

March 3, 1931.

A. K. BRADLEY

1,795,162

GAS PRODUCER

Filed Sept. 27, 1926

2 Sheets-Sheet 1

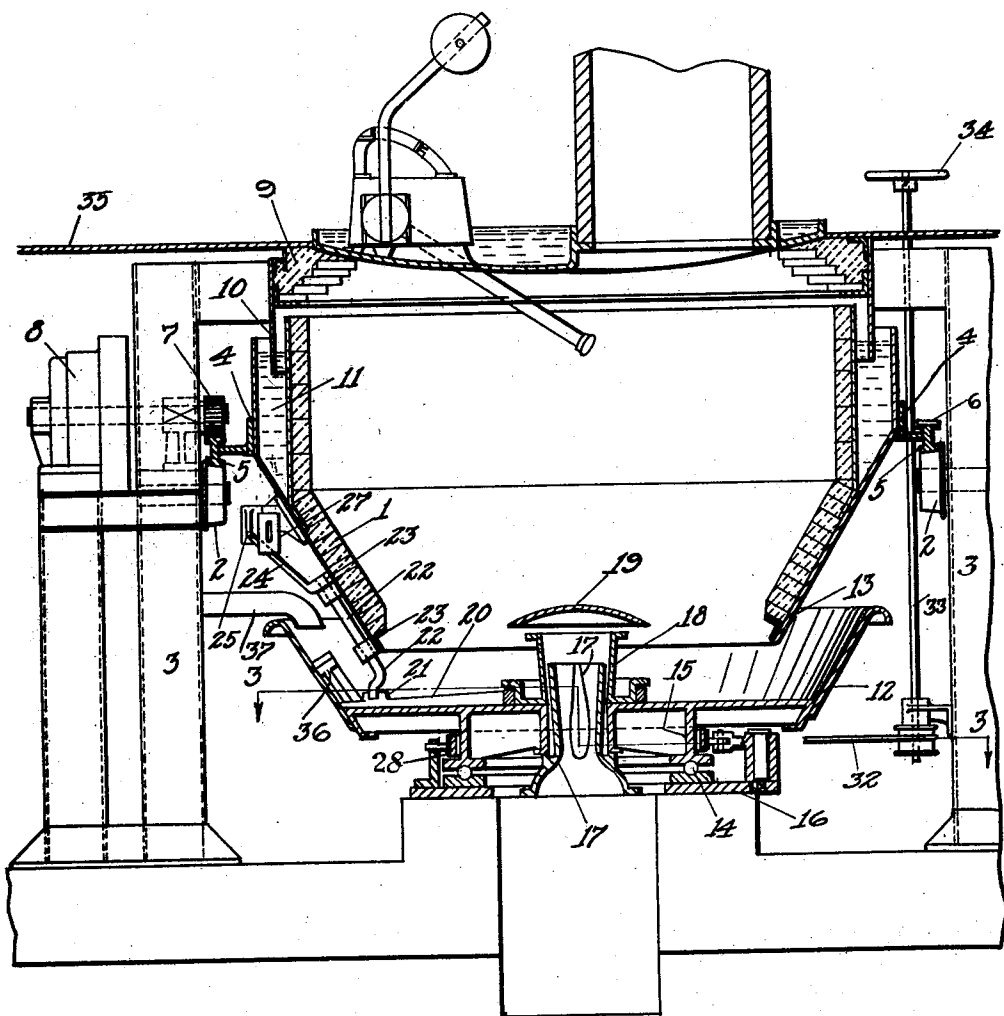


Fig. 1.

