No. 865,616. PATENTED SEPT. 10, 1907.

S. B. SHELDON.

POKER MECHANISM FOR GAS PRODUCERS.

APPLICATION FILED JUNE 7, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

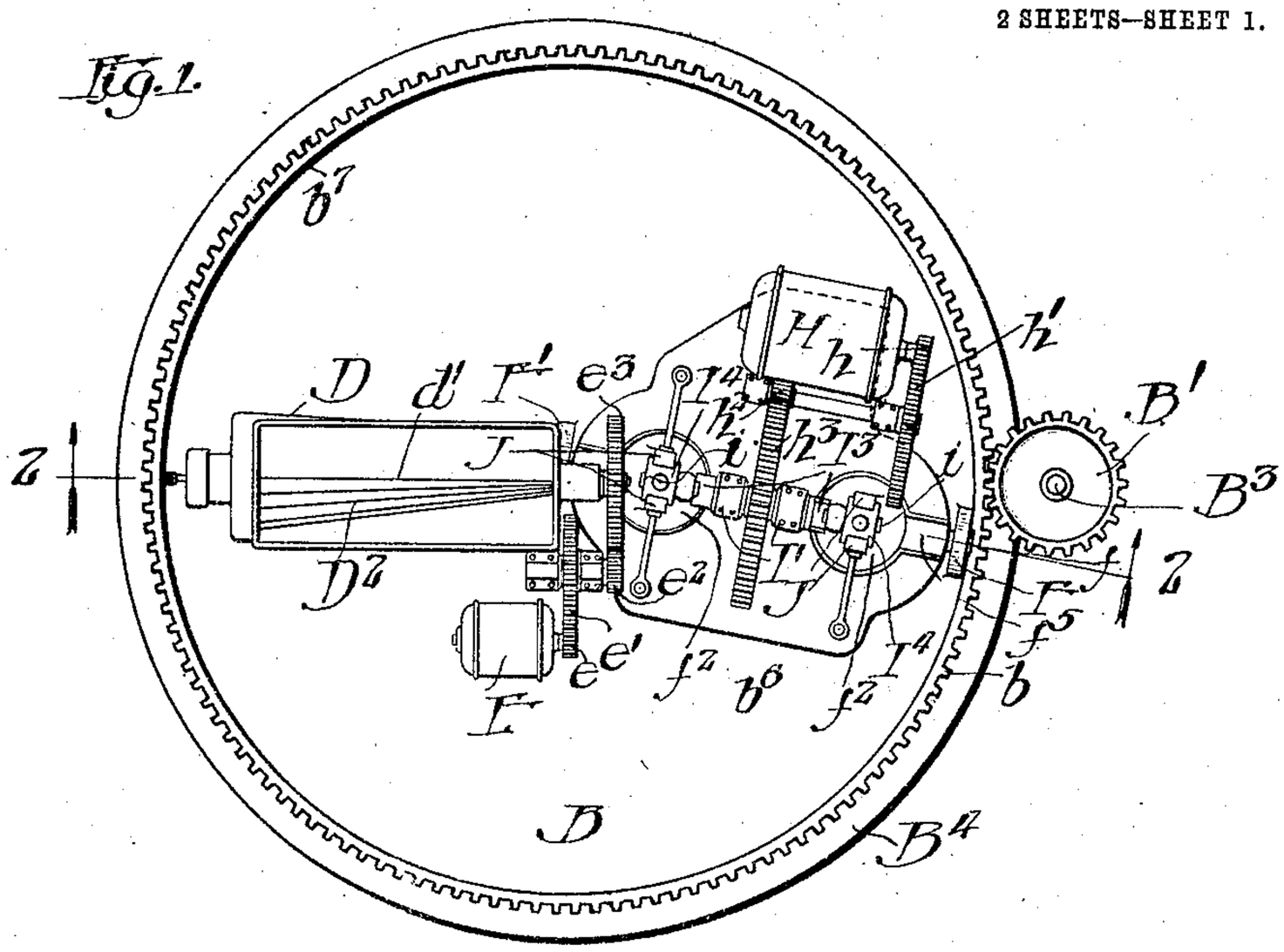
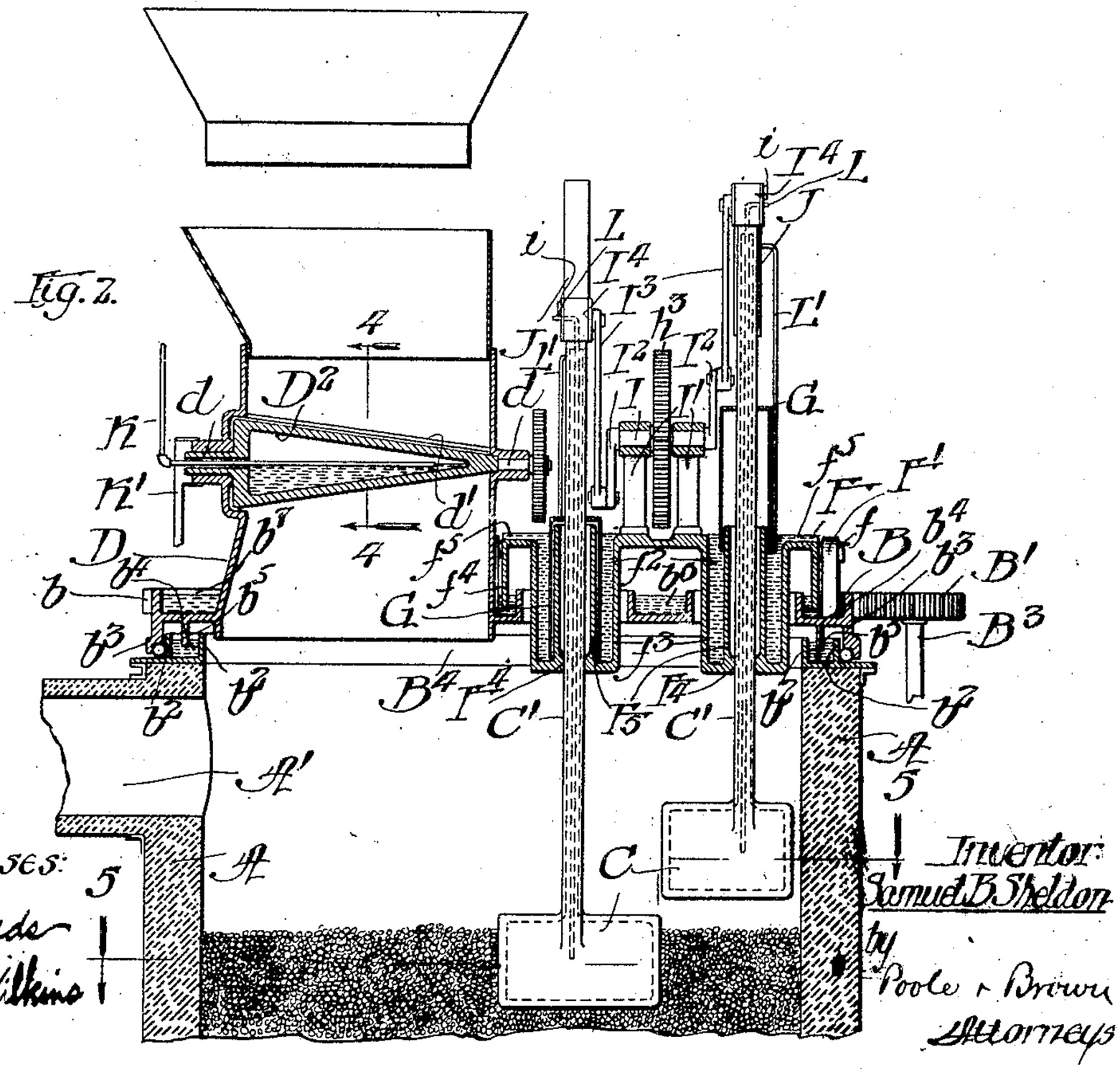


