No. 886,672. PATENTED MAY 5, 1908.

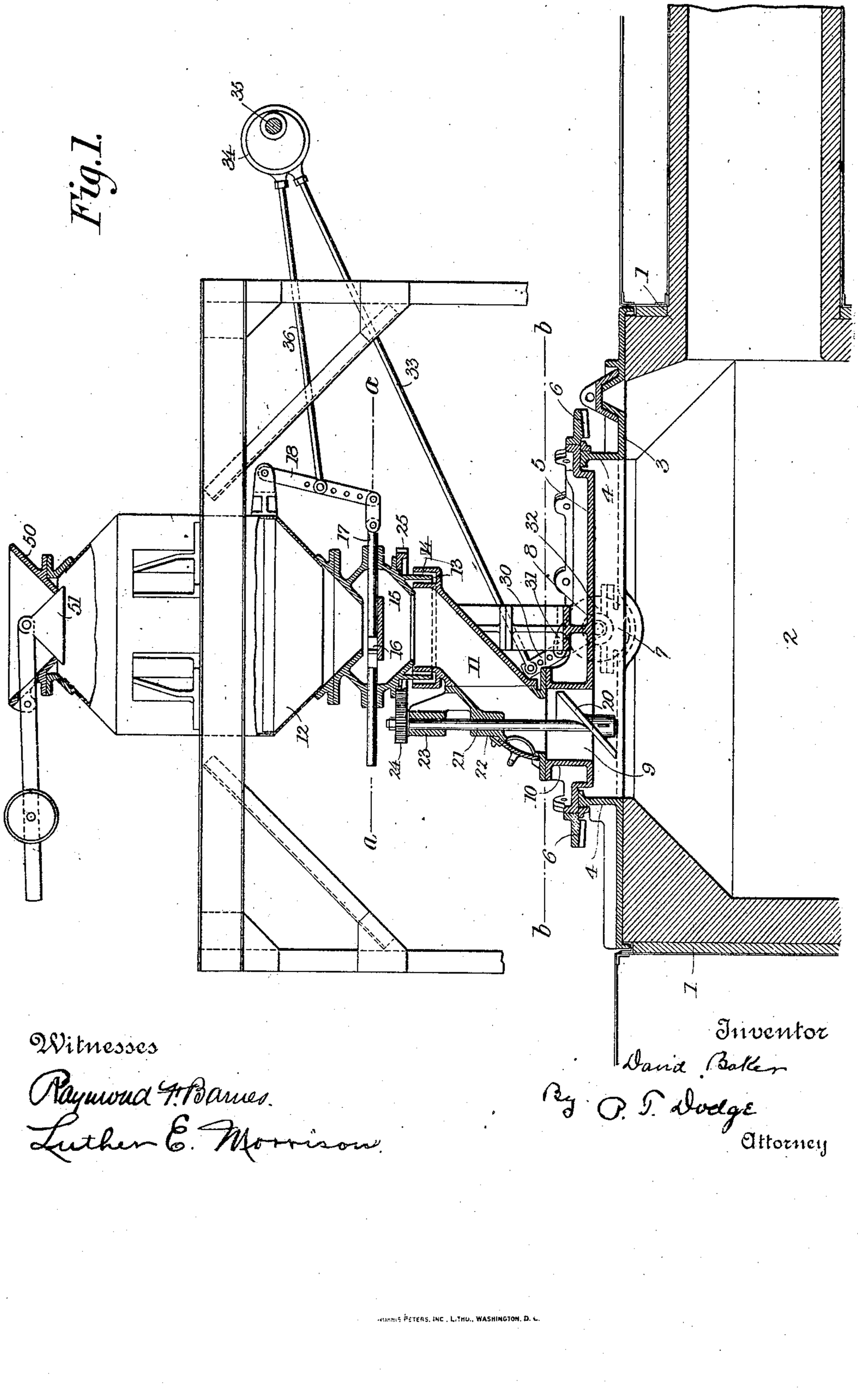
D. BAKER.

FUEL FEEDING MECHANISM FOR GAS PRODUCERS.

APPLICATION FILED NOV. 20, 1907.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 2.

