S. B. SHELDON.

GAS PRODUCER.

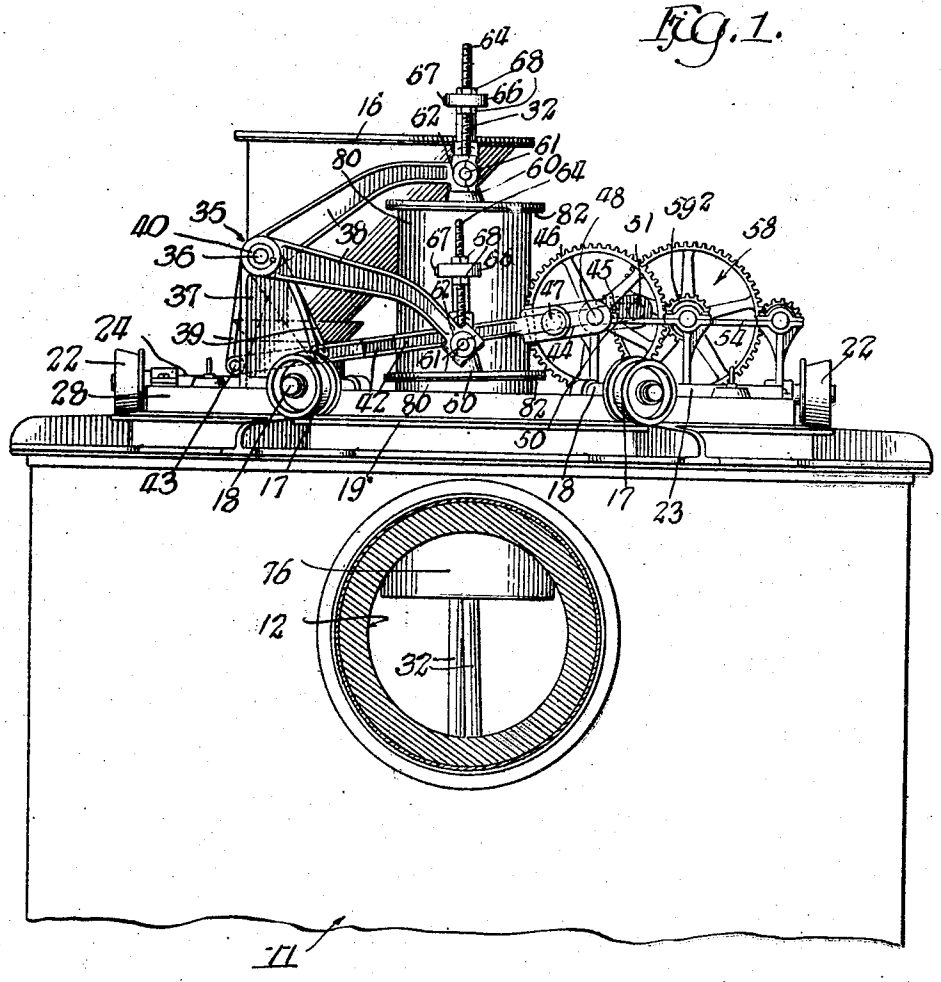
APPLICATION FILED MAR. 6, 1909.

956,199.

