

No. 705,508.

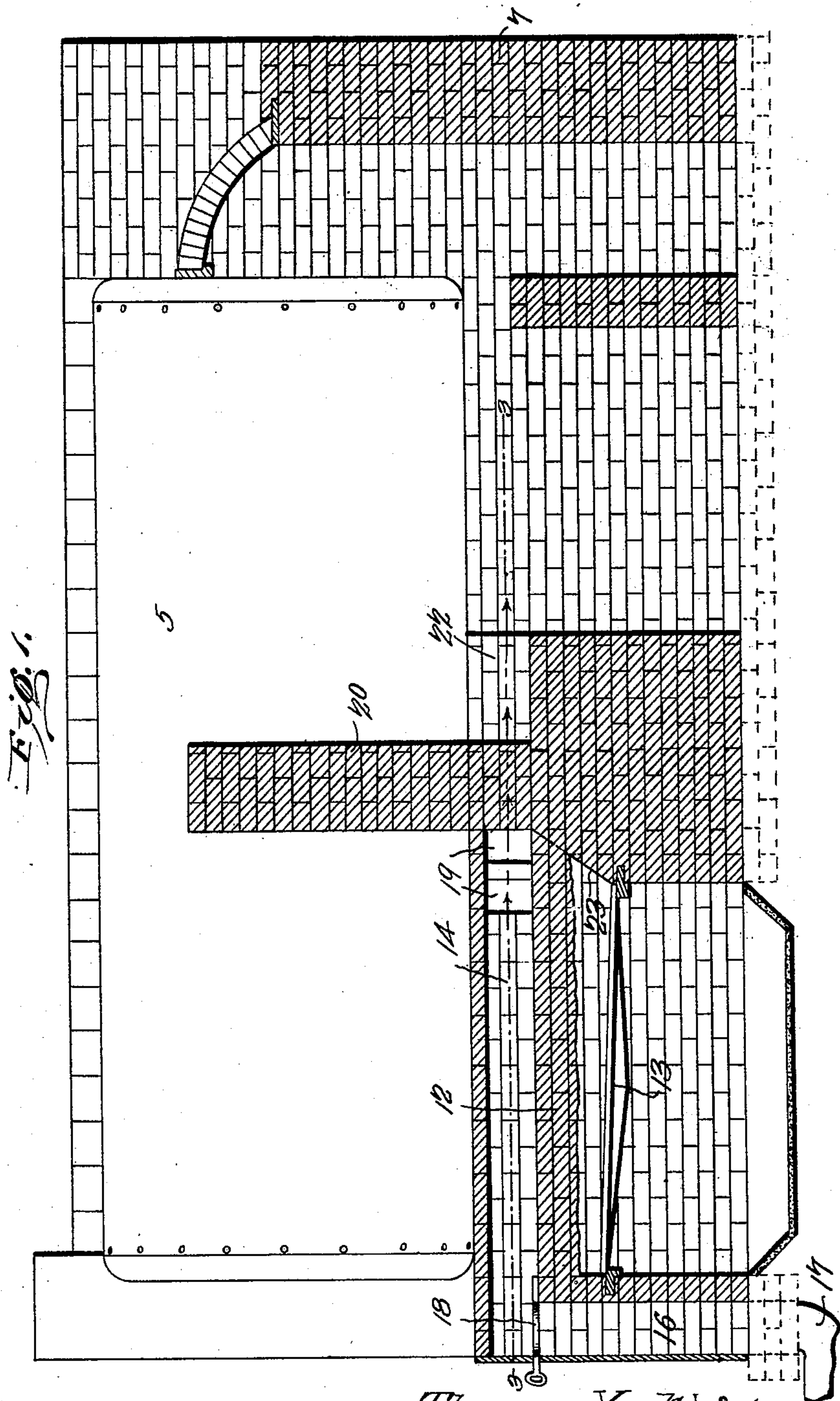
Patented July 22, 1902.

T. YORK.  
BOILER FURNACE.

(Application filed Nov. 13, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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*Jno E. Barker*

