

C. F. MILLER.

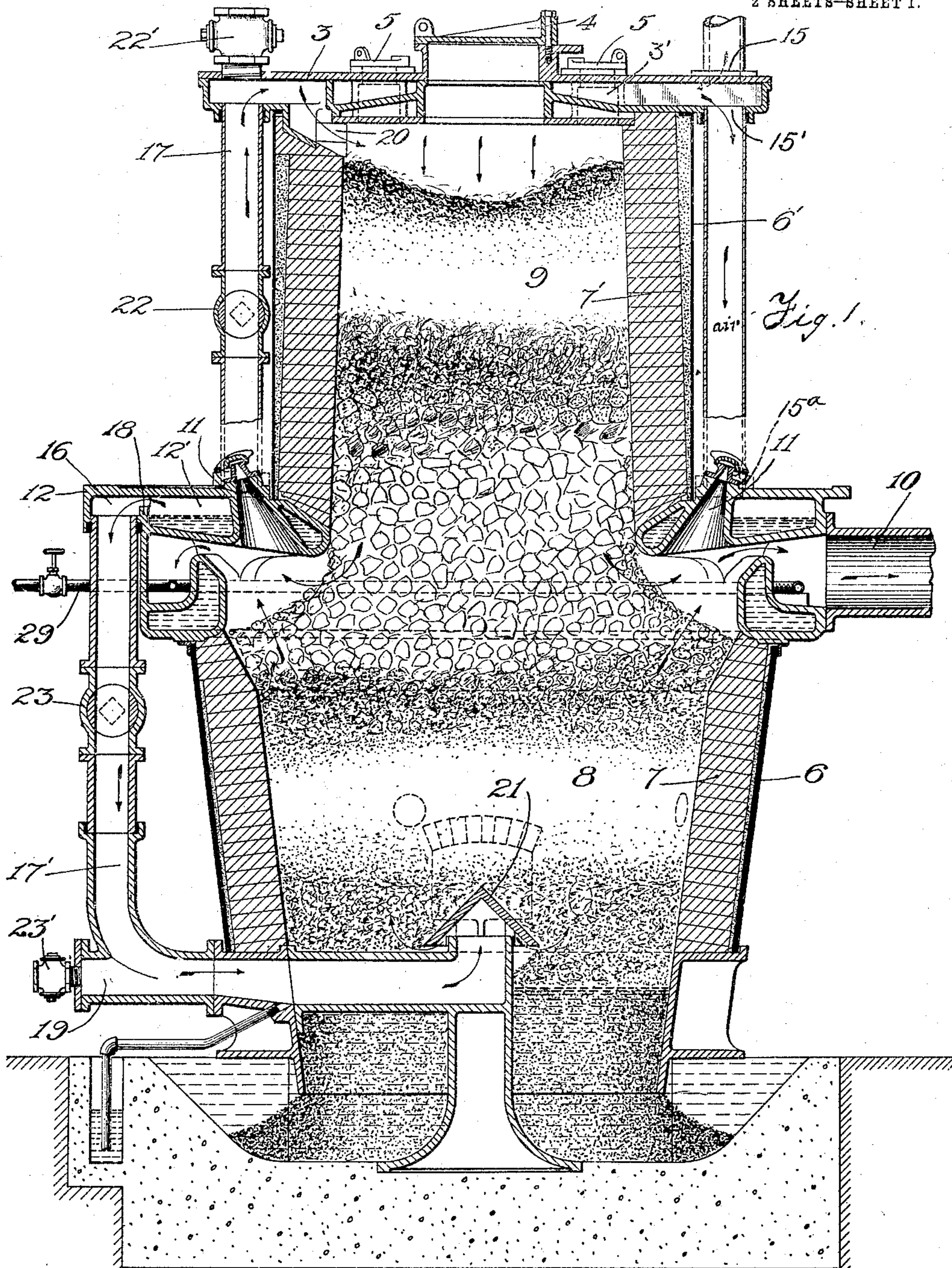
GAS PRODUCER.

APPLICATION FILED APR. 30, 1909.

980,660.

Patented Jan. 3, 1911.

