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(71) Applicant: **AMP INCORPORATED (a Pennsylvania corporation)**
P.O. Box 3608 470 Friendship Road
Harrisburg Pennsylvania 17105(US)

(72) Inventor: **Cosmos, Pete**
1732 English Drive
Mechanicsburg Pennsylvania 17055(US)
Inventor: **Mosser, Bejamin Howard**
1827 Blacklatch Lane
Middletown Pennsylvania 17057(US)
Inventor: **Ohl, William Carey**
2711 Colonial Road
Harrisburg Pennsylvania 17112(US)

(74) Representative: **Warren, Keith Stanley et al**
BARON & WARREN 18 South End Kensington
London W8 5BU(GB)

(54) One-piece molded insulating housing for a circular din connector.

(57) A one piece, molded, insulating connector body (14) for a surface mounted, shielded, electrical connector (10), comprises a plug portion projecting from the body (14) into a forward hood (68) thereto, for mating with a shielded electrical socket inserted into the hood (68). There projects from a terminal receiving face (70) of the body (14), a terminal leg spacer plate (74) having notches for receiving 'U'-shaped retaining members (108) on the legs (100) of the terminals (95) in through cavities (62) in the body (14). Each leg (100) has a lance (112) for insertion in a hole (H) in a substrate (S). The legs (100), and cranked arms (102) connecting them to receptacles (96) of terminals (95), are so shaped and dimensioned that even where the cavities (62) are arranged in three superposed rows, the lances (112) can be inserted into the holes (H) where these are arranged in only two rows, and with a different spacing from that of the rows of cavities.

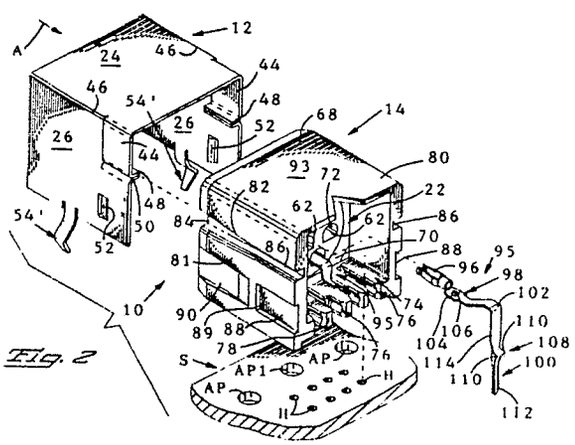

Fig. 2

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ONE-PIECE MOLDED INSULATING HOUSING FOR A CIRCULAR DIN CONNECTOR

This invention relates to an insulating housing for a surface mounted, shielded electrical connector comprising a circular cross-section elongate, plug portion for mating with a circular cross-section electrical socket and having at one end thereof a mating face, a plurality of terminal receiving, parallel cavities, extending through the plug portion axially thereof and each having a pin receiving mouth opening into the mating face, and a substantially rectangular cross-section connector body connected to the plug portion, having a terminal receiving face opposite to said mating face, each of the cavities extending through said body and opening into the terminal receiving face.

Such a housing, which is for a connector which is generally known as a 'Miniature Circular DIN Type Connector', is disclosed in US-A-4,637,669. The body, which is made of a plurality of separate parts, serves to locate and guide between these parts the connecting legs of terminals in the cavities, which legs project from a bottom, mounting face, of the housing for insertion in holes in a substrate, for example a printed circuit board. Although there is disclosed in US-A-4,495,525, a one part, molded insulating housing for a surface mounted electrical connector, of the kind under discussion, having a front shield, the terminal legs are held in position, only by virtue of means for retaining mating parts of the terminals in the cavities.

The present invention is intended to provide a housing of the kind outlined above, which can readily be molded in one piece, preferably by the use of straight action core pins, and in which the terminal legs are firmly and accurately positioned for insertion in the holes in the substrate.

According to the invention, a dielectric housing for an electrical connector is molded in one piece. An elongate circular cross-section plug portion of the housing has a mating face at one end and a plurality of terminal receiving cavities extending axially therethrough. Each cavity has a pin receiving mouth opening onto the mating face. The dielectric housing has a substantially rectangular cross-section connector body formed integrally with the other end of the plug portion and from which projects forwardly a hood surrounding the plug portion, in spaced relationship therewith. The hood allows a circular cross-section electrical socket to be mated with the plug portion. The body has a terminal receiving face opposite to the mating face, with each of the cavities extending through the body having a terminal receiving mouth opening onto the terminal receiving face. An integral terminal leg spacer plate extends from one edge of the terminal receiving face away from the plug portion. The terminal spacer plate has a plurality of elongate, terminal leg receiving channels or notches extending normally of the terminal receiving face and opening onto an edge of the spacer plate removed from the terminal receiving face for retaining terminal legs therein.

Where the cavities comprise a plurality of superposed rows, each of the notches is shaped for the retention of a plurality of terminal legs therein in spaced relationship lengthwise of the notch. Each notch may have a wider portion for receiving one of these terminal legs and a narrower portion, for receiving another of the terminal legs.

For the purpose of protecting the terminal legs, a protective skirt may be provided on said terminal receiving face to extend rearwardly thereof. The forwardly projecting hood, the said body and the protective skirt, may be formed with external grooves each opening into a forward edge of the hood and a rear edge of the protective skirt for slidably receiving a flange on a metal shield for the housing for anchoring the shield thereto. Side walls of the protective skirt may also be formed with notches for receiving detents on the shield, better to anchor the shield to the housing.

Each of said grooves preferably has a deepened portion opening into the rear edge of the protective skirt so that a flange can be engaged in the deepened portion with a snap action, as the shield is slid home over the body.

The invention also relates to the one piece molded housing and the terminals, in combination.

The legs of the terminals, may be provided with retaining means in the form of substantially 'U' shaped members projecting from the legs, for reception in the notches, to retain the legs therein, tips of the 'U' shaped members preferably being provided with skiving wings for biting into the walls of the notches.

The cavities may, for example be arranged in three rows displaced from each other in a direction perpendicular to the mounting face, and the legs of the terminals being so connected to mating portions thereof and the lengths of the legs being such that the legs can be inserted into holes in the substrate which are arranged in only two rows.

The housing can readily be molded in one piece by the use of only straight acting core pins.

For a better understanding of the invention, reference will now be made by way of example to the accompanying drawings in which:

FIGURE 1 is a fragmentary isometric view of a shielded, surface mounted eight position electrical connector;

FIGURE 1A is a fragmentary isometric view of a shielded electrical socket;

FIGURE 2 is an isometric, partly diagrammatic exploded view of a modified version of the connector;

FIGURE 3 is a fragmentary isometric view illustrating a modification of the mounting feet of the connector of Figure 2;

FIGURE 4 is a fragmentary isometric view of a part of the metal shield of the connector of Figure 1;

FIGURE 5 is a view taken of the lines 5-5 of Figure 4;

FIGURE 6 is a fragmentary view taken in the direction of the arrow 6 in Figure 4;

FIGURE 7 is a view taken on the lines 7-7 of Figure 6;

FIGURES 8 and 9 are a longitudinal sectional view and an isometric view, respectively, illustrating a modification of the part shown in Figures 6 and 7;

FIGURE 10 is a similar view to that of Figure 5 but illustrating a modification of the parts shown therein;

FIGURE 11 is an axial actual sectional view of the shielded connector of Figure 1;

FIGURE 12 is a fragmentary front view of the shielded connector of Figure 1;

FIGURE 13 is a fragmentary rear view of the connector of Figure 1 having the terminals in the forward substrate row of holes secured therein;

FIGURE 13A is a rear view of the connector of Figure 2 having the terminals in the rearward substrate row secured therein;

FIGURE 14 is a fragmentary horizontal sectional view of the connector of Figure 1;

FIGURE 15 is an axial sectional view of the shield of the connector of Figure 1;

FIGURE 15A is a cross-section through a retaining member of an electrical terminal shown in Figure 2;

FIGURE 16 is a diagram illustrating the arrangement of electrical terminal receiving cavities in respective modifications of the connectors and the arrangement of holes in a substrate upon which connectors according to said modification are to be mounted;

FIGURE 17 is a diagram illustrating the general configuration of electrical terminals of an eight position connector to enable legs of the terminals to be received in cavities provided in a substrate in two rows;

FIGURES 18 to 25 are views of respective electrical terminals; and

FIGURE 26 is a plan view shown partly in section illustrating a modification of a detail of the connector of Figure 1 or 2.

