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(54) **AN ELECTRIC REFRIGERATOR**

(57) A refrigerator has a refrigerating chamber (2) and a freezing chamber (3). The freezing chamber (2) is provided with plural drawer door bodies (7, 8) and a sealing member (5). The sealing member (5) is used for sealing a clearance between the adjacent two drawer door bodies (7, 8). The sealing member (5) is provided at an opening of the freezing chamber (4) and comprises a support frame (5a) and a decorative plate (5c).

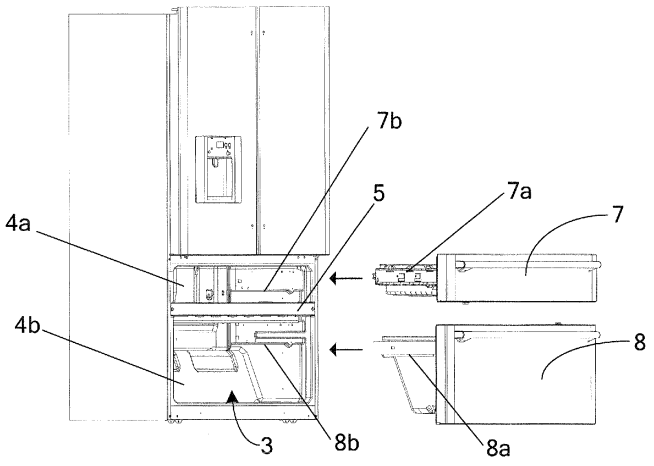

Fig.2

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Description

Filed of the Invention

[0001] The present invention relates to a refrigerator, in particular to a refrigerator with a drawer door body.

Background of the Invention

[0002] A refrigerator, as a household refrigerating/freezing device, is being currently used by a large majority of families. The refrigerator is classified into many types, one type of which is designed as locating a freezing chamber on the upper side of the refrigerator and a refrigerating chamber on the lower side of the refrigerator, and another type of which is designed as locating a freezing chamber on the lower side of the refrigerator and a refrigerating chamber on the upper side of the refrigerator. As for the latter type of refrigerator, the door body of the freezing chamber is classified into several types of a single door body, a double door body, or a drawer type door body, etc.

[0003] In recent years, a refrigerator, commonly referred to as a French opposite-opening door refrigerator, emerges. The upper part of said refrigerator is a refrigerating chamber which is enclosed by a set of opposite-opening doors, and the lower part thereof is a freezing chamber which is enclosed by a drawer type door body. In order to obtain larger storage space, the freezing chamber at the lower part of this type of refrigerator is generally designed to have a relatively large volume.

[0004] During realizing the present invention, the inventor found that at least the following problem is present in the prior art: since the freezing chamber is merely provided with one drawer door body for accommodating objects, when pulling the drawer door body forward and taking out objects, the whole freezing chamber is open to external environment, resulting in excessive leakage of cool air, thereby prolonging the subsequent refrigerating process or frequently starting up a refrigerating system, so as to cause more consumption of electric energy.

Summary of the Invention

[0005] In view of the above, the object of the present invention is to provide a refrigerator having one freezing chamber and plural drawing-pulling door bodies.

[0006] In order to realize the above object, one embodiment of the present invention provides a refrigerator having a refrigerating chamber and a freezing chamber, wherein the freezing chamber is provided with plural drawer door bodies and sealing members; and the sealing member is used for sealing a clearance between adjacent drawer door bodies. In this way, the internal structure of the freezing chamber is not reconstructed, but only a sealing member is added at the opening part. Therefore, each time that one drawer door body is opened for taking out an object, the opening of the freezing chamber laid open to the external environment is relatively small to reduce cool air leakage and energy consumption.

[0007] Preferably, the sealing member is provided at the opening of the freezing chamber, and comprises a support frame and a decorative plate. Arranging the sealing member at the opening allows a simple structure and easy assembly. Moreover, the sealing member comprises a support frame and a decorative plate, with the support frame capable of having a better supporting function and the decorative plate abutting against the drawer door body for sealing.

