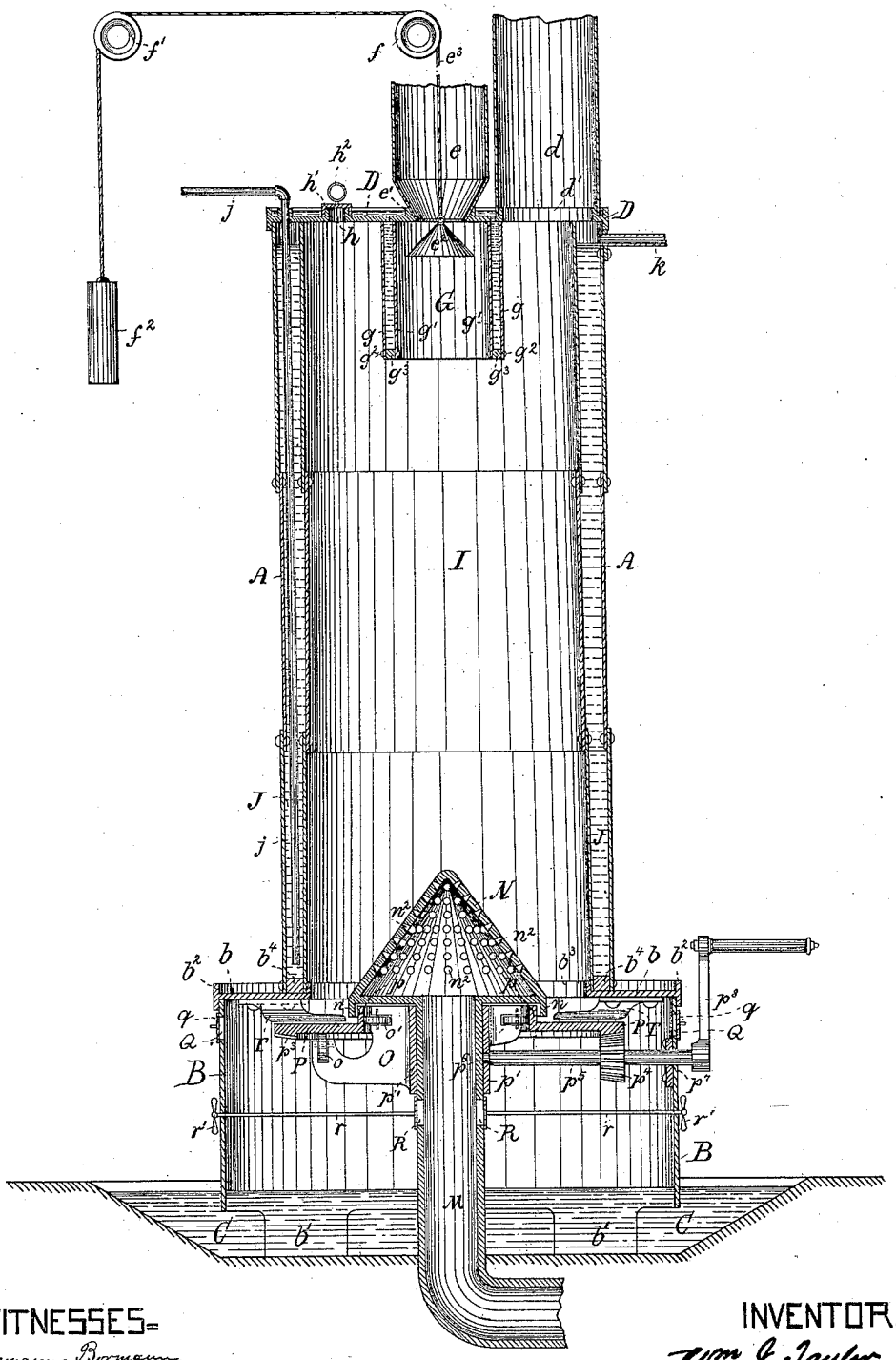
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W. J. TAYLOR.

GAS PRODUCER.

No. 399,795. Patented Mar. 19, 1889.

Fig. 1.



WITNESSES=

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(No Model.) 3 Sheets—Sheet 2.

