A. F. MATLACK.

GAS PRODUCER.

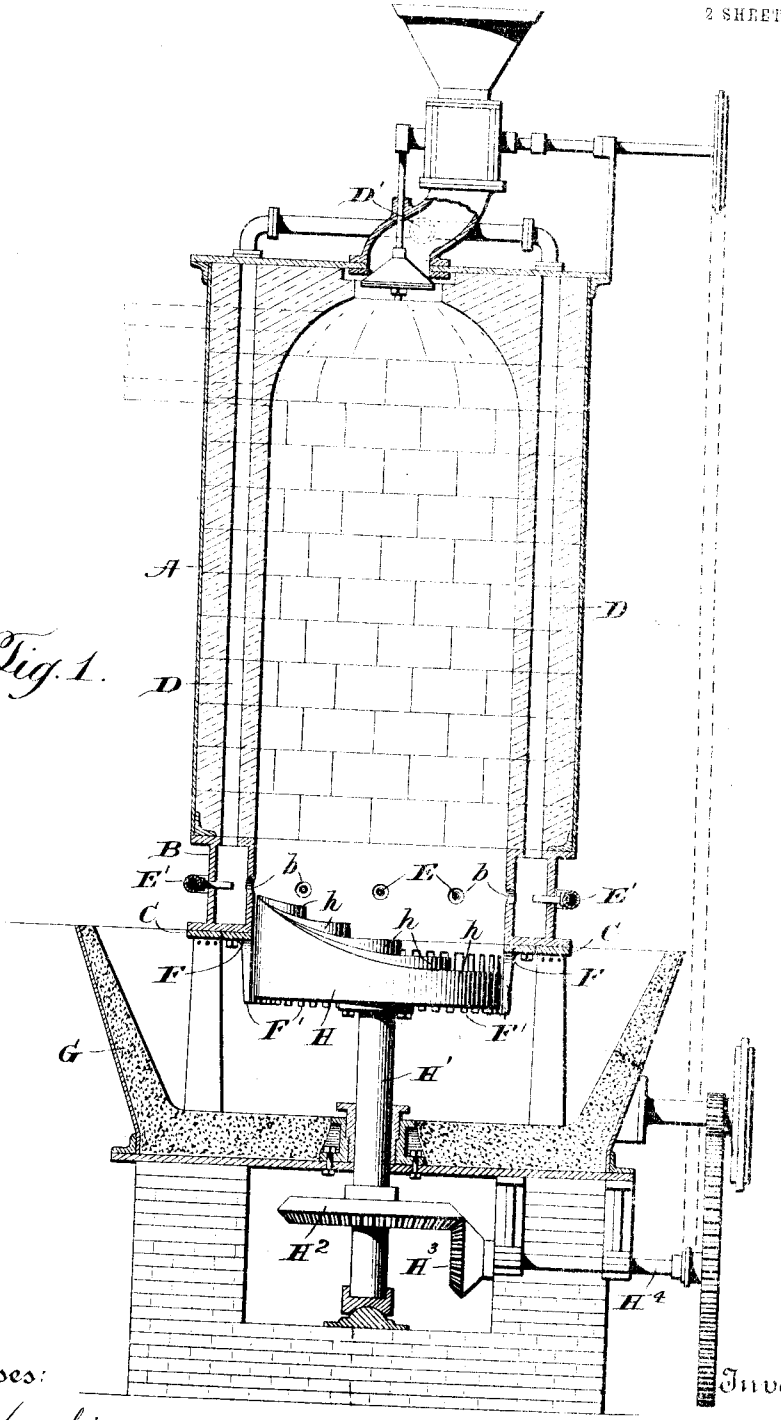
APPLICATION FILED MAY 2, 1910. RENEWED SEPT. 13, 1911.

1,025,148.

Patented May 7, 1912.

2 SHEETS-SHEET 1

Fig. 1.



Witnesses:

Jas. E. Hutchinson.

Thos. R. Heath.

Inventor:

Albert F. Matlack,

By Macnutt Williams Attorneys.

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2 SHEETS—SHEET 2.

Fig. 2.

