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(54) **Electrical component protection device**

Schutzvorrichtung für elektrisches Bauteil

Dispositif de protection pour composant électrique

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(73) Proprietor: **MATSUSHITA ELECTRIC INDUSTRIAL  
CO., LTD.**  
**Kadoma-shi, Osaka-fu (JP)**

(72) Inventor: **Kobayashi, Tatsuhiro,**  
**c/o Matsushita El.Ind.Co Ltd**  
**Kadoma-shi, Osaka-fu (JP)**

(74) Representative: **Grünecker, Kinkeldey,**  
**Stockmair & Schwanhäusser Anwaltssozietät**  
**Maximilianstrasse 58**  
**80538 München (DE)**

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**GB-A- 2 104 732** **US-A- 4 567 390**  
**US-A- 4 620 425**

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## Description

### 1. Field of the Invention

[0001] The present invention relates to an electrical component protection device as set forth in the preamble of claim 1. A protection device of this kind is known from GB-A-2 104 732.

### 2. Description of the prior art

[0002] The aforementioned document discloses a supply and protection unit for an electrically powered, thermostatically controlled hermetic compressor of a thermostatically regulated refrigerator and comprises an electrically insulating support body adapted to be fixed to the casing of the compressor. The support body is provided with cavities opening at one of its faces intended to face towards the compressor for slidably and removably inserting therein a thermally operated protection switch and a resistor with a positive temperature coefficient. Connection means for the connection of the power supply, thermostat and compressor motor are incorporated into the unit. The protection device further comprises a retainer bushing having an insulating property and an elasticity which is interposed between a top panel of a terminal cover and the protection switch and serves as a means for pressing the protection switch against the outer surface of the compressor.

[0003] Another prior art electrical component protection device which is known to the applicants and takes a closed type compressor as an example of application is shown in figures 4 and 5. In figures 4 and 5, a fixing bolt 51 is provided at an upper portion of an outer surface of a hermetic container 50 which constitutes a casing of the closed type compressor, and the fixing bolt 51 serves to fix a terminal cover 52 to an upper portion of the hermetic container 50 by screwing a nut 53. A through hole 52a which extends vertically and through which the fixing bolt 51 is to penetrate is formed at the terminal cover 52.

[0004] The hermetic container 50 is provided with a sealed terminal 54, where a portion of the sealed terminal 54 is buried in a hole formed at a top panel of the hermetic container 50 and the other portion is made to protrude outwardly of the hermetic container 50. The sealed terminal 54 has a plurality of connection terminals 55 which protrude upwardly.

[0005] The terminal cover 52 is formed of a material such as rubber or resin having an electrical insulating property and an elasticity, and it is internally provided with a terminal chamber 56 for housing therein the connection terminals 55 and a protector chamber 58 for housing therein an overload relay 57. In the protector chamber 58 of the terminal cover 52, a coil spring 59 provided around the overload relay 57 is pressed by a stepped portion 60 of the terminal cover 52, by which the overload relay 57 adheres closely to the upper sur-

face of the hermetic container 50.

[0006] In the aforementioned prior art structure, the coil spring 59 is used as a means for pressing the overload relay 57, and it presses the periphery of the overload relay 57. However, the operation of force applied from the coil spring 59 does not uniformly exert on the entire periphery of the overload relay 57. Therefore, a sufficient adhesion of the overload relay 57 to the upper surface of the hermetic container 50 cannot be secured, and this has caused a problem that the operation of the overload relay 57 becomes unstable. Furthermore, the coil spring 59 has been used on condition that the overload relay 57 has a circular configuration. Therefore, the spring cannot be used when the relay has an oval configuration, and this means that the structure lacks versatility.

### SUMMARY OF THE INVENTION

[0007] In order to solve the aforementioned problems, the present invention provides a protection device having a terminal cover for housing therein an electrical component and an overload relay, the terminal cover being mounted on an outer surface of an objective equipment to which it is to be mounted,

wherein a plurality of ribs which serve as a means for pressing the overload relay against an outer surface of a compressor are formed integrally with the terminal cover on an inner surface of a housing section of the terminal cover for housing therein the overload relay, and the ribs are located in positions symmetrical about a center of the overload relay.

