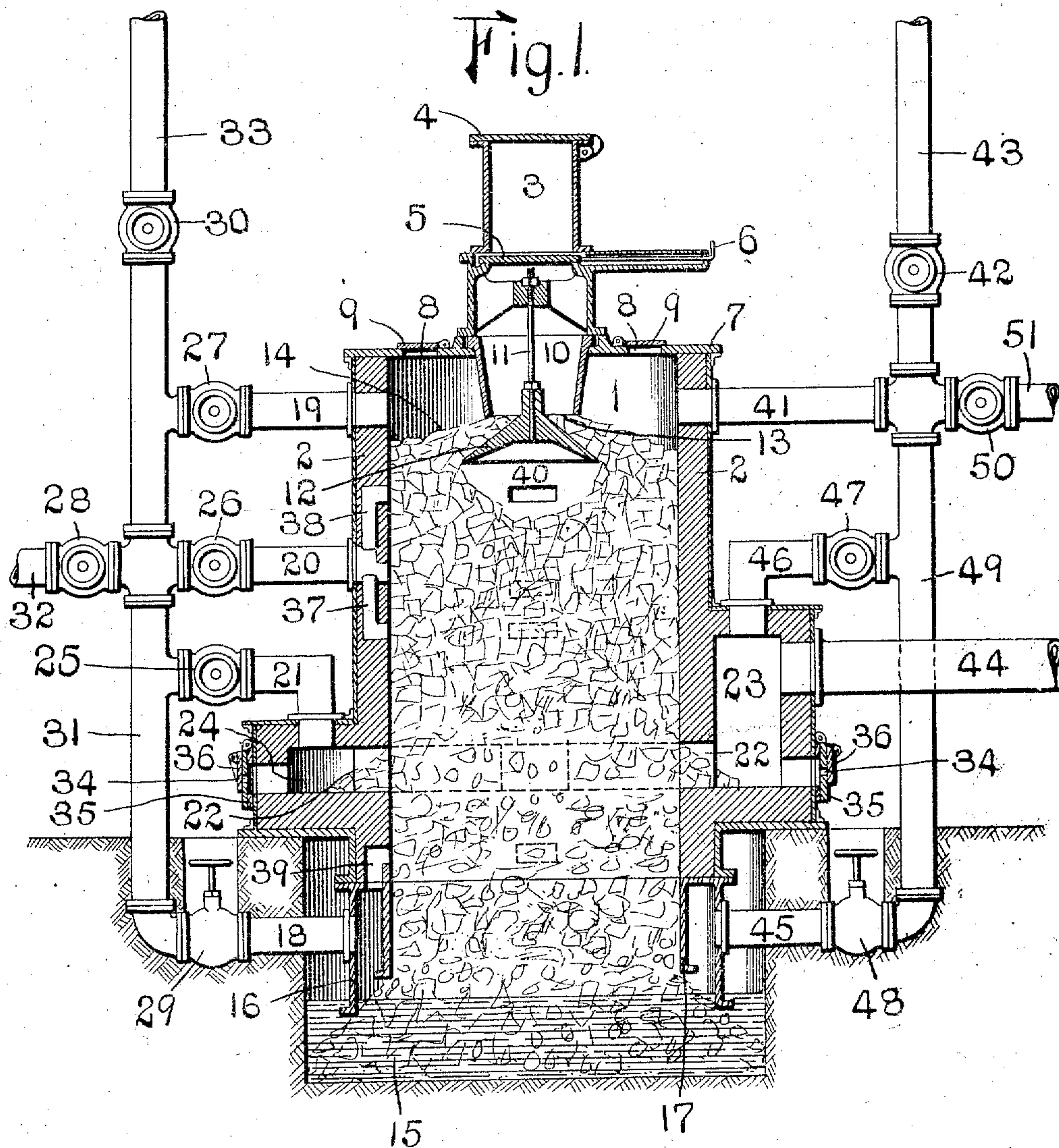


P. EYERMANN.
GAS PRODUCER.

APPLICATION FILED JULY 21, 1905.

2 SHEETS—SHEET 1



Witnesses

A. J. McCauley.

B. J. Funk

Inventor:

Peter Eyermann

BY *W. Kewell Cornwall*

ATTY'S.

