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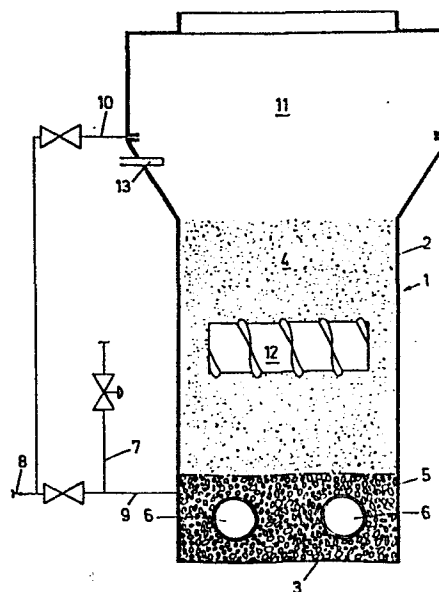
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(54) **Method for removing gasifiable solid or liquid materials from a heat-withstanding carrier in a whirl-bed, and equipment used thereby.**

(57) There is described a method for removing gasifiable solid or liquid materials from a heat-withstanding carrier (12) in a whirl-bed (4), which comprises providing in and directly above the whirl-bed conditions whereby those materials caused to be gasified in the whirl-bed, due to the temperature developed therein, are ignited on the whirl-bed surface.



This invention relates to a method for removing gasifiable solid or liquid materials from a heat-withstanding carrier in a whirl-bed, and to the equipment used thereby.

5 It is known to clean metal parts which are coated with paint or plastic material, by dipping such parts in a heated whirl-bed. There occurs thereby pyrolysis of the gasifiable portion from the materials to be removed, notably paint or plastic material.

10 The resulting gases reach the whirl-bed surface and then together with lighter materials which are carried along with the gases, have to be treated, possibly purified in a separating device, to prevent or at least minimize polluting the environment. This means not only a substantial additional device, but also a continuous monitoring of the progress of the separation
15 process and the purifying rate of those gases released to the outside.

The invention also relates to an equipment particularly intended for the working of said method and actually in such conditions which allow a faster and more thorough cleaning
20 of what has been called hereinbefore a heat-withstanding carrier. Actually it is in most cases a matter of metal parts which are completely coated with paint or plastic material, or which bear traces thereof. The most varied "carriers" may then also be treated in such a whirl-bed.

25 To make the invention object possible, there are provided in and directly above said whirl-bed, conditions whereby the materials brought to gasification in the whirl-bed, as

a result of the temperatures generated therein, are caused to ignite on the whirl-bed surface.

Still according to the invention, the equipment for the working of this method which makes use of a vat wherein the carriers to be treated are located in a heated whirl-bed
5 comprised of granulate grains, has for characteristic that said granulate grains are divided into at least two layers, namely a lowermost layer inert granulate grains wherein a gas-air mixture will be blown, and above said latter layer, there is provided
10 a layer granulate grains which form with the igniting of the gas-air mixture, the whirl-bed proper.

According to a particular embodiment of the invention, perforated pipes are present in said inert granulate grains, to let the gas-air mixture therein.

15 A detail of the invention lies in a post-combustion chamber connecting to said vat, in which chamber lines for feeding secondary air open, and at least in said combustion chamber, a pilot flame is provided for igniting the gas-air mixture which escapes on the whirl-bed surface.

20 Other details and advantages of the invention will stand out from the following description, given by way of non limitative example and with reference to the accompanying drawing.

25 The single figure is a diagrammatic showing, partly in a vertical section, of an equipment according to the invention.

30 The equipment is comprised of a vat, shown generally in 1, with two upstanding wall 2 and a bottom wall 3. The vat 1 is filled with heat-withstanding granulate grains, such as for example quartz sand or aluminum oxide or similar. This forms the whirl-bed 4 proper. Possible sizes of the material the whirl-bed proper is comprised of, lie for example between 200 and 300 microns.

Underneath on the bottom wall 3, there is provided a layer inert granulates 5 wherein at least one, but preferably a plurality of pipes 6 are present for blowing the gas-air mixture into the whirl-bed 4. The layer inert granulates 5 is
5 a layer which is mainly comprised for example of gravel, baked-clay mouldings or other fire-proof materials the sizes of which are larger than the sizes of that material which comprises the whirl-bed proper. The layer inert granulates completely surrounds the pipes 6, and due to the specific weight and larger diameter
10 of that material the inert layer is made of, said layer is never brought into motion, so that wear of said pipes is not to be expected. The ideal area for flame-forming lies in that area exactly above the dashed line between the whirl-bed proper 4 and the layer inert granulates 5, while the very hot gases insure
15 forming of the above-lying fluidized whirl-bed.

The inert granulate layer 5 forms a cold boundary layer relative to the whirl-bed 4. As moreover the air speed in the boundary area between the whirl-bed 4 and layer 5 is faster than the air speed in the whirl-bed proper, said boundary
20 layer has all the advantages of the conventional and known flashback apparatus. This results in the flame being fixed inside the whirl-bed a short distance above the inert granulate layer 5.

