

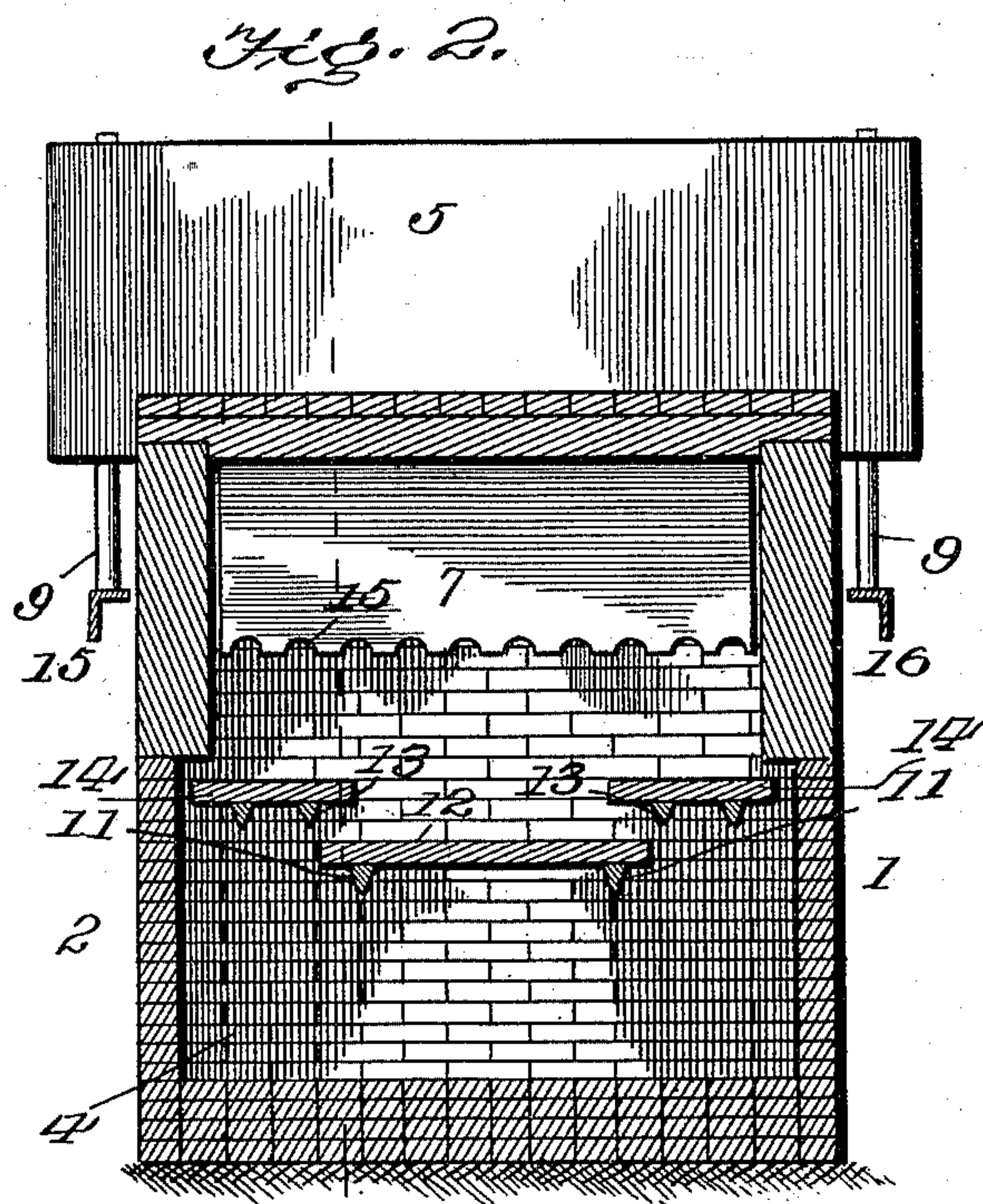
