

No. 898,409.

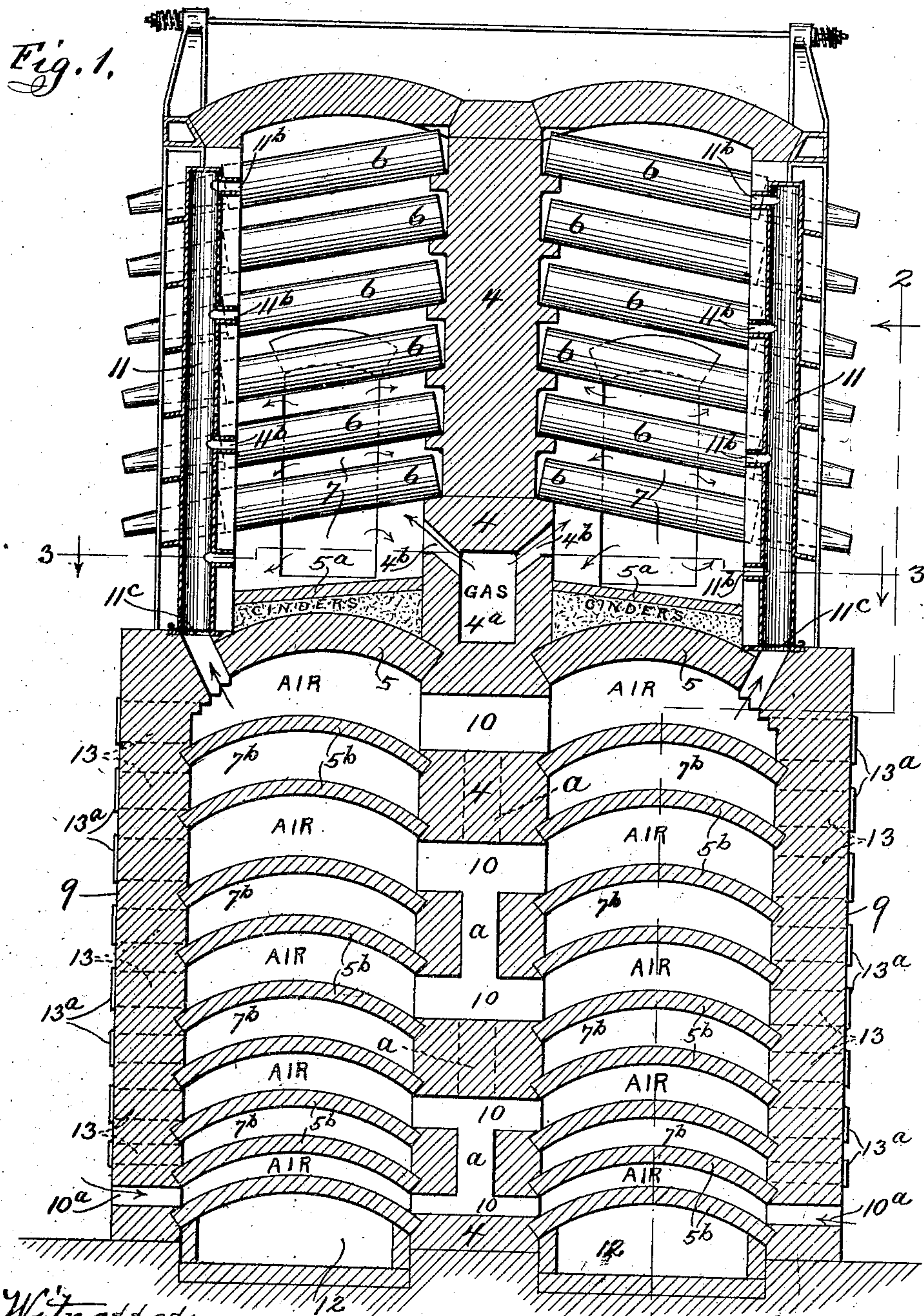
PATENTED SEPT. 8, 1908.

N. L. HEINZ.

RECUPERATIVE SPELTER FURNACE.

APPLICATION FILED JULY 29, 1907.

