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(54) Circuit board mounted electrical connector

(57) An electrical connector is provided for mounting on one side of a circuit board. The connector includes an elongated dielectric housing having a board mounting face and defining a longitudinal center line. A board retention member projects from the board mounting face on one side of the center line for insertion into an appropriate hole in the circuit board. A recess is provided in the board mounting face on an opposite side of the center line and located for accommodating a board retention member projecting through the circuit board from a connecting device mounted on an opposite side of the circuit board.

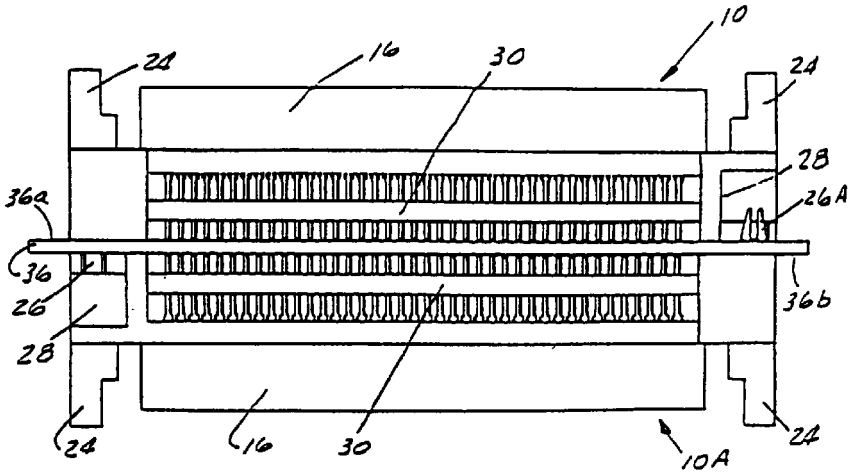

FIG. 5

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Description

Field of the Invention

[0001] This invention generally relates to the art of electrical connectors and, particularly, to an electrical connector for mounting on a circuit board.

Background of the Invention

[0002] A conventional circuit board mounted electrical connector includes a dielectric housing mounting a plurality of terminals for connection to appropriate circuit traces on the circuit board. The housing typically includes one or more board retention members, such as mounting pegs or posts or other boardlock members to hold the housing mounted on a surface of the board. The housing may be molded of plastic material, with the board retention member comprising a peg or post integral with the housing and projecting from a mounting face thereof for insertion into an appropriate mounting hole in the circuit board. Alternatively, the connector may include one or more separate board retention members, such as metal boardlocks, mounted on the plastic housing and projecting into mounting holes in the circuit board.

[0003] With the ever-increasing miniaturization and density of electronic circuitry, space or "real estate" on the surface of a circuit board often is at a premium. When connectors are mounted on opposite sides of a circuit board, the board retention members projecting into or through the board from a connector on one side of the board actually can prevent a second connector from being mounted immediately on the opposite side of the board from the first connector. This results in a less efficient utilization of space or "real estate" on the side of the board opposite the one connector. The present invention is directed to solving these problems by providing an electrical connector structure which allows for connectors to be mounted directly on opposite sides of a circuit board notwithstanding the fact that one or both of the connectors include board retention members extending into or through mounting holes in the circuit board.

Summary of the Invention

[0004] An object, therefore, of the invention is to provide a new and improved electrical connector for mounting on a circuit board and allowing connectors to be mounted directly on opposite sides of the board.

[0005] In the exemplary embodiment of the invention, the connector includes a dielectric housing having a board mounting face. At least one board retention member projects from the board mounting face for insertion into an appropriate mounting hole in the circuit board. A recess is formed in the board mounting face for accommodating a board retention member projecting into the circuit board from a connecting device mounted on an opposite side of the circuit board.

[0006] As disclosed herein, the dielectric housing is elongated, defining a longitudinal center line. The board retention member is located on one side of the center line, and the recess is located on the opposite side of the center line. In the preferred embodiment, a pair of the board retention members are spaced longitudinally of the housing and are located on opposite sides of the center line. A pair of the recesses also are spaced longitudinally of the housing and are located on opposite sides of the center line in alignment opposite the board retention members. The board retention member(s) may be a peg molded integral with the housing or the board retention member(s) may be a metal member mounted on the plastic housing.

