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GAS PRODUCER

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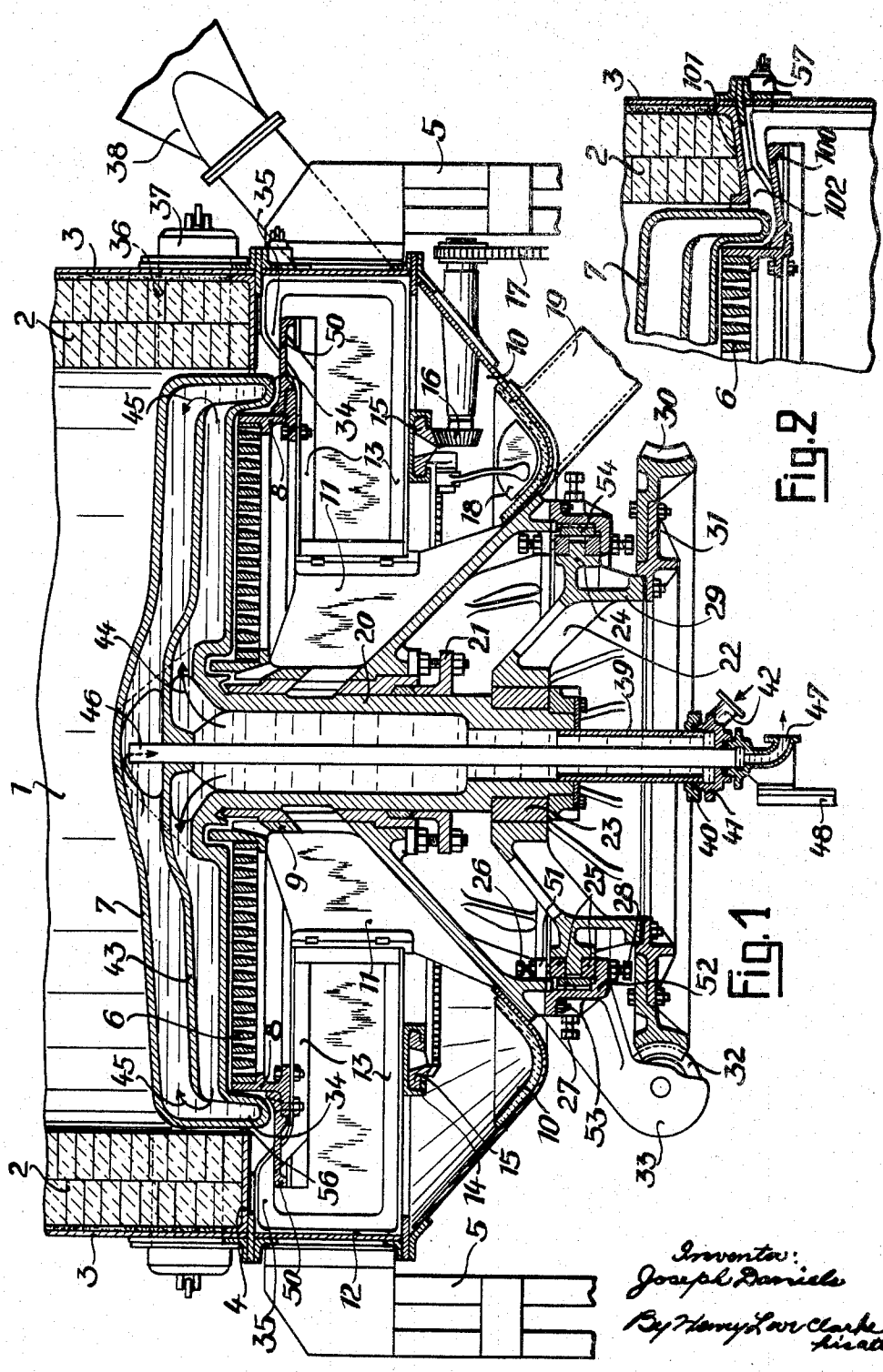

Fig. 2

Fig. 1

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GAS PRODUCER

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This invention relates to gas producers having a stationary horizontal grate above which is arranged an agitating member driven by a centrally disposed vertical shaft.

The present invention principally consists in arranging the ash receptacle casing and the supporting frame for the vertical shaft of the agitating member independently of one another in such a way that the hot ash does not come into contact with the supporting frame for the agitating member shaft and the bearings for same.

According to the invention, the supporting frame for the agitator shaft, and the bearing, as well as the drive, for the agitator shaft are situated underneath the ash receptacle casing in a central recess in the same and are supported on the ash receptacle casing which is firmly connected with the gas producer shaft. The supporting frame is preferably constructed conically corresponding to the central recess in the ash receptacle casing, the outer rim of this cone being slidable in a revolving manner on a bearing face which is attached to the ash receptacle casing. The supporting frame for the agitating member is rotated by means of a suitable drive arranged outside the ash receptacle casing and the gas producer, respectively.

