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(12) # EUROPEAN PATENT APPLICATION

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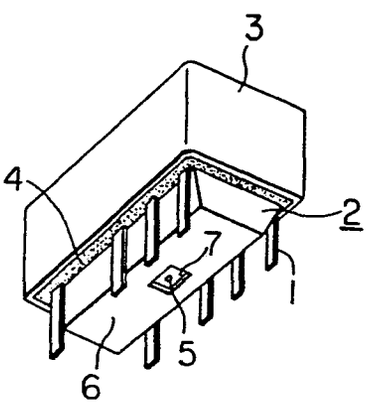
(54) **Compact design relay.**

(57) In a compact design relay, in which gaps between a base member (2) and a case member (3) covering the base member and between the base member (2) and terminal pins (1) mounted on the base member are sealed by filing the gaps with an adhesive (4) which is thermally hardened thereafter, a small air vent hole (5) is formed in part of the case member (3) and/or base member (2) free from the adhesive (4) and is sealed with a further adhesive (8) after the thermal hardening treatment of the first-mentioned adhesive (4).

FIG. 2



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COMPACT DESIGN RELAY

This invention relates to miniature or compact design relays and, more particulaly, to compact design relays having a sealed construction.

Usually, a compact design relay of this type is manufactured by covering a base member provided with necessary terminal pins with a case open at the bottom and a resin adhesive which is applied to portions of the base in engagement with the open end of the cover and those receiving the terminal pins and then thermally hardened. With this construction, however, at the time of the thermal treatment of the resin adhesive the air pressure in the interior of the case is so increased that the inside air leaks to the outside through the adhesive before the adhesive is completely hardened, resulting in such disadvantages that very small air passages may be formed in the adhesive material and that gases produced from the adhesive during the thermal treatment thereof is filled in the interior of the case.

An object of the invention is to remove the drawbacks discussed above.

To achieve the above object, according to the invention there is provided a compact design relay, in which a gap between a base member provided with terminal pins and a case covering the base is sealed by filling

the gap with an adhesive and thermally hardening the adhesive, and in which a vent hole is formed in a portion of the case and/or the base free from the adhesive and is sealed with a further adhesive after the thermal treatment of the first-mentioned adhesive.

Fig. 1 is a sectional view showing an example of the conventional compact design relay.

Fig. 2 is a perspective view showing an embodiment of the invention.

Fig. 3 is a sectional view of the embodiment of Fig. 2.

Fig. 4 is a perspective view showing another embodiment of the invention.

Fig. 5 is a sectional view of the embodiment of Fig. 4.

Fig. 6 is a perspective view showing a further embodiment of the invention.

Fig. 7 is a sectional view of the embodiment of Fig. 6.

Fig. 8 is a perspective view showing a still further embodiment of the invention.

Fig. 9 is a sectional view of the embodiment of Fig. 8.

For the better understanding of the invention, an example of the conventional compact design relay, shown in Fig. 1, will first be described. This compact design relay is manufactured by covering a base member 2

provided with terminal pins 1 with a case 3 open at the bottom and sealing the assembly with a resin adhesive 4 which is applied to portions of the base in engagement with the open end of the cover and those receiving the terminal pins and then thermally hardened. In this case, the adhesive 4 may extend over the while area of the lower end opening of the case 4 and this construction has the drawbacks as discussed previously.

Figs. 2 and 3 show a preferred embodiment in which the invention is applied to such a compact design relay as disclosed in the United States Patent No. 4,227,162 assigned to the same assignee of this invention.

In this preferred embodiment a base 2 has a portion 6 which expands outwardly downwardly and extends along the longitudinal center axis of the base 2. A small hol 5 is formed in a recess 7 provided at a given portion of the expanded base portion 6 and a plurality of terminal pins 1 are arranged parallelly along the opposite sides of the expanded portion 6. In this embodiment the inflated air due to the inner pressure produced when thermally hardening the adhesive 4 filing the gap between the case 3 and base 2 and also gases produced from the adhesive at this time may be exhausted through the hole 5 to the outside, so that there is no possibility of the formation of small air passages in the hardened adhesive and also a cloud of gases produced from the adhesive. After the hardening of the adhesive 4, the small hole 5

is sealed with a small quantity of adhesive 8 in the last step. At this time, only a very small quantity of adhesive 8 is required for sealing the small hole 5, so that there is no possibility of increasing the internal pressure, and the reliability of sealing can be increased. With this construction with the base 2 having such an expanded portion 6, the molding can be provided over a reduced area, and the quantity of the necessary resin can be reduced. Further, when the relay is mounted on a printed -circuit board P for use, improved ventilation can be obtained since a gap is formed between the portion of the relay base at which the terminal pins are mounted the surface portion of the printed-circuit board. Further, since the expanded portion 6 is provided on the underside of the base, the small hole 5 for sealing can be provided in the expanded portion 6 without sacrifice in appearance in use at all. Further, if the interior of the expanded portion 6 of the base 2 is utilized for accommodating a relay coil section, the height of the relay from the printed-circuit board in the mounted state can be reduced to obtain a more compact construction as a whole.