3 SHEETS—SHEET 1.



Witnesses:
R. J. Jackson
Milton Lenoir

Inventor:
Nicholas L. Heinz
By J. M. Whipple

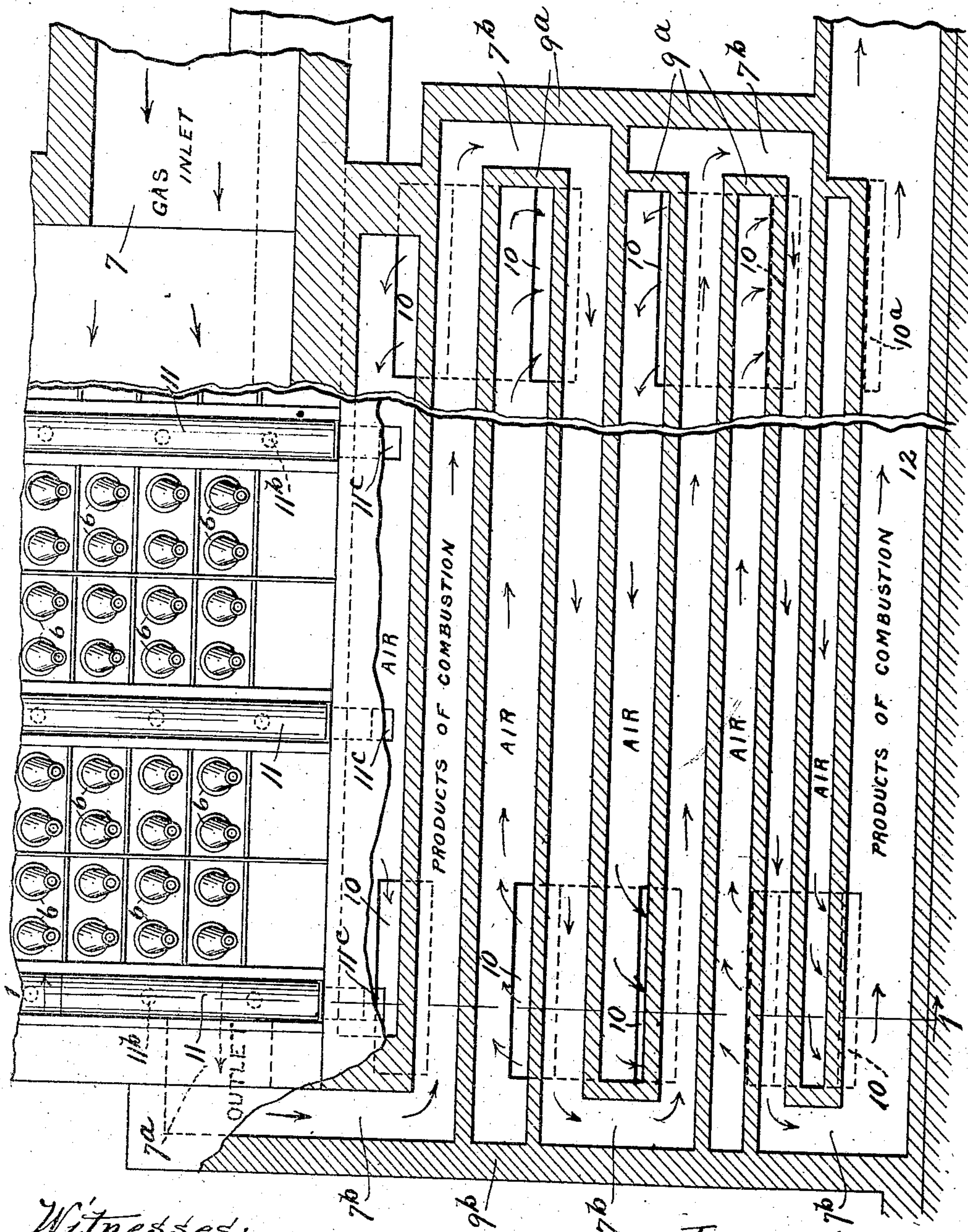
No. 898,409.

N. L. HEINZ.
RECUPERATIVE SPELTER FURNACE.

APPLICATION FILED JULY 29, 1907.

PATENTED SEPT. 8, 1908.

3 SHEETS—SHEET 2.



Witnesses:
R. J. Jaeger
Milton Lenoir

Fig. 2.

Inventor:
Nicholas L. Heinz
By J. H. Schipper
Att'y.

No. 898,409.