As shown in Figures 1 and 2, a shielded electrical connector for mounting on a substrate, for example a printed circuit board, comprises a one piece metal shield 12 and a substantially rectangular cross-section, one piece, molded, insulating connector body 14. There projects from the connector body 14, forwardly, a circular cross-section plug portion 16 for mating with a circular cross-section externally shielded electrical socket 18 (Figure 1A) having a metal shield 19, and into which project electrical pins 17.

As best see in Figure 11, the body 14 has a central portion 22 from which the plug portion 16 projects.

The shield 12 comprises a top wall 24, a pair of side walls 26, each adjacent to the top wall 24 and depending from opposite lateral edges thereof. A front wall 28 adjacent to the top wall 24 and the side walls 26, is formed integrally therewith and has a circular, through opening 30 therein, for receiving the socket 18. The opening 30 has a circular edge 32 from which project a series of resilient cantilever fingers 34 on the shield 12, rearwardly thereof, for engaging the external shielding 19 of the socket 18, the fingers 34 being constantly spaced from one another about the edge 32. Fingers 34 are formed from the portion of surface 28 that otherwise would enclose opening 30. As shown in Figures 4, 6 and 7, each finger 34 has formed therein an embossment 36 proximate to, but spaced back from, its free end 38 and projecting in the radially inward direction of the opening 30 in order to limit free deflection of the fingers 34 by the socket portion 18 as it is being mated with the plug portion 16, so that the shield 19 of the latter engages the embossments 36 and does not overstress the fingers 34.

According to the modification shown in Figures 8 and 9, in which the finger is referenced 34′ and the embossment, 36′, the embossment 36′ is formed at the end of the finger 34′.

According to the modification shown in Figure 5, the finger, which is referenced 34″ is formed with a joggle 40 spaced back from its free end 38″ to provide a raised shoulder 42 for engaging the shield 19.

There depend from opposite lateral edges 46 of the top wall 24 at its rear end, that is to say at its end remote from the front wall 28, tabs 44, each tab 44 terminating in a flange 48, the flanges 48 projecting towards each other, that is to say inwardly of the shield 12. Just below (as seen in Figures 2 and 13, as well as in Figure 15), each flange 48 the respective side wall 26 is formed with a further inturned flange 50, extending parallel to, and being contiguous with, the flange 48 thereabove. Below the flange 50, each side wall 26 has struck out therefrom, a detent 52 in the form of

a resilient tongue projecting obliquely interiorly of the shield 12 proximate to its rear end.

The shield 12 is further provided with means for securing it to the substrate S, in the form of mounting feet 54 (Figures 1, 11, 13, and 15), 54′ - (Figure 2), or 54″ (Figure 3) depending from the respective side walls 26. The mounting feet 54 are in the form of a simple tab, the mounting feet 54′ being in the form of claws which are bowed in opposite directions, outwardly of the shield 12, the mounting feet 54″ being bifurcated and thus comprising two portions, each portion terminating in a barb 56 and said portions being resiliently deflectable towards each other. The front wall 28 is provided with a further mounting foot 58 depending from a rearward extension 60 of the front wall 28 extending parallel to the top wall 24 or, as shown in Figure 10, an extension 60′ of the front wall 28 extending obliquely downwardly therefrom. Said extensions may be said to constitute rudimentary bottom walls of the shield 12.

The plug portion 16 is formed with terminal receiving, parallel cavities 62 extending therethrough, axially thereof and each having a pin receiving flared mouth 64 opening into a mating face 66 body of the plug portion 16. The central portion 22 has projecting forwardly therefrom a hood 68 surrounding the plug portion 16 in spaced relationship thereto, to allow the socket 18 to be mated with the plug portion 16. The portion 22 of the housing 14 has a terminal receiving face 70 opposite to the mating face 66, each cavity 62 extending through the portion 22 and having a terminal receiving mouth 72 opening into the face 70.

The plug portion 16 has axial keyways 61 and 63 for the reception of complementary keys 65 and 67 in the socket 18.

A terminal leg spacer plate 74 extending along the lower edge of the face 70, in a direction away from the plug portion 16 is formed with a plurality of elongate, in the axial direction of the cavities 62, terminal leg receiving spacer notches 76 each extending normally of the face 70 and opening into the rear edge 78 of the spacer plate 74, remote from the face 70, each notch 76 being shaped for the retention two terminal legs therein, to correspond to the two rows of terminal leg receiving apertures in the footprint of the connector.

Notches 76 in spacer plate 74 define sidewalls 75. V-shaped grooves 77 in sidewalls 75 receive lugs 110, which are preferably pointed as shown in Figure 13 or 13A, skive sidewalls 75 upon insertion and prevent withdrawal of legs 100 from notches 76. Lugs 110 not only secure leg 100 in notch 76 but also prevent leg 100 from moving normal to spacer plate 74.

A protective skirt 80 projects from the face 70 of the portion 22, rearwardly from the periphery thereof and adjoins each end of the spacer plate 74. The hood 68, the portion 22, and the skirt 80 are formed on each side wall 81 of the body 14 with a common external groove 82 opening into the forward edge of the hood 68 and the rear edge of the skirt 80, each groove 82 having a flared flange receiving mouth 84 opening into the forward edge of the skirt 68 and a deepened portion 86 opening into the rear edge 78 of the skirt 80. Each side of the skirt 80 is formed with a recess 88 opening into the rear edge of the skirt 80 below the groove portion 86, defining shield retaining shoulder 89. The hood 68 is formed on either side thereof with an external relief recess 90 opening into the forward edge of hood 68. The body 14 has a bottom mounting face 92 opposite to its top wall 93, provided with standoffs 94 as shown in Figures 11 to 13, the face 92 being parallel to the plate 74.

Electrical terminals 95 each for reception in a respective cavity 62 each comprise a forward, mating part in the form of a receptacle 96, an intermediate insertion and retention part 98 connected to the rear end of receptacle 96 and a terminal leg 100 connected to the rear end of the part 98 by way of an arm 102, the leg 100 extending at right angles to the remainder of the terminal 95. The receptacle 96 is formed in accordance with US Patent Application Serial Number 806,149, filed on June 12, 1985, and the insertion and retention part 98 which comprises a laterally barbed retention plate 104 and an insertion hump 106 is formed in accordance with US Patent Application Serial Number 094,944 filed on September 9, 1987, both of which patent applications are incorporated herein by reference. The leg 100 is provided with retaining means in the form of a substantially U-shaped retaining member 108 presenting retention lugs 110, shown in outline in Figure 2. Each leg 100 has an insertion. lance 112 below the member 108 and a leg portion 114 between the member 108 and the part 98. A rear view of the terminals 95 in body 14 is shown in Figures 13 and 13A.

In order to assemble the shield 12 to the connector body 14, the terminals 95 having been inserted into the cavities 62 with the forward ends of the receptacles 96 thereof proximate to the mouths 62 and their legs 100 retained in the notches 76 by means of the retaining members 108, the shield 12 is slid onto the connector body 14 in the direction of the arrow A in Figure 2. During this operation. the flanges 48 and 50 enter respective grooves 82. guided by their flared mouths 84, and finally snap into the deepened portions 86 of the grooves 84. the detents 52 likewise snap into the recesses 88. an edge thereof engaging retaining shoulder 89. The shield is thereby firmly secured to the body 14.

