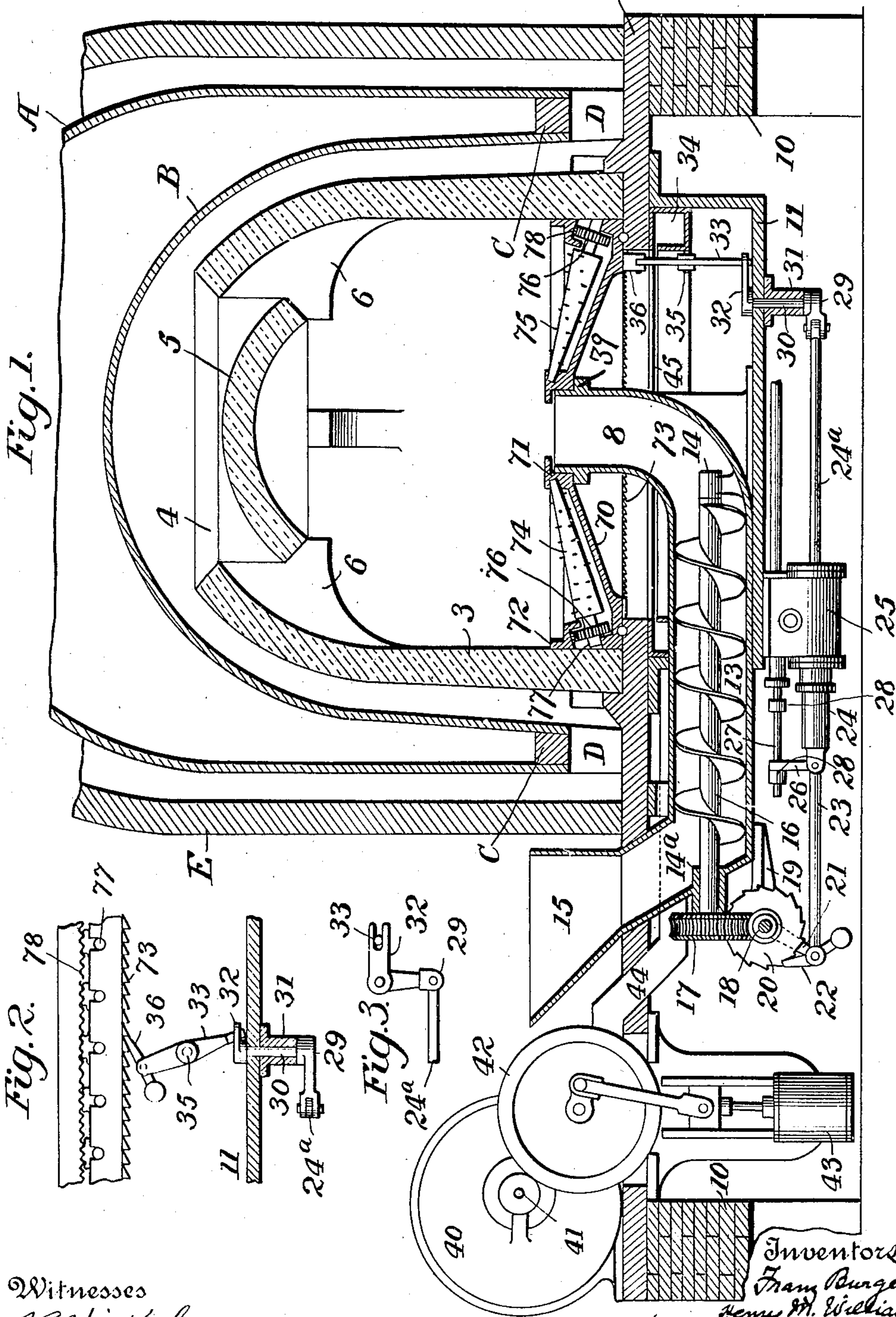


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 DOME SHAPED INCANDESCENT FURNACE.
 APPLICATION FILED MAY 15, 1905.

923,404.

Patented June 1, 1909.



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DOME-SHAPED INCANDESCENT FURNACE.

No. 923,404.

Specification of Letters Patent.

Patented June 1, 1909.

