

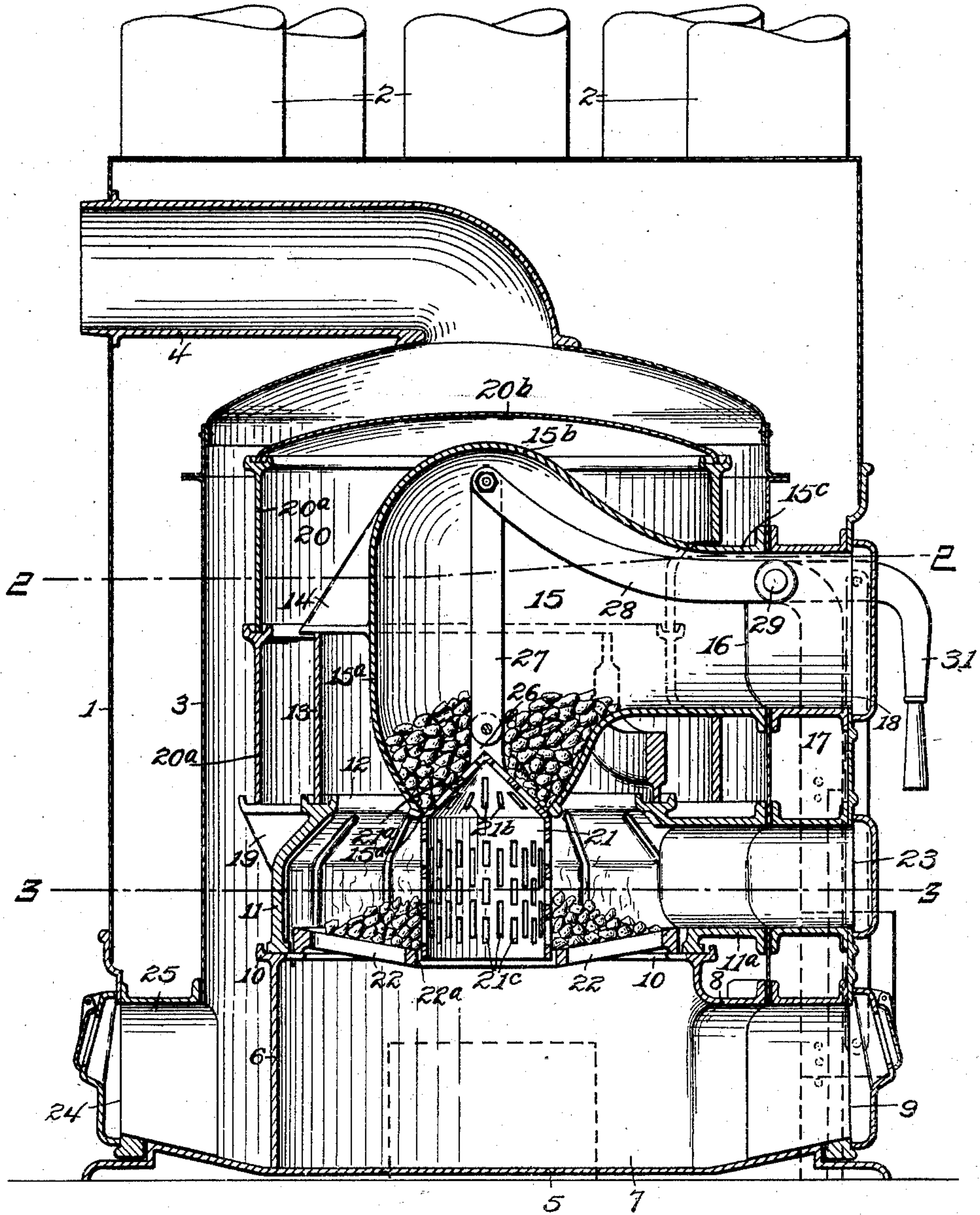
J. M. KELLER.
HOT AIR FURNACE.
APPLICATION FILED JUNE 3, 1908.

928,259.

Patented July 20, 1909.

