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(54) **STACKED SFP CONNECTOR AND CAGE ASSEMBLY**

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H01R 13/60 (2006.01)

(52) **U.S. Cl.** **439/541.5**

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439/607-10, 352, 939, 108, 138, 752, 79,
439/676

See application file for complete search history.

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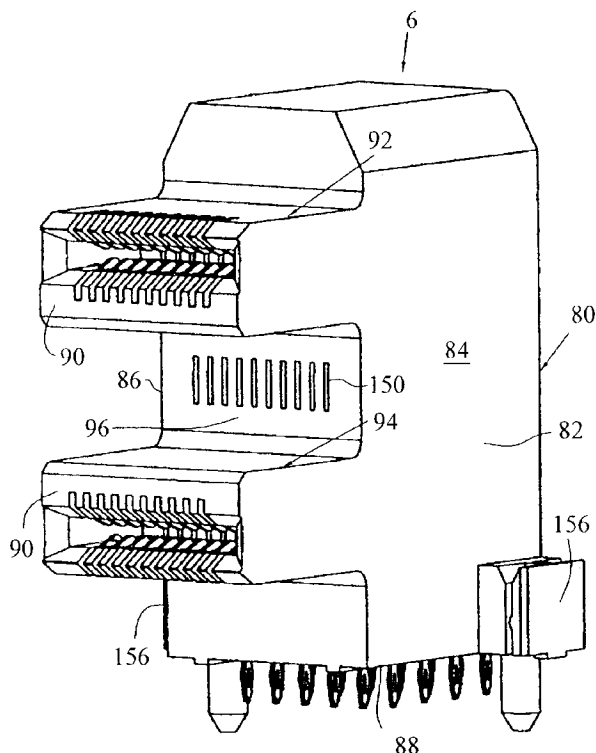
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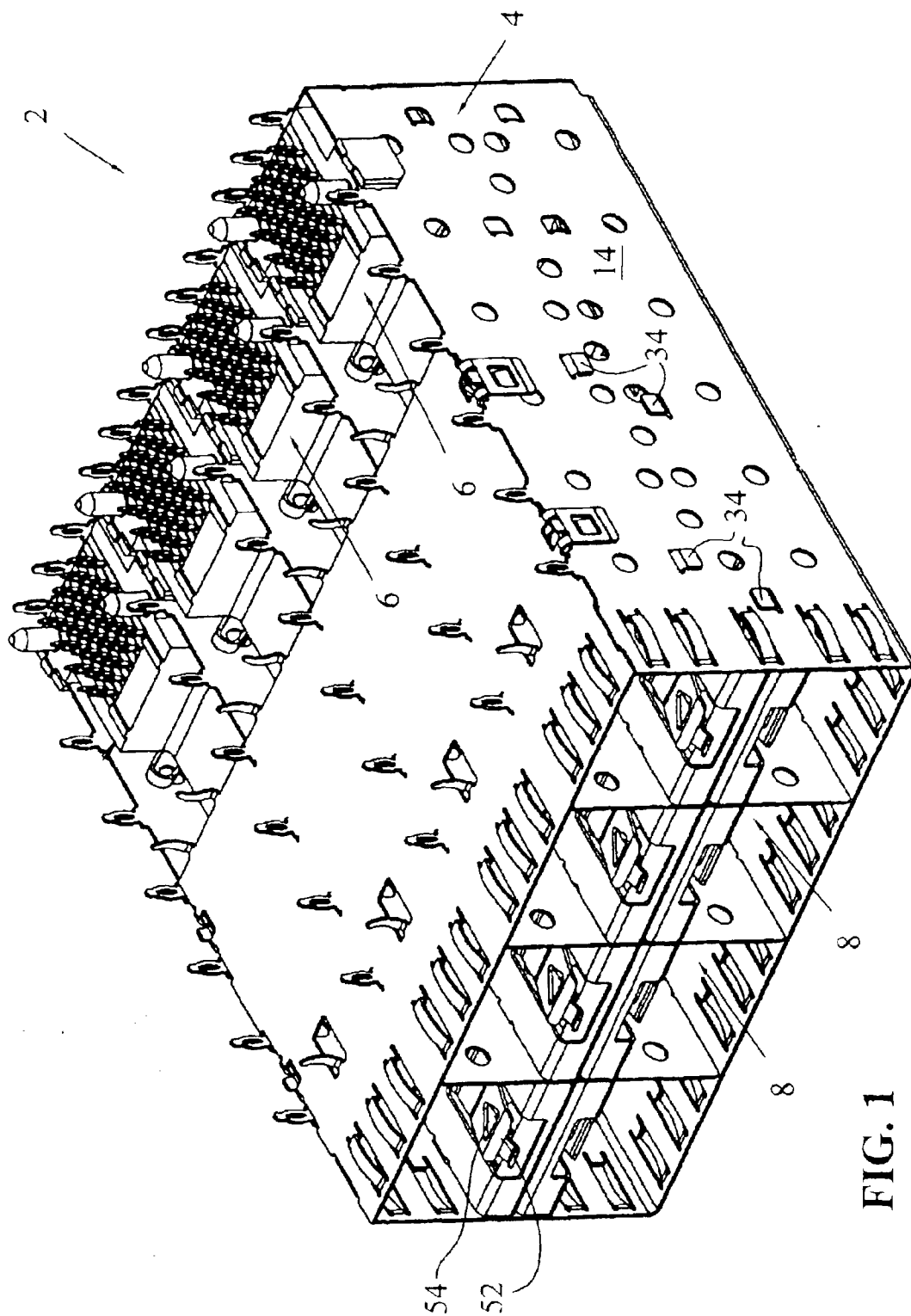
Primary Examiner—J. F. Duverne

(57) **ABSTRACT**

An electrical connector assembly is shown having a stamped and formed shielded cage having a plurality of ports for receiving SFP modules. The cages have an opening extending through a lower face thereof for receiving a header connector having first and second extensions which are aligned with the first and second columnar ports in the cage. Thus, the SFP modules are pluggable into individual ports, whereby two modules are interconnected to a single header connector interconnected to a motherboard.

