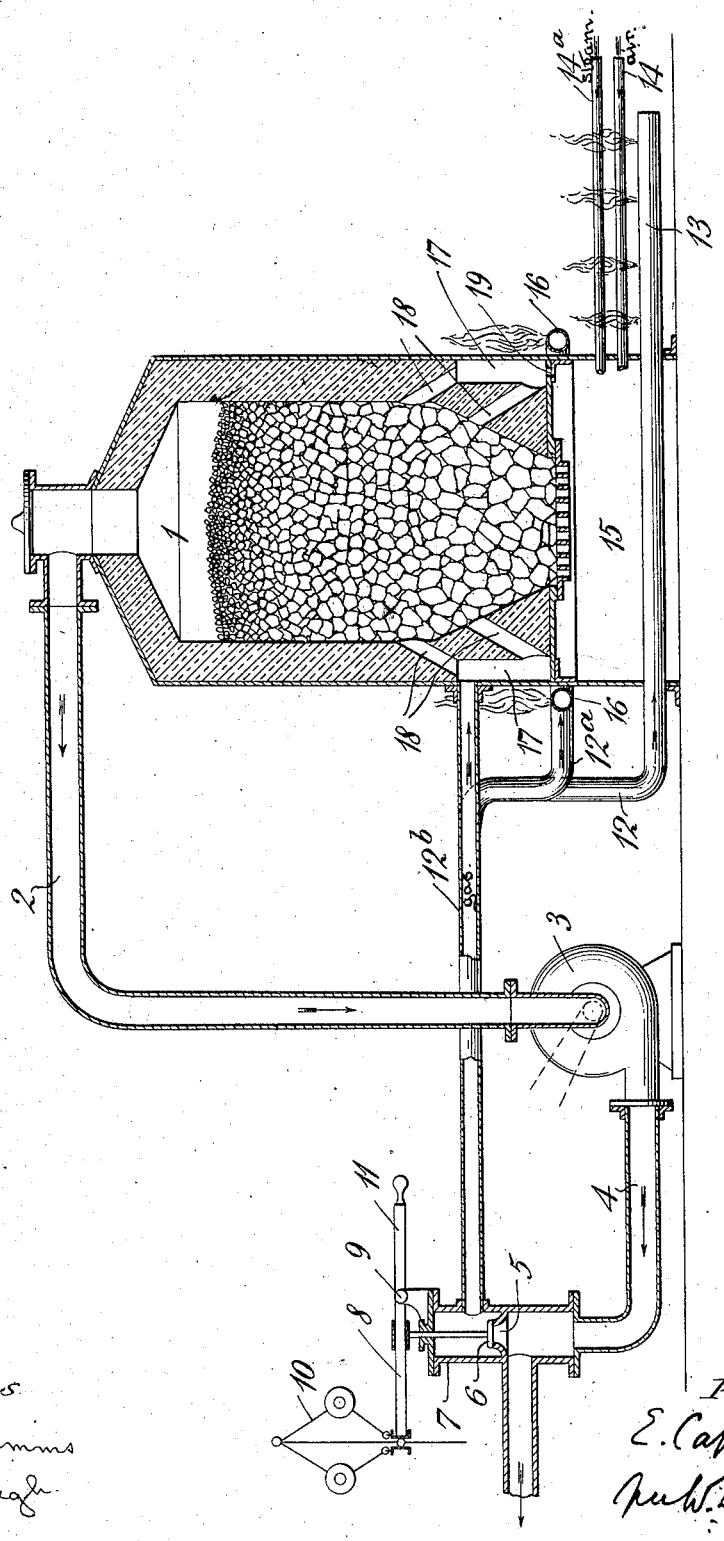
No. 833,673. PATENTED OCT. 16, 1906.

E. CAPITAINE.

MEANS FOR MAINTAINING HEAT IN GAS PRODUCERS.

APPLICATION FILED MAR. 27, 1905.



Witnesses
W. Henry Simms
E. Clough

Inventor
E. Capitaine
per W. Lloyd Wise
Attorney

UNITED STATES PATENT OFFICE.

EMIL CAPITAINE, OF FRANKFORT-ON-THE-MAIN, GERMANY.

MEANS FOR MAINTAINING HEAT IN GAS-PRODUCERS.

No. 833,673. Specification of Letters Patent. Patented Oct. 16, 1906.

Application filed March 27, 1905. Serial No. 252,350.

To all whom it may concern:

Be it known that I, EMIL CAPITAINE, a subject of the German Emperor, residing at Frankfort-on-the-Main, Germany, have invented means or apparatus for maintaining a constant or approximately constant heat in a suction gas-producer with a varying consumption of gas, of which the following is a specification.