P. EYERMANN.
GAS PRODUCER.
APPLICATION FILED JULY 21, 1905.

2 SHEETS—SHEET 2.

Fig. 2.

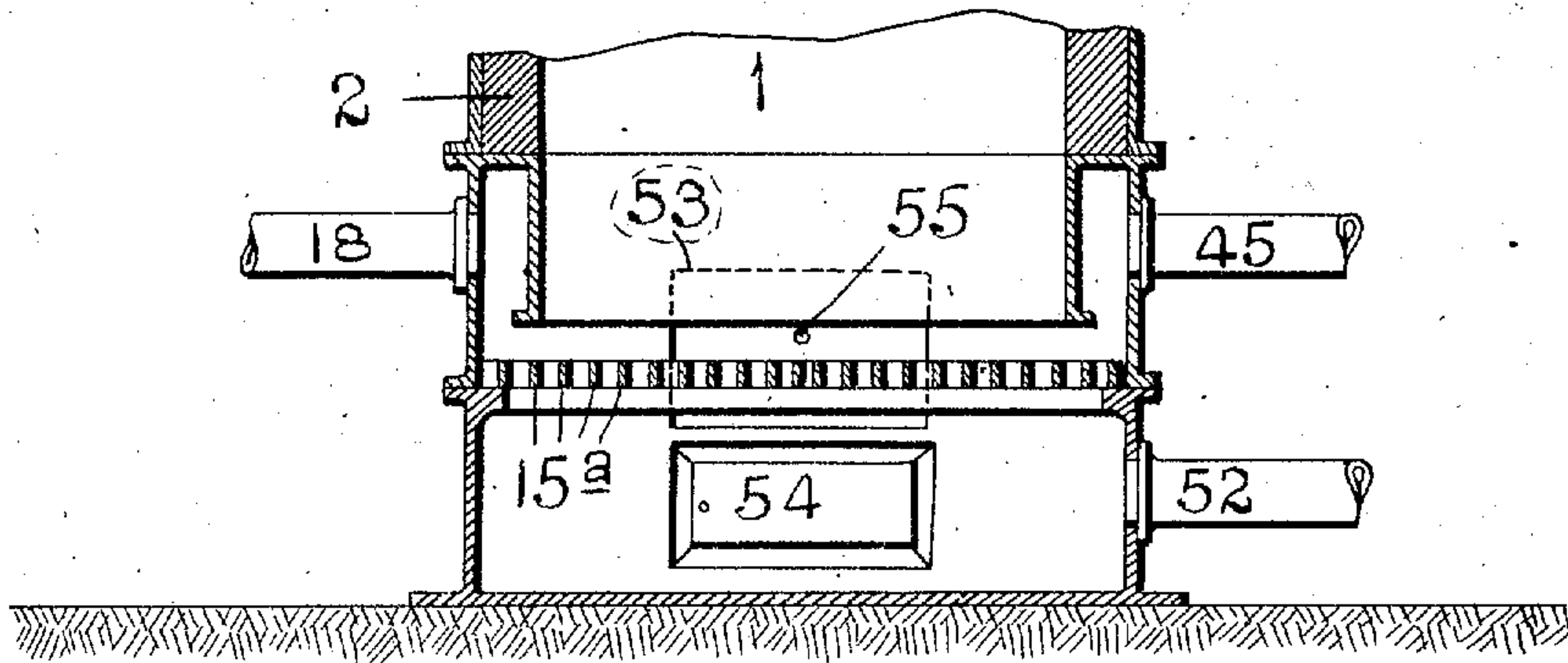
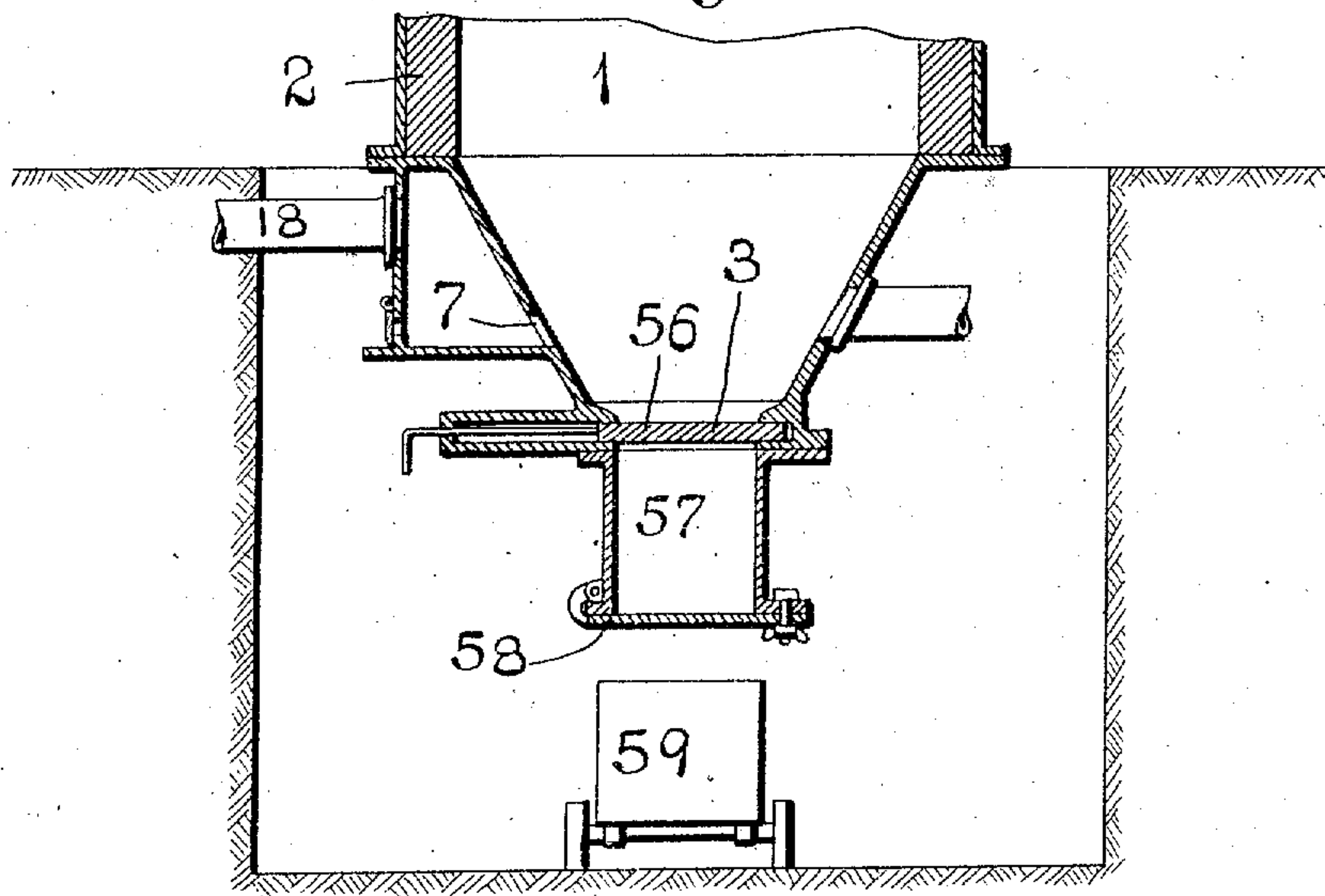


