

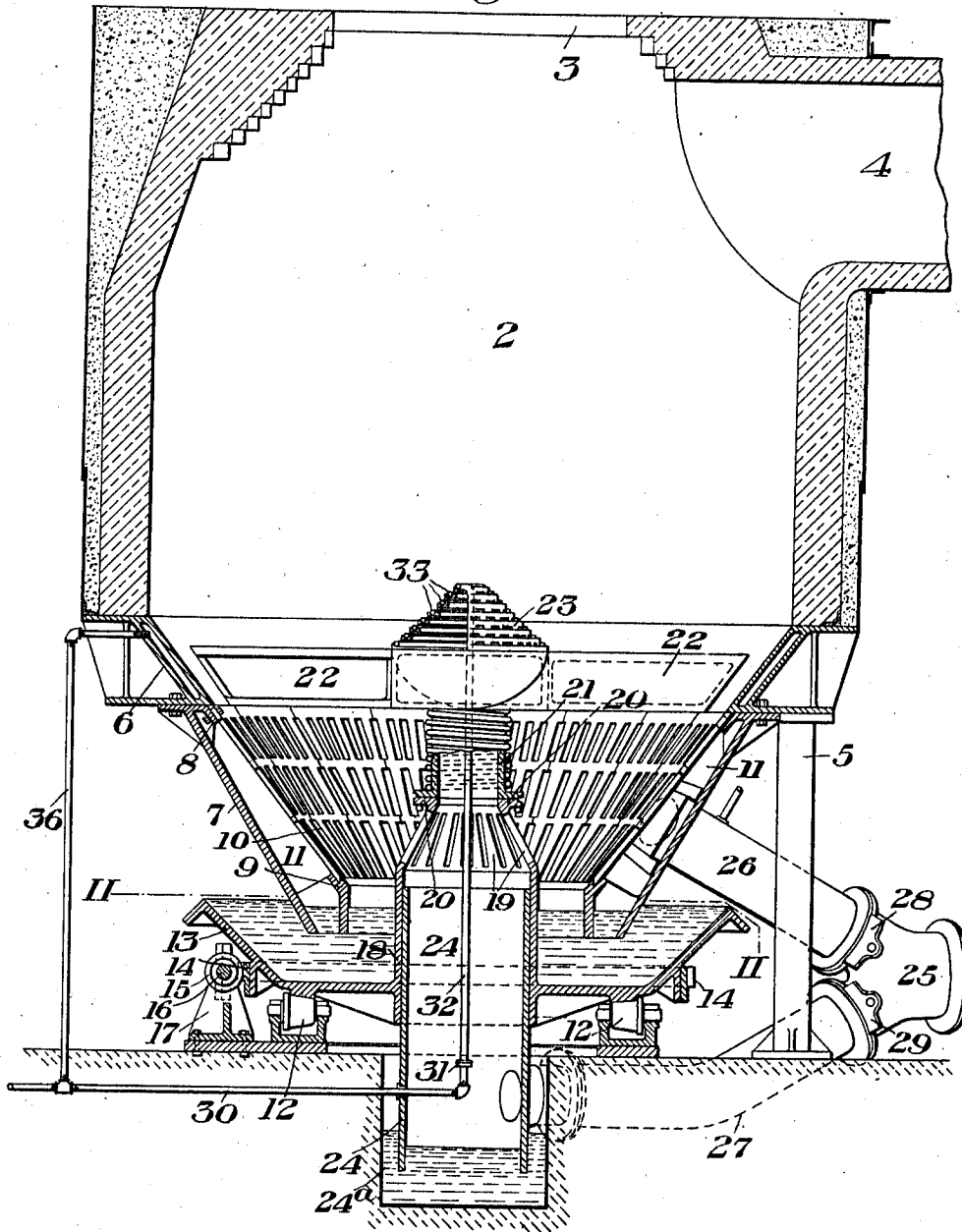
E. VON MALTITZ & H. B. BARNHART.
GAS PRODUCING FURNACE.
APPLICATION FILED DEC. 19, 1908.

