

Description

The present invention relates to a pin-holding device for use in connecting a pin to a printed circuit board which holds the pin while the pin is inserted into the printed circuit board and soldered thereto and to a method of connecting a plurality of pins to a printed circuit board.

As a method of electrically connecting a printed circuit board to a female connector, the method using a header is conventionally well-known. In the header, pins are perpendicularly inserted into a plastic plate and fixed thereto. Such a header is used in such a manner that one end of the pin is inserted into the printed circuit board and soldered thereto, so that one end of the pin is attached to the printed circuit board, thereafter a female connector is mated with the other end of the pin. Therefore, in a case when such a header is used, since the plastic plate of the header is provided between the printed circuit board and the female connector, the entire height of the connecting portion between the printed circuit board and the female connector is increased by the thickness of the plastic plate.

Moreover, there is a method in which only pins are directly embedded into the printed circuit board by a machine without using the above-mentioned header. However, in such a machine, since high accuracy is required in providing the space of the pins to be embedded, the embedding direction of the pin, and the depth of the embedding pin, there is disadvantage in that the manufacturing cost of the machine is increased. Moreover, in a case when the printed circuit board is thin there is a strong possibility that the printed circuit board is split in embedding the pin by the machine. On the other hand, in a case when the pin is manually embedded, the quality thereof is not stabilized, e.g., insufficiently of embedding the pin is generated.

EP-A-0 160 387 discloses a strip for holding and protecting electrical contacts provided with heads. The strip is formed of a band of plastic material having cells opening on one side. The cells are adapted to receive sealingly, by elastic deformation, the heads of the contacts, the strip expanding around a shoulder of each head.

According to one aspect of the present invention, there is provided the combination of a pin holding device and a plurality of pins as defined in Claim 1.

According to another aspect of the invention, there is provided a method of connecting a plurality of pins to a printed circuit board as defined in Claim 4.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which;

Figs. 1, 2 and 3 are the side view, front, and the plan view of the pin-holding device of the first em-

bodiment of the present invention respectively; and

Figs. 4, 5, and 6 are the side view, front view, and the plan view of the pin-holding device of the second embodiment of the present invention respectively.

According to the present pin-holding device, the pin is soldered to the printed circuit board, thereafter the device is detached from the pin. Therefore, as compared with the use of the conventional header, the height of the connecting portion of the printed circuit board to a female connector can be made lower. Also, since the pin is inserted into the printed circuit board and soldered as being held perpendicularly to the present pin-holding present device, the pin can be surely and perpendicularly soldered without being inclined to the printed circuit board.

The substrate of the present pin-holding device is formed of plastic, and has an insertion hole through which the pin is inserted and held. It is important to form the hole such that the pin is fixed to the hole without being detached therefrom while the pin is inserted into the printed circuit board and soldered thereto, and that the pin is easily detached from the hole after the pin is soldered to the printed circuit board.

For the substrate of the present device, a suitable thickness is required so that the pin is surely held without deforming the substrate by the heat of melted solder when the pin is soldered. Moreover, if a plurality of holes are arranged in accordance with the circuit of the printed circuit board so that the plurality of pins are held at the same time, the plurality of pins can be accurately inserted into the printed circuit board at one time. As a shape of the cross section of the pin to be held in the present device, a circular cross section, a rectangular cross section, and the other shapes can be used.

According to the present pin-holding device, the height of the connecting portion of the printed circuit board to the other elements can be made lower. In addition to this matter, the depth of the hole is controlled and the length of the pin projecting from the hole is set to be a predetermined length, thereby the depth of the embedding the pin into the printed circuit board can be easily controlled. Also, by the use of the present device, danger of which the printed circuit board is split is small even if the printed circuit board is extremely thin, and there is no possibility that the pin will be inclined in soldering.

Embodiments of the present invention will be described with reference to the drawings as follows.