3 SHEETS—SHEET 1.

Fig. I



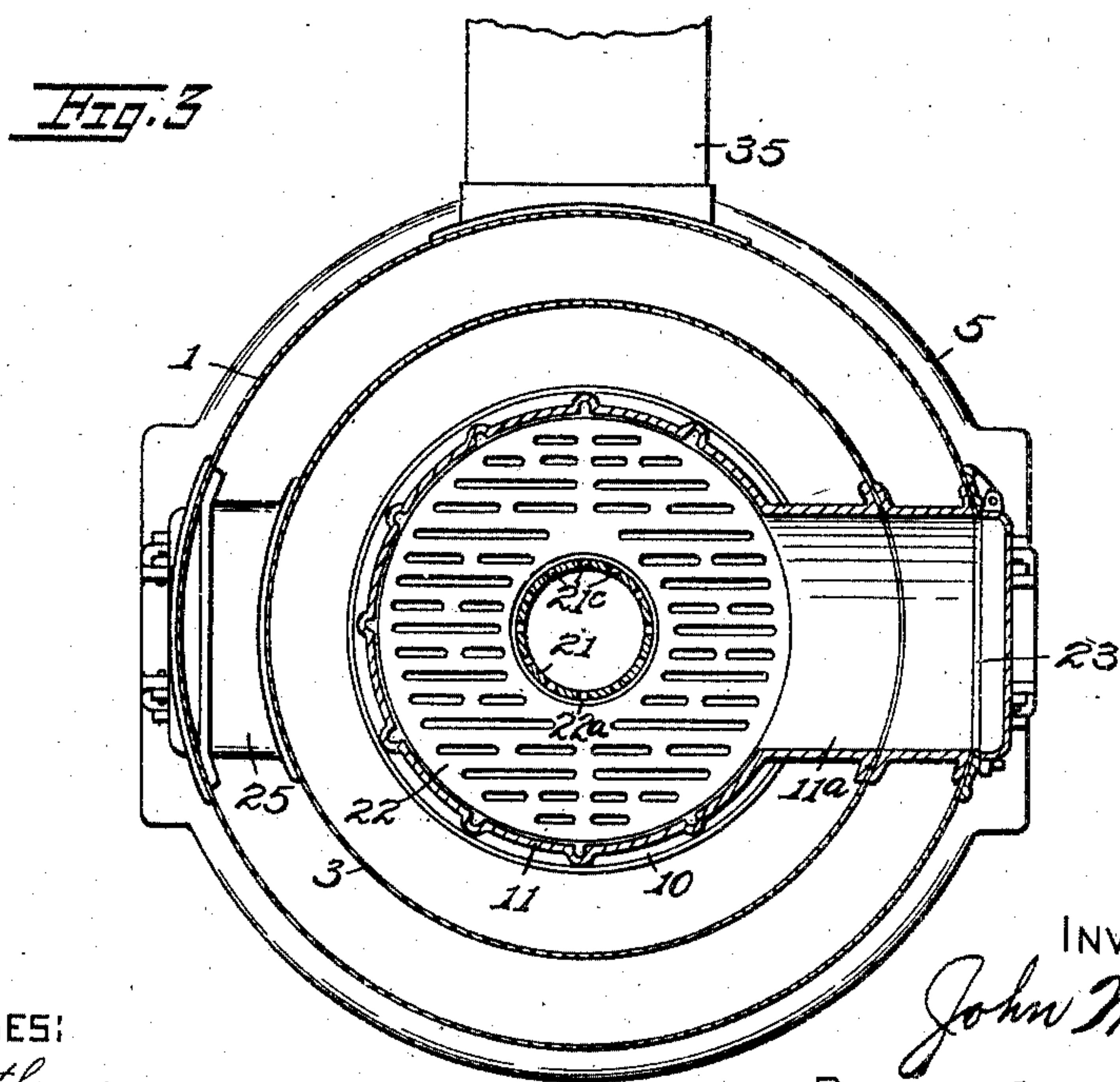
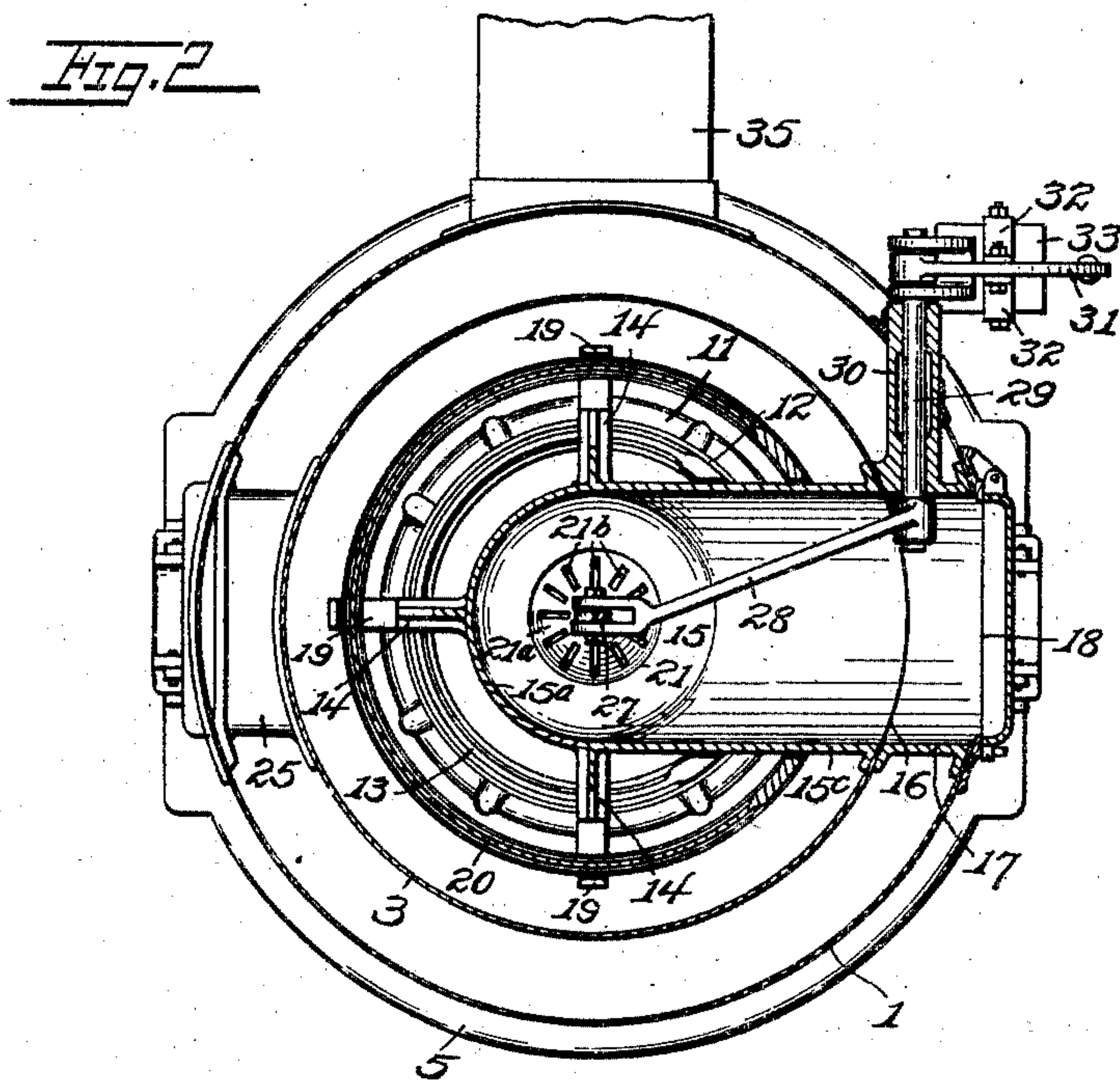
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3 SHEETS—SHEET 2.