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GAS PRODUCER.

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Fig. 3.

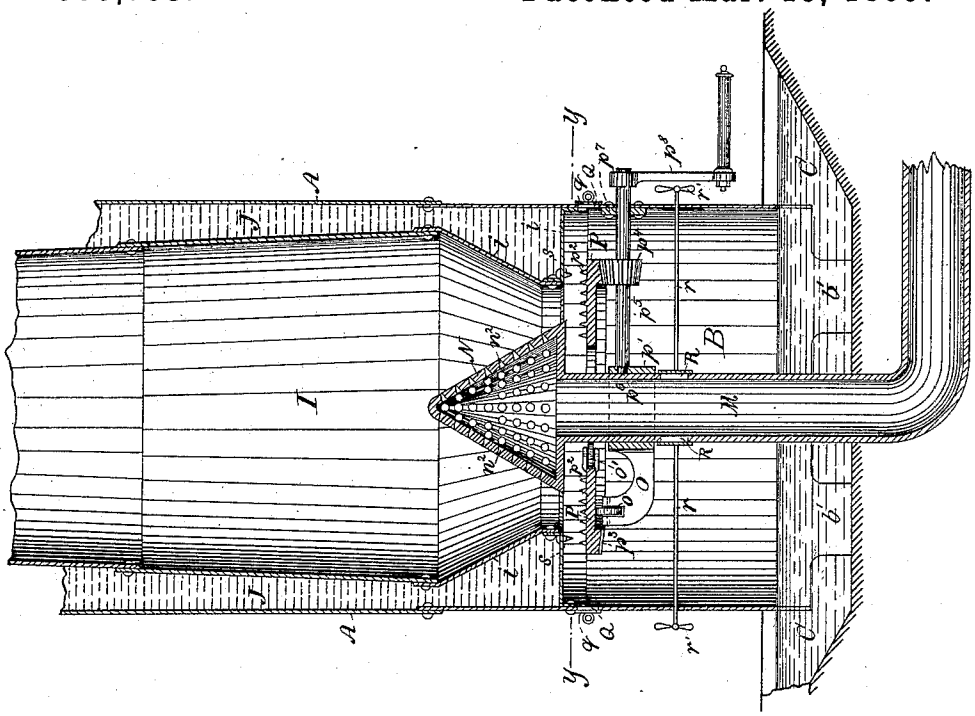
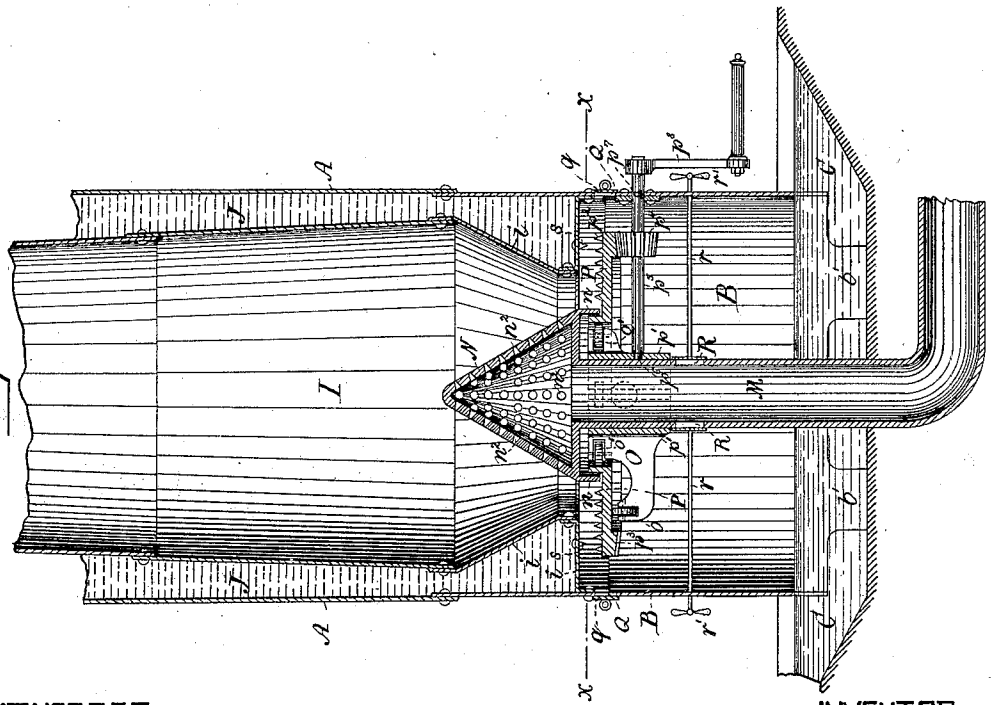


Fig. 2.