[0008] Preferably, a mounting trough is formed on the support frame; a thermal preservation bar is provided between the support frame and the decorative plate; and the thermal preservation bar is provided in the mounting trough of the support frame. By using such a structure, better effects of thermal preservation and heat insulation can be achieved and the leakage of cool air from the freezing chamber can be further prevented.

[0009] Preferably, plural reinforced ribs are provided in the mounting trough of the support frame. Thus, the strength of the support frame can be improved.

[0010] Preferably, an auxiliary sealing bar is provided on the surface of the side of the thermal preservation bar adjacent to the decorative plate. In this way, the effects of thermal preservation and heat insulation can be improved better and the leakage of cool air from the freezing chamber can be further prevented.

[0011] Preferably, through holes are provided on the end parts of the support frame and the decorative plate, and the support frame and the decorative plate are mounted via bolts passing through the through holes onto the opening of the freezing chamber of the refrigerator. In this way, the assembly structure is further simplified.

[0012] Preferably, the drawer door bodies are divided into two sets. By arranging two sets of drawer door bodies, the door bodies are made to be less, which allows more utilization of the space of the freezing chamber.

[0013] Preferably, the refrigerating chamber is enclosed by a set of opposite-opening door bodies. So taking out the objects inside the refrigerating chamber is easy.

[0014] Preferably, the refrigerating chamber is arranged at the upper part, and the freezing chamber is arranged at the lower part.

[0015] Plural drawer door bodies are provided in the freezing chamber and a sealing member is provided between adjacent drawer door bodies. In this way, on one hand, only one freezing chamber is provided, which facilitates the overall design of the refrigerator and the layout of the refrigeration units; and on the other hand, plural drawer door bodies are provided, each of which can be opened and closed independently. Thus, when each drawer door body is opened separately, the freezing chamber only has an opening part corresponding to the drawer door body opening to the external environment, thereby reducing cool air leakage and accordingly reduc-

ing energy consumption. In addition, providing plural drawer door bodies means that plural drawers are available, such that the objects are accommodated more assortatively, for facilitating utilization for a user.

Brief Description of the Drawings

[0016]

Fig. 1 is a perspective view of a refrigerator according to one embodiment of the present invention;

Fig. 2 is an explanatory view of the refrigerator in Fig. 1 when the lower drawer thereof is pulled out; and

Fig. 3 is an explanatory exploding view of partition bars of a sealing member.

Detailed Description of the Preferred Embodiments

[0017] Hereinafter, one embodiment of the refrigerator of the present invention is described with reference to the drawings. In addition, in the following description, if no special explanation is made, the so-called left side and right side represent the left hand side and the right hand side of a person facing the refrigerator, and the upper side and the lower side represent an upper side and a lower side based on human sensory feeling.

[0018] As shown in Fig. 1, it is an embodiment of a refrigerator 1 of the present invention. Said refrigerator 1 is commonly called as a French refrigerator, viz. the upper part of the refrigerator 1 is a refrigerating chamber 2, which, thus, facilitates operation. Obviously, the refrigerating chamber 2 can also be located at the lower part of the refrigerator 1, whose opening is enclosed by a set of opposite-opening door bodies 2a, 2b. The lower part of the refrigerator 1 is a freezing chamber 3, which is also shown in Fig. 2. Of course, the freezing chamber 3 of the refrigerator 1 can also be located at the upper part. The opening of the freezing chamber 3 is enclosed by two drawer door bodies 7, 8. Obviously, the drawer door body of the freezing chamber 3 can be divided into three or more drawer door bodies. In addition, although it is not indicated in detail in the figure, said freezing chamber 3 is a single freezing chamber. In other words, said freezing chamber 3 performs the refrigeration by one refrigeration unit (no shown in the figure). The spaces corresponding to the above two drawer door bodies are communicated with each other.

[0019] In addition, as shown in Fig. 1, a cool drink supply mechanism is provided at the left door body 2a of the opposite-opening door bodies 2a, 2b. Since the mechanism is only slightly related with the inventive key of the present invention, the description related to the mechanism is omitted.

