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54 **Wire-to-board electrical connector.**

57 An electrical connector assembly (2) is shown including a receptacle housing (4) and a wire gripping assembly (6) is comprised of identical halves (40) which sandwich between them a multi-conductor cable (12). The cable gripping members (40) have latching detents (48) which correspond with apertures (36) in a preloaded condition, but with apertures (38) in a fully loaded condition, whereby when in the fully loaded condition, the free ends of the individual conductors (10) project through apertures in the end face (22) of the receptacle member to be aligned with through holes in the printed circuit boards (8).

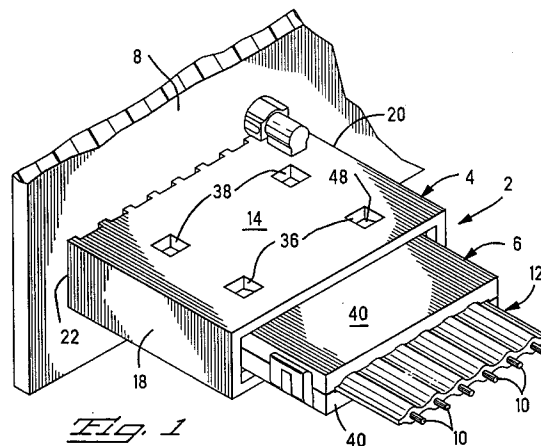


Fig. 1

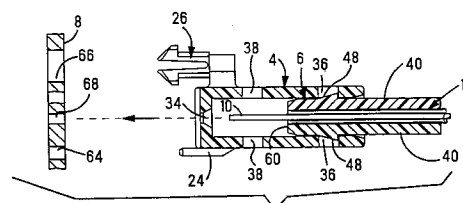


Fig. 1.1

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The subject invention relates to an electrical connector for interconnecting the electrical conductors of, for example a multi-conductor insulated cable, to another component, such as a printed circuit board.

Many times it is necessary to electrically interconnect the individual conductors of a multi-conductor cable to a printed circuit board, for example in electronic units such as televisions, electronic printers, and the like. Many proposals have been made for such interconnections, for example see European Patent Application 0 385 314, where an electrical connector is permanently mounted to a printed circuit board where a wire can be inserted into the connector for interconnection with terminals within the electrical connector. Many times however it is necessary to permanently interconnect the conductors of the multi-conductor cable directly to the printed circuit board, and the present invention addresses that need.

It is therefore an object of the invention to provide an electrical connector to permanently interconnect electrical conductors of an multi-conductor cable, for example, to another component, such as a printed circuit board.

The objects of the invention have been accomplished by providing an electrical connector for mounting electrical conductors to a printed circuit board, comprising a housing member mountable to the printed circuit board, the connector being characterized by a gripping member for gripping the conductors and being cooperable with said housing member for aligning free ends of the wire with the printed circuit board.

It is an advantage of this invention that the conductors may be easily mounted to another component. It is another advantage of this invention that the conductor ends are protected. It is yet another advantage of this invention that reliable strain relief is provided for the conductor. It is a further advantage of this invention that by proper configuration of the electrical connector keying and locking features may be included.

The invention will now be described by way of reference to the drawing figures where;

Figure 1 is an isometric view of the electrical connector of the present invention in a partially assembled manner;

Figure 2 is an isometric view similar to that of Figure 1, however in a fully assembled position, and where the end of the receptacle connector is partially broken away;

Figure 3 is a plan view of the receptacle connector shown in Figure 1;

Figure 4 is an end view of the receptacle connector shown in Figure 3;

Figure 5 is a front view of the receptacle connector shown in Figure 4;

Figure 6 is a plan view of the cable gripping member shown in the isometric view of Figure 2;

Figure 7 is an end view of the cable gripping member shown in Figure 6;

Figure 8 is a front view of the cable gripping member viewed in Figure 7;

Figures 9-13 are figures showing the step by step assembly of the connectors of Figures 1-8.

With reference first to Figure 1 and 2, an electrical connector assembly is shown generally at 2 comprising an electrical receptacle 4 and a cable gripping assembly that is shown generally at 6. The receptacle connector 4 is mounted to a printed circuit board 8, where the electrical connector assembly 2 provides insulative alignment for the conductors 10 of the insulated multi-conductor cable 12.

As shown in Figures 1-5, the electrical connector receptacle 4 is comprised of upper wall 14, lower wall 16 and side walls 18 and 20. A mounting surface 22 is provided at an end thereof whereby alignment pins 24 extend from the lower wall 16 and forwardly of the mating face 22. Furthermore, a latch member 26 is provided that extends from the upper surface 14 and extending forward to include resilient latch members 28, which will be described in greater detail herein.

