(No Model.) 3 Sheets—Sheet 1.

R. WALSH.

SMOKE CONSUMING FURNACE.

No. 515,384. Patented Feb. 27, 1894.

Fig. 1.

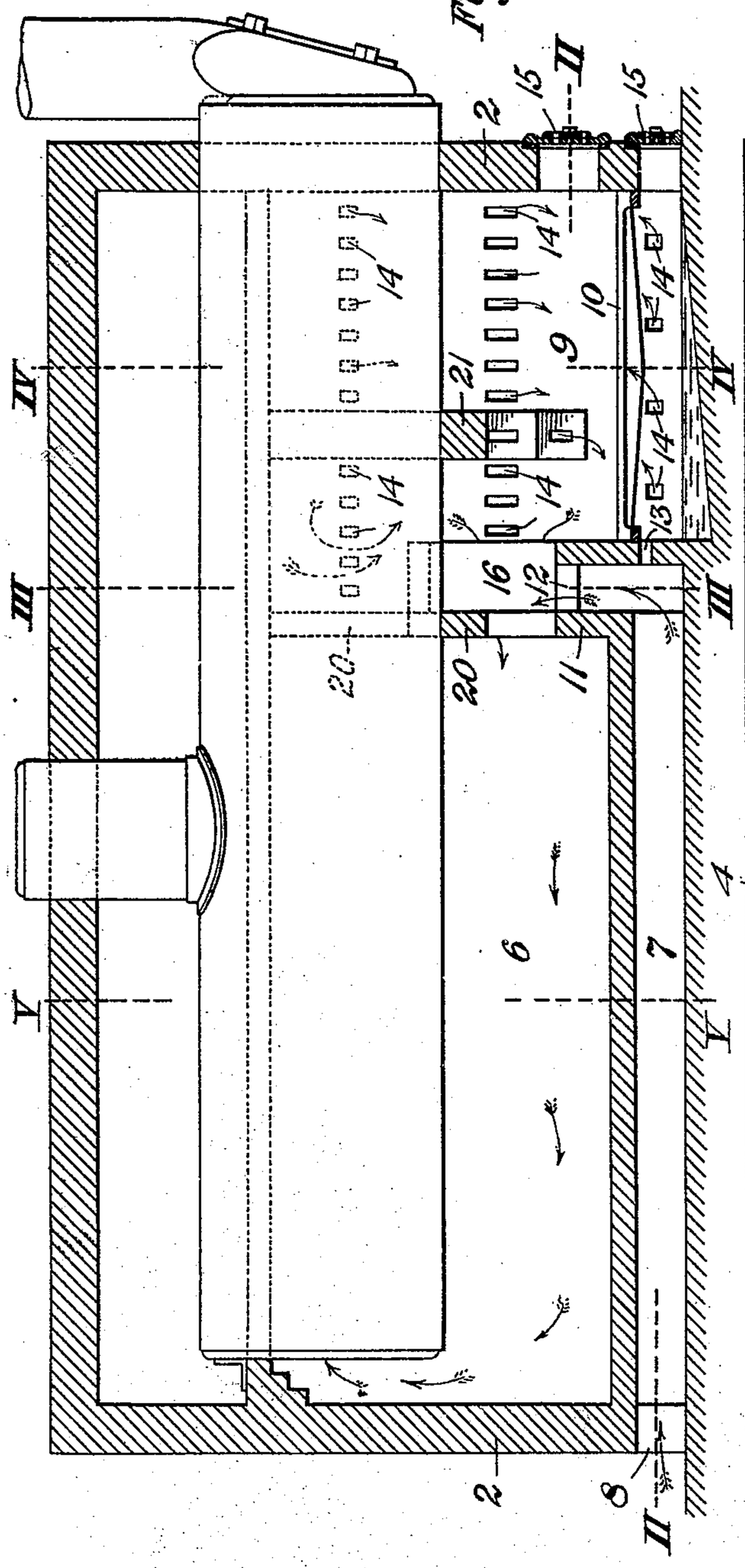

Fig. 2.

