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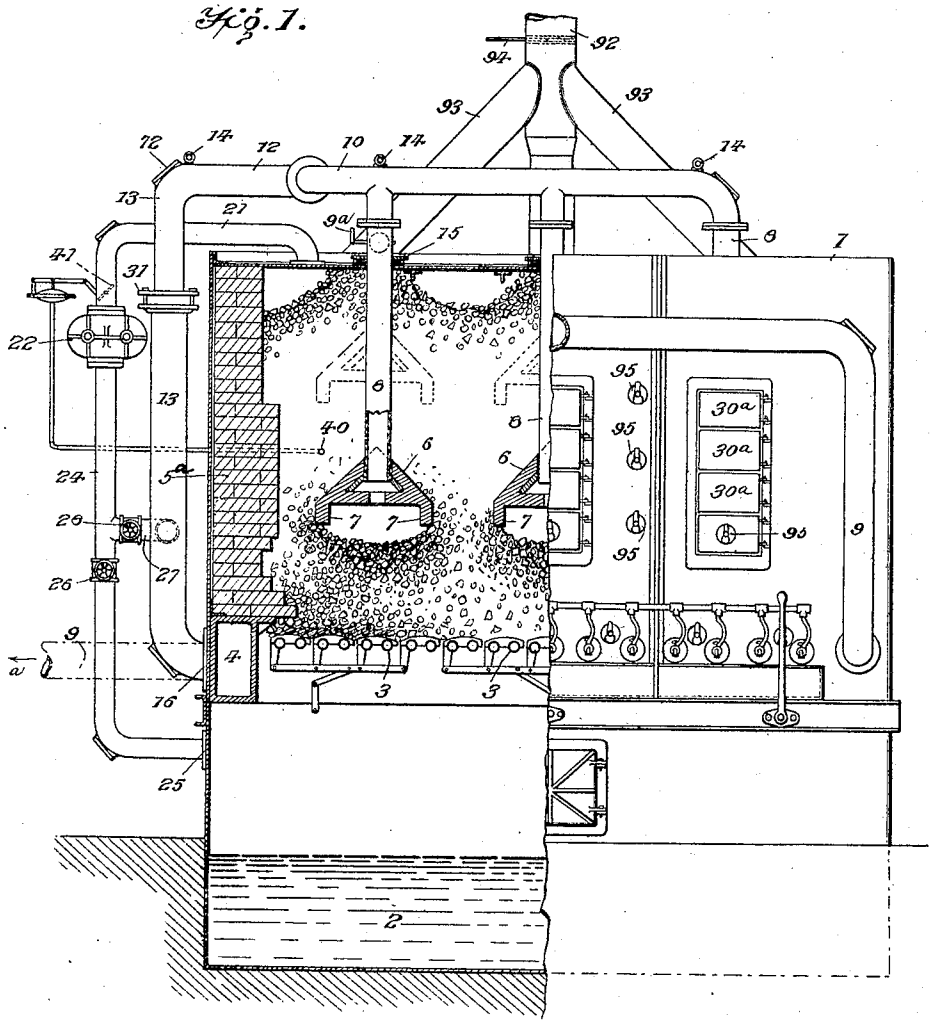
GAS PRODUCER.

APPLICATION FILED FEB. 21, 1908.

909,690. Patented Jan. 12, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 3.