[0020] As shown in Fig. 2, one embodiment of the present invention provides a refrigerator 1 comprising a refrigerating chamber 2 and a freezing chamber 3, wherein the freezing chamber 3 is provided with plural drawer door bodies 7, 8 and a sealing member 5; and the sealing member 5 is used for sealing a clearance between the adjacent drawer door bodies 7, 8. In this way, when each drawer door body is opened independently, the opening of the freezing chamber 3 only has the part corresponding to the drawer door body opening to the external environment, thereby reducing cool air leakage and accordingly reducing energy consumption. Arranging plural drawer door bodies implies that plural drawers are available, such that the objects are accommodated more assortatively, facilitating utilization of the user.

[0021] As shown in Fig. 1 and Fig. 2, the refrigerating chamber is located at the upper part and the freezing chamber 3 is located at the lower part. In this way, the refrigerating chamber 2 with higher utilization rate is placed at the position of easy opening/closing, which facilitates usage. Of course, the freezing chamber 3 can also be located at the upper part, and the refrigerating chamber 2 can also be located at the lower part.

[0022] As shown in Fig. 2, a mounting trough is provided in the right and left edges of the opening of the freezing chamber 3, respectively. A sealing member 5 is mounted at the opening of the freezing chamber by the mounting troughs. The sealing member 5 partitions the opening 4 into an upper opening 4a and a lower opening 4b. As described above, although the opening 4 of the freezing chamber 3 is partitioned to form the upper opening 4a and the lower opening 4b, the inner sides thereof are communicated with each other. In addition, the drawer door body 7 corresponds to the upper opening 4a, and the drawer door body 8 corresponds to the lower opening 4b. When the drawer door body 7 is pushed in the direction indicated by an arrow into the upper opening 4a, a sealing bar (not shown) mounted on the face of the side of the drawer door body 7 adjacent to the freezing chamber 3 is used for sealing the upper opening 4a. When the drawer door body 8 is pushed in the direction indicated by an arrow in the figure into the lower opening 4b, a sealing bar (not shown) mounted on the drawer door body 8 is used for sealing the lower opening. These two sealing bars can be arranged in many manners of the prior art. No description thereof is made herein.

[0023] In addition, as shown in Fig. 2, a square drawer is provided and connected to the drawer door body 7, and a sealing bar is mounted at the side of the drawer door body 7 adjacent to the drawer (inner surface side). Sliding rails 7a (although only one sliding rail is indicated in the figure, the other identical sliding rail is provided on the other side) are mounted at two sides of the drawer. Said sliding rails 7a fit with guide rails 7b mounted at the corresponding position of the inner wall of the freezing chamber 3 (only the right guide rail is shown in the figure, however, a guide rail is provided at the left side of the inner wall as well). The drawer door body 7 is supported and guided by the guide rails 7b. Since the connection

and fitting relationships between the sliding rails 7a and the guide rails 7b are the prior art, no description thereof is made herein.

[0024] In addition, a drawer with a square opening is also mounted at the drawer door body 8. Due to the structure of the refrigerator, the lower the position of the drawer is, the smaller the area of the cross section thereof in a horizontal direction is. Similar to the structure of the above drawer door body 7, two sliding rails 8a are also arranged in the drawer door body 8. Moreover, two guide rails 8b are also arranged at the corresponding position of the inner wall of the freezing chamber 3. Since the structure thereof is similar to that of the above drawer door body 7 and is a common structure in the prior art, no description thereof is made herein.

[0025] Hereinafter, the particular structure of the sealing member 5 of the present invention is described in detail with reference to Fig. 3.

[0026] As shown in Fig. 3, on the sealing member 5, there are sequentially provided a support frame 5a, a thermal preservation bar 5b, and a decorative plate 5c in a direction from the freezing chamber 3 to the external environment.