WITNESSES:
H. E. Arthur,
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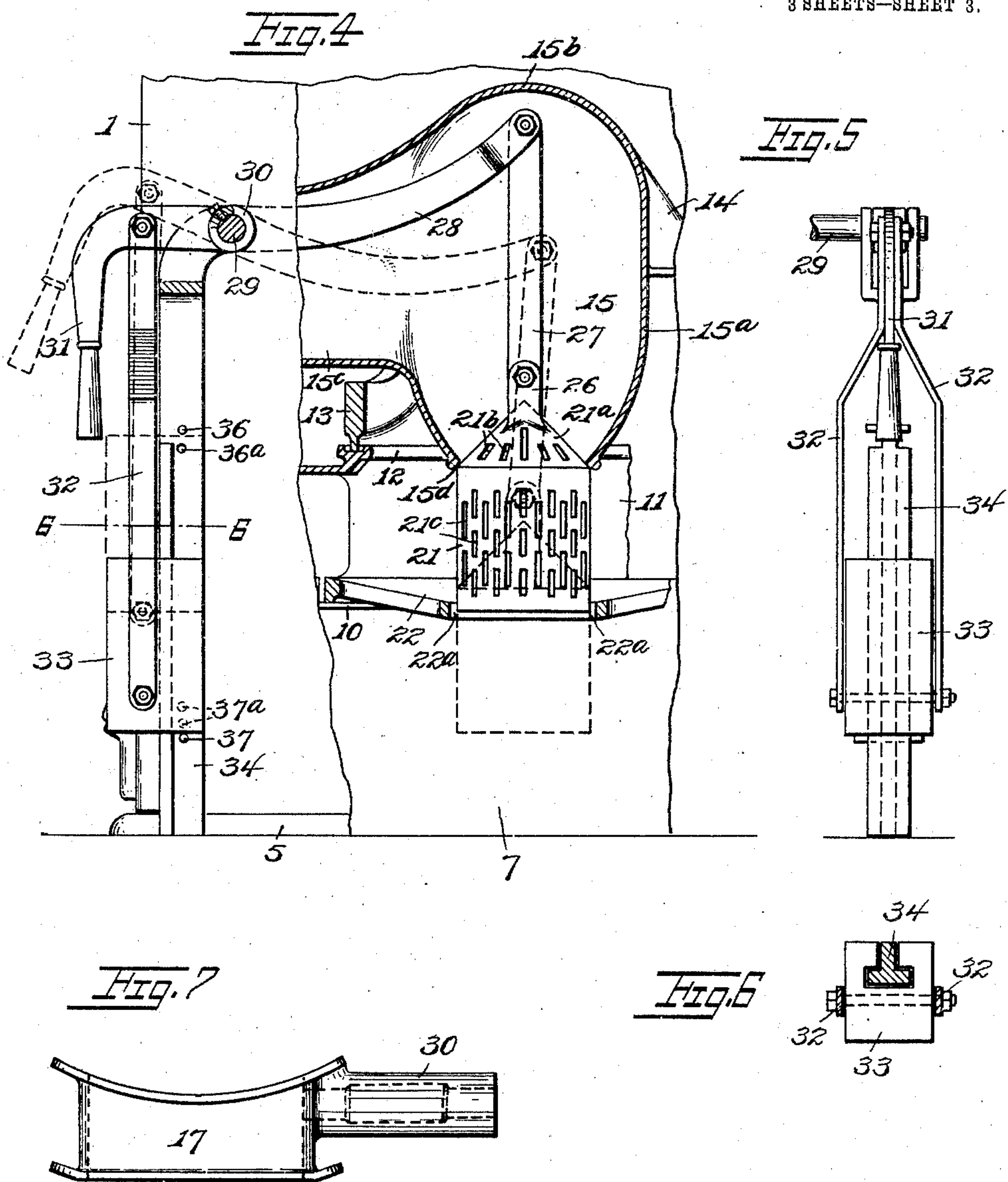
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOHN M. KELLER, OF YOUNGSTOWN, OHIO.

