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W. S. HUYETTE.

GAS PRODUCER.

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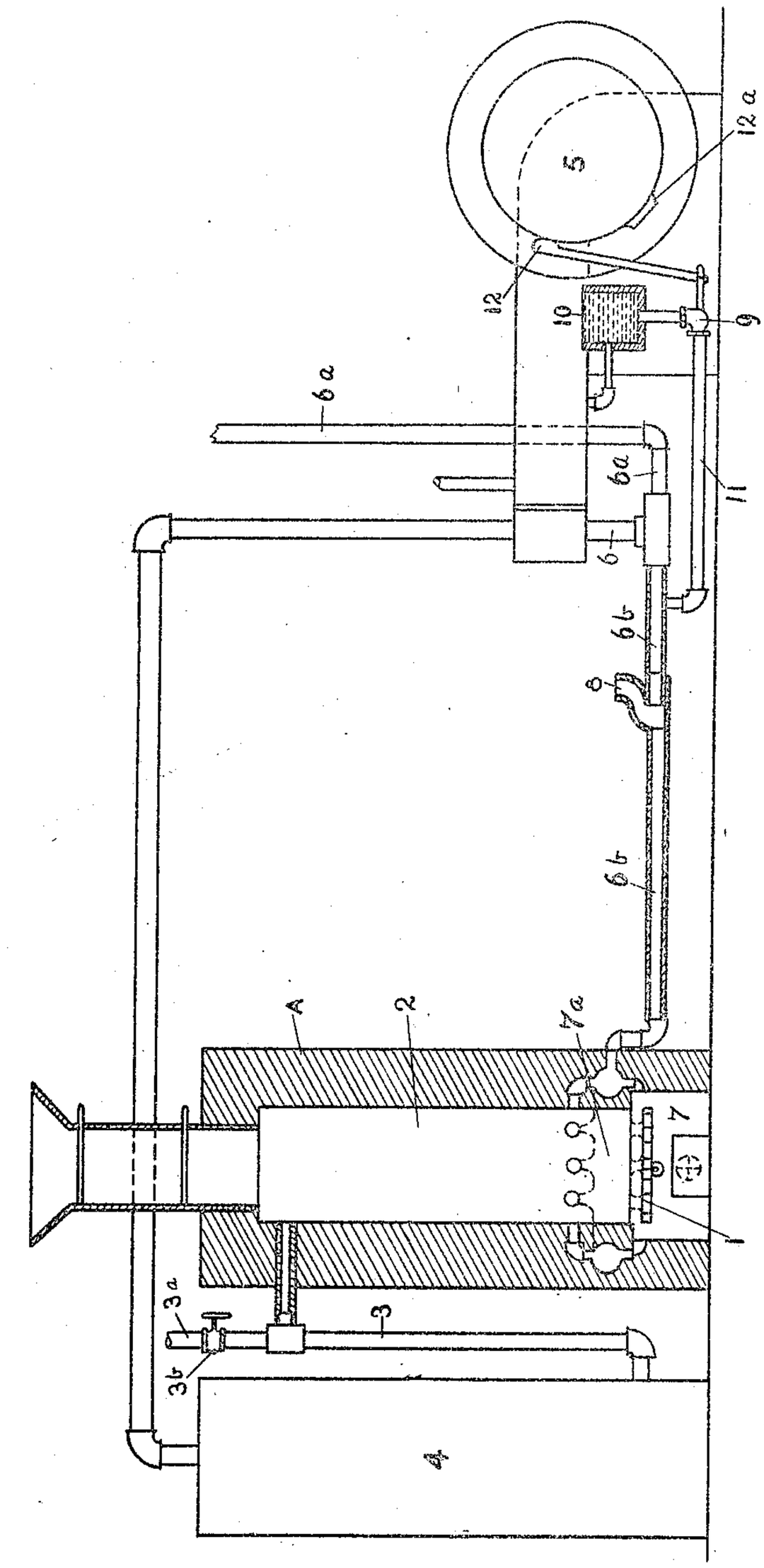

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GAS-PRODUCER.

No. 876,967. Specification of Letters Patent. Patented Jan. 21, 1908.

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To all whom it may concern:

Be it known that I, WILLIAM S. HUYETTE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gas-Producers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a process and means for automatically controlling the production of gas.

One object of my invention is the provision of means for automatically controlling the quantity of gas at either a constant rate or a varying rate of production from a gas producer.