26 Claims, 18 Drawing Sheets





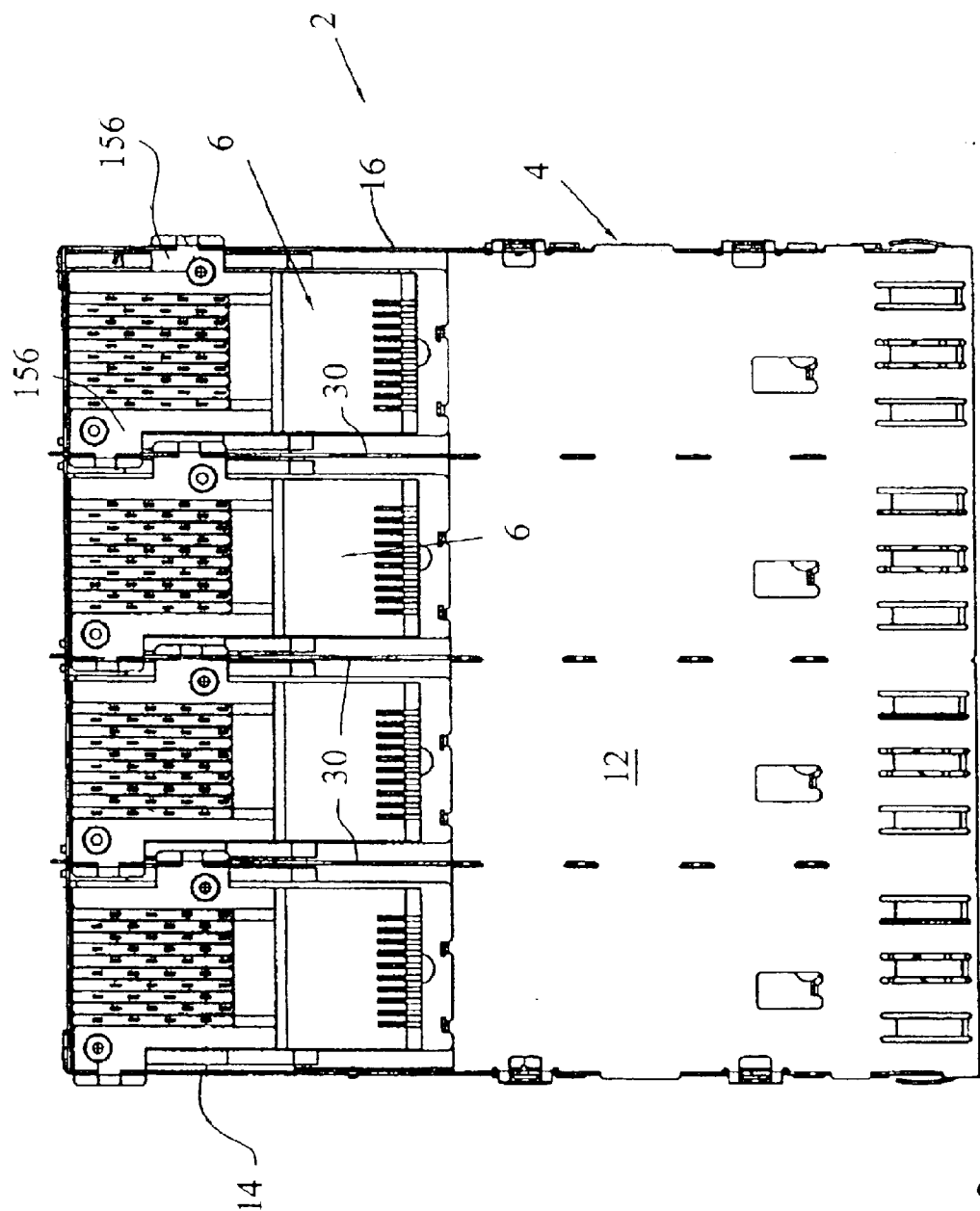


FIG. 2

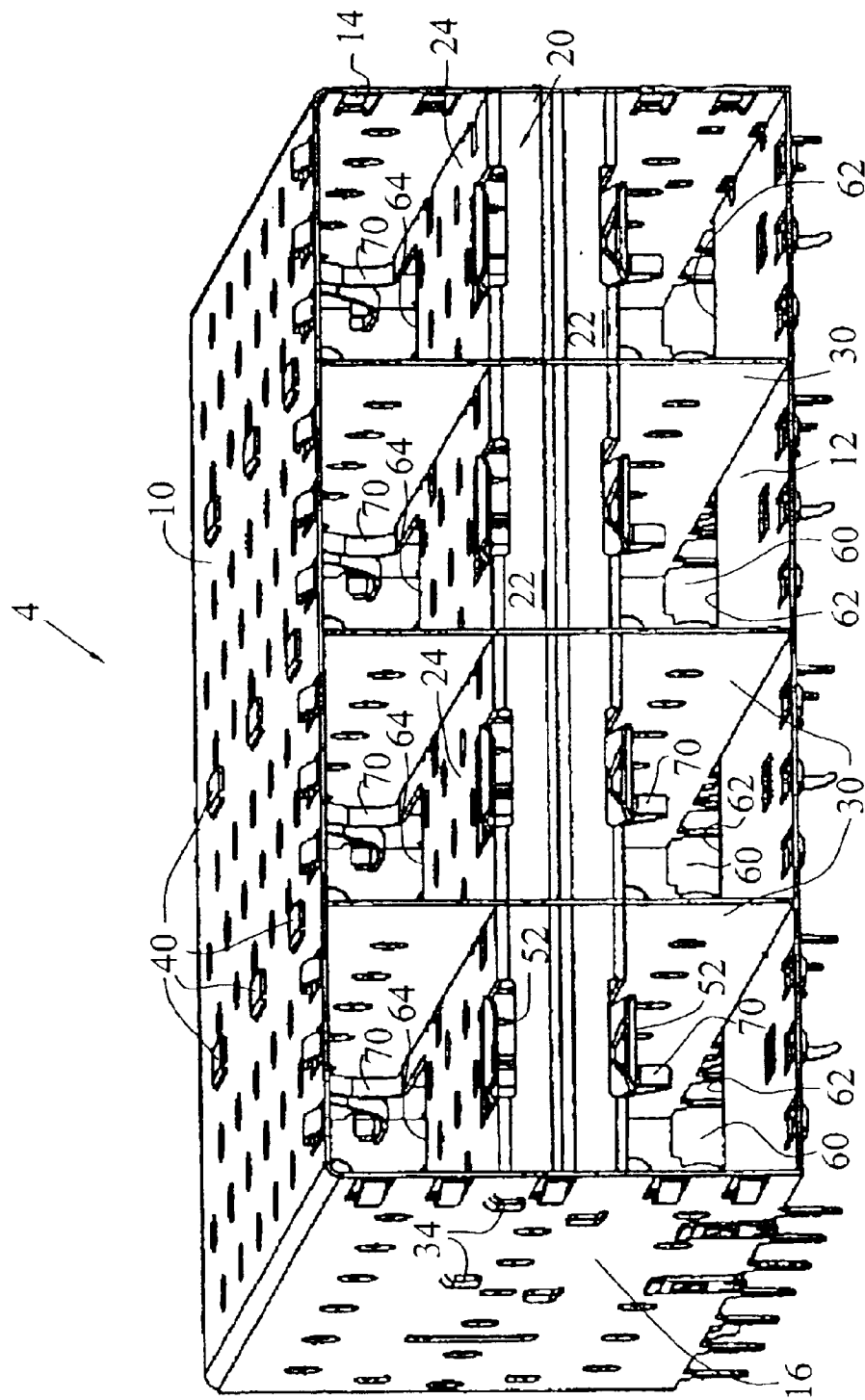
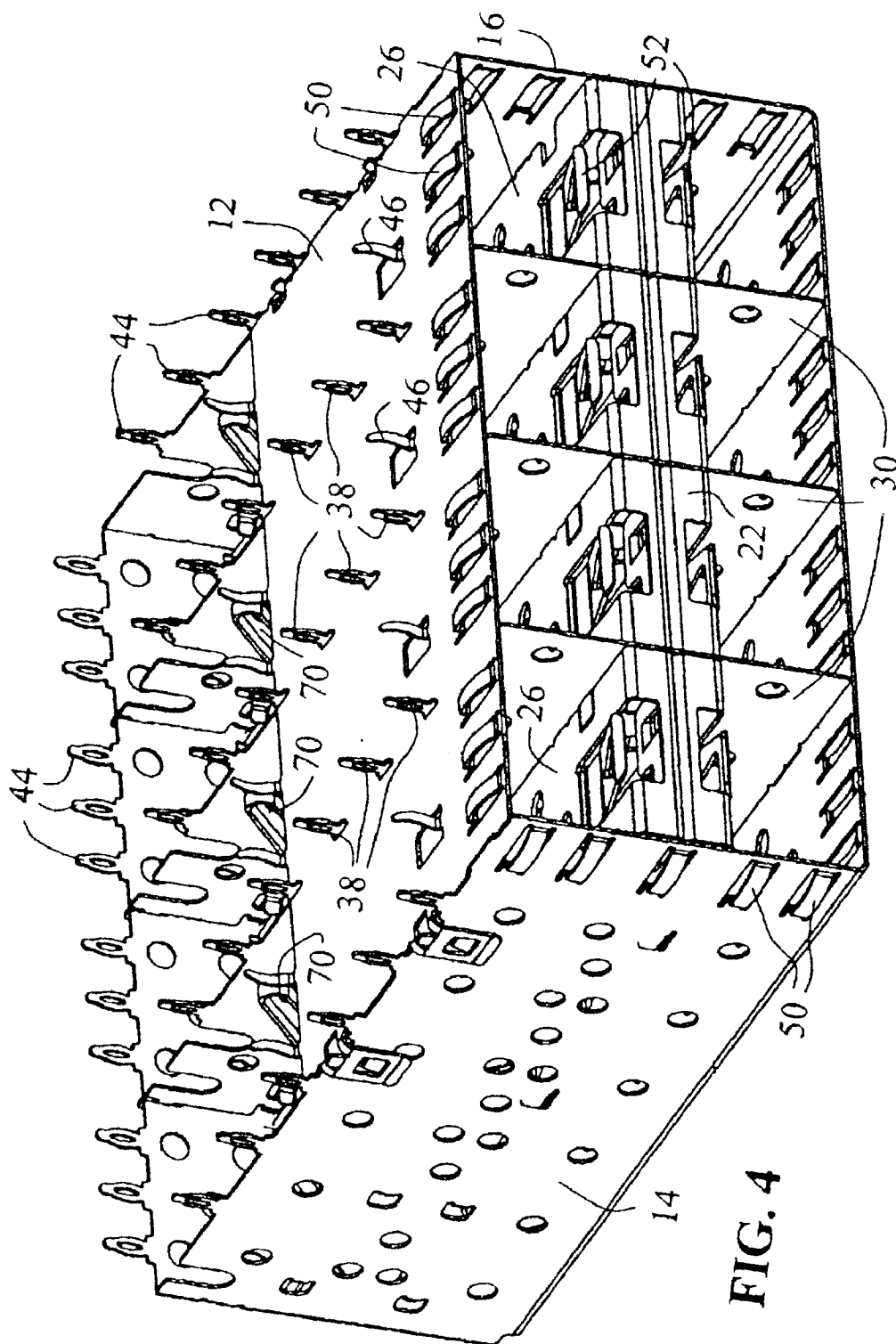


FIG. 3



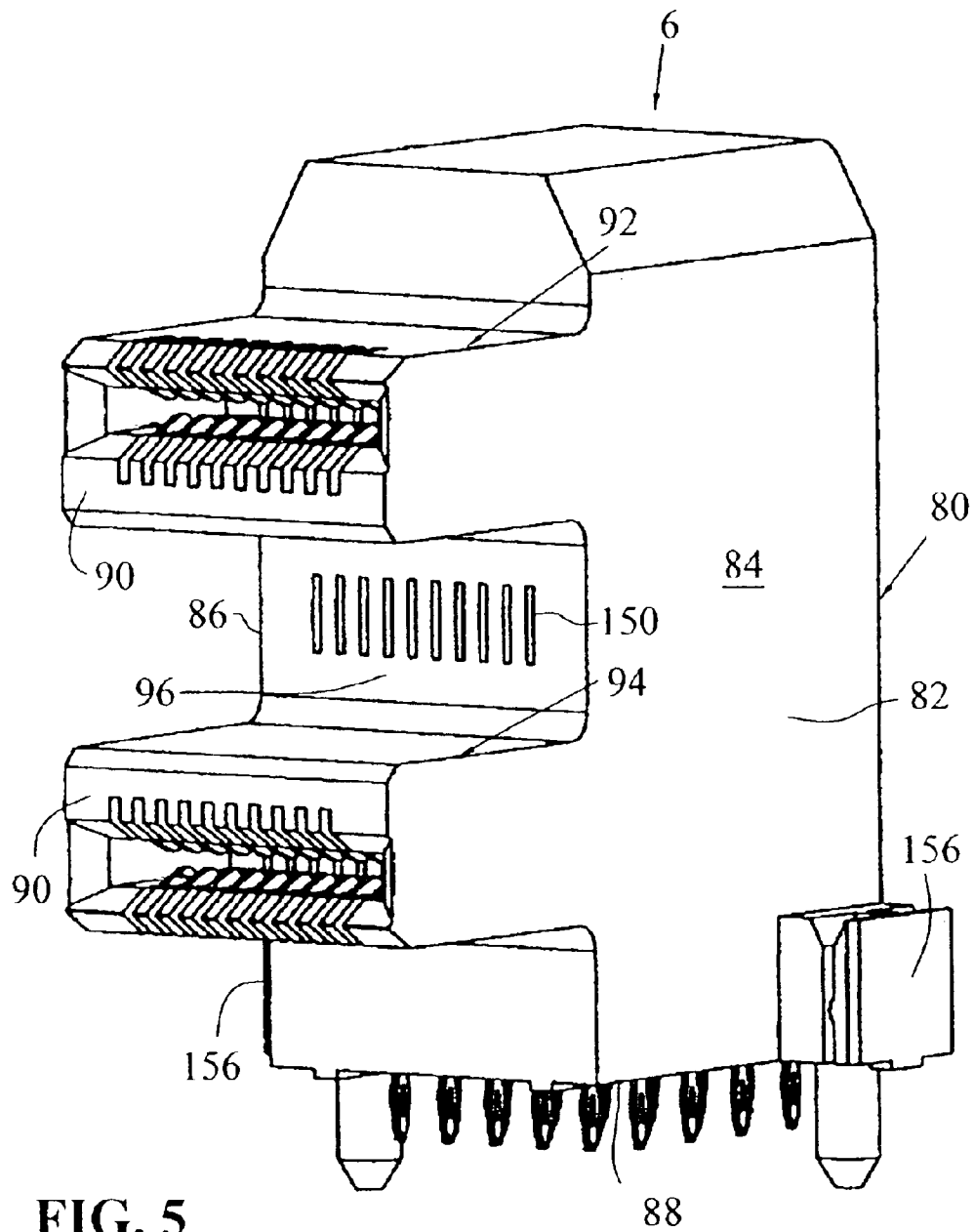
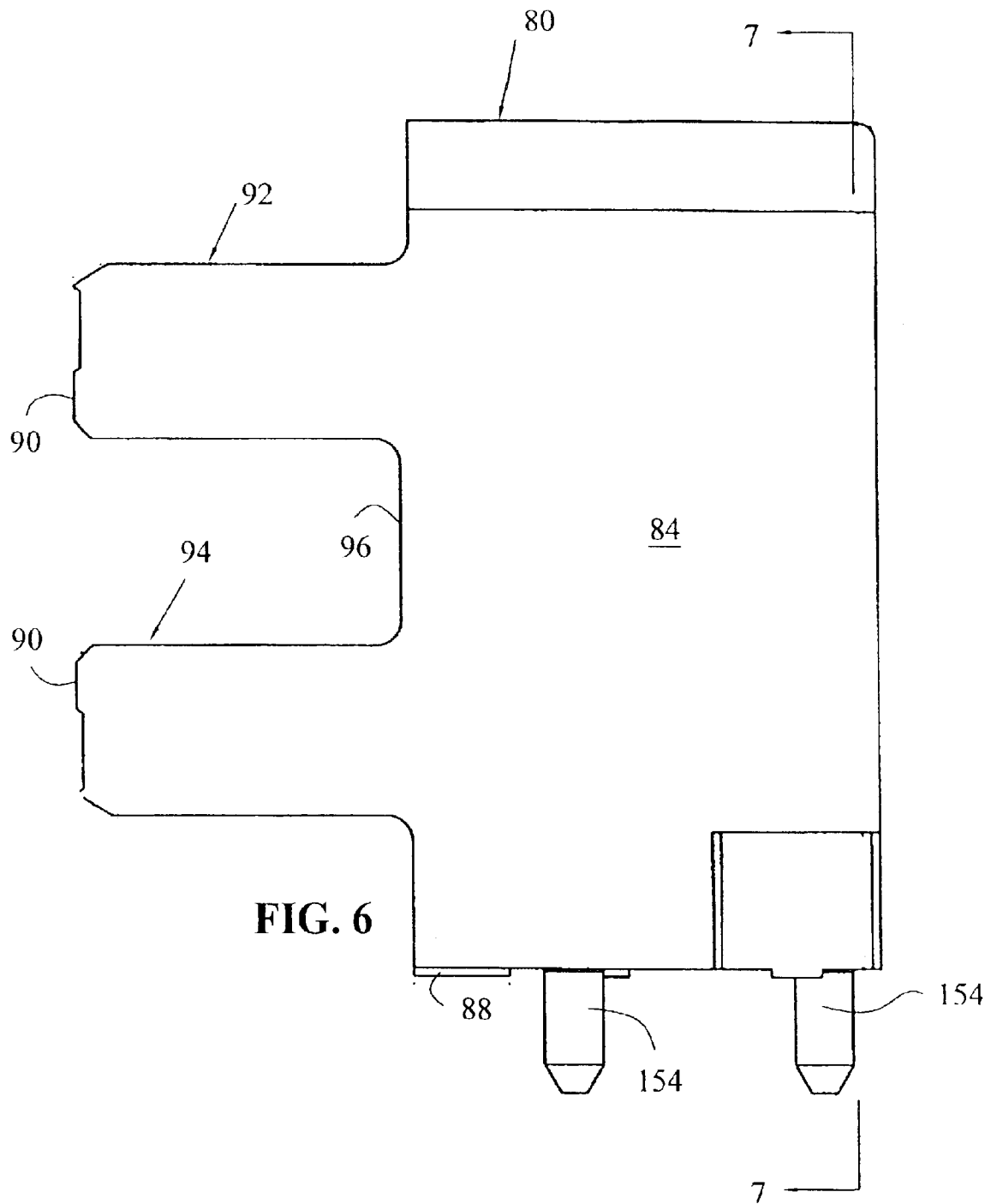