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

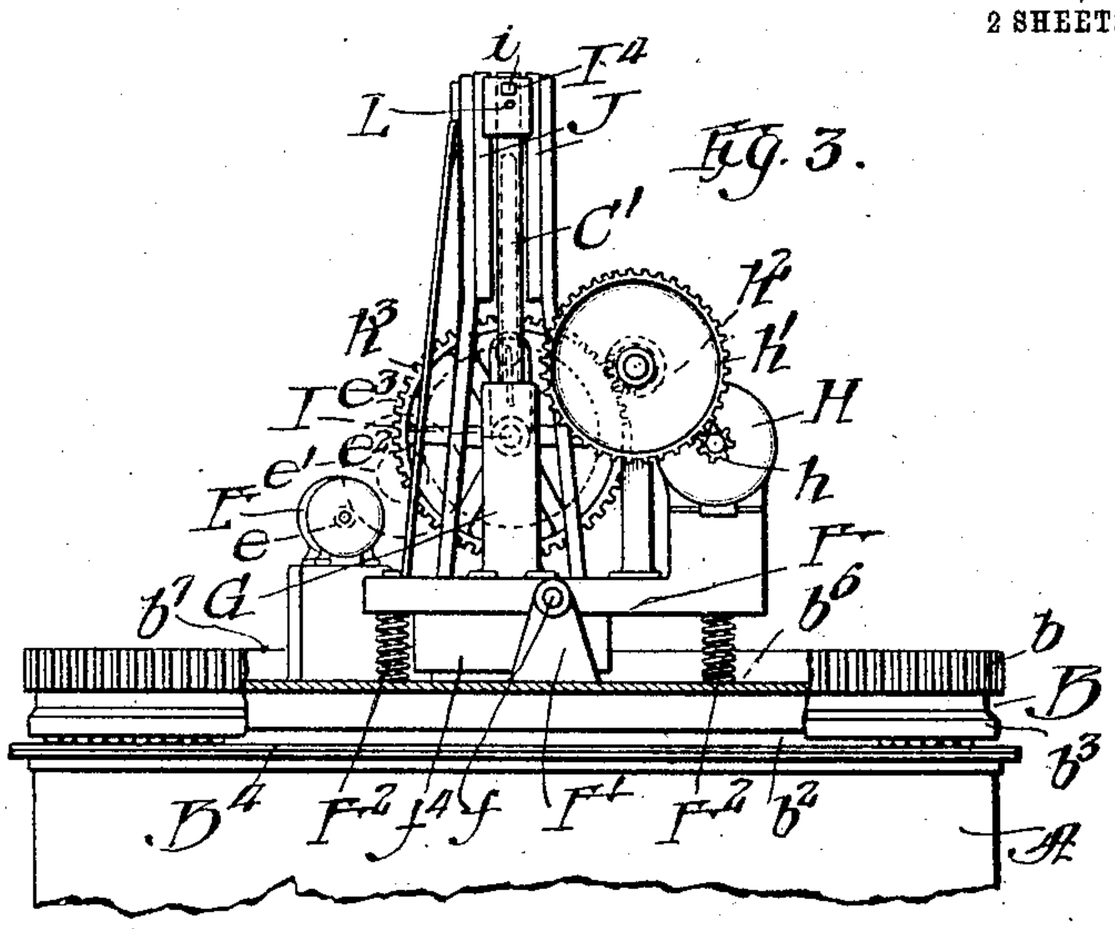


Fig. 4.