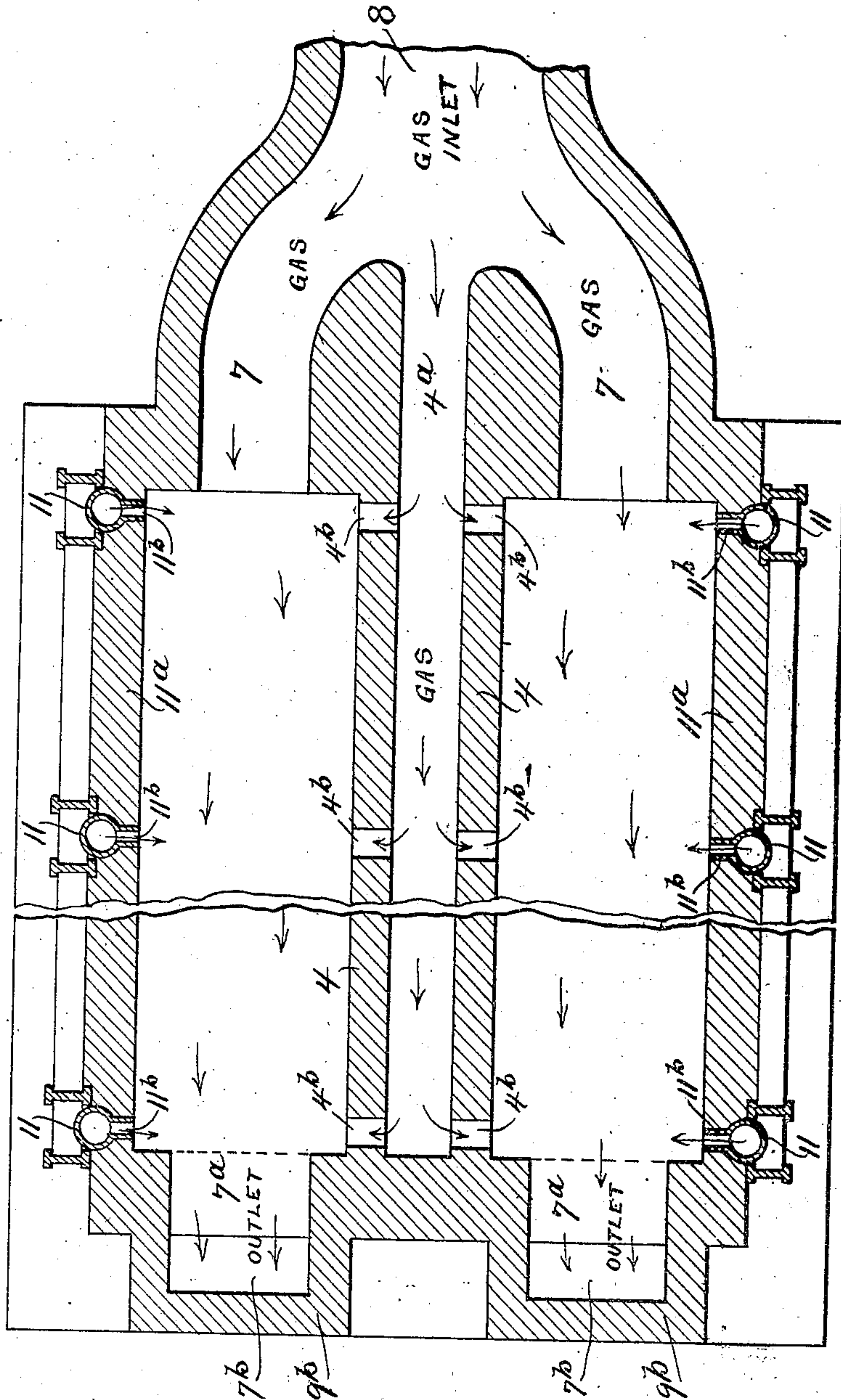
PATENTED SEPT. 8, 1908.

N. L. HEINZ.
RECUPERATIVE SPELTER FURNACE.

APPLICATION FILED JULY 29, 1907.

3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:
R. J. Jacker
Milton Lenoir

Inventor:
Nicholas L. Heinz
By Jno. H. Whipple
Atty

UNITED STATES PATENT OFFICE.

NICHOLAS L. HEINZ, OF LA SALLE, ILLINOIS.

RECUPERATIVE SPELTER-FURNACE.

No. 898,409.

Specification of Letters Patent.

Patented Sept. 8, 1908.

Application filed July 29, 1907. Serial No. 386,068.

To all whom it may concern:

Be it known that I, NICHOLAS L. HEINZ, of La Salle, in the county of LaSalle and State of Illinois, have invented certain new and useful Improvements in Recuperative Spelter-Furnaces, of which the following is a specification.

My invention relates to spelter furnaces having a retort chamber arranged over a recuperative furnace for heating the ingoing air by means of the waste heat.

Among the objects of my improvements are, first, to provide means for equalizing the pressure and improving the continuity of movement of the fire gases lengthwise in and through a long retort chamber; second, to provide an air heater immediately under the retort chamber and connect it with the front thereof by valved flues for furnishing and regulating the supply of hot air in the retort chamber; and, third, to afford facilities for the proper conducting of the products of combustion about a flue or chamber of the air heater for heating the air passing therein toward the retort chamber.

