H. I. LEA.

GAS PURIFYING APPARATUS.

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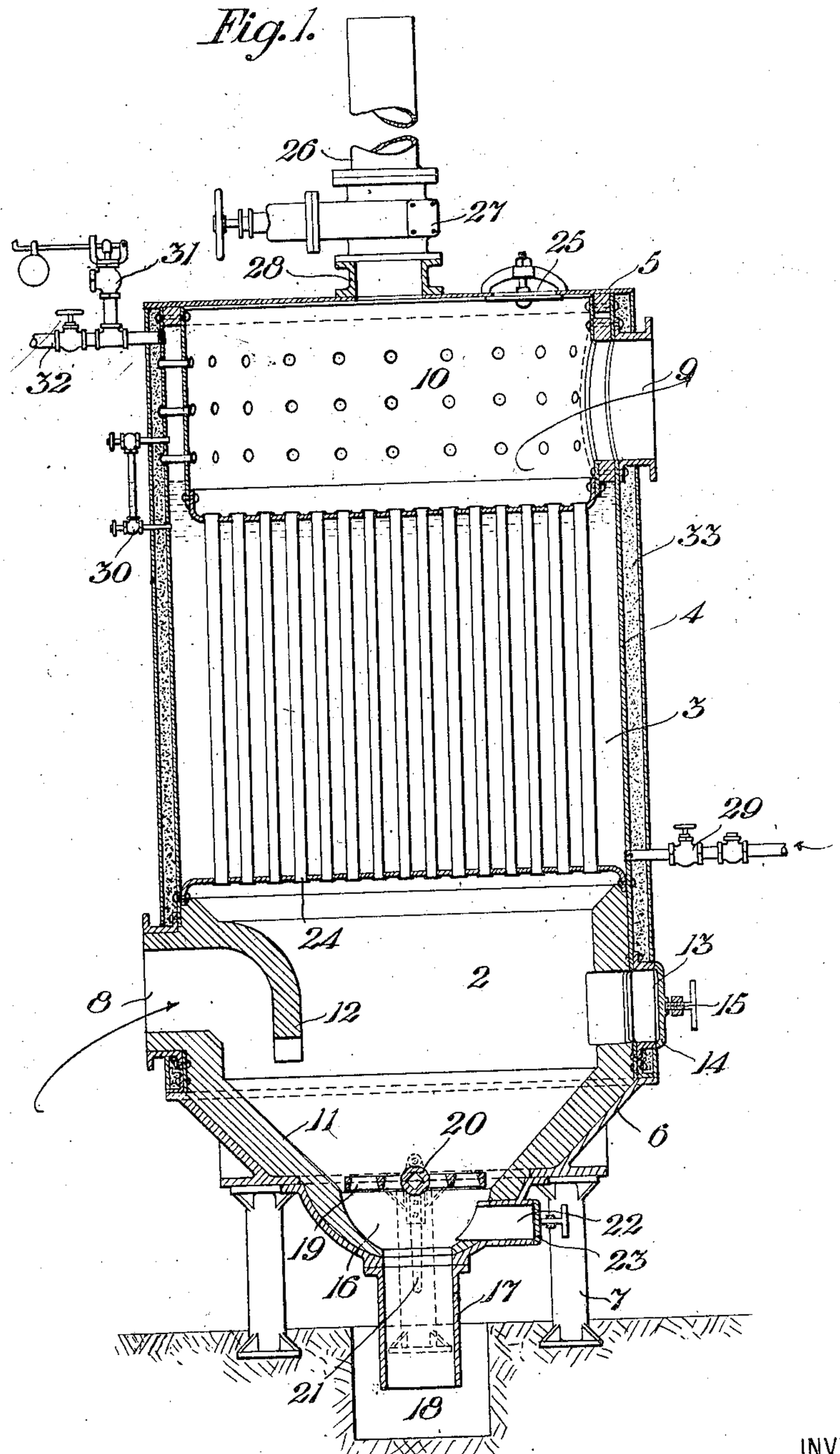
934,679. Patented Sept. 21, 1909.

Fig. 1.



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GAS-PURIFYING APPARATUS.

934,679. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed August 18, 1905. Serial No. 274,716.

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-Purifying Apparatus, of which the following is a specification.

This invention relates to improvements in gas purifying apparatus.

In the manufacture of producer gas from bituminous coal, the gases leaving the generating chamber always contain more or less dust or ash, and with some types of producers they carry objectionable amounts of condensable vapors. It is necessary to remove these and other impurities which the gases may contain before they are suitable for the various uses to which they are applied. In effecting these removals, the general practice has been to pass the gases through various apparatus in which they are cooled as well as purified.

In manufacturing producer gas, as in generating steam, it is essential for the production of an effective apparatus that most of the available energy of the coal shall be effectively utilized.

The object of this invention is, therefore, the production of a purifying chamber in which effective means are obtained for utilizing the sensible heat of the gases passing therethrough.