988,580.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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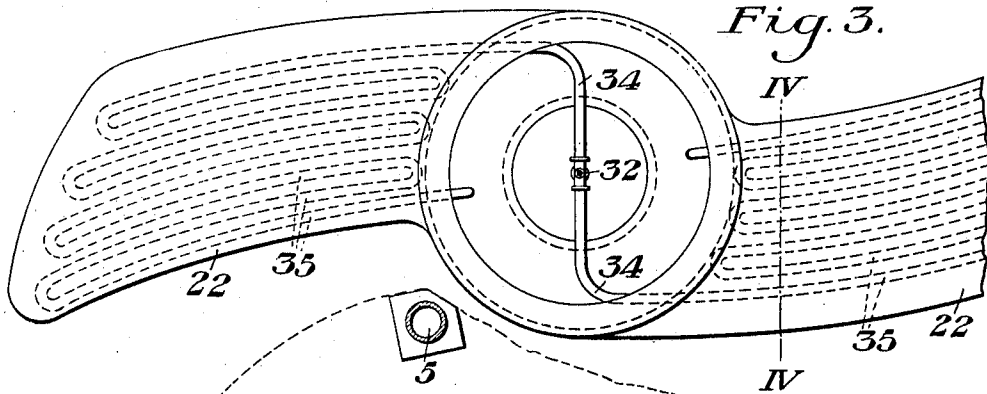


Fig. 2.

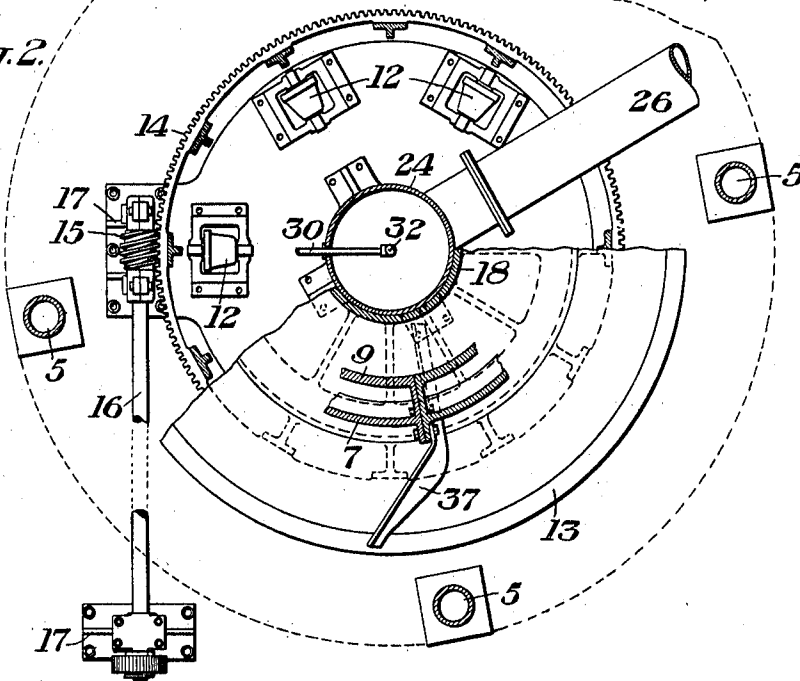
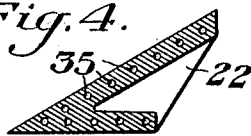


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDMUND VON MALTITZ AND HENRY B. BARNHART, OF CHICAGO, ILLINOIS.

GAS-PRODUCING FURNACE.

988,580.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed December 19, 1908. Serial No. 468,300.

To all whom it may concern:

Be it known that we, EDMUND VON MALTITZ and HENRY B. BARNHART, both of Chicago, Cook county, Illinois, have invented a new and useful Gas-Producing Furnace, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a vertical section through one form of furnace illustrating our invention; Fig. 2 is a sectional plan view on the line II—II of Fig. 1, with parts broken away; Fig. 3 is an inverted plan view of the agitating arms; and Fig. 4 is a sectional view on the line IV—IV of Fig. 3.