While in the illustrated embodiment a recess 7 is formed so that adhesive may spread over the portion of the recess 7 around the small hole 5, it is only necessary for the adhesive to close the small hole 5 which is very small, and it is not necessary to fill the

entire recess 7 with the adhesive. Further, while in the above embodiment the small hole 5 is provided at the center of the expanded portion 6 of the base 2 in the longitudinal direction thereof, this position of the small hole 5 is by no means limitative.

Further, the recess for receiving the adhesive is not always necessary. For example, as shown in Figs. 4 and 5, a ridge 9 provided on the expanded portion 6 to surround the small hall 5 may prevent the adhesive 8 from spreading widely over the surface of the expanded portion 6 in case an excessive quantity of adhesive is applied to the hole 5. In this case, however, since only the lower surface of the ridge 9 comes into abutment contact with the upper surface of a printed-circuit board when the relay is mounted on the board in use, it is preferable to povided another ridge 10 which is arranged substantially symmetrically with respect to the ridge 9 in order to assure the steady mounting of the relay.

Further, while in the above embodiment the base 2 is provided with the expanded portion 6, it is also possible to make the lower surface of the base 2 flat, as shown in Figs. 6 and 7, with grooves 11 formed in the terminal pin mounting portions of the base 2 so that the terminal pins 1 are mounted in these grooves 11 and the grooves 11 are filled with the adhesive 4, provided that there is no problem in ventilation of the

underside of the relay. In this case, the small hole 5 may be provided in any suitable portion other than the grooves. The ridge 9 surrounding the small hole 5 and the ridge 10 for the purpose of steadiness may be provided also in this embodiment in the same manner as in the embodiment of Figs. 4 and 5. However, such a single bar-like ridge 12 may be substituted for the surrounding ridge 10, as shown in Fig. 6.

Further, in the case there is no problem with respect to the heat dissipation or the whole height of the relay when it is mounted on a board, such an embodiment as shown in Figs. 8 and 9 may be utilized. In this embodiment, no grooves are not provided in the base 2 and the adhesive 4 is applied to whole the bottom surfaces of the base 2 except for the areas surrounded by the ridge 9 surrounding the small hole 5 and the ridge 10 for the purpose of steadiness. In this embodiment, the adhesive is unavoidably increased in its quantity. However, the increase in the quantity of adhesive may be considerably reduced by widening the areas surrounded by the ridges 9 and 10.

Further, from the standpoint of the function of the small hole 5 alone, the small hole 5 may be provided in the case 3 or to penetrate both the case 3 and base 2. From the standpoint of appearance, howevere, it is of course better to provide the small hole 5 in the underside of the base 2.

WHAT IS CLAIMED IS:

1. A compact design relay comprising:

a base member (2) provided with a relay mechanism and terminal pins (1) connected to said relay mechanism;

a case member (3) covering said base member;

a first adhesive (4) applied to gaps formed between said base member and said case member and between said base member and said terminal pins and thermally hardened so as to air-trightly seal said gaps;

a small air vent hole (5) formed in at least one of a part of said case member and a part of said base member free from said first adhesive; and

a second adhesive (8) applied to said small air vent hole after the hardening treatment of said first adhesive.

2. A compact design relay according to claim 1, wherein said base member (2) has a portion (6) which expands outsardly downwardly and which extends along a longitudinal center axis of said base member said terminal pins (1) being mounted at portions of said base member along the opposite sides of said expanded portion so that a gap may be provided between the terminal pin mounting portions of said base member and a relay mounting member (P) when the relay is mounted for use on said relay mounting member.

3. A compact design relay according to claim 2,

wherein said small air vent hole (5) is formed in a portion of said expanded base portion (6).

4. A compact design relay according to claim 1, 2 or 3, wherein said base member (2) is provided with grooves (11) communicating with said gaps, and said grooves are filled with said first adhesive(4).

5. A compact design relay according to claim 4, wherein siad base member (2) is provided with a recessed portion (7) and said small air vent hole (5) is formed within said recessed portion.

6. A compact design relay according to claim 4, wherein said base member (2) is provided with a first ridge (9) surrounding said small air vent hole (5).

7. A compact design relay according to claim 6, wherein said base member (2) is provided with a second ridge (10, 12) for stabilizing the mounting state of said relay on a relay mounting member (P) in use, in cooperation with said first ridge (9).