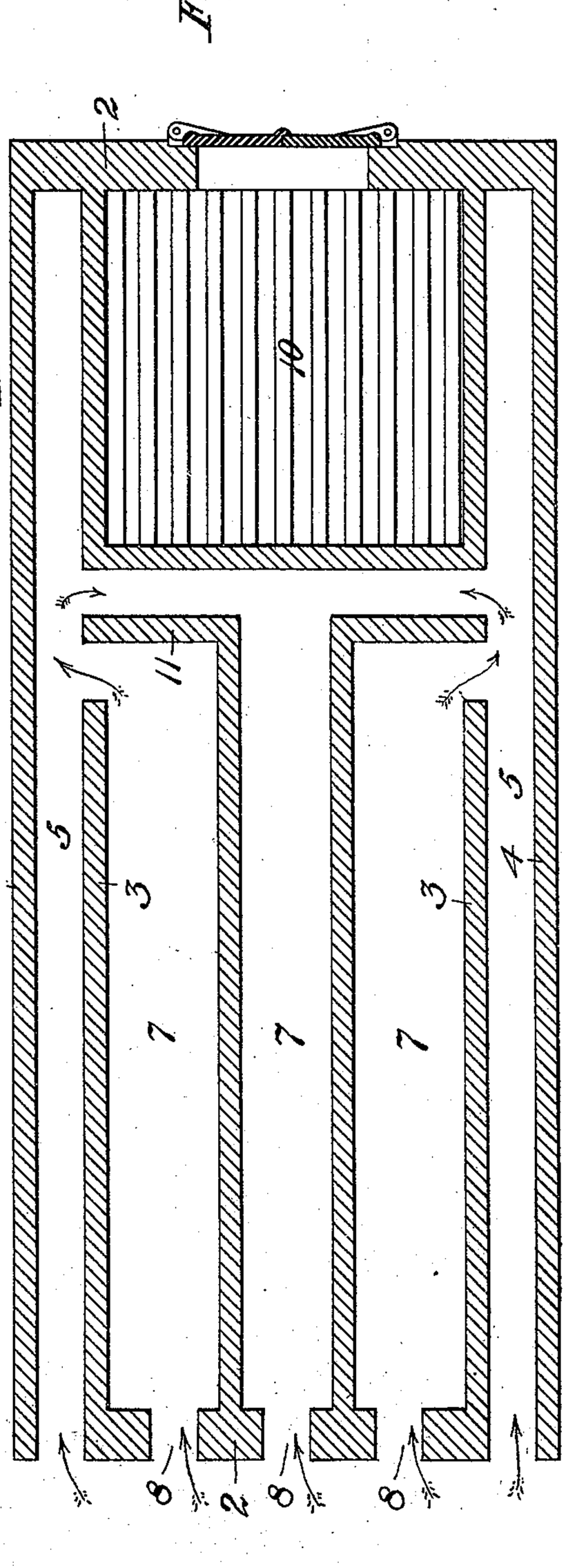

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Fig. 4.

