H. A. DREFFEIN.

GAS PRODUCER.

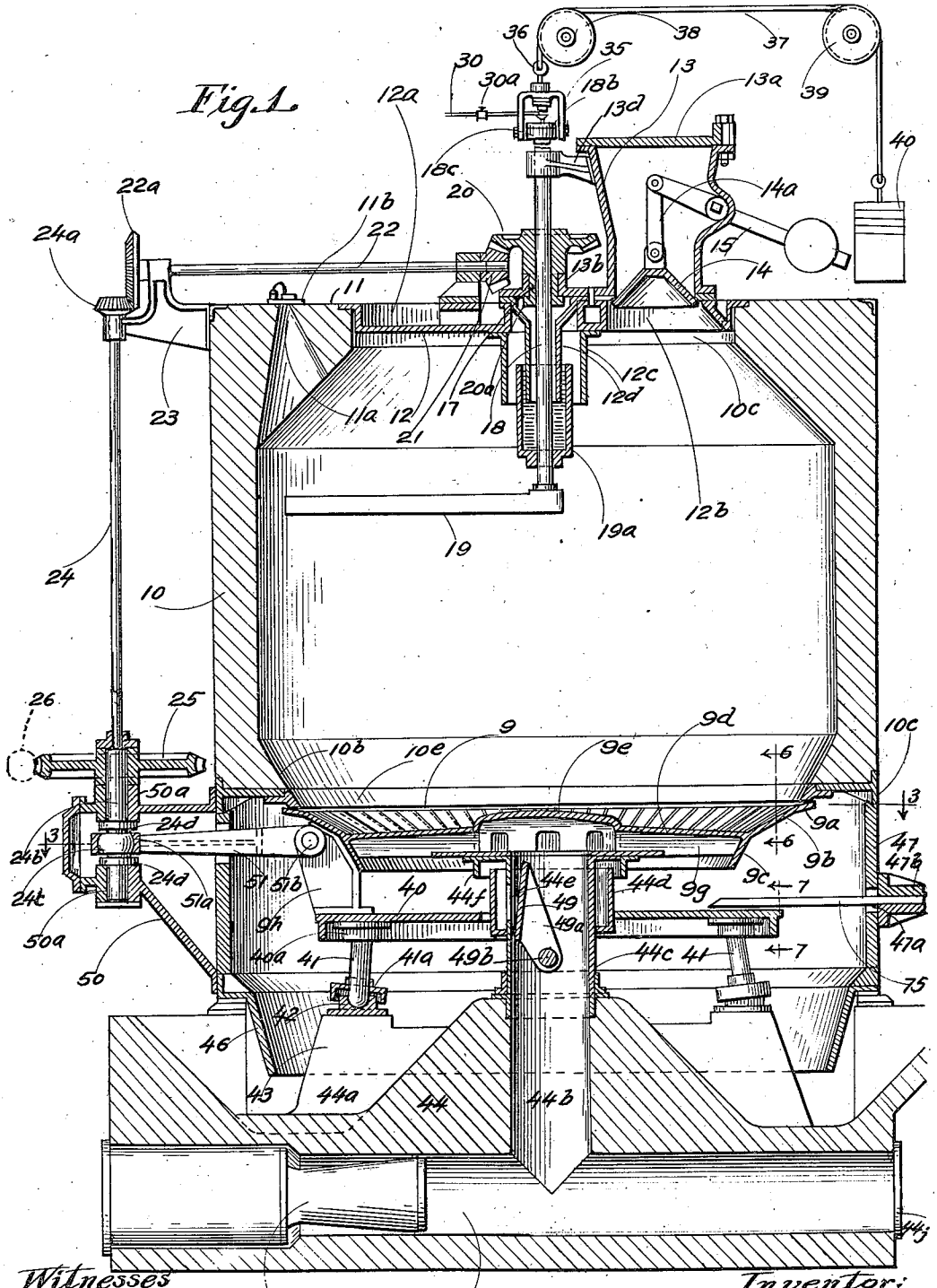
APPLICATION FILED JAN. 12, 1915.

1,243,822.

Patented Oct. 23, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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Henry A. Parker

Inventor:

Henry A. Dreffein

By Sheridan, Wilkinson & Scott, Attys

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4 SHEETS—SHEET 2.

Fig. 8.

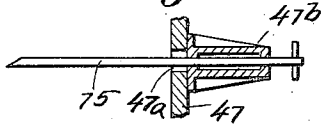


Fig. 2.

