

W. B. CHAPMAN.
GAS PRODUCER.

APPLICATION FILED AUG. 6, 1908.

995,586.

Patented June 20, 1911.

2 SHEETS—SHEET 1.

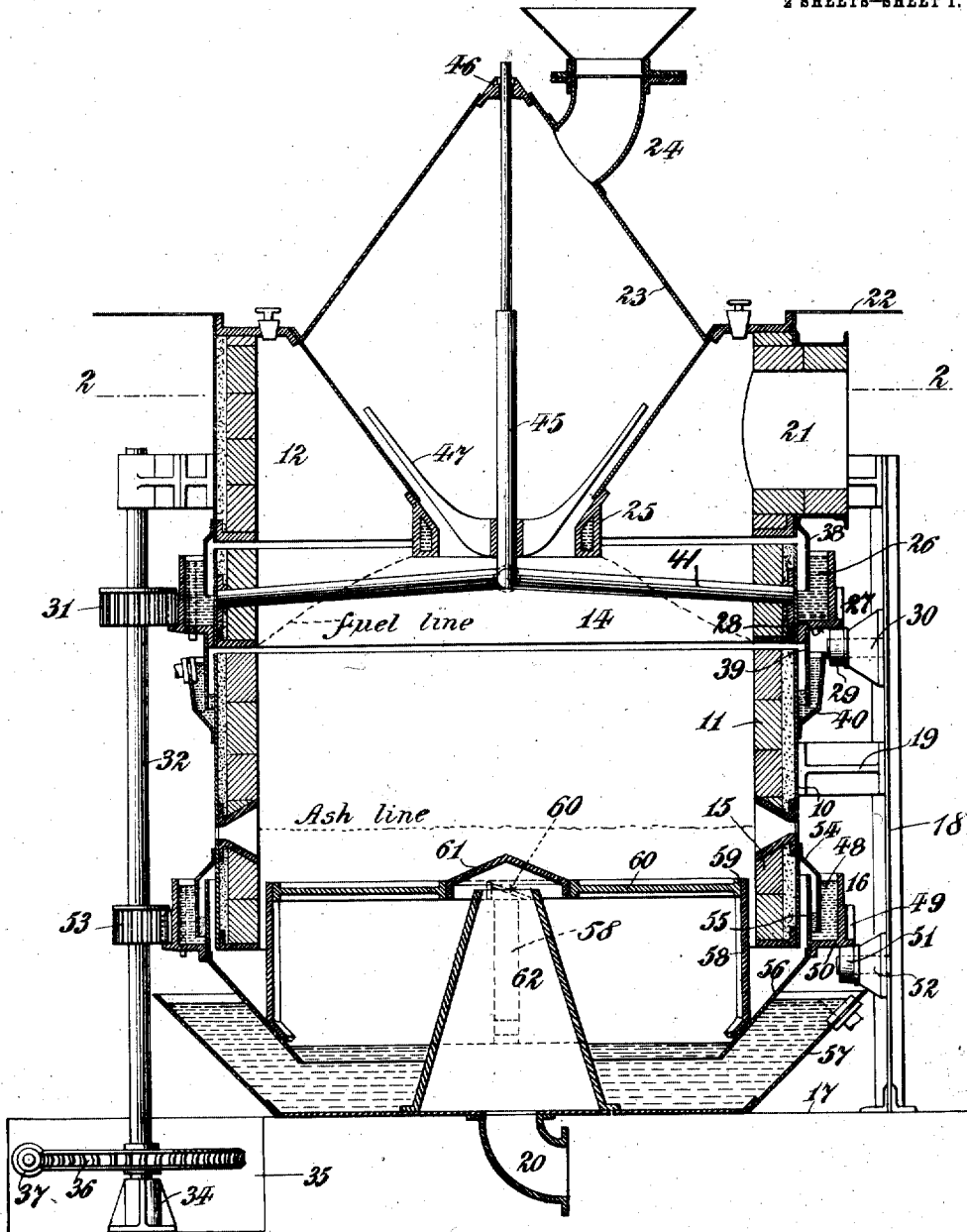


FIG. 1.

