

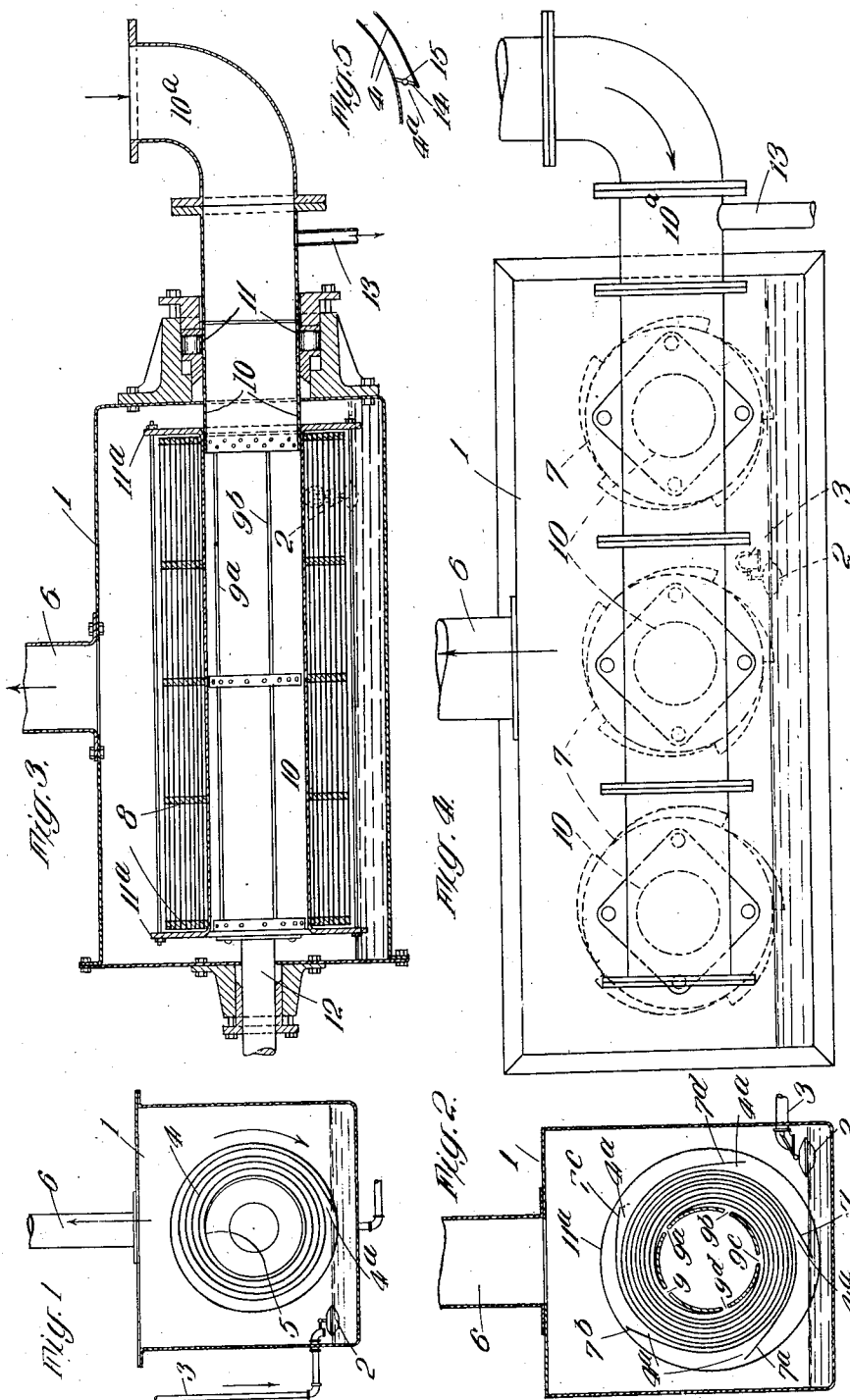
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E. M. SALERNI

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TREATING GASEOUS MEDIUMS WITH LIQUIDS

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Inventors
Edwards H. Salerni
By *Thurman. Sweet. Dwyer*

UNITED STATES PATENT OFFICE.