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2 Sheets-Sheet 2

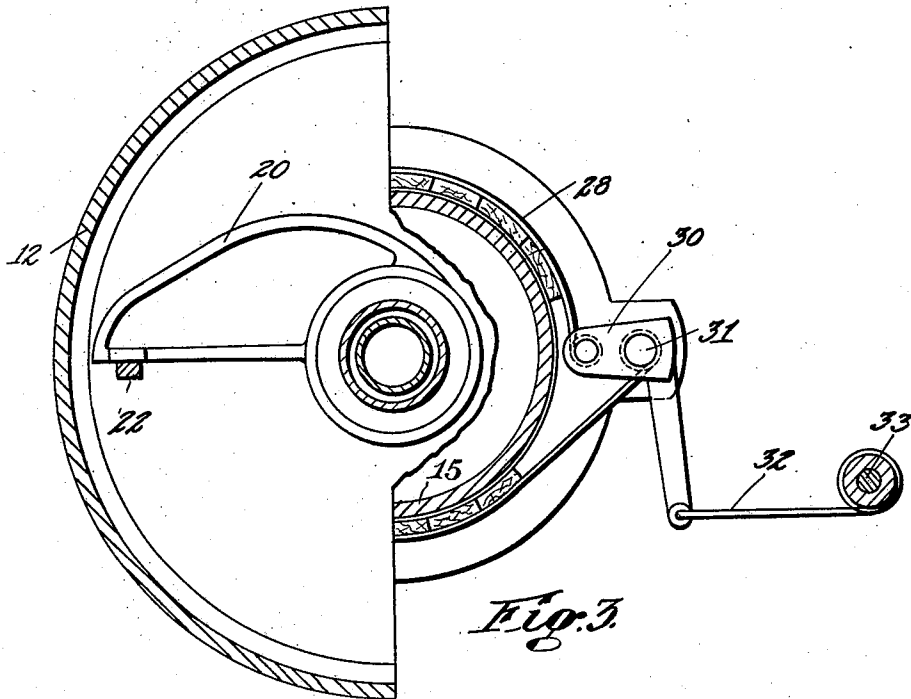


Fig. 3.

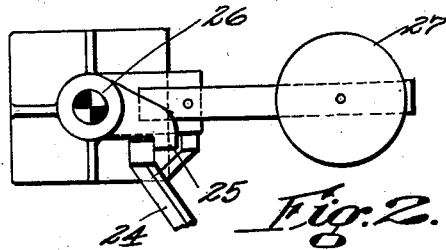


Fig. 2.

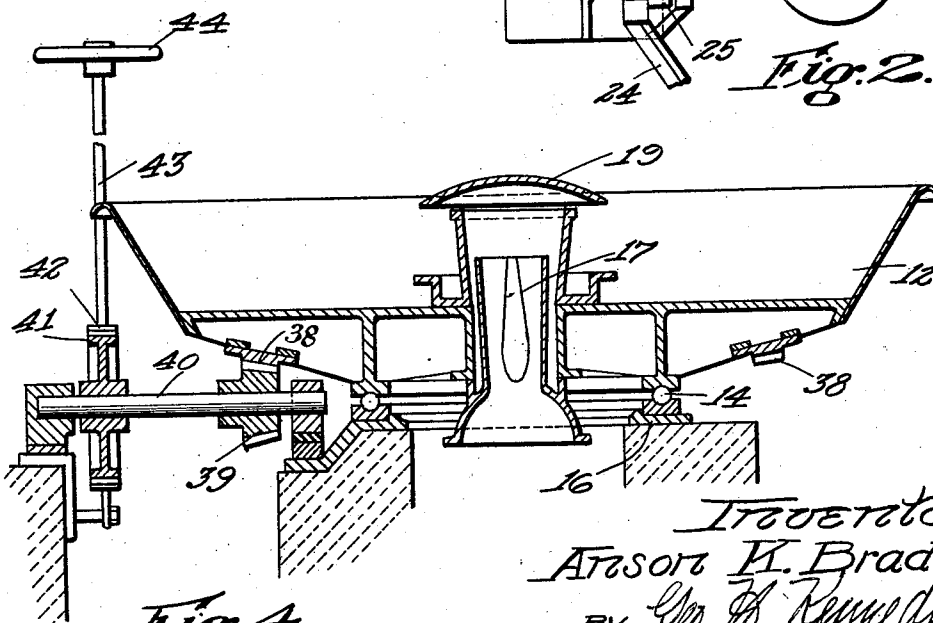


Fig. 4.

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UNITED STATES PATENT OFFICE

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GAS PRODUCER

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The present invention relates to gas producers, and more particularly involves a construction adapted to secure a substantially continuous discharge of ashes from the bottom of the producer during the gas making operation.

The features of my improved construction are fully set forth in the following description, and illustrated in the accompanying drawings, in which—

Fig. 1 is a vertical sectional view of a gas producer embodying the invention.

Fig. 2 is a large-scale fragmentary view showing in side elevation certain devices associated with the ash-removing means of the producer.

Fig. 3 is a large-scale transverse sectional view in two planes on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary vertical sectional view showing a modification of the invention.