2 SHEETS—SHEET 1.



WITNESSES:

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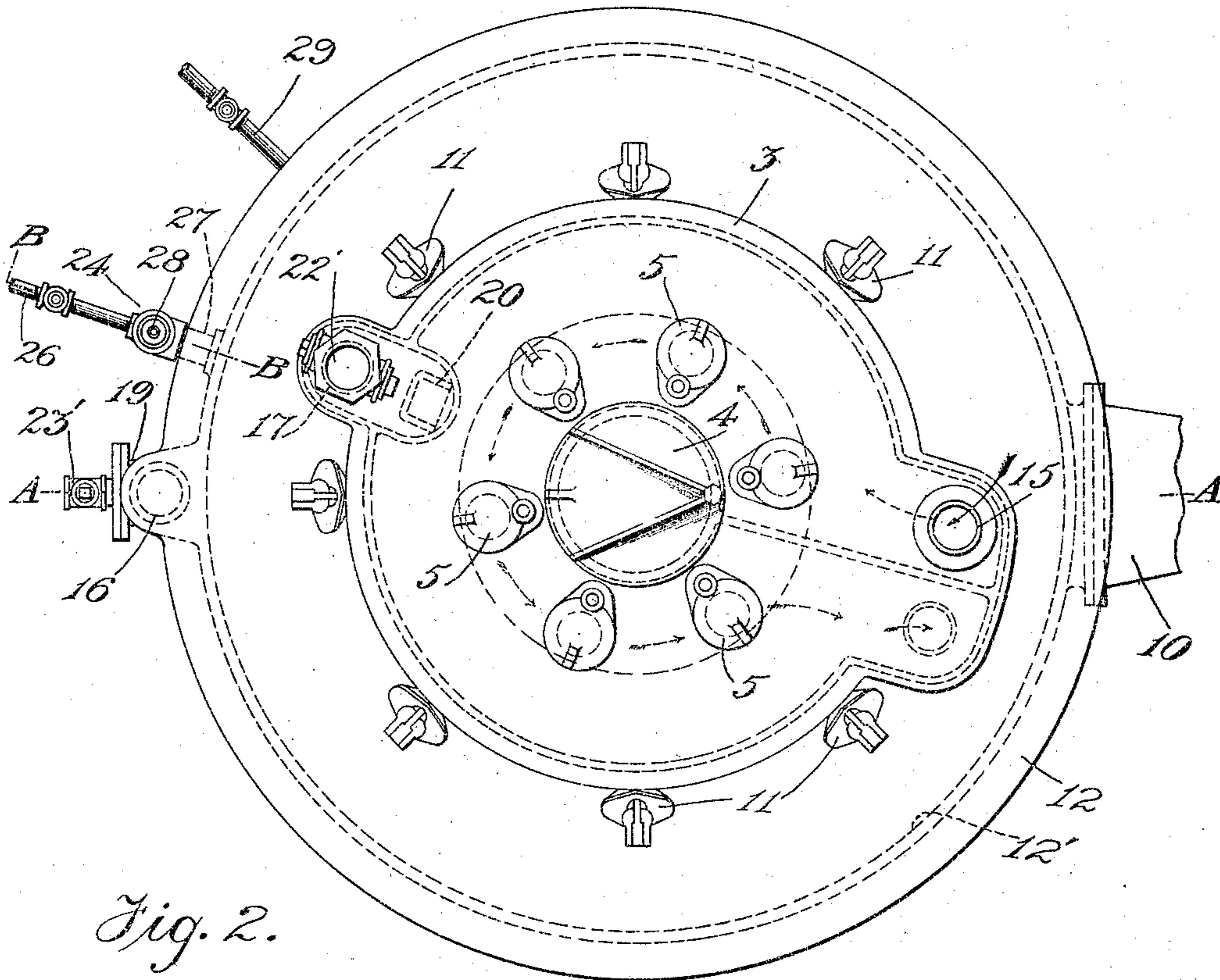


Fig. 2.