EDOARDO MICHELE SALERNI, OF PARIS, FRANCE.

TREATING GASEOUS MEDIUMS WITH LIQUIDS.

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This invention relates to the treatment of gases or vapours with liquids or liquefiable mediums, for example to the washing or scrubbing of natural or industrial gases by means of absorbents or other liquids such as water or oil which exert a physical or chemical action thereon, either for the purpose of extracting therefrom certain valuable constituents such as light hydrocarbon oils or for the purpose of freeing them from impurities, or for promoting a chemical interaction, or for condensing gases or vapours the object of the invention being to provide an improved method and apparatus wherein the active surfaces are large in proportion to the size of the apparatus and also such as to accelerate the washing process or the physical or chemical action.

According to the present invention the liquid and gaseous mediums undergoing treatment are caused to pursue a helicoidal or spiral path in contact with and in contra-flow to one another. To this end a scroll may be formed by rolling a thin metal plate upon itself the convolutions of the scroll being spaced apart to any required extent, for example, by providing indentations or protuberances on or along the surface of the plate before rolling it upon itself to form the scroll. The scroll is mounted within a casing containing in the lower portion thereof a quantity of the liquid or liquefiable medium with which the gaseous medium is to be treated and means are provided for rotating the scroll within the casing, the arrangement being such that, during each rotation, the outer or free end of the scroll dips and collects within the scroll a quantity of the liquid contained in the lower portion of the casing. The gas or vapour which is to undergo treatment is admitted to the interior of the scroll at the centre or axis thereof and, as the scroll rotates, the liquid which was collected from the base of the casing flows inwards in the form of a thin layer through the convolutions of the scroll from the periphery to the axis thereof where it is allowed to escape, in contra-flow to the gas which passes outwardly through the scroll from the axis to the periphery thereof.

In order that the said invention may be clearly understood and readily carried into effect, same will now be described more fully

with reference to the accompanying drawing, in which:—

Figure 1 is a sectional end view of an apparatus provided with a single scroll.

Figure 2 is a sectional end view of a modified form of the apparatus fitted with a plurality of scrolls located one within the other.

Figure 3 is a longitudinal section of Figure 2, and

Figure 4 is an elevation of a modified form of the apparatus in which three sets of scrolls are provided.

Referring to Figure 1, 1 is a casing containing in the lower portion thereof a predetermined quantity of the liquid with which the gas is to be treated the level of the liquid being maintained by a ball float 2 controlling a supply tube 3. 4 is a scroll, which is mounted upon a frame and rotated from any suitable source of power. The gases or vapours which are to undergo treatment enter the scroll at the centre 5 thereof and after undergoing treatment they leave the casing 1 by the pipe 6. In the example shown at Figure 1 a single scroll 4 is provided and in operation, and during each rotation of the scroll 4 it will be clear that a certain quantity of liquid in the lower portion of the casing 1 will be collected by the free end 4^a of the scroll and caused to flow in the form of a thin layer along the interior surface of the scroll from the periphery to the axis thereof while the gases which enter the scroll at the interior thereof will pass outwardly from the axis to the periphery of the scroll in contact with the liquid. The treated gases after leaving the scroll 4 pass off from the apparatus through the pipe 6, while the liquid will flow off from the axis 5 of the scroll. It will thus be seen that the present arrangement provides a very large surface of contact in a comparatively small space while also ensuring that the liquid with which the gas is treated is constantly changed. The liquid at the axis of the scroll is allowed to leave the scroll for example through the inlet through which the gas is admitted to the interior thereof and a baffle may be provided at the said outlet so as to maintain any desired level of liquid within or on the interior surfaces of the scroll.