As shown in Figure 2, the receptacle housing 4 includes an inner aperture 30 which is profiled for receipt of the cable gripping assembly 6 and the end face 22 of the receptacle housing 4 includes a plurality of wire emitting openings 34 (Figure 5) which extend outwardly from the end face 22 but communicate with the inner aperture 30, as best seen in Figures 9 and 10. Finally as shown in Figure 1, the receptacle housing 4 includes first detent openings 36 and second detent openings 38 positioned on both upper and lower wall portions 14,16, as will be further described herein.

With respect now to Figures 6-8, the cable gripping assembly 6 is comprised of two identical cable gripping members 40 comprised of a wall portion 42 having an inner surface 44 contoured to receive conductors 10 of the multi-conductor cable 12, thereby including a plurality of groove portions 46 to receive the insulation therein. The gripping member 40 includes two latch members 48 extending from a top surface thereof and profiled as shown in Figure 7. Two latch arms 50 extend from opposite ends of the member 40 and are diagonally opposed to each other as shown in Figures 6 and 7. Complementary latch projections 54 extend from opposite corners of the gripping member 40 as best shown in Figure 6 in a diagonally opposite sense as the latch members 50. It should be appreciated that this configuration allows two identical gripping members to be interconnected to

each other when in an opposing manner such that the inner surfaces 44 are facing each other, thereby forming an inner surface perfectly conforming to the outer contour of the insulated cable.

With respect now to Figures 9-13, the complete assembly of the above mentioned components will be described in greater detail. With reference first to Figure 9, the multi-conductor cable 12 is moved to a position between two identical gripping members 40 which are then latched together, such that the conductors 10 protrude forwardly from the gripping members 40 and the end face of the insulation is approximately flush with a front end 60 of the cable gripping member 40, as shown in Figure 10.

With the multi-conductor cable 12 fully inserted within the cable gripping members 40, as shown in Figure 10, the assembly can be pushed into aperture 30 of the receptacle member 4 to a position, shown in Figure 11, where the latch members 48 interact with the first set of apertures 36. This forms a prelocked assembly whereby the gripping members 40 and the multi-conductor cable 12 are fully held together within the receptacle, but where the individual conductors 10 of the multi-conductor cable 12 are securely fixed inside the receptacle to prevent any damage during transfer of the assembly.

As shown in Figure 11, this assembly can now be moved towards the printed circuit board 8 where the printed circuit board 8 would include guiding apertures 64 for alignment with pins 24 of the housing 4 and an aperture 66 for interaction with the latch member 26 to secure the housing 4 thereto. Finally, the printed circuit board would include apertures 68 that are in alignment with apertures 34 in the end face of the receptacle, to receive therethrough the individual electrical conductors 10. It should be appreciated that the apertures 68 could be plated therethrough or could include some type of conductive trace surrounding the aperture for forming the electrical interconnection therebetween.

As shown in Figure 12, the assembly of the receptacle member 4, the gripping assembly 6, and the multi-conductor cable 12 is fixed to the printed circuit board by way of the latch member 26, but in a pre-assembled condition where the wire is not yet positioned through the printed circuit board through holes 68. As shown in Figure 13, when it is ready for final assembly, for example by way of soldering the end of the wires to the printed circuit board traces, the gripping assembly 6 can be pushed forwardly to a position where the latch members 48 on the gripping members 40 correspond with apertures 38 in the receptacle assembly, such that the individual conductors 10 now project through the apertures 68 of the printed

circuit board.

