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(54) **SHELF SYSTEM AND CONTROL METHOD THEREOF**

(57) A shelf system (100) and control method thereof. The shelf system (100) comprises: a shelf main body (11), for storing articles; a weight sensing device (12), disposed on the shelf main body (11); a processor (13), connected to the weight sensing device (12), and for recording storage weight information of an article recorded on the weight sensing device (12) and article storage time information, and comparing the time information with a preset time region to determine an article state; and a display device (14) connected to the processor (13), and

for displaying the weight information and article state of the article stored on the shelf main body (11). By the weight sensing device (12) acquiring article weight information, and recording article storage time information, and the processor (13) performing processing thereon and displaying in real time the article weight information and article state on the display device (14), the invention reminds a user of article placement information, preventing an article from spoiling.

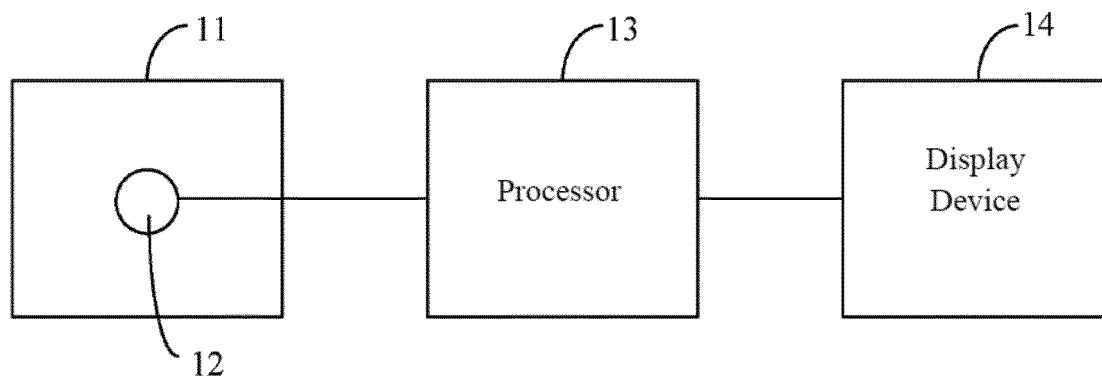


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the technical field of household appliances, and in particular, to a shelf system and a control method thereof.

BACKGROUND OF THE INVENTION

[0002] At present, the space structure of a refrigerating compartment of a refrigerator generally comprises one or more shelves. Different kinds of articles may be stored on one shelf at the same time. However, as the weights of articles stored on the shelf cannot be obtained intuitively, a user needs to open the refrigerator to observe and estimate the articles on the shelf and thus cannot obtain the number and weights of the articles accurately.

[0003] In addition, different kinds of articles stored in the refrigerator usually have different shelf lives. At present, the user can only infer the states of the articles by memorizing the time of placing the articles and the shelf lives thereof, but misjudgment can easily occur just by memorizing the above information. In the prior art, it is also possible to record the time of placing articles manually. However, this method is cumbersome and may not intuitively suggest what state the article is in at the same time.

[0004] In light of the above-mentioned problems, it is necessary to provide a shelf system and a control method thereof to solve the problems.

SUMMARY OF THE INVENTION

[0005] In view of the defects of the prior art, the technical problem solved by the present invention is to provide a shelf system and a control method thereof, which can effectively monitor the weight information and state of an article stored on a shelf in a refrigerator.

[0006] In order to solve the above-mentioned technical problems, the technical solution of the present invention is implemented as follows.

[0007] There is provided a shelf system, which comprises: a shelf main body configured to store an article; a weight sensing device disposed on the shelf main body; a processor connected to the weight sensing device and configured to record weight information of the stored article recorded in the weight sensing device and storage time information of the article, and compare the time information with a preset time interval to determine a state of the article; and a display device connected to the processor and configured to display the weight information and the state of the article stored on the shelf main body.

[0008] As a further improvement of the present invention, the shelf main body comprises a plurality of storage compartments each correspondingly provided with a weight sensing device.

[0009] As a further improvement of the present inven-

tion, the display device comprises a plurality of display areas which is in one-to-one correspondence with the storage compartments and configured to display the weight information and state of an article stored in each storage compartment respectively.

[0010] As a further improvement of the present invention, the preset time interval is $[T1, T2]$, the storage time information of an article is T , and the state of the article includes: a first state in which the storage time information T of the article is less than $T1$; a second state in which the storage time information T of the article is not less than $T1$ and not greater than $T2$; and a third state in which the storage time information T of the article is greater than $T2$.