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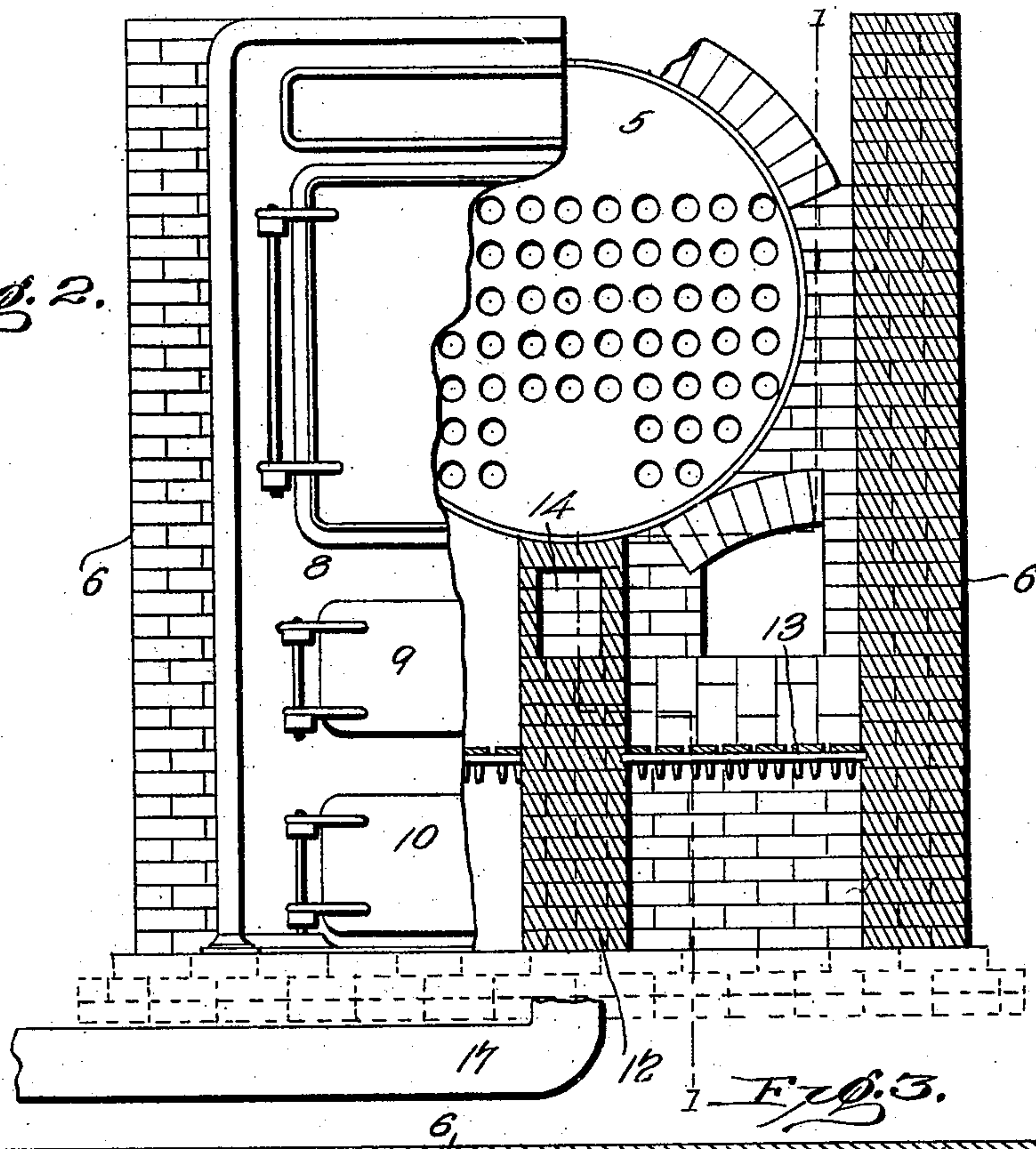
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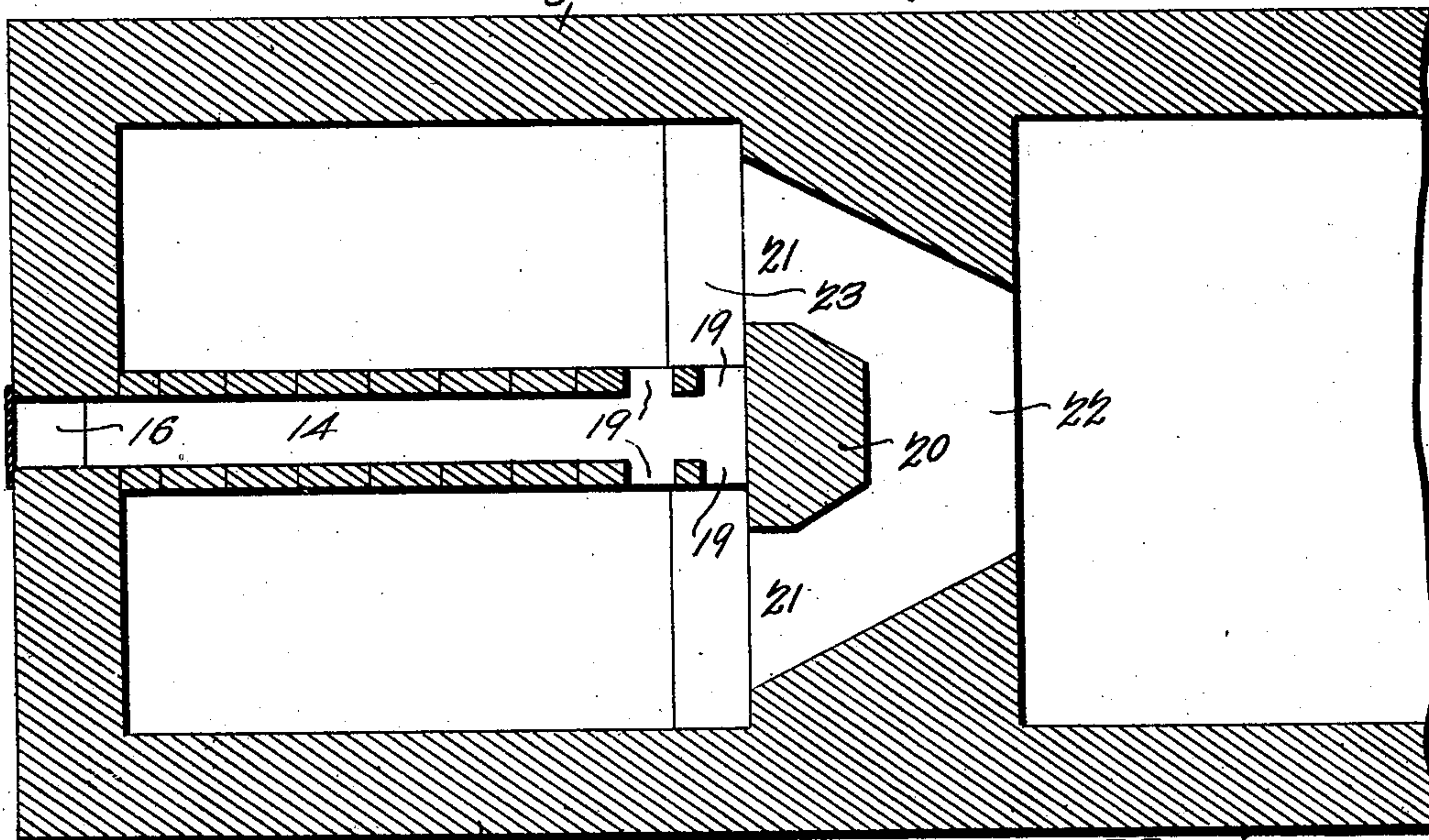
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*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