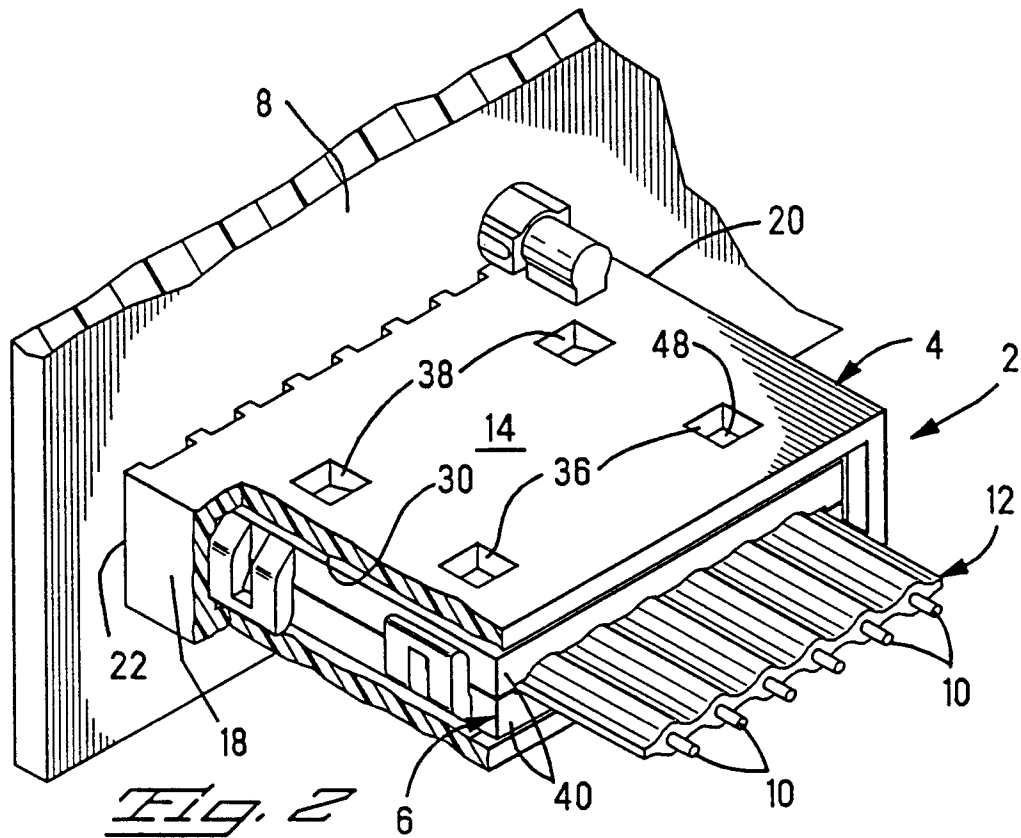
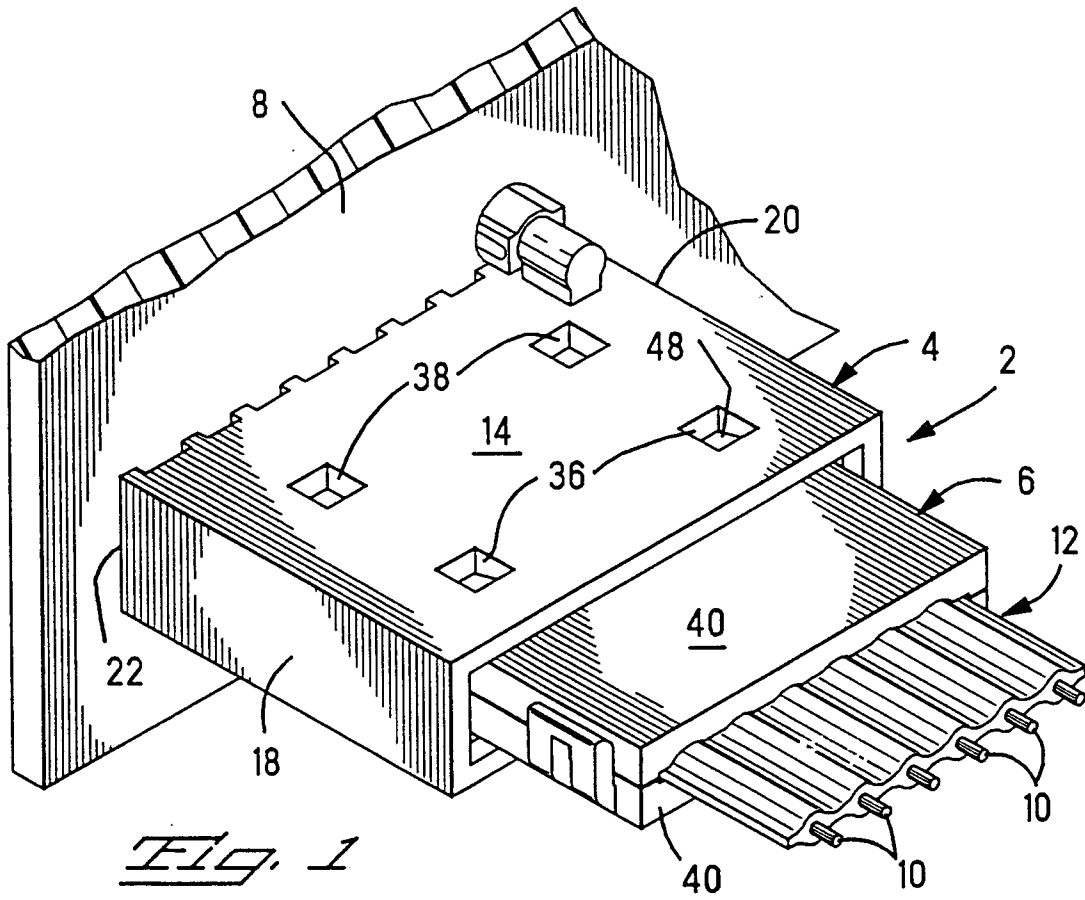
Advantageously, an electrical connector assembly 2 is provided to facilitate the proper assembly of conductors 10 to another component, such as a printed circuit board 8. The electrical connector assembly 2 includes a gripping assembly 6 that is receivable within a receptacle housing 4, mountable to the printed circuit board 8, in a preloaded position with the free ends of the conductors 10 protectively enclosed therein and a fully loaded position, where the conductors 10 extend through apertures in the end face 22 of the housing 4 for alignment with the printed circuit board 8. Where in the fully loaded position the housing 4 and gripper member 6 provide strain relief for the conductors 10.

