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(54) One-piece latching shield for a circular din connector.

(57) A one-piece metal shield (12) for a surface mounted connector (10) having a substantially rectangular body (14) from which a plug portion (16) projects forwardly, is in the form of a rectangular box-like structure having a top wall (24) side walls (26) and a front wall (28). The front wall (28) has a circular opening (30) from the edge (32) of which spring fingers (34) project inwardly of the shield (12) for engaging the shielding (19) of a shielded electrical socket inserted through the opening (30) to mate with the plug portion (16). The shield (12) is secured to the body (14) by means of flanges (48 and 50) thereon which engage with a snap action in grooves in the body (14). At least the side walls (26) have mounting legs (54) for securing the shield (12) and thus the body (14) to a substrate. A latching finger (180) shorter than a spring finger (34), projects from edge of opening (30) for latching behind a depressible protuberance (90) on a complementary connector (20). During mating, the protuberance (90) displaces the latching finger (180) which resiles behind protuberance (90) when mating is completed.

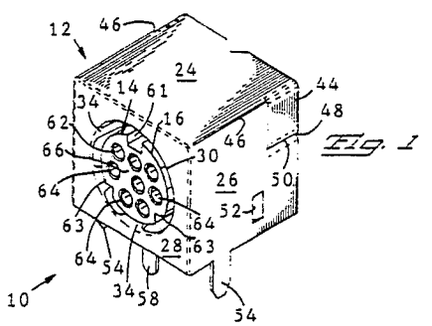

Fig. 1

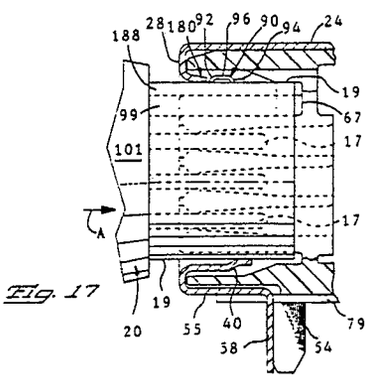

Fig. 17

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ONE-PIECE LATCHING SHIELD FOR A CIRCULAR DIN CONNECTOR

This invention relates to a metal shield for a surface mounted electrical connector having a substantially rectangular cross-section body in which a circular cross-section plug portion projects forwardly for mating with a circular cross-section externally shielded electrical socket, including means for latching.

There is disclosed in US-A-4,637,669 a shielding means for such a surface mounted connector, which is generally known as a "Miniature Circular DIN Type Connector," the shielding means comprising a first shield which encloses the top and sides of the body of the surface mounted connector, and a further, internal shield, which is of circular cross-section and which has a flared mouth for receiving said externally shielded socket. Also, there is disclosed in USA-4,493,525 a shield for a surface mounted connector of the type under discussion, the shield comprising a front plate which is adapted to be secured to the body of the surface mounted connector and which has a central circular socket access opening from the periphery of which project a series of spring fingers for making electrical contact with the shielding of said socket. Additional shielding would be required if the surface mount connector needed to be further shielded.

There is also disclosed in US-A-4,493,525, a first electrical connector having a circular cross-section first mating portion and a second electrical connector having a circular cross-section, shielded, second mating portion for receiving and mating with the first mating portion in a mating direction, the second mating portion having thereon a flexible latch arm provided with a protuberance proximate to its end, the first electrical connector having a latching shoulder provided in the insulating housing thereof, against which the protrusion can latch so as to retain the first and second mating portions in mating relationship. According to US-A-4,493,525, the first mating portion is surrounded by a ring of spring fingers, projecting from a front shield of the first connector for resiliently engaging the shielding of said second mating portion when it is mated with the first mating portion. US-A-4,548,455 discloses means for supporting such a latch arm when the connectors have been mated, so that the protuberance is secured in its latching position against a latching shoulder, said means being actable to release the arm, so that the protuberance can be depressed by the latching shoulder in order to allow the connectors to be unmated.

The present invention is intended to provide a one-piece shield for a miniature circular DIN connector or the like, which can readily be assembled thereto and which is capable for shielding the connector on substantially the entirety of at least four surfaces of the connector housing, as well as serving to make electrical contact with the shielding of the externally shielded socket when it is mated with the surface mounted connector. The one-piece shield further provides a latching function to latchingly secure a mated complementary connector.

According to the present invention, the shield comprises a rectangular, box-like structure comprising a top wall for enclosing substantially the entirety of the top wall of the housing, a pair of side walls each adjacent to the top wall for enclosing substantially the entirety of side walls of the housing, and a front wall adjacent to the top wall and the side walls. The front wall has a circular through opening therein for receiving the externally shielded socket. A series of resilient cantilever fingers are spaced from each other around the circular opening, projecting from its edge inwardly of the shield, for engaging the external shielding of the socket. The shield has means, for example, flanges, for engaging in grooves in the body of the surface mounted connector with a snap action, for anchoring the shield thereto. The shield also has means, for example, mounting legs projecting from the side walls and from the front wall, for reception in apertures in a substrate upon which the surface mount connector is to be mounted.

The resilient cantilever fingers preferably have adjacent to, or at, their free ends, a radially inward offset or embossments projecting from the fingers in the radially inwardly direction of the circular opening in the front wall, for limiting deflection, and thus over-stressing, of the fingers by the socket, when its shielding is engaged thereby. A latching finger which is substantially shorter than the resilient fingers and behind which the protuberance of a complementary connector latches when the connectors are mated. A latching finger may very simply be provided, by forming the front wall with spring fingers and then severing one of the spring fingers to provide the latching finger.