[0027] The support frame 5a is an elongated member, inside which a mounting trough 15a is formed. Thus, its longitudinal cross section approximately renders a U shape, with one side being opening and the other side of a curved surface. Two through holes 21, 21 are provided at both ends of the support frame 5a. In addition, plural reinforced ribs 25a are formed at the inner side of the support frame 5a along the interior of the mounting through 15a. As shown in Fig.3, since the support frame 5a is in a thin plate structure, these reinforced ribs 25a are provided to further enhance its strength and ability of standing against deformation and twist. In addition, the structure of said support frame 5a is not limited thereto, but can merely be in form of a thin plate with plural reinforced ribs formed around its periphery and a mounting hole formed in the middle.

[0028] The thermal preservation bar 5b is also a elongated member, with the length equivalent to or slightly smaller than the length of the above mounting trough 15a, the width equivalent to or slightly smaller than the gap (the width of the mounting trough 15a in the up and down direction) formed by the above reinforced ribs 25a in the up and down direction, and the thickness equivalent to or slightly smaller than the depth of the reinforced rib 25a in a horizontal direction. Therefore, the thermal preservation bar 5b can be embedded into the above mounting trough 15a.

[0029] In addition, auxiliary sealing bars 15b, 15b, extending along the horizontal direction, are arranged on the face of the thermal preservation bar 5b adjacent to the outer side. Moreover, the height of the auxiliary sealing bars 15b, 15b is designed to satisfy the following conditions, viz. when an adjusting bar is mounted in the mounting trough 15a, the auxiliary sealing bars 15b, 15b protrude more outwardly than the support frame 5a and abut against the decorative plate 5c.

[0030] The decorative plate 5c is an elongated flat member made of resin, metal or other hard materials. When the decorative plate 5c is mounted onto the support frame 5a, its inner surface abuts against the auxiliary sealing bars 15b, 15b of the thermal preservation bar 5b. Moreover, the thermal preservation bar 5b is sandwiched between the decorative plate 5c and the support frame 5a. In addition, the decorative plate 5c is provided with though holes 22, 22 at both ends, and when the decorative plate 5c is mounted onto the support frame 5a with the thermal preservation bar 5b interposed therebetween, the through holes 22, 22 correspond to the through holes 21, 21 of the mounting frame 5a, respectively.

[0031] As shown in Fig. 3, when the bolts 23, 23 pass through the through holes 22, 22 and the through holes 21, 21 to fix the sealing member 5 into the mounting trough on the edge of the opening 4 of the freezing chamber 3, said decorative plate 5c substantially flushes with the opening 4 of the freezing chamber 3 in a forth and back direction,. Thus, when the drawer door body 7 (or drawer door body 8) is closed, the sealing bar mounted on the drawer door body 7 (or the drawer door body 8) abuts against the decorative plate 5c and the opening 4 of the freezing chamber 3 to realize sealing the upper opening 4a (or the lower opening 4b) of the freezing chamber 3.

[0032] In addition, the drawer door bodies 7, 8 are coupled to and mounted in the freezing chamber 3 via sliding rails in the above embodiments, however, it is not limited thereto. Other types of door bodies can be used, for example, a door body which can be opened directly, a sliding door, etc.

[0033] The descriptions above are only preferable embodiments of the present invention, which are not used to restrict the present invention. Any amendments, equivalent substitutions, improvements etc. within the spirit and principle of the present invention are all concluded in the scope of protection of the present invention.

Claims

1. A refrigerator, comprising a refrigerating chamber (2) and a freezing chamber (3), **characterized in that**, the freezing chamber (3) is provided with plural drawer door bodies (7, 8) and a sealing member (5) for sealing the clearance between the adjacent drawer door bodies (7, 8).

2. The refrigerator according to Claim 1, **characterized in that**, the sealing member (5) is provided at an opening of the freezing chamber (4) and comprises a support frame (5a) and a decorative plate (5c).

3. The refrigerator according to Claim 2, **characterized in that**, a mounting trough (15a) is formed in the

support frame (5a); a thermal preservation bar (5b) is provided between the support frame (5a) and the decorative plate (5c); and the thermal preservation bar (5b) is provided in the mounting trough (15a) of the support frame (5a).

