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PATENTED MAR. 17, 1903.

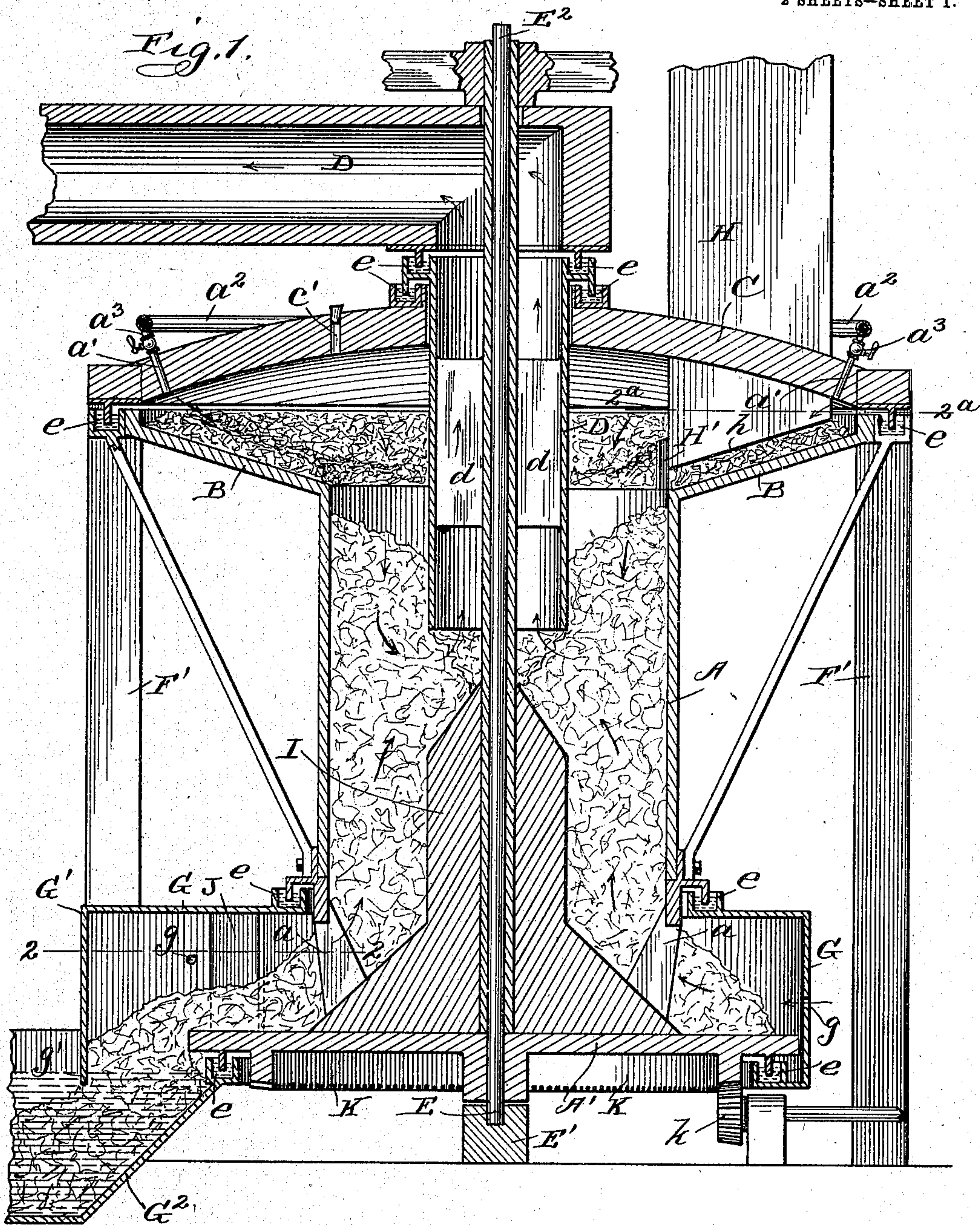
F. W. MATTHIESSEN.