The means for anchoring the shield to the body may comprise a pair of tabs each depending from a respective lateral edge of the top wall, at a position remote from the front wall and each terminating in a flange for engaging in said grooves in the said body of the surface mounted connector. Further flanges may be bent inwardly from the side walls so as to lie in parallel contiguous relationship with the flanges first mentioned, for engagement therewith, in said grooves, more securely to anchor the shield to the said body.

In addition to, or instead of, said flanges, the anchoring means may comprise a pair of resilient detents each projecting obliquely from one of the side walls of the shield in the general direction of the other side wall, for snap engagement in a notch in a lateral wall of said body.

The shield may be secured to the substrate by means of mounting feet projecting from the side walls of the shield and being formed as claws bowed outwardly of the shield, for resilient engagement with the edges of the openings in the substrate.

Each mounting foot may, however, be bifurcated so as to comprise two portions, each portion terminating in a barb for engaging the underside of the substrate when the surface mounted connector with the shield thereon has been mounted on the substrate.

The invention also includes the shield and the surface mounted connector when in the combination.

The grooves for receiving the said flanges, which are preferably formed in opposite side walls of the body may extend from the forward end to the rear end thereof, being deeper proximate to said rear end so that the flanges engage in deepened portions of the grooves with a snap action as the shield is fully assembled to the surface mounted connector.

An embodiment of the invention will now be described by way of example with reference 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 16 is a top plan view, drawn to a reduced scale, of a shielded second electrical connector for mating with the connector shown in Figure 1; and

FIGURE 17 is a diagrammatic view taken on the lines 17-17 of Figure 4, illustrating the second connector when it has been mated with the connector shown in Figure 1.

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 4 spaced back from its free end 38″ to provide a raised shoulder 42 for engaging the shield 19.

The shield 12 of first electrical connector 10 is provided with in-turned flanges 48 and 50 and with detents 52 which anchor it to the body 14. There depend from the side walls 26, mounting feet 54 and from an extension 55 of the front wall 28, mounting feet 58, the feet 54 and 58 being for securing the shield 12, and thus the body 14, to the said substrate. The plug portion 16 is formed with terminal receiving parallel cavities 62 which extend therethrough and also through the central portion 22 of the body 14 and open into a mating face 66 of the plug portion 16 and into a terminal receiving face 70 of the portion 22. The 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 therewith. The plug portion 16 has an axial keyway 65 for slidably receiving a complementary key 67 in the socket 18. Each cavity 62 has secured therein an electrical receptacle 172 for receiving a respective one of the pins 17 of the socket 18. The body 14 has a bottom, mounting face 73 with stand-off lugs 79 for mounting on said substrate.

As shown in Figures 11 and 17, there projects inwardly and rearwardly of, the front wall 28 of the shield 12, a rudimentary latching finger 180, connected to the front wall 28 by way of a smoothly arcuate part 181 presenting a camming surface 183 bowed generally forwardly of the shield 12. The finger 180 projects slightly obliquely, towards the plug portion 16 and is substantially shorter than the fingers 34, being positioned between two of the fingers 34, and evenly spaced therefrom. The finger 180, which is of constant rectangular cross-section, has a flat surface 182 facing towards the plug portion 16 and terminates in a flat free end 184 which is perpendicular to the surface 182. The finger 180 is positioned diametrically opposite to the finger 34 shown in Figure 17 at the bottom of the front wall 28 and which is therefore proximate to the mounting face 73. The shield 12 was initially formed with integral fingers 34 from the portion of surface 28 that otherwise would enclose opening 30 only, the top finger 34 then being severed, back from its joggle 40 to provide the latching finger 180.

The second connector 20, as seen in Figures 16 and 17 comprises an insulating body 186 within which the shield 19 extends from the socket 18 and which receives an electrical cable C, individual leads of which (not shown) are connected to respective connecting portions (not shown) of the pins 17. There extends from the body 186 into the socket 18, a resiliently flexible cantilever latch arm 188 having thereon proximate to its free end, a protuberance 90, projecting through an opening 91 in the shield 19 so that it is upstanding thereabove. The protuberance 90 has a first arcuate surface 92 facing rearwardly of the socket 18 and a second arcuate surface 94 facing forwardly thereof, the surfaces 92 and 94 adjoining a flat summit 96 of the protuberance 90. There is slidably mounted below the arm 188, a stiffly resilient support bar 98, which is connected to a slide (not shown) loaded by a spring (not shown) in the body 186 and which is in turn connected to a sleeve 101 slidably mounted on the body 186. The slide and thus the support bar 98 are normally urged towards an advanced supporting position beneath the arm 188, by the loading spring and can be retracted by pulling the sleeve 101 rearwardly of the body 186, to allow the arm 188 to flex freely downwardly into the socket 18, as disclosed in detail in US-A-4,548,455, which is incorporated herein by reference.

