No. 609,705. Patented Aug. 23, 1898.

J. G. SANDERSON.

GAS PRODUCER.

(Application filed Jan. 7, 1897.)

(No Model.)

Fig. 1.

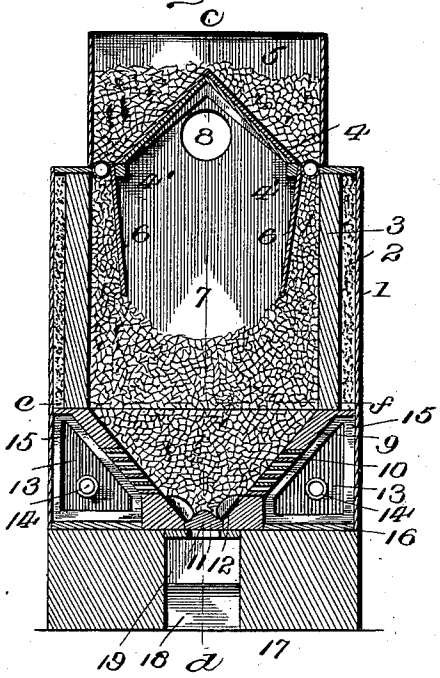


Fig. 2.

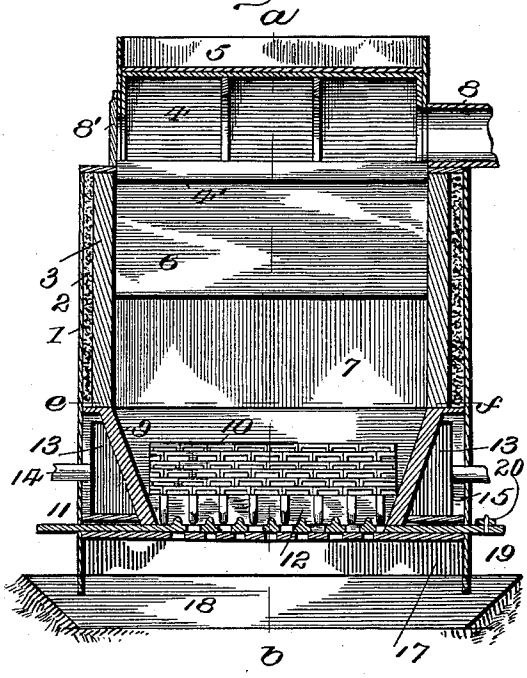


Fig. 3.

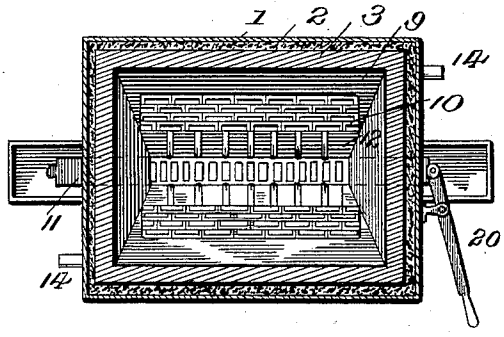
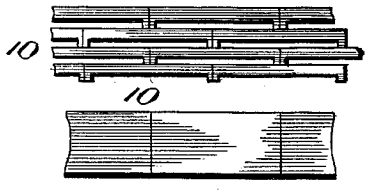


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES GARDNER SANDERSON, OF SCRANTON, PENNSYLVANIA.

GAS-PRODUCER.

SPECIFICATION forming part of Letters Patent No. 609,705, dated August 23, 1898.

Application filed January 7, 1897. Serial No. 618,360. (No model.)

To all whom it may concern:

Be it known that I, JAMES GARDNER SANDERSON, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

My invention consists in the novel construction of a furnace for producing gas, and is especially designed for the use of small coals, such as bituminous breeze and anthracite culm, though larger sizes of coals can be used.

The special features of my present device are the cleaning discharge-valve and means for operating it, the side grates having lateral openings for admission of air and steam, the side chambers where the air and steam are superheated before entering the fuel through the side grates, and the means for feeding the fuel down the sides of the furnace, all of which will be hereinafter more fully described, and pointed out in the claims.

In order that my invention may be fully understood, I will proceed to describe the same with reference to the accompanying drawings, in which—

Figure 1 is a vertical section taken on the line *a b*, Fig. 2. Fig. 2 is a vertical section taken on the line *c d*, Fig. 1. Fig. 3 is a horizontal section through the line *e f*, Figs. 1 and 2; and Fig. 4 is an elevation and plan, on an enlarged scale, of a portion of the side grates.

