J. R. GEORGE.

GAS PRODUCER.

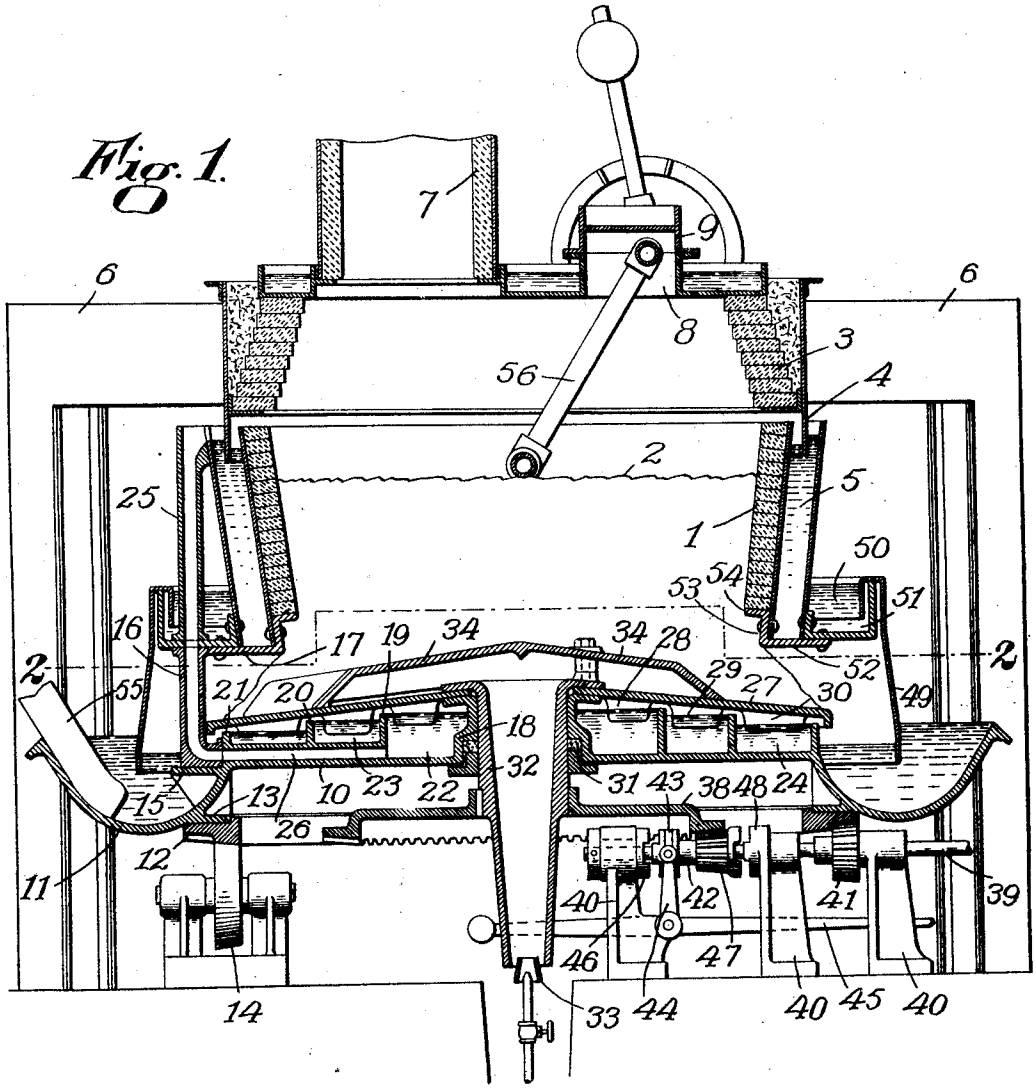
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1,406,637.

Patented Feb. 14, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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2 SHEETS—SHEET 2.

Fig. 2.

