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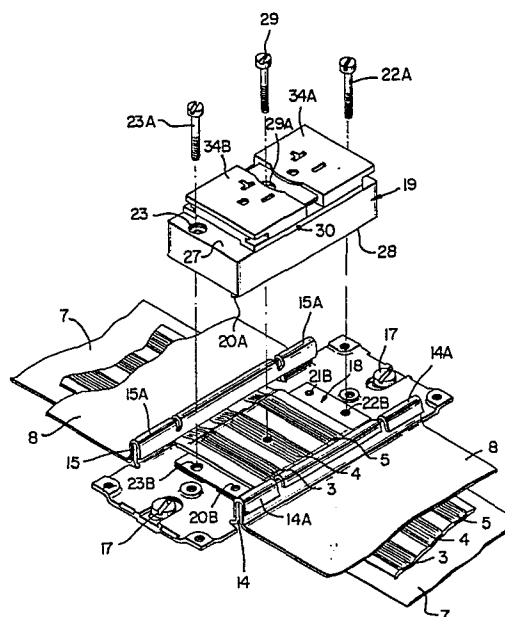
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Connector assembly for undercarpet cable.

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An electrical connector assembly (1) for undercarpet flat, flexible cable (2) includes a metal plate (10) having plural lands (11, 12, 13, 38B) raised in relief, a terminal block (19) constructed to overlie selected lands (11, 12, 13) and a fastener (29A) carried by the block (19) to secure in one of the overlaid lands (12) and apply the block (19) and the overlaid lands (11, 12, 13) in clamped relationship on the flat flexible cable (2), terminals (24A, 25A, 26A) in the terminal block (19) are urged by the block (19) to penetrate the cable conductors (3, 4, 5) to establish electrical connections.

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CONNECTOR ASSEMBLY FOR UNDERCARPET CABLE

A connector assembly for mounting on a floor and for connecting electrical socket receptacles with corresponding conductors of a flat and flexible undercarpet cable extending along the floor comprises, cable connecting terminals in an insulating terminal block structure, conductors connecting the cable connecting terminals with conducting portions of the socket receptacles and a base and cover forming a composite housing on which the receptacles are positioned for receipt of an electrical plug of the type provided on an electrical and of a household appliance or office machine. It is a requirement that the connector assembly have a minimum number of parts designed for ease of assembly with the undercarpet cable.

It is desirable that the terminal block is capable of assembly to the cable without a requirement for severing the conductors or stripping the cable insulation. A further requirement is that the connector assembly be of sturdy construction to withstand collision from floor traffic or furniture. A connector assembly of compact form is desirable to reduce the possibility of collision. Further, a protective cover is desirable for the receptacles.

There is known in U.S. Patent 4,240,688, a connector assembly for flat and flexible undercarpet cable in which socket receptacles are embodied in an insulating receptacle body which is separate from a terminal block for assembly with the cable. Electrical wires are required to bridge between the socket

receptacles and the separate terminal block. First ends of the wires are wrapped over the shanks of screw fasteners that are tightened against the electrical terminals of the terminal block. Second ends of the wires are wrapped over the shanks of screw fasteners that are carried by the receptacle body and tightened against conductive portions of the receptacles. The wires become relocated when the receptacle body is moved into a desired position against a portion of the housing and is secured in place by additional screw fasteners. The disadvantage of screw fasteners is that they require time consuming hand tightening and they tend to loosen, particularly when the wires are relocated, thereby placing strain upon the screw fasteners. The terminal block and separate receptacle body are difficult to assembly with the wires and into a compact form.

The invention is a connector assembly for connecting electrical socket receptacles with corresponding conductors of a flat and flexible undercarpet cable, characterized in that, the conducting portions of the receptacles and the cable connecting terminals are integrally joined by strip conductors, the terminal block comprises an insulating and cable clamping block structure, preferably but not necessarily of one piece construction, and includes cavities receiving the strip conductors and extending between different external faces associated, respectively, with the cable connecting terminals and the conducting portions of the receptacles, and cable penetrating lances are on the cable connecting terminals and penetrate completely through a layer of insulation of the cable and penetrate into corresponding conductors of the cable clamped between an external face of the block structure and a base portion of a composite housing containing the block structure.

The advantage of the invention is that the base portions of the housing, the cable and the terminal block structure are stacked together in compact form with a minimum expenditure of

labor, and a clamping force is applied by the base portion and the terminal block structure to establish their assembly to the cable as well as good electrical connections of the electrical socket receptacles with the corresponding conductors of the cable. The
5 receptacles need not be relocated during assembly of the cover, and thereby the electrical connections are undisturbed.

The invention is characterized in that;

the base portion is formed with lands that project in raised relief, the cable is clamped between the terminal block and
10 corresponding lands, a conductive fastener carried by the terminal block passes through a corresponding conductor and is secured in a corresponding land, and fasteners carried by the cover are secured in corresponding lands.

