Nov. 22, 1938. W. VON DER EMDE 2,137,735

APPARATUS FOR TREATING GASES OR VAPORS WITH LIQUIDS

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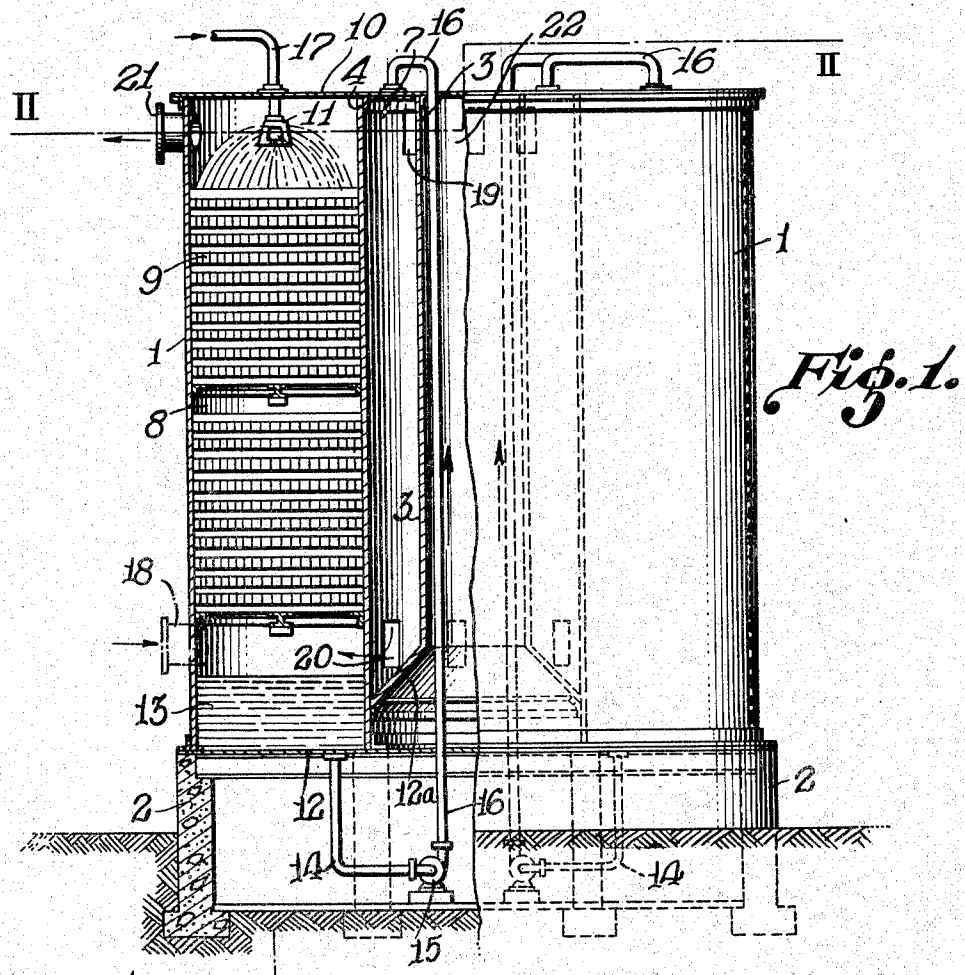


Fig. 1.

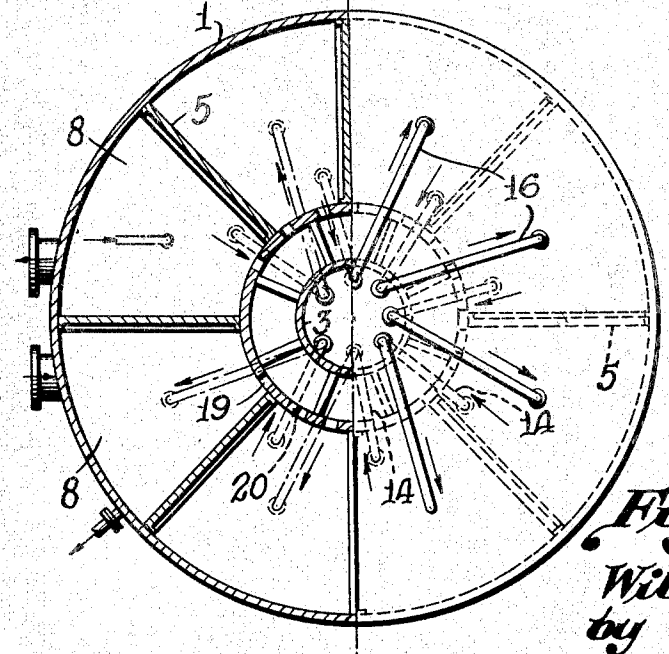


Fig. 2.