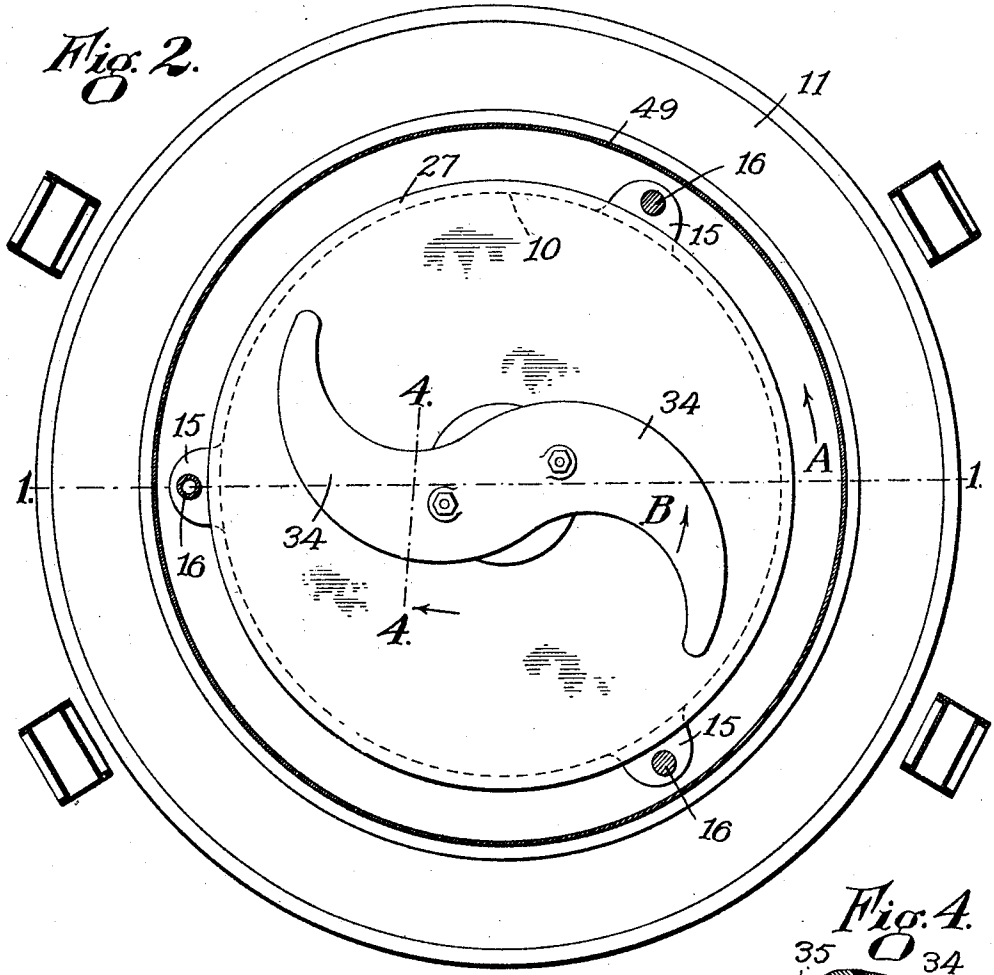


Fig. 4.

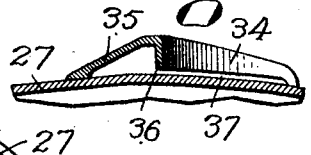
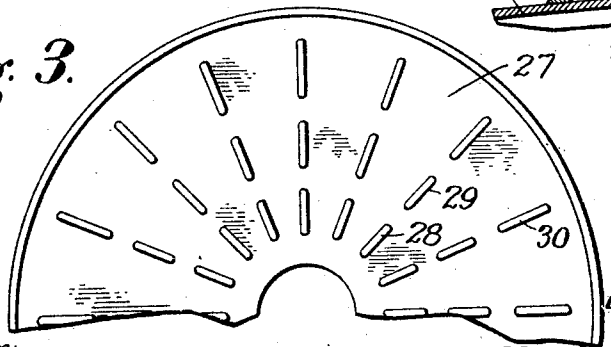


Fig. 3.



Witnesses.

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GAS PRODUCER.

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Application filed July 1, 1915. Serial No. 37,571.

To all whom it may concern:

Be it known that I, JEROME R. GEORGE, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Gas Producer, of which the following, together with the accompanying drawings, is a specification.