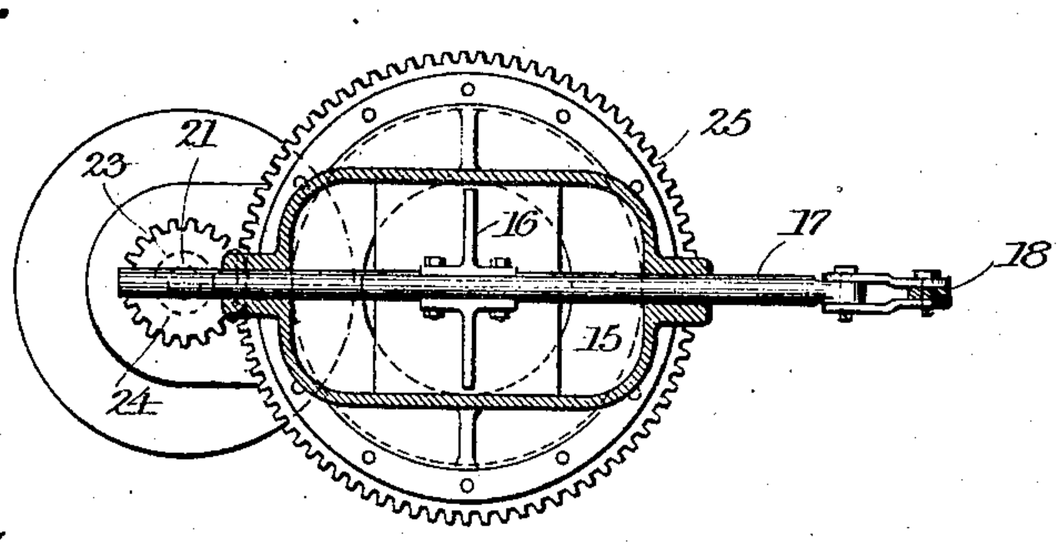
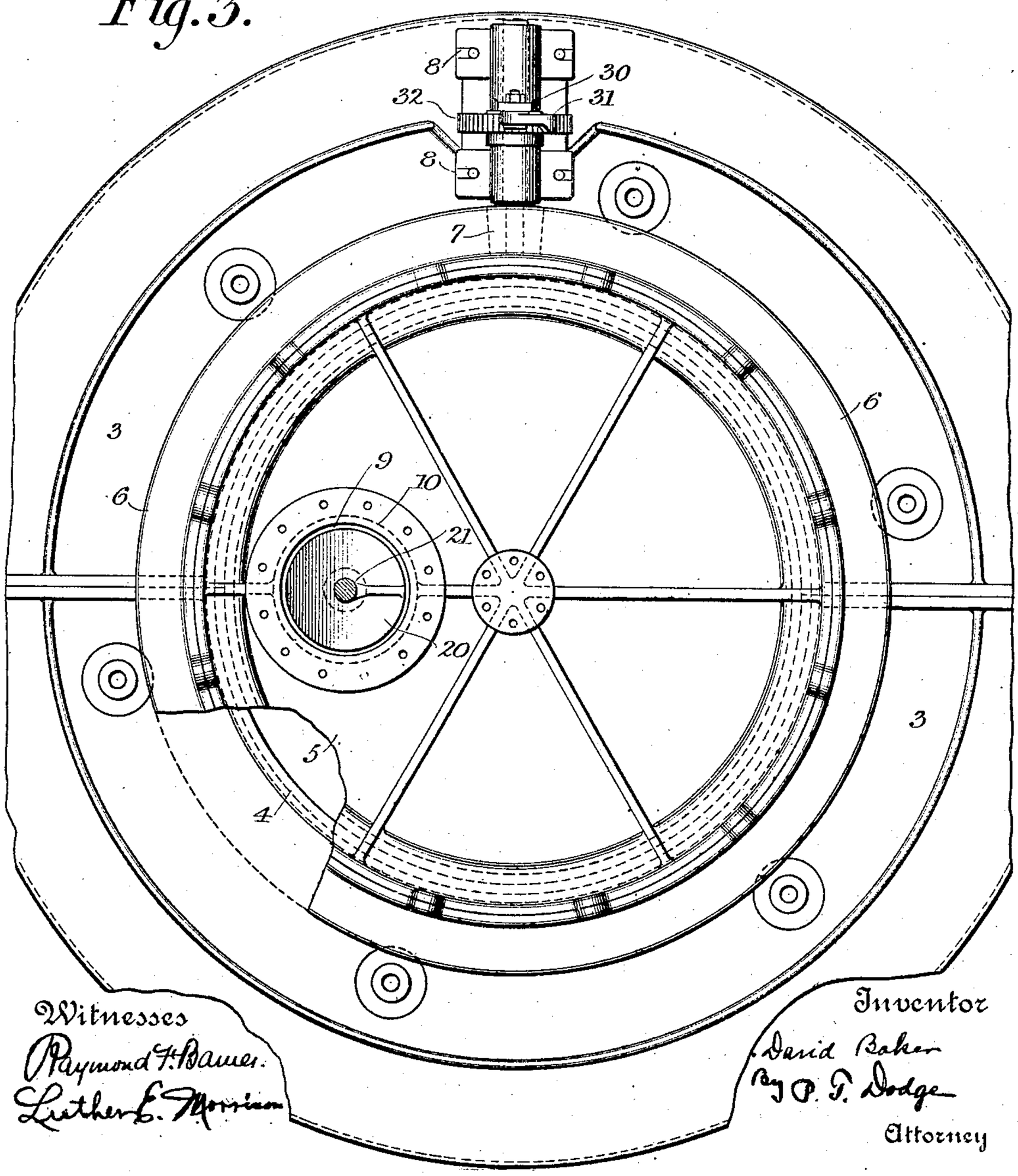


