



(11) **EP 1 521 334 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
24.05.2017 Bulletin 2017/21

(51) Int Cl.:
H01R 9/24 (2006.01)

(21) Application number: **04425737.6**

(22) Date of filing: **01.10.2004**

(54) **Busbar assembly**

Sammelschienenanordnung

Dispositif de barres omnibus

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **01.10.2003 IT BA20030013 U**

(43) Date of publication of application:
06.04.2005 Bulletin 2005/14

(73) Proprietor: **SAEM S.r.l.
70022 Altamura, BA (IT)**

(72) Inventor: **Maggi, Francesco
70022 Altamura (IT)**

(74) Representative: **Bruni, Giovanni
Laforgia, Bruni & Partners
Via Michele Garruba, 3
70122 Bari (IT)**

(56) References cited:
**EP-A- 0 478 469 EP-A- 0 779 679
DE-U- 8 526 328 FR-A- 2 405 565**

EP 1 521 334 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a multipolar terminal board for electric panels.

[0002] Terminal boards are intended for distributing electric current to

[0003] numerous conductors, which are wired thereby inside electric panels or distribution systems.

[0004] Currently used terminal boards are made up of two flat plates of plastic material which, shaped in a specular manner, are kept parallel by mounting metal connection bars having the double function of wiring bars or terminal boards, and connection bars of said side plates. Such a terminal board is known from DE 8526328 U.

[0005] For remarkable levels of power, primary conductors supplying energy to bars/terminal boards have a great section and therefore it is provided the use of an additional greater terminal for each phase arranged on the surface of the plastic plates opposite to the one where the connection bars are joined; in particular, such additional terminal is provided with an end which is introduced in the side plastic plates from the surface opposite to the one where the connection bars are joined, up to reach and to be connected to the respective bar/terminal board by means of screws, in order to guarantee electric continuity to the wiring systems.

[0006] Aim of the present invention is to provide a new terminal board with easier assembly, thus reducing costs, but also easy to be disassembled for an easier access to conductors in case modifications of the electric system are needed.

[0007] The terminal board according to the invention is described in detail in the following and is shown by way of the appended drawings:

- 1) front view of the terminal board with partially removed portions;
- 2) bottom view of the terminal board with partially removed portions;
- 3) view of the surface (3.8s) of the left plate (3s);
- 4) view of the surface 3.9s of the left plate 3s;
- 5) view of the surface (3.8d) of the right plate (3d);
- 6) view of the surface (3.9d) of the right plate (3d);
- 7) magnified view of fig. 5) with portions highlighted;
- 8) connection cage (3.2d) with respective view C and section DD;
- 9) connection cage (3.3d) with respective view E;
- 10) view A of the right plate (3d);
- 11) view B of the plate (3d) with the housing of the sealing plate (21) highlighted, with respective views F and G;
- 12) sealing plate (21);
- 13) view H of only the lid (1) of the terminal board
- 14) view of the insulating plate (30) with respective view I
- 15) sequence view of insulator (4d), (4s) in the introduction direction of the metal terminal board (2) and respective section LL, view M, view N, section PP

and view O

16) front view of the terminal board (2) and respective top view Q

17) left connection bar (42) made up of the terminal board (2) introduced in the insulator (4s).

[0008] The present invention provides a terminal board which can be assembled and disassembled without that the operator needs to separate the terminal of the primary conductors from the terminal board of the secondary conductors.

[0009] In a preferred embodiment, such invention is made up of two parallel plates (3d) and (3s), provided with the same number of connection cages, for example (3.1d, 3.2d, 3.3d, 3.4d) as well as (3.1s, 3.2s, 3.3s, 3.4s); moreover, it is made up of plastic insulators (4s, 4d) which are identical and specular to each other, fig. 15); by introducing the metal terminal bar (2), provided with terminal connections for primary conductors, in the insulators the connection bars (42) are obtained whose ends are apt to be connected integrally to the connection cages provided on the plates (3d) and (3s), in order to constitute a unique body; the terminal board is possibly completed with the removable lid (1) and the insulation plate (30).

