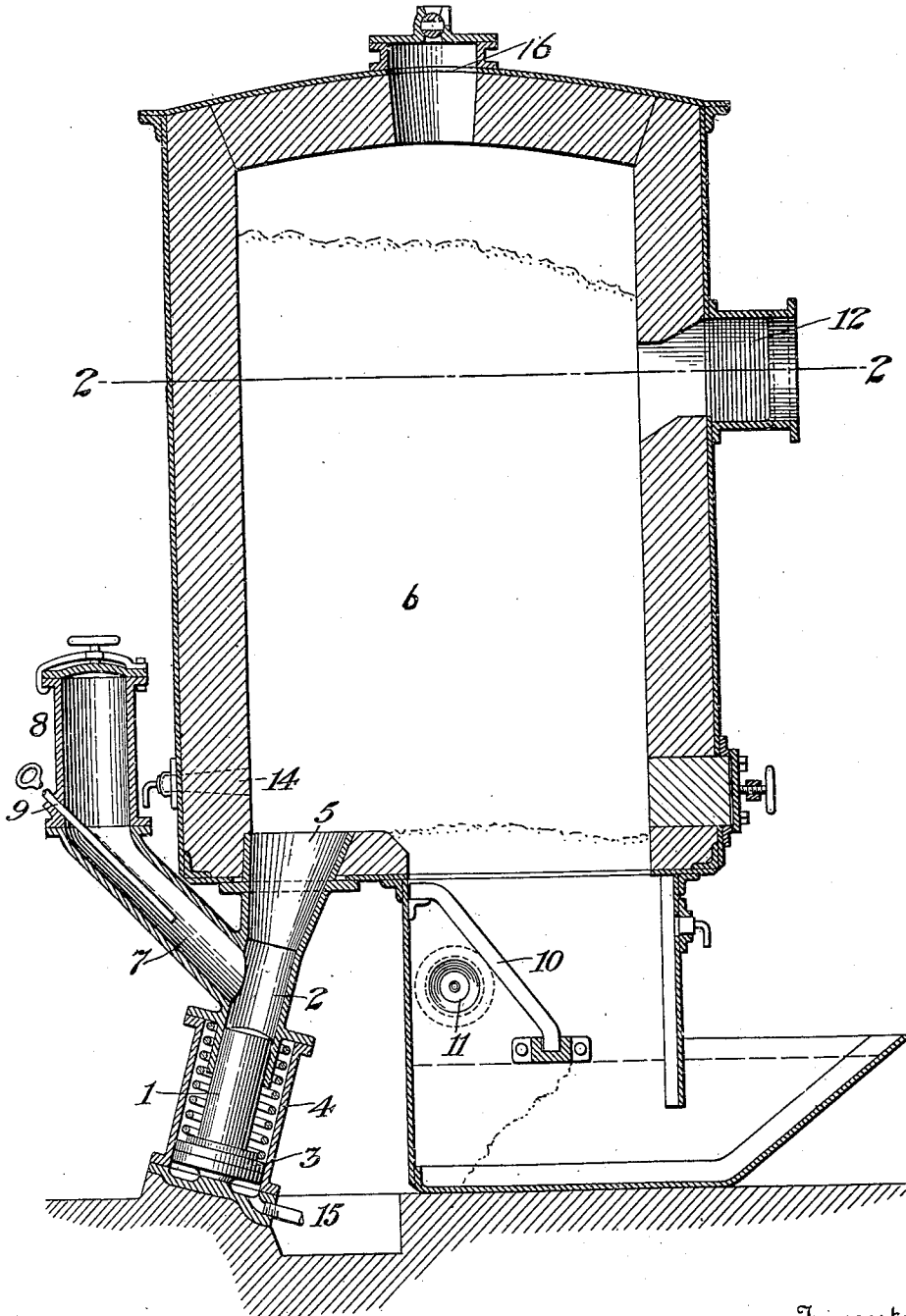


A. M. GOW.
 APPARATUS FOR THE MANUFACTURE OF GAS.
 APPLICATION FILED MAY 21, 1904. RENEWED MAY 13, 1907.

945,715.

Patented Jan. 4, 1910.
 2 SHEETS—SHEET 1.

