

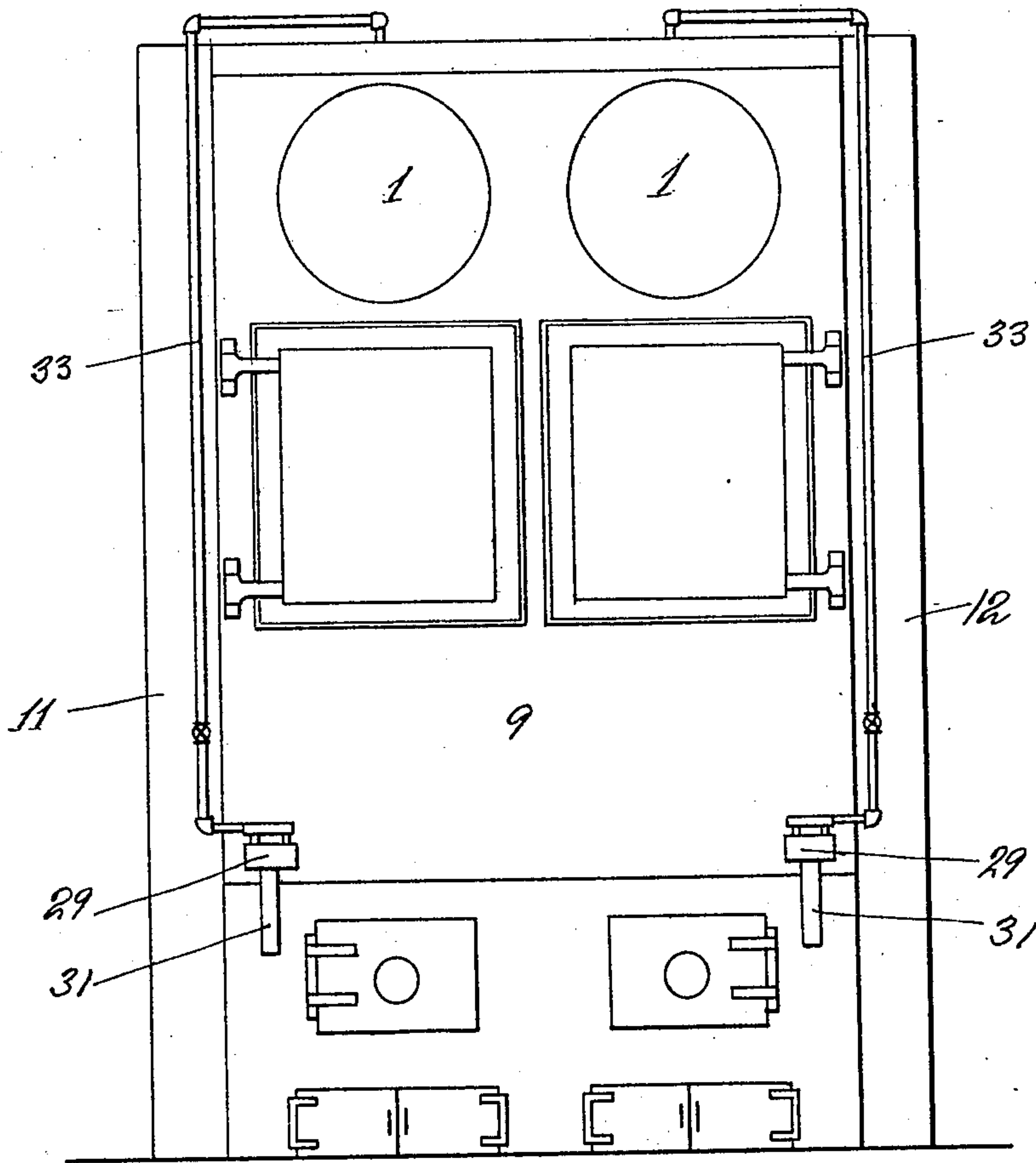
O. D. ORVIS.  
UPDRAFT FURNACE.  
APPLICATION FILED AUG. 3, 1907.

906,737.

Patented Dec. 15, 1908.