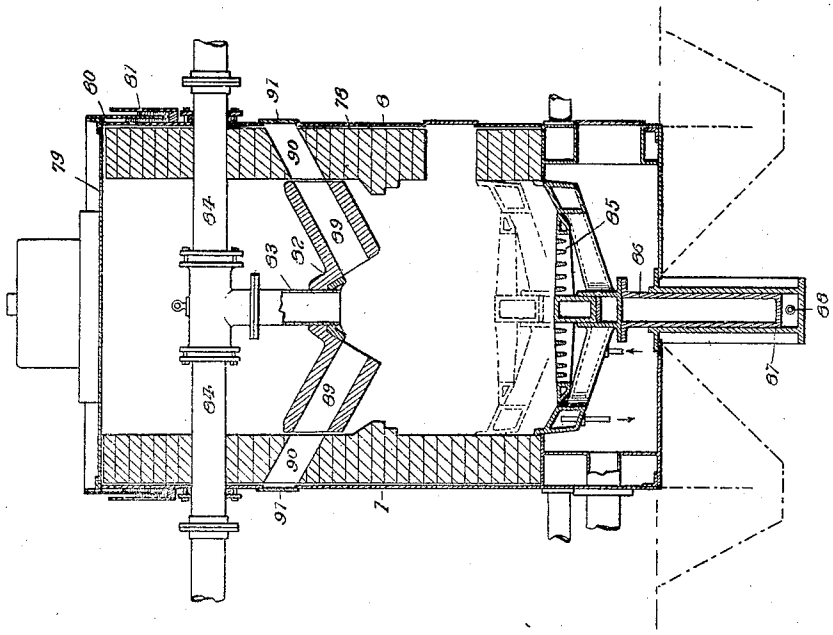
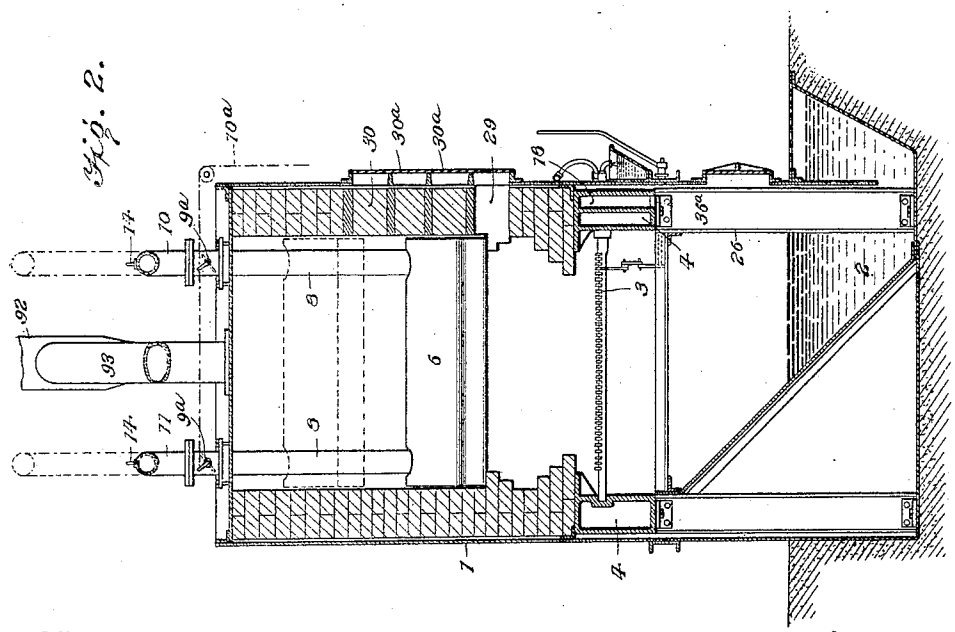


Fig. 2.



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4 SHEETS—SHEET 3.