Fig. 3.



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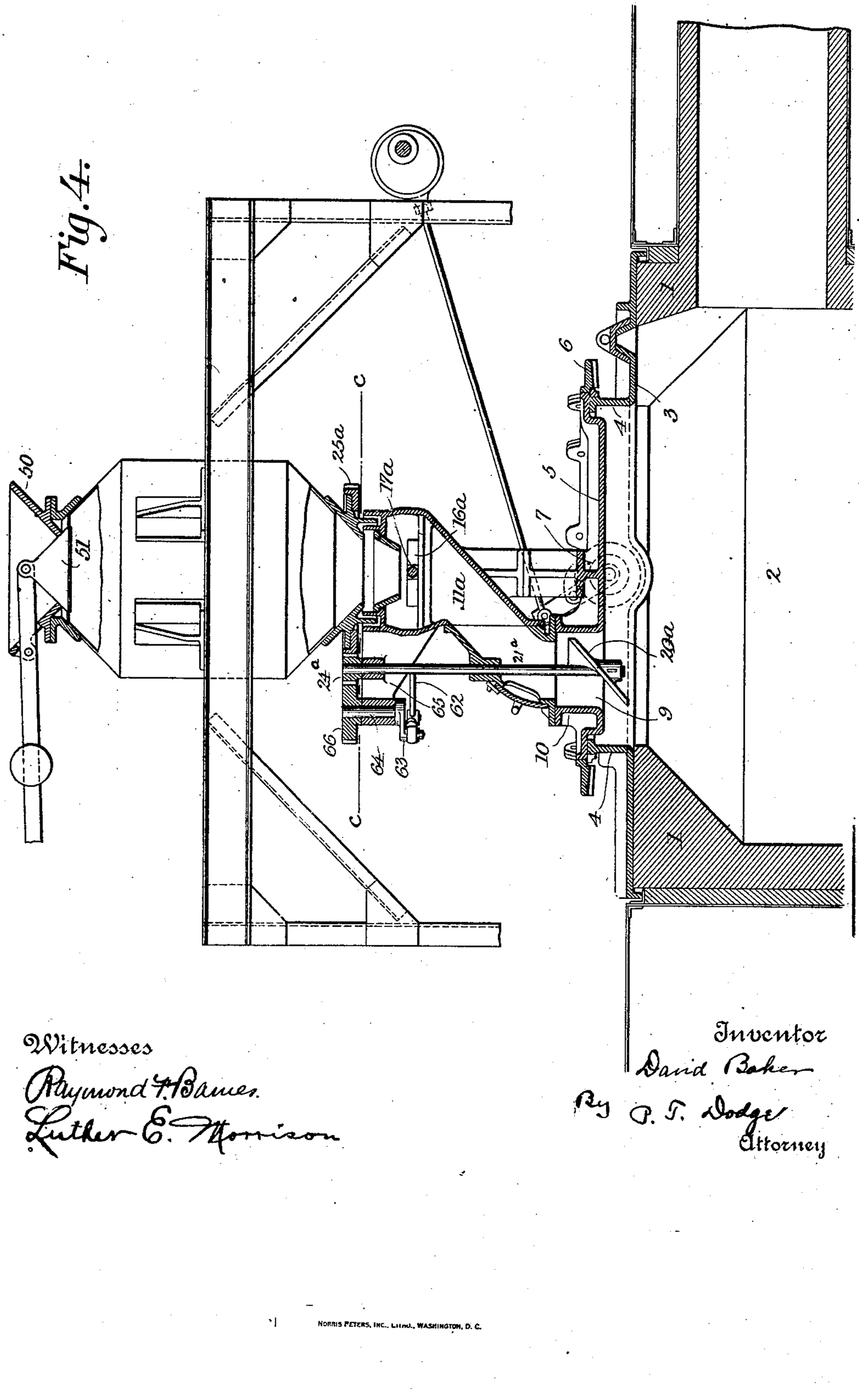
4 SHEETS—SHEET 3.

