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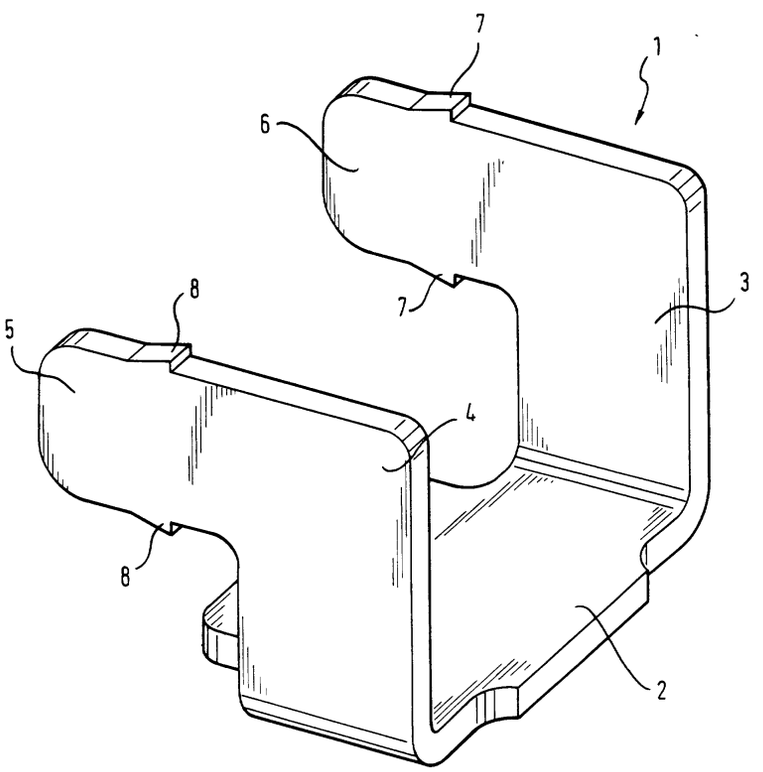
(54) Hold down device for electrical connectors for mounting on the surface of a printed circuit board

(57) The present invention relates to a hold down device (1) for fixing electrical connector casings to be fitted on the surface of a printed circuit board, comprising a U-shaped metal body. The base zone (2) is a flat and wide fixing surface, the device being placed on the side opposite the legs of the contacts to be soldered in order to balance the connector casing when it is positioned and fitted on the surface of the printed circuit board.

Fig. 1



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Description

[0001] The present invention relates to a support fastener and more generally a hold down device for electrical connectors for fitting on the surface of a printed circuit board, comprising a U-shaped metal body. In numerous applications which make use of printed circuit boards, the latter are connected to other components by other pleg-in connections, fixed to the boards on the side of the board connectors. One application concerns more particularly the connection of a printed circuit board of a mobile telephone to its corresponding battery. The connection fasteners are fitted on the connector casing to be fitted on the surface and are then fitted on the surface of the printed circuit board by the use of the so-called "reflow" process. This method of fixing of a connector casing is known from USP 5 186 654. In this patent, two fasteners are provided, one at either end of the connector casing, which engage in recesses provided in the casing for that purpose. Here, it is necessary to provide two fasteners, in order to secure the correct orientation of the connector casing on the printed circuit board. Also, this arrangement calls for an increased space on the printed circuit board, where it is necessary to provide two places for soldering the fasteners and moreover, the fixing zones of the fasteners overhang the contour of the connector casing proper.

[0002] Generally and in addition, the components which are fitted on the surface are provided with soldering legs on either side, in order to compensate for the effects of sliding and of rotation due to the fluidity of the solder. In fact, components which only have legs on one side can experience lifting and unbalancing and therefore be badly soldered; this problem is generally met in mobile telephone battery connectors.

[0003] The present invention has the object to provide a hold down device of the type described here above, which makes it possible to fix a connector casing on a printed circuit board, easily and efficiently.

[0004] This object is achieved according to the invention by a hold down device for fixing electrical connector casings to be fitted on the surface of a printed circuit board, comprising a U-shaped metal body, the base zone being a flat and wide fixing surface, the device being placed on the side opposite to the contact legs to be soldered, in order to balance the connector casing when it is being placed and fitted on the surface of the printed circuit board.