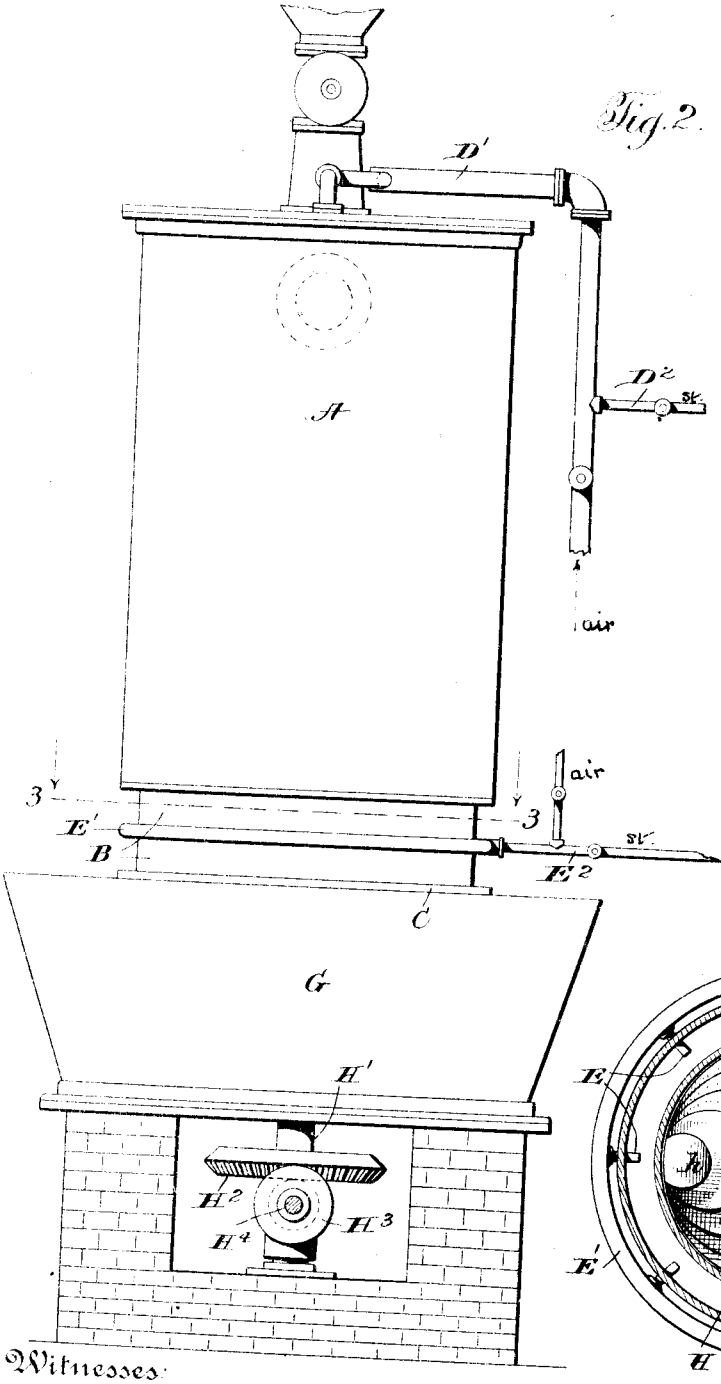
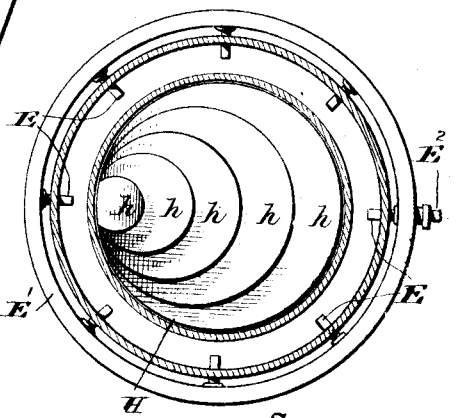


Fig. 3.



Witnesses:

Jas. L. Hutchinson.

Thos. C. Traik.

Inventor:

Albert F. Matlack

By Wilcox & Wilcox Attorneys:

UNITED STATES PATENT OFFICE.

ALBERT F. MATLACK, OF PHILADELPHIA, PENNSYLVANIA.

GAS-PRODUCER.

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To all whom it may concern:

Be it known that I, ALBERT F. MATLACK, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to an improvement in gas producers and more particularly to gas producers of the revolving hearth type.

One of the objects of the present invention is the provision of an improved type of hearth which will keep the fuel in a constant state of agitation; prevent the formation of scaffolds; and effect the discharge of the burned ashes into the ash pit.

A further object of the present invention is the provision of an improved type of hearth in combination with a particularly formed grate, the parts being of such construction as to prevent the passage of incandescent fuel into the ash pit but to readily permit of the discharge of ashes to the ash pit.

A further object of the present invention is the provision of improved means for feeding both air and steam or either, to the body of fuel in the converter in such a manner that the waste heat of the producer is utilized to initially heat such steam or air thus greatly increasing the efficiency of the producer.