The present invention relates to gas producers, and has particular reference to an improved construction by which the discharge of ashes from the producer is facilitated, and by which the blast of air, or air and steam, used to support the combustion of fuel in the producer is introduced and distributed at the level of the ash supporting surface.

The features of my invention are fully set forth in the following description and pointed out in the annexed claims, reference being had to the accompanying drawings, in which—

Fig. 1 is a vertical sectional view of a gas producer embodying my invention, the section being taken on line 1—1, Fig. 2.

Fig. 2 is a horizontal sectional view on line 2—2, Fig. 1.

Fig. 3 is a fragmentary plan view of the bottom of the ash support, and

Fig. 4 is a detail sectional view on line 4—4, Fig. 2.

Similar reference characters refer to similar parts in the different figures.

The gas producer embodied in my invention contemplates a rotatable main or fuel section 1, within which the level of the bed of fuel is maintained at or near the line 2, Fig. 1. The combustion chamber surrounded by the section 1 is enclosed at the top by a stationary cover section 3 having a depending apron 4 which projects into an annular water jacket 5 surrounding the shell of the main or fuel section 1, to provide a water seal against the escape of gases from the combustion chamber. The cover section 3, which is supported from posts 6 or the like, provides the usual conduit 7 for conveying away the gases produced within said chamber, and also provides the usual opening 8, having a removable cover 9, to permit the replenishment of fuel within said chamber.

Disposed below and spaced from the lower edge of the fuel section 1 is a circular water pan 10, from the edge of which depends a preferably integral, annular ash trough 11. To the under side of said trough is attached an annular bevel gear 12, which also provides an annular track 13, by means of which the water pan 10 is rotatably supported upon a plurality of rollers 14, in the present instance three in number, one of which is shown in Fig. 1. The water pan 10 provides a plurality of shelves or lugs 15, in the present instance three in number, one of which is shown in Fig. 1, and each shelf or lug supports a column or post 16 rigidly attached at its upper end to a flange 17 carried by the shell of fuel section 1. In this manner the fuel section 1 is supported by, and held spaced away from, the water pan 10, the two parts being adapted for rotation in unison, in the manner hereinafter specified.

The water pan 10 provides a central upstanding hub 18, and also a plurality of concentric annular upstanding partitions 19, 20 and 21, which are gradually reduced in height toward the outer edge of the pan. In this manner a series of annular water chambers 22, 23 and 24 are produced, within which the cooling water is maintained at different levels, as shown in Fig. 1. The overflow of water from the water jacket 5 is received by a pipe 25, communicating with one of the columns 16, Fig. 1, which is made hollow for this purpose. The lower end of said column 16 is connected to a horizontal passage 26, formed on the bottom of the pan 10 and passing under the several partitions 19, 20 and 21, opening into the innermost and deepest water chamber 22. The overflow from each water chamber supplies in turn the next adjacent shallower chamber, and the overflow from the outermost and shallowest chamber 24 passes into the concave trough 11 formed on the edge of the water pan. It is to be understood, of course, that any number of water chambers, arranged as above described, may be provided in the water pan.

The gradual outward descent of the series of annular partitions 18, 19, 20 and 21 provides for the support thereon of an annular plate 27, frusto-conical in form, which serves as the fuel and ash supporting surface of the producer. Said plate 27 is at-

tached to and rotates with the water pan 10. Projecting from the bottom of said plate are a plurality of annular series of lugs or projections 28, 29 and 30, Fig. 3, which enter the water in the chambers 22, 23 and 24 respectively, and thereby provide an ample cooling for said plate.

Extending through a centrally disposed stuffing box 31, carried by the water pan 10, is an upwardly flaring blast pipe 32, for conveying a blast of air or air and steam to the fire from a source of supply 33. The pipe 32 extends loosely through the water pan 10 and the ash supporting plate 27, so as to be capable of independent rotation relative to those two parts, and terminates at its upper end in a plurality of reversely curved blast arms 34, 34, as shown clearly in Figs. 1 and 2. The said arms, which are open on their under sides, lie flat against the surface of plate 27, as shown in Figs. 1 and 4, the concave side of each arm being formed by an inclined wall 35 rising gradually from the surface of plate 27, and the convex side of each arm being formed by a vertical wall 36. The space enclosed between said walls 35 and 36, and the surface of plate 27 is in communication with the pipe 32; the edges of the vertical walls 36 are cut away to provide slots 37 through which the blast passes to the mass of ash and fuel supported on said plate.