Patented Apr. 26, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



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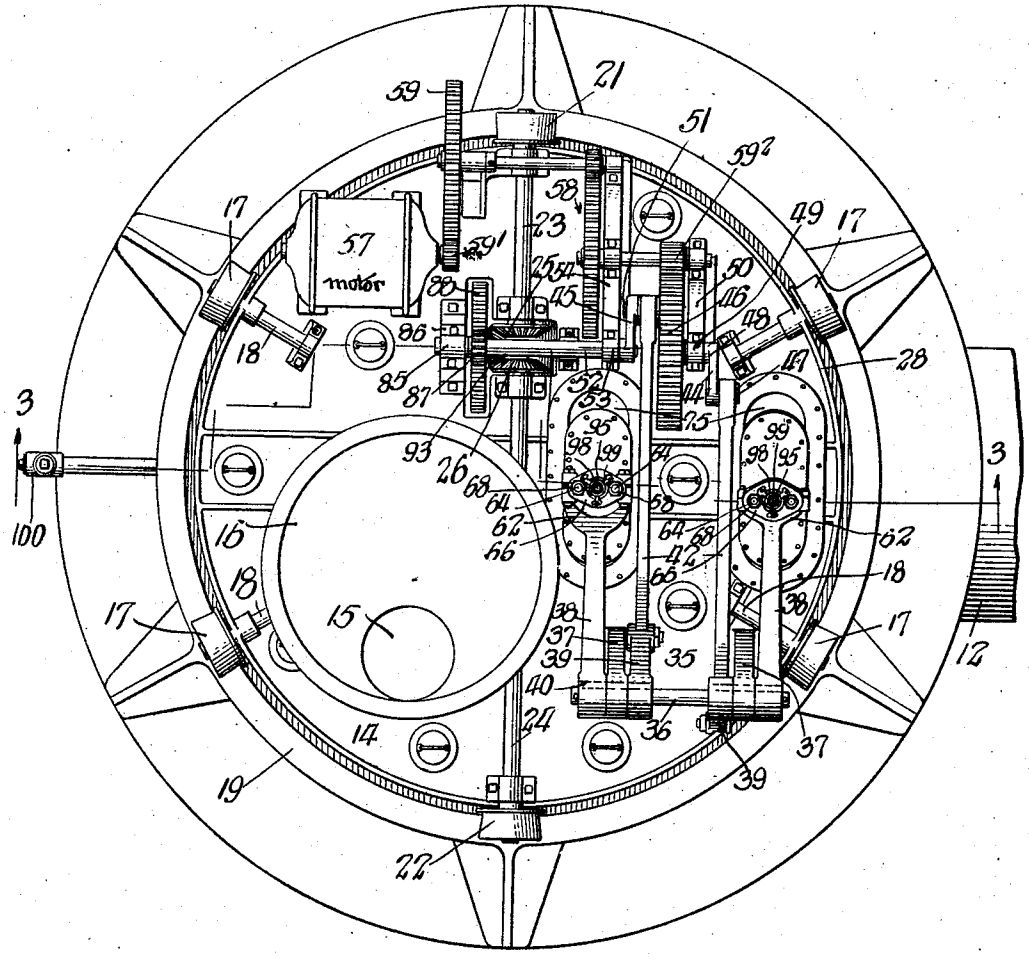
4 SHEETS—SHEET 2.

Fig. 2.



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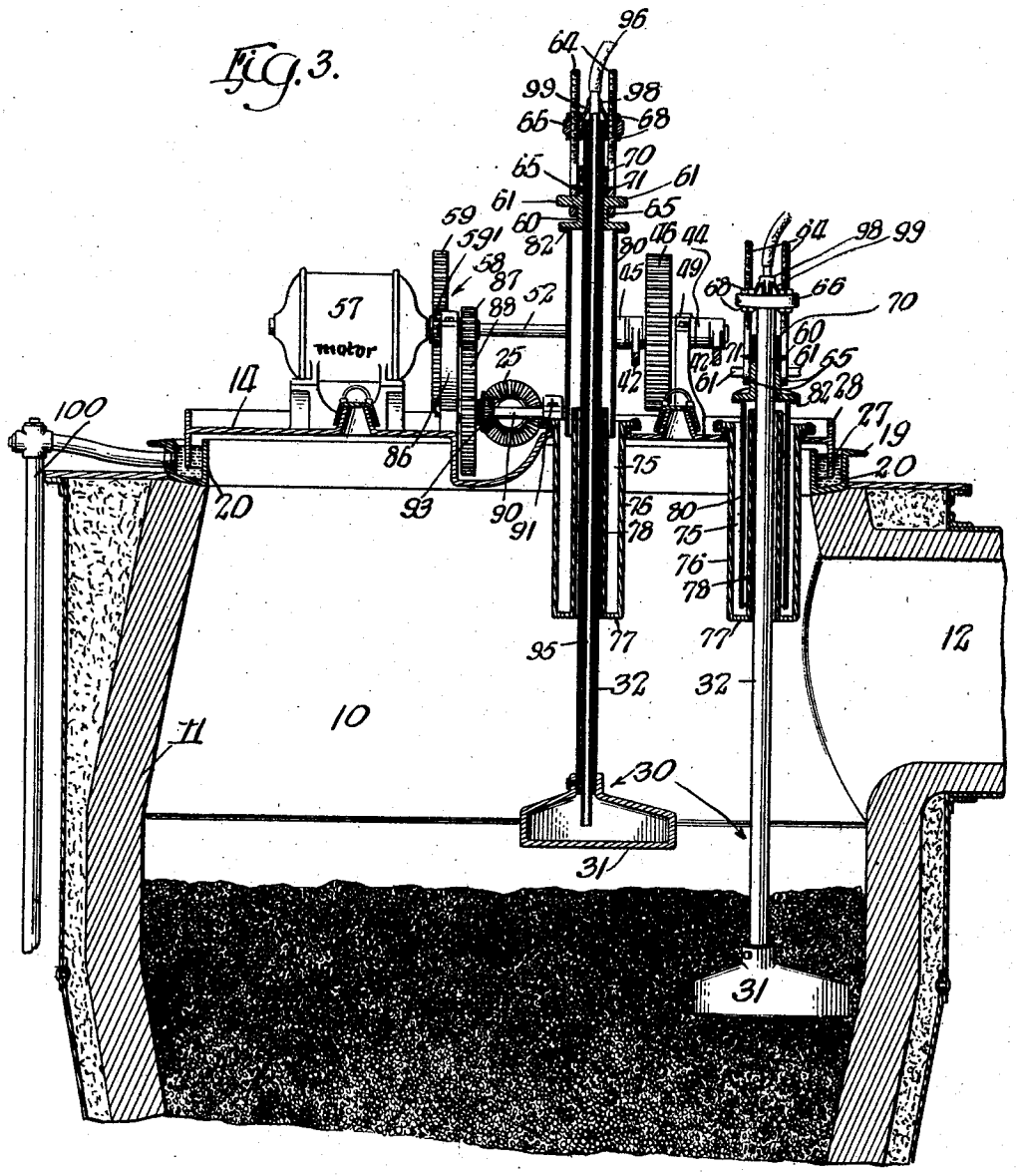
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

