

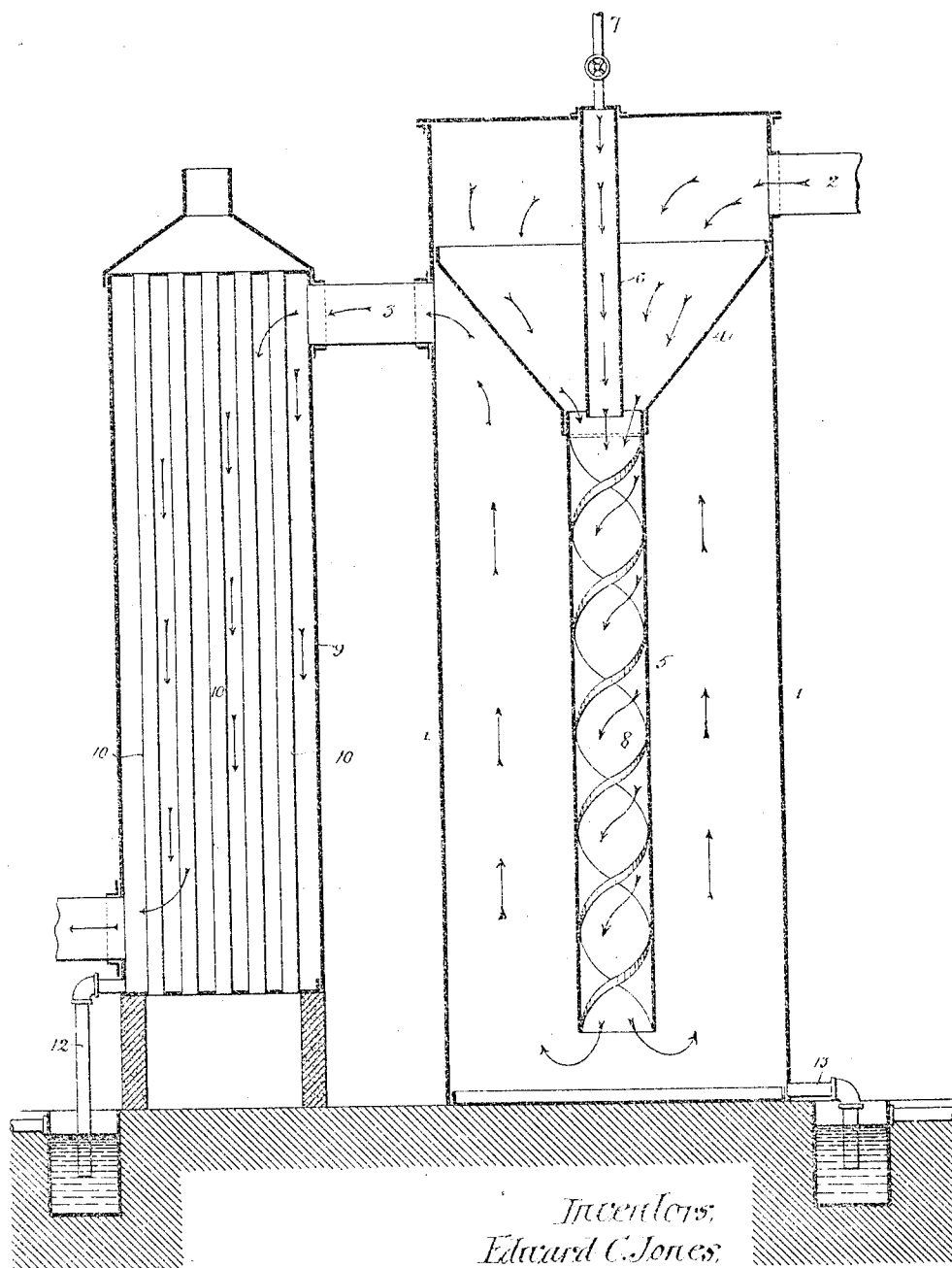
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PATENTED APR. 24, 1906.

E. C. JONES & S. T. WELLMAN.

GAS PURIFIER.

APPLICATION FILED JULY 1, 1904.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD C. JONES, OF SAN FRANCISCO, CALIFORNIA, AND SAMUEL T. WELLMAN, OF CLEVELAND, OHIO.

GAS-PURIFIER.

No. 818,891.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed July 1, 1904. Serial No. 214,980.

To all whom it may concern:

Be it known that we, EDWARD C. JONES, a resident of San Francisco, California, and SAMUEL T. WELLMAN, a resident of Cleveland, Ohio, citizens of the United States, have invented certain Improvements in Gas-Purifiers, of which the following is a specification.

The object of our invention is to provide a simple, cheap, and effective apparatus for separating from gases—such as furnace or producer gas, water-gas, or the like—the ashes, dust, soot, lampblack, tar, or other impurities which are mechanically suspended therein. This object we attain in the manner hereinafter set forth, reference being had to the accompanying drawing, which represents in vertical section apparatus constructed in accordance with our invention.

