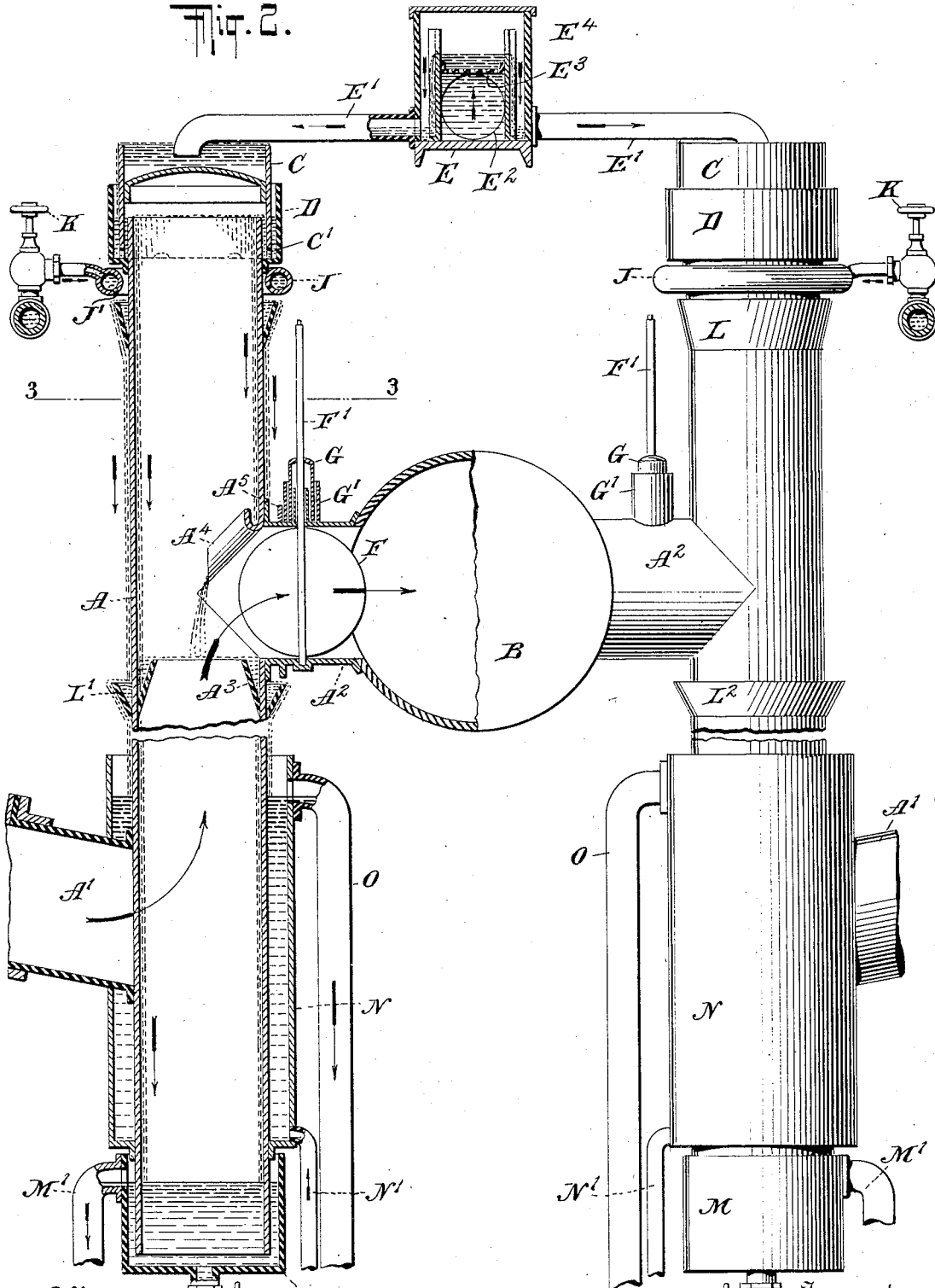


J. B. P. HERRESHOFF.
 APPARATUS FOR TREATING BURNER GASES.
 APPLICATION FILED AUG. 16, 1907.

955,067.

Patented Apr. 12, 1910.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TREATING BURNER-GASES.

955,067.

Specification of Letters Patent. Patented Apr. 12, 1910.

Original application filed August 10, 1906, Serial No. 329,968. Divided and this application filed August 16, 1907. Serial No. 388,823.

To all whom it may concern:

Be it known that I, JOHN B. F. HERRESHOFF, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Treating Burner-Gases, of which the following is a specification.

My invention relates to apparatus for treating burner gases preparatory to the manufacture of sulfuric acid therefrom. The apparatus is designed to cool the gases and to remove from them some of the objectionable constituents before ultimate purification, and its use is to be followed by further purifying steps, and by a drying process such as treatment with strong sulfuric acid.

One great difficulty experienced with burner gases is their tendency to quickly destroy the metallic walls of the cooling conduits through which they pass. Whenever the temperature in such conduits is such that fractional condensation of strong sulfuric acid can take place, such acid at once attacks the iron, lead or analogous material which it reaches. Having found that the difficulty arises from the foregoing causes I invented means for overcoming it. In this connection I may state that neither mere external cooling of the conduit, nor the internal cooling of the gas by spraying or injection will answer for purposes of actual and continuous manufacture.