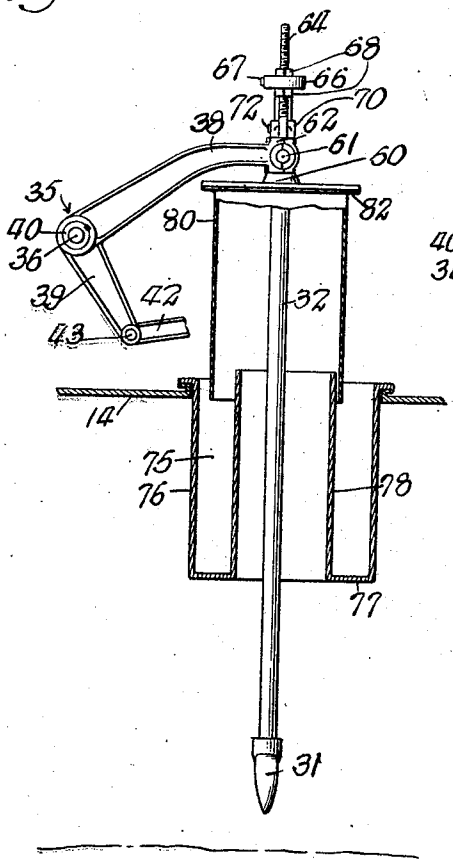


Fig. 5.

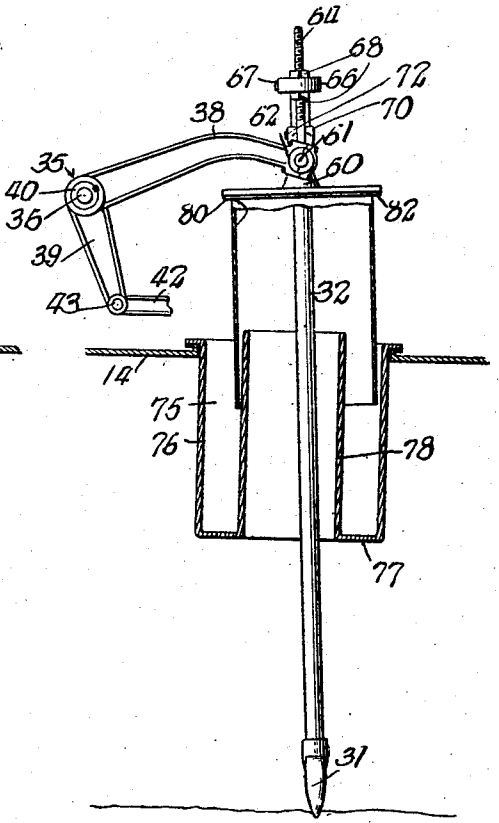
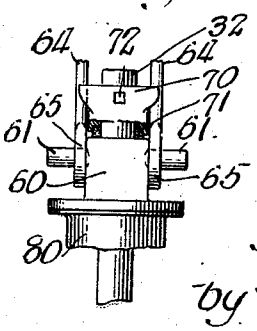


Fig. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL BERTRAM SHELDON, OF SOUTH BETHLEHEM, PENNSYLVANIA.