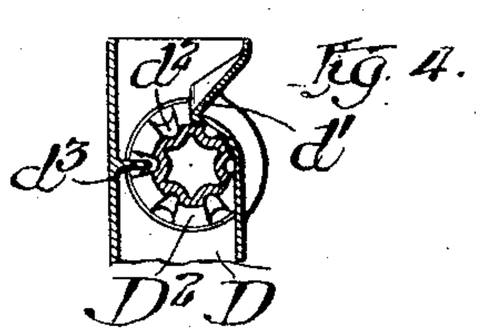
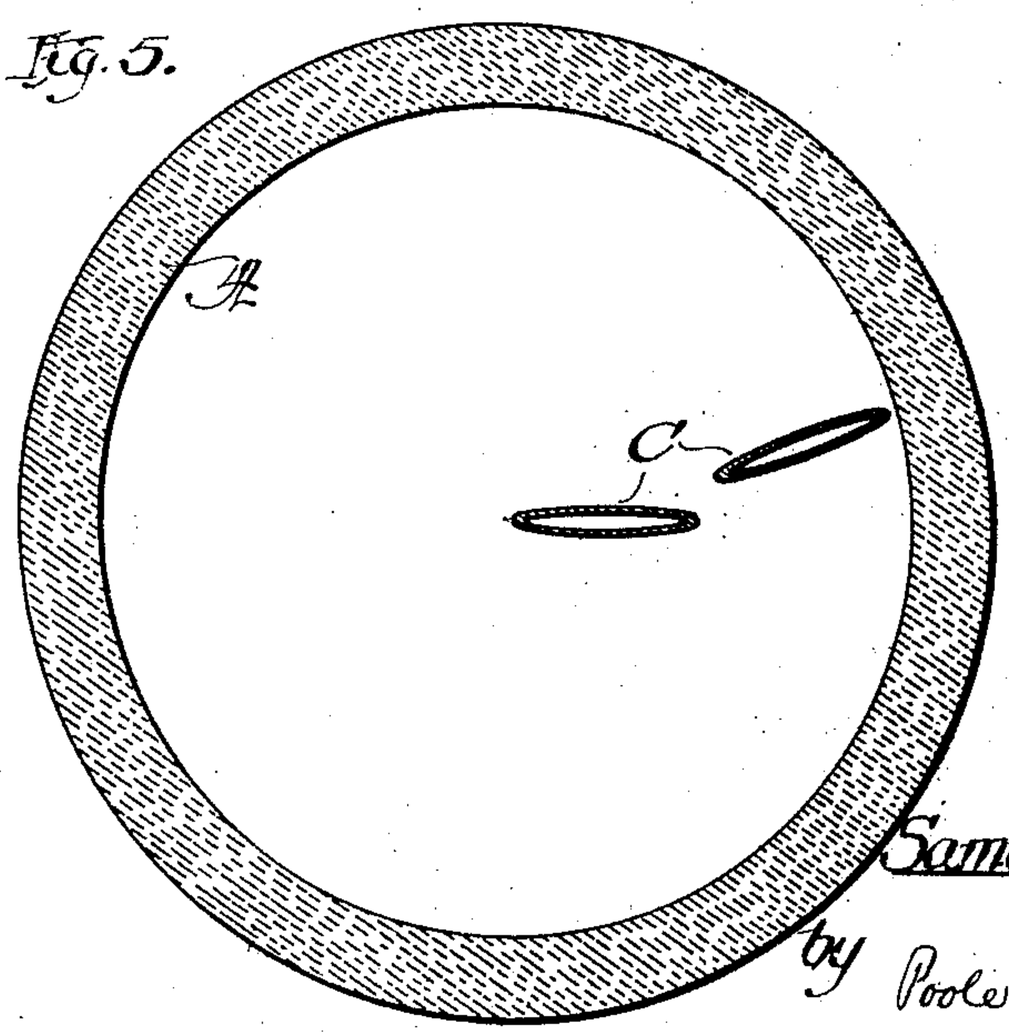


Fig. 5.



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UNITED STATES PATENT OFFICE.

SAMUEL B. SHELDON, OF BUFFALO, NEW YORK.

POKER MECHANISM FOR GAS-PRODUCERS.

No. 865,616. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed June 7, 1906. Serial No. 320,624.

To all whom it may concern:

Be it known that I, SAMUEL B. SHELDON, a citizen of the United States, of Buffalo. in the county of Erie and State of New York, have invented certain new and useful Improvements in Poker Mechanism for 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 improvements relate more specifically to poker mechanisms for poking or stirring the burning fuel in the gas producing chamber, to the manner of operating the pokers, the manner of mounting them in the wall of the producer through which they extend and the manner of water-sealing the joints of the wall through which the pokers extend.

Among the objects of the invention is to improve the construction and operation of poker mechanisms for the purpose specified, and 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 top plan view of a gas producer provided with my novel poker mechanism. Fig. 2 is a vertical section taken on line 2—2 of Fig. 1. Fig. 3 is a side elevation of the upper part of the producer and the poker mechanism, with parts broken away. Fig. 4 is a cross-section taken on line 4—4 of Fig. 2. Fig. 5 is a horizontal plan view illustrating the position of the pokers relatively to each other.

