

Feb. 23, 1971

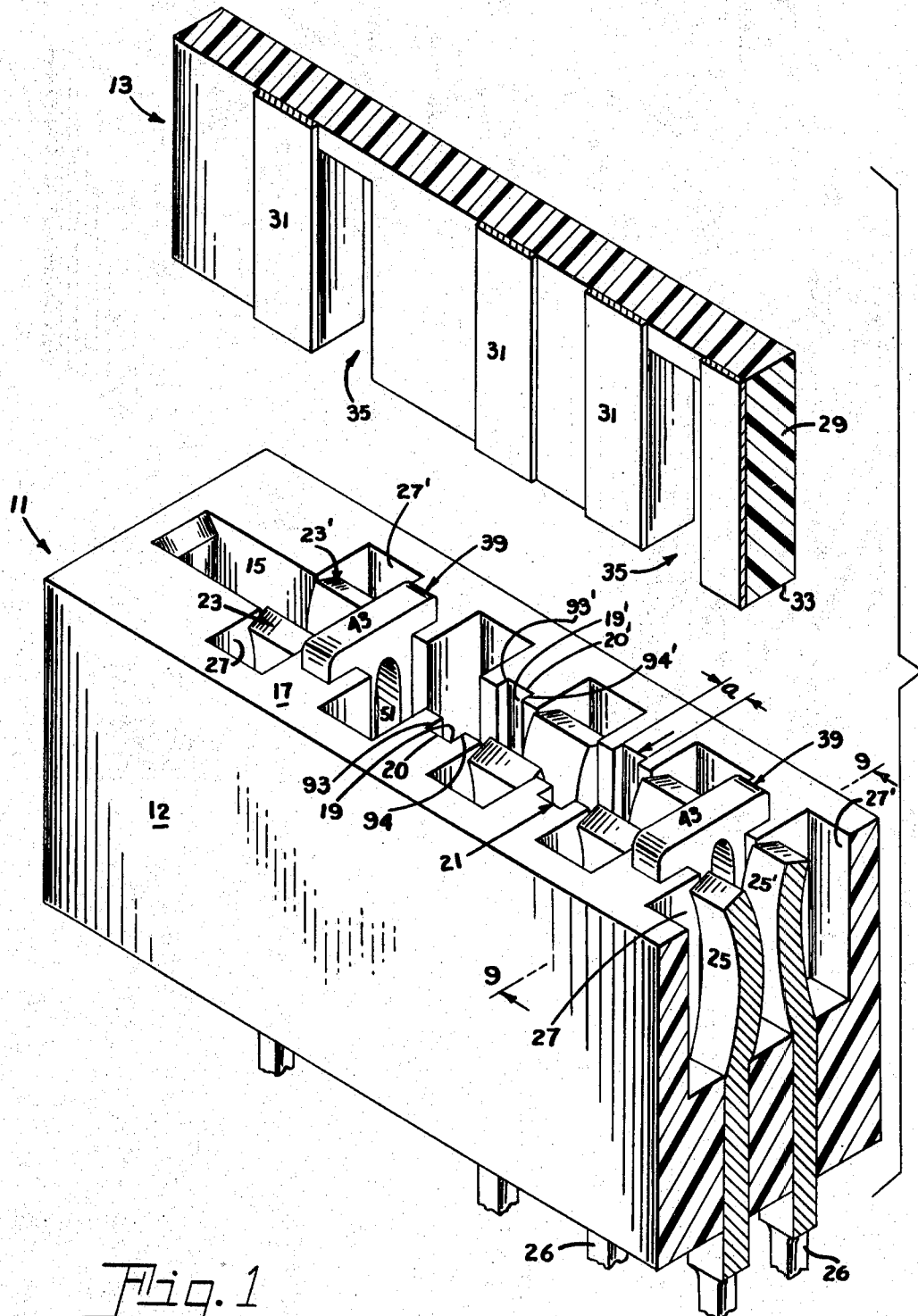
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3,566,340