FIG. 5



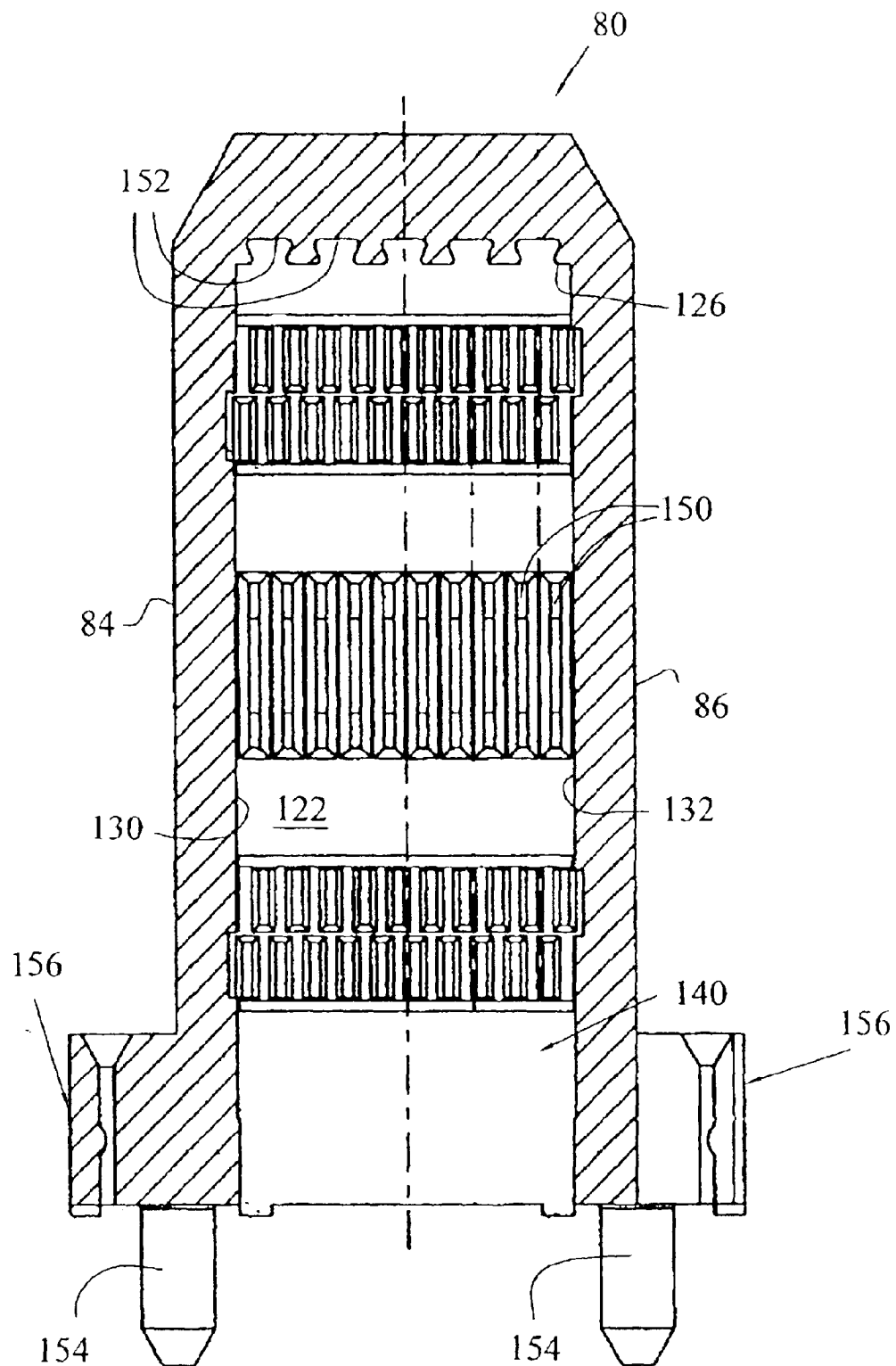


FIG. 7

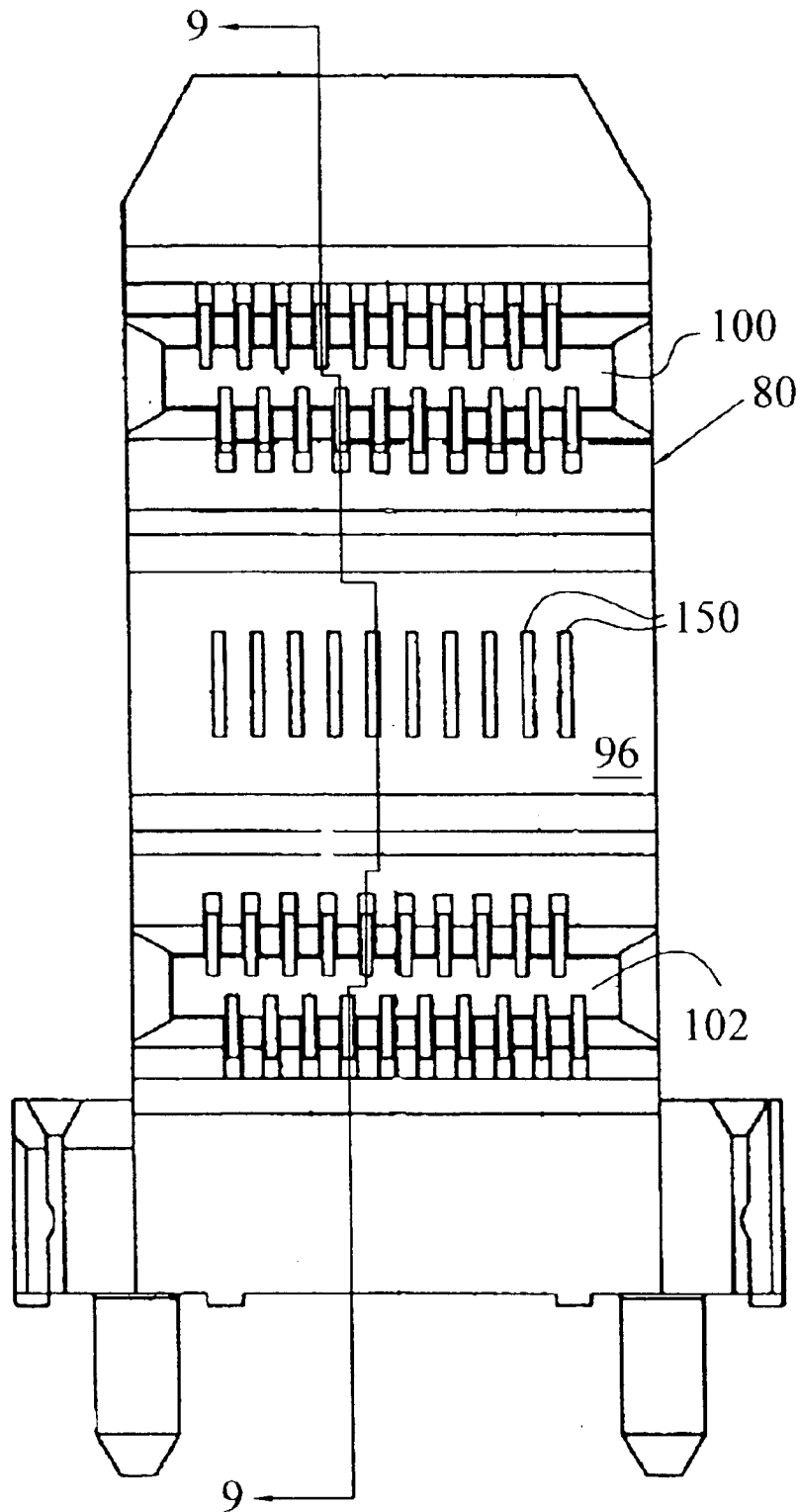
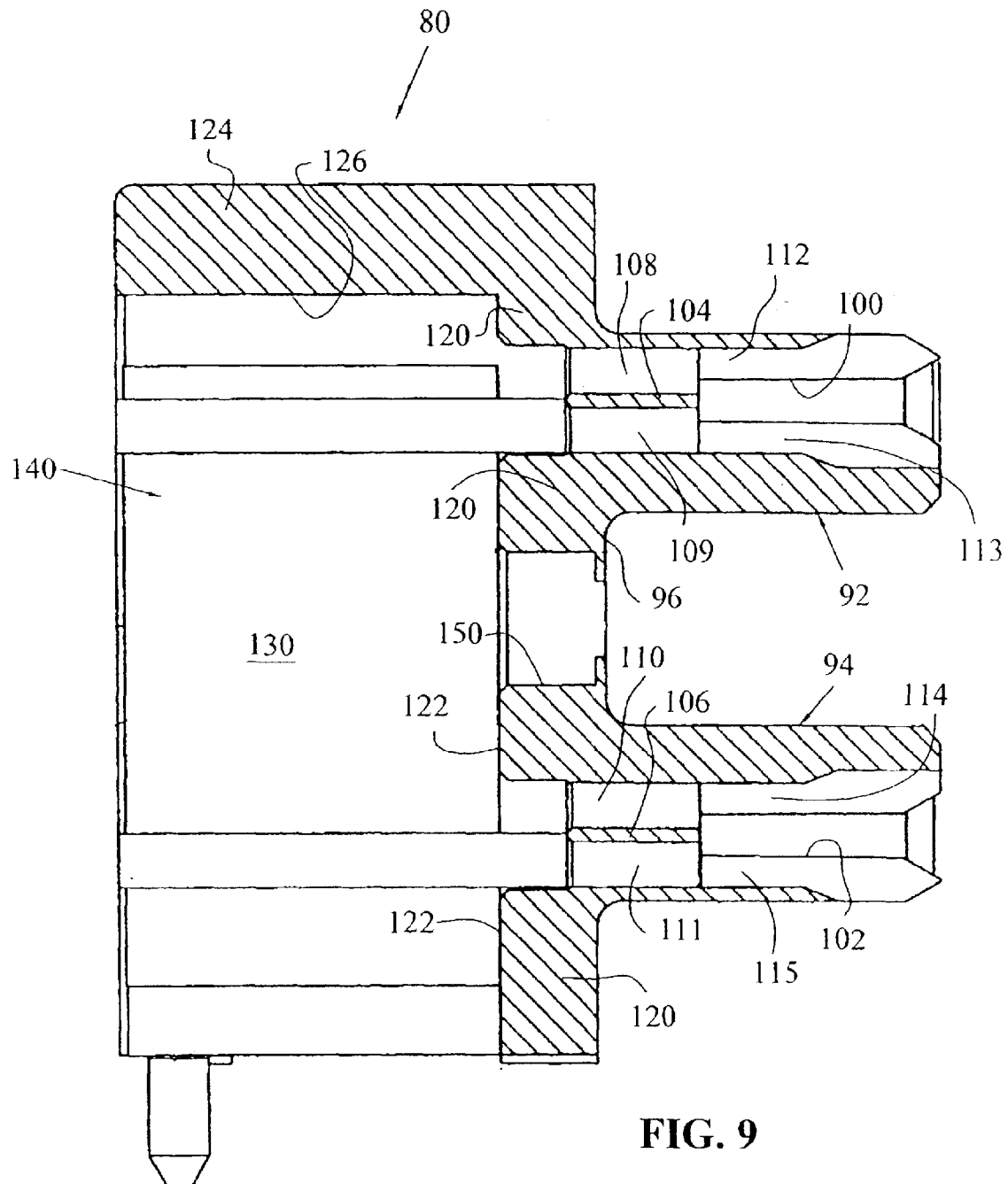