This invention has reference to suction gas-producer engine plants that are repeatedly subjected to a greatly varying load; and it has for its object to avoid in a better manner than heretofore proposed a drawback that usually occurs in such plants under the conditions mentioned and which is due to the fact that the great reduction in the quantities of gas sucked off from the gas-producer by the engine during times of light load causes an undue reduction of the temperature in that part of the producer where the gas is generated, and consequently a reduction in the calorific value of the gas, with the result that there will be a reduction in the efficiency of the engine when the same is subsequently subjected to full load.

Now according to the present invention the temperature in the gas-producer is maintained at a uniform or approximately uniform height with decreasing load on the engine equivalent to the maintenance of the so-called "condition of permanency" in the gas-producer by causing during reduction of the load a larger or smaller quantity of gas, according as the degree in the reduction of load may require, but sufficient for the purpose above mentioned to be sucked from the gas-producer by a pump or exhauster and burning more or less of such gas, according to circumstances, in such a way that some of the heat of combustion thereof will be utilized to assist in maintaining the temperature of the gas-producer at the required degree. This method of maintaining the temperature in a gas-producer forms the subject of a separate application for Letters Patent filed by me, dated April 6, 1906, Serial No. 310,377.

In apparatus according to this invention for carrying out the method referred to the pipe or passage for conveying gas from the gas-producer to the engine is provided at a point between the exhauster and the engine with a gas-outlet controlled by a valve that can be opened more or less by hand or by a governor, so as to allow a greater or smaller quantity of gas to flow from the gas-producer to the place where it is to be burned for maintaining the heat of such gas-producer. The arrangement is such that as soon as the engine is relieved from load up to a predetermined amount, at which the consumption of gas therein decreases in such wise that the temperature in the gas-producer begins to fall, a certain quantity of gas withdrawn from the producer by the exhauster will be allowed to escape from the gas, pipe or passage to the place where it is to be burned and the heat of combustion utilized to maintain the temperature of the gas-producer. Usually only a small quantity of gas will be necessary by its combustion to keep the temperature in the gas-generator at a suitable degree. The heat of combustion of the gas that is burned can be conveyed to the gas-producer in many ways—for instance, by providing in proximity to the fuel-chamber, wherein the gas is produced, heating-surfaces over which the hot gaseous products of combustion can pass and which can be used to heat the air or mixture of air and steam that is supplied to the gas-generator or the gas-generator can be heated from the outside by the heat of the burning gas or by burning the gas in passages in the wall of the producer, so as to prevent or retard loss of heat from the producer by radiation and external cooling during the periods of light load, or the surplus gas may be blown direct into the gas-generator and be burned therein. The quantity of the gas that is thus drawn off, burned, and utilized to assist in heating the gas-generator will vary according as the load of the engine is more or less reduced. The engine may continue to run even when relieved of load. The temperature of the gas-producer may be maintained in the manner described when the engine is at rest. In this case the exhauster must be driven by means independent of the engine.

The accompanying drawing shows, partly in vertical section and partly in side elevation and more or less diagrammatically, a suction gas-producer embodying the present invention.

1 is the suction gas-producer, provided with a suction outlet-pipe 2 in connection with a gas-exhauster 3, arranged to deliver the gas drawn from the producer 1 into a pipe 4, whence it passes to the gas-engine. (Not shown.) In the pipe 4 is a gas-outlet port 5, controlled by a valve 6, that is arranged in a valve-case 7 and connected to a lever 8,

pivoted at 9 and adapted to be automatically operated by a centrifugal governor 10, driven from the engine, and also it may be to be operated by hand through a hand-lever 11. 12 12^a 12^b are pipes connected to the valve-box 7 above the gas-exit valve 6 and by means of which the gas allowed to escape from the pipe 4 past the valve 6 can be conducted to the place where it is to be burned. The pipe 12 may conduct the surplus gas to a burner 13, where it is burned and the resulting heat of combustion used to heat the air and steam passing through the pipes 14^a and 14, respectively, to the ash-box 15 of the gas-producer 1, so that some of such heat of combustion will be conveyed by the air and steam into the mass of fuel in the gas-producer for maintaining the temperature thereof, or the pipe 12^a may conduct the surplus gas to a burner 16, surrounding the exterior of the wall of the gas-producer, so that the heat of combustion of such gas will heat the producer externally to prevent or retard radiation of heat from and external cooling of such gas-producer, or the pipe 12^b may be connected to an annular chamber 17, that surrounds the lower part of the gas-producer and is in communication with passages 18, formed in the wall of the gas-producer, and with the ash-box 15 by openings 19, through which some of the air and steam admitted to the ash-box by the pipes 13 and 14 can pass to the chamber 17 for effecting the combustion of the gas admitted thereto, the resulting flame and hot gases heating the lower part of the wall of the producer externally and escaping through the passages 18 into the producer around the fuel therein, so as to assist in maintaining the temperature thereof and heating the inner surface of the wall of the producer, or the openings 19 may in some cases be omitted, in which case the gas delivered into the chamber 17 will pass into the gas-producer, where it will be burned in contact with the inner surface of the wall of the producer for maintaining the temperature of the fuel. Pilot flames or other gas-igniting devices are provided where necessary for automatically igniting the gas delivered by the pipe 12, 12^a, or 12^b.