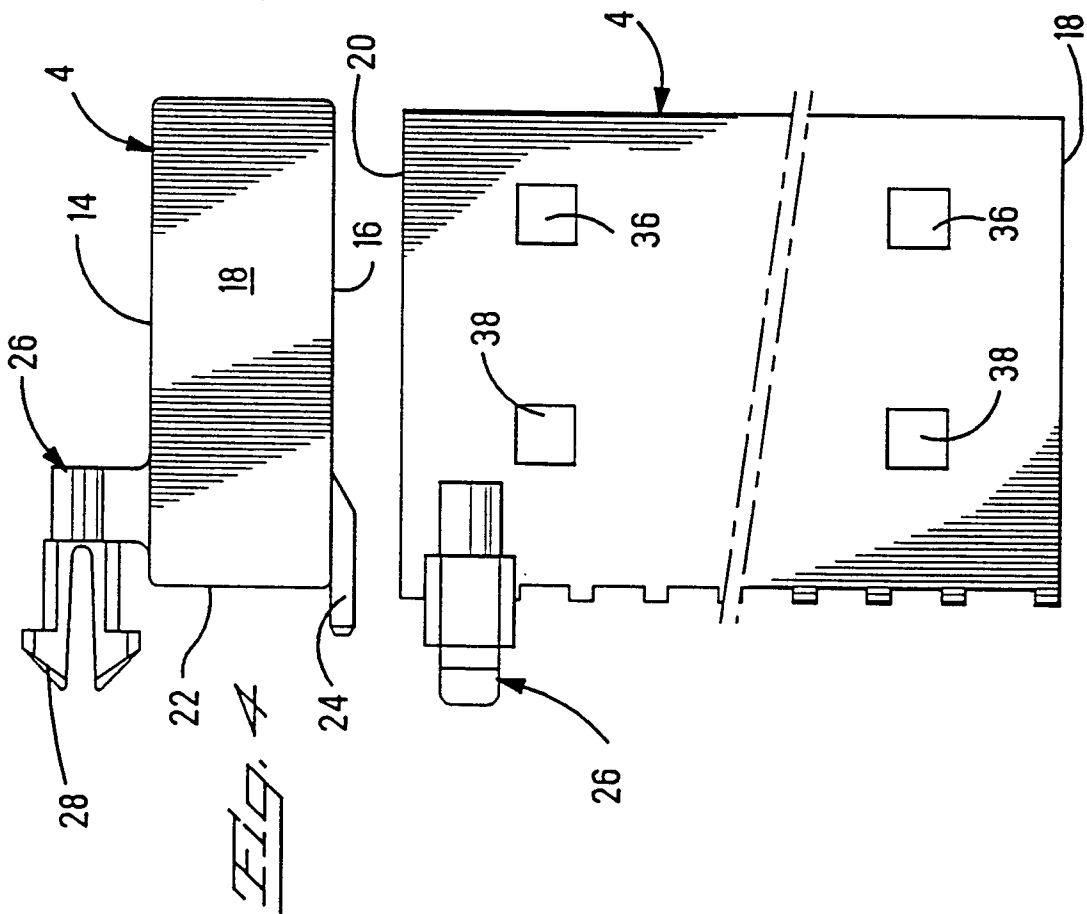
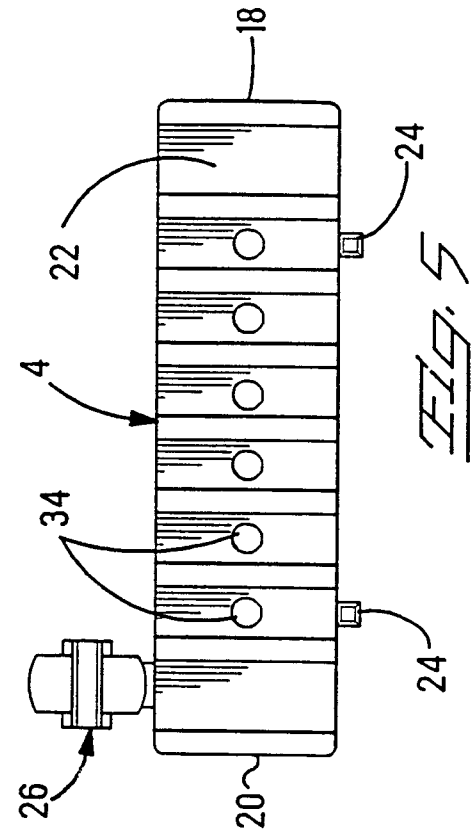
Claims