The invention further is characterized in that, the raised
15 lands provide clearance spaces for the tips of the fasteners that are driven first into the top side of the lands, and then through the thickness of the lands and out from the bottom side of the lands. The raised lands advantageously grip the cable while the cable is clamped against the penetrating electrical terminals.

20 A better understanding of the invention will be obtained from the following detailed description and accompanying drawings of an example of the invention in which:

FIGURE 1 is a perspective view of an electrical connector assembly for undercarpet cable;

25 FIGURE 2 is a cross-sectional view of an undercarpet cable;

FIGURE 3 is a perspective view of the electrical connector assembly according to Figure 1 with parts exploded for illustration purposes;

30 FIGURE 4 is a perspective view of three electrical terminals of the connector assembly according to Figure 1;

FIGURE 5 is a perspective view of a terminal block assembled with the terminals according to Figure 4;

35 FIGURE 6 is a fragmentary perspective view of a plate of the connector assembly and a flat flexible cable in preparation for connection with the connector assembly;

FIGURES 7 and 8 are fragmentary perspective views illustrating component parts during assembly thereof into the connector assembly according to Figure 1.

Figure 1 shows an electrical connector assembly 1 for attachment to an undercarpet flat, flexible cable 2 shown in Figure 2. The cable 2 includes three flexible elongated conductors 3, 4, 5, held parallel and spaced apart by a surrounding sheath 6 of plastics material insulation. A commercial office is supplied with electrical wiring by a network of the cable 2 that is routed along the floor of the office. The cable is laid over a flexible ribbon layer of plastics shield 7 that is laid against the office floor to protect the cable 2 from damage by floor irregularities. The cable 2 is covered by a ribbon layer of metal shield 8 which protects the cable from foot traffic and furniture. Carpeting is installed to cover the office floor. The network of cable 2 is protected by the layers of shield 7, 8 and is hidden under the carpeting.

Figure 3 shows details of the component parts of the connector 1. A flat metal plate 10 is stamped and formed with elongate lands 11, 12, 13 in raised relief. A pair of spaced apart tabs 14, 14 project from one side edge of the plate 10 and are bent to project outwardly of the plane of the plate 10. A similar pair of tabs 15, 15 are on an opposite side edge of the plate. Slotted apertures 16, 16 are provided along end edges of the plate 10 and receive fasteners 17, 17 in the form of machine screws that anchor the plate 10 to an office floor. A cushion pad 18 of insulating material, for example, is constructed to overlie the lands 11, 12, 13.

Figures 3 and 5 show a terminal block 19 constructed to overlie the lands 11, 12, 13. The terminal block 19 is moulded of insulating plastics and with locking means in the form of projecting feet 20A, 21A that register in apertures 20B, 21B in the raised lands 11, 13 respectively. The feet 20A, 21A lock the terminal block against movement relative to the lands 11, 13. Apertures

22, 23 through the block carry fasteners 22A, 23A in the form of machine screws that are secured in apertures 22B, 23B in the raised land 12. The block 19 is provided with three terminal receiving cavities 24, 25, 26 that extend from a first side 27 of the block to a second side 28 from which project the feet 20A, 21A.

Figure 4 shows electrical terminals 24A, 25A, 26A that are stamped and formed from single pieces of metal strip and are constructed for assembly within the cavities 24, 25, 26, respectively. The terminals 24A and 26A are identical to the extent that they have resilient electrical receptacle portions 24B, 24B, 26B, 26B defined by and between pairs of opposed spring fingers 24C, 24C, 24C, 26C, 26C, 26C, 26C. Auxiliary fingers 24D, 24D, 26D, 26D, form sides of the electrical receptacles. The terminals 24A, 26A, further include conductor terminating portions 24E, 26E in the form of planar plates with raised in relief, knife edged lances 24F, 24F, 26F, 26F.

The terminal 25A, includes electrical receptacle portions 25B, 25B defined by and between pairs of opposed resilient spring fingers 25C, 25C, 25C, 25C. Terminal 25A further includes a conductor terminating portion 25E in the form of a planar plate having knife edged lances 25F, 25F raised in relief. The terminals 24A, 25A, 26A are assembled in respective cavities 24, 25, 26 of the terminal block 19. The receptacle portions 24B, 24B, 25B, 25B, 26B, 26B are retained in the cavities 24, 25, 26 and face toward, and open toward, the first side 27 of the terminal block 19. Operation of these receptacle portions is well known from the disclosure of U.S. Patent No. 3,860,739. As shown in Figure 5, the conductor terminating portions 24E, 25E, 26E emerge from the cavities 24, 25, 26 and are bent to overlie against the second side 28 of the terminal block 19 so that the lances 24F, 24F, 25F, 25F, 26F, 26F face outwardly away from the second side 28 of the terminal block 19. Figures 3 and 7 show a conducting fastener 29A in the form of a conducting machine screw

carried in a bore 29 of the cover extending from the first side 27 to the second side 28. The conductive fastener 29A is constructed to secure in an aperture 29B in the land 12. A conductive plate 29C has projecting knife edged lances 29D, 29D, and is mounted in a recess 29E in the land 12. The lances 29D, 29D, project through an opening 29E in the pad 18.