GAS-PRODUCER.

956,199. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed March 6, 1909. Serial No. 481,647.

To all whom it may concern:

Be it known that I, SAMUEL B. SHELDON, a citizen of the United States, and a resident of South Bethlehem, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Producers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in gas producers, and the invention relates more specifically to improvements in poker actuating mechanism by which the pokers are operated to stir or agitate the fuel during combustion, and also to a novel means of supporting and driving the rotative top wall plate of a gas producer upon which the poker actuating mechanism is mounted.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a side elevation of a gas producer equipped with my improvements, the fuel feeding devices being omitted. Fig. 2 is a top plan view thereof. Fig. 3 is a vertical section on the line 3—3 of Fig. 2. Fig. 4 is a side elevation of one of the pokers and its actuating mechanism detached from the other parts, portions being shown in section. Fig. 5 is a similar view with the parts in changed positions. Fig. 6 is a detail illustrating a part of the means for suspending the pokers from their actuating devices.

The combustion chamber 10 is surrounded by the usual refractory wall 11, and said combustion chamber is provided with a discharge conduit 12, through which the gases produced in the furnace are discharged therefrom.

14 designates the metal top wall plate of the combustion chamber. Said top wall plate is provided with a feed opening 15, and a feed hopper or casing 16 surrounds the same through which fuel is fed to the combustion chamber by any suitable feed mechanism, not herein shown. The top wall plate 14 is supported at its outer margin in a manner permitting it to freely rotate. As herein shown, the rotative top wall plate is provided with a plurality of supporting wheels 17, 17 which are mounted on short horizontal shafts 18, 18 extending radially from and carried by the rotative top plate. Said supporting wheels travel on an annular track 19 formed on a ring member 20 that is supported at the top of the vertical wall of the combustion chamber. In accordance with the present invention, one or more of the wheels which thus support the rotating top plate constitute traction wheels through which power is transmitted to drive or rotate the top wall plate, there being two of such traction wheels 21, 22, as herein shown. Said latter wheels are fixed to the outer ends of rotative driving shafts 23, 24 which extend inwardly over the top wall plate and are supported in suitable bearings thereover. The inner ends of said shafts are arranged closely adjacent to each other at one side of the center of the top wall plate, and said shafts are provided at their adjacent ends with oppositely facing beveled gear wheels 25 and 26.

The annular member 20 on which is formed the track 19 that supports the top wall plate is formed to provide, radially inside of the track, an annular trough arranged to be filled with water, and the top wall plate is provided at its margin with a depending annular flange 27 arranged to dip into the water of the trough and thereby constitute a liquid seal between the rotative top plate and the vertical wall of the chamber to prevent the escape of gas from the combustion chamber. The said top wall plate is also provided on its upper side with a vertical, annular, marginal flange or rim 28 to form on the upper side of the plate a shallow receptacle to receive water whereby to keep the entire plate suitably cool.

30, 30 designate fuel agitating pokers, two of which are herein shown. Said pokers comprise flat or elongated heads 31, 31 and stems 32, 32, which latter extend upwardly through openings in the top wall plate and are connected at their upper ends with actuating mechanism located above and supported on said rotative top wall plate. The actuating mechanism is arranged to give the pokers reciprocatory movement to force the same into the fuel bed and withdraw them therefrom, and said pokers are so supported on the actuating devices as to permit the lower ends of the pokers to swing freely rearwardly with respect to their points of

support, relatively to the direction of rotation of the top wall plate which carries the pokers.

The poker actuating and supporting devices will now be described in connection with one of the pokers illustrated, it being understood that said actuating and supporting devices are duplicated in the construction shown.