1. An electrical connector (2) for connecting electrical conductors (10) to another component (8), comprising a housing member (4) mountable to the component (8), the connector (2) being characterized by a gripping assembly (6) for engaging the conductor (10) and being cooperable with said housing member (4) for aligning the free end of the conductor (10) with the other component (8).
2. An electrical connector (2) in accordance with claim 1, characterized in that said housing member (4) is profiled as a receptacle member, into which the gripping assembly (6) is received.
3. An electrical connector (2) in accordance with claim 2, characterized in that the receptacle member (4) has a mating face (22), through which aperture (30) extends, and which is alignable with traces (68) on the other component (8).
4. An electrical connector (2) in accordance with any one of claims 1-3, characterized in that the gripping assembly (6) is comprised of identical halves (40) latchable together to grip the cable (12).
5. An electrical connector (2) in accordance with any one of claims 1-4, characterized in that said gripper assembly (6) and said receptacle (4) have cooperable first and second latching means (48, 36, 38), wherein in a first position the conductor end is within the receptacle (30), and when in said second position, said conductor (10) can project outwardly through said aperture (30).

6. An electrical connector (2) for interconnecting a wire conductor (10) to a trace (68), comprising a housing (4) positionable relative said trace (68), characterized in that a gripper assembly (6) for engaging the conductor (10), with a free end extending therefrom, is receivable within the housing (4) in a first position where the free end of the conductor (10) is within the housing (4) and a fully assembled position where the free end extends from the housing (4) in alignment with the trace (68) when the housing (4) is positioned relative the trace (68). 5
10
7. The electrical connector (2) of claim 6, characterized in that the housing (4) includes a pin (24) that is received in a guiding aperture (64) positioned relative the trace (68). 15
8. The electrical connector (2) of claim 7 or 8, characterized in that the gripper assembly (6) is locked to the housing (4) in the first position and the fully loaded position. 20
9. The electrical connector (2) of anyone of claims 6-8, characterized in that the gripper assembly (6) is securely engaged with the conductor (10) in both the first position and the fully loaded position, thereby providing strain relief for the connection. 25
30
10. A method of electrically connecting free ends of a multi-conductor cable (12) to holes (68) on a printed circuit board (8), comprising the steps of: 35
 positioning the multi-conductor cable (12) within a gripper assembly (6) with the free ends (10) extending therefrom;
 placing the loaded gripper assembly (6) into a housing receptacle (4) in a first position where the housing (4) surrounds the free ends of the conductors (10) and retains them therein; 40
 positioning the combined housing receptacle (4) and gripper assembly (6) relative the holes (68) on the printed circuit board; 45
 inserting the gripper assembly (6) into a fully loaded position within the housing (4) such that the free ends of the conductors (10) extend therefrom into the holes (68) on the printed circuit board (8) and are retained therein. 50