[0007] The concepts of the invention lend themselves appropriately for providing a hermaphroditic connector whereby the board retention member(s) and the recess(es) are located so that identical electrical connectors can be mounted on both sides of the circuit board immediately opposite each other.

[0008] Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

Brief Description of the Drawings

[0009] The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and the advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a top perspective view of an electrical connector embodying the concepts of the invention;
FIGURE 2 is a bottom perspective view of the connector of Figure 1;
FIGURE 3 is a perspective view of the connector of Figures 1 and 2 mounted on top of a circuit board directly opposite a second connector mounted on the bottom of the board;
FIGURE 4 is a perspective view of the assembly of Figure 3, looking toward the rear thereof;
FIGURE 5 is a side elevational view of the assembly of Figure 3;
FIGURE 6 is a somewhat schematic illustration of a plurality of connectors mounted on opposite sides of a circuit board, according to the prior art; and
FIGURE 7 is a view similar to that of Figure 6, with a plurality of connectors according to the invention mounted directly opposite each other on opposite sides of the circuit board.

Detailed Description of the Preferred Embodiment

[0010] Referring to the drawings in greater detail, and first to Figures 1 and 2, an electrical connector, generally designated 10, is designed for mounting on one side of a circuit board, such as a printed circuit board, backplane or the like, as shown hereinafter. The connector includes a one-piece dielectric housing, generally designated 12, which can be unitarily molded of dielectric material such as plastic or the like. The housing is elongated and defines a longitudinal center line 14 (Fig. 2). The housing has a mating portion 16 defining a mating face 16a opposite a board mounting face defined by board-mounting surfaces 18a and 18b. The housing mounts a plurality of terminals in two rows, the terminals having contact portions 20 inside opposite side walls of mating portion 16, along with right-angled tail portions 22 for surface mounting to appropriate circuit traces on the circuit board.

[0011] Board-mounting surfaces 18a are elongated in the direction of center line 14. Board-mounting surfaces 18b are elongated transversely of the center line. A pair of the board-mounting surfaces 18a are provided and located at opposite ends of the housing and spaced on opposite sides of the center line. A pair of the board-mounting surfaces 18b are provided and are located at opposite ends of the housing and spaced on opposite sides of the center line. These four board-mounting surfaces define the board mounting face of the housing and stabilize the housing on the printed circuit board.

[0012] More particularly, housing 12 includes a pair of wing portions 24 spaced outside opposite ends of mating portion 16 and between which a complementary mating connector (not shown) is inserted. The mating connector will have a receptacle for receiving mating portion 16, along with a tongue for insertion into an elongated slot 25 (Fig. 1) within mating portion 16. Appropriate terminals of the mating connector will have contact portions on opposite sides of the tongue for engaging contact portions 20 inside the side walls of mating portion 16.

[0013] Housing 12 of connector 10 includes a pair of integrally molded board retention members or pegs 26 which project from board-mounting surfaces 18a of the housing. The pegs have small, longitudinal ribs 26a which can be crushed when inserted into the mounting holes in the circuit board to provide a tight interference fit between the pegs and the holes. As seen best in Figure 2, one of the pair of mounting pegs 16 is disposed at each opposite end of the longitudinal housing and on each opposite side of center line 14.

[0014] Housing 12 of connector 10 also includes a pair of recesses 28 in the mounting face of the housing for accommodating board retention members projecting through the circuit board from a connecting device mounted on the opposite side of the board, as will be seen hereinafter. Again as best in Figure 2, recesses 28 are located at opposite ends of the housing and on opposite sides of center line 14 adjacent board mounting surfaces 18b. The recesses are aligned transversely on opposite sides of the center line from board retention posts 26.

[0015] An elongated tail aligner 30 includes a plurality of passages through which tails 22 of the terminals extend. The aligner maintains proper spacing or pitch for the terminals. The tail aligner is press-fit into sockets 32 (Fig. 2) in the bottom of housing 12 and is retained therein either by a press-fit or by the addition of an adhering medium.

