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(54) **Power supply structure having sockets located on two opposite faces.**

(57) A power supply system (10) is disclosed in which Schuko sockets (18.1, 18.2, 18.3, 18.4, 18.5, 18.6) are mounted in back-to-back pairs with units between them which provide receptacles (92) for the pins of Schuko plugs. Each unit comprises a moulding (32) of synthetic plastics material which is in the form of a loop with a crossbar (42) dividing the area within the loop into two spaces. Pairs of electrical receptacles are provided in these spaces, one pair of receptacles being neutral and the other being live. The sockets are offset with respect to one another so that the pins of a Schuko plug inserted into one socket of a back-to-back pair enter one neutral and one live receptacle, and the pins of a second Schuko plug being inserted into the other of the back-to-back sockets enters the other neutral receptacle and the other live receptacle.

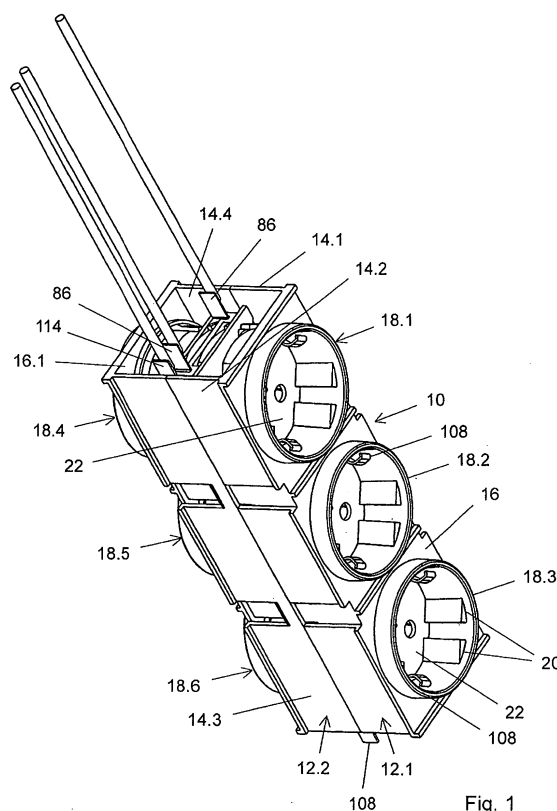


Fig. 1

DescriptionFIELD OF THE INVENTION

5 **[0001]** THIS INVENTION relates to a power supply structure having sockets into which plugs can be inserted.

BACKGROUND TO THE INVENTION

10 **[0002]** For use in places such as laboratories and kitchens, power supply units which are mounted in an opening provided in a working surface have been commercially exploited. An example of such a unit is found in the PCT specification W02006/34513.

[0003] The movable centre column of such a unit has a raised, operative position in which the sockets are accessible above the working surface and a stored inoperative position in which all but a top cap of the column is below the working surface.

15 **[0004]** The type of socket used in Germany is referred to as a Schuko socket. It comprises a cylinder which is closed at one end by a transverse wall. Guides in the form of ribs and grooves extend axially of the cylinder and the transverse wall has two holes in it. A Schuko plug is in the form of a short cylinder with external ribs and grooves that match those of the socket. The plugs can consequently be inserted into the sockets in only predetermined orientations. Two metal pins protrude from one end of the plug cylinder and these pass through the holes in the transverse end wall of the socket.

20 **[0005]** All the electrical connections of the Schuko socket, apart from two earth connections, are on the side of the transverse end wall opposed to the space where the plug is located. As a consequence the depth of a Schuko socket plus its related electrical connections is significant.

[0006] The transverse dimensions of the movable column of the type of power supply unit discussed are limited for practical reasons and for aesthetic reasons. Also, the distance through which the movable column can be lifted is also limited for reasons of stability and aesthetics.

25 **[0007]** The consequence of this is that only a single vertical array of Schuko sockets can be provided with generally not more than three sockets in the vertical array.

[0008] The depth of the Schuko socket cannot be reduced or cannot be reduced sufficiently to enable two vertical arrays of sockets to be provided back-to-back and thereby to enable an increased number of sockets to be provided on a column of acceptable dimensions.

30 **[0009]** The present invention seeks to overcome this problem by reducing the space required for the electrical connectors of the sockets.

BRIEF DESCRIPTION OF THE INVENTION

35 **[0010]** According to the present invention there is provided a power supply structure comprising two rows of Schuko sockets, the rows being arranged back-to-back, the Schuko sockets having transverse end walls with plug pin holes in them and there being a shutter behind each end wall, electrical connectors for the sockets being in units located between the shutters, each unit including a pair of receptacles which are connected to the live bus bar and a pair of receptacles which are connected to the neutral bus bar.

40 **[0011]** Each unit can comprise a moulding of synthetic plastics material which is in the form of a complete loop with a cross bar extending across the loop to provide receptacle spaces on each side of the cross bar, there being walling defining spaced pathways for live and neutral bus bars, the pathways extending generally transversely with respect to the cross bar, there being a pair of plug pin receptacles on each side of the cross bar externally of the mouldings, one pair of receptacles being connected to the live bus bar and the other pair of receptacles being connected to the neutral bus bar.

[0012] Each bus bar can include projecting tabs, and the receptacles of each pair of plug pin receptacles can be joined by a bar, each bar being formed adjacent one end with a tab which is connected to one of the tabs of one of the bus bars thereby to connect the receptacles to the neutral and live bus bars.

50 **[0013]** In this form the live and neutral bus bars preferably extend one along each side of the row of units.

[0014] In the preferred embodiment each shutter is mounted for rotation about its centre, there being a skew surface on each side of the centre mounting which surfaces are encountered by the pins of a plug being inserted into the associated one of said sockets.

[0015] Spring strips can be provided for returning said shutters to the positions in which they close off the plug pin holes upon withdrawal of a plug.

55 **[0016]** To ensure that the pins of plugs being inserted into the sockets do not touch, the back-to-back sockets are arranged with a line joining the plug pin openings of one socket at right angles to a line joining the plug pin openings of the other socket whereby the pins of plugs inserted through back-to-back sockets enter different receptacles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:-

Figure 1 is a pictorial view of a power supply system:
 Figures 1A and 1B are pictorial views, from above and below, of a plastic moulding;
 Figure 2 is a similar view to Figure 1 of the column but to a larger scale and with some parts removed;
 Figure 3 is a further view of the column as illustrated in Figure 2 with further parts removed to enable the electrical connections to be illustrated;
 Figures 4 and 5 are a top pictorial view and a bottom pictorial view of a moulded plastic component of the column;
 Figure 6 is a side elevation of the component of Figures 4 and 5;
 Figure 7 is a detail, to a larger scale, of the lower part of the column of Figure 3;
 Figures 8 and 9 are pictorial views of a contact structure;
 Figure 10 is a pictorial view from above of a further component of the column;
 Figure 11 is an underneath pictorial view of the component of Figure 10;
 Figure 12 is a top plan view of the component of Figures 10 and 11;
 Figure 13 is an underneath plan view of the component of Figures 10 and 11;
 Figure 14 is a side elevation of the component of Figures 10 to 13;
 Figure 15 is a pictorial view of a metal strip which serves as both the neutral and live bus bars;
 Figure 16 is a pictorial view of an earth bus bar;
 Figure 17 is a pictorial view of an earth structure;
 Figure 18 is a pictorial view of a shutter; and
 Figure 19 is a pictorial view of a spring strip.