35 designates a rocking poker supporting and actuating lever which is mounted to rock vertically about a shaft 36 which is supported in the upper end of a standard 37 rising from the top wall plate 14. As herein shown, said rocking lever has the form of a bell-crank lever, it comprising two laterally separated arms 38, 39, one at each side of the bearing standard 37, and a bearing sleeve 40 connecting said arms and having rocking bearing on the shaft 36. The sleeve extends through the standard and through openings in the ends of said lever arms and are keyed or otherwise non-rotatively fixed to said arms. In the present construction the single shaft 36 constitutes the bearing for both poker supporting and actuating levers. Thus when the lower arm of the lever is swung backwardly and forwardly the upper arm rises and falls to give rising and falling or endwise reciprocating movement to its associated poker. The arm 38 extends forwardly from its pivot and is loosely connected or hinged at its forward end with the upper end of its associated poker stem 32, while the other or lower arm extends downwardly from the pivot shaft and is connected at its lower end with an operating link or pitman 42, as by means of a pivot pin 43.

The two pitmen 42 extend forwardly from their points of connection with the lower arms 39 of said rocking levers and are loosely connected at their forward ends with operating cranks 44, 45 carried, as herein shown, by a gear wheel 46. The crank 44 is a typical crank, it being provided with a crank pin 47 with which the associated link 42 is loosely connected. The other parallel member or shaft 48 of the crank 44 is attached to the gear wheel 46 concentric therewith and is journaled in a bearing 49 formed on a standard 50 rising from the top wall plate 14. The crank 45 for operating the other poker comprises a crank pin 51 which is fixed to the gear wheel at one side of its center, to which the associated pitman 42 is loosely connected, and a shaft 52 concentric to the gear wheel 46 and connected with the crank pin 51 by the arm of the crank. Said shaft 52 is mounted in a bearing 53 formed on the upper end of a standard 54 rising from the top wall plate 14. The crank pins are set at 180 degrees apart and the actuating mechanism is so arranged that one poker is thrust into the fuel bed while the other is withdrawn therefrom. The actuating gear wheel 46, thus operatively connected with the poker actuating levers 35, is driven from a suitable motor 57, an electric motor as herein shown, through the medium of a train of reducing gears, designated as a whole by 58, embracing a gear wheel 59 at one side thereof which meshes with a pinion 59^1 on the motor shaft, and a pinion 59^2 at its other side which meshes with the gear wheel 46. The shafts of said gear train are mounted in bearing standards which rise from the top wall plate of the combustion chamber.

The means for supporting and pivotally connecting the poker stems with the arms 38 of the actuating levers are made as follows: Surrounding the upper end of each poker stem, above the rotating top wall plate 14, is a collar 60 which is provided with oppositely extending lugs 61, 61. The forward ends of the upper arms 38 of the supporting and actuating levers are forked and the members 62 of the forked ends of said arms extend on opposite sides of said sleeve and are provided with bearing journals to receive said lugs 61. The said collar 60 fits loosely over the poker stem in order that the stem may be adjusted toward and from the fire bed relatively to its point of connection with the actuating arm. The collar is adjustably connected to the poker stem by means made as follows:—64, 64 designate screw-threaded rods arranged vertically, one at each side of the poker stem, and parallel therewith. The rods are provided at their lower ends with eyes 65 which fit over the lugs 61 laterally inside of the members of the forked arms of the actuating levers. The screw-threaded rods extend upwardly through openings in the ends of a cross-plate 66 which is fixedly attached to the upper end of the stem in any suitable manner. As herein shown, the said plate is provided with a central opening through which the stem extends and the stem is exteriorly screw-threaded for screw-threaded attachment to said plate. The said plate 66 is vertically adjustable on the screw-threaded rods. To this end the rods may extend loosely through the openings in the ends of said plate and the plate may be locked to the rods by upper and lower nuts 68, 68 which have screw-threaded engagement with the rods and bear against the upper and lower sides of said plate. The raising of the plate 66 on said screw-threaded rods 64 has the effect to shorten the depth of stroke of the pokers, and the lowering of the plates on said rods has the effect to increase the depth of said stroke. The poker stem slides through the collar 60 to permit adjustment of said stem relatively to the actuating lever. Surrounding said stem above the collar is a gland 70, between which and said collar 60 is interposed a yielding packing ring 71 which fits the stem so closely as to

prevent the escape of gas between the same and said stem. The gland may be adjustably fixed to the stem by means of set screws 72, whereby the gland may be shifted lengthwise relatively to the stem when the poker is adjusted with respect to its supporting and actuating levers.

