J. ARMSTRONG.

APPARATUS FOR WASHING GASES.

APPLICATION FILED JAN. 8, 1913.

1,143,162.

Patented June 15, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

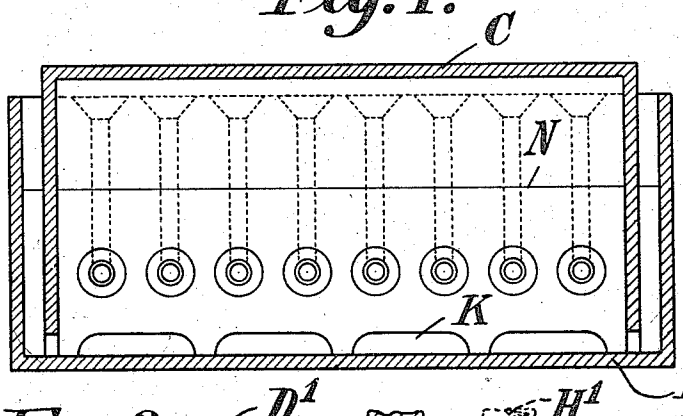


Fig. 3.

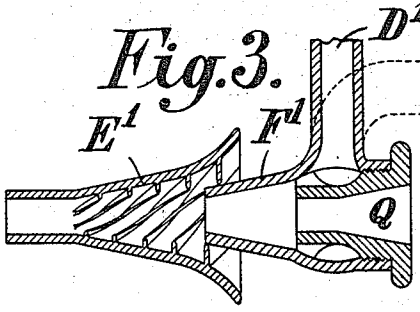
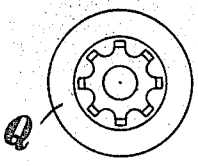


Fig. 4.



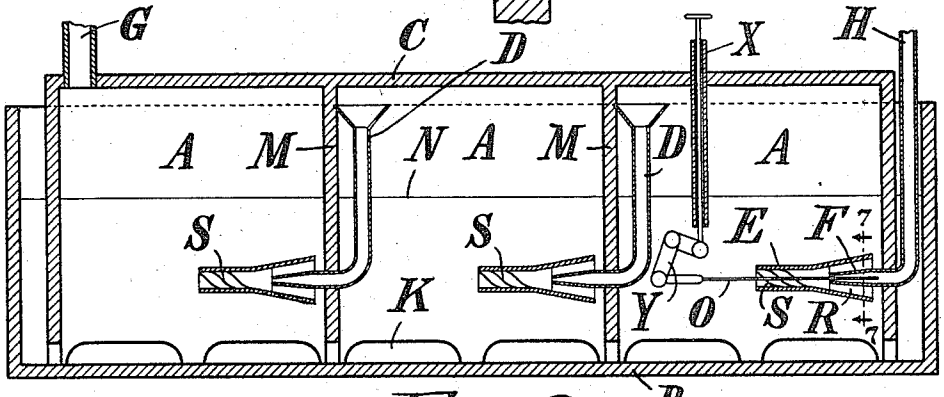


Fig. 2.

Witnesses

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2 SHEETS—SHEET 2.

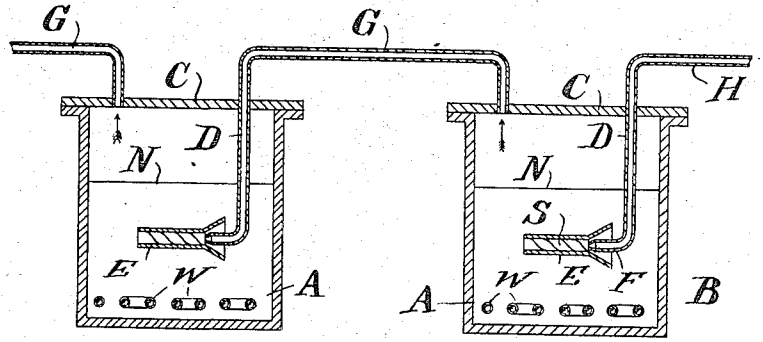


Fig. 5.

