No. 871,651. PATENTED NOV. 19, 1907.

W. STUBBLEBINE.

FURNACE.

APPLICATION FILED JULY 8, 1907.

3 SHEETS—SHEET 1.

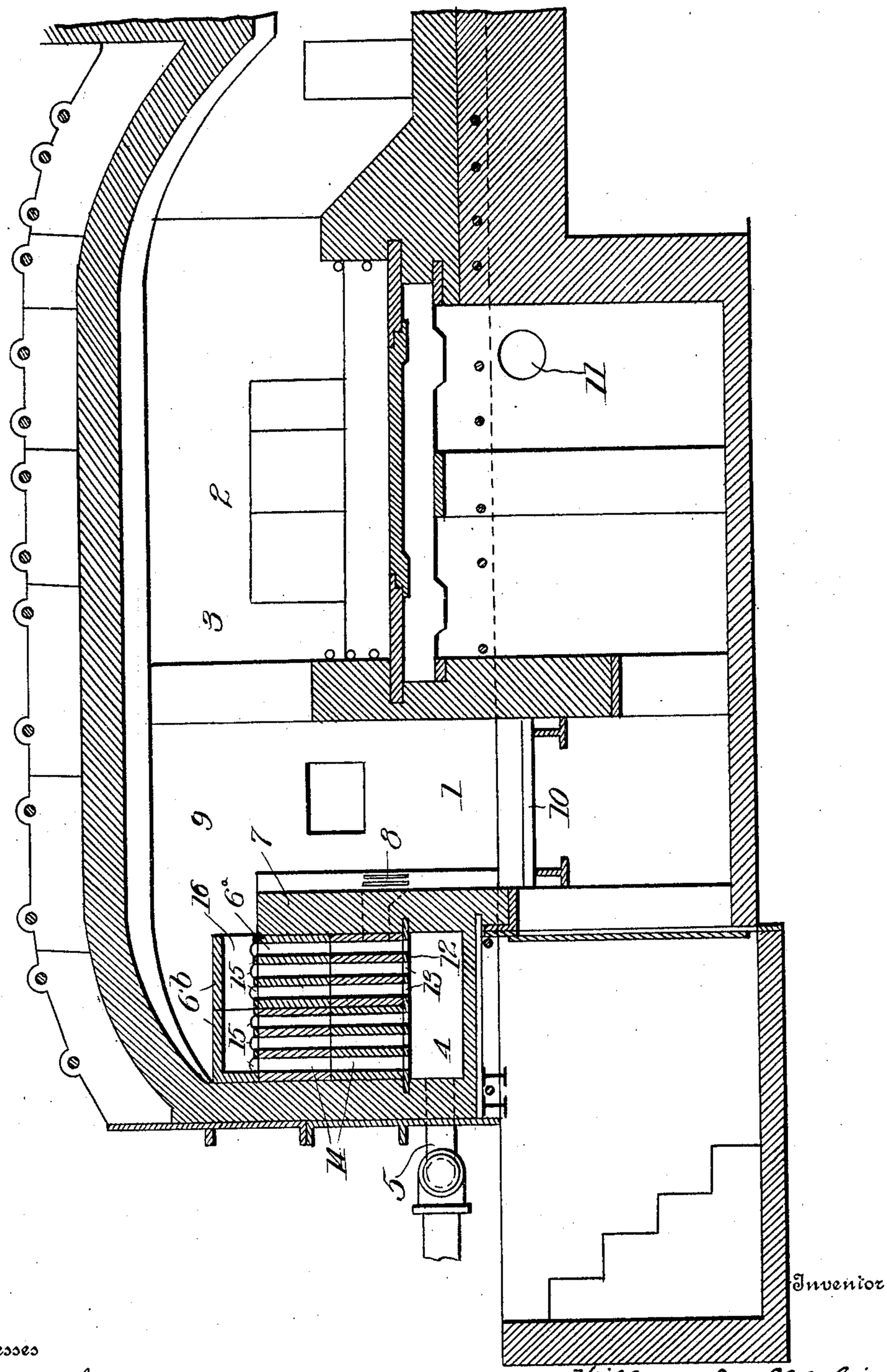

Fig. 1.

Witnesses
C. H. Walker.
F. J. Veihmeyer.