MEANS FOR POLARIZING A CONNECTOR ASSEMBLY

Filed June 14, 1968

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

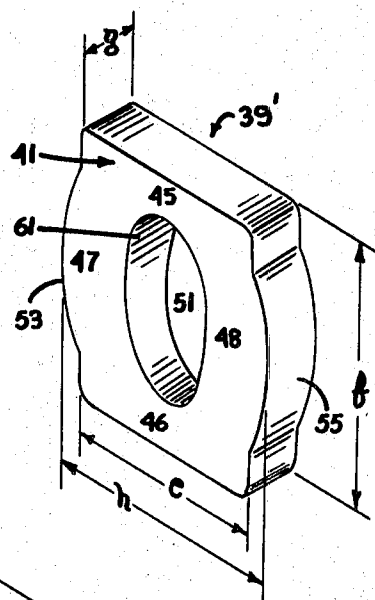
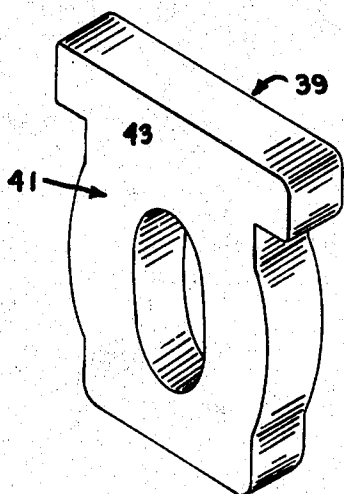


Fig. 5

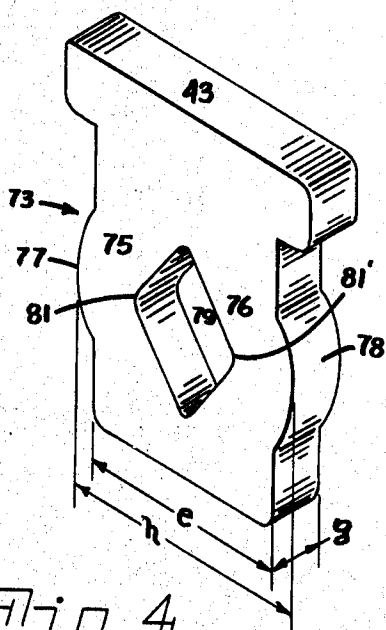
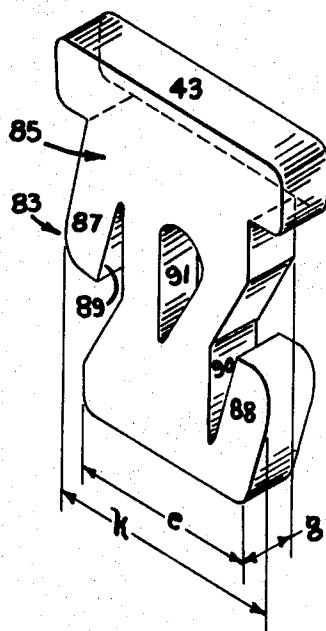
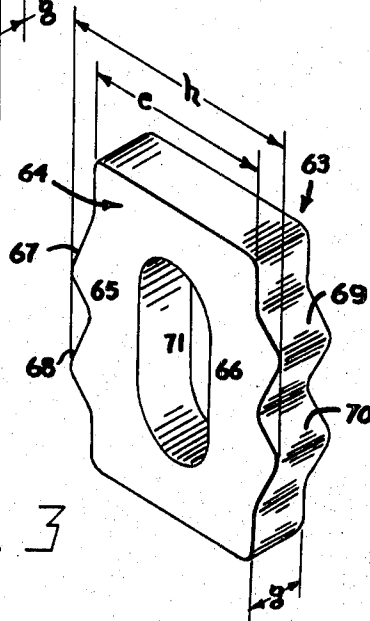