[0010] The connection cages are all made up of four right sides, three thereof being adjacent and perpendicular to each other and to the plane of the plate they belong to, and one lying in such plane and being adjacent to the first three ones. The introduction of the connection bars (42), fig. 17) in the respective cages occurs by making them moving parallel to themselves along respective directions (α , β , γ , δ) as shown in figs. 3) and 4). The same goes for the couple 3.2d and 3.4d.

[0011] Furthermore, the great cages (3.1d) and (3.3d) are specular and similarly made up of corresponding sides and angles equally dimensioned as the cages (3.2s) and (3.4s) on the left plate (3s), but they are all different for the introduction directions of the connection bars 42, which are respectively δ and β for the first two ones and γ and α for the other ones. The same goes for the small cages (3.2d, 3.4d, 3.1s, 3.3s).

[0012] To a great cage, for example (3.1d) on the plate (3d), a little cage corresponds in parallel, i.e. (3.1s) on the plate (3s); moreover, the cages are alternated on the same plate, i.e. a small cage, for example, has great cages adjacent and vice versa; the hooked ends (4.1) of the insulators (4) are introduced in the small cages, while the ends (4.2) in the great cages, so that the terminals (2.1) for primary conductors are spaced the most with respect to each other on the surfaces (3.9s) and (3.9d).

[0013] Given the above cited similarities, only a small cage and a great cage are analyzed in detail, for example (3.2d) and (3.3d). The cage (3.2d), (fig. 8) is made up of two parallel sides (7, 9) and a side (8) adjacent and perpendicular to the first two ones, and is characterized by a rounded area (8.1) and a hole (8.2) of rectangular shape. It is also made up of the side (10), adjacent and perpendicular to the first three ones and provided by the

same plate (3d) the cage belongs to. The only free edge of the side (10) has a right longitudinal concavity (10.1) on the surface (3.9d) and a right concavity (10.2) transverse and adjacent to the side 9, see section DD of fig. 8) and fig. 6). The side 9 has a retaining notch 9.1 on the surface facing the inside of the cage, which is apt to prevent the connection bar from going out in the direction opposite to the introduction along direction γ .

[0014] The great cage is made up of parallel sides 11 and 13 and a side 12 adjacent and perpendicular to the first two ones and is characterized by a rounded area 12.1. It is also made up of a side 14, adjacent and perpendicular to the first three ones and provided by the same plate 3d the cage belongs to. The side 13 has a retaining notch 13.1 facing the inside of the cage, which is apt to prevent the connection bar 42 from going out in the direction opposite to the introduction along direction β . The side (11) is characterized by a transverse fold (11.1), not on its axis, apt to house the thickness (2.11) of the metal bar (2) at the terminal (2.1) for primary conductor, fig. 16).

[0015] The side (14) has the only free edge characterized by a right convexity (14.1) transverse and adjacent to the side (13), figs. 6) and 9).

[0016] Sides (3.5d), (3.6d) and (3.7d) are specular to respective ones (3.5s), (3.6s) and (3.7s), see figs. 3), 4), 5) and 6).

[0017] Side (3.6) is made up of a flat plate perpendicular to the plane of the plate (3) and provided with a horizontal rectangular slit (15), which becomes a real hole with rectangular section when the thickness of plate (3) is exceeded, see figs. 7) and 10).

[0018] Side (3.5) is a flat plate perpendicular to plate (3d) and characterized by a tooth (16), see figs. 3) and 5). Side (3.7d), see fig. 7), is a flat plate characterized by two right and not in axis folds (17) and (18), so that in its profile a right concavity is provided which is apt to house the ISO standard supporting bar. The tooth (19), together with the end (21.1) of the blocking mobile plate (21) prevent the plates (3) from being disengaged from ISO supporting bar, as an alternative there is a hole (31) for wall mounting.

[0019] The blocking plate (21) is introduced in the suitable housing obtained on side (3.7) along the direction ε . The housing is made up of an inversed bridge (22) and two hooks (23), see fig. 11).

