

H. I. LEA.
GAS PURIFIER.

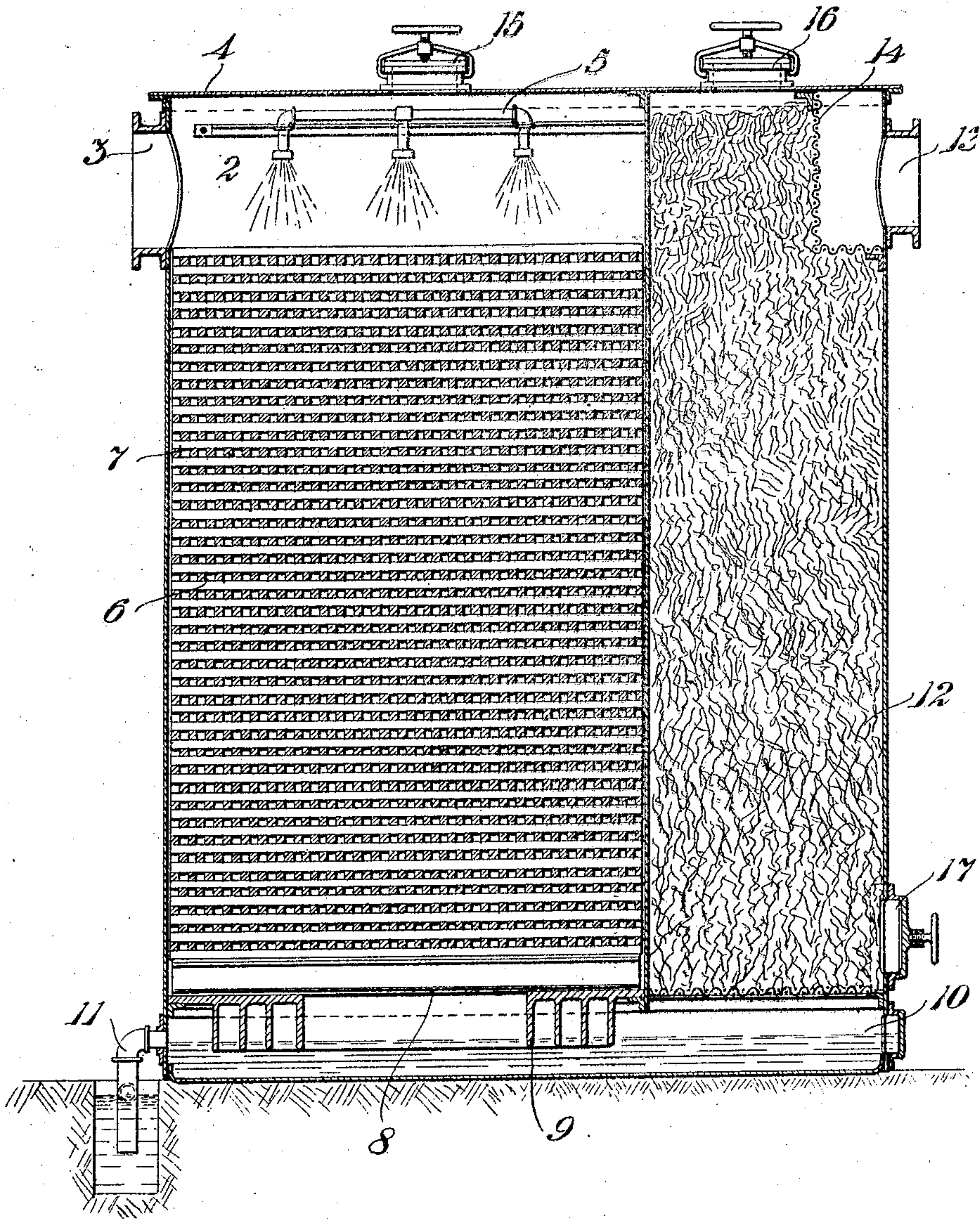
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934,448.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