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(54) **Apparatus for the treatment of clothes, in particular for the steaming and blowing of clothes**

(57) The invention relates to an apparatus for clothes treatment (5) of the type comprising a clothes trail (2) extending from a receiving point (3) of the clothes to be treated to a delivery point (4) of the treated clothes. Advantageously, the apparatus according to the invention

comprises a treatment chamber (10) positioned along said clothes trail (2) and equipped with clothes inlet and outlet doors (11, 12), steaming means (13) and blowing means (14) acting in sequence on clothes being provided in said treatment chamber (10).

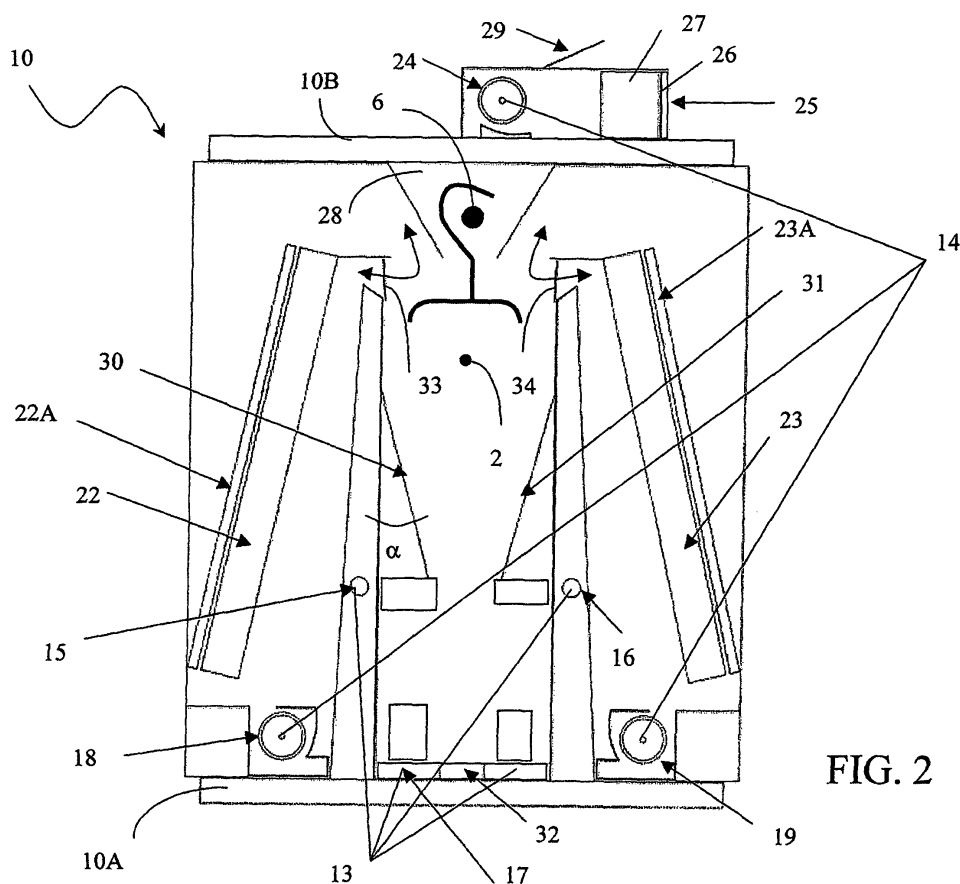


FIG. 2

Description

Field of application

[0001] The present invention relates to an apparatus for clothes treatment, in particular for clothes steaming and blowing.

[0002] More specifically, the invention relates to an apparatus of the type comprising a clothes trail extending from a receiving point of the clothes to be treated to a delivery point of the treated clothes.

Prior art

[0003] As it is well known, in the clothes field, for example coats and jackets, it is needed to freshen them, particularly iron them, so that, after a more or less long lying of packed clothes in the packages through which they have been carried from the manufacturing area, they can be shown in the shop in perfect conditions.

[0004] It is also known that in order to obtain the desired clothes freshening, they should undergo different treatments, particularly two essential treatments which are steaming and blowing.

[0005] Known apparatuses essentially perform a clothes steaming and a subsequent drying/ironing by blowing hot air, which is in particular let forcedly circulate through a generally steam-heated battery, or by blowing cold air, particularly taken from the outside.

[0006] In particular, apparatuses are known, which are based on a so-called tunnel system with a chain having a ring for continuous supply of clothes to treatment stations, clothes continuously moving in sequence through different steaming and drying chambers, realizing very long apparatuses when a high production rate is desired. Now-on-sale tunnel apparatuses also have discontinuities between steaming and drying chambers, decreasing the so-obtained ironing quality.

[0007] A clothes side steaming in a dedicated chamber is also generally provided. Such a steaming, although allowing the external part of the piece of clothing to be well ironed, does not allow steam to penetrate inside the piece of clothing and unfold, and thus iron the lining.

[0008] Moreover, since the piece of clothing continuously moves, these apparatuses provide permanently open ends with subsequent heat releases and thus a decrease in ironing quality and production yield besides an increase in steam and power consumptions. Moreover, the heat and steam release in the machine location environment worsens the already difficult conditions thereof.

[0009] In known apparatuses, both if clothes are continuously supplied in tunnel apparatuses, and if they are supplied step-by-step in chamber apparatuses, a plurality of treatment stations is encountered, located in sequence, leading to a general apparatus complexity and high dimensions.

