J. A. HERRICK.

GAS PRODUCER APPARATUS.

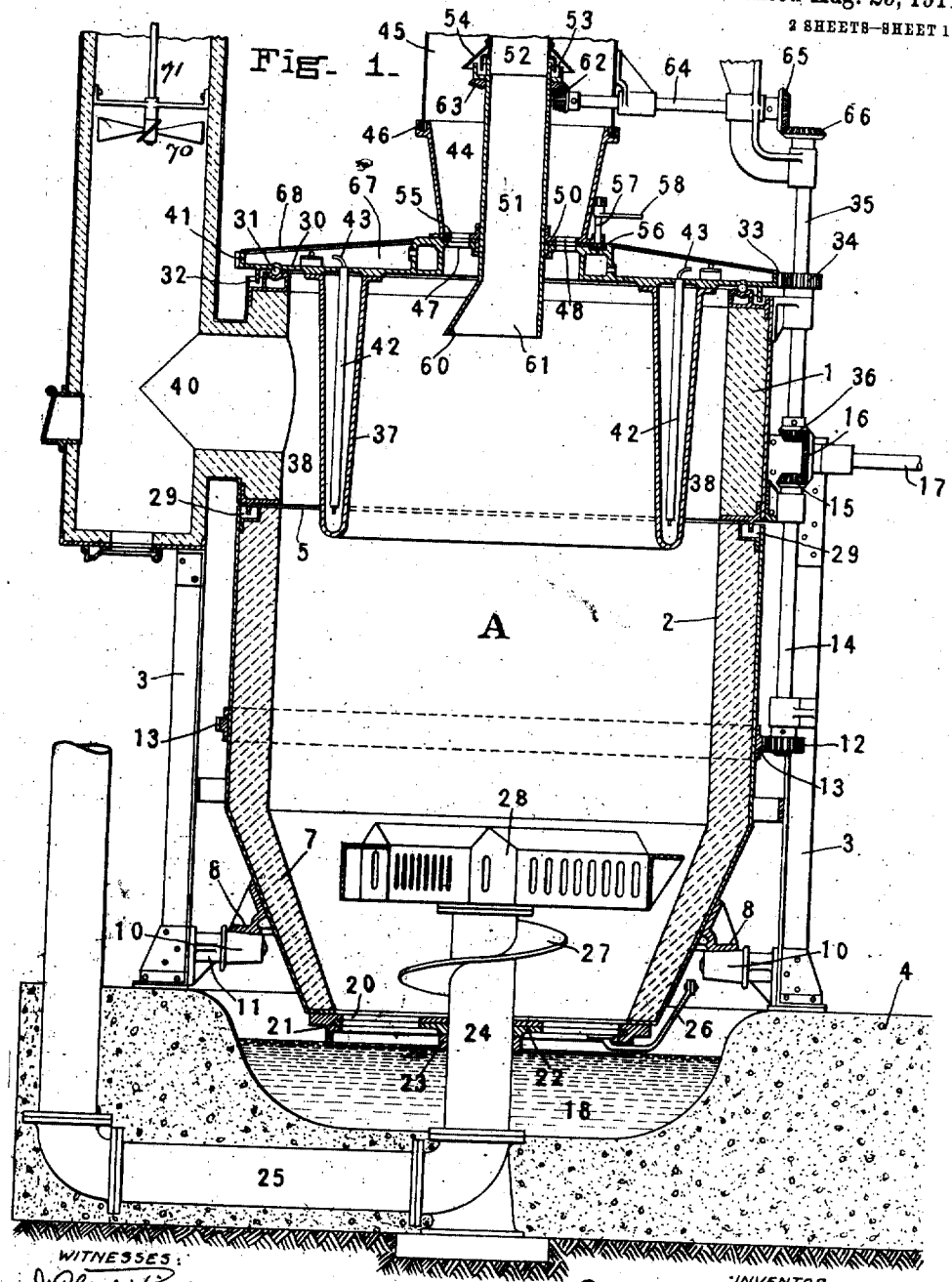
APPLICATION FILED JULY 15, 1909.

1,001,953.