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Fig. 6.

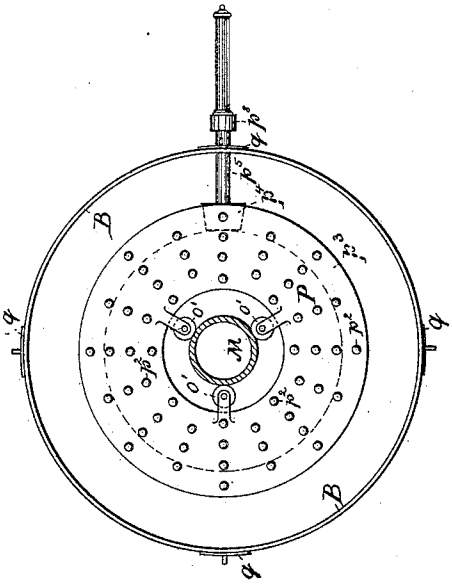


Fig. 7.

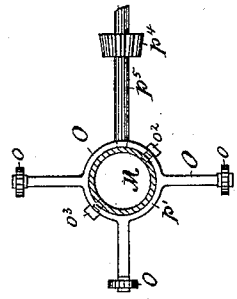


Fig. 4.

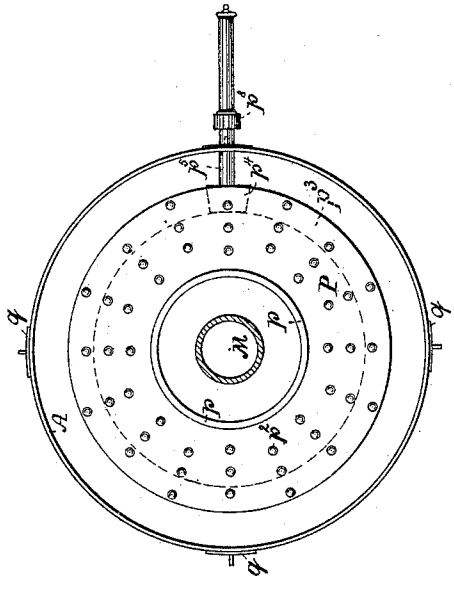
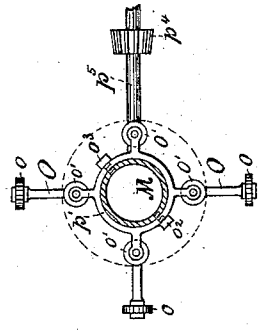


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM J. TAYLOR, OF CHESTER, ASSIGNOR TO THE TAYLOR GAS PRODUCER COMPANY, OF CAMDEN, NEW JERSEY.

GAS-PRODUCER.

SPECIFICATION forming part of Letters Patent No. 399,795, dated March 19, 1889.

Application filed May 2, 1887. Serial No. 236,748. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. TAYLOR, of Chester, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

My invention relates to apparatus for gasifying fuel for metallurgical and other operations of the type generally designated as a "gas-producer," but, however, differing essentially from any of the producers heretofore constructed in that the use of brick linings is entirely dispensed with, and which apparatus, to be hereinafter fully described, I have designated as a "metallic water-cooled gas-producer."

The principal objects of my present invention are, first, to provide simple and effective apparatus in which anthracite, culm, or mineral coals may be used with practical success as fuel for generating the heating or other gas, and in which sticking or clinking of the fuel or non-combustible material to the wall of the combustion-chamber may be obviated, and apparatus which may be driven to much greater capacity, and hence make gas with greater uniformity; second, to provide simple and effective means for the uniform distribution of air, or steam and air, into contact with the fuel in a combustion-chamber for effecting combustion and for obtaining the best practical results in the making of gas for metallurgical and other operations; and, third, to provide means whereby the ashes and clinker or non-combustible material collecting may be readily and effectively discharged from the combustion-chamber while the producer is in full operation and without interference therewith.

