

No. 791,160.

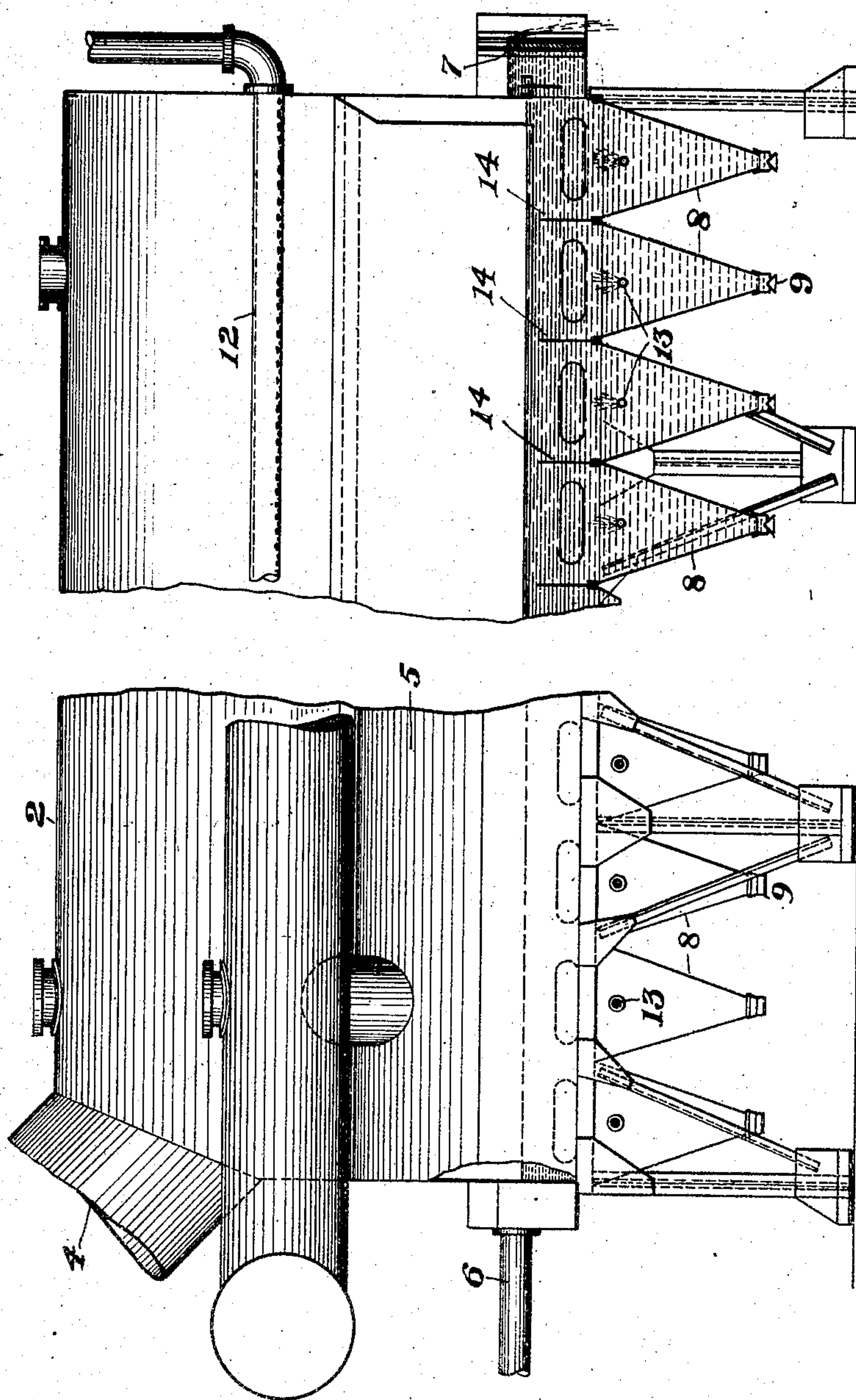
PATENTED MAY 30, 1905.