[0008] With the above-mentioned arrangement, the ribs formed integrally with the terminal cover function to press the overload relay. Therefore, in regard to the state of abutment of the overload relay on the outer surface of the objective equipment to which it is to be mounted, the relay abuts with a uniform force on the entire abutment surface. For the above reasons, a sufficient adhesion of the overload relay to the outer surface of the objective equipment to which it is to be mounted can be secured to allow the operation of the overload relay to be stabilized. Furthermore, since the ribs can be arranged in arbitrary positions according to the configuration of the overload relay, there can be achieved a structure having a versatility superior to the prior art structure employing a coil spring.

[0009] According to a preferred embodiment, a tip end of each rib fronting the overload relay is formed in an arc configuration.

[0010] With the above-mentioned arrangement, even if any rib makes contact with a lead wire or the like attached to the overload relay when housing the overload relay into the terminal cover, the lead wire is not damaged. Therefore, the terminal cover can be set more securely and surely on the overload relay.

[0011] According to a more preferred embodiment, a retainer bushing having an insulating property and an

elasticity is interposed between a top panel of the terminal cover and the overload relay while serving as a means for pressing the overload relay against the outer surface of the compressor.

**[0012]** With the above-mentioned arrangement, in a state in which the ribs hold down the periphery of the overload relay, the retainer bushing holds down the center portion of the overload relay. In this case, since the retainer bushing has an elasticity, it does not hinder the pressing operation of the ribs against the overload relay, and both the pressure force of the ribs and the pressure force of the retainer bushing exert effectively on the overload relay. The above arrangement provides an electrical component protection device having a terminal cover in which the overload relay is made to more securely adhere closely to the outer surface of the objective equipment to which it is to be mounted so as to further ensure the operation of the overload relay.

**[0013]** According to a more preferred embodiment, a projection having a round tip end is provided on an inner surface of the terminal cover in a position corresponding to a center position of the overload relay, the retainer bushing is provided with a hole to be interlocked with the projection of the terminal cover, and the projection and the hole are interlocked with each other to fix and hold the retainer bushing on the terminal cover.

**[0014]** With the above-mentioned arrangement, by fitting the retainer bushing into the terminal cover with the projection inserted into the retainer bushing, the retainer bushing mounting operation can be achieved with a one-touch motion.

**[0015]** According to a more preferred embodiment, the retainer bushing comprises: a base section having a circular peripheral surface configuration corresponding to an inner surface configuration of the terminal cover; a cylindrical pressure section which abuts on the overload relay; a hole which is provided at a tip end of the pressure section and houses therein a nut and a shaft section located in a center position of the overload relay; and a tapered connection section located between the pressure section and the base section.

**[0016]** With the above-mentioned arrangement, by making the peripheral surface of the base section of the retainer bushing have a circular configuration corresponding to the inner surface configuration of the terminal cover, the retainer bushing can be stably held. The pressure section presses the center portion of the overload relay with the nut and shaft section housed in the hole provided at the tip end, and therefore, the overload relay can be stably held down. Since both the base section and the pressure section of the retainer bushing have circular configurations around the axial center, the retainer bushing has no directional property in being mounted to the terminal cover, meaning that it is excellent in workability.

## BRIEF DESCRIPTION OF THE DRAWINGS

### [0017]

- 5 Fig. 1 is an external view of an electrical component protection device according to an embodiment of the present invention;  
 Fig. 2 is a sectional view of the above protection device;  
 10 Fig. 3 (a) is a rear view of the above protection device;  
 Fig. 3 (b) is a sectional view of the above protection device taken along the line A - A;  
 Fig. 4 is an exploded perspective view of a prior art electrical component protection device; and  
 15 Fig. 5 is a sectional view of the prior art protection device.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

20 **[0018]** An embodiment of the present invention will be described below with reference to Figs. 1, 2, 3 (a) and 3 (b).

25 **[0019]** A cylindrical hermetic casing 1 is to house therein an electrical compressor body (not shown), and its upper surface is provided with a protection device 2. The protection device 2 is comprised of a terminal cover 3, a shaft section 4 and a nut 5 for fixing the terminal cover 3 on the upper surface of the hermetic casing 1. The terminal cover 3 houses therein a sealed terminal 6 and an overload relay 7.

