

(No Model.)

R. W. KENNEDY.
GAS HEATING FURNACE.

No. 336,485.

Patented Feb. 16, 1886.

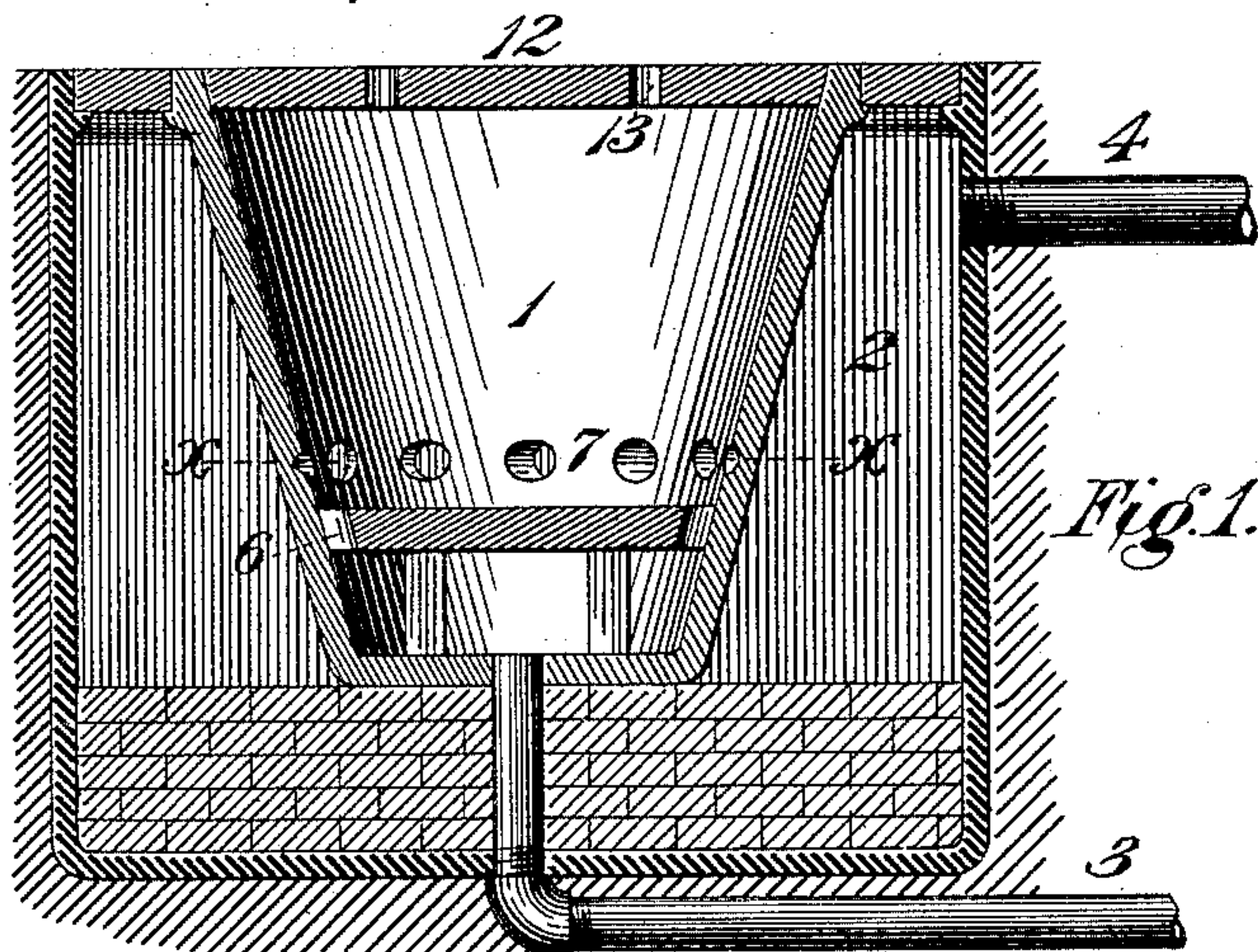


Fig. 1.



Fig. 5.