[0020] The elastic arms (21.2) of plate (21) are apt to be deformed suitably, thus allowing the plate (21) to slide, if pulled from the end (21.4) in the direction opposite to the introduction one, in order to allow the terminal board to be disengaged from the ISO bar, but anyway without that the plate (21) goes out completely from its housing.

[0021] The metal terminal bars (2), fig. 16) are all equal and are characterized by a sequence of connection terminals, whose introduction holes for conductors have suitably different diameters and are alternated so that adjacent terminal bars, since they are turned over in the alternating right and left insulators (4), have no holes with

great diameter aligned with the holes with great diameters on the adjacent bar, for a better distribution of conductors inside the terminal board.

[0022] The ends (4.1) of the insulators (4) are characterized by a hook (4.11) such that they match to the longitudinal groove (10.1) of side (10) of the small cage, moreover the stake (4.13) is apt to be introduced in the hole (8.2) of side (8), so that the connection bar is prevented from going out in the direction normal to the side plates (3). The hole (4.12) is apt to house the retaining tooth (9.1) apt to avoid that the bar goes out in the same introduction direction (α , β , γ , δ). The end (4.2) of the insulator is characterized by an opening (4.23), apt to house the end of the terminal board (2) provided with terminal (2.1) for primary conductor. The coupling of the connection bar in the cages determines the introduction of the side (14) of the great cage in the groove (42.1) and the retaining notch (13.1) in the hole (4.22), so that the end (4.2) is prevented from going out from the great cage both in the direction normal to the plate and in the same direction of introduction in the same.

[0023] The side (4.6) is provided with three tips (4.62) with respective stiffening wires (4.61) apt to contain better the metal terminal board (2) in the insulator, see fig. 15 section LL.

[0024] Side (4.7) is provided with other three stiffening wires (4.71) at the wires (4.61).

[0025] Lastly, side (4.8) is provided with three stiffening wires (4.81) inside the insulator, placed in correspondence of stiffening wires (4.61) and (4.71), and also a thickening (4.21) which continues outside on side (4.3) in the thickness (4.31).

[0026] The lid (1) is blocked on the terminal board, to cover wirings, by means of holes (27) coupling with the teeth (16) of plates (3) and by means of the teeth (26) engaging the holes (15) of plates (3), see figs. 1), 2), 3) and 5). The lid is removed by disengaging the teeth (26) by easily acting on the handles (24) thanks to the cuts (25) which increase the material elasticity.

[0027] Lastly, the insulator plate (30), fig. 14) is apt to avoid the possible contact of a peeled cable with the ISO metal supporting bar, moreover it is shaped so that it can be restrained between the two plates (3) by means of the extensions (28) of the surfaces (3.7), see fig. 11).

Claims

1. Multipolar terminal board for wiring electric cables on connection bars comprising:

- two parallel plates (3d) and (3s), each provided with the same number of connection cages, (3.1 d, 3.2d, 3.3d, 3.4d, 3.1 s, 3.2s, 3.3s, 3.4s);
- plastic insulators (4s, 4d) which are identical and specular to each other
- metal terminal bars (2), provided with terminal connections for primary conductors,

said terminal bars (2) being configured to be inserted in said insulators (4as, 4d) to obtain connection bars (42) whose ends are apt to be integrally connected to said connection cages provided on said parallel plates (3d) and (3s), in order to constitute a unique body

characterized in that said connecting bars (42) in use an angularly offset with respect to each other along their longitudinal axes (α , β , γ , δ) while remaining parallel to each other in different planes.

2. Multipolar terminal board for wiring electric cables on connection bars according to claim 1 **characterized in that** said cages are of two different sizes and **in that** to a great cage (3.1d) on the first of said parallel plates (3d), a little cage (3.1s) corresponds on the second of said parallel plates, (3s).
3. Multipolar terminal board for wiring electric cables on connection bars according to claim 2 **characterized in that** said great and little cages are alternated on the same plate.
4. Multipolar terminal board for wiring electric cables on connection bars according to one of preceding claims **characterized in that** said metal terminal bars (2), comprise a sequence of connection terminals, whose introduction holes for conductors have suitably different diameters and are alternated so that adjacent terminal bars, have no holes with great diameter aligned with the holes with great diameters on the adjacent bar.