The lances 112 which protrude below the

mounting face 92 are then inserted into respective holes H in the substrate S, the mounting feet 54, 54′ or 54″, as the case may be, entering respective apertures AP in the substrate S, and the mounting foot 58 entering an aperture AP1 in the substrate S. The mounting feet 54 and 58 simply wedge in their respective apertures. The mounting feet 54′, however, are resiliently depressed inwardly of the shield 12 by the edges of the apertures AP, being accommodated by the recesses 90, and finally resile, to engage against the lower surface of the substrate S. The two portions of each mounting foot 54″ are compressed towards each other by the edge of the respective aperture AP and finally resile, so that the barbs 56 engage against the lower surface of the substrate S.

Preferably, as shown in Figure 15A, the lugs 110 of each retaining member 108 have sharp edged skiving wings 121 projecting therefrom for biting into the walls of the respective notch 76. Lugs 110 are preferably pointed as shown in Figure 13 or 13A with lugs 110 complementary to and received in grooves 77 in sidewalls 75.

As illustrated in Figure 16, the body 14 may have different numbers of terminal receiving cavities 62 and differently arranged keyways. The cavities 62 may be arranged at two or three levels displaced from one another in a direction perpendicular to the mounting face 92, although the holes H in the substrate S are, in each case, arranged in two rows only. This means that the lengths of the legs 100 and the configuration of the arms 102 must be adapted both to the layout of the cavities 62 and to that of the holes H. The insertion lances 112 of all the terminals 95 must, of course, all be of the same length. In Figure 16 the cavities 62 are numbered 1 to 3, 1 to 4 and so on up to 1 to 8, and the holes H are correspondingly numbered. Where there are, for example, eight cavities disposed in three rows (see 8a and 8b in Figure 16), the configuration of the arm 102 and the leg portion 114 must be different in respect of each terminal 95. That is to say since the holes 2 are arranged in only two rows, and since the cavities are differently spaced from the spacer plate 74, the arm 102 and leg 100 of each terminal must be dimensioned to compensate for such mismatching. As shown diagrammatically in Figure 17, in which the cavities are numbered 1 to 8 and holes are also numbered 1 to 8, the terminals 95 are arranged in four pairs, namely those for the cavities 1 and 2, the cavities 3 and 5, the cavities 4 and 7, and the cavities 6 and 8 respectively, the terminals 95 of each pair being configured so that their arms 102 are cranked in mirror image relationship with one another, that is to say the arms 102 of each pair of terminals 95 offset the legs 100 of the pair in opposite sense with respect to the receptacles 96 thereof.

Figures 18 to 25, in which the parts are referenced in the same way as the terminal parts in Figure 2 show, in fragmentary plan view, strips of the respective pairs of terminals 95. Figures 18 and 19 show the terminals for the cavities 1 and 2, in the bottom row, in which the arms 102 are oppositely directed to the same extent and the leg portions 114 are the shortest. As shown in Figures 20 and 21, the leg portions 114 are longer than those of Figures 18 and 19 because both of the terminals of these Figures are in the second row up from the plate 74, i.e, the middle row. The arms 102 in Figures 18 and 19 and in Figures 20 and 21 offset the legs 100 from receptacles 96 to substantially the same extent because, as will be apparent from Figure 16, the cavities 1 and 2 are offset from the holes 1 and 2 to substantially the same extent as the cavities 3 and 5 are offset from the holes 3 and 5. In the terminal for the cavity 4, shown in Figure 22, which is a middle row terminal the leg portion 114 is shorter than that of the terminal shown in Figure 23 which is for a top row terminal. Each arm 102 in Figures 22 and 23 offsets the receptacle 96 from the leg 100 of respective terminals received in cavities 4 and 7 to accommodate the respective offset in holes 4 and 7 in substrate S, since the cavities 4 and 7 are offset from the holes 4 and 7. The offsets afforded by the arms 102 are, however, greater than in the case of the terminals of Figures 20 to 23. The terminals shown in Figures 24 and 25 are for the cavities 6 and 8, respectively, which are the outside cavities of the top row and the arm portions 114 in both of these figures are, therefore, of equal length. However, although the offset afforded by the arms 102 is equal to that afforded by the arms 102 in Figures 22 and 23, the arms 102 are longer in Figures 24 and 25.

Each of the terminals shown in Figures 18 to 25 forms part of a discrete strip of terminals joined in side by. side relationship by carrier strips 120 and 122, which are primary and secondary carrier strips, respectively, and are connected by transverse strips 123. The length of each leg portion 114 is determined by the positioning of the secondary carrier strip 122 therealong.

It will be apparent that each of the notches 76 must receive the retaining members 108 of two of the terminals 95 since the notches 76 are four in number whereas the terminals 95 are eight in number. To this end, as shown in Figure 26 each notch 76 has a wider part 116 for receiving the retaining member 108 of one terminal 95, communicating with a narrower part 118 for receiving the retaining member 108 of another terminal 95. Where there are eight cavities 62, each of eight different terminal strips are produced as shown in Figures 18 to

25 respectively, each terminal is severed from its strip and, during manufacture of the connector 10, is selectively inserted into its respective cavity 62 in its proper orientation by means of a stitching machine, after the body 14 has been molded. Where there are fewer than eight cavities 62, appropriate ones of the terminals manufactured for a body 14 with eight cavities, are inserted into these fewer cavities.

A rear view of terminals 95 in body 14 is shown in Figures 13 and 13A. Terminals 95 that are received in the row of holes H in substrate S closer to mating face 66 are shown in Figure 13; Figure 13A shows terminals 95 that are received in the row of holes H more distant from mating face 66.

As shown in Figures 18 to 25, the skiving wings 121 of each retaining member 108 are positioned at its end nearest to the insertion lance 112.

As shown in Figure 26, the groove 76′ for the terminal shown in Figure 23 has its wider part 116′ offset from the longitudinal axis X of the groove 76′ for alignment of the terminal with its hole H. As will be apparent from Figure 23, the retaining member 108′ of the terminal is unsymmetrical to allow for this.

Claims

1. A dielectric housing (14) for an electrical connector (10) having an elongate circular cross-section plug portion (16) having a mating face (66) at one end thereof, and a plurality of terminal receiving cavities (62) extending axially through the plug portion (16), each cavity (62) having a pin receiving mouth portion (64) opening onto the mating face (66), a hood (68) surrounding the plug portion (16) in spaced relationship therewith, the hood (68) to allow a circular cross-section, electrical socket (18) to be mated with the plug portion (16), said dielectric housing (14) characterized in that the housing is formed in one piece, with a substantially rectangular cross-section connector body (14) formed integrally with the other end (22) of the plug portion. (16) with the hood (68) projecting forwardly therefrom, said body (14) having a terminal receiving face (70) opposite to the mating face (66), each of said cavities (62) extending through the body and having a terminal receiving mouth (72) opening onto said terminal receiving face (70), and an integral terminal leg spacer plate (74) extending from one edge of the terminal receiving face (70) away from the plug portion (16), the integral terminal spacer plate (74) having a plurality of elongate, terminal leg receiving channels (76) extending normally of the terminal receiving face (70) and opening onto an edge (78) of the spacer plate (74) remote from the terminal receiving face (70).

2. A one-piece dielectric housing (14) as recited in claim 1, characterized in that each of said channels (76) is shaped for the retention of a plurality of terminal legs (100) therein, said plurality of terminal legs (100) in spaced relationship lengthwise along said channels (76).

3. A one-piece dielectric housing (14) as recited in claim 2, characterized in that each channel (76) has an enlarged portion (116′) extending from said edge for receiving a first terminal leg (100) and a narrower portion (118) between said enlarged portion (116′) and said terminal receiving face (70), for receiving a second terminal leg (100).

