

June 22, 1926.

1,590,142

H. T. WHITE ET AL

GAS PRODUCER

Filed June 17, 1925

2 Sheets-Sheet 1

Fig. 1.

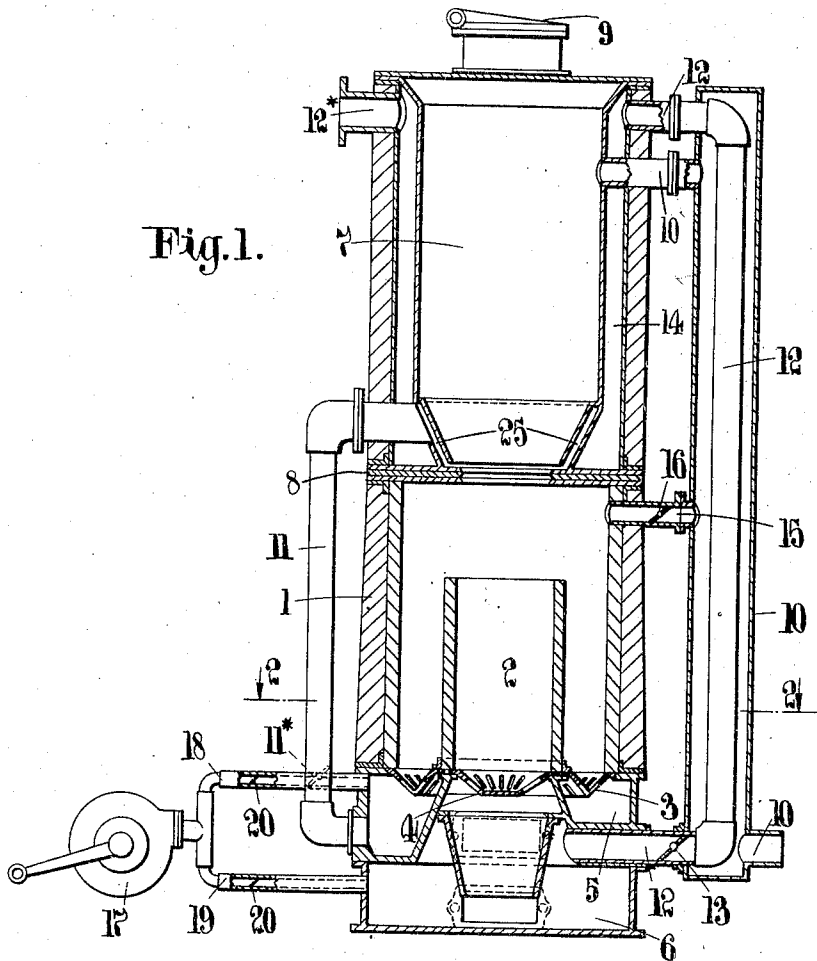
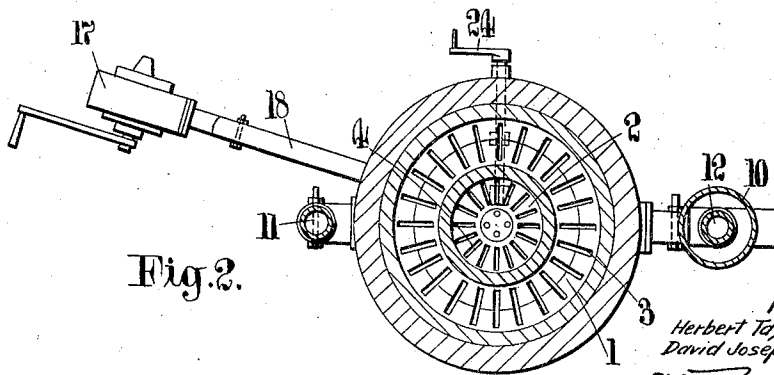


Fig. 2.



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Fig. 4.