Other objects of the invention will be apparent from the detailed description hereinafter when read in connection with the accompanying drawing forming a part hereof wherein a convenient embodiment of the invention is illustrated and wherein like numerals of reference refer to similar parts in the several views.

In the drawings, Figure 1 is a longitudinal section of a gas producer constructed in accordance with the present invention. Fig. 2 is a side elevation of the same, and Fig. 3 is a cross section on line 3—3 of Fig. 2.

Referring now more particularly to the drawings A designates the body of the producer which is preferably circular in cross section and may be of any well known construction, such body being provided at the upper portion thereof with any suitable feeding device and with the usual gas outlet. The producer body is supported upon an annular heater box B, the inner wall of which forms a continuation of the inner surface of the producer body. The heater box B rests upon an annular ring C which is supported by suitable supporting legs secured to a base of any desired construction. Formed in the inner wall of the producer body A are a plurality of air ducts D, the lower ends of which communicate with the heater box B and the upper ends of which extend to the upper portion of the producer body and are connected by suitable branch pipes to an air feed pipe D′ which is adapted to be connected up to a blower or air forcing device of any suitable type. Leading into the air feed pipe D′ at a point adjacent the upper end of the producer body is a steam pipe D^2 which is adapted to communicate with any suitable source of steam supply. Suitable valves are interposed in the air feed pipe D′ and the steam pipe D^2 so that either steam or air or both steam and air may be fed through the ducts D formed in the producer body. Formed in the inner wall of the heater box B are a plurality of openings *b* which permit the air and steam from the ducts D to pass into the bed of fuel in the producer body. Positioned in the outer wall of the heater box B are a plurality of inwardly extending nozzles E, one such nozzle being provided in alinement with each of the ports *b* heretofore described. The nozzles E are connected to an annular pipe E′ which surrounds the heater box B and to which is connected a steam pipe E^2 which extends from any suitable source of steam supply. An air supply pipe, which extends from any suitable blower or air forcing device communicates with the steam supply pipe E^2 adjacent its connection to the annular pipe E′ and suitable valves are interposed in said air pipe and also in the steam supply pipe so that either steam or air may be fed to the nozzles E. In practice the greater volume of the steam and air required in the manufacture of the particular gas being formed is fed through the ducts D so that it will be caused to traverse the entire body of the producer and thereby absorb considerable heat in transit, which causes an initial decomposition of the steam and increases to a material extent the temperature of the air. This larger volume of steam and air, or either steam or air then passes into the heater box where its tempera-

ture is raised to a still greater degree, since such heater box is so positioned to directly surround the incandescent zone of combustion. To facilitate the introduction of the steam and air which has thus been heated into the bed of the fuel, a smaller volume of steam or air is utilized which is caused to pass through the nozzles E and thereby force the heated products in the heater box into the bed of fuel. When steam is supplied to the jets E such steam also serves to keep the ashes soft so that they may be readily removed from the hearth.

Secured to the under side of the ring C is an annular grate ring F from the inner edge of which extend a plurality of downwardly extending closely spaced vertical grate bars F′ and the inner surface of the annular grate thus formed is in alinement with and forms a continuation of the inner surface of the inner wall of the heater box B. Seated upon the base which supports the converter body A and surrounding the lower portion thereof is a water seal basin G of any suitable construction in which water is maintained at a level slightly above the tops of the vertical grate bars F′.

H designates the hearth which is circular in form and is of a size to almost completely fill the space within the grate bars F′. The hearth H is mounted upon a shaft H′ which passes through a packed bearing in the bottom of the water seal pit and has its lower end journaled in a step bearing secured to any suitable base. Secured to the shaft H′ is a gear wheel H^2 with which meshes a gear wheel H^3 mounted upon an actuating shaft H^4 which is journaled in any suitable bearing. The actuating shaft may be driven in any suitable manner to impart a rotary motion to the hearth but I prefer to utilize driving means therefor of such a character that an alternate rotation will be imparted to the hearth, it being rotated in one direction for one complete revolution and then rotated in the opposite direction for a complete revolution, this operation being continuous during the actuation of the shaft H^4. Driving means of this character are well known in this art and I have therefore deemed it unnecessary to herein show and describe any particular form of mechanism for imparting this motion to the hearth. The hearth H is considerably higher on one side than on the other and is provided with an imperforate fuel supporting surface which is made up of a plurality of superposed fuel supporting platforms *h*, all of which are circular in form and which decrease in diameter from the lower portion to the top of the hearth. The fuel supporting platforms are all positioned eccentrically with reference to the hearth and the peripheries of all of such platforms are at one point coincident with a portion of the periphery of the hearth proper, so that the edges of the platform constitute a plurality of eccentrics which during the rotation of the hearth serve to gently push the ashes from the center of the hearth toward the periphery thereof and out through the spaces between the depending vertical grate bars F′.