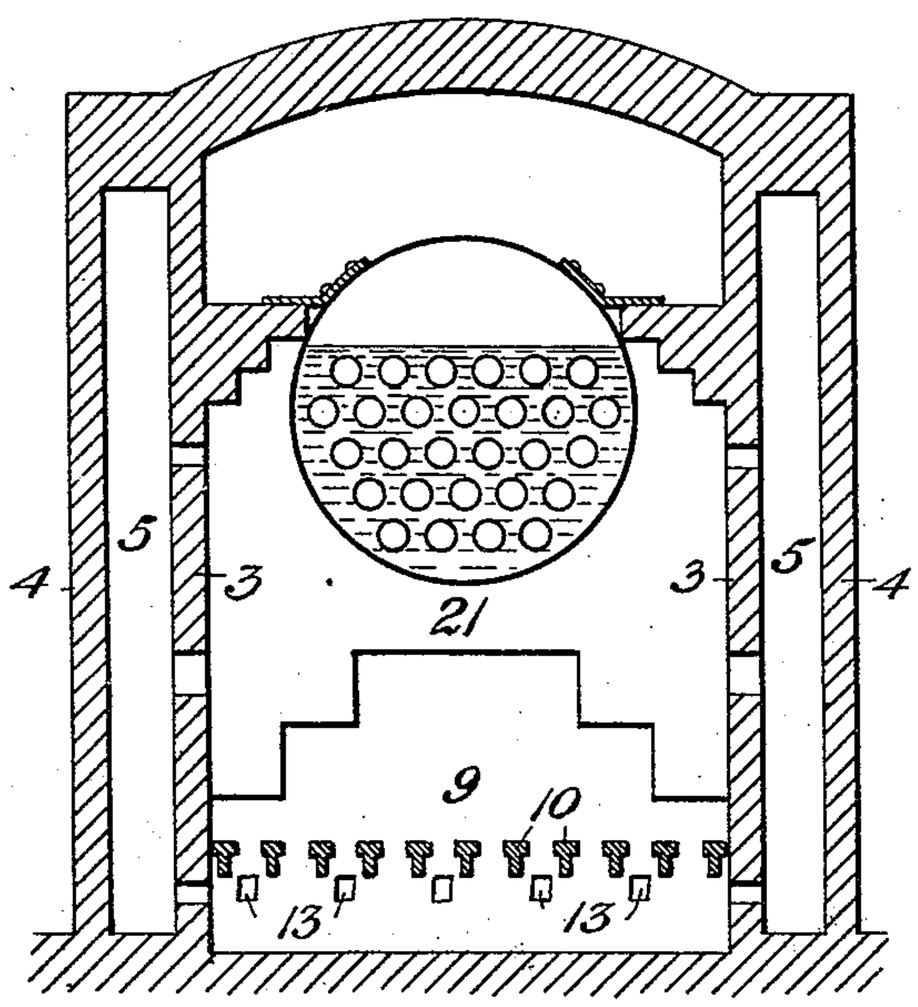

Fig. 3.

