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(71) Applicant (for all designated States except US): **TEXAS INSTRUMENTS KOREA LIMITED** [KR/KR]; 67-1, Sagok-Ri, Iweol-myun, Jincheon-gun, Chungcheongbuk-do 365-820 (KR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **PARK, Young Hwan** [KR/KR]; 67-1, Sagok-Ri, Iweol-myun, Jincheon-gun, Chungcheonbuk-do 365-823 (KR).

(74) Agent: **KIM, Seung Wan**; 14F., Kukdong Building, 60-1, Chungmuro3-ka, Chung-ku, Seoul 100-705 (KR).

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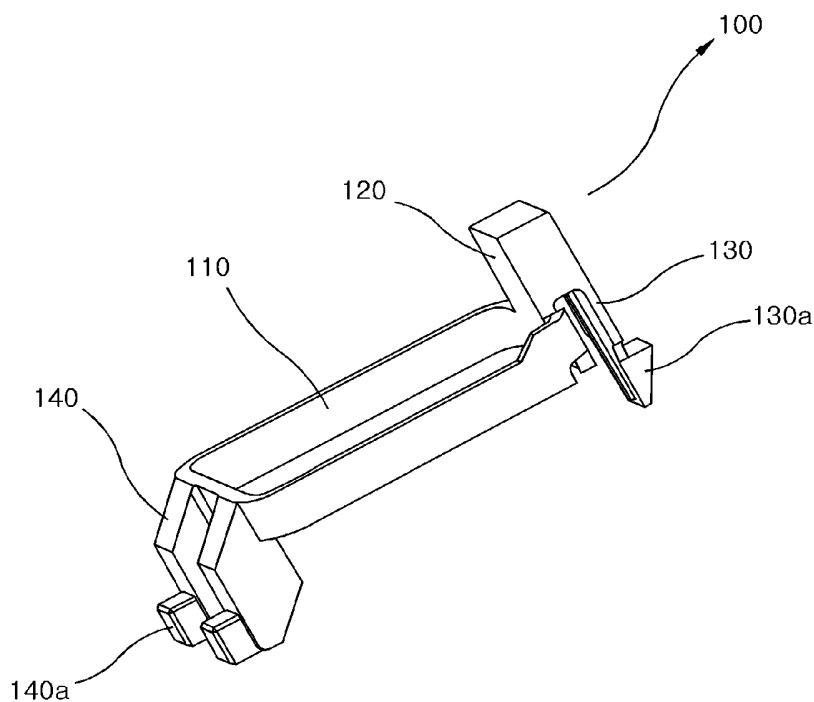
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(54) Title: CLAMP DEVICE FOR MOUNTING CONNECTING PACKAGE FOR REFRIGERATOR COMPRESSOR



(57) Abstract: A clamp device for detachably mounting to a compressor body a connecting package for a refrigerator compressor is provided. The connecting package detachably mounting therein an overload protector for a motor having a pin connector connected to the motor and a connecting terminal for connection with an external power source, and comprising a base having first and second pin connecting holes for connection with the motor, a cover coupled to the base and having terminal slots for connection with an exterior, and a motor starter relay element mounted between the base and the cover and having first and second pin connectors positioned corresponding to the first and second pin connecting holes of the base. The clamp device comprising: an edge frame member fitting over an outer portion of a coupled body of the base and cover; and opposite downward coupling extensions

formed on opposite end portions, respectively, of the edge frame member, wherein the downward coupling extension has at its end an engagement projection for connection to the compressor body.



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## **Description**

### **CLAMP DEVICE FOR MOUNTING CONNECTING PACKAGE FOR REFRIGERATOR COMPRESSOR**

#### **Technical Field**

- [1] The present invention relates generally to a clamp device for mounting a connecting package for a refrigerator compressor, and more particularly to a clamp device for stably mounting a connecting package for a refrigerator compressor to a compressor body in an electrical connection relation, the connecting package being directly mounted on the refrigerator compressor body with a motor starter relay element mounted therein, and capable of directly mounting thereto a motor protector and a running capacitor, if necessary, at the same time, thereby performing functions of power supply for operating the refrigerator compressor and overload protection.

#### **Background Art**

- [2] Generally, a connecting package for a refrigerator compressor is equipped with a PTC (positive temperature coefficient) starter relay element for starting an AC motor used with the refrigerator compressor. Besides the PTC starter relay element, an overload protector for protecting a motor from overload or a running capacitor (RC) for improving an efficiency of the motor can be provided in the connecting package.

#### **Disclosure of Invention**

##### **Technical Problem**

- [3] However, when installing the connecting package in the refrigerator compressor, the overload protector or the running capacitor must be individually wired through separate connecting structures. For this reason, connecting wires and mounting brackets must be provided at an outer portion of the refrigerator compressor. Therefore, not only is a structure of a product complicated, but also maintenance and repair works are difficult while causing an assembling error, thereby degrading quality and productivity of products.
- [4] In addition, such connecting package connected to the compressor body may be disconnected therefrom due to an accidental external force, so that the compressor may be damaged by overload. It would therefore be of benefit to provide a structure for stably fixing the connecting package to the compressor body.
- [5] Accordingly, it is necessary to develop a clamp device for mounting to a compressor body a connecting package for a refrigerator compressor capable of easily performing with a single package unit a connecting operation such as start of a refrigerator compressor, protection of a motor from overload, or improvement of motor efficiency to thus secure the maintenance of stable connecting state.

## Technical Solution

- [6] The present invention is directed to a clamp device for mounting a connecting package for a refrigerator compressor that substantially obviates one or more problems due to limitations and disadvantages of the related art.
- [7] It is an object of the present invention to provide a clamp device for detachably mounting to a compressor body a connecting package for a refrigerator compressor capable of easily performing with a single package unit a connecting operation such as start of a refrigerator compressor, protection of a motor from overload, and/or improvement of motor efficiency.
- [8] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned by practicing the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.
- [9] To achieve this object and other advantages in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a clamp device for detachably mounting to a compressor body a connecting package for a refrigerator compressor, the connecting package detachably mounting therein an overload protector for a motor having a pin connector connected to the motor and a connecting terminal for connection with an external power source, and comprising a base having first and second pin connecting holes for connection with the motor, a cover coupled to the base and having terminal slots for connection with an exterior, and a motor starter relay element mounted between the base and the cover and having first and second pin connectors positioned corresponding to the first and second pin connecting holes of the base, the clamp device comprising: an edge frame member fitting over an outer portion of a coupled body of the base and cover; and opposite downward coupling extensions formed on opposite end portions, respectively, of the edge frame member, wherein the downward coupling extension has at its end an engagement projection for connection to the compressor body.
- [10] The number of the downward coupling extensions formed to the opposite end portions, respectively, of the edge frame member may be at least one extension.
- [11] At least one of the opposite end portions of the edge frame member may be provided with an upward supporting extension, and the downward coupling extension formed to the end portion with the upward supporting extension may be downwardly protruded from the upward supporting extension.
- [12] The compressor body may be provided with a fence structure having opposite

vertical walls with fixing holes into which the engagement projections of the downward coupling extensions are inserted and fixed.