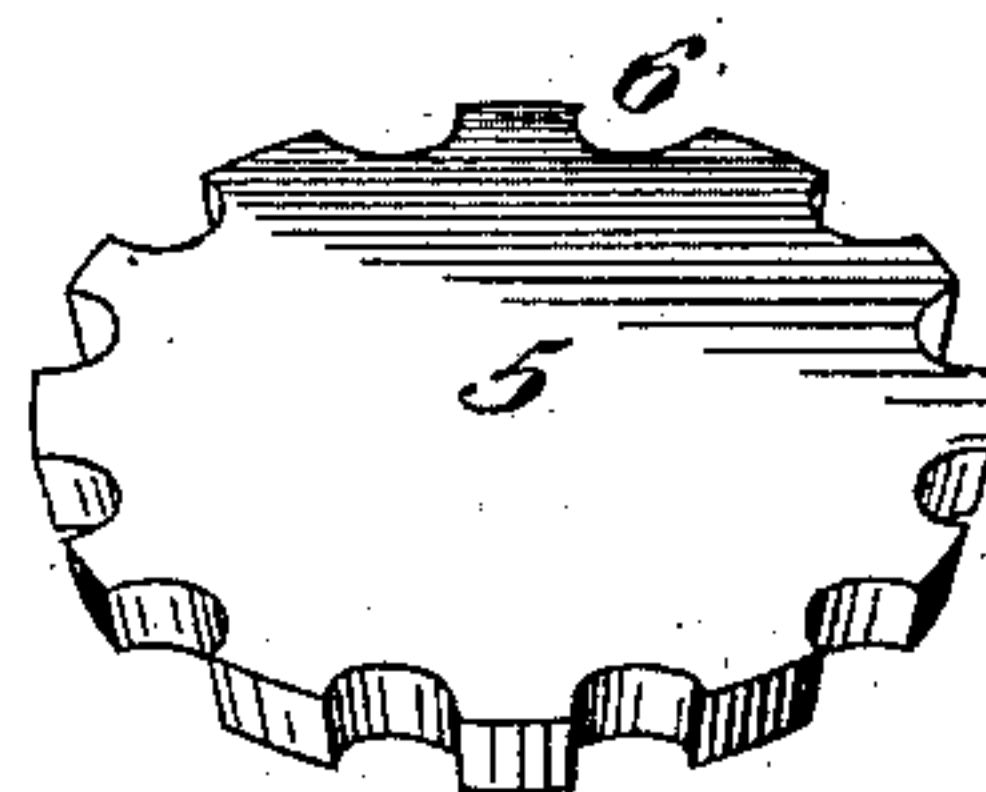


Fig. 6.