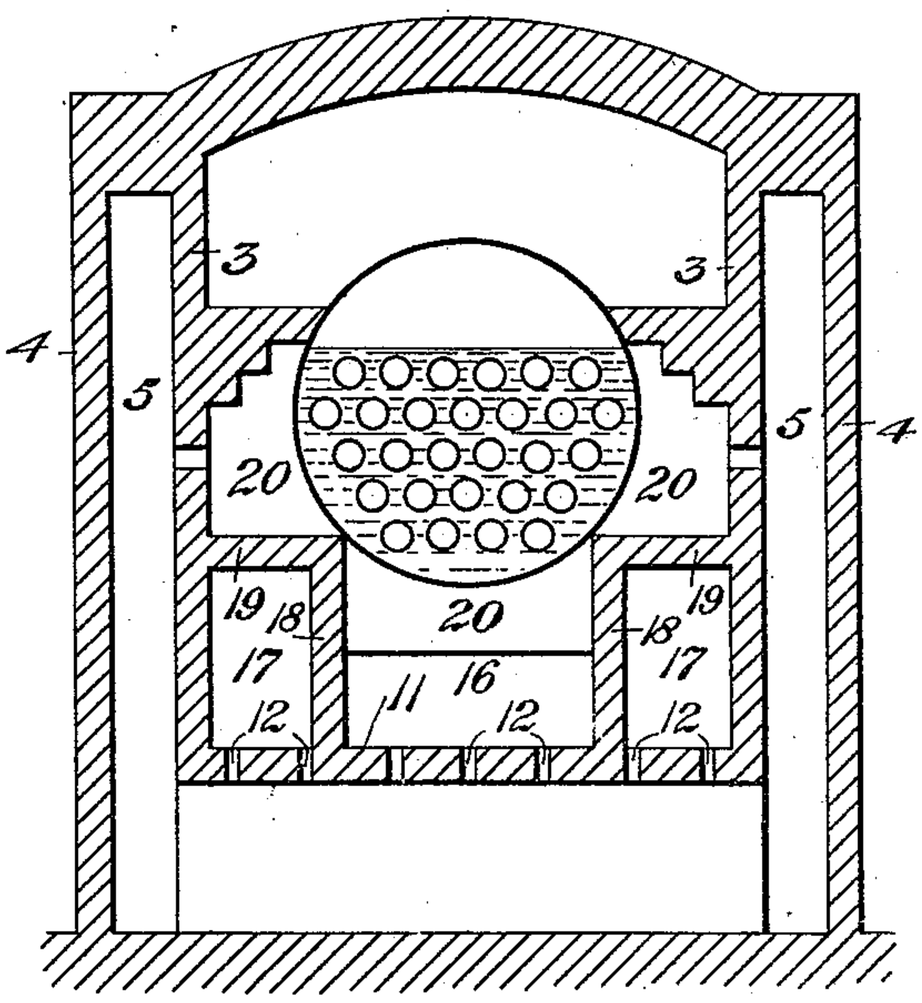

Fig. 6.

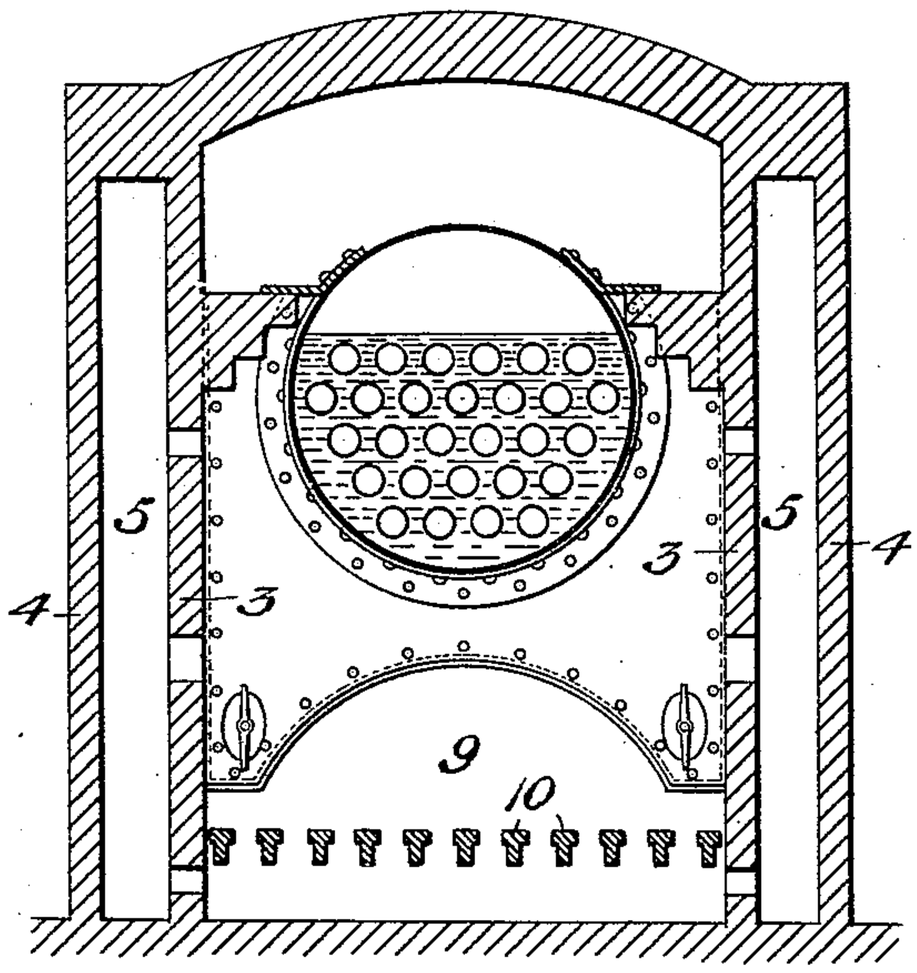

Fig. 5.