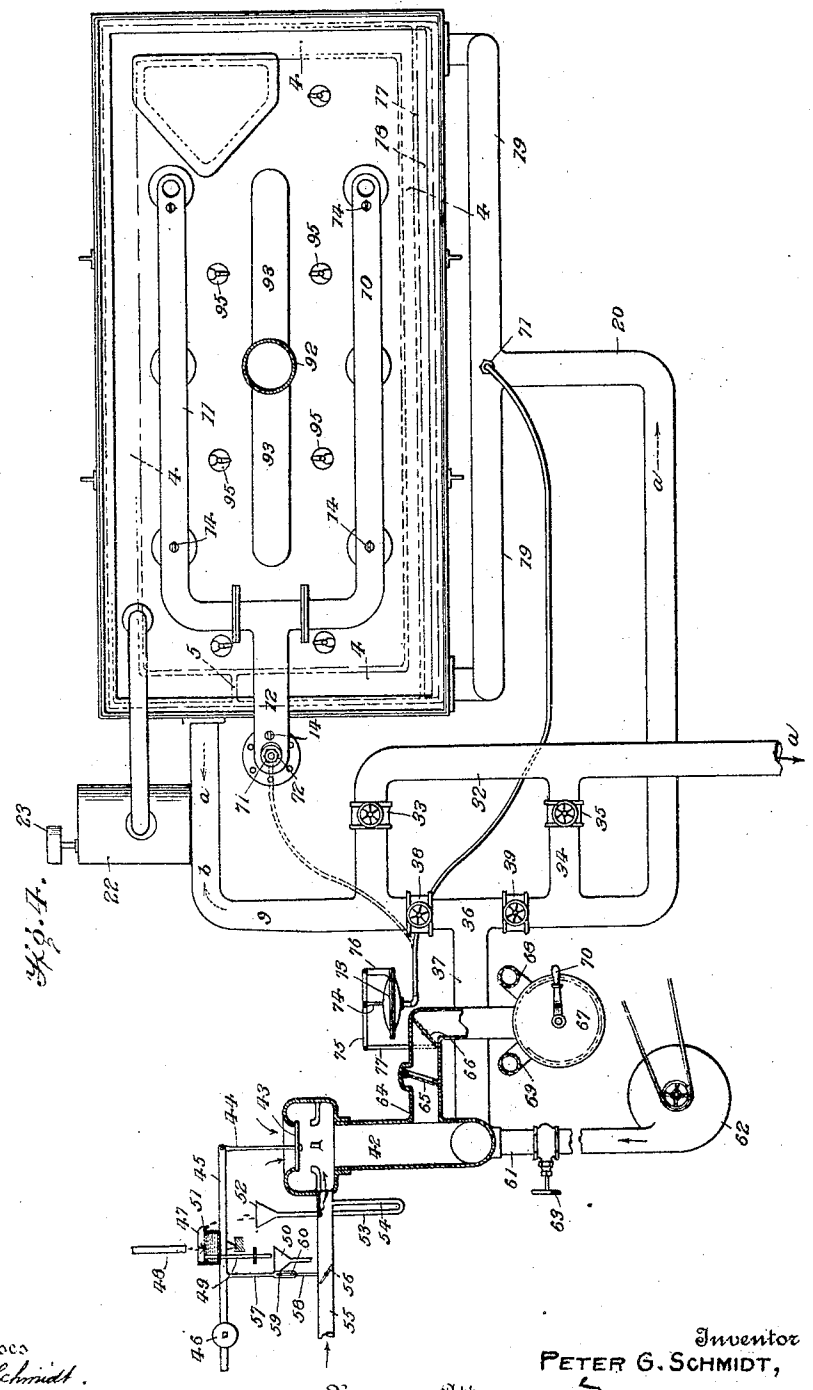


Fig. 4.

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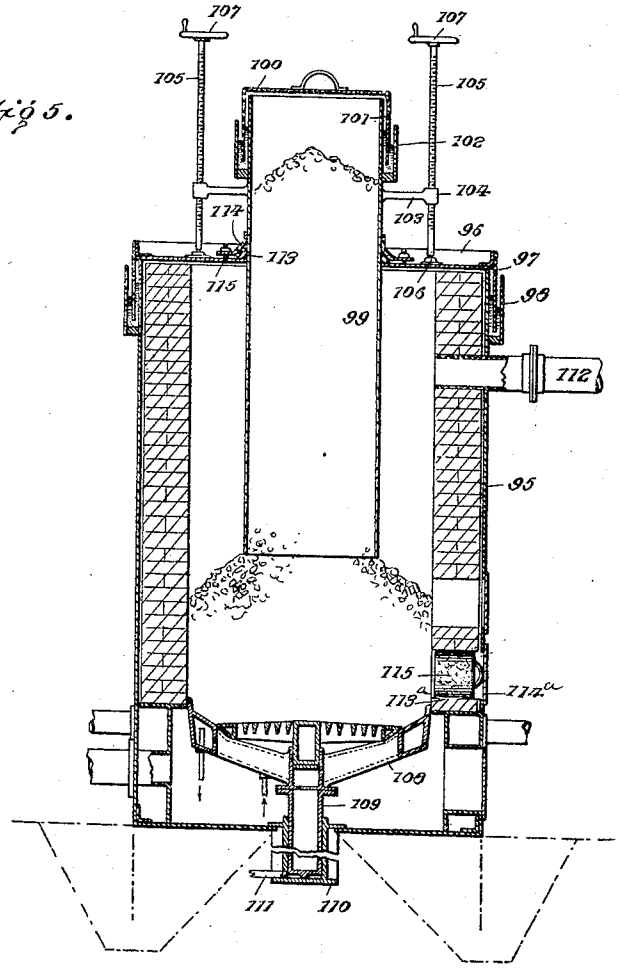
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4 SHEETS—SHEET 4.