DETAILED DESCRIPTION OF THE DRAWINGS

[0018] The column 10 illustrated in the drawings comprises two identical mouldings 12.1 and 12.2 arranged back-to-back. The moulding 12.1 (Figures 1A and 1B) comprises two elongate, spaced, parallel side walls 14.1, 14.2 and a platform 16. Three cylindrical sockets 18.1, 18.2 and 18.3 are moulded integrally with the platform 16, the cylindrical walls of the sockets extending in both directions from the platform 16. Ribs 20 are provided on the inner surfaces of the cylindrical walls. The plugs (not shown) which fit in the sockets have complementary grooves thereby to predetermine the position of the plugs with respect to the sockets. Transverse end walls 22 with plug pin holes 24 in them close off one end of each socket 18.1, 18.2 and 18.3. Lines joining the pin holes 24 are at 45° with respect to the side walls of the moulding. Consequently, when the mouldings are placed back-to-back, the pin holes 24 of one moulding are not aligned with the pin holes of the other moulding.

[0019] The side walls of the moulding 12.2 are designated 14.3 and 14.4 (Figure 1) and its platform is designated 16.1. The sockets of the moulding 12.2 are designated 18.4, 18.5 and 18.6.

[0020] Latches 26 are provided for holding the mouldings 12.1, 12.2 together. Each latch 26 has a rib 28 along its free end. The wall 14.1 has two rectangular holes 30 in it. The moulding 12.2 is similarly configured. When the two mouldings are presented to one another the walls 14.1 to 14.4 cam the latches 26 inwardly until the ribs 28 snap into the holes 30.

[0021] Turning now to Figures 4 to 6, the moulded plastics material component illustrated is designated 32. The component defines two paths 34 which are bounded externally by outer walls 36 which stand proud of a base 38. The base 38 is of square shape. Two part circular walls 40 also stand proud of the base 38 and terminate close to the outer walls 36.

[0022] Within the space between the walls 40 there is a cross bar 42 and two walls 44 and 46. Each wall 44, 46 has generally straight portions 48 which extend from the cross bar 42. The pairs of portions 48 are joined by curved sections 50 which sections are approximately parallel to the walls 40.

[0023] Gaps in the walls 44, 46 are shown at 52, 54, 56, 58 and 60.

[0024] The cross bar 42 has a centre section 62 consisting of two parallel walls 64 with a gap between them and two offset end sections 66. The sections 66 are offset in opposite directions from the gap bounded by the walls 64 of the section 62.

[0025] The component shown in Figures 10 to 14 is designated 68 and comprises a generally rectangular platform 70 with four plug pin holes 72 in it. The holes are in a rectangular array.

[0026] Two posts 74 protrude from one surface of the platform 70 and two angled stops 76 are provided on the same surface. A pair of closely spaced parallel walls 78 define an L-shaped space for receiving and locating a metallic spring strip as will be described. At the centre of the platform 70 there is a pin 80.

[0027] Reference numerals 82 designate rings which are integral with, and protrude upwardly from, the platform 70.

Four locking elements 84 are provided on the underside of the platform 70.

[0028] One component 32 and two components 68 are provided in the space between each pair of back-to-back transverse walls 22, the component 32 being between the two components 68. The elements 84 interlock with the slots designated 32.1 (Figures 4 and 5) that the configuration of the component 32 provides thereby correctly to position each component 68 with respect to the intervening component 32. One component 68 has been omitted from each of Figures 3 and 7 enable the component 32 to be seen.

[0029] An electrically conductive metal strip 86 (Figure 15) forming the neutral component extends along the left hand paths 34 of all three components 32. The strip 86 is bent to conform to the shape of the paths 34 and punched and bent to form tabs 88.

[0030] Each of the structures designated 90 (see Figures 8 and 9) is constituted by a strip of electrically conductive metal slit and bent to provide two arcuate sections 92 between which the pins of a plug inserted into the associated socket pass. The sections 92 are pushed apart by the plug pins as the plug enters thereby to ensure that there is electrical contact between the sections 92 and the pins. The sections 92 are joined by a bar 94 which has, at the centre thereof, a notch 96 in one edge and a protrusion 98 along the other edge. The bar 94 is slit at 100 and a portion of the bar is pushed out to form a connecting tab 102.

[0031] The tabs 88 (Figure 15) co-operate with the tabs 102 so as electrically to connect the strip 86 to the structures 90.

[0032] Two structures 90 are mounted on each component 32 as best seen in Figure 7 and lie one on each side of the crossbar 42. The pairs of structures 90 and 98 are crimped to the components 32.

[0033] A further electrically conductive metal strip 86 passes through the right hand paths 34 of the components 32 and forms the live bus bar. The strip 86 forming the live bus bar is inverted with respect to the strip forming the neutral bus bar. Thus the structure 90 on one side of the cross bar 42 is live and the structure 90 on the other side of the cross bar 42 is neutral.

[0034] An electrically conductive earth plate 104 (see Figure 17) is a press fit into a transverse groove (see Figures 10 and 12) of the platform 70. The earth plate 104 has two holes 106 in it. The rings 82 which are integral with, and protrude upwardly from, the platform 70 enter the holes 106 in the plate 104. This ensures that the plug pins cannot touch the earth plate.

[0035] An upstanding contact 108 of resilient, electrically conductive metal is provided at each end of the plate 104. More specifically a sub-plate with the contacts 108 at each end thereof is provided underneath the plate 104. The contacts 104 pass through holes 110 (Figure 1B) in the end walls 22 of the related socket and protrude into the space which a plug in the socket occupies (see Figure 1A). The posts 74 limit outward movement of the contacts 108. Each earth plate 104 is connected by a tab 112 to an earth strip 114 (see Figure 16) which extends along the outside of each component 32 (see particularly Figure 7). The strip 114 is punched and bent to provide pockets 116 into which the tabs 112 fit. The strip 114 has sets of pockets 116 along each edge thereof. The strip 114 can thus be used as the earth for both rows of sockets.

[0036] A shutter 118 is mounted on the pin 80. An upward extension 120 of the shutter lies immediately adjacent the transverse wall 22 of the associated socket. The shutter 118, as best seen in Figure 18, has skew top surfaces 122 on either side of the extension 120. The shutters 118 as shown in Figure 2 cover the plug pin holes 72 of the component 68 which register with the plug pin holes 24 of the socket. As the pins of the plug being inserted encounter the skew top surfaces 122 of the shutter 118, the shutter 118 is rotated to uncover the holes 72 and permit the pins to pass through into the generally circular spaces defined by the structures 90. The pins enter the rings 82 of the opposed component 68.

[0037] Spring strips 124 (Figure 19) located in the gaps between the walls 78 bear on the shutters 118. When the plug is withdrawn the strip 124, which was deformed as the shutter 118 turns whilst the plug is being inserted, pushes the shutter back to the position illustrated. Such movement is limited by the stops 76.

