



(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:  
29.11.2006 Bulletin 2006/48

(51) Int Cl.:  
D06F 43/06 (2006.01)

(21) Application number: 06010877.6

(22) Date of filing: 24.05.2006

(84) Designated Contracting States:  
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI  
SK TR  
Designated Extension States:  
AL BA HR MK YU

(30) Priority: 25.05.2005 ES 200501262

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(54) System for washing and elimination of particles

(57) System for mixed washing and the elimination of particles, of special usefulness in specific working garments made of continuous filament such as rayon, rayon carbon, polyester carbon, polyester for use in paint booths or similar, or any other activity that requires totally aseptic cleaning for use by a person or that involves the risk of contaminating the products they manufacture, or a material likely to undergo said washing process even if not used for work purposes, characterised in that the garments or materials are subjected to a dry cleaning process that guarantees the elimination of residues of an industrial type and/or subsequently a process of washing in water to eliminate any possible organic residues.

Both washing processes are performed in a perfectly insulated enclosure (2) comprising a clean room (4), consisting of an anteroom (5) and a room (6) fitted with a filtering and air regeneration system (10).

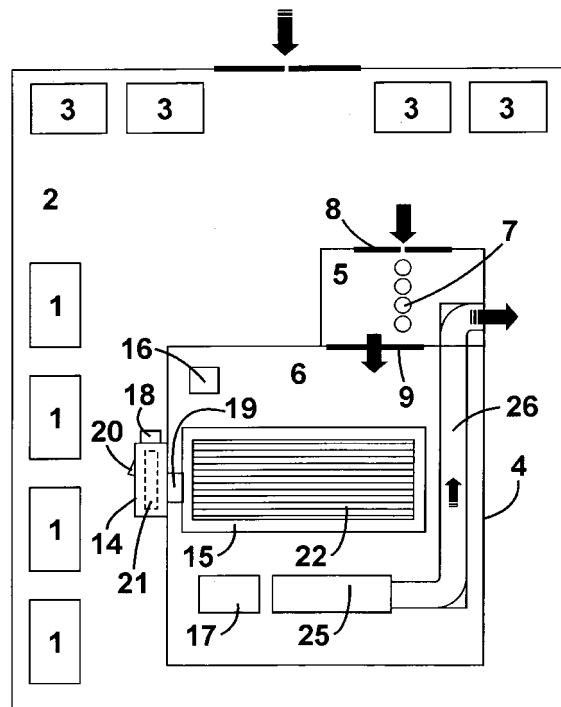


FIG.1

## Description

**[0001]** System for mixed washing and the elimination of particles, of special usefulness in specific working garments made of continuous filament such as rayon, rayon carbon, polyester carbon, polyester for use in paint booths or similar, or any other activity that requires totally aseptic cleaning for use by a person or that involves the risk of contaminating the products they manufacture, or a material likely to undergo said washing process even if not used for work purposes, characterised in that the garments or materials are subjected to a dry cleaning process that guarantees the elimination of residues of an industrial type and/or subsequently a process of washing in water to eliminate any possible organic residues.

**[0002]** Both washing processes are performed in a perfectly insulated enclosure comprising a clean room, consisting of an anteroom and a room fitted with a filtering and air regeneration system.

**[0003]** Personnel access the clean room through the anteroom following an air shower, while the access of the previously dry cleaned garments or materials is performed through a sanitary barrier comprising a rotary drum that removes the particles from the garments/materials, disinfecting and deodorising them through an ozonisation system, before passing to a decontamination table comprising a grille on its surface that acts as a return, enabling the absorption of particles in the folding process, before proceeding to the packaging of the garments, their complete cleanness being checked by a particle counter.

**[0004]** Currently, in order to clean said materials, specifically materials used in paint booths, either washing systems or dry cleaning systems are used.

**[0005]** The use of either of these two systems enables a superficial cleaning of the garments, but does not eliminate the dirty particles adhered to them.

**[0006]** As a result, the greatest inconvenience is caused when these apparently clean garments or materials are used in their work places, thereby contaminating with particles the surfaces that have to be or are being painted, leading to serious production losses and the low quality of the manufactured goods.

