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H1R RAB
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(56) Documents Cited
GB 2256541 A GB 1209158 A GB 0833639 A
EP 0326141 A2 US 5145408 A

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UK CL (Edition M) H1R , H2E
INT CL[5] H01R , H05K

(54) Electric wire-connecting terminal for pcb

(57) An electric wire-connecting terminal which may be inserted and soldered in a printed circuit board 10 using a conventional automatic electronic parts-inserting machine, comprises a sleeve (31) and a pair of legs 32, 32 installed integrally in one piece on the upper portion of the cylindrical sleeve 31. The legs 32, 32 may be cut and bent after insertion into the printed circuit board 10 and may have an elliptical cross-section.

FIG. 5

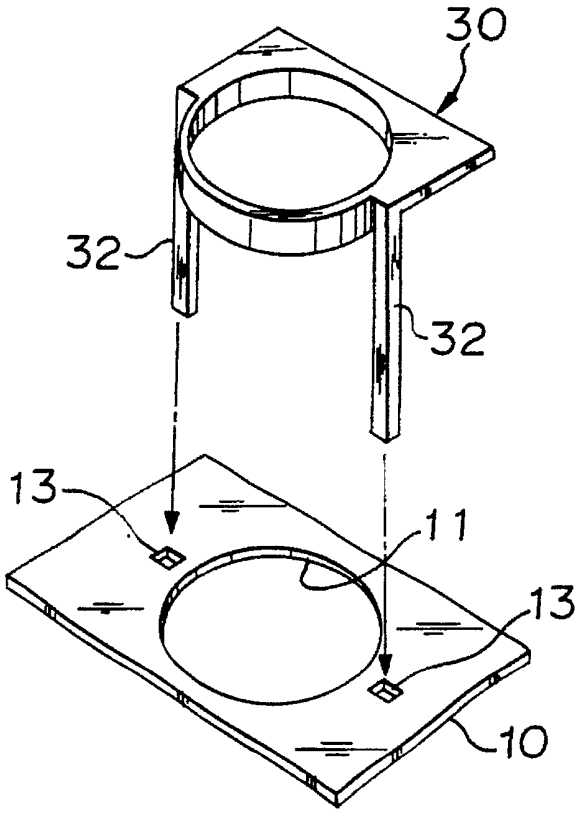

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FIG. 1

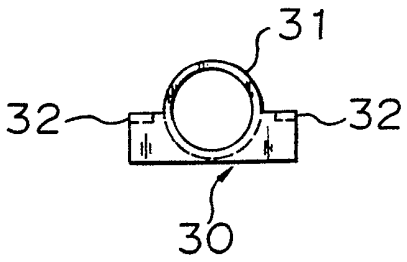


FIG. 2

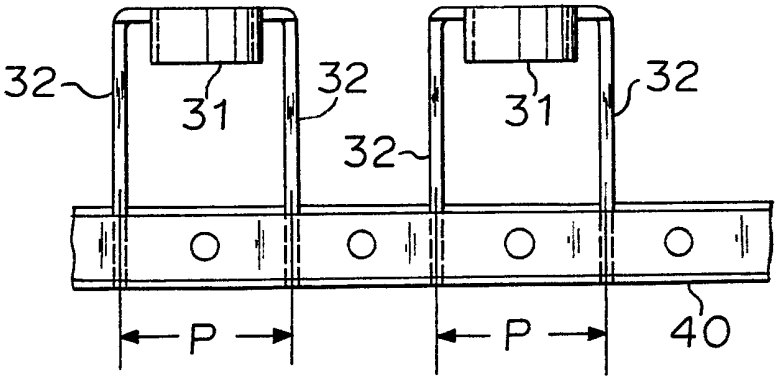


FIG. 3

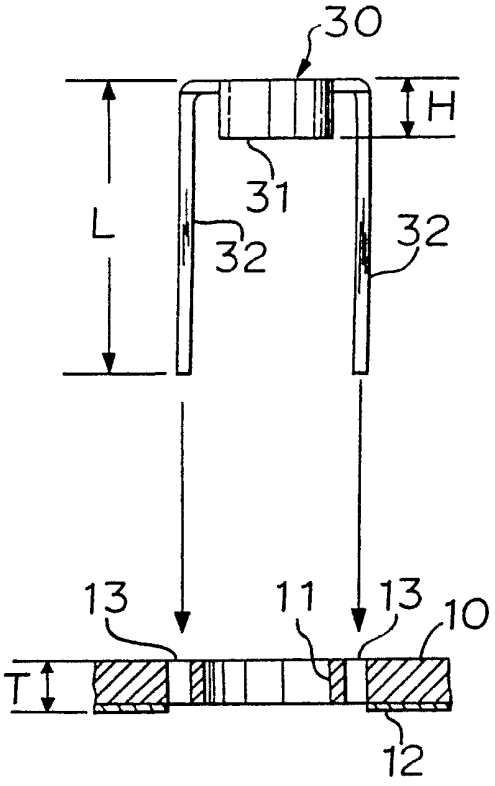


FIG. 4

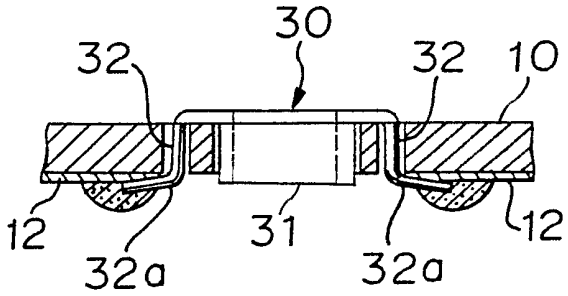


FIG. 5

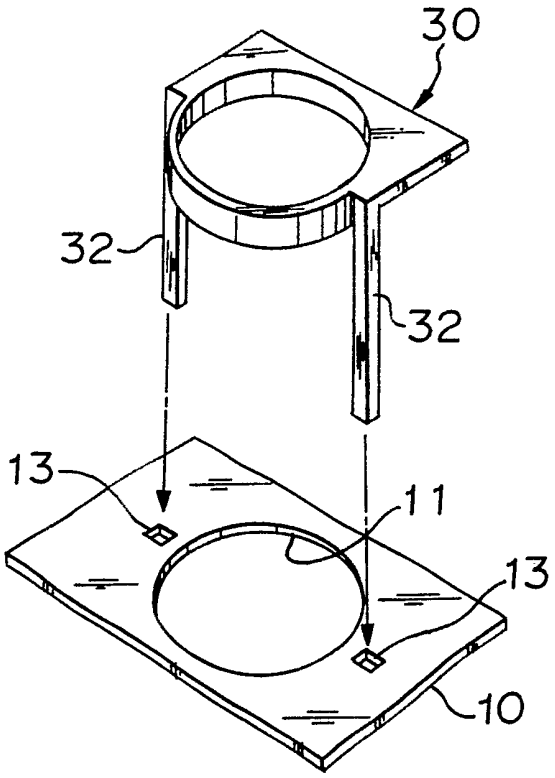