THOMAS YORK, OF PORTSMOUTH, OHIO.

## BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 705,508, dated July 22, 1902.

Application filed November 13, 1901. Serial No. 82,148. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS YORK, a citizen of the United States, residing at Portsmouth, in the county of Scioto and State of Ohio, have invented a new and useful Boiler-Furnace, of which the following is a specification.

My invention relates to certain improvements in boiler-furnaces of that general class forming the subject of Letters Patent granted to me on December 24, 1895, No. 552,031, and has for its principal object to improve the construction of such devices and to permit of the application of the invention to steam-boilers of any type at a minimum cost.

A further object is to provide for the construction of the furnace from fire-brick of the usual size and shape without the necessity of employing bricks of special shape or the use of auxiliary ducts, pipes, or fittings such as are commonly employed and which must be made of special shape or size to suit furnaces of different character.

Still further objects of the invention are to prevent contact of cool air with the surface of the boiler, to provide for the supply of a suitable quantity of highly-heated air at the rear end of the grate to combine with the unconsumed carbonaceous matter, and to insure the impact of the highly-heated flame against the shell of the boiler.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a longitudinal sectional elevation on the line 1 1 of Fig. 2 of a boiler-furnace constructed and arranged in accordance with my invention. Fig. 2 is a transverse sectional elevation of the same. Fig. 3 is a sectional plan view of the furnace on the line 3 3 of Fig. 1.

Similar numerals of reference are employed to designate corresponding parts throughout the several figures of the drawings.

The furnace is one of that type in which air is fed through ducts or channels exposed to the action of the heat of the furnace and discharged in a highly-heated condition to combine with the unconsumed products of com-

bustion arising from the fire, but possesses many advantages over furnaces of the class with which I am familiar in that it may be built of fire-brick of the ordinary shape and size without special fittings and without the employment of any specially-shaped fire-brick.

