

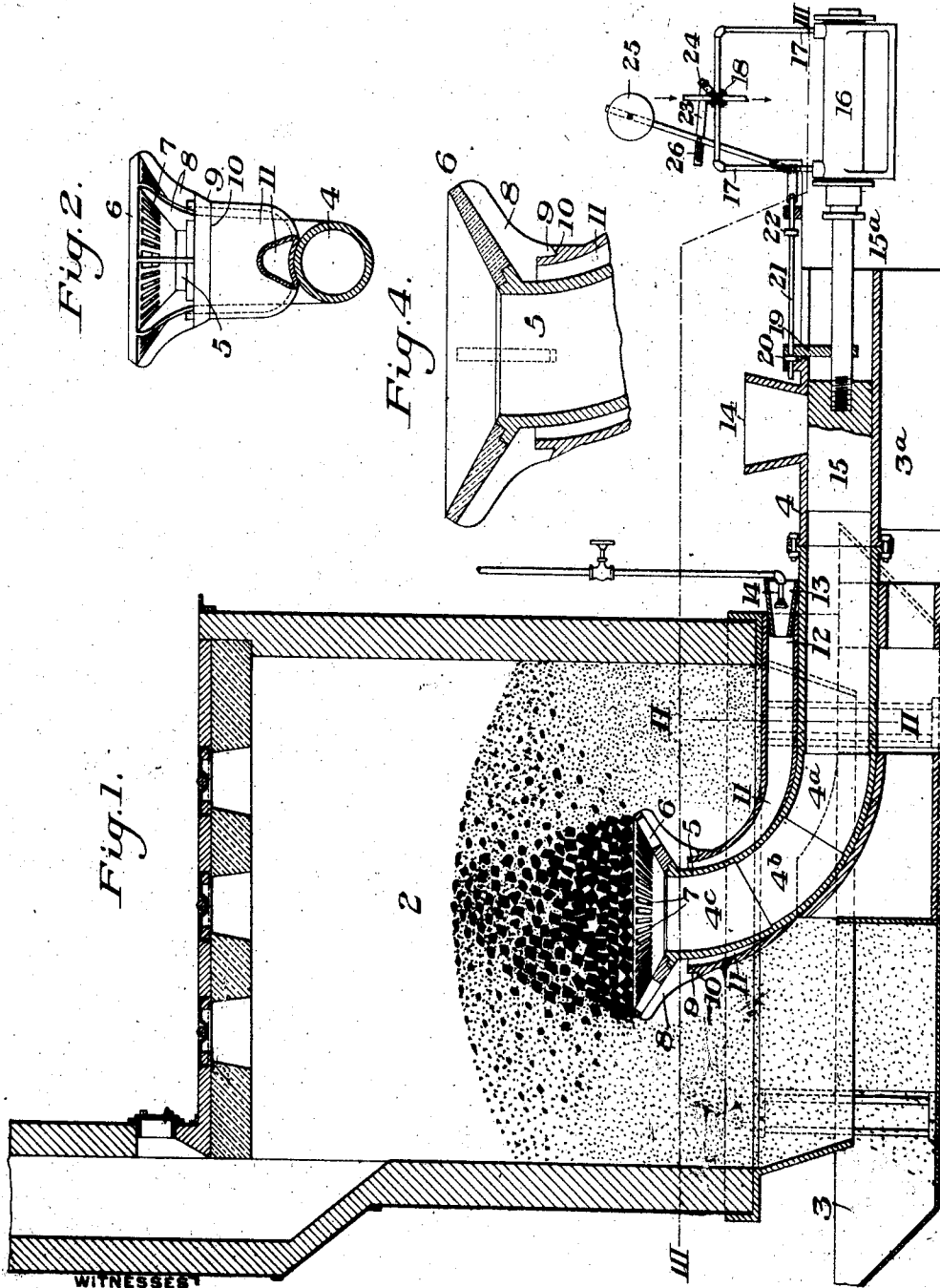
J. C. & J. A. SWINDELL.
GAS PRODUCER.

APPLICATION FILED APR. 15, 1909.

Patented Jan. 18, 1910.

2 SHEETS—SHEET 1.

947,065.