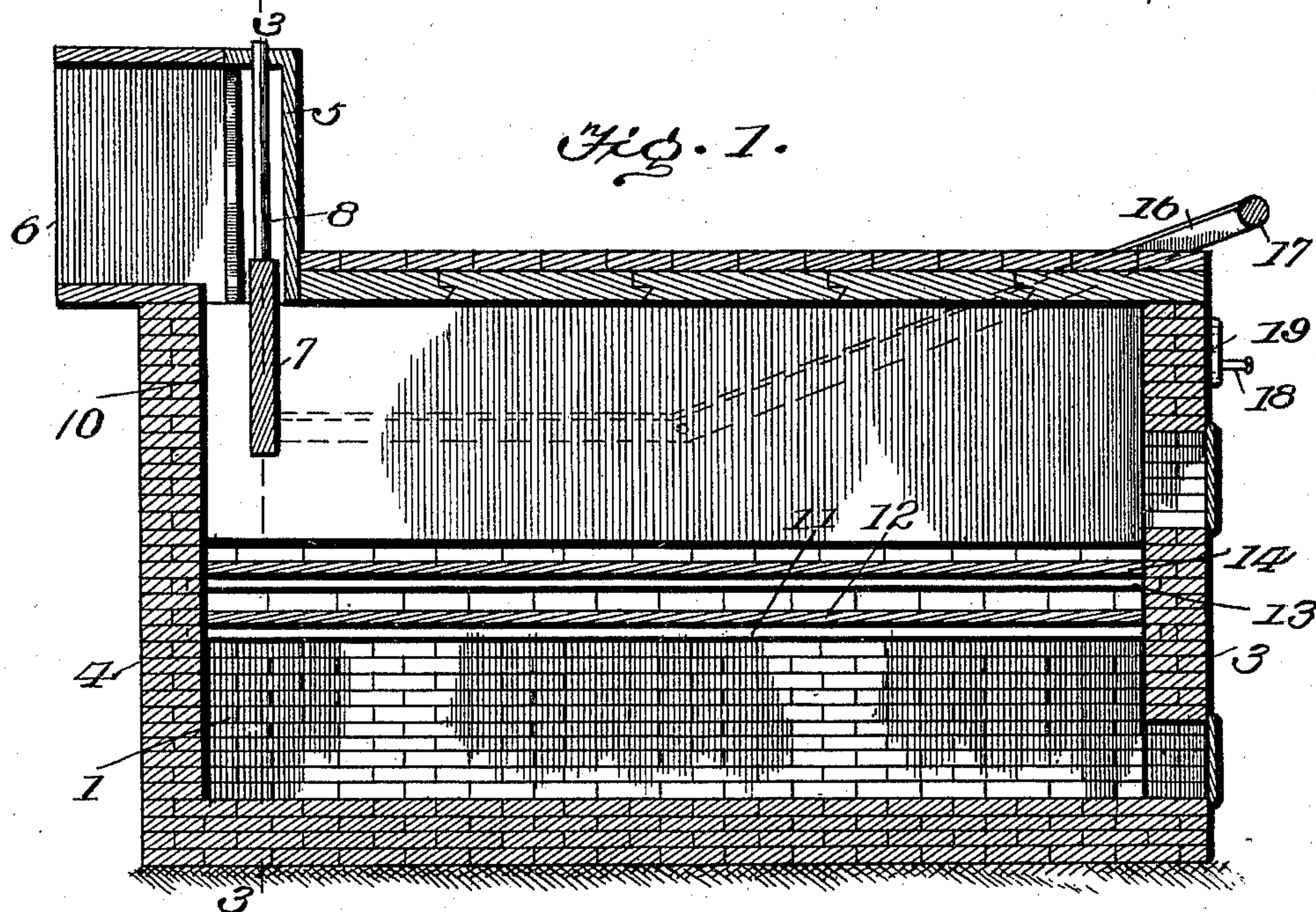
(No Model.)