As shown in the drawings, A designates the vertical annular wall of the combustion chamber of the producer and A^1 the discharge pipe which directs the gas from the producer.

B designates, as a whole, the revolving top of the producer which supports the coal feeding and poker mechanisms and through which the pokers extend.

C C designate the pokers, two being herein shown, and C^1 C^1 designate their shafts which extend upwardly through the revolving top wall B for connection, above said top wall, with the poker actuating mechanism. The poker actuating mechanism operates to impart longitudinal reciprocation to the pokers to force them into and withdraw them from the fuel bed, and such reciprocation thereof, combined with the circular movement imparted thereto by the rotative top wall, serves to thoroughly stir or agitate the fuel bed.

D designates the coal feeding chute through which coal is fed to the combustion chamber of the producer. Said chute is narrow and is mounted radially on the rotative top wall and the feed slot or opening at the bottom of the hopper is substantially equal in length to the radius of the top, so that, as the top rotates, the coal is fed uniformly from the center to the circumference of the chamber all around the same. Means are provided for positively feeding the coal through said chute, consisting, in this instance, of a conical roller D^2 located in said chute and provided with trunnions *d d* mounted in suitable bearings in the inner and outer end walls of the chute. One of the side walls of the chute is arranged to partially cover the conical feed rollers and to form a deflecting surface d^1 (Fig. 4) which directs the coal between the descending side of the roller and the adjacent side of the chute. The roller is provided on its conical surface with a series of longitudinal pockets d^2 which coöperate with a plate or flange d^3 extending inwardly from the side wall of the chute to control the feed of material therethrough. The said roller is driven from a motor E, mounted on the rotative top wall, through the medium of a train of gears *e* e^1 e^2 and e^3, as indicated in Fig. 1.

The cover B is herein shown as rotated through the medium of an annular rack *b* meshing with a gear wheel B^1 fixed to the upper end of a rotative shaft B^3, at one side of the producer chamber. Conveniently, anti-friction bearings are interposed between the rotative cover and the top of the producer chamber. As herein shown, an annular ring B^4 surmounts the vertical wall of said chamber and is provided with upwardly extending, annular flanges b^2 b^2, and bearing rollers are interposed between the angle of the outer flange b^2 and the ring and a downwardly extending annular flange b^3 of the cover B. A water seal is formed at this point to prevent the escape of gas from the producer chamber. A convenient form of water seal comprises, in combination with the annular chamber b^4 formed between the two vertical flanges b^2 b^2 referred to and designed to be filled with a liquid, a downwardly directed flange b^5 on the cover which dips into the liquid in said annular chamber.

The said poker shafts are supported upon and extend through suitable openings in a platform or support F that is mounted on the cover B in a manner to have swinging or oscillatory movement about an axis radial to the cover. Said platform is held yieldingly in position on its pivot through the medium of suitable springs, constructed to permit the platform to oscillate or swing in either direction from its normal horizontal position, while normally holding the platform horizontal. This manner of mounting the poker support is provided in order to permit the pokers to yield backwardly under the lateral stress brought thereon when forced into the fuel bed, thereby preventing such stress bending or distorting the poker shafts. As herein shown, the said platform F is pivoted to the upper ends of standards or posts F^1 rising from the cover B by means of pivot trunnions *f* extending laterally from the platform and having bearing in the upper ends of said posts. The springs referred to for yieldingly maintaining the platform horizontal have the form of spiral springs F^2, as herein shown, interposed between the

ends of the platform and the said rotative top wall B. Springs for the purpose specified may, however, be otherwise formed and mounted.

The shafts C^1 of the pokers extend through guide openings F^4 formed in the lower ends of sleeves F^5 made integral with and extend downwardly from the platform F into the upper end of the producer chamber. The said sleeves F^5 and the poker shafts that reciprocate therethrough are water-cooled in order to protect the same from the heat of the fire below. For this purpose, the said sleeves are surrounded by water chambers f^2 formed between said sleeves and shells f^3 also made integral with said platform or support. The said water chambers f^2 open upwardly and coöperate with downwardly opening cylindric casings G attached to and surrounding the shafts of the pokers and adapted to enter said chambers f^2 around the sleeves F^5 and dip at their lower ends into the water in said chambers. The said cylindric casings G are closed at their upper ends and are attached to the poker shafts by gas tight joints. They are made of such length that their lower ends are submerged at all times in the water in the chambers f^2 in all positions of the poker. This construction affords an effective seal that prevents the escape of gas from the producer chamber around the poker shafts.