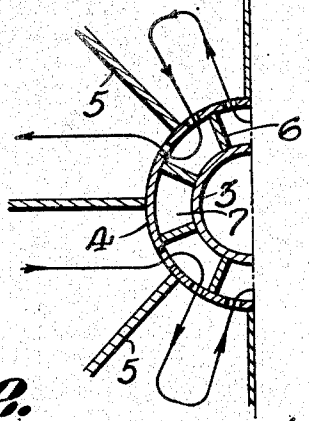


Fig. 3.

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APPARATUS FOR TREATING GASES OR VAPORS WITH LIQUIDS

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4 Claims. (Cl. 261—21)

The invention relates to apparatus for the treatment of gases or vapors, for instance coal distillation gases, with liquids in several stages, and more particularly to such apparatus in which the medium to be treated flows successively through each of a series of chambers in an essentially vertical direction from the bottom to the top, said chambers being filled with a suitable distributing material, for instance wooden hurdles, over which the treating liquid flows downwards and thus comes into contact with the gases or vapors to be treated.

There are known apparatus for the treatment of gases or vapors with liquids, comprising an essentially cylindrical casing, in which are provided a number of radial partitions, so that sector-like compartments are formed within the casing. In the radial partition walls between the individual compartments of the casing there have been provided channels, into each of which the gases or vapors to be treated enter at the bottom of an adjacent washing compartment and from which the medium is withdrawn at the top into the next washing compartment. In this way the medium will flow in succession through all washing compartments from the bottom to the top.

A disadvantage of such washing apparatus lies in that the sections of the washing compartments are nearly all triangular. Such a shape of section is very unfavorable with regard to the uniform distribution of the washing liquid. The tapering corners of such washing compartments are thus avoided by the liquids, which has, however, a tendency to transverse only the larger central part of the compartment. The inner space portion of the washing compartment, effective for the washing process, is thereby only insufficiently utilized and the washing effect of the total apparatus is small in comparison to its size as well as its capital and operating costs.

An object of my present invention is to provide such improvements in washing apparatus having a cylindrical casing and several compartments within the casing, which are formed by radial partition walls, for traversal of the compartments in succession by gaseous medium, and from the bottom to the top in each compartment with flow of the treating liquid downwards in each compartment, so that an essentially complete effective utilization of the inner space of the scrubber may be attained for the treatment of gases or vapors, especially with respect to a uniform distribution of the treating liquid over the whole section of the washer compartments.

In principle, my invention consists in that the gas channels for connecting the individual washing compartments are arranged in the center of the essentially cylindrical washer, for instance in such a way, that a ring-shaped double wall is placed in the washer casing, coaxially with the cylindrical outer shell; the connecting channels being individual connecting channels for leading the gases or vapors from one compartment to the next in series and being formed by radial partitions in said double wall.

Furthermore, my invention consists in that in the free space within the ring-shaped inner shell of the washer casing there are arranged the pipelines conducting the washing liquid from one compartment to another one.

Further characteristic features and objects of my present invention will be readily apparent from the following description of a preferred embodiment of my invention, as illustrated in the attached drawing, which will now be described in detail.

Fig. 1 of the drawing shows a washer, constructed according to my invention, partly in a side view and partly in a vertical section.

Fig. 2 is a composite view, partly in horizontal section and partly in top plan, of the scrubber on line II—II of Fig. 1.

Fig. 3 is a horizontal sectional view of a part of Fig. 2 illustrating especially the path which is to be taken by the gases to be treated in the washer.

The washer illustrated on the drawing consists of an essentially cylindrical outer shell, which is supported upon a suitable foundation, preferably at an elevation. Within the outer shell 1 and coaxially therewith there is an inner cylindrical wall 3. Between the inner wall 3 and the outer wall 1 is likewise provided an intermediate cylindrical partition wall 4, coaxial with the wall 1. The inner space or chamber between the walls 3 and 4 and the outer space or chamber between walls 4 and 1 are divided up by a multitude of radial partition walls 5, 6 by which the two ring-shaped spaces are divided into individual sectors.

As may be seen from Figs. 2 and 3, the partition walls 5 and 6 are staggered, so that the inner compartments 7 of the washer formed by the walls 6 are adjoining two of the outer compartments 8, situated side by side.

The outer compartments 8, which require the major part of the inner space of the washer, serve to bring the gas to be treated into contact with the treating liquid over a large surface. For

this purpose, the compartments 8 are filled with wooden hurdles 9, or another suitable filling material.

The compartments 7 and 8 of the washer are closed at the top by a common cover 10, in which is provided a spray 11 for each washer compartment 8 in order to distribute the treating liquid over the wooden hurdles. The liquor introduced into the washing compartment 8 by means of the spray 11 flows in finely distributed form downwards over the wooden hurdles and is accumulated at the lower end 13 of the washing compartment, which is closed by the bottom 12. The washing compartments 7 are likewise sealed below by means of the inclined bottom 12a.