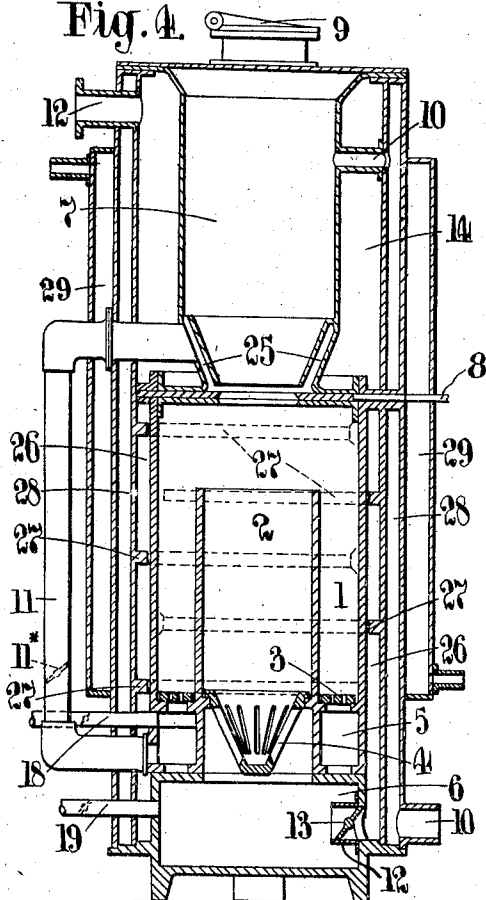


Fig. 3

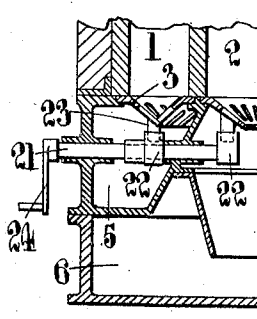


Fig. 5.

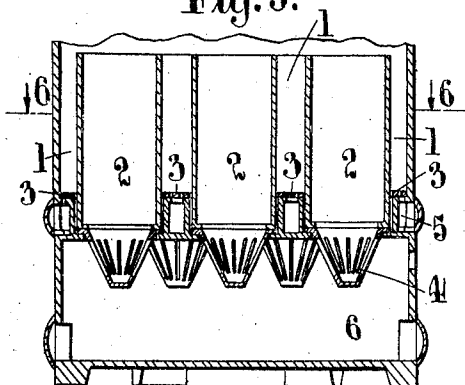
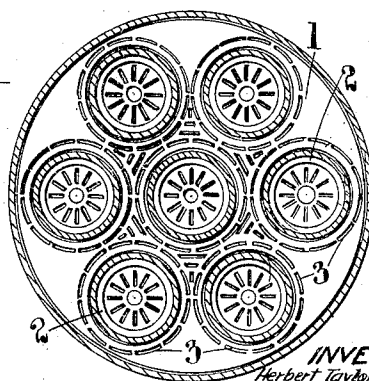


Fig. 6.



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GAS PRODUCER.

Application filed June 17, 1925. Serial No. 37,838.

This invention relates to gas producers of the closed-hearth type in which two concentrically arranged retorts are employed through one of which the air passes in an upward direction, and through the other of which the products of combustion or distillation from the first retort pass in a downward direction, and it has for its object to employ the heat from the gas produced together with the heat from the outer retort for drying the fuel awaiting combustion and to utilize the moisture and volatile substances given off by said drying for conversion into gas in the inner retort whereby the capacity of the apparatus is materially increased. Another object of the invention is a construction of producer which is particularly adapted for utilizing vegetable fuels. A further object of this invention is to obtain a maximum degree of heat in the inner retort and a general economy of heat throughout the system, and a still further object is to obtain a maximum efficiency in producers of large capacity.

We attain these objects by the construction shown in the accompanying drawings in which Figure 1 is a vertical section of the complete apparatus. Figure 2 is a cross section on line 2—2, Figure 1. Figure 3 is a broken view in sectional elevation showing the mechanism for rocking the grates of the retorts. Figure 4 is a vertical section showing a modified form of the grate of the secondary retort and a modified form of the passages for the delivery of the gas from the producer and the delivery of air into the producer. Figure 5 is a broken vertical section of a modified form of apparatus in which the secondary retort is split up into a plurality of elements, and Figure 6 is a cross section of same on line 6—6, Figure 5.

