No. 764,755. PATENTED JULY 12, 1904.

R. D. McMANIGAL.

FURNACE.

APPLICATION FILED NOV. 16, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

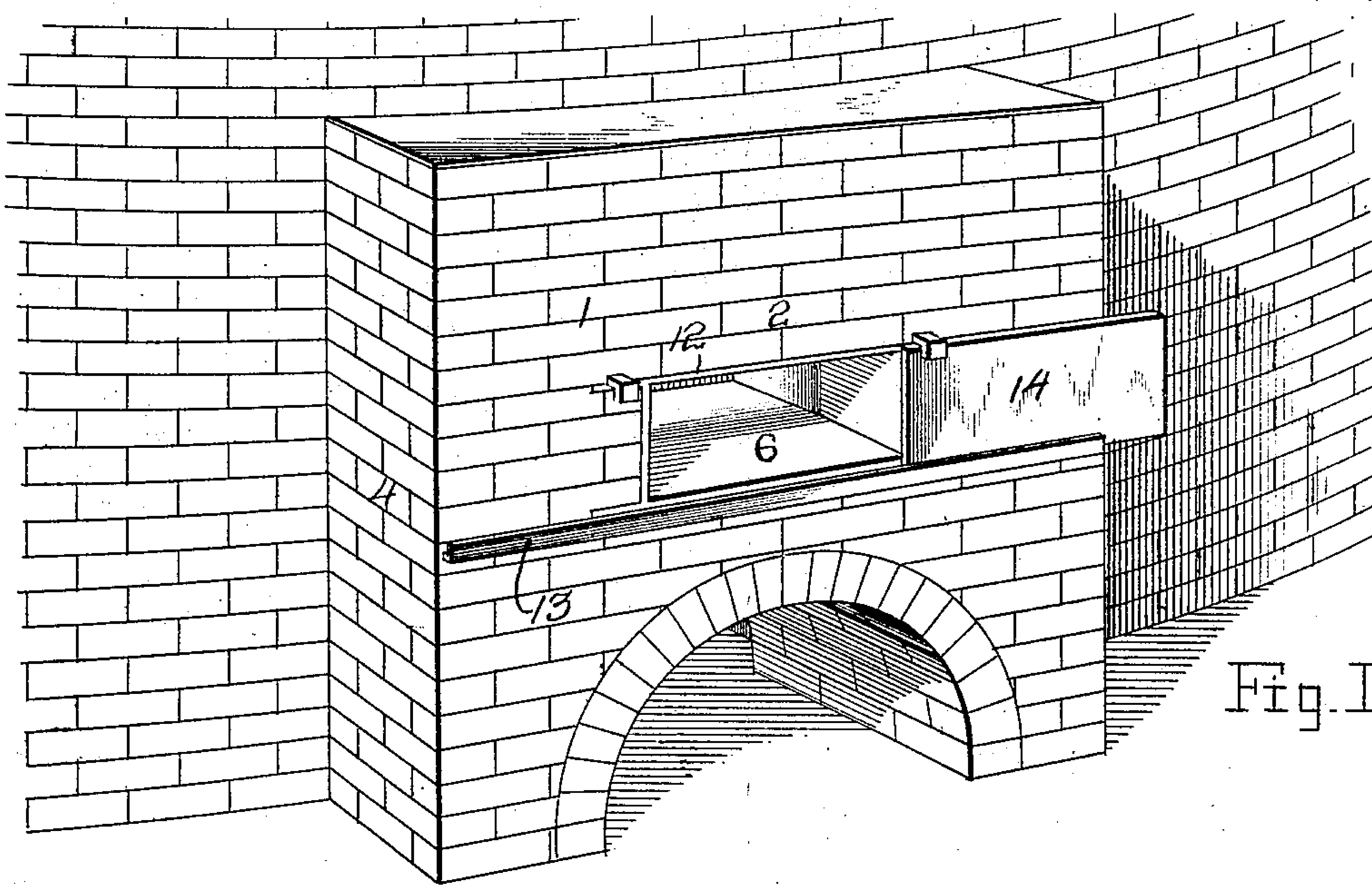

Fig. I.