In order to provide a water seal between the reciprocating poker stem and the rotating top wall plate 14 to prevent the escape of gas through the opening through which the poker stem extends, a construction is provided as follows: Surrounding the opening in the top plate 14 through which the poker stem extends is a water trough or receptacle 75 made of a depth not less than the length of the endwise movement of the poker stem. The outer wall of said trough is formed by a vertical, transversely flattened tube which is attached at its upper end to the top plate and depends therefrom and is elongated in the direction of the swinging or oscillatory movement of the poker stem. The said outer wall 76 is connected at its lower end with the flat bottom wall 77 of the trough which has an elongated opening through which the poker stem extends. Extending upwardly from the said bottom wall 77 is a transversely elongated tubular portion 78 constituting the inner wall of the water trough, the latter tubular wall extending above the level of the rim 28 of the rotative top wall plate of the furnace. The well or trough 75 thus formed between the inner and outer walls 76 and 78 receives water from the space surrounded by said flange 28.

Carried by the stem and depending therefrom is a downwardly opening casing or bell 80, and which extends downwardly into the upwardly opening trough 75. Said bell or casing 80 is made of a length at least as great as that of the reciprocating stroke of the poker, so that, when the poker is in its uppermost position, the lower end of the bell or casing 80 will be below the upper end of the trough and submerged in the water contained therein. Said bell or casing 80 is attached at its upper end to a flange 82 extending laterally from the collar 60. The said bell or casing is transversely elongated in the direction of the swing of the poker to correspond with the cross-section of the trough, and is relatively smaller than the trough to permit free swinging movement of the lower end of the poker rearwardly. This arrangement is such as to provide a water seal between the poker stem and the rotative top wall of the furnace and thus prevent the escape of gas around the stem and through the opening upwardly through which it extends. The yielding packing ring 71, between the sleeve 70 and collar 60, prevents the escape of gas from the combustion chamber upwardly around the poker stem. The pokers thus pivotally mounted upon and connected with their actuating mechanism hang by gravity in vertical positions when withdrawn from the fuel body. When the pokers are lowered they approach and are forced into the fuel bed in straight paths, except as said paths are modified by the rotary movement of the top plate or wall when the pokers strike the fuel bed. The lower ends of the pokers swing rearwardly, relatively to their supports as soon as they strike the fuel bed, and the relative speed of rotation of the top wall plate, with respect to the reciprocating speed of the pokers, is such that the pokers are forced into the fuel bed and withdrawn therefrom while the lower ends of the pokers are free to swing rearwardly, they being withdrawn from the fuel bed before the limit of their rearward swing is reached. By reason of the relatively slow speed of the top wall plate as compared to the reciprocatory speed of the pokers, the pokers swing rearwardly when in contact with the fuel bed but a short distance. The pokers are withdrawn from the fuel bed by the actuating mechanism at times when the lower ends thereof occupy the rearward limits of their swinging movement. As soon as they are withdrawn from the fuel bed they are restored to vertical position by gravity, so that when they are again lowered they move vertically until brought into contact with the fuel bed. Thereafter, the lower ends thereof are swung rearwardly, due to contact with the fuel bed and the rotation of the top wall plate, to be again restored to vertical position when withdrawn from the fuel bed. The pokers are thus thrust into the fuel bed in the same manner as by a hand operation and are not dragged through the fuel as in cases where the movement of the poker is a reciprocating one only, or where a very limited or yielding movement of the poker is provided. The rotation of the top wall plate merely serves to carry the pokers to new points of contact with the fuel bed, so that the fuel will be uniformly stirred. I preferably employ two pokers arranged one radially inside of the other so as to cover the entire area of the bed. As a further and separate improvement, the top wall plate 14 is rotated by power derived from the motor 57 which drives the poker actuating mechanism in the manner hereinabove described. The construction by which the said top wall plate is thus rotated is made as follows:

The crank shaft 52 is arranged transversely with respect to the driving shafts 23 and 24 of the traction and supporting wheels 21 and 22 and is located over the facing beveled gear wheels 25 and 26 at the ends of said shafts. The said crank shaft

52 is mounted at its end remote from its crank 45 in a bearing 85 formed on the upper end of a standard 86 rising from the top wall plate. Fixed to the shaft 52 just inside of said bearing 85 is a gear pinion 87 which meshes with a gear wheel 88 that is located beneath said pinion. Said gear wheel 88 is mounted on and turns with a countershaft 90 which is located between the gear wheels 25 and 26 and is parallel with the crank shaft 52. Said countershaft is rotatively mounted at one end in the standard 86 and at its other end in a bearing 91 supported on the top wall plate. The said shaft 90 carries at one side of the centers of said gear wheels 25 and 26 a beveled pinion 93 which is arranged between and meshes with the said gear wheels. Power is thus communicated to the traction wheel shafts to drive said traction wheels in opposite directions, and in the proper direction to transmit driving power to rotate the top wall plate.