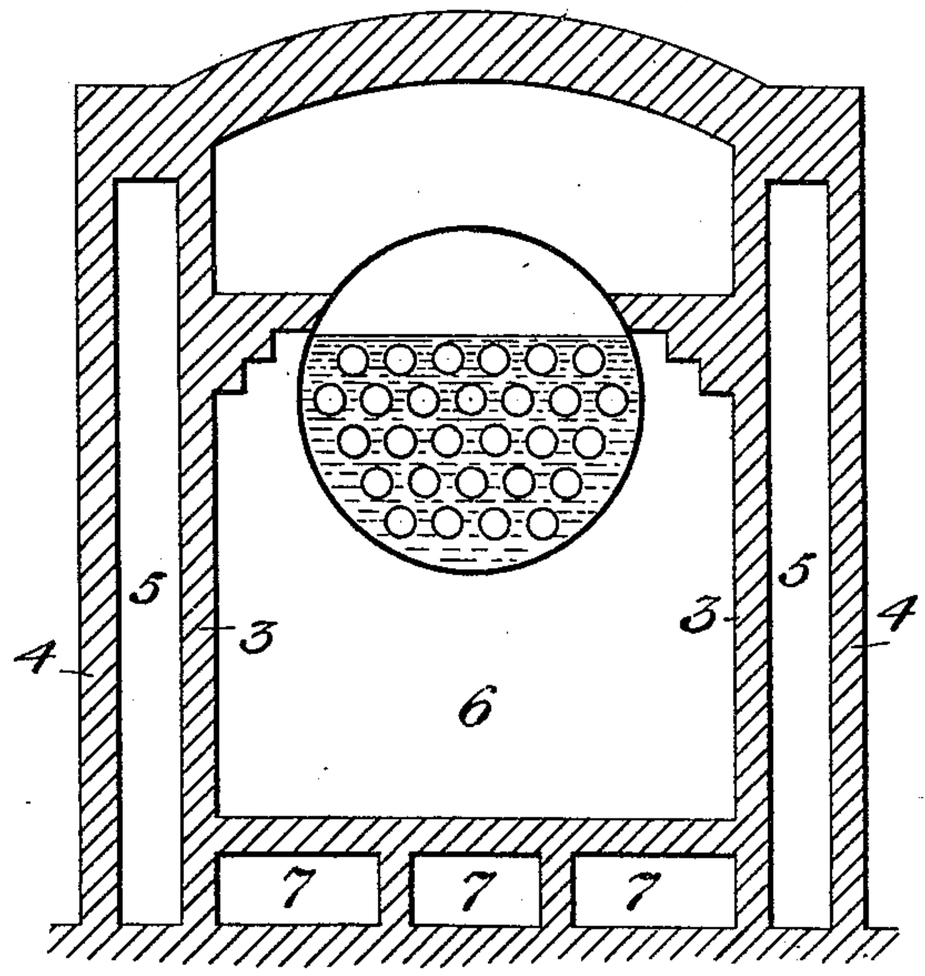

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Fig. 7.