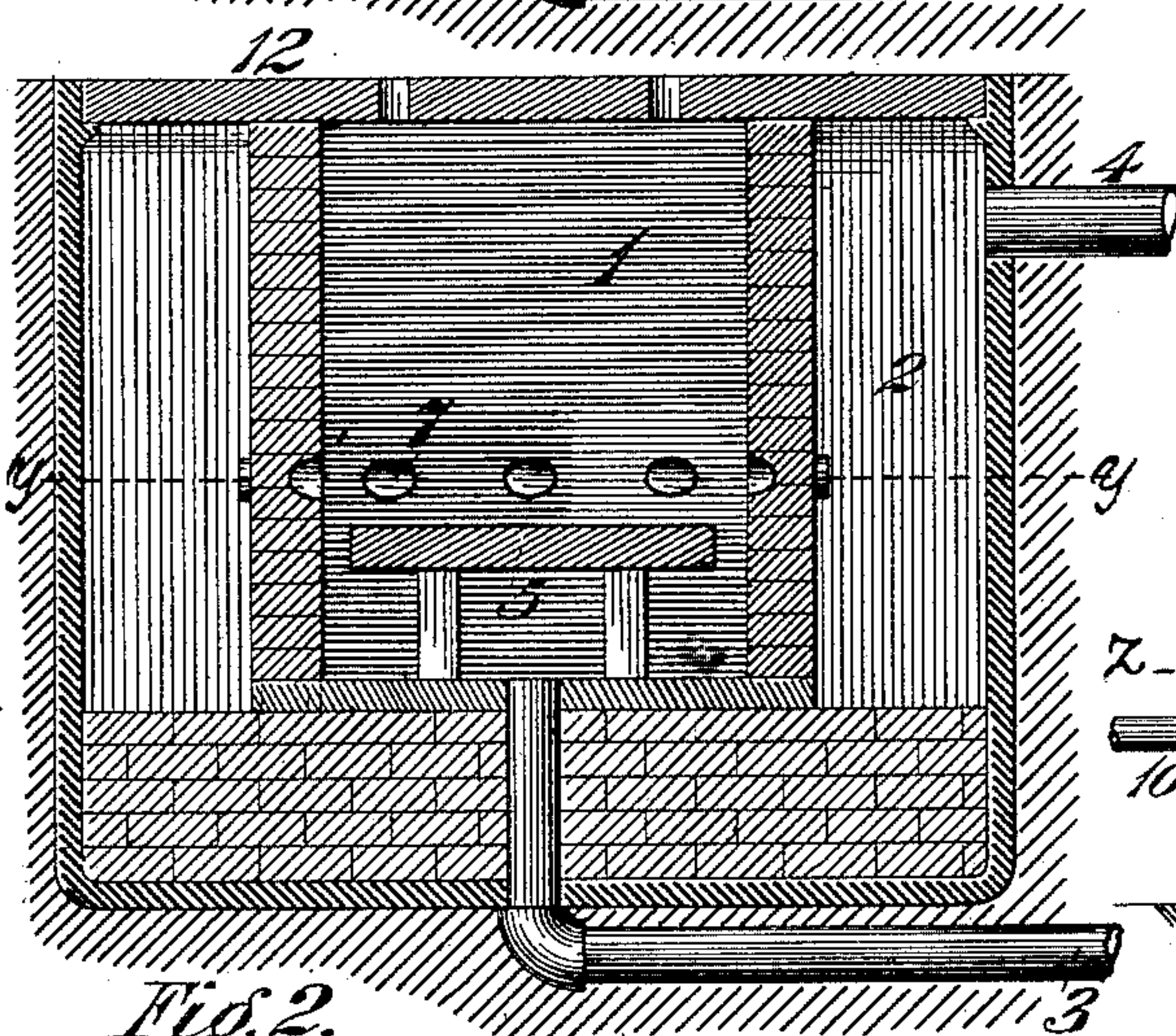


Fig. 2.