In order to provide means for water cooling the pokers, the poker heads 31 consist of hollow castings, the interiors of which are in communication with the hollow poker stems, the latter being made of pipes or tubes of suitable diameter. Contained within said hollow or tubular stems 32 are water supply pipes 95 which extend at their lower ends a distance into the hollow poker heads and extend at their upper ends above the upper ends of the poker stems. Said water supply pipes are made of an exterior diameter substantially less than the interior diameter of the tubular stems, thus affording annular spaces in said stems around the supply pipes. At their upper extended ends said supply pipes are connected with flexible hose 96 through which water is directed from any convenient source to the supply pipes. The supply pipes may be supported on the hollow poker stems in any convenient or preferred manner. As herein shown, supporting collars 98 surround and are fixed to said pipes above the poker stem supporting plates 66 and said collars are provided with supporting legs 99 which bear on the tops of said plates at points outside the central stem receiving openings thereof, (Fig. 3). The cooling water circulates downwardly through the supply pipes and through the hollow poker heads and thence upwardly through the annular space between the supply pipes and the walls of the tubular stems and overflows from the upper open ends of said tubular stems. The cooling water overflows from the said poker stems downwardly into the water receptacle at the upper side of the top wall plate that is surrounded by the rim 28. The water overflows from the top wall plate receptacle over the rim 28 into the sealing trough of the annular ring member 20 from which trough the overflow water is directed through an overflow pipe 100.

I claim as my invention:—

1. Poker mechanism for gas producers comprising, in combination with the rotative top of the gas producer and a poker located eccentrically on said top and extending therethrough, poker actuating mechanism mounted on and turning with said top, embracing a member having rising and falling movement and by which said poker is directly supported and actuated, said poker being suspended at its upper end from said actuating member by a connection permitting the lower end of the poker to swing freely in the direction of its circular path and to maintain its vertical position by gravity when free from the fuel bed.

2. The combination with the rotative top of a gas producer and a poker located eccentrically on said top and extending therethrough, of poker actuating mechanism mounted on and turning with said top, embracing a member having rising and falling movement and by which the poker is directly supported and actuated, said poker being connected at its upper end with said actuating member by a pivotal connection permitting the lower end of the poker to swing freely in the direction of its circular path and to maintain its vertical position by gravity when free from the fuel bed.

3. The combination with the rotative top of a gas producer and a poker mounted eccentrically on said top and extending therethrough, of a poker actuating mechanism mounted on and turning with said top comprising a rocking poker supporting and actuating member provided with an arm which has rising and falling movement, said poker being pivotally connected at its upper end with said arm to permit the lower end of the poker to swing freely in the direction of its circular path.

4. The combination with the rotative top wall plate of a gas producer and a poker extending therethrough, of poker actuating mechanism mounted on and turning with said plate, comprising a vertically swinging poker actuating and sustaining lever pivoted between its ends to a part on said top wall plate and from one end of which the poker is swingingly suspended, and means connected with the other arm of said lever for actuating the same.

5. The combination with the rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of poker actuating mechanism mounted on and turning with said plate comprising a rocking actuating member from which the poker is pivotally suspended in a manner to freely swing from its point suspension,

and means affording endwise adjustment of the poker relatively to said actuating member.

6. The combination with a rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of poker actuating mechanism mounted on and turning with said plate comprising a poker actuating and sustaining member, means for pivotally suspending the poker from said member, means for rocking said member, and screw-threaded means for affording endwise adjustment of the poker relatively to said supporting and actuating member.

7. The combination with a rotative top wall plate of a gas producer and a poker extending through an opening in said plate, a vertically rocking lever pivoted between its ends to a part on said plate, means for rocking said lever, and means for pivoting the poker to the said lever comprising a collar surrounding the poker stem provided with laterally extending bearing lugs, and laterally separated bearings carried by said actuating lever in which said lugs are mounted.

8. The combination with a rotative top wall plate of a gas producer and a poker extending through an opening in said plate, a vertically rocking lever pivoted between its ends to a part on said plate, means for rocking said lever, and means for pivoting the poker to the said lever comprising a collar surrounding the poker stem provided with laterally extending bearing lugs, laterally separated bearings carried by said actuating lever in which said lugs are mounted, a cross plate fixed to the poker stem above said collar, said poker being arranged to slide in the collar, and means for adjustably fixing said collar to said plate.