4. The refrigerator according to Claim 3, **characterized in that**, plural reinforced ribs (25a) are provided in the mounting trough (15a) of the support frame (5a).

5. The refrigerator according to Claim 3 or Claim 4, **characterized in that**, an auxiliary sealing bar (15b) is provided on the surface of the side of the thermal preservation bar (5b) adjacent to the decorative plate (5c).

6. The refrigerator according to any one of Claims 2 to 5, **characterized in that**, through holes (21, 22) are provided on the end parts of the support frame (5a) and the decorative plate (5c), and the support frame (5a) and the decorative plate (5c) are mounted via bolts (23) passing through the through holes (21, 22) onto the opening of the freezing chamber (4) of the refrigerator.

7. The refrigerator according to any one of Claims 1 to 6, **characterized in that**, the drawer door bodies (7, 8) are provided as two sets.

8. The refrigerator according to any one of Claims 1 to 7, **characterized in that**, the refrigerating chamber (2) is enclosed by a set of opposite-opening door bodies (2a, 2b).

9. The refrigerator according to any one of Claims 1 to 8, **characterized in that**, the refrigerating chamber (2) is arranged at the upper part, and the freezing chamber (3) is arranged at the lower part.

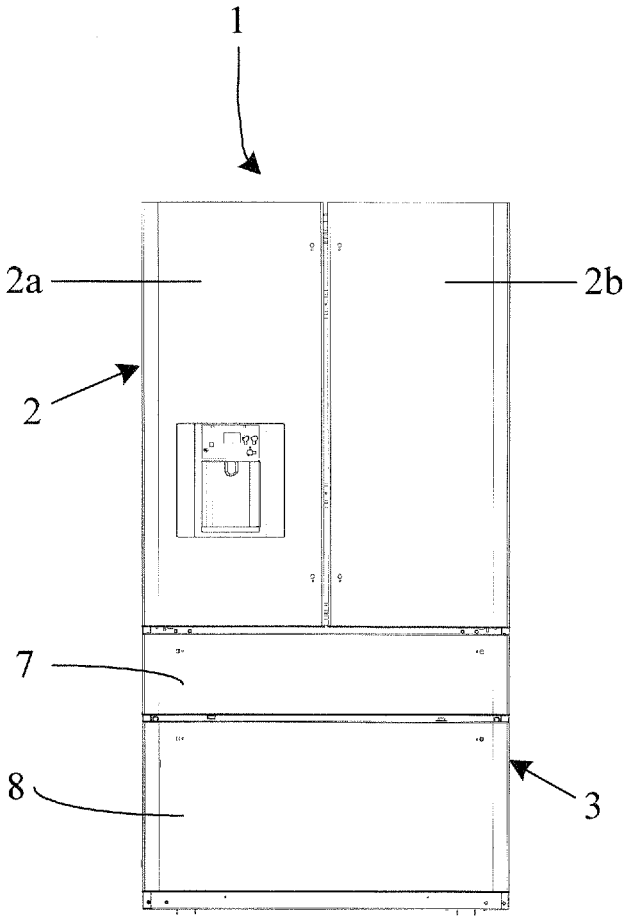

Fig.1

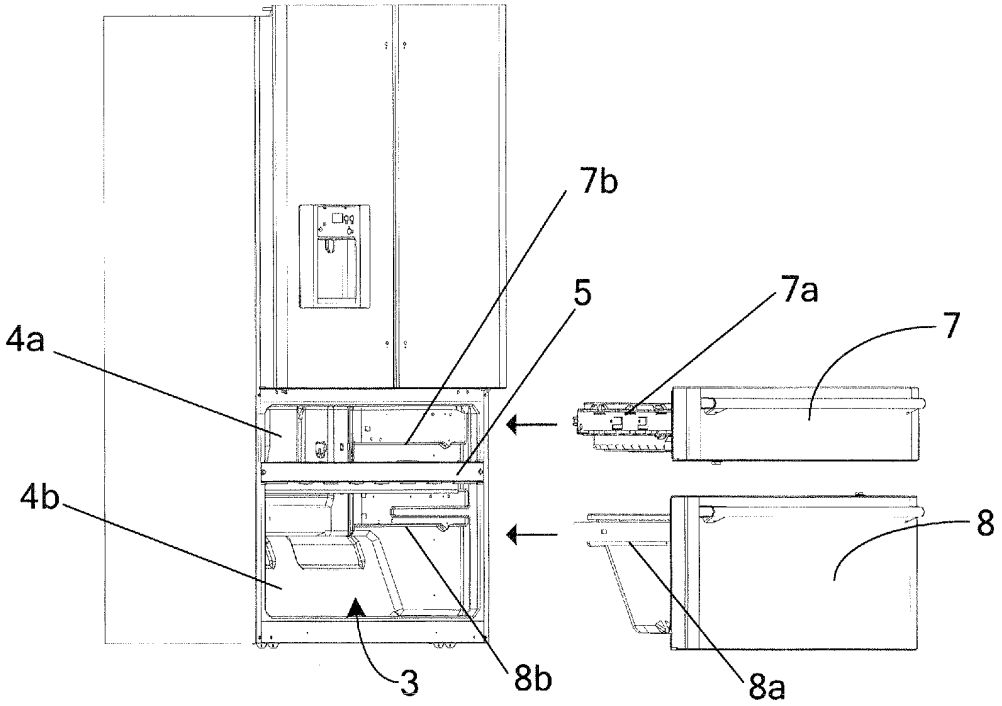

Fig.2

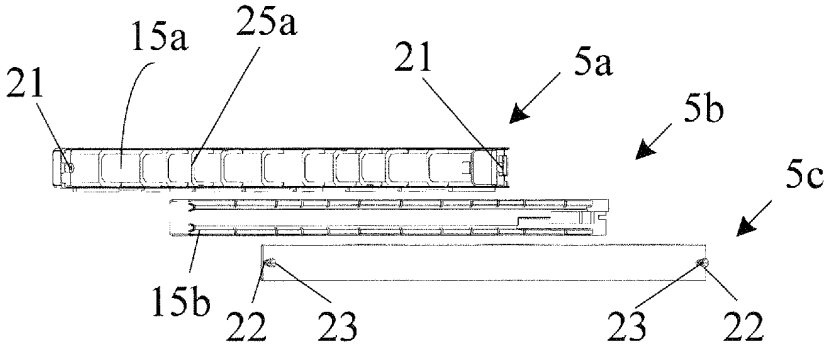

Fig.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/072353