A further object is to decrease the clinker formation in the producer (when coal is used).

Another object of my invention is to improve the thermal conditions in the producer for the purpose of facilitating the chemical reactions taking place therein.

A still further object is to reduce the loss of power in the gas engine required to generate gas in the producer.

The value of connecting a gas producer with a power element, such as a gas engine, has long been recognized and attempts have been made toward this end. But so far as I am aware, such prior devices have not reached a high degree of working efficiency, for this reason, that while the speed of the power element has had a fixed relation to the rate of production of gas, as in a suction gas producer; the quality of gas has not been uniform especially with a varying rate of production; and the formation of clinker in the producer also affects the quality of gas and the rate of production.

It is an object of my invention to introduce a means, controlled by the speed of the engine, for automatically maintaining the quality of the gas generated, with a varying rate of production—as the speed of the engine varies.

The accompanying drawing illustrates in elevation, partly in section one embodiment of my invention for accomplishing the desired results.

(A) indicates any suitable gas producer provided with a grate (1), a fuel chamber (2) and an ash pit (7). A pipe (3) conducts the gas from the producer to any suitable cleaning, purifying, or scrubbing device (4) from whence the gas is conveyed to the gas engine (5) by means of a pipe (4^a).

The engine exhaust pipe (6) is branched, one branch (6^a) adapted to discharge externally of the producer any surplus of exhaust gas from the engine. Any suitable means not shown may be provided for effecting an adjustment of pressure in the branch pipe (6^a). The surplus exhaust gas discharged through pipe (6^a) is only that which can not be utilized in the producer. The remaining branch pipe (6^b) of the exhaust main (6) returns to the producer discharging thereinto in any suitable manner, as into the ash pit (7) or ash zone (7^a) or both.

It is well known that exhaust from gas engines not only issues at a very high temperature, but also with considerable velocity. Since the high pressure exhaust gases have little or are wholly lacking in oxygen it is desirable to mix oxygen (air) therewith before introducing the gases to the gas producer, in order to maintain combustion. As one means for effecting this result, I may provide an "inlet T" at any convenient point in the branch exhaust pipe (6^b), as at (8). The area of opening of the T (8) and the branch pipe (6^a) may be properly determined after experiment, and any suitable means may be provided for securing an adjustment of pressure in the T (8).

As the exhaust gases pass through the branch exhaust pipe (6^b) and into the producer they draw in with them a supply of air, the quantity of which varies with the number of exhaust impulses and also varies with the velocity of the exhaust gases, which velocity changes with the terminal pressure in the cylinder, as with an engine having its speed regulated by a throttling governor, thus taking in a varying charge of gas into the cylinder. By drawing in the air into the branch exhaust pipe (6^b) filled with hot exhaust gases, the air supply is pre-heated before being discharged into the producer.

Steam, as is well known, is used in gas producers to increase the heat power of the gas produced, and to facilitate the operation of the producer. It retards the formation of clinker, reduces inert nitrogen, lowers the temperature and decreases the loss of sensible heat in the gas delivered from the producer. It is of prime importance in producer operating to definitely regulate the quantity of steam admitted to the combustion cham-

ber of the producer. Upon such regulation depends in large measure, the efficiency and economy of the system. The rate of production of gas in the producer is proportioned to the rate of consumption in the engine,—or in other words to the speed of the engine. If the rate of steam supply is constant, while the rate of gas production varies it is impossible to maintain the maximum efficiency and a uniform quality of product from the producer. It is essential to the best operation that the rate of steam supply shall be proportional to the rate of gas production, no matter how the latter may fluctuate. This invention provides means for measuring with accuracy, supplying (in the form of water) and generating the steam supplied to the producer, at rates that are always in proportion to the rate of gas production, and in synchronism with the speed of the engine. As one means for supplying steam to the producer, I connect a valve or cut-off (9) of any convenient style with a supply of water (10). For instance—the valve may control the admission of water to a pipe (11) that leads from a water supply (10) to the branch exhaust pipe (6^b) at any suitable point in the length of the branch exhaust pipe. The operation of the water controlling means, (the valve) is governed by the engine, with which it may be connected in any suitable manner, as by means of the lever (12) and cam (12^a). Of course, the head of water is greater than the exhaust pressure in pipe (6^b) to permit the water to enter the pipe. The water upon entering the hot branch exhaust pipe and mixing with the hot exhaust gases, is generated into steam.