Inventor
By William Stubblebine
Edson Bros,
Attorneys

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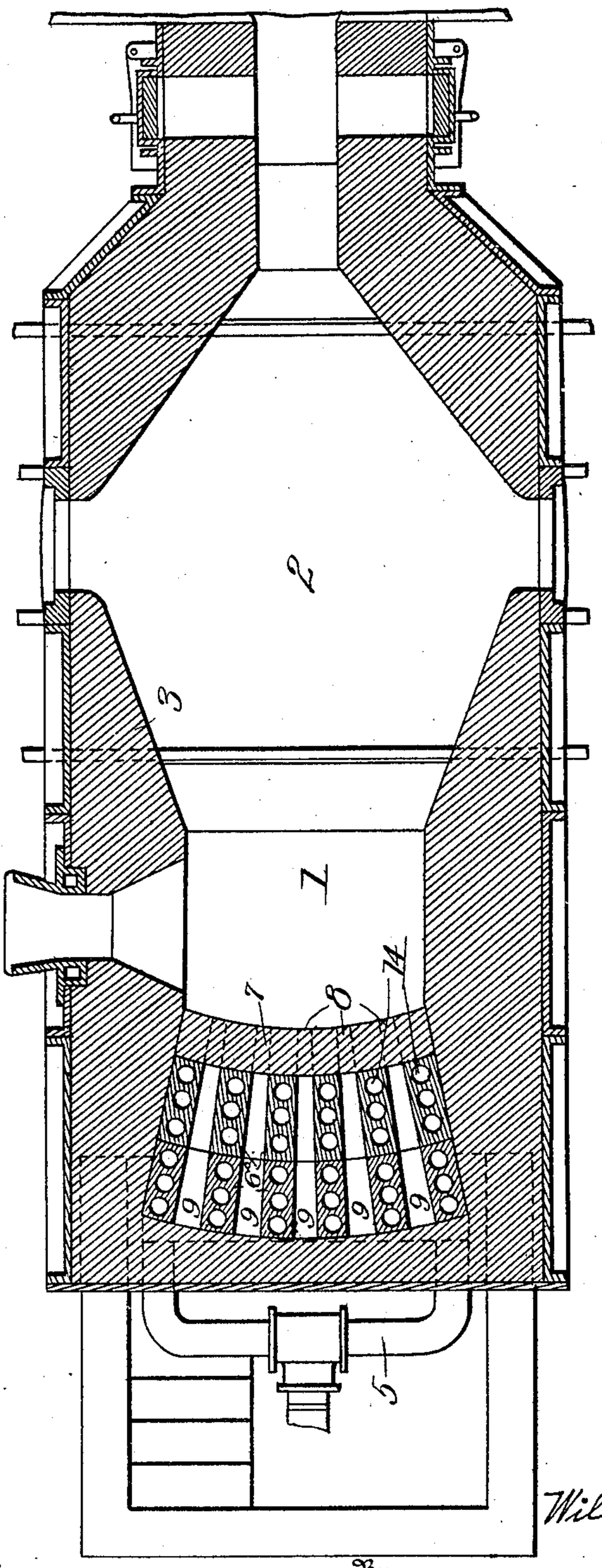
3 SHEETS—SHEET 2.

Fig. 2.



