

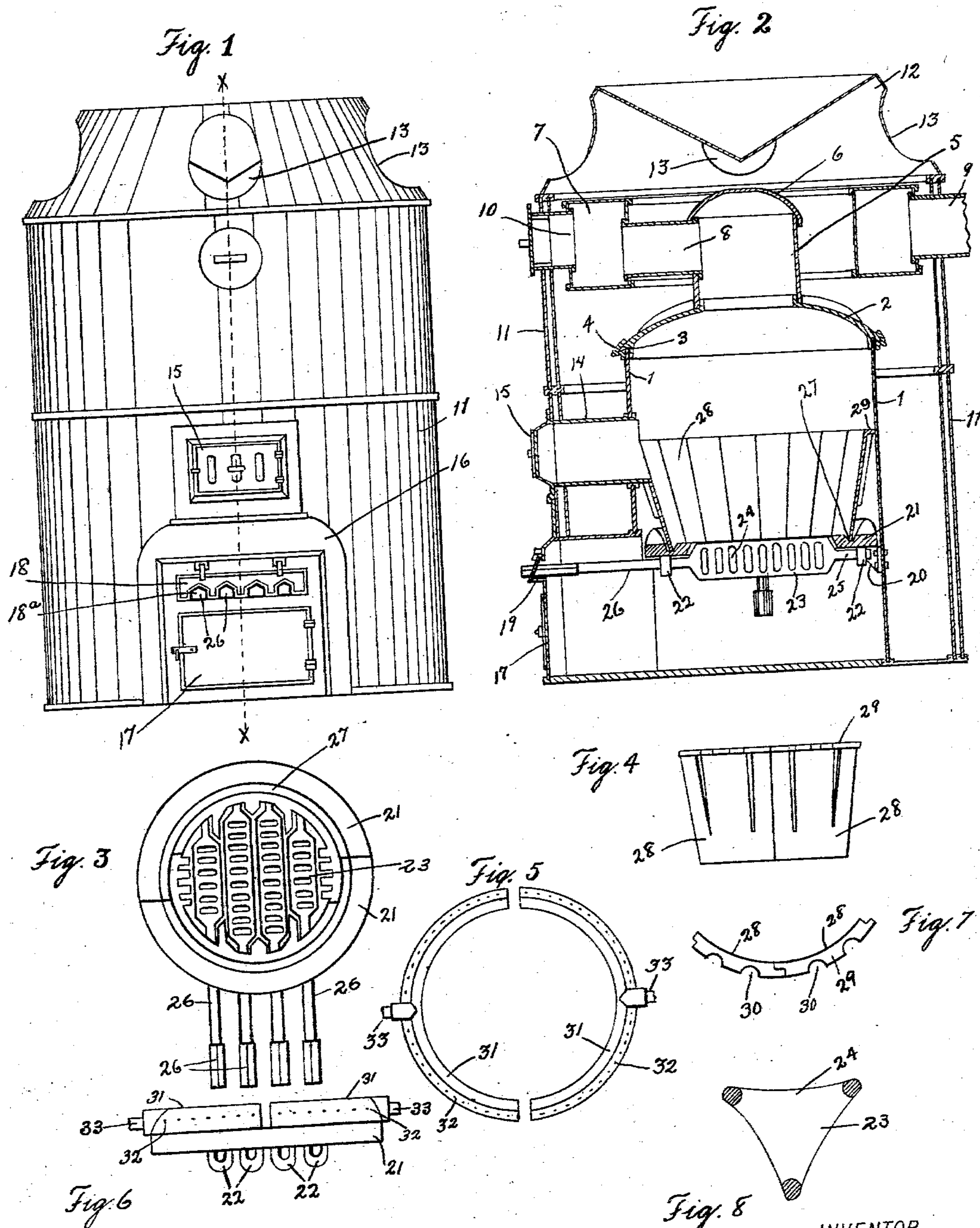
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D. A. EBINGER.  
FURNACE.