Patented Aug. 29, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

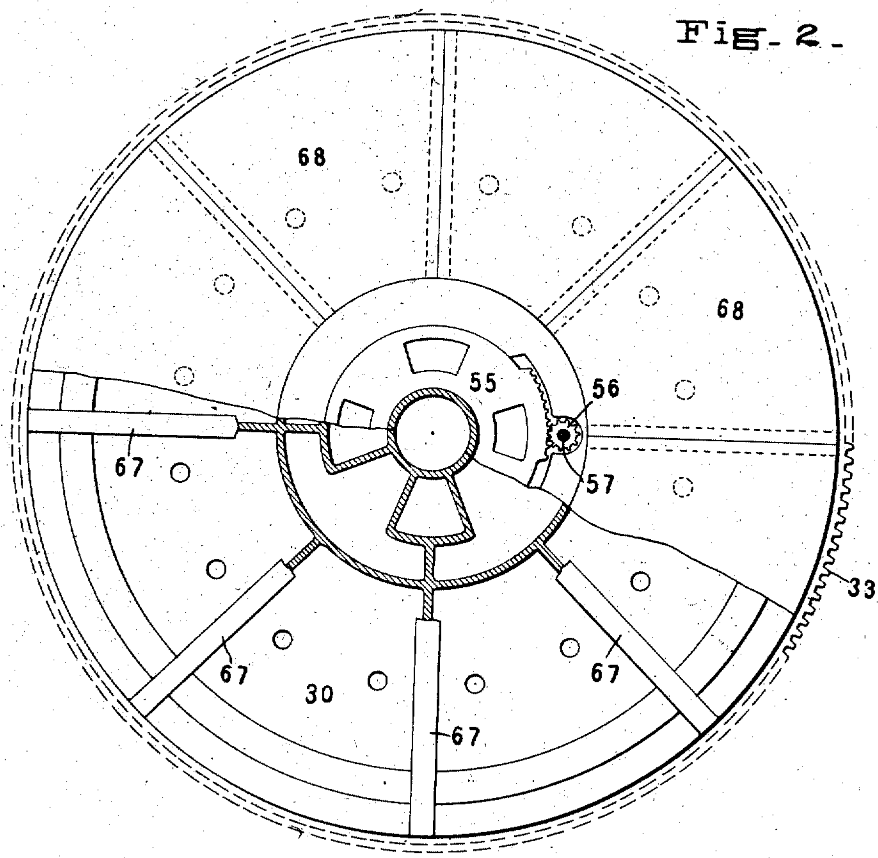
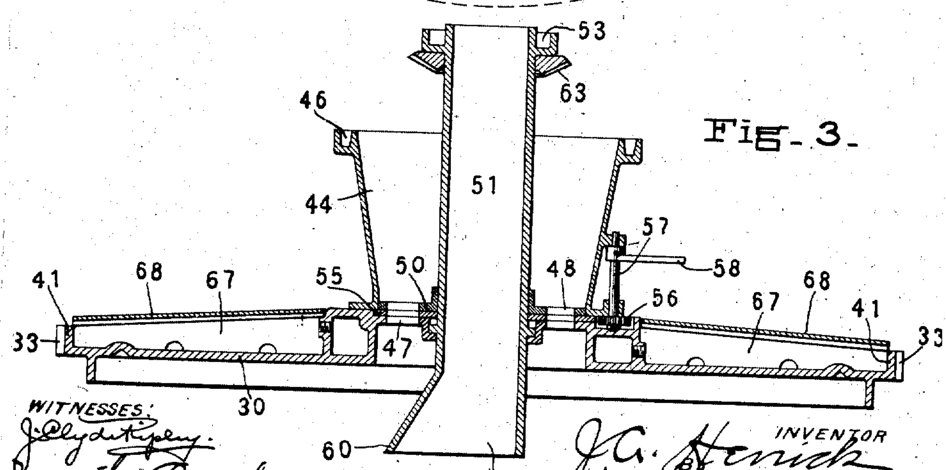


Fig. 3.



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UNITED STATES PATENT OFFICE.

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GAS-PRODUCER APPARATUS.

1,001,953. Specification of Letters Patent. Patented Aug. 29, 1911.

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To all whom it may concern:

Be it known that I, JAMES A. HERRICK, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Gas-Producer Apparatus, of which the following is a specification.

This invention relates to the manufacture of producer gas and one of the objects thereof is to provide a new and improved gas producer.

Another object of the invention is to provide an apparatus of the above character of such construction that the mass within the same will be kept from clogging and the formation of crevices or fissures in such mass prevented.

