A. F. MATLACK.

GAS PRODUCER.

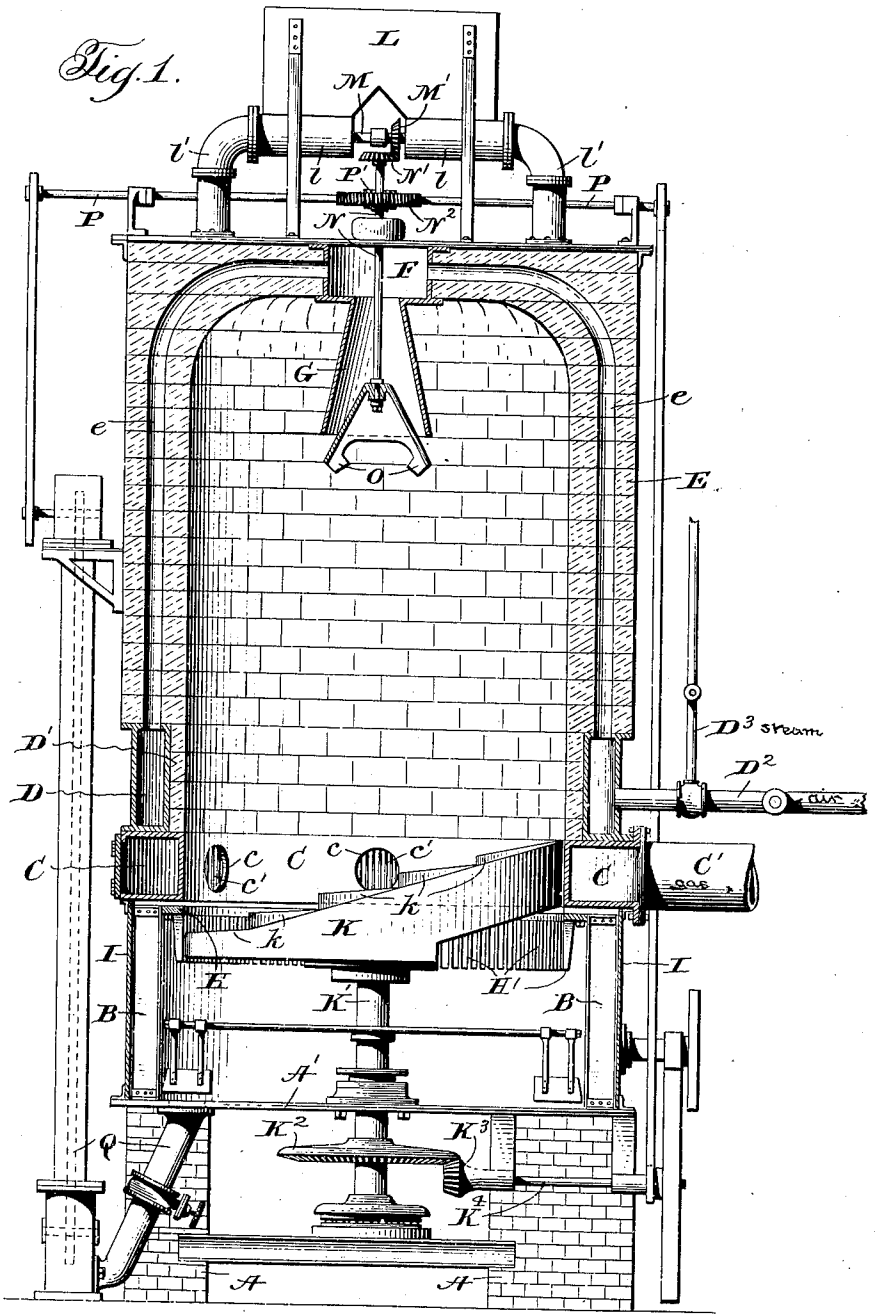
APPLICATION FILED OCT. 5, 1910.

1,025,198.

Patented May 7, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Jas. E. Hutchinson:

Thos. R. Strath.