The pipe 32 has keyed thereto an annular bevel gear 38, in concentric relation to the gear 12, heretofore referred to. A rotating shaft 39, journalled in bearings 40, carries a bevel pinion 41 in constant mesh with gear 12, whereby the water pan and the entire producer shell structure connected to and supported thereby, are rotated at a relatively low speed in the direction of arrow A, Fig. 2. A sleeve 42, loosely carried on shaft 39, provides a groove 43 for engagement by a shipper fork 44 and operating lever 45. The sleeve 42 carries a bevel pinion 47, preferably by means of a spline connection, which pinion 47 is in mesh with the bevel gear 38. The shaft 39 has fixed thereon a collar 46, which presents a clutch face in opposition to a similar clutch face formed on the left hand end of a sleeve 42.

In the normal operation of the producer, the sleeve 42 is disposed in its extreme left hand position, Fig. 1, the bevel pinion 47 being thereby locked to the shaft 39, so that the pipe 32 and arms 34 are positively rotated in the direction of the arrow B, Fig. 2, i. e., in the same direction as the water pan 10 and ash supporting plate 27. The ratios of the gears and pinions 12, 38 and 41, 47 respectively are such that the rotation of the curved blast structure takes place at a slightly different speed, either faster or slower, than the plate 27. so as to produce a slow but continuous change in the relative position of said parts. In this way is produced a slight constant tendency to crowd the ashes outwardly toward the edge of plate 27, thereby preventing the ashes from building up high over the arms 34; at the same time the position of the blast outlets of said arms is being constantly changed, relatively to the mass of superposed fuel, thereby insuring a uniform distribution of the blast.

When it is desired to discharge the ashes in bulk, into the water of trough 11, the sleeve 42 is thrown over to the right, Fig. 1, moving the pinion 47 out of lock with the shaft 39. The right hand end of the sleeve has a clutch face which locks with an opposing stationary clutch face 48 on the central bearing 40 of the shaft, thereby holding the pinion 47, which is still in mesh with gear 38, stationary, and preventing the rotation of the arms 34. The latter, due to the continued rotation of the plate 27, thereupon become a quick-acting ash plow, causing a rapid discharge of ashes into the water of trough 11. When the sleeve 42 is in the intermediate position shown in Fig. 1, with neither of its end clutch surfaces in engagement, the mass of ashes and fuel bearing firmly upon the tops and sides of the arms 34 and covering the entire surface of the plate 27, holds the curved blast structure in close frictional contact with said plate, and causes the rotation of said blast structure in unison with the water pan and fuel section. Under these conditions, no discharge of ashes over the edge of plate 27 takes place, since there is no relative movement between the arms 34 and the plate 27.

As heretofore set forth, the ash trough is filled with water, into which dips the lower edge of an annular skirt 49, depending from the fuel section 1, to provide a water seal between the said section and the water pan. At its upper end said skirt is inturned to provide a depending flange 50, dipping into the water contained in a trough 51 carried by the flange 17 of the fuel section 1, to seal the combustion chamber against escape of gas. The outer wall of trough 51 furnishes support for the skirt 49, in the manner clearly shown in Fig. 1.

The skirt 49 may be temporarily raised, by any suitable means, to afford access to the ash supporting plate 27 and to the blast arms 34, for the purposes of repairing the same. By temporarily supporting the fuel section at one point, through the medium of a chain hoist or the like, one of the columns 16 may be removed, giving room for the withdrawal and replacement, if necessary, of the entire blast arm casting or of the ash supporting plate 27. When four of the columns 16 are employed for the support of the fuel section 1, the removal

of one of these columns can be accomplished without providing any temporary support for the fuel section, and the ash support and blast structure can be removed through the space thus made available.