[0016] Connector 10 also includes an electrostatic discharge clip 34 (Fig. 1) mounted within each wing 24 at each end of the housing. The electrostatic discharge clip is of metal material and is located for engaging appropriate grounding contacts on the mating connector. The electrostatic discharge clips extend downwardly through the housing and terminate in U-shaped feet 34a for surface connection to appropriate grounding pads on the circuit board, as by soldering. Therefore, the electrostatic discharge clip performs an additional function of acting as a "fitting nail" to hold the connector to the circuit board.

[0017] Figures 3-5 show connector 10 mounted on a top side 36a of a circuit board 36. It can be seen that board retention pegs 26 project entirely through the circuit board. A second connector, generally designated 10A, is mounted to a bottom or opposite side 36b of the circuit board. Connector 10A differs from connector 10 only in that connector 10A has independent metal board retention members or boardlocks 26A projecting upwardly through the circuit board. Otherwise, the two connectors are substantially identical and like reference numerals have been applied to the components of connector 10A corresponding to the description of connector 10, above, in relation to Figures 1 and 2.

[0018] Figures 3-5 clearly show how recesses 28 of both connectors 10 and 10A are aligned or in registry with board retention pegs 26 and boardlocks 26A when the connectors are mounted on opposite sides of the circuit board directly opposite each other. In other words, the recesses of one connector accommodate the board retention members projecting through the board from the other connector.

[0019] Figures 6 and 7 show how the concepts of the invention save considerably space or "real estate" on circuit board 36. Turning first to Figure 6, a plurality of electrical connectors, generally designated 40 and 42, according to the prior art are mounted on opposite sides of circuit board 36. Connectors 40 have integral board retention pegs 44 similar to retention pegs 26 of connector 10. Connectors 42 have metal boardlocks 46 similar to boardlocks 26A of connector 10A. However, none of the connectors 40 or 42 have any recesses for accommodating the retention pegs or boardlocks projecting through the board from the opposite side thereof. Therefore, the connectors must be staggered as shown in Figure 6, and it is not possible to mount two connec-

tors directly opposite each other on opposite sides of the circuit board.

[0020] Now, a comparison of Figure 7 can be made with the arrangement of Figure 6 to clearly see the space-saving aspects of the invention. In particular, it can be seen that three connectors 10 according to the invention are mounted on one side 36a of the circuit board directly opposite three respective connectors 10A on the opposite side 36b of the circuit board. It can be seen that board retention pegs 26 and boardlocks 26a of all of the connectors project into recesses 28 of the connector immediately on the opposite side of the circuit board. In comparing Figure 7 with Figure 6, it can be seen that six connectors are mounted on the circuit board in Figure 7 within the same space as only four connectors in Figure 6. In fact, if the pairs of connectors shown in Figure 7 are mounted closer together than that shown therein, still additional space is saved on the circuit board.

[0021] It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. An electrical connector for mounting on one side of a circuit board, comprising:

an elongated dielectric housing having a board mounting face and defining a longitudinal center line;
a board retention member projecting from the board mounting face of the housing on one side of said center line for insertion into an appropriate mounting hole in the circuit board; and
a recess in the board mounting face on an opposite side of said center line and located for accommodating a board retention meter projecting through the circuit board from a connecting device mounted on an opposite side of the circuit board.

2. The electrical connector of claim 1, including a pair of said board retention members spaced longitudinally of the housing.

3. The electrical connector of claim 2 wherein said pair of board retention members are located on opposite sides of said center line.

4. The electrical connector of claim 3, including a pair of said recesses spaced longitudinally of the housing and located on opposite sides of said center line opposite the board retention members.