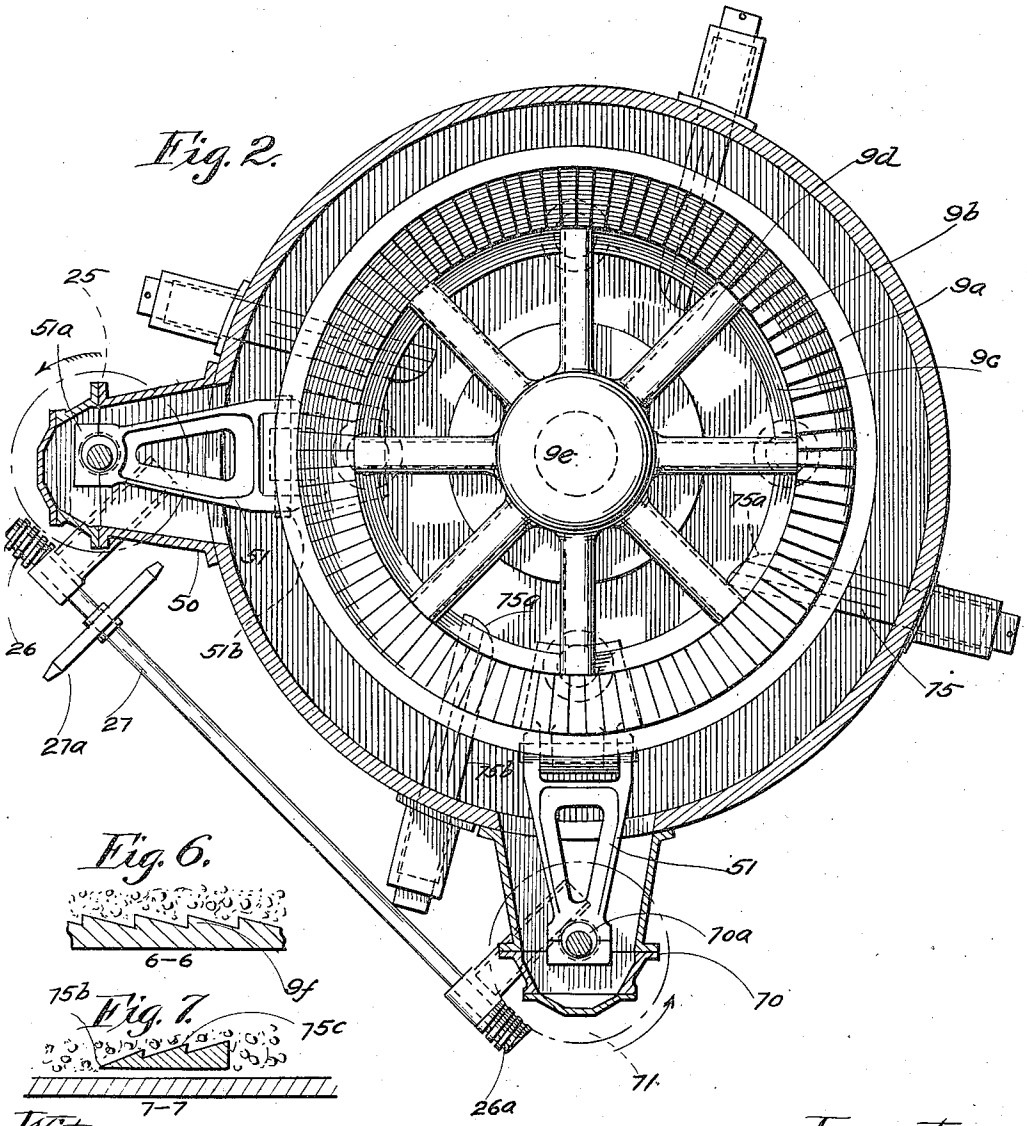


Fig. 6.

Fig. 7.

Witnesses:

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4 SHEETS—SHEET 3.