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To all whom it may concern:

Be it known that we, FRANZ BURGER and HENRY M. WILLIAMS, citizens of the United States, residing at Fort Wayne, in the county of Allen, State of Indiana, have invented certain new and useful Improvements in Dome-Shaped Incandescent Furnaces, of which the following is a specification.

Our invention relates to improvements in what may properly be termed incandescent furnaces which are preferably in a dome-shaped form and which are adapted to be used in connection with a similarly shaped boiler, the object being to produce a furnace in which the fuel is made incandescent without producing smoke and the combustion products are consumed before leaving the fire-box, and to these ends our invention consists in a furnace embracing the various features of construction and arrangement of parts having the general mode of operation and producing the results substantially as hereinafter more particularly set forth.

In the accompanying drawings we have illustrated so much of a furnace and boiler and attachments as is necessary to a clear understanding of our invention, in which—

Figure 1 is a vertical sectional view through the furnace, boiler and fuel and air operating devices some parts being shown in elevation. Fig. 2 is a detail showing the grate operating devices, and Fig. 3 is another detail showing the levers which transmit reciprocating motion to the grate operating devices.

As above intimated, one of the objects of our invention is to provide a furnace wherein the fuel may be completely burned and the gases consumed so that the heat of the fuel may be utilized to the best advantage and the parts of the furnace in operation be rendered practically incandescent, and furthermore to provide such a furnace with means for supplying the fuel and air under pressure and properly distributing it in the furnace, and while the furnace may be of different shapes, it is preferably dome-shaped and is used with a boiler of similar shape, and it is in this connection that we will describe our invention, without necessarily limiting it to the precise details or shape shown.

In the accompanying drawings E repre-

sents a metal jacket which constitutes the outer casing of the furnace chamber, and it is made dome-shaped as indicated. Within this casing and separated therefrom is the boiler made up of the outer shell A and the inner shell B each of which shells is made dome-shaped. The outer shell A is separated from the metal casing E so as to leave a space for the passage of the products of combustion. The two shells A and B are united at their lower edges by the mud ring C, and below this mud ring the shells are provided with ports or passages D for the products of combustion.

Arranged within the dome-shaped cavity in the bottom of the boiler there is a dome-shaped fire box 3 which is made of highly refractory material and which is provided near its top with a central opening 4. Below this opening and on the inside of the fire box 3 is a dome-shaped deflecting plate 5 of refractory material which is preferably supported by brackets 6 formed on the walls 3 of the fire box. In the present instance the lower portions of the boiler, jacket and fire box are shown as mounted upon a plate 9 which is suitably supported by masonry 10, and beneath the plate is fastened the air chamber or ash box 11. It will be observed that since the fire box 3 is of substantially the same shape as the dome-shaped cavity in the boiler formed by the inner shell B a passage will be formed between the fire box 3 and the shell B for the passage of products of combustion.

The fire box is preferably provided with a revolving circular grate having rotating grate-bars, such for instance as shown more particularly in the application of F. Burger, Serial No. 245,772, filed Feby. 15th, 1905, to which reference is made for the details of construction and arrangement. Furthermore the fire box is provided with a central fuel feeding tube indicated at 8. In the present instance, to briefly describe the revolving grate, it comprises a spider 70 having a central rim 71 bearing on a flange 39 on the central feed tube, while its outer rim 72 may be suitably supported in connection with the fire-box on the plate 9. This spider is provided with suitable means for revolving it and is shown with a rack 73 on its under side. Mounted on the spider in suitable bearings are the rotating grate-bars 74 having spirally arranged teeth 75, and these are

provided with suitable means for rotating them, as fully set forth in the application above referred to, and, as indicated, by the pinions 76 mounted on the axles 77 of the grate-bars and engaging a rack 78 secured to the wall 3 of the furnace, so that when the grate is revolved the grate-bars rotate on their axes, and, being preferably tapering, as shown, tend to distribute the fuel in the manner set forth in said application.