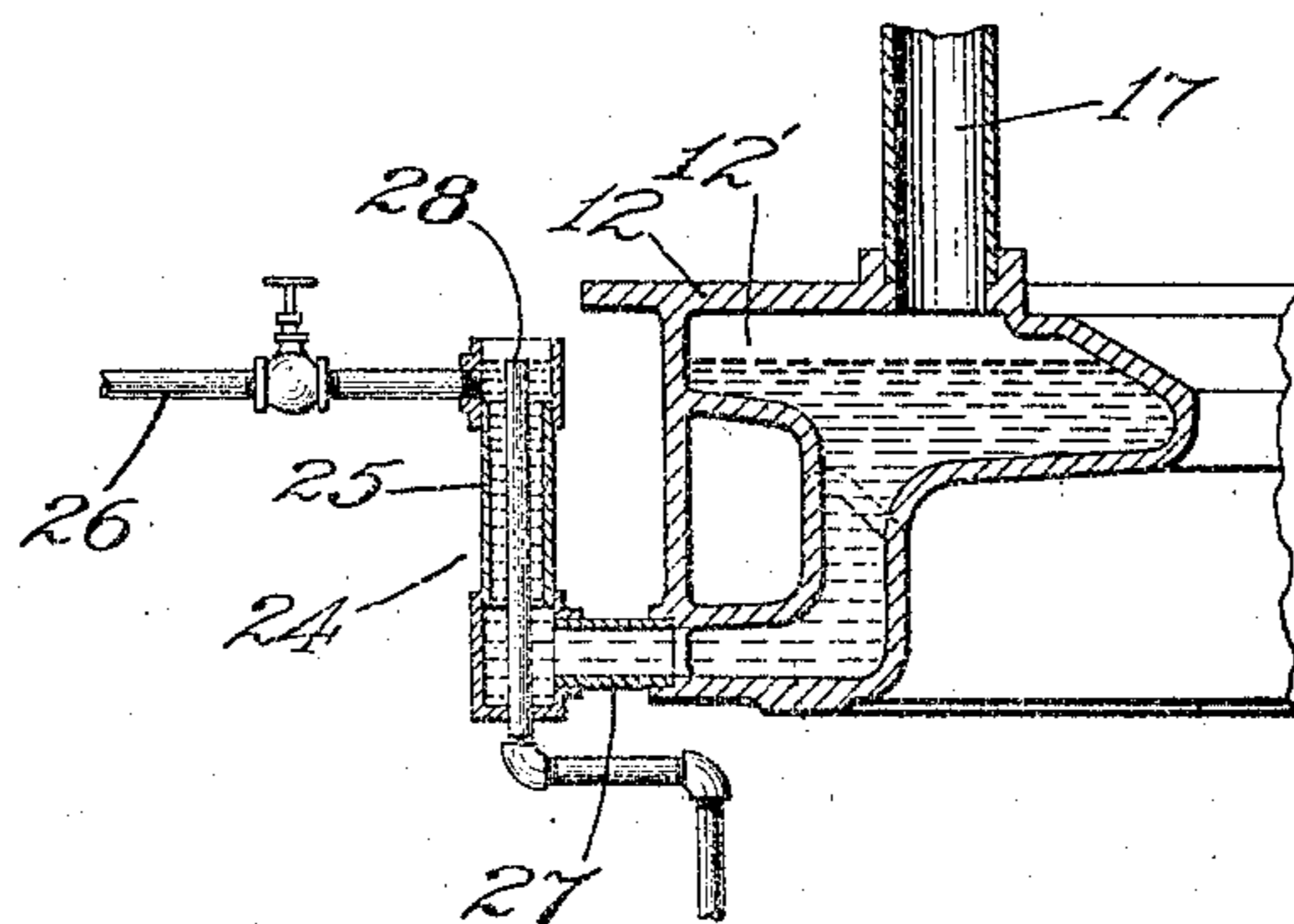


Fig. 3.

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# UNITED STATES PATENT OFFICE.

CHARLES F. MILLER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE MACHINE COMPANY, A CORPORATION OF PENNSYLVANIA.

GAS-PRODUCER.

980,660.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed April 30, 1909. Serial No. 493,146.

*To all whom it may concern:*

Be it known that I, CHARLES F. MILLER, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Gas-Producing, of which the following is a specification.