Fig. 1 is a side view of a pin-holding device 10 of present invention and shows the state in which a pin 20 is held by a hole 12 of a substrate 11. Figs. 2 and 3 are views of the pin-holding device 10 seen in the directions of arrows a and b. In the substrate 11, holes 12 are arranged in a lattice manner, and the pin 20 can be inserted into each hole 12.

To hold the pin in the hole by a suitable holding force, the inner diameter of the hole is set to be slightly smaller than the outer diameter of the pin, so that the pin can be held by frictional force between the hole and the pin or elastic power of a plastic material constituting the substrate in which the hole is formed, when the pin is pressed into the hole.

The device 10 shown in Fig. 1 has a step portion 13 whose cross section is T-shaped. After the pin 20 is soldered to the printed circuit board, the step portion 13 is used as a knob in pulling the device 10 by a hand.

Figs. 4, 5, and 6 show a pin-holding device 30 of the second embodiment of the present invention. In the device 30, a hole 31 is passed through the device 30, and both ends of pin 40 are projected from the device 30. When the length of the pin is long, the thickness of the pin-holding device is made thinner than the length of the pin, thereby materials such as plastic, etc., which constitute the pin-holding device, can be reduced.

As mentioned above, according to the present pin-holding device for use in connecting a pin, the height of the connecting portion of the printed circuit board to the other elements can be made lower than the case using the conventional header, and the inserting the pin into the printed circuit board and soldering the pin thereto can be easily and surely performed.

Claims

1. In combination: a pin holding device (10,30) and a plurality of pins (20,40) for use in connecting the pins (20,40) to a printed circuit board, each pin (20, 40) comprising a longitudinal body of uniform cross-section; said device comprising a block-like substrate (11) of plastics material having a first side and a plurality of holes (12, 31) arranged in parallel rows and columns perpendicular to and extending into the first side, each hole (12,31) having an inner contact surface of uniform cross-section for contacting an associated one of the pins (20,40), the contact surface being slightly smaller in cross-section than the bodies of the pins, the pins (20, 40) being fitted into the holes (12, 31) with said bodies lying within the holes (12, 31) such that the pins (20, 40) are held in the holes (12, 31) solely by elastic or frictional forces created between the inner contact surfaces of the holes (12, 31) in the substrate (11) and the exterior surfaces of the pins (20, 40) with an end region of each of the pins (20, 40) extending outwardly of the substrate (11) through the first side for insertion in the printed circuit board and soldering therein whereby the substrate can be removed from all the pins (20, 40) after the pins (20,40)

have been soldered to the printed circuit board.

2. The combination according to Claim 1, wherein the substrate (11) has a second side and the holes (12, 31) extend entirely through the substrate (11) between the first side and the second side, the pins (20, 40) also extending outwardly of the substrate (11) through the second side.
3. The combination according to Claim 1 or 2, wherein the substrate (11) is provided with a T-shaped region (13) to facilitate pulling of the substrate (11) to remove the substrate from the pins (20, 40) after soldering.
4. A method of connecting a plurality of pins (20, 40) to a printed circuit board, each pin (20, 40) comprising a longitudinal body of uniform cross-section; the pins (20, 40) being fitted into holes (12, 31) in a first surface of a block-like substrate (11) made of plastics material, each hole (12, 31) having an inner contact surface of uniform cross-section contacting an associated one of the pins (20,40) the contact surface being slightly smaller in cross-section than the bodies of the pins, the pins (20, 40) being detachably retained in the holes (12, 31) solely by elastic or frictional forces created between the inner contact surfaces of the holes (12, 31) in the substrate (11) and the exterior surfaces of the pins (20, 40), the pins (20, 40) having end regions extending outwardly of the substrate (11) through the first side, the method comprising using the substrate (11) to insert the end regions of the pins (20, 40) into the printed circuit board, holding the pins (20, 40) within the substrate with respect to the board while the pins (20, 40) are soldered to the board, and detaching the substrate (11) from all of the pins after the pins (20, 40) have been soldered.
5. The method according to Claim 4, wherein the substrate (11) is detached from the pins (20, 40) by pulling on a T-shaped region (13) of the substrate (11).