My invention consists of a metallic main casing, of cylindrical or other suitable form, supported upon a base or joined directly to and forming part of the base, having feet preferably resting in a receptacle filled with water and designated as a "water seal," for the reception of ashes and clinker discharged from the producer. This main casing is provided with a top plate suitably held thereupon and arranged for supporting the feed-hopper and gas-discharge flue, and provided with one or more vertical sight-apertures with removable covers. This flanged top plate is arranged so as to contain a supply of water for keeping the upper parts of the producer cool. The bottom of the main casing is, by preference, supported upon a flanged plate resting upon a base, forming a receptacle for containing a supply of water for keeping the lower portion of the producer cool.

Within the main metallic casing is provided a metallic combustion-chamber of suitable construction, supported by the plate carried upon the base; or it is secured directly to the main casing. Abutting against the interior rim of the bottom plate and between the combustion-chamber and the main casing is provided a rectangular bar, to which, by means of rivets or otherwise, the main casing is rigidly secured to the metallic combustion-chamber. Between this chamber and the main casing a jacket is formed, supplied with water continually by means of a pipe, and with an overflow-pipe arranged so that the water, or condensed steam and water, may be conducted off from the jacket into any suitable receptacle.

Secured to the bottom of and projecting downward from the top plate of the producer is a cylindrical hopper for self-feeding the fuel into the combustion-chamber, consisting of outer and inner tube-sheets secured by means of rivets to an annular ring and the space between the two forming a water-jacket. This cylindrical hopper, suitably connected with the top plate, is provided with one or more openings for the admission and free circulation of water between the two tube-sheets thereof for keeping the hopper at all times cool.

Extending upward through the water seal and base of the producer is an air, or steam and air, blast conduit, the upper portion of which extends into the central combustion-chamber, and is provided with a conical-shaped hood having narrow or inverted-V-shaped interstices therein for discharging air, or steam and air, from the main conduit radially, or nearly so, into the chamber containing the incandescent fuel. Beneath this distributing device, upon supporting and guide rollers, suit-

ably journaled in a bracket or otherwise carried thereby, is a revolving bottom. Above the revolving bottom, and secured preferably to the bottom of the base-plate, is a device for causing the ashes and clinker to be discharged over the outer periphery of the bottom into the ash-pit, or the revolving bottom may be provided with a series of vertical points or teeth arranged around the upper surface of the same, and with a series of points depending from the base-plate and arranged so that a row of depending points will be immediately between a double row of vertical points of the bottom, in order that the clinkers deposited upon the bottom and coming into contact with these points may be more or less ground up, and, when the bottom is suitably actuated, together with the ashes, may be deposited in the ash-pit beneath. This revolving bottom is provided with a ratchet surface upon its under side, and meshing therewith is a cog-wheel secured rigidly to a shaft held in bearings provided therefor in the base and the bottom actuated by a crank in any suitable manner.

In order that my invention may be fully understood by those skilled in the art to which it appertains, I will now proceed to describe the same with special reference to the accompanying drawings, wherein—

Figure 1 is a vertical central section of a water-cooled gas-producer embodying the features of my invention. Figs. 2 and 3 are respectively vertical central sections, partly in broken section, of a water-cooled gas-producer, showing certain modifications in the construction of a combustion-chamber and in the means for supporting and actuating the revolving bottom. Figs. 4 and 6 are respectively transverse sections on the lines $x\ x$ and $y\ y$ of Figs. 2 and 3, showing the main casing, revolving bottom, air or steam blast conduit, and a portion of the mechanism for actuating the revolving bottom. Figs. 5 and 7 are respectively top or plan views of the bracket and wheels for supporting the bottom and the shaft and cog-wheel rigidly secured to said shaft and meshing with the ratchet surface of the revolving bottom for actuating the same by means of a crank.

