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(54) **Household clothes dryer**

(57) A clothes dryer comprising a cabinet (105) housing a drum for clothes to be dried, a clothes drying air circuit including an air-cooled condenser (315), and a condenser cooling air circuit comprising an air outlet (110) provided in a wall (115) of the cabinet. At least one

clothes hanger (130;430;530-1,530-2) is associated to the wall of the cabinet in a position above the air outlet, the clothes hanger being adapted to hang clothes in such a way that the latter are hit by the condenser cooling air exiting from the air outlet.

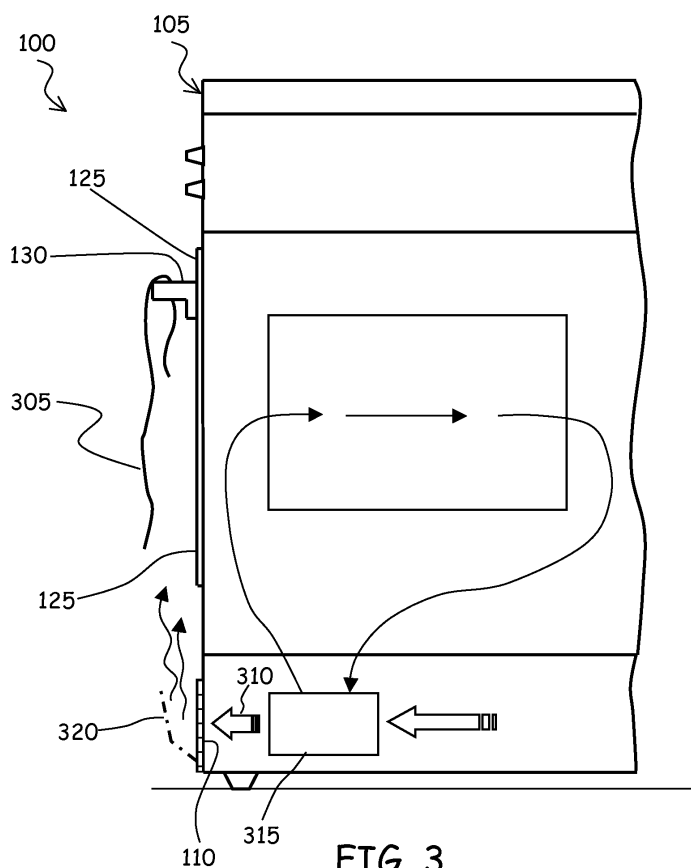


FIG. 3

Description

[0001] The present invention generally relates to the field of household appliances, particularly to appliances for treating clothes and garments, and even more particularly to dryers and/or washer/dryers.

[0002] Condenser-type tumble dryers are known in the art to comprise a closed-loop drying air circuit, adapted to cause heated drying air to circulate through a rotating drum, an air-cooled condenser, *i.e.* an air/air heat exchanger, adapted to remove moisture from the hot moisture-laden drying air exiting said drum, and an open-loop cooling air circuit adapted to circulate through the air-cooled condenser a stream of cooling air taken in from the outside ambient to cool said condenser, and to let out said stream of cooling air again into the outside ambient.

[0003] Through the closed-loop drying air circuit, the hot and moisture-laden drying air is caused to leave the rotating drum and is conveyed towards the air-cooled condenser; then, the dehydrated drying air exiting the condenser is sent back into the drum, upon having been heated up again by heating means provided downstream of the air-cooled condenser, so as to remove additional moisture from the clothes being tumbled in the drum.

[0004] The air-cooled condenser comprises a plurality of fluid passageways, along which the clothes drying air is able to flow for having the moisture condensed and removed therefrom, and these fluid passageways are exposed to the flow of cooling air flowing in the open-loop cooling air circuit. When the cooling air passes through the condenser, the drying air temperature is lowered and heat is transferred to the cooling air; thus, the cooling air which is released into the ambient is warm.

[0005] Several solutions have been proposed to exploit the warm air leaving the condenser.

[0006] For example, in EP 1857585 a clothes dryer is disclosed whose cabinet comprises a top portion in which there is slidably inserted a hanging rack for hanging clothes, able to assume an idle configuration in which it is inserted in the cabinet top portion, and an active configuration in which at least a portion thereof is pulled out from the cabinet so that hanged clothes come to be adjacent to the outlet opening provided in the cabinet for the exit of the warm air.