GAS PRODUCER.

APPLICATION FILED JUNE 12, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

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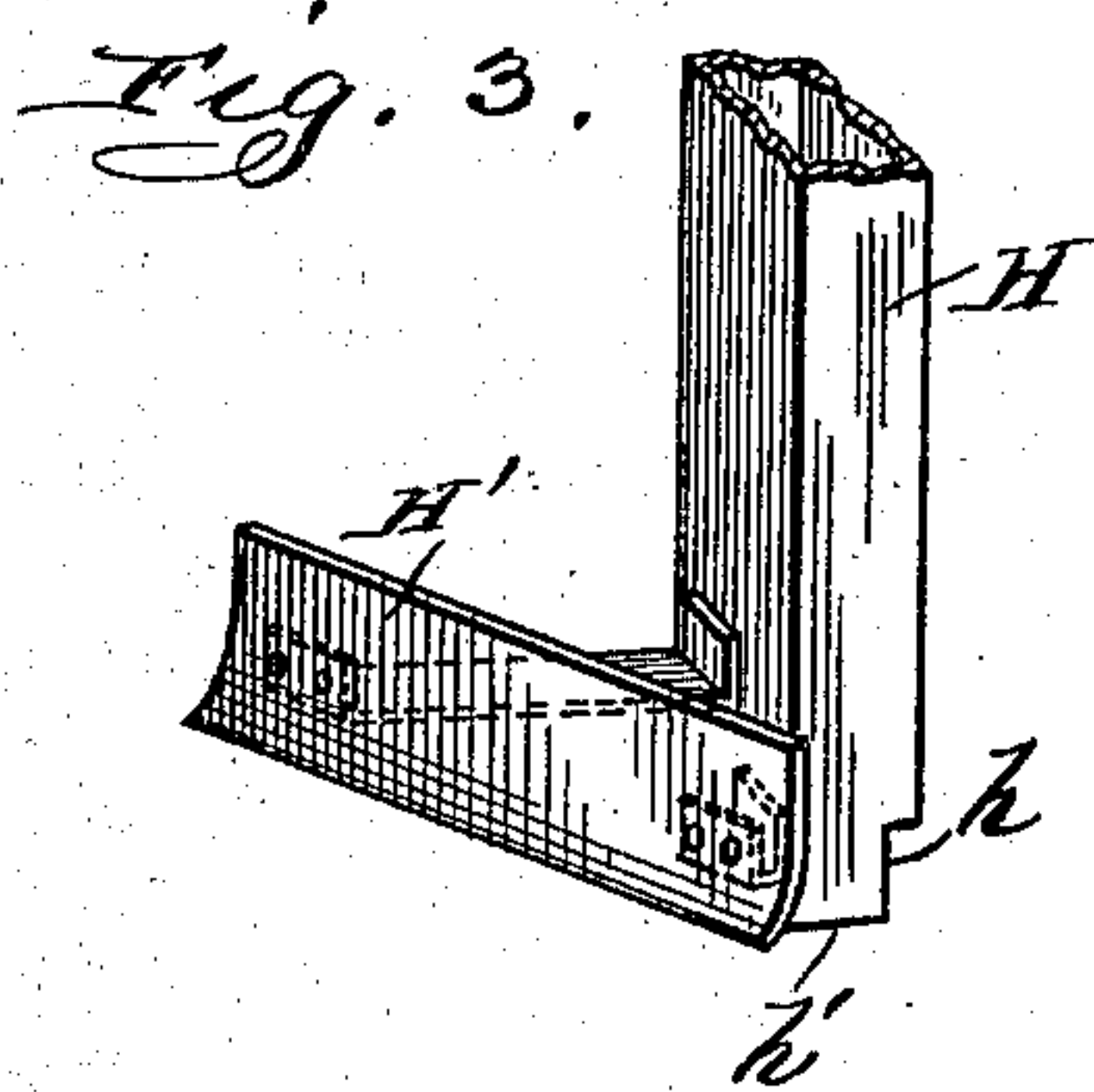
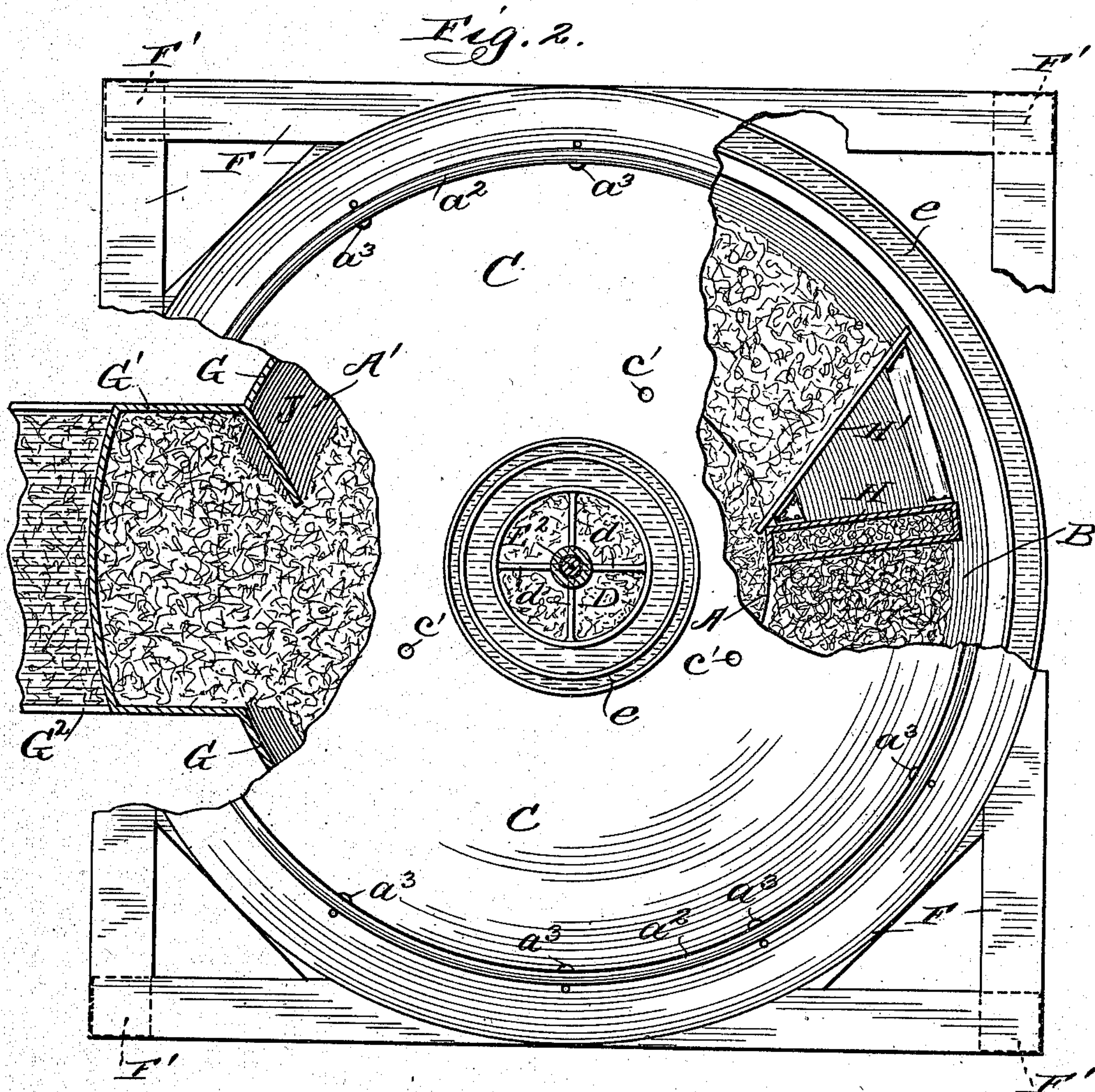
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UNITED STATES PATENT OFFICE.