Fig. 1



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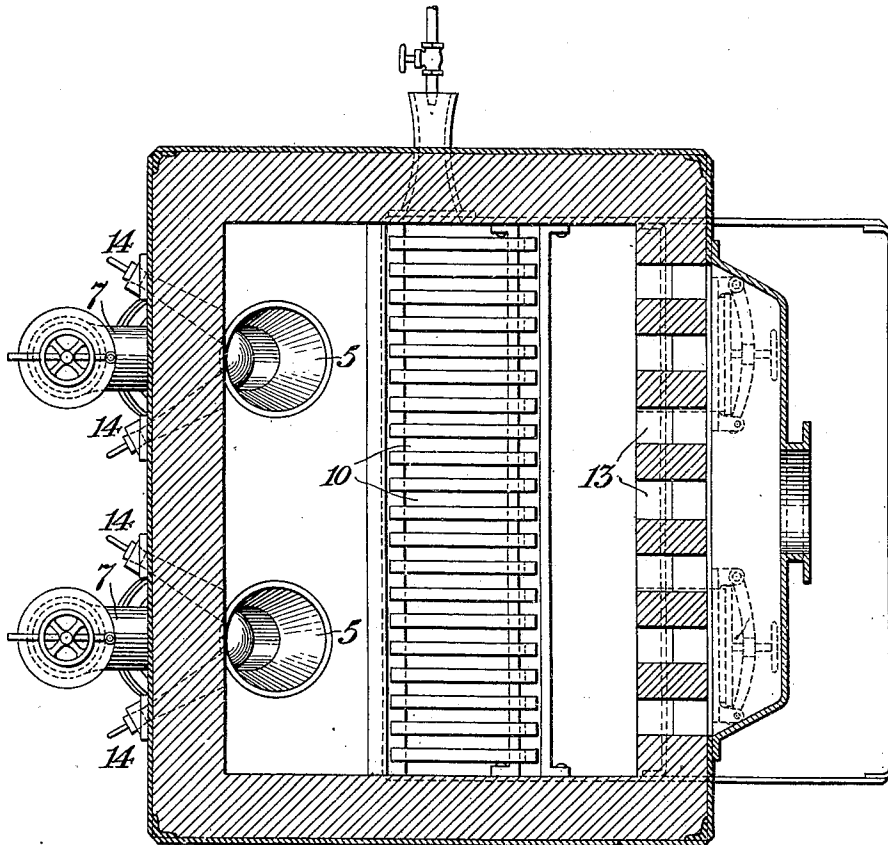
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2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF GAS.

945,715.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Original application filed October 10, 1903, Serial No. 176,490. Divided and this application filed May 21, 1904, Serial No. 209,012. Renewed May 13, 1907. Serial No. 373,381.

To all whom it may concern:

Be it known that I, ALEXANDER M. GOW, a citizen of the United States, and resident of Edgewood Park, county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for the Manufacture of Gas, of which the following is a specification.

The present application is a division of an application filed by me on the tenth day of October, 1903, Serial Number 176,490.

My invention consists of a new apparatus for the manufacture of producer gas, and is especially adapted to the manufacture of such gas for use in gas engines, from bituminous coal or any carbonaceous material containing a large percentage of volatile matter, although it has features of merit that render it valuable for the manufacture of producer gas for any purpose and from any carbonaceous material.

The object of the invention is first to produce a gas which is free from tar and heavy condensable vapors; second, to maintain the fuel bed in a porous condition free from holes and hard spots.

In carrying out the invention the desired results are accomplished by a succession of direct upward pushings practically parallel to the walls of the producing chamber and of sufficient force to lift the superincumbent mass. That is to say, a rising coking column of fuel is maintained and periodically forced upward. The same operation keeps the fuel bed open and porous, so that no hard spots can form by reason of the fact that the upward intermittent agitation serves to break up such hard masses, and no holes can form because the upward intermittent agitation constantly tends to fill them as will be hereinafter pointed out.

Other advantages of my invention are fully set forth in the parent application of which this is a division.

Referring to the drawings, Figure 1 is a vertical section of one form of apparatus for carrying the process into effect; and Fig. 2 is a cross section of the same.

Referring to Fig. 1, the plunger 1 operates in a cylinder, 2, by means of a hydraulic piston, 3, operating in a cylinder, 4. The upper end of the cylinder 2 is enlarged into a conically shaped piece, 5, which projects