[0007] The Applicant observes that such a solution requires heavy modifications to the structure of the dryer cabinet in order to accommodate the rack. Additionally, limitations of space in the room of the house where the dryer is placed may prevent in many cases the use of the rack.

[0008] The Applicant has tackled the problem of how to exploit the warm air released in the ambient by a dryer in a way that is simple from the dryer construction viewpoint and that can be used even when space constraints exist.

[0009] According to an embodiment of the present invention, a clothes dryer is provided comprising a cabinet

housing a drum for clothes to be dried, a clothes drying air circuit including an air-cooled condenser, and a condenser cooling air circuit comprising an air outlet provided in a wall of the cabinet. Clothes hanging means are associated to said wall of the cabinet in a position above said air outlet, the clothes hanging means being adapted to hang clothes in such a way that the latter are hit by the condenser cooling air exiting from the air outlet.

[0010] The clothes hanging means may take the form of at least one clothes hanger.

[0011] In particular, the at least one clothes hanger may comprise at least one bracket, attached to the appliance at one or two ends..

[0012] Said wall may in particular be the front wall of the cabinet, wherein a door openable to allow access to the drum is provided.

[0013] The clothes hanger may be associated to the door. In particular, the clothes hanger may form a handle for the operations of opening and closing the door by a user.

[0014] An air deflector may be associated to said air outlet for promoting the flow of the condenser cooling air exiting from the air outlet towards clothes hanging from the clothes hanger.

[0015] These and other features and advantages of the present invention will best appear from the following description of some exemplary and non-limitative embodiments thereof, to be read in conjunction with the attached drawings, wherein:

Figure 1 is a schematic front view of a dryer according to an embodiment of the present invention;

Figure 2 is a schematic top view of the dryer of **Figure 1**;

Figure 3 is a schematic side view of the dryer of **Figures 1 and 2**;

Figure 4 shows, in a view similar to that of **Figure 2**, another embodiment of the present invention; and

Figure 5 shows, in a view similar to that of **Figure 3**, still another embodiment of the present invention.

[0016] Making reference to the drawings, a clothes and garments dryer **100** comprises a cabinet **105**, within which a drum for the clothes and garments to be dried is rotatably mounted. A closed-loop drying-air circuit is also accommodated within the cabinet **105**, adapted to heat and circulate drying air through the drum, and an air-cooled condenser is provided, adapted to remove moisture from the moisture-laden air exiting the drum; the condenser is inserted in an open-loop cooling-air circuit adapted to circulate over and through the condenser a stream of cooling air taken in from the outside ambient to cool the condenser, and then to release said stream of cooling air into the ambient, through a grid **110** provided in a wall of the cabinet **105**, for example, albeit not limitatively, a front wall of panel **115** of the cabinet **105**, in lower position close to the bottom thereof. The details of the internal structure of the dryer **100** are not shown

because they are *per-se* known.

[0017] The cabinet **105** conventionally comprises, essentially in the top region of the front panel **115** (or possibly in different positions), a man-machine interface denoted globally with **120** comprising indicators, pushbut-

[0018] The front panel **115** is also provided with an aperture for allowing access to the drum, with which a door **125** is associated, being for example hinged to the front panel **115** and pivotable around a horizontal axis **A**. Nothing prevents however that the door **125** is hinged to the front panel **115** so as to be pivotable around a vertical axis.

[0019] The door **125** comprises grip means for facilitating a user in the operation of opening and closing the door. According to an embodiment of the present invention, the grip means comprise a handle having the shape of an elongated U-shaped bracket **130**, like a shackle or clevis, which is attached at its two ends to the door **125**, for example by means of bolts or pins (not shown in the drawings) and which extends in horizontal direction transversally to the door **125**. As better visible in **Figures 2 and 3**, the shackle **130** frontally projects from the door **125**, a passageway being defined between the shackle **130** and the door **125**.

[0020] The shackle **130**, in addition to offering to the user a grip means for opening and closing the door **125**, is thus also exploitable as a clothes hanging rack for hanging clothes, such as for example one or more towels **305**.