WITNESSES

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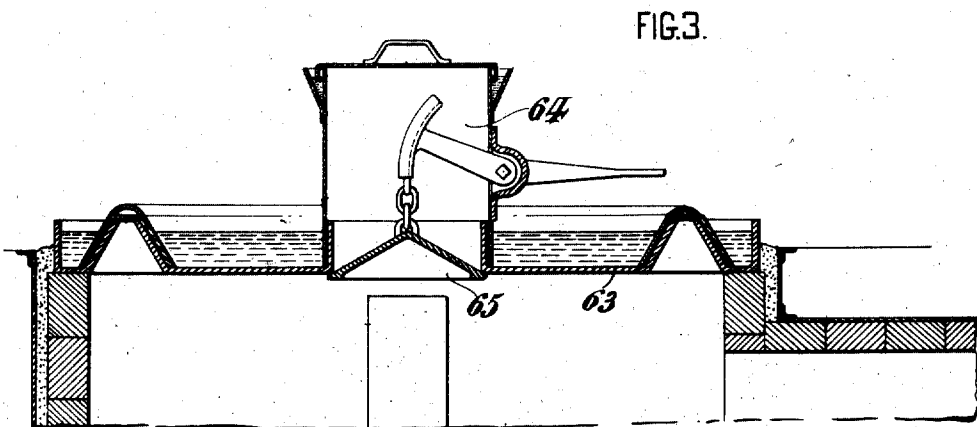
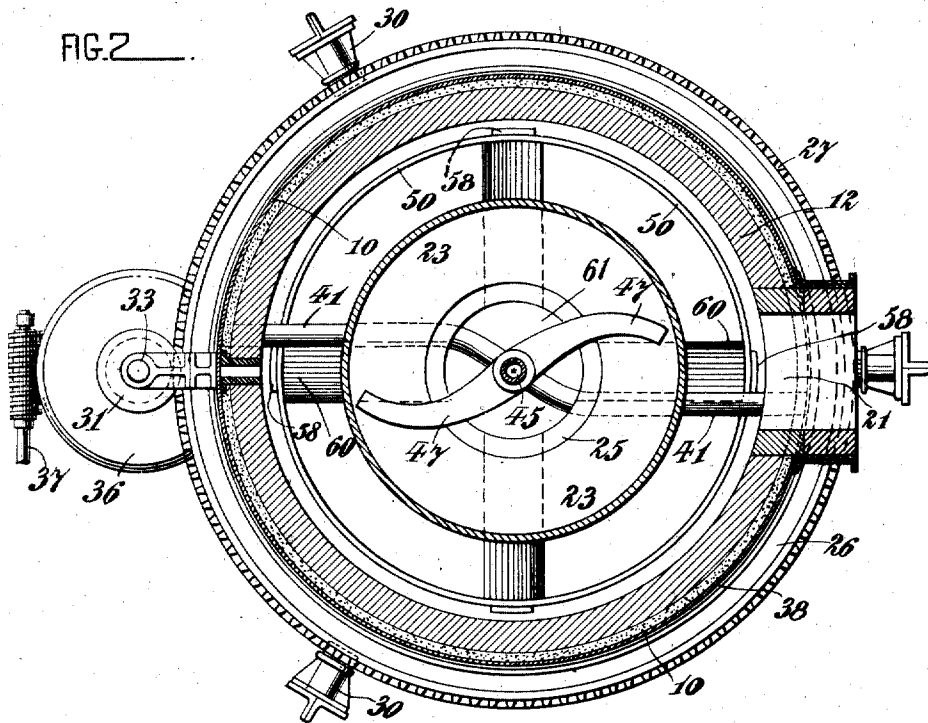
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WITNESSES
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GAS-PRODUCER.

995,586.

Specification of Letters Patent. Patented June 20, 1911.

Application filed August 5, 1908. Serial No. 447,048.

To all whom it may concern:

Be it known that I, WILLIAM B. CHAPMAN, of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Gas-Producers, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a gas producer and its primary object is to provide an apparatus of simplified construction by which a high grade of gas suitable for power and other purposes requiring a high grade fuel, may be manufactured from bituminous coals.

The invention consists in certain novel features of construction which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is had to the accompanying drawings, which illustrate as an example one manner of practically embodying my invention, in which drawings,

Figure 1 is a vertical section of the apparatus; Fig. 2 is a sectional plan on the line 2-2 of Fig. 1; and Fig. 3 is a vertical section showing the upper part of another form of the device.