[0010] The technical problem underlying the present

invention is to provide an apparatus having such structural and functional features as to meet the above-mentioned requirement meanwhile overcoming prior art drawbacks.

Summary of the invention

[0011] The solution idea underlying the present invention is to provide a single clothes treatment chamber or cab equipped with steaming means and blowing means.

[0012] Based on this solution idea, the technical problem is solved by an apparatus for clothes treatment of the type comprising a clothes trail extending from a receiving point of the clothes to be treated to a delivery point of the treated clothes, characterised in that it comprises a treatment chamber positioned along said trail and equipped with clothes inlet and outlet doors, said treatment chamber providing steaming means and blowing means operating in sequence on clothes.

[0013] Advantageously, steaming means comprise at least a steaming device positioned in correspondence with a lower portion of the treatment chamber; while blowing means comprise at least a primary fan positioned in said lower portion of the treatment chamber for air recirculation in said treatment chamber towards a respective manifold equipped with a plurality of blowing nozzles turned towards the clothes trail and a secondary fan positioned in correspondence with an upper portion of said treatment chamber to suck air from the environment and send it to the clothes trail.

[0014] Moreover, the apparatus comprises a superheater provided at said secondary fan entry to heat the air sucked from the environment.

[0015] Conveniently, an adjustable air intake is positioned between said superheater and said secondary fan entry to suck air directly from the environment.

[0016] At least a partition is also provided, being movable between a closed position allowing the air to circulate on side heaters and an open position cutting this side recirculation out, as well as at least a baffle, facing the clothes trail and angularly movable between an essentially vertical position and a position forming an angle with the vertical and turned towards the clothes trail.

[0017] The features and advantages of the apparatus according to the invention will be apparent from the following description of an embodiment thereof given by way of non limiting example with reference to the annexed drawings.

Brief description of the drawings

[0018] In the drawings:

Figure 1 is a schematic perspective view of an apparatus for clothes treatment according to the invention;

Figure 2 is a cross-sectional and enlarged-scale view

of a detail of the apparatus of figure 1, made according to plan II;

Figures 3, 4A and 4B are views of the detail of figure 2 during different apparatus operating steps.

Detailed description

[0019] With reference to the drawings, an apparatus for clothes treatment according to the present invention is globally indicated with 1.

[0020] The apparatus 1 comprises, in a supporting frame, a clothes trail 2 extending from a receiving point 3 of the clothes to be treated to a delivery point 4 of the treated clothes.

[0021] Clothes to be treated, being schematically and limited to a single piece of clothing represented with the numeral reference 5 in figure 1, can be hanged one by one by means of respective hangers on a conveying chain 6 (as shown in the figure only by way of example) or collected on conveying trucks.

[0022] Generally, the apparatus 1 can be equipped with any clothes conveying/handling system, associated in case to a suitable management software of these operations.

[0023] Advantageously, the apparatus 1 according to the present invention comprises a treatment chamber 10 positioned along the clothes trail 2 and equipped with a clothes inlet door 11 and a clothes outlet door 12.

[0024] The apparatus 1 according to the invention comprises steaming means 13 and blowing means 14 acting in said treatment chamber 10.

[0025] In particular, as shown in figure 2, steaming means 13 comprise a first 15 and a second side steaming device 16 positioned on both opposite sides of the clothes trail 2, essentially at half the height of the treatment chamber 10 to send steam directly on clothes to be treated.

[0026] According to the invention, steaming means 13 also comprise a lower steaming device 17 positioned in correspondence with a lower or bottom portion 10A of the treatment chamber 10 to send steam towards the clothes trail 2 from the bottom.

[0027] It should be noted that steam coming from the bottom helps clothes swelling with an increased ironing effect.

[0028] The apparatus 1 is also equipped with suitable steaming device selection and control means, the steaming devices being selected independently from the user and adjusted by a suitable control software.

[0029] Furthermore, two primary air recirculation fans 18 and 19 are housed in the treatment chamber 10, in correspondence with the lower portion 10A of the treatment chamber 10, said fans sending air towards opposed manifolds 20 and 21, suitably equipped with air outlet slits towards the clothes trail 2. Two side heaters 22 and 23 are symmetrically positioned laterally next to said manifolds 20 and 21 to heat recirculation air, the side heaters being equipped with respective filters 22A and

23A.

[0030] According to the invention, the apparatus 1 further comprises a secondary fan 24 positioned in correspondence with an upper portion 10B of the treatment chamber 10. In particular, the secondary fan 24 has an air inlet duct 25 being open in the environment and equipped with a filter 26 and an heater 27, as well as a delivery duct 28 open towards the treatment chamber 10.

[0031] It should be noted that an air intake 29 is also provided along the inlet duct 25, being adjustable in amplitude, open in the environment, positioned between the heater 27 and the secondary fan 24, to let roomtemperature air in.

[0032] Therefore, the primary fans 18 and 19 and the secondary fan 24 compose the blowing means 14.

[0033] It should be noted that the first 15 and second 16 side steaming devices of the steaming means 13 are suitably positioned within manifolds 20 and 21, the steam being sent to clothes through the slits of these manifolds 20 and 21, with a nebulization effect.