Fig. 4.



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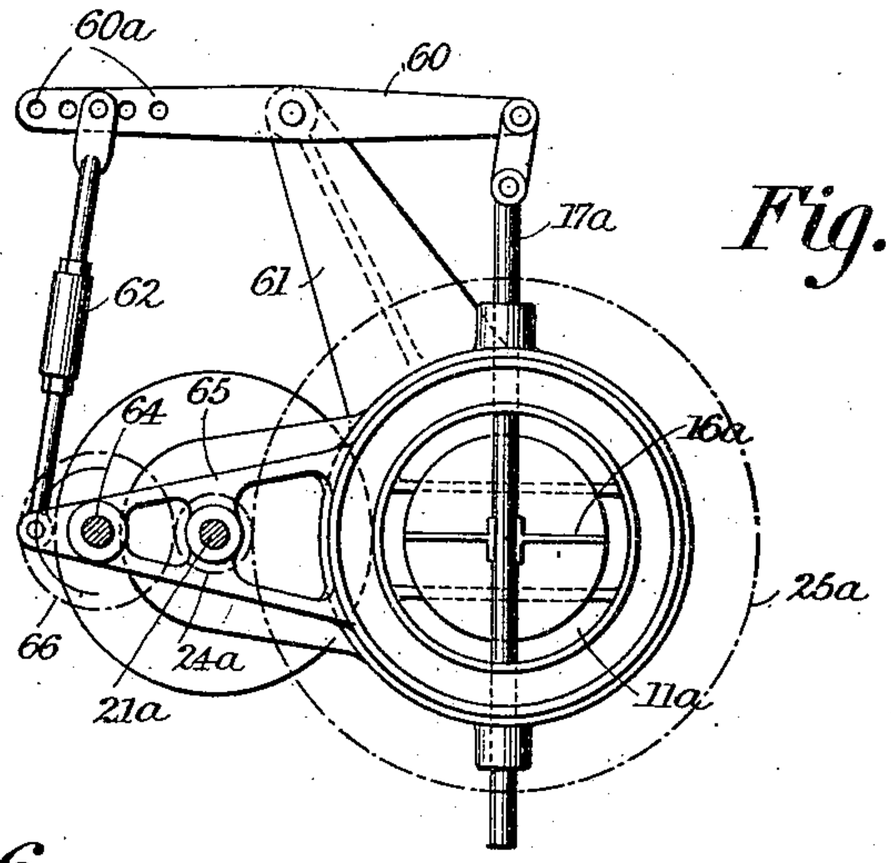
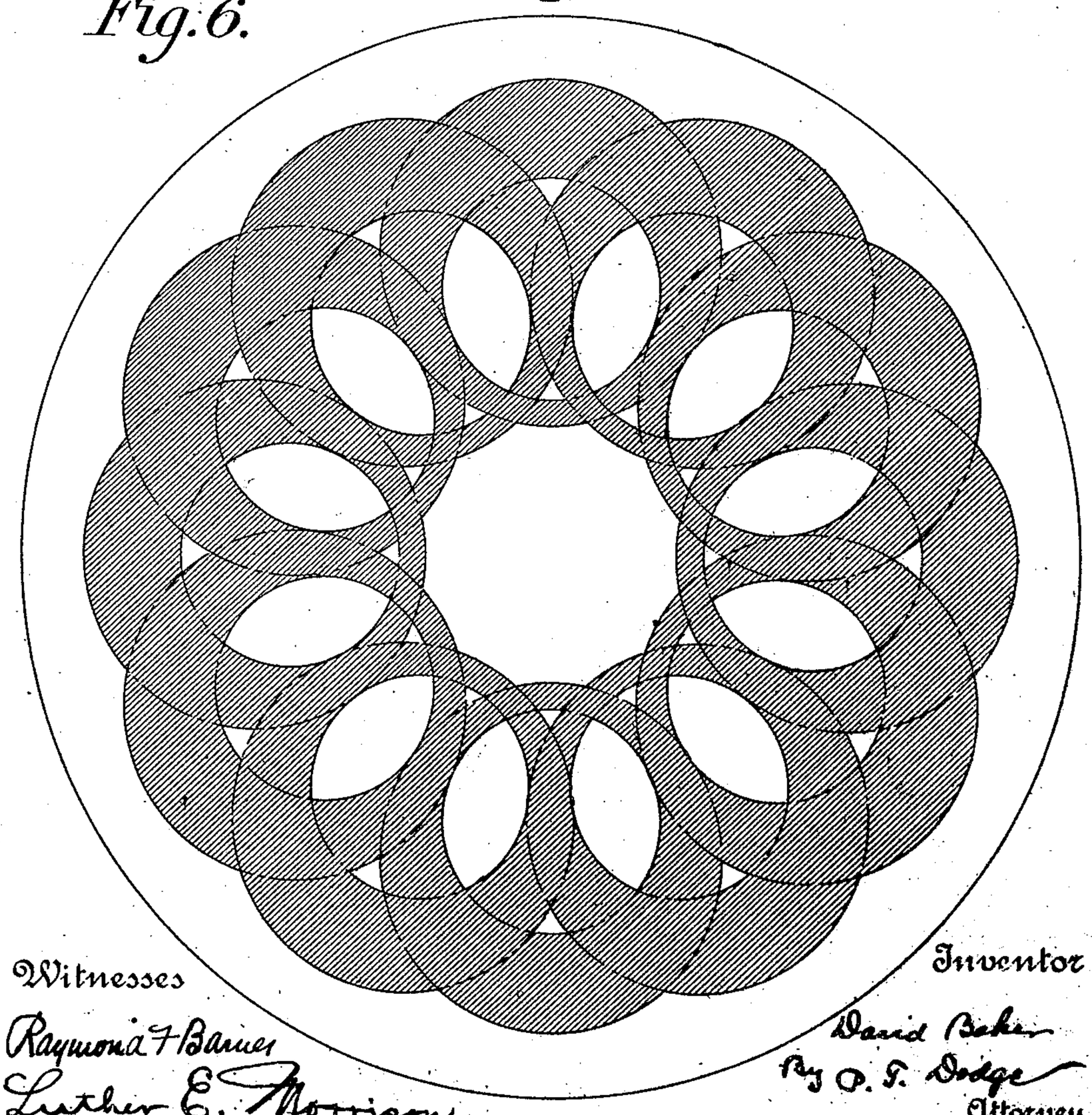