Similar numerals denote similar parts throughout the several views.

The two retorts 1 and 2 which are of circular form are concentrically arranged the former, hereinafter for convenience called the "primary retort" being of greater depth than the other, hereinafter for convenience called the "secondary retort". Both of these retorts are provided with grid grates that for the secondary retort being of an inverted cone shape for the purpose of ensuring a mass of fuel at the bottom of said retort even if the fuel in the retort should

"bridge". The grate 3 for the primary retort opens into an ash pit 5 and the grate 4 for the secondary retort opens into an ash pit 6. On the top of the primary retort is a fuel hopper 7 the lower part of which is of an inverted truncated-cone form and is provided with a sliding plate valve 8 for the purpose of admitting the fuel to the retorts. The upper part of the hopper is provided with the usual closure lid 9.

Air is admitted to the upper part of the fuel hopper 7 through a pipe or passage 10, which is preferably arranged as shown in Figure 1 to form a jacket for the pipe through which the gas passes out of the apparatus, and passes from the lower part of said hopper to the ash pit 5 through a pipe 11 which is fitted with a throttle valve 11*. In order that the air passing through the hopper 7 shall be widely distributed over the fuel therein an annular channel 25 is provided in the wall of the cone-shaped lower end through which the air passes from the hopper to the pipe 11.

A gas delivery pipe 12, which is fitted with a throttle valve 13, leads out of the ash pit 6 said pipe being preferably led as before stated through the air inlet pipe 10 for the purpose of heating the ingoing air. The delivery pipe 12 leads into an annular jacket 14 surrounding the fuel hopper for the purpose of heating the fuel in said hopper, said jacket being provided with an outlet 12*. An auxiliary inlet 15 may be provided to admit air or steam into the upper part of the primary retort for the purpose of providing additional air or moisture to the secondary retort, said inlet being provided with a throttle or other suitable valve 16.

A fan or blower 17 is provided for blowing up either or both of the fires with air at starting in order that the fuel in each of the retorts may be raised to the required temperature to produce gas before bringing the apparatus in operation. This fan or blower 17 is therefore connected to the ash pit 5 by pipe 18 and to the ash pit 6 by a pipe 19 each having a throttle valve 20.

The grates 3 and 4 are so mounted that they are capable of having an oscillating motion imparted to them for the purpose of clearing them of ashes. A convenient mechanism for effecting this is that shown in Figure 3 which consists of a shaft 21 having

two enlargements 22 in which are recesses with which arms 23 carried by the grates engage so that when the shaft is rocked by means of the handle 24 an oscillating movement is imparted to the grates.

The grate 4 of the secondary retort is preferably arranged below the level of the grate 3 as shown in Figure 4, so that the said grate 4 is surrounded by the ash pit of the grate 3 whereby the incoming air is heated by the grate 4.

The passage for the gas instead of being an exterior pipe 12 as shown in Figure 1 may be an annular chamber 26 surrounding the primary retort which merges into the annular jacket 14 around the fuel hopper as shown in Figure 4, and the passage through said annular chamber may be made tortuous by the employment of suitably arranged baffle plates 27. Similarly the air inlet passage may take the form of an annular chamber 28 surrounding the annular gas chamber 26 as shown in Figure 4.

In order to raise the temperature of the air as high as possible before it is admitted to the primary retort an annular chamber 29 may be arranged exterior to the air chamber 28 as shown in Figure 4 to receive the exhaust gases from an internal combustion engine.

In order to obtain a maximum degree of heat in the secondary retort in producers for large capacity said retort may be split up into a plurality of elements as shown in Figures 5 and 6 the grids of the grate 3 of the primary retort being arranged around said secondary retorts.