Our invention relates to furnaces for producing a uniform gas from solid fuel, with the least amount of manual labor, and is designed to provide means of novel and effective character for leveling the fuel above the grate and for agitating it to keep it free from ash and to prevent the formation of clinkers; also to provide a furnace which will partially gasify the fuel above a grate, while the remaining gas is liberated below the said grate; also to provide a furnace having a novel arrangement and construction of grates, and air supply leading thereto whereby we are enabled to supply air to the fuel from the outside thereof, as well as from a central point within the bed of fuel.

The precise nature of our invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that changes can be made in the construction and arrangement by those skilled in the art without departing from our invention as shown and described.

15 In the drawings, the numeral 2 designates the chamber of the furnace, which is preferably an upright cylindrical shell contracted inwardly at the top, and is provided with a fuel charging inlet 3 and a gas outlet 4. The furnace 2 is supported on columns 5, which are in turn supported on any suitable foundations. The lower portion of the furnace is provided with the hollow frusto-conical base 6 to which is secured or formed integrally therewith a downwardly projecting shell 7, provided with an inwardly and downwardly projecting flange 8 at its upper

end and at its lower end with a flanged ring 9 having projecting ribs between it and the shell 7. Resting on the flange of the ring 9 and secured to the flange 8 of the shell 7 are the grate bars 10, which are arranged to form a hollow, downwardly converging cone.

11 is an air chamber, open at its lower end and whose walls are composed of the shell 7, its flange 8, ring 9 and grate bars 10. Mounted on suitably journaled anti-friction rollers 12 is a water pan 13, having a worm-wheel 14 which is engaged by a worm 15 on a shaft 16 mounted in bearings 17, and which is driven from any suitable source of power to rotate the pan. Projecting upwardly from this pan is the sleeve or casing 18, whose upper portion is provided with the conical grate 19 and the flange 20, and secured to the flange 20 is a hollow hub 21 of an agitator having arms 22, 22. The diameter of the hub is increased at the point to which the arms 22 are secured, and projecting from the upper portion of this hub is the circular step grate 23. Within the sleeve or casing 18 and around which it rotates is a tube 24 whose lower end projects into a water sealing pit 24^a.

25 is an air inlet pipe, to which is connected the branch pipes 26 and 27 having the respective gate valves 28 and 29. The branch pipe 26 leads into the air chamber 11 and the pipe 27 leads into the tube 24.

30 is a water supply pipe leading from any source to the center of the tube 24, and is provided with a joint 31 to which is connected an upwardly projecting pipe 32; this joint 31 permitting a rotation of the pipe 32 with relation to pipe 30. This pipe 32 projects upwardly and is connected to a coil of cooling pipes 33 encircling the central step grate 23, and 34, 34 are branch pipes connected to the pipe 32 and a series of cooling channels 35, 35 in the agitator arms 22. The hollow frusto-conical portion 6 of the furnace 3. is connected to the water supply pipe 30 by means of a pipe 36.

Secured to the lower portion of the shell 7 is the scraper 37, which projects downward into the water pan 13, which pan is normally filled with water to seal the mouth of the air chamber 11, and the lower end of the furnace. The agitator arms 22 are curved and angular in cross-section, as shown in Figs. 3

and 4. The front edge of these agitators are sharp and curved in such a manner that the rotation thereof through the medium of the water-pan driving mechanism, will cut through the fuel and tend to draw it from the center of the furnace to the edge thereof.

The coal is dumped into the furnace 2, through the fuel charging inlet 3 by any well known means, and sufficient fuel is kept therein to keep the level thereof well above the level of the arms 22 of the agitator. The rotation of these arms cuts through the fuel levels and keeps the upper portion in motion. The rotation of the sleeve 18, hub 21 and water-pan 13, keeps the lower portion of the fuel in motion breaking up all clinkers and discharging the ashes into the pan 13 from which they are removed by the scraper 37.