FIG. 6

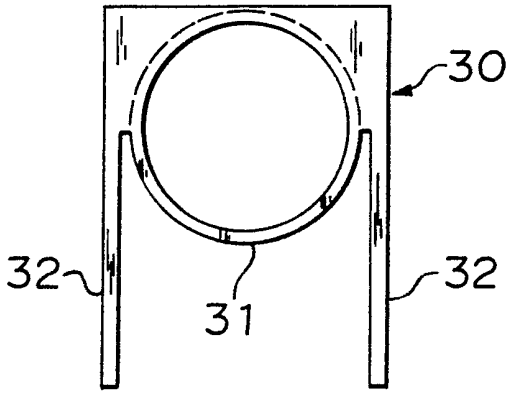


FIG. 7

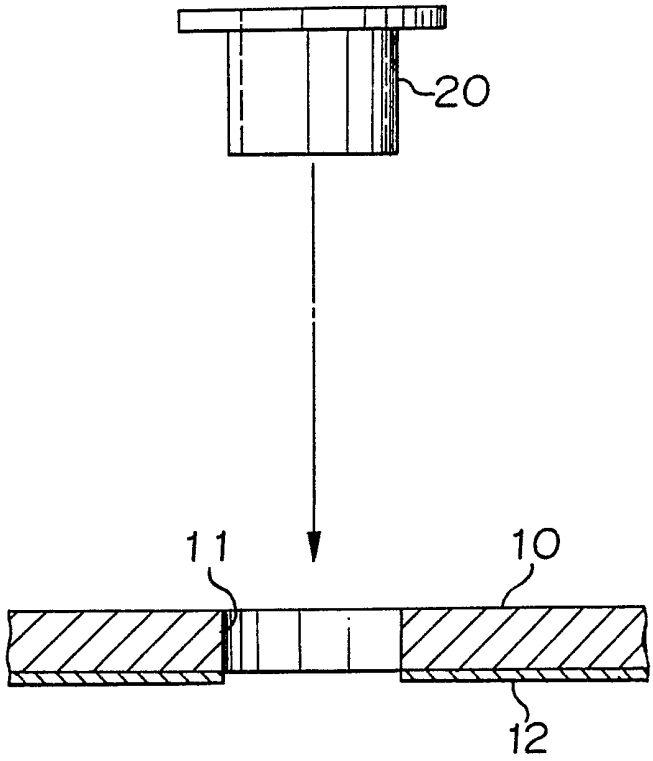
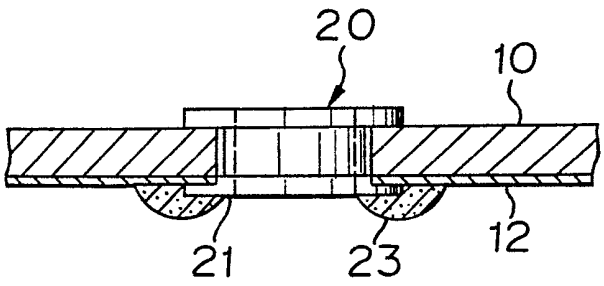


FIG. 8



ELECTRIC WIRE-CONNECTING TERMINAL

The present invention relates generally to an electric wire-connecting terminal and, more particularly, relates to an electric wire-connecting terminal insertable in a printed circuit board.

Generally, when installing a power supply cord in a printed circuit board, that cord is soldered to the circuit board after the cord wire is inserted in a hole punched in the circuit board.

Up to the present, in order to conform to European safety standards and the like, as shown in Fig. 7, a grommet 20 equivalent to an electric wire-connecting terminal is inserted downwardly by hand (as shown with an arrow) into a round hole 11 punched on the printed circuit board 10 from the upper surface of the circuit board, then the flange portion 21 facing the bottom surface of the circuit board is exclusively caulked by applying a caulking tool and joined to a circuit 12 of the circuit board by soldering as shown in Fig. 8.

In electric wire-connecting terminals according to such conventional art, the grommet 20 is inserted in the PCB by the printed circuit board maker. If the work is not done by the printed circuit board maker, it is necessary to caulk the grommet to the PCB requiring the use of caulking tools exclusively for this purpose and in an operation separate from the inserting process of other electric parts. This requires considerable labor and time.

The present invention was developed to solve the above-mentioned problem, and the object thereof is to provide an electric wire-connecting terminal joinable to the printed

circuit board at the same time it is inserted therein, by using a conventional automatic electronic parts-inserting machine.

According to the present invention there is provided an electric wire-connecting terminal insertable in a printed circuit board comprising:-

a sleeve;

at least two legs each comprising a pin portion extending along but spaced from the outer surface of the sleeve substantially parallel to the axis of said sleeve and a joint portion connecting a first end of said pin portion to said sleeve.