Fig. 3



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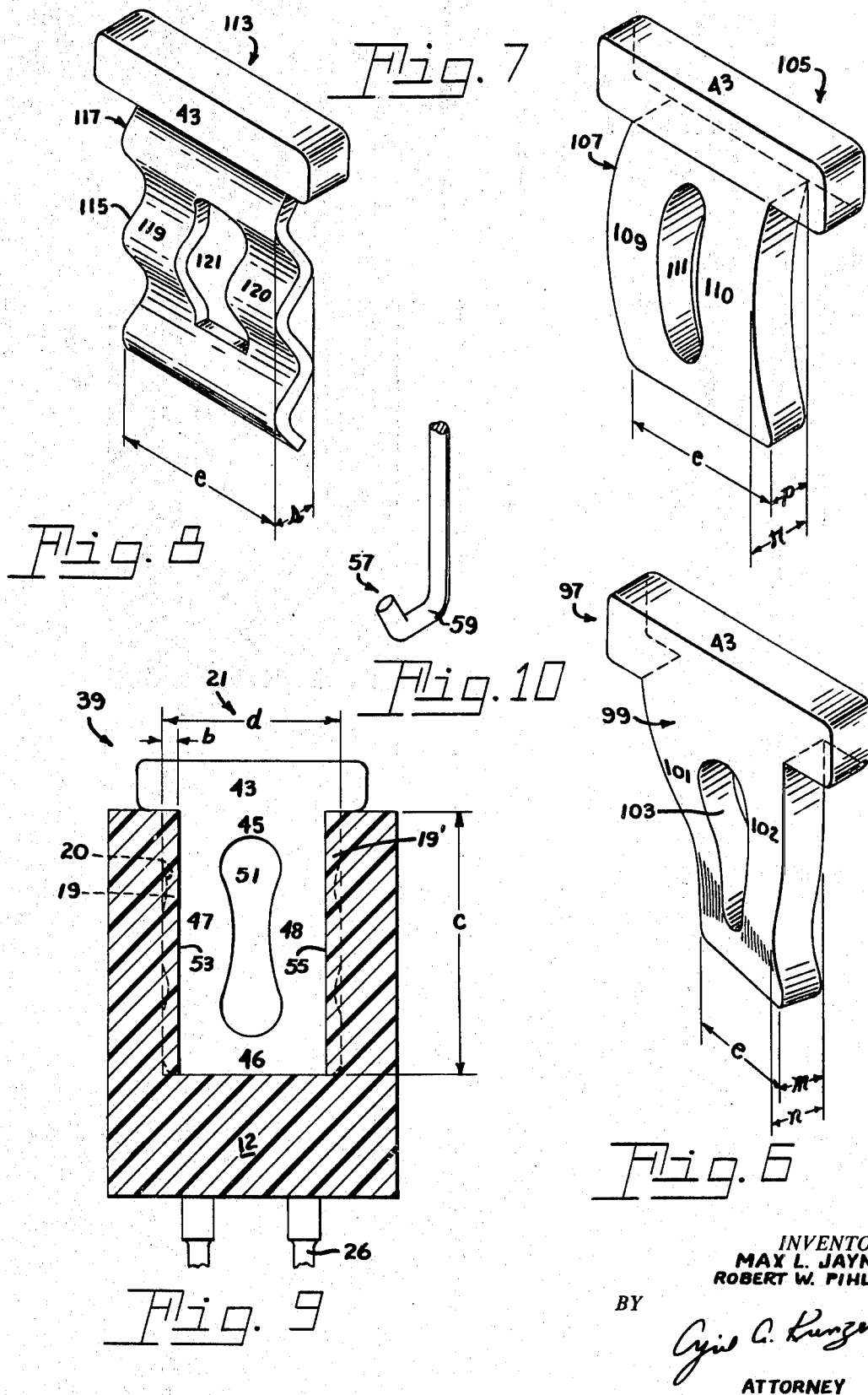
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Filed June 14, 1968