The water jacket 5 of the fuel section is formed by spaced inner and outer plates surrounding the usual fire brick lining. An annular plate 52, forming the bottom of the water jacket, has a substantially vertically disposed portion 53 to which the inner jacket plate is secured, and a horizontally disposed shelf 54 providing for the erection of the brickwork thereon. The outer water jacket plate being attached to the inner wall of trough 51, it will be clear that the construction shown and described avoids the necessity for flanging the plates which are used to form the bottom and sides of the water jacket.

The ashes crowded into the rotating trough 11 by the arms 34 may be removed therefrom by the use of a stationary inclined blade 55, Fig. 1, in the manner common to devices of this class. The constant rotation of the section 1, containing the bed of fuel, enables the use of a fuel evener 56, of a type known in the art, requiring a relative traversing movement between it and the bed of fuel, for levelling the surface of said bed.

By the arrangement and disposition of parts shown and described, which makes it possible for the blast to be discharged at the level of the ash supporting surface, a producer of much less height than the ordinary types of mechanical gas producers is provided. The support provided for the ashes is entirely dry at all times, in distinction to producers in which the ash pan is utilized in the formation of a water seal, yet all danger of overheating said support is absent, owing to the cooling furnished by the water pan beneath the same. The location of the blast structure in immediate proximity to the ash supporting surface, rather than at a distance above the same, as in prior constructions, insures an ash bed of uniform character, since there is no obstruction to the passage of ashes onto the surface of the support.

I claim,

1. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, and a single device movable relatively to said support for discharging blast into said bed over the entire surface of said ash support and for controlling the discharge of ashes from said support.

2. In a gas producer, a fuel section, an imperforate ash support on which the bed of fuel rests, and means movable relatively to said ash support to provide blast discharge openings operable over the entire surface of said support, and to procure the discharge of ashes from said support.

3. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, a blast discharging means extending across and in substantial contact with said ash support, and means for causing relative movement between said ash support and said blast discharging means to procure the discharge of ashes from said support.

4. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, a blast discharging member in substantial contact with said ash support, and means for causing relative movement between said member and said ash support, to procure the discharge of ashes from said support.

5. In a gas producer, a fuel section, an imperforate ash support on which the bed of fuel rests, and a blast supply pipe passing concentrically through said ash support, having substantially radial extensions cooperating with said support to provide blast discharge openings in substantially radial lines from the center to the outer edges of said support.

6. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means for rotating said ash support, means for discharging blast near the surface of said ash support, and means for imparting rotation to said blast discharging means independently of said ash support to procure the discharge of ashes from said support.

7. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means for rotating said ash support, means for discharging blast near the surface of said ash support, and means for holding said blast discharging means stationary during the rotation of said ash support.

8. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means for rotating said ash support, a blast discharging means extending entirely across said ash support, and means for selectively procuring the rotation of said blast discharging means either in unison with said ash support or at a different speed.

9. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, and a blast device providing discharge openings in substantially diametrical relation to said ash support, said blast device being movable relatively to said ash support to effect distribution of blast to the superposed bed of fuel.

10. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, a blast distributing member normally cooperating with said ash support to effect the continuous discharge of ashes therefrom, and means for accelerating the ash discharging action of said blast distributing member.

11. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, a blast conveying member normally cooper-

ating with said ash support to effect the continuous discharge of ashes therefrom, and means for rendering said blast conveying member inoperative as an ash discharging means.

12. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, a water pan supporting said fuel section and said ash support, an ash receptacle surrounding said water pan to receive the overflow therefrom, and means for forming a water seal between said fuel section and said ash receptacle.

13. In a gas producer, a fuel section, an imperforate ash support on which the bed of fuel rests, and a blast discharging means movable relatively to said ash support and cooperating therewith to provide blast discharge openings effective over the entire area of said ash support.

14. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means for discharging blast at the surface of said support, means for simultaneously rotating said support and said discharging means to produce relative movement between them, and means for arresting the movement of one of said parts.

15. In a gas producer, a fuel section having a water jacket, an ash support on which the bed of fuel rests, means for cooling said support, and means for supporting said fuel section above said ash support, said supporting means serving to convey water from said water jacket to the cooling means of said ash support.

16. In a gas producer, a fuel section comprising a fire brick lining and a water jacket surrounding said lining, the bottom wall of said water jacket providing a shelf for the support of said fire brick lining.