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC：F25D11, F25D23,F25D25

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRS，CNKI，WPI,EPODOC,PAJ:，freezer, refrigerator, cooler, cold store , ice box, drawer, seal, airproof, encapsulate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP7248171A(FUJITSU GENERAL LTD) 26.Sep.1995(26.09.1995)description paragraphs【0006】,【0007】, figures 1, 4	1，2，6，7， 9
Y		8
Y	CN2185872Y(HANGZHOU REFRIGERATOR INST)21.Dec.1994(21.12.1994) abstract, figure 1	8
A	CN2255593Y(ZHANG YONGCHANG)04.Jun.1997（04.06.1997）description page 3 last paragraph ,figure 1	1
A	CN2684112Y(YANG SHENGYUAN) 09.Mar.2005（09.03.2005）the whole document	1-9
A	JP10300338A(TOKYO SHIBAURA ELECTRIC CO) 13.Nov.1998（13.11.1998）the whole document	1-9

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 Sep.2009（14.09.2009）	**24 Sep. 2009 (24.09.2009)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer SUN, Ping Telephone No. (86-10)62084861

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/072353

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
JP7248171A	26.09.1995	None	
CN2185872Y	21.12.1994	None	
CN2255593Y	04.06.1997	None	
CN2684112Y	09.03.2005	None	
JP10300338A	13.11.1998	JP3982769B2	26.09.2007

Form PCT/ISA /210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/072353

CLASSIFICATION OF SUBJECT MATTER

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F25D23/02 (2006.01) i
F25D25/00 (2006.01) i

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