In starting the producer, the lid 9 and the valve 8 of the fuel hopper are both opened, fuel is placed upon both the grates 3 and 4, and the fan is used to blow up both fires, the required quantity of air for the respective fires being controlled by the throttle valves 20. Meanwhile the throttle valve 11* is kept closed. The fires being well alight, fuel is fed out of the hopper until both the retorts are full, the fuel flowing over from the secondary retort when it is full into the primary retort. When the fires have been fanned up to the desired heat, the valve 8 of the fuel hopper is closed as is also the lid 9 of the fuel hopper. Suction then occurring through the connection of the gas outlet 12* with the engine, and the throttle 13 having been opened, air enters the hopper 7 through the pipe 10 and passing through said hopper takes up the moisture and volatile substances from the fuel therein, and then passes out by the annular channel 25 and the pipe 11 to the ash pit 5 and thence through the grate 3 to the primary retort 1. The products of combustion from the primary retort then pass downwardly through the secondary retort 2 where they are converted into a fixed gas

which passes through the grate 4 into the ash pit 6, and thence through the pipe 12 and the annular chamber 14 around the fuel hopper to the outlet 12*.

What we claim is:—

1. A gas producer comprising in combination, two concentrically arranged retorts of the closed hearth type, a superposed fuel hopper, an independent grate for each retort, an independent ash pit for each grate, an air inlet to the ash pit of the primary retort which passes through the fuel hopper, a gas outlet from the ash pit of the secondary retort which passes through the air inlet passage to the fuel hopper, an annular chamber around the primary retort and the fuel hopper through which the gas passes to its outlet, means for supplying air under pressure independently to each of the ash pits, and means for independently agitating the grates of both retorts.

2. A gas producer comprising in combination, two concentrically arranged retorts of the closed hearth type, a superposed fuel hopper, an independent grate for each retort, an independent ash pit for each grate, an air inlet to the ash pit of the primary retort which leads from the fuel hopper, a gas outlet from the ash pit of the secondary retort, an annular chamber around the primary retort and the fuel hopper through which the gas passes to its outlet, baffle plates in said chamber for making the passage through said chamber tortuous, and an annular chamber exterior to the gas chamber through which the ingoing air to the fuel hopper passes.

3. In a gas producer, the combination of two concentrically arranged retorts of the closed hearth type, a superposed fuel hopper, an independent grate for each retort, an independent ash pit for each grate, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, a by-pass air inlet leading directly into the primary retort, a gas outlet from the ash pit of the secondary retort which is jacketed by the air inlet passage, and an annular chamber exterior to the fuel hopper through which the gas passes to its outlet.

4. In a gas producer, the combination of two concentrically arranged retorts of the closed hearth type, an independent grate for each retort, a superposed fuel hopper, an independent ash pit for each grate, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, a by-pass air inlet leading into the upper part of the primary retort, a gas outlet from the ash pit of the secondary retort which passes through the by-pass air inlet passage, an annular chamber exterior to the fuel hopper through which the gas passes to its outlet, means for supplying air

under pressure independently to each of the ash pits, and means for agitating the grates of both retorts.

up purposes, and means for agitating the grates of both retorts.

5. A gas producer comprising in combination, a vertically arranged cylindrical retort of the closed hearth type, a plurality of vertically arranged cylindrical inner or secondary retorts of lesser depth than the outer or primary retort, and independent grate for the primary retort, an independent grate for each of the secondary retorts, said grates being of an inverted-cone shape, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an ash pit for the grate of the primary retort, a common ash pit for the grates of the secondary retorts, an air inlet to the ash pit of the primary retort which passes through the fuel hopper, a gas outlet from the ash pit of the secondary retort, and an annular chamber around the fuel hopper through which the gas passes to its outlet.

6. A gas producer comprising in combination, two concentrically arranged retorts of the closed hearth type, the inner or secondary retort being of lesser depth than the outer or primary retort, an independent grate for each retort, the grate for the secondary retort being of an inverted-cone shape, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an ash pit for the grate of the primary retort, an ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, means for heating the air admitted to said hopper, an air conduit between said hopper and the ash pit of the primary retort, an annular chamber surrounding the fuel hopper, and gas outlet means from the ash pit of the secondary retort which passes gas through the chamber surrounding the fuel hopper.