From the particular construction of hearth just described, it will be seen that as the hearth is rotated the fuel is constantly agitated, the body of fuel on one side of the hearth being elevated while that on the other side is being lowered, thus breaking up any clinkers which might be formed and preventing the formation of what are known as scaffolds. The grate may be made up of any number of eccentrically arranged fuel platforms of the character heretofore described. The hearth is of such a height that fully one half of the supporting surface thereof is positioned above the tops of the vertical grate bars F′, and as only the materials which are on the portions of the hearth below the tops of said grate bars can be forced out between such grate bars, it will be apparent that the falling of any unburned fuel or incandescent fuel into the ash pit is effectually prevented.

The producer heretofore described is equally efficient in making either ordinary producer gas or what is known as common air gas; semi-water gas; or water or hydrogen gas. In making ordinary producer gas or common air gas, air only is supplied to the ducts D and to the nozzles E. In making semi-water gas both air and steam are fed to the ducts D and steam alone to the nozzles E. In making water gas the body of fuel is first heated to incandescence by the air blast and then steam alone is introduced into the body of fuel through both the ducts D and nozzles E. In all cases, however, a large percentage of the air or steam which is required is caused to pass through the ducts D and into the heater box B before it is forced into the body of the fuel thereby utilizing the waste heat of the producer to initially heat the steam and thus greatly increasing the efficiency of the apparatus.

While a convenient embodiment of the invention is illustrated in the accompanying drawings, it will be appreciated that many changes may be made in the form and construction therein shown without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:—

1. In a gas producer, a body, an annular grate constituting a continuation of the lower portion of said body, a hearth rotatably supported at the lower end of said body and provided with means for effecting lateral movement of the ashes thereon through said grate upon rotation thereof.

2. In a gas producer, a body, an annular

grate comprising separated grate bars constituting a continuation of the lower end of said body, a water seal for the lower end of the producer body and a hearth rotatably supported in the space surrounded by the annular grate and provided with means for effecting lateral movement of the ashes thereon through said grate upon the rotation of the hearth.

3. In a gas producer, a body, an annular grate constituting a continuation of the lower end of said body, a circular hearth rotatably supported in the lower portion of said body, the supporting surface of said hearth being imperforate and formed of a plurality of stepped platforms having inclined supporting surfaces.

4. In a gas producer, a body, an annular grate constituting a continuation of the lower portion of said body, a circular hearth rotatably supported in the lower portion of the producer body, the supporting surface of said hearth being imperforate and formed of a plurality of superposed fuel supporting platforms decreasing in diameter from the lower portion to the top of the hearth and positioned eccentrically to the axis of the hearth.

5. In a gas producer, a body, an annular grate constituting a continuation of the lower portion of said body, an imperforate circular hearth rotatably supported in the lower portion of the producer body, the supporting surface of said hearth being formed of a plurality of superposed circular fuel supporting platforms decreasing in diameter from the lower portion to the top of the hearth and positioned eccentrically to the axis of the hearth, the top of said hearth being positioned above the top of the annular grate and the lower portion of said hearth being positioned below the top of the annular grate.

6. In a gas producer, a body, an annular grate constituting a continuation of the lower portion of said body, means for maintaining a water level above the top of said grate, an imperforate circular hearth rotatably supported in and substantially filling the space surrounded by said annular grate, the supporting surface of said hearth being formed of a plurality of stepped platforms, a portion of which are positioned above the top of said annular grate and a portion of which are positioned below the top of the annular grate.

7. In a gas producer, a body, an annular grate constituting a continuation of the lower portion of said body, means for maintaining a water level above the top of said grate, an imperforate circular hearth rotatably supported in and substantially filling the space surrounded by said annular grate, said hearth being provided with a fuel supporting surface formed of a plurality of superposed stepped platforms decreasing in diameter from the lower portion to the top of the hearth and positioned eccentrically to the axis of the hearth, a portion of said platform being positioned above the top of said annular grate and a portion of said platforms being positioned below the top of said grate.

8. In a gas producer, a body provided at its lower end with a hollow heater box having a plurality of ports in the inner walls thereof affording communication between said heater box and the interior of the body, said body being provided with a plurality of passages therein communicating with said heater box, and a rotatable imperforate hearth in the lower portion of the producer body, said hearth being provided with means acting upon the rotation thereof to agitate the fuel.