FIG. 8



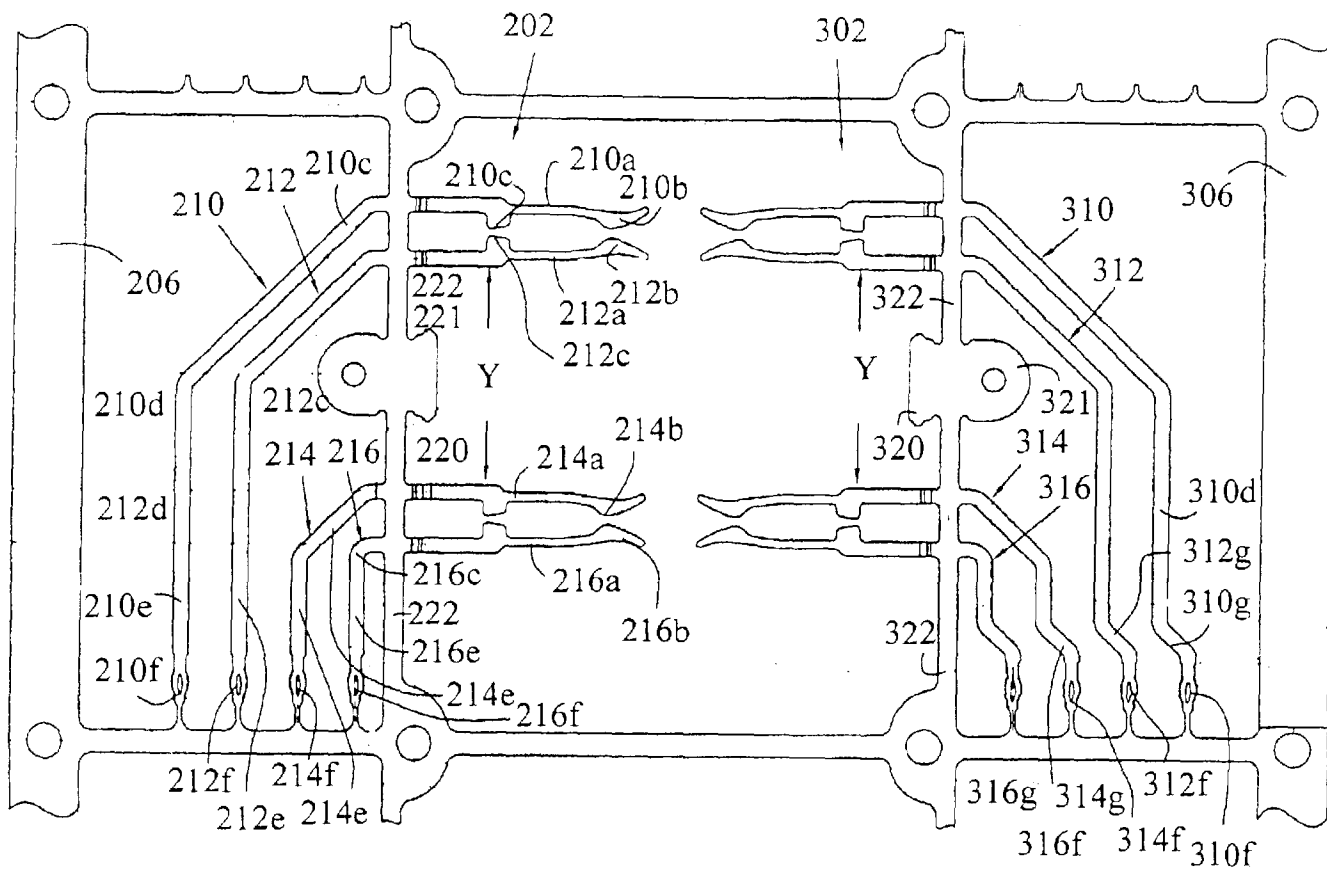


FIG. 10

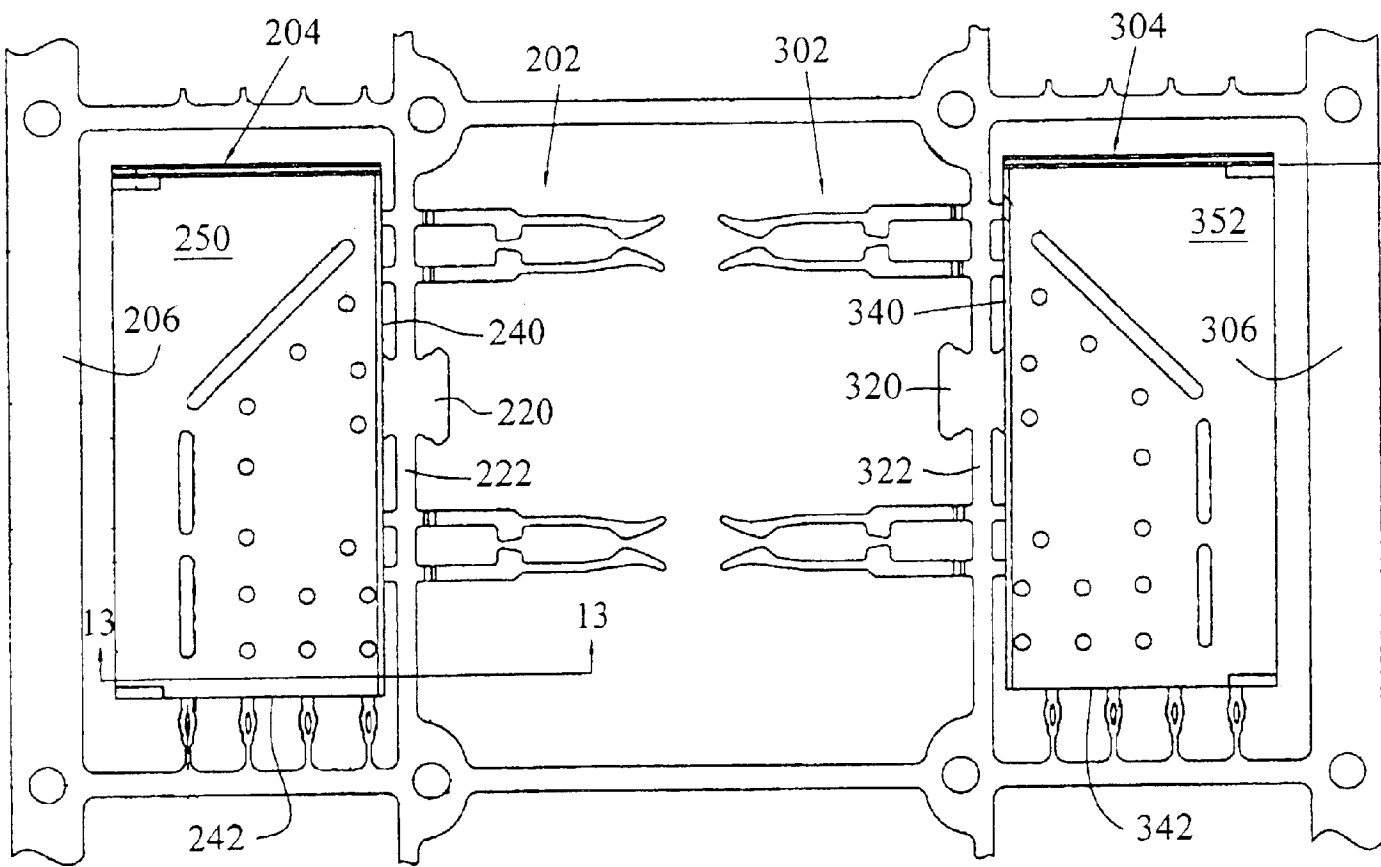


FIG. 11

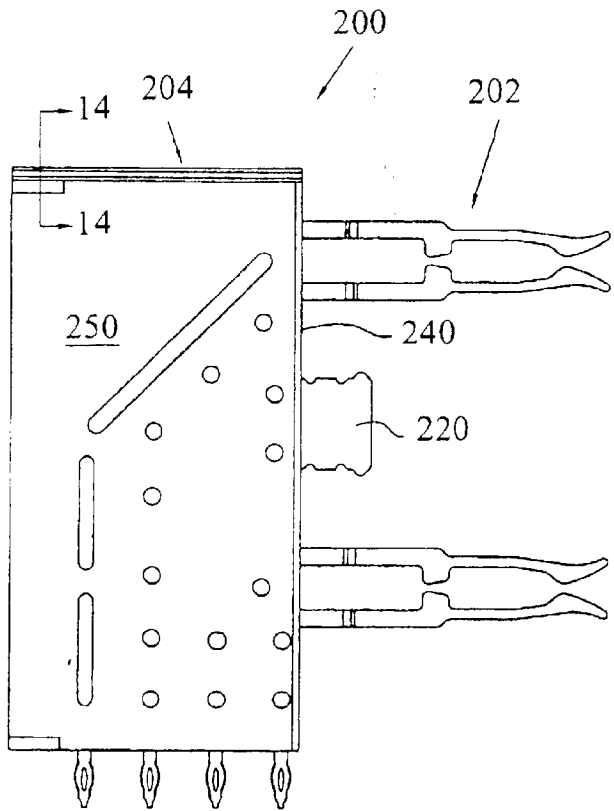


FIG. 12A

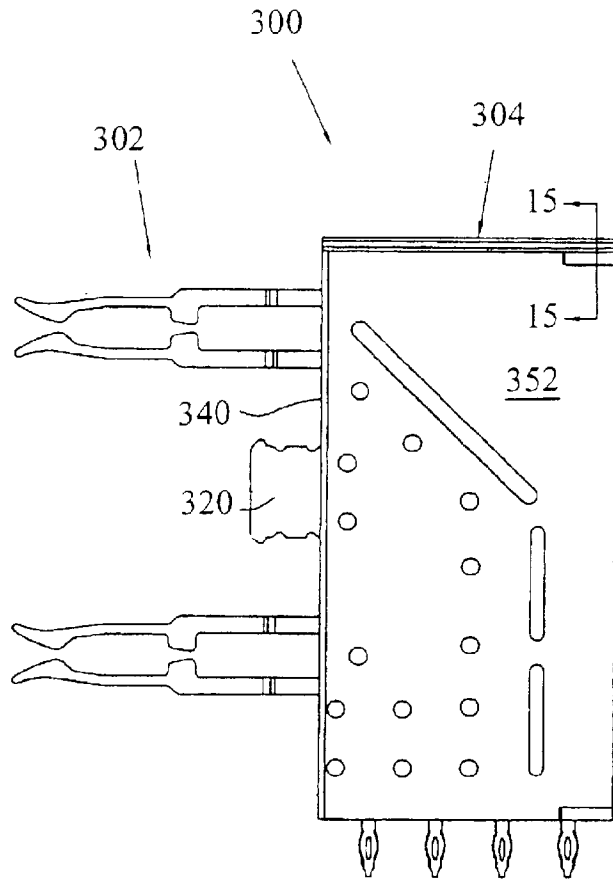


FIG. 12B

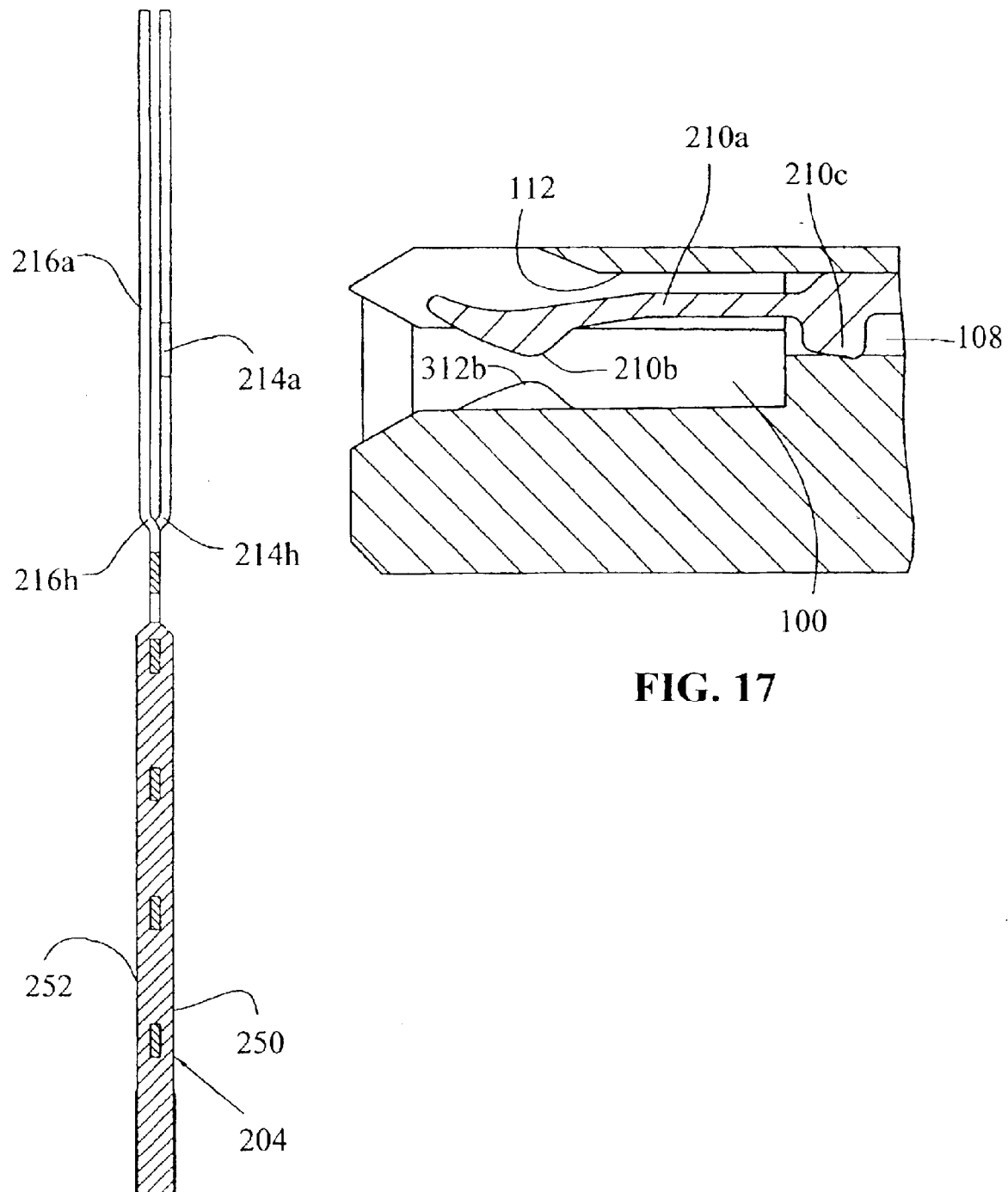


FIG. 17

FIG. 13

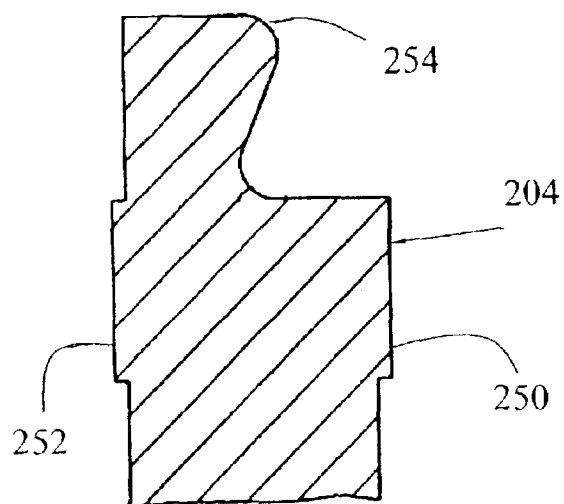


FIG. 14

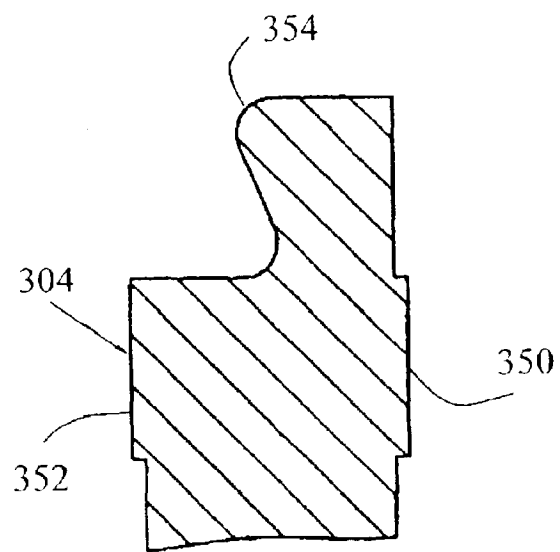


FIG. 15

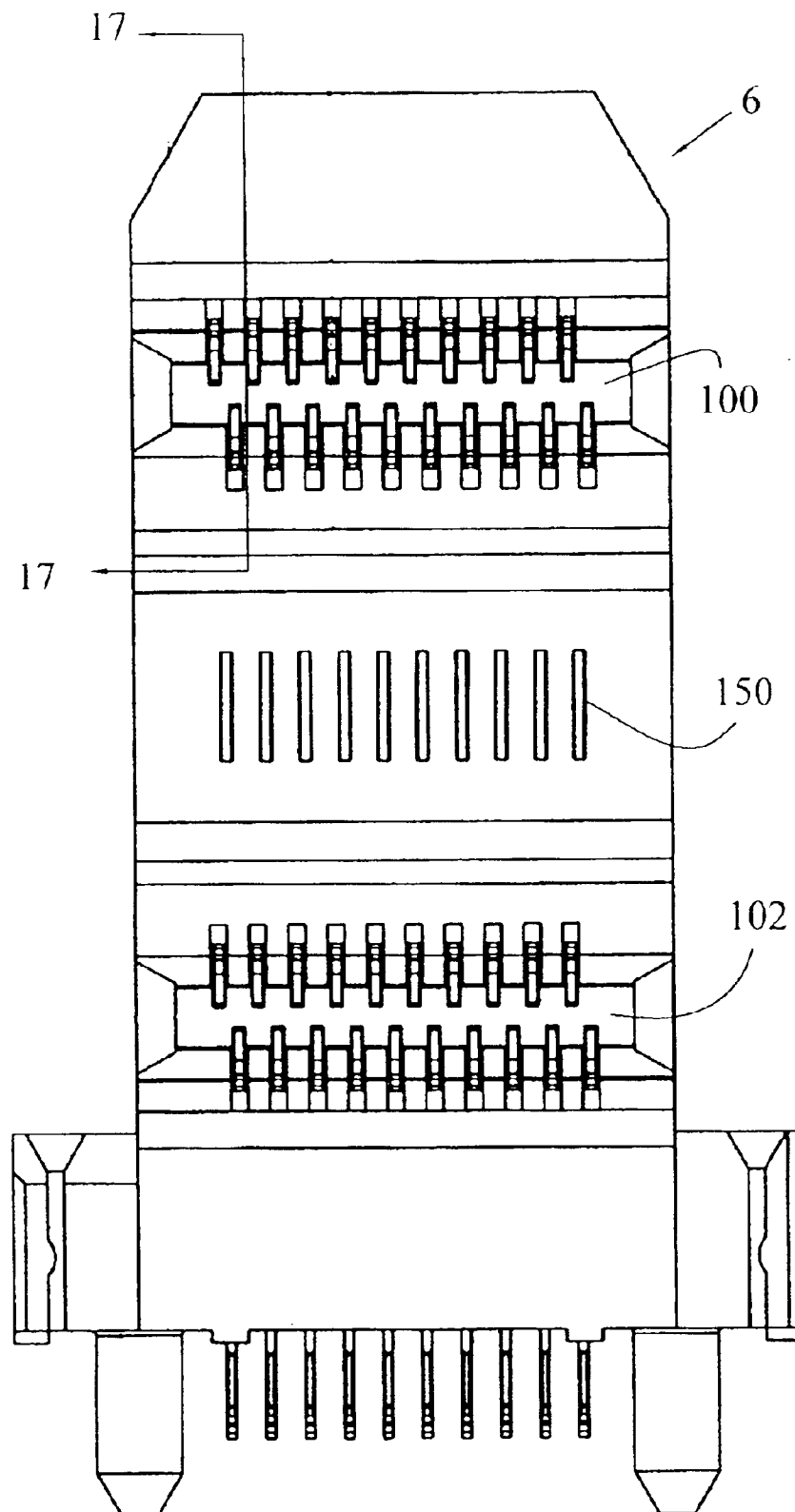


FIG. 16

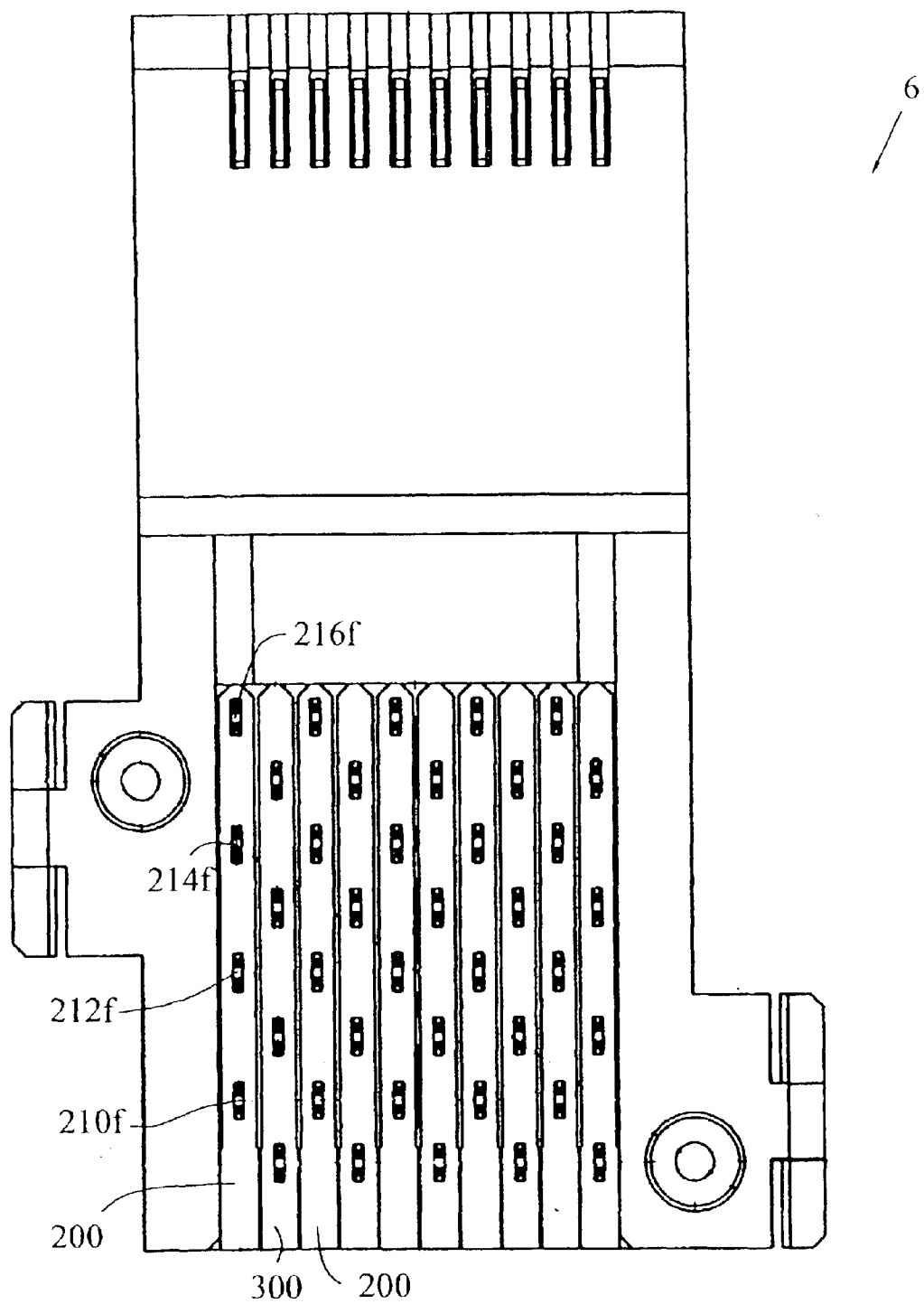


FIG. 18

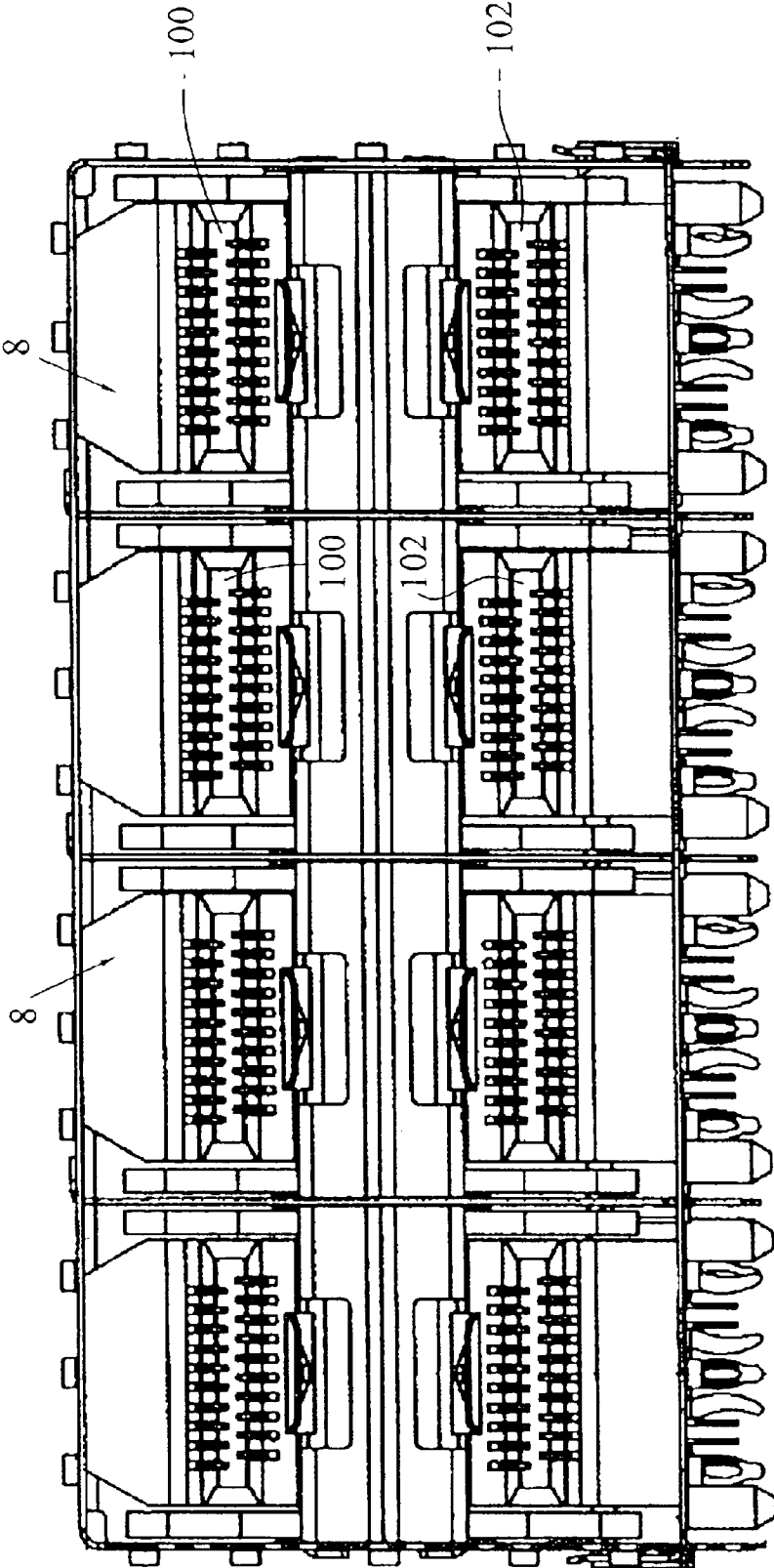


FIG. 19

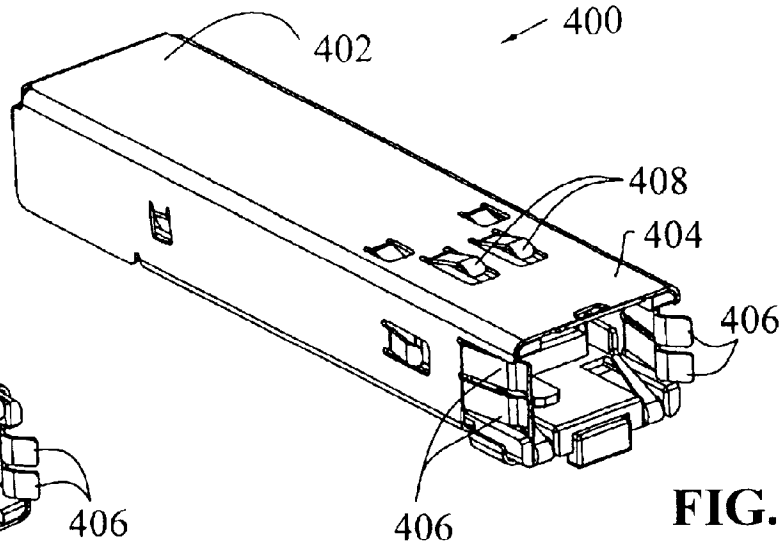


FIG. 20

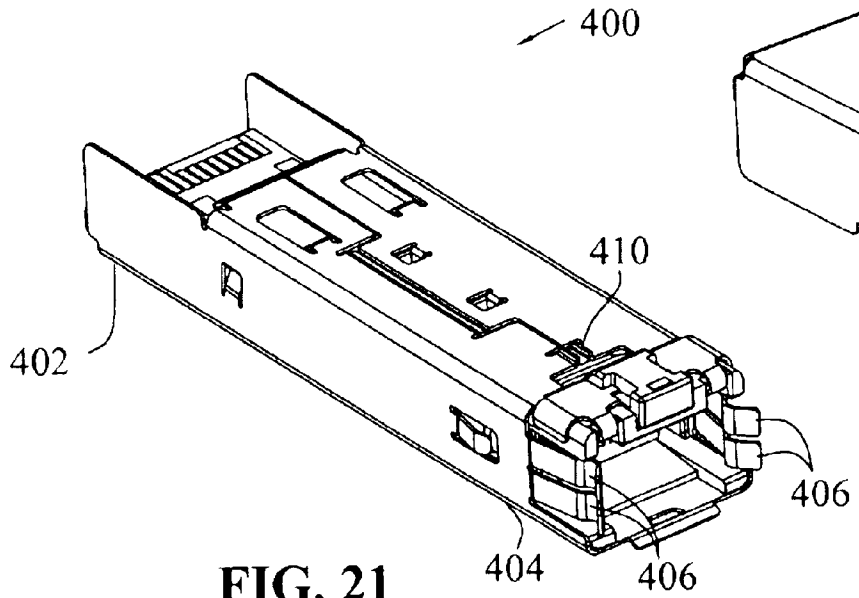


FIG. 21

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STACKED SFP CONNECTOR AND CAGE ASSEMBLY

FIELD OF THE INVENTION

The present invention relates generally to electronic connector systems and, more specifically, to low-profile connector systems for pluggable electronic modules, such as transceiver modules for high speed fiber optical and copper communications.

BACKGROUND OF INVENTION

It is known to provide a metal cage with a plurality of ports, whereby SFP modules are pluggable therein. Such modules are similar to that disclosed in U.S. Pat. No. 6,517,382. In fact, several pluggable module designs and standards have been introduced in which a pluggable module plugs into a receptacle which is electronically connected to a host circuit board. For example, a well-known type of transceiver developed by an industry consortium is known as a gigabit interface converter (GBIC) or serial optical converter (SOC) and provides an interface between a computer and a data communication network such as Ethernet or Fibre Channel. These standards offer a generally robust design which has been well received in industry.

Although these conventional pluggable designs have been used successfully in the past, they tend to be unsuitable for miniaturization which is an ever-constant objective in the industry. It is desirable to miniaturize transceivers in order to increase the port density associated with the network connection, such as, for example, switch boxes, cabling patch panels, wiring