5. The electrical connector of claim 4 wherein said board retention members are transversely aligned with the recesses.

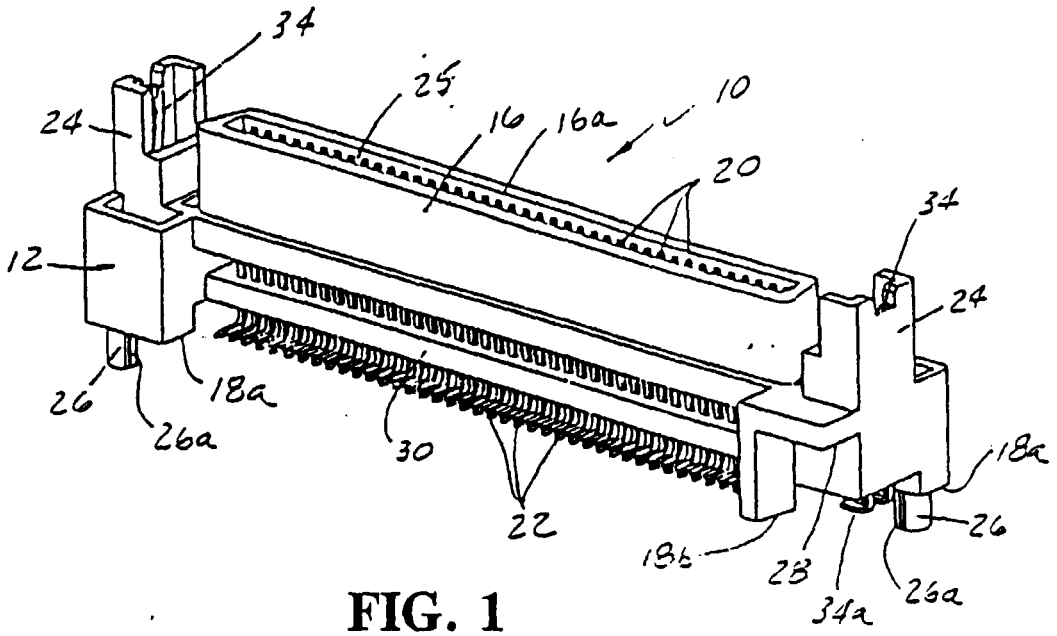
6. The electrical connector of claim 1, including a pair of said recesses spaced longitudinally of the housing.

7. The electrical connector of claim 6 wherein said pair of recesses are located on opposite sides of said center line.

8. The electrical connector of claim 1 wherein said housing is of molded plastic material and said board retention member comprises a peg integral with the housing.

9. The electrical connector of claim 1 wherein said housing is of plastic material and said board retention member comprises a metal member.

10. The electrical connector of claim 1, including a pair of discrete board-mounting surfaces at each opposite end of the housing, with one surface in each pair being on each opposite side of the center line.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25
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16
16a
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12
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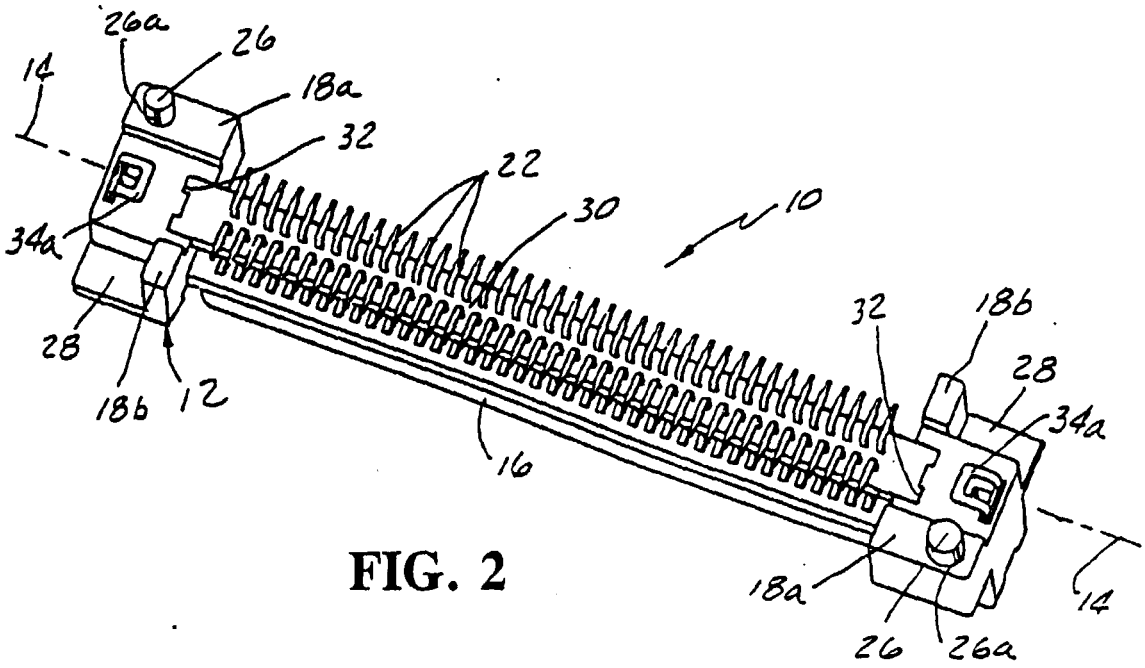
18a
26a
30
22
18a
18b
28
26
34a
26a