4. A one-piece dielectric housing (14) as recited in claim 1, characterized in that each channel (76) defines a side wall (75), said side wall (75) having a groove (77) therein to receive a complementary projection (110) on a terminal leg (100), whereby movement of the terminal (100) normal to the spacer plate (74) is prevented.

5. A one-piece dielectric housing (14) as recited in claim 1, characterized by a protective skirt (80) extending rearwardly from the periphery of said terminal receiving face (70) adjoins each end of said spacer plate (74).

6. A one-piece dielectric housing (14) as recited in claim 5, characterized in that each of two opposite sides (81) of said body (14) is formed with an external groove (82), each groove opening into a forward edge of said hood (68) and into a rear edge of said skirt (80), for slidably receiving a flange on a metal shield (12) for said body (14).

7. A one-piece dielectric housing (14) as recited in claim 6, characterized in that each groove (82) has a flared, flange receiving mouth (84) opening into said forward edge, and a deepened part (86) opening into said rear edge (78) for receiving the respective flange with a snap action.

8. A one-piece dielectric housing (14) as recited in claim 6, characterized in that each of two opposite sides of said skirt (80) is formed with a recess (88) for receiving a detent (52) on said shield (12) with a snap action.

9. A one-piece dielectric housing (14) as recited in claim 1, characterized in that each of two opposite sides of said hood (68) is formed with an external relief recess (88) for a resilient anchoring member (52) on said shield (12).

10. A one-piece dielectric housing (14) as recited in claim 1, characterized by at least one of said channels (76) is not axially aligned with a respective terminal receiving cavity (62) such that a terminal leg connected to a terminal (100) adapted to be received in said terminal receiving cavity (62) extends transversely of said cavity (62), thence

normal to said cavity (62) to extend through said channel (76).

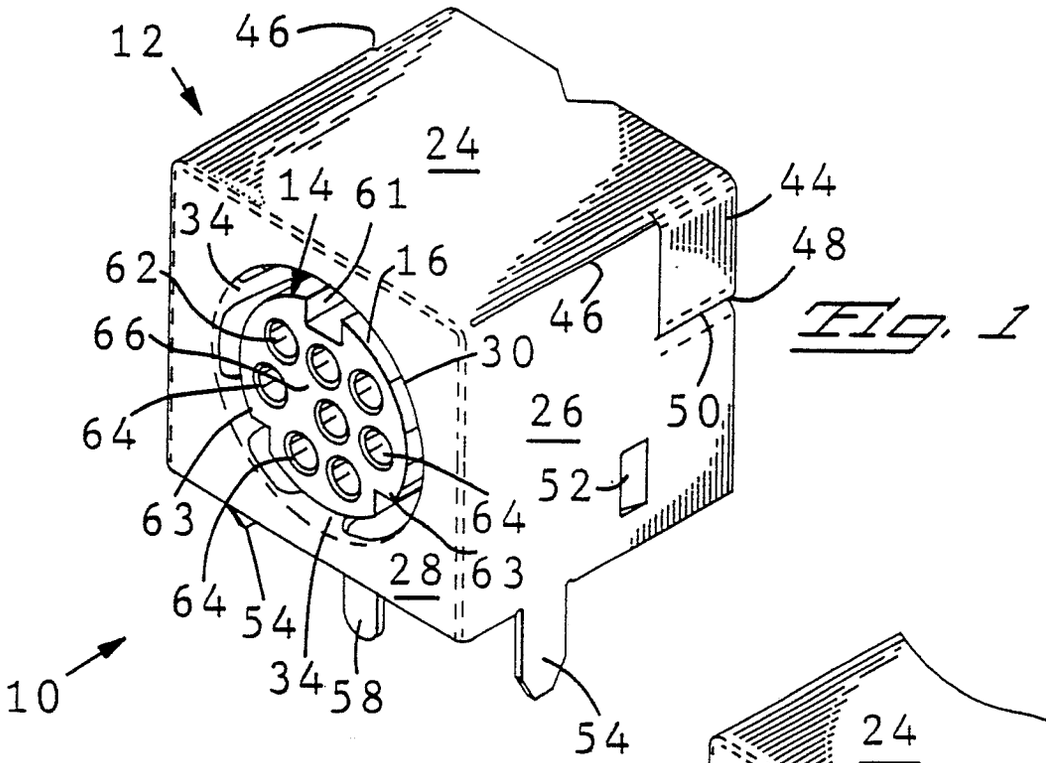


Fig. 1

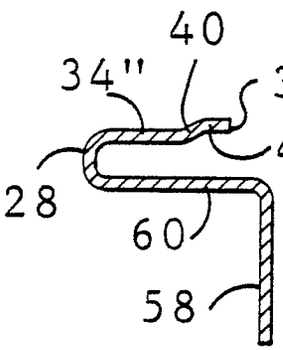
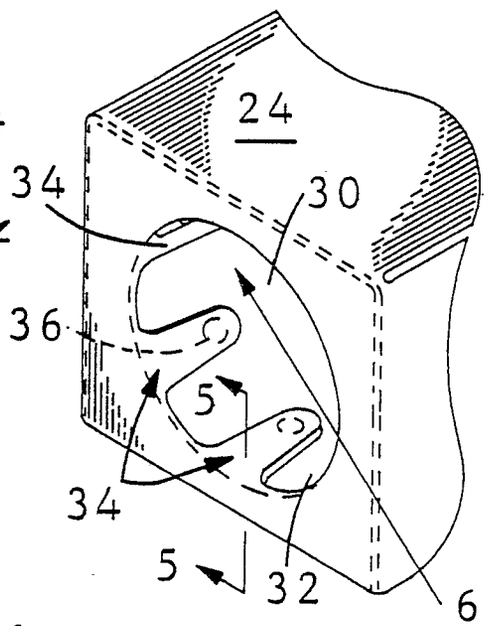