An apparatus embodying my present invention is shown in the accompanying drawings in which—

Figure 1 is a general outside view of such apparatus, Fig. 2 is an enlarged view of same with parts in section, and Fig. 3 is a cross-section and plan on line 3—3 of Fig. 2.

The apparatus comprises a standpipe A or a series of such pipes, each provided at its lower part with an inlet connection A' through which the gas to be treated enters, and near the top with an outlet connection A² from which the treated gases pass to a header B, whence they are conducted to such other apparatus for purifying and other treatment as may be desired. Each standpipe A carries at its upper part a cap or sleeve C of slightly larger diameter, to permit of the formation of an annular space for

overflow. This cap C is surrounded by a cylindrical wall D supported upon the standpipe, and small openings C' are made at or near the bottom of the cap C so that a liquid discharged into the space between the cylindrical wall D and the cap C may flow through the openings C', and rise in the annular space between the cap C and the upper end of the stand-pipe proper and overflow into said stand-pipe so as to form a continuous film to the inner surface thereof. This liquid, which is preferably weak sulfuric acid, is conveyed to the cup-shaped top of cap C from a supply tank E through a pipe E'. The said tank has an inlet pipe E² for the acid, a perforated partition E³ through which the acid may rise, and imperforate vertical walls or weirs E⁴ over the upper edges of which the acid may flow to reach the supply pipes E'.

Below the point where the outlet connection A² leaves the stand-pipe A, I locate within the pipe an inclined catch shield A³, and above the opening leading to the outlet connection A², I arrange a sloping gutter A⁴, from which so much of the liquid film flowing down on the inside of the stand-pipe as is caught by the gutter will be directed past the opening A² into the catch shield A³ whence it resumes its flow along the inner wall of the stand-pipe. In the outlet connection A² I may arrange a damper F, having an operating stem F', and preferably also provided with a hydraulic seal to prevent the escape of gases, said hydraulic seal comprising a closed bell-shaped portion G, which dips into a receptacle G', containing water or other liquid forming the seal.

To aid in cooling the pipe and its contents I have provided an annular tube J, connected with a suitable source of water (or other cooling medium) supply, as by a valve K, and having openings J' to discharge the water downwardly against the outer surface of the stand-pipe, and, if desired, into an annular trough L. The cooling water thus flows along the outside of the stand-pipe. At the point where the outlet A² branches off, a suitable guide rib A⁵ is provided, so as to lead the water around the outlet connection A² into a trough L', from which the water again overflows along the outside of the stand-pipe.

The open lower end of the stand-pipe dips into a tank M containing a liquid, and having an overflow M' so as to form a hydraulic seal. Around the lower portion of the stand-pipe is a jacket N, which not only receives at its upper end the water which has flowed down on the outside of the stand-pipe, but also has a water supply pipe N' at the bottom. Thus, in the said jacket water will flow upward to the outlet pipe O. The entire stand-pipe is thus cooled by a double flow of water, some passing up and some down as described.

In operation, as the gases pass through the stand pipe they will be cooled by the weak acid flowing down on the inside, and also by the action of the cooling liquid flowing on the outside of the stand-pipe. The inner film of fluid will prevent condensed acid from reaching and attacking the walls of the stand-pipe. Particles of impurities carried by the gases will be caught in said inner film and separated out of said gases carried to the tank or trough M, whence they may be conveniently removed, as, for instance, through pipe *a*. Any acid withdrawn at M', if desired, can be further cooled and purified and then returned to the supply tank E through the pipe E².

Instead of forming the film which flows within the stand-pipe of weak sulfuric acid the same may be formed of any other fluid adapted to the purpose.

The present application is a division of one filed by me in the United States Patent Office on August 10, 1906, Serial No. 829,968.

I claim:

1. A stand-pipe for burner gases, provided with an inlet and outlet for the burner gases, a liquid inlet located near the top above the outlet of the burner gases and adjacent to the inner surface of the stand-pipe to produce a flowing film therein.

2. A stand-pipe for burner gases, provided with an inlet and an outlet for the burner gases, a liquid inlet located near the

top above the outlet of the burner gases and adjacent to the inner surface of the stand-pipe to produce a flowing film therein, and means for passing a cooling fluid along the outer surface of the stand-pipe.

3. A stand-pipe for burner gases, provided with an inlet and an outlet for the burner gases, a liquid inlet located near the top and adjacent to the inner surface of the stand-pipe, to produce a flowing film therein, and means for enveloping said stand-pipe in a cooling fluid, moving from both ends toward an intermediate point.

4. A stand-pipe for burner gases, provided with an inlet and an outlet for the burner gases, and an annular liquid inlet located near the top above the outlet of the burner gases and adjacent to the inner surface of the stand-pipe.

5. A stand-pipe for burner gases, provided with an inlet and an outlet for the burner gases, a liquid inlet located near the top above the gas outlet and adjacent to the inner surface of the stand-pipe, a liquid outlet at the bottom, and a gutter for carrying the liquid past the opening through which the gases pass.

6. A stand-pipe for burner gases, provided with an inlet and an outlet for the burner gases, a liquid inlet located near the top and adjacent to the inner surface of the stand-pipe to form a continuous film therein, liquid inlets located at the top and bottom of the stand-pipe respectively on the outside thereof, and a liquid outlet located between said inlets, so that the liquid will flow both upward and downward to said outlet.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN B. F. HERRESHOFF.

Witnesses:

JOHN A. KEHLENBECK,
JOHN LOTKA.