Inventor:

Albert F. Matlack,

By Wilson Wilson Attorneys:

A. F. MATLACK.

GAS PRODUCER.

APPLICATION FILED OCT. 5, 1910.

1,025,198.

Patented May 7, 1912.

2 SHEETS—SHEET 2.

Fig. 2.

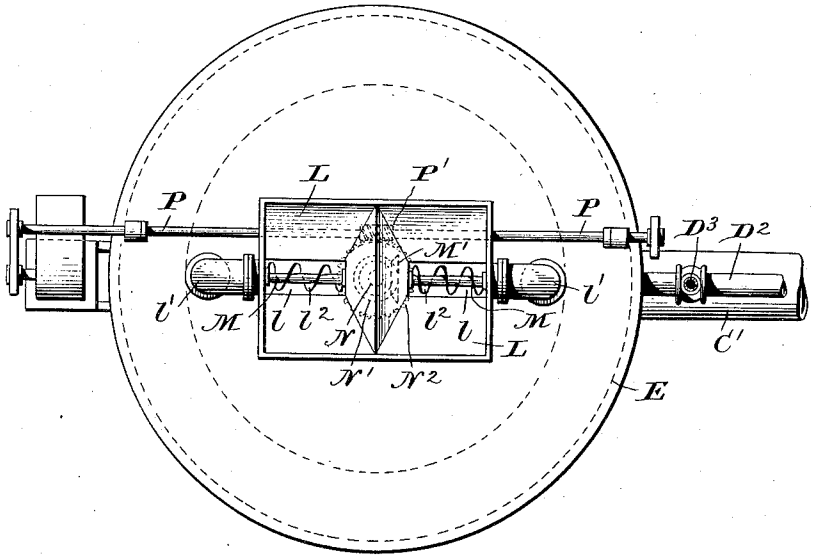
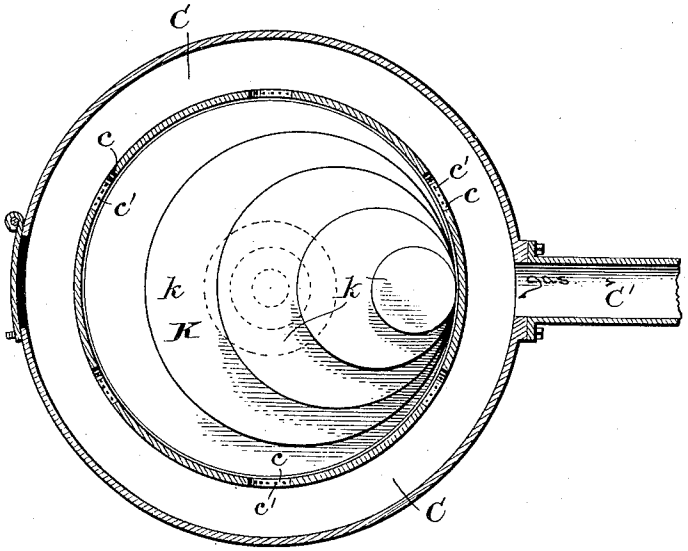


Fig. 3.



Witnesses:

Jas. E. Hutchinson.

Thos. R. Strath.

Inventor:

Albert F. Matlack,

By Macnutt & Evans Attorneys.

UNITED STATES PATENT OFFICE.

ALBERT F. MATLACK, OF PHILADELPHIA, PENNSYLVANIA.

GAS-PRODUCER.

1,025,198. Specification of Letters Patent. Patented May 7, 1912.

Application filed October 5, 1910. Serial No. 585,524.

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 one of the objects of the present invention is the provision of a device of this character in which the finest and softest kinds of fuel can be used, particularly those fuels containing a high percentage of tarry and volatile matters, without the attending evils which have heretofore existed when attempts have been made to utilize fuel of this nature.

A further object of the invention is the provision of means for increasing the size of the zone of combustion in the producer without impairing the efficiency thereof so that substantially all of the fuel products will be converted into gas.

