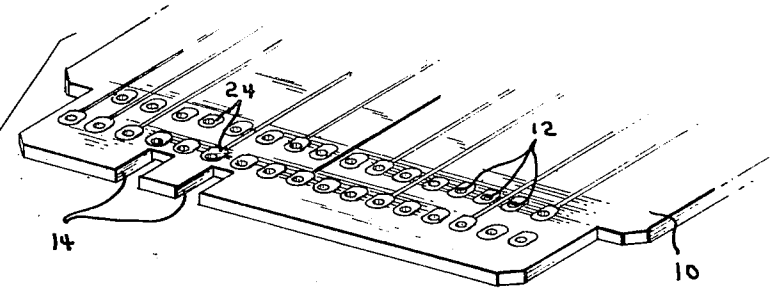
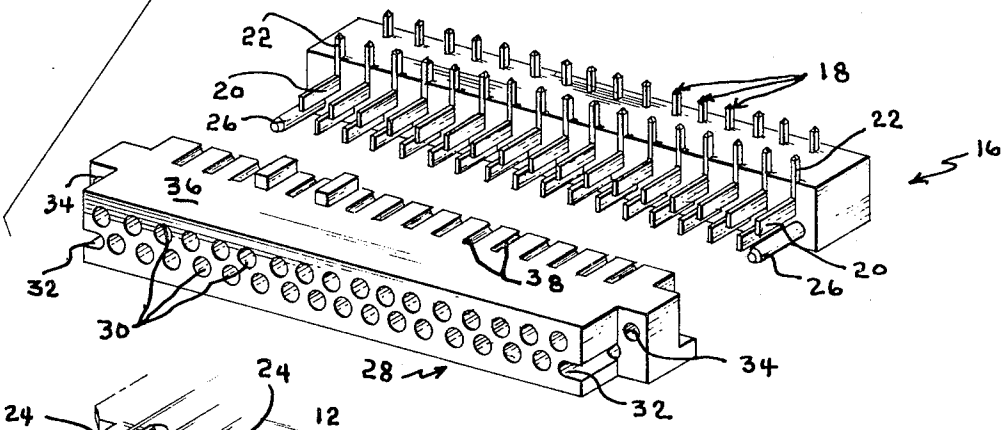
June 30, 1970 D. N. BUSHEY ET AL 3,518,620