In order to prevent the escape of gas from the producer chamber through the joint between said oscillatory platform or support F and the revolving top wall or cover of the producer, the said platform or support is constructed to coöperate with the cover to form a water-seal. Said water-seal is made as follows: The platform is provided with a downwardly extending, continuous flange f^4 which dips at its lower margin into an upwardly opening chamber b^6 formed on the upper surface of the revolving cover and surrounded by the annular flange b^7 on which is formed the annular rack b before referred to. The said flange f^4 is made of such depth that its lower margin remains submerged in the sealing chamber b^6 in all positions of the oscillatory support and the revolving top wall of the producer is not broken when said platform is swung to one side or the other of its normal horizontal position.

The means herein shown for imparting a reciprocatory motion to the pokers embraces a motor H supported on the platform or support F and connected by a train of gears $h\ h^1\ h^2\ h^3$ with a horizontal, rotative shaft I that is mounted on standards $I^1\ I^1$ rising from the platform or support on each side of the gear wheel h^3. Said shaft is provided at its ends with cranks $I^2\ I^2$ which are connected by links $I^3\ I^3$ with cross-heads $I^4\ I^4$ that have sliding engagement with vertical guides J J rising from and supported on the oscillatory platform. The upper ends of the shafts of the pokers are connected with said cross-heads, whereby the rotary motion of said shaft imparts vertical reciprocation to the pokers. The said cranks $I^2\ I^2$ are directed in opposite directions from the shaft I, whereby the pokers C are operated alternately to force the same into the fuel bed. The said poker shafts may be adjustably connected with the cross-heads in such manner that the distance which the pokers penetrate the fuel bed may be varied, while the total stroke of the pokers remain the same. To this end the poker shafts may extend through openings in the cross-head and be fixed thereto by set-screws *i* thereby permitting the pokers to be raised or lowered as desired relatively to said cross-heads.

In practice, the reciprocatory movement of the pokers is comparatively rapid, relatively to the speed of rotation of the top wall B of the producer chamber, so that the duration of the lateral strain or stress brought on the pokers, due to such rotation, is not great for each reciprocation thereof and is readily compensated for. Moreover, it is unnecessary for the pokers to penetrate the burning fuel to a great depth when the operation of the pokers is rapid and continuous, thereby minimizing the lateral stress brought upon the pokers and their shafts and enabling such stress to be compensated for by a comparatively short oscillation of the platform or support in which the pokers are mounted.

The pokers are made of such width, whatever the number thereof, as to cover practically the radius of the circular fuel bed. In producers of ordinary size two pokers of the construction shown are sufficient to cover the area required. The pokers are shown as arranged one in rear of the other, relatively to their circular direction of movement and inclined relatively to each other and to a given radius of the producer chamber (Figs. 2 and 5). This arrangement may be conveniently effected by disposing the shaft I with its axis at an angle to a given radius of the fuel bed. An advantage of this arrangement of the pokers is that the fuel bed is more thoroughly stirred or agitated with less lateral stress on the pokers than if the pokers be arranged side by side in the same plane.

The pokers and the conical feed roller are made hollow and are water-cooled to avoid overheating. The cooling liquid is introduced into the hollow feed roller through a pipe K that extends through the hollow trunnion *d* at the larger end of the roller and into the interior of the roller, and the heated liquid is discharged from said hollow roller through said hollow trunnion around the pipe K into a drain pipe K^1. The cooling liquid is introduced into the hollow poker shafts and pokers through inlet pipes L that extend to the lower ends of the hollow pokers, and the heated liquid is discharged therefrom through outlet or drain pipes L^1. Conveniently the heated liquid is discharged from the pipes L^1 into the sealing chambers f^2, which seals the openings in the supporting platform F through which the shafts of the pokers extend. As herein shown, the sealing chamber b^6 is also replenished by water that drains from the sealing chambers f^2 through lateral gutters f^5 leading from the tops of said sealing chambers.