In order to mate the first and second connectors, 10 and 20, respectively, the socket 18 is inserted through the circular opening 30 in the shield 12 so that the key 67 engages in the keyway 65, in a mating direction indicated by the arrow A in Figure 17, whereby each pin 17 enters a respective cavity 62 so as to be engaged in the respective receptacle 172 in the cavity 62. The slide and thus the sleeve 101 are, prior to the mating operation, in said advanced position whereby the support bar 98 extends beneath the arm 188. Since the arm 188 has some flexibility, the socket 18 is permitted to advance into mating relationship with the plug portion 16 because the protuberance 90 is depressed by engagement of its surface 94 with the camming surface 183 of the rudimentary finger 180, against the resilient action of the support bar 98, the finger 180 being raised from the oblique position in which it is shown in Figures 11 and 16, onto the flat summit 96 of the protuberance 90. When the protuberance 90 has passed the free end 184 of the finger 180, the protuberance 90 resiles so as to latch there behind as shown in Figure 17. The connectors 10 and 20 are accordingly firmly retained in mating relationship, because the arm 188, being supported by the support bar 98, cannot be depressed by the finger 180 simply by pulling

on the cable C. When the connectors 10 and 20 are to be unmated, the sleeve 101 is pulled rearwardly thereby to retract the support bar 98 from beneath the arm 188, leaving the arm 188 free to flex inwardly of the socket 18. Thus as the connector 20 is pulled away from the connector 20, by pulling on the sleeve 101 and, the protuberance 90 guided by its surface 92, slips under the finger 180, the summit 96 of the protuberance 90 slides on the surface 182 of the finger 180 until the protuberance 90 passes the surface 92. The connectors 10 and 20 cannot be unmated by pulling on the cable C, as the sleeve 101 will not thereby be retracted.

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 Figures 13 or 13A, skive side walls 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 190 opening into the forward edge of hood 68. The body 14 has a bottom mounting face 192 opposite to its top wall 193, provided with stand offs 194 as shown in Figures 11 to 13, the face 192 being parallel to the plate 74.

Electrical terminals 195 each for reception in a respective cavity 62 each comprise a forward, mating part in the form of a receptacle 196, an intermediate insertion and retention part 198 connected to the rear end of receptacle 196 and a terminal leg 100 connected to the rear end of the part 198 by way of an arm 102, the leg 100 extending at right angles to the remainder of the terminal 195. The receptacle 196 is formed in accordance with US Patent 4,776,651, and the insertion and retention part 198 which comprises a laterally barbed retention plate 104 and an insertion hump 106 is formed in accordance with US Patent 4,775,336, 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 198. A rear view of the terminals 195 in body 14 is shown in Figures 13 and 13A.

In order to assemble the shield 12 to the connector body 14, the terminals 195 having been inserted into the cavities 62 with the forward ends of the receptacles 196 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 74 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 190, 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 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.

Claims

1. A shielded electrical connector (10), having an insulative, substantially rectangular cross-section housing (14) having an annular recess within which projects forward a circular cross-section plug portion (16) for mating with a circular cross-section, externally shielded electrical socket (18), said housing (14) having a top wall (193), side walls and a front wall, a one piece metal shield (12) for shielding portions of said connector housing, said shield (12) having a front wall (28) having a substantially circular through opening (30) therein for receiving said socket (18), said shield (12) characterized by having a top wall (24) for enclosing substantially the entirety of a top wall (193) of said housing (14), a pair of shield side walls (26) each adjacent to the shield top wall (24), for enclosing substantially the entirety of side walls of said housing (14), and a shield front wall (28) adjacent to the shield top wall (24) and the shield side walls (26), whereby shielding is provided over substantially the entire connector housing (14).

2. A shielded electrical connector (10) as recited in claim 1, wherein said opening (30) defines an edge (32), further characterized by a plurality of resilient, cantilever fingers (34) spaced from each other around said opening (30) and projecting from said edge (32) into said shield (12) for resiliently engaging the external shielding of said socket (18) when received therein.

3. A shielded electrical connector (10) as recited in claim 1, further characterized by means (44,48,52) on said shield (12) for securing said shield (12) to said housing (14).

4. A shielded electrical connector (10) as recited in claim 1, further characterized in that said side walls (26) depend from opposite lateral edges (46) of said top wall (24).

5. A shielded electrical connector (10) as recited in claim 1, further characterized in that said side walls (26) depend from opposite lateral edges of said front wall (28).

6. A shielded electrical connector (10) as recited in claim 1, further characterized by means (54;54′;54″;58) depending from said shield (12) for securing said shield to a substrate (S).

7. A shielded electrical connector (10) as recited in claim 6, wherein said securing means is further characterized by a mounting foot (58) extending from a rudimentary bottom wall of said shield (12), which projects from said shield front wall (28) normally thereof.

8. A shielded electrical connector (10) as recited in claim 1, further characterized in that the externally shielded electrical socket (18) has a resiliently depressible protrusion (90), one of the fingers (34) being a latching finger (180) that projects inwardly of the circular opening (30) to depress said protrusion (90) as said socket is mated with said shielded electrical connector (10), said latching finger being such that said protrusion (90) resiles when the mating portions of the socket (18) and the shielded electrical connector (10) have

been mated to assume a latching position and secure the socket and connector in a mated position.

9. A shielded electrical connector (10) as recited in claim 8, further characterized in that the latching finger (180) has a free end (184), such that the protrusion (90) resiles behind the free end (184) of latching finger (180) when the socket (18) and shielded electrical connector (10) have been mated to assume a latching position.

10. A shielded electrical connector (10) as recited in claim 8, further characterized in that the latching finger (180) is connected to the shield (12) by a smoothly arcuate portion (183) for camming engagement with said protrusion (90).