2 Sheets—Sheet 1.

E. FALES.  
FURNACE.

No. 584,816.

Patented June 22, 1897.



Witnesses  
*James F. Massey*

Inventor  
*Edward Fales*  
by *J. R. Nottingham*  
His Attorney



(No Model.)

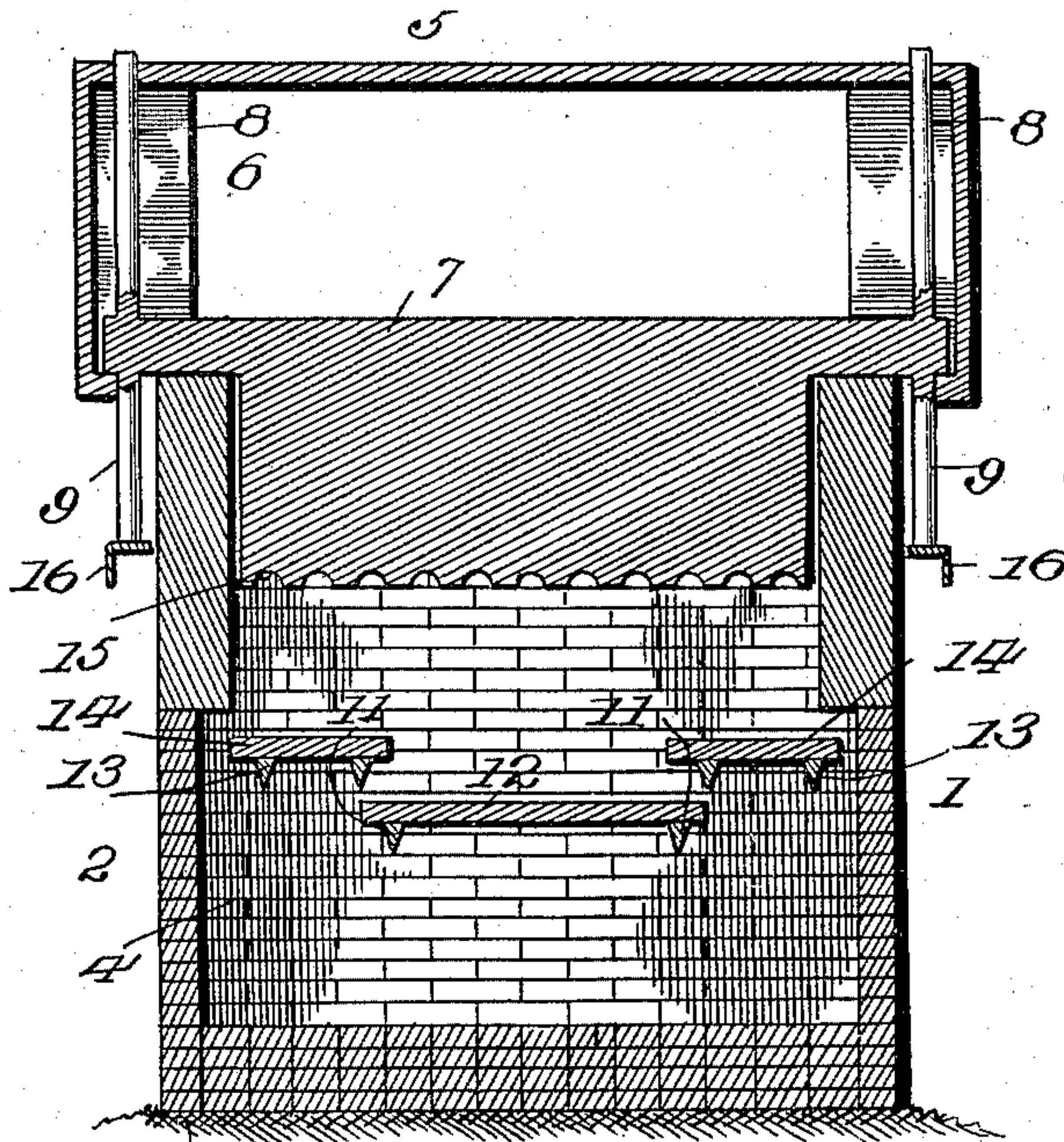
2 Sheets—Sheet 2.