4 Sheets-Sheet 3



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MEANS FOR POLARIZING A CONNECTOR ASSEMBLY

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4 Sheets-Sheet 4

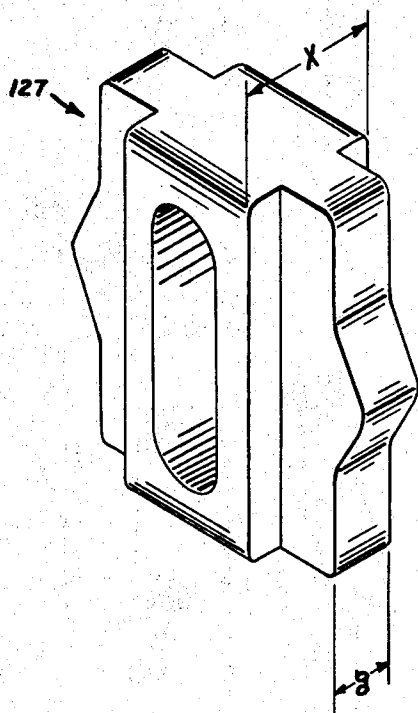


Fig. 12

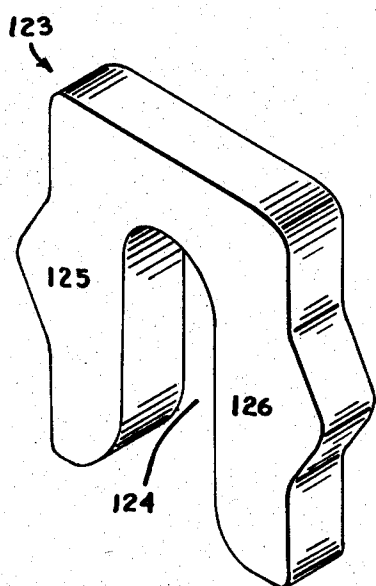


Fig. 11

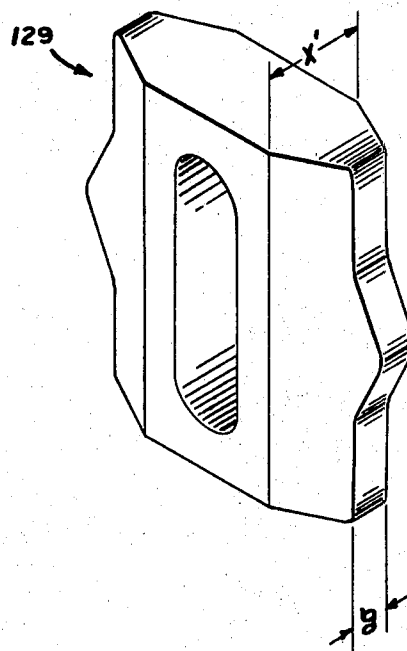


Fig. 13

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MEANS FOR POLARIZING A CONNECTOR ASSEMBLY

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Filed June 14, 1968, Ser. No. 737,163

Int. Cl. H01r 13/64; H05k 1/07

U.S. Cl. 339-186

4 Claims

ABSTRACT OF THE DISCLOSURE

Removable key means for polarizing a multiple contact connector assembly for accommodating printed circuit boards whereof at least one key of flexural material is discretely formed to resiliently fit within respective spaced apart channels in a manner that the key can be easily inserted therinto and resiliently retained therein to provide desired polarization of the assembly. The key is also formed with provisions to provide facile removal thereof when a change of polarization is desired.

BACKGROUND OF THE INVENTION

The invention relates to means for polarizing a multiple contact electrical connector assembly and more particularly to a flexural key type polarizing means adapted for insertion and resilient retention in a connector assembly formed to receive printed circuit boards.