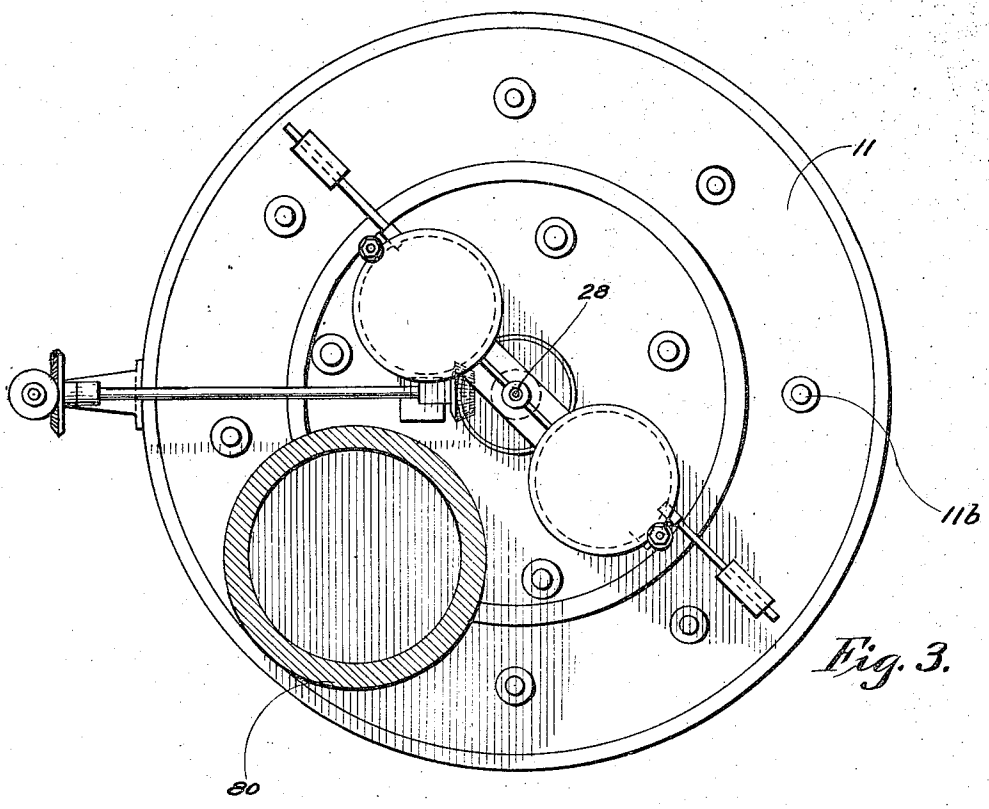


Fig. 3.

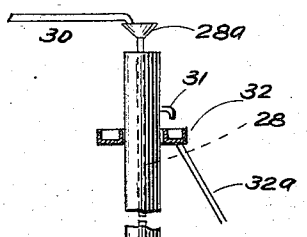


Fig. 4.

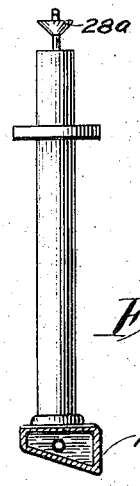
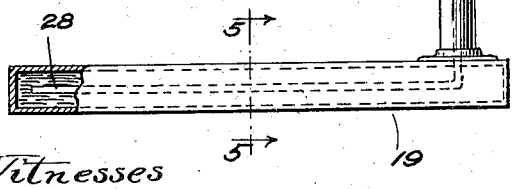


Fig. 5



Witnesses

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GAS PRODUCER.

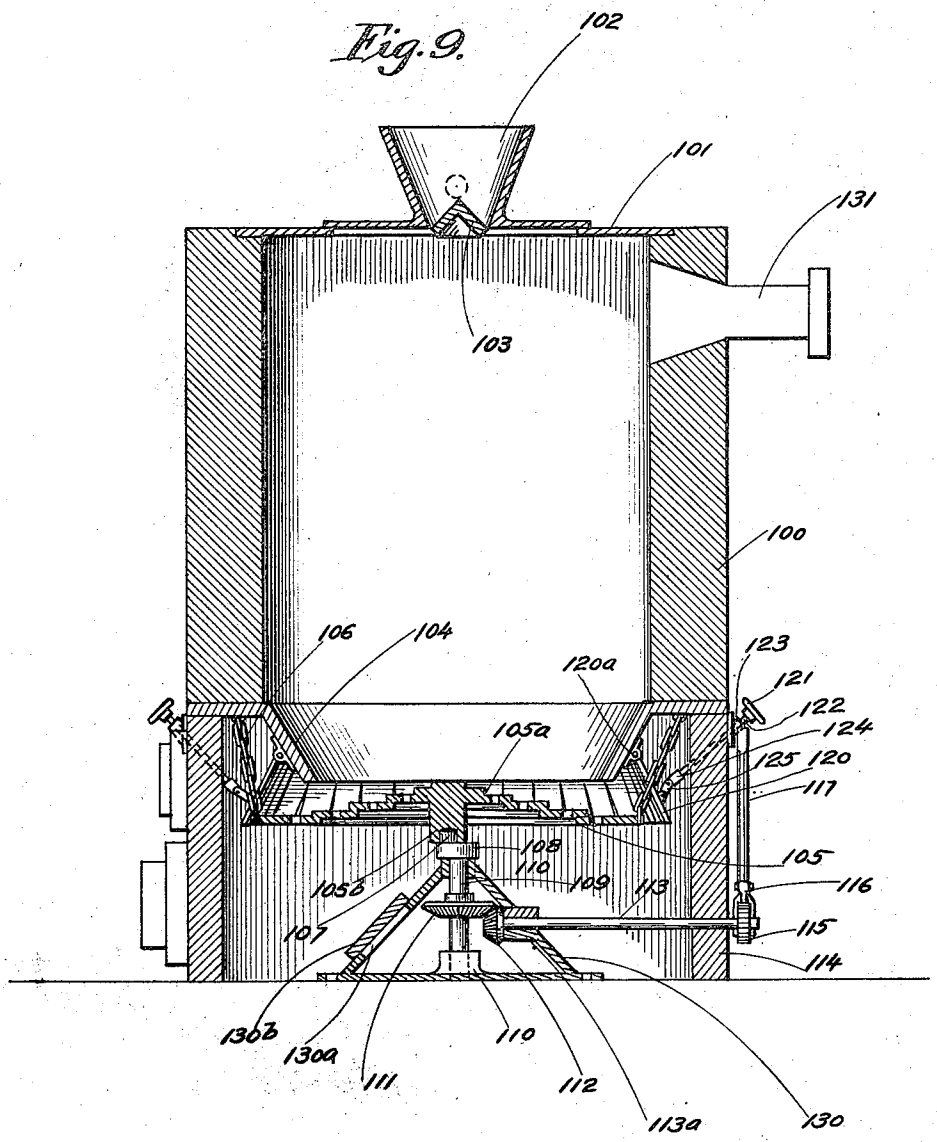
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Patented Oct. 23, 1917.