Patentansprüche

1. Kombination aus folgendem: Eine Stifthalteeinrichtung (10, 30) und eine Mehrzahl von Stiften (20, 40) zur Verwendung beim Verbinden der Stifte (20, 40) mit einer gedruckten Schaltungsplatte, wobei jeder Stift (20, 40) einen länglichen Körper mit einem gleichmäßigen Querschnitt aufweist; die Vorrichtung ein blockähnliches Substrat (11) aus einem Kunststoffmaterial aufweist, welches eine erste Seite und eine Mehrzahl von Öffnungen (12, 31) hat, welche in paral-

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- lelen Zellen und Spalten senkrecht zu und in Erstreckungsrichtung in der ersten Seite angeordnet sind, jede Öffnung (12, 31) eine innere Kontaktfläche mit einem gleichförmigen Querschnitt zum Kontaktieren eines der zugeordneten Stifte (20, 40) hat, die Kontaktfläche im Querschnitt geringfügig kleiner als die Körper der Stifte ist, die Stifte (20, 21) passend in die Öffnungen (12, 31) eingesetzt werden, wobei die Körper in den Öffnungen (12, 31) derart liegen, daß die Stifte (20, 40) in den Öffnungen (12, 31) lediglich durch elastische Kräfte und Reibungskräfte gehalten sind, welche zwischen den inneren Kontaktflächen der Öffnungen (12, 31) in dem Substrat (11) und dem äußeren Flächen der Stifte (20, 40) erzeugt werden, wobei ein Endbereich jedes Stifts (20, 40) aus dem Substrat (11) durch die erste Seite zum Einführen in die gedruckte Schaltungsplatte nach außen verläuft und diese angelötet sind, wodurch das Substrat von allen Stiften (20, 40) abgezogen werden kann, nachdem die Stifte (20, 40) an der gedruckten Schaltungsplatte angelötet sind.
2. Kombination nach Anspruch 1, bei der das Substrat (11) eine zweite Seite hat, und die Öffnungen (12, 31) sich vollständig durch das Substrat (11) zwischen der ersten Seite und der zweiten Seite erstrecken, und bei der die Stifte (20, 40) auch aus dem Substrat (11) durch die zweite Seite nach außen verlaufen.
3. Kombination nach Anspruch 1 oder 2, bei der das Substrat (11) mit einem T-förmigen Bereich (13) versehen ist, um in erleichterter Weise das Substrat (11) abzuziehen und das Substrat von den Stiften (20, 40) nach dem Löten zu entfernen.
4. Verfahren zum Verbinden einer Mehrzahl von Stiften (20, 40) mit einer gedruckten Schaltungsplatte, bei dem jeder Stift (20, 40) einen in Längsrichtung verlaufenden Körper mit einem gleichmäßigen Querschnitt aufweist, die Stifte (20, 40) passend in die Öffnungen (12, 31) in einer ersten Fläche eines blockähnlichen Substrats (11), welches aus Kunststoffmaterial hergestellt ist, eingesetzt sind, jede Öffnungen (12, 31) eine innere Kontaktfläche mit einem gleichförmigen Querschnitt hat, welche einen der zugeordneten Stifte (20, 40) kontaktiert, die Kontaktfläche geringfügig kleiner im Querschnitt als die Körper der Stifte ist, die Stifte (20, 40) lösbar in den Öffnungen (12, 31) lediglich durch elastische Kräfte oder Reibungskräfte gehalten sind, welche zwischen den inneren Kontaktflächen der Öffnungen (12, 31) und dem Substrat (11) und den äußeren Flächen der Stifte (20, 40) erzeugt werden, die Stifte (20, 40) Endbereiche haben, welche sich aus

dem Substrat (11) durch die erste Seite nach außen erstrecken, wobei das Verfahren aufweist, daß das Substrat (11) zum Einführen der Endbereiche der Stifte (20, 40) in die gedruckte Schaltungsplatte eingesetzt wird, die Stifte (20, 40) in dem Substrat bezüglich der Platte gehalten werden, während dem die Stifte (20, 40) an die Platte angelötet werden, und das Substrat (11) von allen Stiften gelöst wird, nachdem die Stifte (20, 40) angelötet sind.