Fig 5.



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UNITED STATES PATENT OFFICE.

PETER G. SCHMIDT, OF TUMWATER, WASHINGTON.

GAS-PRODUCER.

No. 909,690. Specification of Letters Patent. Patented Jan. 12, 1909.

Application filed February 21, 1908. Serial No. 417,200.

To all whom it may concern:

Be it known that I, PETER G. SCHMIDT, a citizen of the United States, and a resident of Tumwater, in the county of Thurston and State of Washington, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

My invention is an improvement in gas producers and consists in certain novel construction and combination of parts hereinafter described and claimed.

The object of the invention is to produce an apparatus wherein the depth of the fuel in the decomposing zone of the producer may be regulated, while retaining the same relation between the decomposing zone and the distillation zone and without interrupting the operation of the producer.

Referring to the drawings forming a part hereof, Figure 1 is a front view partly in section of a producer according to my invention. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a similar view of a modified form, and Fig. 4 is a plan view of the producer and the regulating mechanism therefor, and Fig. 5 is a central vertical section through another modified form.

In the embodiment shown in Figs. 1, 2 and 4, the producer is of any desired construction, in the present instance being rectangular in cross section, and comprising a casing 1 provided at its bottom with a water seal 2, a suitable grate 3 being provided upon which the fuel rests.

At about the level of the grate, a conduit 4 is provided extending entirely around the producer, the said conduit having a transverse partition 5 at one end for a purpose to be presently described. That portion of the producer above the grate is provided with a suitable lining of refractory material 5^a, and the grate is preferably cooled by water circulation, as indicated in Fig. 2.

A plurality of shields 6 are arranged within the producer above the grate, each of said shields extending transversely of the producer, and being as shown in Fig. 1, substantially triangular in cross section, the sides of the base being provided with the depending flanges 7 for a purpose to be presently described, and the apex being provided near each end with an opening for receiving a collecting pipe 8. The collector pipes 8 extend through the top of the casing of the producer, and each is provided with a valve 9^a, the valves being operated by a chain 10^a passing to the front of the producer. All of the collector pipes 8 at the front of the producer deliver to a branch 10, of a pipe 12, and all of the collector pipes at the rear of the producer deliver to a branch 11 of the same pipe. A plurality of eyes 14 are connected with the pipes 11 and 12 to which is adapted to be secured any suitable means for raising and lowering the shields in the producer. It will be noticed that a suitable packing 15 is provided where each of the collector pipes enter the producer.

The pipe 12 extends over one end of the producer and bends downwardly as at 13 communicating with the conduit 4 before described as at 16, upon one side of the partition 5. At the front of the producer, the conduit 4 is divided longitudinally by a partition 17, to form a second conduit 18 with which communicate the branches 19 of a pipe 20, the pipe 20 being connected with a regulating mechanism to be presently described.

A pipe 21 leads from the upper part of the producer outwardly and downwardly to an exhausting mechanism 22, provided with a pulley 23, which may be driven in any suitable manner, and a pipe 24 leads from the exhauster downwardly and communicates with the producer as at 25 below the grate 3, a valve 26 being arranged in the pipe 24. A branch pipe 27 leads from the pipe 24 to the pipe 13, and a valve 28 is also arranged in the pipe 27.