By our improved apparatus we are enabled to gasify a portion of the carbon contained in the fuel located above the incandescent bed by the introduction of air through the grate 19. This partial gasification of the fuel by means of the upper central grate tends to keep down the temperature in the incandescent bed to a point below the temperature at which the formation of clinkers begins; while the rotation of the agitators assists in the prevention of the formation of clinkers and also assists in an equal gasification of the fuel in this portion of the furnace. The carbon remaining in the fuel below the grate 19 is supplied with a large quantity of atmospheric oxygen, and since the temperature in this part of the producer, on account of the large percentage of ash present in comparison with the carbon, cannot reach such a temperature where clinkers are made and carbon monoxid is formed, this carbon is burned to carbon dioxid. This dioxid rises gently through the bed of incandescent coke where it is reduced to monoxid, and where on account of this endothermic reaction the temperature is lowered. The air which enters through the grates 10 and 19, and which has not lost all its atmospheric oxygen, will meet the incandescent coke bed in a pre-heated state, which is expedient for a speedy reaction.

The advantages of our invention result from the partial gasification of the fuel above the main grate in the manner described, thereby preventing excessive heat above the main grate; also from the breaking up and leveling of the upper surface of the fuel and the freeing of ashes therefrom by the operation of the agitator, whereby even and continuous gasification is obtained, and all clinker formation is prevented or broken up. The water-pan forms a perfect seal for the bottom of the furnace, while its rotation and the rotation of the sleeve and central grate provides for an even feed of fuel and ash discharge, thereby avoiding the

formation of holes or channels in the fuel bed which would permit the undecomposed atmospheric oxygen passing through the furnace.

By means of the apparatus shown and described we are enabled to generate a gas without the aid of steam, which is dry, high in monoxid and low in dioxid, and which is comparatively free from dust, due to the slow even current of gas leaving the producer.

We claim:—

1. A gas producer consisting of a furnace having a main grate to receive the fuel, a rotating water-pan to seal the bottom of the furnace, a centrally located tube projecting from the water-pan into the furnace to the upper layers of the incandescent body of the fuel, openings in the tube to form a grate opposite the main grate, and a grate at the upper end of the tube, means to supply air to the grates, and means to rotate the water-pan; substantially as described.

2. A gas producer consisting of a furnace with a main grate, a water-cooled ring above the main grate, an air chamber surrounding the main grate, a rotatable water-pan to seal the air chamber and bottom of the furnace and to receive the ashes thereupon, a centrally located tube projecting from the pan into the furnace, a grate at the upper end of the tube and above the main grate, a second grate formed in the walls of said tube, agitating arms secured to the tube between the grates thereon, a hollow shaft within the tube and around which the said tube and water-pan rotates, and means to supply air to the air chamber and the hollow shaft; substantially as described.

3. A gas producer consisting of a furnace with a main grate, a water-cooled ring above the main grate, an air chamber surrounding the main grate, a rotatable water-pan mounted on anti-friction rollers to seal the air chamber and bottom of the furnace and to receive the ashes thereupon, a centrally located tube projecting from the pan into the furnace, a grate at the upper end of the tube and above the main grate, a second grate formed in the walls of said tube, agitating arms secured to the tube between the grates thereon, means to cool the tube and agitating arms, a hollow shaft within the tube and around which the said tube and water-pan rotate, and means to supply air to the air chamber and the hollow shaft; substantially as described.

4. A gas producer consisting of a furnace with a main grate, a water-cooled ring above the main grate, an air chamber surrounding the main grate, a rotatable water-pan to seal the air chamber and bottom of the furnace and arranged to receive ashes thereupon, a centrally located tube projecting from the pan into the furnace, a grate at the upper

end of the tube and above the main grate, a
second grate formed in the walls of said
tube, a hollow shaft within the tube around
which the said tube and water-pan rotates,
5 and means to supply air to the air chamber
and the hollow shaft; substantially as de-
scribed.

In testimony whereof, we have hereunto
set our hands.

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H. B. BARNHART.

Witnesses:

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C. W. ROBERTSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
