable to the end that air may be supplied at the points where in experience it is found most desirable to supply it in order to attain the maximum amount of heat with the minimum amount of oil; to provide a furnace of the type referred to which will occupy a small floor space relative to its capacity may be most easily and economically constructed, operated and maintained, wherein all parts will be most readily accessible and which will require a minimum of expense of repair; together with such other objects as may hereinafter appear.

Furnaces of the present general type are useful for many purposes. Among others may be mentioned the heating of boiler tubes for welding new ends thereon preparatory to emplacing them in boilers, and for other operations in construction and repair shops wherein intense, and highly localized and concentrated heat is required, and time is the essential element of efficient operation. For purposes of illustration I therefore show my improved apparatus as constructed for heating a plurality of boiler tubes, though it is obvious that with slight modification it may readily be adapted to a number of other uses. In practice I have found

that by the provision of a furnace of the present construction I am able to quickly attain an intense white heat which enables me to carry on the operations of welding boiler tubes with facility and great expedition, thereby rendering possible a considerable economy in time, not only of that of the individual operators, but also of that required for repair of boilers.

In the attainment of the foregoing objects and the advantages, as well as such others as may hereinafter appear, I have provided a construction illustrated in preferred form in the accompanying drawings, wherein—

Figure 1 is a front elevational view of a furnace embodying my improvements; Fig. 2 is a end elevational view of the furnace of Fig. 1; Fig. 3 is a sectional view taken of the line III—III of Fig. 4; Fig. 4 is a sectional view taken on the line IV—IV of Fig. 5; and Fig. 5 is a sectional view taken on the line V—V of Fig. 4.

Referring first more particularly to Figs. 1 and 2 of the drawing it will be observed that the furnace proper 10 is supported on suitable legs 11—11, which are here shown as integral with the framing members 12—12, though obviously the entire body of the furnace may be built up of fire brick, instead of lined with refractory material as here illustrated. For the purpose of supplying oil to the furnace I make use of a pipe 13 attached to a convenient source of oil supply (not shown), and for the purpose of supplying air to the furnace, of a conduit 14 connected to a source of air under compression, which may be a storage tank, an air compressor, a fan or such other means as may be conveniently at hand (not shown).

Admission of oil to the furnace is preferably controlled by a needle valve 15 and to facilitate cleaning of the pipe 13 or drawing off the oil supply, I make use of a drain cock 16. Admission of air supplied to the interior of the furnace by extensions 17, 18 and 19 of the pipe 14 may be controlled by any suitable means, preferably slide valves 20, 21 and 22, the respective functions of which will be below pointed out. For vaporizing the oil and mixing the gas with air preparatory to ignition I make use of a construction of burner wherein the conduit 17 terminates in a casing 23, introduced into the furnace. Adjacent to the point of entry of the casing 23 into the furnace, I provide a long horizontal primary combustion cham-

ber 26 having a passage 27, whereby (Fig. 3) insertion of burning waste for the initial ignition of the vapor on starting the furnace may be attained. At the end of the chamber 26, I provide a vertical secondary combustion chamber 29 and at the top thereof a horizontal heating chamber 30 arranged substantially parallel with chamber 26. The three chambers are lined with fire brick or other refractory material in case the furnace as a whole is not built of such material, providing a refractory member 31<sup>a</sup> whereby heat absorbed in either chamber aids in heating the other chamber. Referring now more particularly to Fig. 4 it will be observed that at the outer end of the chamber 26, and preferably concentric with the chamber 29, I arrange a passage 31, connected to the air supply pipe 18, and at the upper end of the chamber 29 a passage 32 connected with the air supply pipe 19. The outer end of the heating chamber 30 is provided with a passage 33 terminating in an obliquely directed spout 34 (Fig. 5) whereby the slag may be directed away from the pipes 13 and 17 and the slide 20, in order to avoid fouling them, and the outer end of the passage 30 is likewise provided with an upwardly directed draft passage 34<sup>a</sup>, by stopping of which the draft may be controlled.

From inspection of Figs. 1 and 5 particularly, it will be observed that the chamber 30 is open to the atmosphere on both sides and has provided on each side rests 35 having dished portions 36 to maintain the tubes or other articles in position and to prevent them from contact with each other and consequent coalescence during the heating operation.