closets, and computer I/O. Recently, a new standard has been promulgated and is referred to herein as the small form factor pluggable (SFP) standard which specifies an enclosure height of 9.8 mm and a width of 13.5 mm and a minimum of 20 electrical input/output connections. In addition to miniaturizing the module, it is also desirable to increase its operating frequency. For example, applications are quickly moving from the sub-gigabit realm to well over a gigabit. Conventional pluggable module configurations, however, cannot meet these parameters. It is also desirable to increase the port density and optimize the connection interface for the SFP modules.

Miniaturizing a module while maintaining or even increasing its operating speed, presents a number of design problems particularly in applications in which data transmission rates are high, e.g., in the range of 1–10 Gbs (Gigabits/second). Of particular concern is reducing electromagnetic interference (EMI) emissions. Due to FCC regulations, there is a need not only to minimize the EMI emissions of the module, but also to contain the EMI emissions of the host system in which the module is mounted regardless of whether a module is plugged in to the receptacle.

In conventional designs, this EMI shielding was achieved by using conductive spring-loaded door which was capable of swinging shut and closing the receptacle when the module was removed. Conventional receptacles also had spring clips to ground the receptacles to the bezel opening of the host system. Providing space for spring-loaded doors and spring clips on the receptacle tends to be problematic if not impossible in miniaturized configurations. Additionally, the small size presents problems in dissipating heat from the module and incorporating traditional mechanisms for ejecting and retaining the module and for electrically connecting the module to the host circuit board.

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Therefore, there is a need for a connection system design that conforms to the SFP standard while minimizing EMI emissions, increase port density and provide convenient pluggable operation. The present invention fulfills this need among others.