The operation of the mechanism described will be apparent from the foregoing, but may be briefly stated as follows: The top wall of the producer chamber is rotated slowly through the medium of the gear wheel B^1 while the pokers are reciprocated rapidly through the medium of the motor H, the train of gears and the crank-shaft I, said pokers penetrating the fuel bed alternately. The circular movement of the pokers imparted thereto by the rotating top wall B places a rearward stress on the pokers when forced into the fuel bed, as is obvious, and such stress is communicated to the spring sustained, oscillatory platform F by which the pokers are directly supported. The said platform or support yields to such stress, thereby avoiding the bending or distortion of the pokers and their shafts,

such as would tend to occur if the pokers were non-yieldingly supported in the top wall. Said springs, while permitting the pokers to yield backwardly under heavy stress, are made of sufficient strength to hold the pokers to their work to properly stir the fuel bed under normal conditions and return the pokers to their normal positions when withdrawn from the fuel bed. Moreover, the resistance which causes the pokers to yield backwardly is greatest when the pokers reach the limit of their downward strokes and is gradually lessened as the pokers are withdrawn from the fuel bed. As a consequence the spring pressure exerted on the pokers act, when the pokers are rising out of the fuel bed, to displace the upper portion of the fuel or throw it forwardly and thereby promote the stirring of the fuel.

I claim as my invention:—

1. The combination with a gas producer and its rotative top wall, of a poker extending through said top wall into the producer and having yielding connection with said top wall, permitting its lower end to yield backwardly relatively to the direction of rotation of said top wall.

2. The combination with a gas producer and its rotative top wall, of a poker extending through said top wall into the producer and having yielding connection with said top wall, permitting backward yielding of the lower end of the poker relatively to the direction of rotation of the top wall, and means for giving endwise reciprocatory motion to the poker.

3. The combination with a gas producer and its rotative top wall, of a spring-controlled poker support mounted on said top wall, a poker mounted in said support and extending into the producer, and means for giving endwise reciprocatory motion to said poker.

4. The combination with a gas producer and its rotative top wall, of a poker support pivoted to the top wall to oscillate on an axis substantially radial to the top wall, a poker mounted in said support and means for giving endwise reciprocatory motion to the poker.

5. The combination with a gas producer and its rotative top wall, of a poker support pivoted to said top wall to oscilliate on an axis substantially radial to the said top wall, a poker mounted in said support and extending into the producer, a spring applied to said support in a manner permitting the poker to yield rearwardly against the resistance exerted on the poker by the fuel bed, and means for giving endwise reciprocatory motion to the poker.

6. The combination with a gas producer and its rotative top wall, of a poker support pivoted on said top wall to oscillate about an axis substantially radial to said wall, a poker mounted in said support and extending into said producer, springs interposed between said support and top wall, one on each side of the pivot of the support, and means for giving endwise reciprocatory motion to said poker.

7. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said top wall, a poker extending through said support into the chamber, and mechanism carried by said support for giving endwise reciprocatory motion to said poker.

8. The combination with a gas producer and its rotative top-wall, of a spring controlled, oscillatory poker support mounted on said wall, a poker extending through said top wall, and actuating means for said poker mounted on said support.

9. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, pokers extending through said support into said chamber, actuating means for said pokers mounted on said support, comprising a rotative shaft provided with cranks operatively connected with said pokers, and a motor having geared connection with said shaft.

10. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, pokers extending through said support into said chamber, poker actuating mechanism, carried by said support, comprising a rotative shaft provided with cranks, cross-heads operatively connected with said cranks to which said pokers are attached, guides rising from said support in which said cross-heads slide, and a motor on the support having geared connection with said shaft.

11. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said top wall, a poker extending through said support into the producer, means for giving endwise reciprocatory motion to said poker, and means for varying the effective stroke of the poker.

12. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, a poker extending through said support into said chamber, poker actuating mechanism carried by the support comprising a rotative crank-shaft, an apertured cross-head operatively connected with said crank-shaft and through which the shaft of the poker extends, and means for adjustably affixing said poker shaft to the cross-head to vary the effective stroke of the poker.

13. The combination with a gas producer and its top wall provided with a poker opening, of an endwise movable poker extending through said opening into the producer, means for giving endwise reciprocation to said poker and means for sealing the opening between the poker and the top wall embracing a water receptacle on the top wall surrounding said opening and a downwardly opening casing attaching to the poker and extending into the same, said receptacle being made of a length at least as great as the stroke of the poker.

14. The combination with a gas producer and its rotative top wall, of a poker extending through an opening in said wall into the producer and having yielding connection with the top wall, permitting it to yield backwardly relatively to the direction of rotation of said top wall, and means for water-sealing said opening.

15. The combination with a gas producer and its rotative top wall, and means for water sealing the joint between the body of the producer and said top wall, of a poker support supported and having oscillatory movement on said top wall, a poker mounted in said support and extending into the producer, and means for water-sealing the joint between said oscillatory support and said top wall.

16. The combination with a gas producer and its rotative top wall, of a poker support yieldingly mounted on said top wall, a poker mounted in said support and extending into the producer and means for water-sealing the joint between the support and the top wall.

17. The combination with a gas producer and its rotative top wall, of a poker support pivoted to the top wall to oscillate on an axis substantially radial to said top wall, a poker mounted in said support, and means for water-sealing the joint between the said support and the top wall.

18. The combination with a gas producer and its rotative top wall, of a poker support yieldingly mounted on said top wall, a poker mounted in said support and extending into the producer, means for water-sealing the joint between said support and top wall, and means for giving endwise reciprocatory motion to said poker.

19. The combination with a gas producer and its rotative top wall, of a poker support yieldingly mounted on said top wall, a poker mounted in said support and extending into the producer, said support being provided around the poker with a continuous or closed flange, and the top wall being formed to provide a sealing chamber into which said flange extends.

20. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, a poker extending through an opening in said support, means for reciprocating said poker, and means for water-sealing said opening.

21. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, means for water-sealing the joint between said support and wall, a poker extending through an opening in said sppport and means for water-sealing said opening.

22. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on

said wall, a poker extending through an opening in said support, said support being provided around said opening with an upwardly opening sealing chamber and a casing fixed to and surrounding said poker and extending into the sealing chamber.

23. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, a poker and a water-cooled guide carried by said support through which the poker extends.

24. The combination with a gas producer and its rotative top wall, of two pokers extending through an opening in said top wall, and flattened at their lower ends, one of said pokers being disposed in rear of the other, relatively to the direction of rotation of said top wall.

25. The combination with a gas producer and its rotative top wall, of two pokers extending through an opening in the top wall and flattened at their lower ends, means for reciprocating said pokers comprising a rotative shaft carried by said top wall and operatively connected with said poker, said shaft being inclined relatively to a given radius of said rotative top wall.

26. The combination with a gas producer and its rotative top wall, of two pokers extending through an opening in said top wall and flattened at their lower ends, said flattened lower ends of the pokers being inclined relatively to each other.

27. The combination with a gas producer and its rotative top wall, of two pokers extending through an opening in said top wall and flattened at their lower ends, said flattened ends of the pokers being inclined relatively to a given radius of the rotative top wall and to each other.

28. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said top wall, a poker extending through an opening in said support, means for water-sealing the joint between said poker support and rotative top wall, means for water-cooling said poker and means for conducting the heated water discharged from the poker to said water-seal.

29. The combination with a gas producer and its rotative top wall, of an oscillatory poker support mounted on said wall, means for water-sealing the joint between said support and top wall, a poker extending through an opening in said support into the combustion chamber, means for water-sealing said opening, means for water-cooling said poker, means for conducting the heated water discharged from the poker to the water-seal around said poker opening, and means for conducting the overflow from said latter seal to the water-seal between said poker support and top wall.

In testimony, that I claim the foregoing as my invention I affix my signature in presence of two witnesses, this 2d day of June A. D. 1906.

SAMUEL B. SHELDON.

Witnesses:

A. C. BYAM,

ANTHONY H. VOGEL.