Referring to the drawings, A is the main casing, preferably cylindrical in form, made of wrought-iron or of plate-iron in sections suitably riveted together and supported upon the flanged top-plate, b, of the base B, as shown in Fig. 1; or the main casing, as shown in Figs. 2 and 3, may be connected directly with the base B and form part thereof. The base B is provided with feet b', resting upon the bottom of the dish-shaped receptacle C, kept constantly filled with water, termed a "water seal," for the reception of the ashes and clinker discharged over the outer periphery of the revolving bottom of the producer, to be hereinafter fully explained.

To the top of the main casing A fits snugly a double-flanged annular plate, D, made of cast or wrought iron and so constructed and arranged as to form a receptacle for containing and maintaining a supply of water for cooling the top of the producer.

d is a gas-flue fitting snugly against an annular vertical rim, d', cast with the top plate.

e is the bosh-shaped feed-hopper fitting into and held snugly against a vertical annular rim, e', cast with or otherwise secured to the top plate, D. This feed-hopper e is provided with a bell, e^2, which fits snugly against the bosh-shaped throat of the hopper e and is raised and lowered by means of a chain, e^3, passing over one or more pulleys, f and f', attached to a weight, f^2.

Projecting downward from and suitably supported by the flanged top plate, D, is a cylindrical self-feeding hopper, G, having outer and inner tube-sheets, g and g', rigidly attached, by means of bolts or rivets g^2, to an annular rectangular ring, g^3, and as so arranged forming an annular chamber or jacket between the two sheets for the free circulation of water admitted through one or more openings provided in the flanged top plate, D, for keeping the hopper cool. Around the periphery of the water-cooled hopper G and extending therethrough are arranged transverse flues g^4 for permitting any gas accumulating in the upper portion thereof to readily and continually escape into the gas-flue d. In the top plate, D, of the producer, at suitable distances apart and preferably cast therewith, are sight-apertures h, provided with removable covers h', having eyes h^2, for their ready removal for examination of the upper portion of the producer for any purpose that may be desired.

I is the central metallic combustion-chamber, supported upon the annular flanged plate b of the standard or base B. This annular base-plate b is T-shaped in cross-section, as shown in Fig. 1, with a peripheral rim, b^2, and with an inner vertical rim, b^3, forming an annular U-shaped channel for containing a supply of water for keeping the lower portion of the producer cool. Between the main casing A and the combustion-chamber I is a rectangular bar, b^4, which rests upon the base-plate b, and the two chambers held solidly thereto by means of rivets or otherwise, and into the annular space J thus formed is admitted water, which freely circulates around and around therein, constituting what is termed a "water-jacket," the water being admitted thereto through a pipe, j, extending downward from the flanged top plate, D, to within a short distance of the bottom of the water-jacket. Near the top of the producer and opposite to the water-admission pipe j is a pipe, k, as shown in Fig. 1, for discharging the water from the jacket J into any suitable receptacle.

The central metallic combustion-chamber, I, of cylindrical form in diameter, may be the

same from top to bottom, as shown in Fig. 1, or slightly taper inward from the bottom to the top, or in form that of two inverted frustums of cones joined to each other, so that the smaller ends constitute, respectively, the upper and lower extremities of the chamber, the greatest diameter of which will of course be at the point where the larger ends of the frustums join, as shown in Figs. 2 and 3, this largest part constituting what is generally known as the "top" of the bosh.

It will be observed in Figs. 2 and 3 that the main metallic casing, made of plate-iron or other suitable metal in sections riveted together, extends from top to the water-seal ash-pit of the producer, and that the bosh-shaped combustion-chamber I is held in position within this casing by a Z-shaped metallic plate, *i*, riveted or bolted to the throat end of the chamber I and to the metallic casing A in any well-understood manner.

Extending vertically upward through the water seal C and base B is a conduit, M, having upon its upper extremity a conical-shaped hood, N, either secured thereto or cast therewith. This conical-shaped hood N is provided with a series of narrow or inverted-V-shaped interstices, n^2, preferably increasing in number from the apex to the solid base of the hood and extending therethrough for the free passage and discharge of air, or steam and air, by forced draft, radially or otherwise, into the incandescent fuel in the chamber I, for effecting combustion and obviating any sticking or clinkering of the non-combustible material to the wall of the combustion-chamber. This conical-shaped hood N in Figs. 1 and 2 is provided with a depending flanged annular rim, *n*.