HOT-AIR FURNACE.

No. 928,259.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed June 3, 1908. Serial No. 436,347.

To all whom it may concern:

Be it known that I, JOHN M. KELLER, a citizen of the United States of America, and resident of Youngstown, county of Mahoning, and State of Ohio, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

This invention relates to improvements in hot-air furnaces, and it has for its primary object to provide a furnace having superior heat-generating attributes or characteristics.

A further object of the invention is to provide a hot-air furnace of the gas-producer type wherein the gas is extracted from the coal prior to the combustion of the latter and is directed into the combustion chamber for facilitating the combustion of the fuel contained therein.

A still further object is to provide a furnace of the character mentioned which, owing to the almost perfect combustion of the fuel had therein, effects a material and manifest economy in the use of said fuel, and a still further object is to provide a furnace which has convenient and efficient means for more or less evenly distributing the fuel over the grate-bars of the combustion chamber.

With these and various other objects in view, all of which will hereinafter be made apparent, the invention finally consists in the particular construction, arrangement and combination of parts which will hereinafter be fully described, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central vertical section of the furnace which constitutes my invention; Fig. 2 is a horizontal section of the same on the line 2—2, Fig. 1; Fig. 3 is a similar section on the line 3—3, Fig. 1; Fig. 4 is a plan view, partially in section, of a portion of the furnace; Fig. 5 is a front elevation of a portion of the bell-operating means; Fig. 6 is a horizontal section on the line 6—6, Fig. 4; and Fig. 7 is a side elevation, enlarged, of the shaft-bearing and of the distance-piece of which it forms an integral part.

Referring to said drawings, in which like reference characters designate like parts throughout the several views—1 indicates an outer shell or casing, preferably of sheet metal, and 2 a plurality of heat-conducting pipes leading from the top of said shell. Located within and spaced away from the shell

1 is an inner shell or casing 3, also preferably of sheet metal, from whose top leads a smoke-conducting pipe 4.

Mounted upon a base 5 which forms the bottom of the furnace is a substantially cylindrical cast-iron shell 6, open at its top, whose interior forms an ash-pit 7. Said shell 6 has at one side thereof an extended substantially tubular neck-portion 8 which projects outward through the side of the shell 3, and access to said neck-portion is had through a door-closed opening 9 in the outer shell 1. An integral annular flange 10 carried by the upper edge of the shell 6 serves as a base upon which rests a substantially circular fire-pot 11, preferably of cast-iron, which is upwardly tapered so that its circumference at its top is materially less than at its base.

Mounted upon an annular channeled flange 12 carried by the upper edge of said fire-pot is a substantially cylindrical cast-iron ring 13 upon whose upper edge is supported a plurality of supporting lugs 14 carried by a gas-producer 15 which consists of a body portion 15^a, for containing a body of fuel, said body portion being preferably elliptical in vertical section and circular in horizontal section, and having a dome-like top 15^c and a horizontal hollow neck-portion 15^e through which the coal is supplied, said neck-portion projecting outwardly to an opening 16 in the shell 3. A hollow distance-piece 17 is interposed between a door-closed opening 18 in the outer shell 1 and said opening 16.

Mounted upon outwardly-extending supporting-arms or lugs 19 formed integral with said fire-pot 11 and spaced substantially midway between said ring 13 and the shell 3 is a shell 20 preferably consisting of a plurality of superposed circular cast-iron rings 20^a, and having its top closed by a cap 20^b. Said cap serves as a baffle for the products of combustion, causing said products, as they rise from the fire-pot through the ring 13 which encircles the body portion 15^a of the gas-producer, to pass downward between the walls of the shell 20 and the ring 13 and to enter the chamber inclosed by the shell 3. Suspended beneath said body portion of the gas-producer is a vertically-movable bell 21 of cylindrical form and having a cone-shaped top 21^a provided with slot-like perforations 21^b, said conical top being adapted, when said bell occupies its normal position, to close a circular opening 15^d in the bottom of

the body portion of the gas-producer. The cylindrical body of said bell is also provided with slot-like perforations, herein designated 21^c.

5 Mounted upon the inner edge of the flange 10 of the shell 6 is a circular grate 22 having a central circular opening 22^a therein within which the bell 21 is held, as shown. Access is had to the interior of the fire-pot for stirring the fuel upon the grate, etc., through a door-closed opening 23 to which a substantially tubular neck-portion 11^a leads from said fire-pot; and access is similarly had with the interior of the shell 3 at its base through a door-closed opening 24 and a hollow distance-piece 25 interposed between the shells 1 and 3. Combustion of the coal which lies in a bed on the grate takes place within the fire-pot, and additional coal is supplied to the grate by partially lowering the bell 21 into the ash-pit 7 and away from the opening 15^a, thus allowing the coal contained in the gas-producer 15 to drop or to be poked down in a circle about the bell. The heat resulting from combustion, in playing upon the bottom of the gas-producer, extracts the gas from, and consequently cokes, the coal contained in said producer. The gas passes downward into the bell 21 through the slots 21^b in the conical top 21^a thereof, and thence passes outward through the slots 21^c therein directly to the interior of the fire-pot, or to the fire on the grate. This results in producing a heat of greater intensity than would be produced were fresh coal supplied directly to the fire-pot or grate.