- [13] The base may have, at its opposite upper side portions, stopper protrusions serving as a grip knob when released from the cover and as a stopper for positioning the clamp device when mounting the same.
- [14] The edge frame member may be further provided with a shield roof at its certain end side so as to shield the terminal slots of the cover for connection to an exterior for preventing the moistures from being penetrated thereinto when the clamp device is mounted to the connecting package.
- [15] The downward coupling extension may be made from a resilient material such that the downward coupling extension resiliently contacts the opposite vertical walls of the compressor fence upon coupling with the compressor fence by means of press-contacting the vertical walls.
- [16] At least one of the engagement projections of the downward coupling extensions may be formed with a guide inclined surface for easy coupling.

### **Advantageous Effects**

- [17] The clamp device of the invention can be detachably mounted to the connecting package for a refrigerator compressor, and conveniently and detachably fixed to the compressor body while being in a state of being mounted to the connecting package, thereby providing an effect of securing stability of operation of the connecting package.

### **Brief Description of the Drawings**

- [18] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:
- [19] FIGS. 1, 2, 3 and 4 are a perspective view, a front view, a plan view and a backside view, respectively, of a clamp device for a connecting package for a refrigerator compressor according to one embodiment of the present invention;
- [20] FIG. 5 is a perspective view of a connecting package for a refrigerator compressor;
- [21] FIG. 6 is a perspective view of a compressor fence to which the connecting package for a refrigerator compressor of FIG. 5 is attached;
- [22] FIG. 7 is an exploded perspective view illustrating a method for mounting the clamp device of the invention to the connecting package of FIG. 5 having a structure capable of mounting a running capacitor;
- [23] FIG. 8 is an exploded perspective view illustrating an example of basic construction of a connecting package for a refrigerator compressor to which a clamp device of the

invention is to be mounted;

[24] FIG. 9 is a perspective view illustrating a state where a clamp device of the invention and a running capacitor are mounted to the connecting package of FIG. 5;

[25] FIG. 10 is a perspective view illustrating a state where the connecting package of FIG. 9 with the clamp device and the running capacitor mounted thereto is fixed to the compressor fence of FIG. 6;

[26] FIGS. 11 and 12 are enlarged perspective views illustrating A and B portions, respectively, of FIG. 10;

[27] FIGS. 13 and 14 are perspective view and front view, respectively, illustrating a clamp device according to another embodiment of the present invention; and

[28] FIG. 15 is a perspective view illustrating a state where the connecting package of FIG. 5 with the clamp device of FIG. 13 mounted thereto is fixed to the compressor fence of FIG. 6.

### **Best Mode for Carrying Out the Invention**

[29] Preferred embodiments of the invention will now be described in detail with reference to the accompanying drawings.

[30] FIGS. 1, 2, 3 and 4 are a perspective view, a front view, a plan view and a backside view, respectively, of a clamp device for a connecting package for a refrigerator compressor according to one embodiment of the present invention; FIG. 5 is a perspective view of a connecting package for a refrigerator compressor; and FIG. 6 is a perspective view of a compressor fence to which the connecting package for a refrigerator compressor of FIG. 5 is attached.

[31] Referring to these drawings, the clamp device 100 for the connecting package for a refrigerator compressor according to the present invention covers and fits over the outer portion of the connecting package 200 and is fixed to a compressor body, i.e., a compressor fence 500, so that when the connecting package 200 for a refrigerator compressor is connected to the connecting pins P1, P2 and P3 of a terminal section 550 of the compressor body, the connecting package can be stably fixed to the compressor body.

[32] The connecting package 200 for a refrigerator compressor, to which the clamp device 100 of the invention is adapted, can include various kinds of connecting packages connected to the compressor body to perform a function such as power supply and/or motor protection, and one example among them is shown in FIGS. 5, 7 and 8.

[33] The connecting package 200 illustrated in these drawings is the connecting package as disclosed in Korean Registered Utility Model No. 0298274 by the applicant of the invention, which Utility Model is hereby incorporated herein by reference in its

entirety.

[34] However, it is understood by the skilled in the art that the clamp device of the invention can be adapted not only to that of Utility Model, but also to those of similar function and shape.

[35] First, a construction of an object such as the above connecting package to which the clamp device of the invention can be adapted will now be described briefly.

[36] As illustrated in FIGS. 5, 7 and 8, the connecting package 200 for a refrigerator includes a base 230, a cover 210 detachably coupled to the base, and a motor starter relay element 220 mounted to an internal space between the base and the cover. An overload protector 300 is mounted inside of the cover from the bottom portion of the base.

[37] The base 230 is formed in substantially rectangular shape, and includes at one end side an opening mounting section 233 as a space for mounting the overload protector 300 for motor, and at center portion thereof a mounting section 232 as a space for mounting the starter relay element 220.

[38] The cover 210 includes thereon a first connecting terminal slot 211 at one end side thereof for connection with a connecting terminal 311 of the overload protector 300 connected to an external power source, a second connecting terminal slot 213 at the center side thereof for connection with a connecting terminal 223 of the relay element 220 connected to the external power source, and third connecting terminal slots 212 at the other end side thereof for connection with receptacles 222 of a jumper of the relay element 220 connected to a quick connector of the running capacitor.

[39] Herein, the connecting terminal slots have upwardly protruded edges so that they form a structure that foreign substance or rainwater cannot be easily penetrated thereinto when connected with the external power source and the running capacitor.

[40] A pair of ear portions 235 is formed on the both sidewalls of the base, serving as a grip for holding by hands when decoupling the cover from the base. As described later, the ear portions also serve as a stopper for supporting the clamp device from the bottom thereof when the clamp device 100 of the invention is mounted to the connecting package 200. The ear portions are referred to a grip knob or a stopper protrusion according to its function.

[41] In addition, a rod type running capacitor mounting pole 215 can be further provided with the cover 20 at the upper center portion thereof so as to support and mount to the connecting package 200 a running capacitor 400 for improvement of operational efficiency of a motor.

[42] The running capacitor 400 includes two quick connectors at its lower portion and a fastening tab 415 at one side of the upper portion thereof, which is inserted into the mounting pole. The fastening tab is formed with a protruded planar portion which has

a hole and a slot extending from the hole up to the end of the planar portion, so that when the running capacitor is inserted into the mounting pole through the hole of the fastening tab, the hole has room for enlargement due to the slot, which facilitates mounting or releasing of the running capacitor to or from the mounting pole.