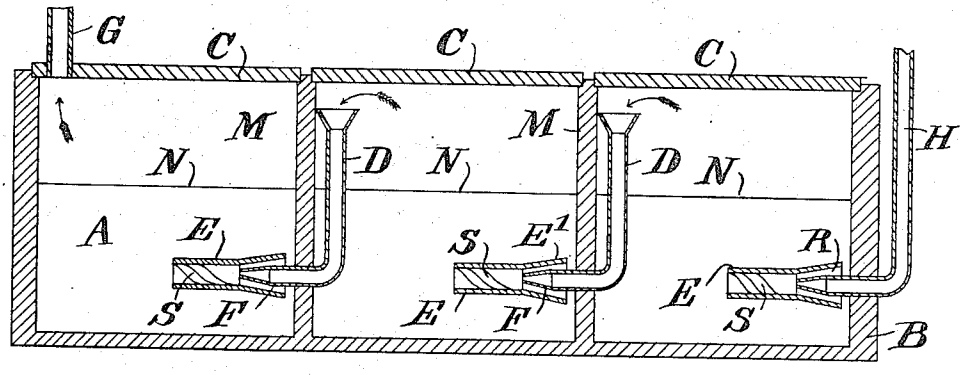


Fig. 6.

Witnesses

H. E. Montague

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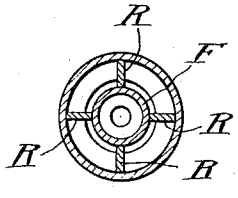


Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN ARMSTRONG, OF LONDON, ENGLAND.

APPARATUS FOR WASHING GASES.

1,143,162. Specification of Letters Patent. Patented June 15, 1915.

Application filed January 8, 1913. Serial No. 740,840.

To all whom it may concern:

Be it known that I, JOHN ARMSTRONG, a subject of the King of Great Britain, residing at London, in the Kingdom of England, have invented certain new and useful Improvements in Apparatus for Washing Gases, of which the following is a specification.

The object of this invention is an apparatus for extracting from fumes or gases, tar, benzol, oil, acids, alkalis, oxids, carbonates, or other salts of metals or earths and other impurities, and for cleansing and scrubbing the gas or air from impurities. The gases or fumes for treatment are drawn off from the delivery pipe, and passed under pressure in any well known manner and are forced through the apparatus herein described.

Referring to the drawings, Figure 1 is a transverse section of the Fig. 2; Fig. 2 is a vertical longitudinal section of my apparatus; Fig. 3 a vertical section of a modified form of nozzle; Fig. 4 an end view thereof; Figs. 5 and 6 are vertical longitudinal sections also of the apparatus where only single tanks are used without the inverted tank, and Fig. 7 is a sectional view, taken on the line 7—7 of Fig. 2, showing the detail of the nozzle.

Similar letters of reference apply to each.

Referring first to Figs. 1 and 2, in these A A A are a series of compartments formed by the inverted tank C, and its diaphragms M. This tank rests in a larger tank B, and has openings K all around and through the partitions.

Referring to Fig. 5, A A A are a series of separate tanks joined by tubes conveying the gas or air to be cleaned or scrubbed.

Referring to Fig. 6, A A A are a series of compartments formed in a tank of which the diaphragms M are the divisions, and C are the lids. These tanks are filled with the liquid to say the line shown at N.

H is a pipe bringing the compressed gas or fumes to the nozzle F. Surrounding this nozzle is a larger conical tube E continuing with a parallel or nearly parallel continuation beyond the end of the tube F. This pipe H has three or more ribs R extending the length of the nozzle F, and forming a conical skeleton hole as shown in Fig. 7. The two can be brazed together if desired. The tube E is rifled by means of small flanges or projections S so as to cause a strong vortex, and there being considerable pressure on the pipe H and the nozzle F, the liquid and gases or fumes are intimately mixed and driven with great force forward into the liquid in the tank. There is a line of these pipes H and nozzles as shown in Fig. 1, which gives a section however of the middle compartment, and not the first compartment. In this first compartment there is a tube X, dipping down into the water, and a spindle with a handle at the upper end and an eye at the lower one connected to an elbow lever Y, the lower arm of which in turn is connected to a needle O extending into the nozzle, as clearly shown in Fig. 2. By moving the handle up and down it will be seen that the needle or scraper can be agitated in the nozzle F, and thus keep the nozzle open. In this compartment are a series of pipes D bringing the fumes from the top of the first mentioned chamber into a nozzle and tube in the second chamber, while a further funnel tube D carries them to the third chamber, and so on, to as many chambers as are required. The pipe G is the exit pipe for the cleaned gases. The openings K, Fig. 2. are used when the same fluid is used in all compartments or when only one tank is used with a single compartment, but where one fluid for instance tar is used to condense and separate tar from the gas, and another fluid say sulfuric acid for separating the ammonia, and another fluid say oil for separating benzol, and another fluid say lime water for separating carbonic acid the openings K are done away with and the apparatus as shown in Figs. 5 and 6 are used with separate independent compartments.