[0011] As a further improvement of the present invention, colors of the first state, the second state and the third state displayed on the display areas are a first color, a second color and a third color respectively.

[0012] Correspondingly, there is provided a control method for a shelf system, which comprises the following steps: S1, acquiring weight information of an article stored on a shelf main body; S2, recording storage time information of the article on the shelf main body; S3, acquiring the weight information and the storage time information of the stored article, and determining a state of the stored article in accordance with a preset time interval; and S4, displaying, by a display device, the weight information and the state of the article stored on the shelf main body.

[0013] As a further improvement of the present invention, the shelf main body comprises a plurality of storage compartments. The step S1 includes: acquiring the weight information of the article stored in each storage compartment of the shelf main body.

[0014] As a further improvement of the present invention, the step S2 includes: recording the storage time information of the article in each storage compartment of the shelf main body.

[0015] As a further improvement of the present invention, "determining a state of the stored article in accordance with a preset time interval" in the step S3 includes: in the case where the preset time interval is $[T1, T2]$ and the storage time information of an article is T , comparing T with $T1$ and $T2$; if T is less than $T1$, determining that the article is in a first state; if T is not less than $T1$ and not greater than $T2$, determining that the article is in a second state; if T is greater than $T2$, determining that the article is in a third state.

[0016] As a further improvement of the present invention, the step S4 includes: distinguishing the first state, the second state or the third state of the article by displaying different colors on the display device.

[0017] The present invention has the following beneficial effects: by acquiring the weight information on the article using the weight sensing device, recording the storage time information of the article, processing the above-mentioned information using the processor and displaying the weight information and the state of the

article on the display device in real time, the user is reminded of article placement information to prevent the article from going moldy and rotten.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 illustrates a modularized schematic diagram of a shelf system in a first embodiment of the present invention;

Fig. 2 illustrates a schematic flowchart of a control method for a shelf system in the first embodiment of the present invention; and

Fig. 3 illustrates a modularized schematic diagram of a shelf system in a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] To make the objects, technical solutions and advantages of the present invention clearer, the embodiments of the present invention are described in detail with reference to the accompanying drawings. Examples of these preferred embodiments are given in the accompanying drawings. The embodiments of the present invention shown in the accompanying drawings and described based on the accompanying drawings are only exemplary and are not intended to limit the present invention.

[0020] In addition, it should be noted that in order not to obscure the present invention by unnecessary details, the accompanying drawings only show the structures and/or processing steps closely related with the technical solutions of the present invention, while other details not closely related therewith are omitted.

[0021] Further, it should be noted that the terms "comprise", "include" or other variants intend to include the listed elements in a non-exclusive manner, so that the processes, methods, objects or devices including a series of elements not only include such elements but also include other elements not clearly listed, or the inherent elements of such processes, methods, objects or devices.

[0022] As shown in Fig. 1, a shelf system 100 in a first embodiment of the present invention comprises:

a shelf main body 11 configured to store an article;

a weight sensing device 12 which is disposed on the shelf main body 11 and may be a pressure sensor or other device configured to detect a weight; and

a processor 13 which is connected to the weight sensing device 12 and configured to record weight information of the stored article recorded in the

weight sensing device. Meanwhile, the processor 13 is further provided with a clock unit (not shown), such that the storage time information of an article may be recorded in combination with the clock unit. The processor is further provided with a preset time interval. The processor may determine the state of the article just by comparing the time information with the preset time interval.

[0023] The shelf system further comprises a display device 14 which is connected to the processor 13 and configured to display the weight information and state of the article stored on the shelf main body 11.

[0024] Correspondingly, Fig. 2 illustrates a control method for a shelf system in the present embodiment, which comprises the following steps: S1, acquiring weight information of an article stored on a shelf main body; S2, recording storage time information of the article on the shelf main body; S3, acquiring the weight information and the storage time information of the stored article, and determining a state of the article in accordance with a preset time interval; and S4, displaying, by a display device, the weight information and the state of the article stored on the shelf main body.

