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A DEVICE FOR CLEANING GASES, SUCH AS EXHAUST GASES AND/OR SYNTHESIS GASES

TECHNICAL FIELD

The invention concerns a device of cleaning gases, like exhaust gases and/or synthesis
5 gases that are obtained from the gasification of household and commercial waste.

BACKGROUND OF THE INVENTION

To clean all kinds of contaminated industrial gases, but also improve the quality of
impellents, they are cleaned in several successive washers with different goals, wherein
temperature and pH value of the washing liquids can change dramatically. The washers have
10 the job of removing hazardous substances, for example CO₂, CO, NO_x and also solid
impurities like all types of dust, from the gas stream.

Conventional gas washers are designed so that each individual was level, arranged
separate from the other and connected to one another by pipelines, contains a specifically
acting solution that generally binds only a certain hazardous substance physically and/or
15 chemically, and if necessary absorbs or adsorbs it. Substance exchangers, so-called column
dripping installations, assigned to the wash levels make sure that the washing liquid in
question can be circulated widely and that the gas/liquid contact takes place over the largest
possible surface area. A complete wash level is characterized by a largely closed or sealed
container in a battery or cascade arrangement with sufficient compressive strength with inlet
20 and outlet holes, at least one inspection hole and a sump with carry-out potential. Since the
washing liquids are supposed to trickle through the gas phase as much as possible via
dripping installations, hence the liquid phase falls, down from above, while the gas stream
to be cleaned flows up from below, washer towers are preferred, i.e., vertical standing
cylindrical containers, several of which are connected in series to one another by pipelines
25 and thus form a vertical battery of containers. Each vertical container represents an



independent was level. Compensators are often introduced into the pipelines with which such wash levels are connected to one another, in order to be able to trap various processing temperatures between the containers, which also applies to pressure valves for various pressures in the containers.

5 These known column washing installations have a series of disadvantages that can be seen not only in their substantial expense for equipment, although this does keep installation and operating costs extraordinarily high. Each of the individual washer containers is connected to one or more other was levels via several pipelines. compensators and the like, i.e. each washer boiler requires its own expense for assembly with separate foundations,
10 constant monitoring of the pipe connections and more of the same. For each individual washer level, a complete pressurized container with two bumped boiler heads is needed, which is associated with additional cost for materials and individual production, especially for wash processes that take place at higher pressures. The pipe connections with their valves, compensators and the like act as pressure reducers for the gas stream through the
15 washing installation, so that if there is a substantial loss of pressure, work must be done on most wash levels. The causes considerable disadvantages, especially for gas washers with only slight pressure gradients in the stream.

SUMMARY OF THE INVENTION AND ADVANTAGES

 This invention is therefore bases on the task of improving a device for cleaning gases,
20 like exhaust gases and/or synthesis gases of the type mentioned at the beginning in such a way that especially also with multilevel gas washers, the design, assembly and maintenance work, as well as the operational safety and reliability, are much more favorable than was previously the case.



Due to the fact that all wash levels are in a common horizontal pressurized container, a very economic modular design of the whole multilevel washing installation is possible and especially individual assemblies can be dispensed with on site and not replaced. The production cost for the total system is already therefore substantially reduced overall, since
5 now only two bumped or boiler heads are necessary for the one pressurized container. The preferably horizontal design of the individual pressurized boiler and its internal division into the individual was levels through pressurized boiler and is internal division into the individual was levels through disk-shaped standing bulkheads introduced vertically makes possible a trouble-free line-up of individual washer with high different goals without there have to be
10 a inspection hole for each washer sump assigned to it for each individual washer leave.

Since the standing bulkheads have gas passages with a very large cross section, the pressure loss of the gas stream is negligibly small when going from one wash level into the next. Necessary material-exchange units can be arranged trouble-free between the standing bulkheads and attached to them wherein there can be conventional material exchangers usual
15 for such washing installations in the past. Within one or each wash level limited by standing bulkheads, the gas stream can move in a meandering fashion up and down in cross section by hanging bulkheads that release a lot of gas through the washing liquid and by immersion bulkheads that close of the gas stream going down and release the gas going up. The path of the gas stream within one wash level can thus be extended, depending on the necessary
20 holding time, wherein also a large number of material-exchange surfaces, variable in each wash level, can be added.

Heating elements in the washing liquid, heat resisters in the gas stream, spray coolers and other temperature devices can by arranged in and between the individual wash levels and here, despite or just because of the uniform modular design, may vary in arrangement and



number. In this way, it is possible to have the respective wash reactions run under optimal parameter conditions, such as temperature, pressure and/or pH value.