[43] Similarly, the mounting pole 215 also has a construction for facilitating mounting or releasing when the running capacitor 400 is mounted or released to or from the mounting pole 215.

[44] The running capacitor mounting pole 215 has a longitudinal slot 215a at its end portion and engagement projections 215b each having an inclined surface at the outer surfaces of opposite sides to the slot.

[45] In addition, the running capacitor mounting pole 215 also includes a triangular vertical positioning plate 215c extending between the pole and the upper cover portion. The vertical plate is a positioning element for positioning a location to which two quick connectors of the running capacitor are to be inserted, i.e., two connecting terminal slots 212 of the cover 210, when mounting the running capacitor.

[46] The relay element 220 for start of the motor includes a disc-type positive temperature coefficient (PTC) element 225 disposed in a recess at the center of the base, rectangular conductive plates 221a and 221b disposed opposite to the PTC element, and U-shaped resilient connecting members electrically connecting between the respective conductive plates and the PTC element with its open ends resiliently contacting the PTC element and its closed ends disposed fixedly to the respective conductive plates 221a and 221b by means of such as a welding.

[47] The conductive plates 221a and 221b are respectively connected in parallel with a pin connector PC2 connected to a primary winding side of the motor and a pin connector PC3 connected to a secondary winding side of the motor, and are provided with connecting terminals connected to the running capacitor through the jumper 222.

[48] In addition, the conductive plate 221a to which the pin connector PC2 connected to the primary winding side of the motor is attached is provided with a connecting terminal 223 for electrical connection with the external power source.

[49] The overload protector 300 is a device for protecting the motor from overload, and includes two parallel triangular planar stoppers serving as a stopper and supporter when mounted to the above-mentioned connecting package 200, a pin connector PC1 connected to the primary winding side of the motor, and a terminal 311 for electrical connection to an external.

[50] Such overload protector is the same one as that disclosed in USP No. 4,241,370, the content of which is incorporated herein by reference in its entirety. The connecting package 200 receives those of similar kinds of such overload protector.

[51] FIG. 7 is an exploded perspective view illustrating a method for mounting the

clamp device of the invention to the connecting package of FIG. 5 having a structure capable of mounting the running capacitor.

- [52] Referring to this drawing, the clamp device 100 of the invention covers and fits over the outer portion of the connecting package 200, and is supported from the bottom thereof by the stopper 235 of the connecting package.
- [53] When mounting the running capacitor, the fastening tab 415 of the running capacitor is inserted into the mounting pole 215 on the connecting package.
- [54] Hereinafter, the clamp device 100 of the invention mounted to the above-mentioned connecting package 200 to fix the same to the compressor body will be described.
- [55] As illustrated well in FIGS. 1, 2 and 3, the clamp device 100 of the invention is a device for detachably fixing the connecting package 200 for refrigerator compressor to the compressor body, and includes an edge frame member 110 covering and fitting over the outer portion of a coupled body of the base and cover (i.e., the connecting package 200), and downward coupling extensions 130 and 140 formed on the opposite end portions, respectively, of the edge frame member.
- [56] An engagement projection 130a or 140a is formed to an end portion of the downward coupling extension for fixing to the compressor body.
- [57] Although the downward coupling extension formed on the end portions of the edge frame member is illustrated so that one extension 130 is formed on one end side of the edge frame member and two extensions 140 are formed on the other end side of the edge frame member, only at least one downward coupling extension may be formed on each end portion of the edge frame member.
- [58] At least one of the opposite end portions of the edge frame member 110 is provided with an upward supporting extension 120, and the downward coupling extension 130 formed to the end portion with the upward supporting extension 120 is downwardly protruded from the upward supporting extension 120.
- [59] The upward supporting extension 120 serves to support the connecting package while being in contact with the outer surface of the connecting package when the clamp device 100 of the invention is mounted to the connecting package 200.
- [60] As illustrated in FIG. 6, a fixing construction for fixing the clamp device 100 mounted to the connecting package to the compressor body is provided to the compressor body.
- [61] Such fixing construction of the compressor body is a structure of a compressor fence 500 having opposite vertical walls 501a and 510b with fixing holes 510a' and 510b' into the engagement projections 130a and 140a of the downward coupling extensions 130 and 140 of the clamp device 100 are inserted and fixed.
- [62] The compressor fence 500 attached to the compressor body by welding, etc. includes a center circular compressor terminal 550 with three pins P1, P2 and P3



protruded from the compressor body, and opposite vertical walls 510a and 510b to the center compressor terminal. The vertical walls have fixing holes 510a' and 510b' so that when the clamp device 100 of the invention is connected to the compressor, as shown in FIG. 5, the pin connector PC1 of the overload protector and the first and second pin connecting holes PC2 and PC3 of the base, i.e., three pin connecting holes are inserted into the three pins of the circular compressor connecting terminal 550 as well as the engagement projections 130a and 140a of the downward coupling extensions 130 and 140 of the clamp device 100 are coupled into the fixing holes 510a' and 510b' of the compressor fence.

- [63] FIG. 9 is a perspective view illustrating a state where the clamp device of the invention and the running capacitor are mounted to the connecting package of FIG. 5; FIG. 10 is a perspective view illustrating a state where the connecting package of FIG. 9 with the clamp device and the running capacitor mounted thereto is fixed to the compressor fence of FIG. 6; and FIGS. 11 and 12 are enlarged perspective views of A and B portions, respectively, of FIG. 10, which illustrate a state where the clamp device 100 of the invention is mounted to the connecting package 200 and the compressor fence 500, together with the running capacitor 400.
- [64] The fixing holes of the opposite vertical walls are formed such that only at least one hole is formed to the respective vertical walls. The number and shape of the fixing hole however is not limited as illustrated, but can be changed.
- [65] The downward coupling extensions of the clamp device 100 are preferably formed from a resilient material such that when coupled to the compressor fence, the extensions resiliently contact the opposite vertical walls of the compressor fence by the press-contact therewith.
- [66] At least one engagement projection of the downward coupling extensions of the clamp device is formed with a guide inclined surface for easy coupling (in the drawing, the engagement projection 130a' is illustrated as the guide inclined surface).
- [67] Meanwhile, according to one embodiment of the present invention, the edge frame member 110 of the clamp device is further provided with a shield roof 120' at its certain end side so as to shield the terminal slots (for example, slot 211) of the cover for connection to an exterior for preventing the moistures from being penetrated therein when the clamp device is mounted to the connecting package 200.
- [68] A clamp device 100' with such shield roof is illustrated in FIGS. 13, 14 and 15.
- [69] The other constructions of the clamp device 100' of this embodiment, except the shield roof 120', are same as those of above embodiment, so the description on the constructions will be omitted.
- [70] When using such clamp device with shield roof, rainwater and so forth cannot be penetrated into the connecting terminal, which secures a stable operation of the

connecting package.