For effecting the lowering and raising of the bell 21, a series of levers and other associated mechanism is employed, the preferred embodiment of which is shown in the drawings and will not be described.

Pivotally connected at its lower end to upright lugs 26 carried by the conical top of the bell, and located within the gas-producer, is the lower end of a substantially upright link 27, whose upper end is pivotally connected to the inner end of a lever 28 whose outer end is fixed upon the inner end of a transverse shaft 29 journaled in an appropriate bearing 30 which is cast integral with the distance-piece 17 and lies substantially tangential to the shell 3 and has its outer end projected outward through the shell 1. The outer end of said shaft 29 has fixed thereon an operating-lever 31, preferably of angular formation, as shown, whereby said shaft may be rotated slightly forward to effect the lowering of the bell. Pivotally connected to said operating-lever at their upper ends is a pair of suspension-links 32 which support at their lower ends a weight 33 by means of which the weight of the bell is counterbalanced and which normally sustains said bell in its upraised or normal position. Said weight is feathered on one side and is in ver-

tically-movable relation to a stationary guiding-post 34 located adjacent to and exteriorly of the shell 1, as is clearly shown in Figs. 2, 5 and 6. For limiting the travel of the bell, stops 36 and 37 are respectively located above and below the weight 33 at desired points whereby the movement of said weight is limited, said stops being in the form of removable pins. A series of aligned holes 36^a and 37^a are provided in the post 34 for the reception of said pins. Cold air is supplied to the interior of the shell 1 through the usual cold-air box 35.

As is apparent, the construction of grate, gas-producer, bell and bell-operating mechanism may be readily applied or adapted to any type of heater other than the hot-air heater herein shown and described, as, for instance, to hot-water heaters, steam heaters, or to water-tube boilers, steam boilers and the like.

It will be observed that various changes or alterations within the scope of the appended claims may be resorted to without departing from the general spirit or scope of the invention. Hence, I do not limit myself to the precise construction and arrangement of parts herein shown and described.

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

1. In a furnace, a grate having a central opening therein, a gas-producer shell having a feed opening in its side and an opening in its bottom, said shell being supported above said grate, a bell suspended in the opening in the grate and underlying said producer shell and closing the opening in the bottom of the latter, said bell being adapted for lowering through the grate-opening to admit of the unobstructed passage of fuel from the producer to the grate through the bottom of the former.

2. In a furnace, a grate having a central opening therein, a gas-producer shell located over said grate and adapted to receive heat therefrom, said shell having a fuel-feed opening therein and having an opening in its bottom, and a perforated element normally closing the opening in the bottom of said shell and vertically movable in the opening in the grate, said element being adapted to be moved away from said bottom opening to admit of the passage of fuel from the producer to the grate.

3. In a furnace, a grate, a gas-producer shell located over said grate and adapted to receive heat therefrom, said shell having a fuel-feed opening therein and having an opening in its bottom, a tubular member having a conical top normally closing the opening in the bottom of said shell, means for lowering and raising said member respectively from and to said opening, said member having openings therein for admit-

ting of the passage of gas generated in the producer to the grate when the former occupies its normal position.

4. In a furnace, a fire-pot, a grate having an opening therethrough, a gas-producer located over said grate and adapted to contain a body of coal, said producer having an opening in its bottom and being adapted to be heated by the fire on the grate within the fire-pot for extracting the gas from the coal contained therein, and a perforated vertically-movable member normally closing both of said openings and adapted for lowering through the grate-opening to free the gas-producer opening from obstruction.