Patentansprüche

1. Multipolare Klemmenleiste zur Verdrahtung von elektrischen Kabeln an Anschlussleisten, umfassend:

- zwei parallele Platten (3d) und (3s), die jeweils mit der gleichen Anzahl von Anschlusskäfigen (3.1d, 3.2d, 3.3d, 3.4d, 3.1s, 3.2s, 3.3s, 3.4s) versehen sind;
- Kunststoffisolatoren (4s, 4d), die identisch und spiegelbildlich zueinander sind
- Metallklemmen (2), die mit Klemmenanschlüssen für Primärleiter versehen sind,

wobei die besagten Klemmen (2) derart konfiguriert sind, dass sie in die besagten Isolatoren (4as, 4d) eingeführt werden können, um Verbindungsstangen (42) zu erhalten, deren Enden mit den an den besagten parallelen Platten (3d) und (3s) vorgesehenen Anschlusskäfigen integral verbunden sind, um einen einzigartigen Körper zu bilden

dadurch gekennzeichnet, dass die besagten Verbindungsstangen (42) im Gebrauch

im Winkel in Bezug zueinander entlang ihren Längsachsen (α , β , γ , δ) versetzt sind, wobei sie in verschiedenen Ebenen parallel zueinander bleiben.

2. Multipolare Klemmenleiste zur Verdrahtung von elektrischen Kabeln an Anschlussleisten nach Anspruch 1, **dadurch gekennzeichnet, dass** die besagten Käfige aus zwei verschiedenen Größen bestehen und dass einem großen Käfig (3.1d) auf der ersten der besagten parallelen Platten (3d) ein kleines Käfig (3.1s) auf der zweiten der besagten parallelen Platten (3s) entspricht.
3. Multipolare Klemmenleiste zur Verdrahtung von elektrischen Kabeln an Anschlussleisten nach Anspruch 2, **dadurch gekennzeichnet, dass** die besagten großen und kleinen Käfige sich auf derselben Platte abwechseln.
4. Multipolare Klemmenleiste zur Verdrahtung von elektrischen Kabeln an Anschlussleisten nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die besagten Metallklemmen (2) eine Folge von Anschlussklemmen aufweisen, deren Einführungslöcher für Leiter in geeigneter Weise unterschiedliche Durchmesser aufweisen und sich derart abwechseln, dass benachbarte Klemmenleisten keine Löcher mit großem Durchmesser aufweisen, die mit den Löchern mit großen Durchmessern an der benachbarten Leiste ausgerichtet sind.

Revendications

1. Bornier multipolaire pour câblage de câbles électriques sur des barres de connexion comprenant:

- deux plaques parallèles (3d) et (3s), chacune dotée du même nombre de cages de connexion, (3.1d, 3.2d, 3.3d, 3.4d, 3.1s, 3.2s, 3.3s, 3.4s);
- des isolateurs en plastique (4s, 4d) qui sont identiques et spéculaires les uns aux autres
- des barres de bornes métalliques (2), pourvues de connexions de bornes pour des conducteurs primaires,

lesdites barres de bornes (2) étant configurées pour être insérées dans lesdits isolateurs (4a, 4d) pour obtenir des barres de connexion (42) dont les extrémités peuvent être intégralement connectées auxdites cages de connexion prévues sur lesdites plaques parallèles (3d) et (3s) afin de constituer un corps unique

caractérisé en ce que

lesdites barres de connexion (42) en cours d'utilisation sont angulairement décalées l'une par rapport à l'autre le long de leurs axes longitudinaux (α , β , γ ,

δ), tout en restant parallèles entre elles dans des plans différents.