### **Industrial Applicability**

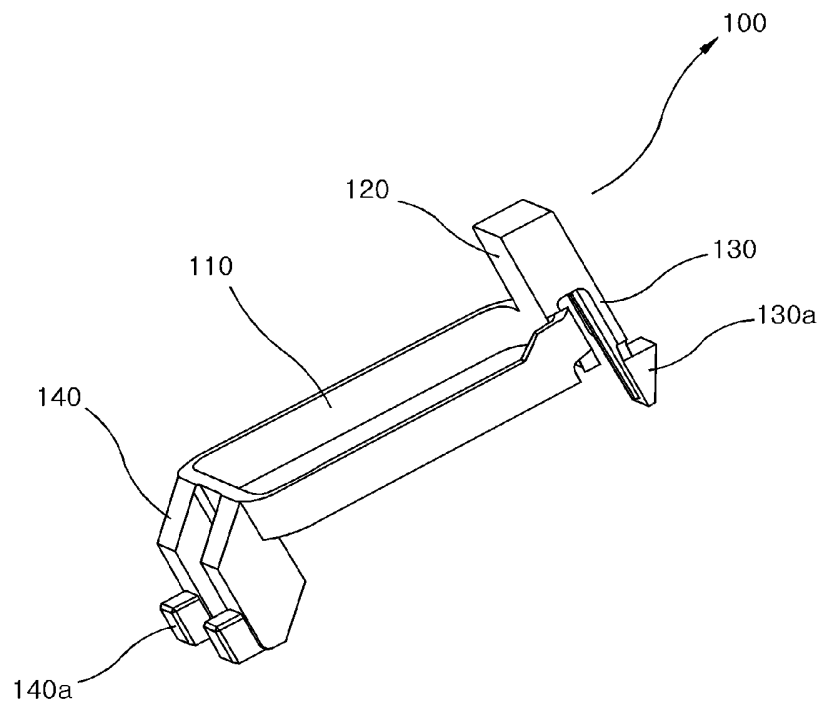
- [71] The forgoing embodiments are merely exemplary and are not to be construed as limiting the present invention. The present teachings can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.

## Claims

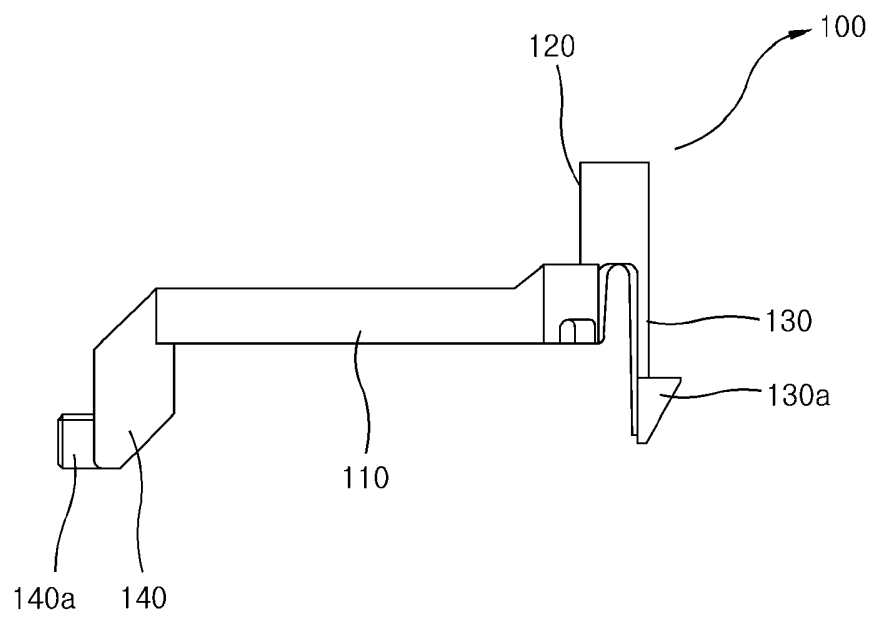
- [1] A clamp device for detachably mounting to a compressor body a connecting package for a refrigerator compressor, the connecting package detachably mounting therein an overload protector for a motor having a pin connector connected to the motor and a connecting terminal for connection with an external power source, and comprising a base having first and second pin connecting holes for connection with the motor, a cover coupled to the base and having terminal slots for connection with an exterior, and a motor starter relay element mounted between the base and the cover and having first and second pin connectors positioned corresponding to the first and second pin connecting holes of the base, the clamp device comprising:  
an edge frame member fitting over an outer portion of a coupled body of the base and cover; and opposite downward coupling extensions formed on opposite end portions, respectively, of the edge frame member, wherein the downward coupling extension has at its end an engagement projection for connection to the compressor body.
- [2] The clamp device according to claim 1, wherein the edge frame member is further provided with a shield roof at its certain end side so as to shield the terminal slots of the cover for connection to an exterior for preventing the moistures from being penetrated thereinto when the clamp device is mounted to the connecting package.
- [3] The clamp device according to claim 1 or 2, wherein the number of the downward coupling extensions formed to the opposite end portions, respectively, of the edge frame member is at least one extension.
- [4] The clamp device according to claim 1 or 2, wherein at least one of the opposite end portions of the edge frame member is provided with an upward supporting extension, and the downward coupling extension formed to the end portion with the upward supporting extension is downwardly protruded from the upward supporting extension.
- [5] The clamp device according to claim 1, wherein the compressor body is provided with a fence structure having opposite vertical walls with fixing holes into which the engagement projections of the downward coupling extensions are inserted and fixed.
- [6] The clamp device according to claim 1, wherein the base has, at its opposite upper side portions, stopper protrusions serving as a grip knob when released from the cover and as a stopper for positioning the clamp device when mounting the same.

- [7] The clamp device according to claim 1 or 2, wherein the downward coupling extension is made from a resilient material such that the downward coupling extension resiliently contacts the opposite vertical walls of the compressor fence upon coupling with the compressor fence by means of press-contacting the vertical walls.
- [8] The clamp device according to claim 1 or 2, wherein at least one of the engagement projections of the downward coupling extensions is formed with a guide inclined surface for easy coupling.

