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SPRING CONNECTOR FOR PRINTED CIRCUIT BOARD

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FIG.1.

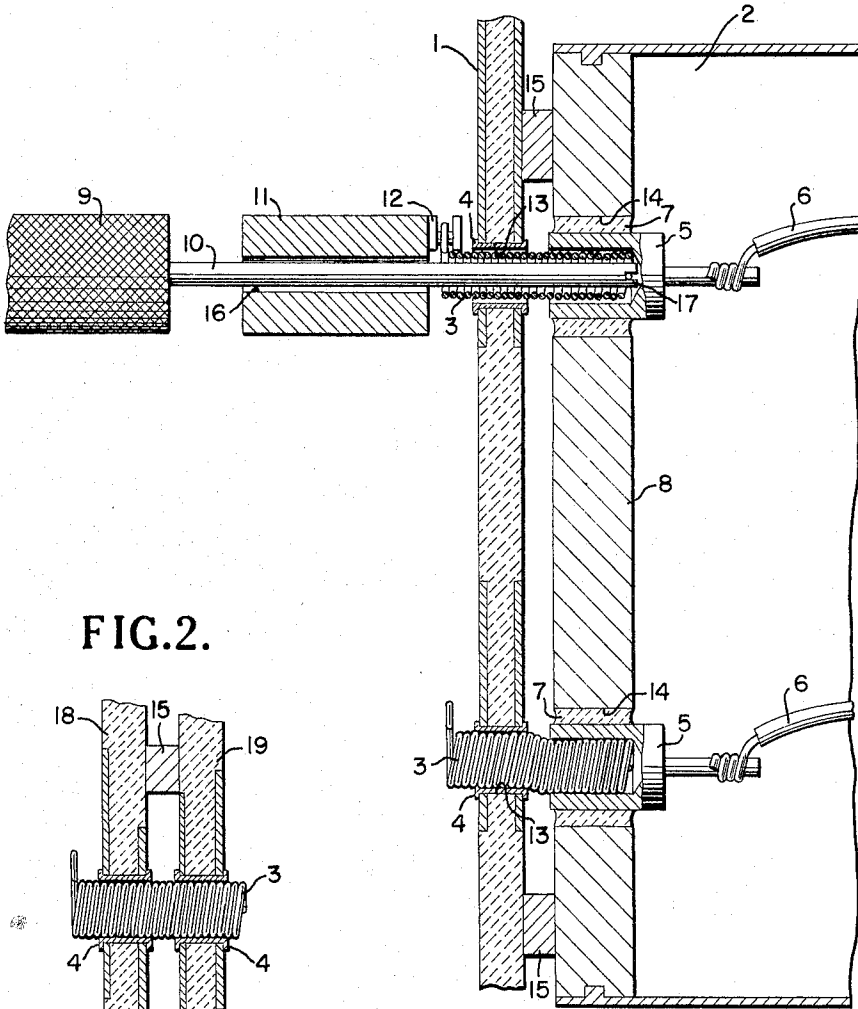
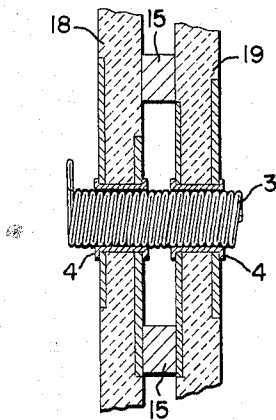


FIG.2.



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SPRING CONNECTOR FOR PRINTED CIRCUIT BOARD

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2 Claims. (Cl. 339-17)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to a means for connecting electrical and electrical-mechanical components to circuit boards or electric circuitry and more particularly to a coiled spring electrical connector.

In the field of connecting electrical-mechanical components to circuit boards or electrical circuitry, it has been the general practice to employ a coiled spring housed within the circuit board and a plug housed within the component so that the plug may be inserted into the coiled spring in order to make an electrical connection. Various types of spring clips have been soldered to the circuit board and are insertable in a socket housed within the component. Also various types of complex cabling systems have been used to connect a circuit board to a component. Although such devices have served the purpose, they have not proved entirely satisfactory under all conditions of service for the reasons that considerable difficulty has been experienced in repairing defective connections. It has been found that the sub-miniature connectors required too much space for engaging, disengaging and the cabling. Prior devices have also required complex cabling systems, have been very expensive and not too reliable in operation.

The general purpose of this invention is to provide a coiled spring electrical connector which embraces all the advantages of similarly employed electrical connectors and possesses none of the aforescribed disadvantages. To attain this purpose, the present invention contemplates a unique coiled spring electrical connector insertable by a special tool into a circuit board having an eyelet therein and then into an insulated socket housed within the base or side of a component. The coiled spring electrical connector provides a method of connecting and interconnecting a number of elements such that much less space is required than by using standard connectors and cabling. In the instant invention, complex cabling systems are eliminated, cost is reduced and high reliability is obtained.

An object of the present invention is the provision of a new and improved electrical connector.

Another object of this invention is to provide a new and improved coiled spring electrical connector suitable for use in printed circuit boards.

A further object of the invention is the provision of a reliable, flexible and tight-fitting electrical connection.