Fig. 5

Fig. 4



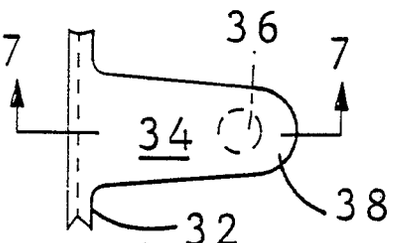


Fig. 6

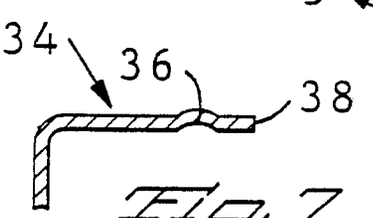


Fig. 7

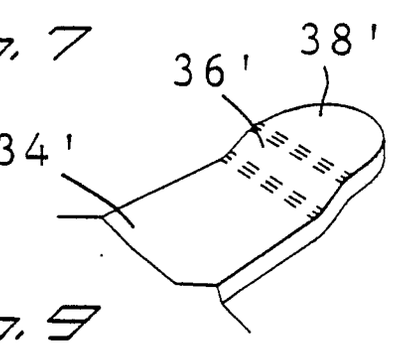


Fig. 9

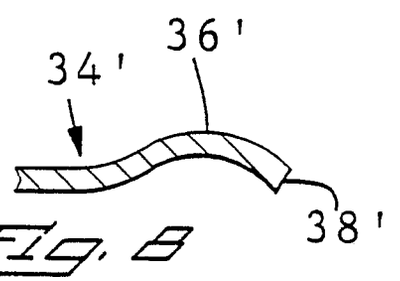


Fig. 8

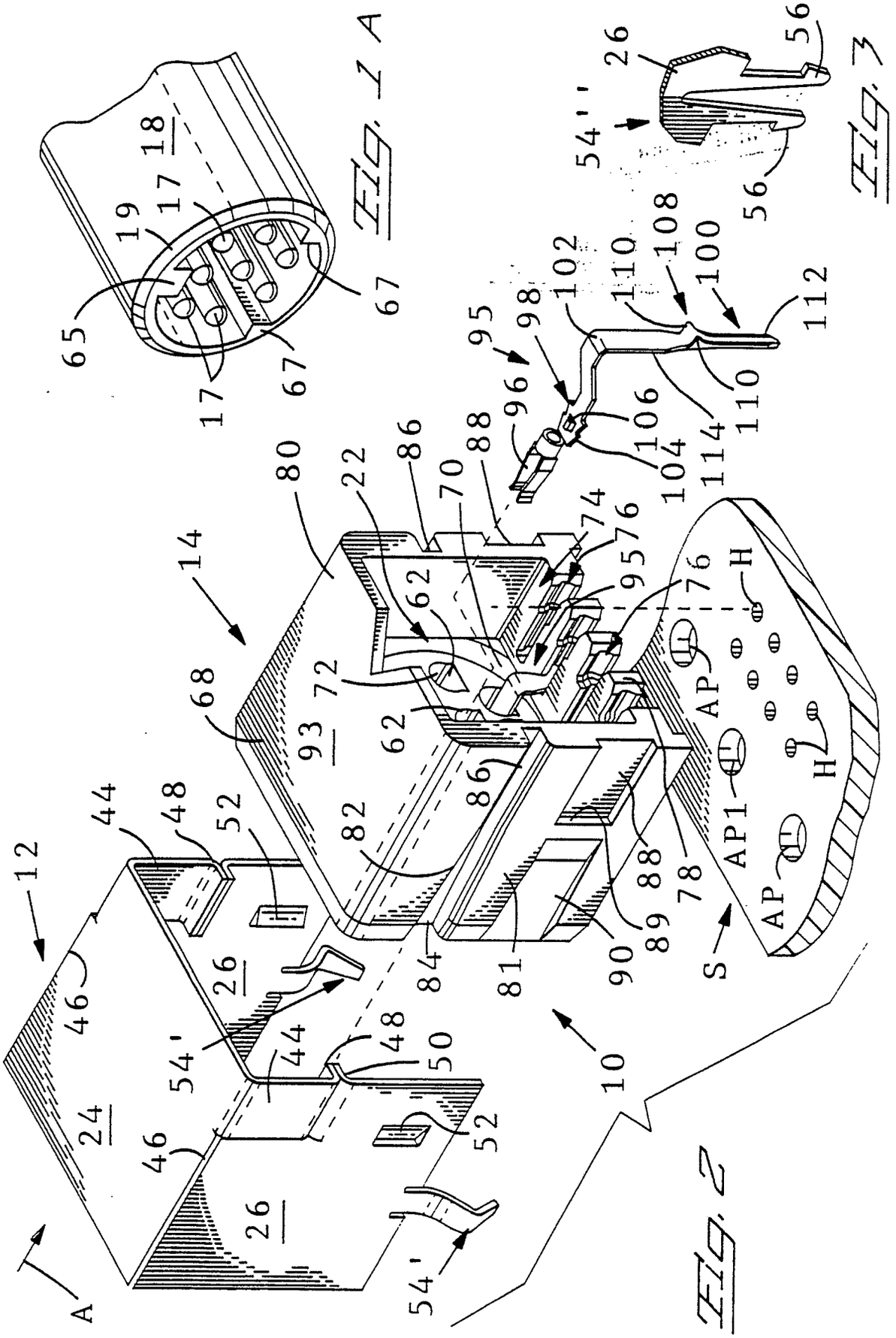


Fig. 2

Fig. 1A

Fig. 3

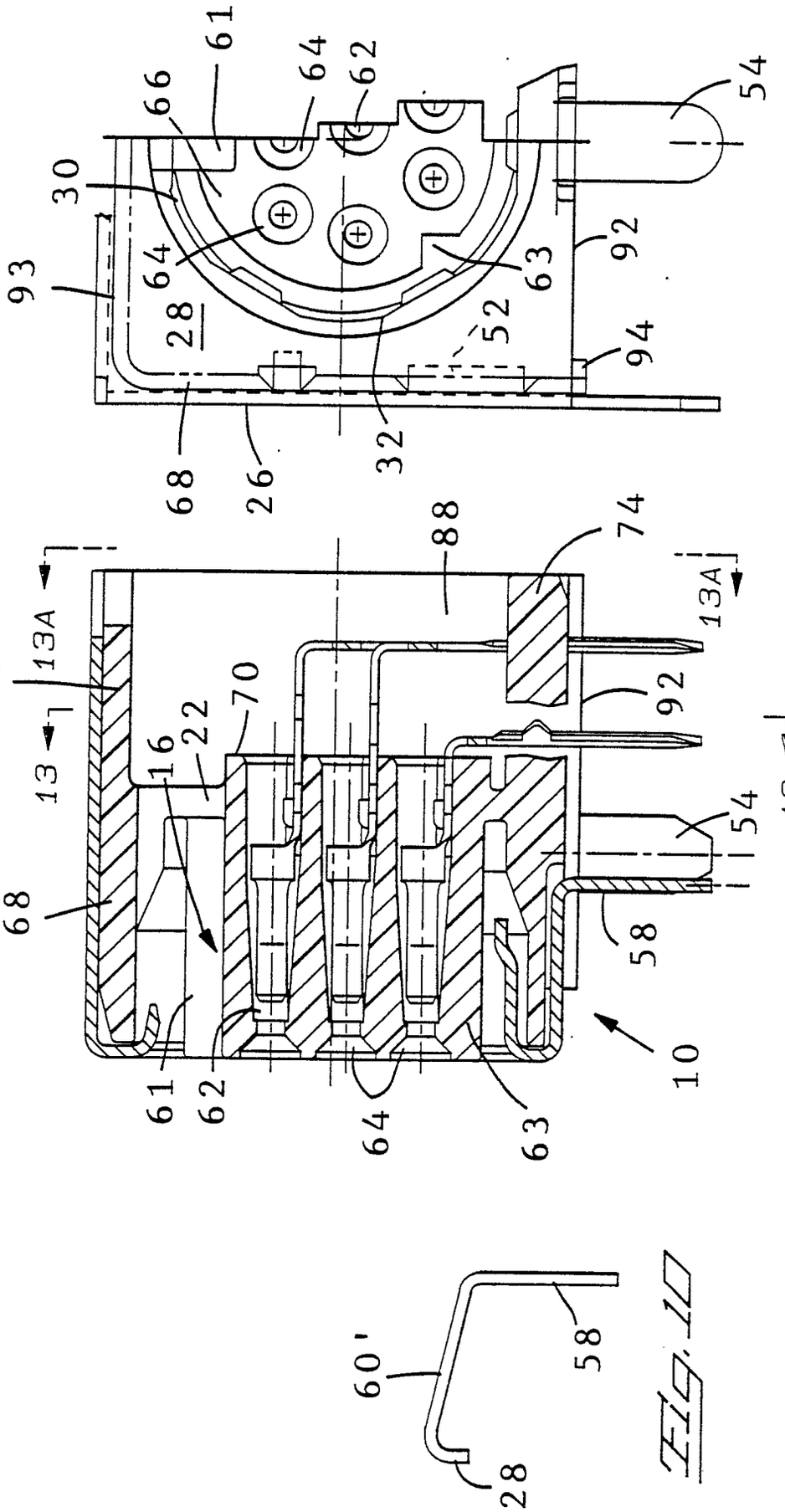


Fig. 12

Fig. 11

Fig. 10

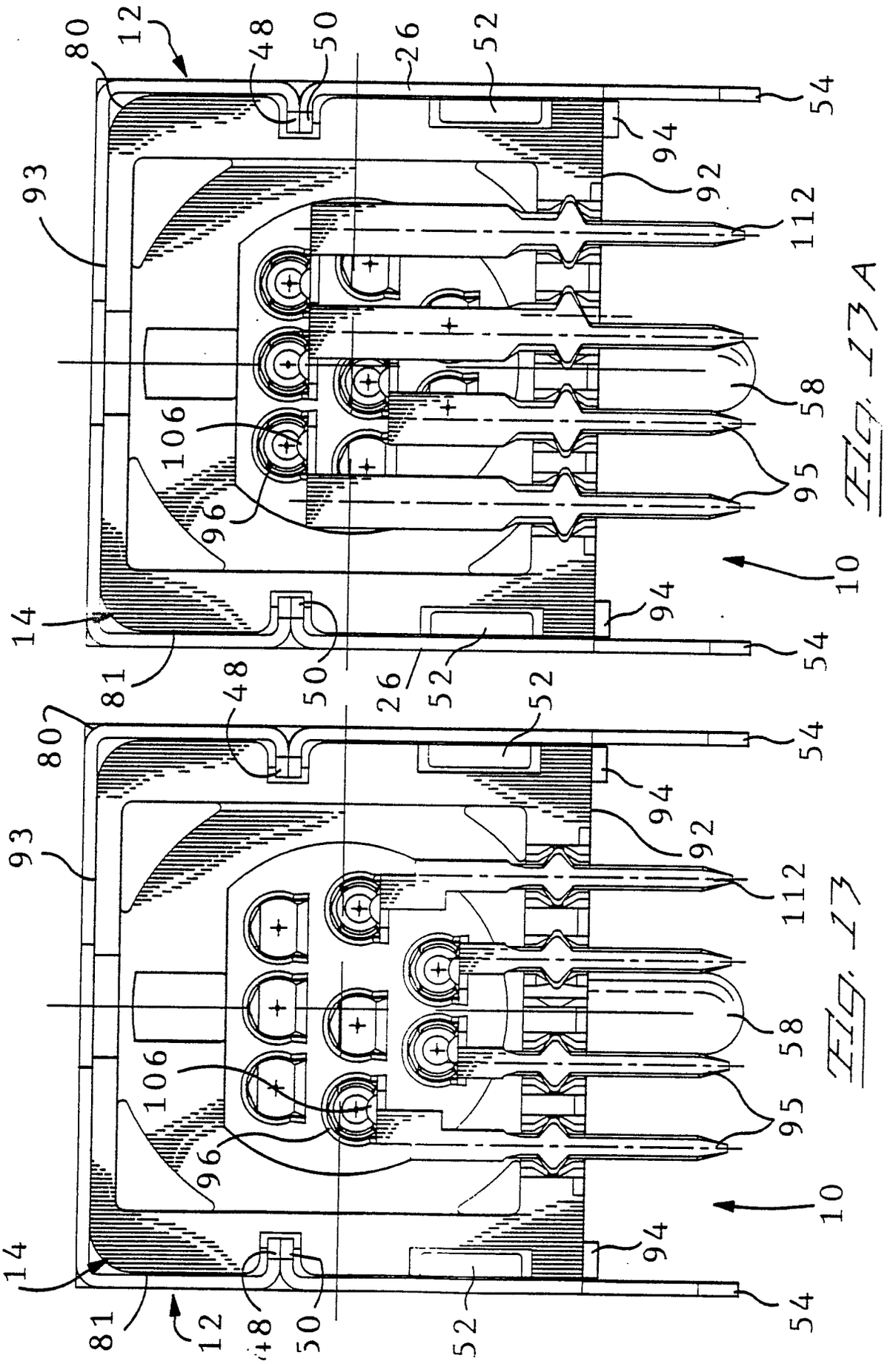


