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C. W. LUMMIS

GAS PRODUCER

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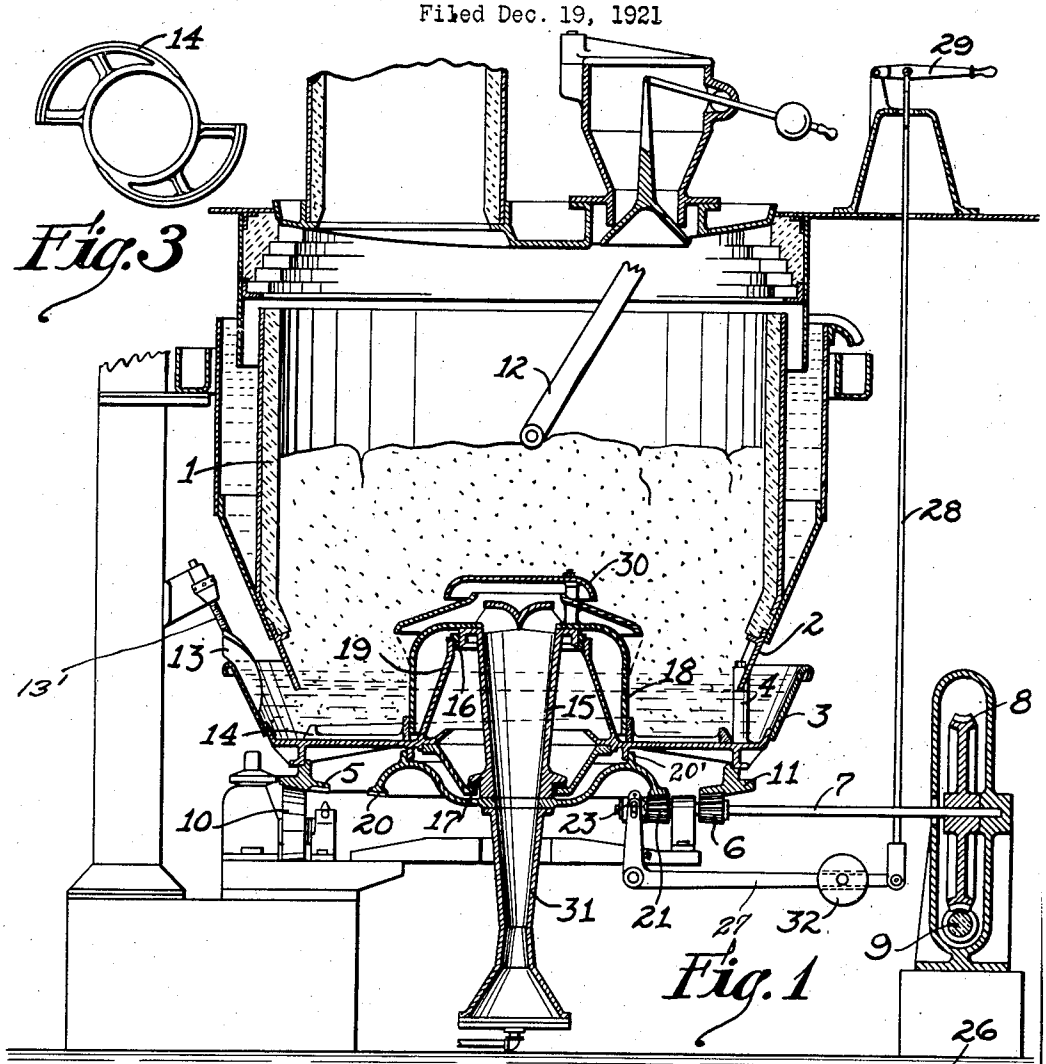