J. S. OURSLER.
APPARATUS FOR WASHING GAS.

APPLICATION FILED JULY 23, 1904.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

Walter Samaras

A. M. Stearns

INVENTOR

John S. Oursler

By James E. Baskin

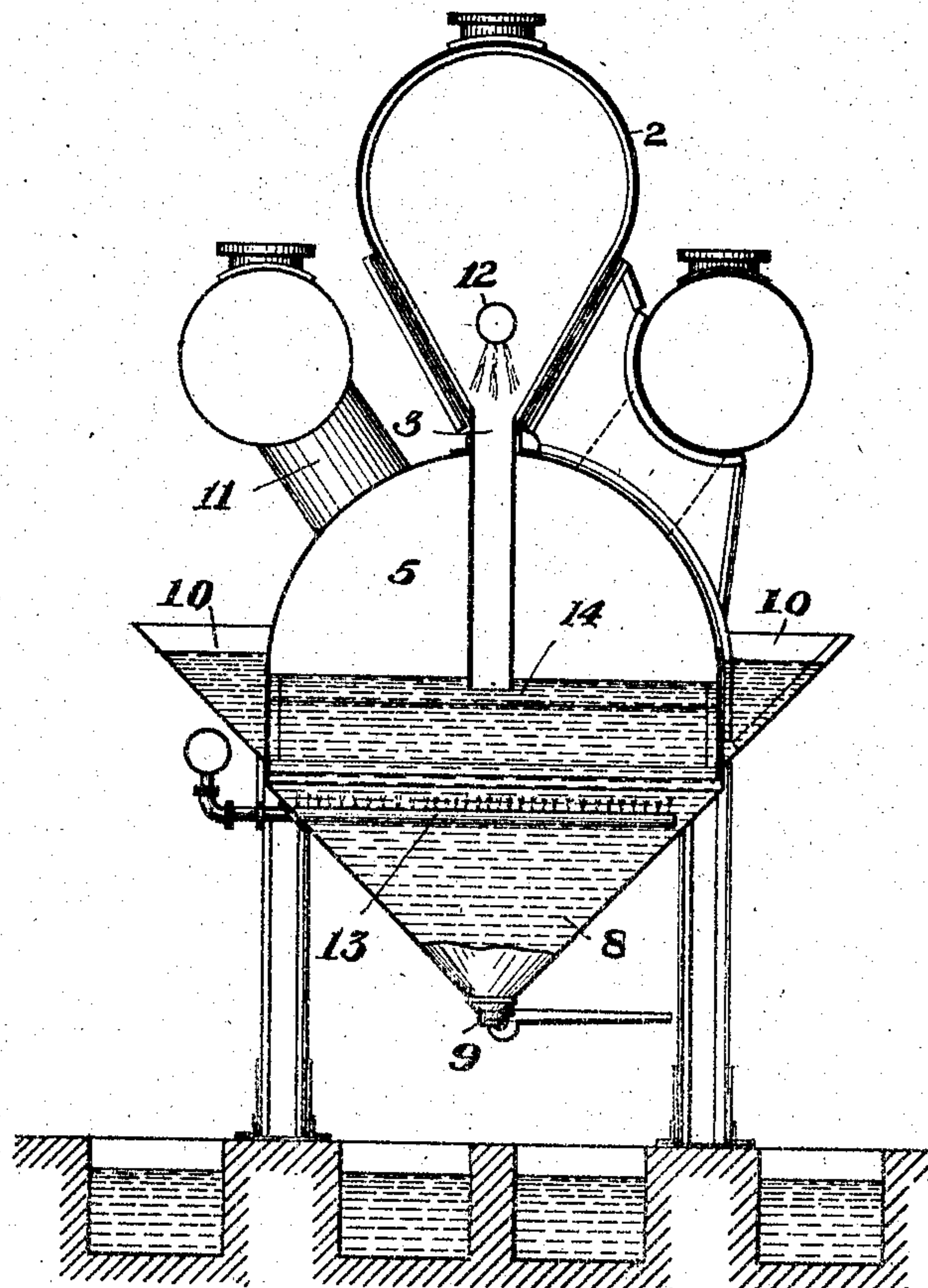
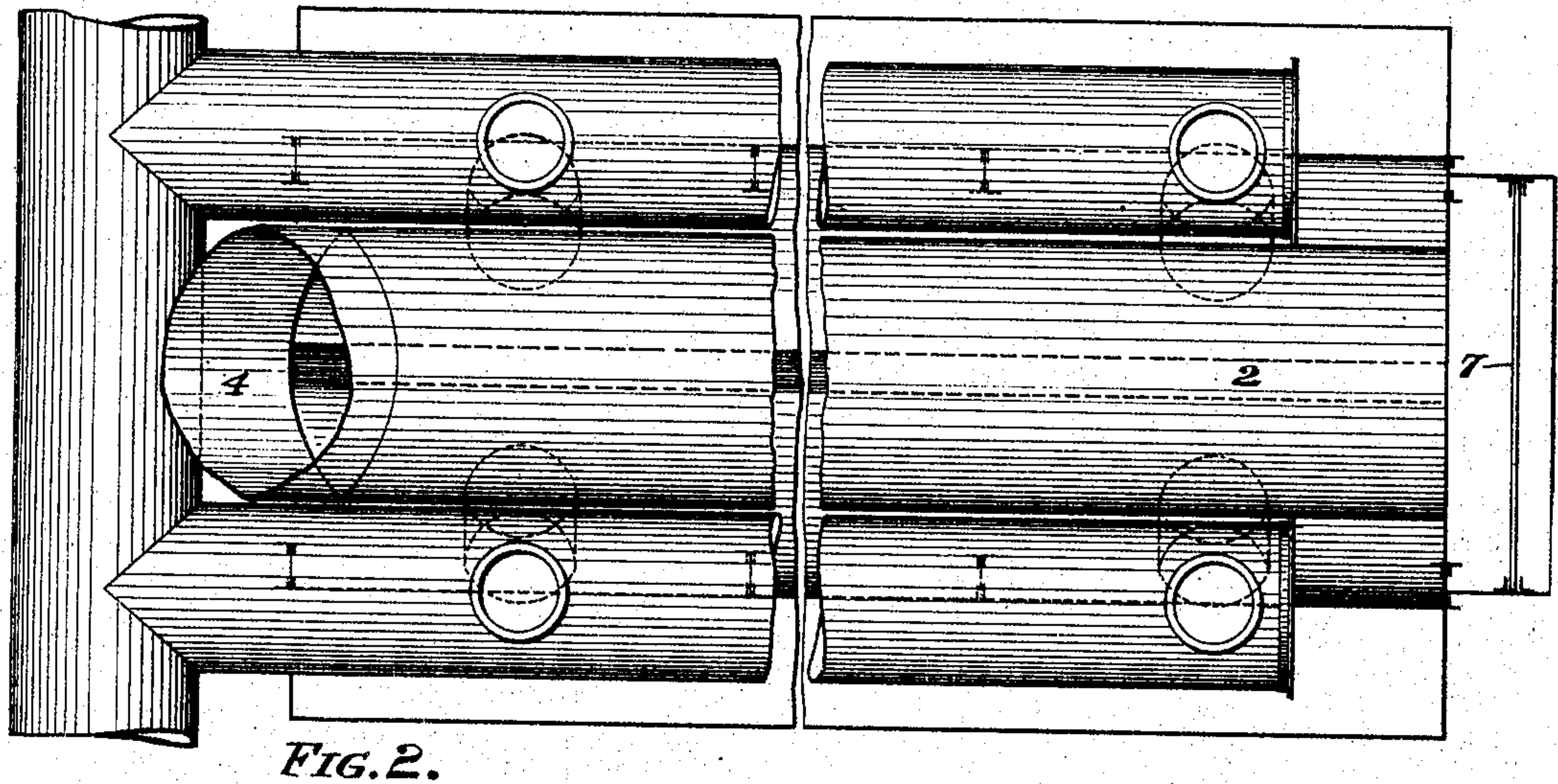
his Attorney