Like reference characters refer to like parts in the different figures.

Referring to Fig. 1, the gas producer therein illustrated provides the usual fuel containing shell 1, which, in the present construction, is adapted to be continuously rotated at a relatively slow speed, say one complete revolution in five or six minutes. To this end, said shell 1 is rotatably supported on a series of elevated rollers 2, 2, carried by the stationary columns 3, 3,—the shell having secured to its outer wall a surrounding ring 4, whose lower surface provides an annular track 5 adapted to run on said rollers 2, 2. The upper surface of ring 4 is made in the form of an annular gear 6, with which meshes a driving pinion 7 that derives its rotation, at an appropriate speed, from any suitable source of power, such as a motor 8. The columns 3 provide for the stationary support of the top or cover section 9 of the producer, which has the usual depending annular skirt 10 that projects into the water jacket 11 surrounding the shell 1, thereby to form a water seal between the shell 1 and cover section 9, allowing the former to rotate relative to the latter without escape of gas.

An ash pan 12 disposed below the open lower end of shell 1 is adapted to contain a body of water of sufficient depth to form a

water seal with an annular depending skirt 13 of said shell, as is usual in rotary water seal gas producers. Said ash pan 12 has no mechanical connection with the rotating fuel shell 1; on the contrary, said ash pan is independently supported for rotation, as for instance, upon a ball bearing 14 interposed between an annular hub 15 on the bottom of said pan and a stationary base member 16. The ash pan 12 has a central opening therethrough for the passage of the blast of air and steam to the interior of the producer, the blast being supplied by a suitable blower 17, and the central opening through the pan being surrounded by an upwardly projecting flange or hub 18 which supports a blast distributing hood 19 of ordinary construction.

The flange or hub 18 serves as a pivotal bearing for a laterally projecting curved plow arm 20, which lies flat on the bottom of ash pan 12, and is adapted, in the absence of restraint, to partake of any rotary motion to which said pan is subjected. Near its outer end said plow 20 provides a raised lug 21 for cooperation with the end of a rocking member 22 which is supported in suitable bearings 23, 23, on the wall of rotary shell 1. From the upper end of member 22 projects a lever arm 24, by which said member can be rocked in its bearings to move its lower end into and out of the path of lug 21 on plow 20.

In the position of the parts shown in Fig. 1, the member 22 has been rocked into operative position, so that its lower end, in the rotation of shell 1, will engage lug 21, and this position is yieldingly maintained by the engagement of the free end of lever arm 24 with a hook or latch 25, pivoted at 26 on the outside of shell 1, as shown in Fig. 2. A counterweight 27 normally holds the hook or latch down, thereby preventing the member 22 from turning in its bearings 23, 23; thus the rotation of shell 1 is imparted to plow 20 to sweep the latter around on the surface of pan 12 at the same speed as that at which the shell itself rotates, so long as no abnormal or excessive resistance to such rotation of the plow 20 is encountered. However, in the event of such excessive resistance, the torsion communicated to member 22 by lug 21 will

exert itself through arm 24, in a direction to raise the pivoted hook or latch 25 and its counterweight 27, until said arm 24 is released, allowing said member 22 to swing in its bearings 23, 23, until its lower end clears the lug 21 on plow 20.

In operation, the friction of the bed of fuel and ashes, rotated continuously by the containing shell 1, is sufficient, in the absence of retarding influences, to cause rotation of pan 12 in substantial unison with said shell. Under these conditions, viz, with the shell 1 and pan 12 rotating together at the same speed, the ash plow 20, regardless of the operative or inoperative disposition of the member 22, remains ineffective, since said plow will partake of the same rate of rotation as the ashes in which it is submerged. However, according to the present invention, provision is made for effecting, at the will of an operator, any desired differential rotation between the shell 1 and the ash pan 12, and this is utilized to obtain continuous action of the plow 20, with a wide range of variation in the rate of ash removal from the producer, in the following manner:—

As shown in Figs. 1 and 3, the annular hub 15 of pan 12 is encircled by a brake band 28, which is guided and supported in its contracting and expanding movements by any suitable means, not shown. One end of band 28 is secured to any fixed point, and the other end is fastened to one arm of a lever 30, pivoted at 31. The band 28 is tightened or loosened by movement of the other arm of lever 30, the latter for this purpose having connected thereto a cable 32 adapted to wind up on a brake-actuating shaft 33, here shown equipped with a hand-wheel 34 disposed above the operating platform 35 of the producer, although any other convenient location may be selected.