30 **[0020]** The terminal cover 3 has at its base portion a stepped section 3a corresponding in configuration to the overload relay 7, and a plurality of ribs 8 are integrally formed on an inner surface of the stepped section 3a in order to press the overload relay 7 against an upper surface of the hermetic casing 1 for the achievement of adhesion. With this arrangement, the overload relay 7 can be pressedly fixed on the upper surface of the hermetic casing 1 only by the terminal cover 3, so that the reduction in number of components can be achieved, thereby allowing a cast reduction to be achieved. Further, the terminal cover 3 has a housing section 9 for housing the overload relay 7, and the ribs 8 are located in positions symmetrical about the center line of the housing section. With this arrangement, the terminal cover 3 can uniformly press the overload relay 7 against the upper surface of the hermetic casing 1 for the achievement of adhesion.  
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**[0021]** The overload relay 7 can be pressed by providing the ribs 8, however, it is feared that an electrical component such as a lead wire will be possibly damaged by any rib 8 when the overload relay 7 is set on the upper surface of the hermetic casing 1 and then the terminal cover 3 is put on it.

55 **[0022]** In view of the above, a tip end of each rib 8 is formed into an arc configuration to allow the terminal

cover 3 to be set securely and surely in the present invention.

**[0023]** By pressing the entire periphery of the overload relay 7 by the plurality of ribs 8, the periphery of the overload relay 7 can be made to closely adhere to the upper surface of the compressor body. However, in order to more surely operate the overload relay 7, it is required to make the overload relay 7 and the upper surface of the hermetic casing 1 closely adhere to each other throughout at the entire contact surface.

**[0024]** For the above reasons, according to the present invention as shown in Fig. 2, a retainer bushing 10 made of rubber or the like having an insulating property and an elasticity is interposed between a top panel of the terminal cover 3 and the overload relay 7 while serving as a means for pressing the overload relay 7 against the upper surface of the hermetic casing 1.

**[0025]** The retainer bushing 10 presses the overload relay 7 when the terminal cover 3 is set. Therefore, the overload relay 7 and the upper surface of the hermetic casing 1 are made to closely adhere to each other, thereby allowing the operation of the overload relay 7 to be further ensured. In this case, since the retainer bushing 10 has an elasticity, it does not hinder the pressing operation of the ribs 8 against the overload relay 7, and both the pressure force of the ribs 8 and the pressure force of the retainer bushing 10 exert effectively on the overload relay.

**[0026]** As shown in Figs. 2, 3 (a) and 3 (b), a projection 11 having a round tip end is provided on the top panel of the housing section 9 of the terminal cover 3, and a hole 12 to be interlocked with the projection 11 is provided in the retainer bushing 10. With this arrangement, the retainer bushing 10 can be inserted and fixed into the terminal cover 3 with a one-touch motion, thereby allowing the workability to be improved.

**[0027]** Next, as shown in Fig. 2, in regard to the retainer bushing 10, its base section 10a has a circular peripheral surface configuration corresponding to the inner surface configuration of the terminal cover 3, and a pressure section 10b which is to abut on the overload relay 7 has a cylindrical configuration. The pressure section 10b has at its tip end a hole 10c for housing therein a nut 12 and a shaft section 13 located in the center position of the overload relay 7, and a connection section located between the pressure section 10b and the base section 10a has a tapered configuration.

**[0028]** With the above-mentioned arrangement, the peripheral surface of the base section 10a of the retainer bushing 10 has a circular configuration corresponding to the inner surface configuration of the terminal cover 3, and therefore, the retainer bushing can be stably held on the terminal cover 3. The pressure section 10b presses the center portion of the overload relay 7 with the nut 12 and shaft section 13 housed in the hole 10c located at its tip end, and therefore, the overload relay 7 can be stably held down. Since both the base section 10a and the pressure section 10b of the retainer bushing 10 have

circular configurations around the axial center, the retainer bushing has no directional property in being mounted to the terminal cover 3, meaning that it is excellent in workability.