Referring to Figs. 1 and 2 the producer is there shown as constructed of a metal shell 10 with a brick or other non-conducting lining 11. The shell of the producer is constructed of four sections 12, 14, 15 and 16 of which the top section 12 is stationary, the intermediate second section 14 revoluble, the third section 15 stationary and the bottom section 16 revoluble. The stationary sections are suitably supported on the floor 17 by stanchions 18 from which brackets 19 project to and are fastened on the stationary sections. The producer has an air inlet 20 at the bottom and a gas outlet 21 passing through the walls of the top section 12 immediately below the charging floor 22. Said top section carries a coal hopper 23 with a suitable feed spout or other means 24. The hopper tapers downward into the body of the producer and terminates in a water-cooled cast iron throat ring 25 to which the water may be conducted by piping of any desired arrangement (not shown). To the revoluble section 14 is fastened a ring casting which serves a manifold function, to wit, forming an annular water cup 26, a spur gear 27 and a supporting track 28.

The track 28 runs on rollers 29 carried by brackets 30 projecting from the stanchions 18 and in this manner the rotating member 14 is supported with a suitable clearance between the sections 12 and 15 so that it may revolve without friction. With the gear 27 a pinion 31 meshes which pinion is fast on a rotating vertical shaft 32 carried, for example, in a bearing 33 attached to the section 12 at the top end of the shaft and in a step bearing 34 arranged in a pit 35 constructed below the base line of the producer. For imparting motion to said shaft I have shown a worm wheel 36 together with a worm 37 connected with a suitable source of power. At the lower edge of the top section 12 an annular skirt 38 is arranged which projects downward into the water cup 26 and this cup being filled with water, a seal is formed which prevents the escape of gas between the sections at this point. The rotating section 14 also carries a downwardly projecting skirt 39 which dips into a cup 40 attached to the stationary section 11, forming a waterseal between the bottom of the section 14 and the top of the section 11. The coal from the hopper 23 gravitates through the throat ring 25 and lies in the body of the producer with a conical top surface which if undisturbed would assume the normal angle of repose. The coal, however, is leveled out and spread uniformly over the fire by means of a coal spreader 41. This coal spreader is in the form of an iron pipe and its ends are passed through the walls of the section 14 to communicate with the water cup 26. The coal spreader is hollow throughout so that water may be circulated through it to cool the same and prevent its destruction by the fire. From the middle or center of the coal spreader a pipe or tubular shaft 45 passes upward, this pipe being securely attached to the coal spreader to rotate therewith and extending centrally through the hopper and through a stuffing box or other seal 46, so that steam generated within the hopper without mingling with the gas generated therein. The pipe 45 serves the further function of supporting the coal agitator 47. This, as is shown in Fig. 2, is reversely curved and has a hub attached to the pipe 45 at a point within the hopper and extends upward from opposite sides of the pipe in proximity to the tapering bottom of the hop-

per so that upon the rotation of the section 14 the agitator bar moves continuously along the bottom of the body of the coal in the hopper preventing the formation of arches therein and securing a constant feed. The section 16 of the hopper is provided with a ring casting forming a water cup 48, a spur gear 49 and a track 50. The track is sustained on rollers 51 carried by brackets 52 which project from the stanchions 18 and the gear 49 is in mesh with a pinion 53 fast to the shaft 32. To the stationary section 15 an annular skirt 54 is attached which projects down into the water cup 48 to form a water seal at the lower end of the section 15. Said casing has at its inner side an annular sheet metal wall 55 forming the inner wall of the cup 48 and at the lower edge of the casing a tapering sheet metal skirt 56 is secured, the same projecting downward and tapering inward to a point considerably below the upper edge of the ash pan 57. Said skirt 56 forms part of the section 16 and revolves therewith and it carries a number of stanchions 58 projecting upward within the section 15 and also rotating with the section 16. To the upper ends of these stanchions a ring 59 is joined and this ring supports the inclined ash plows 60. Of these plows there are preferably four and the same have the cross sectional form indicated in Fig. 1 so that they will exert an upstroking action in the ash bed just below the incandescent or fire zone and agitate the same through the medium of the upper part of the ash bed for the purpose of preventing the formation of blow holes in the fire and insuring a compact body of incandescent coal. By agitating the fire through the medium of the plows described the formation of large clinkers is avoided due to the thorough and continued breaking up of the molten matter of which the clinkers are formed. At their inner ends centrally in the producer the plows 60 support a hood 61, the top surface of which is pyramidal in form and which hood rotates with the section 16. The hood covers the open upper end of the stationary blast nozzle and clinker crusher 62. This is mounted in the bottom of the ash pan and is of square or other angular cross sectional form with the result that the ash body inclosed in the skirt 56 and rotating with the same will be continually thrust against the angular nozzle 62 serving to crush or break up the clinkers in the ash body and facilitating the removal of the ashes from the pan. The hood 61 in rotating with the plows 60 exerts an agitating action on the ash bed similar to that of the plows themselves. The nozzle 62 communicates with the pipe line 20 supplying the air blast which air blast passes out the open upper end of the nozzle under the hood and upward into the fire. Water is supplied to the various water seal cups and

to the ash pan in any desired manner and it may be arranged to flow constantly, overflowing from one cup into the other and finally reaching the ash pan which it fills for the purpose of forming a water seal through which the ash may be removed without interfering with the continuous operation of the producer.