FIG. 1


26a
26
14
18a
32
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28
18b
12
32
18b
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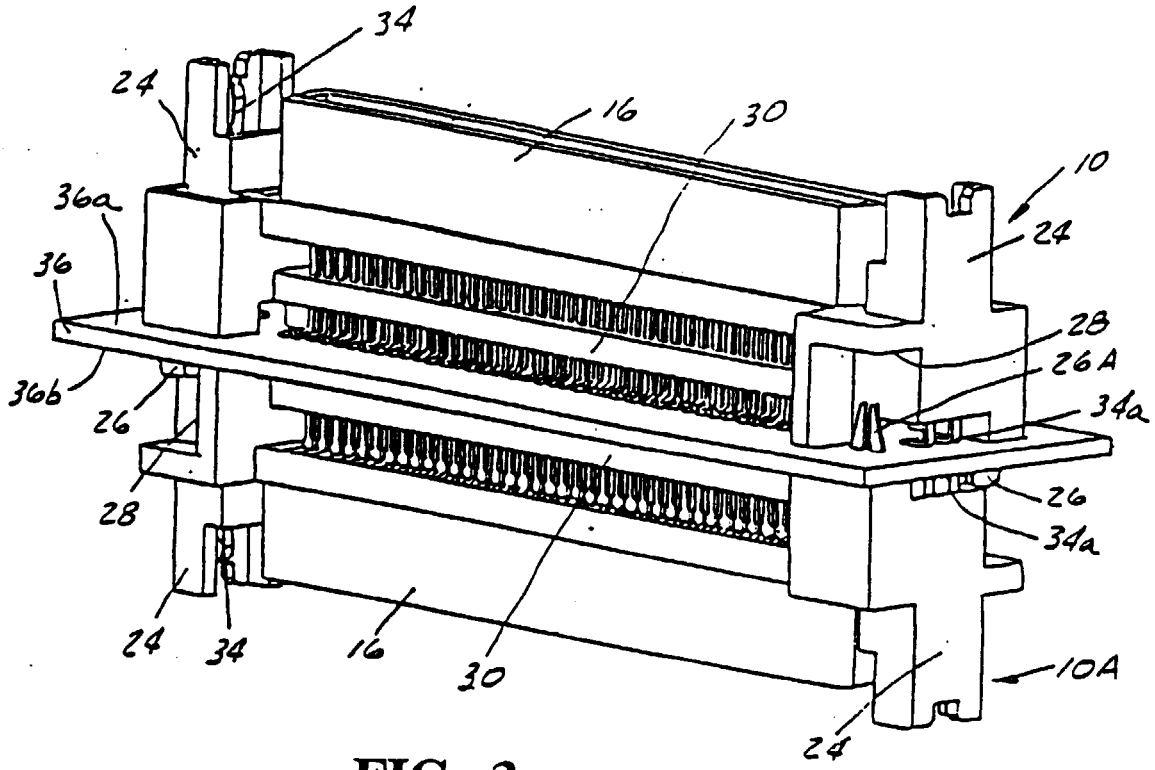
34a
16
18a
14
26
26a