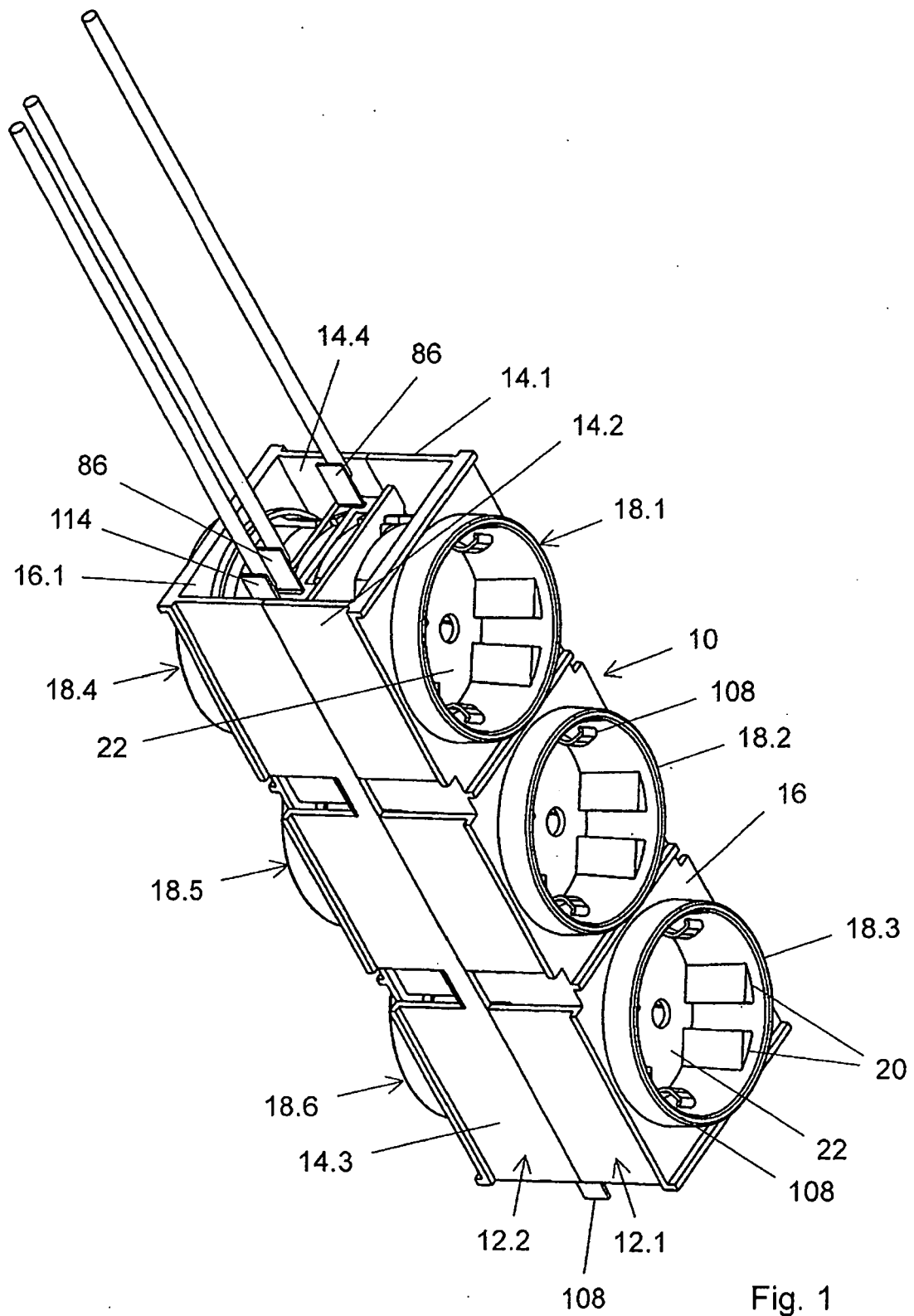
[0038] It will be understood that the opposed sockets such as 18.2 and 18.5 can each receive a plug. The pins of each plug enter the structures on opposite sides of the cross bar 42 thereby to connect to the live and neutral of the power supply system with the pins of the plugs in different sections 92.

Claims

1. A power supply structure comprising two rows of Schuko sockets, the rows being arranged back-to-back, the Schuko sockets having transverse end walls with plug pin holes in them and there being a shutter behind each end wall, electrical connectors for the sockets being in units located between the shutters, each unit including a pair of receptacles which are connected to the live bus bar and a pair of receptacles which are connected to the neutral bus bar.
2. A power supply structure as claimed in claim 1, wherein each unit comprises a moulding of synthetic plastics material which is in the form of a complete loop with a cross bar extending across the loop to provide receptacle spaces on

each side of the cross bar, there being walling defining spaced pathways for live and neutral bus bars, the pathways extending generally transversely with respect to the cross bar there further being a pair of plug in receptacles on each side of the cross bar, one pair of receptacles being connected to the live bus bar and the other pair of receptacles being connected to the neutral bus bar.