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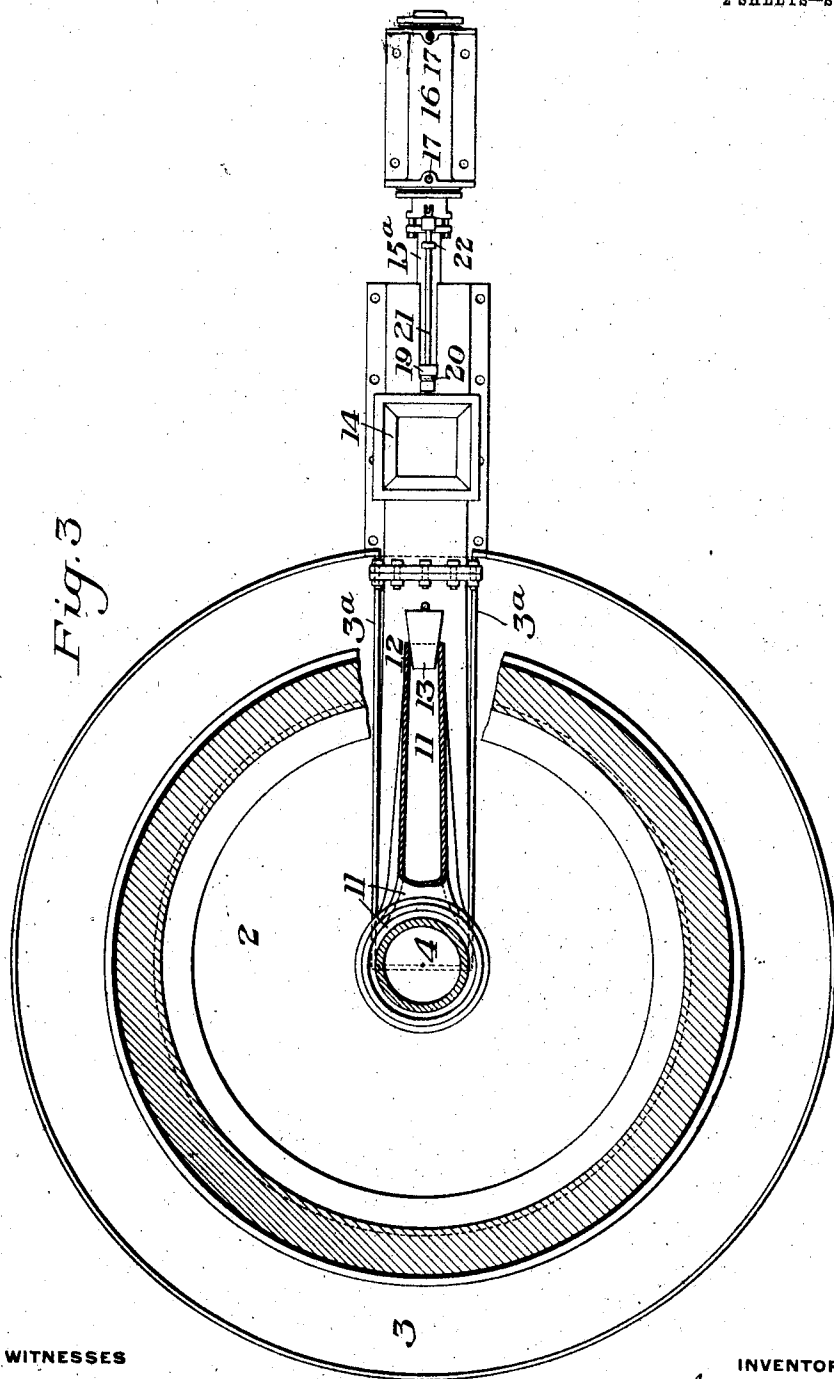
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UNITED STATES PATENT OFFICE.

JOHN C. SWINDELL AND JOHN A. SWINDELL, OF PITTSBURG, PENNSYLVANIA.

GAS-PRODUCER.

947,065.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed April 15, 1909. Serial No. 490,144.

To all whom it may concern:

Be it known that we, JOHN C. SWINDELL and JOHN A. SWINDELL, both of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Gas-Producers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of a gas producer showing our invention applied thereto; Fig. 2 is a detail section on the line II—II of Fig. 1; Fig. 3 is a horizontal section on the line III—III of Fig. 1 with a portion of the furnace wall broken away; and Fig. 4 is a detail sectional view showing a modification.

Our invention has relation to gas producers of the water-sealed type; and is designed to provide means whereby furnaces of this type may be supplied with fuel by an underfeed. Our invention is also designed to provide means of this character so arranged that the incoming fuel effect a more or less constant agitation of the fuel bed, thus maintaining it in proper condition and freeing it from ash; also to feed the air and steam to the fuel bed in such a manner that the hottest portion of the fuel bed will be at the central and intermediate portions of the furnace instead of at the sides, thereby preventing to a large extent the formation of clinkers on the side walls of the furnace.

