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⑰ **Compact design relay.**

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㉒ References cited:
DE-A-2 618 492
DE-A-2 908 887
GB-A-2 029 107

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Description

This invention relates to miniature or compact design relays and, more particularly, 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 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 disadvantages such as the fact that very small air passages may be formed in the adhesive material and that gases produced from the adhesive during the thermal treatment thereof fill the interior of the case.

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

In German Specification DE—A—2,618,492 there is disclosed a base member provided with a relay mechanism and terminal pins connected to said relay mechanism; a case member covering said base member; a first adhesive applied to gaps formed between said base member and said case member and between said base member and said terminal pins, said first adhesive being thermally hardened so as to seal said gaps in an air-tight manner; an air vent hole formed in the base member; a second adhesive which has been applied to said air vent hole after the said first adhesive has been hardened. In the construction shown in German Specification DE—A—2,618,492, however, the base member is substantially flat and the air vent hole is not disposed outwardly of the first adhesive. As a result, it is not possible to introduce the first adhesive by injecting it into position because of the risk of the first adhesive entering the air vent hole, and use therefore has to be made of a fleece containing the first adhesive. Such use of a fleece, however, increases costs and makes it difficult to ensure that there is perfect sealing of the said gaps. Moreover, when the relay of German Specification DE—A—2,618,492 is mounted on a printed circuit board, there is no space for ventilation therebetween by reason of the substantially flat nature of the base member.

The present invention is therefore characterised in that said base member, as known per se, has a centrally disposed trough-shaped portion and first and second flat portions on opposite sides of said trough-shaped portion, said terminal pins being mounted in said flat portions, and further characterised in that the bottom of the trough-shaped portion projects substantially outwardly both of the first adhesive and of the first and second flat portions, the air vent hole being

formed in the bottom of the trough-shaped portion so as to be free from said first adhesive.

The construction of the present invention ensures that the first adhesive can be introduced in such a way that the gaps between the flat portions of the base member and the case member, and the gaps between the flat portions and the terminal pins, can be easily sealed in a single manufacturing process with a minimum of first adhesive and without any risk that the first adhesive will enter the air vent hole. The construction of the present invention also ensures that there is a substantial gap between the portion of the relay base at which the terminal pins are mounted and the surface portion of the printed circuit board so as to ensure adequate ventilation.

A relay having a centrally disposed trough-shaped portion is disclosed per se in the Applicants' German Specification DE—A—2,908,887. The relay of the latter specification, however, does not have an air vent hole sealed by a second adhesive.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

Figure 1 is a sectional view showing an example of a conventional compact design relay,

Figure 2 is a perspective view showing an embodiment of the invention,

Figure 3 is a sectional view of the embodiment of Figure 2,

Figure 4 is a perspective view showing another embodiment of the invention, and

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

For the better understanding of the invention, an example of a conventional compact design relay, which is shown in Figure 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 which is 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, the resin then being thermally hardened. In this case, the adhesive 4 may extend over the whole area of the lower end opening of the case 4 and this construction has the drawbacks as discussed previously.

Figures 2 and 3 show a preferred embodiment in which the invention is applied to a compact design relay such as disclosed in German Specification DE—A—2 908 887 assigned to the same assignee of this invention.

In this preferred embodiment, a base 2 has a projecting trough-shaped portion 6 which projects outwardly downwardly and extends along the longitudinal centre axis of the base 2. The base 2 has first and second flat portions 2a, 2b on opposite sides of the projecting trough-shaped portions 6. The bottom of the projecting trough-shaped portion 6 thus projects substantially outwardly of the adhesive 4 and of the flat portions 1a, 2b. A small vent hole 5 is formed in a recess 7

provided in the bottom of the projecting trough-shaped portion 6 so that the vent hole 5 is free from the adhesive 4. A plurality of terminal pins 1 are arranged parallel to each other along the opposite sides of the projecting portion 6, the terminal pins 1 being mounted in the flat portions 2a, 2b. In this embodiment the inflated air due to the inner pressure produced when thermally hardening the adhesive 4 filling 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 either the formation of small air passages in the hardened adhesive or of a cloud of gases produced from the adhesive. After the hardening of the adhesive 4, the small vent hole 5 is sealed with a small quantity of adhesive 8 as the last step. At this time, only a very small quantity of adhesive 8 is required for sealing the small vent 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 a projecting trough-shaped portion 6, the moulding 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 thereon, improved ventilation can be obtained since a gap is formed between the portion of the relay base at which the terminal pins are mounted on the surface portion of the printed-circuit board. Further, since the projection trough-shaped portion 6 is provided on the underside of the base, the small vent hole 5 for sealing is provided in the bottom of the projecting trough-shaped portion 6 without any sacrifice in appearance in use at all. Further, if the interior of the projecting trough-shaped 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 embodiment illustrated in Figures 2 and 3, a recess 7 is formed so that adhesive may spread over the portion of the recess 7 around the small vent hole 5, it is only necessary for the adhesive to close the vent 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 vent hole 5 is provided at the centre of the bottom of the projecting trough-shaped portion 6 of the base 2 in the longitudinal direction thereof, this position of the small vent hole 5 is by no means limitative.