4 SHEETS—SHEET 4.

Fig. 9.



Witnesses:

C. C. Burnap

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UNITED STATES PATENT OFFICE.

HENRY A. DREFFEIN, OF CHICAGO, ILLINOIS.

GAS-PRODUCER.

1,243,822. Specification of Letters Patent. Patented Oct. 23, 1917.

Application filed January 12, 1915. Serial No. 1,788.

To all whom it may concern:

Be it known that I, HENRY A. DREFFEIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

This invention relates to improvements in gas producers, and has for its object to provide a new and improved form of gas producer in which coal feeding in at the top is evenly distributed, and in which a slight movement is constantly imparted to the fuel body in such wise as to maintain the same in compact condition, formation of holes being prevented whereby an even burning body of fuel is constantly present.

Still another object is to provide an improved table to which is imparted a gyratory motion whereby the fuel body is kept in a settled compact condition, and in addition I provide means to gather and collect the ashes as they form.

Still another object is to provide means for regulating the admission and distribution of the air and steam to the fuel body.

These and other objects are effected by the mechanism and structure set forth and described below and shown in the accompanying drawings, in which

Figure 1 is a vertical section through a producer embodying my invention;

Fig. 2 is a transverse horizontal section through the same taken along the line 2—2 of Fig. 1;

Fig. 3 is a plan view of the producer;

Fig. 4 is an enlarged detail elevation partially in section of the distributing member;

Fig. 5 is a section taken along the line 5—5 of Fig. 4;

Fig. 6 is a detail taken along the line 6—6 of Fig. 1;

Fig. 7 is a similar view taken along the line 7—7 of Fig. 1;

Fig. 8 is a detail, partially in section, of one of the ash scrapers; and

Fig. 9 is a vertical section of a modification of my invention.

Like numerals refer to like elements throughout the drawings, in which 10 designates generally the shell of the producer having the top 11, in which are the sight and poke holes 11^a for which are provided usual hinged caps 11^b, see Fig. 1. The top portion 11 and shell 10 are shown as formed of refractory material, as is customary in this class of devices. A central aperture 11^c is provided in the top portion 11 of the producer and in this is inset the cover 12 having a depressed upper portion in which is carried water, or the like, 12^a for cooling purposes. This cover 12, preferably formed of metal, is provided with the charging openings 12^b with which communicate the hoppers 13 having the pivoted covers 13^a. Mounted in these hoppers 13 are the valves 14 connected by links 14^a with counterweighted levers 15 which normally serve to keep the valves 14 in position closing the openings 12^b.

Formed integrally with the hoppers 13 and mounted on the cover 12 is the sleeve 13^b in which is mounted a bearing 17 through which in turn projects the rotatable shaft 18 carrying at its lower extremity a distributing member 19. The latter is hollow and is adapted to rest on the top of the fuel body, being rotated thereover by the mechanism hereinafter described. This distributing member 19 is rhomboidal in cross section, as shown in Fig. 5, and is preferably arranged to rotate with the narrower edge leading. A sleeve 12^c projects downwardly from the cover 12 and is spaced from and located around the shaft 18. Concentrically mounted within the sleeve 12^c and extending downward from the top of the cover 12 through a central opening therein is provided the sleeve 12^d through which extends the shaft 18, as shown in Fig. 1. An inverted cup or sleeve 19^a is attached to the shaft 18 and projects upwardly into the space between sleeves 12^c and 12^d, the former projecting downwardly into the cup or sleeve 19^a for some distance. The latter is filled with oil or similar fluid of high evaporation point forming a fluid seal, as will be apparent, and thereby preventing escape of gas or flame through the central opening in the cover 12. Attached to the shaft 18 above the cover 12 is the bevel gear 20 meshing with a right angularly disposed bevel pinion 21 which is attached to a horizontal shaft 22. The latter carries a second bevel gear 22^a at its outer extremity being bracketed adjacent thereto in the bracket bearing 23. This latter is provided with a second bearing in which is journaled the upright shaft 24, having fixed thereon the bevel pinion 24^a which meshes with the bevel gear 22^a. The shaft

24 is attached adjacent its lower extremity to a worm gear 25 which is driven by a worm 26 carried on a counter shaft 27. This counter shaft 27 is provided with a sprocket 27^a which may be rotated by a chain, thereby operating to rotate shaft 18 through the line of gearing and shaft described above. A slow rotation will be imparted to the distributing member 19 so that coal will be evenly distributed over the top of the body of fuel and the same will be maintained approximately level.