FREDERICK W. MATTHIESSEN, OF LASALLE, ILLINOIS.

GAS-PRODUCER.

SPECIFICATION forming part of Letters Patent No. 723,224, dated March 17, 1903.

Application filed June 12, 1902. Serial No. 111,258. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. MATTHIESSEN, of Lasalle, in the State of Illinois, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

The invention relates to gas-producers or furnaces for reducing bituminous coal in making producer-gas; and the chief object of my improvements is to provide a furnace in which all of the hydrocarbons from bituminous coal can be burned out of the gases before they enter the flue through which they are taken to the place of storage or use. To do this, the coal must be coked and then burned and the fuel-gases from the burning coke must not be allowed to mix with the hydrocarbons until both the hydrogen and the carbon thereof are oxidized. The distilling of the hydrocarbons must be effected by the heat generated through the burning of the hydrocarbons. The requisites of a furnace or gas-producer necessary to secure this result are a gas-tight chamber of such construction as to provide a place for burning coke and a place for retaining the fresh coal separate from the coke, means for the introduction of air on top of the coal for the oxidizing of the hydrocarbons, and an exit for the gases communicating with that portion of the chamber in which the coke is burned.

A further object is to provide a gas-producer with a rotary gas-tight compartment adapted for burning coke and retaining the fresh coal separate therefrom, means for continuous feeding, and means for continuous discharge of clinkers and ashes to maintain uniform conditions within the chamber, all the operations being automatic and produced by the simple rotation of the chamber.

I have obtained these objects in the gas-producer constructed as illustrated in the accompanying drawings, in which—

Figure 1 is a vertical central section of an apparatus containing my invention. Fig. 2 is a top or plan view of the same with portions of the top broken away to show interior construction and having the exit-flue removed. Fig. 3 is a detail showing a detached part in perspective.

The chamber comprises a cylindrical part A, mounted on a bottom plate A', having suit-

able flanges or brackets *a* therefor, a flange B at the top of the cylindrical part, and a cover C extended over the cylinder and flange, said parts being connected by gas-tight joints. The flange B is integral with the cylindrical part and is preferably inclined downward toward the same, but not enough to cause the coal to slide off. The purpose of the flange is to provide a bottom for a relatively enlarged part of the chamber at the top of the central cylindrical part, upon which the fresh coal may be placed and retained in the enlarged upper part of the chamber while coke is being burned in the central cylindrical lower part, the coal and coke being kept separate, but under one cover common to both. The cover is provided with openings *a'*, through which twyers from an air-pipe *a''* are introduced for forcing air into the enlarged upper part of the chamber under the cover.

D is a flue for taking off the gas. This flue is preferably extended through the enlarged upper part of the chamber and communicates with the central lower part well down below the bottom of the enlarged upper part of the chamber. The coal while on the flange B is subjected to sufficient heat to cause the hydrocarbons to be distilled therefrom, and these may be ignited and caused to burn in the enlarged upper part by the introduction of air, so as to increase the heat there to any desired degree. The twyers are provided with valves *a'''* for regulating the admission of air, so that all the elements of the hydrocarbons can be oxidized in the enlarged upper part of the chamber before mixing with the fuel-gases from the coke burning in the central lower part of the chamber. The hydrogen has only one state of oxidation, and is therefore fully burned. The carbon may be burned to carbonic oxid (CO) or carbon dioxid, (CO₂.) If the heat resulting is too great, a part of the carbon components will have to be burned to CO, and any surplus oxygen, whether present as such or through a too large proportion of carbon dioxid, will be taken up in passing through the upper portion of the coke to reach the exit-flue. This latter result may be effected by regulating the amount of air admitted beneath the coke.