Fig. 3

Fig. 1

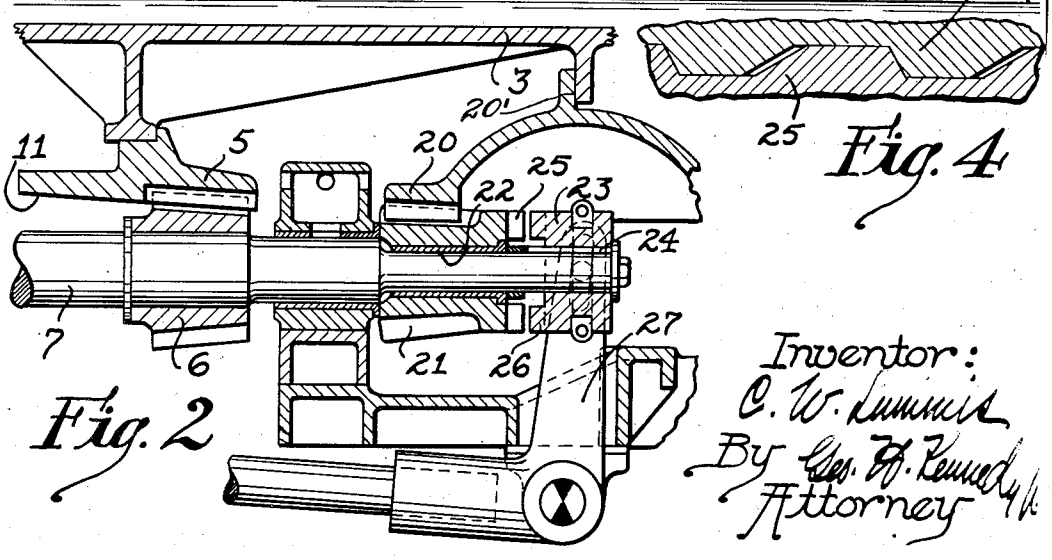


Fig. 2

Fig. 4

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GAS PRODUCER.

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The present invention relates to gas producers, and more particularly involves improvements in the instrumentalities employed for procuring and controlling the discharge of ashes from the producer during the gas making operation.

The invention contemplates an exceedingly simple combination and arrangement of elements for these purposes, having all the capabilities of much more complicated prior art devices, in procuring the automatic agitation of the fuel bed and the discharge of ashes therefrom, the construction being fully described hereinafter with reference to the accompanying drawings, wherein,

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

Fig. 2 is an enlarged detail view showing the operating mechanism partly in elevation and partly in vertical section.

Fig. 3 is a plan view of an ash plowing member.

Fig. 4 is a fragmentary enlarged development in plan of certain safety clutch details.

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

Referring particularly to Fig. 1, the gas producer therein illustrated embodies the usual fuel containing shell 1; said shell has a depending skirt 2, which is adapted to make a seal with the body of water contained in the usual bottom or ash pan 3. The pan 3 supports the shell 1 above it by means of a plurality of spaced posts 4 only one of which is shown, and the entire shell and pan structure as a unit is supported for rotation through its attached annular track 11 secured to the bottom of the pan 3, and running on an annular series of rollers, one of which rollers is shown at 10, Fig. 1. Formed integrally with the track 11 is an annular gear 5 which meshes with a pinion 6 that is keyed to a constantly rotating actuating shaft 7. Said shaft 7 is driven from any suitable source of power, not shown, by a worm gear 8 and worm 9, and thus imparts continuous rotation to the unit pan and shell structure.

By this construction the fuel bed is subjected to a continuous rotation, which enables the upper surface thereof to be properly and continuously agitated, as for instance by means of a surface agitating device 12, which is here shown as a swinging radial leveller adapted to float on the surface of the fuel, and to change its position in response to the variations in the level thereof, as fully described in Letters Patent No. 1,251,064, granted December 25, 1917, to Lummis and Isley.

The removal of ashes from the producer is accomplished by a stationary inclined plow 13, disposed peripherally of the pan 3 and adjustable vertically relative to said pan by means of a screw 13'. This plow 13 works in cooperation with a double spiral plow 14 on the bottom of the pan, said plow 14 being preferably of the skeleton construction shown in Fig. 3. In operation, said plowing member 14, as hereinafter described, sweeps over the surface of the bottom of pan 3, being of such a diameter as not to interfere with the peripheral supports 4, and crowds the ashes outwardly beyond said posts, thereby disposing them in position to be removed by the plow 13.