[0021] In this way, as depicted in **Figure 3** (wherein also the drum and the closed-loop drying air circuit are very schematically depicted), when the dryer **100** is in operation, thanks to the fact that the shackle **130** is located over the grid **110**, the flow of warm cooling air **310** that, after cooling the condenser **315**, exits from the cabinet **105** through the grid **110**, flows upstream investing the cloth(es) hanging from the shackle **130**, gently drying or simply warming it (them). The upstream flow of the cooling air exiting from the grid **110**, by natural convection due to the higher temperature of the warm cooling air compared to the ambient temperature, may be further promoted by providing the grid **110** with an air deflector **320**.

[0022] In this way, the flow of warm condenser cooling air released into the ambient by the dryer is expediently exploited for drying or at least warming clothes like towels.

[0023] The solution according to the present invention is constructively very simple, nevertheless very easy to use, and does not pose problems of space, because even if the dryer **100** is located in small rooms, the front thereof is always freely accessible.

[0024] The clothes hanging rack may take different shapes; for example, **Figure 4**, which is similar to **Figure 2**, depicts a clothes hanging rack taking the form of a shackle **430** defining a double clothes hanging portion, for example for hanging multiple towels in different

spaced-apart positions with respect to the surface of the wall **125**.

[0025] The present invention has been here described taking as an example one embodiment thereof. Several modifications to the described embodiment, as well as other invention embodiments are possible, without departing from the protection scope defined in the appended claims.

[0026] For example, conventional grips means for the door opening and closing may be provided which are distinct from the clothes hanging rack.

[0027] Multiple clothes hanging racks may also be provided, for example vertically spaced apart, and preferably protruding to a different extent from the door **125**, as for example depicted in **Figure 5**, where two shackles **530-1** and **530-2** are shown, or two or more shackles of reduced length may be attached to the door **125** in horizontally aligned but spaced-apart positions.

[0028] The cabinet wall to which the clothes hanging rack or racks according to the present invention is or are attached and where the grid for the exit of the condenser cooling air is not necessarily the front panel of the appliance cabinet, where the door is present: for example, it may be a cabinet lateral wall.

[0029] Several shapes are possible for the clothes hanging rack or racks.

Claims

1. A clothes dryer comprising a cabinet (**105**) housing a drum for clothes to be dried, a clothes drying air circuit including an air-cooled condenser (**315**), and a condenser cooling air circuit comprising an air outlet (**110**) provided in a wall (**115**) of the cabinet, **characterized in that** at least one clothes hanger (**130;430;530-1,530-2**) is associated to said wall of the cabinet in a position above said air outlet, the clothes hanger being adapted to hang clothes in such a way that the latter are hit by the condenser cooling air exiting from the air outlet.
2. The clothes dryer of claim 1, wherein said at least one clothes hanger comprises at least one bracket.
3. The clothes dryer of claim 1 or 2, wherein said wall is the front wall of the cabinet wherein a door (**125**) openable to allow access to the drum is provided.
4. The clothes dryer according to claim 3, wherein said clothes hanger is associated to the door.
5. The clothes dryer of claim 4, wherein said clothes hanger forms a handle for the operations of opening and closing the door by a user.
6. The clothes dryer of any one of the preceding claims,

wherein an air deflector **(320)** is associated to said air outlet for promoting the flow of the condenser cooling air exiting from the air outlet towards clothes hanging from the clothes hanger.