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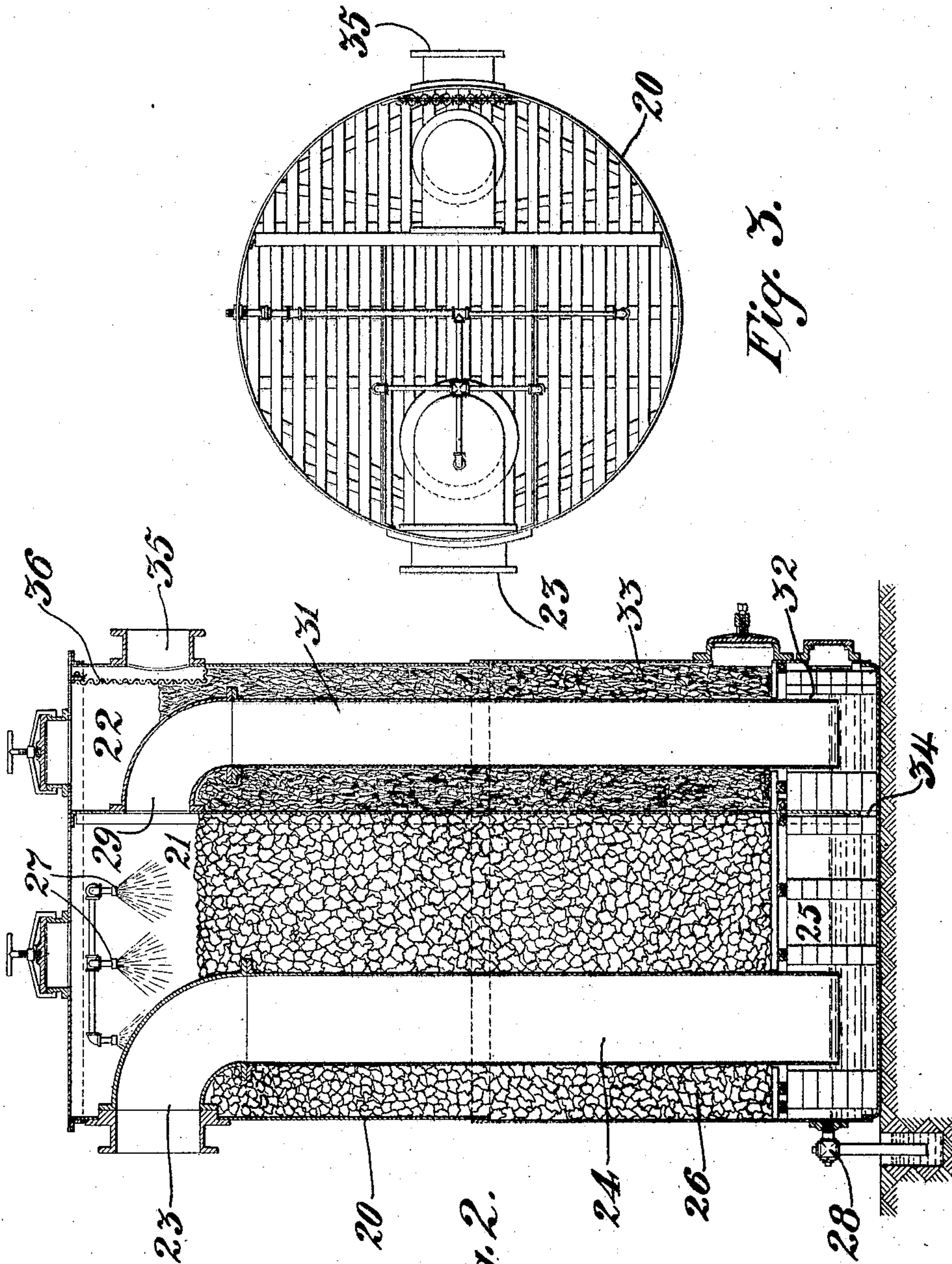


Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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

GAS-PURIFIER.