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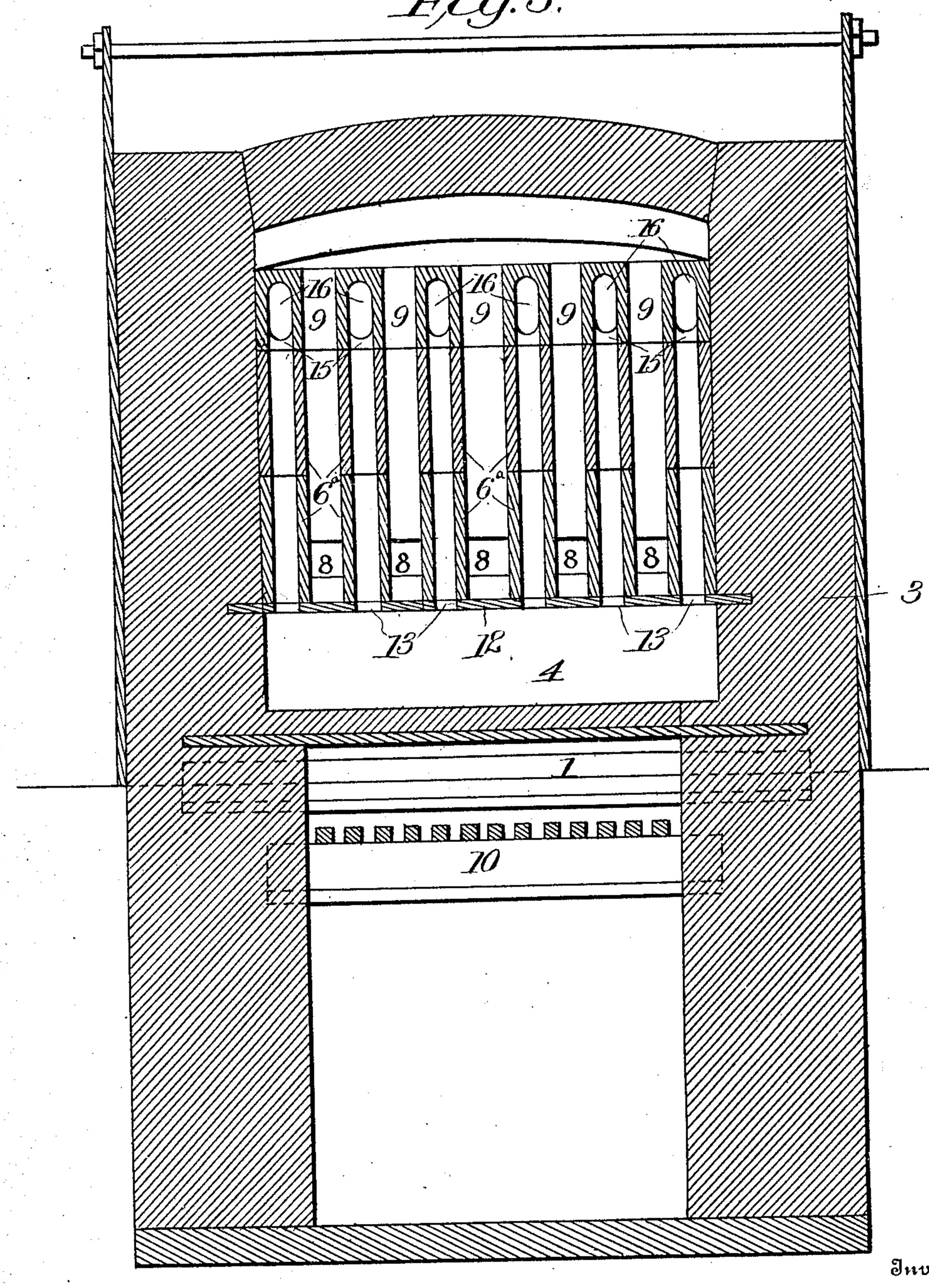
3 SHEETS—SHEET 3.

Fig. 3.



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By Edson Bros,

Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM STUBBLEBINE, OF CORAOPOLIS, PENNSYLVANIA.

FURNACE.

No. 871,651. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed July 8, 1907. Serial No. 382,685.

To all whom it may concern:

Be it known that I, WILLIAM STUBBLEBINE, a citizen of the United States, residing at Coraopolis, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to metallurgical furnaces and is applicable to all kinds of such furnaces.

It has for its object to effect more nearly the complete or perfect combustion of the fuel than has heretofore been possible with previously known constructions.

The invention consists in the features of construction and combinations of devices hereinafter described and specified in the claims.

In the accompanying drawings, illustrating the preferred embodiment of my invention: Figure 1 is a longitudinal vertical section of a furnace equipped with my invention. Fig. 2 is a horizontal section thereof, and Fig. 3 is an enlarged vertical section through the recuperator.