Figures 3 and 7 show a faceplate 30 of moulded plastics and having flanges 31 moulded with projecting feet 32 constructed for assembly in apertures 32A in the side 27 of the terminal block 19. The flanges 31 are moulded with a raised track 33 having two arrays of profiled apertures 24G, 24G, 25G, 25G, 26G, 26G aligned with the electrical receptacle portions 24B, 24B, 25B, 25B, 26B, 26B and constructed for receipt of an electrical plug (not shown) of the type provided on the electrical cord of a household appliance or office machine. A cover plate is divided into two cover sections 34A, 34B constructed for slidably mounting on the track 33. Wire springs, one shown at 35, mount in each of recesses 36, 36, 36, 36 in the first side 27 of the terminal block 19 and pass through openings 36A, 36A, 36A, 36A in the faceplate 30 and engage respective cover sections 34A, 34B, and bias the cover sections into mutual abutment. The cover sections 34A, 34B each have profiled apertures 24H, 25H, 26H that become aligned with the profiled apertures 24G, 25G, 26G in the faceplate 30 upon slidably positioning the cover sections 34A, 34B along the track 33 in opposition to the springs and in respect to the faceplate 30. The terminal block 19 is assembled with the terminals 24A, 25A, 26A, the faceplate 30, and the cover sections 34A, 34B.

Figures 3 and 8 show a cover 37 constructed to cover the plate 10. Fasteners 38A in the form of machine screws are carried in bores 38 of the cover 37 and are constructed to secure in apertured lands 38B that are raised in relief from the plate 10. The cover 37 has a hollow interior 39 constructed to receive the terminal block 19. A top wall 40 surrounding the hollow interior 39 is constructed for mounting against the first side 27 of the

terminal block 19 coplanar with the flanges 31 of the faceplate 30.

Further details of the assembly are shown in Figure 6. The cable 2 and the shields 7, 8 are laid against a floor. The shield 8 is severed transversely of its length to expose the cable 2. The plate 10 is assembled between the cable 2 and the shield 7 and is secured by the fasteners 17 to the floor. The elongate lands 11, 12, 13 lie under the conductors 3, 4, 5 while the insulation pad 18 separates and cushions the conductors from the lands 11, 12, 13.

Figure 7 shows the edges of the shield 8 folded out of the plane of the remainder of the shield 8 to impinge the tabs 14, 15. The edges of the shield 8 are trimmed to the height of the tabs 14, 15. Conductive U-shaped spring clips 14A, 15A clip together the shield 8 and the tabs 14, 15 thereby establishing electrical connections therebetween. The terminal block 19 overlies the lands 11, 12, 13 with the cable conductors 3, 4, 5 interposed. The fasteners 23A, 29A, 22A is secured in the lands 11, 12, 13 and mount the block 19 to the plate 10. The conductive fastener 29A are secured also into and through the conductor 4, and the plate 29C establishing ground potential electrical connections with the plates 10, 29C, the conductor 4 and the fastener 29A. The conductors 3, 4, 5 are clamped between the block and the lands 11, 12, 13. The conductors conform to the raised edges of the lands and are gripped by the raised lands to prevent their movement. The cushion 18 prevents the raised edges of the lands from penetrating the cable insulation 6. The block 19 urges the knife edged lances 24F, 24F, 25F, 25F, 26F, 26F, 29D, 29D to penetrate completely through a layer of the cable insulation 6 and penetrate respective conductors 3, 4, 5, thereby to establish electrical connections with those conductors and those lances. Thereafter, the cover 37 shown in Figure 8 is assembled over the terminal block 19, the faceplate 30 and the cover sections 34A and 34B, so that the wall 40 of the cover 37 is coplanar with the flanges 31, 31 of the faceplate 30. The cover sections 34A, 34B are slidably supported on the track 33 that is elevated from the flanges 31, 31 and the wall 40.