## Claims

1. An electrical component protection device (2) having a terminal cover (3) for housing therein an electrical component (6) and an overload relay (7), the terminal cover (3) being mounted on an outer surface (1) of an objective equipment to which it is to be mounted, characterized by further comprising: a plurality of ribs (8) which serve as a means for pressing the overload relay (7) against the outer surface of the objective equipment and are formed integrally with the terminal cover (3) on an inner surface of a housing section (9) of the terminal cover (3) for housing therein the overload relay (7), said ribs (8) being located in positions symmetrical about a center of the overload relay (7).
2. An electrical component protection device as claimed in Claim 1, wherein a leading end of each of the ribs (8) fronting the overload relay (7) is formed in an arc configuration.
3. An electrical component protection device as claimed in claim 1 or 2, wherein a retainer bushing (10) having an insulating property and an elasticity is interposed between a top panel of the terminal cover (3) and the overload relay (7) while serving as a means for pressing the overload relay (7) against the outer surface (1) of the objective equipment.
4. An electrical component protection device as claimed in Claim 3, wherein a projection (11) having a round tip end is provided on an inner surface of the terminal cover (3) in a position corresponding to a center position of the overload relay (7), the retainer bushing (10) is provided with a hole to be interlocked with the projection (11) of the terminal cover (3), and the projection (11) and the hole are interlocked with each other to fix and hold the retainer bushing (10) on the terminal cover (3).
5. An electrical component protection device as claimed in Claim 4, wherein the retainer bushing (10) comprises: a base section (10a) having a circular peripheral surface configuration corresponding to an inner surface configuration of the terminal cover (3); a cylindrical pressure section (10b) which abuts on the overload relay (7); a hole (10c) which is provided at a tip end of the pressure section (10b) and houses therein a nut (12) and a shaft section (13) located in a center position of the overload re-

lay (7); and a tapered connection section located between the pressure section (10b) and the base section (10a).

### Patentansprüche

1. Schutzvorrichtung (2) für ein elektrisches Bauteil mit einer Anschlußabdeckung (3) zum Aufnehmen eines elektrischen Bauteils (6) und eines Überlastrelais, wobei die Anschlußabdeckung (3) an einer Außenfläche (1) einer betreffenden Einrichtung angebracht ist, an der sie angebracht werden soll, dadurch gekennzeichnet, daß sie weiterhin enthält:
  - mehrere Rippen (8), die als Einrichtung zum Drücken des Überlastrelais (7) gegen die Außenfläche der betreffenden Einrichtung dienen und integral mit der Anschlußabdeckung (3) auf einer Innenfläche eines Gehäuseabschnittes (9) der Anschlußabdeckung (3) ausgebildet sind, um darin das Überlastrelais (7) aufzunehmen, wobei sich die Rippen (8) in Positionen befinden, die symmetrisch um eine Mitte des Überlastrelais (7) angeordnet sind.
2. Schutzvorrichtung für ein elektrisches Bauteil nach Anspruch 1, bei der ein führendes Ende jeder Rippe (8), die dem Überlastrelais (7) gegenüberliegt, bogenförmig ausgebildet ist.
3. Schutzvorrichtung für ein elektrisches Bauteil nach Anspruch 1 oder 2, bei der eine Haltebuchse (10), die über eine Isoliereigenschaft verfügt und elastisch ist, zwischen einer oberen Wand der Anschlußabdeckung (3) und dem Überlastrelais (7) angeordnet ist und als Einrichtung zum Drücken des Überlastrelais (7) gegen die Außenfläche (1) der betreffenden Einrichtung dient.
4. Schutzvorrichtung für ein elektrisches Bauteil nach Anspruch 3, bei der ein Vorsprung (11) mit einem runden Spitzenende auf einer Innenfläche der Anschlußabdeckung (3) in einer Position angebracht ist, die einer Mittenposition des Überlastrelais (7) entspricht, die Haltebuchse (10) mit einem Loch ausgestattet ist, um mit dem Vorsprung (11) der Anschlußabdeckung (3) verriegelt zu werden, und der Vorsprung (11) sowie das Loch miteinander verriegelt sind, um die Haltebuchse (10) auf der Anschlußabdeckung (3) zu halten und zu fixieren.
5. Schutzvorrichtung für ein elektrisches Bauteil nach Anspruch 4, bei der die Haltebuchse (10) enthält: einen Basisabschnitt (10a) mit einer runden Umfangsfläche entsprechend der Beschaffenheit einer Innenfläche der Anschlußabdeckung (3); einen zylindrischen Druckabschnitt (10b), der gegen das Überlastrelais (7) stößt; ein Loch (10c), das an ei-