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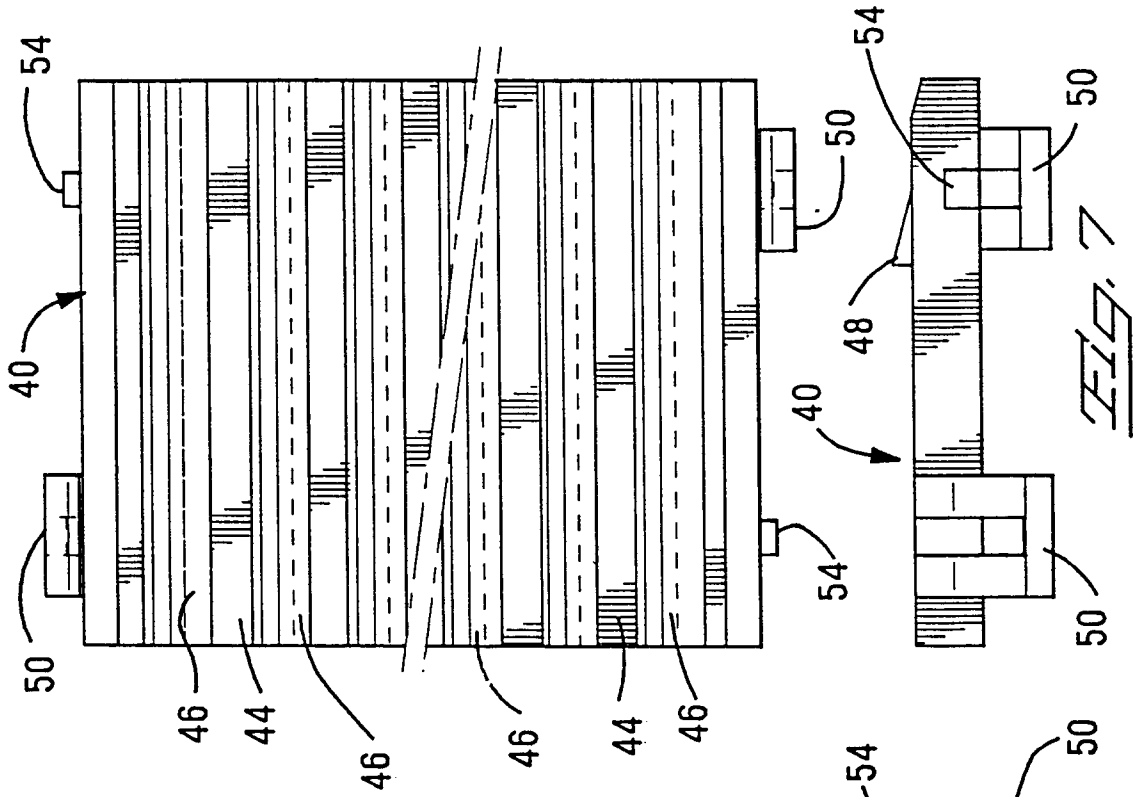