For the purpose of making the gas-producer automatic in operation I mount the bot-

tom plate A' on an upright shaft E, which is stepped at the bottom in a bearing of the frame E' and journaled at the top E², so as to firmly support the gas-producer chamber in a vertical position and permit it to revolve freely. The cover is stationary and supported independently of the chamber by a frame F, resting on uprights F'. Surrounding the bottom plate and lower edge of the chamber is a casing G, which is stationary and has perforations g for the admission of air. The connections between the casing and the bottom of the chamber and between the outer rim of the flange B and cover C and also between the cover and flue at the points e are made gas-tight by means of a water seal of ordinary form.

In the present instance the lower inner part of the flue D is made separate from the outer upper portion and supported on the shaft by radial flanges d, so as to rotate with the chamber. It is not essential, however, that this part of the flue be made separate from the outer part and connected so as to revolve about the shaft. It obviously may be integral with the outer part and have a rigid connection with the cover.

The cover is provided with an oblong opening, preferably extended radially of the chamber and reaching nearly across the bottom B, and through this opening the spout H of the feeding-hopper is inserted. This spout preferably has its inner end shortened at one side, as shown at h, and is inserted through the opening until the longer side h' will just clear the upper side of the flange B. The coal falling through the spout rests upon the flange and is carried out of the spout at the short side by the rotation of the flange in the direction toward that side, so as to cause a thin layer of coal about the thickness of the spout or the height of the opening at h to be laid on the flange. The long side of the spout may be used to sweep the coal off of the flange B as carried against it by the rotation; but to do this more effectually I prefer to employ a plow share-like scraper H', which may be mounted either on the spout or on the under side of the cover and which should be inclined from a radial position outwardly in a direction opposite to the rotation, so as to extend obliquely across the flange with the outer end farthest advanced, and thus be better adapted to throw the coal inward or toward the center of the chamber than it would be if occupying a radial position.

The casing is provided with an extension G' at one side for allowing the clinkers and ashes to be discharged, and the shaft is provided with a cone I, which causes the ashes and clinkers descending in the cylindrical part of the chamber to be deflected out toward the outer margin of the base-plate A', so as to lie outside the inner line of the chamber, and a scraper J is mounted on the casing and extends obliquely across the margin of the base-plate outside the base of the cone,

so as to sweep the ashes and clinkers off into an ash-receptacle G², which is filled with water rising above the lower edge g' of the extension to form a water seal.

The bottom of the base-plate is provided with an annular rack K, with which a pinion k of a power-shaft is made to engage for rotating the chamber.

The cover is provided with one or more openings c', which are in line with the interior of the cylindrical part of the chamber, so that one or more stoking-bars may be inserted and extended down alongside the wall for scraping off clinkers when required. These openings are closed ordinarily.

In operation only a small amount of air is admitted at the bottom in order to completely burn the carbon passing down toward the bottom of the cylindrical part of the chamber. The coal-spout being kept constantly full while the chamber is rotated will constantly deliver its layer of coal on the flange or bottom of the enlarged upper part of the chamber. The rotation is slow, it being calculated so that the coal remaining on the upper bottom during the making of a complete revolution will have all of the hydrocarbons distilled out of it, so that it will be completely coked when reaching the scraper H', by which it will be constantly thrown off the flange into the lower central cylindrical part, thereby keeping up a constant feeding of fresh coal to the upper part of the chamber and a constant feeding of coke to the central lower part and a constant discharge of ashes and clinkers as long as the rotation continues. While it is thought that the first-named object is best attained in and by a rotary chamber such as here shown and described, it is contemplated that it may be attained in a stationary gas-producer having a chamber of substantially the construction here shown in connection with any known means for causing the coal to be fed into and passed on through the chamber while being subjected to the distilling and oxidizing operations in the upper part of the chamber and to the final complete burning of the carbon in the lower part of the chamber.

