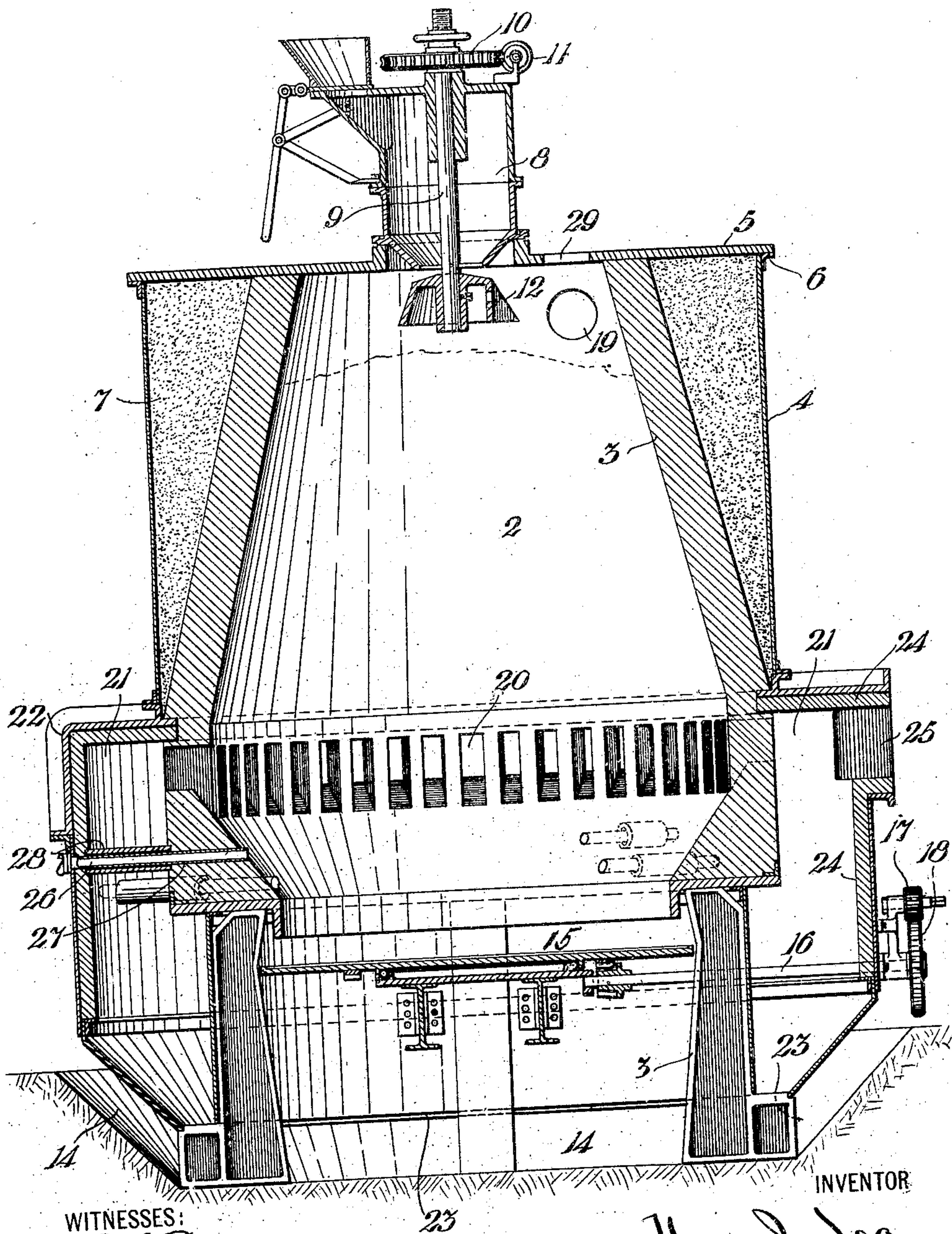


H. I. LEA.
GAS PRODUCER.
APPLICATION FILED JULY 24, 1905.

Patented Sept. 21, 1909.

934,446.



WITNESSES:

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HENRY I. LEA, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE MACHINE COMPANY, A CORPORATION OF PENNSYLVANIA.

GAS-PRODUCER.

934,446.

Specification of Letters Patent. Patented Sept. 21, 1909.

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To all whom it may concern:

Be it known that I, HENRY I. LEA, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas-Producers, of which the following is a specification.

This invention relates to gas producers.

In ordinarily operated producers tarry vapors and ammonia form a component of the products of the gas generating chamber and instead of being an advantage they occasion an absolute loss in the thermal efficiency of the producer. The tarry vapors, dust, ash and such condensible vapors as the gas may carry, in leaving the gas generating chamber, are a source of difficulty in producer apparatus as they stop or choke up the gas passages. A serious difficulty encountered in operating bituminous producers is the tendency of the fuel to bridge or arch over the fuel bed, forming what is technically known as a "hang", which is very objectionable and may at times prove dangerous.

The object of this invention, therefore, is the production of a producer in which the tarry and condensible vapors and the ammonia gas formed in the gas generating chamber, are converted into hydrocarbons of high thermal value.