nem Spitzenende des Druckabschnittes (10b) ausgebildet ist und eine Mutter (12) sowie einen Schaftabschnitt (13) aufnimmt, der sich in einer Mittenposition des Überlastrelais (7) befindet; und einen konisch zulaufenden Verbindungsabschnitt, der sich zwischen dem Druckabschnitt (10b) und dem Basisabschnitt (10a) befindet.

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### 10 Revendications

1. Dispositif (2) de protection pour composant électrique comportant un couvercle terminal (3) destiné à abriter un composant électrique (6) et un relais de surcharge (7), le couvercle terminal (3) étant monté sur une surface extérieure (1) d'un équipement d'objectif sur lequel il doit être monté, caractérisé en ce qu'il comprend en outre :
  - une pluralité de nervures (8) qui servent de moyens pour presser le relais de surcharge (7) contre la surface extérieure de l'équipement d'objectif et forment une seule pièce avec le couvercle terminal (3) sur une surface intérieure d'une partie de logement (9) du couvercle terminal (3) pour y abriter le relais de surcharge (7), lesdites nervures (8) étant situées dans des positions symétriques par rapport au centre du relais de surcharge (7).
2. Dispositif de protection pour composant électrique selon la revendication 1, dans lequel une extrémité de tête de chacune des nervures (8) faisant face au relais de surcharge (7) a une configuration en forme d'arc.
3. Dispositif de protection pour composant électrique selon la revendication 1 ou 2, dans lequel une douille de retenue (10) dotée de propriété isolante et d'élasticité est interposée entre un panneau supérieur du couvercle terminal (3) et le relais de surcharge (7) tout en servant de moyen pour presser le relais de surcharge (7) contre la surface extérieure (1) de l'équipement d'objectif.
4. Dispositif de protection pour composant électrique selon la revendication 3, dans lequel une projection (11) dont l'extrémité a un bout rond est placée sur une surface intérieure du couvercle terminal (3) dans une position correspondant à une position centrale du relais de surcharge (7), la douille de retenue (10) est pourvue d'un trou qui doit être verrouillé avec la projection (11) du couvercle terminal (3), et la projection (11) et le trou sont verrouillés l'un avec l'autre pour fixer et tenir la douille de retenue (10) sur le couvercle terminal (3).
5. Dispositif de protection pour composant électrique selon la revendication 4, dans lequel la douille de retenue (10) comprend : une partie de base (10a)

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présentant une configuration de surface périphérique circulaire correspondant à une configuration de surface intérieure du couvercle terminal (3); une partie de pression cylindrique (10b) qui bute contre le relais de surcharge (7); un trou (10c) qui est placé à une extrémité de bout de la partie de pression (10b) et y abrite un écrou (12) et une partie d'arbre (13) située dans une position centrale du relais de surcharge (7); et une partie de connexion conique située entre la partie de pression (10b) et la partie de base (10a).