O is a cast or wrought iron bracket provided with vertical rollers *o* and transverse rollers *o'*, suitably journaled in this bracket for supporting and guiding the revolving bottom P, having at the inner peripheral extremity thereof an upper flanged rim, *p*, extending upward under the conical-shaped hood N and parallel with the depending annular rim *n* of the hood N, and as thus arranged the ashes and cinder are prevented from coming in contact with the guide-rollers *o'*, journaled in the bracket O, provided with an annular sleeve, *p'*, encircling the casing of the conduit M and held rigidly thereto by means of set-screws o^2 and o^3.

To the bottom of the flanged base-plate *b* are secured three or more depending scrapers, T, of any suitable form, and which are arranged so that the ashes and clinkers falling upon the revolving bottom from the combustion-chamber may be readily and quickly discharged over the outer periphery thereof into the ash-pit beneath by the mere revolving of the bottom around and around by the attendant in charge and while the producer is making gas. The revolving bottom P, of circular or other suitable form, may be provided upon its upper surface with a series of projecting points or vertical teeth, p^2, as shown in Figs. 2 and 3, for grinding up the clinkers accumulating in the combustion-chamber and deposited on the bottom P, which, together with the ashes, may be readily discharged over the outer periphery thereof through the circular chamber B into the water-seal C beneath. The ashes and clinker discharged into the water-sealed ash-pit beneath may be readily removed therefrom in any well-understood manner.

It will of course be understood that the revolving bottom P must be located at a proper distance from the throat of the central combustion-chamber, I, and be in proportion relatively thereto, in order that the clinker and ashes deposited thereon may be held thereby in a mass until the bottom is actuated by the turning of the crank to be described.

Upon the under peripheral surface of the revolving bottom P is provided a ratchet surface, p^3, and meshing therewith is a cog-wheel, p^4, rigidly secured to a shaft, p^5, held in a bearing, p^6, provided to receive the end extremity of the shaft in the sleeve of the bracket O, secured to the conduit M, and in a bearing, p^7, provided therefor in the base B. This shaft p^5 has a crank, p^8, by the operation of which the circular bottom P may be revolved around and around, thereby effectually discharging the ashes and clinker into the water seal or ash-pit during the time that the apparatus is making gas without the slightest interference therewith.

In the air, or steam and air, blast conduit M are provided two or more dampers, R, operated by horizontal rods *r* and handles *r'* from the outside of the base B, and as thus arranged permit of the change of course of the air, or steam and air, from the conduit M in an upward direction through the cylindrical chamber or base B, and the throat of the central combustion-chamber into contact with the incandescent fuel whenever it shall become necessary so to do. In the base B, at suitable distances apart, are provided peep-holes Q, provided with covers *q*, which may be removed to ascertain the condition of the fuel around about the conical-shaped hood N or the circular bottom P, or for whatever purpose it may become necessary to make an examination of the apparatus.

In Fig. 3 is shown a modified form of the conical-shaped hood N, cast with the blast-conduit M without the depending rim *n*. The bracket O in this figure is provided with vertical supporting guide-rollers *o*, and the circular revolving bottom P, with its vertical points p^2, is provided with three horizontal traveling rollers, *o'*, suitably journaled in brackets cast with the bottom, and when it is actuated by turning the crank p^8 the rollers *o'*, in frictional contact with the casing M, travel around and around in a similar manner to those already described in connection with the bracket shown in Figs. 1 and 2.

Projecting downward through the inverted-

Z-shaped plate *i*, to which the combustion-chamber I is attached, is a series of depending points, *s*, which aid in cutting or grinding up the cinder or clinkers. These points are perfectly arranged so that the upper row of depending points comes immediately above and between a double row of vertical points of the revolving bottom P, in order that the work of cutting and grinding the clinkers may be most successfully accomplished.