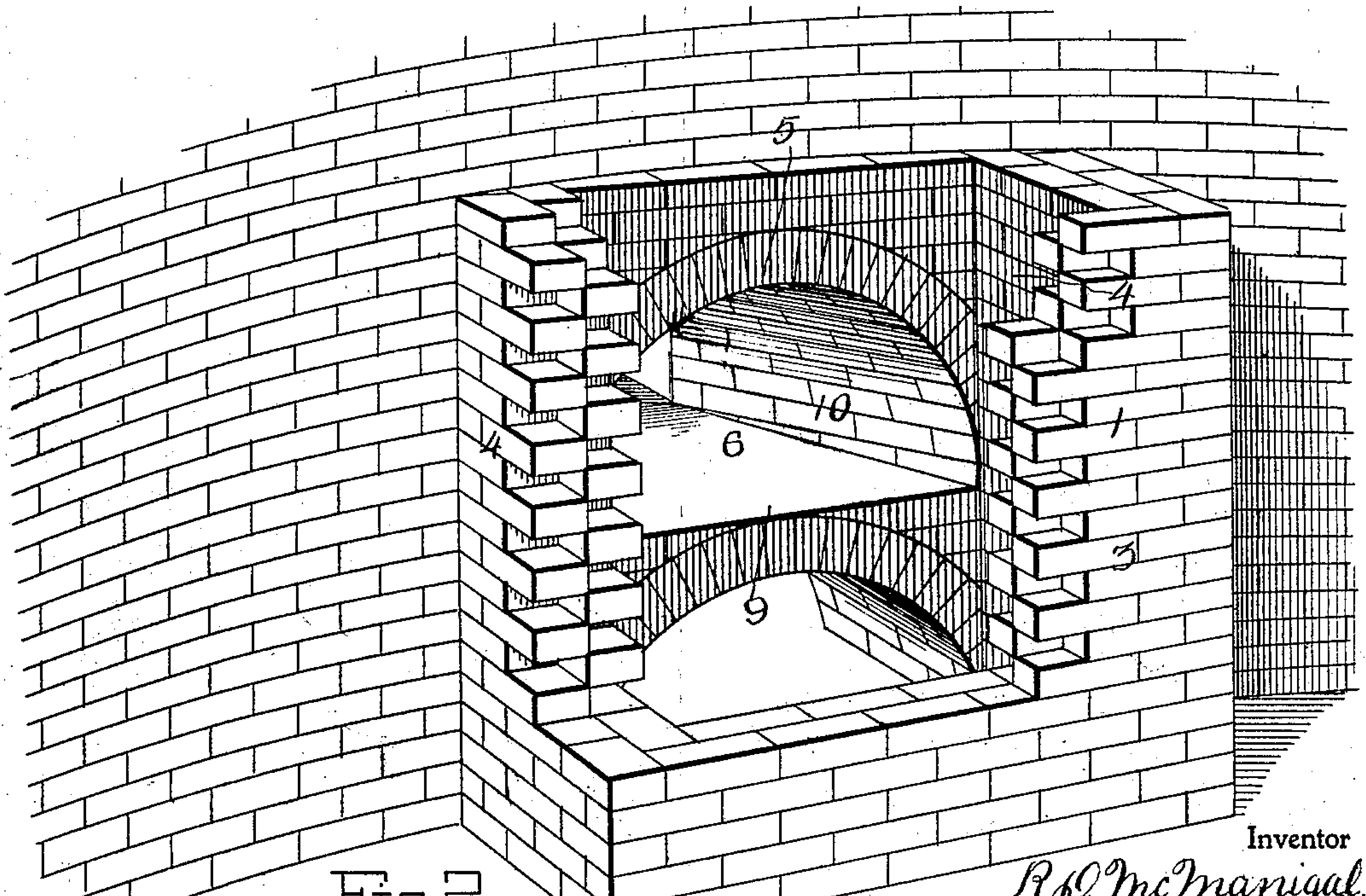

Fig. 2.

Witnesses

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NO MODEL. 2 SHEETS—SHEET 2.

Fig 3.