A further object of the present invention is the provision of a gas producer of such a nature that a deeper bed of fuel can be utilized than with the producers heretofore in use.

A further object of the invention is the provision of means for agitating the entire bed of fuel and for effecting the passage of heated air and steam therethrough to convert the same into gas.

Other objects of the invention will be apparent from the detailed description hereinafter when read in connection with the accompanying drawings 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 my improved producer, Fig. 2 is a top plan view of the same, and Fig. 3 is a transverse section through the suction box, the hearth being shown in elevation.

Referring now more particularly to the drawings A designates a suitable base or support upon which is positioned a horizontally arranged plate A′. Extending upwardly from the plate A′ are a plurality of legs or supports B upon the tops of which is supported an annular hollow suction box C, the inner wall of which is provided with a plurality of openings *c* therein, within each of which is positioned a suitable screen *c′*. Supported upon the hollow suction box C is a circular hollow heater box D, the inner wall of which is conveniently provided with a facing D′ of fire brick, the inner surface of which is in alinement with and forms a continuation of the exposed face of the inner wall of the suction box C. Supported upon the heater box D is the body E of the producer, which is conveniently formed of fire brick and is preferably circular in cross section, the inner wall of said producer forming a continuation of the fire brick facing D′ of the heater box. Formed in the body of the producer E are a plurality of longitudinally disposed ducts *e*, the lower ends of which communicate with the heater box D and the upper ends of which communicate with a distributing chamber F which is secured in the top of the body of the producer. Communicating with the distributing box F and extending downwardly therefrom into the body of the producer is a blast pipe G, which is preferably circular in cross section and is flared outwardly from the inlet end to the discharge end thereof. Communicating with the annular heater box D heretofore described is an air pipe D^2, which leads from a blower or other suitable source of air under pressure. Communicating with the air pipe D^2 adjacent its junction with the heater box is a steam pipe D^3 which leads from a steam boiler or other suitable source of steam under pressure. Suitable valves are interposed in the steam and air pipes just described so that either air or steam, or both, may be fed under pressure to the heater box. It will be understood that the air or steam, or both, which is fed to the heater box D will pass therefrom through the ducts *e* to the distributing chamber F and from thence under pressure through the blast pipe onto the upper portion of the bed of fuel. The air and steam which is admitted to the heater box is caused to traverse substantially the entire body of the producer before it is admitted to the bed of fuel so that it absorbs considerable heat in transit, which causes an initial decomposition of the steam and increases to a ma-

terial extent the temperature of the air, thus greatly increasing the efficiency of the producer.

Depending from the under side of the suction box C is an annular grate ring H from the inner edge of which extends a plurality of downwardly extending closely spaced vertical grate bars H′, and the inner surface of the annular grate thus formed is in alinement with and forms a continuation of the exposed surface of the inner wall of the suction box. Surrounding the legs B is an annular wall I which coöperates with the plate A′ heretofore referred to, to form a water seal basin in which water is maintained by any suitable means at a level slightly above the tops of the vertical grate bars H′.

K designates the hearth which is circular in form and is of a size to almost completely fill the space within the grate bars H′. The hearth K is mounted upon a shaft K′ 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 K′ is a gear wheel K^2 with which meshes a gear wheel K^3 mounted upon an actuating shaft K^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 parts 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 another complete revolution, this operation being continuous during the actuation of the shaft K^4. The hearth K 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 *k*, 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 *k* are all positioned eccentrically with reference to the hearth and the peripheries of all of such platforms are at the highest point of the hearth coincident with the periphery of the hearth proper while the supporting surfaces of all of said platforms are inclined upwardly toward the highest point of the hearth and are co-incident at the highest point of the hearth. From this construction it will be seen that the edges of the several fuel supporting platforms 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 H′ and that as the hearth is rotated the entire bed of 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. The hearth may be made up of any number of eccentrically arranged fuel platforms and is of such a height that fully one-half of the supporting surface thereof is positioned above the top of the vertical grate bars 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.