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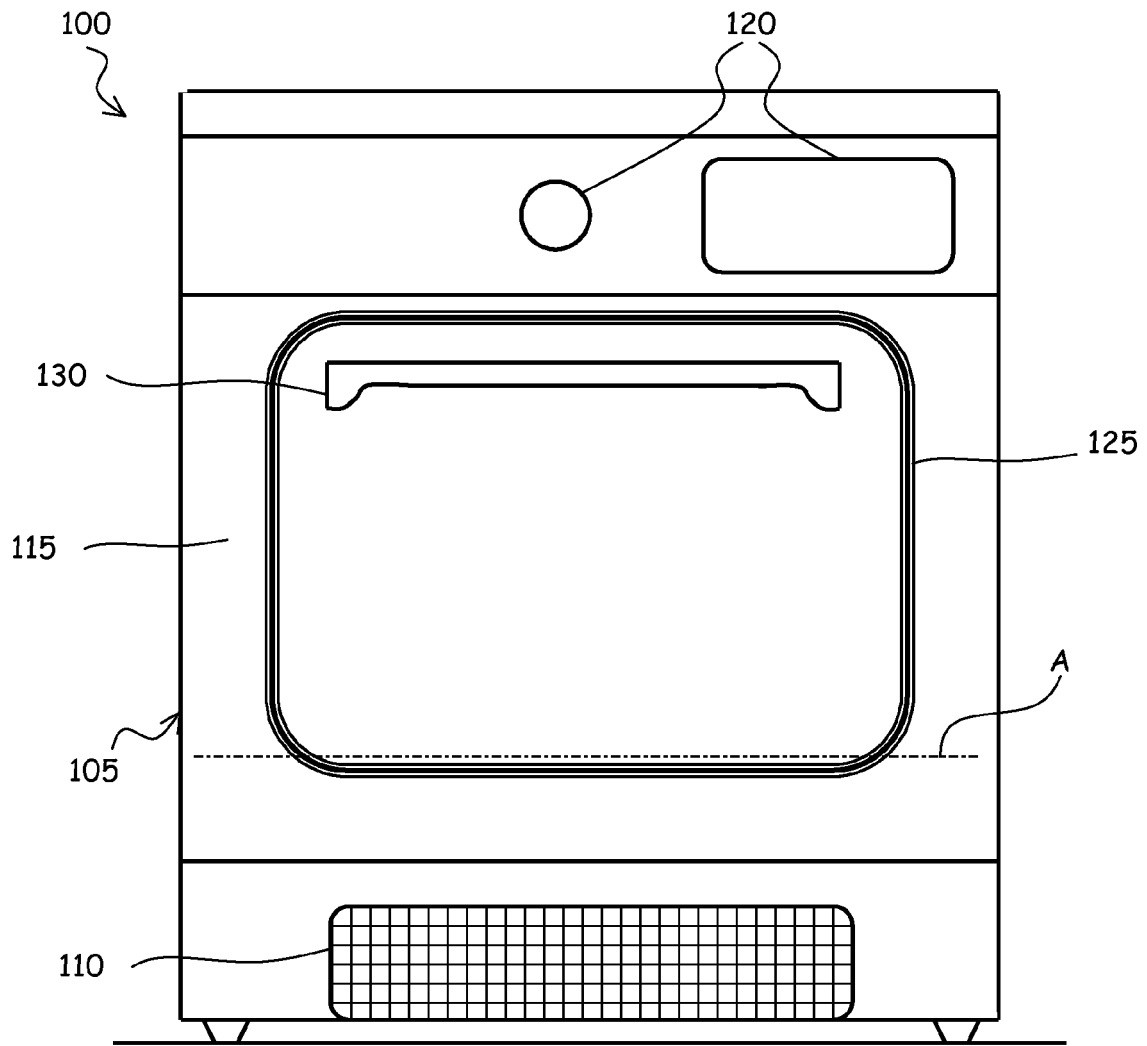