**[0007]** In order to address the existing problems, a system for mixed washing and the elimination of particles has been designed, characterised in that it comprises two cleaning processes, one dry and another subsequent one with detergent, both in a perfectly insulated enclosure provided with a clean room consisting of an anteroom and room, both equipped with a filtering and air regeneration system.

**[0008]** The system presented herein maintains a rigorous order throughout the entire process, thus resulting in the total cleaning of the garments or materials and leaving them particle-free, the following process being maintained:

## Dry cleaning:

**[0009]** When the garments or materials are prepared for their cleaning, they are sorted into clearly differentiated batches, and put through dry cleaning machines with perchloroethylene. This first wash provides a pre-cleaning thereby eliminating part of the adhered particles and industrial dirt such as fats, oils, etc.

## Wet washing:

**[0010]** The aforementioned batches of garments or materials, which have had industrial dirt removed from them following dry cleaning, are taken by manual or automatic means to the second part of the process, which is wet washing with water and detergent.

**[0011]** By means of this wash organic dirt is eliminated and the quality of the cleanness is improved by eliminating a large part of the adhered particles and the rest of the organic dirt.

**[0012]** Both steps take place in an insulated enclosure in which, in addition to the dry and wet cleaning machines, is located a clean room in which the cleaning system that is presented is completed.

## Clean room:

**[0013]** The clean room is an enclosure with a clean atmosphere for the final treatment of the garments after the washing processes, the main purpose being to remove from the material or garment the particles that could not be eliminated in the previous processes.

**[0014]** The clean room consists of two zones: **Anteroom** and **room**

### - Anteroom

**[0015]** The anteroom is the zone where personnel enter the room. An air shower occurs in said room, the purpose of which is to clean the particles that the person who is about to enter the room may have on their exterior.

**[0016]** The air shower is activated automatically when the entrance door is opened, thereby enabling access to the interior of the room, once the entrance door has been closed.

### - Room

**[0017]** The room is the zone where the garments are handled, sorted, mended if necessary, folded and packaged.

**[0018]** The room is fitted with an air circulation system comprising three filters to retain any particles there may be in the atmosphere, thereby allowing the most stringent cleaning levels to be reached.

**[0019]** The first filter acts as a pre-filter, the second is a high-efficiency filter and the third is an absolute filter.

**[0020]** *The room also features innovative elements*

such as:

**a sanitary barrier, decontamination table and control methods.**

**. Sanitary barrier**

**[0021]** The sanitary barrier consists of two mouths, one an inlet and the other an outlet, and an ozonisation system.

**[0022]** The inlet mouth is located in the insulated enclosure in order to enable the access of the garments or materials originating from the wash, which, by means of a rotary drum shed the particles through the filtered air. During this process the disinfection and deodorisation of the garments is conducted by means of an ozonisation system.

**[0023]** The outlet mouth is located in the interior of the room itself, from where the garments or materials are removed and deposited on the decontamination table.

**. Decontamination table**

**[0024]** The decontamination table is used for folding garments, and has a grille on its surface that acts as a return, enabling the absorption of particles during the folding process.

**[0025]** The air reaches the garments through diffusers incorporated into the top part of the room.

**[0026]** The approximate return of 80% of the air in the room occurs through the decontamination table, with approximately 20% of the air being provided from the exterior.

**[0027]** The bottom part of the table incorporates grilles that allow the renewal of the air in the event of the total or partial obstruction of the surface of the table.

**Control methods:**

**[0028]** In the interior of the room there is a continuous-action particle controller to guarantee the required ambient level.

**[0029]** In addition, as a last control prior to the garments or materials being packaged, the number of particles present in the garments or materials is measured by a rotary drum connected to a particle counter.

**[0030]** In the event that the minimum allowable level of particles is exceeded, the entire batch must go through the system process recommended herein again.

**[0031]** The garments or materials, once packaged, exit the room on a conveyor belt to prevent their contamination as far as possible. They are then sorted in the insulated enclosure and packaged for their distribution.