934,448.

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

Application filed March 1, 1907. Serial No. 380,001.

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 made a new and useful Invention in Gas-Purifiers, of which the following is a specification.

This invention relates to gas purifiers and more particularly to organized apparatus in which the operations of scrubbing, washing and drying the gas are performed.

It is well known that in the distillation of coal or other carbonaceous matter, capable of being utilized in the manufacture of gas, it is necessary to remove the impurities from the distilled gases before they are suitable for the uses to which they are to be applied. In order to effect the said removals water is generally utilized in the operation of washing and scrubbing and auxiliary means are then provided for removing the moisture imparted to or mechanically carried by the gases.

The object of this invention is the production of an organized purifying apparatus, comprising a combined washer, scrubber and drier. This and other objects I attain in an apparatus embodying the features herein described and illustrated in the drawings accompanying this application and forming a part thereof.

Figure 1 is a sectional elevation of an apparatus embodying my invention; Fig. 2 is a sectional elevation of a modification of my invention; and, Fig. 3 is a plan view of the apparatus shown in Fig. 2.

The purifier illustrated subjects the gas or gases to the successive operations of scrubbing, washing and drying; each operation being performed in separate chambers combined within one inclosing shell and constituting the organized apparatus.

Hot gases from the producer or generating chamber enter the chamber 2 of the purifier through the gas inlet port 3, with which the exterior casing 4 of the purifier is provided, and which is provided with a pipe. The gases in chamber 2 are intimately mixed with and wet by water sprayed from suitably arranged pipes 5. After the gases are par-

tially cooled in the chamber 2 they pass through the chamber 6, which is provided with checker-brick 7, wet by the flow of water from the pipes 5. The chamber 6 may be filled with coke, breeze or other similar material, and the gas, in passing through the small interstices, deposits the tar or other condensable products which it may carry.

The lower portion of the chamber 6 is provided with a gas outlet 8 around which are annular flanges or skirts 9 which project below the surface of the water contained within a washing chamber 10. The chamber 10 collects the water discharged from the chamber 6, and is provided with an outlet pipe 11 so arranged that the water will stand at a desired height, submerging the lower edges of the skirts 9. The gas in bubbling through the water in the chamber 10, parts with any dust, tar or condensable material unremoved by the checker-brick chamber 6 and is still further cooled.

Connected to the chamber 10 and in the direction of the flow of the gas, is a drying chamber 12, which is filled with any suitable material for collecting the moisture carried by the gases and through which the gases may readily pass.

The chamber 12 is provided with a gas outlet port 13, through which the gases leave the purifier.

In order that the packing material utilized in chamber 10 will not be mechanically carried through the gas outlet port 13 into the gas main by the flow of gas, a screen 14, inclosing the port 13, has been provided.

The exterior shell 4 is provided with openings 15, 16 and 17 which are provided with suitable closing means, as shown. The opening 15 provides access into the chambers 2 and 6, while the openings 16 and 17 connect with the chamber 12 and are utilized for introducing the drying material and in keeping it in suitable working condition.

The gases in passing through the drying chamber 12 enter wet at the bottom and, therefore, will necessarily deposit the major part of the moisture or water, mechanically carried by the gases, in the lower portion of the chamber.

A great difficulty with drying chambers of this kind has been occasioned by allowing the gas to enter at the top. The moisture is then deposited near the top, and trickling through the drying chamber, wets the entire mass of drying material. The extra weight occasioned by the water tends to pack the material and impedes the flow of gas there-through and since the water percolates throughout the entire mass of drying material the drying operation is not very effective. By my method the top portion of the drying material collects moisture very slowly and the disadvantage of the increased weight of the water in packing the material is substantially overcome. In case of an explosion occurring in the gas-main, or other accidents that may tend to force the excelsior or drying material to the bottom of the chamber, the opening 16 is utilized for loosening up or readjusting the drying material.