The shields 6 are arranged at suitable intervals in the producer and are arranged a suitable distance above the grates, the height of the shields depending upon the material to be converted. In front of each shield the wall of the producer is provided with a vertical series of door openings 29 each closed by a plug 30 of refractory material, so that whatever the depth of the shield in the producer, access may be gained to the space beneath the same for the removal of clinkers and like material.

The improved producer is adapted to be operated either on the up draft or the down draft principle as may be desired. When using the up draft principle, the products of decomposition pass into the shield, through the collector pipe 8, and the branches 10 and 11, to the pipe 12, and through the pipe 13

to the conduit 4. It will be noticed that the pipe 13 is provided with a slip joint 31 in order to permit the raising and lowering movement of the shield. The products of decomposition pass to the front of the producer and entirely around the same and out through the pipe 9 from which they may be taken directly through a pipe 32 provided with a valve 33, and also connected by a pipe 34 having a valve 35 with the regulating mechanism to be described.

The incoming air enters from the pipe 20 into the conduit 18, which is provided in its bottom with a plurality of openings 36[a], to permit the air to enter the space beneath the grates and to pass upwardly therethrough to the material being converted.

When operating on the down draft principle, the air enters through the pipe 9, passes around the producer through the conduit 4 and into the pipe 13. From thence the air passes through the pipe 12 and its branches 10 and 11 to the collector pipes 9, and out of the shields to the material on the grate bars. The products of decomposition pass downwardly through the grate bars, in to the space therebelow and outwardly through the branches 19 to the pipe 20 from whence they may be taken directly through the branch pipe 34.

It will be noticed from an inspection of Fig. 4, that the pipes 9 and 20 are continuous, the said pipes being connected by a short section 36, having a branch 37 leading to the regulating device, and provided with valves 38 and 39 on each side of said branch. When the producer is being operated on the up draft principle, the products of decomposition pass out through the pipe 9, and the valves 38 and 35 are closed, while the valve 33 is open. When operating on the down draft principle the products of decomposition pass out through the pipe 20, and the valves 38 and 39 are closed, the valve being open.

When operating on the up draft principle, a considerable amount of tar and like material is distilled in the space above and between the shields, which products of distillation pass upwardly to the top of the producer and are exhausted through the pipe 21 by the exhauster 22, the said products passing through the pipe 24 into the space below the grate and upwardly through the burning material on the grates to the shields.

When operating on the down draft principle, the distillation products from the space above and between the shields may be passed directly into the pipe 13, by closing the valve 26 and opening the valve 28. The products then pass downwardly through the shields and through the burning material on the grates.

A thermostat 40 of any suitable construction is arranged within the space above the shields, the thermostat operating a valve 41 in the pipe 21. Should the material in the space between the shields become too greatly heated, the thermostat will close or partly close the valve 41, thus shutting off all or parts of the draft to reduce the temperature.

The regulating mechanism before mentioned, is connected to the branch pipe 37 before described, and comprises a casing 42 having a valve seat upon which is normally seated a valve 43, connected by a link 44, with one end of a balanced lever 45, the opposite end of the lever being provided with an adjustable weight 46. A cup 47 is secured on the lever which is supplied with liquid by a drip pipe 48. The cup is provided with an over flow pipe 49 delivering to a funnel 50, and the cup is also provided with a spout 51, delivering to a funnel 52, having a down pipe 53, and an up pipe 54, which latter delivers to an air pipe 55 opening into the casing 42 before mentioned.

The air pipe 55 is provided with a valve 56, having an arm 58 rigid therewith, with an angular portion 59 engaging a slot 60 in an arm 57 rigid with the lever 45 before mentioned.