into the gas making chamber, 6. Extending from the side of the cylinder 2 and opening into it is a pipe, 7, surmounted by a hopper, 8, for receiving fuel. The pipe 7 is arranged on an incline so that the fuel placed in the hopper will tend by gravity to enter the pipe 2 when the plunger 1 is below the opening of the pipe 7. A poker, 9, may be employed, if desired, for assisting the gravity feed. A sloping grate, 10, extends toward the opposite side of the chamber, and air and steam are admitted under the grate bars, by means of a pipe 11, and pass through the spaces between the said bars into the producing chamber through a bed of ashes lying immediately upon the bars. In this case I have shown a gas outlet, 12, at a point below the normal fuel level, in order to prevent the possibility of heavy hydrocarbon vapors passing up the wall of the producing chamber and escaping to the gas outlet without having to pass through a body of incandescent coke. I have also shown ports, 13, 13, as leading into the gas offtake, the placing of the feed mechanism at the side of the producer makes it convenient to introduce poke holes, 14, 14, by which the ascending column may have holes poked through it in a horizontal direction to facilitate the liberation of the gases therein and also to break it up to some extent in order that the power required to force it upward may be reduced. This feature is desirable for such fuels as are liable to cake into a hard sticking mass. The hydraulic cylinder 4 is made in the usual manner and operated through a pipe, 15, by ordinary valve devices, (not shown). The gas making chamber 6 is lined with brick in the usual manner.

The operation is as follows: The gas making chamber is filled with ashes up to the top of the flaring extension piece 5 and a fire is started upon the ashes. The hopper 8 is charged with coal; the plunger 1 is lowered, and if necessary the poker 9 is agitated to assist in the entrance of coal by gravity into the cylinder 2 above the plunger. The plunger 1 is then forced upward. In practice I have found that by making the face of the plunger convex and flaring the pipe into which it discharges, the coal is made to

arch so that the plunger may be withdrawn without the coal falling down again. These operations are repeated until a sufficient body of fuel has been accumulated in the producer. At the same time air and steam are admitted through the pipe 11, and the opening between the grate bars, to promote gasification. It will hasten matters if a body of coke be charged into the gas making chamber at the start through the opening 16 at the top of the producer, but it is not essential to do so, for as soon as fuel enough has accumulated in the chamber to press against walls, gas making begins and the fuel is rapidly converted into coke.

It will be seen that in the operation of the invention there is maintained an intermittently rising column of coking fuel, which column at its base is a fresh charge of fuel and which is progressively coked as it ascends. This ascending column breaks up and crowds fuel against the walls of the producing chamber. The air and steam pass through the coke and semi-coked coal surrounding the ascending column. By the time a fresh charge of fuel has traversed the height of the fuel bed, the tar-forming hydrocarbons have been completely distilled from it.

In practice I have found that the center of the rising column remains black at the bottom and is only dull red at the top, so that, looking into the top of the producer in which the column is located, there is seen a dark center surrounded by incandescent coke extending to the walls of the producer. As the fuel surrounding the column is gasified, it is replenished from the column, and the resulting ash passes downward and may be removed by any well-known means.

I claim as my invention:

1. The combination in a gas producer, of a gas generating chamber provided with a fuel admission aperture, a blast admission port located below said aperture and a gas delivery port located near the top of said chamber, a reciprocating plunger for forcing successive charges of fuel through said aperture in a line substantially parallel to the walls of the chamber, means for introducing fuel ahead of said plunger and a water sealed ash removal port communicating with said chamber and located below said blast admission port.

2. In combination in a gas producer, a

gas generating chamber provided with a blast inlet port, a gas delivery port and a fuel admission port located near the bottom and at one side of said chamber, grate bars located above said blast admission port and at one side of and below said aperture and a water sealed ash removal port located at one side of said producer and below said grate bars.

3. In combination in a gas producer, a gas generating chamber provided with a fuel admission aperture located near the bottom thereof, a gas delivery port located near the top thereof and an offset in said chamber extending below said aperture and provided with a blast admission port and an ash removal port.

4. In combination in a gas producer, a gas generating chamber provided with a fuel admission aperture located near the bottom of said chamber and a gas delivery port located near the top of the chamber, means communicating with said aperture for delivering fuel to said chamber in a line substantially parallel with the walls of said chamber, an offset in said chamber located at one side of and below said aperture and provided with a blast admission port and a fuel grate located in said offset and above said blast admission port.

5. The combination in a gas producer, of a gas generating chamber provided with a fuel admission port located near the bottom of said chamber and a gas delivery port located near the top of said chamber, an offset in said chamber extending below said aperture and provided with a blast admission port and means for withdrawing ash from said chamber.

6. The combination in a gas producer, of a gas generating chamber provided with a gas delivery port and a fuel admission aperture, means for delivering fuel through said port into said chamber, an offset in said chamber extending below said aperture and provided with a blast admission port and a water sealed means for withdrawing ash from said chamber.

Signed at Pittsburgh, in the county of Allegheny, and State of Pennsylvania, this 12th day of May A. D. 1904.

ALEXANDER M. GOW.

Witnesses:

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BIRNEY HINES.