Further, the recess for receiving the adhesive is not always necessary. For example, as shown in Figures 4 and 5, a ridge 9 which is provided on the bottom of the projecting trough-shaped portion 6 to surround the small vent hole 5 may prevent the adhesive 8 from spreading widely over the surface of the bottom of the projecting trough-shaped portion 6 in case an excessive quantity of adhesive is applied to the vent 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 provide another ridge 10 which is arranged substantially symmetrically with respect to the ridge 9 in order to assure the steady mounting of the relay.

Claims

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 (2); a first adhesive (4) applied to gaps formed between said base member (2) and said case member (3) and between said base member (2) and said terminal pins (1), said first adhesive (4) being thermally hardened so as to seal said gaps in an air-tight manner; an air vent hole (5) formed in the base member (2); a second adhesive (8) which has been applied to said air vent hole (5) after the said first adhesive has been hardened, characterised in that said base member (2), as known per se, has a centrally disposed trough-shaped portion (6) and first and second flat portions (2a, 2b) on opposite sides of said trough-shaped portion (6), said terminal pins (1) being mounted in said flat portions (2a, 2b), and further characterised in that the bottom of the trough-shaped portion (6) projects substantially outwardly both of the first adhesive (4) and of the first and second flat portions (2a, 2b), the air vent hole (5) being formed in the bottom of the trough-shaped portion (6) so as to be free from said first adhesive (4).

2. A compact design relay according to claim 1, characterised in that the said bottom of the trough-shaped portion (6) is mounted in a relay mounting member (P).

3. A compact design relay according to claim 1 or 2 characterised in that the bottom of the trough-shaped portion (6) is provided with a recessed portion (7), and said air vent hole (5) is formed within said recessed portion.

4. A compact design relay according to claim 1 or 2 characterised in that the bottom of the trough-shaped portion (6) is provided with a first ridge (9) surrounding said air vent hole (5).

5. A compact design relay according to claim 4 characterised in that the bottom of the trough-shaped portion (6) is provided with a second ridge (10, 12) which, together with the first ridge (9), is adapted to stabilize the mounting of said relay on a relay mounting member (P).

Patentansprüche

1. Relais kompakter Bauweise, umfassend ein Basiselement (2) mit einem Relaismechanismus sowie mit letzterem verbundenen Anschlußstiften

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(1), ein das Basiselement (2) umschließendes Gehäuseelement (3), ein erstes Klebmittel (4), das in die zwischen Basiselement (2) und Gehäuseelement (3) sowie zwischen Basiselement (2) und Anschlußstiften (1) gebildeten Fugen eingebracht und thermisch ausgehärtet ist, so daß es die Fugen luftdicht verschließt, eine im Basiselement (2) ausgebildete Entlüftungsöffnung (5), (und) ein zweites Klebmittel (8), das nach dem Aushärten des ersten Klebmittels in die Entlüftungsöffnung (5) eingebracht worden ist, dadurch gekennzeichnet, daß das Basiselement (2) in an sich bekannter Weise einen mittigen, muldenförmigen Abschnitt (6) sowie erste und zweite flache Abschnitte (2a, 2b) auf gegenüberliegenden Seiten des muldenförmigen Abschnitts (6) aufweist, wobei die Anschlußstifte (1) in den flachen Abschnitten (2a, 2b) montiert sind, sowie weiterhin dadurch gekennzeichnet, daß der Boden des muldenförmigen Abschnitts (6) gegenüber sowohl dem ersten Klebmittel (4) als auch erstem und zweitem flachen Abschnitt (2a, 2b) wesentlich nach außen vorsteht, wobei die Entlüftungsöffnung (5) im Boden des muldenförmigen Abschnitts (6) so ausgebildet ist, daß sie vom ersten Klebmittel (4) frei ist.

2. Relais kompakter Bauweise nach Anspruch 1, dadurch gekennzeichnet, daß der Boden des muldenförmigen Abschnitts (6) auf einem Relais-tragelement (P) montiert ist.

3. Relais kompakter Bauweise nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Boden des muldenförmigen Abschnitts (6) mit einem vertieften Abschnitt (7) versehen ist und die Entlüftungsöffnung (5) im vertieften Abschnitt ausgebildet ist.

4. Relais kompakter Bauweise nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Boden des muldenförmigen Abschnitts (6) mit einem ersten, die Entlüftungsöffnung (5) umgebenden Steg (9) versehen ist.