[0005] According to one embodiment of the hold down device according to the invention, the uprights have at their free ends and on the same side, shoulders formed transversely with respect to the axis of the upright and comprise indentations for fixing by hooking into the connector casing.

[0006] In this embodiment of the hold down device according to the invention, the ends of the shoulders have rounded corners and the indentations are formed at a distance from the corners on the side edges as ramps rising backwards in the direction of insertion.

[0007] The fixing surface of the hold down device according to the invention is preferably connected by means of a small bar to a carrying strip, where the distances between the small bars on the carrying strip are chosen in such a way as to make possible a direct and automatic insertion of the hold down devices into the connector casings, whilst the hold down devices are still on the carrying strip.

[0008] According to another embodiment of the hold down device according to the invention, the hooking of the uprights into the connector casing takes place in the side walls of a receiving plug socket of a connector casing and the base zone overhangs the fixing side of the base of the connector casing by the same height as the soldering legs of the contacts overhang the base of the casing.

[0009] According to yet another embodiment of the hold down device according to the invention, the small bars are separated from the zones of the bases of the hold down devices by vibrations and/or machine bending, when the hold down devices have been inserted into their casing.

[0010] The invention will now be explained more fully by means of the description of an embodiment example referring to Fig. 1, 2 and 3 :

Fig.1 is a perspective view of a hold down device and in particular a support fastener according to the invention;

Fig. 2 shows a support fastener on its carrying strip ; and

Fig. 3 shows a support fastener according to Fig. 1, inserted into the connector casing.

[0011] Fig. 1 shows the hold down device or fastener support 1, according to the invention, which has a U-shaped metal body with a base 2 and two uprights 3, 4. The base is designed to have a contact surface large enough and wide enough to make possible its effective fitting on the printed circuit board.

[0012] Each of the uprights 3,4 has, located perpendicularly to its longitudinal axis, a shoulder 5,6 arranged in the same direction. On the side edges of the shoulders 5, 6 are arranged, at a certain distance from the fronts of the shoulders, indentations or hooks 7, 8 which make it possible to fix the connection rigidly in position when the support fastening 1 is inserted on a connector casing. They have the shape of ramps to facilitate their introduction into the connector housing. Similarly, the edges of the fronts of the shoulders 5, 6 are rounded.

[0013] Fig. 2 shows three support fasteners 1 according to the invention, connected by means of a small bar 9 to a carrying strip 10. The carrying strip and the fasteners are cut from the same plate on which only one further working step is needed to bend the fasteners into

their final shape. The fasteners are arranged at a distance from one another on the carrying strip 10 provided for the direct and automatic insertion into the connector casings, whilst the latter are still connected by the small bar 9 to the carrying strip 10. This facilitates the fitting of the casings in such a way that the connector casings fixed in this way can be provided with elements which are required for the next stage. Accordingly, the separation of the connector casing from the carrying strip 10 does not take place until the fasteners have been inserted into their casing. The separation takes place by vibration and/or bending of the small bars 9.

[0014] Fig. 3a is a perspective view of a connector casing 11 with three identical contacts 12 in the plug-in sockets 13 provided for that purpose. Fig. 3b shows the same arrangement as seen from the opposite side and aslant, with a support fastener 1 already in place. In the side walls 14 of the central plug-in socket 13 are provided recesses and slots, in which the shoulders 5, 6 become lodged. The support fastener 1 is therefore placed in the casing 11, in a direction parallel to the level of the base 2. In the case which is shown here, the base of the central plug-in socket 13 is recessed at the place of the base 2 of the support fastener 1. Alternatively, it is also possible to envisage providing slots only in the uprights 3, 4 in order to insert the support fastener 1 onto the casing 11. The lower side of the base 2 of the support fastener 1 is on the same level as the contact ends of the soldering legs 15 of the contacts 12. The latter finally determine the distance from the lower side of the base 2 of the support fastener 1 with respect to the base of the casing 11, which is defined by the corresponding length of the uprights 3, 4. The fitting on the surface of the connector casing 11 onto the printed circuit board is effected by pressing and then soldering the support fastener 1 on a corresponding liquid tin soldering eye at the same time as the soldering of the soldering legs 15 to the corresponding eyes of the circuit on the board. Using a gripping tool provided for moving the connector casing 11, it is possible to envisage an exact placing of the connector casing on the board. There is neither a fastener, nor a part which is integral with the top of the connector casing and this solution produces a large amount of additional space. The preceding description of an embodiment example of the present invention should not be understood to be in any sense a restrictive one. The invention also concerns any variants which are covered by the protected Claims. Thanks to this fastener and more generally to this hold down device, any tilting during the positioning of the casing is avoided. Similarly, any effect of sliding or tilting due to the fluidity of the solder during fitting on the surface, are similarly avoided.