5. In a furnace, a fire-pot, a grate, a gas-producer located over said grate and adapted to contain a body of coal, said producer being provided with a bottom-opening and being adapted to be heated by the fire on the grate within the fire-pot for extracting the gas from the coal contained therein, a perforated vertically-movable suspended member normally closing said opening, and means for lowering and raising said member with respect to said opening for respectively feeding coal to the grate and cutting off the coal supply to the grate.

6. In a furnace, a fire-pot, a grate, a gas-producer located over said grate and adapted to contain a body of coal, said producer having a bottom opening therein and being adapted to be heated by the fire on the grate within the fire-pot for extracting the gas from the coal contained therein, a perforated member normally closing said bottom opening and being vertically movable through said grate to and away from said opening, means for normally holding said member in upraised position, and means whereby said member may be lowered to admit of the passage of coal from said producer to the grate.

7. The combination with a plurality of air-chamber-inclosing shells, of a grate, a gas-producer, having a direct coal-feed, mounted over said grate for receiving heat emanating therefrom whereby the gas is extracted from the coal contained therein, said producer having an opening in the bottom thereof, a conical member having communicating openings in its top and sides, said member normally closing said bottom opening against the passage of coal from the gas-producer, and means for lowering said member from said opening, said communicating openings being adapted for admitting of the unobstructed passage of gas generated in said producer to the fire on the grate.

8. The combination with a plurality of air-chamber-inclosing shells, of a grate, a gas-producer, having a direct coal-feed, mounted over said grate for receiving heat emanating therefrom whereby the gas is extracted from the coal contained therein, said producer having an opening in the bottom

thereof, a member suspended below and normally closing said opening against the passage of coal from said producer, said member being provided with perforations therein, means whereby said member may be lowered with respect to said opening for admitting of the passage of coal from the producer to the grate, and means for limiting the downward movement of said member.

9. The combination with a plurality of air-chamber-inclosing shells, of a grate, a gas-producer, having a direct coal-feed, mounted over said grate for receiving heat emanating therefrom whereby the gas is extracted from the coal contained therein, said producer having an opening in the bottom thereof, a cylindrical body having a conical top suspended beneath said producer with said conical top normally closing said opening, said cylindrical body having perforations in its said top and in its sides for permitting gas generated in the producer to escape to the fire on the grate, and means for lowering said body with respect to the producer.

10. The combination with a plurality of air-chamber-inclosing shells, of a grate, a gas-producer, having a direct coal-feed, mounted over said grate for receiving heat emanating therefrom whereby the gas is extracted from the coal contained therein, said producer having an opening in the bottom thereof, a cylindrical body having a conical top suspended beneath said producer with said conical top normally closing said opening, said cylindrical body having perforations in its said top and in its sides for permitting gas generated in the producer to escape to the fire on the grate, and a series of levers whereby said body may be lowered with respect to said producer.

11. The combination with a plurality of air-chamber-inclosing shells, of a grate, a gas-producer having a direct coal-feed, mounted over said grate for receiving heat emanating therefrom whereby the gas is extracted from the coal contained therein, said producer having an opening in the bottom thereof, a cylindrical body having a conical top suspended beneath said producer with said conical top normally closing said opening, said cylindrical body having perforations in its said top and in its sides for permitting gas generated in the producer to escape to the fire on the grate, a series of levers whereby said body may be lowered with respect to said producer, and means whereby said body is automatically elevated after lowering and is sustained in its normal upraised position.

12. The combination with a plurality of air-chamber-inclosing shells, of a grate, a gas-producer, having a direct coal-feed, mounted over said grate for receiving heat emanating therefrom whereby the gas is extracted from the coal contained therein, said producer

having an opening in the bottom thereof, a
cylindrical body having a conical top sus-
pended beneath said producer with said con-
ical top normally closing said opening, said
5 cylindrical body having perforations in its
said top and in its sides for permitting gas
generated in the producer to escape to the
fire on the grate, a series of levers whereby
said body may be lowered with respect to

said producer, and a weight whereby said 10
body is automatically sustained in its normal
upraised position.

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

JOHN M. KELLER.

Witnesses:

R. H. JACOBS,

B. M. CAMPBELL.