5 The arrangement of equipment defined above yields a compact combination washer for which it is also advantageous if its out dimensioning is roughly adapted to the Euronorm for transport containers, at least regarding its dimensions is selected so that it meets the usual requirements via both rail and road transport routes.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be explained in greater detail below using Figures 1 and 2, which show one preferred, but exemplary form of embodiment.

10 Figure 1, shows a schematic longitudinal section through a cleaning device according to the invention, and;

Figure 2, shows the cross section of the device in the sectional plane F-F in the same form of embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

15 As can be seen from Figure 1, a cylindrical cover 1 of a container arranged lying down, which should be identified below as a combination washer, is closed on the front side by bumped boiler heads 1. Unwashed gases go through the inlet 2 into the combination washer and cleaned gas goes out the outlet 3. Within the combination washer composed of the components 1 and 3, several wash levels A to E are arranged, which are separated from one another by individual standing bulkheads 4. Other hanging bulkheads 6 and immersion
20 bulkheads 5 are provided and make it possible to deflect the gas stream several times within a wash level. The wash levels A to E each have washing liquids in various states and various temperatures, as needed.



For example, Figure 1 shows the same washing liquid here in the baths B and B', but the bath temperatures are different. The two liquid baths between B and B' are separated by the shortened standing bulkhead 4' with the hanging bulkhead 6' arranged over it, whose lower edge has roof-shaped guard 6". Between the bulkheads there are material exchangers 11, only the first four of which are marked in Figure 1, which can have a design that is known per se. The washing liquid goes to the material-exchange columns through spray pipes 7. For the sake of clarity, only one material exchange column is shown in Figure 1; in practical use, several columns are arranged one after the other with the corresponding number of spray planes, and care is taken to create the largest possible surface of washing fluid.

The individual wash levels A to E are accessibly through inspection shafts 8 closed by covers.

Gas can be cooled advantageously using mist collectors 9. Instead of heat exchanges, it can also be advantageous to use spray cooling. A heat register 10 allow the synthesis gas being cleaned to be reheated, for example to improve the degree of effectiveness of an active charcoal filter arranged after it.

Figure 2 shows, when seen in the direction of the section F-F in Figure 1, with the same names for the components, the large-surface gas passage of the bulkheads, which make possible an optical flow through the combination washer with minimalized pressure drop.

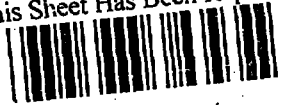
The area of the hanging bulkhead 6 is shown cross-hatched in Figure 2 for the sake of clarity. The washing liquid, as shown schematically, is kept in circulation in the direction of the arrow by a revolving pump P.

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The number of wash levels and the number of synthesis gas displacements within one level can also be varied and adapted to the requirements, like the number of material-exchange elements and the spray levels shown.

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CLAIMS

1. A device of cleaning gases, like exhaust gases and/or synthesis gases that are obtained from the gasification of all kinds of trash like household and commercial trash, wherein the gases are subjected to several wash processes with different washing liquids at,
5 if need by, different temperatures, characterized by the fact that: all the different wash processes are done in a basically horizontal pressurized container (1) with a plurality of spatially successive wash levels (A to E); the individual wash levels (A to E) are separated by standing bulkheads (4) with large vertical, disk-shaped, flow-through openings (12); each was level (A to E) is assigned its own sump and it own inspection hole (8); and material
10 exchanger units/columns (11) are assigned to the individual wash levels (A to E).
2. A device according to Claim 1, characterized by the fact that within at least one of the wash levels (A to E), there are hanging bulkheads, (6) and immersion bulkheads (5) deflecting the gas stream.
3. A device according to Claim 1, characterized by the fact the common
15 pressurized container (1) contains devices for tempering (9,10) the gases and/or washing liquids.
4. A device according to Claim 1, characterized by the fact that the pressurized container (1) is designed as a prestandardized unit in dimensions that allow transport on railways and/or roads.