Claims

1. A hold down device (1) for fixing electrical connector casings (11) to be fitted on the surface of a printed circuit board, comprising a U-shaped metal body and **characterised by** the fact that the base zone (2) is a flat and wide fixing surface, the device being placed on the side opposite to the legs of the contacts to be soldered to balance the connector casing when it is being placed and fitted on the surface of the printed circuit board.

2. A hold down device according to Claim 1, **characterised by** the fact that the uprights (3, 4) have at their free ends and on the same side, shoulders (5, 6), formed transversely with respect to the axes of the uprights and comprising indentations (7, 8) for fixing by hooking into the connector casing (11)

3. A hold down device according to Claim 1, **characterised by** the fact that the ends of the shoulders (5, 6) have rounded corners and that the indentations (7, 8) are formed at a distance from the corners on the side edges as ramps rising backwards in the direction of insertion.

4. A hold down device according to Claims 1 or 2, **characterised by** the fact that the fixing surface (2) is connected by means of a small bar (9) to a carrying strip (10), where the distances (a) between the small bars on the carrying strip (10) are chosen in such a way as to make possible a direct and automatic insertion of the hold down devices into the connector casings (11), whilst the hold down devices are still on the carrying strip (10)

5. A hold down device according to one of the preceding Claims, **characterised by** the fact that the hooking of the uprights (3, 4) into the connector casing (11) is effected in the side walls of a pleg-in socket (13) of a connector casing (11) and that its base (2) overhangs the fixing side of the base (16) of the connector casing at the same height as that at which the soldering legs of the contacts (15) overhang the base of the casing (16)

6. A hold down device according to Claim 3, **characterised by** the fact that when the hold down devices have been inserted into their casing, the small bars (9) become separated by vibrations and/or machine bending of the base zone (2) of the hold down device (1)