Referring now to Figs. 3 and 4 which show a section of a modified injector for the first compartment, a similar device is used in each of the other two or more compartments, the pipe H′ being curved and passed through the diaphragm M as shown in dotted lines instead of passing upwardly to the top of the tank, as shown in Fig. 2. In these, Q is an open nozzle screwed into nozzle F′. An end view of nozzle Q is shown in Fig. 4. F′ is a nozzle continuation of tube D′. The latter is continued upward and ends in a funnel as shown in Fig. 2. E′ is a modified form of funnel E.

In thus describing my invention, it is almost immaterial whether the nozzles F and the tubes E are horizontal, inclined or vertical, so long as they are concentric. Fur-

ther, the tubes D with the nozzles, et cetera, are preferably fixed as in the tank C Figs. 2 and 6, or as in the lid C of tank shown in Fig. 5, for convenience of cleaning, so that the entire inverted tank C with all its appurtenances can be lifted out of the simple tank B. Means for drawing off the water or other fluids, or dirt, in the tank, not shown, can be placed in any convenient position. These form no part of my invention, and therefore I have not depicted them, and they may differ in position in almost every installation. When too this apparatus is used for extracting ammonia and tar from gases, it may be desirable to give means for heating the same but any well known means can be used for this purpose. A coil heater for this purpose is shown in Fig. 5, being designated by the letter W. When treating ordinary coal gas from the retorts, the tar and solid impurities are left floating mainly in the first compartment. In the second compartment the gases can be treated for ammonia, and in the third, oil can be placed for extracting the benzol and other hydrocarbons.

I declare that what I claim is:—

1. In an apparatus for removing liquid or solid matters from air or gases, the combination of a tank adapted to contain a cleansing liquid; an injector nozzle immersed to a considerable depth in said cleansing liquid; means for forcing the air or gas to be cleaned at some pressure through the nozzle; and a tube surrounding the nozzle and spaced therefrom, whereby an opening is formed in the rear of the nozzle into and through which a strong current of liquid is drawn, and the entire power used for cleaning the air or gas is its own initial pressure.

2. In an apparatus for removing liquid or solid matter from air or gases, the combination of a tank adapted to contain a cleansing liquid; a horizontally-disposed nozzle placed at a considerable distance below the level of the cleansing liquid and through which the air or gas is designed to be forced under pressure; and a tube surrounding the nozzle, the interior of said tube being rifled at the forward end thereof, whereby a combined jet of the cleansing liquid and the air or gas to be cleaned is forced forwardly through the liquid in the tank with a rotary motion.

3. In an apparatus for removing liquid or solid matter from air or gases, the combination of a closed tank having partitions therein, forming a plurality of compartments, and adapted to contain a cleansing liquid; a series of nozzles located in one of said compartments and placed at a considerable distance below the level of the liquid therein; an injector tube placed about each nozzle in spaced relation thereto, the interior discharge end of said tube being rifled; and means for removing air or gas from the upper portion of each compartment and delivering the same to a similar series of nozzles arranged in the next compartment.

4. In an apparatus for removing liquid or solid matter from air or gases, the combination of a tank open at its top; and an inverted tank a little less in area than the other located within the first tank and subdivided into a series of compartments by cross-partitions or diaphragms, the lower portion of the walls of said inverted tank and said diaphragms being provided with openings, whereby the various compartments are placed in intercommunication.

5. In an apparatus for removing liquid or solid matter from air or gases, the combination of a main tank open at the top; an inverted tank located in the main tank and provided with a series of cross diaphragms subdividing the inverted tank into a series of compartments; a series of pipes extending from the upper part of each compartment downwardly and thence through a diaphragm and terminating in the lower portion of the next adjacent compartment; a nozzle formed at the lower end of each of said pipes; and an injector tube surrounding each of said nozzles, whereby the air or gas will be forced through the cleansing liquid in each of the compartments at substantially the same initial pressure throughout the apparatus.

In witness whereof, I have hereunto signed my name this 28 day of December 1912, in the presence of two subscribing witnesses.

JOHN ARMSTRONG.

Witnesses:
H. D. Jameson,
O. J. Worth.