Since diversified printed circuitry can be adequately accommodated on circuit boards of similar dimensions, it is important that the desired boards be inserted into the proper connector assemblies. To achieve proper matching, it is conventional to polarize the socket assembly with one or more wedge inserts or keys in a manner that only boards having properly oriented mating slots can be received therein. One conventional type of polarizing insert is formed to provide a friction or interference fit when forcibly pressed into a closely dimensioned slotted opening. Such polarizing means require close dimensional tolerances which results in high fabrication costs. In addition, the press fit type of polarizer causes both insertion and removal difficulties. A broken key resultant of the required insertion pressure provokes further aggravation in that special tooling and added time are required to ready the socket for usage.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the invention to reduce the aforementioned difficulties and to provide improved means for polarizing a connector assembly to accommodate the proper circuit boards therein.

Another object is to provide polarizing means that can be readily inserted, easily removed and inexpensively fabricated.

The foregoing objects are achieved in one aspect of the invention by the provision of a polarizing key of flexural material that is discretely formed to resiliently fit within spaced apart locating channels in the connector assembly. The flexural characteristics and constructional form of the key facilitate easy insertion and removal as may be required and provide for positive resilient retention thereof within the keying slot to effect the desired polarization.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially sectioned perspective view showing a portion of a connector assembly having polarizing means therein oriented to receive a portion of a compatibly formed circuit board;

FIGS. 2 through 8 and 11 through 13 are perspective views of various embodiments of the resilient polarizing key;

FIG. 9 is a sectional view taken along the line 9-9 of FIG. 1 showing the resilient retention of a polarizing key within the connector assembly; and

FIG. 10 illustrates a type of removal means formed to withdraw the polarizing key from the connector assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For a better understanding of the present invention, together with other and further objects, advantages, and capabilities thereof, reference is made to the following specification and appended claims in connection with the afore-described drawings.

With reference to the drawings, FIG. 1 and FIG. 9, which is a section taken along the line 9-9 of FIG. 1, partially show a multiple contact connector assembly 11 whereof the assembly block portion 12 is formed to accommodate a printed circuit board 13. The assembly block is usually fabricated of an insulated plastic material having internal shaping to comprise a discrete board-receiving recess 15 which opens on the face 17 of the assembly block. On either side of the recess are a plurality of open substantially vertically disposed channels 19 and 19' each having dimensions substantially defined as a width "a," a depth "b," and a length "c." It is to be noted that the channel length "c" is not necessarily required to equal the depth of the receiving channel 15. While substantially rectilinear channels are shown and described, other cross-sectional channel configurations, such as arcuate or ovoid, may be equally utilized in keeping with the concept of the invention. The channels are aligned as spaced apart pairs of facing channels 19 and 19' to provide a plurality of polarizing channel means 21 each having a defined span "d." A plurality of aligned metallic electrical contact members 23 and 23' suitably positioned and affixed in the block portion, have resilient contact portions 25 and 25' located in suitable contact recesses 27-27' that are oriented in the assembly in spaced relationship to the adjacent polarizing channel means 21. Proper external circuitry, not shown, is connected to the exterior contact portions 26 protruding from the assembly block.

The circuit board 13, which is only partially illustrated in FIG. 1, is formed of an insulative substrate 29 with exposed circuit connective areas 31 disposed relative to the leading edge 33 of the board. These connective areas are aligned to mate with the respective resilient contact portions 25 and 25' when the board is inserted into the connector assembly. Included in the leading edge portion of the board are one or more polarizing slots 35 which serve as means for differentiating the particular circuitry application for which the board is intended. The proper connector assembly for accommodating the aforementioned circuit board has polarizing means 39 oriented therein to mate with the polarizing slots 35 formed in the board.