A further object is to provide the air heater with suitable openings for cleaning the flues and passages through the same.

I attain these objects by the means illustrated in the accompanying drawings in which—

Figure 1 is a transverse, vertical section of a recuperative spelter furnace containing my invention, the section being taken at the line 1 1 of Fig. 2. Fig. 2 is a fragmentary view partly in front elevation and partly in longitudinal section taken on the line 2 2 of Fig. 1. Fig. 3 is a fragmentary horizontal section taken on the line 3 3 of Fig. 1, showing a plan view.

Similar signs marked on the drawings refer to similar parts throughout the several views.

The retort chamber and recuperative chamber or air heater are divided lengthwise and centrally by a vertical wall 4, and separated horizontally by heavy arches 5 with a covering of cinder and top plates 5^a. At the place of the horizontal separation the vertical wall 4 is provided with a large horizontal flue 4^a whose upper part rises somewhat above the bottom of the retort chamber and is provided with ports 4^b at intervals along the entire length which open into the space below the lowermost tier of retorts 6, on both sides of the wall 4. At one end of the retort

chamber and close to the bottom, it is provided with a large opening 7 on each side of the wall 4. The flue 8 leading from a gas producer (not shown) communicates with the retort chamber through the openings 7 and flue 4^a by its ports 4^b. The gas entering through the opening 7 tends to rise in the retort chamber and the pressure causes it to travel horizontally through to the further end of the chamber, which is provided with an opening 7^a on each side of the vertical wall 4 for the letting out of the products of combustion. As is ordinarily the case, the gas introduced through an opening or openings at the end of the retort chamber and caused to pass through to the other end meets with more or less resistance from the retorts arranged across its path. The flue 4^a is closed at the further end so that all of the gas entering into it must pass to the retort chamber through the ports 4^b. The tendency of the gas to rise in the retort chamber and the obstruction to its horizontal movement by the retorts, increase the pressure at the entrance and at other places in the retort chamber. This causes the gas to flow more readily in the flue 4^a and to pass therein more freely than in the retort chamber to the places which offer the least resistance or pressure. The pressure of gas in the retort chamber is thus equalized throughout said chamber space and made to move more regularly through the space between the retorts, and by this means the first of the objects above mentioned is attained.

The part of the wall 4 which is below the arches 5 is provided with a series of thin arches 5^b spanning the space between it and the outer side walls 9 and extending along the entire length of the retort chamber, as seen in Fig. 2. The space between these arches gradually increases from the bottom upward. At opposite ends of said lower part of wall 4 are provided openings 10 through said wall. These are connected by vertical flues *a* in said wall, so that the space inclosed between the outer walls 9 and each alternate pair of the arches 5^b is connected through openings 10 and flues *a* and forms a meandering flue or chamber which gradually increases in transverse area from a point near the bottom of the walls 9 to the arches 5. Through the walls 9 an opening 10^a is provided near the bottom and corresponding in size with the lowermost of the openings 10, through the wall 4. The openings 10^a are

for the admission of air to such meandering flue or chamber which constitutes what I have above denominated an air chamber or heater immediately under the retort chamber.

A series of tile flues 11 are placed in the side walls 11^a of the retort chamber at suitable intervals, being arranged opposite to the ports 4^b of the flue 4^a, and connected with the air chambers immediately below the arches 5. The tile flues are provided with ports 11^b of uniform size for admitting air from the air heater to the retort chamber. They are also provided with valves 11^c at the bottom for regulating the amount of air admitted to them. The air being thus introduced in the vertical planes occupied by the ports 4^b aids in the maintenance of a uniform pressure and movement of the gases throughout all parts of the retort chamber. The air heater with its valved flues, having ports of uniform size, thus placed in the front of the furnace and at points in line with the gas ports of the flue 4^a constitutes the means whereby the second object mentioned above is attained.