APPLICATION FILED JAN. 17, 1903.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

DAVID A. EBINGER, OF COLUMBUS, OHIO.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 753,250, dated March 1, 1904.

Application filed January 17, 1903. Serial No. 139,382. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID A. EBINGER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Furnaces, of which the following is a specification.

My invention relates to the improvement of furnaces; and the objects of my invention are to provide an improved construction of furnace adapted for the burning of either gas or coal, or both; to so arrange and construct the parts thereof as to insure a thorough heating of the air prior to its passage from the furnace-casing and a perfect separation of the products of combustion from the heated air, and to produce certain improvements in details of construction which will be more fully pointed out hereinafter. These objects I accomplish in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of my improved furnace. Fig. 2 is a central vertical section on line *xx* of Fig. 1. Fig. 3 is a plan view of the grate frame and bars with the burner removed therefrom. Fig. 4 is a side elevation of two united sections of the fire-pot. Fig. 5 is a plan view of the burner. Fig. 6 is a side elevation of the grate-bar frame, showing the burner supported thereon. Fig. 7 is a plan view of the fire-pot sections shown in Fig. 4, and Fig. 8 is an enlarged transverse section of one of the grate-bars.

Similar numerals refer to similar parts throughout the several views.

In constructing my improved furnace I provide an internal drum or vertical casing 1, which is preferably of the cylindrical form. This drum or casing 1 is provided with a dome-like cap 2, the lower side of the wall of which is recessed throughout its circumference, as indicated at 3, to receive the upper end of the casing or drum 1. The joint thus effected is made additionally tight by the employment of an external binding-ring 4, which is so shaped in cross-section as to cause its lower portion to embrace the upper end of the drum 1 and its upper portion to embrace the outer and lower portion of the dome 2. This ring is suitably secured in the position shown and

described. Connected with the upper end of the dome and secured about the central opening of the latter is a dome neck or extension 5, which is surmounted by a concavo-convex cap 6. This dome-neck is surrounded by a horizontally-disposed flue-ring 7, which is connected with said dome-neck through the medium of a horizontal flue-section 8. The ring 7 is provided with a smoke-outlet-pipe section 9 and also with a normally closed clean-out opening 10. The internal drum or casing 1, as well as the flue-ring 7, are inclosed by a double-walled external casing 11, which is preferably of sheet metal. This casing 11 is surmounted by a cover-piece 12, in the side wall of which is formed at suitable intervals openings 13, with which may be connected heat-conducting pipes in the usual manner.

Extending through the casing 11 and communicating with the drum 1 is a horizontal doorway-casing 14, the outer projecting portion of which is provided with a suitably-hinged door 15. On its forward side and below the feed-door casing 14 the internal casing or drum 1 is provided with a forward extension 16, which projects through the external casing 11, and which extension in its forward face is provided with a doorway which communicates with the usual pit which is beneath the hereinafter-described grate-bars, this doorway being adapted to be closed by a suitably-constructed hinged door 17. Above the door 17 I provide an elongated opening which is normally closed by a horizontally-disposed door-plate 18, the latter being hinged at its upper side to the projecting portion 16 of the furnace. This door 18 is inclined outward and downward and has its lower portion resting against an outturned lip 19 of the projecting furnace portion 16. For the reason hereinafter described the lower side of the door 18 is formed at intervals with recesses or notches 18<sup>a</sup>.

Within the drum or internal casing 1, at a point below the center of the height thereof, I support by means of suitable brackets, one of which is indicated at 20, a horizontal grate-frame ring 21, which, as indicated more clearly in Fig. 3 of the drawings, is preferably formed of two adjoining ring-segments. Depending

from the under sides of the front and rear portions of the ring 21 are grate-bar bearing-lugs 22.