- 5
3. A power supply structure as claimed in claim 2, wherein each bus bar includes projecting tabs, and wherein the receptacles of each pair of receptacles are joined by a bar, each bar being formed adjacent one end with a tab which is connected to one of the tabs of one of the bus bars thereby to connect the receptacles to the neutral and live bus bars.
- 10
4. A power supply structure as claimed in claim 3, wherein the live and neutral bus bars extend one along each side of the row of units.
- 15
5. A power supply structure as claimed in any preceding claim, wherein each shutter is mounted for rotation about its centre, there being a skew surface on each side of the centre mounting which surfaces are encountered by the pins of a plug being inserted into one of said sockets.
- 20
6. A power supply structure as claimed in claim 5, and including spring strips for returning said shutters to the positions in which they close off the plug pin holes upon withdrawal of a plug.
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7. A power supply structure as claimed in any preceding claim, wherein back-to-back Schuko sockets are arranged with lines joining the plug pin openings of one socket at right angles to a line joining the plug pin openings of the other socket whereby the pins of plugs inserted through the back-to-back sockets enter different receptacles.
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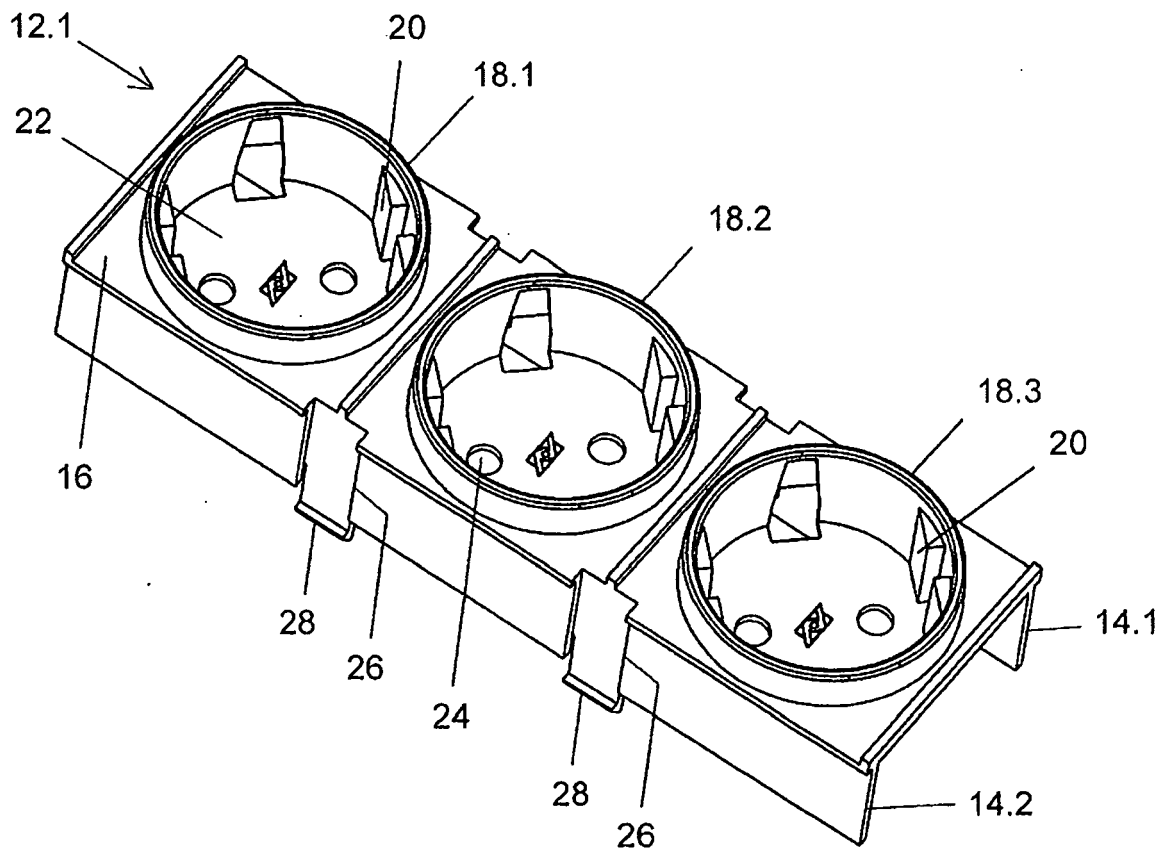
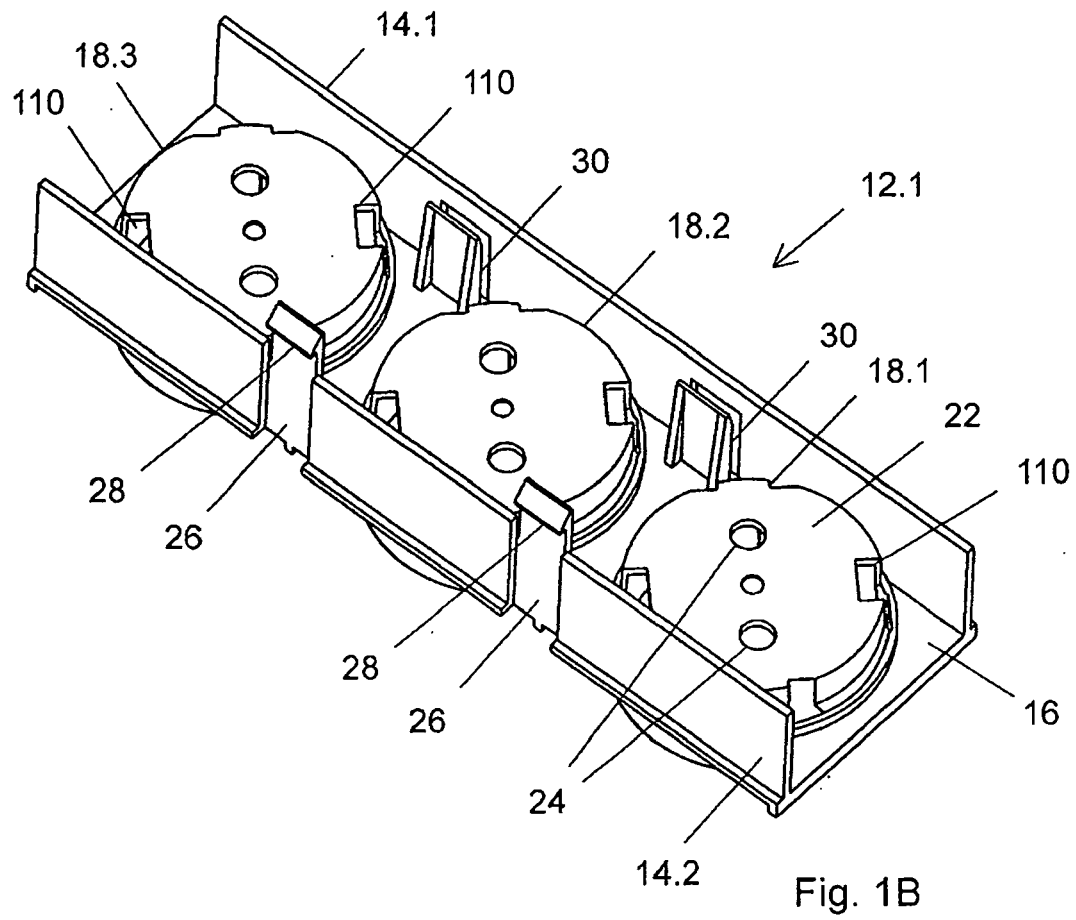
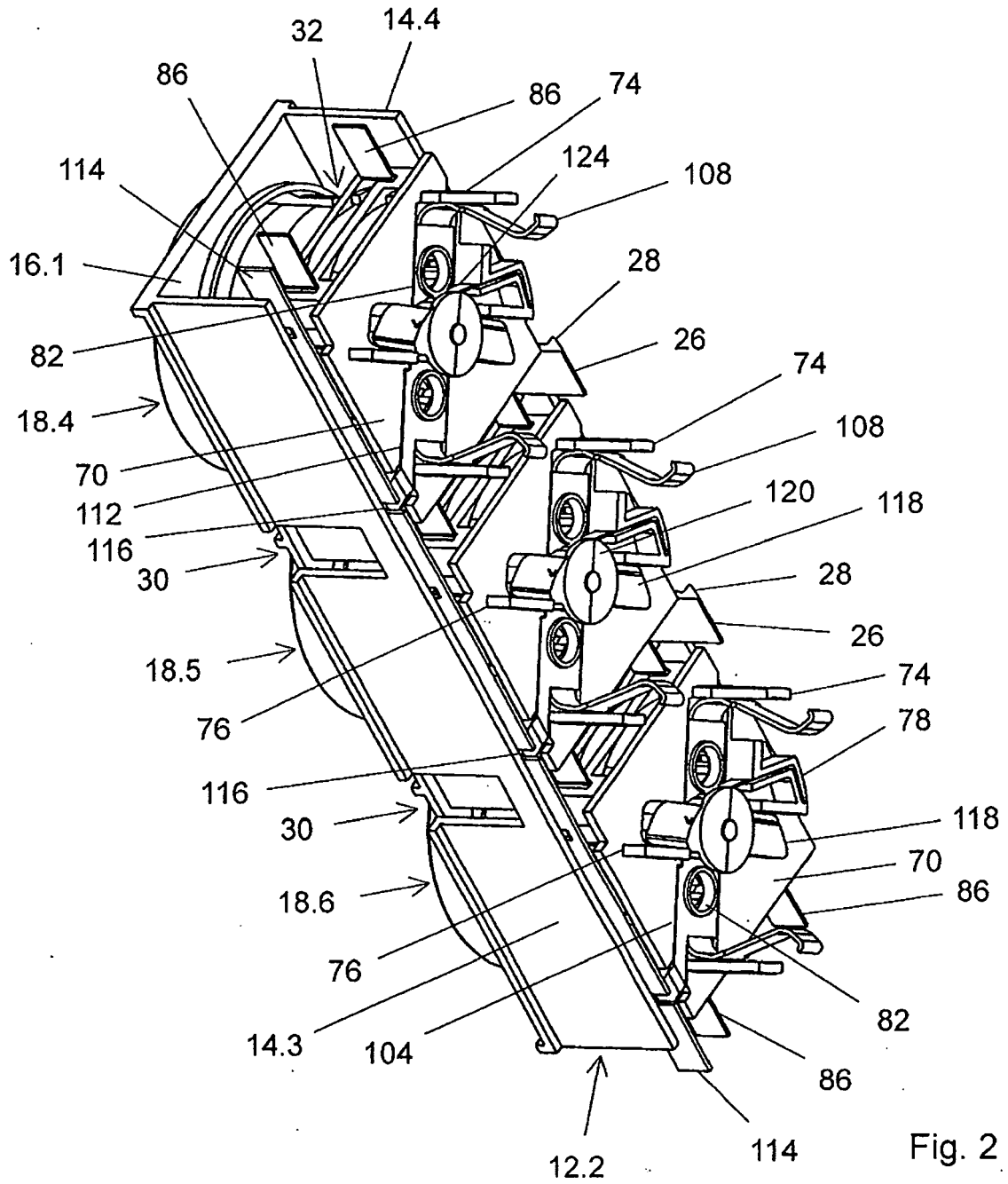
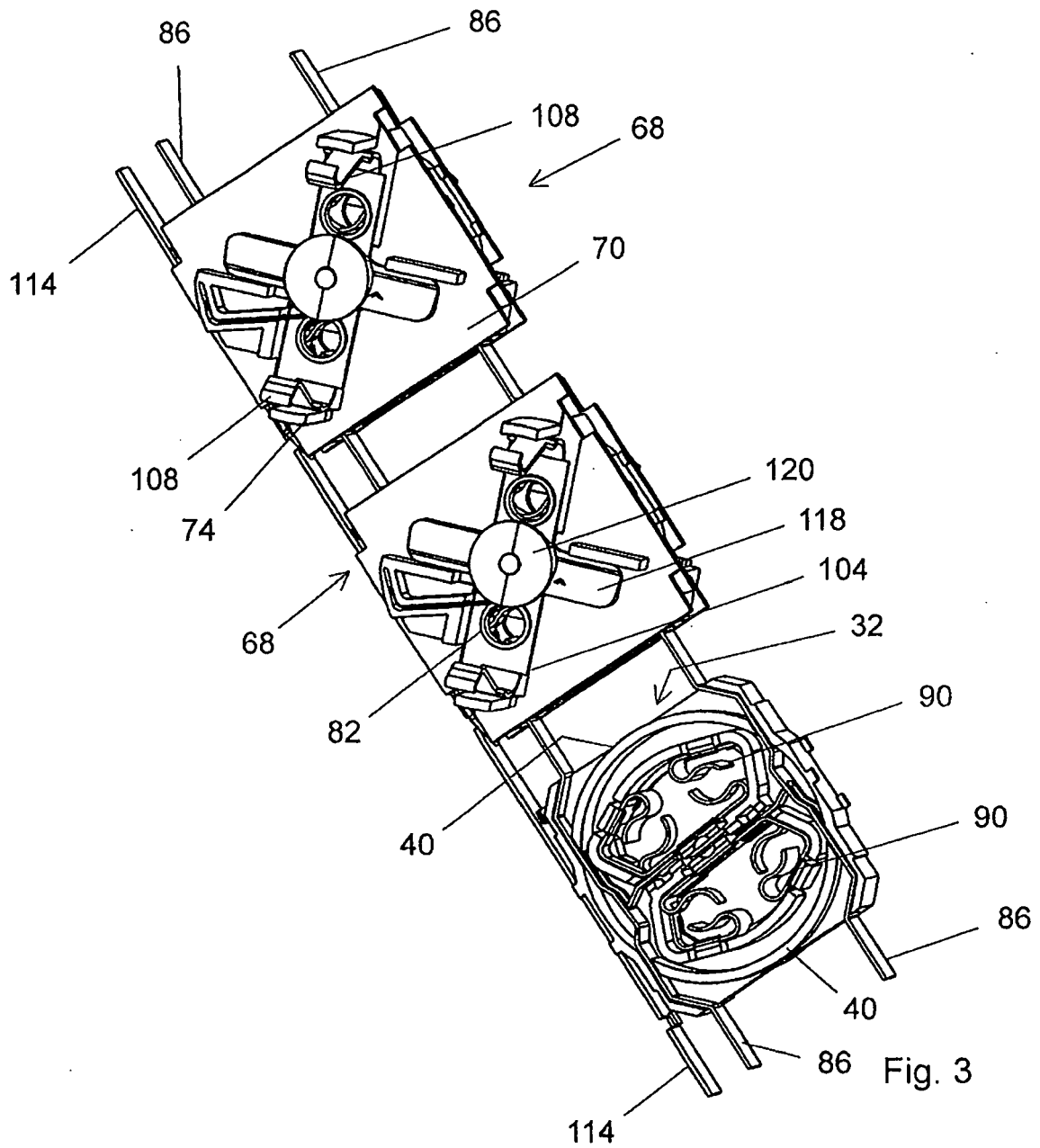