CONNECTOR KEYING DEVICE

Filed April 11, 1968

FIG 1





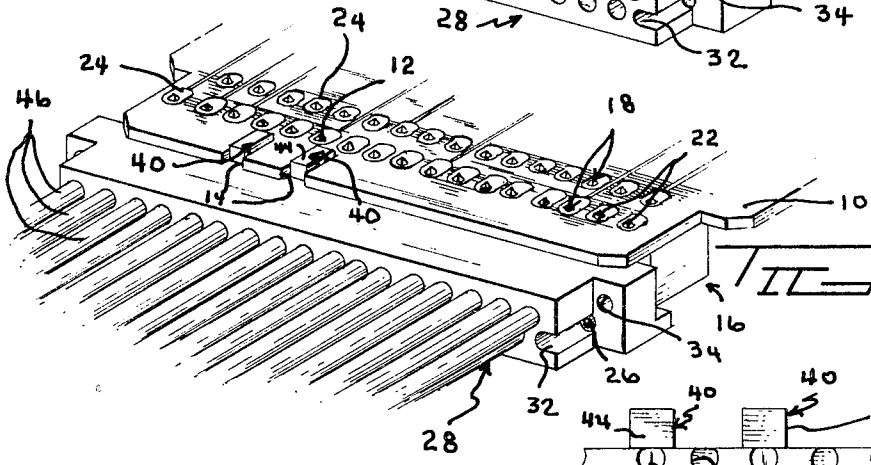


FIG 2

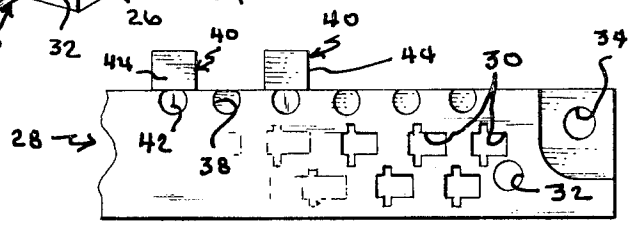


FIG 3

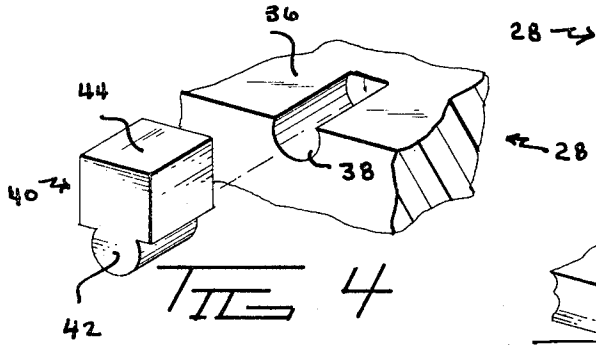


FIG 4

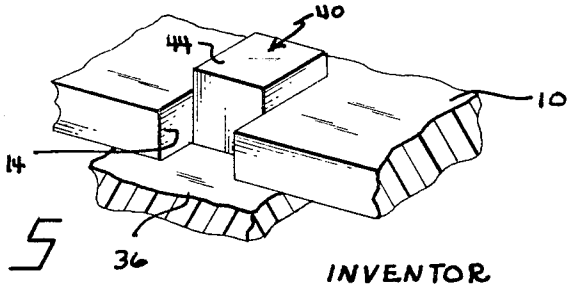


FIG 5

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United States Patent Office 3,518,620
Patented June 30, 1970

3,518,620

CONNECTOR KEYING DEVICE

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Filed Apr. 11, 1968, Ser. No. 720,641
Int. Cl. H01r 13/64; H05k 1/18
U.S. Cl. 339—184 4 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure relates to an electrical connector device having plural male and female connecting members on separate connector portions, the connector portions being molded to prevent polarization error, one of the portions carrying an apertured printed circuit board with cut out areas, the connector also including selectively positionable keying means for mating with the cut out areas on the printed circuit boards whereby only pre-selected male and female portions with accompanying apertured printed circuit boards can be interconnected.

This invention relates to a keying device for an electrical connector and more specifically to a keying device for use with electrical connectors which can be selectively positioned in the electrical connector to selectively provide different keying in the same electrical connector device.

The problem of accurately interconnecting male and female connector devices has been well recognized in the prior art. In order to provide such accurate connection of male and female electrical connector members the prior art has resorted to the well known expedience of keying. Keying provides proper orientation of devices with multiple contact plug-in elements to insure that a particular plug-in element can be inserted only in the correct receptacle of a group of similar receptacles otherwise capable of receiving the same plug. The prior art has also resorted to the expedient of polarization to insure that the male connector member is properly orientated with respect to the female member rather than being, for example, turned 180 degrees with respect thereto. Examples of prior art connectors utilizing keying and/or polarization are exemplified by the patents to Gilbert (2,746,022); D'Amico (2,902,665); Fox (2,994,056); Kirk (3,024,436); Hagan (3,177,461); Kinkaid (3,264,599); and Moulin (3,281,-761). These prior art devices have performed reasonably well in their jobs of keying and/or polarization. However, once the keying or polarization for a particular connector has been set up there is no way to change this polarization or keying set up. It is therefore possible that electrical connectors with keying and/or polarization which are identical but which have differing electrical connection patterns thereon can easily be interchanged and provide erroneous wiring and other interconnection in an electrical system. The above noted prior art devices have no provision for automatically indicating that an improperly wired or otherwise improper connector with attached circuitry is being utilized, the only possibility of noting error being obtained by markings placed on the connector body itself.

In accordance with the present invention the above problems of the prior art are overcome by providing an electrical connector having male and female portions. One of the portions being provided with a plurality of spaced slots adjacent an upper surface thereof, and a key which is insertable into the slots and which can be positioned into any slot to provide a plurality of possible key positions on each end portion of the connector body. The other portion of the connector is secured to a circuit member, the latter being provided with selectively positioned receptacles for mating with a particular configuration of the keying members whereby a single connector member can be provided with plural keying combinations to provide automatic differentiation between different wiring combinations or the like with the same connector member. This prevents the possibility of utilizing a pair of connector members with associated electrical circuitry which are not designed to be used together and thereby to prevent error.

It is therefore an object of this invention to provide a connector keying device capable of assuming a plurality of keying combinations.