This invention relates to that type of gas producer, especially suited for the gasification of fuels more or less rich in tar-forming constituents, which type consists in general of an updraft combustion section, on which is superimposed a downdraft combustion section, the gas being withdrawn at the junction of the said updraft and downdraft sections.

One object of the invention is to produce a gas producer of this general type, in which simple and effective means are employed for regulating the combustion in the updraft and downdraft sections respectively in accordance with the relative proportions of fixed carbon and volatile matter in the fuel.

A further object of the invention is to produce a new and original gas producer of this general type, which provides simple and efficient means for access to the refractory lining for breaking up and dislodging clinkers.

These and other objects I attain in a producer embodying the features herein described and illustrated.

In the drawings accompanying this application and forming a part thereof: Figure 1 is a sectional elevation along the line A A of Fig. 2 and illustrates a producer embodying my invention; Fig. 2 is a plan view of the apparatus shown in Fig. 1; and, Fig. 3 is a fragmental sectional elevation along the line B B of Fig. 2 and illustrates a water-supply device employed in connection with the vaporizing chamber.

The updraft section 8 consists of a shell 6 provided with a fire brick or refractory lining 7. On the upper end of the updraft section is a vaporizing chamber 12 made ring-shaped of cast iron or other suitable metal. This vaporizing chamber has one or more openings 10 through it by means of which the gas is taken off. Supported on the vaporizing chamber is the downdraft section 9 consisting of a shell 6', the outer diameter of which is less than the largest inner diameter of the updraft section 8.

This upper shell 6' is also provided with a fire brick or refractory lining 7'.

In order that the producer may operate continuously and efficiently, it is necessary to keep clinkers from adhering to the lining which must be done by breaking them up periodically with a poker or clinker bar. In all producers of this general type hitherto constructed, poking can be done only through the top, necessitating very long and heavy pokers, which become heated over such a considerable portion of their length as to make them difficult for the operator to handle. Also by reason of the extreme depth of the producer the operation of cleaning the walls and breaking up clinkers is laborious and consequently apt to be neglected and at best is inefficient.

In my improved producer, with the outer diameter of the downdraft section smaller than the inner diameter of the updraft section, I am enabled to put a plurality of poke holes 11 extending downward through the vaporizer from its upper surfaces. These poke holes give easy access to the lining of the updraft section, and clinker may be dislodged from the walls and broken up with comparative ease and efficiency, by means of pokers of less than half the length required in the ordinary construction of this general type of producer. The poking of the downdraft section may be done conveniently and efficiently through suitable poke holes in the top with a short light bar as the depth to be covered from the top is less than half the total height of the producer.

Producers of this general type as heretofore constructed have been made with open tops. I use a closed top 3 with a suitable charging door 4 and poke holes 5 with covers, in order that the draft and combustion may be more completely under control.

The top 3 is provided with an interior chamber 3' which surrounds the charging opening or door 4 and is divided by the radially extending diaphragm. An air inlet port 15 is provided in the upper side of the top 3 and communicates with the chamber 3' on one side of the diaphragm. A port 15' is provided in the lower side of the top 3 and communicates with the chamber 3' on the other side of the diaphragm. The port 15' communicates through a suitable pipe with an air inlet port 15<sup>a</sup> provided in the

vaporizing top 12. With this arrangement all of the air drawn into the producer first circulates through the chamber 3' and the double advantage of air cooling the top 2 and of warming the incoming air is obtained.

An air inlet port 15<sup>a</sup> in the casting 12 communicates with the annular vaporizing chamber 12'. An outlet port 16 is provided in the casting 12 and is located diametrically opposite the inlet port 15<sup>a</sup> and communicates with the chamber 12' and with the blast pipes 17' of the producer, the blast pipe 17 for top portion of the producer being in direct communication with the top of the chamber 12'. The chamber 12' is adapted to be filled with water and an apron 18 is provided immediately adjacent to the port 16 for the purpose of preventing the water from flowing out of the chamber through the port 17'.