Another object is to provide improved means for discharging fuel into a producer and for distributing it evenly upon the bed therein.

A further object is to provide improved means for discharging ashes from the producer.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts, which will be exemplified in the construction hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is illustrated one form of various possible embodiments of my invention: Figure 1 is a vertical sectional view taken through the producer showing the same; Fig. 2 is a top view partly in section with certain of the parts broken away better to illustrate the construction; and Fig. 3 is a vertical sectional view taken through the cover portion of the producer.

Similar reference characters refer to similar parts throughout the several features of the drawing.

Referring now to the drawings, A represents the casing of a producer, the same being constituted in the present instance by upper and lower sections 1 and 2, respectively, the upper section being supported as by means of legs or pillars 3 which rest upon the foundation or setting 4. The casing is divided horizontally to provide the upper and lower sections 1 and 2 along line 5 indicated at 5, which construction permits of the lower section 2 being revolved.

The lower section of the producer tapers inwardly as shown at 7 which tapered portion carries an annular track 8 which rests upon rollers 10 revolubly mounted upon studs 11 carried by pillars 3. These rollers rotatably support the lower section 2 of the producer.

The means provided for revolving section 2 comprises a gear wheel 12 which meshes with teeth formed upon the annular member 13 encircling section 2 and fixedly secured thereto. Gear wheel 12 is carried upon the shaft 14 which has a bevel gear 15 meshing with a driving bevel gear 16 upon the shaft 17, which latter shaft receives its power from any suitable source.

18 indicates a receptacle or basin formed in the setting 4 underneath the body of the producer into which dips the tapering end 7 of section 2. The lower end of the latter extends below the level of the water in the basin whereby the lower end of the producer is trapped or sealed. Basin 18 is also adapted for receiving ashes which are discharged from the lower end of the producer which ashes will be removed by any suitable means, a space for this purpose being provided between the lower end of the producer and the side wall of the basin. In order that the discharge of the ashes from the basin of the producer may be properly regulated an apertured plate 20 is secured to the lower end of section 2, and mounted in slides 21 formed in this plate is a second plate 22 having apertures which register with those of plate 20. Plate 22 is also supported at its central portion by means of the collar 23 carried upon an upstanding portion 24 of the blast pipe 25 which extends through the support 4 of the producer. Secured to plate 22 is an arm 26 by means of which the same may be rotated to vary the position of the apertures thereof with respect to those of the fixed plate 20. Thus it will be seen that the size of the ash discharge apertures of the producer may be regulated as desired. The upstanding por-

tion 24 of the blast pipe is supplied with a spiral wing 27 which assists in forcing the ashes in a downward direction when section 2 of the producer is rotated. This upstanding portion also carries twyer box structure 28 by means of which the blast is discharged or distributed within the producer.

The upper portion of section 1 of the producer which may be sealed from section 2 as by means of the water seal 29, is provided with a revoluble cover 30, the same being supported upon ball bearings as at 31 so that the same may be radially revolved and said cover and the upper section 1 may be sealed, as by means of the water seals 32. This cover may be provided with peripheral teeth as at 33 with which mesh a gear wheel 34 carried upon the shaft 35 having a bevel gear 36 which meshes with bevel gear 16 and by means of which said shaft is rotated. It will be noted that shafts 14 and 34 and their driving connections are such that the cover portion 30 and the lower section of the producer 2 will be revolved in opposite directions.

Located within section 1 of the producer, depending from cover 30 and supported thereby is an annular curtain or partition 37, the lower end of which terminates below the point of jointure of sections 1 and 2. This annular partition or curtain is spaced from the inner walls of section 1 of the producer to form a mixing chamber 38 and leading from this mixing chamber is a discharge pipe 40 by means of which the gas may be led to any desired location. Cover 30 of th producer is provided at its edge with an upstanding flange 41 and this flange and the cover provide a receptacle for holding water which serves to cool the top of the apparatus. The annular partition or curtain 37 which is preferably hollow, as shown, may be also water cooled by means of the pipes 42 which conduct water from the cover portion to the lower end of the curtain, and pipe 43 extending through pipe 42 serves to conduct the water from the bottom of the curtain 37 back to the water receptacle formed upon the cover portion.