Fig. 1A







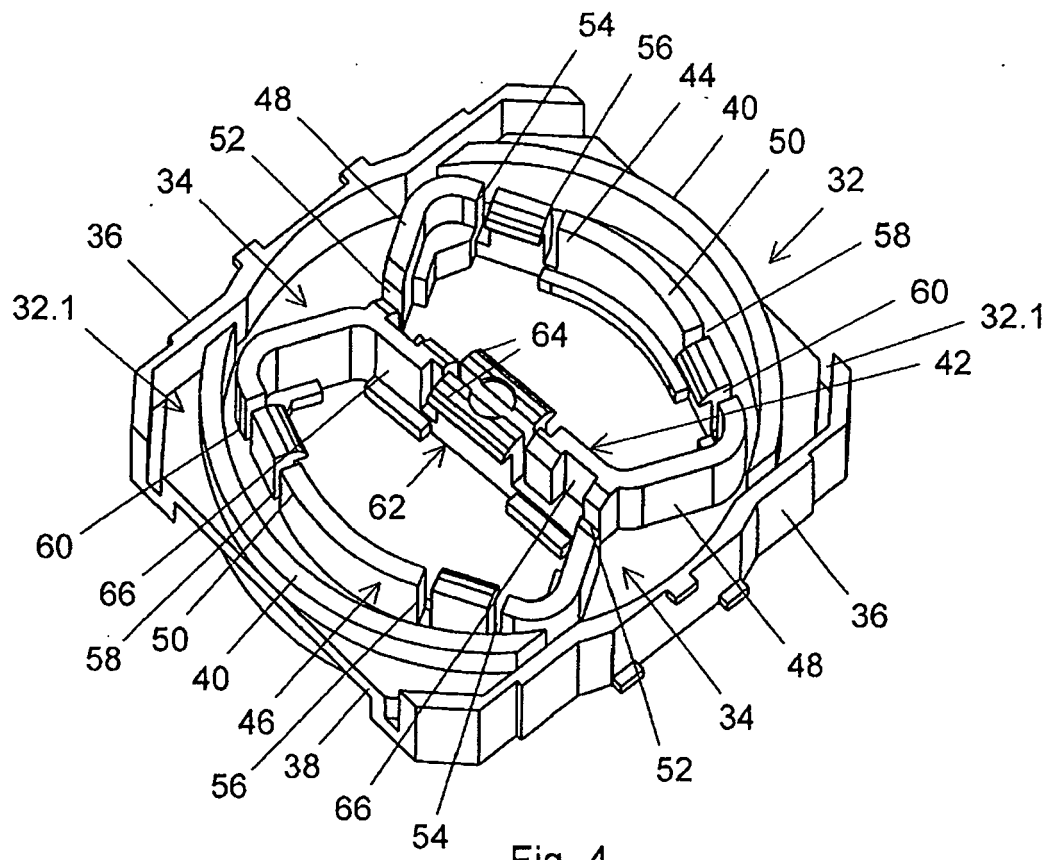
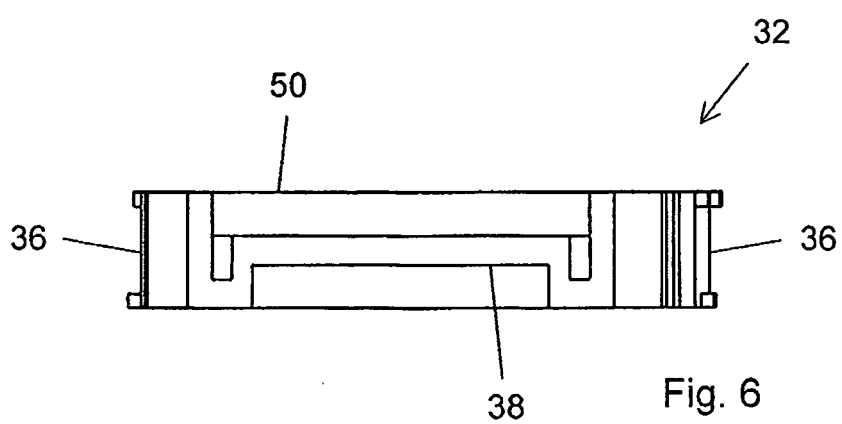
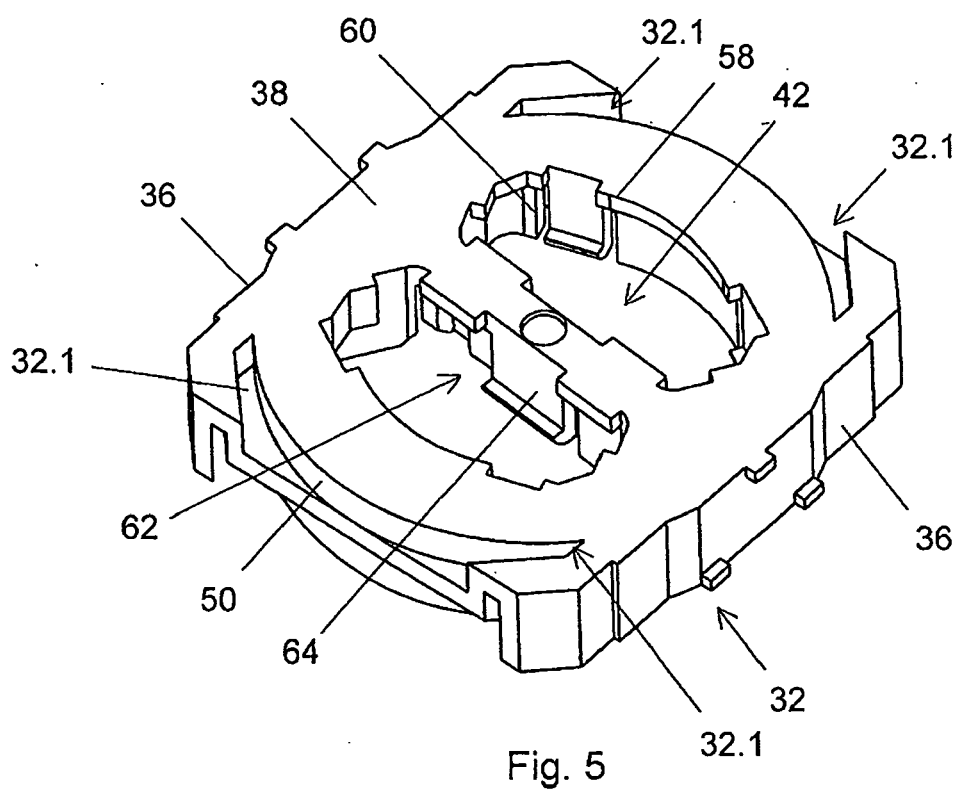