9. The combination with a rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of a poker supporting and actuating member mounted on and turning with said plate, means for pivoting the poker to the said member comprising a collar surrounding the poker stem provided with laterally extending bearing lugs, laterally separated bearings carried by said supporting and actuating member in which said lugs are mounted, a plate fixed to the poker stem above said collar, said poker being arranged to slide in the collar, screw-threaded rods at the side of the poker stem provided with eyes which engage said lugs, said rods extending through openings in the plate, and nuts engaging the screw-threaded rods for fixing the rods to said plate.

10. The combination with the rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of a vertically swinging bell crank poker actuating and supporting lever pivoted to a standard rising from said plate, means for suspending the poker from one arm of said lever, and means pivotally connected with the other end of said lever for rocking or swinging the same.

11. The combination with the rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of a vertically swinging bell crank poker actuating and supporting lever pivoted to a standard rising from said plate, means for suspending the poker from one arm of said lever, a rotative crank shaft and a pitman connecting said crank shaft with the other arm of said bell crank lever.

12. The combination with a rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of a vertically rocking poker supporting and actuating member mounted on and turning with said plate, a collar surrounding the poker stem and provided with lugs which are mounted in bearings carried by said rocking member, and means for providing a water seal between the poker stem and said top plate, comprising an upwardly opening trough attached to and depending from the top wall plate, and a bell or casing surrounding and carried by said collar and extending downwardly into said trough.

13. The combination with a rotative top wall plate of a gas producer and a poker extending through an opening in said plate, of a vertically rocking poker supporting and actuating member mounted on and turning with said plate, a collar surrounding the poker stem and provided with lugs which are mounted in bearings carried by said rocking member, and means for providing a water seal between the poker stem and said top plate, comprising an upwardly opening trough attached to and depending from the top wall plate, a bell or casing surrounding and carried by said collar and extending downwardly into said trough, the poker being endwise movable in the sleeve for adjustment, and a packing ring surrounding the stem above said collar.

14. A gas producer provided with a rotative top wall plate, an annular track supported on the side wall of the producer radially outside of the top wall plate, supporting wheels for the top wall plate which rest and roll on said track, and shafts extending radially from the plate upon which said wheels are mounted, at least one of said wheels being a traction wheel carried by the rotative top plate for actuating said traction wheel.

15. A gas producer provided with a rotative top wall plate, an annular track supported on the producer wall, supporting wheels for said plate which rest and roll

on said track, at least one of said wheels being a traction wheel, a driving shaft affixed to said traction wheel, and a motor supported on the top wall plate operatively connected with said driving shaft.

16. A gas producer provided with a rotative top wall plate, an annular track supported on the producer wall, supporting wheels for said top wall plate which rest and roll on said track, two of said supporting wheels, located at opposite sides of the top wall plate, being traction wheels, driving shafts connected with said traction wheels and extending inwardly over the top wall plate toward each other and provided at their adjacent ends with gear wheels, and a motor carried by said top wall plate geared to said gear wheels to rotate them in opposite directions.

17. The combination with a gas producer provided with a rotative top wall plate, an annular track supported on the producer wall, supporting wheels for said top wall plate which rest and roll on said track, two oppositely located wheels being traction wheels, driving shafts connected with and extending inwardly over the top wall plate from said traction wheels and provided at their adjacent ends with gear wheels, poker actuating mechanism carried by said top wall plate, a crank shaft operatively connected with said poker actuating mechanism and with said gear wheels of said driving shafts, and a motor for driving said crank shaft.

18. A gas producer provided with a rotative top wall plate, an annular track supported on the producer wall, supporting wheels for said top wall plate which rest and roll on said track, two oppositely located wheels being traction wheels, driving shafts connected with said traction wheels and extending inwardly toward each other over the top wall plate and provided at their adjacent ends with beveled gear wheels which face each other, poker actuating mechanism mounted on and turning with the said top wall plate, a crank shaft arranged transversely over the driving shaft for operating said poker actuating mechanism, and gear connection between said crank shaft and the facing gear wheels of said driving shaft arranged to rotate said shafts in opposite directions.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 27th day of February A. D. 1909.

SAMUEL BERTRAM SHELDON.

Witnesses:

JAS. C. FREDERICK,

JAMES KERNAN.