[0034] Advantageously according to the invention, two baffles 30 and 31 are provided within the treatment chamber 10, on the opposite sides of the clothes trail 2, being angularly movable between an essentially vertical position and a position forming an angle α with the vertical and turned towards the clothes trail 2.

[0035] In the example, this angle α is comprised between 10° and 50°, preferably between 30° and 40°.

[0036] Baffles 30 and 31 can be positioned between the vertical position and the position forming the angle α in an adjustable way through per se traditional mechanical means.

[0037] Advantageously according to the invention, baffles 30 and 31 are movable between the vertical position and the position forming the angle α , with an essentially fan-like motion under the action of motor means, individually or in pairs, in phase or counterphase between each other.

[0038] A lower heater 32 is also provided, being positioned in correspondence with the lower portion 10A of the treatment chamber 10, to be used for further heating the steam.

[0039] Finally, shutters or partitions 33 and 34 are provided within the treatment chamber 10, being movable between a closed position (as shown in figures 2, 3 and 4A), allowing air to circulate on side heaters 22 and 23, and an open or nearly open position (as shown in figure 4B), cutting or nearly cutting this side recirculation out. In particular, in a completely closed position partitions 33 and 34 are essentially positioned along the side manifolds 20 and 21, while in a completely open position they are extending between such side manifolds 20 and 21 and the delivery duct 28 of the secondary fan 24.

[0040] In the apparatus 1, along the clothes trail 2, upstream of the treatment chamber 10, an auxiliary pretreatment chamber 35 is also advantageously provided, being equipped with an inlet door 36 for clothes to be treated, communicating with the treatment chamber 10

in correspondence with the door 11.

[0041] A plurality of delivery nozzles, particularly microdiffusers, are provided in the auxiliary pre-treatment chamber 35, turned towards the clothes trail 2 to deliver a pre-treatment fluid.

[0042] This pre-treatment fluid is chosen between a fluid such as water to pre-moisturize the clothes to be treated, for example linen clothes, or a sizing substance, such as a polymerising or general fixing product.

[0043] It should be noted that the auxiliary pre-treatment chamber 35 can also pre-moisturize clothes by exploiting the return of condensate from the treatment chamber 10 (through suitable connection ducts not shown in the figure) and/or a corresponding air and/or steam drainage.

[0044] Moreover, the auxiliary pre-treatment chamber 35 can comprise an heating module, used for example for wet clothes pre-drying, such as in the industrial laundry field.

[0045] In the apparatus 1, along the clothes trail 2, downstream of the treatment chamber 10, an auxiliary post-treatment chamber 37 is also provided, communicating with the treatment chamber 10 in correspondence with the door 12 and equipped with an outlet door 36 for treated clothes.

[0046] A plurality of delivery nozzles, particularly microdiffusers, are provided in the auxiliary post-treatment chamber 37, turned towards the clothes trail 2 to deliver a post-treatment fluid.

[0047] This post-treatment fluid is chosen between a fluid such as a sanitizing substance, or generally a chemical product, to disinfect clothes to be treated, for example imported clothes, or a perfume to scent clothes.

[0048] The auxiliary post-treatment chamber 37 is advantageously equipped with UV sterilization lamps and with a refrigerating module, being per se traditional, to cool treated clothes, for example to make possible unload operations easy, particularly manual, as well as with a heating module, for example to perform a desired polymerisation of possible sizing substances.

[0049] Furthermore, the refrigerating module can be used to "fix" by thermal shock the ironing condition being obtained in the treatment chamber 10.

[0050] The apparatus 1 also comprises, in correspondence with the treatment chamber 10, a camera turned towards the clothes trail 2 to remotely control clothes being treated, particularly to control the blowing thereof.

[0051] The camera particularly allows the clothes behaviour to be seen within the treatment chamber 10, thus facilitating and accelerating the ironing program compilation.

[0052] It should also be noted that the camera is equipped with a refractivity control device, suitable to check for example the treated clothes real colour subsequently deciding on the discard thereof from the lot of treated clothes which are for example ready to be shown.

[0053] The operation of the apparatus 1 according to the invention will now be seen in greater detail.

[0054] With reference to figures 1 and 3, in the treatment chamber 10, clothes to be treated undergo a steaming step. During this step, clothes are subject to steam action, which can come from side steaming devices 15 and 16, when direct steaming onto the piece of clothing is not detrimental, or from the lower steaming device 17, particularly suitable for delicate clothes.

[0055] During steam action, baffles 30 and 31 can be fixed in predetermined angular positions, for example depending on the piece of clothing to be treated. Alternatively, these baffles 30 and 31 can be operated with a fan-like motion, individually or in pairs, in phase or counterphase between each other, so as to reduce possible folds and flaws on clothes to be treated, essentially stirring or shaking them.

[0056] Instead, with reference to figures 1, 4A and 4B, after the steaming step, the piece of clothing is subject to a blowing step to perform the desired drying thereof.

[0057] In this case, air is let in towards clothes through the slits of side manifolds 20 and 21 (as shown by way of example in figure 4A, with the shutters 33 and 34 in the closed position) and from the top, through the secondary fan 24 (as shown by way of example in figure 4B, with the shutters 33 and 34 in the open position). It should be noted that the air sent from the top is advantageously temperature-modulated through the air intake 29. In particular, with the air intake 29 being adjusted at the greatest openings, the hot air effect on clothes supporting hangers is attenuated, reducing undesired deformations thereof. This clothes supporting hanger cooling mechanism also allows the apparatus operating temperature to be increased, subsequently improving the quality yield thereof, reducing the risks to deform or even melt hangers.