Fig. 3.



Witnesses

a. j. McCauley

B. J. Fink

Inventor:

Peter Eyermann

BY Bakerwell Cornwall

ATT'Y'S.

UNITED STATES PATENT OFFICE.

PETER EYERMANN, OF BELOIT, WISCONSIN, ASSIGNOR TO FAIRBANKS-MORSE MANUFACTURING CO., OF BELOIT, WISCONSIN, A CORPORATION OF WISCONSIN.

GAS-PRODUCER.

No. 858,589.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed July 21, 1905. Serial No. 270,672.

To all whom it may concern:

Be it known that I, PETER EYERMANN, a citizen of the United States, residing at Beloit, Wisconsin, have invented a certain new and useful Improvement in Gas-Producers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional elevational view of a gas producer constructed in accordance with my invention;

Figure 2 is a vertical sectional view through the lower end of a slightly modified form of producer showing the inclosed grates in lieu of the water seal; and

Figure 3 is a section through the lower end of still another form of producer showing a double closure device at the bottom.

This invention relates to gas producers, and particularly to an apparatus for improving the physical and chemical properties of gases for the purpose of enhancing their value for industrial uses.

One of the objects of the invention is to provide a gas generator which may be used for generating gas from anthracite products, such as coal, coke or charcoal, as well as from bituminous products such as lignite, coking coals, wood, straw and similar fuels. One of the disadvantages resulting from the manufacture of gas in the producers now generally known, is the fact that the gas contains many impurities, causing different difficulties under various conditions. For example, the amount of carbonic acid generated in the ordinary type of up-draft producer reduces the heating value, while the tar in the gas has a tendency to spoil the valves, pistons, igniters, etc. in the gas engine to which such gas is usually fed. In the existing down-draft producers, the generated gas has been found to contain an excessive amount of tar, the proportion of tar being so excessive that a great part of the fuel is not burned. As a result, the producer soon becomes filled with charred coal or coke, making it unfit for practical use, especially in connection with gas engines. One of the objects of this invention is to overcome these difficulties by means of the apparatus illustrated in the drawings, and in which like characters of reference refer to like parts in the several views.

Referring now to the drawings, the producer is illustrated as comprising a suitable shell 1 illustrated as being cylindrical, and which is provided with a fire-proof lining 2. Under certain conditions the lining may be inserted so as to give a tapered shape to the interior of the producer, but such construction is not essential under all circumstances. The fuel may be introduced through a closed feeding device illustrated as a hopper

3. This hopper may be closed on top as well as at its lower end by any suitable means. However, in Figure 1 I have illustrated the hopper as being closed at the top by a door 4, while the lower part may be closed by a sliding gate valve 5 having a rod and handle 6 extending through the charging device, whereby access may be had from the exterior to open or close the gate as occasion may demand. It is essential that this door may be conveniently operated to prevent the escape of gas during the time that the producer is being charged with fuel so as to prevent air from entering the producer in the event that the producer is being used as a suction gas producer and to prevent the escape of gas in the event that the device is being used as a pressure producer.

The producer is provided with a main top plate 7 having a number of what might be termed poking holes 8 through which suitable pokers may be inserted to agitate the fuel, said holes being closed, if desired, by suitable closures, such as the doors 9. Below the hopper is a coal magazine 10. This magazine may be dispensed with under certain conditions, but its use will enable the producer to be operated more easily than if it were eliminated.

Suspended from a rod 11 is a conically-shaped fuel distributing plate 12 leaving a clearance space 13 between the magazine and the cone for passing the coal into the body of the producer. When the coal is fed into the producer it may be leveled by means of pokers introduced into the openings 8 until the level of the fuel will assume proportions as indicated at 14. In the lower portion of the producer, illustrated in Fig. 1, is a water seal 15. This water seal is made preferably by means of a casing 16 which may be cast or otherwise formed and which extends down from the bottom of the fire brick lining 2. The casing is provided with a lower end 17 on the inside of the producer and which is in the form of a flange, so that the pile of ashes, clinkers and other products will be distributed toward the bottom of the producer to avoid the necessity of the use of grates. The casing 16 terminates short of the bottom of the water seal 15 so as to allow air or steam to enter through a pipe 18 between the double wall of the casing 16 so that the air or steam may be introduced in an upward direction from the bottom of the producer. The chamber between the walls 16 and 17 does not continue uninterrupted clear around the furnace but is provided with partitions separating the side carrying the pipe 18 from the side carrying the pipe 45 whereby direct connection between such sides is prevented. Air or steam from any suitable source may also enter this producer from the top through a pipe 19, or the air or steam may enter the middle portion of the producer through either pipe 20 or 21 if required. The main gas

escape openings are at 22. Air entering at 21 will be permitted to burn up tarry residues in chambers 23 and 24 which encircle the casing 1 of the producer. If the chamber 24 is not connected to chamber 23 this air will pass through a carbon-containing layer, thus making gas, the proper admixture of air and steam being admitted through the pipe 21 by means of operating valve 25. All other air supplies may be regulated by the valves 26, 27, 28, 29 and 30 in the several branches, all connected to the main supply pipe 31.