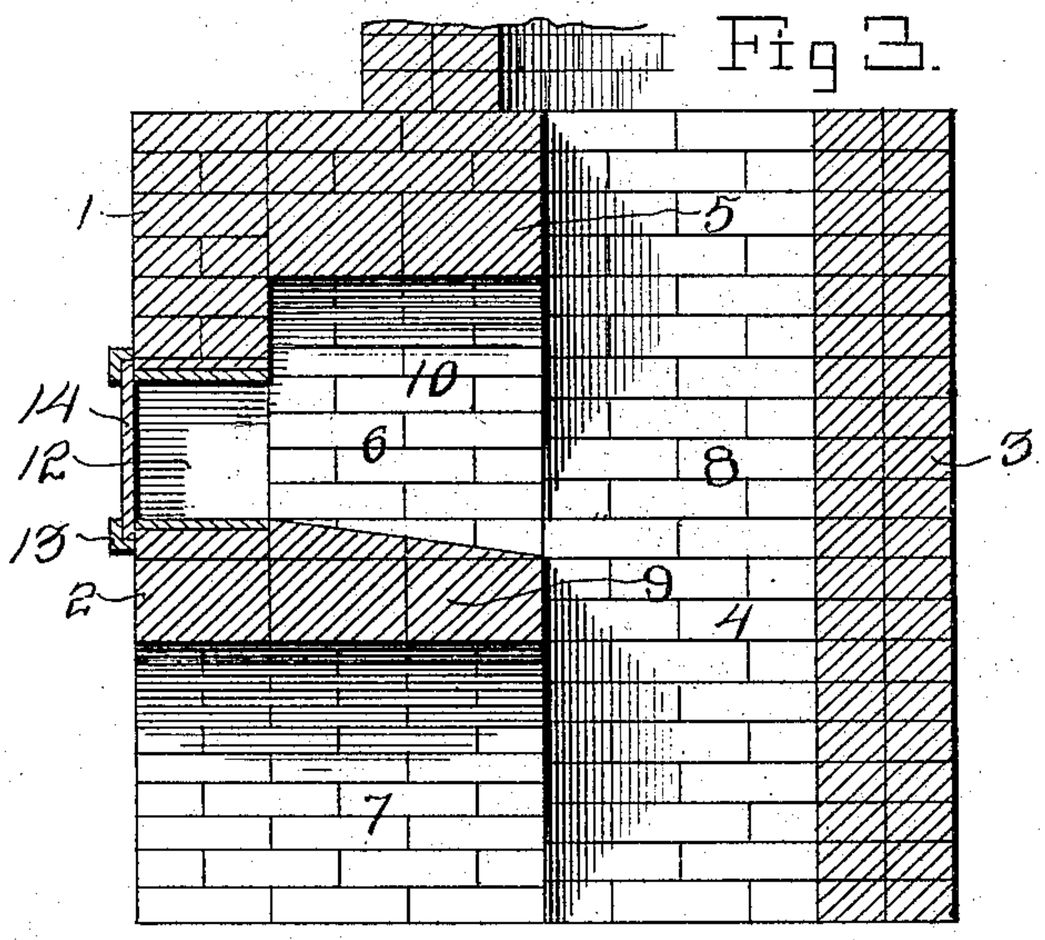


Fig. 4.