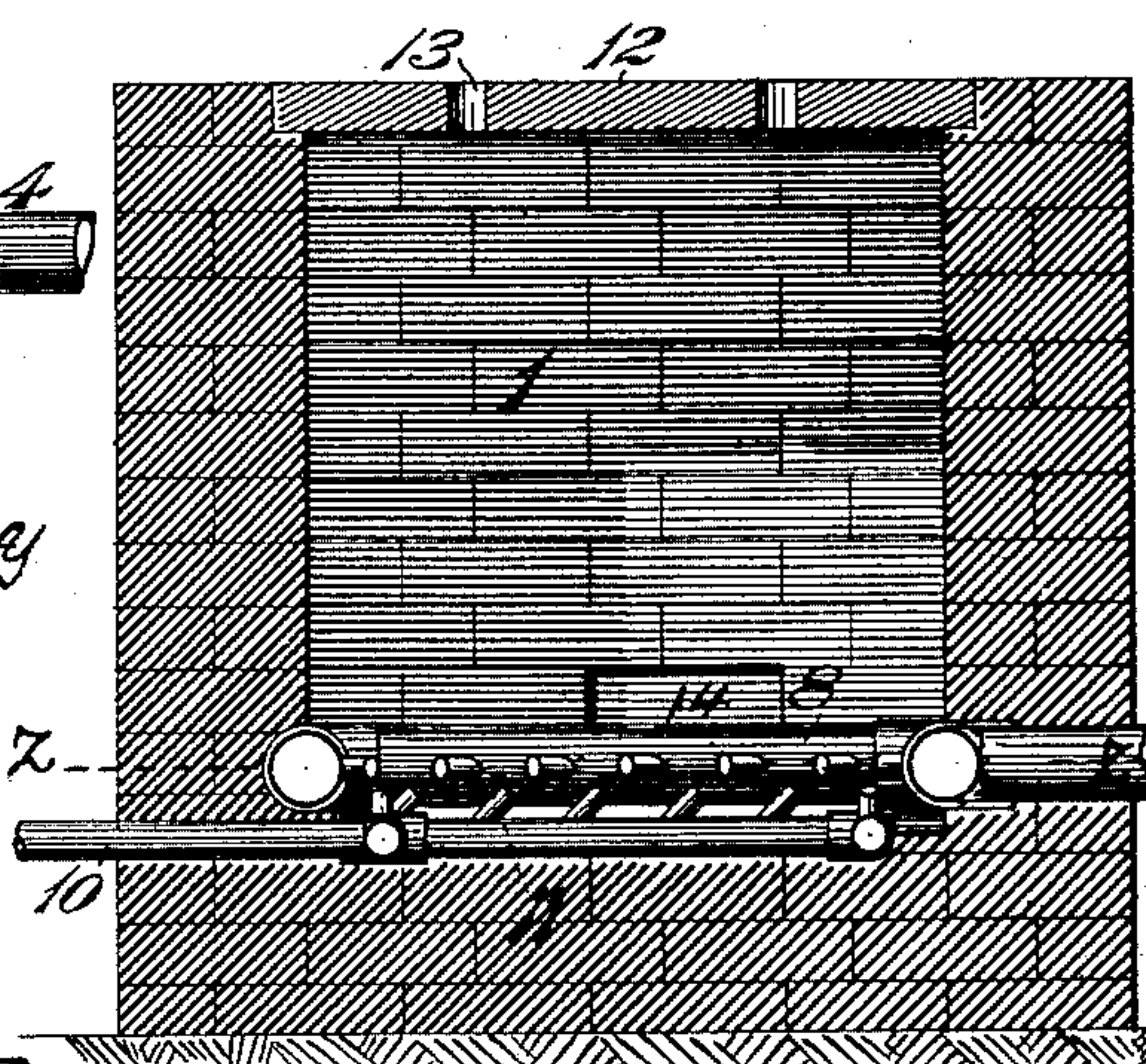


Fig. 3.