[0025] Specifically, the determination and display method for the state of the article in the present embodiment includes: defining the preset time interval set in the processor as $[T1, T2]$ and the storage time information of the article recorded by the processor as T . The state of the article determined by the processor just by comparing the time information with the preset time interval includes: a first state in which the storage time information T of the article is less than $T1$; a second state in which the storage time information T of the article is not less than $T1$ and not greater than $T2$; and a third state in which the storage time information T of the article is greater than $T2$.

[0026] Correspondingly, colors of the first state, the second state and the third state displayed on the display device are a first color, a second color and a third color respectively.

[0027] For example, with respect to an article, the preset time interval may be [5 days, 10 days]. The processor updates the time information T on the stored article in real time. If the storage time information T is less than 5 days, it is determined that the article is in a fresh state, and the display device displays a green color correspondingly. If the storage time information T is not less than 5 days and not greater than 10 days, it is determined that the article is not in a fresh state, and the display device displays an orange color correspondingly. If the storage time information T is not less than 10 days, it is determined that the article is in an expired state, and the display device displays a red color correspondingly. The user may monitor the article stored on the shelf in time in accordance with the colors displayed on the display device, and remove the expired article in time to prevent it from getting moldy and rotten.

[0028] At the same time, the display device may also display the weight information of the article stored on the shelf in real time, so that the user may monitor the weight information of the article on the shelf in real time to avoid the adverse effects caused by the excessive storage of articles on the shelf.

[0029] As shown in Fig. 3, a shelf system 200 in a second embodiment of the present invention comprises: a shelf main body 21 configured to store an article, a weight sensing device, a processor 23 and a display device 24.

[0030] The present embodiment differs from the first embodiment in that the shelf main body 21 comprises a plurality of storage compartments. Preferably, a description is made by taking three storage compartments as an example in the present embodiment. The shelf main body 21 comprises a first storage compartment 211, a second storage compartment 212 and a third storage compartment 213.

[0031] The weight sensing device is disposed on the shelf main body 21 and may be a pressure sensor or other device configured to detect a weight.

[0032] Correspondingly, each storage compartment in the present embodiment is correspondingly provided with a weight sensing device, including a first weight sensing device 221, a second weight sensing device 222 and a third weight sensing device 223 which are disposed in the first storage compartment 211, the second storage compartment 212 and the third storage compartment 213 respectively. The first weight sensing device 221, the second weight sensing device 222 and the third weight sensing device 223 are used to detect the weight information of the articles respectively stored in the first storage compartment 211, the second storage compartment 212 and the third storage compartment 213.

[0033] The processor 23 is connected to the first weight sensing device 211, the second weight sensing device 222 and the third weight sensing device 223 respectively and configured to record the weight information of the stored articles recorded in each of the first weight sensing device 211, the second weight sensing device 222 and the third weight sensing device 223. Meanwhile, the processor 23 is further provided with a clock unit (not shown), such that storage time information of the articles on each of the first storage compartment 211, the second storage compartment 212 and the third storage compartment 213 may be recorded in combination with the clock unit. The processor is further provided with a preset time interval. The processor may determine the state of the article in each storage compartment just by comparing the time information with the preset time interval.

[0034] The display device 24 is connected to the processor 23 and configured to display the weight information and state of the articles stored on the shelf main body 21.

[0035] Correspondingly, the display 24 in the present embodiment comprises a first display area 241, a second display area 242 and a third display area 243. The first display area 241, the second display area 242 and the third display area 243 are used for displaying the weight

information and state of the articles stored in each of the first storage compartment 211, the second storage compartment 212 and the third storage compartment 213 respectively.

[0036] A control method for a shelf system in the present embodiment comprises the following steps: S1, acquiring weight information of an article stored in each storage compartment of a shelf main body; S2, recording storage time information of the article in each storage compartment of the shelf main body; S3, acquiring the weight information and the storage time information on the article stored in each storage compartment of the shelf main body, and determining the state of the stored article in accordance with a preset time interval; and S4, displaying, by each display area of the display device, the weight information and the state of the article stored in each storage compartment of the shelf main body.

[0037] Similarly, in the present embodiment, with respect to the first storage compartment, the preset time interval set in the processor may be defined as [T1, T2] and the storage time information of an article recorded by the processor is defined as T. The states of the article determined by the processor by comparing the time information with the preset time interval include: a first state in which the storage time information T of the article on the first storage compartment is less than T1; a second state in which the storage time information T of the article on the first storage compartment is not less than T1 and not greater than T2; and a third state in which the storage time information of the article on the first storage compartment is greater than T2.