E. FALES.  
FURNACE.

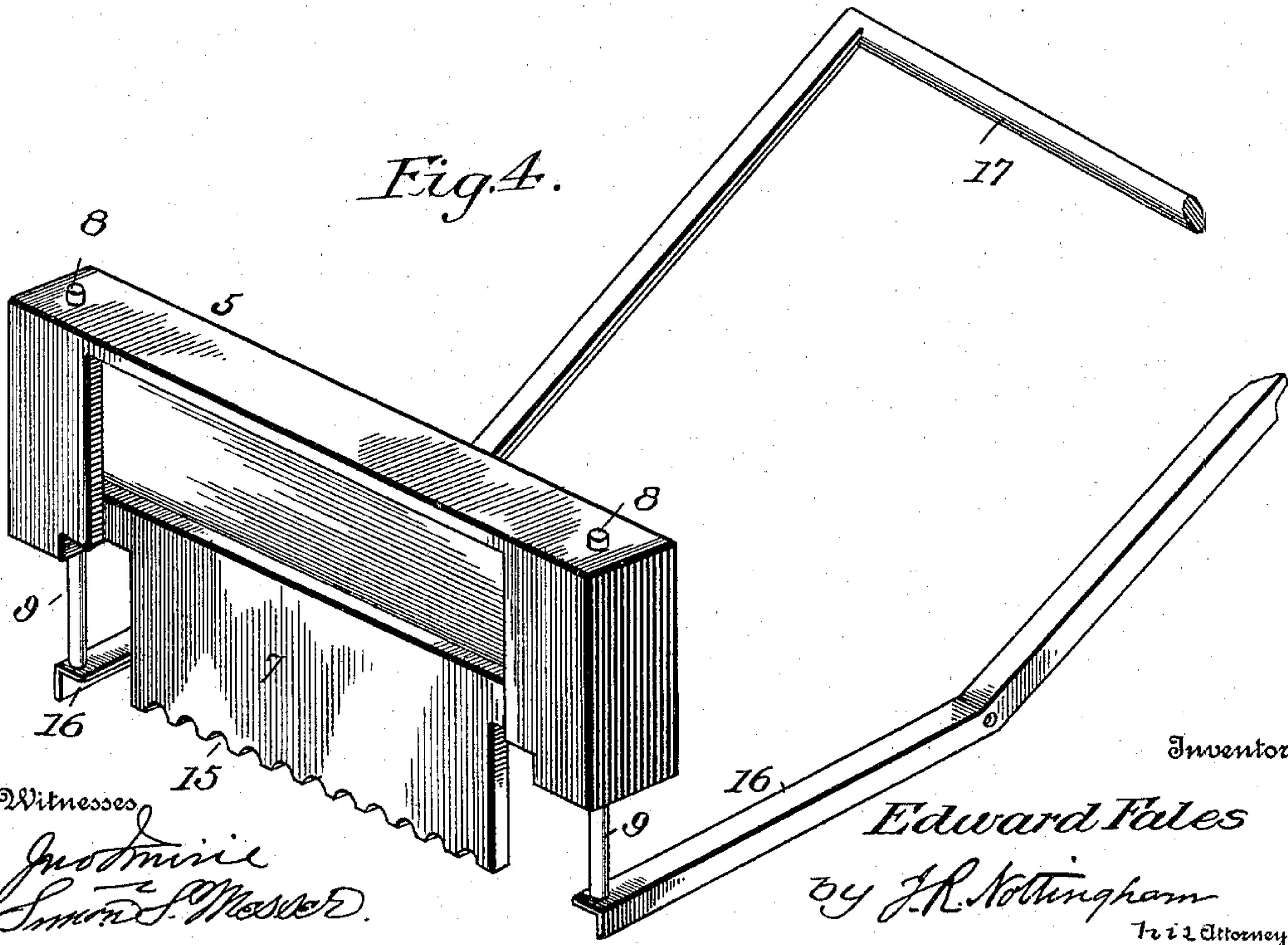
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*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

EDWARD FALES, OF WINTHROP, MASSACHUSETTS.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 584,816, dated June 22, 1897.

Application filed May 10, 1897. Serial No. 635,950. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD FALES, a citizen of the United States, residing at Winthrop, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Furnaces; and I do hereby 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.