The outlet openings 7^a empty into down flues 7^b in the end walls 9^a 9^b of the air heating chamber, which communicate with the alternate spaces between the arches 5^b and form a continuous meandering passage way for the products of combustion around on the outside of the passage way marked "air" on the drawings. The movements of the air and the products of combustion in their respective courses through the air heater are in opposite directions as indicated by arrows, the air entering at the bottom and passing on upward into the most enlarged parts of the air chamber immediately under the arches 5. This air chamber is connected by the passages 10 immediately below said arches at the opposite ends of the furnace, as seen in Fig. 2. The air entering at the bottom is permitted to expand and caused to move onward slower as it becomes hotter and until it reaches said largest part of the air chamber; and the products of combustion passing from the retort chamber enter the flue space immediately under the topmost of the thin arches 5^b, which forms the bottom of said largest part of the air chamber and thence passes on downward about the air passage toward and to the large flues 12 at the bottom which leads to a chimney (not shown). This construction constitutes the means whereby the third object is attained. It is distinguished from the prior art, so far as known to me, by the independent flues for the products of combustion in the air heater being connected at their upper part with the retort chamber at the exit end and near the bottom through the opening 7^a and being gradually diminished in cross-section area from the top part to the points where they connect with the large

flues 12. These independent flues are also used in conjunction with the air flue or chamber connected by the transverse passages *a* whereby a uniform pressure of the hot air under the entire bottom of the retort chamber is maintained.

Cleaning openings 13 (shown by dotted lines Fig. 1) through the side walls 9 of the air heater are provided at suitable intervals along the length of the furnace. They have doors 13^a for closing them. Through these openings a rake or scraper may be introduced for reaching all horizontal parts of the interior of the air chamber and flues for the products of combustion, for the purpose of cleaning them of accumulated dust or soot.

All matters disclosed by the specification and drawings herein which are regarded as novel and patentable and which are not claimed herein are made the subject of claims in a divisional application filed March 16, 1908, Serial No. 421,524.

What I claim is—

1. The retort chamber having a longitudinal division wall, a gas inlet opening and an outlet opening at opposite ends, near the chamber bottom and at each side of the division wall, a large horizontal flue in the division wall near the chamber bottom and provided with ports at intervals along its length and communicating with the space at the bottom of said chamber on both sides, and a gas supply flue having common connection with the gas inlet openings and large horizontal flue.

2. The retort chamber having a longitudinal division wall, a gas inlet opening and an outlet opening at opposite ends, near the chamber bottom and at each side of the division wall, a large horizontal flue in the division wall near the chamber bottom and provided with ports at intervals along its length and communicating with the space at the bottom of said chamber on both sides, and a gas supply flue having common connection with the gas inlet openings and large horizontal flue, in combination with an air heating chamber placed under the same and having flue connections therewith.

3. The retort chamber having a longitudinal division wall, a gas inlet opening and an outlet opening at opposite ends near the bottom at each side; a large horizontal flue near the bottom and provided with ports at intervals opening on each side of the division wall into the bottom of the chamber space, and air flues in the front walls of the retort chamber and provided with uniform ports emptying into the retort chamber.

4. The retort chamber having a longitudinal division wall, a gas inlet opening and an outlet opening at opposite ends near the bottom at each side, a large horizontal flue near the bottom and provided with ports at intervals opening on each side of the division wall

into the bottom of the chamber space, and air flues in the front walls of the retort chamber and provided with uniform ports emptying into the retort chamber in combination 5 with an air heater placed beneath the same and having flue connections therewith.

5. In a spelter retort furnace the combination with a long horizontal retort chamber provided with a gas inlet opening at one end 10 and an outlet opening at the other or further end and having transversely arranged retorts, a large horizontal flue extended along near the bottom of the chamber and provided with ports at intervals along its length 15 communicating with the chamber space below the retorts, and a gas supply flue having common connection with the gas inlet opening of the chamber and with said large horizontal flue.

20 6. In combination an air heating chamber and a superimposed retort chamber having a vertical, longitudinal division wall, the air heating chamber having alternate passages for the escaping products of combustion and 25 for the admission of air, and the retort chamber having gas inlet openings at opposite ends at each side of the division wall and a horizontal flue with ports at intervals, a gas supply flue connected with the inlet openings 30 and with the horizontal flue, exit flues connected with the outlet openings and with the

passages for the products of combustion in the air heater, and air induction flues provided with ports in the front walls of the retort chamber and connected with the air passages of the air heating chamber immediately 35 below the retort chamber.

7. In combination, an air heating chamber and a superimposed retort chamber having a vertical longitudinal division wall, the air 40 heating chamber having alternate passages for the escaping products of combustion and for the admission of air and cleaning openings through the side walls and the retort chamber having gas inlet openings and outlet 45 openings at opposite ends at each side of the division wall and a horizontal flue with ports at intervals, a gas supply flue connected with the inlet openings and with the horizontal flue, exit flues connected with the outlet 50 openings and with the passages for the products of combustion in the air heater and air induction flues connected with the air passages of the air heating chamber immediately 55 below the retort chamber and with the retort chamber by ports extended through its front walls.

NICHOLAS L. HEINZ.

Witnesses:

ROBT. C. WELTER.
C. N. MORRISON.