FIG. 1

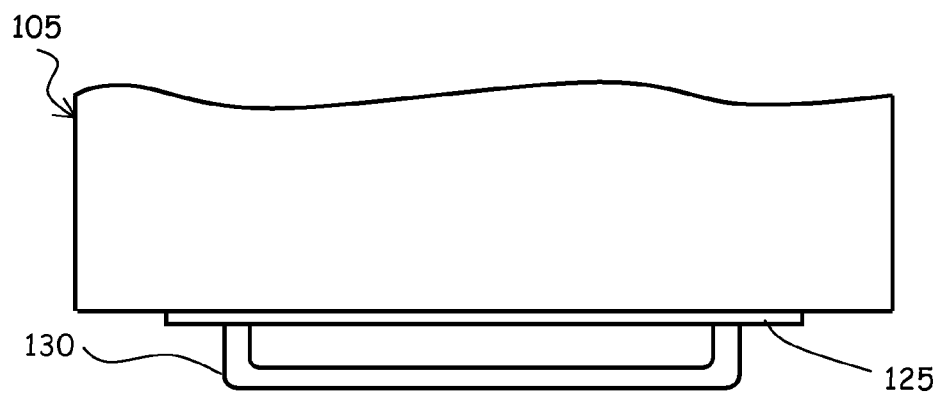
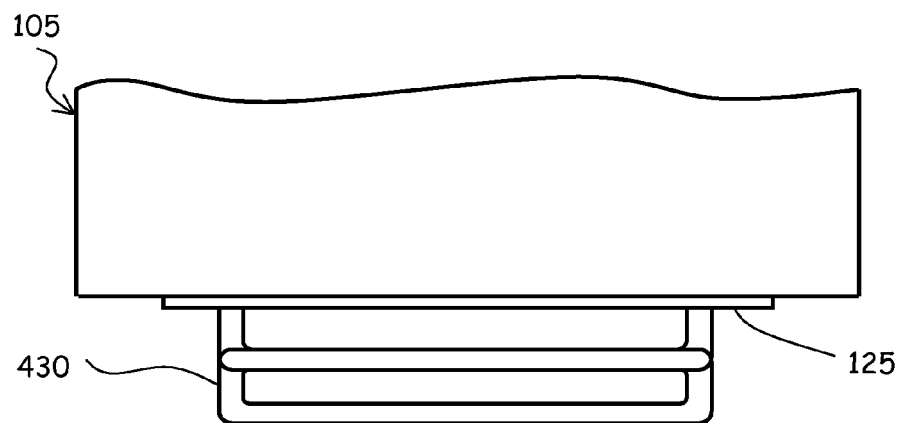
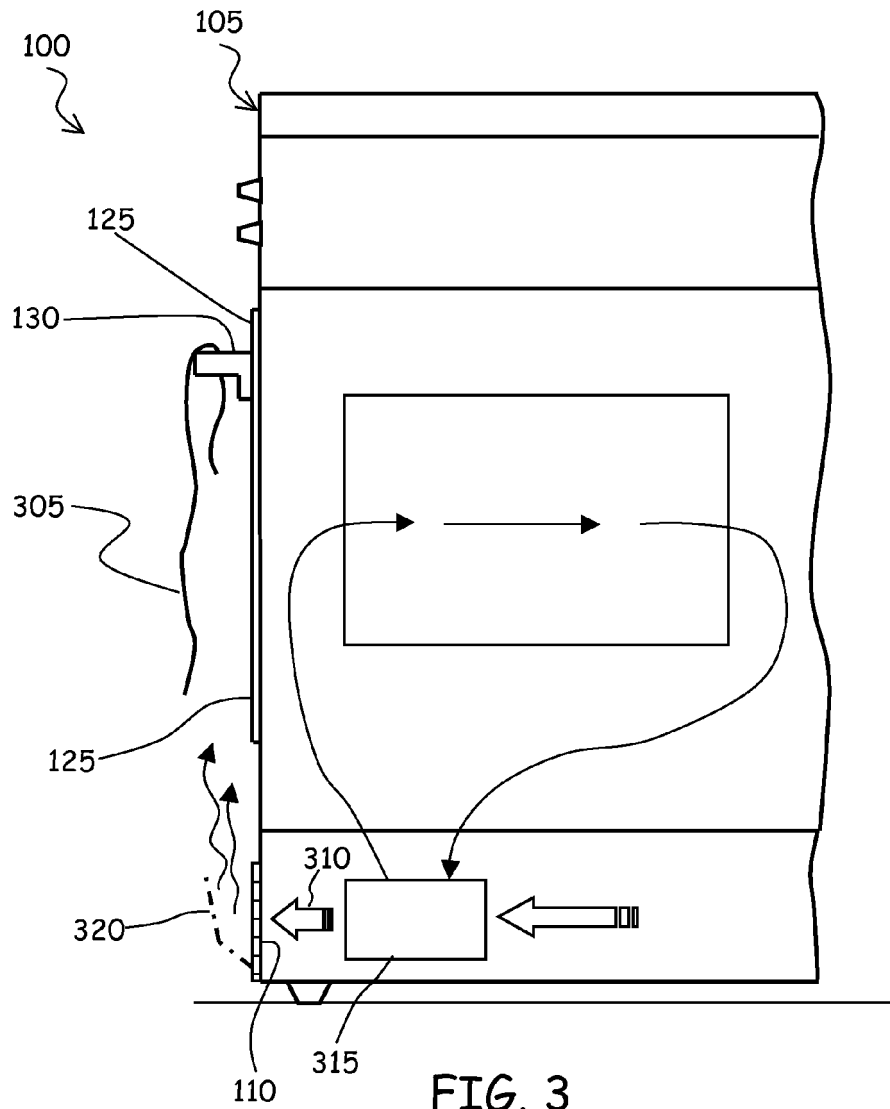