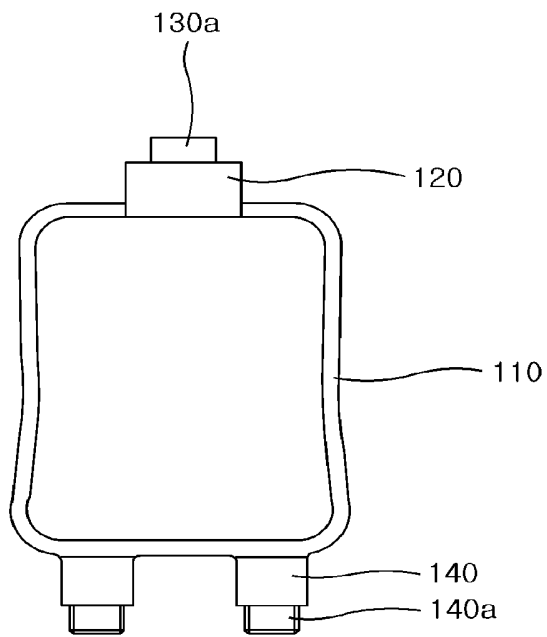
[Fig. 1]



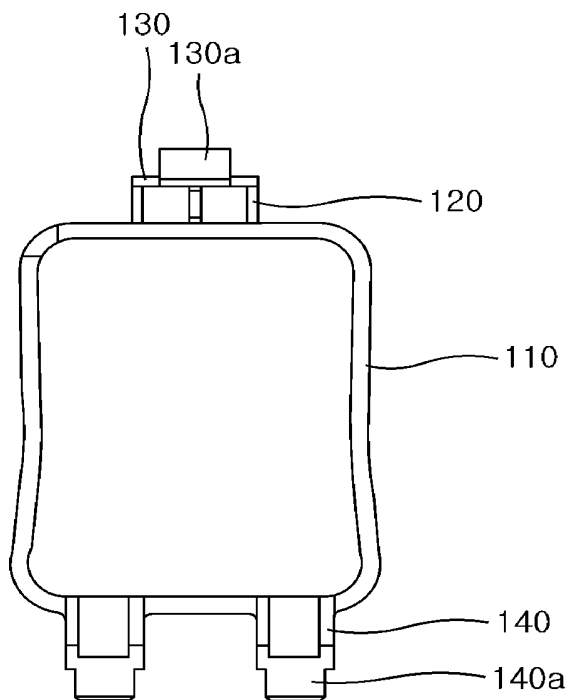
[Fig. 2]



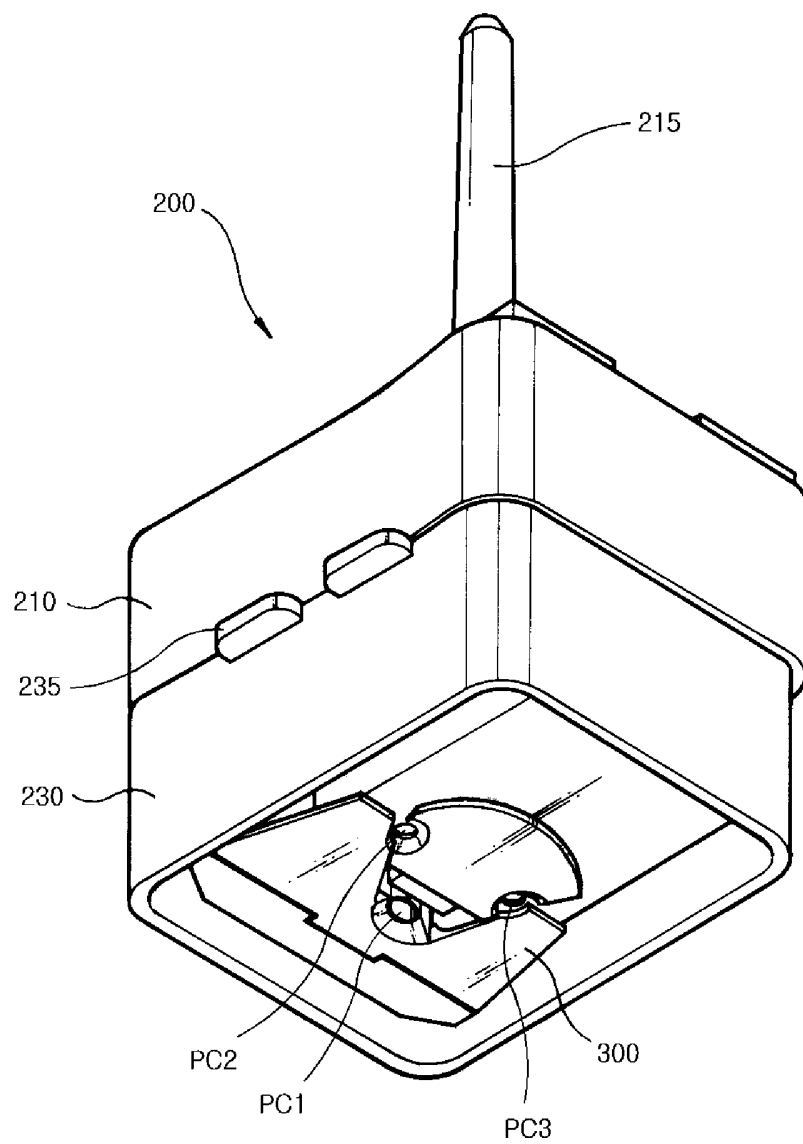
[Fig. 3]



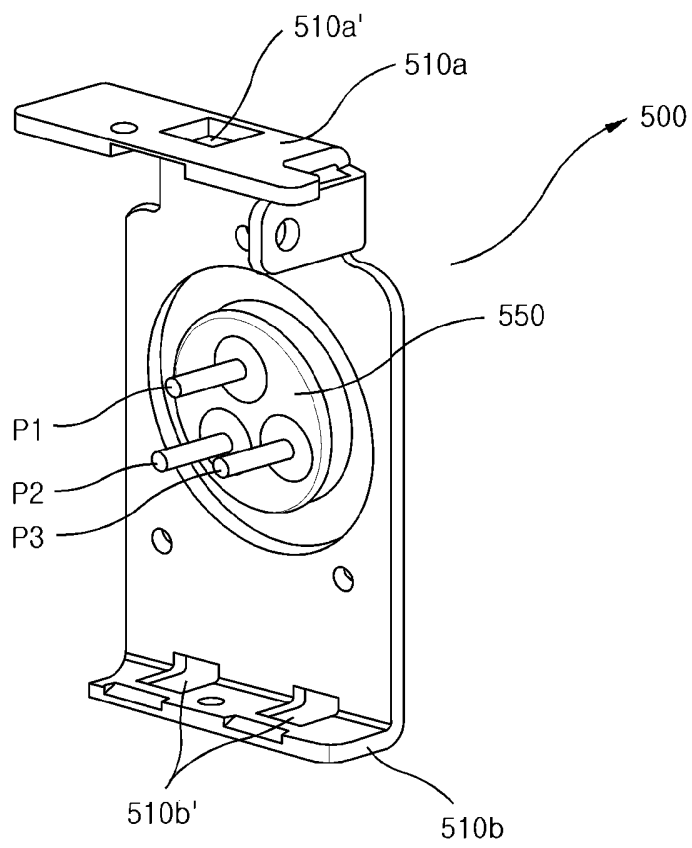
[Fig. 4]