The precise nature of our invention will be best understood by reference to the accompanying drawings, in which we have shown the preferred form thereof, and which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of the parts without departing from the spirit and scope of our invention as defined in the appended claims.

In these drawings, the numeral 2 designates a gas producer furnace, which may be in general of any approved type, and which is shown as having the water-sealing pan or basin 3 at its base.

4 designates a feed pipe, which extends horizontally into the base of the furnace from one side and thence upwardly to a point within the fuel space of the furnace, where it terminates in a shouldered end portion 5, upon which is removably supported a funnel-shaped grate 6. This grate may consist of a funnel-shaped casting, having

its lateral wall provided with the series of openings 7 and having exterior supporting ribs 8 which are shouldered at their lower ends, as indicated at 9, to engage a shoulder 10 at the upper inner end portion of a steam and air supply pipe 11. In this manner the grate is given a double support, which enables it to sustain the load of fuel which rests upon it in use, as indicated in Fig. 1. The steam and air supply pipe 11 extends into the base of the furnace immediately above the feed pipe 4, having a circular outer end portion 12, into which extends a nozzle 13 and steam jet 14. The pipe 11 gradually changes its section, as indicated in Fig. 2, and from the point shown in Fig. 2 flares out and surrounds the upwardly extending end of the feed pipe in the manner shown in Fig. 1 so as to form a discharge portion which concentrically surrounds the upper portion of the feed pipe, the upper end of said discharge portion terminating a short distance below the upper end of the feed pipe.

Any suitable means may be employed for feeding the fuel through the pipe 4 into the furnace. In the drawing, I have shown the pipe 4 as provided with a supply hopper 14, and as having therein a plunger 15, which is arranged to reciprocate below the hopper and carried by the rod 15 whose opposite end extends into a power cylinder 16. The power cylinder 16 is a double-acting cylinder having the supply pipes 17 and reversing valve 18. The valve 18 is controlled as follows:—The rod 15 has a tappet arm 19 secured thereto, and which is designed to engage a collar 20 on a longitudinal movable shifting rod 21 at the end of one stroke of the plunger 16; and to engage a similar collar 22 on said rod at the limit of the opposite stroke of the plunger. The rod 21 has a link connection 23 with an arm 24 on the stem of the valve 18. This link connection is also provided with a counterweight 25, which is arranged to be thrown past center by the movement of the rod 21, and thereby act to shift the valve, sufficient lost motion being provided in the connections, as indicated at 26, to prevent the rod 21 from acting directly to shift the valve. This and other suitable forms of feeding apparatus forms the subject-matter of our copending application Serial No. 490,143 and is not specifically claimed herein. In order to free the column of fuel, which is moved through the feed

pipe 4 into the furnace by the action of the plunger 15, and also to relieve largely the back pressure on the plunger, due to such column of fuel, the discharge end portion of said feed pipe is preferably provided with sections 4^a, 4^b, and 4^c, which are of progressively increasing diameters.

The operation will be readily understood. At each backward stroke of the plunger 15 a quantity of fuel falls into the feed pipe 4 from the hopper 14, and upon the forward stroke of the plunger this fuel is moved forwardly through the feed pipe toward the furnace, causing the discharge into the central portion of the fuel bed of an approximately equal quantity of fuel at each forward stroke. This fuel enters the central portion of the feed bed in this manner, thereby raising and loosening the previously fed fuel, thus providing for proper combustion and keeping the fuel bed free of ash. The air and steam supplied by the nozzle 13 and steam jet 14 pass through the pipe 11, and a portion is discharged outwardly in all directions at the upper end of the pipe 11 while the remainder passes out through the funnel-shaped grate 6. In this manner a proper quantity of steam and air is discharged directly into the central portion of the fuel bed; and the hottest portion of such bed will be at the central portion thereof and between the green fuel and the ash instead of at the sides. The larger portion of the fuel will, therefore, be reduced to ash before it reaches the sides of the furnace, as indicated in Fig. 1. This largely reduces the formation of clinker on the side walls of the furnace, and also greatly facilitates the proper operation of the furnace.

To receive the pipes 4 and 11 the water pan or basin 3 is provided with the separated end walls 3^a, as shown in Fig. 3, said walls forming a trough through which the pipes extend into and through the base portion of the furnace.

In the modification shown in Fig. 4, the openings 7 in the funnel-shaped grate 6 are omitted and the said funnel-shaped member is formed as a solid piece detachably supported in a manner similar to that shown in Fig. 1, so that it can be readily removed and renewed when necessary.

