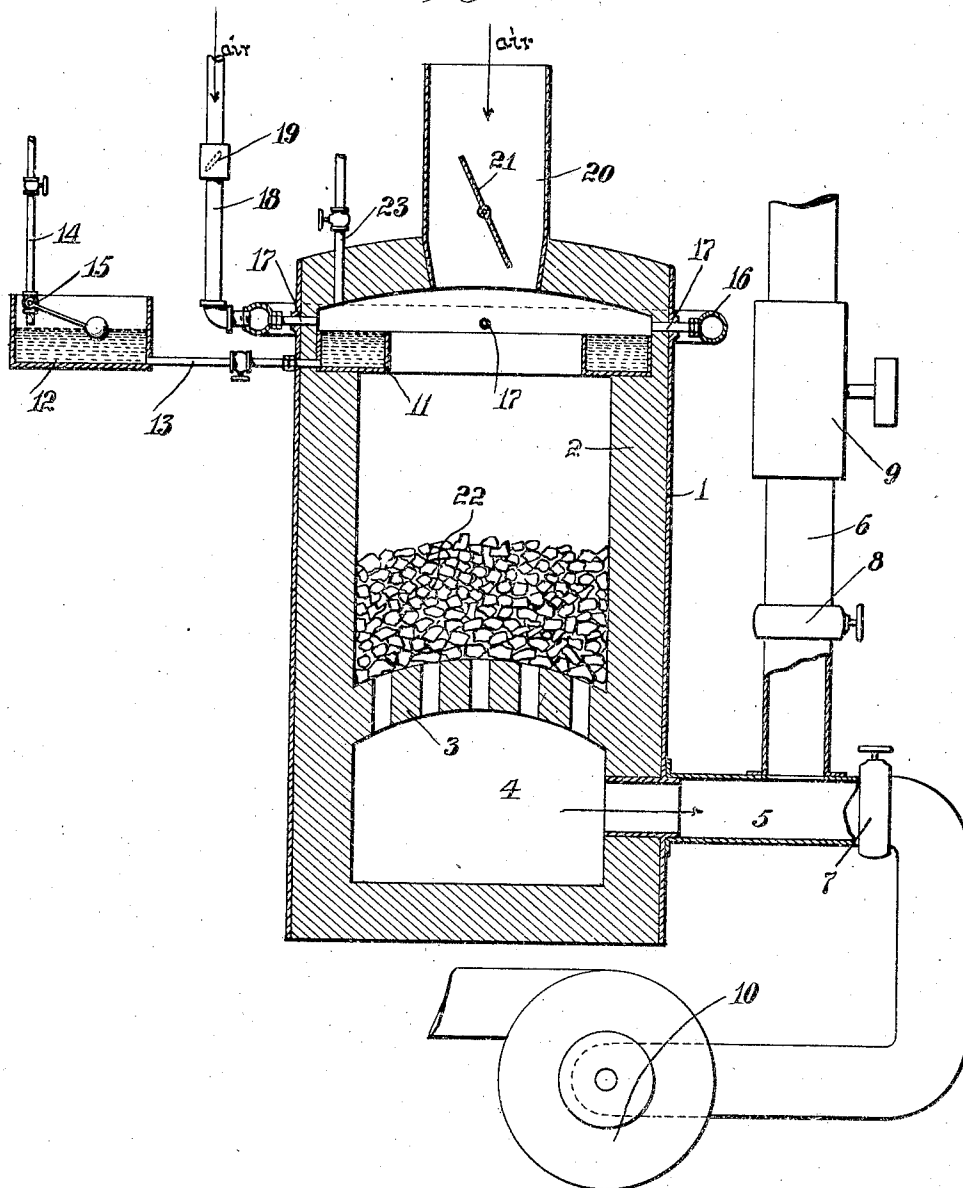


G. M. S. TAIT.
 APPARATUS FOR MAKING GAS FROM LIQUID FUEL.
 APPLICATION FILED FEB. 12, 1912.

1,049,778.

Patented Jan. 7, 1913.
 2 SHEETS—SHEET 1.

Fig. 1.