FIG. 1

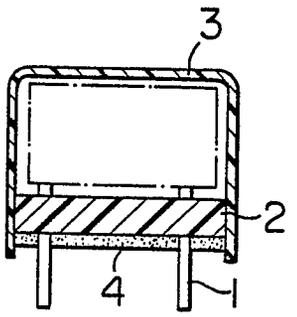


FIG. 2

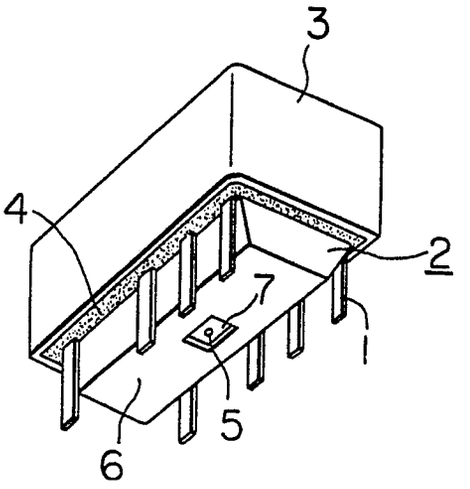


FIG. 3

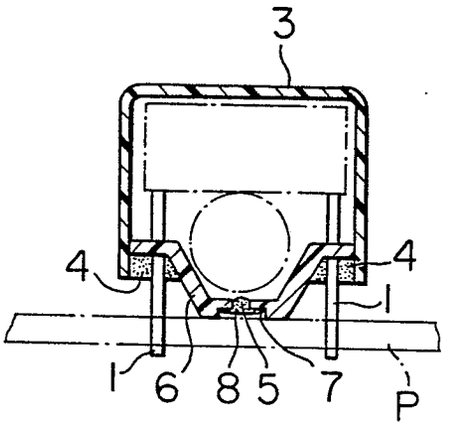


FIG. 4

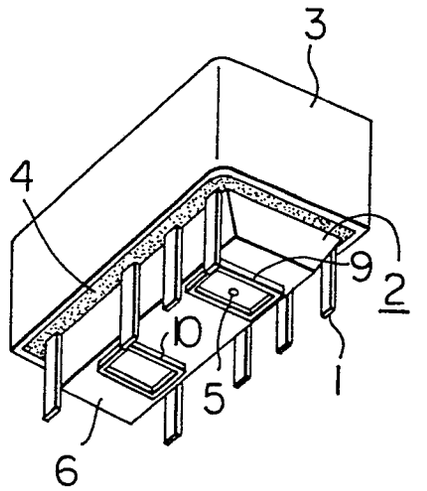


FIG. 5

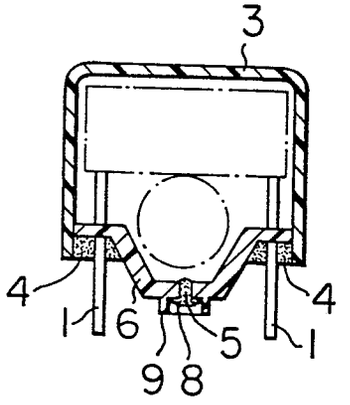


FIG. 6

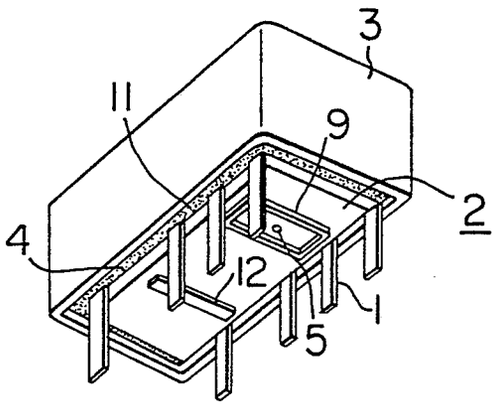


FIG. 7

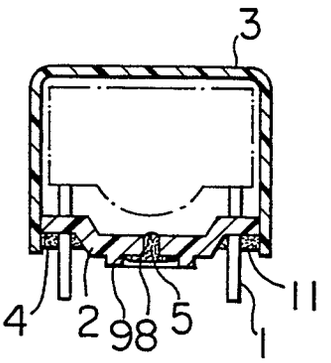


FIG. 8

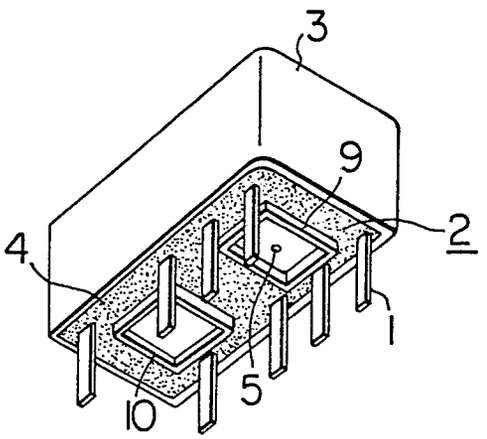
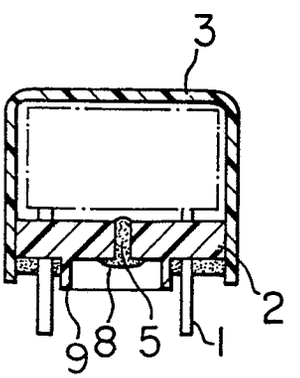


FIG. 9



European Patent Office

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Application number
EP 81 30 3143

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X,Y	DE - A - 2 618 492 (SIEMENS) * Page 6, lines 6-18 *	1-4,6,7
Y D	DE - A - 2 908 887 (IZUMI DENKI) * Page 17, alineas 2 and 3 * & US - A - 4 227 162	2-4
A	GB - A - 2 029 107 (R. BOSCH) * Page 2, lines 83-102 *	5

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

H 01 H 50/02

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

H 01 H 50/00
H 05 K 5/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same category
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	09-03-1982	LIBBERECHT