In the gas producer constructed according to this invention, the hot ash pressed by the agitating member through the grate openings does not come into contact with the supporting frame and the drive for the agitator but instead they lie in a cool zone. Thus a warping of the supporting frame, as a result of the heat accumulating in the hot ash, is safely prevented and the exact central position of the agitating member is assured. Furthermore the drive and the bearing are not soiled by the penetrating ash.

Other features of the invention consist in providing the supporting frame for the agitator shaft with a rim-like extension directed downwards at the circumference of which is disposed the gear tooth system for the drive of the agitating member. Furthermore the bearing for the pinion engaging in the teeth of this driving rim is arranged outside on the ash receptacle casing.

This invention also has for its object to arrange within the substantially annular ash receptacle casing an ash scraper held by a movable supporting ring and separately driven which scraper discharges the ash into a suitable outlet of the ash receptacle casing.

Furthermore this invention comprehends the provision of a ring extension underneath the support for the horizontal grate on its circumference, the producer shaft bricklining with intervening space extending down to underneath the plane of the top of the grate on this ring extension. At the end of the agitating member there is arranged a downwardly directed extension which extends to near the ring extension of the grate support.

Finally another advantage of this invention is that the bearing faces for the support of the agitating member shaft are adjustable on the bearing point axially and radially to the axis of the agitating member.

The main feature of the apparatus embodying my invention is that it makes it possible that the drive and the bearing for the highly stressed agitating member are freely accessible from outside and are in particular exactly adjustable so that the bearing and the drive will not only be properly attended to but they may even be exactly adapted with respect to any alterations made to the shape of the lower part of the gas producer.

Further objects and features of my invention will be in part obvious and in part specifically pointed out in the description hereinafter contained which, taken in conjunction with the accompanying drawing, discloses a preferred embodiment thereof; such embodiment, however, is to be considered merely as illustrative of its principles. In the drawing:

Fig. 1 is a vertical section of the lower part of a gas producer constructed in accordance with the invention.

Fig. 2 shows another embodiment of the ring extension arranged on the grate support and of the lower end of the bricklining of the gas producer.

The gas producer shaft 1, as illustrated on the drawing is formed of refractory brickwork 2 which is surrounded by a shaft jacket 3 constructed of sheet iron or another suitable material and the brickwork 2 is carried by a ring-like supporting slab 4 connected with the jacket 3. The shaft jacket 3 rests on supports 5 that are placed on suitable foundations, which for simplicity's sake are not shown on the drawing.

The gas producer shaft 1 is closed below by a stationary horizontal grate 6 over which rotates a water-cooled agitating member 7. The grate 6 is supported at the circumference by a support 8 having the shape of a ring and in the middle by a carrying rim 9 forming part of the ash receptacle casing 10.

As may be seen from the drawing, the ash receptacle casing 10 is connected with the supports 5. The casing 10 has essentially the shape of an annular body with an annular conically tapered bottom of the form of an inverted cone in cross section. A multitude of bracing ribs 11 are provided around the middle of said casing 10 for supporting the rim 9. A series of upper and lower ribs 13 are disposed between the bracing ribs 11 and the circumference 12 of the ash receptacle casing 10. The upper ribs 13 carry the circumferential support 8 and are bent in the

form of steps extending downwardly from the circumference 12 of the ash receptacle casing 10 towards the center of the casing 10.

The lower ribs or webs 13 carry a supporting ring 14 to which is attached a bevel gear tooth rim 15, said tooth rim being driven through the pinion 16 by means of chain gearing 17 outside the casing 10. To the tooth rim 15 there is fixed an ash scraper 18 which moves over the bottom of the ash receptacle casing 10 thus discharging the ash accumulating on the bottom into the ash outlet pipe 19.

The agitating member 7 revolving over the grate 6 has in the center a cylindrical extension 20 extending downwards which extension serves as a driving shaft for the agitating member 7. The agitating member 7 and the pivot 20 are preferably made as a combined cast steel body.

The driving shaft 20 extends through the central carrying rim 9 of the ash receptacle casing 10 and reaches outside of the bottom of the ash receptacle casing 10. A gas-tight connection between the shaft 20 and the casing 10 is arrived at by means of a stuffing box seal 21.