If the device is to be used as a suction gas producer, the air may be drawn through the pipe 32 for consumption, as for starting an engine; or if the device is to be used as a pressure producer, compressed air may be supplied by pipe 33. The waste ashes may be removed at any convenient point adjacent the water seal 15 in a manner generally known. In the event that the device is to be used as a suction gas producer this water seal will admit the steam supply for the producer, and the ashes and cinders which will be heated to incandescence will drop into the water, thus vaporizing parts of it, and the vapor will be permitted to pass upwardly through the fuel, thus improving the gas and avoiding the necessity of utilizing a steam boiler or vaporizer.

As circumstances may direct, I may or may not employ pocket holes or openings 34 at the gasifying zone through which the ashes may be removed and which are normally closed by doors 35. The openings or pockets 34 in the doors 35 are relatively small. These small openings may be covered by auxiliary doors 36 of any desired construction. Attention is called to the fact that the poking holes 8 may be sufficiently large so that fuel may be fed through them if it is desired not to open the main coal-charging device, as for example, in the event that the main charging device has a single cover. Attention is also directed to the fact that a number of higher and lower air flues 37 and 38 may branch off from the air supply pipe 20 or may lead directly into the inside of the producer, and the same may be said of the lower air supply 18 where branches 39 may enter somewhat higher in the producer. The fuel distributor 12 will leave a certain space 40 free below the same. This space will add to the perfect production of the gas because the air from the top can easily enter the center of the producer, and for this purpose any convenient form may be given to the distributor 12.

In operation, after the first fire in the producer has been made, all smoke and waste gas will be permitted to escape through the pipe 41 by operating valve 42 in the chimney 43. The main gas escape pipe 44 will permit the drawing of the gas from the center of the producer from the chambers 23. As long as the furnace, engine or other source of consumption is shut off from the pipe 44, the gas is produced under air pressure; thus the escaping waste gases may pass through the pipes 45 and 46, the valves 47 and 48, and pipe 49, to the chimney. It will also be noticed that it is possible to take gas from the pipes 41, 45 and 46 when the chimney valve 42 is closed, and this gas may be drawn through a valve 50 and the pipe 51. These pipes 41, 45 and 46 may also be used for supplying steam or any other vapors to the producer.

From the above description it will be seen that this producer is suitable for all kinds of fuel. Non-bitu-

minous fuels may be heated by up-draft, taking air from the bottom and drawing the gas through the top through the pipe 51. Bituminous fuel may be treated in a combined up-and-down draft, taking air through the openings 18, 19, 20 and 21, or only some of these openings may be used under certain conditions, the treatment varying with the quality of the fuel. Easily inflammable material like straw, wood, leaves, etc., may be gasified in a simple down-draft furnace, taking the air only from the top.

In Figure 2 I have illustrated a modification of the lower end of the producer, using grates 15^a instead of the water seal. In this construction the opening 18 will be utilized as the air supply, 45 as a waste gas pipe, through which the gas may escape, and 52 an air and steam supply. 53 and 54 indicate openings through which instruments may be inserted for cleaning the producer, which openings may be closed by suitable doors. 55 designates poke holes in one of the cleaning doors. These poke holes may be arranged at any suitable point, the idea being to have the poke holes arranged so that the pokers may be moved back and forth in horizontal planes at any place in the producer. These small openings in the larger doors also serve as sight openings, so that the working of the products in the producer may be observed from the outside. This arrangement is rather important in that it reduces the liability of accident, for, should the attendant desire to open one of the larger doors he might first open the smaller door so that in case an explosion is taking place the products would not be blown through the door opening and the liability of injury to the attendant would be reduced.

In Figure 3 I have illustrated another form of the lower end of the producer, in which all ashes and clinkers are packed downwardly in the hopper and are permitted to rest on a closing device 56 of any desired description. In Figure 3 the same slide gate 56 is shown as is illustrated in Figure 1. Below this closing device 56 is a vessel 57 which is closed on its lower end by suitable means 58. The closing means may be simply a fall door or a gate valve. The ashes will be permitted to fall in a small car 59 so that they may be carried to a suitable premises and dumped. The operation of this device is as follows:

In case of down-draft it is not desired that the producer get air in the lower end; therefore, the device 57 is open and the ashes are packed down in the vessel 58. Afterward the vessel 57 is closed and the device 58 is opened without any danger of the entering of uncontrolled air or escaping gas. The controlled quantities of air, steam, etc., may be allowed to enter through the pipe 18 and openings 7, and the poking hole 8 may be used as disclosed in Figure 1.