[0038] Correspondingly, colors of the first state, the second state and the third state displayed on the first display area of the display device may be a first color, a second color and a third color respectively.

[0039] Similarly, the states of the articles displayed on the second display area and the third display area in the second storage compartment and the third storage compartment may be the same as those displayed on the first display area in the first storage compartment, and will not be repeated here again.

[0040] Further, a user may store different kinds of articles, which usually have different shelf lives, in different storage compartments. As such, it is necessary to set different preset time intervals for different storage compartments. For example, the first storage compartment may store an article with a relatively shorter shelf life, and the preset time interval may be set as [1 day, 2 days]. The second storage compartment may store an article with a normal shelf life, and the preset time interval may be set as [5 days, 10 days]. The third storage compartment may store an article with a long shelf life, and the preset time interval may be set as [30 days, 50 days]. As such, the articles on the shelf may be monitored more conveniently.

[0041] It should be understood that a description is made in the present embodiment by taking the three storage compartments and the three display areas on the

display as an example. The number of the storage compartments on the shelf main body and the number of the display areas on the display device may be set as other numbers in other embodiments according to user requirements, which will not be described here by way of example.

[0042] Compared with the prior art, the present invention has the following beneficial effects: by acquiring the weight information on the article using the weight sensing device, recording the storage time information of the article, processing the above-mentioned information using the processor and displaying the weight information and the state of the article on the display device in real time, a user is reminded of article placement information to prevent the article from going moldy and rotten.

[0043] It should be understood that although the present description describes the present invention through the embodiments, each embodiment may include several technical solutions. The presentation manner of the present description only aims to make the descriptions clearer. Those skilled in the art should take the present description as an integral document. The technical solutions in the respective embodiments may be combined properly to form other embodiments which may be understood by those skilled in the art.

[0044] The above detailed descriptions are only descriptions of the feasible embodiments of the present invention, and are not intended to limit the protection scope of the present invention. Equivalent embodiments or modifications within the spirit of the present invention shall be embraced by the protection scope of the present invention.

Claims

1. A shelf system, comprising:

a shelf main body configured to store an article;
a weight sensing device disposed on the shelf main body;
a processor connected to the weight sensing device and configured to record weight information of the stored article recorded in the weight sensing device and storage time information of the article, and compare the time information with a preset time interval to determine the state of the article; and
a display device connected to the processor and configured to display the weight information and the state of the article stored on the shelf main body.

2. The shelf system according to claim 1, wherein the shelf main body comprises a plurality of storage compartments each correspondingly provided with a weight sensing device.

3. The self system according to claim 2, wherein the display device comprises a plurality of display areas which is in one-to-one correspondence with the storage compartments and configured to display the weight information and the state of the article stored in each storage compartment respectively.

4. The shelf system according to claim 1, wherein the preset time interval is [T1, T2], the storage time information of the article is T, and the state of the article includes:

a first state in which the storage time information T of the article is less than T1;
a second state in which the storage time information T of the article is not less than T1 and not greater than T2; and
a third state in which the storage time information T of the article is greater than T2.

5. The self system according to claim 4, wherein colors of the first state, the second state and the third state displayed on the display areas are a first color, a second color and a third color respectively.

6. A control method for a shelf system, comprising the following steps:

S1, acquiring weight information of an article stored on a shelf main body;
S2, recording storage time information of the article on the shelf main body;
S3, acquiring the weight information and the storage time information of the stored article, and determining the state of the stored article in accordance with a preset time interval; and
S4, displaying, by a display device, the weight information and the state of the article stored on the shelf main body.

7. The control method according to claim 6, wherein the shelf main body comprises a plurality of storage compartments; the step S1 includes: acquiring weight information of the article stored in each storage compartment of the shelf main body.

8. The control method according to claim 7, the step S2 includes: recording storage time information of the article in each storage compartment of the shelf main body.

9. The control method according to claim 6, wherein "determining the state of the stored article in accordance with the preset time interval" in the step S3 includes:

in the case where the preset time interval is [T1, T2] and the storage time information of the article is T, comparing T with T1 and T2; if T is less than T1,

determining that the article is in a first state; if T is not less than T1 and not greater than T2, determining that the article is in a second state; if T is greater than T2, determining that the article is in a third state.

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10. The control method according to claim 6, wherein the step S4 includes:
distinguishing the first state, the second state or the third state of the article by displaying different colors on the display device.