The polarizing means 39 is a body member formed as an insert key having flexural characteristics to facilitate facile insertion into and removal from the proper polarizing channels 19 and 19' as shown in FIG. 1. The key is formed of a resilient non-conductive material having the necessary flexural characteristics, insulative qualities, dimensional stability, and heat and abrasion resistances required for the usage. Suitable substances are found, for example, in the thermoplastic class of resins, such as, for instance, nylon and polycarbonate materials, but other substances exhibiting the above-identified characteristics are equally applicable. Usually the keys are of a color

differing from that of the connector block to facilitate rapid visual identification of the polarization. In greater detail, the polarizing insert key 39 is further delineated in FIGS. 2 and 2a. The key 39 in FIG. 2 has a longitudinal section 41 with a horizontal T-bar 43 formed at the top which exceeds the lateral breadth of the key and is fashioned to stop against the face 17 of the connector assembly when the key is fully inserted therein. The T-bar is advantageous in that it affords a larger identification area on the face of the connector assembly and provides means for gripping the top of the key. In the various embodiments to be subsequently described, the T-bar 43 may or may not be incorporated depending upon whether or not the above noted features relating to stopping, identifying or gripping, are desired. The outstanding contribution of this invention is mainly concerned with that portion of the key which is positioned within the polarizing channels 19 and 19' of the assembly.

To clarify description of the polarizing key, one embodiment 39' thereof as shown in FIG. 2a will be utilized. This embodiment is substantially the same as that illustrated in FIG. 2 with the exception that the T-bar is eliminated. The longitudinal section is formed of ends 45 and 46 and longitudinal flexural side portions or members 47 and 48 intermediate of which there is a defined elongated opening 51. The key has a basic lateral breadth "e," a length "f" and an edge defined thickness "g" which are compatible with the respective corresponding dimensions "d," "c," and "a" of the polarizing channel means 21 to permit sliding acceptance of the key therein.

At this point it is appropriate to mention that in referring to the several embodiments of the insert key to be subsequently described, the designated lateral breadth "e" and the edge defined thickness "g" dimensions are in keeping with the span "d" and width "a" of the related polarizing channel means 21 to facilitate a slidable acceptance of the different key embodiments therein. The expanded dimensions of flexural elements in the several keys, to effect resilient retention, are identified by other letter notations.

In the embodiment shown, in FIG. 2a, each of the side members 47 and 48 of the key has at least one part thereof shaped as protrusions 53 and 55 which form an expanded lateral breadth "h" that exceeds the basic lateral breadth "e." The protrusions and associated flexural side members are related to the aperture 51 in a manner to permit lateral flexure of the side members into the aperture to effect lateral retractive movement of the protrusions 53 and 55 when the key is inserted in a sliding manner into the polarizing channel means. The resilience of the retracted side members exerts sufficient resilient retention force against the channel means in the region of the protrusions, to retain the key as positioned.

When it is desired that the connector assembly 11 be polarized in a different manner, the resiliently retained keys can be expeditiously removed by utilizing a hook-type key removal means 57, as shown in FIG. 10. The removal means comprises a hook-shaped metallic member 59 fashioned to fit through the top portion 61 of the opening 51 and cooperate against the top member 45 whereby the key can be easily withdrawn and reused in another polarizing requirement.

In another embodiment shown in FIG. 3, the key 63 has basic dimensions of breadth, length, and thickness that substantially equal those of the embodiment illustrated in FIG. 2a. In this instance the longitudinal section 64 has side flexural members 65 and 66 with a plurality of protrusions 67, 68, 69, and 70 thereon extending beyond the basic lateral breadth "e." The flexural side members cooperating with the opening 71 provide resilient retention of the key in the polarizing channel means.

Another related embodiment comprising the key 73 is illustrated in FIG. 4 wherein the side members 75 and 76 have discrete protrusions 77 and 78 thereon. The de-

fined opening 79 is substantially diamond shaped with the lateral apices 81 and 81' thereof being oriented relative to the laterally extending protrusions 77 and 78.