Attest:
Paul H. Frank

by

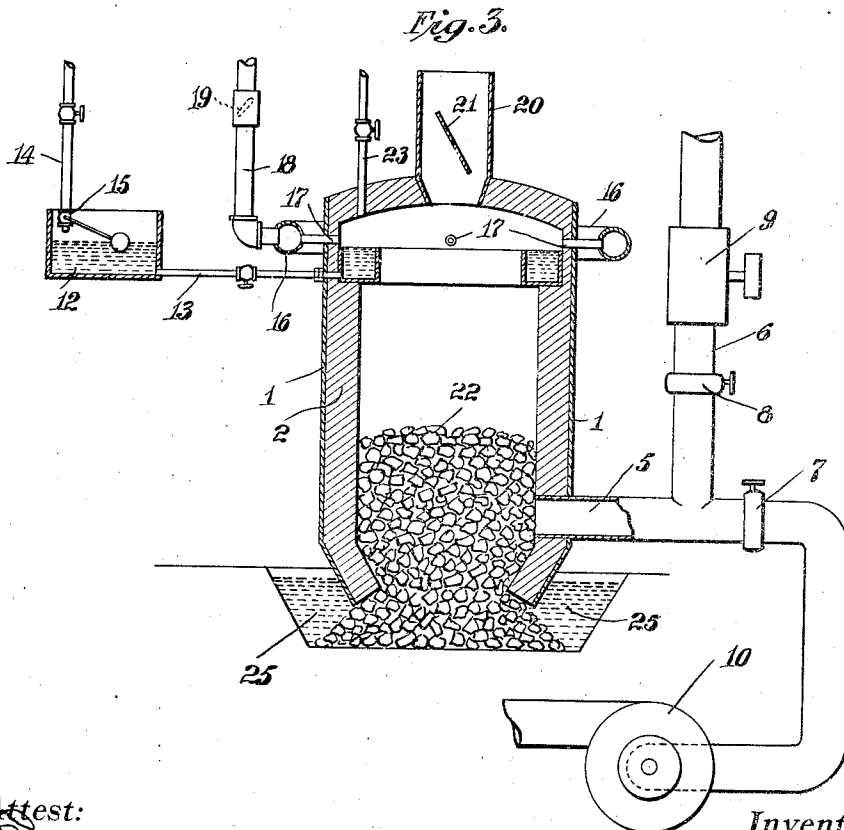
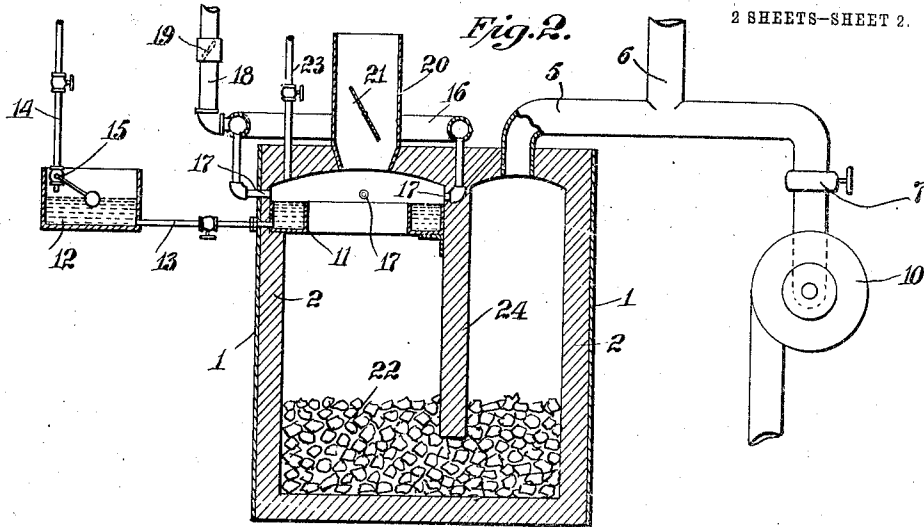
Inventor:
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UNITED STATES PATENT OFFICE.

GODFREY M. S. TAIT, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO INTERSTATE INVESTMENT COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF VIRGINIA.

APPARATUS FOR MAKING GAS FROM LIQUID FUEL.

1,049,778.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed February 12, 1912. Serial No. 676,933.

To all whom it may concern:

Be it known that I, GODFREY M. S. TAIT, a British subject, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Making Gas from Liquid Fuel, of which the following is a specification.

My invention relates to apparatus for making gas from liquid fuel, and comprises an improved structure wherein a body of liquid fuel is maintained within a container adapted for combustion to take place within it, in connection with means for supplying a restricted portion of air in the immediate vicinity of the surface of said body of liquid fuel, to maintain combustion at the surface of said liquid fuel and thereby cause volatilization of the liquid, together with means for supplying a further proportion of air to support partial combustion within said container.

The novel features of the said apparatus are particularly set forth in the appended claims.

The objects of my invention are, to provide an improved apparatus of making gas from oil, to avoid formation of tarry residues and condensible constituents of the gas, to make the apparatus simple, compact, automatic in action, and relatively inexpensive, to provide for thorough fixing of the gas, and to provide within the apparatus ample gas-storage space, such as may permit the efficient operation, in connection with said gas making apparatus, of an internal combustion engine, such as a large single cylinder, slow speed four cycle engine, which draws gas from the apparatus irregularly.