Gas supply occurs through a line 7, while air is fed through line 8 and reaches the pipes 6 as primary air
25 together with the gases, through the gas-air pipe 9. Secondary air reaches the equipment through a set lines 10. The lines 10 open above said whirl-bed 4 into a post-combustion chamber 11, which has a larger size relative to vat 1.

Due to the low speed of the gas-air mixture
30 through the whirl-bed, the main flame is fixed over the whole whirl-bed surface area. Consequently the gas mixture can bring the whirl-bed faster to the required temperature (generally 650°C). This is due to the outstanding heat-transfer in the

whirl-bed proper and the contact between the flame and the fluidized grains in said whirl-bed. The whirl-bed temperature is adjustable by means of an automatic temperature regulator which adjusts accordingly the gas flow-rate.

5 On the whirl-bed surface, inside the post-combustion chamber 11, the pyrolysis gases generated by the combustion of the paint or plastic remains present on the surface of those metal parts which have been dipped in the whirl-bed, are ignited.

10 In the diagrammatic drawing, the metal parts which are being treated in the whirl-bed, are outlined by a single component 12. Said component 12 fulfills the definition of the "carrier" as described hereinabove.

15 It is clear that in a whirl-bed according to the invention, a large number heat-withstanding carriers, for example metal parts, may be treated. The workpieces to be treated are brought from the top into the whirl-bed, with or without making use of a supporting frame or basket. Due to the very rational whirl-bed temperature, the workpieces treated therein are not
20 distorted and there is obtained an accurate temperature control over the whole whirl-bed volume. The gasification of the material to be removed on the workpiece occurs inside the whirl-bed. The pyrolysis gases rise through the whirl-bed to the surface thereof. The pyrolysis gases mix in the whirl-bed with the gas-
25 air mixture, in such a way that a homogeneous mixture of gas, air and pyrolysis gases is ignited on the whirl-bed surface. Above said whirl-bed and during the whole operation time, a pilot flame 13 is present. Said pilot flame burns continuously, independently of the presence of pyrolysis gases. Above said whirl-bed
30 there is provided the post-combustion chamber 11 wherein a post-combustion is made possible by tangentially feeding secondary combustion air.

 The actual cleaning of the metal parts inside the whirl-bed occurs as a matter of fact in two phases. On the one

hand, there is pyrolysis of the gasifiable portion of those materials which adhere to the (metal or plastic) workpieces, and on the other hand the workpieces 12 to be treated are also deprived of non-gasifiable materials due to the mildly scouring action of that medium the whirl-bed 4 is comprised of. Due to such combined cleaning method, the workpieces being treated are cleaned in a very short time.

The most clear advantages of the methods and of the equipment being used thereby are as follows:

10 1°) The continuous presence of a gas flame above the whirl-bed is a very prominent feature of the method and equipment according to the invention. As the power is fed at the top to the whirl-bed, the heating time is independent from the bed surface area. The method according to the invention is thus to be used with whirl-beds independently from the whirl-bed surface area. The gas mixture can bring the whirl-bed fast to a high temperature by the flame contact with the fluidized granulates. As the pyrolysis gases always have to pass the flame front above the whirl-bed, such gases are ignited and completely burned (1200°C). Smoke gases are generated notably by the above-mentioned pyrolysis and such gases are made completely harmless in the post-combustion chamber 11. The combustion heat from the pyrolysis gases is recovered as such combustion occurs in the surface of the whirl-bed, which means a substantial energy saving.

25 2°) The power supply is proportional to the air flow-rate. As the starting time shortens with a larger air flow-rate, larger granulates may be used in the whirl-bed. Coarser granulates are easier to calibrate, in such a way that dust-forming by elutriation is avoided. The equipment according to the invention may thereby remain continuously open at the top for visual control or check. With the use of coarser granulates and a larger air flow-rate, the heat transfer and the diameter of

the whirl-bed are increased. Due to the more turbulent whirl-bed, the workpieces treated therein are cleaned faster.

It must be understood that the invention is in no way limited to the above embodiments and that many changes
5 may be brought therein without departing from the scope of the invention as defined by the appended claims.

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CLAIMS

1. Method for removing gasifiable solid or liquid materials from a heat-withstanding carrier in a whirl-bed, which comprises providing in and directly above the whirl-bed conditions whereby those materials caused to be gasified in the whirl-bed, due to the temperature developed therein, are ignited on the whirl-bed surface.

2. Equipment for the working of the method as defined in claim 1, whereby use is made of a vat wherein the carriers to be treated (12) are arranged in a heated whirl-bed comprised of granulate grains, in which said granulate grains are divided into at least two layers, namely a lowermost layer inert granulate grains (5), wherein a gas-air mixture is blown, and thereabove a layer granulate grains, which form with the igniting of the gas-air mixture, the whirl-bed (4) proper.