The successful operation of a producer of this general type requires that the combustion zone shall be maintained at a constant level. In order that the combustion zone may be maintained at a constant level it is essential that the division of the blast supply between the updraft and downdraft sections shall be capable of adjustment to suit various ratios of fixed carbon and volatiles in the different fuels that may be used. The larger the proportion of fixed carbon the greater must be the proportion of blast delivered to the updraft section and vice versa. To accomplish this the outlet of the vaporizing chamber is connected with the top section of the producer through the pipe 17 and the adjusting valve 22 and communicates with the bottom section of the producer through the pipe 17' and the adjusting valve 23. It is obvious that with this arrangement the blast to the two sections may be divided in any proportion desired.

Depending on the moisture in the fuel, and the varying degrees of heat generated by the various fuels, it is essential that the proportions of air and vapor in the blast shall be adjustable. To accomplish this I place in the blast pipe between the valve 22 and the blast opening 20, and between the valve 23 and the twyer 21, regulating valves 22' and 23' respectively opening to the atmosphere or communicating with a dry air supply that may or may not be preheated by any suitable means. By this arrangement it is obvious that the proportions of vapor and air may be adjusted in any desired ratio, and the ratio in the blast supplied to one section is entirely independent of that in the blast supplied to the other.

Water is delivered to the chamber 12' and is maintained at a constant level by means of a water supply device 24 illustrated in Fig. 3. The device consists of a tube or

pipe 25 to which water is delivered by a supply pipe 26 and which communicates with the chamber 12' through a pipe 27. An overflow pipe 28 extends upwardly through a tube 25 and is open at its upper end. A continuous flow of water is maintained through the pipe 26 and consequently through a pipe 28, and by this arrangement the water level is maintained constant within the chamber 12' without subjecting the chamber to the cooling action of the flow. This water supply device may be replaced by an ordinary float valve which will maintain the level of the water constant within close limits without waste of water.

29 is a water supply pipe for cleaning the interior of the casting 12.

The operation of the producer is as follows: After the fuel bed is well established within the gas generating chamber and a current of air is drawn through the vaporizing chamber by suction transmitted through the gas offtake port 10, a blast of vapor-laden air is introduced above and below the fuel bed. The fresh fuel is fed to the downdraft portion 9 of the generating chamber and the function of this portion of the chamber is to convert the fresh fuel into coke by the disassociation of its hydrocarbon constituents. These hydrocarbons in passing down through the incandescent fuel are converted into fixed gases before reaching the offtake port. The coke formed in the downdraft portion is completely gasified in the updraft or lower portion of the producer.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim is:

1. A producer comprising, an updraft section, a downdraft section with its outside diameter less than the greatest interior diameter of the updraft section, a vaporizing top located between said sections with a gas offtake port and a plurality of poke holes so disposed as to permit passing a slice bar along the inner walls of the updraft section.
2. A producer comprising, an updraft section, a downdraft section, and a vaporizing top located between said sections and provided with poke holes and a gas delivery port.
3. An up and down draft producer comprising, an updraft section, a downdraft section the outside diameter of which is less than the greatest inside diameter of the updraft section and an annular vaporizing top for the updraft section located between the sections and provided with an interior

vaporizing chamber and air admission port, air and vapor delivery ports, a gas offtake port and a plurality of poke holes for the updraft section.

5 4. An up and down draft producer comprising, an updraft section, a vaporizing top therefor provided with a vaporizing chamber, an air admission port, air and vapor delivery ports, a gas offtake port and a plurality of poke holes, a downdraft section 10 mounted on the vaporizing top, and communicating with the updraft section by means of a suitable opening in the center of the vaporizing top and an air cooled top for 15 the downdraft section the air cooled chamber of which connects with the air admission port of the vaporizing top.

5. A suction gas producer having a down- 20 draft section and an updraft section, an intermediate offtake, a vaporizer, pipes lead-

ing in opposite directions from the vaporizer into the respective sections, air inlets for said pipes, and valves in said pipes between the air inlets and the vaporizer.

6. A suction gas producer having a down- 25 draft section and an updraft section, an intermediate vaporizer, an offtake, pipes leading from the vaporizer to the respective sections, air inlet ports for the pipes, valves in the pipes to cut off communication between 30 the vaporizer and the sections and valves in the air inlet ports.

In testimony whereof, I have hereunto subscribed my name this 26th day of April, 1909.

CHAS. F. MILLER.

Witnesses:

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