[Fig. 5]

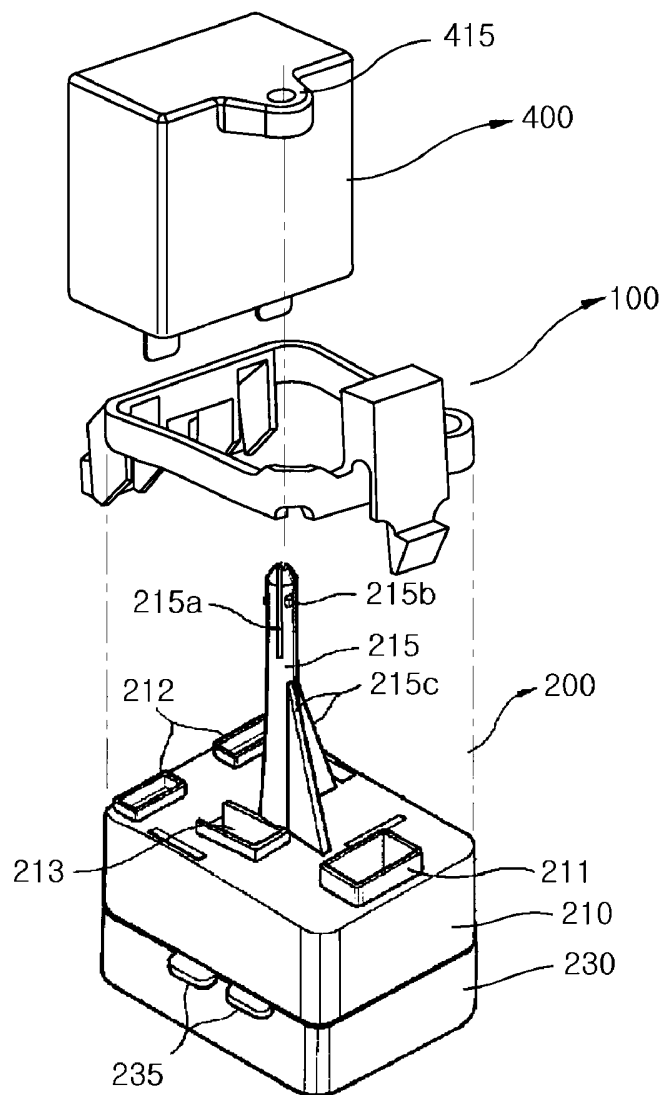


[Fig. 6]