FIG. 13A

FIG. 13

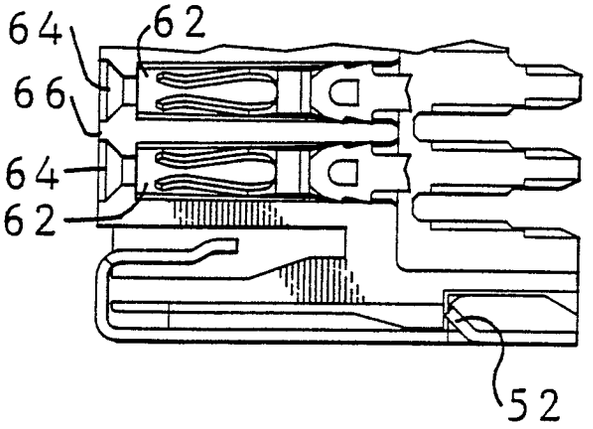


Fig. 14

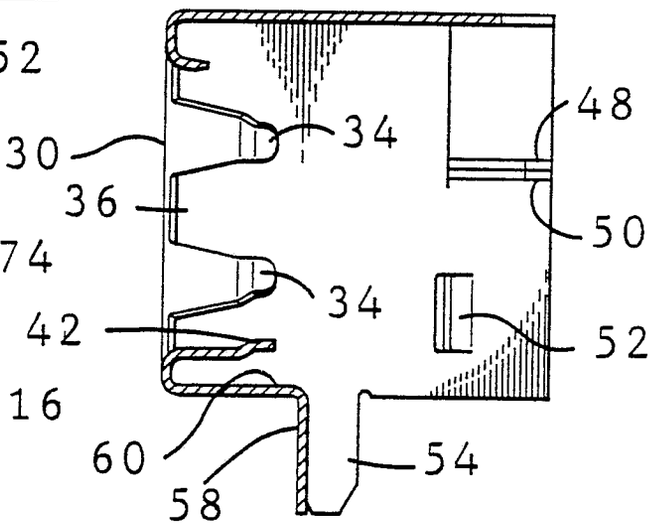


Fig. 15

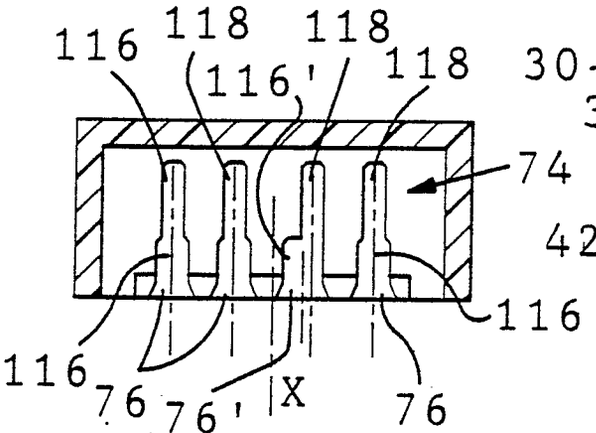


Fig. 26

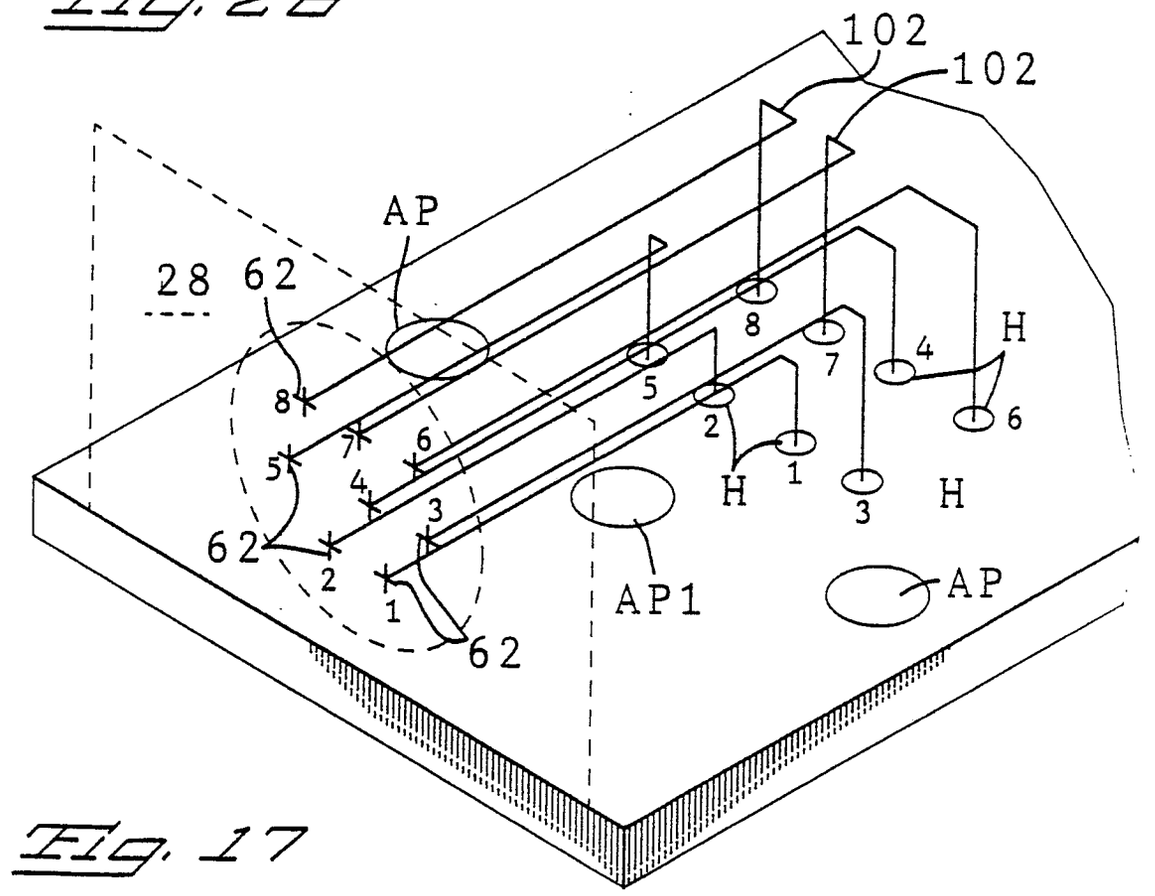


Fig. 17

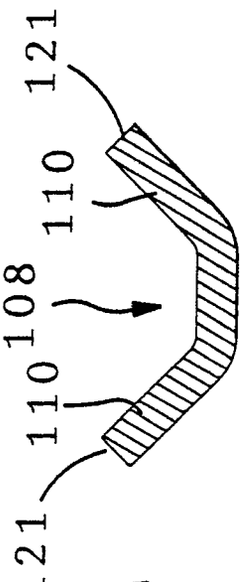


Fig. 15A

Fig. 16

CAVITY LAYOUT								
CAVITY NUMBER	3	4	5a	5b	6	7	8a	8b
HOLE LAYOUT (BOTTOM VIEW)	S1	S1	S1	S1	S1	S1	S1	S1