The presence of ashes, dust, soot, lampblack, tar, and other impurities in furnace or producer gas, water-gas, or the like is a well-recognized objection, and costly centrifugal apparatus has been devised for the purpose of effecting the separation of such impurities from the gas; but, aside from the expense of installing and operating said apparatus, the same is not effective for the purpose intended, since it does not accomplish the complete elimination of the impurities. Hence if the gas is intended for lighting purposes sufficient of the impurities remain therein to choke the burners, or if it is intended for power purposes sufficient impurity remains to choke the interior parts of the engine, cause the valves, pistons, and rods to cut and grind, and render impossible effective lubrication of these parts, thereby causing frequent and expensive stoppage for repairs. It has been found, however, that the objections to the ordinary method of separation can be effectually overcome by first mixing the gas with liquid in vapor form and then separating such vapor from the gas by precipitation or otherwise, experience having demonstrated that the liquid vapor will combine with the mechanically-suspended impurities in the gas, and hence will permit of their separation from the gas with the vapor, leaving the gas quite dry and pure; and our invention consists of simple, cheap, and effective means whereby the desired intimate admixture of the gas and vapor can be effected.

In the drawing, 1 represents a vertical tank of any suitable cross-section and of any required dimensions, according to the amount of gas to be treated. Entering this tank near the top is a pipe 2, which supplies the gas laden with impurities, and at a somewhat lower point on the tank is a discharge-pipe 3 for the mixture of gas and steam. Between these two pipes is interposed an inverted cone 4, from the center of which a depending tube 5 extends to any required distance from the bottom of the tank. From the top of the tank depends a tube 6, which terminates at its lower end in the upper end or mouth of the pipe 5 and which receives steam from any convenient generator through a valved pipe 7, preferably of smaller diameter than the pipe 6. The high-pressure steam therefore expands in the pipe 6 and issues from the lower end of the same under comparatively low pressure, but with force enough to operate as an ejector and cause a flow of gas from the upper portion of the tank 1 into and through the depending pipe 5. This pipe is by preference provided with a spiral blade 8 or other means for causing intimate admixture of the steam and gas, although the mere downward flow of said steam and gas through an unobstructed pipe 5 may, if desired, be relied upon for effecting such admixture.

The mixture of gas and steam escapes from the lower end of the pipe 5, rises in the tank 1; and escapes therefrom through the pipe 3 to a condenser 9 of any appropriate form, that shown in the drawing being an air-cooled condenser, through which the mixture of steam and gas is caused to pass from top to bottom, the air passing upwardly through a series of internal tubes 10, so as to condense the steam and cause it, with the impurities carried thereby, to be precipitated in the lower portion of the condenser, from which it escapes through a trapped pipe 12. A similarly-trapped pipe 13 provides for the escape of any water of condensation from the tank 1.

While we prefer to use steam as the agent for removing the impurities from the gas, other vapors of liquid may be employed.

The apparatus shown and described is continuous and automatic in its operation, has no moving parts to get out of order, requires no attention, and can be operated practically without expense, since the limited amount of

steam employed is a negligible quantity in the gas-making or furnace plants in connection with which the mixer is intended to be used.

5 While we prefer to employ the mixer with the parts occupying the relation to each other shown in the drawing, the tank 1 and its gas and steam connections might be reversed top for bottom, if desired, the trapped
10 overflow-pipe 13, however, always communicating with the lower portion of the tank. In either form of apparatus the gas and vapor throughout a portion of their passage through the mixer are caused to flow downwardly or
15 in opposition to their natural tendency to rise, this provision aiding in the accomplishment of the desired intimate admixture of the vapor and gas.

Having thus described our invention, we
20 claim and desire to secure by Letters Patent—

1. The combination, in a gas and vapor mixer, of a mixing vessel having a partition dividing it into two chambers with a mixing-
25 pipe extending therefrom, a gas-supply pipe communicating with the chamber on one side of said partition, a discharge-pipe communicating with the chamber on the other side of same, and a vapor-pipe discharging
30 into the mouth of the mixer-pipe so as to induce a flow of gas into and through the same, substantially as specified.

2. The combination in a gas and vapor mixer, of a mixing vessel having at the top
35 an inverted conical partition with mixing-pipe extending downwardly therefrom and terminating at the bottom of said vessel, a gas-inlet communicating with the vessel above said partition, means for injecting vapor
40 into said gas, an outlet below the partition for the mixed gas and vapor, and means for obstructing the direct flow of gas and va-

por through the mixing-pipe, substantially as specified.

3. The combination in a gas and vapor mixer, of a mixing vessel having a partition
45 therein, a mixing-pipe within the vessel extending downwardly from said partition and terminating adjacent to the bottom of said vessel, said pipe having a relatively tortuous
50 passage through it, a gas-supply pipe communicating with the chamber on one side of said partition, a pipe extending to the entrance of said mixing-pipe for injecting vapor into the gas as it enters said pipe, and an
55 outlet for the mixed gas and vapor from the chamber on the other side of the partition, substantially as specified.

4. The combination in a gas and vapor mixer, of a mixing vessel having a partition
60 therein, a mixing-pipe extending from said partition and having means for preventing the direct flow of gas and vapor therethrough, means for injecting gas and vapor into the
65 mouth of said pipe, and an escape-pipe for the mixed gas and vapor, said escape-pipe being so disposed that after the mixture of gas and vapor leaves the mixing-pipe, it is
70 caused to flow in an opposite direction from that of its passage through said pipe, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

EDWARD C. JONES.

SAMUEL T. WELLMAN

Witnesses to the signature of Edward C. Jones:

JULIUS CALMANN,

A. P. GIANNINI.

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D. P. BALLARD,

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