**[0032]** The present system for mixed washing and the elimination of particles provides multiple advantages over systems currently being used, the most notable advantage being not the mixed washing itself, but the fact that it is thanks to the mixed washing that all types of

industrial and organic dirt are eliminated.

**[0033]** Another of the most important advantages concerns the fact that the garments are free of particles, almost all of them in their passage through a sanitary barrier, consisting of a drum that removes the aforementioned particles.

**[0034]** Another added advantage is that the garments, in passing through the sanitary barrier during the cleaning process, are disinfected and deodorised by an ozonisation system.

**[0035]** Additionally, a further advantage in relation to known means concerns the use of a clean room, consisting of an enclosure with a clean atmosphere for the final treatment of the garments following the washing processes, comprising two zones: Anteroom and room

**[0036]** An important advantage is that the anteroom generates an air shower, the purpose of which is to clean the particles that the person who is about to enter the room may have on his/her exterior.

**[0037]** Another important and fundamental advantage provided by the system presented is the use of the room, where the garments and materials are handled, sorted, mended if necessary, folded and packaged, and which is equipped with an air circulation system comprising three filters, a decontamination table and control methods.

**[0038]** In order to better understand the purpose of the present invention, a preferential practical embodiment of said invention has been shown on the plan attached. On said plan:

Figure 1 shows a diagram developing the different phases of the system.

Figure 2 shows a schematic view of the filtering and air regeneration in the room.

The system for mixed washing and the elimination of particles is characterised by a sequence of operations detailed below:

**Dry cleaning:**

**[0039]** The garments are sorted for cleaning into clearly differentiated batches and pass through dry cleaning machines (3), where they are cleaned following the process.

**Wet washing:**

**[0040]** Said batches are conveyed by manual or automatic means to the washing machines (1) with water and detergent.

**[0041]** Both processes take place in an insulated enclosure (2) in which, as well as the dry cleaning machine (3) and the wet cleaning machine (1), a clean room is located (4).

**Clean room:**

**[0042]** The clean room (4) is an enclosure with a clean atmosphere for the final treatment of the garments after the washing processes and consists of two zones: anteroom (5) and room (6).

**- Anteroom**

**[0043]** The anteroom (5) is the zone where personnel enter the room (6). An air shower (7) occurs in said room, the purpose of which is to clean the particles that the person who is about to enter the room (6) may have on his/her exterior.

**[0044]** The air shower (7) is activated automatically when the entrance door (8) is opened, thereby enabling access to the interior of the room (6), once the entrance door (9) has been closed.

**- Room**

**[0045]** The room (6) is the zone where the garments are handled, sorted, mended if necessary, folded and packaged, and is equipped with an air recirculation system (10) comprising three filters (11, 12 and 13) to retain any particles that may be in the atmosphere.

**[0046]** The filter (11) acts as a pre-filter, the filter (12) is a high-efficiency filter, and the filter (13) is an absolute filter. The room also features innovative elements such as: a sanitary barrier (14), a decontamination table (15) and control methods (16 and 17)

**. Sanitary barrier**

**[0047]** The sanitary barrier (14) consists of two mouths, one an inlet (18) and the other an outlet (19), and an ozonisation system (20).

**[0048]** The inlet mouth (18) is located in the insulated enclosure (2) in order to enable the access of the garments or materials, which, by means of a rotary drum (21) shed the particles through the filtered air. During this process the disinfection and deodorisation of the garments or materials is conducted through an ozonisation system (20).

**[0049]** The outlet mouth (19) is located in the interior of the room (6) itself, from where the garments are removed and deposited on the decontamination table (15).

**. Decontamination table**

**[0050]** Specially designed for folding the garments, provided with a grille (22) on its surface that acts as a return, enabling the absorption of particles during the folding process.

**[0051]** The air reaches the garments through diffusers (23) incorporated into the top part of the room.

**[0052]** The table (15) incorporates grilles (24) for the recirculation of the air.

**Control methods:**

**[0053]** In the interior of the room (6) there is a continuous-action particle controller (16) to guarantee the required ambient level.