The mode of operation of the water-cooled gas-producer hereinbefore described may be explained as follows: The producer is fired in any well-understood manner, and the fuel admitted through the hopper *e*, the bell of which is lowered a sufficient distance to permit of the free passage of the fuel to the central combustion-chamber, I, and when sufficiently charged the bell e^2 is drawn upward snugly against the bottom of the feed-hopper *e* and the air, or steam and air, by forced blast admitted through the conduit M and discharged radially, or nearly so, through the narrow interstices n^2, provided in the conical-shaped hood N, extending upward into the central combustion-chamber, I, for effecting combustion, and the gas arising therefrom carried off through the gas-flue *d* in the top of the producer for utilization, and whenever necessary the crank p^8, operating the revolving bottom P, may be revolved by the attendant in charge for discharging the ashes and clinkers from the central combustion-chamber into the ash-pit over the outer periphery of the revolving bottom P, while the making of gas for metallurgical and other purposes is uninterruptedly going on.

It is manifestly obvious that the more important features of my present invention may be modified. For example, the stationary conical-shaped hood and the revolving circular bottom, instead of being arranged as shown and described, may be combined and scrapers revolved around the surface of the bottom without departing from the real spirit of my invention, and hence I reserve the right to modify these features in any manner that may be deemed best for carrying out the same in the more extended practice thereof.

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

1. The combination, in a gas-producer, of a stationary conical-shaped device having radial rows of narrow perforations therein, a blast-pipe formed integral with said device and supporting the same in position, a bracket secured to said pipe having guide-rollers journaled in said brackets, a circular bottom with points arranged around the top surface of said bottom, and means, substantially as described, for rotating said bottom, substantially as and for the purposes set forth.

2. The combination, in a gas-producer, of a conical-shaped stationary device having radial rows of narrow openings therein, a blast-pipe secured to said device and supporting the same in position, a circular depending flange formed with the base of said device, a bracket secured to said pipe having supporting and guide rollers, a circular bottom with an inner vertical flange mounted on said bracket and guided by said rollers, and means, as described, for rotating said bottom, substantially as and for the purposes set forth.

3. The combination, in a gas-producer, of a conical-shaped device having a series of narrow V-shaped openings therein, a blast-pipe secured to said device and supporting the same in position, a bracket having guide-rollers journaled thereto and said bracket secured to said pipe, a circular bottom with radial rows of points cast therewith, rollers journaled in brackets secured to the inner edge of said bottom, and means, as described, for rotating said bottom, substantially as and for the purposes set forth.

4. The combination, in a gas-producer, of one or more scrapers secured to the base-plate of the producer, a stationary conical-shaped device having radial rows of narrow openings therein, a blast-pipe formed integral with said device and supporting the same in position, a bracket with horizontal arms and to which guide-rollers are journaled, a circular flat bottom, and means, as described, for rotating the same, substantially as and for the purposes set forth.

5. The combination, in a gas-producer, of a conical-shaped stationary device having radial rows of narrow openings therein and a blast-pipe formed integral with said device and supporting the same in position, a bracket having rollers journaled thereto and said bracket secured to said pipe, a circular solid bottom having radial rows, points cast with the same, means, as described, for rotating said bottom, and a series of points secured to the plate supporting the combustion-chamber and depending therefrom, substantially as and for the purposes described.

6. The combination, in a gas-producer, of a conical-shaped stationary device having radial rows of narrow openings therein, and a blast-pipe formed integral with said device and supporting the same in position, one or more dampers in said blast-pipe having rods and handles for opening and closing said dampers, substantially as and for the purposes set forth.

7. The combination, with a gas-producer mounted in a receptacle, C, for containing water, of a blast-pipe provided with a stationary device having rows of narrow openings therein and extending upward through said receptacle into the combustion-chamber thereof, a bracket secured to said pipe having rollers journaled thereto, a circular solid bottom mounted thereon, and means, as described, for rotating said bottom, substantially as and for the purposes set forth.

8. In a gas-producer, the stationary device

N, formed integral with the conduit M, the bracket O, rigidly secured to said conduit, the solid bottom P, mounted on said bracket, and means, as described, for rotating the same, and the curved scrapers T, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WM. J. TAYLOR.

Witnesses:
HERMANN BORMANN,
THOMAS M. SMITH.