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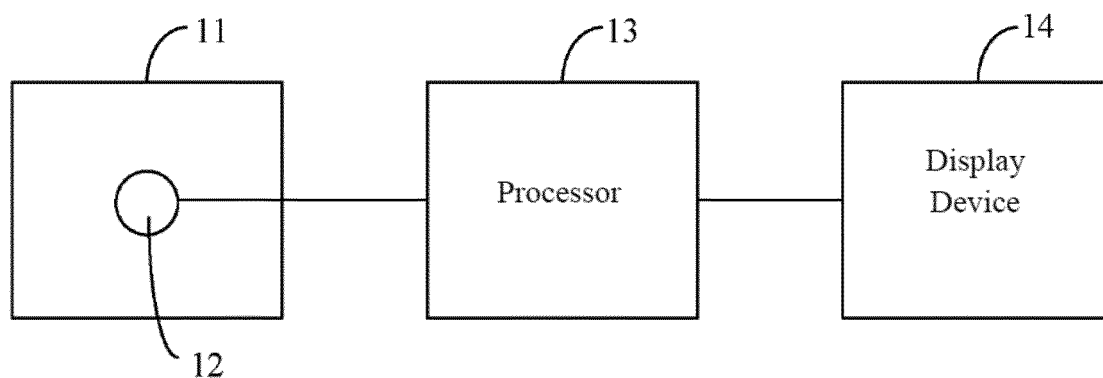