When the producer is in operation, the draft through the pipe 37 will open the valve 43, and through the connection of the lever 45 with the valve 56, the latter valve will also be opened, the amount of the opening depending upon the strength of the draft. The cup 47 is arranged to provide a limited amount of liquid to the pipe 55 but whenever the valve 43 is opened, the amount of liquid is increased, since the cup is inclined to permit a greater quantity of liquid to flow therefrom. A pipe 61 leads from the casing 42 to an exhauster 62, in the present instance a fan, the said pipe being provided with a valve 63 by means of which a forced draft may be made use of. Another pipe 64 leads from the casing 42, the said pipe being provided with a check valve 65, and with a thermostat operated valve 66 to be presently described, to a casing 67, connected by a pipe 68 with the exhaust of the engine or with any other suitable source of inert gas, and by a pipe 69 with a source of steam supply. A manually operated valve 70 is arranged in the casing, the said valve being adapted to regulate the proportionate amount of steam and exhaust products admitted through the pipes 68, 69. A thermostat 71 of any desired construction is adapted to be inserted either in the pipe 20 at the junction of the branches 19, 19 or into the pipe 12 at the point 72, the thermostat operating the usual diaphragm in the casing 73, which is connected by a link 74 with the lever 75, pivoted to the bracket 76 on the casing, and connected by a link 77, with the valve 66 before mentioned. When the producer is being operated on the up draft principle, the thermostat is inserted

in the pipe 12 and when being operated on the down draft principle, it is inserted in the pipe 20. In either case, the temperature of the products of decomposition control the valve 66 to admit more or less of the mixed inert gas and steam to the burning material. The admission of the mixture to the burning fuel reduces the temperature thereof and it is also partly converted into gas.

In the modified form shown in Fig. 3, the producer is circular in cross section instead of rectangular, the casing 78 thereof being closed by a cover 79, provided with a marginal flange 80 resting in the water seal 81. The shield 82 is fixed, the collector pipe 83 leading from the shield to a transverse pipe 84. The grate 85 is provided at its center with a piston 86, moving in a cylinder 87 connected by a pipe 88 with a suitable source of fluid under pressure, so that by admitting the fluid to the cylinder the piston will be raised to adjust the distance of the grate from the shield.

The shield is provided with one or more of inclined openings 89 registering with openings 90 through the producer wall and closed by doors 91. By opening the doors 91, the combustion area of the material in the producer may be inspected and clinkers, etc., removed therefrom.

It will be evident from the description, that by using the improved producer the combustion of the material may be regulated very closely, to secure a perfect destructive distillation to obtain a gas free from tar. The decomposition zone may be regulated within narrow limits, depending upon the nature of the material which is being converted into gas, and a change in fuel may be made without interrupting the operation of the producer, merely by adjusting the depth of the decomposition zone in accordance with the fuel used, or quality of gas to be produced.

It will be evident that the shields 6 act as collectors when the producer is operated on the up-draft principle, and as twyers when the producer is operated on the down draft principle. The producer is provided with the usual feed pipe 92 having branches 93 delivering above the shields as shown in Fig. 1, the feed pipe being provided with the usual gate 94, and in either case a suitable cooling arrangement may be made use of to prevent them and the top of the producer from overheating. By first passing the air for the producer through the conduit 18, a considerable preliminary heating is attained, since the products of decomposition in the conduit 4 transfer a considerable portion of their heat to the incoming air.

It will be understood that the openings 29 in the front of the casing not in use, are closed by the plugs 30, and each of the openings is provided with an independent door 30ª.

The provision of the door openings 29 and 90 permits the decomposition zone to be inspected at any time, and at whatever level in the producer such zone may lie. This provision permits a close observation of the process of decomposition, and the easy removal of clinkers which form as a plastic mass on the surface of feed just below the shields when working on the down draft principle.

In the modified form shown in Fig. 5, the casing 95 is provided with a cover 96 having a marginal flange 97 depending into a water seal 98, and provided with a central opening through which extends a tubular shield 99, said shield being open at its bottom and closed at its top by a cover 100 having a marginal flange 101, depending into a water seal 102.

The shield is provided with laterally extending arms 103, provided at their free ends with threaded bearings 104, through which pass threaded rods 105, having a rotatable connection with sockets 106 secured to the cover, and operated by hand wheels 107.