Similar parts are indicated by the same reference-numbers in the various figures.

1 represents the outer shell or casing, of metal, of the producer; 2, a space filled with any heat-non-conducting material, such as mineral wool, sand, ashes, &c., and 3 a fire-brick lining extending from the line *e f* to the top of the furnace.

4 represents a metal cover or top provided with the ribs, as shown, for giving additional strength and peaked lengthwise of the furnace. This top forms the under side of fuel-hoppers 5 and is supported by metal beams 4′, which are placed a sufficient distance from the sides of the furnace, so as to leave openings for feed-valves along the two sides, through which the fuel is fed to the furnace from the hoppers above. In one end of this peaked (or, it may be, arched) top is the gas-outlet pipe 8, and in the other end is a hinged door 8′.

6 represents converging metal plates extending down from the beams 4′ and forming the inner walls of the magazine-feeders. These plates are inclined away from the sides of the furnace, so as to give the fuel a free downward passage.

7 represents the gas-chamber, in which may be located a feed-water heater (not shown) of any description for supplying the steam-generator, which is necessary for furnishing the steam required in the production of gas under this process.

9 represents the inclined metal sides of the downwardly-converging fire-pot, and 10 the inclined side grates, constructed as hereinafter explained and intended only for the admission of air and steam.

11 represents a horizontal ash-cleaning discharge-valve, the upper portion being adapted to move lengthwise on top of a stationary part, each part having openings which register and the upper portion having projections, as shown.

12 represents metal pieces on each side of the cleaning discharge-valve, located below the side grates and also provided with projections which, being stationary, assist in breaking up clinker when the upper part of the discharge-valve is reciprocated.

13 represents two superheating air and steam chambers into which air and steam are forced under pressure through the pipes 14, and 15 are metal frames supporting the side grates and fire-pot, as well as the portion of the furnace above the fire-pot. These frames rest on the base-plates 16, also of metal, which in turn rest on the foundations 17, preferably of masonry. Beneath the cleaning discharge-valve there is a tank 18, containing water and extending outside the foundation of the producer. The water-level, being above the bottom 19 of the outer casing 1, makes a water seal and prevents the escape of air and steam when the cleaning discharge-valve is being reciprocated.

The side grates 10 are made up of metal plates resting on top of each other, as shown in Fig. 4. The plates have ribs projecting from their top or bottom surfaces to separate

them and leaving lateral openings or horizontal spaces between the plates, through which the air and steam can pass from the chambers 13. Preferably there are no grates in the ends of the fire-pot, only along the sides, in which case the fuel is fed only along the sides and not at the ends. The fuel in the fire-pot is maintained in a state of rapid combustion, and the walls of the fire-pot being of metal the chambers 13 will be very hot and will superheat the air and steam before it comes in contact with the fuel. The movable portion of the cleaning discharge-valve 11 can be reciprocated by means of a hand-lever, as shown at 20, or by power connected in any convenient manner. The ashes fall into the water-tank and may be removed from the outside without interrupting the operations of the producer.

I have indicated revolving feed-valves in the openings between the fuel-hoppers and magazine-feeders, although they are unnecessary where very small coals and dust are used. They are necessary, however, when prepared coal or larger sizes are used. These valves are metal pipes with openings or slots extending the length of the hopper and of sufficient width to admit the coal to fill the pipes when the openings are on top and to discharge when the valves are revolved so that the openings will be down. They may be revolved by any suitable mechanism. As before stated, these were unnecessary where fine coals, such as anthracite culm and bituminous breeze, are used, as experience has shown that where a magazine-feed is used the considerable mass of the fine fuel containing much "dust" prevents the escape of gas through the hopper. I have not considered it necessary to show mechanism for revolving these valves, if employed, as it would need but simple sprocket or cog wheels on the ends of the pipes with chain belt or pinion to operate them, and also I have considered it unnecessary to show a steam-generator for supplying steam used in the process, as any form of generator may be used, and in many cases the steam would be taken from generators used for power or other purposes.

I do not confine myself to the particular construction of the discharge-valve as shown. Other known means for breaking and removing ash and clinker may be used in combination with the novel features of my construction.