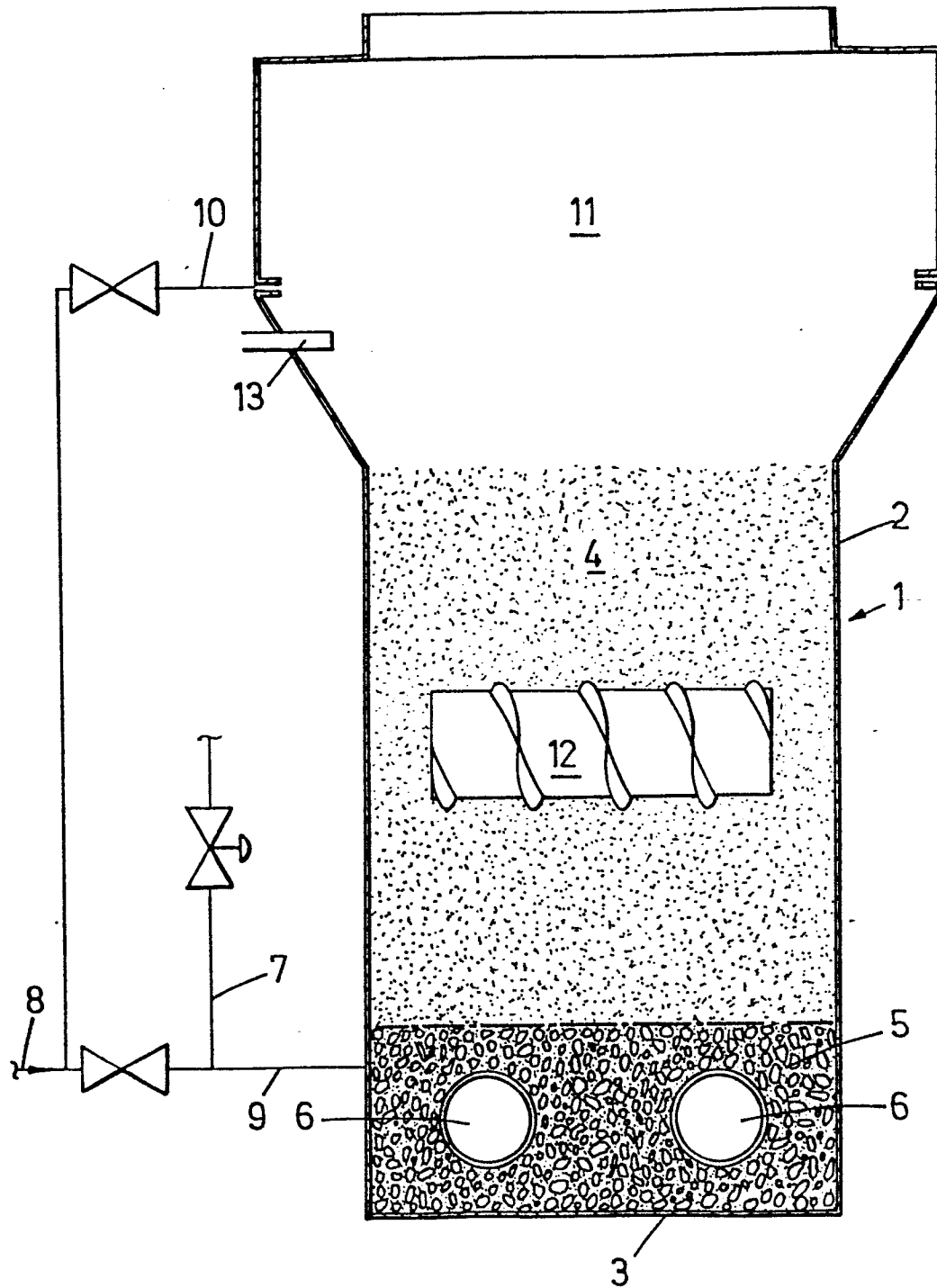
3. Equipment as defined in claim 2, in which in said inert granulate grains (5), perforated pipes (6) are present for letting the gas-air mixture therein.

4. Equipment as defined in either one of claims 2 and 3, in which said vat is connected at the top, to a post-combustion chamber (11) wherein lines (10) are provided for feeding tangentially secondary air.

5. Equipment as defined in any one of claims 2 to 4, in which in said post-combustion chamber (11), at least one pilot flame (13) is provided for igniting that gas-air mixture which escapes on the whirl-bed surface.

6. Equipment as defined in any one of claims 2 to 5, in which said inert granulate grains (5) have sizes and a specific weight whereby said grains are not brought into motion by the circulation between said granulate grains of said gas-air mixture.

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DOCUMENTS CONSIDERED TO BE RELEVANT			EP 85201348.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 3 524 633 (SHILLER) * Column 3, line 1 - column 4, line 40; claims; fig. 1-4 * --	1,2	F 23 G 7/00 C 22 B 7/00 B 01 J 8/24
A	DE - A - 2 315 958 (PROCEDYNE) * Page 3, line 16 - page 5, line 1; claims; fig. * --	1,2	
A	DE - A - 2 337 894 (PROCEDYNE) * Claims * --	1,2	
A	US - A - 4 241 021 (SKRZEC) * Fig. 1; column 3, lines 7-15 * ----	1,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			F 23 G C 22 B B 01 J
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 17-12-1985	Examiner TENGLER
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			