5. Verfahren nach Anspruch 4, bei dem das Substrat (11) von den Stiften (20, 40) dadurch getrennt wird, daß ein T-förmiger Bereich (13) des Substrats (11) abgezogen wird.

Revendications

1. En combinaison : un dispositif porte-broches (10, 30) et une pluralité de broches (20, 40) pour utilisation dans le raccordement des broches (20, 40) à une carte à circuit imprimé, chaque broche (20, 40) comprenant un corps longitudinal d'une section transversale uniforme; ledit dispositif comprenant un substrat en forme de bloc (11) de matériau synthétique présentant une première face et une pluralité de trous (12, 31) agencés en colonnes et en rangées parallèles, disposées perpendiculairement à cette première face et pénétrant en son sein, chaque trou (12, 31) présentant une surface de contact interne d'une section transversale uniforme pour réaliser un contact avec l'une des broches à laquelle elle est associée (20, 40), la surface de contact étant légèrement inférieure en section transversale à celles des corps des broches, les broches (20, 40) étant montées dans les trous (12, 31) avec lesdits corps disposés à l'intérieur des trous (12, 31) de telle façon que les broches (20, 40) soient maintenues dans les trous (12, 31) uniquement par des forces élastiques ou de friction créées entre les surfaces de contact interne des trous (12, 31) du substrat (11) et les surfaces externes des broches (20, 40), une zone d'extrémité de chaque broche (20, 40) faisant saillie vers l'extérieur du substrat (11) à travers la première face pour être insérée dans la carte à circuit imprimé et y être brasé, le substrat pouvant être enlevé de toutes les broches (20, 40) après le brasage des broches (20, 40) sur la carte à circuit imprimé.
2. La combinaison selon la revendication 1, selon laquelle le substrat (11) présente une deuxième face et les trous (12, 31) s'étendent en traversant complètement le substrat (11) entre la première face et la deuxième face, les broches (20, 40) faisant également saillie vers l'extérieur par rapport



au substrat (11), à travers la deuxième face.

3. La combinaison selon la revendication 1 ou 2, dans laquelle le substrat (11) est muni d'une zone en forme de T (13) pour faciliter une action de traction sur le substrat (11) afin d'enlever le substrat des broches (20, 40) après brasage. 5
4. Un procédé de raccordement d'une pluralité de broches (20, 40) à une carte à circuit imprimé, chaque broche (20, 40) comprenant un corps longitudinal de section transversale uniforme; les broches (20, 40) étant montées dans des trous (12, 31) d'une première surface d'un substrat en forme de bloc (11) réalisé en matière synthétique, chaque trou (12, 31) présentant une surface de contact interne de section transversale uniforme en contact avec l'une des broches (20, 40) associée, la surface de contact étant légèrement inférieure en section transversale à celles des corps des broches, les broches (20, 40) étant maintenues de façon amovible dans les trous (12, 31) uniquement par des forces élastique ou de friction établies entre les surfaces de contact internes des trous (12, 31) du substrat (11) et les surfaces externes des broches (20, 40), les broches (20, 40) présentant des zones d'extrémité faisant saillie vers l'extérieur du substrat (11) à travers la première face, le procédé comprenant les étapes consistant à utiliser le substrat (11) pour insérer les zones d'extrémité des broches (20, 40) dans la carte à circuit imprimé, à retenir les broches (20, 40) dans le substrat par rapport à la carte pendant le brasage des broches (20, 40) sur la carte, et à détacher le substrat (11) de toutes les broches après le brasage des broches (20, 40). 10 15 20 25 30 35 40
5. Un procédé selon la revendication 4, selon lequel le substrat (11) est détaché des broches (20, 40) par traction sur une zone en forme de T (13) du substrat (11). 45 50 55