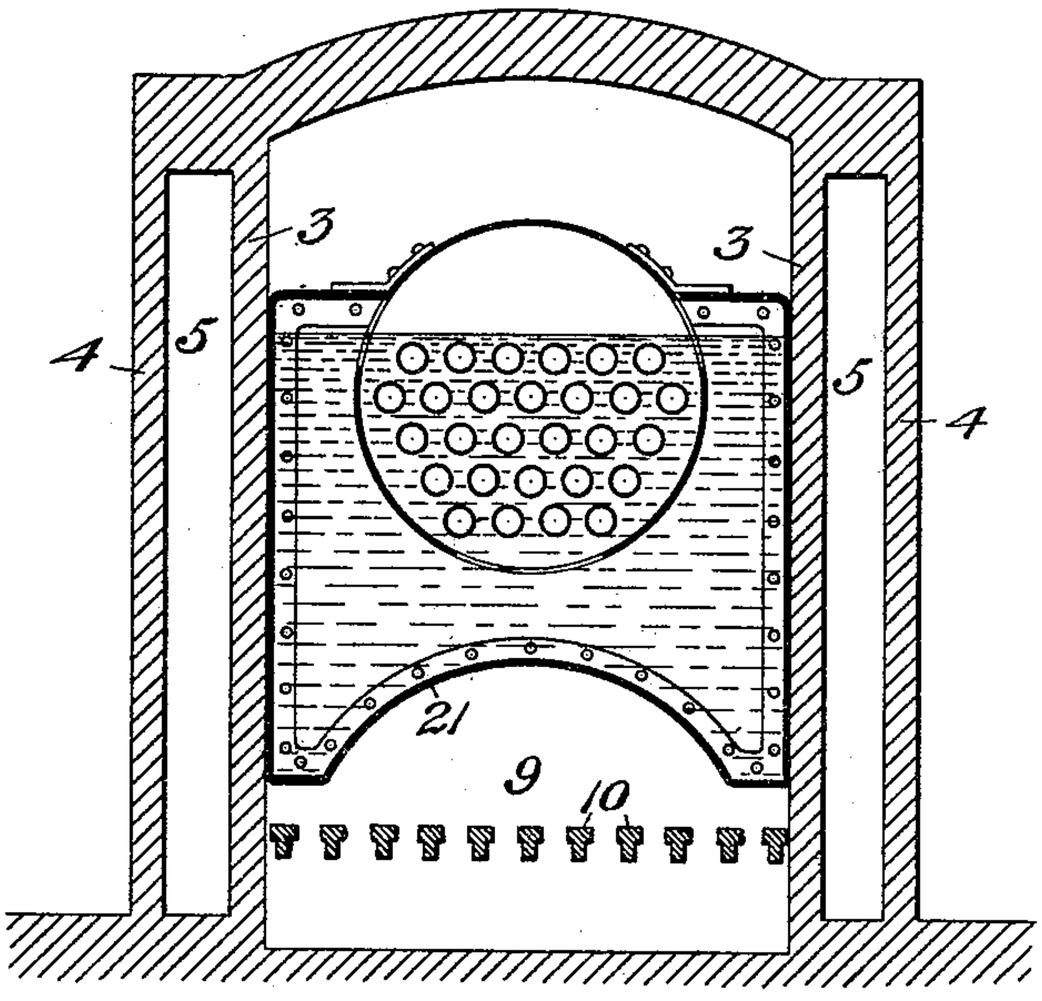
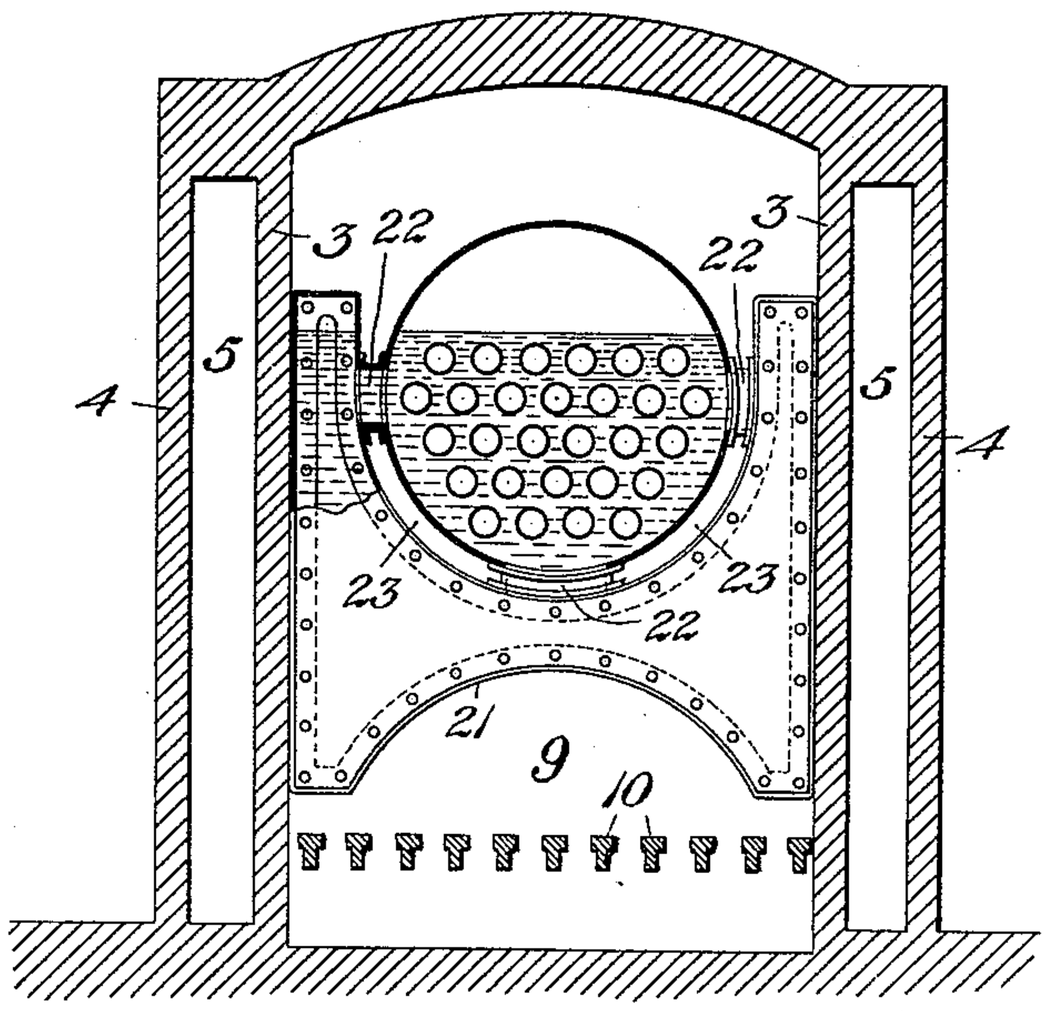