[0058] In particular, by way of example, an air circulation is shown in figure 4A, being performed by means of the primary fans 18 and 19 and of the secondary fan 24, with the shutters 33 and 34 and air intake 29 in the closed position, while an air circulation being performed by means of the primary fans 18 and 19 and the secondary fan 24 is shown in figure 4B, with the shutters 33 and 34 and the air intake 29 in the open position.

[0059] Air action on clothes is also adjusted by suitably adjusting the angular position of baffles 30 and 31. In this case too, the possible baffle fan-like motion, individually or in pairs, in phase or counterphase between each other, facilitates the air drying effect on clothes and clothes fixation in the ironed condition. The turbulence generated by fan and baffle action also helps particularly heavy clothes to dry.

[0060] Generally, blowing means 14 and baffles 30 and 31 blow air from the bottom and from the top, also generating a desired turbulence air recirculation. Suitably, they can be controlled in an independent way, thus mixing at will the clothes swelling effect with the shaking one.

[0061] Suitably, baffles 30 and 31 are fixed in such a position as to convey the air towards the clothes trail 2 if

a piece of clothing needs to be swollen or they are operated in a synchronous or asynchronous way to enhance the turbulence effect and thus clothes shaking.

[0062] Particularly, it is possible to select the amount of air let in from the bottom and from the top to suit the piece of clothing to be ironed and the peculiar requirements thereof. For example, it is possible to envisage a cotton dress blowing step with 70% of air from the top to keep it in position and 30% from the bottom to allow the desired swelling thereof or a trousers blowing step with 30% of air from the top to shake it and 70% from the bottom to allow the desired swelling thereof.

[0063] It is also possible to envisage a positioning and/or a moving, as well as predetermined air from the bottom/air from the top ratios which can be automatically selected by the user.

[0064] It should be noted that, during the steaming and blowing steps, further pre and post-treatments of the clothes occur in pre and post-treatment chambers 35 and 37, according to need.

[0065] Finally, it is worth noticing that the treatment chamber 10 size is set in order to allow a suitable amount of clothes to be treated to be housed therein (thus ensuring some quantity yield of the apparatus 1), the required clothes swelling and shaking being however ensured by blowing means 14 and baffles 30 and 31.

[0066] The main advantage of the apparatus according to the present invention is a perfect treatment of a wide range of different types of clothes, being realised by means of a structurally simple and compact apparatus, also allowing a great variety of different treatments.

[0067] The apparatus being proposed also proves to be easy to clean due to the use of air circulation realised by means of fans and baffles movement and by means of the openings in the environment, such as treatment chamber 10 doors. The maintenance of the different components being positioned in the treatment chamber 10 proves to be similarly easier.

[0068] Finally, the apparatus being proposed also proves to be highly automated being remotely video-controlled, human intervention being limited to clothes load and unload and thus not requiring skilled personnel. This video-control also allows operating parameters to be finely adjusted to ensure a perfect clothes ironing in all apparatus operating conditions.

[0069] In conclusion, the apparatus for clothes treatment according to the invention realises an essentially universal multi-operating system. The particular multi-functionality of the proposed apparatus results in the possibility to perform therein different special treatments on clothes to be treated, such as sterilization, sanification, perfuming, ionisation, moisturizing or permanent-ironing chemical product application and so on.

[0070] Obviously, in order to meet contingent and specific requirements, a skilled in the art could bring several changes and variations to the above-described apparatus, all comprised within the scope of protection of the invention as defined in the following claims.

Claims

1. An apparatus for clothes treatment (5) of the type comprising a clothes trail (2) extending from a receiving point (3) of the clothes to be treated to a delivery point (4) of the treated clothes, **characterised in that** it comprises a treatment chamber (10) positioned along said clothes trail (2) and equipped with clothes inlet and outlet doors (11, 12), steaming means (13) and blowing means (14) acting in sequence on clothes being provided in said treatment chamber (10).
2. An apparatus according to claim 1, **characterised in that** said steaming means (13) comprise at least a steaming device (17) positioned in correspondence with a lower portion (10A) of said treatment chamber (10).
3. An apparatus according to claim 2, **characterised in that** said blowing means (14) comprise at least a primary fan (18, 19) positioned in said lower portion (10A) of the treatment chamber (10) for air recirculation in the treatment chamber (10) towards a respective manifold (20, 21) equipped with a plurality of blowing slits turned towards the clothes trail (2).
4. An apparatus according to claim 3, **characterised in that** said blowing means (14) comprise a secondary fan (24) positioned in correspondence with an upper portion (10B) of said treatment chamber (10) to suck air from the environment and send it to said clothes trail (2).
5. An apparatus according to claim 4, **characterised in that** it comprises a heater (27) provided at the entry of said secondary fan (24) to heat the air sucked from the environment.
6. An apparatus according to claim 5, **characterised in that** it comprises an adjustable air intake (29) positioned between said heater (25) and said secondary fan (24) entry to suck air directly from the environment.
7. An apparatus according to claim 6, **characterised in that** it comprises at least a partition (33, 34) being movable between a closed position allowing the air to circulate on side heaters (22, 23) and an open position cutting this air circulation out.
8. An apparatus according to claim 7, **characterised in that** it comprises at least a baffle (30, 31), facing said clothes trail (2) and angularly movable between an essentially vertical position and a position forming an angle (α) with the vertical and turned towards said clothes trail (2).