The plow 14 is adapted to rotate either in unison with the pan 3 and shell 1, or at a different speed; when rotation in unison occurs, the plow 14 is inoperative, but when relative movement takes place, in the manner hereinafter described, the plowing function is obtained, and the ash is crowded outwardly over the bottom and up the side of the pan for removal by the plow 13. The operation of the plow 14 is controlled in the following manner:—

A centrally disposed member 15 passes upwardly through the ash pan 3, the latter having an inner water containing flange 19, which provides a bearing 16 for the support of member 15, and for its rotation when desired. A similar lower bearing 17 for said member 15 is also preferably provided. The rotatable member 15 is connected to the plow 14 by an annular member 18, the latter being in the form of a skirt which enters the water in the pan 3 and effectually seals and prevents any escape of gas past the running joint which member 15 makes at the bearing 16 with said pan. The attachment of the plow 14 to the lower end of the member 18 is made in any suitable way to constrain rotation of said parts in unison, preferably however, so that the weight of said plow is sustained by the ash pan, rather than by the bearings 16 and 17.

In the absence of independent rotation

imparted to the plow 14 through members 15 and 18, said plow rotates in unison with the pan 3 and shell 1, as do also said members 15 and 18, because of their direct support by said pan. Under these conditions there is substantially no agitation of the lower portion of the fuel bed, and hence no appreciable movement of ashes in the pan 3. The present invention however, provides for a positive independent rotation of said plow 14, through the agency of the members 15 and 18, and this is accomplished in the following manner:—

Secured to the member 15 is a gear 20, which, inwardly of its periphery, makes a running joint at 20′ with a flange on the bottom of ash pan 3, this permitting the gear and pan to rotate at different speeds. Said gear 20 meshes with a pinion 21 that normally runs loosely on a sleeve 22 on constantly rotating shaft 7. Adjacent the loose pinion 21 is a clutch collar 23, the latter being attached to shaft 7 by a key or spline 24, which compels its rotation with the shaft, but permits of its longitudinal movement thereon. The opposing faces of pinion 21 and collar 23 are provided respectively with cooperating clutch jaws 25 and 26, Fig. 2, normally out of engagement, but which may be thrown into engagement by longitudinal movement of the collar 23. This collar 23 is adapted to be moved by a bell-crank shipper lever 27, to which is pivotally connected a link 28, the latter extending to the operating floor and being actuated by a hand lever 29, the manipulation of which, as will be seen, engages and disengages the clutch.

When the clutch teeth are thrown into engagement, the rotation of shaft 7 is imparted to the pinion 21, and the relation of said pinion to the gear 20 is such that the plow 14, through members 15 and 18, is rotated at a slightly higher speed than the shell 1 and pan 3. That is, with driving pinions 6 and 21 of substantially the same size, as shown, the gear 20 being smaller than the gear 5, will have imparted thereto a higher speed of rotation than gear 5. Such relative movement causes the ash upon the bottom of rotating pan 3 to be crowded outwardly, the crowding force being exerted substantially in the plane of support of the ash, or approximately at the lowest position that the ash reaches before being discharged through the water seal. The arrangement is such that the ash is maintained continuously under the influence of plow 14, even after passing out of contact therewith, there being no abrupt deflection of the ash from the line of the force exerted by said plow until the ashes reach the outer wall of the pan 3; there they are crowded upwardly by the ashes behind, which are being pushed out by the plow 14.

With the producer operating at its maximum capacity and with coal having a very high ash content, it may be necessary to rotate the plow 14 through the clutch connection with shaft 7 practically all of the time. On the other hand, with lower rates of gasification and with coals of a lower ash content, the clutch 23 will only be thrown in intermittently.