The exhaust gases, either before or after generating the steam, take up the supply of air, as above set forth, and the mixture of exhaust gas, air and steam, is carried along by the velocity of the exhaust, thus being thoroughly mixed mechanically and then discharged into the gas producer in the form best adapted to produce the desired reaction. Thus, I return to the producer a portion of the sensible heat from the exhaust gases.

It is obvious that the connection and arrangement of parts may be varied, as I merely desire to disclose one of the embodiments of which my invention is capable.

Now, as is well-known, the speed of a gas engine varies with its working conditions. If the speed is high, a larger amount of gas is required than if the speed is low. And therefore, when the engine speed increases, or when the load increases, the number of exhaust impulses increases. The engine will thus operate the water-controlling means more rapidly, furnishing a greater amount of water to the exhaust, and at the same time the increased exhaust provides the increased B. T. U. to generate the steam and also draws in a greater amount of air; thus increasing the blast in the producer as well as accomplishing a like increase in suction impulses acting upon the producer: thereby increasing the activity in the gas producer, resulting in an increased supply of gas to the engine. The rate of gas production is, moreover, increased in proportion to the speed of the engine, and the various functions in connection with gas producers vary directly and harmoniously balance with the speed of the engine, and being once adjusted will maintain practically uniform conditions in the producer under widely varying rates of gas production. Obviously, when the speed of the engine decreases, the water-controlling means will be operated less rapidly, thus supplying a less amount of water to the exhaust pipe and at the same time the decreased exhaust will draw in a lesser amount of air, thus decreasing the blast in the producer as well as decreasing the suction impulses acting upon the producer to reduce the activity in the gas producer, which results in a decreased supply of gas to the engine.

The branch pipe (3^a) from the producer provides the draft in the producer when the engine is not in operation, as in marine engines, or at night, so as to maintain the production of gas and the air for production is then drawn into the producer (A) through the air inlet (8) and the pipe (6^b).

The valve (3^b) in the draft pipe (3^a) is closed—preferably automatically—when the engine is started, and is opened,—preferably automatically,—when the engine is stopped so that the producer may be kept constantly in operation. Therefore, it follows that the water controlling means is also stopped when the engine is shut down, so that no water or exhaust gases are discharged into the branch exhaust pipe to the producer. Under these conditions, the desired rate of gas production, or activity in the producer, depends upon the intensity of the draft provided for supplying the required quantity of air.

When the engine is in operation, the ash pit (7) of the producer (A) is kept tightly closed, so that when the mixed gases are discharged wholly or in part into the ash pit (7), a positive pressure is provided therein and the engine materially assists in the production of the gas, decreasing the negative work done by the engine piston in exhausting the gas through the producer and scrubber. This feature can also be used to advantage in increasing the rate of gas production in the producer.

Having thus fully disclosed my invention, what I claim as new is—.

1. The combination with a gas producer, a power element, means for conducting gas from the producer to the power element, and a conduit for conducting the exhaust from the power element to the producer, of means

interposed in the conduit for admitting oxygen thereto, means likewise interposed in the conduit for admitting water thereto and mechanical means controlled by the speed of the power element for governing the admission of water to the conduit.

2. The combination with a gas producer, a power element, means for conducting gas from the producer to the power element, and a conduit for conducting the exhaust from the power element to the producer, of mechanical means automatically controlled by the speed of the power element, for supplying water to the conduit in measured quantities that vary proportionately as the speed of the power element varies.

3. The combination with a gas producer, a power element supplied with gas from the producer, and a conduit for conducting the exhaust from the power element to the producer, of a water supply communicating with the conduit, and mechanical means governed by the speed of the power element for automatically varying the quantity of water supplied to the conduit proportionately as the speed of the power element varies.

4. The combination with a gas producer, an engine supplied from the producer, a conduit leading the exhaust under its own pressure from the engine back to the producer and means for admitting air to the conduit, of means for admitting water to the conduit, a valve controlling the admission of water to the conduit, and means connected to the valve and actuated by the engine for automatically operating the valve in synchronism with the speed of the engine to cause the discharge into the conduit of an accurate quantity of water varied in proportion to the quantity of exhaust gases in the conduit.

In testimony whereof, I affix my signature in presence of two witnesses.

WILLIAM S. HUYETTE.

Witnesses:
C. F. WILSON,
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