Having thus fully described my invention and its operation, what I claim is—

1. In an apparatus of the class described, a gas-producer chamber having a central, lower part and an enlarged, upper part provided with a cover common to both parts, the bottom of the upper part being connected with the upper part of the central, lower part and adapted to retain fuel in the upper part distinct from the fuel in the central, lower part, as specified.

2. In an apparatus of the class described, a chamber having a central, lower part and an enlarged, upper part with a cover common to both parts, the bottom of the upper part being connected with the top of the lower part and adapted to retain fuel in the upper part distinct from fuel in the lower part, and

the cover being provided with openings for admitting air into the chamber over the bottom of the lower part, as specified.

3. In an apparatus of the class described, a chamber having a central, lower part, an enlarged, upper part and a cover common to both parts, the bottom of the upper part being joined to the top of the central, lower part and adapted to retain fuel in the upper part distinct from fuel in the central, lower part, in combination with a flue communicating with the central, lower part below the fuel-line therein, as specified.

4. In an apparatus of the class described, a chamber having a central, lower part, an enlarged, upper part and a cover common to both parts, the bottom of the upper part being joined to the top of the central, lower part and adapted to retain fuel in the upper part distinct from fuel in the lower part, in combination with a flue communicating with the central, lower part, below the fuel-line therein, means for feeding fuel to the bottom of the upper part and for causing the fuel to pass on from the bottom of the upper part to the central, lower part, as specified.

5. In an apparatus of the class described, a chamber having a central, lower part, an enlarged, upper part and a perforated cover common to both parts, the bottom of the upper part being joined to the top of the lower part and adapted to retain fuel in the upper part distinct from the fuel in the central, lower part, in combination with a flue communicating with the central, lower part below the fuel-line therein, and means in connection with the perforations of the cover for forcing air into the upper part of the chamber, as specified.

6. In an apparatus of the class described, a chamber having a central, lower part, an enlarged, upper part and a perforated cover common to both parts, the bottom of the enlarged, upper part being joined to the top of the central, lower part and adapted to retain fuel in the upper part distinct from fuel in the lower part, in combination with a flue communicating with the central, lower part and means in connection with the perforations of the cover for forcing and regulating the introduction of air into the upper part of the chamber, as specified.

7. In an apparatus of the class described, a

chamber comprising a plate at the bottom mounted on a vertical, rotatable shaft, a central, cylindrical part mounted on the bottom plate, and an enlarged, upper part mounted on the cylindrical part, a cover extended over the top of the chamber, an independent support for the cover, and a water-seal connection between the cover and the outer rim of the enlarged part of the chamber, as specified.

8. In an apparatus of the class described, a chamber comprising a horizontal bottom plate mounted on a vertical, rotatable shaft, a central, cylindrical part mounted on the bottom plate, an enlarged, upper part having its bottom connected to the upper end of the central, cylindrical part, a cover extended over the enlarged part and central, cylindrical part, a water seal in connection, and an independent support for the cover, in combination with a flue extended down through the enlarged part of the chamber and communicating with the central, cylindrical part well below the bottom of the enlarged part, as specified.

9. An apparatus of the class described, comprising a chamber having the bottom plate, central, cylindrical, lower part and enlarged, upper part connected as shown and mounted on a vertical, rotatable shaft in combination with a perforated, stationary cover supported independently thereof, a water seal between the cover and the adjacent, upper part, a feed-spout extended through the cover over the bottom of the enlarged part of the chamber, and a scraper arranged to sweep the said bottom, as specified.

10. An apparatus of the class described, comprising a chamber having a bottom plate, central, lower part and enlarged, upper part mounted on a vertical rotatable shaft, a stationary cover independently supported over the same and having water-seal connection therewith, a casing surrounding the bottom plate and having water-seal connections therewith and with the lower edge of the chamber-wall, and a scraper mounted on the casing and arranged to sweep the outer margin of the bottom plate, as specified.

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Witnesses:

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