FIG. 2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36a
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26A
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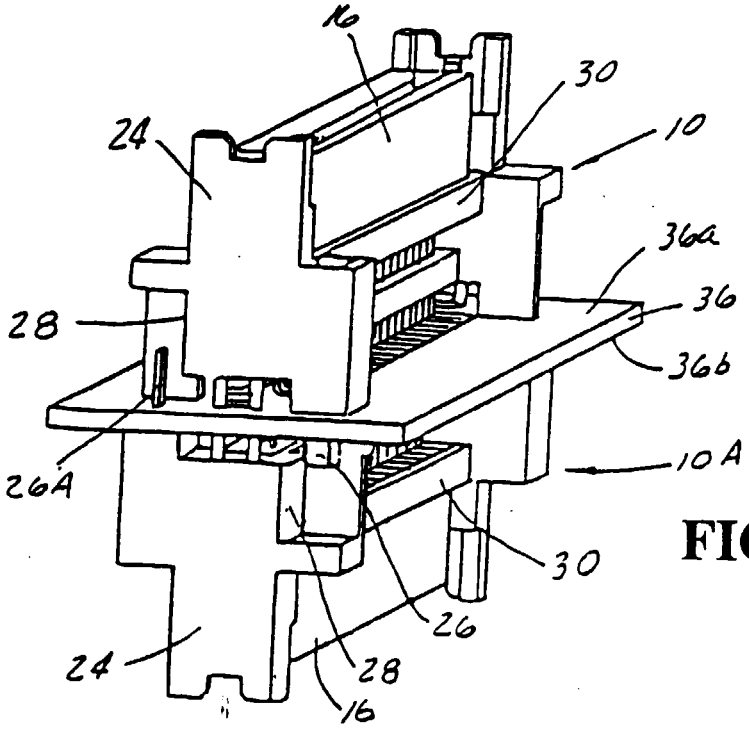
10A
24

FIG. 3


16
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36a
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36
366
10A
26A
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16