9. An apparatus according to claim 8, **characterised in that** it comprises adjusting means of the angular position of said at least one baffle (30, 31) to position said at least one baffle (30, 31) in a predetermined angular position. 5
10. An apparatus according to claim 9, **characterised in that** it comprises motor means to alternatively angularly move said at least one baffle (30, 31). 10
11. An apparatus according to claim 10, **characterised in that** it comprises at least a first and second baffles (30, 31) being symmetrically positioned with respect to said clothes trail (2), as well as respective adjusting means of the angular position and motor means to angularly move said baffles (30, 31), individually or in pairs, in phase or counterphase between each other. 15
12. An apparatus according to any of the previous claims, **characterised in that** it comprises, along said clothes trail (2) and upstream of said treatment chamber (10) an auxiliary clothes pre-treatment chamber (35). 20 25
13. An apparatus according to claim 12, **characterised in that** said auxiliary pre-treatment chamber (35) comprises a plurality of delivery nozzles to deliver a pre-treatment fluid. 30
14. An apparatus according to any of the previous claims, **characterised in that** it comprises, along said clothes trail (2) and downstream of said treatment chamber (10) an auxiliary clothes post-treatment chamber (36). 35
15. An apparatus according to claim 14, **characterised in that** said auxiliary post-treatment chamber (36) comprises a plurality of delivery nozzles to deliver a post-treatment fluid. 40
16. An apparatus according to any of the previous claims, **characterised in that** it comprises, in correspondence with said treatment chamber (10), a camera turned towards said clothes trail (2) to remotely control clothes being treated. 45
17. An apparatus according to claim 16, **characterised in that** it comprises a refractivity control device in correspondence with said camera. 50