A further object is the production of a combination dust chamber and a steam generator in which simple means are utilized for discharging the impurities from the dust-chamber during the operation of the apparatus.

These and other objects I attain in an apparatus embodying the features herein described and illustrated.

The single sheet drawing accompanying this application and forming a part thereof, is a vertical section of a combined dust-chamber and steam generator embodying this invention.

A dust-chamber 2 and a superimposed tubular boiler 3 are inclosed within a cylindrical casing 4, which is provided with a suitably attached top-portion 5 and a base portion 6. The base portion 6 is provided with suitable mounting supports 7 and the shell portion 4 is provided with a gas inlet port 8 and an outlet port 9, which connect respectively with the dust chamber 2 and a gas-collecting chamber 10, which is arranged above the steam boiler. The dust chamber 2 is provided with a suitable fire brick lining 11 and a fire brick apron 12 adjacent and opposite to the inlet port 8. An opening 13, which is provided with a cover 14, and a convenient locking means 15, is suitably arranged in the walls of the chamber 2. An opening 16, at the bottom of chamber 2, is provided with a downwardly extending pipe 17 which, with a recess 18, in the foundation, constitutes a water-seal. A grate 19 is mounted on a bar 20 which is journaled on the base portion 6 adjacent to the hole 16 and is adapted to turn the grate 19 to a vertical or dumping position through the operation of a crank 21, with which it is provided. Between the grate 19 and the opening 16 is a laterally extending passage 22, which is provided with a suitable cover 23 and connects the interior of the chamber 2 with the atmosphere.

The boiler 3 is provided with a suitable number of tubes 24 which connect the chamber 2 with the gas collecting chamber 10. The top portion 5 is provided with a suitably closed opening 25 which provides access into the chamber 10.

A stack 26, provided with a valve 27, connects with the chamber 10 through the flanged opening 28. The boiler 3 is provided with a suitably valved feed pipe 29, gage-glass 30 and safety-valve 31, which is connected to the main steam pipe 32. The exterior shell 4 is provided with a suitable lagging 33. The intake port 8 is adapted to be connected by suitably valved passages to a gas generating chamber and the outlet port 9 connects with passages leading to gas purifiers or to storage tanks, or to gas consuming appliances.

In the manufacture of producer gas, steam is generally utilized as a component of the fuel-bed blast, and the apparatus herein described has been designed to utilize the sensible heat of the gases produced in the gas generating chamber in the production of the steam utilized in the blast. Before the producer proper is started, the boiler 3 may be fired through the opening 13, above the grate 19, the necessary air being admitted through the opening 22 below the

grate. The valve 27 of the stack 26 being open and the inlet-port 8 and the outlet-port 9 closed by valves with which their connecting passages are provided. The products of combustion passing through the tubes 24 quickly generate steam which is utilized in starting the producer. After the producer is in operation the door 22 and the valve 27 are closed, the fuel on the grate 19 is dumped into the recess 18, and the valves operating in the passages connecting with the ports 8 and 9 are opened. The gas from the producer on entering the port 8 travels through the dust-chamber 2 at a relatively slow rate, and is afforded a chance to deposit the dust and drops the condensible vapor on the inclined bottom of the chamber 2 from which it will pass through the water-sealed opening 16. The apron 12 which is adjacent to port 8, to some extent augments the deposition of the recrement as the gas entering the chamber is deflected downwardly and since the velocity is very slight the dust and heavier particles will be precipitated by their own weight. The gas now having been partially cleaned passes through the tubes 24, giving up its sensible heat to the water contained within the boiler and thereby generates steam. The gas from the tubes 24 is collected in the chamber 10 and is conducted through the outlet-port 9 to additional purifiers or to a gas-main.

This type of boiler may be utilized with either up or down draft producers, and I do not wish to limit its use to apparatus utilizing bituminous coal, as an auxiliary heater may be employed in case the sensible heat of the gases generated is not sufficient to maintain the desired steam pressure.

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

1. An apparatus of the class described, comprising a dust collecting chamber provided with a gas inlet-port, a deflector adjacent to said inlet-port, a superimposed boiler, a fuel grate under said boiler, and a gas collecting chamber above said boiler provided with a stack and a gas outlet port.

2. A gas purifier comprising a dust collecting chamber provided with a gas inlet port, a deflector apron adjacent to said inlet port, a recrement discharge port, a fuel grate and an air supply port and a gas collecting chamber provided with a gas outlet port and a stack, in combination with a steam generator which forms means of communication between said chambers.

3. A gas purifier, comprising a dust collecting chamber provided with a gas inlet port, a deflector apron adjacent to said inlet port, a recrement discharge port, a fuel grate and an air admission port below said grate, in combination with a gas collecting chamber and a heat conserving agent located between, and forming a means of communication between said chambers.

In testimony whereof, I have hereunto subscribed my name this 21st day of July, 1905.

HENRY I. LEA.

Witnesses:
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