A further object is the production of a producer in which effective means are utilized for preventing the choking up of the gas passages.

A further object is the production of a producer in which simple means are utilized for preventing bridging or the phenomenon known as a "hang" in the fuel bed.

These and other objects I attain in a producer embodying the features herein described and illustrated.

In the single sheet drawing accompanying this application and forming a part thereof, a vertical section of a producer embodying this invention is shown.

A gas generating chamber 2 is provided with a fire brick lining 3, the inner surfaces of which are inclined from the vertical forming a truncated cone-shaped chamber. The fire brick lining is inclosed by a cylindrical shell 4 to which the top portion 5 is connected by a flange angle 6. Between the shell portion 4 and the fire brick lining, a suitable non-conducting material 7 is utilized

as lagging. The top portion 5 is provided with a suitable fuel charging device 8 through which extends a shaft 9 operated by gears 10 and 11. Mounted on the shaft 9 and rotated by it is a fuel distributor 12 which is adapted to spread the fuel entering the chamber 2.

The producer is mounted on suitable supporting frames 13 and is provided with a water bottom 14. Mounted on cross beams which are supported by the frames 13 is a revolving grate 15 which is operated through the shaft 16, by the externally mounted gears 17 and 18. A port 19 extending through the fire brick lining 3 near the top of the generating chamber 2, is connected to the exterior air and steam passages and is adapted to introduce an operating blast into the generating chamber. Near the bottom of the generating chamber is arranged an annular row of gas offtake ports 20 which connect with an annular chamber 21, the inclosing casing 22 of which is connected to the shell portion 4 and extends downwardly into the water bottom 14. The chamber 21 communicates with the water bottom 14 through an annular opening 23 arranged in the bottom of the casing 22. The chamber 21 is provided with a fire brick lining 24 and a gas offtake port 25 which connects with the exterior gas passages of the producer. Suitably arranged sight holes 26, consisting of tubes 27, which extend through the chamber 21, and the fire brick lining 3, are utilized for ascertaining the condition of the ash bed. The portions of the tubes 27 extending through the chamber 21 are provided with tile covers 28 to protect it from the heat of the gases.

In starting the producer a large port 29, located in the top portion 5, is opened and a wood fire is started on the ash bed, which is maintained at a suitable depth on the revolving grate 15. The air for maintaining the combustion is supplied through the bottom portion of the producer which is not water sealed until a good fuel bed has been established. After a full live fuel bed has been attained the water seal 14 is filled, sealing the bottom of the producer and the opening 23 of the chamber 21, and the ports in the cap portion 5 are closed and a blast is admitted at the top of the chamber 2 through the opening 19. By the admission of the blast the producer starts to generate gas which is taken off through the annularly

arranged ports 20. The arrangement of the ports 20 is such that their combined cross sectional area, with reference to the outlet port 25, is relatively large and, therefore, the velocity of the gas leaving the ports 20 and passing through the chamber 21, is very slight and the ash or dust which the gas may carry is afforded an opportunity of dropping into the lower part of the chamber 21 and entering the water seal 14, through the annular opening 23. By this arrangement the refuse material, which is objectionable because of its tendencies to choke up the gas passages, is discharged into the water seal of the producer from which it may be drawn without affecting the operation of generating the gas. The ash discharged by the revolving grate 15 also drops into the water bottom 14 from which it may be removed without affecting the operation of the producer.

The walls 3 of the upper portion of the generating chamber 2 are so inclined that the tendencies of the fuel bed to bridge or to form a "hang" is substantially overcome, but the inclination is not sufficient to form gas passages between the lining and the fuel bed. The tarry vapor and ammonia which are liberated near the top of the gas generating chamber, pass through the fuel bed, and because of the destructive distillation which takes place, are partly broken up into their elements and converted into hydrocarbons of high thermal value, by coming in contact with the incandescent carbon.

The special advantages of this producer are that the dust and ash are removed with-

out interfering with the operation of the producer, and the ammonia and tarry vapors are converted into gases of high thermal value and the objectionable tendencies encountered in bituminous producers of the fuel bed to bridge is overcome.

The inclined walls of the gas generating chamber, the annular offtake port, and their inclosing chamber 21, may be utilized with either an up or down draft producer and still fall within the limits and scope of this invention.

Having now described my invention what I claim as new and useful and desire to secure by Letters Patent is:

In a gas producer, a truncated cone shaped ash chamber, a truncated cone shaped gas generating chamber above the ash chamber, the two chambers being connected together at their greatest diameters, a blast admission port provided near the top of the gas generating chamber, a liquid sealed bottom for said ash chamber, an annular row of gas delivery ports located at the juncture of the two truncated cone shaped chambers, an annular collecting chamber surrounding the lower portion of said producer and surrounding the gas delivery ports and a water sealed recement discharge port.

In testimony whereof, I have hereunto subscribed my name this twentieth day of July, 1905.

HENRY I. LEA.

Witnesses:

DAVID WILLIAMS,
JNO. S. GREEN.