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

DAVID BAKER, OF PHILADELPHIA, PENNSYLVANIA.

FUEL-FEEDING MECHANISM FOR GAS-PRODUCERS.

No. 886,672. Specification of Letters Patent. Patented May 5, 1908.

Application filed November 20, 1907. Serial No. 403,053.

To all whom it may concern:

Be it known that I, DAVID BAKER, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Fuel-Feeding Mechanism for Gas-Producers, of which the following is a specification.

This invention has reference to mechanism for effecting a uniform feed to and an even distribution of the fuel in the combustion chambers of gas producers, to the end that the level of the fuel bed may be preserved and an effective combustion of the fuel obtained.

The invention consists in mechanism operating to feed the fuel to the combustion chamber in a path progressing circularly around the center of the chamber, and simultaneously operating to subject the fuel, as it is thus carried around the chamber, to a radial distributing action; whereby the fuel will be spread evenly and uniformly, and the level of the fuel bed at all times preserved.

In the preferred embodiment of my invention, the fuel enters the combustion chamber through a spout or chute which is revolved about a vertical axis so as to direct the fuel into the chamber in a circular path, and the discharge end of the chute is provided with an obliquely arranged deflecting or distributing plate which is rotated around a vertical axis as the spout traverses its circular path, with the result that the fuel will, as it leaves the discharge end of the chute, be spread out and distributed radially from an advancing center coincident with the path of travel of the spout. In this way every portion of the surface of the fuel bed will be reached, and an even and uniform distribution of the fuel effected. It will be understood, however, that the mechanism for effecting the distribution of the fuel in this manner may be variously modified within the knowledge of the skilled mechanic without departing from the limits of my invention, provided the mode of operation is substantially as pointed out above.

In the accompanying drawings:—Figure 1 is a side elevation, partly in section, of the upper end of a gas producer having my invention applied thereto. Fig. 2 is a horizontal sectional plan view on the line *a*—*a* of Fig. 1. Fig. 3 is a similar view on the line *b*—*b* of Fig. 1. Fig. 4 is a vertical sectional elevation of a modification of my invention. Fig. 5 is a cross sectional plan view on the line *c*—*c* of Fig. 4. Fig. 6 is a view in the nature of a diagram, showing the manner in which the fuel is distributed by my improved apparatus.

Referring to the drawings:—1 represents the upper end of a gas producer containing the usual combustion chamber 2, and 3 represents a cover plate or rim applied to the top of the producer and having rising from its center an annular vertical throat 4, the upper edge of which is flanged so as to form a bearing surface, on which is seated and supported a horizontal rotatable cap plate 5. The cap plate has its peripheral edge projecting beyond the throat 4, and has formed on its under side, bevel gear teeth 6, engaged by a horizontal bevel driving pinion 7, mounted in bearings 8 on the fixed cover plate 3 and driven in a manner to be more fully described hereinafter, whereby a rotary motion of the cap plate around a vertical central axis is effected.

At a point to one side of its center, the rotating cap plate is formed with a circular opening 9, surrounded by a throat 10, forming the lower discharge end of a vertical cylindrical chute 11, extending obliquely upward toward the center and having its upper receiving end terminating vertically beneath the lower discharge end of a fixed flue reservoir 12, sustained by the superstructure of the furnace, a water seal joint being formed between the discharge end of the fuel reservoir and the upper end of the spout, by forming the latter with an annular channel 13, into which is extended a vertical flange 14 depending from the lower end of the reservoir, the annular space between these parts being filled as usual with water or other sealing liquid.

Beneath the discharge end of the reservoir is sustained a fixed horizontal plate 15, on which the fuel falls as it leaves the reservoir, and from which plate it is pushed by a vertical scraper blade 16, extending transversely across the plate and reciprocated thereon, with the result that the fuel will be pushed alternately over the opposite edges of the plate, and will thus enter the upper end of the rotary spout in intermittent streams. The scraper blade is carried by a horizontal rod 17 slidingly guided through openings in a casing 17ª surrounding the blade and plate, which rod is connected to the lower end of a

pendent lever 18, vibrated in a manner to be more fully described hereinafter.

In the discharge end of the rotating spout is arranged an obliquely extending deflector or distributing plate 20, fixed to the lower end of a vertical shaft 21, extending upwardly and mounted to revolve in bearings 22 and 23 fixed to the spout, the upper end of the shaft having fixed to it a pinion 24, meshing with a fixed circular rack 25, formed on the exterior of the chamber 15. The deflector plate is so disposed within the end of the spout that it will receive on its surface and discharge in a lateral direction, the fuel flowing through the spout, and as the plate is revolved by its shaft, as the latter is carried around and its pinion caused to travel over the rack 25, the direction of flow of the fuel is constantly changing, being subjected to a radial distribution from an advancing center as the lower end of the spout pursues its circular path around the center of the combustion chamber. It will be observed, therefore, that by reason of the rotation of the cap plate, the discharge end of the spout is carried around a circular path, and the fuel flowing therefrom is distributed in a corresponding manner in the combustion chamber; and it is further seen that by reason of the rotation of the deflector plate, as the spout is thus carried around, the fuel will, as it leaves the spout, be subjected to a radial distribution, and in this manner will be directed toward the center of the combustion chamber and toward its periphery and at intermediate points, so that it is spread evenly and uniformly over the entire surface of the fuel bed.