FIG. 6

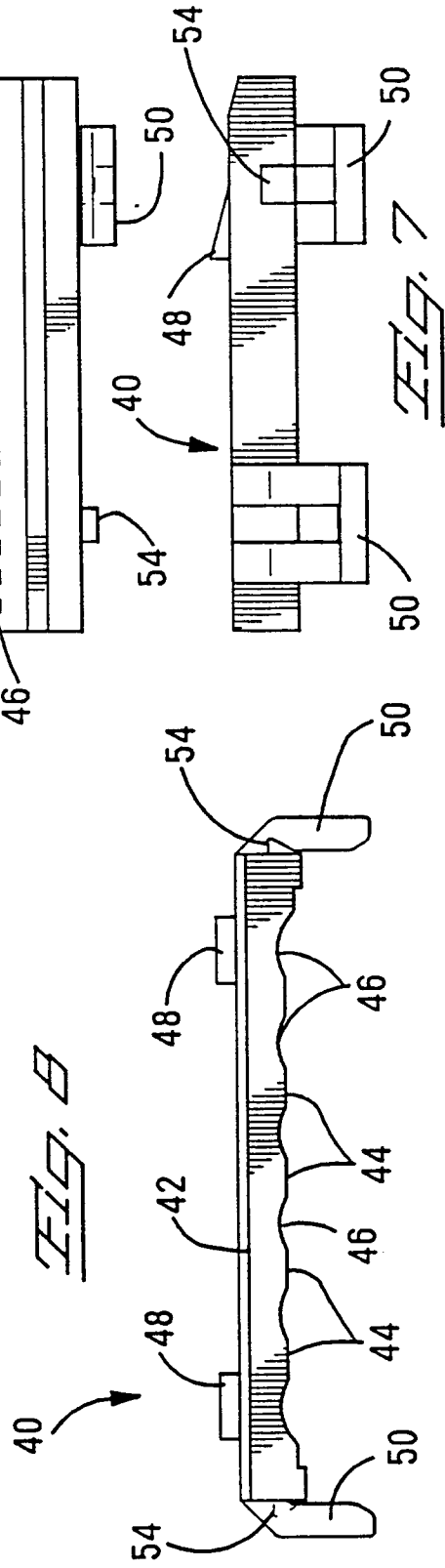
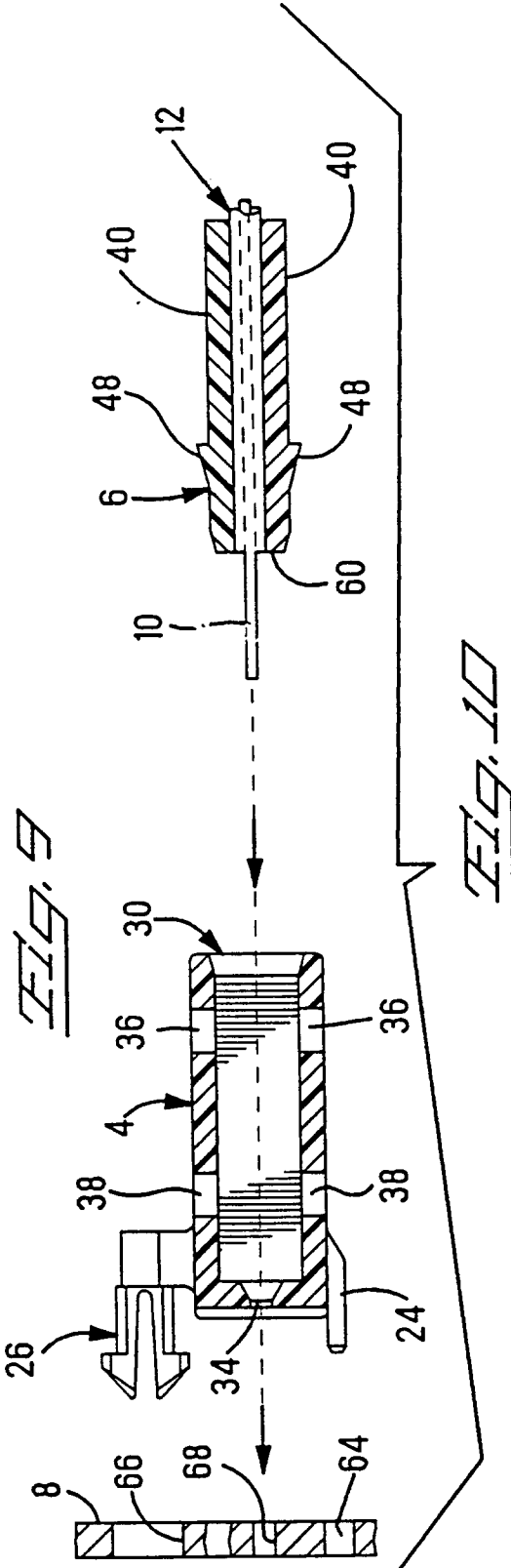
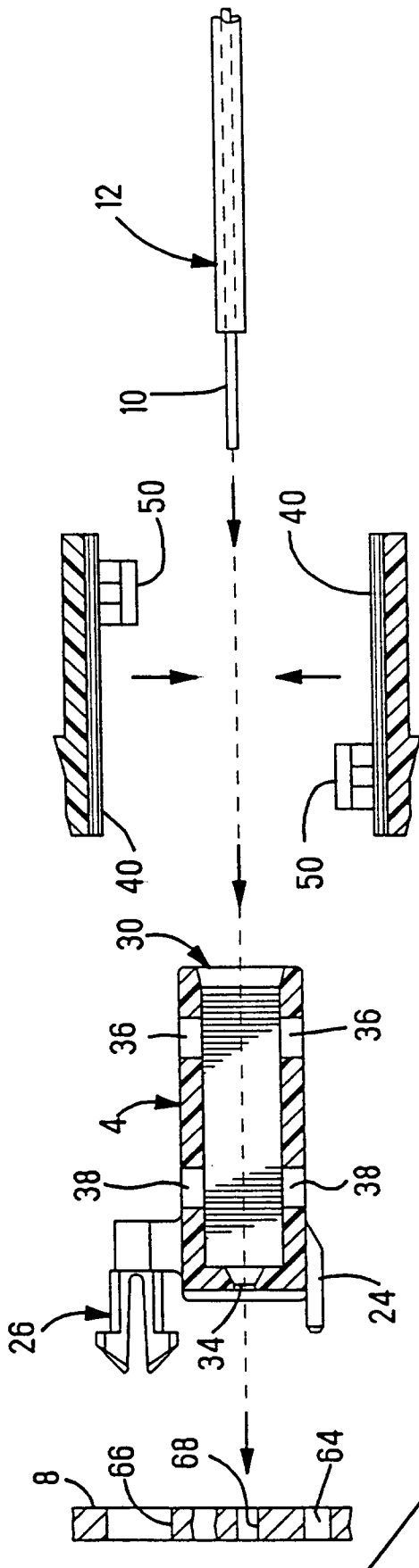