I will now proceed to describe my invention with reference to the accompanying drawing, which shows more or less diagrammatically and in central vertical section oil-gas producers embodying my invention.

In Figure 1, 1 designates the usual producer-shell and 2 the usual fire brick lining thereof, and 3 a grate within said producer having beneath it a gas space 4 to which is connected a gas-exit pipe 5. To this pipe 5 is connected a purge pipe 6; and in pipes 5 and 6 are suitable valves 7 and 8 whereby the gas may be discharged through pipe 6 or through pipe 5, as desired. 9 designates the

suction fan in the purge pipe 6 and 10 a suction fan connected to main gas exit pipe 5. In the case of ordinary suction gas producers supplying gas to engines, it is customary to provide some suction device, such as a fan, or jet-ejector, in or connected to the purge pipe for the purpose of heating up the producer and for the purpose of keeping the producer hot when the engine is not operating. In the case of suction producers supplying gas to furnaces, etc., it is customary to provide suitable suction apparatus, such as a fan, in or connected to the main gas offtake pipe, to supply draft through the producer; and in some cases, even when the producer supplies gas to an engine itself capable of producing suction through the producer, a fan or blower is provided between the producer and the engine. My improved producer will be provided ordinarily with similar suction producing means, and in the drawing I have indicated fans 9 and 10 merely as diagrammatic representations of suitable suction producing means. In the upper part of the producer a suitable liquid fuel receptacle 11, open at the top, is provided, the particular receptacle shown in the drawing being an annular receptacle, though this form is not essential. And I have indicated a constant level tank 12 connected by pipe 13 to this receptacle 11, for supplying liquid fuel thereto, liquid fuel being supplied to said constant level tank 12 by suitable means, such for example as pipe 14 and float valve 15. I have also indicated means for supplying a restricted proportion of air to the producer, for maintaining a certain amount of surface combustion of the fuel in receptacle 11, the particular means illustrated being a bustle pipe 16 having connections 17 to the interior of the producer, at suitable points, air being supplied to the bustle pipe by means of a pipe 18 having in it a suitable valve 19. In the top of the producer I have indicated a main air inlet 20 of the general nature of a hopper, having within it a suitable regulating damper 21. I usually provide on the grate 3, a layer of suitable thickness of porous material, such as coke, broken brick, etc., which material is maintained in an incandescent state, during the operation of the apparatus, by heat gen-

erated within the apparatus, this material 22 serving to thoroughly fix the gas produced.

The operation of the apparatus is as follows: Supposing first that the apparatus is already in operation, and therefore that the producer is well heated, and that the body of porous material 22 is also highly heated, surface combustion of the combustible liquid in receptacle 11, maintained to a limited extent by air admitted through the bustle pipe 16 and connections 17, causes the oil in receptacle 11 to volatilize, the resulting vapors being drawn downward by suction applied to pipe 5 or pipe 6 and meeting air drawn in through air inlet 20, the air supply being so regulated that only partial combustion takes place, the result of such combustion being to produce a gas, which is fixed by passage through the incandescent material 22. The heat of the partial combustion taking place within the producer is necessarily transmitted, to a considerable extent, to the fuel in container 11, and assists in the volatilization of the fuel in said container and this heat so transmitted may at times be sufficient so that admission of air through bustle pipe 16 is unnecessary and may be discontinued; though in general I prefer to admit air both through the bustle pipe and through connection 20; and similarly, particularly when the rate of gasification is low, it may be unnecessary to admit air through connection 20. The level of the fuel in container 11 is kept substantially constant by means of the constant level tank 12 and the float-valve 15. In starting the apparatus in operation, if the fuel used be one which does not readily ignite, from the flame of a match or taper, a small quantity of more readily ignitable fluid, such as kerosene, is admitted through a connection 23, or other suitable means, such readily ignitable liquid floating as a thin film upon the surface of the less ignitable liquid already in said container 11, and being ignited by a taper, or by dropping ignited material, such as waste, into the producer through hopper 20, or in any other suitable way. The readily ignitable liquid, once ignited, produces sufficient heat to start vaporization of the less ignitable liquid, and a draft through the producer is produced by operation of the fan 9 in the purge pipe 6, valve 8 in the purge pipe being open and valve 7 in the main gas discharge pipe being closed. At first, the combustion in the producer may be complete, and by such combustion the refractory walls of the producer are heated, and also the porous material 22 in the producer is heated; and as the producer becomes sufficiently heated, the combustion in the producer becomes less complete, as is shown by the issue of combustible gas from the mouth of the purge pipe; and when the

color of the flame from the mouth of the purge pipe indicates that gas of a suitable quality is being produced, valve 8 in the purge pipe may be closed and valve 7 opened and the suction producing device 10, or other suitable suction producing device connected to gas discharge pipe 5, may be set in operation, the producer being then in full operation.