To provide for the cooling of the distributing member 19 I make the same hollow, the shaft 18 also being hollow and communicating with the interior of distributer 19. A tube 28 extends downwardly through shaft 18 to the outer portion of distributer 19, as shown in Fig. 4, and this tube 28 is provided with a funnel or a mouth portion 28^a at its upper extremity into which water or other cooling fluid is delivered by means of a pipe 30 having a regulating or stopcock 30^a therein. Water may thus be delivered at any desired rate to the distributing member 19, and to provide circulation therethrough I provide an outlet tube 31 adjacent the top of shaft 18 located above a circular trough 32 from which leads a pipe 32^a so that excess of water circulating through the shaft and distributing member will flow from tube 31 into trough 32, and therefrom through pipe 32^a, from whence it may be carried where desired or may flow into the cover recess 12^a to replace the fluid evaporated therefrom.

A bracket 13^d provided with a bearing extends outwardly from the hopper 13 and provides a bearing for the shaft 18 intermediate its extremities, as shown in Fig. 1. This shaft 18 is provided with a collar 18^b at its upper extremity beneath which is mounted a second collar 18^c not attached to the shaft 18. A yoke 35 is attached to the last named collar 18^c by bolts or the like. This yoke carries an eye-bolt 36 to which is attached a cable 37. This cable runs over and on pulleys 38 and 39 and is attached at its other extremity to a weight 40. The latter is intended to substantially counter-balance the weight of the shaft and distributing member in such wise that the latter will rest on the surface of the fuel body and operate to spread the fuel but will be allowed to move up or down a limited amount to provide for slight variations in the height of the fuel body. The fluid seal provided by cup or sleeve 19^a will provide for this movement, and I further connect the bevel gear 20 by means of a spline or the like, not shown, to the shaft 18 so that it will remain constantly in motion with the bevel pinion 21. This first named bevel gear 20 is provided with the hub sleeve from which depends the flanged sleeve 20^a having a flange at its lower extremity coacting with the portion 13^b of hopper 13 to prevent vertical displacement of the bevel gear 20.

At its lower portion the shell 10 of the producer has its inner wall curving inwardly, as indicated by numeral 10^b, and it rests upon a metal supporting plate or ring 10^c. Extending downwardly from the latter to form a continuation of the surface 10^b is the ring 10^e, see Fig. 1. Located below the ring 10^e and extending slightly outwardly of the same is the bosh 9 having a portion inclining downwardly from the ring 10^e. This bosh 9 comprises the comparatively horizontal portion 9^a extending outwardly of the apron or ring 10^e, the main portion 9^b which is inclined more toward the horizontal than the ring 10^e, and the downwardly inclined portion 9^c. Projecting inwardly from portion 9^c are the radial tube arms 9^d connected to a central cap 9^e. The main portion 9^b of the bosh 9 is provided with the corrugations or teeth 9^f, see Fig. 6. Each of the arms 9^d constitutes a tube having a downwardly facing opening 9^g at its outer portion. Attached to and extending downwardly from the bosh 9 are the arms 9^h to which is attached a table 40. This table 40 is provided with cups or sockets 40^a on its under surface in which are socketed the upper extremities of pins 41, see Fig. 1. These pins 41 are rounded at their extremities and have their lower extremities pivotally mounted in sockets 42 mounted upon portions 43 of the base 44. Inverted caps 41^a are attached to the pins 41 slightly above sockets 42. These pins are so arranged in the embodiment shown that when the table 40 is in neutral or centrally located position the former are inclined inwardly, as shown in Fig. 1, for a purpose to be hereinafter described.

The base 44 is provided and is preferably constructed of concrete, or the like, being dished out annularly as indicated at 44^a. An apron 46 extends downwardly into the ash collecting recess 44^a from the cylindrical shell 47, which extends therebetween and the main shell 10. Projecting upwardly through the center of the base 44 is the passage 44^b through which steam and air may flow, and mounted upon the top of base 44 in communication with passage 44^b is the conduit 44^c having the spaced sleeve 44^d concentrically located therearound, and the depending flange 44^f located outwardly of the upper extremity of the sleeve 44^d. An outlet 44^e is provided in the upper portion of conduit 44^c, the latter being extended upwardly to communicate with the underside of cap 9^e whereby the steam and air may flow outwardly through the radial tubes 9^d through openings 9^g and upwardly through the fuel body. A valve or gate 49 is mounted upon the arm 49^a which is attached to

the rotatable operating rod 49[b] and is located in the passage 44[b] adjacent to the top thereof and is so constructed and arranged that rotation of the same in the position shown in Fig. 1 will result in substantial closing of the outlet 44[e], whereupon the major portion of the steam and air will flow outwardly through the arms 9[d]. When the valve 49 is moved toward its other position a large portion of the steam and air will flow through the opening 44[e] into the space inside of sleeve 44[d] and thence upwardly through the fuel body. In either event the steam and air will be considerably disseminated prior to its reaching the body of the fuel.