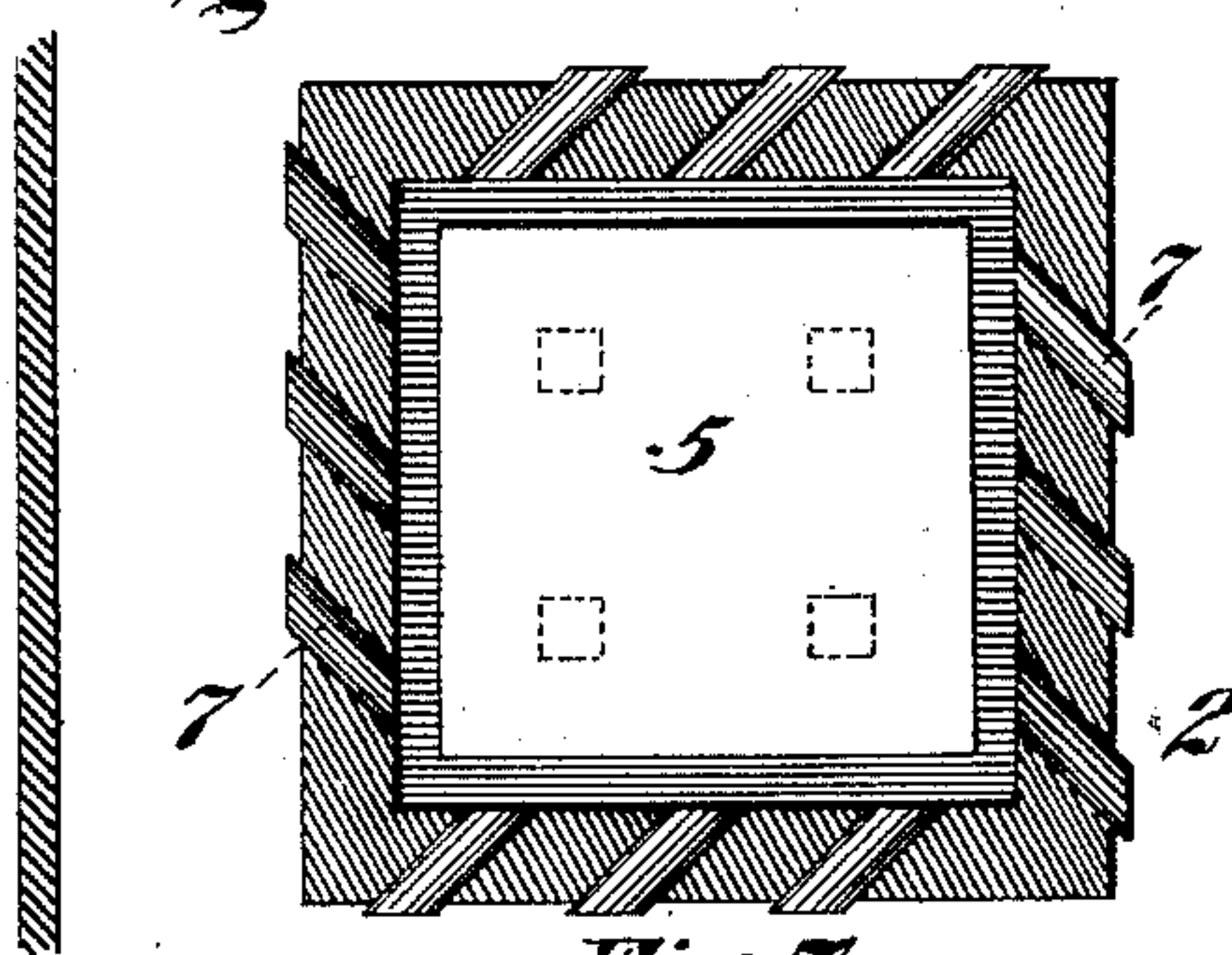


Fig. 7.

WITNESSES:

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ROBERT W. KENNEDY, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO JONES & LAUGHLINS, (LIMITED.)

GAS-HEATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 336,485, dated February 16, 1886.

Application filed September 2, 1885. Serial No. 175,978. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. KENNEDY, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Gas-Heating Furnaces, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a vertical sectional view of my improved gas-heating furnace. Fig. 2 is a similar view of a modified form of the furnace. Fig. 3 is a sectional elevation of a further modification of the manner of constructing the furnace. Fig. 4 is a sectional view of the furnace shown in Fig. 3, the section being taken on the line $z z$. Fig. 5 is a horizontal section on the line $x x$, Fig. 1. Fig. 6 is a perspective view of the spreading or distributing tile. Fig. 7 is a horizontal sectional view, the section being taken on line $y y$, Fig. 2.

The invention herein relates to certain improved forms of furnace and its connections, for the purpose of utilizing natural gas as the heating agent; and the object of my invention is to construct such an apparatus as to effect a thorough commingling of the gas and air as they enter the combustion-chamber, or immediately after the ignition of the gas and during its combustion; and to these ends the invention consists in the construction and combination of parts, substantially as hereinafter described and claimed.

The heating or combustion chamber 1, formed by a crucible, as in Fig. 1, or by a box formed of fire-bricks, as in Fig. 2, is inclosed within an air or blast chamber, 2, which is preferably formed of iron, as shown. The bottom of the air or blast chamber is covered by several layers of brick, forming a support or foundation for the crucible or box forming the combustion-chamber. Through the bottom of the air-chamber and the combustion-chamber is introduced the pipe 3, connected to some suitable gas-supply, and through one wall of the air-chamber, preferably near the top, is introduced the pipe 4, connected to some suitable air-forcing apparatus. In the combustion-chamber is located the spreading

or distributing tile or plate 5, arranged a short distance above the end of the gas-inlet pipe 3.

In the form of furnace shown in Fig. 1, where a crucible having tapering sides forms the heating-chamber, the tile is made circular in form, and of such diameter as to be supported by the sides of the crucible a short distance above the end of the inlet-pipe 3. Around the edges of this tile or plate are formed a series of notches, 6, forming passages for the escape of gas along the sides of the crucible. Through the sides of the crucible, just above the spreading or distributing tile, are formed a series of openings, 7, connecting the combustion-chamber with the air-chamber. These holes are formed at an angle to the radii of the crucible, so as to impart a swirling or circular movement around the crucible to the air as it enters the crucible. It is preferred that the openings 7 through the crucible should be at their exit or inner ends in the same vertical plane as the notches 6 in the distributing-tile, in order that the air as it enters the combustion-chamber may impinge on the rising currents of gas, and, commingling therewith, impart to the gas a corresponding circular movement. In cases where the combustion-chamber is formed of brick, and is therefore quadrangular in cross-section, the spreading-tile 5 is made a little smaller than the internal dimensions of the combustion-chamber, thereby forming narrow slits or spaces between the sides of the chamber and the edges of the tile for the passage of wide thin streams or currents of gas. The tile or plate is supported in this form of furnace by short posts or pillars of any suitable material.