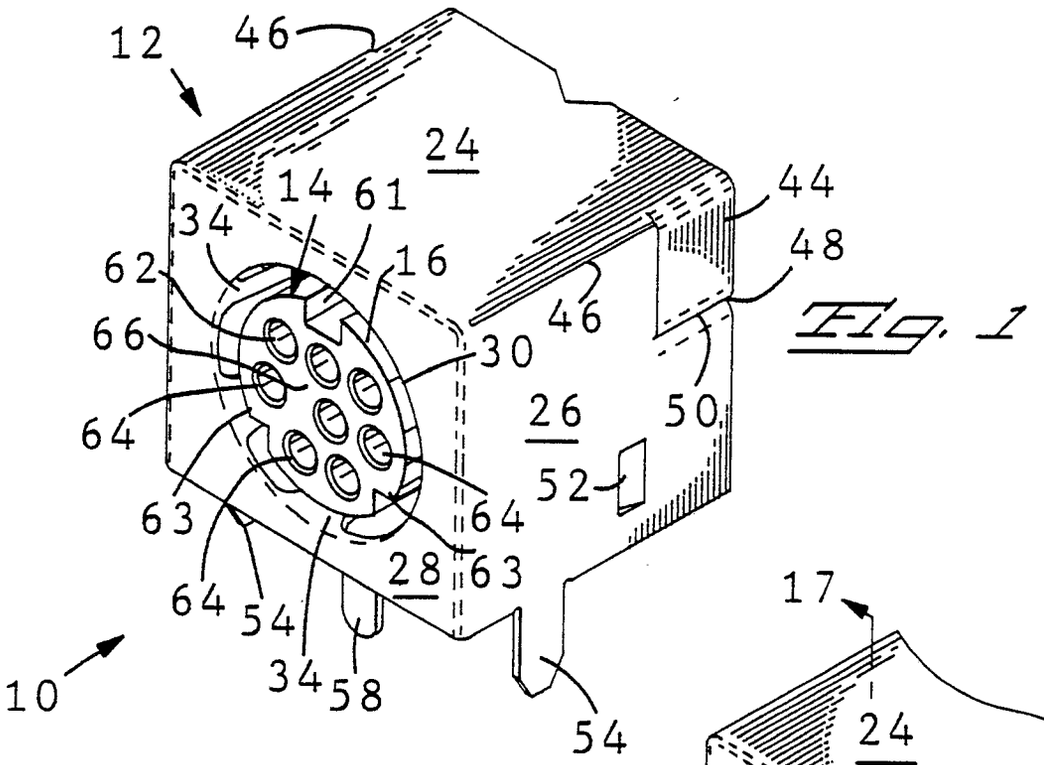

Fig. 1

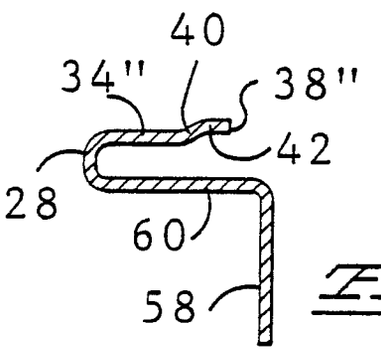

Fig. 5

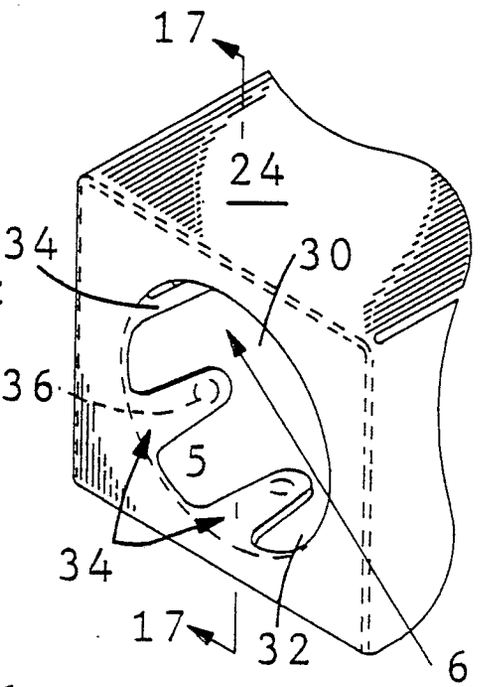

Fig. 4

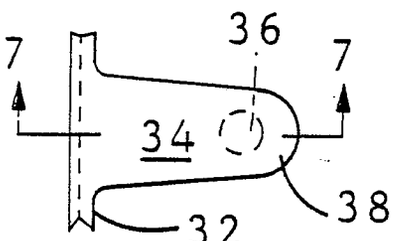

Fig. 6

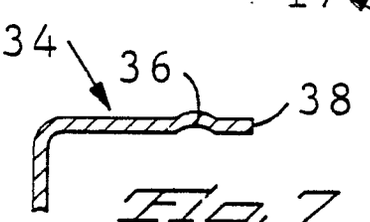

Fig. 7