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FIG.1

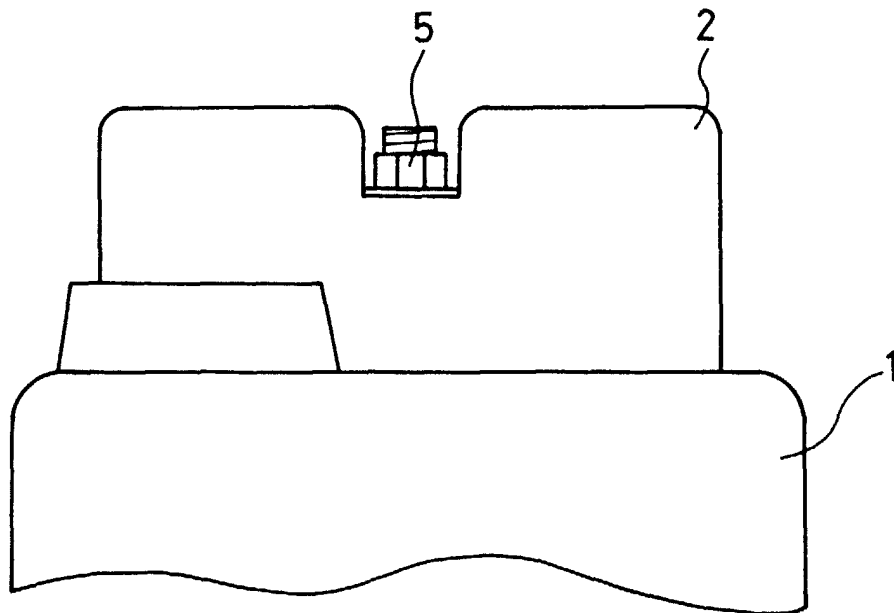


FIG.2

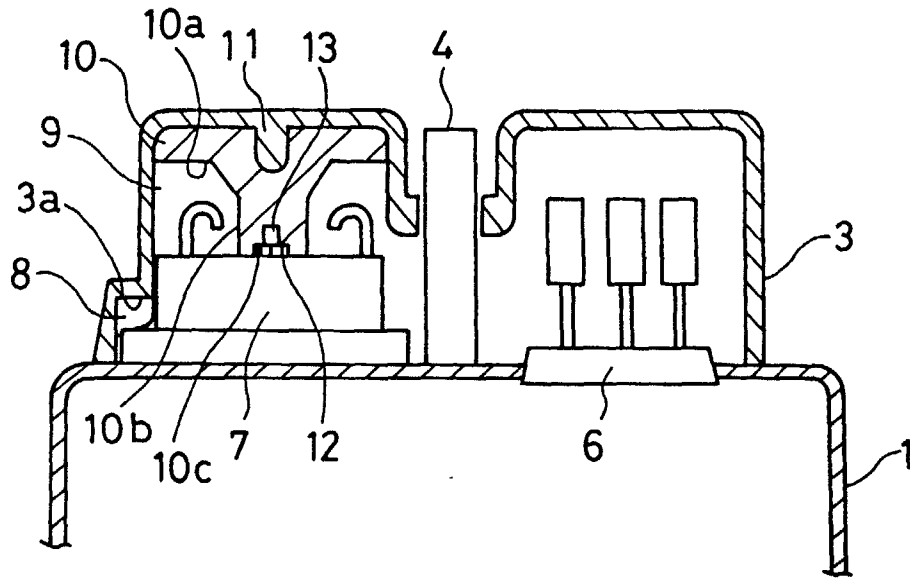


FIG.3

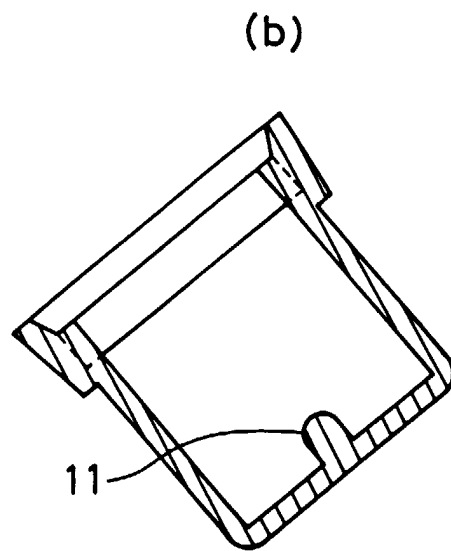
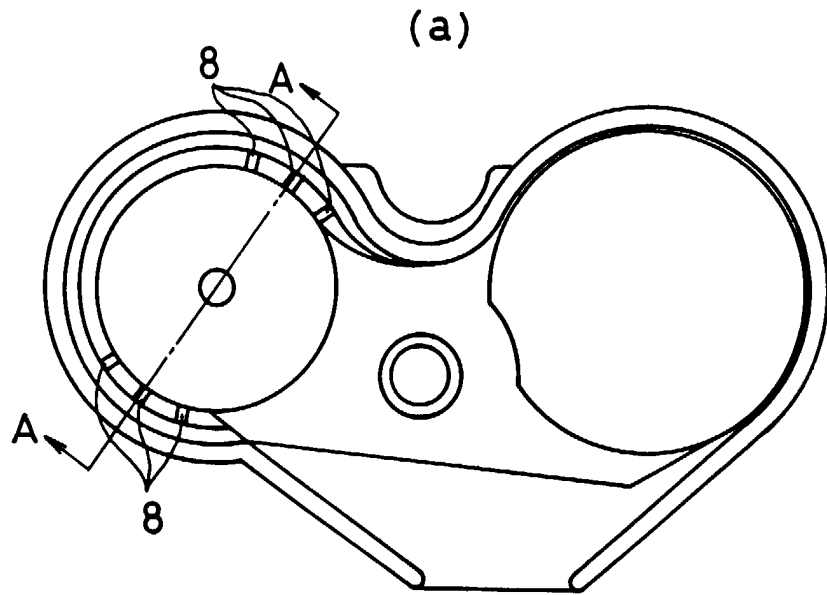