FIG. 2



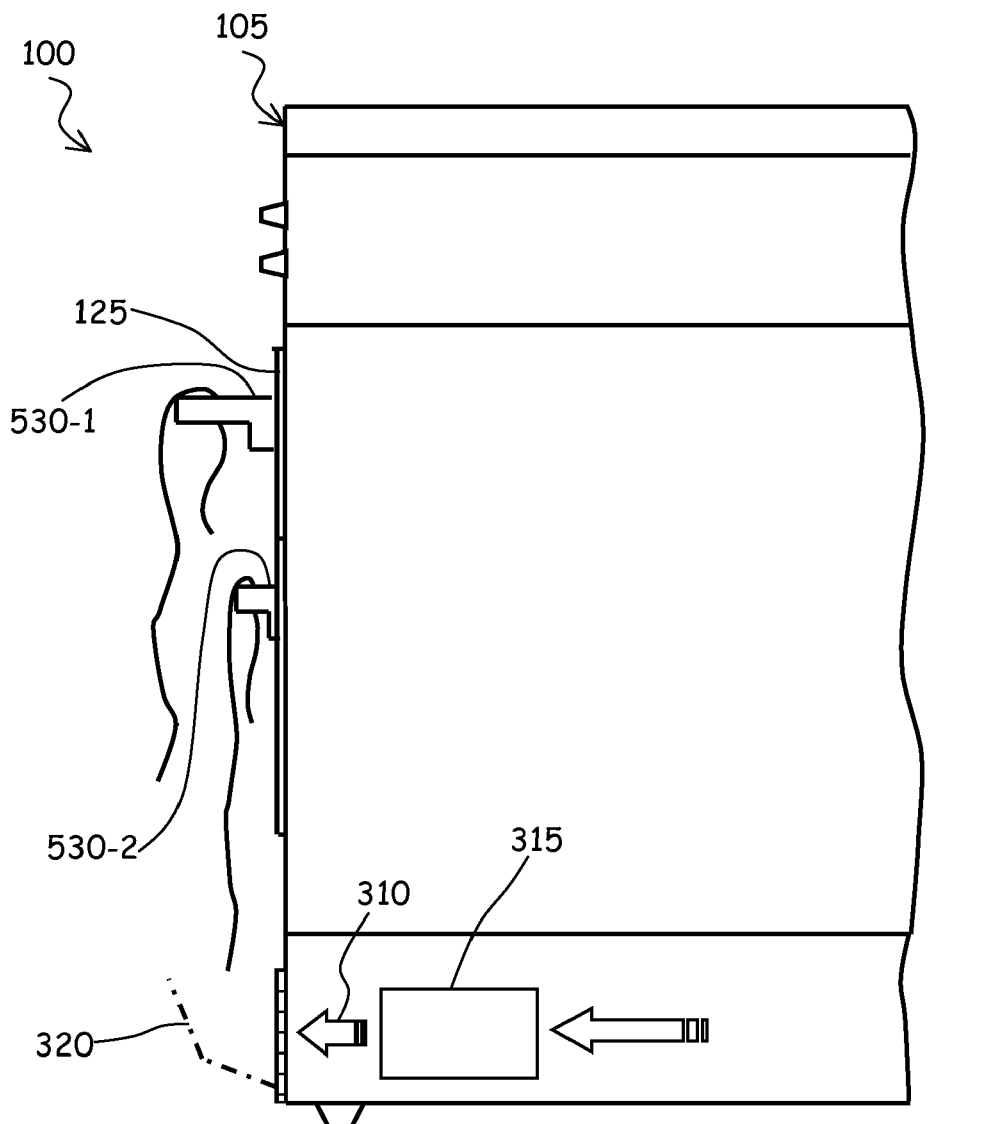


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 08 17 1493

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* the whole document * -----	4,5	
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			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 April 2009	Examiner Spitzer, Bettina
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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EP 08 17 1493

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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29-04-2009

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