**[0054]** In addition, as a final control prior to the garments or materials being packaged, they pass through a rotary drum (17) connected to a particle counter that measures the particles present in the garment or material.

**[0055]** The garments or materials, after being packaged in a vacuum machine (25), exit the room (6) on a conveyor belt (26).

**[0056]** Having described the nature of the present invention in sufficient detail, in addition to a means for putting it into practice, all that remains to be added is that its description is not restrictive, and that variations can be made provided that said variations do not alter the essential nature of the characteristics claimed below.

**Claims**

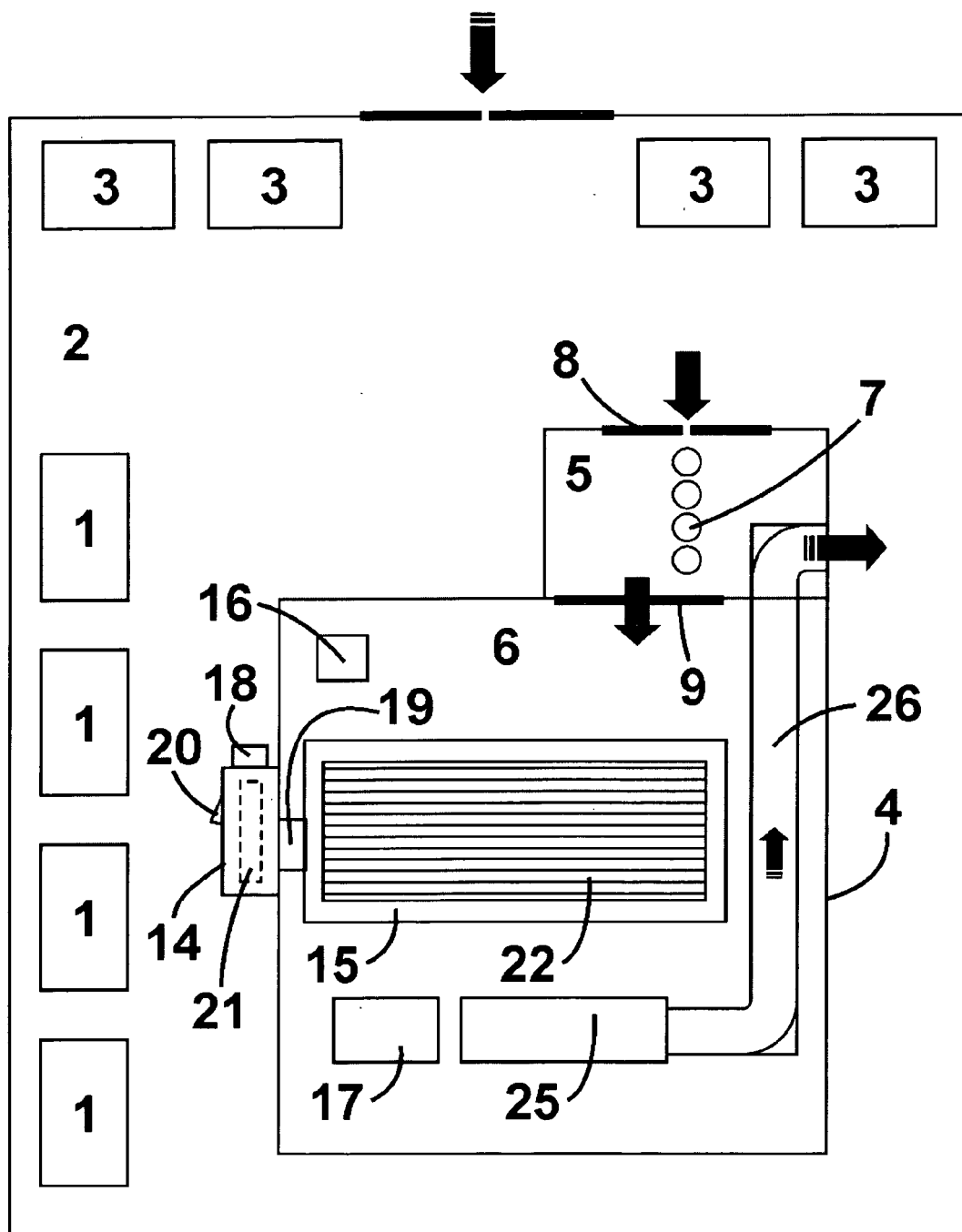
1. System for mixed washing and the elimination of particles, of special usefulness in specific working garments made of continuous filament such as rayon, rayon carbon, polyester carbon, polyester for use in paint booths or similar, or any other activity that requires totally aseptic cleaning for use by a person or that involves the risk of contaminating the products they manufacture, or a material likely to undergo said washing process even if not used for work purposes, **characterised in that** the garments or materials are subjected to a dry cleaning process that guarantees the elimination of residues of an industrial type and/or subsequently a process of washing in water to eliminate any possible organic residues, both being performed in a perfectly insulated enclosure (2) where a clean room (4) is located, equipped with a filtering and air regeneration system.
2. System for mixed washing and the elimination of particles according to the preceding claim wherein for the dry cleaning process, the garments or materials are sorted into clearly differentiated batches, and put through dry cleaning machines (3) with perchloroethylene.
3. System for mixed washing and the elimination of particles according to claim 1 wherein the batches, already clean after the dry cleaning, are conveyed by manual or automatic means to the wet washing machines (1) with water and detergent.
4. System for mixed washing and the elimination of particles according to claim 1 wherein the clean room (4) is an enclosure with a clean atmosphere for the final treatment of the garments or materials after the