Fig. 4



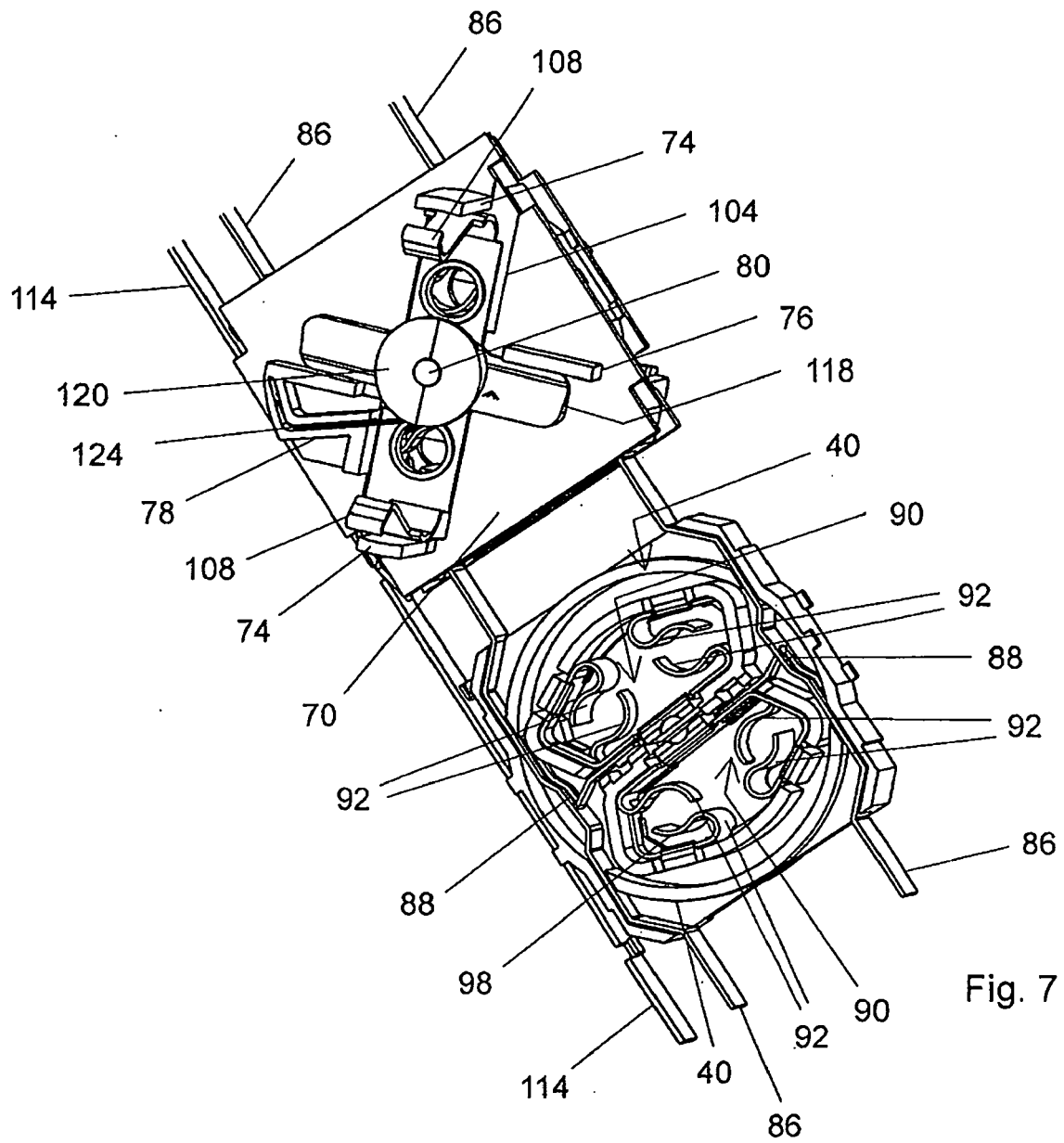


Fig. 7

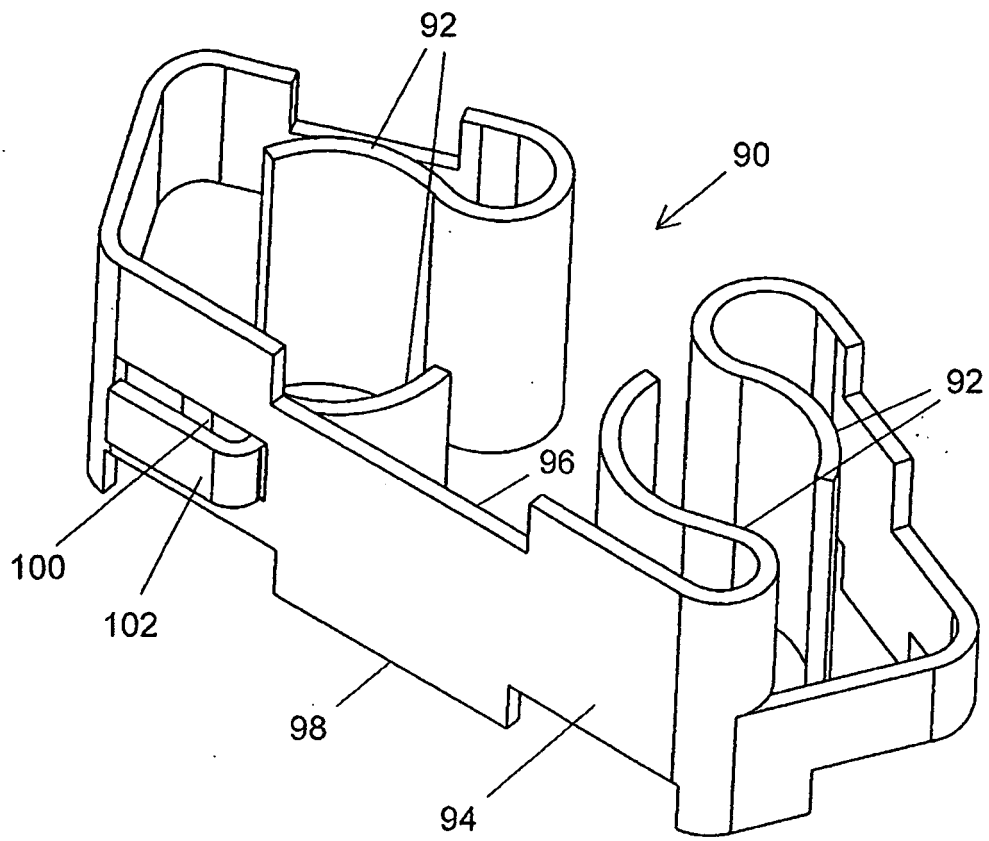


Fig. 8

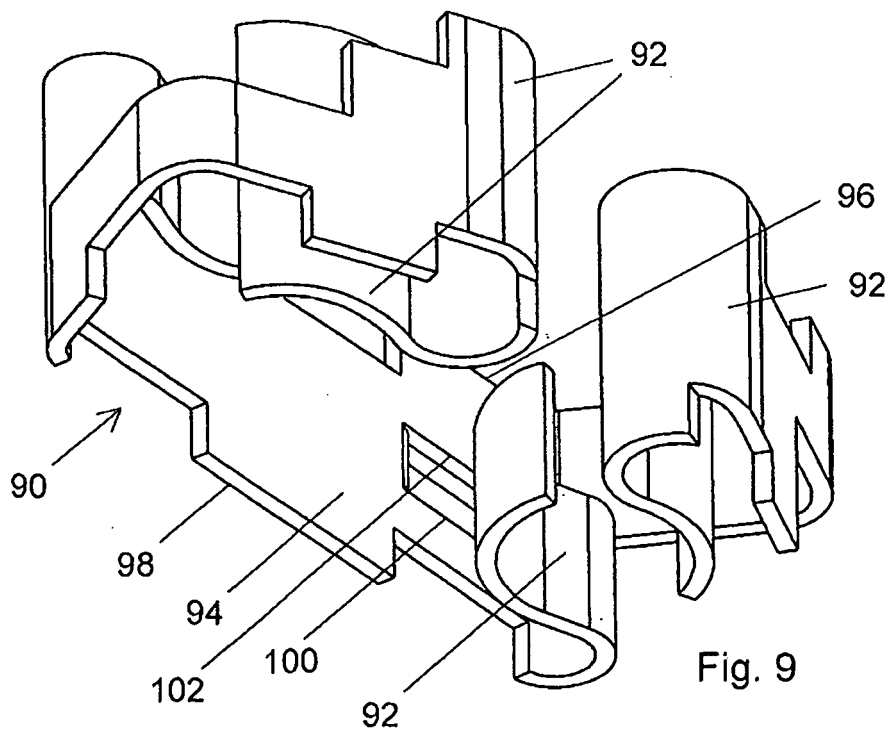
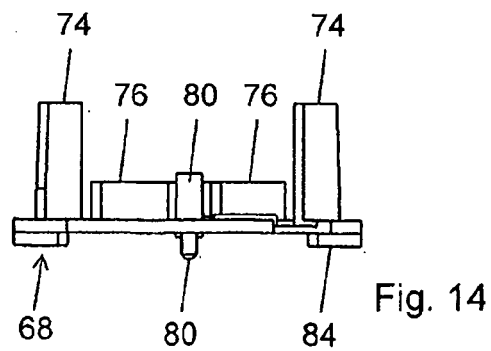