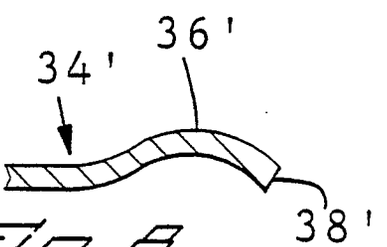

Fig. 8

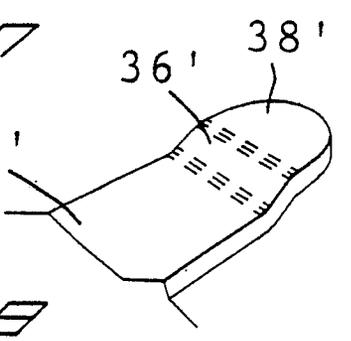

Fig. 9

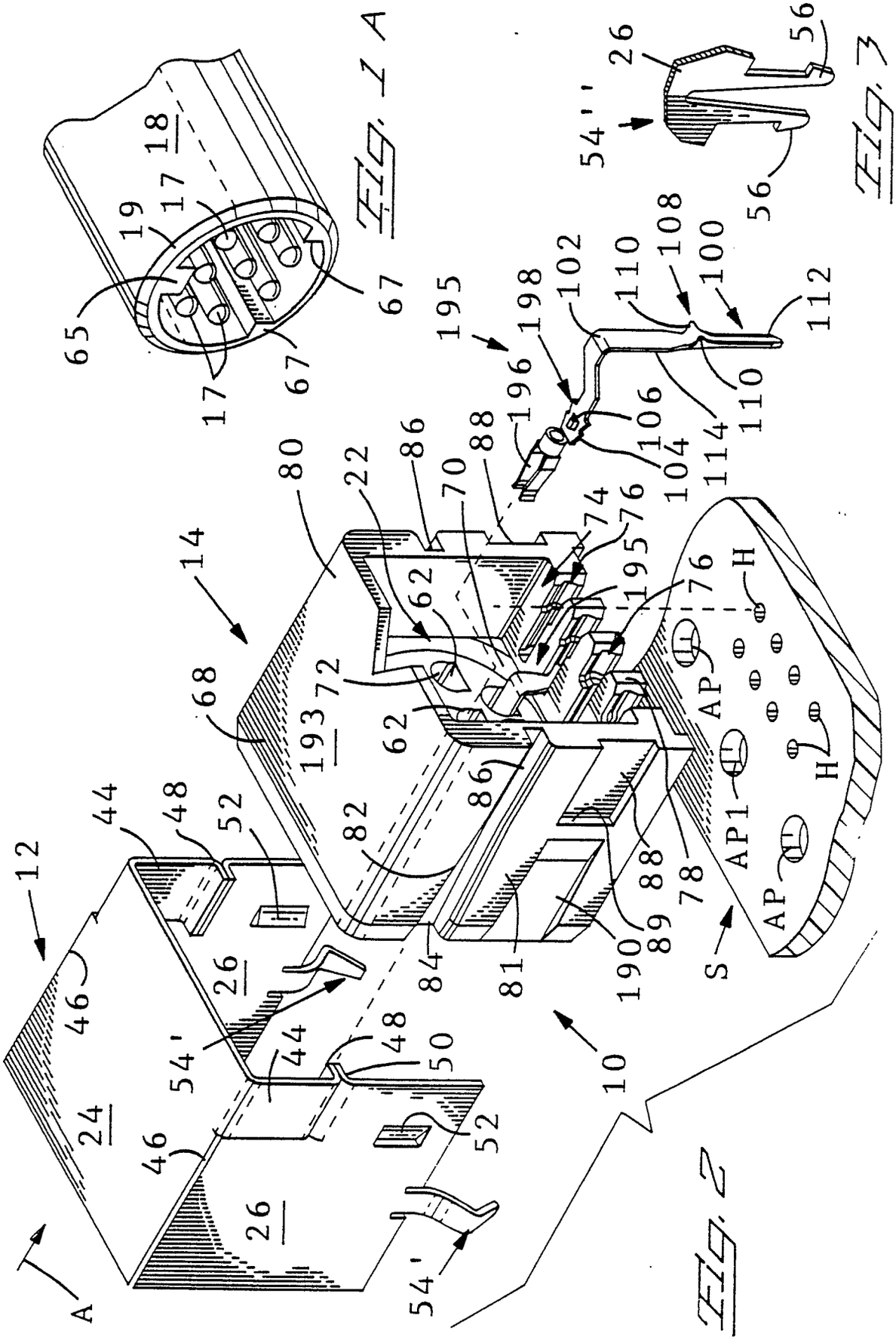

Fig. 2

Fig. 1A

Fig. 3

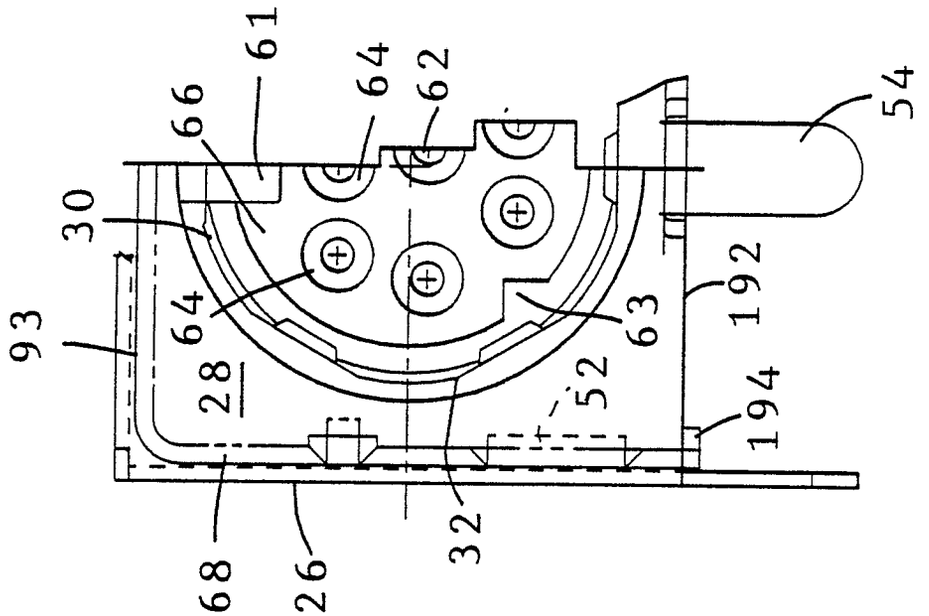
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Fig. 12