L designates a fuel hopper which is supported in any suitable manner upon the top of the producer body E and the lower portion of which is provided with two discharge troughs *l l* which communicate by discharge pipes *l′ l′* with the top of the producer body E. The troughs *l l* are in alinement and rotatably supported in said troughs are oppositely directed conveyer screws l^2 l^2, which when rotated serve to force fuel from the hopper L through the discharge pipe *l′ l′* into the top of the producer body E. The conveyer screws l^2 l^2 are supported upon a shaft M which carries a pinion M′ in mesh with a pinion N′ secured upon the upper end of a vertically disposed shaft N which is journaled in a suitable bearing secured to the top of the producer body E and which extends downwardly through the distributer box F and into the blast nozzle G leading therefrom. Secured to the lower end of the shaft N and projecting beyond the lower end of the blast nozzle G are stirrers O which are plow-shaped and are adapted to project downwardly into the bed of fuel. The stirrers O form a cone-head against which the air and steam from the blast pipe G is delivered so that such air and steam is thrown outwardly and delivered into the furrows made in the body of the fuel by the stirrers. The shaft N is provided adjacent its upper end with a pinion N^2 with which meshes a worm P′ which is secured to a horizontally arranged shaft P mounted to rotate in suitable bearings secured to the top of the producer body. The shaft P is connected by a suitable gearing to the shaft K^4, heretofore referred to, so as to run in unison therewith and the gearing which drives the shaft N and the stirrers O is of such arrangement and construction that said stirrers will be rotated in the same direction and at the same speed as the hearth, thereby picking up the motion to the bed of fuel produced by the hearth. This construction is of importance where a very deep bed of fuel is used, as it is found that the hearth alone does not give sufficient agitation to the entire bed of fuel above a certain depth.

Leading from the suction box C at the lower end of the producer body is a gas outlet pipe C′ which leads to any suitable suction device, which may be of any well known construction and has not therefore been illustrated.

The ashes which are forced through the grate bars H′ may be removed from the water seal pit in any suitable manner and in the present embodiment of the invention I have illustrated an elevator Q which may be used for this purpose. The elevator Q may if desired be driven from the shaft P.

In the use of the device the air and steam are fed under pressure to the top of the bed of fuel and suction is applied to the pipe C′, the gases being drawn through the openings *c* in the suction box and passed to any suitable scrubber or purifying device. By using the suction applied to the lower portion of the bed of fuel and by feeding the air and steam to the upper portion of the bed of fuel under pressure, it has been found that the producer has been rendered far more efficient than any other down draft producer heretofore in use which employs either pressure or suction alone, and this is due largely to the fact that the zone of combustion is substantially increased in size without in any way increasing the pressure of the air and steam to such an extent as to impair the efficiency of the furnace, and by reason of this fact the producer herein described is particularly efficacious in the treatment of fuel containing tar and other volatile matter.

The water seal performs a distinct function in connection with a producer of the type described in that it prevents the gas from passing from the bottom of the ash pit and confines the gases to the ash zone, through which the gases must pass before passing into the suction box C. This arrangement serves to partially scrub the gas as any heavier particles of tar which may remain in the gas are eliminated by the passage of the gas through the ashes and are passed out through the annular grate with the ashes.

While a convenient embodiment of the invention has been illustrated in the accompanying drawings, it will be understood that many changes may be made to 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, a gas outlet port adjacent the lower end of the body of the producer, a rotary stirrer positioned in the top of the body of the producer, and a fixed blast pipe surrounding said stirrer and positioned to discharge thereon.

2. In a gas producer, a body, a gas outlet port adjacent the lower end of the body of the producer, a fixed blast pipe positioned in the upper portion of the body of the producer, a vertical shaft rotatably supported in the upper portion of the producer within said blast pipe, a cone-shaped stirrer secured to the lower end of said shaft and projecting without the blast pipe, means for rotating said shaft.