CLAIMS:

1. A connector assembly (1) for mounting on a floor and for connecting electrical socket receptacles (24B, 25B, 26B) with corresponding conductors (3, 4, 5) of a flat and flexible undercarpet cable (2) comprises, cable connecting terminals (24E, 25E, 26E) in an insulating terminal block structure (19),
5 conductors (24A, 25A, 26A) connecting the cable connecting terminals (24E, 25E, 26E) with conducting portions of the receptacles (24B, 25B, 26B) and a base portion (10) and cover (37) forming a composite housing on which the receptacles (24B, 25B, 26B) are positioned for receipt of an electrical plug of the type provided on an electrical cord, characterized in that; the
10 conducting portions of the receptacles (24B, 25B, 26B) and the cable connecting terminals (24E, 25E, 26E) are integrally joined by strip conductors (24A, 25A, 26A), the terminal block structure (19) includes cavities (24, 25, 26) receiving the strip conductors (24A, 25A, 26A) and extending between different external faces associated, respectively, with the cable connecting terminals (24E, 25E, 26E) and the conducting portions of the receptacles (24B, 25B, 26B), and cable penetrating lances (24F, 25F, 26F) are on
20 the cable connecting terminals (24E, 25E, 26E) and penetrate completely through a layer of insulation (6) of the cable (2) and penetrate into corresponding conductors (3, 4, 5) of the cable (2) clamped between an external face of the block structure (19) and a base portion (10) of the composite housing containing the block
25 structure (19).

2. The electrical connector according to Claim 1, and further including a faceplate (30) overlying the block structure (19) and having profiled apertures (24G, 25G, 26G) aligned with the cavities (24, 25, 26) in the block structure and with the electrical
30 receptacle portions (24B, 25B, 26B) of the terminals (24A, 25A, 26A) and two cover sections (34A, 34B) each slidably mounted on the faceplate (30), and profiled apertures (24H, 25H, 26H) in each cover section that become aligned with the profiled apertures (24G,

25G, 26G) in the faceplate (30) upon slidably positioning the cover sections (34A, 34B) in respect to the faceplate (30).

3. The electrical connector according to Claim 2, in which the faceplate (30) includes a flange (31) and a track elevated
5 above the flange (31), the cover (37) includes a wall (40) coplanar with the flange (31) on the faceplate (30), and the cover sections (34A, 34B) are slidably mounted on the track (33).

4. The electrical connector according to Claims 1 and 2, and further including a plurality of tabs (14, 15) bent outwardly of
10 the plane of the base portion (10), a metal sheet (8) which overlies the cable (2) being folded against the tabs (14, 15), and conductive clips (14A, 15A) holding together the sheet (8) and tabs (14, 15) to establish electrical connections therebetween.