The opening 17 at the bottom of the chamber 12 is provided for withdrawing the drying material after it ceases to be effective.

The mechanical construction of the purifier is such that the operation of refilling or readjusting the drying material may be done without subjecting the purifier to a long period of idleness.

In Figs. 2 and 3 a modified apparatus embodying my invention is shown. A cylindrical shell 20 incloses a scrubbing chamber 21 which communicates with the source of gas supply and a drying chamber 22, which communicates with the gas delivery mains.

A gas inlet port 23 is located near the top of the scrubbing chamber 21 and communicates through a downwardly projecting pipe 24 with a chamber 25, which is located below the scrubbing chamber. The pipe 24 extends through the chamber 21, which is partially filled with a porous material 26. Spray nozzles 27 are located near the top of the chamber 21 and communicate through suitable piping with a source of water supply. The water discharged from the nozzles 27 percolates through the porous mass within the chamber 21 and is delivered to the chamber 25, which is provided with an offtake pipe 28, so arranged that the water will rise to a desired height in the chamber 25 and submerge the lower end of the pipe 24.

A gas delivery port 29 is located above the porous mass 26 near the top of the chamber 21 in a partition which separates the chambers 21 and 22 and delivers gas through a downwardly extending pipe 31, to a chamber 32, which is located below the drying chamber 22. The drying chamber surrounds the downwardly extending pipe 31 and is filled with any suitable material 33 which will collect the moisture carried by the gas, and through which gas will readily pass.

The chamber 32 receives the water col-

lected from the gas by the material 33 and communicates with the chamber 25 through a submerged port 34 and the pipe 31 is so arranged that it extends below the level of water maintained in the chamber 32. A gas delivery port 35 is located near the top of the drying chamber 22 and is provided with a screen 36.

The gases entering the shell 20 through the port 23 are conducted by the pipe 24 below the surface of the water maintained in the chamber 25. The gas in bubbling through the water parts with any dust, tar or gases which are soluble in water, such as sulfureted hydrogen or ammonia gas. The gases after being, partially cooled and washed by the water in the chamber 25 pass through the porous mass 26 in the scrubbing chamber 21 where they are further wet by the water delivered from the nozzles 27 and are subjected to the scrubbing action of the wet, porous material. The gases delivered from the porous material come in contact with the pure and cold water discharged from the nozzles 27 and are delivered through the port 29 and the pipe 31 to the chamber 32, where they are again caused to pass through water and part with any foreign material that may not have been removed in the scrubbing chamber. The gases delivered to the chamber 32 pass upwardly through the drying chamber 22 and deliver any moisture that they may carry to the drying material 33 contained in the chamber. The dry gases are then delivered through the port 35 to the gas delivery mains. This modification of the apparatus is an improvement over the apparatus shown in Fig. 1 in that the dirty and hot gases entering the scrubbing chamber come in contact with dirty and warm water while the cleaner and cooler gases are washed by clean and cold purifying water. This is accomplished by causing the gas to travel through the scrubbing chamber in an opposite direction to the flow of purifying water.

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

1. In a gas purifier comprising a scrubber, a washer and a drier inclosed within a casing provided with a gas inlet port, a gas outlet port, and means whereby the gas enters said scrubber and is discharged therefrom into said washer through a port provided with a plurality of annular flanges extending into said washer; the said gas entering the bottom of said drier from said washer and being discharged therefrom through said gas outlet port.

2. In a gas scrubber, a casing, two filter beds in said casing, one of which is adapted to receive gas and water and the other of which is adapted to absorb water from the gas, a water seal in the casing at the bottom

of said filter beds and communicating there-
with, means for permitting gas to pass
through the second named filter bed in an
upward direction, and water discharging
5 means in the casing and above the first
named filter bed.

In testimony whereof, I have hereunto

subscribed my name this 21st day of Feb-
ruary, 1907.

HENRY I. LEA.

Witnesses:

CHARLES W. MCGHEE,
E. W. MCCALLISTER.