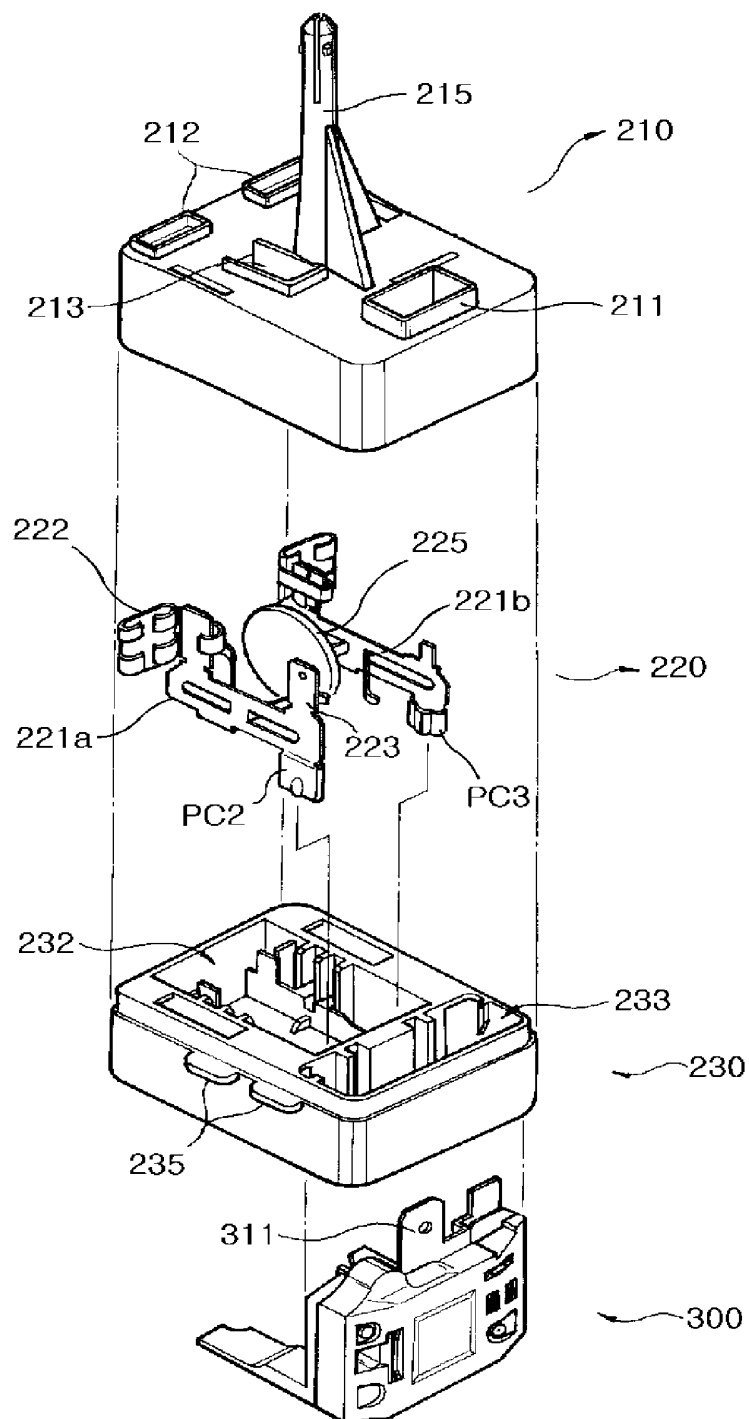




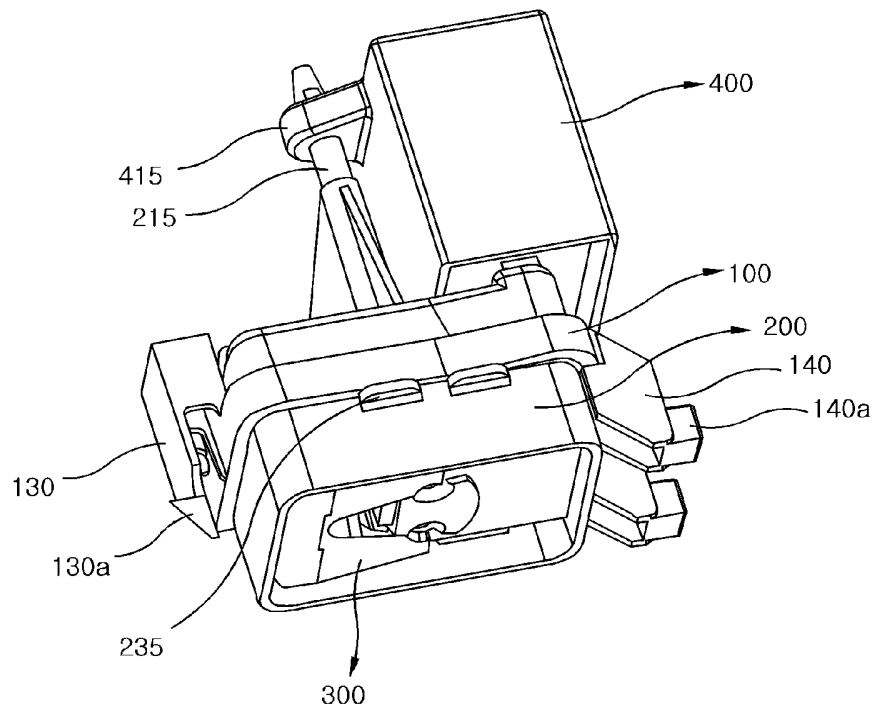
[Fig. 7]



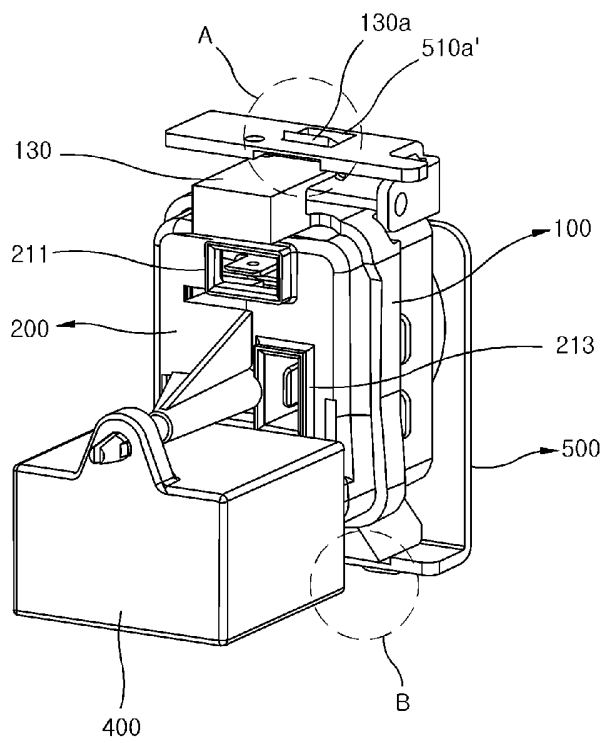
[Fig. 8]



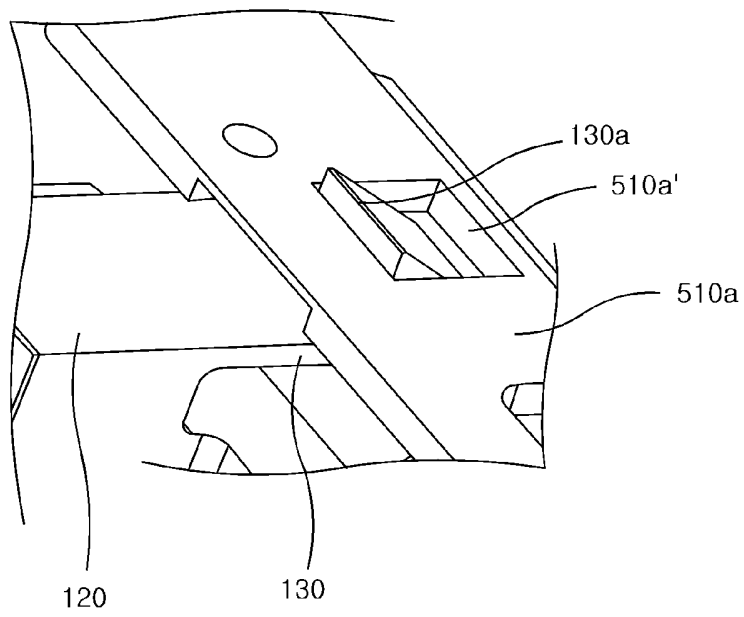
[Fig. 9]



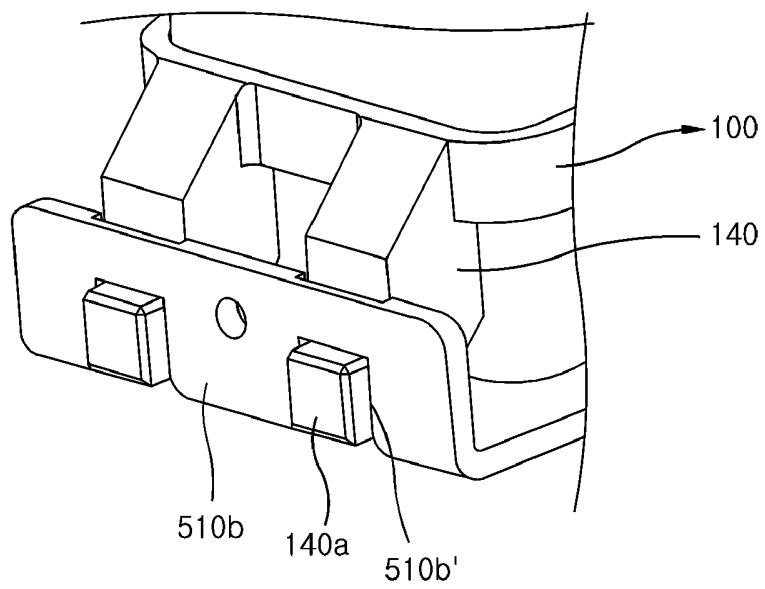
[Fig. 10]