My invention relates to furnaces; and it consists in the new and useful construction and novel arrangement of the several parts, as will be hereinafter described, and particularly pointed out in the claims.

The principal object sought to be accomplished by means of the invention is to effect a saving in fuel and to consume the smoke before it escapes into the smoke-stack or chimney, whether hard or soft coal be used as fuel.

Another and an essential object of the invention is the attainment of a much greater degree of heat than has been heretofore obtained from the same amount of fuel.

These objects I attain by means of the apparatus illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view of my improved furnace; Fig. 2, a central transverse section of the same; Fig. 3, a similar section on line 3 3 of Fig. 1; and Fig. 4, a perspective view of the casing or housing, the adjustable retarder-plate adapted to slide therein, and the connected levers for operating the retarder-plate.

Referring to the several views, the numerals 1 and 2 indicate the respective side walls of the furnace, and 3 and 4, respectively, the front and rear walls thereof. The front and rear walls are preferably constructed entirely of brick of a proper thickness, and the front wall is provided with the usual openings into the fuel or combustion chamber and into the ash-pit below the same, said openings being provided with suitable doors. The side walls are constructed of brick to a point or level just above the line where the upper fuel-supporting plates are to be supported, and for the remainder of the distance they are preferably constructed of slabs of fire-clay of a sufficient thickness to overhang the inner side of the side walls, as shown in Figs. 2 and 3.

The furnace is covered for a greater portion of its length with slabs, preferably fire-clay, of proper thickness, and upon the slabs is laid one or more courses of brick. Over a part of the uncovered portion is arranged a casing or housing 5, of metal or other suitable material or of metal lined with slabs of fire-clay. The rear side of the casing or housing is preferably open the width of the interior of the furnace, and abutting the said side is an exit-flue 6, preferably of fire-clay, which communicates with the opening in the rear side of said casing or housing.

Within the casing or housing is arranged a vertically-movable retarder-plate 7, formed, preferably, of fire-clay, with an arm 8 at each side. The body of the retarder-plate extends down into the furnace between its side walls, and the arms 8 are each provided with a vertical guide-rod 9, the respective ends of which are adapted to slide in holes made in the top and bottom of the casing or housing, said holes being properly packed to prevent the admission of air. The casing or housing is situated a sufficient distance forward of the rear wall of the furnace as to leave a passage 10 between said wall and the retarder-plate for the escape of the products of combustion into the exit-flue.

The numeral 11 indicates two bars or beams running lengthwise of the furnace having their ends embedded in the front and rear walls, respectively, and resting upon said bars is an imperforated slab 12, of fire-clay, which forms the longitudinal central portion of the fuel-support. At either side of the bars or beams 11, parallel therewith and a short distance above, are two similar bars or beams 13, and resting upon each set of said bars is an imperforate slab 14, of fire-clay, which forms the upper side portions of the fuel-support, the three slabs constituting the fuel-support proper. One side of each of the upper portions of the fuel-support projects or extends partly under the overhanging wall of the furnace, leaving a sufficient space between the side wall and the side edge of the said upper portion of the fuel-support and between the latter and the overhanging portion of said side wall for the admission of air from the ash-pit to the incandescent fuel. The other side of each of the upper portions



of the fuel-support projects over the adjacent side of the central or lower portion of the said fuel-support, so as to prevent the coal from dropping through into the ash-pit below and also to form passages for the admission of air to the longitudinally-central portion of the fuel.

As thus constructed the fuel-support is provided with a pocket which extends substantially the entire length of the furnace, and consequently a greater depth of fuel is had along the longitudinal central portion of the support than at the sides thereof. This pocket is closed at the bottom, and it will be observed that the openings for the admission of air are laterally disposed.

It will also be observed that the other openings, through which the air is admitted at the sides of the combustion-chamber, are laterally disposed with reference to the fuel-support as a whole.