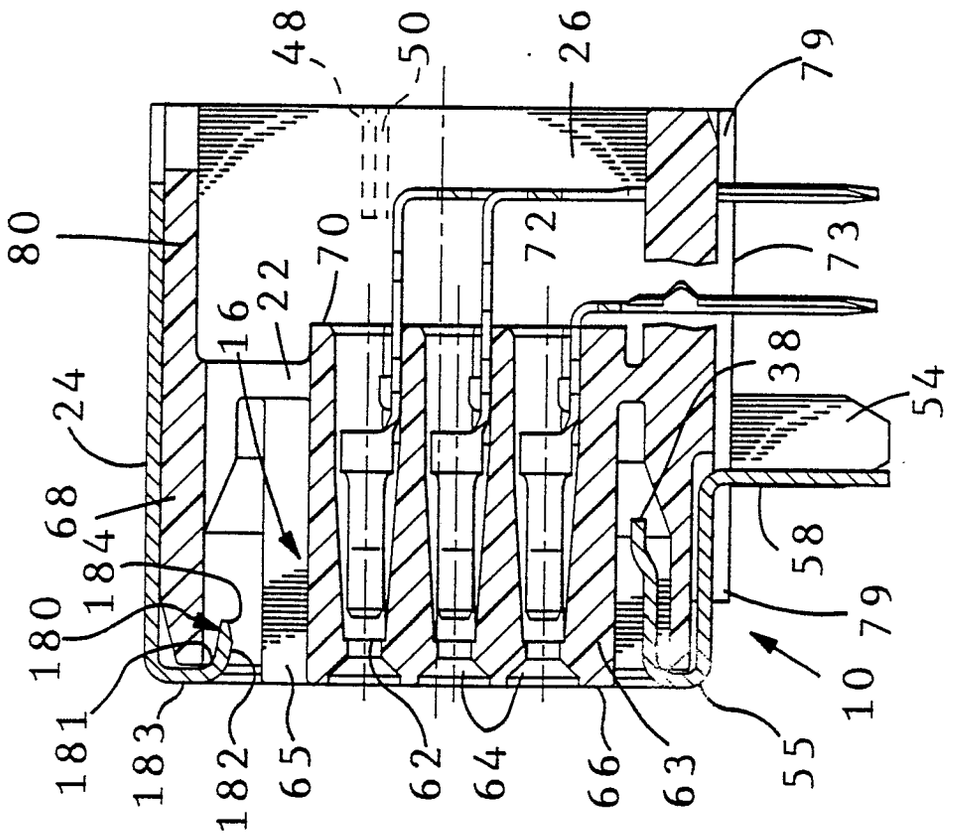
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Fig. 11