3 SHEETS—SHEET 1.

*Fig 1*



Witnesses  
*M. Reimann*  
*Chas. Gessert*

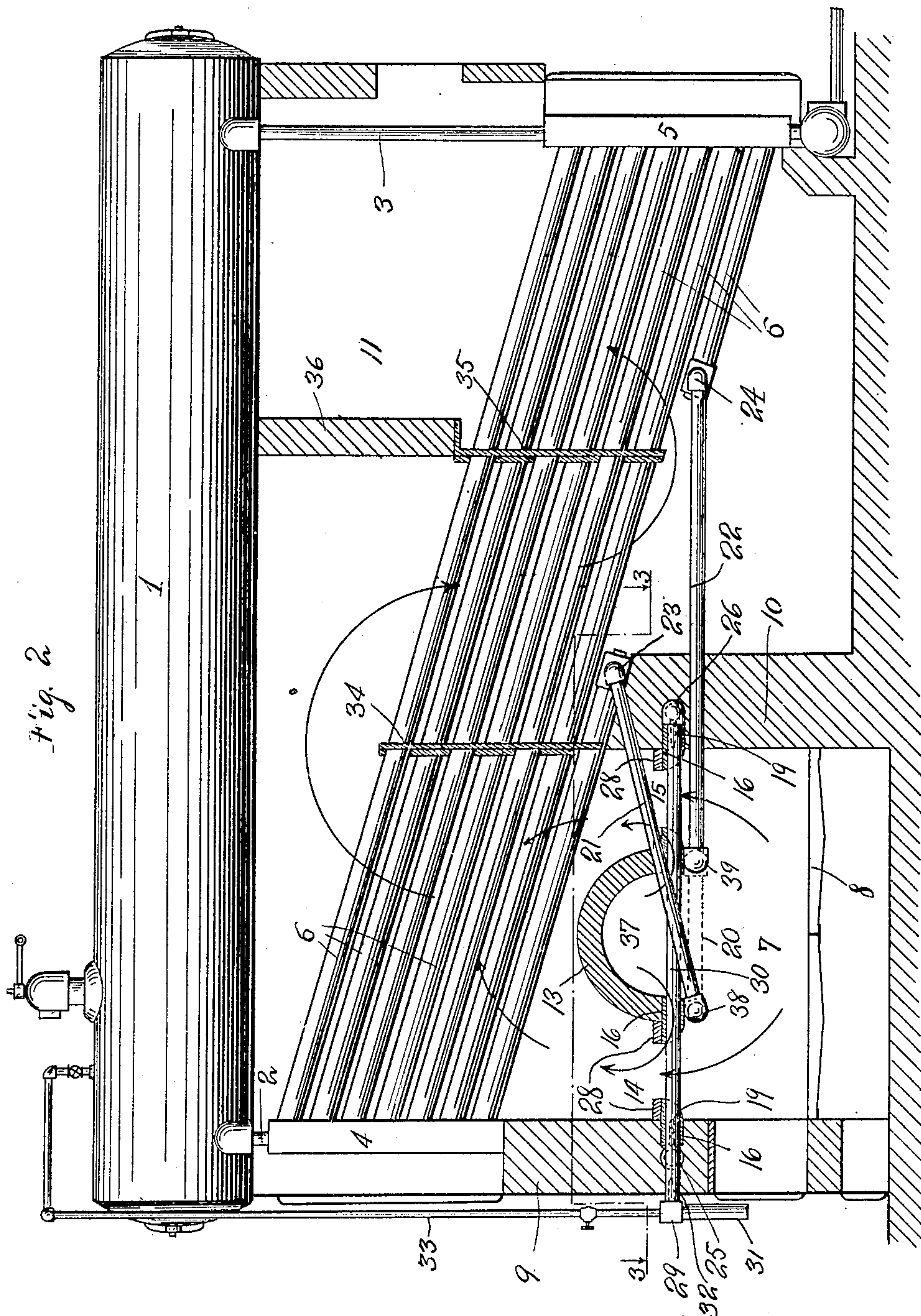
*Orel D. Orvis* Inventor  
By his Attorney  
*Ivan E. A. Kringsberg*

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3 SHEETS—SHEET 2.



Witnesses  
 M. Riemann  
 Chas. A. Gessert

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 By his Attorney  
 Ivan E. A. Koenigsberg.





# UNITED STATES PATENT OFFICE.

OREL D. ORVIS, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO ORVIS SMOKE CONTROLLER COMPANY, OF NEW YORK, N. Y.

## UPDRAFT-FURNACE.

No. 906,737.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed August 3, 1907. Serial No. 386,945.

*To all whom it may concern:*

Be it known that I, OREL D. ORVIS, a citizen of the United States of America, and a resident of Jersey City, Hudson county, State of New Jersey, have invented certain new and useful Improvements in Updraft-Furnaces, of which the following is a specification.

This invention relates to furnaces and has particular reference to means for producing perfect combustion with its resulting advantages and absence of smoke.

The invention comprises novel and useful features in the construction of a furnace for boilers, and consists of such elements, arrangements of parts and features of construction as will produce the desired result.

In some respects this invention is an improvement on and utilizes certain features of the construction set forth in my patent of March 22nd, 1892, No. 471,135.

In the accompanying drawings this invention is shown as applied to a water tube boiler of a convenient design, but my invention is applicable to other types of boilers as well.

The detailed construction is set forth in the specification and the novel features pointed out in the claims, but I desire it understood that I am not to be limited to the exact form shown.

In the drawings Figure 1 is a front elevation of a boiler furnace embodying my invention. Fig. 2 is a side elevation with the side wall removed and parts in section. Fig. 3 is a plan view substantially on line 3—3 of Fig. 2 with the piping uncovered. Fig. 4 is a detail view of interior parts shown in Figs. 2 and 3.