It is a further object of this invention to provide a single electrical connector which can be selectively keyed to a plurality of possible keying combinations.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing in which like reference numerals refer to like parts:

FIG. 1 is an exploded perspective view of an electrical connector keying device made in accordance with the teachings of the present invention;

FIG. 2 is a perspective view showing the connector members of FIG. 1 in their assembled position;

FIG. 3 is an enlarged end view showing the positioning of keys within a connector member;

FIG. 4 is an enlarged fragmentary perspective view showing details of the keying means; and

FIG. 5 is an enlarged perspective view showing the manner in which the keying means cooperates with a printed circuit board.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illutrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purpose of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In FIG. 1 there is shown a preferred embodiment of the connector keying device in accordance with the present invention and comprises a printed circuit board or other appropriate device **10** having a plurality of apertures **12** therein and a pair of grooves **14** selectively machined therein or placed therein in any other suitable manner as will be explained in more detail hereinbelow. The printed circuit board **10** is mounted on a pin header member **16** of the connector by aligning the apertures **12** with a plurality of pins **18** which are secured within the member **16**. The pins **18** are substantially L-shaped and have forward projecting portions **20** extending at right angles to the upper projecting portions **22**. The pins **18** are electrically conducting and may be composed, for example, of brass with a gold-nickel plating thereon. The pin header member **16** is made of an insulating material such as diallyl phthalate or other suitable insulating material. The upper portions **22** of pins **18** are configured to extend through the apertures **12** in circuit board **10** and subsequently the pins **18** are electrically connected to pads **24** surrounding the apertures **12** by a dip soldering process or the like. A pair of polarizing pins **26** extend from the header member **16** adjacent the lower surface thereof, such pins serving to properly orient the header

member relative to the receptacle assembly indicated generally at **28**.

The receptacle assembly includes a plurality of apertures **30** for receiving the portions **20** of the pins **18** and further includes a pair of apertures **32** for receiving the polarizing pins **26**. It can be seen from the location of the apertures **32** and polarizing pins **26** that the two connector halves **16** and **28** can only be mated in their intended fashion and cannot be accidentally misoriented. A pair of mounting holes **34** are also provided on the receptacle assembly to permit mounting of the assembly mechanically as desired for a particular use.

The upper surface **36** of the receptacle assembly **28** is provided with a series of regularly spaced slots **38**, such slots opening into the forward face of the assembly. The slots **38**, better seen in FIG. 4, are conveniently formed with an arcuate cross-section for slidably receiving a selectively positionable key **40**. Each key **40** has a depending arcuate portion **42** for entry into the slot **38** and further has an upper generally rectangular portion **44** for cooperation with the grooves **14** formed in the circuit member **10**. The keys **40** are preferably formed of an electrically insulating material so that their disposition in the grooves **14** of the printed circuit board will not cause shorting between adjacent pads **24** surrounding the apertures **12** in the immediate vicinity of the grooves **14**. The keys **40** are slidable in and out of the slots **38** and are normally held therein by frictional force. If desired, a bonding agent may be employed in those particular instances where the keys are to be permanently located within a particular slot. However, in normal use it is desirable that the keys be readily positionable in any desired slot.

In operation the receptacle assembly **28** will be previously set up with electrical conductors **46** extending into the apertures **30** for electrically engaging the portions **20** of the pins **18** on the pin header member. The particular arrangement of conductors **46** is normally related to a particular printed circuit board. Therefore, to insure that a particular connector is employed by an operator with only the proper circuit board, the keying device of the instant invention is employed. For example, as shown in the drawings two keys **40** are positioned in particular slots **38** and the circuit board is provided with two grooves **14** placed to receive the two keys. It is readily understandable that any circuit board with a different groove configuration would not be usable with the particular connector assembly as keyed and it is also readily understandable that any other keying arrangement on the connector assembly would prevent that connector assembly from being used with the particular circuit board shown. In this way there is provided a very inexpensive and foolproof method of insuring proper matching between a circuit member and a connector assembly. When the particular connector assembly shown is desired to be used with a different circuit member then it is merely necessary to remove the keys **40** and to change the location or pattern of the keys to match a different circuit member.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

We claim:

1. An electrical connector comprising a first connector member, a second connector member for mating mechanically and electrically with said first connector member, a circuit board member connected to said second connector member and having a portion for lying adjacent said first connector member, and keying means for matching said first connector member to said circuit board member, said keying means comprising a plurality of slots disposed along said first connector member, said slots communicating wtih an external surface of said first connector member, said external surface being disposed for lying adjacent said circuit board member portion when said first and second connector members are in mated position, at least one key selectively positioned in said slots and extending outwardly of said first connector member from said external surface thereof, and at least one predetermined selectively positioned recess formed in said circuit board member portion for receiving said key to thereby match said circuit board member to said first connector member.

2. In an electrical connector as set forth in claim **1** wherein a plurality of keys are selectively positioned in said slots and wherein a plurality of recesses are formed in said circuit board member portion.

3. In an electrical connector as set forth in claim **1** wherein said key is formed of an electrically insulating material.

4. In an electrical connector as set forth in claim **3** wherein said key has a depending arcuate portion and wherein said recess is of arcuate cross-section for receiving said portion.

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U.S. Cl. X.R.

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