Casings 50 project outwardly from the shell 47 adjacent each extremity of the shaft 27 and are provided with bearings 50[a] therein. In one of the bearings 50[a] is journaled the portion 24[b] of shaft 24 which carries at its upper extremity the bevel pinion 24[a] meshing with the bevel gear 22[a], as above described. The shaft portion 24[b] is provided with an eccentric 24[c] located between the collars 24[d]; and the eccentric 24[c], which is slightly curved or rounded, is rotatably mounted in the socket 51[a] of an arm 51, the latter being pivotally attached at 51[b] to one of the arms 9[h] connecting the bosh and table. A pair of these arms 51 are provided, as shown in Fig. 2, one of them being connected to the eccentric 24[c] and shaft 24, as above described, while the other is operatively connected to a shaft 70 which is journaled in the bearing 50[a] of the other casing 50. The shaft 70 carries an eccentric 70[a], similar to the eccentric 24[c], and has secured thereon a worm gear 71 which is operated by the worm 26[a] carried on the shaft 27, as shown in Fig. 2.

It will be obvious that rotation of the shaft 27 in the proper direction will result in rotation of the worm gears 25 and 71 in the direction indicated by the arrows, whereupon a parallel motion will be imparted to the arms 51, owing to the arrangement of the eccentrics, and this motion will result in a species of gyratory motion of the table 40 and bosh 9. By gyration or gyratory motion I refer to the species of movement imparted to the bosh and table, or table alone in the modification shown, *i. e.*, a species of eccentric revolution about a fixed point. In other words each point of the table and bosh travels an orbit, circular in the form shown and described. The mounting of these members upon the pivot pins 41 permits this movement, which is such that every point on the table and bosh travels in a circle. This movement results in the imparting of a gradual rotation or twisting to the fuel body, this movement being accentuated by the teeth 9[f] of the bosh 9 which have one upright face and one inclined face and are so related with respect to direction of rotation of the gears 25 and 71 that they are constantly advancing the lower portion of the fuel body in a rotatory movement due, as stated above, to the gyration of the bosh 9 and grate 40. This movement of the fuel body results in the settling of the same so that it is constantly maintained in compact form and pockets or holes which ordinarily form in gas producer use are eliminated and filled up, thereby freeing the operator from constant poking of the fire. Furthermore, the operation of the distributing member 19 is such as to evenly spread fuel over the top of the fuel body and to maintain the top of the fuel in a level condition, as stated above.

Another movement results from the gyration of the bosh and table, due to the arrangement of the pivot pins, it being apparent that, for example, as shown in Fig. 1, as the table moves to the right hand of the figure, left hand pin 41 inclines toward the horizontal, resulting in the lowering of that side of the table and bosh while the other pin 41 at the right hand of Fig. 1 assumes a more upright position, resulting in the raising of the table and bosh at that side of the figure. An undulatory movement of the table and bosh is therefore obtained in combination with the gyratory movement previously described, and a very thorough agitation of the fuel body results. The undulatory movement is so related to the gyratory movement of the bosh and the arrangement of the teeth 9[f] that fuel sliding down the inner wall of the shell 10 and the inclined portion 10[b] thereof will, upon the reverse movement of the bosh and table, move upwardly again along the inclined portion 10[b] instead of crowding toward the center of producer chamber. The teeth 9[f] permit this backward and forward movement while at the same time operating to exert a twist on the fuel body which tends to rotate the same. This effect is accentuated by the lessening of the inclination of the main portion 9[b] of bosh 9 and results in a more thorough and efficient fuel consumption, since unconsumed coal is not easily shaken down with the ashes as is the case in many producers now in use.

To provide for the removal of the ashes deposited on the table 40 I provide scraper bars 75 inserted through apertures 47[a] in shell 47. Slotted brackets 47[b] are mounted on the shell 47 adjacent the apertures 47[a] and scraper bars 75 also extend through these brackets 47[b], added support being formed thereby. These bars are preferably located, as shown in Fig. 2, being slightly offset with respect to radial lines. These bars are further provided with the curved forward portions 75[a], extended to an edge, and are also provided with the edge portion 75[b] from which extend toward the other side

of the bars 75 the teeth 75°, see Fig. 7. The purpose of this arrangement is to provide for the traveling of the edges 75ª and 75ᵇ into the body of the ashes when the latter is moved in one direction relative to the bars, while movement in the other direction will bring the body of ashes against the rear edge of the bars 75, which latter will force the ashes toward the outer edge of the table 40 from whence they will drop down into the pit 44ª for removal by the operator. The pit 44ª is constructed in the usual manner for containing water to form a seal for the apron 46.