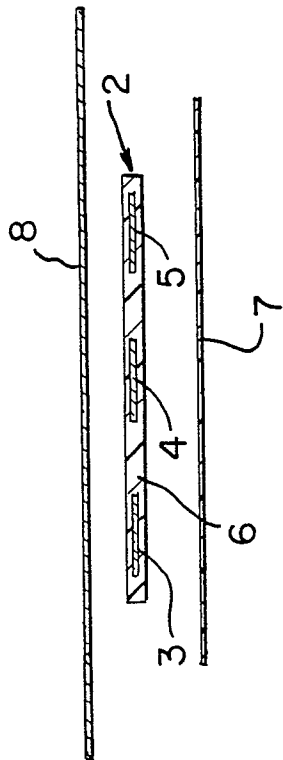


Fig. 2

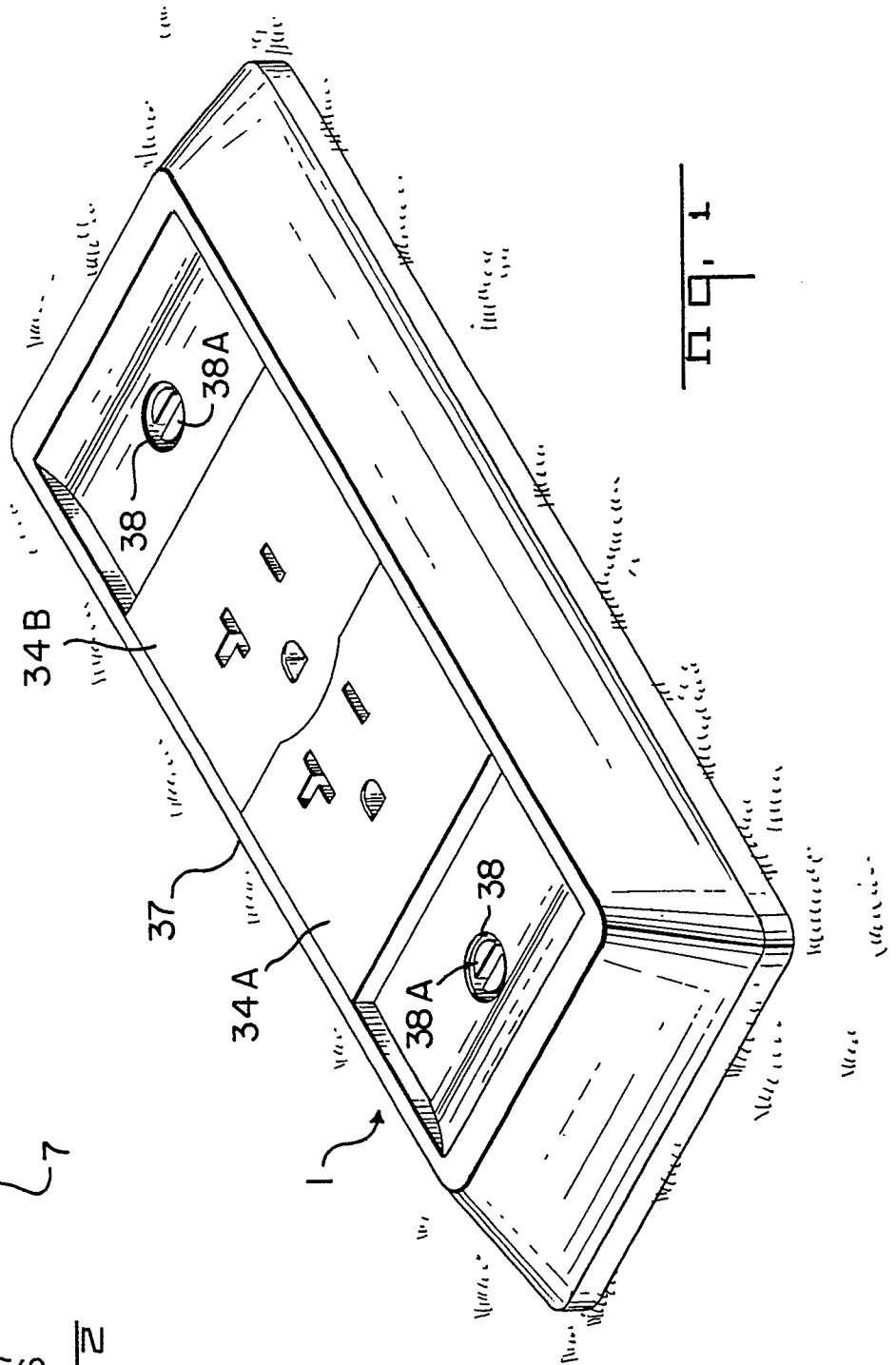