The openings 7, for the admission of air into the combustion-chamber, are formed of short sections of pipe arranged between two layers of brick having the same angular arrangement as in the case of the crucible above described.

In lieu of either of the above-described forms of furnace, it may be constructed as shown in Fig. 3, where the combustion-chamber is formed of brick walls, as shown; and in lieu of the surrounding air-chamber 2 a pipe or ring chamber, 8, is arranged on or near the bottom of the chamber 1, said pipe or ring being partially surrounded by the walls of the

chamber, as shown, and provided with a series of tips or openings for the admission of the air from the ring-pipe, which is connected to any suitable air-forcing apparatus, into the chamber 1, said tips or openings being so arranged or constructed as to impart a circular or swirling movement to the escaping air. Below the ring pipe or chamber 8, and preferably somewhat in under it, is arranged a similar ring-pipe, 9, which is connected by the pipe 10 with a gas-supply, and is provided with tips or burners 11, so located as to bring their discharge-orifices in close proximity to the discharge-orifices of the tips of the ring-pipe 8, in order that the currents of air and gas escaping from the respective tips may impinge against each other and be thoroughly combined or mixed. In order to effect a more thorough commingling of the air and gas, I arrange the tips 11 at an acute angle to the ring-pipe 9, but in a direction opposite to the inclination of the tips of the ring-pipe 8, so as to give the gas a swirl in a direction opposite to the circular movement imparted to the air by the tips of the ring-pipe 8.

In using the above furnace the pressure of the air-blast should be greater than that of the gas, so that the commingled air and gas will circulate in a horizontal plane, thereby confining the combustion therefrom within the combustion-chamber. This feature or characteristic of my invention—*i. e.*, confining the combustion within a comparatively narrow vertical limit—is of especial importance in the use of natural gas, which, on account of small specific gravity, will rise rapidly and separate from the air before perfect combustion can take place, where they are admitted together without any provision being made to prevent their separation; but by imparting a rotary or swirling motion to the combined air and gas this upward tendency of the gas is prevented for a sufficient length of time to enable a thorough combustion to be effected. In the form of apparatus shown in Figs. 3 and 4 the two currents, impinging against each other, are broken up and thoroughly mixed; but the final direction of rotation is that of the air, as its pressure is the greater.

I have shown my improved furnace as applied to the heating of chain-links preparatory to welding, the combustion-chamber being covered by a tile, 12, provided with holes 13, in which the links are held until sufficiently heated; but I do not wish to limit myself to furnaces for that purpose, as my invention may be applied with equal or greater advantage to other purposes.

If desired, the notches 6 in the tile 5 may be formed at angles, so as to impart a swirl to the gas in a direction contrary to the movement of the air, as stated in relation to the construction shown in Figs. 3 and 4.

In the construction as shown in Fig. 3, one of the bricks, as 14, is left loose, so that it can be readily removed for the purpose of cleaning the combustion-chamber.

I claim herein as my invention—

1. In a heating-furnace, the combination of a combustion-chamber, air-feeding apparatus arranged to impart a rotary or swirling movement to the air within the combustion-chamber, and gas-feeding apparatus arranged to feed the gas at an angle to the line of air-feed, substantially as set forth.

2. In a heating-furnace, the combination of a combustion-chamber, an air-feeding pipe or chamber arranged around the combustion-chamber, said chambers being connected by air-conduits arranged to impart a circular or swirling motion to the air as it is fed into the combustion-chamber, and gas-feeding devices constructed to feed the gas at an angle to the line of air-feed, substantially as set forth.

3. In a heating-furnace, the combination of a combustion-chamber, an air-chamber surrounding the same, said chamber being connected by angularly-arranged air-passages, as described, a gas-pipe entering the bottom of the combustion-chamber, and a distributing or spread tile or plate arranged over the mouth of the gas-pipe, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ROBERT W. KENNEDY.

Witnesses:

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G. W. WILLIAMS.