In the present instance the fuel feeding tube 8 consists of a vertical and a horizontal portion, in the horizontal portion of which is located the fuel conveyer 13, which is shown journaled inside the tube in the box 14 and in the box 14^a in the walls of the tube, which are turned upward at the outer end to form the walls of a hopper 15 to receive the fuel. The shaft 16 of the fuel conveyer is provided at its outer end with a worm wheel 17 into which engages the worm 18 journaled in the boxes 19 which are bolted to the tube 8. On the worm shaft 18 is keyed the ratchet wheel 20, and loosely mounted on the shaft 18 is a lever 21 provided at its outer end with a gravity pawl 22 engaging said ratchet wheel. The end of the lever 21 is connected by the rod 23 to the piston rod 24, and this is shown relatively large in diameter and operates in the cylinder 25. As the power to operate the ratchet wheel 20 is only required in one direction, very little power is necessary on the in-stroke, and therefore the piston rod 24 is purposely made relatively large.

The valves of the engine may be operated in any suitable way, and we have shown the valve stem 27 as provided with two collars 28 adjustably mounted thereon and with an arm 26 connected to the piston rod 24 and adapted to impinge upon the collars to move the valves at the proper time in a well-known manner.

As above intimated, the grate is automatically operated step by step, and we have shown connected to the piston rod 24 a rod 24^a connected to the lever 29 mounted on the shaft 30 working in bearings 31 bolted to the under side of the ash box 11. The shaft 30 projects into the interior of the ash box and is provided with a slotted lever 32 which engages one end of the lever 33 fulcrumed on the air distributing box 34 at a point 35, the upper end of which lever is provided with a gravitating pawl 36 adapted to engage the ratchet toothed rim 73 on the under side of the grate.

We have also shown means for supplying air to the fire box, and while the details of this may vary it consists of a blower 40, the shaft of which is provided with a friction roll 41 engaging a friction wheel 42 driven by an engine 43 mounted on the base plate 9, and leading from the blower is a duct or passage 44 extending to the annular chamber 34 located in the ash box under the grate,

and this air chamber is provided with a circular slot 45 through which the air escapes into the closed ash box and thence through the grate bars into the fire box.

From this description the operation will be readily understood, and it will be seen that the fuel is introduced into the fire box through the tube 8, being continuously fed by means substantially such as that described, and is distributed from the center of the grate toward the periphery thereof by means of the revolving grate and rotating grate-bars, and at the same time air under pressure is fed into the fire box, passing through the fuel, so that the most complete combustion is attained. As a matter of fact the wall 3 and the deflecting crown plate 5 practically become incandescent, and the products of combustion pass up through the opening 4 and down around the walls of the fire box, between them and the inner dome-shaped shell of the boiler, out through the passages D and up the outside of the boiler between that and the jacket E, so that the heat is fully utilized before it escapes to the outside air. In this way not only is the fuel practically consumed so as to make a smokeless furnace, but the heat is utilized economically and is maintained at an even temperature, and the whole provides an economical, simple and efficient furnace for the purposes intended.

It will be observed that the dome-shaped fire box adapts itself for the purposes intended, especially in connection with a similarly shaped boiler arranged substantially as shown in connection with the fire box, and therefore we prefer to embody our invention in such a generally shaped furnace and boiler.

What we claim is:—

1. The combination with a dome-shaped fire box having a central opening at the top, of a circular revoluble grate, means for supplying fuel through the central part of the grate, and a curved deflecting plate below the central opening in the fire-box.

2. The combination with a dome-shaped fire box having a central opening at the top, of a circular grate, means for revolving said grate, a central fuel feeding tube passing up through the grate, and a dome-shaped deflector below the central opening in the top of the fire box.

3. The combination with a dome-shaped fire box having a central opening at the top, of a grate at the bottom of said fire box, a fuel inlet passing through said grate, means for supplying fuel through said inlet, and a curved deflecting plate below the central opening at the top of the fire box so arranged as to deflect laterally the gases arising from the green fuel at the said inlet, and to commingle them with the air passing through the grate.

4. The combination with a dome-shaped

fire box having a central opening at the top, of a circular revoluble grate, means for supplying fuel through the central part of the grate, and a deflecting plate concave on its under surface above said inlet, whereby the hydrocarbon gases from the green fuel at the inlet are deflected laterally and downwardly and intermingled with the air passing through the grate.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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Witnesses:

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