washing processes and consists of two zones: anteroom (5) and room (6).

5. System for mixed washing and the elimination of particles according to claim 4 wherein the anteroom (5) is the zone where personnel enter the room (6), an air shower (7) being produced, the purpose of which is to clean the particles that the person who is about to enter the room (6) may have on his/her exterior, activated automatically when the entrance door is opened (8), thereby enabling access to the interior of the room (6), once the entrance door (9) has been closed. 5 10
6. System for mixed washing and the elimination of particles according to claims 4 and 5 wherein the room (6) is the zone where the garments are handled, sorted, mended if necessary, folded and packaged, and is equipped with an air circulation system (10) comprising three filters (11, 12 and 13) that retain any particles there may be in the atmosphere, a sanitary barrier (14), decontamination table (15) and control methods (16 and 17). 15 20
7. System for mixed washing and the elimination of particles according to claim 6 wherein the filter (11) acts as a pre-filter, the filter (12) is a high-efficiency filter, and the filter (13) is an absolute filter. 25
8. System for mixed washing and the elimination of particles according to claims 4, 5 and 6 wherein the sanitary barrier (14) consists of two mouths: one an inlet mouth (18) situated in the insulated enclosure (2), to enable the access of the garments or materials, which, by means of a rotary drum (21) shed the particles through the filtered air and are disinfected during this process, through an ozonisation system (20), while the outlet mouth (19) is located in the interior of the room (6) itself, from where the garments are removed and deposited on the decontamination table (15). 30 35 40
9. System for mixed washing and the elimination of particles according to claims 4, 5, 6 and 8 wherein the decontamination table (15) especially designed for folding the garments and the recirculation of air through grilles (24), is provided with a grille (22) on its surface that acts as a return, enabling the absorption of particles during the folding process, with the air reaching the garments through diffusers (23) incorporated into the top part of the room (6). 45 50
10. System for mixed washing and the elimination of particles according to claims 4, 5, 6, 8 and 9 wherein in the interior of the room (6) there is a continuous-action particle controller (16) that guarantees the required ambient level, and a roller (17) that counts the particles on the garments or materials before be-

ing packaged, as a last control.

11. System for mixed washing and the elimination of particles according to claims 4, 5, 6, 8, 9 and 10 wherein the garments or materials, once packaged in a vacuum machine (25), exit the room (6) on a conveyor belt (26).