The operation is as follows: When the load on the engine is reduced below a predetermined amount, the gas-exit valve 6 is opened more or less, either automatically by the governor 10 or by the hand-lever 11, and some of the gas drawn off from the gas-producer by the exhauster 3 and delivered into the pipe 4 is allowed to escape by the pipe 12, 12^a, or 12^b, or two or all of such pipes to the place or places where it is to be burned and there ignited, the heat of combustion being conveyed to the gas-producer in one or more or all of the ways hereinbefore described.

It will be evident that the details of construction can be varied and that various changes can be made in the construction of the suction gas-producer plant hereinbefore described without departing from the spirit and scope of the invention so long as the relative arrangement of the main parts of the apparatus or the mode of operation described is preserved.

What I claim is—

1. In a suction gas-producer plant, the combination with a gas-producer, a suction gas-outlet pipe therefrom, and a gas-delivery pipe for supplying gas to a gas-engine, of a gas-exhauster arranged between said pipes, a gas-outlet valve in said delivery-pipe, means for opening said valve and allowing some of the gas to escape from said delivery-pipe, and means for conducting away and burning the escaping gas and utilizing the heat of combustion to heat said gas-producer.

2. In a suction gas-producer plant, the combination with a gas-producer, a suction gas-outlet pipe therefrom, and a gas-delivery pipe for supplying gas to a gas-engine, of a gas-exhauster arranged between said pipes, a gas-outlet valve in said delivery-pipe, means for opening said valve and allowing some of the gas to escape from said delivery-pipe, and a pipe or conduit for conducting away the escaping gas, said pipe or conduit having its exit end in proximity to said gas-producer.

3. In a suction gas-producer plant, the combination with a gas-producer, a suction gas-outlet pipe therefrom, and a gas-delivery pipe for supplying gas to a gas-engine, of a gas-exhauster arranged between said pipes, a gas-outlet valve in said delivery-pipe, means for opening said valve and allowing some of the gas to escape from said delivery-pipe, a combustion-chamber formed in and around the wall of the producer, and a pipe for conducting the gas escaping past said valve to said combustion-chamber.

4. In a suction gas-producer plant, the combination with a gas-producer, a suction gas-outlet pipe therefrom, and a gas-delivery pipe for supplying gas to a gas-engine, of a gas-exhauster arranged between said pipes, a gas-outlet valve in said delivery-pipe, a governor adapted to automatically open said gas-valve to a greater or less extent when the load on the engine falls below a predetermined amount, and means for conducting away and burning the escaping gas so as to heat said gas-producer.

5. In a suction gas-producer plant, the combination with a gas-producer, a suction gas-outlet pipe therefrom, and a gas-delivery pipe for supplying gas to a gas-engine, of a gas-exhauster arranged between said pipes, a gas-outlet valve in said delivery-pipe, means for opening said valve and allowing some of the gas to escape from said delivery-pipe, a combustion-chamber formed in and around the wall of the producer, passages extending

through the wall of said producer from the interior thereof to said chamber, and a pipe for conducting the gas escaping past said valve to said chamber.

6. In a suction gas-producer plant, the combination with a gas-producer, a suction gas-outlet pipe therefrom, and a gas-delivery pipe for supplying gas to a gas-engine, of a gas-exhauster arranged between said pipes, a gas-outlet valve in said delivery-pipe, means for opening said valve and allowing some of the gas to escape from said delivery-pipe, a combustion-chamber formed in and around the wall of the producer, passages extending through the wall of said producer from the interior thereof to said chamber, air-inlet openings between said chamber and the ash-box of said gas-producer, and a pipe for conducting the gas escaping past said valve to said chamber.

Signed at London, England, this 16th day of March, 1905.

EMIL CAPITAINE.

Witnesses:
H. D. JAMESON,
F. L. RAND.