17. In a gas producer, a fuel section having a fire brick lining and a water jacket comprising inner and outer plates surrounding said lining, the bottom of said water jacket providing a shelf for the support of said lining, and sealing said plates together by a substantially horizontal joint.

18. In a gas producer, a fuel section, a rotating ash support on which the bed of fuel rests, means operative over the surface of said ash support for discharging blast into said bed, and means for procuring the discharge of ashes from said rotating ash support by relative rotation of said blast discharging means.

19. In a gas producer, a fuel section, an imperforate ash support on which the bed of fuel rests, and blast discharging means operative over the surface of said ash support and adapted to move relatively to said ash support to procure the discharge of ashes from the outer edge of said support.

20. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means operative over the entire surface of said ash support for discharging blast into said bed, and means for causing relative movement between said ash support and said blast discharging means, whereby to procure the discharge of ashes from said support by said blast discharging means.

21. In a gas producer, a fuel section, an imperforate ash support on which the bed of fuel rests, and a separate and independent means for supplying blast to said bed, said means having substantially radial extensions providing blast discharge openings from the center to the outer edges of said support, and means for causing relative movement between said ash support and said blast supply means.

22. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means for rotating said ash support, means for discharging blast into the bed of fuel, and means for imparting rotation to said blast discharging means independently of said ash support to procure the discharge of ashes from said support.

23. In a gas producer, an ash support, a rotatable blast device adapted to sweep over the surface of said support in effecting the discharge of ashes therefrom, and means for increasing or decreasing the relative movement between said blast device and said support, to control the rate of ash discharge from the latter.

24. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, means for rotating said ash support, a blast discharging means extending entirely across said ash support, and means for selectively procuring the rotation of said blast discharging means either in unison with said ash support or at a different speed.

25. In a gas producer, an ash support, a blast device normally operable to procure continuous slow discharge of ashes from said support, and means selectively operable on said blast device either to discontinue said discharge or to increase the rate thereof.

26. In a gas producer, an ash support, a blast device, means operable normally to produce slight relative movement between said parts, whereby to cause continuous slow discharge of ashes from said support, means selectively operable to produce greater relative movement between said parts, whereby to accelerate the discharge of ashes from said support, and means selectively operable to constrain relative movement, whereby to discontinue the discharge of ashes from said support.

27. In a gas producer, means for supporting a bed of fuel, means for rotating said supporting means, a device operable over the surface of said support for introducing blast to said bed in the plane of said support, and means for rotating said blast device

independently of said supporting means and at a different speed, whereby to distribute the blast evenly to said bed.

28. In a gas producer, a support for a bed of fuel, a blast device providing discharge openings in substantially diametrical relation to said support, and means selectively operable to procure rotation of said parts in unison or to constrain relative movement between them.

29. In a gas producer, a rotating support for a bed of fuel, a device operable over the surface of said support for introducing blast to said bed, and means normally operable to rotate said parts at different speeds, whereby to obtain a continuous discharge of ashes from said support by said blast device.

30. In a gas producer, a support for a bed of fuel, a device for introducing blast to said bed, means normally operable to rotate said parts at different speeds, and means selectively operable to permit rotation of said parts in unison.

31. In a gas producer, a support for a bed of fuel, a device for introducing blast to said bed, means normally operable to rotate said parts at different speeds, and means selectively operable to hold one of said parts from rotation.

32. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, and a water pan disposed below said ash support, the latter having depending fins projecting into the water of said pan.

33. In a gas producer, a fuel section, an ash support on which the bed of fuel rests, said ash support sloping downwardly from its center, a water pan below and concentric with said ash support, means associated with said pan for maintaining the water therein at a plurality of different levels corresponding to the slope of said ash support, and cooling fins depending from said ash support into the water of said pan.

34. In a gas producer, a support for a bed of fuel sloping downwardly from its center, a water receptacle disposed below and concentric to said ash support, a series of concentric partitions in said water receptacle increasing in height toward the center thereof, whereby to maintain a plurality of water levels at approximately the same distance from the ash support, and a plurality of fins depending from said ash support and adapted to be immersed in the water contained between the respective partitions.

Dated this 30th day of June 1915.

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Witnesses:

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