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 515,384, dated February 27, 1894.

Application filed August 21, 1893. Serial No. 483,607. (No model.)

To all whom it may concern:

Be it known that I, ROBERT WALSH, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a new and useful Improvement in Smoke-Consuming Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section of a boiler setting and fire place constructed in accordance with my invention. Fig. 2 is a horizontal section on the line II II of Fig. 1. Fig. 3 is a vertical cross section on the line III III of Fig. 1. Fig. 4 is a like section on the line IV IV of Fig. 1. Fig. 5 is a like section on the line V V of Fig. 1. Fig. 6 is a similar section to Fig. 4 but showing a modified form of construction of the baffle wall. Fig. 7 is a similar view but showing the baffle wall in section and illustrating the circulation and communication with the shell of the boiler. Fig. 8 is a similar sectional view illustrating a further modification of construction, in which the baffle wall is secured to the boiler at intervals.

Like symbols of reference refer to like parts wherever used throughout this specification.

My invention consists in an improvement in the construction of the combustion chamber of fuel burning furnaces, having for its object the perfect combustion of all the elements of the fuel, to the combined ends of securing the highest possible results as to heat from the fuel burned and the resultant absence of smoke and other objectionable products of combustion.

In the drawings I have illustrated my construction of combustion chamber as applied to an ordinary tubular boiler, but I am not limited to such construction, as it may, with equal readiness, be applied to many other forms in which similar results are desired, as for instance puddling and heating furnaces, garbage and domestic furnaces, stoves and grates, and to many kinds where the nature of the construction is such as to admit of the conditions of my improvement being fulfilled.

For the purpose of securing the rapid and perfect decomposition of the air in the process of combustion, I have designed a system of communicating flues and passages whereby the air, in its progress from the outside atmosphere to the point of combustion, is caused to traverse such passages in contact with a large area of heated wall surface, so that it is thereby brought to a high temperature by the time it enters the fire place, and is to that extent better suited to the ends in view.