FIG. 7



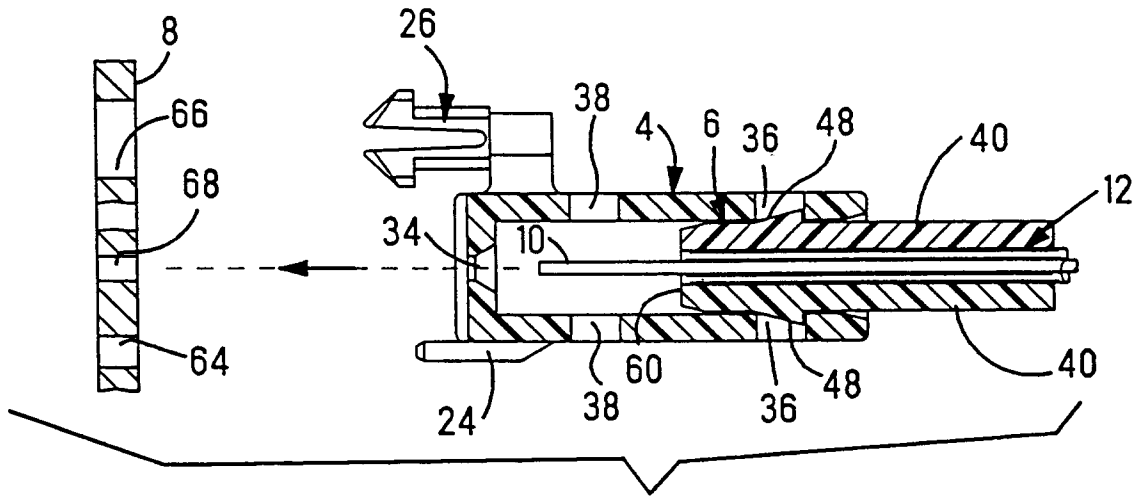


Fig. 11

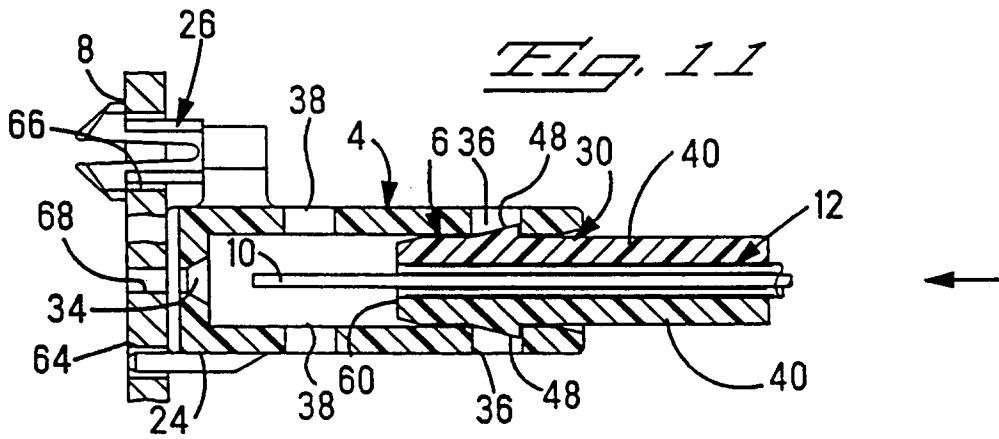


Fig. 12

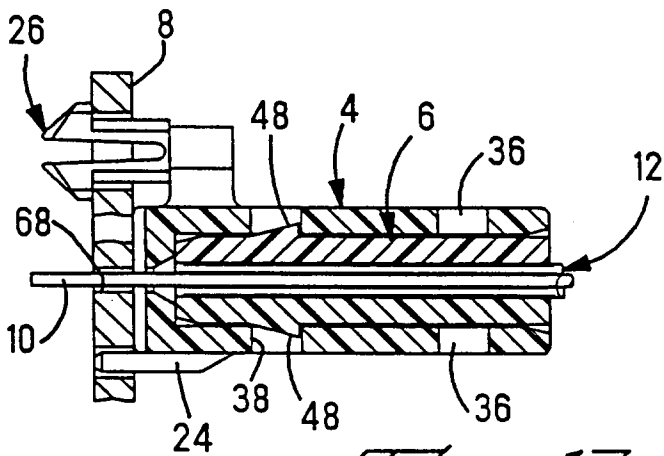


Fig. 13