9. In a gas producer, a cylindrical body portion having a plurality of passages in the wall thereof, a hollow heater box at the lower end of said body in communication with the passages therein, said heater box being provided with a plurality of ports in the inner wall thereof, a valved steam pipe in communication with the passages in the wall of the producer body, a valved air pipe in communication with the passages in the producer body, and a rotatable imperforate hearth in the lower portion of the producer body, said hearth being provided with means acting upon the rotation thereof to agitate the fuel.

10. In a gas producer, a body portion provided with a plurality of passages in the wall thereof, a hollow heater box at the lower end of said body in communication with the passages therein, said heater box being provided with a plurality of ports in the inner wall thereof and with a plurality of nozzles in the outer wall thereof in alinement with said ports, and a rotatable imperforate hearth in the lower portion of the producer body, said hearth being provided with means acting upon the rotation thereof to agitate the fuel.

11. In a gas producer, a body portion provided with a plurality of passages in the wall thereof, a hollow heater box at the end of said body in communication with the passages therein, said heater box being provided with a plurality of ports in the inner wall thereof and with a plurality of nozzles in the outer wall thereof in alinement with said ports, a valved air pipe in communication with the passages in the wall of the producer body, a valved steam pipe in communication with the passages in the wall of the producer body, a valved air pipe in communication with the nozzles in the heater box, a valved steam pipe in communication with the nozzles in the heater box, and a rotatable imperforate hearth in the lower

portion of the producer, said hearth being provided with means acting upon the rotation thereof to agitate the fuel.

12. In a gas producer, a body portion provided with a plurality of passages in the wall thereof, a hollow heater box at the lower end of said body in communication with the passages therein, said heater box being provided with a plurality of ports in the inner wall thereof, an annular grate below said heater box and forming a continuation of the inner wall thereof, and an imperforate hearth rotatably supported in the lower portion of the producer, said hearth being provided with means for agitating the body of fuel upon rotation and for effecting the lateral discharge of the ashes thereon through said grate.

13. In a gas producer, a body portion provided with a plurality of passages in the wall thereof, a hollow heater box at the lower end of said body in communication with the passages therein, said heater box being provided with a plurality of ports in the inner wall thereof, an annular grate below said heater box and forming a continuation of the inner wall thereof, and an imperforate hearth rotatably supported in and substantially filling the space inclosed by said annular grate, the supporting surface of said hearth being formed of a plurality of superposed platforms, a portion of which are positioned above the top of the annular grate.

14. In a gas producer, a body portion provided with a plurality of passages in the wall thereof, a hollow heater box at the lower end of said body in communication with the passages therein, said heater box being provided with a plurality of ports in the inner wall thereof, an annular grate below said heater box and forming a continuation of the inner wall thereof, and an imperforate hearth rotatably supported in and substantially filling the space inclosed by said annular grate, the supporting surface of said hearth being formed of a plurality of superposed fuel supporting platforms decreasing in diameter from the lower portion to the top of the hearth and positioned eccentrically to the axis of the hearth.

15. A rotary hearth for gas producers comprising an imperforate circular body portion of greater height at one side than at the other and provided with a plurality of stepped fuel supporting surfaces, the axes of which are eccentrically disposed with reference to the axes of the hearth, the peripheries of all of said fuel surfaces being coincident with the periphery of the hearth at the highest point thereof.

16. A rotary hearth for gas producers comprising a circular body portion of greater height at one side than at the other and provided with a plurality of circular stepped fuel supporting surfaces eccentrically disposed with reference to the axes of the hearth, the peripheries of all of said hearth surfaces being coincident with the periphery of the hearth at the highest point thereof and the supporting surfaces of all of said platforms inclined upwardly toward the highest point of the hearth.

17. In a gas producer, a circular body, an annular grate depending from the lower end thereof, a circular hearth rotatably supported within said annular grate, said hearth being of greater height at one side than at the other and being provided with a plurality of stepped circular fuel platforms decreasing in diameter from the lower portion to the top of the hearth and positioned eccentrically to the axes of the hearth, the peripheries and supporting surfaces of all of said fuel platforms being coincident at the highest point of the hearth.

18. In a gas producer, a body, an imperforate circular hearth rotatably supported in the lower portion of the body and adapted to support the bed of fuel therein, means acting upon the rotation of the imperforate hearth for agitating the entire bed of fuel in the producer body, and means for introducing heated air into the bed of fuel through the producer body at a point above the supporting surface of the imperforate hearth.

19. A rotary hearth for gas producers comprising a circular body portion provided with an inclined face and with a plurality of stepped fuel supporting platforms on said face, the axes of which are eccentrically disposed with reference to the axis of the hearth.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT F. MATLACK.

Witnesses:
E. M. SEARCH,
G. M. SCOFIELD.