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2 SHEETS—SHEET 2.



WITNESSES

Walter Samaras
A. M. Steen

INVENTOR

John S. Oursler
by James H. Parkhurst
his Attorney

UNITED STATES PATENT OFFICE.

JOHN S. OURSLER, OF NEWCASTLE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JOHN REIS, OF NEWCASTLE, PENNSYLVANIA.

APPARATUS FOR WASHING GAS.

SPECIFICATION forming part of Letters Patent No. 791,160, dated May 30, 1905.

Application filed July 23, 1904. Serial No. 217,786.

To all whom it may concern:

Be it known that I, JOHN S. OURSLER, of Newcastle, in the county of Lawrence and State of Pennsylvania, have invented a certain new and useful Improvement in Apparatus for Washing Gas, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation, partly in section, illustrating my improved gas-washer. Fig. 2 is a longitudinal horizontal sectional view, and Fig. 3 is a cross vertical sectional view.

Like symbols of reference indicate like parts wherever they occur.

My invention relates to an improved apparatus for washing the gases drawn from the blast-furnace for the purpose of removing the dirt, dust, and moisture that passes with the gas from the furnace, and thus render the gas non-injurious to the hot-blast stove, boiler-furnace, gas-engine, or other appliance to which the gas may be conducted.

In modern blast-furnace practice it is customary to draw from the furnace-stack the gases which are generated in the blast-furnace and to lead them to the furnace under the steam-boilers, where they serve as fuel for the fire. These gases, while they are composed of hydrogen, oxygen, and carbon, are impure in the condition in which they pass from the furnace—that is, they are mingled with solid particles of silicon, iron ore, and other foreign matter and also a certain percentage of moisture to such an extent as to prevent the economical use of the gases while in their crude condition in the hot-blast stoves, in gas-engines, or in other furnaces or regenerators where this foreign matter or moisture would be injurious to the brickwork or mechanical parts either through disintegration of the brick or through the clogging or cutting of flues or parts. To remove this foreign matter from the gases, one method is to cause the gas as it comes from the blast-furnace to pass through water in which the foreign matter is supposed to be deposited, leaving the gas, washed and purified, to pass to the place of use. As, how-

ever, the gas as it comes from the blast-furnace is very hot, the temperature being generally from 400° to 600° Fahrenheit, the hot gas when it is brought in contact with the water is apt to vaporize the water, which vapor passes off with the gas, charging it with moisture, which is exceedingly injurious to the brickwork of furnaces and hot-blast stoves and to the parts of gas-engines—so much so that where this moisture exists in the gas to any considerable extent it renders the gas unfit for use.

The object of my invention is to thoroughly wash the gas to remove impurities and also the moisture which passes with the gas from the blast-furnace.

I will now describe my invention, so that others skilled in the art may manufacture and use the same.

My invention consists in a gas-washer adapted to cause the gas to pass in a sheet against and into a stream of water, sprays of water being employed to aid in the washing and cooling of the gas, devices being provided for the collection and separation of the foreign matter and devices being provided for preventing the cold water from collecting in the bottom of the washer out of reach of the gases.

In the drawings, 2 represents the body of the washer, consisting, preferably, of a long commodious horizontal receiving-chamber adapted to receive the gas from the furnace. This chamber is shown pear-shaped in cross-section—that is, it has a rounded or cylindrical roof and side wall, which converge to a slot or long narrow opening 3 at the bottom, which opening extends the entire length of the chamber. At one end of the chamber 2 and opening thereinto is a pipe or conduit 4, which serves to lead the gas to the receiving-chamber from the blast-furnace. Below the receiving-chamber 2 is the washing-chamber 5, into which the vertical walls of the lower portion of the chamber 2 extend to such a depth as to bring the slot 3 below the water-level in the washing-chamber. The connections between the two chambers are so made as to prevent the escape of gas to the atmosphere. This chamber 5 is adapted to

contain a large bath of flowing water, the level of which is above the mouth of the slot 3, whereby the gas as it passes from the chamber 2 through the slot 3 is compelled to pass through the water, and rising therefrom it collects in the upper portion of the chamber 5. The effect of this is not only to wash the gas and separate the dust and impurities therefrom, but also to lower its temperature, and as the temperature of the gas is lowered the moisture contained within the gas becomes condensed and separates therefrom. At one end of the chamber 5 is an inlet-pipe 6 for the water-supply, and at the other end of this chamber is an adjustable overflow-dam 7, which is water-sealed and allows the water to flow from the chamber 5. This overflow-dam may be adjusted at the height desired to cause a greater or less depth of water in the washing-chamber. At the bottom of the chamber 5 are conical pockets 8, arranged in series one beside the other, the purpose of which is to receive the deposit of dust, which in the condition of soft flowing mud may be drawn off from time to time at the bottom of the pockets by means of the valves 9. Along the sides of the upper portion of the pockets 9 are pockets 10, which are also so constructed as to be sealed by the water in the chamber 5, and they serve as poke-holes through which access may be had to the pockets 9 to aid in forcing the mud through the valve-ports by means of poles. Leading from the top of the chamber 5 are the gas-outlet pipes 11, by means of which the gas is led to the conduit that conducts the gas to the place of use.