Fig. 1

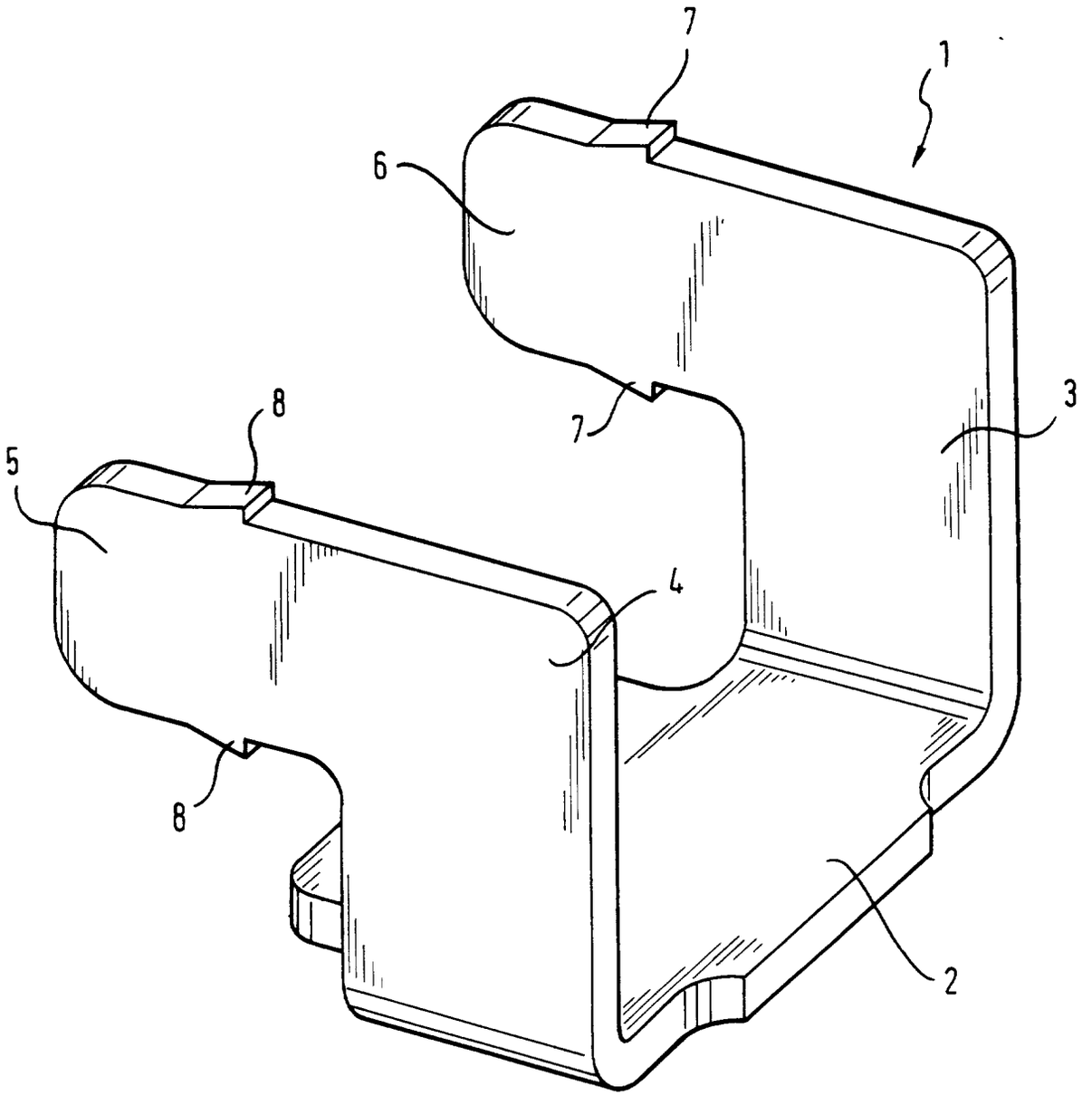


Fig. 2

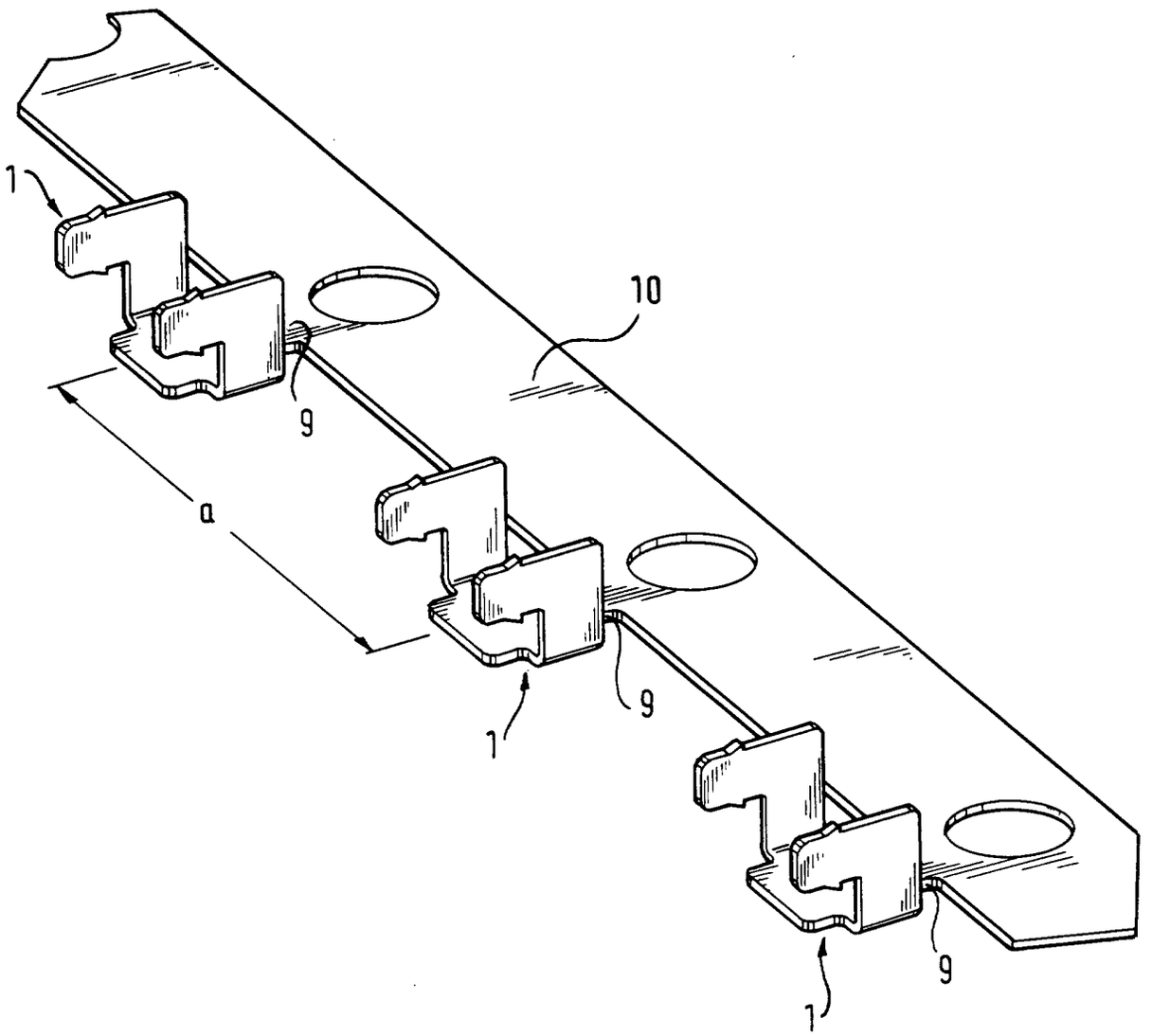


Fig. 3a

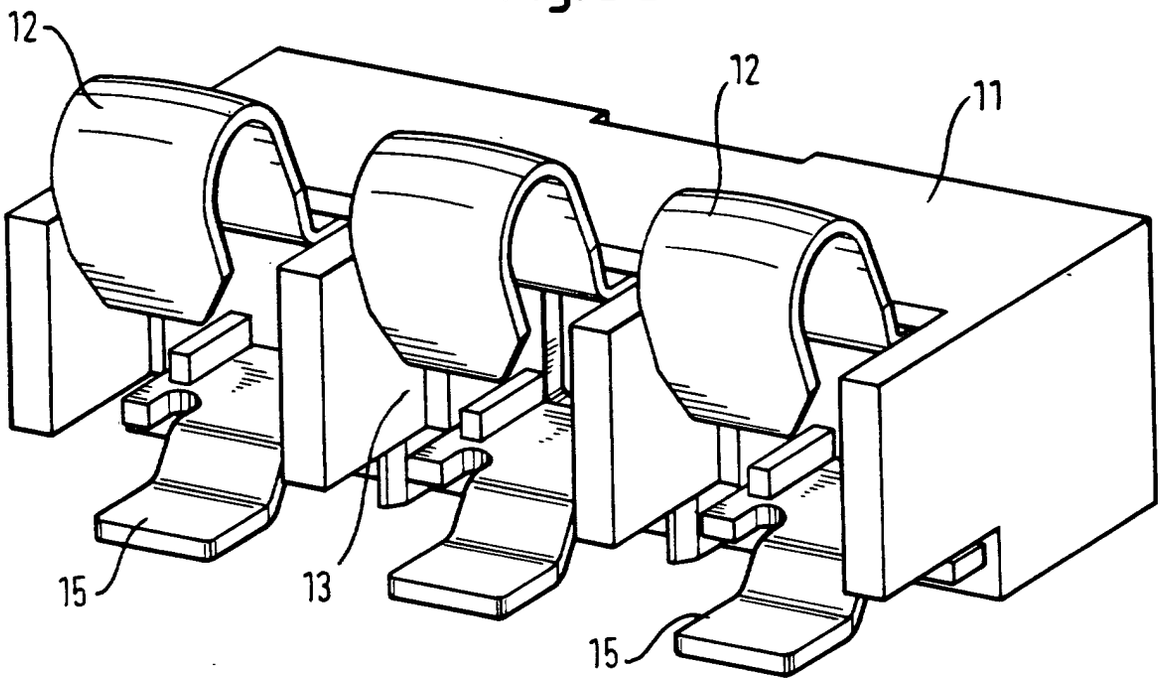
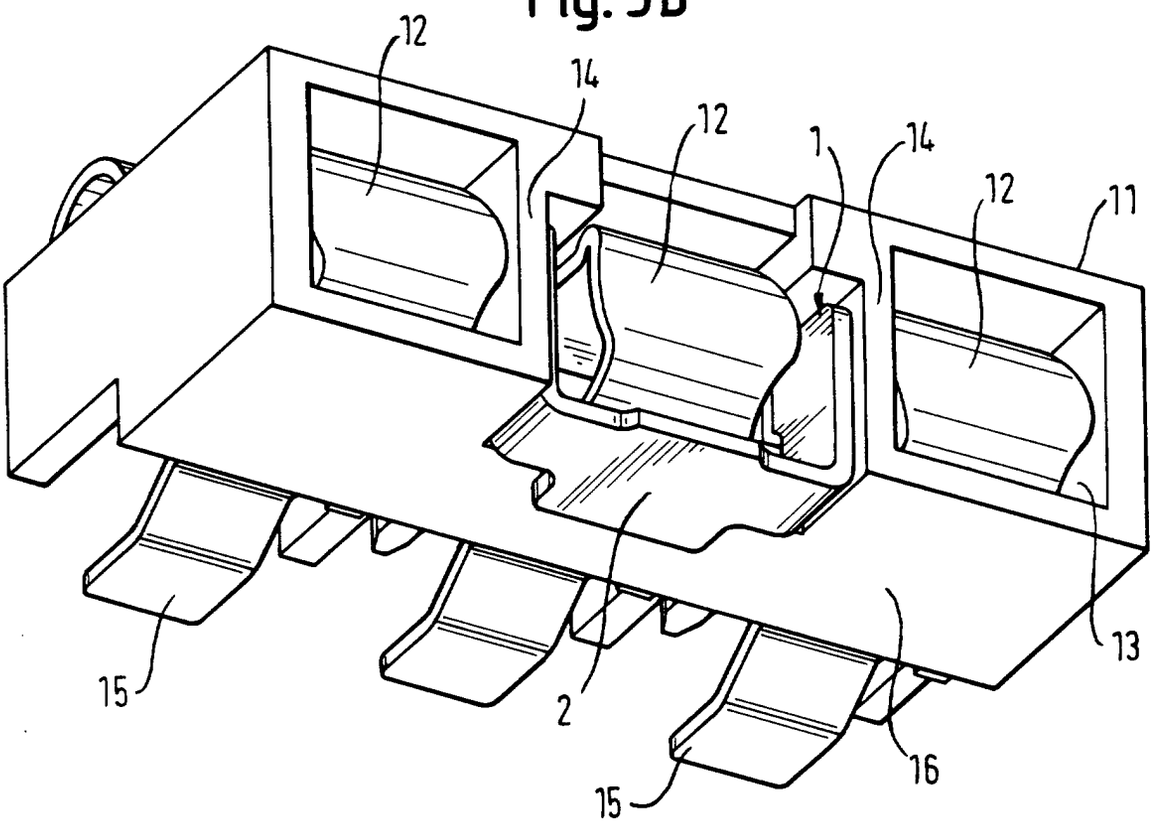


Fig. 3b



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EUROPEAN SEARCH REPORT

Application Number
EP 01 12 4205

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A X	* the whole document * & TW 389 416 Y (HON HAI PREC INDUSTRY CO LTD) 1 May 2000 (2000-05-01)	3	
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X	US 5 232 379 A (LAI CHING-HO) 3 August 1993 (1993-08-03) * column 1, line 65 - column 2, line 56; figures 3,5A,5B *	1,5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 January 2002	Criqui, J-J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 12 4205

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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