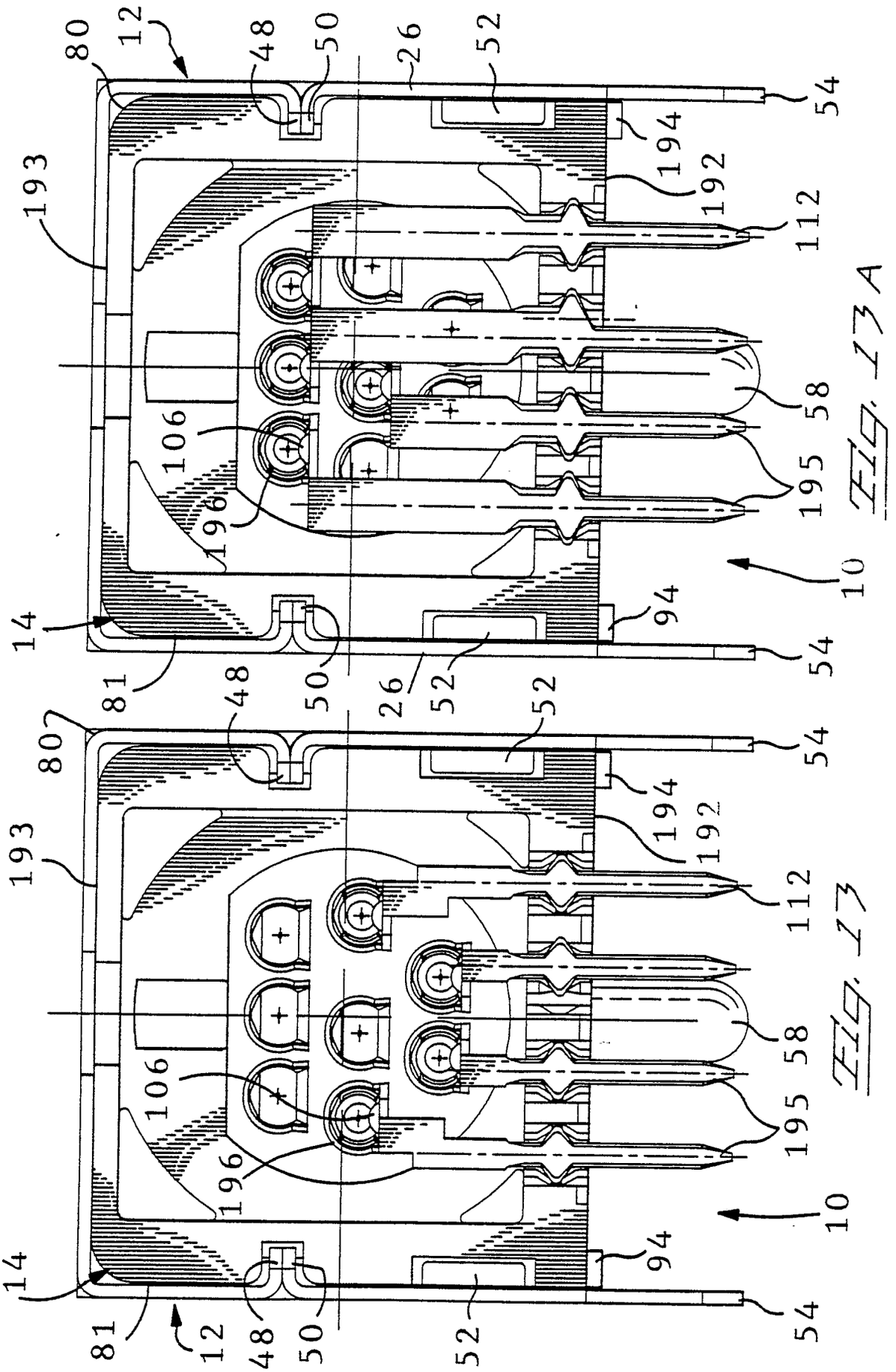

FIG. 13A

FIG. 13

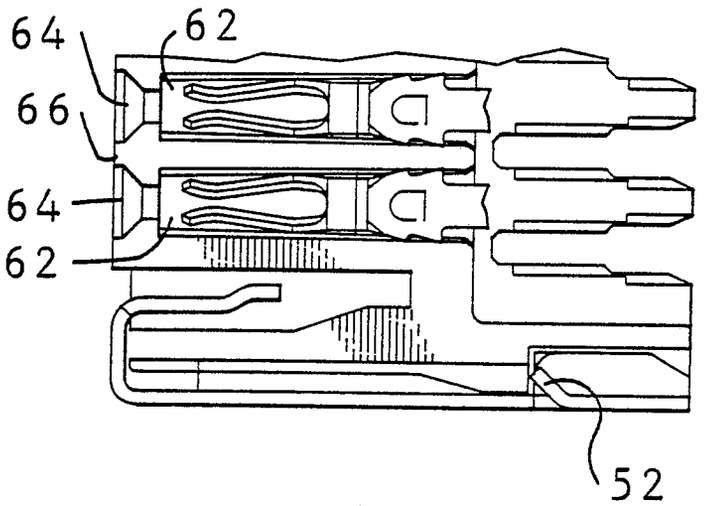

Fig. 14

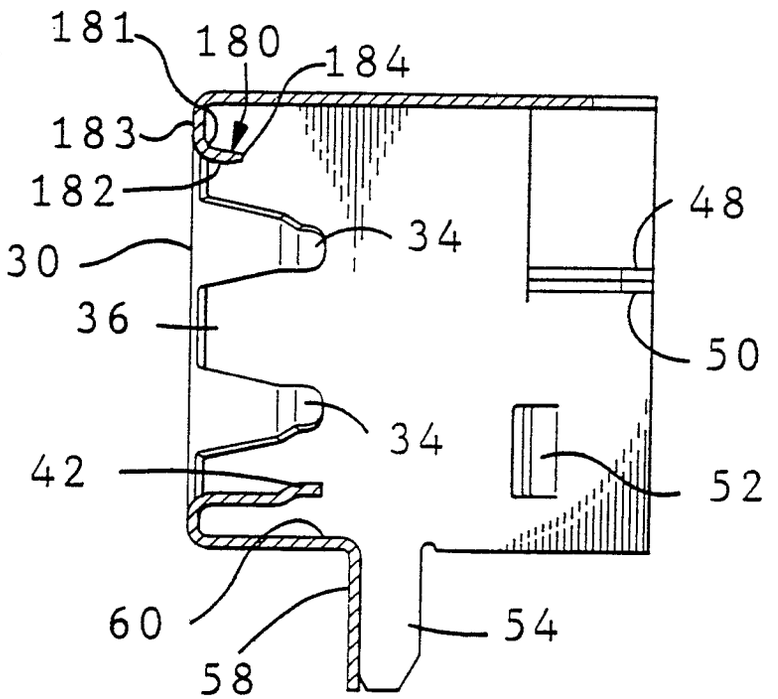

Fig. 15

Fig. 10

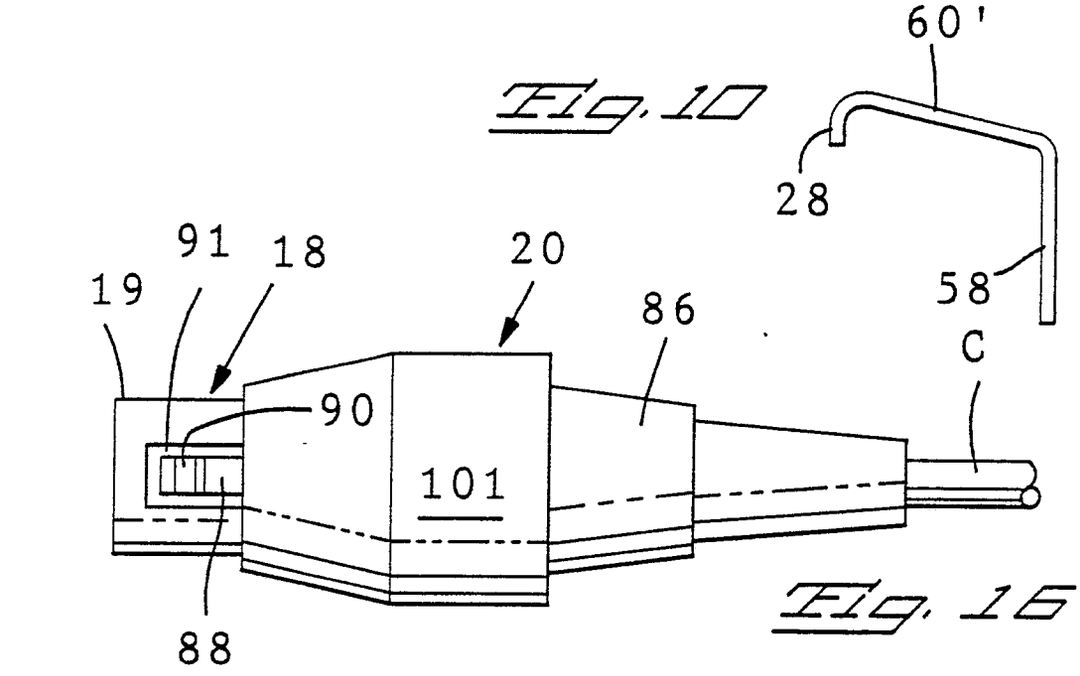

Fig. 16

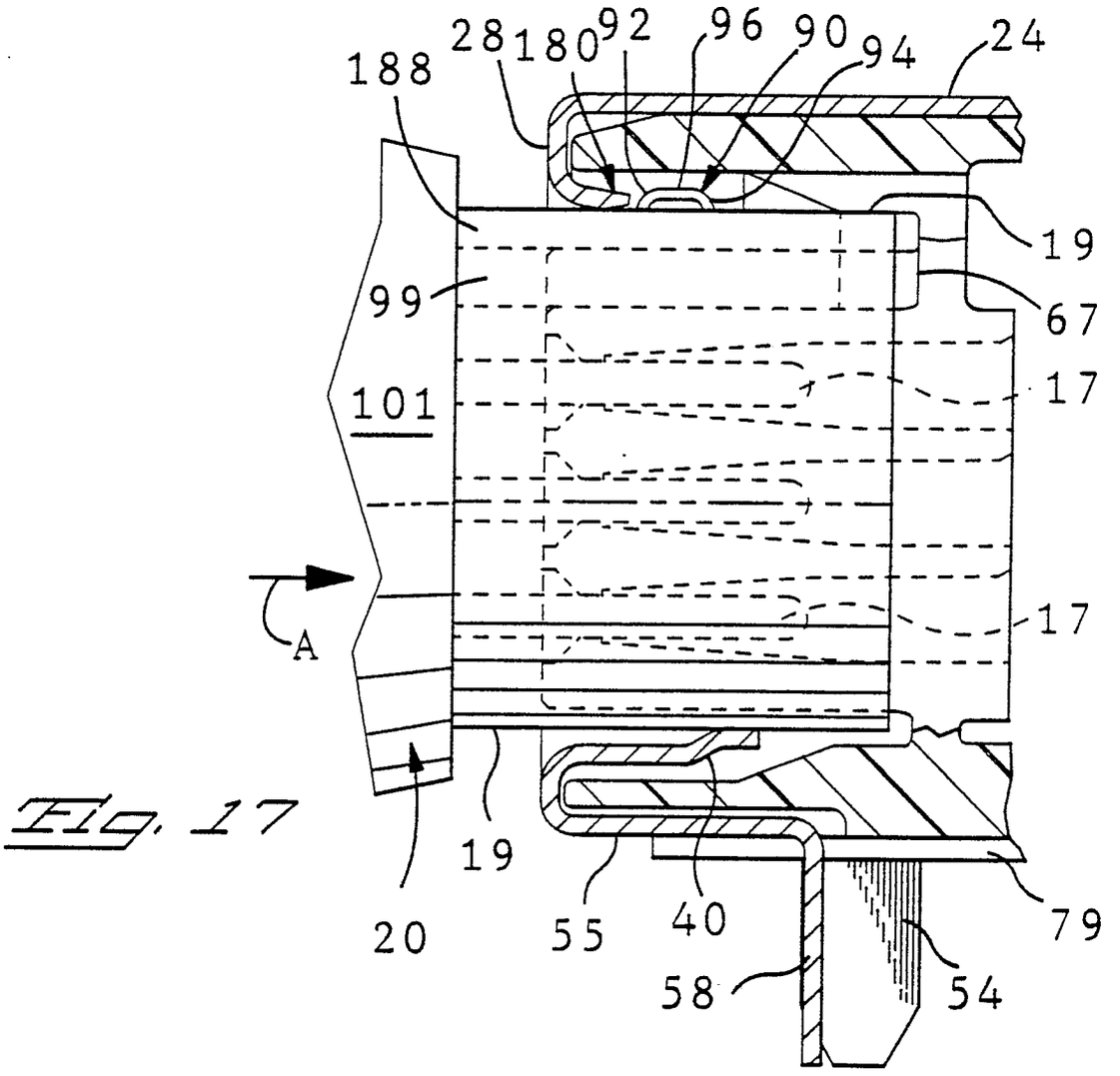

Fig. 17

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 5297

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)
D,A	US-A-4637669 (HOSIDEN) * column 3, line 45 - line 58; figures 4, 14 *	1	H01R13/658
A	US-A-4623211 (MOLEX) * column 4, line 13 - line 26; 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	26 JULY 1989	CERIBELLA G.

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

& : member of the same patent family, corresponding document

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