Advantageously such a terminal may comprise:

a cylindrical sleeve insertable downwardly in a round hole punched in the printed circuit board; and

a pair of legs integrally shaped in one piece 180° apart from each other on the upper side of the cylindrical sleeve of the terminal, the legs able to be bent towards specified directions at the tip portions thereof after insertion in a pair of leg-inserting holes punched on both sides of the round hole of the printed circuit board.

With respect to the present invention, as the pair of legs integrally installed in one piece on the upper portion of the cylindrical sleeve of the terminal is equivalent to the leads of the packaging of electronic components on continuous tapes, it becomes possible to use a conventional automatic electronic parts-inserting machine for inserting the terminal in the printed circuit board by taping the legs of the terminal.

In a further aspect of the present invention there is

provided a printed circuit board assembly comprising:-

a terminal as above described according to the invention;

a printed circuit board comprising:

an upper and a lower surface, said lower surface being printed with a circuit;

a terminal sleeve receiving hole;

at least two leg receiving holes spaced radially from said terminal sleeve receiving hole;

said sleeve and said pins being inserted from above said upper surface of said board through said sleeve receiving hole and said leg receiving holes, the ends of said pins extending through said printed circuit board below said lower surface being bent in specified directions after insertion through said printed circuit board.

The invention will be more clearly understood from the following description given by way of example only with reference to the accompanying drawings in which:

Fig. 1 is a plan view of an embodiment of the electric wire-connecting terminal according to the present invention.

Fig. 2 is a plan view of a packaging of the connecting terminals taped serially on continuous tape.

Fig. 3 is an explanatory drawing showing the electric wire-connecting terminal which is to be inserted in the printed circuit board.

Fig. 4 is a sectional view of the embodiment of the electric wire-connecting terminal according to the present invention, inserted in the printed circuit board.

Fig. 5 is a perspective view showing the embodiment of the electric wire-connecting terminal according to the present

invention which is being inserted into the printed circuit board.

Fig. 6 is a plan view of the embodiment of the electric wire-connecting terminal according to the present invention shown in Fig. 5 before the legs are bent.

Fig. 7 is an explanatory drawing showing the grommet equivalent to the conventional electric wire-connecting terminal being inserted in the printed circuit board.

Fig. 8 is a sectional view showing the grommet equivalent to the conventional electric wire-connecting terminal inserted in the printed circuit board.

A preferred embodiment according to the present invention is described practically and in detail with reference to the related drawings as follows.

First, the construction of the electric wire-connecting terminal according to the present invention is described. Parts of the terminal that are the same as the conventional terminal are designated with the same reference numerals.

As shown in Fig. 1 and Fig. 5, the electric wire-connecting terminal 30 for connecting an electric power source cord to the printed circuit board 10 is comprised with a cylindrical sleeve 31 through which the electric power source cord (not shown) passes, and a pair of plate like legs 32, 32 provided integrally in one piece, on the upper portion of the cylindrical sleeve 31. The profile of each of the legs 32, 32 may be approximately elliptical and used in general as leads of the electronic component instead of the plate like profile like plates as shown in the drawing.

The height H of the cylindrical sleeve 31 is rated longer

than the thickness of the printed circuit board 10. Lengths L of the legs 32, 32 are shaped considerably longer than the thickness T of the printed circuit board 10, and are able to be cut and bent after being inserted in the printed circuit board by an automatic inserting machine and finally soldered.

In Fig. 2 a pair of tapes 40, usually composed with an adhesive tape and a kraft paper tape (non-adhesive), hold legs 32, 32 between the tapes.

As shown in Fig. 6, the electric wire-connecting terminal 30 is punched out from sheet metal so as to shape a cylindrical sleeve 31 and a pair of legs 32, 32, and the legs 32, 32 are bent through 90° as shown in Fig. 5 after being punched out.

Although the lead inserting pitch P of the conventional inserting machine is limited by the inserting machine head, by changing the head, it becomes possible to set the pitch P at for example 5, 10 and 12.5 mm.

By setting the pitch between the legs of the terminal at 5 mm., the packaged terminals 30 are able to be inserted in the printed circuit board by applying the conventional automatic electronic components inserting machine.