SUMMARY OF THE INVENTION

The objects have been accomplished by providing an electrical connector, comprising an insulative housing having an upstanding body, having a lower printed circuit receiving face and a mating face. The mating face comprises upper and lower printed circuit card receiving slots, where the receiving slots extend horizontally across the face, and are positioned one above the other. A terminal array is comprised of a stamped lead frame overmolded with a web of plastic material, and each array comprises upper and lower terminals pairs, with an upper pair comprised of cantilever beam contacts flanking the upper printed circuit card receiving slot, and a lower pair comprised of cantilever beam contacts flanking the lower printed circuit card receiving slot. The terminals within the pairs are positioned proximate each other, and the pairs are spaced apart from each other by a vertical spacing. Each terminal of the lower pair has an intermediate portion transitioning into a printed circuit board portion, and each terminal of the upper pair has an intermediate portion transitioning into an extension portion, and then into the printed circuit board portion.

The connector housing includes upper and lower extensions which extend from a body portion of the connector housing to the front mating face, the upper and lower printed circuit card receiving slots being positioned in respective upper and lower extensions. The connector body portion defines a recessed face, intermediate the upper and lower extensions. The overmolded web of material is substantially rectangular in configuration, having a front vertical edge positioned with the upper and lower pair of cantilevered beam contacts extending outwardly from the front edge, and a lower horizontal edge having the printed circuit board contacts extending outwardly therefrom. The cantilever beam contacts of the upper and lower pairs are laterally staggered relative to each other, and extend laterally staggered over the upper and lower printed circuit card receiving slots.