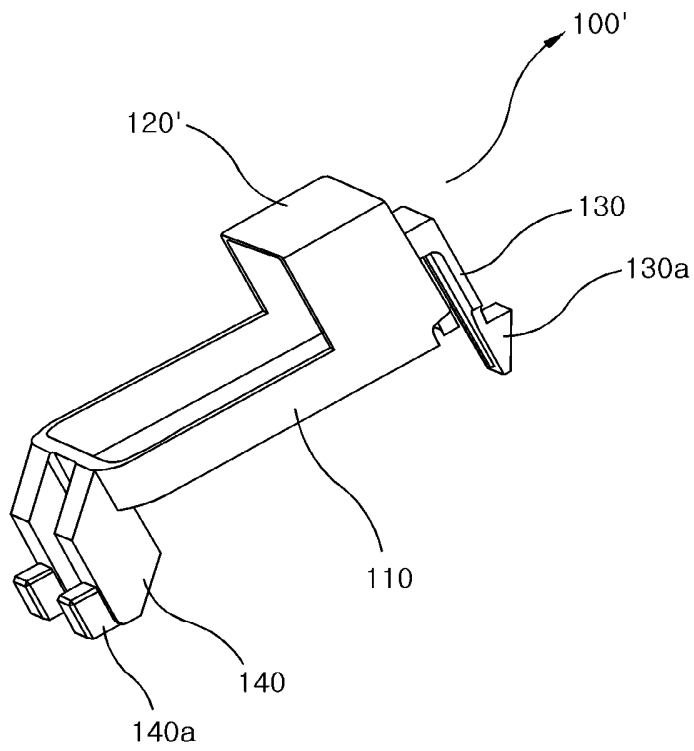
[Fig. 11]



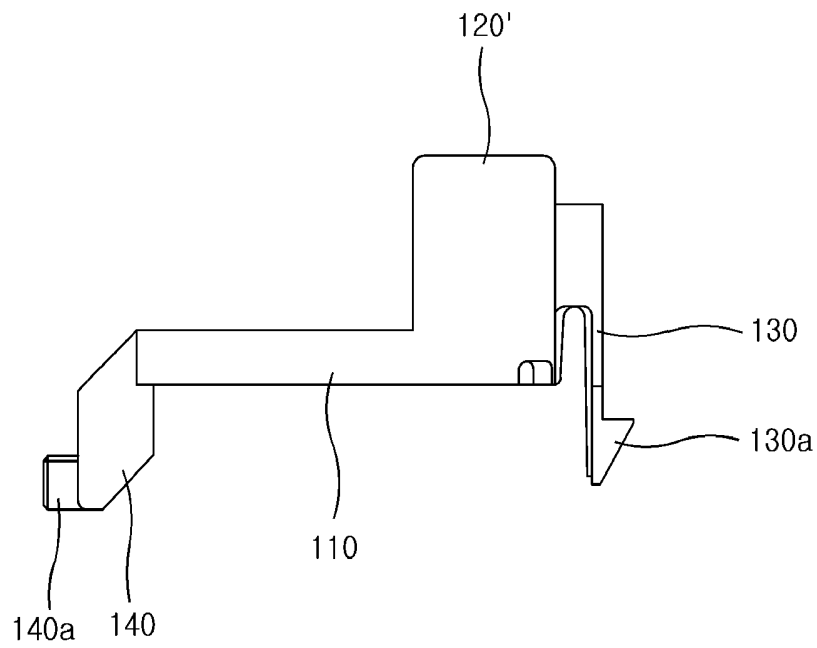
[Fig. 12]



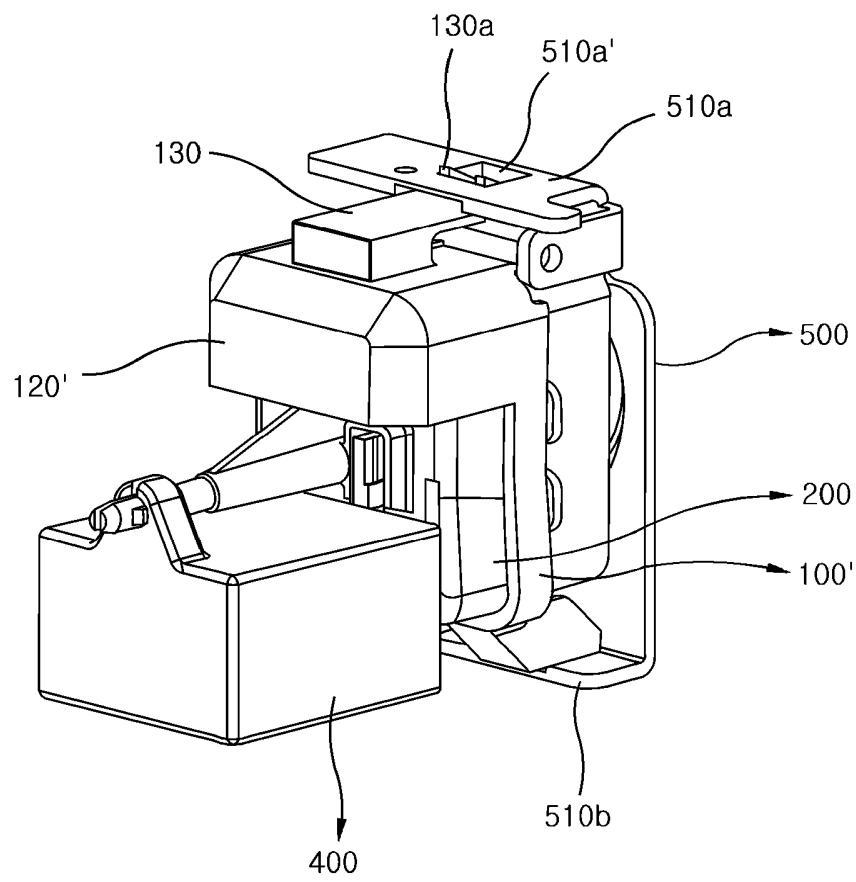
[Fig. 13]



[Fig. 14]



[Fig. 15]



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR2005/003305

**A. CLASSIFICATION OF SUBJECT MATTER****F25D 19/00(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)

IPC8: F04B, F25D

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

KR.JP : classes as above

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages          | Relevant to claim No. |
|-----------|---------------------------------------------------------------------------------------------|-----------------------|
| A         | KR 2004-83877 A (JAHWA ELECTRONICS CO., LTD.) 6 OCTOBER 2004<br>see the whole document      | 1-8                   |
| A         | KR 20-264453 Y1 (TEXAS INSTRUMENTS INCORPORATED) 19 FEBRUARY 2002<br>see the whole document | 1-8                   |
| A         | JP 01-211673 A (MATSUSHITA REFRIG CO LTD ) 24 AUGUST 1989<br>see the whole document         | 1-8                   |
| A         | EP 037261 A1 (TEXAS INSTRUMENTS INCORPORATED) 27 JULY 1990<br>see abstract                  | 1-8                   |
| P,A       | KR 10-503970 B1 (JAHWA ELECTRONICS CO., LTD.) 26 JULY 2005<br>see the whole document        | 1-8                   |

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Korean Intellectual Property Office  
920 Dunsan-dong, Seo-gu, Daejeon 302-701,  
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Authorized officer

LEE, Jin Uk

Telephone No. 82-42-481-5514



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