FIG. 1

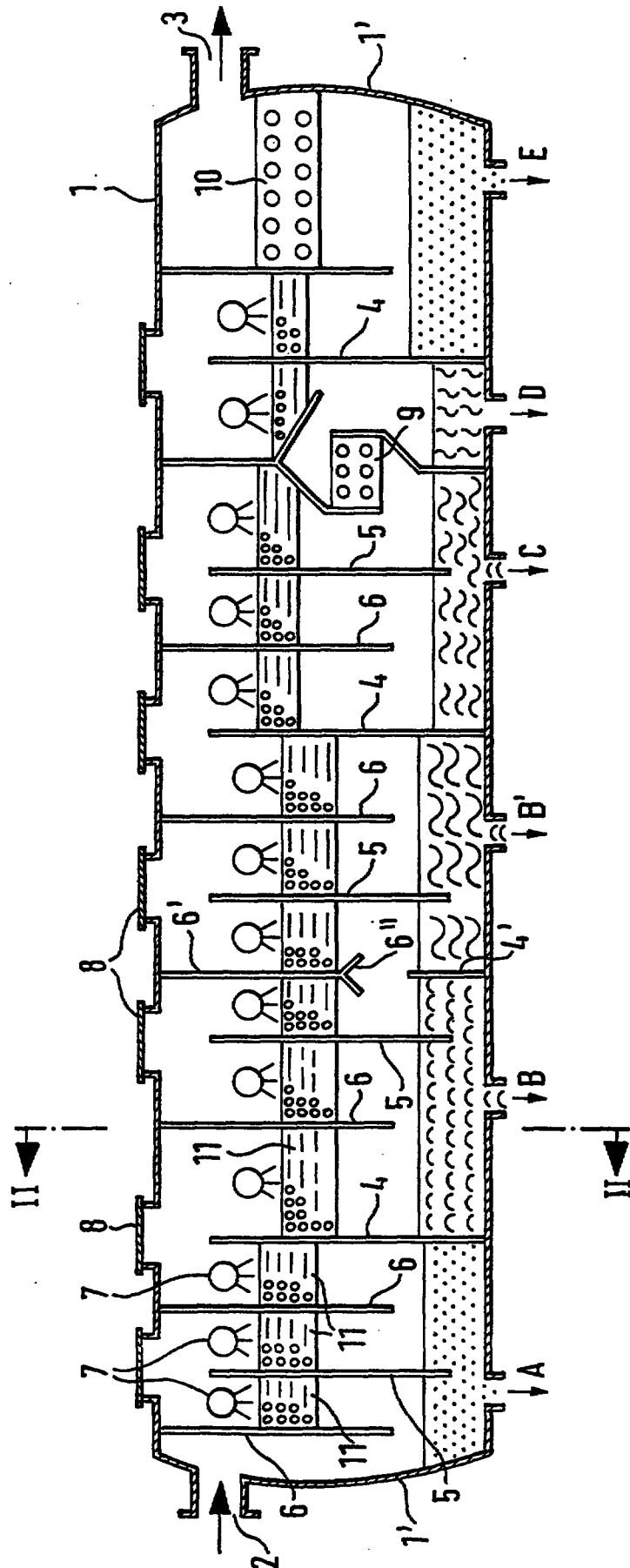
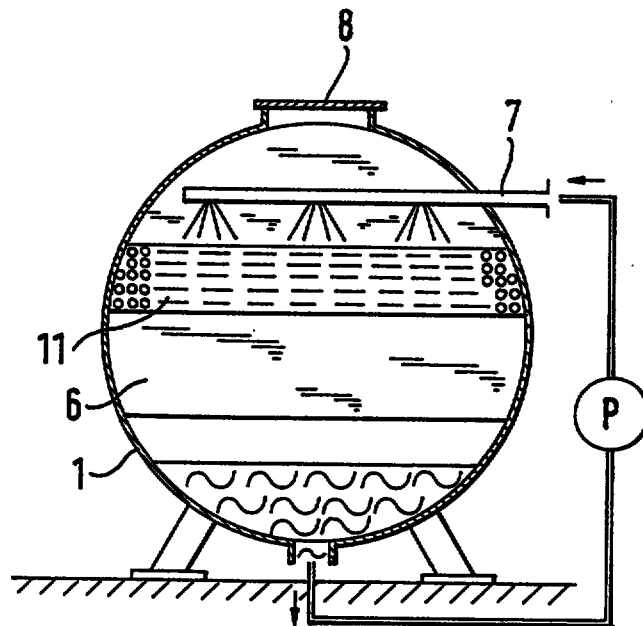


FIG.2



A DEVICE FOR CLEANING GASES, SUCH AS EXHAUST GASES AND/OR SYNTHESIS GASES

ABSTRACT

The invention describes a device for cleaning gases, namely exhaust gases and/or synthesis gases, which can be obtained from the gasification of all types of trash, like household and commercial trash. For this, the gases are subjected to several wash processes with various washing liquids at various temperatures, if need be. All of the different wash processes are carried out in a single compact, horizontal pressurized obtainer with a large number of wash levels arranged spatially one after the other. The individual wash levels are separated from one another by vertical disk-shaped bulkheads with flow-through holes with large surface areas. Each wash level is assigned its own sump and its own inspection opening.