In the process for generating gas in my improved producer the hopper is kept supplied with fuel, which is continuously supplied to the magazine-feeders. They, being always filled, maintain a uniform bed of fuel in the furnace. The air to maintain combustion and steam for decomposition enters the superheating-chambers 13 and through the grates 10 into the lower part of the fuel-bed. As the fuel is consumed the reciprocating of the upper portion of the discharge-valve 11 loosens it up, and as the openings in the upper and lower portions register with each other the ash is discharged into the water-tank beneath, from which it may be removed without disturbing the operation of the producer.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A gas-producer comprising a casing, the fuel-hoppers, the magazine-feeders located at the sides of the casing and providing a gas-chamber between them, the downwardly-converging fire-pot having side grates formed with lateral grate-openings, the superheating-chambers for the air and steam located at the sides of the fire-pot and discharging through the grate-openings, and means for breaking clinker and discharging ash at the foot of the inclined sides; substantially as described.

2. A gas-producer comprising a casing, the fuel-hoppers, the magazine-feeders located at the sides of the casing and providing a gas-chamber between them, the downwardly-converging fire-pot having side grates formed with lateral grate-openings, the superheating-chambers for the air and steam located at the sides of the fire-pot and discharging through the grate-openings, and the discharge-valve located at the bottom of the said fire-pot; substantially as described.

3. A gas-producer comprising a casing, the magazine-feeders located at the sides of the casing and providing a gas-chamber between them, the downwardly-converging fire-pot having side grates formed with lateral grate-openings, the superheating-chambers for the air and steam located at the sides of the fire-pot and discharging through the grate-openings, the breaking-pieces provided with projections and located beneath the grates, and the discharge-valve having projections working in conjunction with the projections on the breaking-pieces and located between the breaking-pieces; substantially as described.

4. A gas-producer comprising a fire-pot having downwardly-converging ends, and downwardly-converging sides formed with horizontal plates spaced apart to provide lateral openings proportioned to the width of said plates, the plates being of sufficient width to prevent ash or fuel falling through the lateral openings between the plates, the superheating-chambers located at the ends and sides of the fire-pot and discharging through the said lateral openings, and the magazines located at the sides of the producer through which the fuel is continuously fed; substantially as described.

5. A gas-producer comprising a continuous feeding device along two sides of the producer, a fire-pot having two downwardly-converging sides formed with horizontal plates spaced apart to provide lateral openings proportioned to the width of said plates, the plates being of sufficient width to prevent ash or fuel falling through the lateral openings between the plates, the superheating-chambers located at

the sides of the fire-pot and discharging through the said lateral openings, and a suitable device for breaking and discharging ash and clinker at the foot of the converging sides; substantially as described.

6. A gas-producer comprising a downwardly-converging fire-pot having side grates, the breaking-pieces having projections and located beneath the side grates, and the ash-discharge valve consisting of a stationary portion having openings, and a movable portion having openings adapted to register with the openings in the stationary part, and projections working in conjunction with the projections on the breaking-pieces; substantially as described.

7. A gas-producer comprising a fire-pot having downwardly-converging ends, and downwardly-converging sides formed with horizontal plates spaced apart to provide lateral openings proportioned to the width of said plates, the plates being of sufficient width to prevent ash or fuel falling through the lateral openings between the plates, the superheating-chambers located at the ends and sides of the fire-pot and discharging through the said lateral openings, the downwardly-flaring magazines located at the sides of the producer through which the fuel is continuously fed, and a water-tank beneath the fire-pot to receive the ash as the fuel is consumed; substantially as described.

8. A gas-producer comprising feed-hoppers extending lengthwise of the producer, the peaked top forming the under side of the hoppers placed a sufficient distance from the sides of the producer to provide feed-openings, rotary cylindrical valves located in the feed-openings along the two sides, the inwardly-inclined pendent plates forming the inner walls of the magazine-feeders, a fire-pot having two downwardly-converging sides formed with horizontal plates spaced apart to provide lateral openings, and the superheating-chambers located at the sides of the fire-pot and discharging through said lateral openings; substantially as described.

9. A gas-producer comprising a continuous feeding device along the sides of the producing-chamber, a fire-pot having downwardly-converging sides formed with grate-plates with openings arranged to prevent ash or fuel falling through the superheating-chambers located about the sides of the fire-pot and discharging through the said openings, a suitable device for breaking and discharging ash and clinker below the fire-pot, and a water-tank forming a seal for the ash-pit; substantially as described.

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