7. A gas producer comprising in combination, two concentrically arranged retorts of the closed hearth type, the inner or secondary retort being of lesser height than the outer or primary retort, an independent grate for each retort, the grate for the secondary retort being of an inverted-cone shape, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an ash pit for the grate of the primary retort, an ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, means for heating the air admitted to said hopper, an air conduit between said hopper and the ash pit of the primary retort, an annular chamber surrounding the fuel hopper, gas outlet means from the ash pit of the secondary retort which passes gas through the chamber surrounding the fuel hopper, means for supplying air under pressure independently to each of the ash pits for starting

8. A gas producer comprising in combination, two concentrically arranged retorts of the closed hearth type the inner or secondary retort being of lesser height than the outer or primary retort, an independent grate for each retort, the grate for the secondary retort being of an inverted-cone shape, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an annular chamber around said fuel hopper, an independent ash pit for the grate of the primary retort, an independent ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, gas outlet means from the ash pit of the secondary retort which passes gas first through the air inlet passage and thence through the annular chamber around the fuel hopper, means for supplying air under pressure to the ash pits of both grates, and means for agitating the grates of both retorts.

9. A gas producer comprising in combination, two concentrically arranged retorts of the closed hearth type the inner or secondary retort being of lesser height than the outer or primary retort, an independent grate for each retort, the grates for the secondary retort being of an inverted-cone shape, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an ash pit for the grates of the primary retort, an ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, an annular chamber adjacent to the primary retort and the fuel hopper providing an outlet for gas from the ash pit of the secondary retort, an annular chamber exterior to said annular gas passage for the passage of the ingoing air to the primary retort, and an annular chamber exterior to the air chamber adapted to receive the exhaust gases from an internal combustion engine.

10. A gas producer comprising in combination two concentrically arranged retorts of the closed-hearth type the inner or secondary retort being of lesser height than the outer or primary retort, an independent grate for each retort, the grate for the secondary retort being of an inverted-cone shape, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an ash pit for the grate of the primary retort, an ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, an annular chamber ex-

terior to the primary retort and the fuel hopper providing an outlet for gas from the ash pit of the secondary retort, an annular chamber adjacent to said annular gas passage for the passage of the ingoing air to the primary retort, an annular chamber exterior to the air chamber adapted to receive the exhaust gases from an internal combustion engine, means for supplying air under pressure to the ash pits of both grates, and means for agitating the grates of both retorts.

11. A gas producer comprising two concentrically arranged retorts of the closed hearth type, the inner or secondary retort being of lesser height than the outer or primary retort, an independent grate for each retort, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an annular chamber around said hopper, an ash pit for the grate of the primary retort, an ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, a gas outlet from the ash pit of the secondary retort, means for heating the air passing into the fuel hopper by means of the gas leaving the apparatus, and an auxiliary inlet to the primary retort for the admission of air or steam.

12. A gas producer comprising in combination, a primary retort, a plurality of secondary retorts located within said primary retort said inner or secondary retorts being of lesser height than the outer or primary retort, independent grates for said retorts, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an annular chamber around said fuel hopper, an ash pit for the grate of the primary retort, a common ash pit for the grates of the secondary retorts,

an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, a gas outlet from the ash pit of the secondary retort which is jacketed by the passage for the air to the fuel hopper and which leads into the annular chamber around the fuel hopper, means for supplying air under pressure independently to the ash pits of the grates, means for agitating the grates of the retorts, and means for admitting auxiliary air or steam into the upper part of the primary retort.

13. In a gas producer, the combination of two concentrically arranged retorts of the closed-hearth type the inner or secondary retort being of lesser height than the outer or primary retort, an independent grate for each retort, a superposed fuel hopper having a closure lid at its upper part and a controlling feed valve at its lower part, an ash pit for the grate of the primary retort, an ash pit for the grate of the secondary retort, an air inlet to the fuel hopper, an air conduit between said hopper and the ash pit of the primary retort, an annular chamber around the primary retort and the fuel hopper through which the gas passes from the ash pit of the secondary retort to the gas outlet from the producer, an annular chamber exterior to said annular gas passage for the passage of the ingoing air to the fuel hopper, an auxiliary inlet leading into the upper part of the primary retort for the admission of additional air or steam, an annular chamber exterior to the air chamber adapted to receive the exhaust gases from an internal combustion engine, means for supplying air under pressure to the ash pits of both grates, and means for agitating the grates of both retorts.

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