An annular, preferably conical, supporting frame 22 is rigidly connected with the lower end of the shaft 20, the connection between the revolving supporting frame 22 and the shaft end 20 being secured by wedges 23 or in another suitable manner. The supporting frame 22 is fitted at the circumference with a rim projection 24 being T-shaped in its cross section and serving as a bearing body. Annular upper and lower bearing parts 25, which may likewise be divided into several segments if necessary, fit against the outer surface of the annular bearing body 24. These bearing rings 25 are under the influence of the upper adjusting screws 26, the lateral adjusting screws 27, and the lower adjusting screws 28 in such a manner that the bearing rings 25 may be set radially towards as well as axially of the axis of the pivot 20. Said adjusting screws are supported on an annular projection 51 of the ash receptacle casing 10, and on a suitable rim 52 preferably divided from but fixed onto the casing 10 by screws 53. Between the rim 52 and the bearing rings 25 there is a divided pressure ring 54 loosely provided therein.

As may be seen from the drawing, the bearing projection 24 of the supporting frame 22 is of a very large diameter as compared with the diameter of the agitator shaft 20 so that a proper supporting of the agitator shaft even against the high stresses occurring during the operation of the gas producer is assured. Due to the adjustability of the bearing in radial as well as in axial direction of the revolving axis of the agitator shaft 20 there is the possibility of adapting the range of the movement of the agitating member 7 exactly to the desired position and shape of the horizontal grate 6. The agitating member 7 can therefore be reset also during the operation of the gas producer in such a manner that it moves exactly at the desired distance over the face of the grate 6.

The supporting frame 22 for the agitator shaft 20 has an annular extension 29 directed downwardly to which is rigidly attached the driving part 31 which is equipped with worm tooth gear system 30 for rotation of the agitating member 7.

A worm 32 carried in a supporting arm 33 engages the worm tooth gear system 30. Said supporting arm 33 is firmly connected with the rim 52 which is attached to the ash receptacle casing 10 and its exact position is likewise adjustable in correspondence with the adjusting possibility of the supporting frame 22 which carries the driving part 31.

Due to this connection arrangement of the driving means with the agitating member 7, security is given that all the parts of the drive, even at maximum stressing, maintain their proper position so that a jamming within the drive or a unilateral stressing of the circumferential tooth system of the agitating member drive 31 may easily be avoided.

As likewise shown in the drawing, the support 8 for the grate 6 is equipped with a continuous horizontal extension 50. Between the inner face of the shaft wall 2 and the circumference of the grate support 8 there is a free space 56. The projections 34, arranged at the ends of the agitating member 7, extend into the thus formed free space 56. Furthermore the bricklining 2 of the producer shaft jacket reaches down to underneath the plane of the upper parts of the grate 6. This arrangement assures that all the parts of the shaft adjacent to the grate can be maintained at a favorable high operating temperature. The ash accumulating on the grate bottom will not form any lumps, the crushing of which is practically impossible during normal operation. On the other hand, the ash is discharged also by the projection 34 of the agitating member 7, through the space 35 between the supporting plate 4 of the producer shaft bricklining and the annular grate support with its projection 50, into the ash receptacle casing 10 which procedure is of advantage insofar as lumps which do not fall through the grate openings also may be removed through this joint.

In order to be able to remove ash lumps from the gas producer when the operation is interrupted, openings 36, which may be closed by the lids 37, are provided on the same level as the grate of the producer shaft jacket.

The gasifying media for instance steam, or air and steam may be introduced into, and the water gas evolved during the downrun period of the water gas process may be withdrawn from the ash receptacle casing through the pipe 38.

The agitating member 7 is adapted for rotating over the horizontal grate 6 and is equipped with a water cooling system. The cooling water is delivered through the hollowing agitator shaft 20, which for this purpose is fitted below with a connecting pipe 39 coupled to coupling 41, having a stationary cooling water inlet pipe 42 and outlet pipe 47, by means of a stuffing box 40. The cooling water is led through the branch 42 and then flows through the connecting pipe 39 into the shaft 20 from where it is led off into the cavity of the agitating member 7 which is suitably fitted with a central partition 43 (see arrow 44). At the ends of the agitating member 7 the cooling water flows into the space above the partition 43 (see arrow 45) and is finally discharged through an outlet pipe 46 provided in the shaft 20. The lower end of the outlet pipe 46 is connected with the outlet branch 47. The coupling means for the intake and offtake of the cooling water (see part 41) are mounted on a special frame 48 which is suitably fastened to the bottom or the supports of the gas producer.

As shown in Fig. 2 the annular circumferential support 100 extends slantwise upwards to

the outside. Also the brickwork support 101 is inclined thereto.