For the purpose of shielding the operatives from the heat of the furnace I provide the front thereof with a water curtain, indicated at 40 in Fig. 2 (and in dotted lines in Fig. 1) such curtain being cooled by a spray supplied by the pipe 41 connected to a convenient source of water supply (not shown) and is further cooled by an air blast from the perforations 43 in the pipe 44 which is connected at a convenient point to the conduit 14.

In the operation of my improved furnace and carrying out my improved process of combustion, lighted waste is first inserted through the opening 27 in the usual manner, the valve 15 opened and the slide 20 partly moved outward to allow the influx of oil and air respectively. The vapor becoming ignited is forced through the primary combustion chamber 26 into the secondary combustion chamber 29 and thence to the heating chamber 30, and as it approaches the chamber 29, the slide 21 having been opened, it is subjected to a jet of air from the passage 31 whereby it is further com-

minuted and oxidized, the draft reinforced and as it approaches the heating chamber 30 (the slide 22 having been opened) to a third jet of air from the passage 32, by which operation the greatest amount of air which can be made use of in the efficient burning of the vapor is supplied. It will be apparent on viewing the drawings, especially Fig. 4, that as the vapor is subjected to a jet striking it at right angles at three points, viz. at 61, where it leaves the casing 17, at 31, and at 32 a high degree of comminution and vaporization, a thorough admixture of air with consequent combustion, and such degree of velocity as may be desired, is attained, and not only the mixture, but also the admission of air both in respect to volume and to the points where combustion can be most thoroughly effected is fully regulable, and that the relative volumes of the oil, vapor, and several jets of air are entirely under the control of the operator, and that thereby the air may be admitted at the points where it will be most effective in securing the highest degree of combustion and thence heat.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent is the following:—

1. A furnace comprising, in combination, a primary combustion chamber, a secondary combustion chamber arranged at an angle thereto, a heating chamber arranged at an angle to the secondary combustion chamber, and a slag vent at the end of and in line with said heating chamber opposite to its connection with said secondary combustion chamber.

2. A furnace comprising, in combination, a horizontal combustion chamber, a vertical secondary combustion chamber communicating therewith, a horizontal heating chamber communicating with said secondary combustion chamber, and an air conduit for each of said chambers and arranged for discharge thereinto.

3. A furnace comprising, in combination, a horizontal combustion chamber, a vertical secondary combustion chamber communicating therewith, a horizontal heating chamber communicating with said secondary combustion chamber, an independent air conduit for each of said chambers and arranged for discharge thereinto, and independent means for regulating the admission of air to each of said conduits.

4. A furnace comprising, in combination, a primary combustion chamber, a secondary combustion chamber, a heating chamber, a main air pipe having extensions to each of said chambers and arranged for discharge thereinto, a burner in said primary combustion chamber and a source of oil supply for said burner.

5. A furnace comprising, in combination,

a primary combustion chamber, a secondary combustion chamber, a heating chamber, air supply connections for each of said chambers and arranged for discharge thereinto, a  
5 burner in said primary combustion chamber and a source of oil supply for said burner, said several air connections being provided with independent controlling means.

6. A furnace comprising, in combination,  
10 a horizontal primary combustion chamber, a horizontal heating chamber, a secondary combustion chamber connecting said two first mentioned chambers, air supply connections provided with orifices in line with  
15 each of said chambers, a burner in the primary combustion chamber connected to a source of oil supply and to one of said sources of air supply, and independent means for controlling the admission through  
20 each of said several supply connections.

7. A furnace comprising in combination, a horizontal primary combustion chamber, a horizontal heating chamber, a secondary combustion chamber connecting said two  
first mentioned chambers, air supply con- 25  
nections provided with orifices in line with each of said chambers, a burner in the primary combustion chamber connected to a source of oil supply and to one of said  
sources of air supply, and independent 30  
means for controlling the admission through each of said several air supply connections.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

JAMES SHIELDS THOMPSON.

Witnesses:

R. H. QUAYLE,  
PAUL CARPENTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."