Air and steam is admitted through a nozzle 44ʰ communicating with a cross passage 44ⁱ from which leads the passage 44ᵇ. Passage 44ⁱ is continued outwardly to one side of the producer where it is normally covered by the plate 44ʲ which may be removed to provide for cleaning of the passage 44ⁱ of any ash or dirt which may become deposited therein.

It will be apparent that I have provided a new and improved form of producer in which a body of fuel is maintained in compact condition. The agitation due to the gyratory and the undulatory movements is widely distributed and takes place substantially throughout the fuel body, appearing for a considerable distance above the bosh as an undulatory wave. Also, it will be apparent that I have provided simple and efficient means for distributing the steam and air supply either through the outer portions of the fuel body or over the central portions, or throughout the body, as desired. To provide for the offtake of the gas, I have shown the ordinary form of discharge conduit indicated by numeral 80 in Fig. 3.

In Fig. 9 I have shown a modification which comprises a simple hand-operated form of producer for use in small installations, or where small hard coal producers are found desirable. In the form shown in the figure, 100 indicates the producer shell having the cover plate 101 at its top, at the central portion of which is the charging hopper 102 having movable gate valve 103 controlling the admission of fuel therethrough. At the bottom of the shell 100 is provided the inwardly inclined bosh 104 and below the bosh is provided a perforated table or plate 105 supported upon a plurality of chains 106. This table or plate 105 is formed with a series of annular steps succeeding each other downwardly and outwardly from the center so as to form a plurality of annular shoulders 105ª. Adjacent its central portion the plate is provided with the socketed boss 105ᵇ in which is socketed a stub shaft 107 mounted upon the eccentric 108 which is in turn carried by the main shaft 109. The latter is journaled in step bearing 110 and carries a bevel gear 111 with which meshes a bevel pinion 112 mounted on the cross shaft 113, this latter being journaled in a bearing 113ª and also in the side of the ash casing 114. The shaft 113 projects outwardly of the latter and carries a ratchet 115 with which coacts a pawl 116 carried by the pivotally mounted handle 117, whereby oscillation of the handle by the operator results in rotation being imparted to shaft 109, whereupon the table 105 will partake of a gyratory motion similar to that of the grate in the form shown in Fig. 1. This gyration results in the constant movement and settling of the fuel body and the ashes are either discharged over the periphery of the table 105 or through the apertures thereof, the latter also serving to admit air and steam to the body of the fuel. Around the periphery of the table plate 105 are a series of plates 120 which are hinged, as shown at 120ª, on the bosh 104. Each plate 120 is operated by a hand wheel 121 secured to a rod 122 which has screw threaded engagement with a bracket 123 carried by the casing 114. Each rod 122 extends through the casing 114 and has its inner end swiveled in a socket member 124 which is secured to the adjacent plate 120 by means of a pivoted link 125. If one portion of the fuel body shakes down more rapidly than other portions, the plates 120 adjacent said first mentioned portion may be lowered to arrest the progress of the material coming off the table adjacent thereto, until other portions of the fuel body have been more thoroughly shaken down. A conical casing 130 is provided about the gears 111—112 and the incidental mechanism. Clean-out aperture 130ª is provided in this conical casing and a closure 130ᵇ is provided therefor. A take-off conduit 131 is provided adjacent the top of the producer.

It will be obvious that, as stated above, oscillation of the handle 117 will result in the gyration of the table and the operator may perform such oscillation whenever it becomes desirable in the operation of the producer.

It is apparent that my invention is susceptible of many modifications and improvements, and capable of adaptations other than the particular one illustrated, and I do not wish to restrict myself to the form shown and described beyond the scope of the appended claims.

What I claim is:

1. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end of said shell, and means to impart a gyratory motion to said bosh.

2. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end of said shell, means to impart a gyratory motion to said bosh, and means to impart an undulatory motion to said bosh.

3. A gas producer comprising a fuel containing shell, a table adjacent the lower end of said shell, and means to impart a gyratory motion to said table.

4. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh and attached thereto, and means to impart a gyratory motion to said table and bosh.

5. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh, said bosh and table being secured the one to the other, and means to impart an undulatory motion to said table and bosh.

6. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh, said bosh and table being secured the one to the other, means to impart an undulatory motion to said table and bosh, and means to impart a gyratory motion to said table and bosh.

7. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh, said bosh and table being secured the one to the other, said bosh and table being mounted upon pivot members.

8. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh, said bosh and table being secured the one to the other, said bosh and table being mounted upon pivot pins.

9. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh and attached thereto, said table member being supported upon pivot pins, said pins being mounted in sockets.

10. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh and attached thereto, said table member being supported upon pivot pins, sockets for said pivot pins carried by said table, said pivot pins being seated therein at one extremity, and sockets for said pivot pins at their other extremities.

11. A gas producer comprising a fuel containing shell, a bosh adjacent the lower end thereof, a table member below said bosh and attached thereto, said table member being supported upon pivot pins, sockets for said pivot pins carried by said table, said pivot pins being seated therein at one extremity, sockets for said pivot pins at their other extremities, and caps carried by said pivot pins over said last named sockets.

12. A gas producer comprising a shell, the inner wall of said shell being inclined inwardly at the lower portion thereof, a bosh located beneath said inclined wall portion, said bosh being inclined therebelow and forming an obtuse angle with said portion of said shell wall, and means to gyrate said bosh.

13. A gas producer comprising a shell, the inner wall of said shell being inclined inwardly at the lower portion thereof, a bosh located beneath said inclined wall portion, said bosh being inclined therebelow and forming an obtuse angle with said portion of said shell wall, and means to gyrate said bosh, said bosh being further provided with corrugations or teeth having one upright face and one inclined face, substantially as described.

14. A gas producer comprising a fuel containing shell, a bosh located therebeneath, and a table located beneath and attached to said bosh, arms secured to said bosh and table, rotatable shafts, eccentrics carried by said shafts and operatively attached to said arms whereby rotation of said shafts will impart a gyratory motion to said bosh and table.

15. A gas producer comprising a fuel containing shell, a bosh located therebeneath, a table located beneath and attached to said bosh, arms secured to said bosh and table, rotatable shafts, eccentrics carried by said shafts and operatively attached to said arms whereby rotation of said shafts will impart a gyratory motion to said bosh and table, and means to support said table and bosh.

16. A gas producer comprising a fuel containing shell, a bosh located therebeneath, a table located beneath and attached to said bosh, arms secured to said bosh and table, rotatable shafts, eccentrics carried by said shafts and operatively attached to said arms whereby rotation of said shafts will impart a gyratory motion to said bosh and table, and means to support said table and bosh, said means being arranged to impart an undulatory motion thereto upon gyration thereof.

17. A gas producer comprising a fuel containing shell, a bosh located therebeneath, a table located beneath and attached to said bosh, arms secured to said bosh and table, rotatable shafts, eccentrics carried by said shafts and operatively attached to said arms whereby rotation of said shafts will impart a gyratory motion to said bosh and table, and means to support said table and bosh, said means being arranged to impart an undulatory motion thereto upon gyration thereof, said means comprising pivot pins.

18. A gas producer comprising a fuel containing shell, a bosh located therebeneath, a table located beneath and attached to said bosh, arms secured to said bosh and table, rotatable shafts, eccentrics carried by said shafts and operatively attached to said arms whereby rotation of said shafts will impart a gyratory motion to said bosh and table, and means to rotate said shafts in unison.

19. A gas producer comprising a fuel containing shell, a bosh located therebeneath, a table located beneath and attached to said bosh, arms secured to said bosh and table, rotatable shafts, eccentrics carried by said shafts and operatively attached to said arms whereby rotation of said shafts will impart a gyratory motion to said bosh and table, and means to rotate said shafts in unison, said means comprising a cross shaft and gearing.

20. In mechanism of the class described, a table, a bosh attached thereto, means to gyrate said bosh and table, and fluid distributing ducts carried by said bosh.

21. In mechanism of the class described, a table, a bosh attached thereto, means to gyrate said bosh and table, fluid distributing ducts carried by said bosh, and means to supply fluid thereto.

22. In combination, a fuel containing shell, a gyratory table coacting therewith, and means coacting with said table to automatically remove ash or the like therefrom.

23. In combination, a fuel containing shell, a gyratory table coacting therewith, and means coacting with said table to automatically remove ash or the like therefrom, said means operating by and during the movement of said table.

24. In mechanism of the class described, a fuel containing shell, a table located therebeneath, means to gyrate said table relative to said shell, and means to raise a portion of the edge of said table adjacent a corresponding portion of the circumference of said shell as the center of said table moves toward said circumferential portion.

25. In mechanism of the class described, a fuel containing shell, a table located therebeneath, means to gyrate said table relative to said shell, means to raise a portion of the edge of said table adjacent a corresponding portion of the circumference of said shell as the center of said table moves toward said circumferential portion, and means to lower the opposite portion of said table edge.

26. In mechanism of the class described, a fuel containing shell, a table located therebeneath, means to gyrate said table relative to said shell, and means to support said table, said supporting means being constructed and arranged to raise the portion of the table edge adjacent that portion of the circumference of the fuel containing shell toward which the center of said table is moving.

In testimony whereof, I have subscribed my name.

HENRY A. DREFFEIN.

Witnesses:
GLEN E. SMITH,
HENRY A. PARKS.