In this way the speed of rotation of pan 12 can be closely controlled by manipulation of the friction brake 28, so that any desired speed differential can be established between the positively rotated shell 1 and the frictionally rotated ash pan 12. Assuming the rotation of the pan 12 to be only slightly retarded by the brake 28, there will, nevertheless, be produced a sufficient shearing and grinding action in the lower part of the fuel bed to insure a proper descent of ashes and clinker into the pan 12, and at the same time the rotation of plow 20 in unison with the shell 1 at a slightly higher speed than the pan 12, will crowd the ashes outwardly on the bottom of said pan and up the inclined face of the plow extension 36, so as to be reached by the stationary skimmer 37 for removal from the ash pan at that point. Tightening of the brake band 28 to further retard the rotation of the pan 12 will increase the grinding and shearing action in the lower part of the fuel bed, and also the rate of ash

discharge, it being apparent that the action of the plow 20, when operatively engaged by the member 22, is at a rate proportional to the amount by which the pan's rotation lags behind the rotation of the fuel shell 1.

When it is desired to discontinue the plowing and discharge of ashes, the operator lifts the counterweight 27, which raises the latch 25 and releases the arm 24; thereupon, the tendency of plow 20 to rotate with the slower-speed pan 12, on which it rests, rather than with the faster-speed shell 1, produces sufficient pressure of lug 21 against member 22 to rock the latter into its inoperative position, so that it clears said lug. Not until the operator again disposes arm 24 behind the latch 25 will plowing and discharge of ashes be resumed,—but notwithstanding this, the relative movement between shell and ash pan, resulting from braking of the latter, continues, producing a very beneficial shearing action in the ashes, which tends to settle the ashes down the wall of the producer and so fill the pan with them.

In the modified form of the invention shown in Fig. 4, the operation is precisely the same as above described, but the means employed to retard the frictional rotation of the ash pan 12 is slightly different. As shown in Fig. 4, said ash pan on its under side carries an annular gear 38, which meshes with a pinion 39 on a shaft 40,—the latter at its other end carrying a wheel or drum 41. Encircling the wheel or drum 41 is a suitably supported brake band 42, which is adapted to be tightened on said drum by operating mechanism of substantially the same form as that shown in Figs. 1 and 3, the same embodying a shaft 43 adapted to be operated by a hand wheel 44, in any convenient location. Braking the drum 41 retards the frictional rotation of the ash pan 12, and thus produces the continuous discharge of ashes by the plow 20 at a rate determined by the lag of said ash pan's rotation behind the rotation of fuel shell 1.

I claim:

1. In a gas producer, a rotatably mounted fuel-containing shell and a rotatably mounted ash pan, actuating means for continuously imparting positive rotation only to said shell during the operation of the producer, said ash pan being frictionally rotatable from the rotation of said shell by the friction of the contained bed of fuel, a friction brake selectively operable on said pan to establish a differential between its rotation and that of said shell, and an ash plow rotatably mounted in said pan and adapted to be connected to said shell for rotation in unison therewith, thereby to discharge ashes from said pan continuously at a rate determined by the degree of retardation of said pan by said friction brake.

2. In a gas producer, a rotatably mounted

fuel containing shell and a rotatably mounted ash pan, actuating means for continuously imparting positive rotation to one only of said parts during the operation of the producer, the other of said parts being frictionally rotatable from the rotation of the first part by the friction of the contained bed of fuel, a friction brake operable on said frictionally-driven part to establish a differential between its rotation and that of said positively-driven part, and an ash plow carried by said pan, and selectively rotatable either with said positively-driven part or with said frictionally-rotated part.

3. In a gas producer, a rotary fuel-containing shell and a rotary ash pan, means for imparting positive rotation to only one of said parts, with the other part adapted to derive frictional rotation from said positively rotated part in consequence of the friction of the contained bed of fuel and ash, a frictional braking device operable on said frictionally rotated part to establish a differential between its rotation and that of said positively rotated part, an ash plow mounted in said pan and adapted selectively to rotate in unison either with said positively-driven part or with said frictionally-driven part, and means for controlling the action of said plow by said braking device.

Dated this 22nd day of September, 1926.

ANSON K. BRADLEY.