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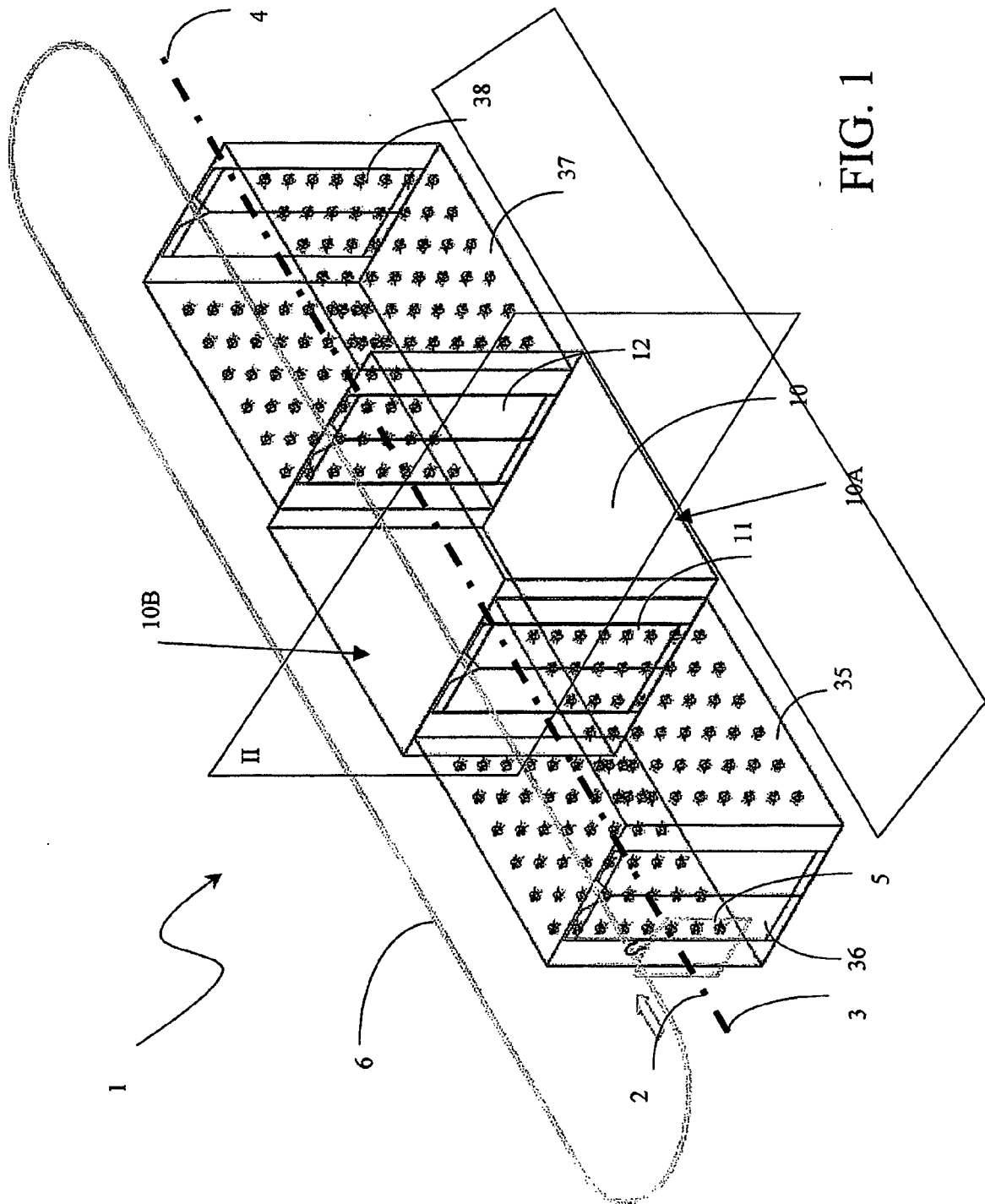
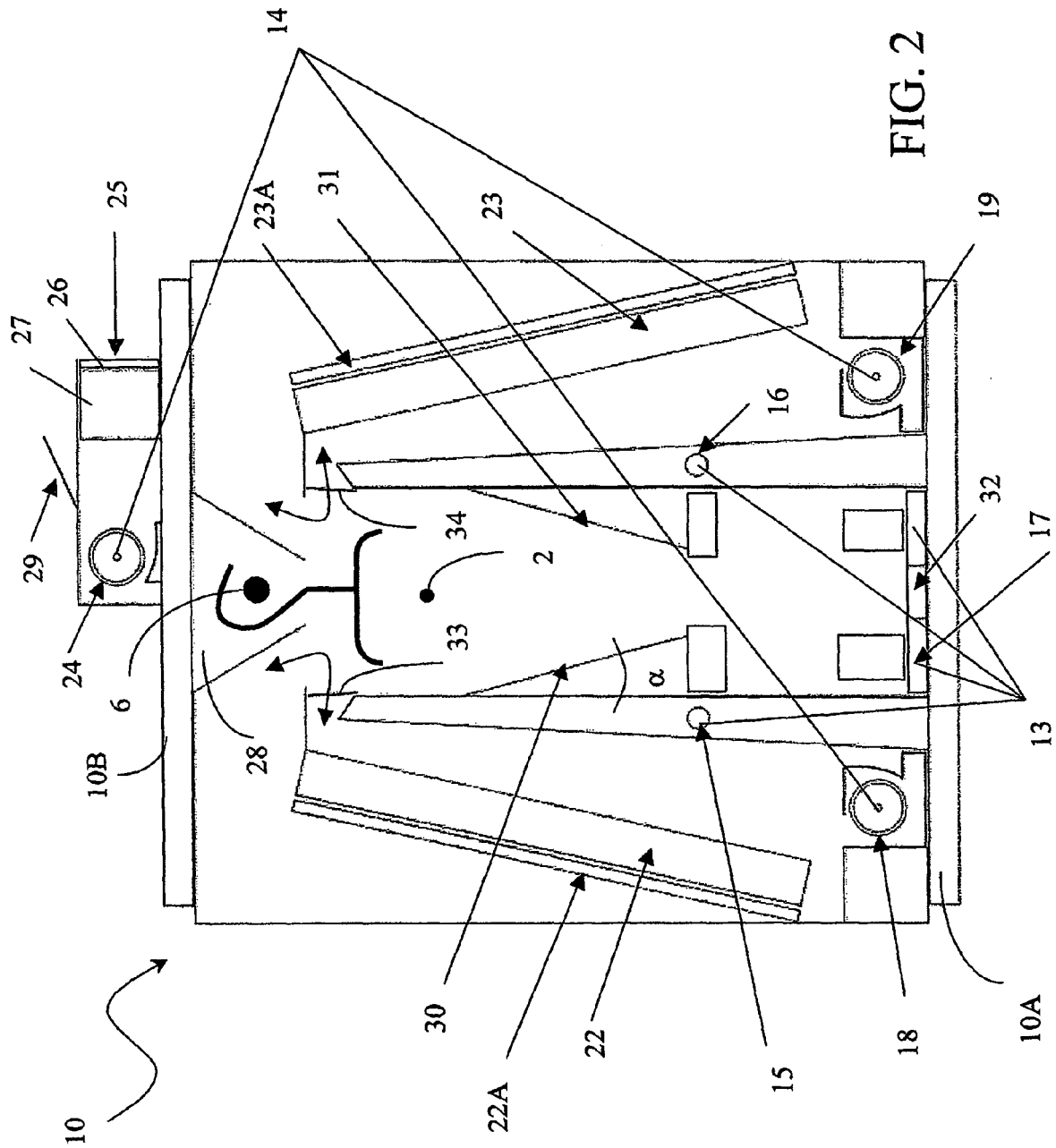
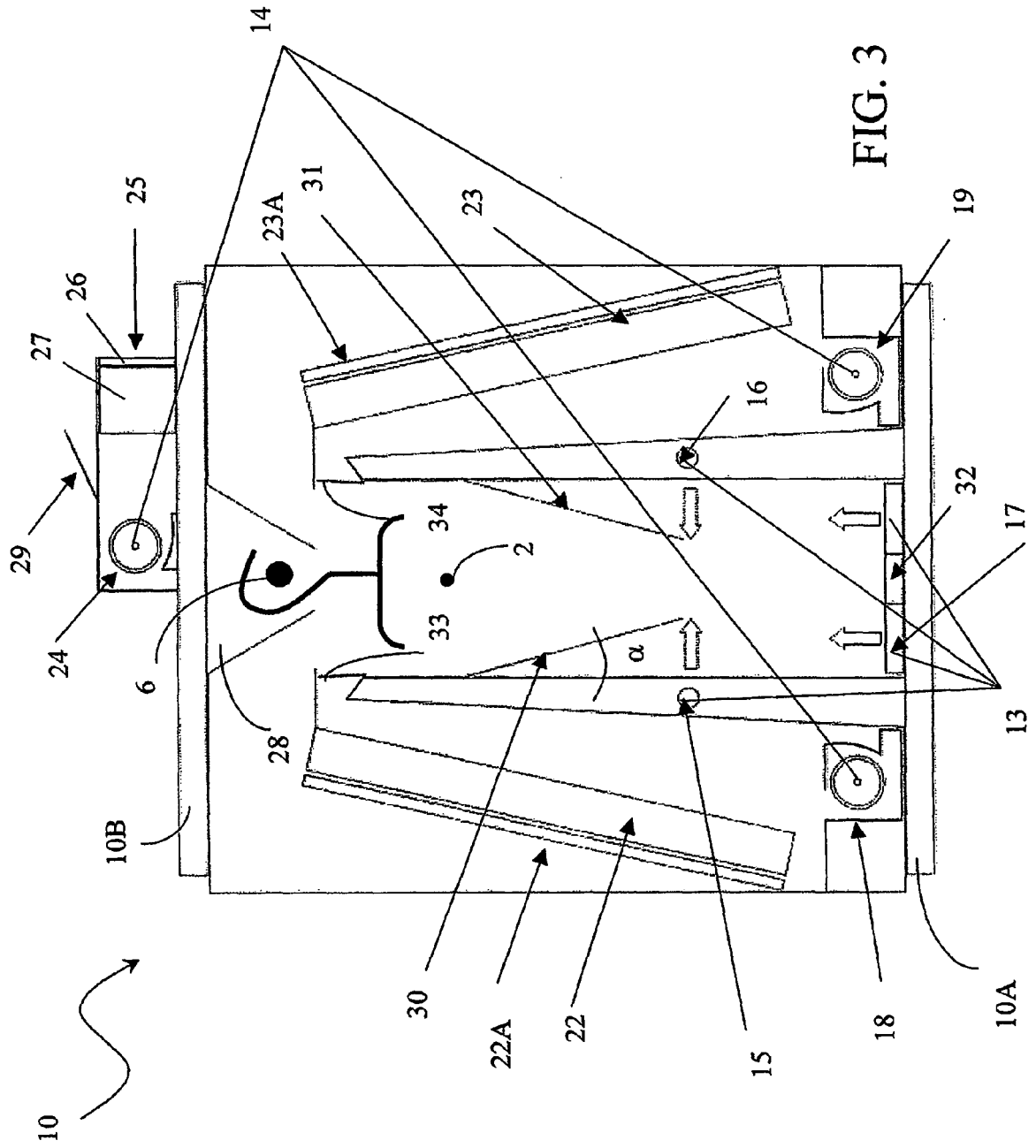
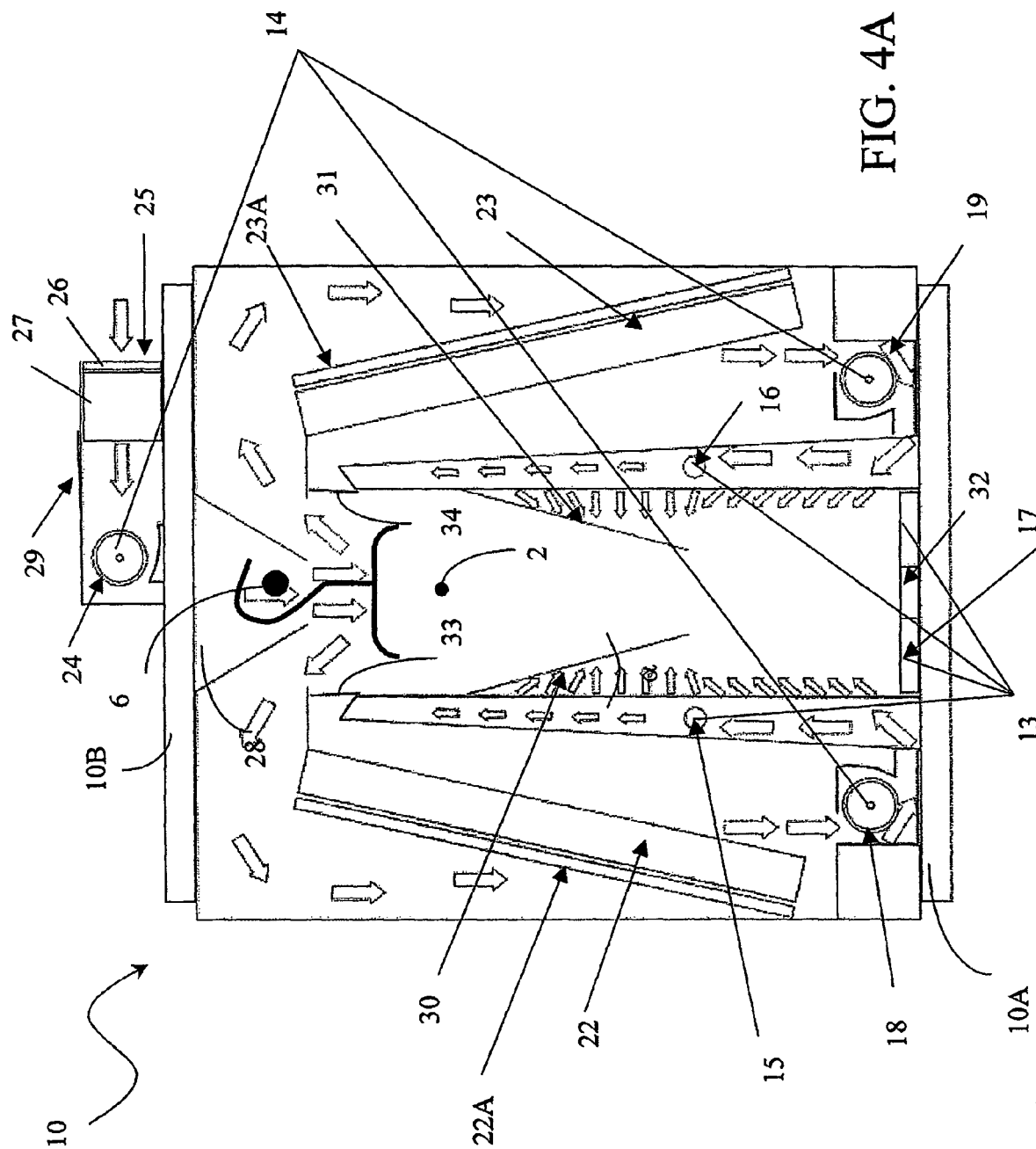