FIG. 4

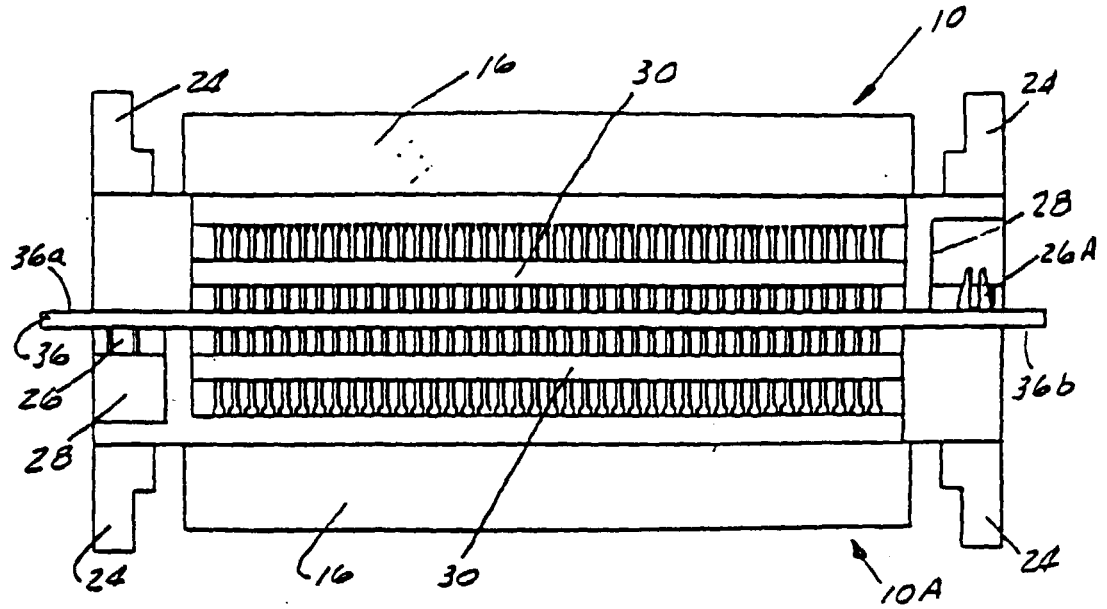

FIG. 5

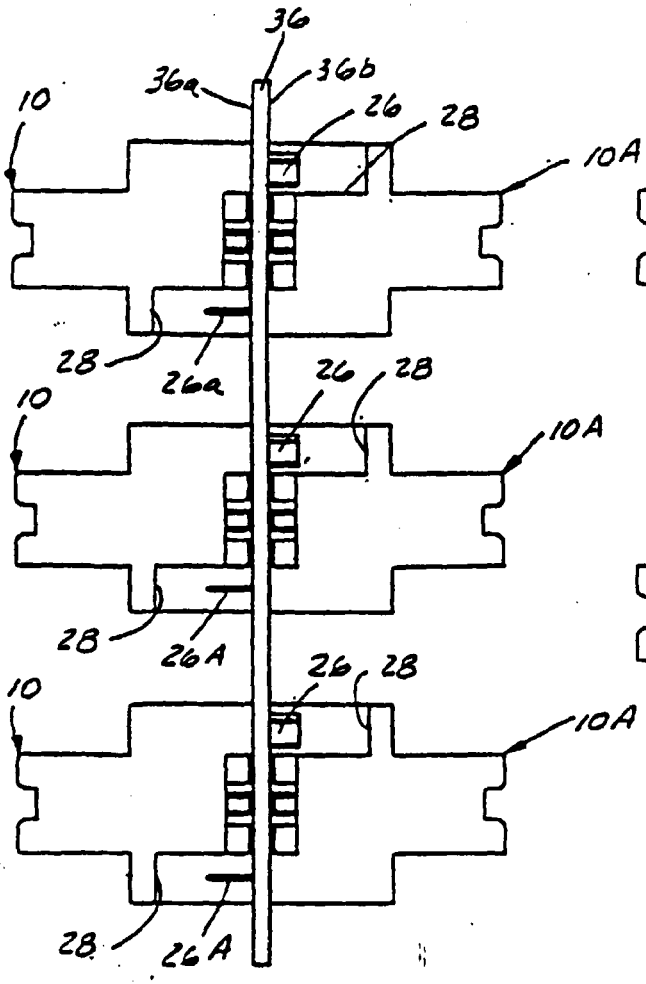

FIG. 6

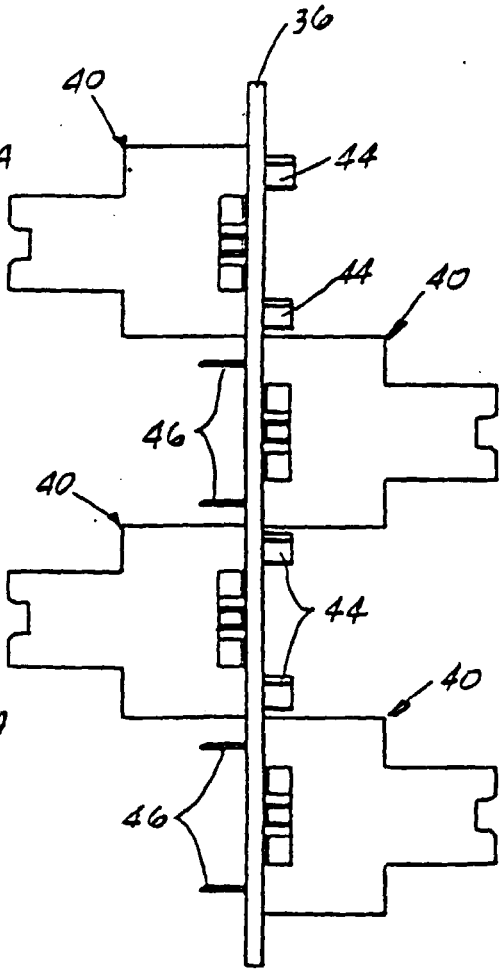

FIG. 7