In the operation of the producer a fire is kindled in the body thereof and coal charged in through the hopper. The starting operation is continued until the normal running condition indicated in Fig. 1 is obtained in which the incandescent zone or fire line reaches down to a point slightly above the hood 61 below which is the body of ashes, the fire extending up to a point near the top of the section 15 until it heats the green coal zone extending downward from the throat of the hopper. The rotation of the section 14 causes the spreader 41 to sweep over the top of the fuel bed and level out the coal as fast as fed from the hopper, the level of the fuel being kept approximately at the elevation of the spreader. The section 16, however, causes a bodily rotation of the lower part of the ash bed grinding the same against the angular nozzle 61 which breaks or crushes the clinkers and allows the ready removal of the ashes. Also, by the operation of the plows 60, the top part of the ash bed is given an upward agitation which is communicated through the ashes to the incandescent coal, packing the same and insuring a uniform fire as explained. In connection with this arrangement it is important to note the location of the plows within the stationary section 15 and the rotation of such plows through the medium of the section 16. This is an important feature of the invention and is one which has never been heretofore attempted. The ash is gradually settled to the bottom of the pan and, owing to the tapering form of the nozzle 62, it is, by the rotation of the section 16, slowly worked out to the edge portion of the pan and may there be readily removed by an attendant shoveling out the ash. The air is either drawn or forced in through the nozzle 62 according as to whether the producer is operated on the suction or pressure principle. The air passes upward through the incandescent coal and after undergoing the usual reactions with the fuel, is formed, with the fuel, into gas which is finally carried off through the conduit 21.

The modification shown in Fig. 3 involves a somewhat simplified construction in that it omits the charging hopper, agitator arms and coal spreader forming part of the structure shown in Figs. 1 and 2, and by reason of the omission of the coal spreader, the upper rotating section of the producer is made sufficiently deep to bring about an

actual rotation of the fuel bed in the manner set forth in my copending application Serial No. 353,882, filed January 24, 1907. Otherwise the structure is practically the same as in Figs. 1 and 2. In Fig. 3 the producer is provided with a watercooled top 63 having a charging hopper 64 and bell 65 as is commonly employed in blast furnaces.

Various other modifications may be resorted to without departing from my invention or the several features thereof.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A gas producer having a stationary section, a rotating section below it adapted to impart a rotary motion to the ashes, an ash pan below the second named section and a clinker crusher rising from the bottom of the ash pan, said crusher tapering from the base upward.

2. A gas producer having a stationary producer section adapted to carry the incandescent fuel, a tapering section below the same adapted to carry the ashes, means for imparting a rotation to the tapering section, an ash pan closing the lower end thereof, an agitator contained within the upper section and means extending between the lower section and the agitator to connect the agitator with the lower section, whereby the agitator is revolutely driven.

3. A gas producer having two stationary sections, with a movable section interposed between them, a hopper carried by the top stationary section and a coal spreader attached to the rotatable section and adapted to move through the top of the coal bed to level off the same, and an agitator located within the hopper and also having connection with the rotatable section to be driven thereby.

4. A gas producer having a rotatable section in proximity to the top of the coal bed, a coal spreader carried by said rotatable section and a hopper above the rotatable section, an agitator in the hopper and means for connecting the agitator with the coal spreader to operate the agitator.

5. A gas producer having a charging hopper, an agitator in the same and a rotating producer section below the hopper forming a part of the exterior wall of the producer and having connection with the agitator.

6. A gas producer having a rotating section, a watercooled agitating member extending across the same from side to side and means for withdrawing the steam vapor from said agitating member to the exterior of the producer, such means comprising an outlet pipe rising centrally from the agitating member and passing out through the top of the producer.

7. A gas producer having a narrow rotat-

ing section at or near the top level of the fuel and an agitator attached to and extending across the same from side to side for the purpose specified, a feeding means above the agitator, an agitator for the feeding means and a connection between the two agitators.

8. A gas producer having relatively movable sections, a water seal device between them, a hollow agitator carried by one of said sections and communicating with the water seal for the purpose specified, a feeding means above the agitator, an agitator for the feeding means and a connection between the two agitators.