The inclination of the circumferential slot 102 thus formed, which serves for the ash extraction is advantageous since the ash accumulates in the sloped slot, thus affording an effective closure for the slot against the passage therethrough of the gasifying media, and hot air blast introduced to the fuel bed from underneath the grate into the space above the grate. These media are therefore forced to flow practically only through the openings in the horizontal grate 6 into the gas producer shaft. At the part of the producer shaft bricklining near the slot 102, the temperature remains therefore practically equal which is of special advantage for the life of the bricklining. This effect may still be improved by having the openings on the circumference of the grate provided at a certain distance from the producer shaft wall.

At the height of the intervening space 102 there is still further provided, in the wall of the casing, a closable opening 57 through which any accumulations of ash lumps may be removed, if necessary.

I have now above described my present invention on the lines of a preferred embodiment thereof but my invention is not limited in all its aspects to the mode of carrying it out as described and shown, since the invention may be variously embodied within the scope of the following claims.

I claim:

1. A gas producer comprising an annular shaft with an outer casing, a stationary grate provide with openings for the passage of ash and gaseous media therethrough, an agitating member mounted for rotation over the upper surface of the grate, an ash receptacle casing underneath the grate firmly connected with the casing of the gas producer shaft, a centrally disposed driving shaft for said agitating member extending through the grate and the ash receptacle casing, said ash receptacle casing supporting the middle of the grate and having a central conical wall around the driving shaft, an adjustable annular bearing for the supporting shaft disposed outside of but beneath the ash receptacle casing, a supporting frame firmly connected with the driving shaft and lying outside the ash receptacle but substantially in the area of the central conical wall of the ash receptacle casing and arranged rotatably in said annular bearing.

2. A gas producer as claimed in claim 1, and in which the supporting frame for the driving shaft of the agitating member is provided with a circumferential extension below the annular bearing having fastened thereto a driven ring-gear, and in which an operating gear therefor is arranged in a bearing fastened to the outside of the bottom of the ash receptacle casing.

3. A gas producer as claimed in claim 1, and in which the supporting frame for the driving shaft of the agitating member is provided with a circumferential extension below the annular bearing having fastened thereto a driven ring-gear, and in which an operating gear therefor is arranged in a bearing fastened to the outside of the bottom of the ash receptacle casing, said supporting frame having on its circumference a vertical rim with a centrally disposed outwardly extending horizontal rib, and in which the annular bearing is constituted of spaced upper and lower vertically slidable rings provided with adjusting screws operable from above and below and an encompassing ring laterally adjustable and operable by adjusting screws from the side, for axial and radial adjustment of the setting of the supporting frame and the agitating member, said centrally disposed outwardly extending horizontal rib being rotatably slidable within the rings of the adjustable bearing.

4. A gas producer as claimed in claim 1, and in which a ring is mounted for sliding rotation inside the ash receptacle casing and in which an arm is attached to the ring, said arm reaching to the bottom of the ash receptacle casing and having an ash scraper thereon, said sliding ring having a ring-gear, a pinion therefor, and a driving shaft for said pinion extending through the ash receptacle casing to the outside of same.

5. A gas producer as claimed in claim 1, and in which the shaft is constituted of brickwork extending down to a level underneath the top of the grate, said brickwork being carried by an annular plate connected with the producer shaft casing, and in which the inner wall surface of the brickwork of the producer shaft is spaced from the outer extremity of the grate to leave a free annular space, and in which said grate has an ash retaining shelf extending from the bottom of the grate underneath said free space and reaches out underneath the shaft brickwork at a spaced distance therefrom to prevent gaseous media from flowing around the grate through said free annular space.

6. A gas producer as claimed in claim 1, and in which the shaft is constituted of brickwork extending down to a level underneath the top of the grate, said brickwork being carried by an annular plate connected with the producer shaft casing, and in which the inner wall surface of the brickwork of the producer shaft is spaced from the outer extremity of the grate to leave a free annular space, and in which said grate has an ash retaining shelf extending from the bottom of the grate underneath said free space and reaches out underneath the shaft brickwork at a spaced distance therefrom to prevent gaseous media from flowing around the grate through said free annular space, and in which the agitating member comprises a beam having a downwardly directed extension at both ends, said extensions reaching into the free annular space between the shaft brickwork and the outer grate extremity.

7. A gas producer as claimed in claim 1, and in which the shaft is constituted of brickwork extending down to a level underneath the top of the grate, said brickwork being carried by an annular plate connected with the producer shaft casing, and in which the inner wall surface of the brickwork of the producer shaft is spaced from the outer extremity of the grate to leave a free annular space, and in which said grate has an ash retaining shelf extending from the bottom of the grate underneath said free space and reaches out underneath the shaft brickwork at a spaced distance therefrom to prevent gaseous media from flowing around the grate through said free annular space, the annular supporting plate for the brickwork of the producer shaft being inclined towards the interior of the shaft, and the ash retaining shelf of the grate being likewise inclined substantially parallel thereto.

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