In operation the products of combustion rise in the upper part of the furnace and are carried by the draft of the furnace toward the rear and, impinging against the retarder-plate, are drawn downward and under said retarder-plate, up the passage 10, and out through the exit-flue. As combustion is most complete at the rear of the furnace, it will be seen that by retarding the passage of the products of combustion and causing them to pass down through the zone of intense heat at that point the gases and smoky products will be consumed before reaching the exit-passage 10. The lower edge of the retarder-plate is maintained in close proximity to the bed of fuel, and in order to allow for a free passage of the products of combustion thereunder the edge of the plate is provided with a series of open slots 15. The retarder-plate is adjustable vertically by means of two fulcrumed levers 16, one on each side of the furnace, connected together at their forward ends by a bar 17, the free ends of the levers resting under the rods 9. When the furnace is filled with fuel to its capacity, the retarder-plate is raised by pulling down the connected ends of the levers and securing the bar 17 in the desired position by means of a pin 18, which sets over said bar into a hole in a loop or staple 19, secured to the front wall of the furnace, the said loop being provided with a series of such holes to permit of different degrees of adjustment, accordingly as the fuel is being consumed. It will be understood, however, that the retarder-plate may be left free to move, by its own weight, downward as the fuel is being consumed.

In making the fire the ashes are pushed over the side edges of the side plates and the central plate, falling into the ash-pit below.

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

65 1. The combination of a furnace, a fuel-support comprising a central imperforate plate and side imperforate plates supported

above the central plate forming a pocket, and means for admitting air at the side edges of the side and central plates. 70

2. The combination of a furnace and a fuel-support comprising a central imperforate plate and two side imperforate plates, the said side plates arranged and supported above the central plate forming a pocket with the inner side edges of the side plates projecting over the adjacent edges of the same. 75

3. In a furnace, the combination with the side walls having overhanging ledges, of a fuel-support comprising a central imperforate plate and two side imperforate plates forming a pocket, the outer side edges of the side plates extending under and below the overhanging ledges, as and for the purpose set forth. 80 85

4. The combination of a furnace, and a fuel-support comprising a central imperforate plate and two side imperforate plates, the side plates being arranged and supported above the central plate in such a manner that a pocket will be formed and air admitted around and over the side edges of both the side and central plates. 90

5. In a furnace, the combination with the side walls having overhanging ledges, of a fuel-support comprising a central imperforate plate and two side imperforate plates forming a pocket, the outer side edges of the side plates extending under and below the said ledges and their inner side edges over and above the respective side edges of the central plate. 95 100

6. The combination of a furnace and a retarder-plate in the furnace, whereby the passage of the products of combustion is caused to be retarded and directed downward into the bed of incandescent fuel before passing to the exit-flue. 105

7. The combination of a furnace, a casing or housing connected therewith and an adjustable retarder-plate situated partly within said casing or housing and the furnace, substantially as specified. 110

8. The combination with a furnace, of a casing or housing connected therewith, a retarder-plate situated partly within said casing or housing and the furnace, and means for vertically adjusting the retarder-plate, substantially as specified. 115

9. The combination with a furnace and its exit-flue, of a casing or housing opening into the furnace and communicating with the exit-flue, and a retarder-plate vertically adjustable in said casing or housing and the furnace, substantially as specified. 120 125

10. The combination with a furnace and its exit-flue, of a casing or housing opening into the furnace and communicating with said exit-flue, a retarder-plate having arms provided with guide-rods adapted to slide in said casing or housing, and means for vertically adjusting said retarder-plate, substantially as specified. 130

11. The combination, of a furnace and a



fuel-support having a fuel-pocket extending substantially the whole length of the combustion-chamber, the said fuel-support and the said pocket being provided with laterally-disposed openings for admitting air.

12. The combination, of a furnace having greater length than width and a correspondingly-shaped fuel-support having a fuel-pocket extending substantially the whole length of the combustion-chamber, the said fuel-support and the said pocket being provided with laterally-disposed openings for admitting air.

13. The combination, of a furnace, a fuel-support having a fuel-pocket extending substantially the whole length of the combustion-chamber, means for admitting air, and an automatic retarder-plate for directing the passage of the gases down into the bed of the fuel.

In testimony whereof I affix my signature in the presence of two witnesses.

EDWARD FALES.

Witnesses:

J. R. NOTTINGHAM,  
GEORGE J. BOND.