9. A gas producer having a body portion, a rotary section below it adapted to impart a rotary motion to the ashes, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan.

10. A gas producer having a body portion, a rotary section below it adapted to impart a rotary motion to the ashes, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan, said crusher being non-circular in cross-section.

11. A gas producer having a body portion, a rotary section below it adapted to impart a rotary motion to the ashes, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan, said crusher tapering from the base upward.

12. A gas producer having a body portion, a rotary section below it adapted to impart a rotary motion to the ashes, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan, said crusher tapering from the base upward and being non-circular in cross-section.

13. A gas producer having a body portion, a rotating section below it adapted to impart a rotary motion to the ashes, an agitator carried by said section, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan into proximity to said agitator.

14. A gas producer having a body portion, a rotary section below it adapted to impart a rotary motion to the ashes, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan, said clinker crusher serving as a gas conduit.

15. A gas producer having a body portion, a rotating section below it adapted to impart a rotary motion to the ashes, an agitator carried by said section, an ash pan below said section and a clinker crusher rising from the bottom of the ash pan into proximity to said agitator, said crusher serving as a gas conduit and said agitator serving to prevent the admission of ashes to said conduit.

16. A gas producer having a body portion, a rotating section below it, a movable section below it adapted to impart a bodily movement of the ashes in respect to the fuel within said body portion, an ash pan below

the said rotary section and closing the lower end thereof and a clinker crusher extending upwardly from said ash pan into said movable section.

17. A gas producer having a body portion, a rotating section below it adapted to impart a bodily movement to the ashes in respect to the fuel within said body portion, an ash pan below the said rotary section and closing the lower end thereof and a clinker crusher extending upwardly from said ash pan into said movable section and an agitator carried by said movable section and extending into proximity to said clinker crusher.

18. A gas producer having a body portion, a rotating section below it, a movable section below it adapted to impart bodily movement to the ashes in respect to the fuel within said body portion, an ash pan below the said rotary section and closing the lower end thereof and a clinker crusher extending upwardly from said ash pan into said movable section, said crusher being non-circular in cross-section and serving as a gas conduit and said agitator having a portion serving as a cap for the upper end of said clinker crusher.

19. A gas producer having an exterior wall portion adapted to contain the incandescent fuel, a rotatable lower section adapted to carry the ashes, a stationary ash pan beneath said section and an agitator independent of the ash pan carried by said rotatable lower section and projecting upwardly into a body section above the same.

20. A gas producer having a body portion including a movable section, a hopper carried above said body portion, a coal spreader attached to said rotatable section and adapted to move through the top of the coal bed to level off the same and an agitator located within the hopper and having connection with said rotatable section to be driven thereby.

21. A gas producer having a rotating section, a water cooled agitating member extending across the same from side to side, and means for withdrawing the steam vapor to the exterior of the producer, such means comprising an outlet pipe connected to said agitating member intermediate the ends of the latter.

22. A gas producer having an upper stationary section, means for feeding coal thereto, a rotary wall section below said station-

ary section and having its lower end of smaller diameter than its upper end, an agitator carried by said rotary wall section, a stationary ash pan and a combined nozzle clinker crusher extending upwardly from said rotary wall section.

23. A gas producer having an upper stationary section, means for feeding fuel thereto, a rotary wall section below the same, a second rotary section below the first-mentioned rotary section and having its lower end of smaller diameter than its upper end, an agitator carried by said last-mentioned rotary section and a stationary ash pan below said last-mentioned rotary section and a combined nozzle and clinker crusher extending upwardly from said ash pan into said rotary section.

24. A gas producer having two annular superimposed sections each forming an exterior wall of the body of the producer of which sections the lower is open at the bottom and rotatable, an agitating means carried by the lower section and projecting upward into the upper or stationary section and a stationary ash pan below said lower section.

25. A gas producer having two annular superimposed sections each forming an exterior wall of the body of the producer of which sections the lower is open at the bottom and an agitating means carried by the lower section and projecting into the upper or stationary section, such agitating means comprising a plow or plows extending across the producer, and a stationary ash pan below said lower section.

26. A gas producer having two superimposed sections each forming an exterior wall of the body of the producer of which sections the lower is rotatable, an agitating means carried by the lower sections and projecting into the upper or stationary section, such agitating means comprising a plow or plows extending across the producer and having an inclined upper side to stroke upward on the material in the producer.

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

WILLIAM B. CHAPMAN.

Witnesses:

ISAAC B. OWENS,

E. I. McLAUGHLIN.