By rotating the hand wheels 107, the shield may be raised or lowered into the producer to regulate the depth of material on the grate, and as a consequence the depth of the decomposition zone of the producer. The grate 108 is also adjustable in the casing, being provided with a piston 109 moving in a cylinder 110, which cylinder is provided with a pipe 111 communicating with any suitable source of fluid under pressure.

The producer is provided with an outlet pipe 112, for removing the products of decomposition, and a packing 113ª encircles the shield outside of the cover, the packing being retained in place by a ring 114ª, bolted as at 115 to the cover.

The operation of the modification just described, is similar to the operation of the other forms shown, the material however, being fed through the shield instead of around the shield.

The producer is provided with a plurality of door openings 113ª closed by doors 114ª, and plugs 115 of refractory material are provided for closing the openings when not in use.

I claim:

1. A producer comprising a casing, a grate, a plurality of shields arranged transversely of the casing above the grate, collector pipes leading from the shields outside the casing, a pipe to which said collector pipes deliver, a conduit within the casing at approximately the level of the grate, and to which said pipe delivers, a pipe leading from the conduit, said conduit being provided with a partition between the first and the last named pipe, a pipe leading from the upper part of the producer, means for placing said pipe in

communication with the space beneath the grate, or with the conduit, a valve in the pipe, a thermostat arranged within the producer, and means whereby the thermostat will operate said valve.

2. A producer comprising a casing, a grate, a plurality of shields arranged transversely of the casing above the grate, collector pipes leading from the shields outside the casing, a pipe to which said collector pipes deliver, a conduit within the casing at approximately the level of the grate, and to which said pipe delivers, a pipe leading from the conduit, said conduit being provided with a partition between the first and last named pipes, and a pipe leading from the upper part of the casing to the space below the grate.

3. A producer comprising a casing, a grate, a plurality of shields arranged transversely of the casing above the grate, collector pipes leading from the shields outside the casing, a pipe to which said collector pipes deliver, a conduit within the casing at approximately the level of the grate, and to which said pipe delivers, a pipe leading from the conduit, said conduit being provided with a partition between the first and last named pipes, and means for raising and lowering the shields whereby to regulate the depth of the material on the grate.

4. A producer comprising a casing, a grate, a plurality of shields arranged transversely of the casing above the grate, collector pipes leading from the shields outside the casing, a pipe to which said collector pipes deliver, a conduit within the casing, at approximately the level of the grate, and to which said pipe delivers, a pipe leading from the conduit, said conduit being provided with a partition between the first and last named pipes, and means for raising and lowering the shields in unison to regulate the depth of the material on the grate.

5. In a producer, a grate for sustaining the material, a shield arranged above the grate, means for adjusting one of said elements toward and from the other whereby to regulate the depth of the material on the grate, pipes leading from the shield outside the casing, and means for supplying air to the material on the grate through the shield or from beneath the grate.

6. In a producer, the combination with the grate, of a shield thereabove, a pipe leading from the shield outside the casing, means for varying the relative position of the shield and the grate whereby to regulate the depth of the material on the grate, and means for causing the products of decomposition to pass upwardly through the shield or downwardly through the grate.

7. A producer provided with a grate, a shield above the grate, means for adjusting the distance of the shield from the grate whereby to regulate the depth of material on the grate, and pipes leading from the shield outside the casing for the purpose set forth.

8. In a producer, the combination with the grate, of a shield thereabove, means for varying the relative position of the shield and the grate whereby to regulate the depth of material on the grate, the shield being provided with means for conducting the products of decomposition from the producer.

9. In a producer, the combination with the grate, of a shield thereabove for receiving the products of decomposition, and means for varying the relative position of the shield and the grate whereby to regulate the depth of material on the grate.

10. In a producer, the combination with the grate, of a shield for receiving the products of decomposition arranged above the grate, and adjustable with respect thereto, whereby to regulate the depth of the material on the grate.

11. In a producer, a casing, a grate in the casing, a shield above the grate, means for adjusting the distance of the shield from the grate, said casing being provided with openings leading to the space beneath the shield for the purpose set forth.

12. In a producer, the combination with the grate, of a shield above the grate and means for varying the relative position of the shield and the grate for the purpose set forth.

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