The embodiment of the key 83 shown in FIG. 5 has a longitudinal section 85 with discretely formed flexural side members 87 and 88 which protrude in an angular manner to effect an expanded lateral breadth "k" which exceeds the basic lateral breadth "e." The protruding portions 87 and 88 are formed to cooperate with related compatible openings 89 and 90. Upon insertion into the polarizing channel means 21, the angularly oriented side members 87 and 88 are retracted into the related openings 89 and 90 to simultaneously exert resilient retention force against the channel means. Another opening 91 in the longitudinal section is discretely formed to enhance the lateral resilient characteristics of the key and also provide means for key withdrawal.

The aforedescribed embodiments shown in FIGS. 2, 2a, 3, 4, and 5 all exert defined areas of resilience in the direction of lateral breadth whereby resilient force or pressure is exerted against discrete areas of substantially the bottom portions 20 and 20' of the channels 19 and 19'. In the embodiments to be described, such as those shown in FIGS. 6, 7, and 8, resilient retention force or pressure is also effected, but in these instances it is exerted against the sides 93 and 94 of channels 19 and 19'.

The embodiment of the key 97 shown in FIG. 6 has a flexural longitudinal section 99, a lateral breadth "e" and side members 101 and 102 which define an opening 103 therebetween. The thickness of the material "m" is less than the width "a" of the channels 19 and 19'. A slight resilient twist is provided to the longitudinal section to produce a torsional effect upon insertion of the key into the polarizing channel means 21. The side members have a prior-to-insertion twist that effects a resilient dimension "n" that exceeds the channel width "a." As the key is inserted, the side members substantially conform to the dimensions of the channel in a manner to substantially remove the twist. This effects a torsional resilient retention of the key by exerting a resilient force substantially against the sides of the channels.

In FIG. 7, a key 105 is shown whereof the flexural longitudinal section 107 has a lateral breadth "e" and side members 109 and 110 which define an opening 111 therebetween. The thickness of the material "p" is less than the width "a" of the channels 19 and 19'. At least one of the flexural side members is discretely formed to have a longitudinal camber therein to effect a resilient dimension "r" that exceeds the channel width "a." Upon inserting the key into the polarizing channel means 21, the resilient pressure resultant from substantially straightening the camber formation effects sufficient force across the width of the respective channels 19 and 19' to promote the resilient retention of the insert key therein and provide desired polarization of the connector assembly.

A further embodiment is illustrated in FIG. 8 wherein the insert key 113 is formed to have a plurality of lateral corrugation formations 115 fashioned to provide the flexural longitudinal section 117 with an effective thickness "s" which exceeds the channel width "a." Between the side members 119 and 120 is an opening 121. When the flexural key is inserted into the polarizing means 21, the resilient corrugations slidably fit within the channels 19 and 19' and effect resilient force across the width "a" of the respective channels and against the sides 93, 94, 93' and 94' thereof in a manner to promote resilient retention of the insert key therein.

In the several embodiments of the invention that are shown and described, both of the respective side members are similarly formed, but such is not intended to be limiting. It is in keeping with the concept of the invention that at least one of the flexural side members be formed to exert a sufficient resilient force within the polarizing channel means to effect retention of the key therein. The openings in the longitudinal members promote the resil-

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ient movement of the flexural side members and provides means for facile removal of the respective polarizing keys from the connector assembly.

Another embodiment of the polarizing means is shown in FIG. 11 wherein the insert key 123 is configured as an open-end structure having an elongated opening 124 defined between flexural side members. As in the other aforementioned embodiments, the side members 125 and 126 are formed to exert resilient retention force against the channel means when the key is inserted thereinto.

There are occasions when it is desired to have polarizing insert keys that effect bowing or flexing pressures additional to that normally provided by the edge defined thickness of the material. In these instances an additional intermediate material thickness is provided between the channel defined edges. As shown in FIG. 12 the insert key 127 resembles that shown in FIG. 2a except that the intermediate material thickness "x" is greater than the edge-defined thickness "g." A related embodiment is illustrated in FIG. 13 wherein the insert key 129 has an intermediate material thickness "x" which exceeds the edge-defined thickness "g." It will be noted that the defined edge of the insert key 129 is formed to slidably mate with polarizing channel means having a compatible cross-sectional shape.