The bevel pinion 7 for imparting a rotary motion to the cap plate may be driven in any appropriate manner, but I prefer to operate the same by means of a rocking lever 30, mounted at its lower end on an axis coincident with that of the bevel wheel and provided with a driving pawl 31, engaging the teeth of a ratchet wheel 32 rotatable with the bevel gear. The lever is given a vibratory motion by means of a rocker arm 33, connected at one end to the lever and having its opposite end connected to an eccentric disk 34 on a driving shaft 35. I prefer to reciprocate the scraper 16 by connections from the same driving shaft, said connections consisting of a rocker arm 36, jointed at one end to the pendent lever 18, before alluded to, and having its opposite end connected with the eccentric disk 34.

The upper end of the fixed fuel reservoir is provided with a feed hopper 50, by which the fuel may be introduced into the reservoir, which is closed at this point to prevent the escape of gas, by means of a weighted valve 51, or by other suitable means.

The scraper blade being operated by the eccentric, will make two reciprocations or movements across the plate, for every revolution of the eccentric, so that there will be two periods of maximum feed of the fuel into the upper end of the rotary spout, for every complete revolution of the eccentric. In order that, under these conditions, the periods of maximum feed will occur when the distributing plate 20 is pointing or inclined toward the periphery of the combustion chamber, to the end that the greatest amount of fuel will be distributed there, and the smaller amount toward the center, where the area is less, as shown in Fig. 6, I so arrange the parts that the distributing plate will make two revolutions for every revolution of the eccentric, which operates the scraper blade, with the relation of the parts such that at the maximum periods in the feed of the material by the scraper blade, the distributing plate will be inclined outward toward the periphery of the combustion chamber, as shown in Fig. 1. The result of this will be to make the least flow of fuel toward the center of the producer, where the area is relatively smaller, and the feed will gradually increase and reach its maximum amount when the distributing plate is in the opposite radial position, that is, pointing toward the walls of the producer, where the area to be covered by the coal is relatively greatest.

In the modified form of the mechanism, shown in Figs. 4 and 5, the scraper blade 16^a is guided in its movement in the rotary spout 11^a, the outer end of the rod 17^a being linked to a horizontal lever 60, pivoted between its ends on the outer end of a supporting arm or bracket 61 and sustained by the rotary spout 11^a. The opposite end of lever 60 is jointed to one end of a link 62, whose opposite end is connected with a crank arm 63 on the lower end of a vertical shaft 64, mounted in a bearing on the end of an arm or bracket 65, sustained by the rotary spout 11^a. The upper end of shaft 64 carries a pinion 66, driven by pinion 24^a on the shaft 21^a, which drives the distributing plate, the said pinion 24^a receiving its motion from the fixed circular rack 25^a, with which it meshes as it is carried therearound by the rotation of the spout, as described in connection with Fig. 1. As a result of the construction described, it will be observed that as the spout is carried around, it will impart a rotary motion to shaft 21^a carrying the distributing plate, and to the pinion 24^a on said shaft, which pinion, meshing with pinion 66 on shaft 64, will rotate crank arm 63 and vibrate lever 60, and this in turn will reciprocate rod 17^a and cause the scraper blade 16^a to move alternately back and forth across the fixed plate.

As in the first instance described, it is desirable that during the periods of maximum feed of the material by the scraper blade, the distributing plate will be inclined so as to direct the fuel toward the periphery of the

chamber, and in order to accomplish this, the parts are so arranged that for every revolution of pinion 66, which drives crank pin 63, the distributing plate will make two revolutions; and the relation of the parts is such that when the scraper blade is in its positions where it effects the maximum discharge of material from the supporting plate on which it slides, the distributing plate will be inclined outward, as shown in Fig. 4, and pointing toward the periphery of the producer.

The pinion 24ª has a ratio of one to six and four-tenths of the fixed rack 25ª, so that the distributing plate will make six and four-tenths revolutions for one complete revolution of the spout. This causes the distributing plate to discharge in a different circle from the preceding revolution of the spout.

In order that the amount of fuel fed by the scraper blade may be varied, or in other words, in order that the throw of said blade may be changed so as to decrease or increase its movements, I connect the end of link 62 with the end of lever 60 adjustably, which is effected by forming in the end of lever 60 a number of holes 60ª in either of which a pivot pin, carried by link 62, may be passed so as to connect this link 62 at different points on lever 60.