5. Relais kompakter Bauweise nach Anspruch 4, dadurch gekennzeichnet, daß der Boden des muldenförmigen Abschnitts (6) mit einem zweiten Steg (10, 12) versehen ist, der zusammen mit dem ersten Steg (9) die Anbringung des Relais an einem Relais-tragelement (P) zu stabilisieren vermag.

Revendications

1. Relais compact, comprenant un organe de base (2) pourvu d'un mécanisme de relais et de broches de connexion (1) reliées audit mécanisme de relais; un organe de boîtier (3) recouvrant l'organe de base (2); un premier adhésif (4) appliqué à des interstices formés entre l'organe de base (2) et l'organe de boîtier (3) et entre l'organe de base (2) et les broches de connexion (1), le premier adhésif (4) étant durci thermiquement de manière à sceller lesdits interstices de façon étanche à l'air; un trou d'aération (5) formé dans l'organe de base (2); un second adhésif (8) qui a été appliqué au trou d'aération (5) après que le premier adhésif a été durci, caractérisé en ce que ledit organe de base (2), tel que connu en soi, possède une partie en forme d'auget (6) disposée centralement et des première et seconde parties plates (2a, 2b) sur les côtés opposés de la partie en forme d'auget (6), lesdites broches de connexion (1) étant montées dans lesdites parties plates (2a, 2b), et en outre caractérisé en ce que le fond de la partie en forme d'auget (6) fait saillie sensiblement vers l'extérieur à la fois du premier adhésif (4) et des première et seconde parties plates (2a, 2b), le trou d'aération (5) étant formé dans le fond de la partie en forme d'auget (6) de manière à être dégagé du premier adhésif (4).

2. Relais compact selon la revendication 1, caractérisé en ce que le fond de la partie en forme d'auget (6) est monté sur un organe (P) de montage du relais.

3. Relais compact selon la revendication 1 ou 2, caractérisé en ce que le fond de la partie en forme d'auget (6) est pourvu d'une partie en renforcement (7), et le trou d'aération (5) est formé à l'intérieur de ladite partie en renforcement.

4. Relais compact selon la revendication 1 ou 2, caractérisé en ce que le fond de la partie en forme d'auget (6) est pourvu d'une première nervure (9) entourant le trou d'aération (5).

5. Relais compact selon la revendication 4, caractérisé en ce que le fond de la partie en forme d'auget (6) est pourvu d'une seconde nervure (10, 12) qui, en association avec la première nervure (9), est agencée pour stabiliser le montage dudit relais sur un organe (P) de montage du relais.

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FIG. 2

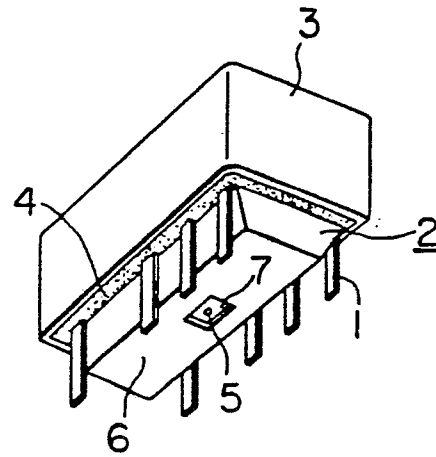


FIG. 1

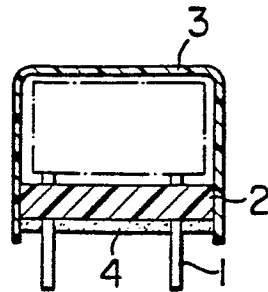


FIG. 4

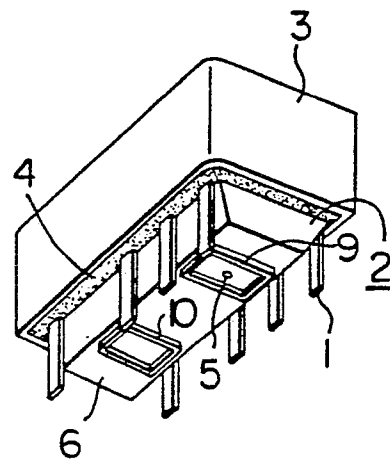


FIG. 3

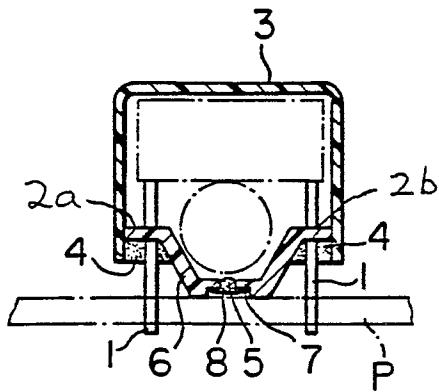


FIG. 5