The central member 15, through which rotation is imparted to the plow 14, is preferably made hollow, for the conveyance of air or air and steam blast to the usual blast hood 30; the supply of blast is furnished in any suitable manner, as by a pipe 31 communicating with the lower end of central member 15. As shown in Fig. 4, the angles of the clutch jaws 25 and 26 are such that the clutch is self-releasing, when an undue resistance to the rotation of the plow 14 is encountered. These jaws are prevented from disengaging, under normal conditions, in the absence of undue resistance, by the weight of the clutch-actuating parts, and also, if necessary, by the provision of an adjustable weight 32 on the lever 27.

According to the present invention the shell of the producer is supported from the ash pan in such a manner as to do away with all obstructions to the free descent of the ash; and, notwithstanding this form of support, the plowing mechanism is such as to procure the delivery of ashes beyond the supporting means, for discharge from the periphery of the pan. In addition, it is to be noted that this plowing action is obtained, when desired, without affecting the distribution of blast; in other words, the plowing mechanism is never compelled to operate in order to assist the distribution of blast, at times when the plowing of ashes might be detrimental.

I claim,

1. In a gas producer, an ash pan whose bottom provides the lowest level reached by the ashes prior to their discharge from the producer, a fuel shell, peripherally arranged supports connecting said shell with the ash pan bottom and uniting pan and shell for rotation in unison without obstruction to the free descent of ashes into said pan from said shell, means for rotating said pan and shell in unison during the operation of the producer, a separate rotary plowing member effective on the bottom of said pan, and at said lowest ash level, thereby to procure movement of ashes on said bottom beyond said peripheral supports, and means selectively operable to permit rotation of said plowing member in unison with said pan and shell, or to procure rotation of said member at a different speed.

2. In a gas producer, an ash pan, a fuel shell, peripherally arranged supports connecting said shell with the ash pan bottom

and uniting pan and shell for rotation in unison without obstruction to the free descent of ashes into said pan from said shell, means for rotating said pan and shell in unison during the operation of the producer, a separate rotary plowing member within the ash pan, and effective on the ashes therein at the lowest level reached by said ashes prior to their discharge from the producer, thereby to procure movement of said ashes on the ash pan bottom beyond said peripheral supports, said plowing member, when free, being rotatable in unison with said pan, and means for independently rotating said plowing member at a different speed from the speed of said pan.

3. In a gas producer, a fuel shell, a water-seal pan whose bottom affords the lowest point of support for the bed of ash and fuel, means for rotating said shell and pan in unison, an ash plow supported on the bottom of said pan for rotation in unison therewith when said plow is inoperative, means for selectively imparting an independent rotation to said plow at a different speed from the speed of shell and pan, to render said plow operative, and means for automatically interrupting the independent rotation of said plow in the event of undue resistance thereto.

4. In a gas producer, an ash and water-seal pan, a fuel shell, peripherally arranged supports connecting said shell with the bottom of said pan and uniting pan and shell for rotation in unison without obstruction to the free descent of ashes into said pan from said shell, means for imparting rotation to said pan and shell during the operation of the producer, a plowing member supported on the bottom of said pan and effective on the ashes therein at the lowest level reached by said ashes prior to their discharge from the producer, thereby to procure movement of said ashes on the bottom of the pan beyond said peripheral supports, a rotatable member to which the said plowing member is secured, said rotatable member making a seal with the water in said pan, and means for imparting rotation to said last named member at a speed different from the speed of pan and shell.

5. In gas producer, a shell and a water-seal pan connected together and for rotation in unison, means for supporting said shell from said pan, an independently revoluble ash plow supported on the bottom of said pan, a rotatable member to which said plow is secured, said member making a seal with water in said pan, and means for imparting a rotation to said member independently of and at a speed different from the rotation imparted to pan and shell.

6. In a gas producer, a fuel shell, a water-seal pan whose bottom affords the lowest point of support for the bed of ash and fuel in said producer, means for rotating said shell and pan in unison, an independently revoluble ash plow supported on the bottom of said pan and adapted to rotate in unison therewith when said plow is inoperative, a rotatable member to which said plow is secured, said member making a seal with the water in said pan, and means for imparting an independent rotation to said member at a speed different from that of pan and shell, to render said plow operative when desired.

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