Other objects and features of the invention will become apparent as the disclosure is made in the following detailed description of a preferred embodiment of the invention as illustrated in the accompanying sheet of drawing in which:

FIG. 1 is a cross-sectional view of a circuit board and the component showing a coiled spring electrical connector being inserted by a tool into both elements, and another connector in the inserted position; and

FIG. 2 is another embodiment of the invention in which a coiled spring connector is shown connecting two printed circuit boards.

Referring now to the drawing, wherein like reference characters designate like or corresponding parts throughout the views, there is shown in FIG. 1 a circuit board 1 having a printed circuit on one or two sides thereof. 5 Spaced adjacent to the circuit board 1 is a component 2. A coiled spring electrical connector 3 connects the circuit board 1 to the insulated socket 5 in base 8 of component 2. Eyelets 4 are inserted in openings 13 located in the circuit board 1. Sockets 5 having apertures therein of 10 approximately the same diameter as apertures in the eyelets are inserted through openings 14 in the base 8. These sockets can be hermetically sealed in the base or insulated from the base, if so desired. The coiled spring connector 3 has a normal diameter which is slightly 15 larger than the diameter of the apertures of the eyelets 4 and sockets 5. Wires 6 are wrapped around the pins of sockets 5 to complete the electrical circuit. The wires are connected to electrical and electrical-mechanical components such as resistors, capacitors, relays, accelerometers, timers and switches (not shown). Spacers 15 20 separate the circuit board 1 from the base 8. A tool for inserting and removing the coil spring connector 3 comprises a knurled knob 9, rod 10 and cylindrical member 11 rotatable on the rod. At one end of the rod 10 is a 25 U-shaped portion 17 for grasping one end of the coiled spring connector 3. The rod 10 is inserted into the cylindrical member 11 which has a hole 16 therein for receiving the rod 10. The cylindrical member 11 has an extension 12 thereon for grasping the other end of the coil 30 spring connector 3.

The coiled spring electrical connector is connected and disconnected in the following manner. The rod in inserted into the coiled spring 3 and one end of the coiled spring connector 3 is attached to the U-shaped end 17 of 35 the rod 10. The other end of the coiled spring connector 3 is attached to the extension 12 of the cylindrical member 11. The cylindrical member 11 is rotated with respect to the knob 9 and rod 10 thereby twisting the coils tighter and reducing the diameter of the coiled spring 40 connector 3. While the coiled spring connector is in this reduced condition, it is inserted through the eyelet 4 in the circuit board 1 and then into the insulated socket 5 in base 8. The cylindrical member 11 is rotated back to its initial position and disconnected from the coiled 45 spring connector, and the rod 10 is also disconnected from the coiled spring connector thereby allowing the coil to expand and flexibly connect the circuit board 1 to the socket 5 in base 8. An electrical circuit is now completed between the circuit board 1, eyelet 4, coiled spring 50 connector 3, insulated socket 5 and wire 6. Thus it can be seen that there is shown on FIG. 1 a tool for inserting a coiled spring connector and a coiled spring connector in the connecting position after the tool has been removed. If it is desired to remove the coiled spring connector, 55 the tool is connected to both ends of the coiled spring connector 3, rotated so that the diameter of the connector is reduced, and then the connector is withdrawn from the socket 5 and the eyelet 4.

It is to be understood that the coil diameter and the wire diameter of the coiled spring connector may be varied depending on the current to be carried. Also, the capacity of the spring connection can be increased by inserting an electrical conducting flexible core inside the coil after the coil has been inserted into the circuit board and the base. Further, the elements to be connected by the coiled spring connector can be varied to meet the function desired. For example, FIG. 2 shows a coiled spring electrical connector 3 in electrically connecting 60 engagement with a circuit board 18 and a circuit board 19, each board having a printed circuit thereon. The coiled spring connector or a plurality of them can be 70

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used to interconnect any number of printed circuit boards or printed circuit boards in combination with a component. Each circuit board can be constructed with a printed circuit on each side or internally thereof, if desired.

It can be seen that a unique coiled spring electrical connector has been provided to electrically connect a circuit board to a component. A coiled spring electrical connector has been provided that makes a flexible, tight-fitting electrical connection between a circuit board and a component and is reliable in operation.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An electrical interconnecting device for interconnecting an insulating board having a printed circuit thereon with at least one terminal to the base of an electrical component having at least one terminal thereon, said connecting device comprising:

a tubular conductive eyelet extending through said board and in electrically conducting engagement with a terminal of said printed circuit,

an insulated conductive socket closed at one end located in the base of said component and in electrically conducting engagement with a terminal thereon,

and an electrically conductive coiled spring having a normal coil diameter throughout its length slightly larger than the internal diameters of said eyelet and

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said socket and capable of being reduced in diameter for permitting insertion through said eyelet and into said socket and thereafter being expanded to resiliently engage the inner walls of said eyelet and said socket, thereby electrically connecting the printed circuit terminal to the terminal of the electrical component.

2. A device as set forth in claim 1 and including spacers positioned between the insulating board and the component base for maintaining a given spaced relationship therebetween when the coil spring has engaged the eyelet and the socket.

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