My invention also consists in the arrangement of the flues so that the air is supplied in such a manner as to give a very thorough admixture and adequate supply to the fuel while in progress of combustion.

A further important feature, which I consider essential to the perfect operation of my invention, consists in a baffle-wall, which is designed to check the progress of the escaping gases and to retain them within the fire chamber until thoroughly consumed.

Referring to the drawings 2 represents the front and back walls of a furnace, the side walls of which are formed of an inner and an outer wall, 3, 4, forming between them the passage 5.

Beneath the floor of the back part of the furnace 6 is a series of flues or passages 7 provided with inlet openings 8 for the admission of air.

9 is the combustion chamber, below which are located the grate bars 10, and immediately back of the ends of the bars is the hollow bridge wall 11, constructed in like manner to the side walls, and communicating with the passages therein and with the central ground passage 7. The bridge wall is supplied along its top and front, immediately under the grate bars with the ports 12, 13, through which the previously heated air passes to the interior of the furnace.

At various heights throughout the combustion chamber are arranged rows of ports 14, communicating with the hollow-side-walls, the purpose of which is to distribute the heated air thoroughly throughout the entire area of the furnace and to bring it into contact with the fire.

The amount of air that is admitted into the openings 8 may be regulated by stoppers, such as bricks, which may be placed therein, and the doors in the front are supplied with dampers 15 for a like purpose.

As shown in Fig. 3 the space above the bridge wall is divided into a central opening 16 and side openings 17, 17, by means of the tiles 18 and 19, and the partition 20 is brought down partially, cutting off part of the area through the central opening. The object of this construction is to divert the gases down onto and into close contact with the bridge wall, and the hot air escaping through the ports 12 giving ample opportunity for admixture before finally escaping into the chamber 6.

The baffle wall 21 is formed of tiles or bricks extending clear across from side to side of the fire chamber and located about two-thirds of the way back to the bridge wall. The lower edge is made to conform somewhat to the shape of an arch and it will be seen that the gases of combustion will be forced under it and into close contact with the body of fuel resting on the grate bars, so that having become thoroughly mixed with the heated air upon the ports 14 while in the fore part of the furnace, such mixture of air and gas will be thus brought into contact with the hottest part of the furnace, resulting in a very perfect combustion.

In Figs. 6, 7, and 8 I have illustrated in detail some modified forms of the baffle wall, in which it is constructed of sheet metal and forms part of the boiler proper, serving the purpose of a baffle wall and at the same time generating steam while the metal in contact with the flame is protected from burning away. When it is desirable to attach this form of baffle wall to an old boiler, it may be done in the manner shown in Fig. 8, in which the wall is made to conform generally to the under surface of the boiler, and is connected thereto by the hollow necks 22, riveted to the shell of the boiler, at the same time leaving a space 23 for the passage of gases.

The operation is as follows: Fire having been started in the grate bars, and the fuel properly distributed thereon, after the walls and passages have become thoroughly heated, the air supply may be so regulated that the amount admitted is just sufficient to give perfect combustion in the manner already described, resulting in the highest possible degree of heat, and the entire absence of smoke.

I am aware that it is not new to use air which has been previously heated by the products of combustion and such I do not claim as my invention since it consists in the arrangement of the ports and the manner of supplying air to the fuel, together with the further features of invention as outlined and set forth in the following claim.

What I claim is—

In a furnace, the combination of the combustion chamber 9, provided with air supply ports 14, and the baffle wall 21 similarly supplied with air ports, with the hollow bridge wall 11, ports 12 and 13, vertical dividing walls 18, 18, and horizontal walls 19, 19, partition walls 20 and central openings 16 and side openings 17, 17, in the manner and for the purposes described.

In testimony whereof I have hereunto set my hand this 12th day of August, 1893.

ROBERT WALSH.

Witnesses:
C. M. CLARKE,
JOHN L. RALPH.