As shown in Fig. 6, the effect of introducing the fuel into the combustion chamber in a circular path from which it is spread out radially, is to distribute the same in a series of overlapping rings arranged circularly around the center of the combustion chamber, which rings by reason of the manner in which the feeding mechanism is operated, contain more material in their outer portions, which lie next the periphery of the chamber, than in their inner portions, which lie next the center of the chamber.

Having thus described my invention, what I claim is:—

1. In combination with a gas producer provided with the usual combustion chamber, means for feeding the fuel to said chamber in a path progressing around a vertical axis, and means at the outlet of said feeding means for spreading the fuel in a series of rings from said path as the feeding action progresses.

2. In combination with a gas producer, provided with the usual combustion chamber, means for feeding the fuel into said combustion chamber in a circular path, and means for distributing the fuel radially from a center advancing coincidently with said path.

3. In combination with a gas producer and its combustion chamber, a fuel reservoir, a rotary spout conducting the fuel from the reservoir to the combustion chamber, and a rotary deflector plate in said spout, rotatable around a vertical axis; whereby the plate will serve to distribute the fuel radially from a center coincident with the path of movement of the rotary spout.

4. In combination with a gas producer and its combustion chamber, a fuel reservoir, a rotary spout communicating with said reservoir and having its discharge end arranged to deliver into said combustion chamber, and an inclined deflector plate in the discharge end of the spout rotatable around a vertical axis.

5. In combination with a gas producer having a combustion chamber, a fuel reservoir, a spout having its upper end in position to receive the fuel from the reservoir, and its lower end discharging into the producer to one side of its center, means for rotating the spout around a vertical axis, and an inclined deflector plate rotatable in the lower end of the spout around a vertical axis.

6. In combination with a gas producer and its combustion chamber, a fuel reservoir, a rotatable cap plate covering the combustion chamber and provided at one side of its center with an opening, a spout having its lower end connected with said opening and its upper end in position to receive the fuel from the reservoir, means for rotating the cap plate; whereby the lower discharge end of the spout will be carried around in a circular path, an inclined deflector plate arranged in the discharge end of the spout, and means for rotating said deflector plate around a vertical axis.

7. In combination with a gas producer and its combustion chamber, a fuel reservoir, a fixed circular rack, a spout having its upper end in position to receive the fuel from the reservoir and having its lower end discharging into the combustion chamber to one side of its center, means for rotating said spout about a vertical axis; whereby its lower discharge end will be carried around in a circular path, a fuel distributing device in the discharge end of the spout, a vertical shaft to which said device is fixed, said shaft being extended upward through the spout to its outside, and a pinion on said shaft meshing with the fixed rack; whereby a rotary motion will be imparted to the shaft as the latter is carried around with the revolving spout, thereby imparting to the fuel distributing device a rotary motion around a vertical axis.

8. In combination with a gas producer and its combustion chamber, means for distributing the fuel therein in a series of rings disposed circularly around the center of the chamber, and means for so controlling the flow of the material that the rings will contain the greatest amount of fuel in their outer sides, substantially as described.

9. In combination with a gas producer and its combustion chamber, a fuel reservoir, a rotary spout receiving the fuel from said reservoir and directing it into the combustion

chamber, means for effecting the flow of the material into the spout intermittently, whereby it will have a maximum and a minimum period of feed, means for directing the fuel as it leaves the spout alternately outward and inward, respectively, toward the periphery and center of the combustion chamber, and means whereby the fuel will be directed outward toward the periphery of the combustion chamber coincident with its period of maximum feed into the spout.

10. In combination with a gas producer and its combustion chamber, a fuel reservoir, a rotary spout receiving the fuel from said reservoir and discharging the same into the combustion chamber, a fixed plate on which the material is received from the reservoir, a scraper blade reciprocating across said plate and acting to feed the fuel into the upper end of the spout in intermittent streams, an inclined distributing plate in the discharge end of the spout, means for rotating the same around a vertical axis, and means whereby said distributing plate will incline outward toward the periphery of the furnace at the moment when the scraper blade effects the maximum feed of the flow of the fuel into the upper end of the spout.

In testimony whereof I hereunto set my hand this 11th day of November, 1907, in the presence of two attesting witnesses.

DAVID BAKER.

Witnesses:
LOUISE B. MORRIS,
L. M. HUDNUT.