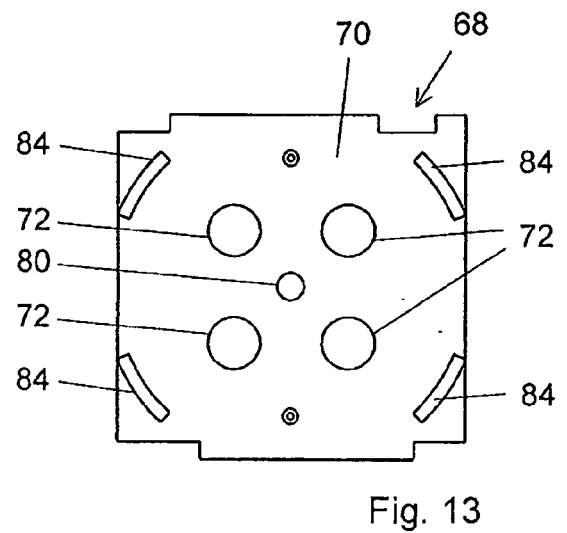
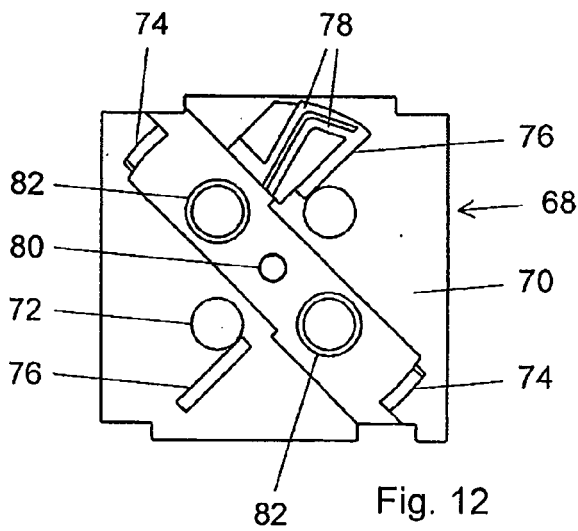
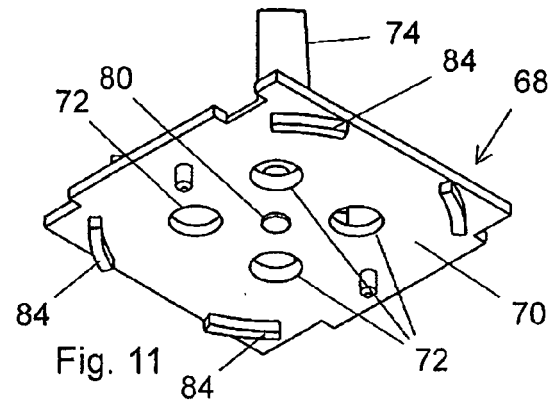
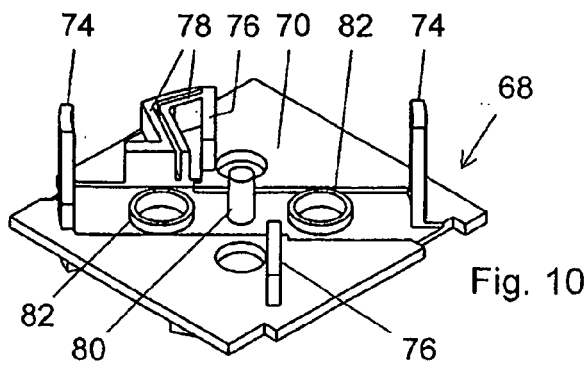
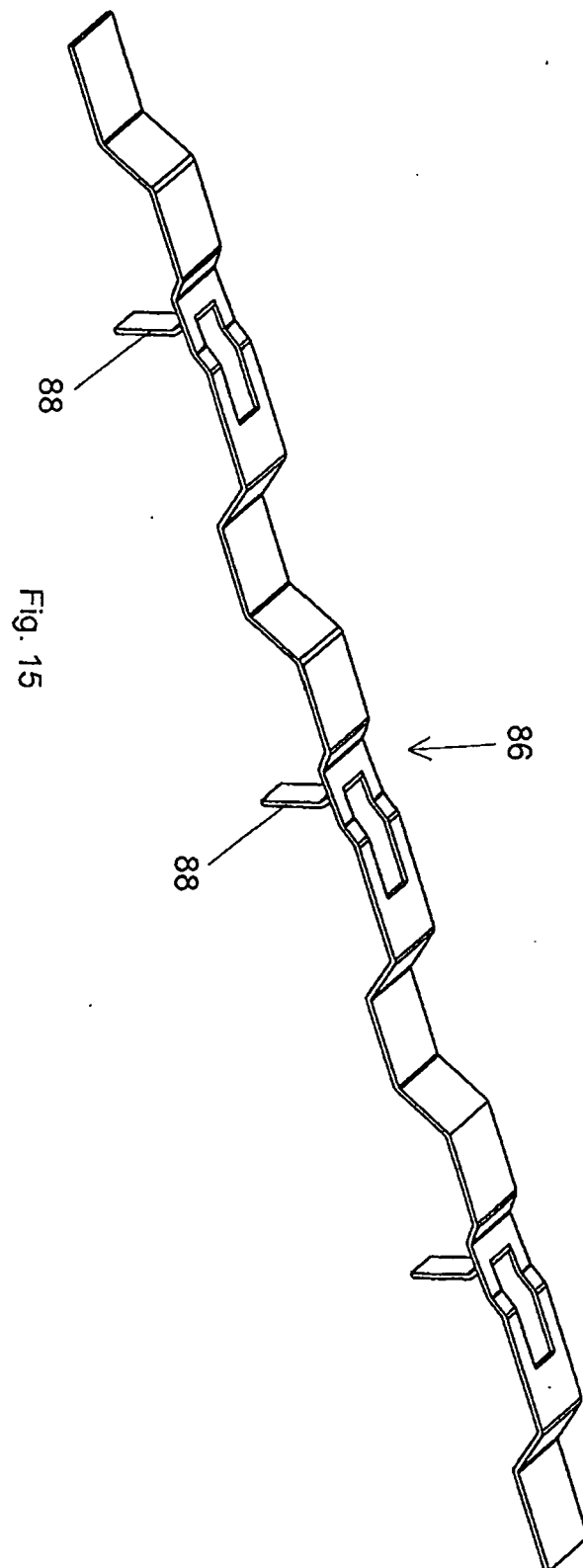