The advantages of our invention will be readily apparent to those skilled in the art, since, as above described, the fuel, together with the steam and air are fed to the furnace in such a manner as to overcome the difficulties which have heretofore been experienced in the operation of furnaces of this type. We do not, however, limit ourselves to the precise construction and arrangement of the parts which we have herein shown and described; as it will be obvious that numerous changes can be made therein. Thus, our fuel feeding apparatus is applicable to producer

furnaces of other constructions than those indicated in the drawings; any desired feeding apparatus may be employed for forcing the column of fuel through the feed pipe; and changes may be made in the details and arrangement of such feed pipe and of the air and steam supply pipe.

What we claim is:—

1. A gas producer having a water-sealing bosh, a fuel feed pipe extending upwardly into the central portion of the fuel bed, said pipe terminating in an open discharge, and means for discharging air and steam into the central portion of the fuel bed in a zone surrounding the central fuel discharge, the producer being otherwise closed against the entrance of air into said bed, and there being a free fuel and ash space surrounding the feed pipe and extending downwardly to the water bosh, substantially as described.

2. A gas producer having a water-sealing bosh, a fuel feed pipe extending through the bosh and upwardly into the central portion of the fuel bed, and terminating in a funnel-shaped discharging portion, a steam and air supply pipe having a portion which surrounds the upper portion of the fuel feed pipe, said steam and air pipe terminating below the funnel-shaped discharge portions and having its upper end open, substantially as described.

3. A gas producer having a water-sealing bosh, a fuel feed pipe extending through the bosh and upwardly into the central portion of the fuel bed, and terminating in a funnel-shaped discharging portion; a steam and air supply pipe having a portion which surrounds the upper portion of the fuel feed pipe, said steam and air pipe being arranged to discharge steam and air into the fuel bed and at a point below the fuel discharge, and the producer being otherwise closed against the entrance of air to said bed, substantially as described.

4. A gas producer having a fuel feed pipe extending upwardly through its base into the fuel chamber and a steam and air supply pipe having its inner end surrounding the upper portion of the fuel feed pipe but terminating at a point below the upper end of the fuel feed pipe, the steam and air supply pipe being open at its upper end and arranged to discharge steam and air around the fuel feed pipe, substantially as described.

5. A gas producer furnace, having a fuel feed pipe extending upwardly through its base into the fuel chamber, and having its upper end portion formed by portions or sections of progressively increasing diameters, with an upwardly facing shoulder or ledge at the junction of said portions, substantially as described.

6. A gas producer furnace, having a fuel

feed pipe extending upwardly through its base into the fuel chamber, and having its upper end portion formed by portions or sections of progressively increasing diameters, each section or portion being of a uniform diameter throughout its length, but each section being of a greater diameter than the preceding section, substantially as described.

10 7. A gas producer furnace, having a fuel feed pipe extending upwardly through its base into the fuel chamber, and having its upper end portion formed by portions or sections of progressively increasing diameters, each section or portion being of a uniform diameter throughout its length, but each section being of a greater diameter than the preceding section, with ledges or shoulders at the points where the diameter changes, substantially as described.

20 8. In a gas producer, a fuel feed pipe extending upwardly into the lower portion of the furnace, another pipe surrounding the upper end portion of the feed pipe, and a funnel-shaped discharge member removably supported in the upper end of the fuel feed pipe and also having downwardly tapering rib portions which engage the upper end portion of the second pipe, substantially as described.

30 9. In a gas producer, a fuel feed pipe extending upwardly into the lower portion of

the furnace and having a shouldered upper end, another pipe surrounding the upper end portion of the fuel pipe and also having a shouldered upper end, and a funnel-shaped discharge member removably supported in the shouldered upper end of the fuel feed pipe and also having downwardly tapering rib portions which engage the shouldered upper end portion of the second pipe, substantially as described.

10. A gas producer having a fuel feed pipe extending upwardly through its base into the fuel chamber and a steam and air supply pipe having its inner end surrounding the upper portion of the fuel feed pipe but terminating at a point below the upper end of the fuel feed pipe, the steam and air supply pipe being open at its upper end and arranged to discharge steam and air around the fuel feed pipe, and the fuel feed pipe having a downwardly flared funnel-shaped discharge portion overlying the upper end of the steam and air supply pipe and acting as a deflector for the discharged steam and air, substantially as described.

In testimony whereof, we have hereunto set our hands.

JOHN C. SWINDELL.
JOHN A. SWINDELL.

Witnesses:

GEO. H. PARMELEE,
H. M. CORWIN.