3. In a gas producer, a body, a gas outlet port adjacent the lower end of the body of the producer, a fixed blast pipe positioned in the upper portion of the body of the producer, a vertical shaft rotatably supported in the upper portion of the producer within said blast pipe, a cone-shaped stirrer secured to the lower end of said shaft and projecting without the blast pipe, a rotary hearth positioned in the lower end of the producer, and means for rotating said hearth and stirrer in the same direction.

4. In a gas producer, a body provided with a plurality of passages in the wall thereof and with a gas outlet port adjacent the lower end thereof, a blast nozzle fixed in the upper portion of the producer body and depending therefrom, said nozzle being in communication with the upper end of the passages in the producer body, a heater box encircling the producer body and in communication with the lower end of the passages in the producer body, a stirrer rotatably supported in the upper portion of the producer body within the blast nozzle and projecting therebelow, and a fluid supply pipe communicating with said heater box.

5. In a gas producer, a body provided with a plurality of passages in the wall thereof and with a gas outlet port adjacent the lower end thereof, a blast nozzle fixed in the upper portion of the producer body and depending therefrom, said nozzle being in communication with the upper ends of the passages in the producer body, a heater box encircling the producer body and in communication with the lower end of the passages in the producer body, a stirrer rotatably supported in the upper portion of the producer body within the blast nozzle and projecting therebelow, and a fluid supply pipe communicating with said heater box, a hearth rotatably supported in the lower end of the producer body, and means for rotating said hearth and stirrer in the same direction.

6. In a gas producer, a circular body, an annular suction box at the lower end of said body provided with a plurality of gas inlet ports in the inner wall thereof, a suction pipe leading from said suction box, an annular grate depending from said suction box and forming a continuation of the inner wall thereof, an imperforate hearth rotatably supported in the lower portion of said producer body, said hearth being provided with means for agitating the body of fuel

upon rotation thereof and for effecting the lateral discharge of the ashes thereon through said annular grate, and means for delivering fluid under pressure into the upper portion of the producer body.

7. In a gas producer, a body, an annular suction box at the lower end of said body provided with a plurality of gas inlet ports in the inner wall thereof, a suction pipe leading from said suction box, an annular grate depending from said suction box and forming a continuation thereof, an imperforate circular hearth rotatably supported in 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 said annular grate, and means for delivering fluid under pressure into the upper portion of the producer body.

8. In a gas producer, a body, an annular grate depending from the lower end of said body, an imperforate hearth rotatably supported in the space surrounded by the annular grate and provided with means for agitating the bed of fuel and for effecting lateral movement of the ashes thereon through said grate upon the rotation of the hearth, a gas outlet pipe communicating with the lower portion of the producer body, means for supplying fluid to the upper portion of the producer body, a rotary stirrer in the upper portion of the producer body, and means for rotating said stirrer and hearth in the same direction in unison.

9. In a gas producer, a body, an annular suction box at the lower end of said body provided with a plurality of gas inlet ports in the inner wall thereof, a suction pipe leading from said suction box, an annular grate depending from said suction box and forming a continuation thereof, a water seal for the lower end of the producer body, 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 rotation of the hearth, and means for feeding fluid into the upper portion of the producer body.

10. In a gas producer, a body, a depending blast nozzle in the upper portion of said body, a heater box encircling the producer body, ducts leading from said heater box to said blast nozzle, means for feeding fluid to the heater box, an annular suction box at the lower end of the producer body provided with a plurality of gas inlet ports in the inner wall thereof, a suction pipe leading from said suction box, an annular grate depending from said suction box and forming a continuation thereof, and an imperforate circular hearth rotatably supported in 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 said annular grate.

11. In a gas producer, a body, a blast nozzle extending downwardly into the upper portion of the body, a hearth rotatably supported in the lower portion of the body, said hearth being provided with a supporting surface of stepped eccentric platforms, the faces of which are inclined, and a suction pipe communicating with the portion of producer body surrounding the ash zone above said hearth.

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

ALBERT F. MATLACK.

Witnesses:

C. J. ALLÉN,

E. N. M. SEARCH.