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REPLACEMENT SHEET

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A DEVICE FOR CLEANING GASES, SUCH AS
EXHAUST GASES AND/OR SYNTHESIS GASES

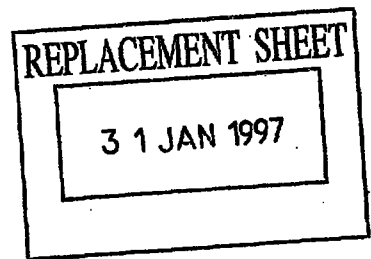
TECHNICAL FIELD

The invention concerns a device of cleaning gases, like exhaust gases and/or synthesis gases that are obtained from the gasification of household and commercial waste.

BACKGROUND OF THE INVENTION

To clean all kinds of contaminated industrial gases, but also improve the quality of impellents, they are cleaned in several successive washers with different goals, wherein temperature and pH value of the washing liquids can change dramatically. The washers have the job of removing hazardous substances, for example CO₂, CO, NO_x and also solid impurities like all types of dust, from the gas stream.

Conventional gas washers are designed so that each individual was level, arranged separate from the other and connected to one another by pipelines, contains a specifically acting solution that generally binds only a certain hazardous substance physically and/or chemically, and if necessary absorbs or adsorbs it. Substance exchangers, so-called column dripping installations, assigned to the wash levels make sure that the washing liquid in question can be circulated widely and that the gas/liquid contact takes place over the largest possible surface area. A complete wash level is characterized by a largely closed or sealed container in a battery or cascade arrangement with sufficient compressive strength with inlet and outlet holes, at least one inspection hole and a sump with carry-out potential. Since the washing liquids are supposed to trickle through the gas phase as much as possible via dripping installations, hence the liquid phase falls, down from above, while the gas stream to be cleaned flows up from below, washer towers are preferred, i.e., vertical standing cylindrical containers, several of which are connected in series to one another by pipelines and thus form a vertical battery of containers. Each vertical container represents an



independent was level. Compensators are often introduced into the pipelines with which such wash levels are connected to one another, in order to be able to trap various processing temperatures between the containers, which also applies to pressure valves for various pressures in the containers.

These known column washing installations have a series of disadvantages that can be seen not only in their substantial expense for equipment, although this does keep installation and operating costs extraordinarily high. Each of the individual washer containers is connected to one or more other wash levels via several pipelines, compensators and the like, i.e. each washer boiler requires its own expense for assembly with separate foundations, constant monitoring of the pipe connections and more of the same. For each individual washer level, a complete pressurized container with two bumped boiler heads is needed, which is associated with additional cost for materials and individual production, especially for wash processes that take place at higher pressures. The pipe connections with their valves, compensators and the like act as pressure reducers for the gas stream through the washing installation, so that if there is a substantial loss of pressure, work must be done on most wash levels. This causes considerable disadvantages, especially for gas washers with only slight pressure gradients in the stream.

SUMMARY OF THE INVENTION AND ADVANTAGES

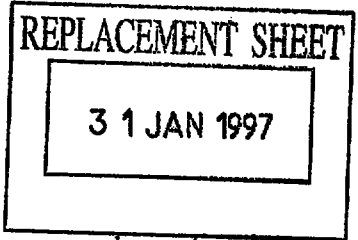
This invention is therefore based on the task of improving a device for cleaning gases, like exhaust gases and/or synthesis gases of the type mentioned at the beginning in such a way that especially also with multilevel gas washers, the design, assembly and maintenance work, as well as the operational safety and reliability, are much more favorable than was previously the case.

31 JAN 1997

Due to the fact that all wash levels are in a common horizontal pressurized container, a very economic modular design of the whole multilevel washing installation is possible and especially individual assemblies can be dispensed with on site and not replaced. The production cost for the total system is already therefore substantially reduced overall, since now only two bumped or boiler heads are necessary for the one pressurized container. The preferably horizontal design of the individual pressurized boiler and its internal division into the individual wash levels through pressurized boiler and its internal division into the individual wash levels through disk-shaped standing bulkheads introduced vertically makes possible a trouble-free line-up of individual washer with high different goals without there have to be a inspection hole for each washer sump assigned to it for each individual washer leave.