Referring more particularly to the drawings, 1 designates the fire box and 2 the working chamber of the furnace 3. The structure which I call the recuperator is built at the end of the fire box. The bottom reservoir 4 of the recuperator receives the air blast from the pipe 5 and from thence said blast passes up through passages in spaced apart sets of bricks 6 constituting the main structure of the recuperator and enters the fire box over the wall or partition 7. Said air blast creates an induced current which draws a portion of the gases from the fire box through ports 8 in said wall 7 into the spaces 9 between the sets of bricks 6. Said gases pass up through these spaces and enter the fire box again over the wall 7. The blast under the grate 10 enters at 11 and passes through the fire box commingling with the mixed air and gas from the recuperator thereby causing perfect combustion.

As is well known, the product of combustion when the air first comes in contact with the lower layer of fuel and the grate bars is carbonic acid and this carbonic acid in passing through the upper layers of fuel takes up carbon and becomes carbonic oxid. In doing this the larger part of the heat developed in the first stage of the process of combustion is lost, one volume of CO_2 becoming two volumes of CO. By means of my recuperator the desired additional oxygen is furnished to the fire box.

The sets of bricks 6 comprising the main structure of the recuperator are supported upon a plate 12 which separates them from the bottom reservoir or compartment 4. Said bricks are preferably arranged on diverging lines so that the spaces 9 between them are flared away from the ports 8 which are also flared to correspond. The plate 12 has perforations 13 therein registering with the passages in said bricks but the spaces 9 are cut off from the reservoirs 4 by said plate. As shown, each row or set of bricks comprises six bricks arranged in horizontal pairs, one above another. The four lower bricks 6^a are formed with vertical passages 14, those of the upper pair registering with those of the lower pair. Said upper pair of bricks 6^a reach up to a level with the top of the partition or wall 7. The top pair of bricks 6^b form an arch over the passages in the lower bricks and serve to deliver the air over the wall 7 to the fire box. As illustrated said bricks 6^b have short vertical passages 15 registering with the passages 14 in the bricks 6^a and opening on a horizontal passage 16. The gases which are sucked in through the ports 8 into the spaces 9 pass over the wall 7 between the sets or pairs of bricks 6^b.

I claim:

1. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of the fire box and separated therefrom by a wall which does not extend to the roof of said fire box, and means to deliver air and gas through said recuperator to said fire box over said wall.

2. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of said fire box and separated therefrom by a wall, spaced apart sets of bricks in said recuperator having vertical passages through which an air blast is delivered over said wall into the fire box and means to draw gas from the

fire box in the spaces between said sets of bricks and to deliver said gas over said wall into said fire box again.

3. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of said fire box and separated therefrom by a wall, diverging spaced apart sets of bricks in said recuperator having vertical passages through which an air blast is delivered over said wall into the fire box, and means to draw gas from the fire box into the spaces between said sets of bricks and to deliver said gas over said wall into said fire box again.

4. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of said fire box and separated therefrom by a wall, and diverging spaced apart sets of bricks in said recuperator having vertical passages through which an air blast is delivered over said wall into the fire box, said wall having flared openings leading to the flared spaces between said sets of bricks through which gas is drawn to be delivered again over said wall.

5. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of said fire box and separated therefrom by a wall, spaced apart sets of bricks in said recuperator having vertical passages, the top bricks having horizontal passages whereby an air blast is delivered over said wall into the fire box, and means to draw gas from the fire box into the spaces between said sets of bricks to be delivered again to said fire box over said wall.

6. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of said fire box and separated therefrom by a wall, spaced apart sets of bricks in said recuperator, the lower bricks having vertical passages and the top bricks having vertical passages registering with those in the lower bricks and horizontal passages communicating with said vertical passages to deliver air therefrom to the fire box over said wall, and means to draw gas from the fire box into the spaces between said sets of bricks, to be delivered again to said fire box over said wall.

7. In a furnace of the character described, the combination, with the fire box, the working chamber and means to deliver an air blast below the grate in said fire box, of a recuperator arranged at the end of said fire box and separated therefrom by a wall, spaced apart sets of bricks in said recuperator, the lower bricks having vertical passages and extending up to a level with the top of the wall, the top bricks having horizontal passages whereby an air blast is delivered over said wall into the fire box, and means to draw gas from the fire box into the spaces between said sets of bricks to be delivered again to said fire box over said wall.

In testimony whereof, I affix my signature, in presence of two witnesses.

WILLIAM STUBBLEBINE.

Witnesses:

CHAS. H. STEVENSEN,

W. A. STUBBLEBINE.