Fig. 1

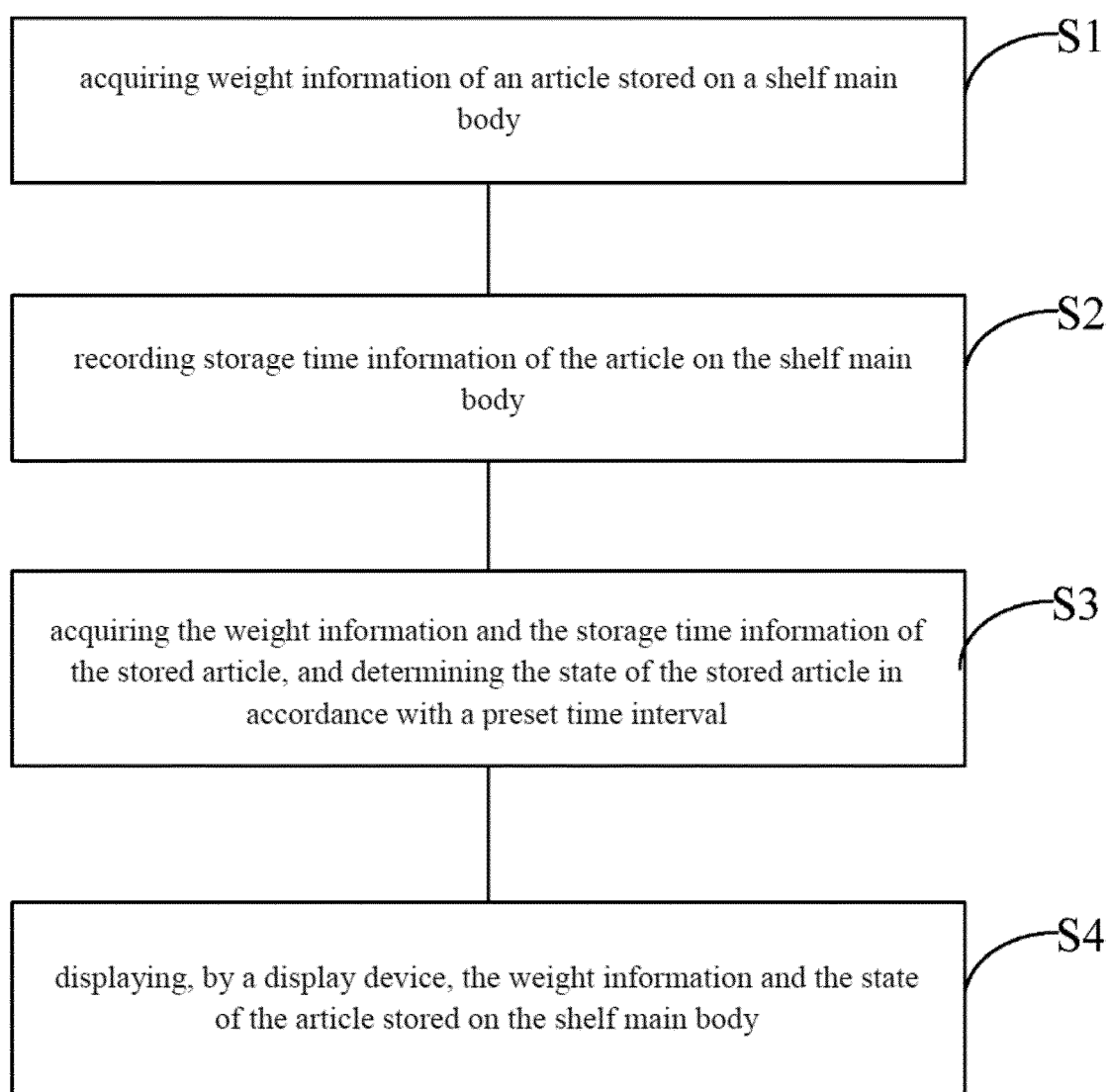


Fig. 2

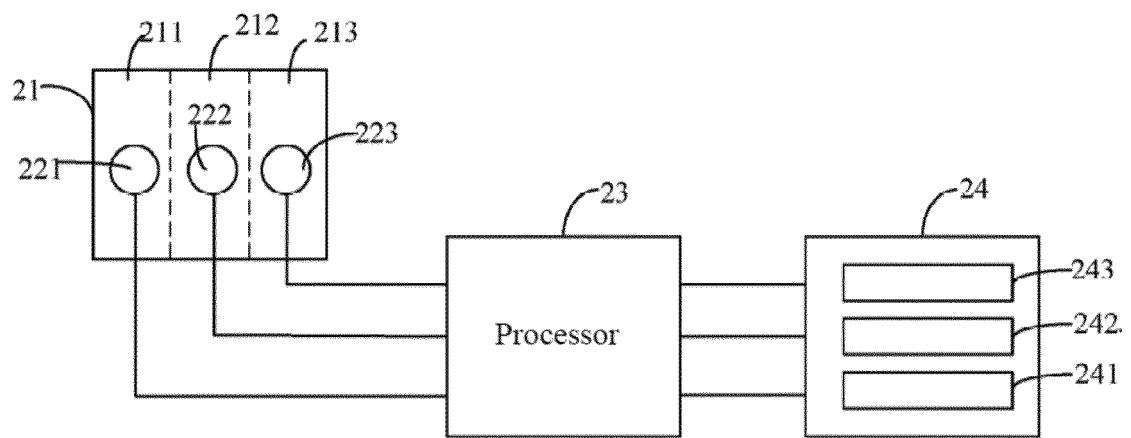


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/086168

A. CLASSIFICATION OF SUBJECT MATTER

F25D 25/02 (2006.01) i

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)

F25D 25; F25D 29

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)

CNTXT; CNABS; CNKI; VEN; SIPOABS: period of validity, gravity sensing, separator, shelf life, timing, interval, refrigerator, chiller, freezer, fridge, weight, gravity, shelf, fresh, time, expiration, date, out, display+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 105258443 A (QINGDAO HAIER CO., LTD.), 20 January 2016 (20.01.2016), description, paragraphs [0021]-[0035], and figures 1-3	1-10
Y	CN 104776681 A (NINGBO RIYING ELECTRIC APPLIANCES CO., LTD.), 15 July 2015 (15.07.2015), description, paragraphs [0022]-[0030], and figures 1-7	1-10
Y	CN 201035626 Y (ZHANG, Yang), 12 March 2008 (12.03.2008), description, page 1, line 11 to page 2, line 15, and figures 1-2	1-10
A	CN 103822428 A (SICHUAN CHANGHONG ELECTRIC CO., LTD.), 28 May 2014 (28.05.2014), the whole document	1-10
A	CN 201429864 Y (ZHOU, Weizhong), 24 March 2010 (24.03.2010), the whole document	1-10
A	KR 100727027 B1 (DAEWOO ELECTRONICS CORP.), 12 June 2007 (12.06.2007), the whole document	1-10

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"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	"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 105258443 A	20 January 2016	None	
CN 104776681 A	15 July 2015	None	
CN 201035626 Y	12 March 2008	None	
CN 103822428 A	28 May 2014	CN 103822428 B	20 January 2016
CN 201429864 Y	24 March 2010	None	
KR 100727027 B1	12 June 2007	None	

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