The method of inserting the terminals 30 into the printed circuit board is described as follows.

Every printed circuit board stacked on the board-supplying device is pulled out on a conveyer (not shown) with a manipulating lever and supplied into the automatic inserting machine (not shown). It is then transferred to an X-Y table, set in the specified position by reference pins, and carried under the inserting head.

Taped electric wire-connecting terminals 30 according to

the present invention and other electronic parts are supplied to the inserting head. As shown in Fig. 3 and Fig. 5, the terminal 30 is inserted in the round hole 10 and the leg inserting holes 13, then the legs are bent to form bent portions 32a, 32a as shown in Fig. 4.

The bent portions 32a, 32a are then fixed with solder 23 to the circuit 12 of the printed circuit board 10.

Next, the working of the electric wire-connecting terminal 30 according to the present invention is described as follows.

In the prior art, the terminal-inserting work was performed in two separate steps, namely the grommet-inserting step and the soldering step.

By applying the present invention, it becomes possible to perform the same work at the same time by using an automatic inserting machine. Accordingly, drastic reductions in both labor and costs are achieved by discontinuing use of the grommet and caulking tools, and eliminating the corresponding process.

In other words, by providing a pair of bendable legs installed integrally in one piece on the upper portion of the cylindrical sleeve of the terminal, it becomes possible to fix the electric wire-connecting terminal simultaneously inserted and soldered in the printed circuit board using a conventional automatic inserting machine for inserting electronic parts in the printed circuit board.

Accordingly, the amount of work and the production costs are drastically reduced as no special machines or processes are required.

CLAIMS

1. An electric wire-connecting terminal insertable in a printed circuit board comprising:-

a sleeve;

at least two legs each comprising a pin portion extending along but spaced from the outer surface of the sleeve substantially parallel to the axis of said sleeve and spaced in a radial direction from the outer edge of said sleeve, and a joint portion connecting a first end of said pin portion to said sleeve.

2. A terminal according to claim 1, wherein said legs are formed integrally in one piece on an upper portion of said sleeve, said legs being bent into an inverted L-shape to form the pin and joint portions.

3. A terminal according to any preceding claim, comprising a pair of legs spaced 180° apart around the sleeve.

4. An electric wire-connecting terminal substantially as described with reference to and as illustrated in Figures 1 to 6.

5. A plurality of terminals according to any preceding claim having the legs thereof releasably attached to a continuous tape.

6. A printed circuit board assembly comprising:-

a terminal according to any one of claims 1 to 4;

a printed circuit board comprising:

an upper and a lower surface, said lower surface being printed with a circuit;

a terminal sleeve receiving hole;

at least two leg receiving holes spaced radially

from said terminal sleeve receiving hole;

said sleeve and said pins being inserted from above said upper surface of said board through said sleeve receiving hole and said leg receiving holes, the ends of said pins extending through said printed circuit board below said lower surface being bent in specified directions after insertion through said printed circuit board.

7. A printed circuit board assembly substantially as hereinbefore described, with reference to and as illustrated in Figures 4, 5 and 6.

8. A printed circuit board assembly according to claim 6 or claim 7, comprising a terminal inserted into a printed circuit board by an automatic electronic parts inserting machine.

9. An electronic product comprising a printed circuit board assembly according to any one of claims 6 to 8.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(Search report)

Application number
GB 9326314.3

Relevant Technical Fields

(i) UK Cl (Ed.M) H2E, H1R

(ii) Int Cl (Ed.5) H01R, H05K

Search Examiner
MRS J BANNISTER

Date of completion of Search
22.3.94

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
ALL

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2256541 A	(AMP) see Figure 6 - sleeve (20), legs (16)	1-3
X	GB 1209158	(HOWARD) see Figure 2 item (22)	1-3
A	GB 0833639	(EMI)	
A	EP 0326141 A2	(BSG)	
X	US 5145408	(SIEMENS) see sleeve (15) Figure 2, legs (6)	1,3

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).