In order to aid in the cooling and washing of the gas, I employ a series of spray-pipes, one of which, 12, extends longitudinally in the receiving-chamber 2 above the slot 3 and sprays water downwardly into the slot. Other spray-pipes, 13, extend across the upper portion of the pockets 9 and spray the water upwardly. These latter sprays serve to agitate the water in the washing-chamber.

To prevent the colder water from collecting in the pockets 9 and to cause it to come in direct contact with the gas as it passes from the slot 3, I employ vertical plates 14, situate in the chamber 5 below the level of the water and below the level of the mouth of the slot 3. These plates or partitions extend upwardly from the ridges between the pockets to a point just below the surface of the water in the chamber and serve to cause the cold water coming from the pipe 6 to overflow the plates 14 and distribute itself throughout the chamber 5. Another important office of the partition 14 is to enable the scum to be drained from the entire surface of the water in the chamber 5. This scum, which is composed of the impurities separated from the gas, floats on the surface of the water, and if allowed to accumulate it would soon so cover the surface

of the water as to prevent the gas from coming in contact therewith. By opening the valve 9 of any one of the pockets 8 the scum will be drawn off as the water passes out of that pocket without emptying the remaining pockets of the series.

While I prefer to have the washer much longer than its width, yet it may be of any shape—square, rectangular, or circular—and as it is preferably low and extended in form the waste water from the furnace may be used in the washing-chamber. As the washer receives its water at one end and discharges it at the other and as the flow of water is in the same direction as the flow of gas, all the scum and foam arising from the impurities flow to the discharge end of the chamber 5, where they are at intervals blown from the washer. As there are no surface cross-partitions in the chambers 2 and 5, the flow of water and gas is practically uninterrupted.

The advantages of my invention will be appreciated by those skilled in the art.

Although I have shown the partitions 14 as plates extending from the ridges of the pockets, I do not desire to limit myself to this construction.

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

1. In apparatus for washing gas, a receiving-chamber having an inlet gas-pipe, a washing-chamber having a series of dust-receiving pockets, an extended narrow passage for permitting the gas to flow in a thin stratum from the receiving-chamber to the washing-chamber below the level of the water-outlet, and a series of plates situate below the mouth of the narrow passage and extending below the level of the water-outlet; substantially as specified.

2. In apparatus for washing gas, a receiving-chamber having an inlet gas-pipe, a washing-chamber having a series of dust-receiving pockets, a series of water-sealed pockets communicating with the dust-receiving pockets, an extended, narrow passage for permitting the gas to flow in a thin stream from the receiving-chamber to the washing-chamber below the level of the water-outlet, and a gas-outlet conduit; substantially as specified.

3. In apparatus for washing gas, a receiving-chamber having an inlet gas-pipe, a washing-chamber situate below the receiving-chamber, a narrow channel having vertical sides and extending from the receiving-chamber to a point below the surface of the water in the washing-chamber, a series of dust-receiving pockets in the bottom portion of the washing-chamber, and a series of vertical plates situate below the mouth of the channel and below the level of the water-outlet; substantially as specified.

4. An apparatus for washing gas, a receiving-chamber having an inlet gas-pipe, a washing-chamber situate below the receiving-

chamber, a narrow channel having vertical
sides and extending from the receiving-cham-
ber to a point below the water-outlet in the
washing-chamber, a series of dust-receiving
5 pockets in the bottom portion of the washing-
chamber, the pockets being separated from
each other by partitions, extending to a point
just below the level of the water-outlet of the
washing-chamber, and drain-openings at the

bottom of the pockets; substantially as speci- 10
fied.

In testimony whereof I have hereunto set
my hand.

JOHN S. OURSLER.

Witnesses:

A. M. STEEN,
JAMES V. BAKEWELL.