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Heating elements in the washing liquid, heat resisters in the gas stream, spray coolers and other temperature devices can be arranged in and between the individual wash levels and here, despite or just because of the uniform modular design, may vary in arrangement and



number. In this way, it is possible to have the respective wash reactions run under optimal parameter conditions, such as temperature, pressure and/or pH value.

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BRIEF DESCRIPTION OF THE DRAWING

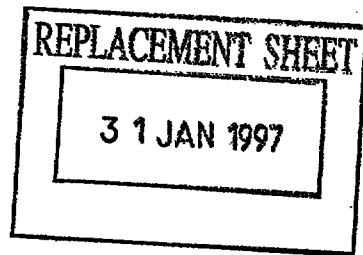
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For example, Figure 1 shows the same washing liquid here in the baths B and B', but the bath temperatures are different. The two liquid baths between B and B' are separated by the shortened standing bulkhead 4' with the hanging bulkhead 6' arranged over it, whose lower edge has roof-shaped guard 6". Between the bulkheads there are material exchangers 11, only the first four of which are marked in Figure 1, which can have a design that is known per se. The washing liquid goes to the material-exchange columns through spray pipes 7. For the sake of clarity, only one material exchange column is shown in Figure 1; in practical use, several columns are arranged one after the other with the corresponding number of spray planes, and care is taken to create the largest possible surface of washing fluid.

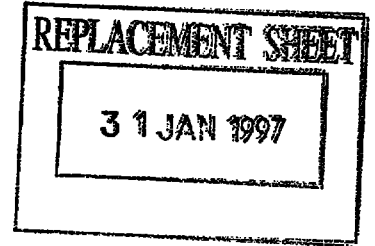
The individual wash levels A to E are accessibly through inspection shafts 8 closed by covers.

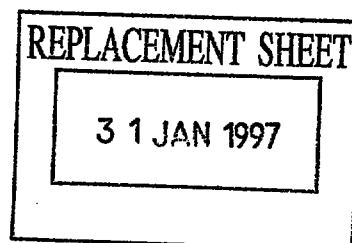
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The area of the hanging bulkhead 6 is shown cross-hatched in Figure 2 for the sake of clarity. The washing liquid, as shown schematically, is kept in circulation in the direction of the arrow by a revolving pump P.

The number of wash levels and the number of synthesis gas displacements within one level can also be varied and adapted to the requirements, like the number of material-exchange elements and the spray levels shown.





CLAIMS

1. A device of cleaning gases, like exhaust gases and/or synthesis gases that are obtained from the gasification of all kinds of trash like household and commercial trash, wherein the gases are subjected to several wash processes with different washing liquids at, if need by, different temperatures, characterized by the fact that: all the different wash processes are done in a basically horizontal pressurized container (1) with a plurality of spatially successive wash levels (A to E); the individual wash levels (A to E) are separated by standing bulkheads (4) with large vertical, disk-shaped, flow-through openings (12); each was level (A to E) is assigned its own sump and it own inspection hole (8); and material exchanger units/columns (11) are assigned to the individual wash levels (A to E).

2. A device according to Claim 1, characterized by the fact that within at least one of the wash levels (A to E), there are hanging bulkheads, (6) and immersion bulkheads (5) deflecting the gas stream.

3. A device according to Claim 1, characterized by the fact the common pressurized container (1) contains devices for tempering (9,10) the gases and/or washing liquids.

4. A device according to Claim 1, characterized by the fact that the pressurized container (1) is designed as a prestandardized unit in dimensions that allow transport on railways and/or roads.



A DEVICE FOR CLEANING GASES, SUCH AS EXHAUST GASES AND/OR SYNTHESIS GASES

ABSTRACT

The invention describes a device for cleaning gases, namely exhaust gases and/or synthesis gases, which can be obtained from the gasification of all types of trash, like household and commercial trash. For this, the gases are subjected to several wash processes with various washing liquids at various temperatures, if need be. All of the different wash processes are carried out in a single compact, horizontal pressurized obtainer with a large number of wash levels arranged spatially one after the other. The individual wash levels are separated from one another by vertical disk-shaped bulkheads with flow-through holes with large surface areas. Each wash level is assigned its own sump and its own inspection opening.

FIG. 1