In starting the producer, damper 21 in main air inlet 20 will ordinarily be closed or nearly so; and as the heating up continues this damper 21 may be opened more or less until it is opened sufficiently for the intended degree of gasification in the producer. In general, when the producer is operating under constant conditions or substantially so, a relative adjustment of valves 19 and 21 may be found such that no further adjustment of these valves will be required during normal operation, the flow of air through 20 and 18 being proportional.

The inlet 20 constitutes convenient means for cleaning and renewing the porous material 22 from time to time if required, also for charging such material 22 into the producer initially. Air may be supplied under plus pressure to pipe 18, or air may be drawn through pipe 18, bustle pipe 16 and connection 17, by the suction of suction producing devices 9 or 10.

In Fig. 2 I illustrate an alternative form of apparatus, wherein the interior of the producer chamber is divided into two chambers by a curtain wall 24, which does not extend quite to the bottom of the chamber. The liquid fuel receptacle and air inlet 20 are on one side of the curtain wall, and the gas offtake connection 5 on the other side of the curtain wall, porous material, such as coke, broken brick, etc., being at the bottom of both spaces and extending above the bottom of the curtain wall, constituting a porous septum through which the gases resulting from partial combustion will pass readily. This construction obviates the use of a grate.

In the construction shown in Fig. 3, the producer is open at the bottom, water seal trough 25 being provided beneath the producer. The object of this device is to enable the removal of the porous material from the producer while same is in operation without allowing the escape of gas, or allowing any tarry deposit which might otherwise accumulate in the base of the producer, to run off through the water seal.

What I claim is:

1. A gas producer comprising a chamber having within it an open topped annular liquid receptacle adapted for surface combustion of the liquid within it, said chamber provided with means for admitting air, including a main air inlet located opposite the central opening of such annular recep-

tacle, said chamber provided, on the side of said receptacle opposite that on which such main air inlet is located, with a gas offtake connection.

5 2. A gas producer comprising a chamber having within it an open topped annular liquid receptacle adapted for surface combustion of the liquid within it, said chamber provided with means for admitting air, including a main air inlet located opposite
10 the central opening of such annular receptacle, said chamber provided, on the side of said receptacle opposite that on which such main air inlet is located, with a gas
15 offtake connection, and further provided, intermediate said receptacle and gas offtake connection, with a layer of porous material.

20 3. A gas producer comprising a closed chamber provided with an annular receptacle for liquid fuel, and with a gas offtake connection, and further provided with one or more air inlets arranged to admit air close to the surface of liquid in such receptacle, and with a main air inlet over the
25 annular opening of such receptacle, and regulating means for controlling the relative flow of air through such different inlets.

30 4. A gas producer comprising a refractory-walled-chamber having in its upper portion a main air inlet, and in its lower portion a gas off-take, and provided with a body of porous material interposed between said air inlet and gas off-take, and a
35 receptacle for liquid fuel located intermediate said main air inlet and body of porous material, said liquid receptacle open at the top and adapted to permit surface
40 combustion of the liquid within it.

5. A gas producer comprising a refrac-

tory-walled-chamber having in its upper portion a main air inlet, and in its lower portion a gas off-take, and provided with a body of porous material interposed between said air inlet and gas off-take, and a
45 receptacle for liquid fuel located intermediate said main air inlet and body of porous material, said liquid receptacle open at the top and adapted to permit surface
50 combustion of the liquid within it, said chamber further provided with one or more air inlets located immediately above said liquid receptacle and adapted to maintain surface
55 combustion of the liquid within said receptacle.

6. A gas producer comprising a refractory-walled chamber having in its upper portion a main air inlet, and in its lower portion a gas off-take and an open-topped
60 liquid fuel receptacle located in the upper portion of said chamber and near the main air inlet thereof, and adapted for surface combustion of the fuel within it.

7. A gas producer comprising a refractory-walled chamber having in its upper portion a main air inlet, and in its lower portion a gas off-take and an open-topped
65 liquid fuel receptacle located in the upper portion of said chamber and near the main air inlet thereof, and adapted for surface combustion of the fuel within it, and a body of porous material intermediate said receptacle and gas off-take.
70

In testimony whereof I have signed this
75 specification in the presence of two subscribing witnesses.

GODFREY M. S. TAIT.

Witnesses:

H. M. MARBLE,
D. A. DAVIES.