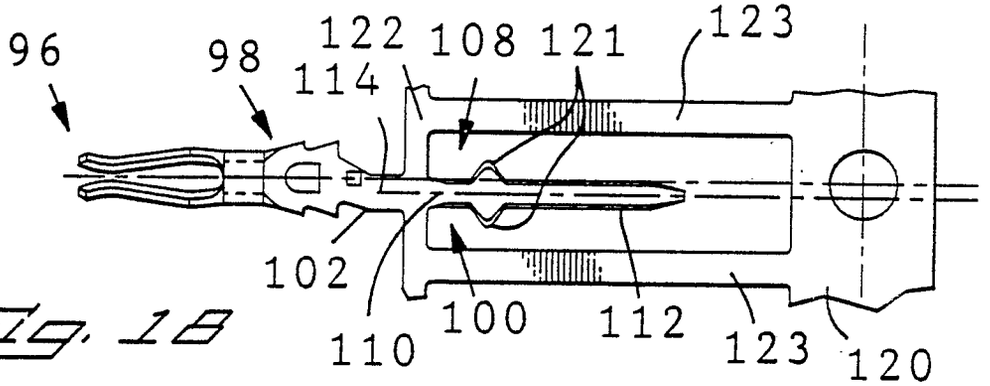


Fig. 18

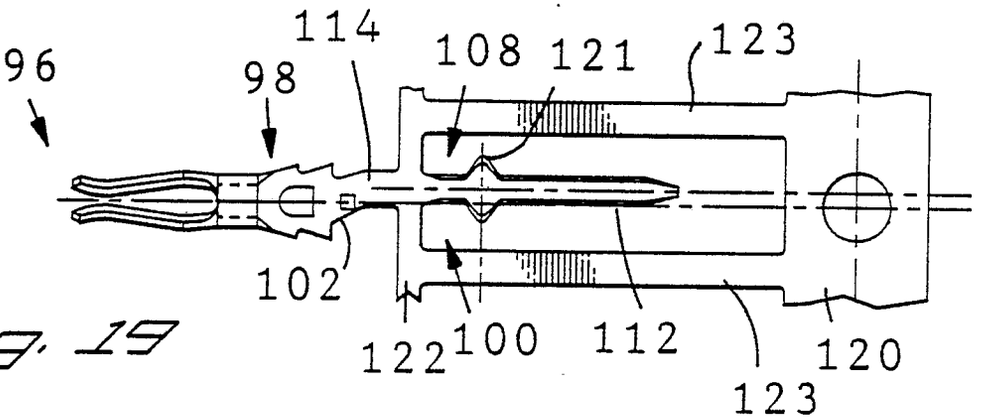


Fig. 19

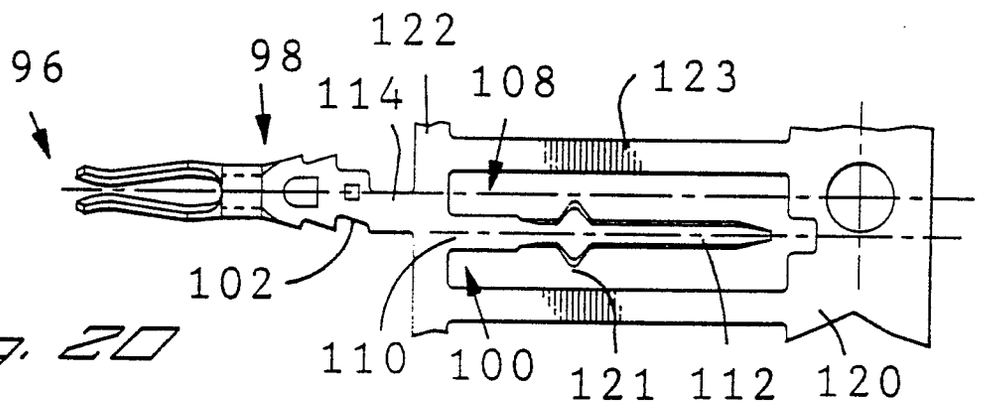


Fig. 20

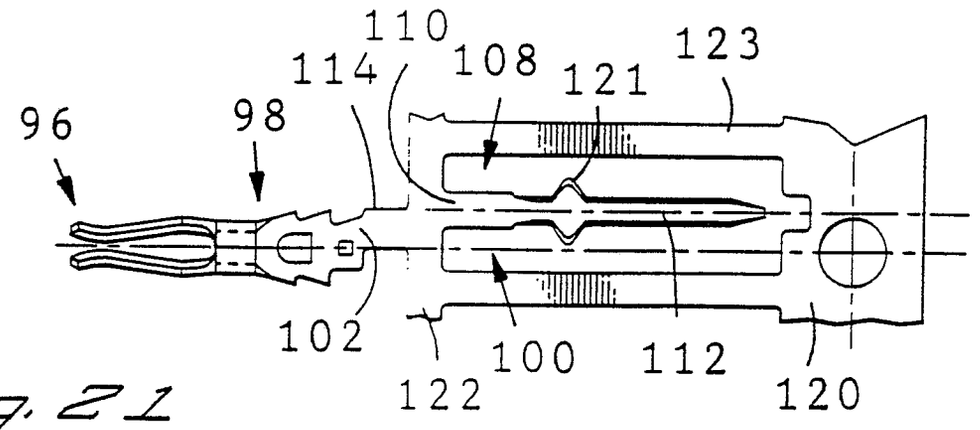


Fig. 21

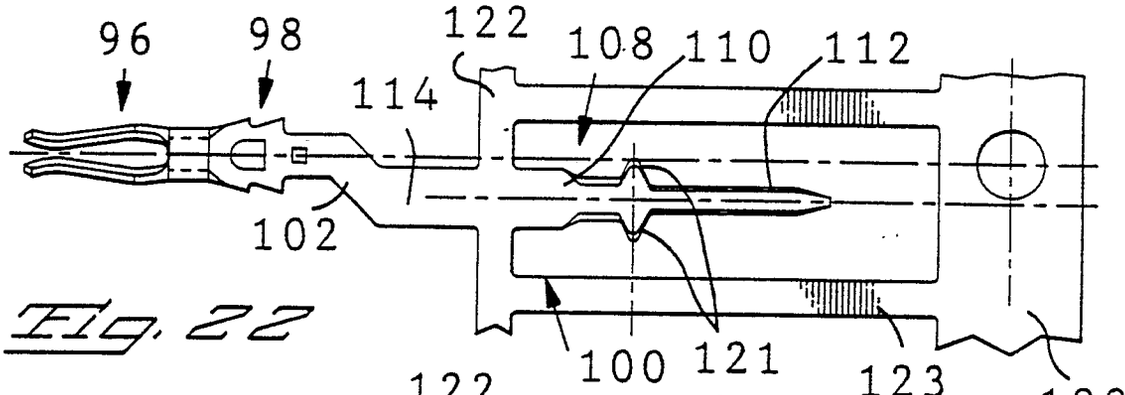


Fig. 22

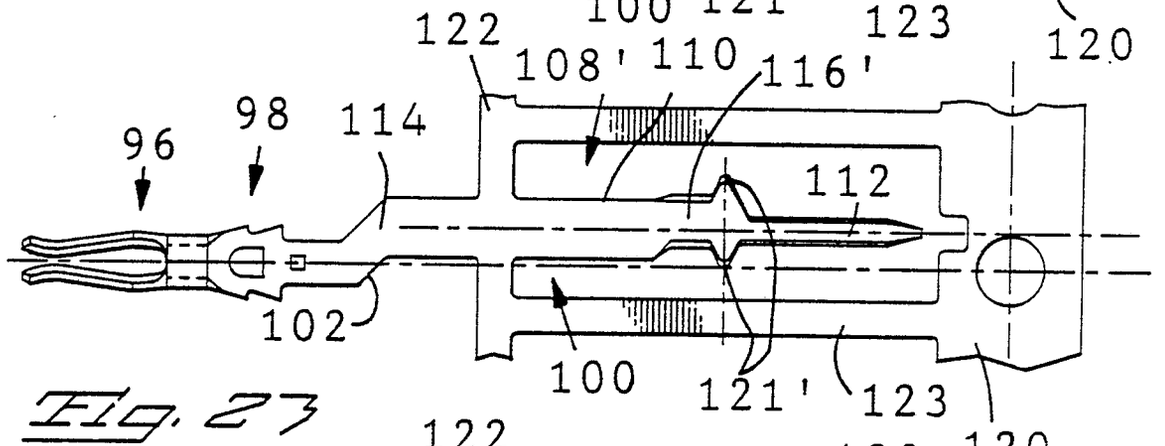


Fig. 23

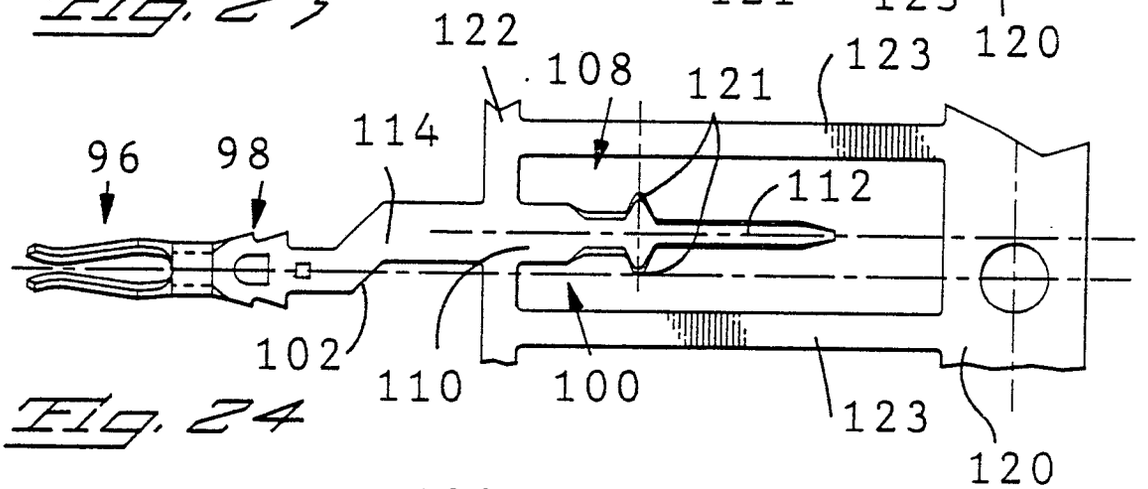


Fig. 24

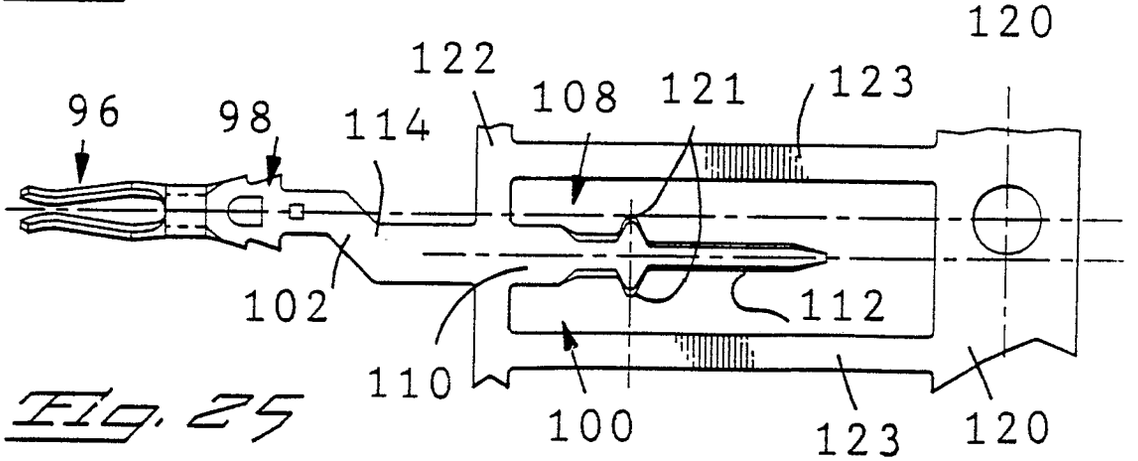


Fig. 25

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 5299

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	EP-A-0228194 (AMP) * page 2, line 22 - line 34; figure 1 * ---	1	H01R23/70
A	US-A-4721473 (AMP) * column 3, line 43 - line 59; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 JULY 1989	CERIBELLA G.

CATEGORY OF CITED DOCUMENTS

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