The washing liquid flows from the bottom of the washing compartment 8 through the pipelines 14 to a pump 15. It is advisable to have for each washing compartment a special pump, by means of which the treating liquid can be delivered through the pipeline 16 to the spray 11, of the same or another compartment. The washing liquid, according to the arrangement of the pipelines, flows either through each washing compartment in circulation or successively through all washing compartments in circulation or in any other suitable way.

Under certain circumstances it is, therefore, preferable to interconnect the pipelines 14 and 16 by the insertion of shut-off valves, with other pipelines, so that one or another direction of liquor stream through the washer can be obtained, as required.

The pipelines for the treating liquid are so arranged as shown on the drawing, that the washing liquid passes through all the compartments 8. A fresh washing liquid is supplied into one of the washing compartments from pipeline 17, which is connected with one of sprays 11.

If the treating liquid is kept in circulation, within each individual washing compartment, fresh washing liquid can likewise still be delivered only into one washing compartment, if the compartments 8 are interconnected by suitable overflow elements, for instance syphon tubes, through which the excessive treating liquid can be withdrawn into the next washing compartment and so forth, in which case the spent treating liquid in the last washing compartment can be discharged from the washer continuously or periodically.

Each washing compartment 8 is filled with wooden hurdles and provided with liquor pumps as above described.

The operation of the apparatus is as follows:—

The gas to be purified is introduced through the pipeline 18 into one of the washing compartments 8 into the space between the bottom wooden hurdles 9 and the liquor which has accumulated at the bottom of the washer. The gas flows upwards through the filling material of the compartment 8 and thus comes into intimate contact with the liquid flowing over the hurdles. The gas then flows from the space above the wooden hurdles 9 through an opening 19 in the intermediate cylindrical partition wall into the adjacent inner compartment 7. Here the gas flows downwards so as to enter at the lower end of the compartment 7 through an opening 20, into the adjacent washing compartment 8, while said compartment is being traversed by the liquor. The gas thus flows through each of the washing compartments 8 in the direction from the bottom to the top, until it will be discharged in finished condition from the last washing compartment through a pipe 21, coming out at the top.

As may be seen from Figures 1 and 2 of the drawing, the washer has in the interior a central chamber 22, open at the top and at the bottom. This space according to my invention is preferably used for housing the pipelines 16 or other apparatus, which are necessary for the circulation of the washing liquid, so that the washer has a smooth and wind resisting surface at the outside. Moreover, the pipelines situated on the top of the scrubber can likewise be covered by a roof in the shape of a cone.

The pumps necessary for delivering the liquid are arranged according to my invention in the space underneath the washer. As may be seen from Figure 1, this arrangement gives a compact unit which on account of its small space required and of its simple outer shape offers considerable advantages.

Instead of providing the washer with one gas inlet and one gas outlet, it may under certain circumstances also be possible, to arrange several gas inlets and exits which if necessary, may be provided with suitable shut-off valves so that, as required, the washer is not only traversed by one single gas current, which flows through all washing compartments in succession, but may be traversed by several partial gas streams of which each stream only traverses a part of the washing compartments.

I have now described my present invention on the lines of a preferred embodiment thereof. But my invention is not limited in all its aspects to the mode of carrying it out as described and shown, since it may be variously embodied within the scope of the following claims.

I claim:—

1. An apparatus for treating gases or vapors with liquids, comprising a cylindrical closed casing in which is arranged co-axially an inner cylindrical wall and an intermediate cylindrical wall co-axial with the outer wall and intermediate the inner wall and the cylindrical casing to form inner and outer chambers, radially extending partition walls forming compartments in the outer chamber between the cylindrical casing and the intermediate wall, radially extending partition walls in the inner chamber between the intermediate wall and said inner wall providing individual inner channels therein, certain of said compartments each having a connection with the upper end of one of said channels and another connection with the lower end of an adjacent channel whereby the channels and compartments are alternately arranged in a single series, and means for introducing the treating liquid into the individual compartments.

2. An apparatus for treating gases or vapors with liquids comprising a cylindrical closed outer wall casing in which is arranged co-axially an inner cylindrical wall, radially extending partition walls between the cylindrical outer wall casing and the said inner wall, said inner wall being built as a double wall comprising an intermediate and an innermost wall inside of which are provided radial partition walls, said partition walls being staggered relative to the radial partition walls which are provided between the outer wall casing and the intermediate wall of the inner double wall, connecting openings in the intermediate wall of said double wall through which individual compartments of the double wall are connected at the top with one of the outer washing compartments and at the bottom

with another adjacent one of the outer washing compartments and means for introducing the treating liquid into the individual outer compartments.

3. Apparatus as claimed in claim 1, and in which the pipelines for recirculating the treating liquid are arranged inside a space, open at the top and at the bottom, which is formed inside the inner wall by the cylindrical arrangement of the inner wall.

4. Apparatus as claimed in claim 1, and in which the pumps for delivering the treating liquid are arranged underneath the washer.

WILHELM VON DER EMDE.