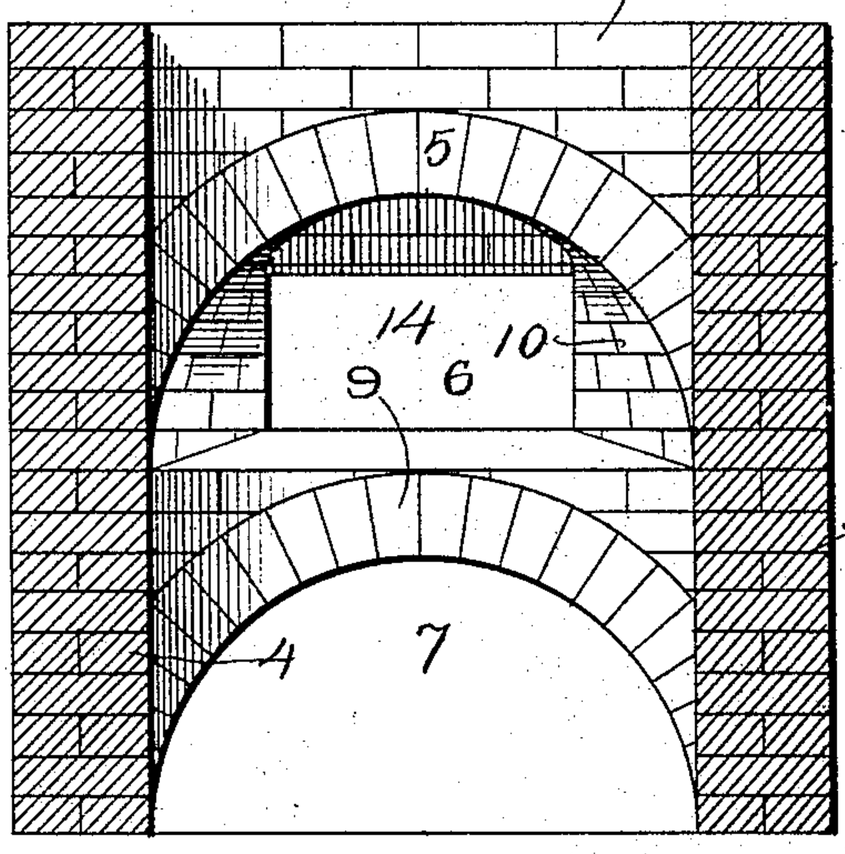
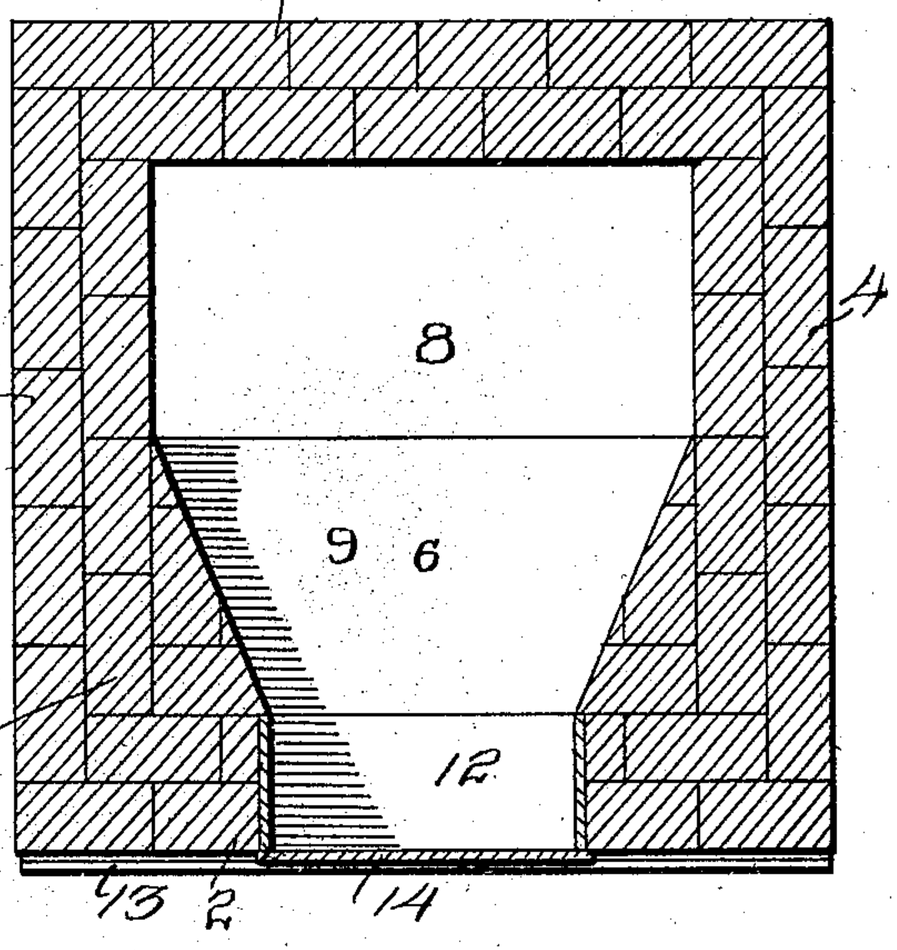


Fig. 5



Witnesses
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No. 764,755. Patented July 12, 1904.

UNITED STATES PATENT OFFICE.

ROBERT D. McMANIGAL, OF LOGAN, OHIO.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 764,755, dated July 12, 1904.

Application filed November 16, 1903. Serial No. 181,404. (No model.)

To all whom it may concern:

Be it known that I, ROBERT D. MCMANIGAL, a citizen of the United States, residing at Logan, in the county of Hocking and State of Ohio, have invented certain new and useful Improvements in Furnaces; and I do 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.

This invention relates to improvements in furnaces for kilns and the like.

The object of the invention is to provide a furnace of this character in which the necessity of a grate is obviated.

Another object is to construct a furnace of this character in which any kind of fuel may be used and that can be easily operated by unskilled workmen.