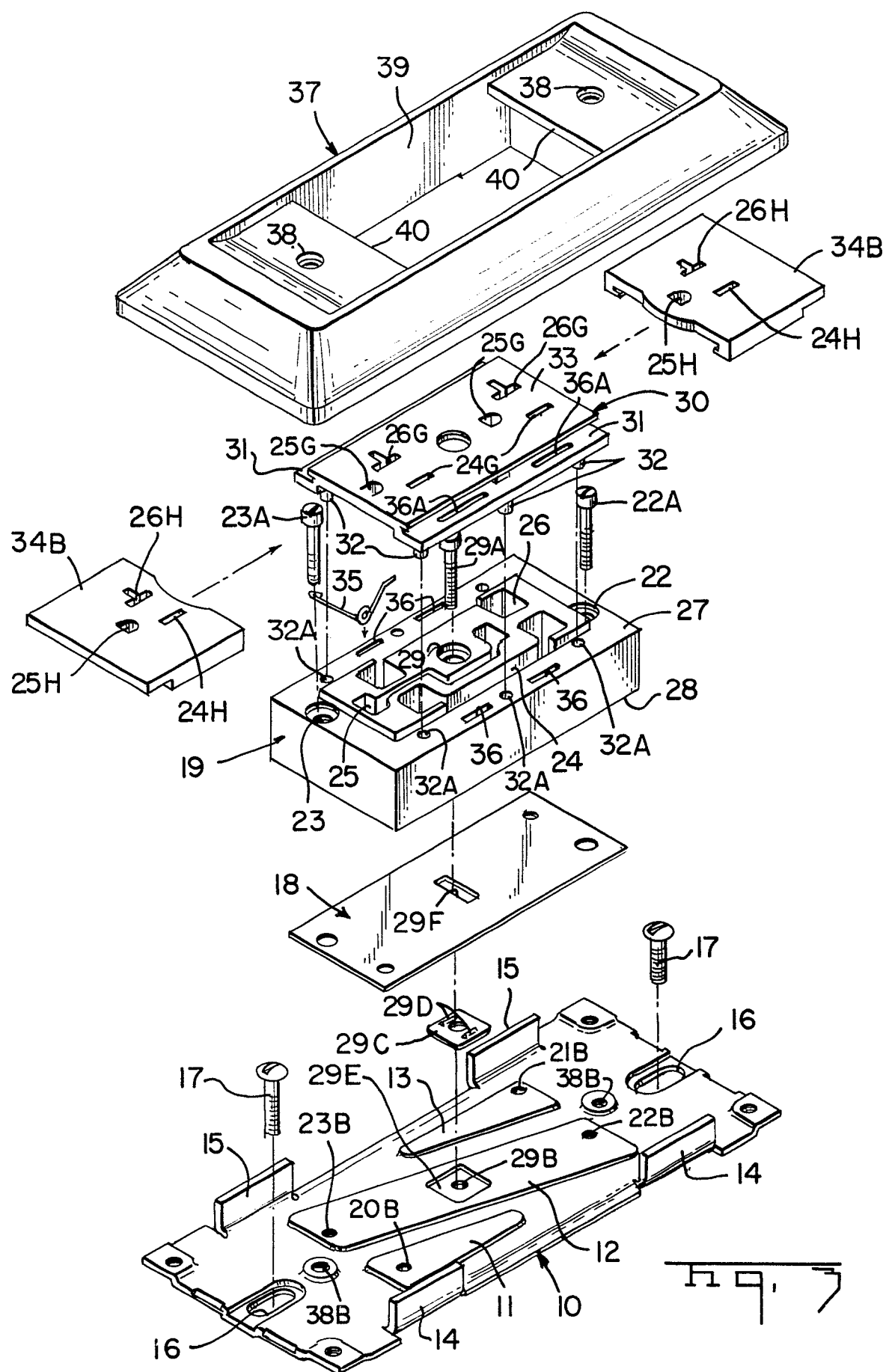
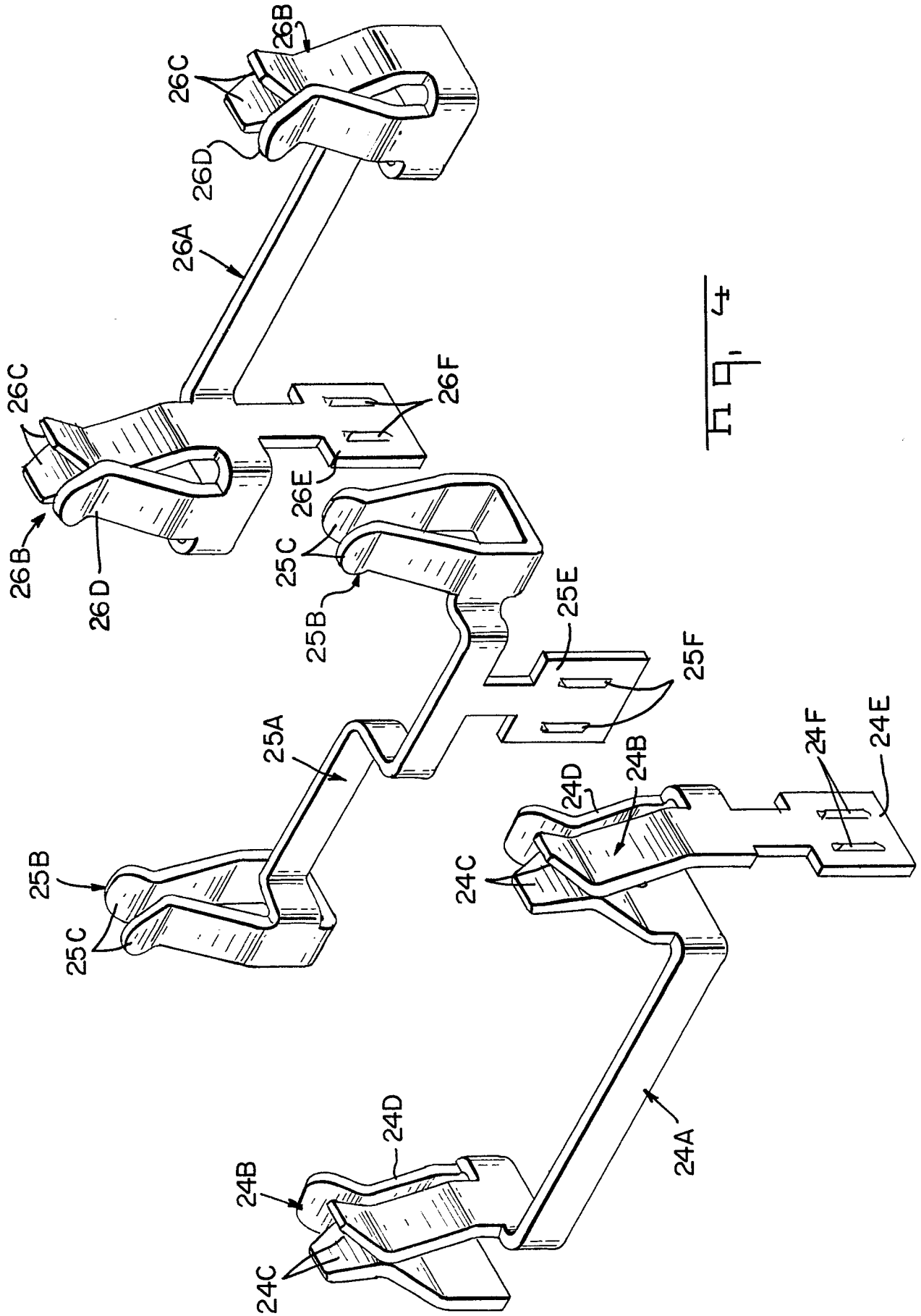