44 denotes an annular fuel hopper, suitably supported upon cover 30 and adapted to revolve therewith. Into this hopper fuel may be discharged from the chute 45, suitably supported above the producer; a water seal 46 being provided between hopper 44 and chute 45. The cover 30 is provided with apertures as at 47, and registering with these apertures are apertures 48 of the plate 50 carried by a revoluble portion 51 of the blast pipe 52. Section 51 of the blast pipe may be suitably sealed from section 52 thereof, by means of the water seal 53, said seal being protected as by means of a shield 54. Disposed beneath plate 50 is an annular apertured plate 55, the apertures of which are adapted to register with apertures 47 and 48. This plate which is provided upon its edge with gear teeth may be rotated as by means of the gear wheel 56 on the shaft 57 provided with the hand lever 58. It will be seen that the rotation of this plate will vary the size of the apertures which lead from the hopper to the interior of the producer, and it will be seen that by the rotation of section 51 of the blast pipe the apertures between the hopper and the producer will be alternately opened and closed whereby fuel will be periodically discharged into the interior of the producer.

One side 60 of the depending portion 61 of the section 51 of the blast pipe may be flared as at 60 so that some of the fuel will be deflected laterally thereby insuring an even distribution thereof upon the top of the bed. Section 51 of the blast pipe may be revolved by means of the bevel gear 62 which meshes with the bevel gear 63 carried by section 51. Bevel gear 62 is carried by shaft 64. Shaft 64 is provided with the bevel gear 65 which meshes with a similar gear 66 upon shaft 35.

The cover is provided with radially extending ribs 67 which have apertures to allow the water to flow to all parts of the said cover. A plate 68 rests upon these ribs and forms a platform above the cover.

In order to assist in the discharge of the gas from the producer, a fan as at 70 may be provided in the discharge conduit 40, said fan in the present instance being driven by a shaft and supported in the spider 71. Of course this fan may be located at any point in the discharge conduit.

The carbonaceous material which in the present instance is bituminous coal is introduced into the hopper 44 and is discharged therefrom periodically through the cover of the producer, whence it falls into the basin chamber constituted by the lower section 2. The fuel is then ignited in the usual manner. When a suitable bed of burning coal has been obtained within the producer additional fresh fuel is introduced by means of the hopper and the apparatus is then ready to operate.

When the apparatus is in normal operation the lower section 2 is revolved as has been heretofore explained and the proper amount of blast which may be composed of either steam or air or an admixture of these gases admitted into the interior of the producer. As will be noted this blast may be discharged into the producer through the twyer box 28 and through the blast pipe 52; the blast passing through the bed of fuel within the space formed interiorly of the partition or curtain 37 which may be herein termed "retort" passes in a down-

ward direction through the bed to meet the gases passing upward through the lower section 2 which may be termed "combustion chamber". The gases thereupon pass upward into the space 38 which may be termed "mixing chamber" and it will be noted that the gases passing downward through the retort must necessarily pass through the bed of incandescent fuel contained in the section 2 of the producer before they pass into the mixing chamber whence they are discharged through the exit conduit 40. The suction produced by the fan 70 assists in withdrawing the gas from the producer. The rotation of the depending curtain or partition 37, as has been above described, serves constantly to agitate the mass within the producer and prevent the formation of crevices or fissures and the rotation of the section 51 of the blast pipe serves to evenly distribute the fuel upon the top of the mass.

It will accordingly be seen that I have provided a construction well adapted among others to attain all the ends and objects of my invention above enumerated in a simple yet efficient manner.

As the fuel in the retort becomes heated the more volatile hydrocarbon constituents are distilled off and these gases pass downwardly through the partly coked portion of the fuel to mix with the lighter and more permanent gases which pass upward through the bed of incandescent fuel in the lower part of the producer. Thus the distillation and oxidation of the hydrocarbon constituents of the fuel will take place in the retort and the coke will be burned off in the lower portion of the producer or combustion chamber, sufficient oxygen being supplied by the blast to oxidize any volatile constituents present in the fuel discharged to that portion of the producer. The carbon dioxid gas passing through the coked material unites largely with the free carbon present to form carbon monoxid gas and any carbon monoxid gas formed in the lower portion of the producer will pass through the bed of incandescent fuel to the mixing chamber in an unchanged condition.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination in a gas producer of a casing, a revoluble cover therefor, and a depending curtain carried by said cover which extends downwardly within the producer, and means for revolving the cover.