In the said drawings the reference numeral 1 indicates the boiler proper connected by the pipes 2 and 3 to the front and rear headers 4 and 5 respectively, which are connected by the inclined tubes 6.

7 indicates the fire box and 8 the grate located between the front wall 9 and the wall 10 as usual, while 11 and 12 are the side walls. These parts are built up and constructed as usual, and provided with the necessary accessories, etc., well known in the art and which are not shown nor described in detail, as they form no part of this invention.

In order to concentrate the heat from the fire and bring the same to as high degree as

possible, before the same acts on the boiler to increase the efficiency thereof, the following means are employed which also serve to quickly heat the water directly and by its peculiar construction acts to produce perfect combustion and consumption of all gases, thereby producing smokelessness.

About in the center of the fire box and above the same I provide an arch 13, which stretches from side to side of the furnace. In front and rear of said arch are passages 14 and 15 and along said passages are formed pockets constructed as follows: In the front wall 9, the fire brick wall 10 and in the arch underneath the ends thereof, I insert a series of fire bricks 16 which project into the passages referred to and are spaced to form the two sides of the pockets 17, which inner side is formed by special bricks 18 having an aperture into which is inserted jets as 19 the purpose of which will be explained later. The tops of the pockets are closed by a line of bricks indicated by 28, while the bottoms of said pockets are open. The arch 13 and its bricks 16 rest on the water pipes 38, 39 connected on one side by the pipe 20 and on the other side by pipes 21 and 22 whereby they are made a part of the circulating system in as much as the pipes 21 and 22 connect with one of the inclined pipes 6 at 23 and 24 respectively.

In the walls 9 and 10 are provided headers 25, 26, to which the aforesaid jets 19 are connected. The header 25 connects by pipes 27, 27 with the vacuum boxes 29, while the header 26 is connected to the same boxes by pipes 30, 30. The vacuum boxes are provided with the air inlets 31 and have the steam jets 32 which receive steam from the boiler through pipes 33. The usual baffle plates as 34 and 35 and wall 36 are provided.

The object and advantage of the above described construction can now be understood. It will be clear that by reason of the arch a retort as 37 is provided which serves as a storage chamber in which the heat is intense and in which all the gases commingle as indicated by arrows in Fig. 4. This commingling of gases at a very high temperature serves to consume all the combustible before the heat passes out under the arch, up through the passages and to the tubes and boiler when it takes its usual course. By reason of the pipe 20 and parts of the pipes 21 and 22 being located in and close to the fire box, the water



in these pipes is circulated rapidly and steam is generated so quickly, that a surplus of steam beyond that required for the jets is obtained in these pipes alone.

5 From the boiler the steam, under pressure, passes through the pipes 33 and as it is forced through the jets 32 it creates a vacuum in the boxes 29, thus sucking in fresh air through the air inlets 31. This air is quickly heated  
10 and passes out through the jets 19 and is shot across the passages 14 and 15 and into the pockets 17 which are already red hot, so that by this means I am able to constantly supply the air in the fire box and surrounding the  
15 arch with fresh heated air.

From an inspection of Fig. 4 it will be seen that I have provided means for a thorough commingling of the combustible and gases and further I have provided means supplying  
20 hot fresh air to the fire box thus making perfect combustion possible.

The advantage of the above construction is of course a greater boiler efficiency with consequent economy in fuel consuming, while  
25 smokeless combustion is assured.

I claim:

1. In a furnace the combination of a boiler, a fire-box, a transverse fire brick wall at the rear of said fire-box, a transverse arch lo-  
30 cated within the said firebox and above the level of the normal fuel line, and spaced from the front of the boiler and the aforesaid rear fire brick wall, whereby passages are formed for the heated gases at the front and rear of  
35 said arch, a row of bricks supported in the front wall of said furnace, in the front and

rear of said arch and in the front of the said transverse fire brick wall, the said four rows of bricks having pockets formed therein and other rows of bricks superimposed over the  
40 first mentioned four rows of bricks and covering the aforesaid pockets, and jets for injecting hot air under steam pressure into the aforesaid pockets.

2. In a furnace the combination of a boiler, a fire-box, a transverse fire brick wall at the rear of said fire-box, a transverse arch lo-  
45 cated within the said firebox and above the level of the normal fuel line, and spaced from the front of the boiler and the aforesaid rear fire brick wall, whereby passages are formed for the heated gases at the front and rear of said arch, a row of bricks supported in the front wall of said furnace, in the front and rear of said arch and in the front of the said  
50 transverse fire brick wall, the said four rows of bricks having pockets formed therein and other rows of bricks superimposed over the first mentioned four rows of bricks and covering the aforesaid pockets, jets for injecting  
55 hot air under steam pressure into the aforesaid pockets, the said jets being at the front and rear of the said firebox and located in the pockets of the two of the aforesaid four rows of bricks having pockets and connections be-  
60 tween the said jets and the said boiler.

Signed at New York, N. Y., this 1st day of Aug., 1907.

OREL D. ORVIS.

Witnesses:

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FREDERICK C. HUNTER.