The connector also comprises a locking tab overmolded in the web of material, the locking tab being positioned in the vertical spacing, and extends outwardly from the front edge thereof, the locking tab engaging a slot in the recessed face of the housing. The locking tab is formed from the same material as the stamped lead frame, but is stamped free from the terminals.

The connector housing includes a cavity behind the recessed face and the upper and lower extensions, to receive a plurality of stacked terminal arrays. The overmolded web of material includes substantially planar side surfaces, to allow the stacking of the terminal arrays. The connector further comprises cooperative aligning elements on adjacent stacked terminal arrays. The cooperative elements are defined by a cooperative dovetail being positioned on the adjacent stacked terminal arrays, which are received in receiving slots formed on an upper surface of the cavity.

In an alternate embodiment, an electrical connector assembly comprises a shielding cage comprised of a plurality of ports defined in an array of a plurality of rows and columns. The shielding cage has a front mating face, side walls, a top wall, a rear wall, and a partially extending lower wall and intermediate wall, forming a communication open-

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ing between a column of vertical ports. An electrical connector comprises an insulative housing having an upstanding body, the electrical connector is receivable in the communication opening and has a lower printed circuit receiving face and a mating face, the mating facing comprising upper and lower printed circuit card receiving slots. The receiving slots extend horizontally across the face, and are positioned one above the other, and each are generally aligned with one of the ports in the column, and a plurality of terminals defined in an array, with each array comprising upper and lower terminals pairs, with an upper pair comprised of cantilever beam contacts flanking the upper printed circuit card receiving slot, and a lower pair comprised of cantilever beam contacts flanking the lower printed circuit card receiving slot.

The assembly further comprises a plurality of pluggable modules, receivable in at least some of the ports, the module having a printed circuit card adjacent a pluggable end of the modules and being positionable with the slots and engageable with the terminal pairs, and an interface connector at a front end, the interface connector being accessible through the port when the module is plugged in, the interface connector and the printed circuit card being electrically interconnected.

The terminal array is comprised of a stamped lead frame overmolded with a web of plastic material, each array comprising upper and lower terminals pairs, with an upper pair comprised of cantilever beam contacts flanking the upper printed circuit card receiving slot, and a lower pair comprised of cantilever beam contacts flanking the lower printed circuit card receiving slot. The terminals within the pairs are positioned proximate each other, and the pairs are spaced apart from each other by a vertical spacing, and each terminal of the lower pair has an intermediate portion transitioning into a printed circuit board portion; and each terminal of the upper pair has an intermediate portion transitioning into an extension portion, and then into the printed circuit board portion.

The connector housing includes upper and lower extensions which extend from a body portion of the connector housing to the front mating face, the upper and lower printed circuit card receiving slots are positioned in respective upper and lower extensions. The body portion defines a recessed face, intermediate the upper and lower extensions. The overmolded web of material is substantially rectangular in configuration, having a front vertical edge positioned with the upper and lower pair of cantilevered beam contacts extending outwardly from the front edge, and a lower horizontal edge having the printed circuit board contacts extending outwardly therefrom. The cantilever beam contacts of the upper and lower pairs are laterally staggered relative to each other, and extend laterally staggered over the upper and lower printed circuit card receiving slots.

The connector further comprises a locking tab overmolded in the web of material, the locking tab being positioned in the vertical spacing, and extends outwardly from the front edge thereof, the locking tab engaging a slot in the recessed face of the housing. The locking tab is formed from the same material as the stamped lead frame, but is stamped free from the terminals.

The connector housing includes a cavity behind the recessed face and the upper and lower extensions, to receive a plurality of stacked terminal arrays. The overmolded web of material includes substantially planar side surfaces, to allow the stacking of the terminal arrays. The connector further comprises cooperative aligning elements on adjacent

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stacked terminal arrays. The cooperative elements are defined by a cooperative dovetail being positioned on the adjacent stacked terminal arrays, which are received in receiving slots formed on an upper surface of the cavity.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view from an underside of the electrical connector assembly showing the cage and electrical connectors;

FIG. 2 is a bottom plan view of the assembly of FIG. 1;

FIG. 3 is a front perspective view of the cage of FIG. 1 less the connectors;

FIG. 4 is an underside perspective of the cage assembly FIG. 3;

FIG. 5 is a perspective view of the connector shown in FIG. 1;

FIG. 6 is a side plan view of the connector shown in FIG. 5;

FIG. 7 is a cross-sectional view through lines 7—7 of FIG. 6;

FIG. 8 is a front plan view of the connector of FIG. 5;

FIG. 9 is a cross-sectional view through lines 9—9 of FIG. 8;

FIG. 10 is a top plan view of the stamped and formed lead frame which form adjacent contacts for the housing of FIG. 5;

FIG. 11 is a view showing the molded, insulated web of material overmolded on the lead frame of FIG. 10;

FIGS. 12A and 12B show the terminal subassemblies removed from the lead frame of FIG. 11;

FIG. 13 shows a cross-sectional view through lines 13—13 of FIG. 11;

FIG. 14 is a cross-sectional view through lines 14—14 of FIG. 12A;

FIG. 15 is a cross-sectional view through lines 15—15 of FIG. 12B;

FIG. 16 is a front plan view of the assembled connector;

FIG. 17 shows a partial cross-sectional view through lines 17—17 of FIG. 16;

FIG. 18 is a lower plan view of the assembled connector of FIG. 16;

FIG. 19 is a front plan view showing the connectors in place within the cage;

FIGS. 20 and 21 show perspective views of a module for receipt within the cage of FIG. 1 and for interconnection with the connector.

DETAILED DESCRIPTION OF THE EMBODIMENT

With reference first to FIGS. 1 and 2, an electrical connector assembly is shown generally at 2, which comprises a shielded, stamped and formed cage member 4 including a plurality of connector assemblies 6 positioned therein. It should be appreciated from FIG. 1 that the connector assembly is intended for placement on a motherboard and includes a plurality of ports 8 for receipt of modules, as will be described herein.

As shown in FIGS. 3 and 4, the cage member 4 is shown less the electrical connectors 6, and is shown generally comprised of a top wall 10, a lower wall 12, side walls 14 and 16, which together define the general enclosure for cage member 4. The cage member 4 is subdivided into rows by

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way of a center separator member **20**, having a front face portion at **22** with an upper wall **24** (FIG. 3) and a lower wall **26** (FIG. 4). Meanwhile, the cage **4** is divided into columns by way of vertically extending divider walls at **30**. It should be appreciated that the center separator member **20** is retained in place by tabs **34**, which extend from side edges of the upper and lower walls **24**, **26**, and which extend through the side walls **14**, **16**, as best shown in FIGS. 1 and 3. The vertical dividers **30** are positioned and retained to the upper and lower plates **10**, **12** by way of printed circuit board tines **38** (FIG. 4) extending through apertures of the lower plate **12** and by way of bent-over tab portions **40** (FIG. 3) which extend through apertures in the upper plate portion **10**.

The cage member **4** has numerous features allowing the grounding of the cage to a motherboard and/or a further panel. As shown best in FIG. 4, in addition to printed circuit board tines **38**, the perimeter of the cage housing includes a plurality of printed circuit board tines at **44**, which are profiled to both mechanically hold the cage to a motherboard as well as to ground the cage thereto. Resilient tongues **46** are also struck from lower wall **12** and provide grounding of the cage to the motherboard. Around the perimeter of the cage towards the front edge thereof, the cage includes a plurality of resilient tongues **50**, which are profiled to engage an edge of an opening through which the cage is inserted. The walls **24** and **26** include grounding tabs **52** adjacent a front edge thereof for grounding a module to be inserted therein. Finally, the grounding tabs have latching openings **54**, as will be more fully described herein.

With reference now to FIG. 3, the cage member **4** also includes a communication opening, generally designated by reference numeral **60** and which is formed by opening **62** extending through lower wall member **12** (FIG. 3), through opening **64** through divider wall **24** (FIG. 3), and through a corresponding opening similar to opening **64**, which extends through wall **26** (not shown). The communication opening **60** extends through lower wall **12** and through intermediate walls **24**, **26** at the rearward side thereof for access to connector member **6**, as will be described in further detail.

Finally, with respect to FIGS. 3 and 4, the cage also includes module kick-out springs **70**, which are defined by a reversely bent loop of stamped and formed material, which is defined into a forwardly directed spring.

With respect now to FIGS. 5 through 9, connector **6**, and more particularly, the housing **80**, will be described in further detail. As best shown in FIG. 5, connector **6** includes housing **80**, which is defined by an upstanding body portion **82** having side walls **84**, **86**, a lower face **88** for receipt on a printed circuit board, and a mating face at **90**. As shown in FIG. 5, upper and lower extension portions **92** and **94** extend from the body portion **82** to define the mating face **90**. A recessed face **96** is defined between the upper and lower extensions **92**, **94** at the front face of the body portion **82**. Finally, as shown best in FIG. 8, circuit card receiving slots **100** and **102** extend inwardly from front faces **90** of each of the respective upper and lower extensions **92**, **94**, and extend inwardly to the housing body **80**.

With reference now to FIGS. 7 through 9, the interior of the housing will be described in greater detail. With reference first to FIG. 9, the interior of the cavity is shown in greater detail. It should first be noted that FIG. 9 is a staggered cross section through each of the contact cavities as shown in FIG. 8, such that each of the cavities is shown in cross section. As shown, slots **100** and **102** extend inwardly into their respective extensions **92**, **100** rearwardly

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to respective intermediate walls **104**, **106**, thereby defining upper and lower terminal-receiving passageways **108–111** in each of the upper and lower extensions. As also shown in FIG. 9, passageways **108–111** are aligned with slots **112–115**, respectively, which flank the slots **100**, **102** and which open on to the front face **90**. As also shown best in FIG. 9, extensions **92** and **94** extend from a front wall section **120**, which defines an inner surface at **122**. Housing **80** also includes a top wall portion **124** defining an inner surface at **126**. Furthermore, as best shown in FIG. 7, side walls **84** and **86** define inner surfaces **130** and **132**. Thus, a rear cavity **140** is defined in housing **80**, rearward of central wall **120**, bounded by surfaces **122**, **126** and inner surfaces **130**, **132**. It should be appreciated that this cavity **140** is defined for the receipt of terminal modules, as will be described in greater detail.

With respect to the terminal module, housing **80** includes a plurality of locking slots **150**, which extend through the recessed face **96**, as best shown in FIGS. 5 and 8, and extend inwardly through wall **20** to surface **22**, as best shown in FIGS. 7 and 9. Furthermore, as shown in FIG. 7, housing **80** includes a plurality of dove-tail slots **152** positioned within upper surface **126** for aligning the modules, as will be described herein. The connector housing **80** also includes aligning posts **154** and latching members **156**. Latches **156** are positioned on opposite corners of the housing, as best shown in FIGS. 5 and 7. Latches **156** are profiled for slidable receipt over edges of divider plates **30**, and over edges of side walls **14** and **16**, as will be described further herein.

With respect now to FIGS. 10 through 12B, the terminal modules will be described in greater detail. With respect first to FIGS. 12A and 12B, two terminal modules **200** and **300** are shown where each of the modules generally includes a terminal lead frame **202** and **302**, overmolded by a web of plastic material **204** and **304**. As shown best in FIG. 10, lead frames **202** and **302** are shown stamped from a common sheet of material which can be carried by carrier strips **206**, **306**. Each terminal set **202**, **302** is comprised of four terminals, an upper pair of terminals **210**, **212**; **310**, **312**; and a lower set of terminals **214**, **216**; **314**, **316**. As shown in FIG. 10, the upper and lower pairs are separated by a vertical distance **Y**, and retention tabs **220**, **320** are positioned in that vertical spacing and held in place by a carrier strip portion **222**, **322**, respectively.