2. The combination in a gas producer of a casing having fixed and revoluble sections, a chamber for containing raw fuel or coke located in one of said sections, and spaced from the walls thereof, said chamber being revoluble, and means for revolving said chamber.

3. The combination in a gas producer of a casing, a depending annular curtain located in the upper part of said casing, means whereby said curtain may be revolved, means for delivering blast into the lower part of said casing, and means for delivering blast within said curtain.

4. In combination with a gas producer, a casing having upper and lower sections, one of which is revoluble, a depending revoluble curtain located in the upper section adapted to contain raw fuel and form an upper combustion chamber, and means for revolving said curtain.

5. The combination in a gas producer of a casing comprising a fixed upper section and a revoluble lower section, a revoluble cover for the upper section, a depending annular wall carried by said cover, and means for revolving the cover.

6. The combination in a gas producer of a casing comprising a fixed upper section and a revoluble lower section, a depending annular revoluble wall located in the upper section and carried by the cover portion of the producer, the exterior surface of which is spaced from the opposed interior surface of the casing, said wall depending below the point of jointure of said upper and lower sections, and means for revolving said wall.

7. The combination in a gas producer having an upper fixed section and a lower revoluble section of a depending revoluble annular casing in the upper section, the lower end of which depends below the point of jointure between the fixed and lower revoluble sections, means for revolving said annular casing, and a gas discharge conduit leading from the upper section.

8. The combination in a gas producer of a casing having relatively movable upper and lower sections, and a revoluble retort located in one of said sections, and means for revolving said retort.

9. The combination in a gas producer of a casing having relatively movable upper and lower sections, a revoluble retort lo-

cated in one of said sections, means for revolving said retort, and means for discharging fuel into said retort.

10. The combination in a gas producer of a casing composed of relatively movable upper and lower sections, a revoluble cover upon the upper section, a retort formed by a wall which depends from the cover and which is adapted to revolve therewith, the space between said retort and the walls of the upper section of the casing forming a fixing and mixing chamber for the gases, means for discharging fuel through said cover into said retort, means for delivering blast through said cover into said retort, means for delivering blast into the lower section of said casing, and means for revolving said cover.

11. The combination in a gas producer of a casing having a lower movable section and an upper fixed section, a movable retort in said upper section spaced from the walls thereof to provide a mixing chamber, means for moving said retort, and means for conducting gas from said mixing chamber.

12. The combination in a gas producer of a casing divided horizontally to form upper and lower relatively movable sections, means for revolving the lower section, a revoluble cover for the upper section, a depending annular wall carried by the cover and revoluble therewith, and means for revolving the cover in a direction opposite to that in which the lower section is revolved.

13. The combination in a gas producer of a casing having a lower movable section, an upper fixed section, and a movable retort in said upper section which is spaced from the walls thereof to provide a mixing and fixing chamber between the same and the inner walls of the upper section.

14. The combination in a gas producer of a casing, a depending annular curtain located in the upper part of said casing, means for revolving said curtain, means for delivering blast into the lower portion of said casing, and means for delivering blast within said curtain.

15. The combination in a gas producer of a casing, a depending annular curtain located in the upper part of said casing, means for revolving said curtain, means for delivering blast into the lower portion of said casing, and means for delivering fuel and blast evenly within said curtain.

16. The combination in a gas producer of a casing comprising a fixed upper section and a revoluble lower section, a cover for the upper section, a depending annular wall carried by said cover, and means for revolving said annular wall.

17. The combination in a gas producer of a casing having a revoluble cover portion, means for revolving the same, a chamber carried by the cover portion, and means for uniformly feeding fuel and conveying blast through said cover into said chamber carried thereby.

18. The combination in a gas producer provided with a rotatable retort in its upper portion, said retort being spaced from the inner walls of the producer to form a mixing chamber for the gases, of means for forcing blast into the lower portion of the producer, means for forcing a blast into the upper portion of said producer and within said retort, mechanical means for withdrawing the gas intermediate the upper and lower ends of said producer at a point above the lower end of said retort, a gas delivery pipe leading from the space between said retort and the inner walls of the casing, and means for rotating said retort.

In witness whereof I affix my signature in the presence of two witnesses.

JAMES A. HERRICK.

Witnesses:
A. S. HONIGSBERG,
B. W. COULDOCK.