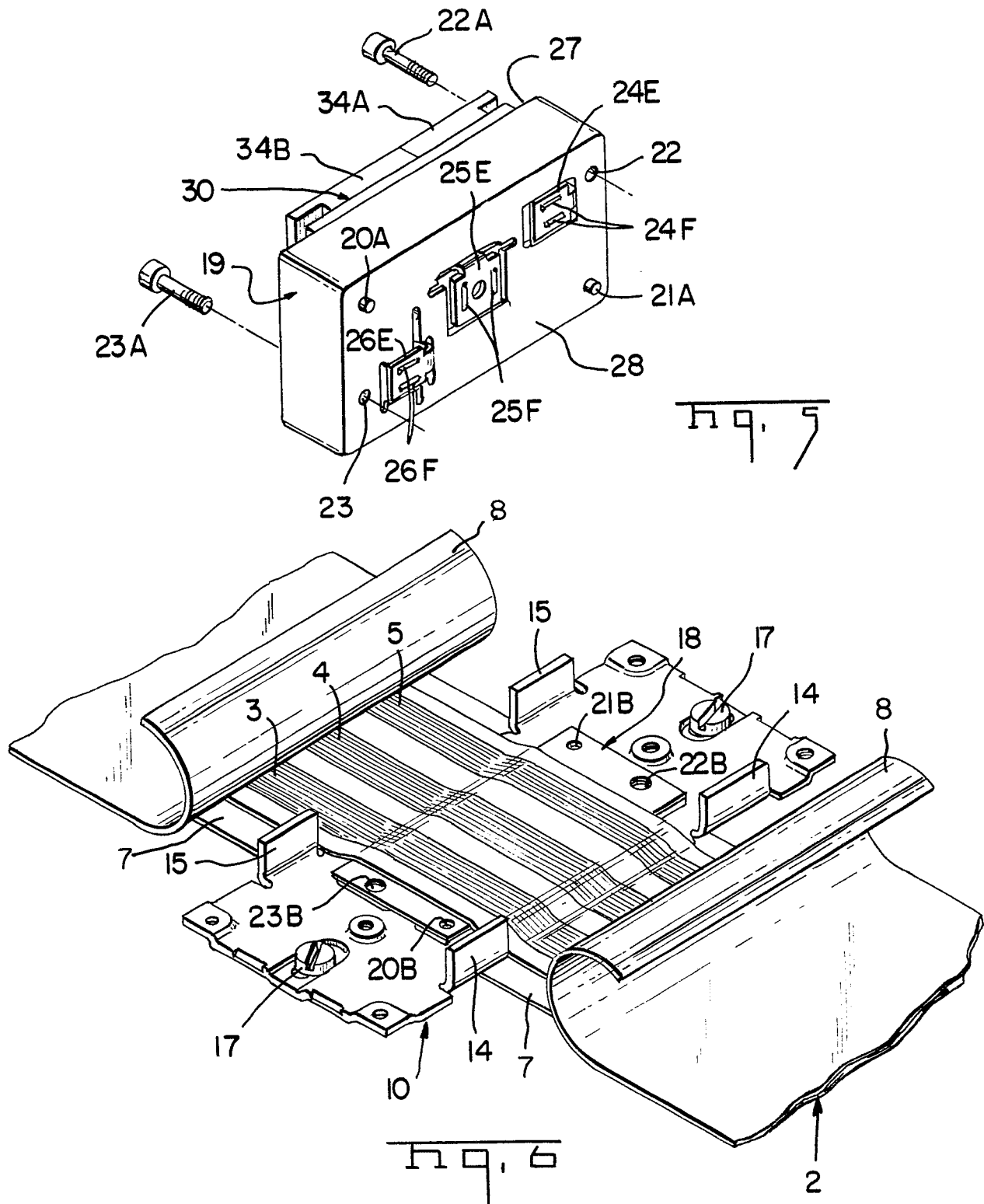
Fig. 1





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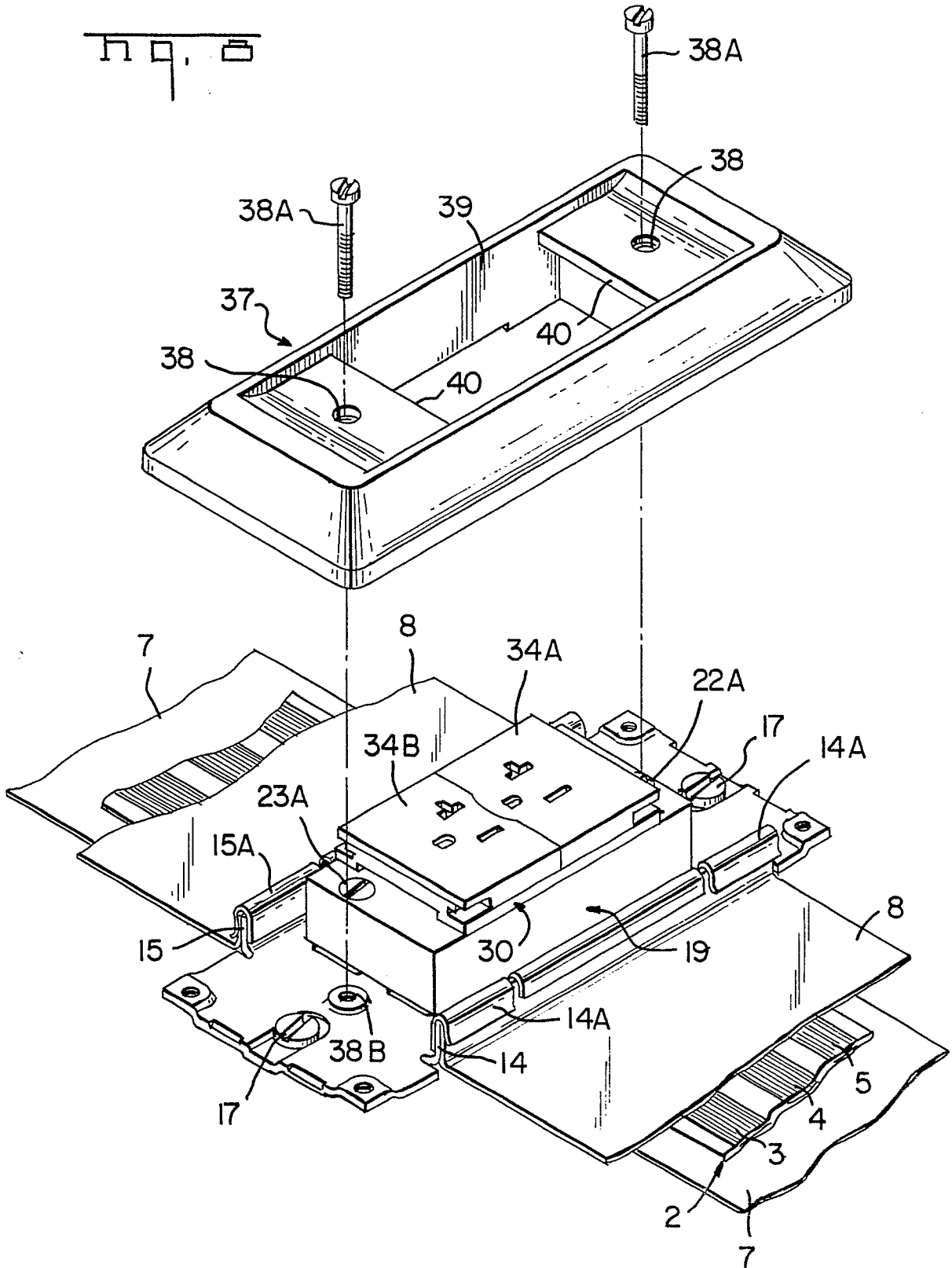
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Fig. 7 is an exploded perspective view of the assembly. It shows the base assembly (1) and the upper assembly (2) separated. The base assembly (1) includes a main body (1) with a top surface (2) and a bottom surface (3). It features a central channel (4) and side rails (5). A top plate (6) is shown with a central opening (7) and side flanges (8). The upper assembly (2) includes a main body (2) with a top surface (3) and a bottom surface (4). It features a central channel (5) and side rails (6). A top plate (7) is shown with a central opening (8) and side flanges (9). The exploded view shows the components being aligned for assembly.

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Fig. 6





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EUROPEAN SEARCH REPORT

0090494

Application number

EP 83 30 0934

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. ³)
A,D	US-A-4 240 688 (AMP) * Column 2, line 4 - column 3, line 22; figures 1-3 *	1	H 01 R 23/66 H 02 G 3/18 H 01 R 4/24
A	--- US-A-4 030 801 (AMP) * Abstract; figures 1-3 *	1	
A	--- FR-A-2 361 759 (AMP) * Figures 1-6 *	1	
A	--- FR-A-2 234 677 (ITT) * Page 3, lines 10-27; figures 3-5 *	1	

			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			H 01 R H 02 G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17-06-1983	Examiner LOMMEL A.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	