FIG.4

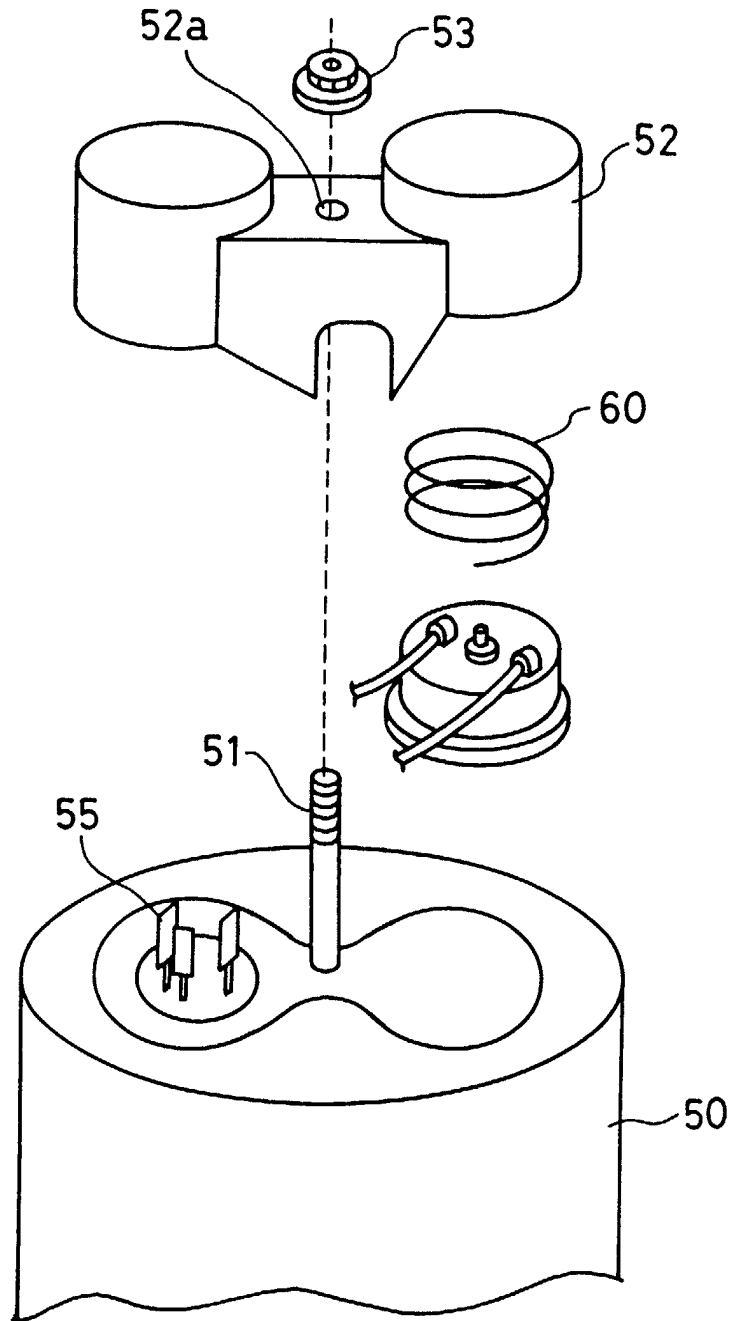


FIG.5