23 represents grate-bars the bodies of which are preferably triangular in cross-section, as indicated more clearly in Fig. 8 of the drawings, each of these bodies being hollow and formed with side and top slotted openings 24. Each of the grate-bars is provided with a short rearwardly-extending stem or trunnion 25, which trunnions are pivotally mounted in openings of the rear lugs 22, while the forward ends of said bars are provided with longer stems 26, the outwardly-projecting end portions of which are preferably angular in cross-section and which are journaled in the forward lugs 22. The angular or squared end portions of the grate-bar stems 26 project, as shown, through the correspondingly-shaped recesses 18<sup>a</sup> of the door 18.

In forming the grate-bar-frame ring 21 I provide the upper surface thereof with a continuous circular groove 27, in which are supported the lower ends of the sections 28 of the fire-pot. These curved sections or segments are formed with rabbeted sides, so as to overlap each other in the manner indicated in Fig. 7, and the upper ends of said sections are formed with outwardly-projecting flanges 29, which flanges at intervals are formed with recesses 30. The unrecessed portions of the flanges are adapted, as shown, to bear against the inner surface or wall of the casing or drum 1.

Upon the grate-frame ring 21, on the outer side of the lower portion of the fire-pot, I support a burner comprising two substantially half-ring sections 31, these sections being formed on their outer sides with a plurality of comparatively small burner-openings 32. Each of the burner-sections has leading there-to a gas-supply pipe 33.

When coal or similar fuel is used in my improved furnace, it will be understood that such fuel will be fed through the doorway or casing 14 into the fire-pot and that the heat thus generated within said fire-pot and within the internal drum or casing 1 will be radiated from said drum and the air within the external casing 11 heated. The products of combustion, as will readily be seen, will rise into the dome extension 5, from which they will escape through the passage 8 to the ring 7, thence out through the outlet 9. When gas is employed as a fuel, it is obvious that the flame from the sections of the burner-ring will be directed against the inner surface of the drum 1, with the result that said drum will be thoroughly heated. Owing to the fact that the burner is located between the fire-pot and drum and that the inclination of the fire-pot and contact with the drum results in forming

between said parts an annular combustion-chamber it is obvious that the fire-pot will likewise be heated from the gas-flame, thus increasing the heat radiation by the direct heating of the greater metal surface. It will also be understood that both coal or similar fuel and gas may be employed at the same time.

When it is desired to shake or oscillate the grate-bars, it is obvious that a suitable operating crank or key may be applied to the outwardly-projecting ends of the grate-bar stems 26, the door 18 being first thrown upward. This door when in its normal position, however, will serve to lock the grate-bars against rotation.

An advantage in the construction described, which permits of the employment of both coal and gas as a fuel, lies in the fact that the additional heat imparted from the gas-flame results in the consumption of the gas and carbon given off as a result of combustion of the fuel in the fire-pot. In this manner the coal-smoke is practically consumed and the formation of soot within the flues obviated.

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

1. In a furnace, the combination with a casing or drum 1, doorways communicating therewith, a dome surmounting said casing or drum, and a smoke-conducting flue above the drum communicating with the latter, of a grate-bar-supporting-frame ring mounted in said drum, said ring having a continuous groove in its upper side, a sectional fire-pot having its lower end seated in the groove of said ring and having a recessed top flange contacting with the inner surface of said drum and a ring-burner mounted on said grate-bar-frame ring about the base of said fire-pot, substantially as specified.

2. In a furnace, the combination with the furnace-body comprising an internal case or drum 1, an external case and doorways in the latter communicating with said internal drum, said internal case having an extension 16 which projects through the external case and doorway, a hinged door 18 in said extension, said hinged door having angular recesses formed at intervals in its under side, of a grate-frame ring mounted on the inner side of said internal casing and provided with depending bearing-lugs 22, a fire-pot rising from said ring and grate-bars arranged beneath said fire-pot and having end stems journaled in said ring-lugs, the forward stems being angular in cross-section and extending through the recesses of said door 18, substantially as specified.

DAVID A. EBINGER.

In presence of—

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