Although I have shown the details of my improved gas producer in the forms best known to me at this time, I would have it understood that I do not limit myself to the exact details of construction but reserve the right to utilize such changes in form, proportion and minor details of construction as may suggest themselves from time to time and come within the scope of the appended claims.

In such claims as I have defined the gas chamber as a hot gas chamber I have reference to a reservoir or chamber in which the gas is relatively hot and in contra-dis-

tion to a producer in which the gas escapes from the top.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

- 5 1. A combined up and down-draft gas producer comprising a casing adapted to contain fuel, a gas chamber located at approximately the center of the casing and communicating with the interior thereof, a pipe communicating with said chamber through which the gas escapes, and
- 10 means for supplying air to said gas chamber; substantially as described.
2. A combined up and down-draft gas producer comprising a casing adapted to contain fuel, a gas chamber located at approximately the center of the casing and communicating with the interior thereof, a pipe communicating with said chamber through which the gas escapes,
- 15 means for supplying air to said gas chamber, and means for supplying air to said casing at points above and below the gas chamber; substantially as described.
- 20 3. A combined up and down-draft gas producer comprising a casing adapted to contain fuel, a gas chamber located at approximately the center of the casing, a pipe communicating with said chamber through which the gas escapes, a main pipe for supplying air or steam, branches
- 25 18 and 19 extending from said main pipe to the lower and upper ends of the casing respectively, a branch 20 extending from the main pipe and entering the casing at a point above the gas chamber, a branch 21 from said main pipe entering the gas chamber, and pipes 41 and 45 communicating with the upper and lower ends of the casing respectively for conveying away waste gas; substantially as described.
- 30 4. In a gas producer, a fuel chamber, a casing 16 depending from the lower end of said chamber, a body of water into which said casing extends to form a seal, and an annular member 17 spaced away from the inside of the casing 16 and terminating above the body of water; substantially as described.
- 35 5. In a gas producer, a fuel chamber, a casing 16 depending from the lower end of said chamber, a water seal into which said casing 16 extends, an annular member 17
- 40

spaced away from the casing 16 and terminating above the surface of the water, and air and gas pipes connected to the space between the casing 16 and member 17.

6. In a gas producer, a fuel chamber, gas and air pipes connected to the top thereof, a casing 16 depending from the lower end of said chamber, a water seal into which said casing 16 extends, an annular member 17 spaced away from the casing 16 and terminating above the surface of the water, and air and gas pipes connected to the space between the casing 16 and member 17.

7. In a gas producer, a casing adapted to receive fuel, a gas chamber located at approximately the center of the casing and provided with a gas escape, a member located at the bottom of the casing and comprising two walls which are spaced away from each other to form a chamber, a pipe 45 communicating with said chamber, a pipe 18 communicating with said chamber for supplying air or steam thereto, and a port 39 extending from said chamber to the interior of the casing; substantially as described.

8. In a gas producer, a casing adapted to receive fuel, a gas chamber located at approximately the center of the casing and provided with a gas escape, a member connected to the bottom of the casing and consisting of two walls spaced away from each other to form a chamber, a pipe 45 communicating with said chamber, a pipe 18 entering said chamber for supplying air or steam thereto, a pipe 41 communicating with the upper end of the casing, and an air supply pipe entering the casing at a point intermediate the gas chamber and the upper end of the casing; substantially as described.

9. A gas producer having a water seal at the bottom thereof, and a depending outside casing 16 having air and steam openings entering the lower end of the producer, a chimney, and a connection between the chimney and said outside water seal casing; substantially as described.

In testimony whereof, I hereunto affix my signature, in the presence of two witnesses, this 13th day of July, 1905.

PETER EYERMANN.

Witnesses:

J. W. BATES,

CHAS. W. PHINN.