Fig. 9





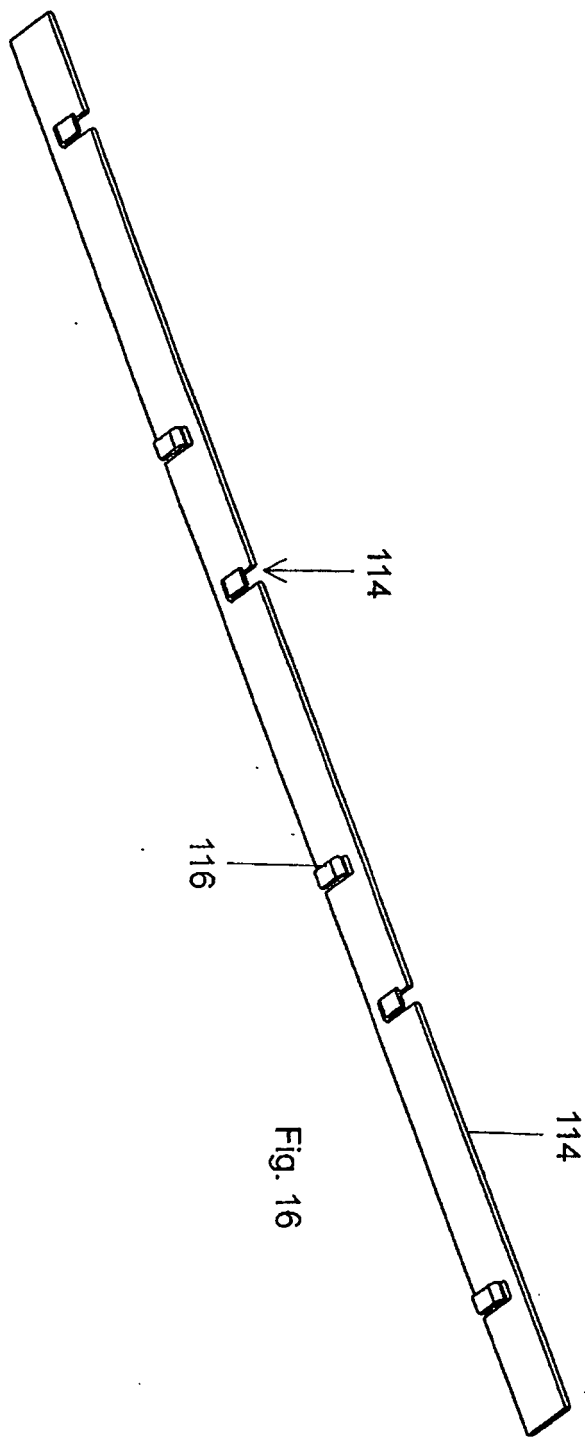
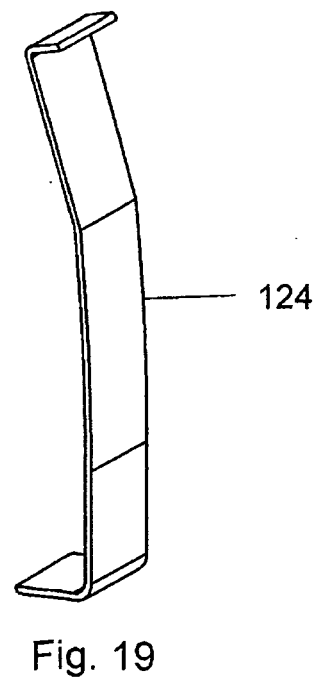
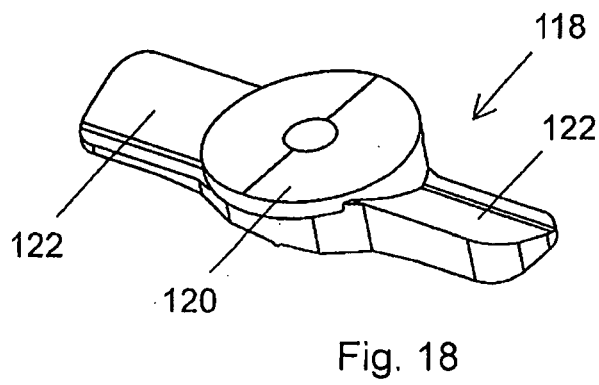
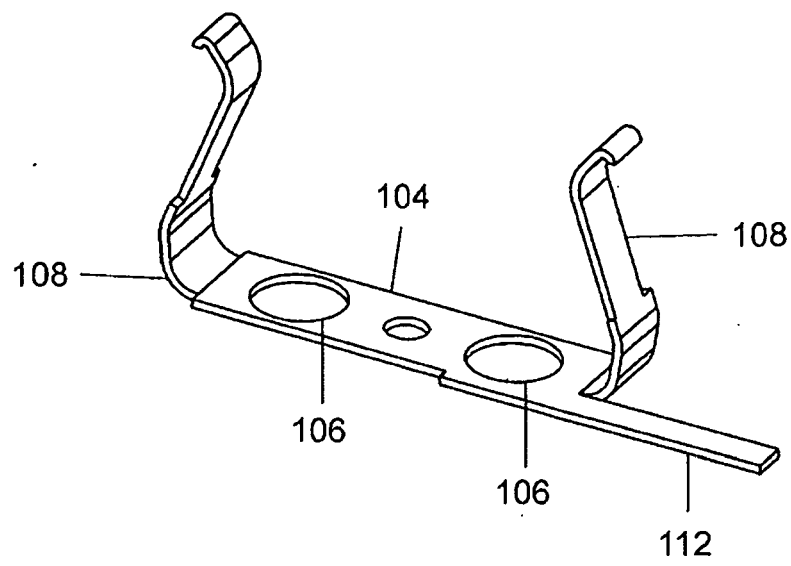


Fig. 16





EUROPEAN SEARCH REPORT

Application Number
EP 10 00 2081

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Place of search Munich		Date of completion of the search 14 June 2010	Examiner Hugueny, Bertrand
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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