**FIG.1**

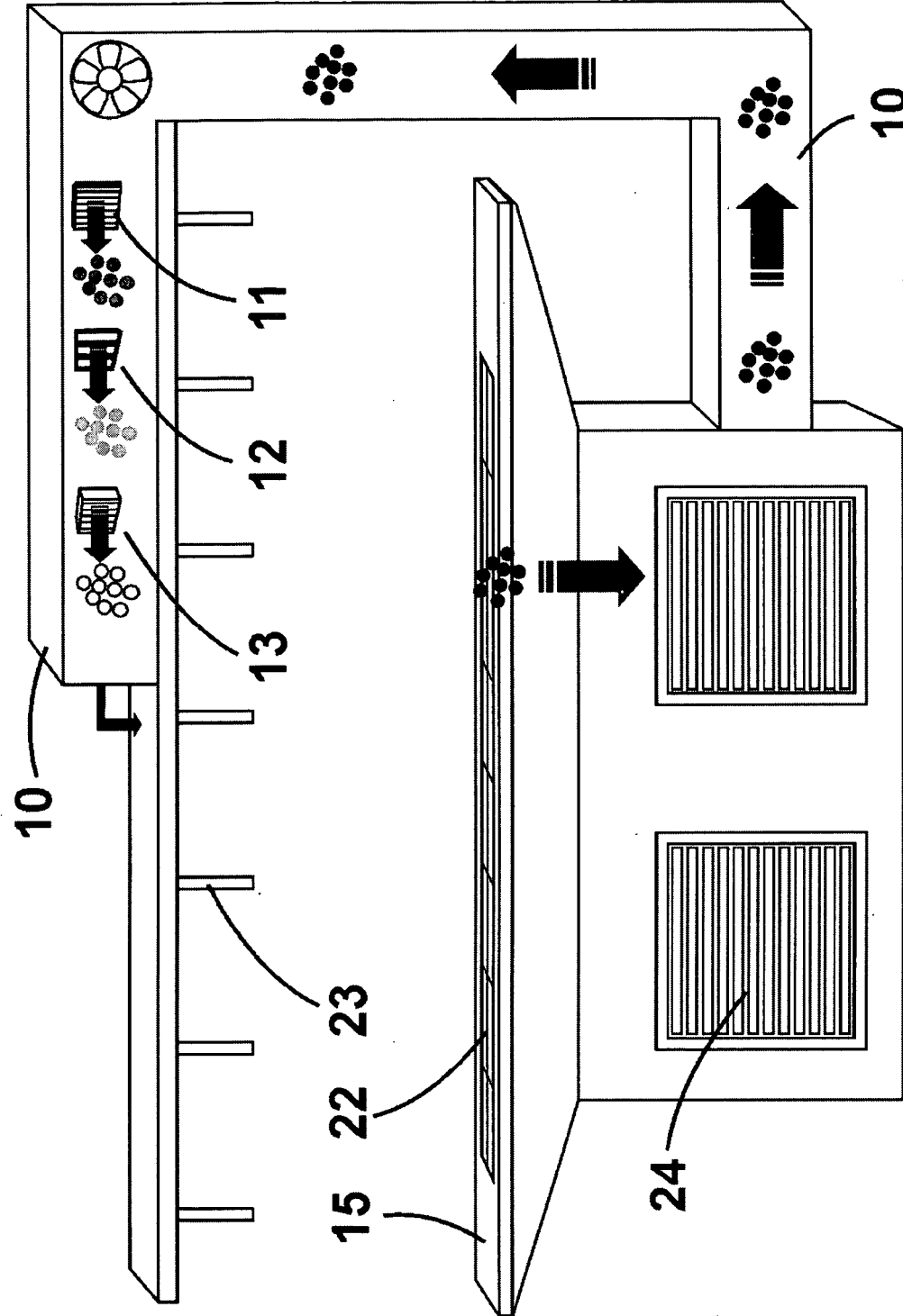


FIG.2



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 06 01 0877

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>23 August 2006</b>	Examiner <b>Clivio, E</b>
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			

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EPO FORM 1503 03 82 (P04C01)



**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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