In the arrangement shown at Figure 2

five scrolls 7, 7^a, 7^b, 7^c, and 7^d are provided and located one within the other so as to increase the contacting surfaces within a given space the scrolls being spaced apart by distance pieces 8, 8. The outer end of each scroll is displaced relatively to that of the other scrolls and the several scrolls are mounted upon a tube 10 provided with slots 9, 9^a, 9^b, 9^c, and 9^d extending longitudinally of the tube 10 each slot communicating with one of the scrolls 7, 7^a, 7^b, 7^c, and 7^d. The tube 10 is rotatably mounted upon a fixed tube 11 through which the gases or vapours enter the scrolls 7^a, 7^b, 7^c, 7^d, and 7^e and the framework 11^a which carries the tube 10 and the scrolls 7, 7^a, 7^b, 7^c, and 7^d is adapted to be rotated by a shaft 12. As in the arrangement shown at Figure 1 a predetermined depth of liquid is maintained in the bottom of the casing 1 by a ball float 2 communicating with an inlet pipe 3, and an outlet for the purified or treated gas or vapour is provided at 6. The gas or vapour which is to undergo treatment enters the tube 10 through the tube 11 and enters the scrolls 7, 7^a, 7^b, 7^c, and 7^d through the slots 9, 9^a, 9^b, 9^c, and 9^d. As the framework 11^a rotates, the outer end of each scroll will successively dip into the liquid in the lower part of the casing 1 and collect a quantity thereof which will circulate through the scrolls in counter-current to the gas or vapour from the periphery to the axis thereof the surplus liquid flowing along the tubes 10 and 11 and escaping at the point 13.

In the arrangement shown at Figure 4 three sets of compound revolving scrolls 7, 7 are provided and located side by side within the casing 1.

In order to ensure that only a predetermined quantity of liquid is picked up so that the interior of the scroll is not actually flooded with the liquid means may be provided for varying the cross-sectional area of the inlet or inlets leading to the scroll or scrolls or a dipper or other like device may be provided and attached to the outer end of the scroll or the outer end of each scroll, which dipper can only collect at each rotation a predetermined quantity of liquid. A suitable method of obtaining this result is shown on an enlarged scale at Figure 5 where a plate 14 is provided within the outer end 4^a of the scroll 4 the plate being mounted upon a shaft 15 so that the plate 14 can be adjusted as desired to vary the cross-sectional area of the opening 4^a. In order to ensure that the liquid collected during each rotation of the scroll or scrolls will flow over the entire surface thereof the scroll or scrolls may be divided into sections

as shown at Figure 3 from the periphery to the axis thereof by the distance pieces 8, 8. The scroll or scrolls may if desired be constructed from corrugated or other metal so as to increase the surface of contact between the gas or vapour and the liquid, or the space between the convolutions may be filled with a loose material such as iron filings, turnings, coke or the like.

The scrolls may have any desired number of convolutions and may be of any desired length and the gases or vapours may be adapted to pass successively through a plurality of scrolls.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A method of treating a gaseous medium with a liquid which consists in causing the gaseous medium to move outwardly in an advancing spiral path and the liquid medium to move inwardly in a contracting spiral path in contact with and in contra-flow to the gaseous medium.

2. Apparatus for treating a gaseous medium with a liquid comprising a casing, a spirally wound plate rotatably mounted within said casing, means for admitting liquid to said casing, means for rotating said spirally wound plate so that its free end dips into said liquid and causes a quantity thereof to pass inwardly from the periphery to the axis thereof, means which permit liquid to escape from the axis of said spirally wound plate and means for admitting a gaseous medium to the interior of said spirally wound plate so that the gaseous medium passes outwardly from the axis to the periphery thereof in contra-flow to said liquid.

3. Apparatus for treating a gaseous medium with a liquid comprising a series of scrolls constituted by spirally wound plates located one within the other, means for rotating the scrolls within a casing containing a liquid so as to cause the liquid to move inwards through the convolutions of each scroll from the periphery to the axis thereof and means for admitting a gaseous medium to the interior of said scrolls so that it passes outwardly from the axis to the periphery thereof in contra-flow to said liquid.

4. Apparatus as claimed in claim 2 in which means are provided for varying the cross-sectional area of the opening at the free end of the rotating spirally wound plate.

5. Apparatus as claimed in claim 3 in which means are provided for varying the cross sectional area of each opening at the free end of each of the scrolls.

EDOARDO MICHELE SALERNI.