Each of the pairs of terminals are virtually identical, yet are mirror images of each other, as will be described herein. Terminal **210** includes a cantilever beam section **210a** defining a forward contact section **210b** adjacent a front end of the terminal. Terminal **210** further includes a locking tab portion **210c**. Terminal **210** further includes an intermediate angled portion **210c**, which transitions the terminal from a horizontal to a vertical position, and transitions into an elongate extension portion at **210d**, which compensates for the horizontal spacing **Y** and which is interconnected to compliant pin portion at **210e**. As shown in FIG. 10, each of the terminals has equivalent components, with the exception that terminals **214** and **216** do not have elongate extension portions such as **210d** and **212d**, rather, terminals **214** and **216** have intermediate portions **214c**, **216c**, respectively, which transition generally into printed circuit board portions **214e**, **216e**.

As shown in FIG. 10, terminal lead frame **302** is virtually identical to lead frame **202**, with the exception that each of the terminals includes a kinked leg portion **310g–316g**, which generally steps the compliant pin portions **310f–316f** rearwardly, relative to the corresponding compliant pin portions **210f–216f**, respectively.

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With respect now to FIG. 11, with the lead frame as shown and described in FIG. 10, molded webs **204**, **304** are insert-molded over a portion of the lead frame, leaving the cantilever beam portions of each of the terminals extending forwardly from front edges **240**, **340**, respectively, of the molded webs. In a similar nature, the compliant pin portions **210f**–**216f** extend downwardly from a lower edge **242**, **342** of the molded webs **204**, **304**. As shown in FIGS. 10 and 11, each of the tab portions **220**, **320** includes an eyelet portion, **221**, **321** which is overmolded adjacent the front edges **240**, **340**, yet the forward portion of the tabs **220**, **320** extends outwardly from the front edge. When the overmolded webs **204**, **304** are placed in the position shown in FIG. 11, lead frames **206**, **306**; and **222**, **322** can be stamped free from the lead frame, thereby defining the completed inserts as shown in FIGS. 12A and 12B as **200** and **300**, respectively.

With reference now to FIG. 13, the configuration of the cantilever beam terminals **214a** and **216a** is shown in greater detail. As shown, each of the terminals is kinked at **214h** and **216h** to stagger the cantilever portions **214a** and **216a**. Furthermore, as shown in FIG. 13, the web **204** includes side surfaces **250**, **252**, whereas molded insert **304** includes side surfaces **350**, **352** (FIGS. 12B, 15). As shown best in FIGS. 14 and 15, the top edge of the molded inserts are also configured as cooperative dove-tail portions, such that, when molded inserts **204** and **304** are positioned in a stacked relation, with surface **252** of insert **204** positioned against surface **350** of insert **304**, the two profiles **254** and **354** provide a dove-tail tongue configuration. It should be appreciated that this tongue configuration is profiled as the dove-tail slot **152**, as shown in FIG. 7. With the components as described above, the assembly of the connector assembly and the connector assembly to the cage will now be described.

As mentioned above, each of the terminal subassemblies **200**, **300** are positioned stacked one against the other, with surface **350** of molded insert **304** positioned against surface **252** of molded insert **204**. These molded inserts may now be inserted into the cavity portion **140** of housing **80**, such that the individual terminals align with respective passageways **108**–**111**. Continued movement of the inserts into the housing causes the terminals to be positioned within respective slots **112**–**115** (FIG. 9). A continued force causes locking tabs **220**, **320** to be inserted into slot **150**, thereby locking the inserts in place with the front edge **240** of the molded inserts positioning molding inserts **204**, **304** fully positioned within the cavity, with surfaces **240**, **340** against inner surface **122** of housing **80**. As also mentioned above, the dove-tail configuration **254**, **354** allows alignment of the individual arrays with the dovetail slots **152**. The cantilever beams are positioned within housing **80**, whereby tab portions (such as **210c**) are interference fit within the respective passageway **108**, and the tab portion **210c** acts as a fulcrum with the cantilever beam portion **210a** extending forwardly, with a portion of beam **210a** in slot **212**, and the contact point **210b** extending into the receiving slot **100**. It should be appreciated that each of the cantilever beams is so situated in their respective passageways and slots. Thus, the fully assembled configuration of connector **6** is shown in FIGS. 16 and 18.

Connector **6** can now be positioned within the cage member, through floor portion **12** to the position shown in FIGS. 1, 2 and 19. As best shown in FIG. 2, each of the connectors is shown clipped to the cage member, whereby latches **156** in opposite corners of the connector are clipped to either an outside wall **14**, **16** or an internal divider wall **30**. As shown best in FIG. 2, due to its staggered configuration of the latches **156**, the connector housings **80** can be

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positioned in a closely aligned array. As also shown best in FIG. 19, each of the printed circuit card receiving slots **100**, **102** are aligned within the port openings **8** for receipt of a module.

Finally, as shown in FIGS. 20 and 21, a small form-factor pluggable (SFP) module is shown at **400** having a circuit card at one end **402** thereof for interconnection into slots **100**, **102** and into interconnection with the plurality of electrical terminals is shown. The module **400** would further include an electrical interconnection within the module to an interface at end **404**, such as a copper interface in the way of a modular jack, or to a fiber optic connector for further interfacing. The module would also include grounding tabs such as **406**, **408**, and a raised embossment at **410** (FIG. 21). This embossment would latch into triangular shaped openings **54** (FIG. 1) of the grounding tabs **52**. This allows for easy extraction of the modules **400** as the grounding tabs are accessible from the front end of the cage. These SFP modules are similar to those known as Tyco Part Number 1367251 and as shown in U.S. Pat. No. 6,517,382, incorporated herein by reference.

Advantageously, the assembly of the entire electrical connector assembly is simplified by the availability of the connector header **4** having interconnectability vis-à-vis two printed circuit card receiving slots **100**, **102**, which further increases the port density and efficiency of the overall system.

What is claimed is:

1. An electrical connector, comprising:

an insulative housing having an upstanding body, having a lower printed circuit receiving face and a mating face, said mating face comprising upper and lower printed circuit card receiving slots, said receiving slots extending horizontally across said face, and being positioned one above the other; and

a terminal array comprised of a stamped lead frame overmolded with a web of plastic material, each said array comprising:

upper and lower terminals pairs, with an upper pair comprised of cantilever beam contacts flanking said upper printed circuit card receiving slot, and a lower pair comprised of cantilever beam contacts flanking said lower printed circuit card receiving slot;

said terminals within said pairs being positioned proximate each other, and said pairs being spaced apart from each other by a vertical spacing;

each said terminal of said lower pair having an intermediate portion transitioning into a printed circuit board portion; and

each said terminal of said upper pair having an intermediate portion transitioning into an extension portion, and then into said printed circuit board portion.

2. The connector of claim 1, wherein said housing includes upper and lower extensions which extend from a body portion of said connector housing to said front mating face, said upper and lower printed circuit card receiving slots being positioned in respective upper and lower extensions.

3. The connector of claim 2, wherein said body portion defines a recessed face, intermediate said upper and lower extensions.

4. The connector of claim 3, wherein said overmolded web of material is substantially rectangular in configuration, having a front vertical edge positioned with said upper and lower pair of cantilevered beam contacts extending outwardly from said front edge, and a lower horizontal edge having said printed circuit board contacts extending outwardly therefrom.

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5. The connector of claim 4, wherein said cantilever beam contacts of said upper and lower pairs are laterally staggered relative to each other, and extend laterally staggered over said upper and lower printed circuit card receiving slots.

6. The connector of claim 4, further comprising a locking tab overmolded in said web of material, said locking tab being positioned in said vertical spacing, and extends outwardly from said front edge thereof, said locking tab engaging a slot in said recessed face of said housing.

7. The connector of claim 6, wherein said locking tab is formed from the same material as said stamped lead frame, but is stamped free from said terminals.

8. The connector of claim 4, wherein said housing includes a cavity behind said recessed face and said upper and lower extensions, to receive a plurality of stacked terminal arrays.

9. The connector of claim 8, wherein each said overmolded web of material includes substantially planar side surfaces, to allow the stacking of said terminal arrays.

10. The connector of claim 9, further comprising cooperative aligning elements on adjacent stacked terminal arrays.

11. The connector of claim 10, wherein said cooperative elements are defined by a cooperative dovetail being positioned on said adjacent stacked terminal arrays, which are received in receiving slots formed on an upper surface of said cavity.

12. An electrical connector assembly, comprising:

a shielding cage comprised of a plurality of ports defined in an array of a plurality of rows and columns, said shielding cage having a front mating face, side walls, a top wall, a rear wall, and a partially extending lower wall and intermediate wall, forming a communication opening between a column of vertical ports; and

an electrical connector, comprising an insulative housing having an upstanding body, said electrical connector being receivable in said communication opening and having a lower printed circuit receiving face and a mating face, said mating facing comprising upper and lower printed circuit card receiving slots, said receiving slots extending horizontally across said face, and being positioned one above the other, and each being generally aligned with one of said ports in said column, and a plurality of terminals defined in an array, with each said array comprising upper and lower terminals pairs, with an upper pair comprised of cantilever beam contacts flanking said upper printed circuit card receiving slot, and a lower pair comprised of cantilever beam contacts flanking said lower printed circuit card receiving slot.

13. The connector assembly of claim 12, further comprising a plurality of pluggable modules, receivable in at least some of said ports, said module having a printed circuit card adjacent a pluggable end of said modules and being positionable with said slots and engageable with said terminal pairs, and an interface connector at a front end, said interface connector being accessible through said port when said module is plugged in, said interface connector and said printed circuit card being electrically interconnected.

14. The connector assembly of claim 13, wherein said shielding cage includes adjacent said front mating face, tabs having latching openings therein, and said modules have complementary latching embossments for engagement with said openings for latching said modules in place.

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15. The connector assembly of claim 12, wherein said a terminal array is comprised of a stamped lead frame overmolded with a web of plastic material, each said array comprising upper and lower terminals pairs, with an upper pair comprised of cantilever beam contacts flanking said upper printed circuit card receiving slot, and a lower pair comprised of cantilever beam contacts flanking said lower printed circuit card receiving slot.

16. The connector assembly of claim 15, wherein said terminals within said pairs are positioned proximate each other, and said pairs being spaced apart from each other by a vertical spacing, and each said terminal of said lower pair having an intermediate portion transitioning into a printed circuit board portion; and each said terminal of said upper pair having an intermediate portion transitioning into an extension portion, and then into said printed circuit board portion.

17. The connector assembly of claim 15, wherein said housing includes upper and lower extensions which extend from a body portion of said connector housing to said front mating face, said upper and lower printed circuit card receiving slots being positioned in respective upper and lower extensions.

18. The connector assembly of claim 17, wherein said body portion defines a recessed face, intermediate said upper and lower extensions.

19. The connector assembly of claim 18, wherein said overmolded web of material is substantially rectangular in configuration, having a front vertical edge positioned with said upper and lower pair of cantilevered beam contacts extending outwardly from said front edge, and a lower horizontal edge having said printed circuit board contacts extending outwardly therefrom.

20. The connector assembly of claim 19, wherein said cantilever beam contacts of said upper and lower pairs are laterally staggered relative to each other, and extend laterally staggered over said upper and lower printed circuit card receiving slots.

21. The connector assembly of claim 20, further comprising a locking tab overmolded in said web of material, said locking tab being positioned in said vertical spacing, and extends outwardly from said front edge thereof, said locking tab engaging a slot in said recessed face of said housing.

22. The connector assembly of claim 21, wherein said locking tab is formed from the same material as said stamped lead frame, but is stamped free from said terminals.

23. The connector assembly of claim 22, wherein said housing includes a cavity behind said recessed face and said upper and lower extensions, to receive a plurality of stacked terminal arrays.

24. The connector assembly of claim 23, wherein each said overmolded web of material includes substantially planar side surfaces, to allow the stacking of said terminal arrays.

25. The connector assembly of claim 24 further comprising cooperative aligning elements on adjacent stacked terminal arrays.

26. The connector assembly of claim 25, wherein said cooperative elements are defined by a cooperative dovetail being positioned on said adjacent stacked terminal arrays, which are received in receiving slots formed on an upper surface of said cavity.

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