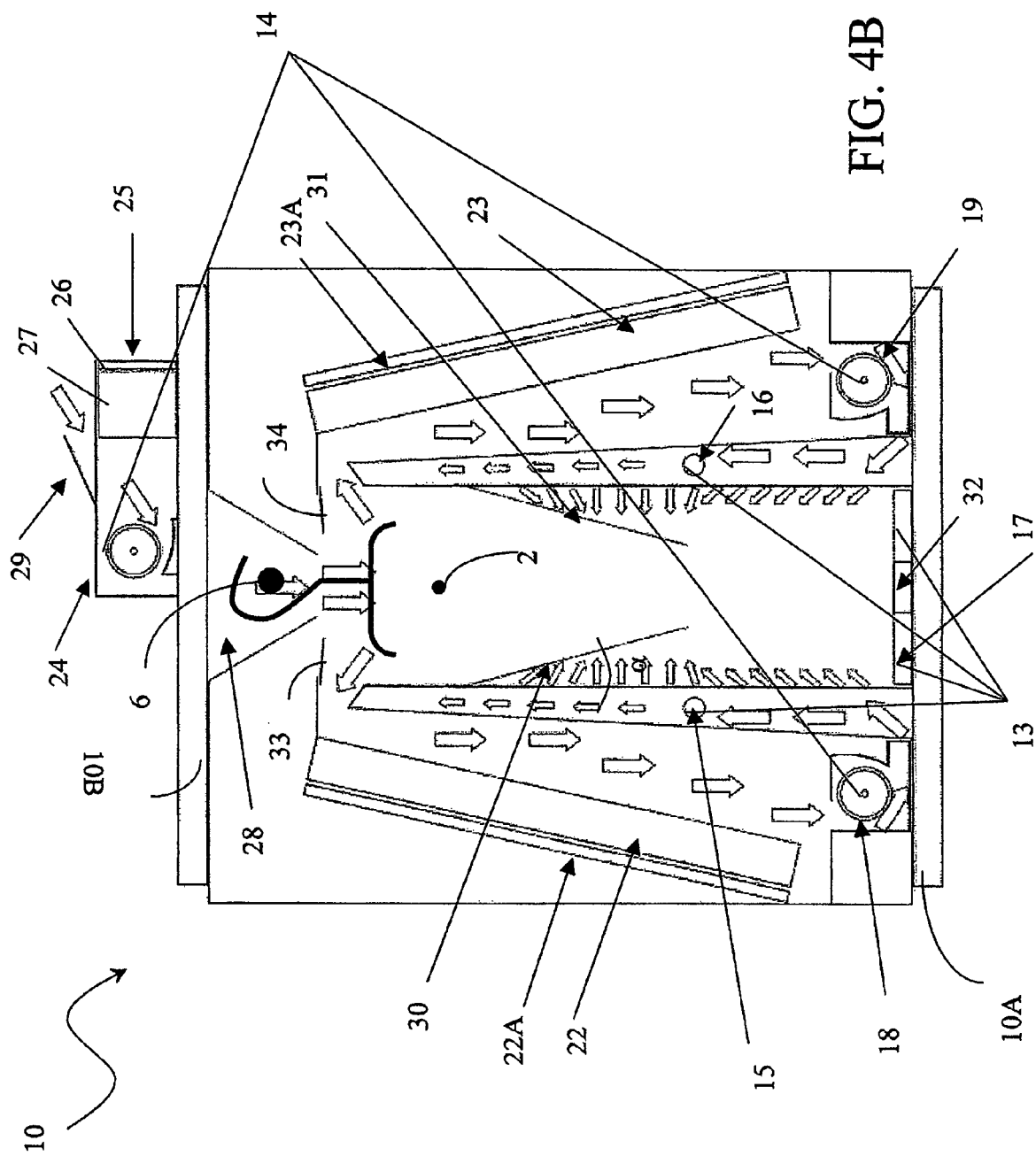


FIG. 1











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Place of search Munich		Date of completion of the search 25 October 2007	Examiner Bichi, Marco
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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**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.
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