A further object is to provide a furnace having a perfect combustion and in which the coal is reduced to coke before being placed in the combustion-chamber.

A still further object is to construct the chambers of the furnace so that no cold air can enter the kiln during the process of burning or firing, thereby preventing checking or cracking of the ware while burning, the arrangement of the chambers also being such that they may be readily cleaned out without exposing the workmen to the heat of the fire.

With these and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be more particularly described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a perspective view of a portion of a kiln, showing the outside construction of a furnace. Fig. 2 is a similar view showing the construction of the furnace within the kiln, parts of the furnace being removed to show the interior construction of the same. Fig. 3 is a central vertical longitudinal section through the furnace. Fig. 4 is a vertical cross-section view. Fig. 5 is a horizontal sectional view taken just above the floor of the gas or feed chamber.

Referring more particularly to the drawings, 1 denotes the furnace, which may be constructed of any suitable material, but is here shown as constructed of brick and built into the walls of the kiln. Any desired number of furnaces may be formed in the kiln, only one of which is shown in the drawings.

The furnace consists of a front wall 2, a rear wall 3, side walls 4, and a top arched wall 5. Within said walls are arranged three compartments or chambers, a feed and gas chamber 6, a warming and cleaning chamber 7, and a combustion-chamber 8. The feed and gas chamber 6 is arranged above the cleaning and warming chamber and separated from the same by a horizontally-disposed wall 9, the upper side of which forms the floor of the chamber 6 and may be inclined, as shown. The lower side of the wall 9 is arched and forms the roof of the cleaning and warming chamber 7.

The rear ends of both the chambers 6 and 7 are open and in communication with the combustion-chamber 8, and the upper end of the chamber 8 is open and in communication with the interior of the kiln, as shown. The side walls of the feed and gas chamber 6 converge toward the front to form a contracted passage 10, which opens on the outside of the furnace and forms a feed-opening for the introduction of the fuel. In the feed-passage is arranged a metallic door-frame 12, on the outer edges of which are formed guideways or flanges 13, in which is arranged to slide a door 14, by which said feed-passage is closed. The forward end of the arched cleaning and warming chamber 7 is open at its inner and outer ends, as shown.

The operation of the furnace is as follows: The door 14 of the gas-chamber is closed. A fire is now started in the warming and cleaning chamber and kept at a low heat until the kiln is "water-smoked" and the combustion-chamber is heated. The door in the feed or gas chamber is now opened and a charge of coal placed on the bottom or floor of the gas or feed chamber. The door is then closed and the coal left until it is reduced to coke. It is then pushed back into the combustion-chamber and another charge of coal is placed on the bottom of the gas or feed chamber.

The gas formed from the coal during its reduction into coke is drawn from the gas-chamber into the heated combustion-chamber, where it ignites before entering the kiln, thereby greatly increasing the heating capacity of the furnace.

The converging sides of the gas-chamber 6 from the rear to the front of the same forms a large area at the rear for the combustion of gas with a small amount of fuel in front.

The construction of the combustion-chamber renders the use of grate-bars unnecessary, thereby reducing the expense incurred in the provision and renewal and repair of the same. A perfect combustion is to be had in a furnace constructed as herein described, thereby making less ashes and no smoke when the kiln is on full fire. Less coal is also required in this furnace, thus reducing the cost of operating the kiln.

Kilns heated by these furnaces may be used for burning any grade of clay goods, such as brick, terra-cotta, tile, crockeryware, and the like.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grateless furnace, comprising a gas-forming chamber having forwardly-converging side walls and a contracted feed-opening closed by a door, a warming and cleaning chamber arranged beneath said gas-forming chamber, and a combustion-chamber arranged at the rear of said gas and warming chambers and in communication therewith, substantially as described.

2. A grateless furnace for kilns, comprising a horizontally-disposed gas-forming chamber, open at its inner end, and having an inclined floor and forwardly-converging side walls, a contracted feed-opening formed at the outer end of said chamber, and a sliding door arranged to close said opening, a warming and cleaning chamber arranged beneath said gas-forming chamber, said warming-chamber being open at its outer and inner ends, and a vertically-disposed combustion-chamber arranged in rear of said gas and warming chambers and in communication with the same and opening at its upper end into the interior of said kiln, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT D. McMANIGAL.

Witnesses:

FRED. I. BRIGHT,

S. H. BRIGHT.