It is within the concept of the invention that the several aforedescribed embodiments of the insert key can also incorporate the increased intermediate material thickness if the characteristics effected thereby are desired. In any instance the increased material thickness "x" or "x'" should not be such as to extend into the adjacently located contact recesses 27 and 27'.

The several foregoing embodiments provide a flexural polarizing insert key that exhibits improved features not evidenced in the art. The resilient key described in each specific embodiment is readily inserted, easily removed, and inexpensively fabricated.

While there have been shown and described what are at present considered the preferred embodiments of the invention, it will be obvious to those skilled in the art that various modifications and changes may be made therein without departing from the invention.

What is claimed is:

1. Means for polarizing a multiple contact connector assembly for accommodating printed circuit boards whereof the assembly block portion has a discrete board-receiving recess formed therein to open on the face thereof, said recess having a plurality of open channels of fixed width, depth and length dimensions aligned as spaced apart pairs of facing channels disposed on either side of the recess to provide a plurality of polarizing channel means each having a fixed defined span and oriented in spaced relationship to contact members positioned in separate channels adjacent thereto, wherein the improvement comprises:

at least one body member formed as an insert key having flexural characteristics to facilitate facile insertion into and removal thereof from said polarizing channel means, said key being of resilient material having flexural side members joined by supporting top and bottom end members to form an intermediate longitudinal section therebetween with at least one defined opening therein having an initial shape and a deformed shape when said key is in said polarizing channel, said key being dimensioned to have a basic lateral breadth and length and a compatible edge defined thickness formed to be slidably acceptable in said defined channel means, said key having at least one of said end supported flexural side members formed with at least one protruding portion extending laterally therefrom to provide an expanded lateral

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breadth of said key that exceeds the basic lateral breadth thereof, said expanded lateral breadth being resiliently compressed during polarization to deform said opening to effect sufficient resilient force against said polarizing channel means to promote the resilient retention of said insert key therein and provide polarization of said connector assembly.

2. Means for polarizing a multiple contact connector assembly according to claim 1 wherein said insert key has an end member formed to exceed said basic lateral breadth of said key to provide a top T-bar thereon fashioned to stop against the face of said connector assembly and seat substantially directly thereon when said key is inserted into said defined polarizing channel.

3. Polarizing means according to claim 1 wherein said longitudinal section is fabricated to have at least one combination aperture therein formed in a manner to promote resilient movement of said flexural longitudinal portion and provide means for expeditiously removing said insert key from said polarizing channel means.

4. Means for polarizing a multiple contact connector assembly for accommodating printed circuit boards whereof the assembly block portion has a discrete board-receiving recess formed therein to open on the face thereof, said recess having a plurality of open channels of fixed width, depth and length dimensions aligned as spaced apart pairs of facing channels disposed on either side of the recess to provide a plurality of polarizing channel means each having a fixed defined span and oriented in spaced relationship to contact members positioned in separate channels adjacent thereto, said polarizing means comprising:

at least one body member formed as an insert key having flexural characteristics to facilitate facile insertion into and removal thereof from said polarizing channel means, said key being of resilient material having flexural side members joined by supporting top and bottom end members to form an intermediate longitudinal section therebetween with at least one defined opening therein, said key being dimensioned to have a basic lateral breadth and length and an intermediate material thickness between the defined edges of said side members, said intermediate thickness being greater than an edge defined thickness shaped to be slidable in said channel means, said key having at least one of said flexural side members formed with at least one protruding portion extending laterally therefrom to provide an expanded lateral breadth of said key, said expanded lateral breadth being resiliently compressed during polarization to deform said opening to effect sufficient resilient force against said polarizing channel means to promote the resilient retention of said insert key therein and provide polarization of said connector assembly.

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