Referring to the drawings, 5 represents a suitable boiler inclosed by side walls 6 6, a rear wall 7, and the usual metallic furnace-front 8, the latter being provided with fire and ash-pit doors 9 and 10, respectively, and with a door 11 by which access may be had to the flue-sheet. The ash-pit and combustion-chamber are divided into two longitudinal sections by a central wall 12, formed of the usual fire-brick and built solidly up to a point above the fuel-grates 13. Between the solid portion of the wall and the under side of the shell of the boiler is formed a longitudinal duct or channel 14, which may be formed by placing the fire-bricks on end and introducing between the tops of the fire-brick and the shell of the boiler suitable transversely-disposed fire-brick, which will prevent direct contact between the air within the duct and the shell of the boiler.

The forward end of the duct 14 may lead directly out to the open air in the boiler-room; but in some cases, especially where it is desired to employ a large quantity of air or air under pressure, I provide at the front of the boiler a vertical passage 16, connecting the duct 14 with a pipe 17, through which air or a mixture of air and superheated steam may be forced to the duct. To regulate the quantity of air supplied, I provide a suitable damper 18, by which the area of the passage may be governed.

At the rear end of the combustion-chamber suitable openings 19 are arranged in the sides of the dividing-wall, forming outlets through which the highly-heated air may escape at the rear of the combustion-chamber and there unite with and consume the carbonaceous matter in the products of combustion, resulting in the consumption of all smoke and gases.

About midway of the length of the boiler is formed a bridge-wall 20, which is continued up to a point above the top of the boiler in order to insure the passage of the products of combustion through the boiler-flues from the



rear to the escape-flue at the front of the furnace. In the bridge-wall at points leading from the combustion-chambers are two flues or passages 21, which merge at the rear of the wall into a single passage 22, the outer walls of the passages being inclined in the manner more clearly shown in Fig. 3 in order to direct the products of combustion into contact with the shell of the boiler at the lowest point thereof, and thus avoid to a considerable extent any escape of flame along the side walls of the furnace without actual contact with the boiler-shell. The rear end of the grate-surface is somewhat in advance of and below the outlet-opening 21, and between these two points the wall is inclined, as indicated at 23, giving an upward tendency to the products of combustion at the point where they meet and mingle with the highly-heated air issuing from the openings 19.

I have found in practice that with a boiler-furnace constructed as described there is no perceptible escape of carbon from the escape-flue or chimney of the furnace, the smoke being entirely consumed, and at the same time the efficiency of the boiler is materially increased and a considerable reduction is effected in the cost of fuel employed to produce a given amount of steam in the same boiler having a furnace of the ordinary type.

The structure is particularly advantageous and economical in that there is nothing used in its construction except the fire-brick of ordinary shape and size, which may be obtained in quantity within convenient distance of the place where the furnace is to be situated, all specially-shaped bricks or fittings being dispensed with.

While the construction herein described, and illustrated in the accompanying drawings, presents the preferred form of furnace, it is obvious that changes in the form and proportions and in minor details of construction may be made without departing from the spirit or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim is—

1. The combination in a boiler-furnace, of a centrally-disposed longitudinal wall dividing the ash-pit and combustion-chamber into two sections, said wall being built solidly to a point above the level of the grates and be-

ing provided with an air duct or passage having communication at one end with an air-supply and having at its rear end side ducts or passages opening into the rear of the combustion-chamber, and a bridge-wall having an opening leading from each of the combustion-chambers, and a rear escape-opening connecting with the combustion-chamber openings to form a passage for the products of combustion.

2. The combination in a steam-boiler furnace, of a centrally-disposed longitudinal wall dividing the fire-pot and combustion-chamber into two sections, said wall having an air duct or passage extending longitudinally thereof, at a point above the grate-surface and having at its outer end a valved passage in communication with an air-supply, there being at the rear end of said wall side ducts or openings to permit of the passage of air to the rear of the combustion-chambers, a lateral bridge-wall having an opening leading from each of the combustion-chambers at a point above and to the rear of the rear ends of the grate-bars and in horizontal alinement with the air duct or passage of the longitudinal wall, substantially as specified.

3. The combination in a boiler-furnace, of the ash-pit and combustion-chamber, the centrally-disposed longitudinal wall 12 formed of ordinary fire-brick and built solidly up to a point above the level of the fuel-grate and being provided with a longitudinally-disposed air duct or passage 14 having communication with a vertically-disposed air duct or passage 16, a damper 18 disposed in said passage 16, said longitudinal duct 14 being provided at its rear end with side ducts or openings 19 opening into the two divisions of the combustion-chamber, and a bridge-wall having a centrally-disposed longitudinal passage 22 located above the rear ends of the grates and having tapering side walls, there being a flue or passage 21 leading from each of the combustion-chambers and merging into the passage 22, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THOMAS YORK.

Witnesses:

WM. F. WHITNEY,  
JOHN SHOPE.