2. Bornier multipolaire pour câblage de câbles électriques sur des barres de connexion selon la revendication 1, **caractérisé en ce que** lesdites cages sont de deux tailles différentes et **en ce que** par rapport à une grande cage (3.1d) sur la première desdites plaques parallèles (3d), une petite cage (3.1s) correspond à la seconde desdites plaques parallèles, (3s). 5 10
3. Bornier multipolaire pour câblage de câbles électriques sur des barres de connexion selon la revendication 2, **caractérisé en ce que** lesdites grandes et petites cages sont alternées sur la même plaque. 15
4. Bornier multipolaire pour câblage de câbles électriques sur des barres de connexion selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdites barres de bornes métalliques (2) comprennent une séquence de bornes de connexion, dont les trous d'introduction pour les conducteurs ont des diamètres convenablement différents et sont alternés de sorte que des barres terminales adjacentes n'ont pas de trous avec un grand diamètre alignés avec les trous avec de grands diamètres sur la barre adjacente. 20 25

30

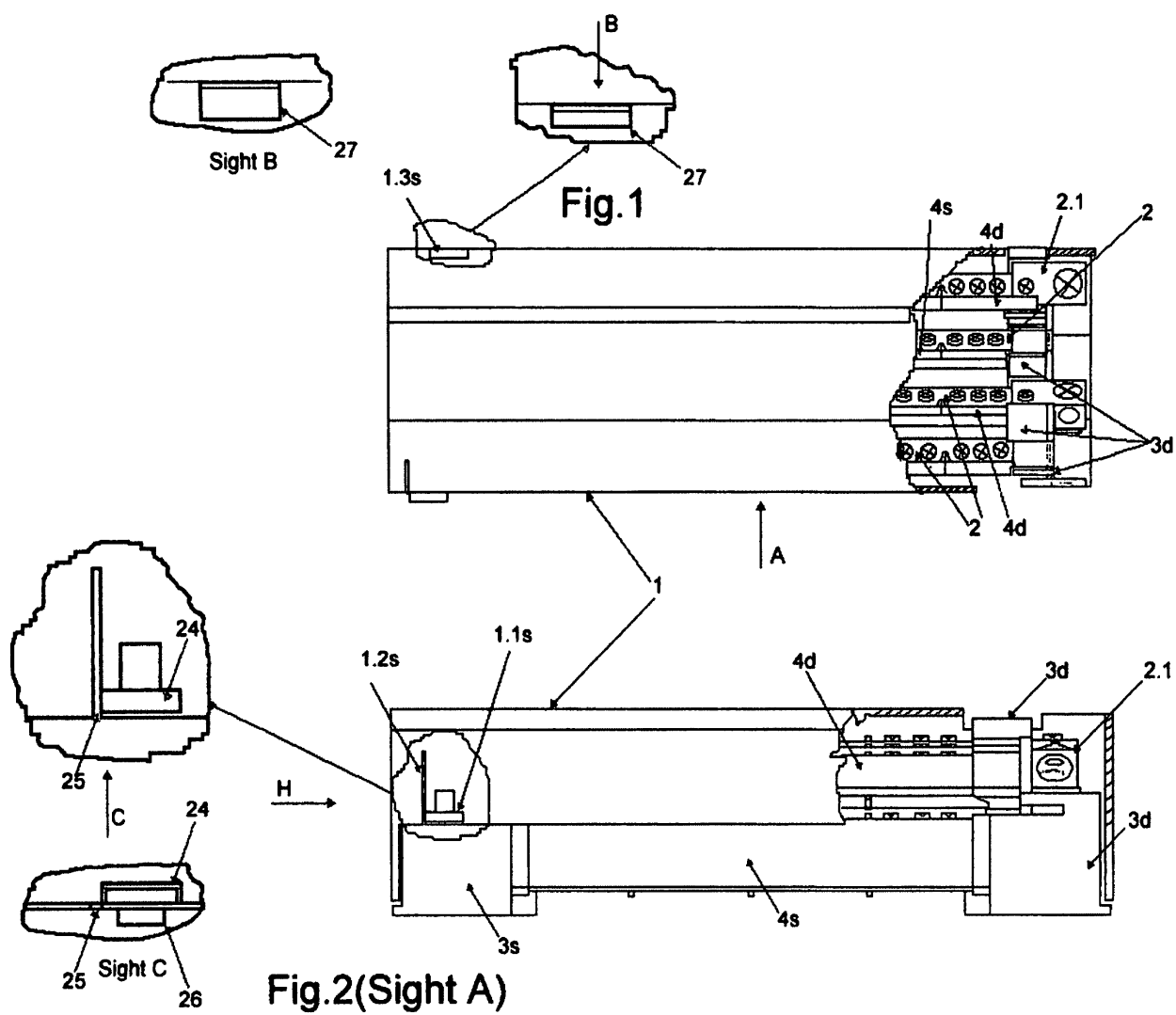
35

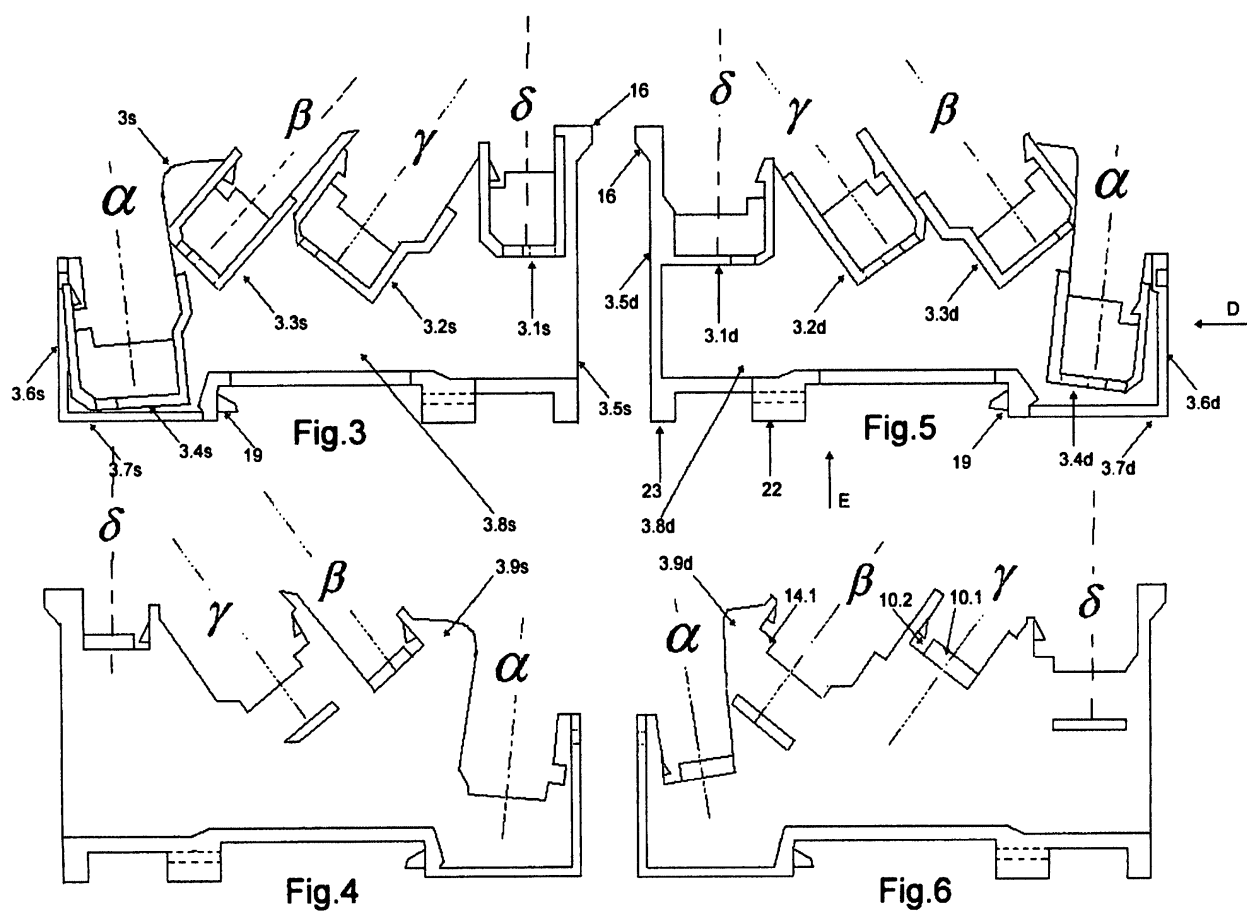
40

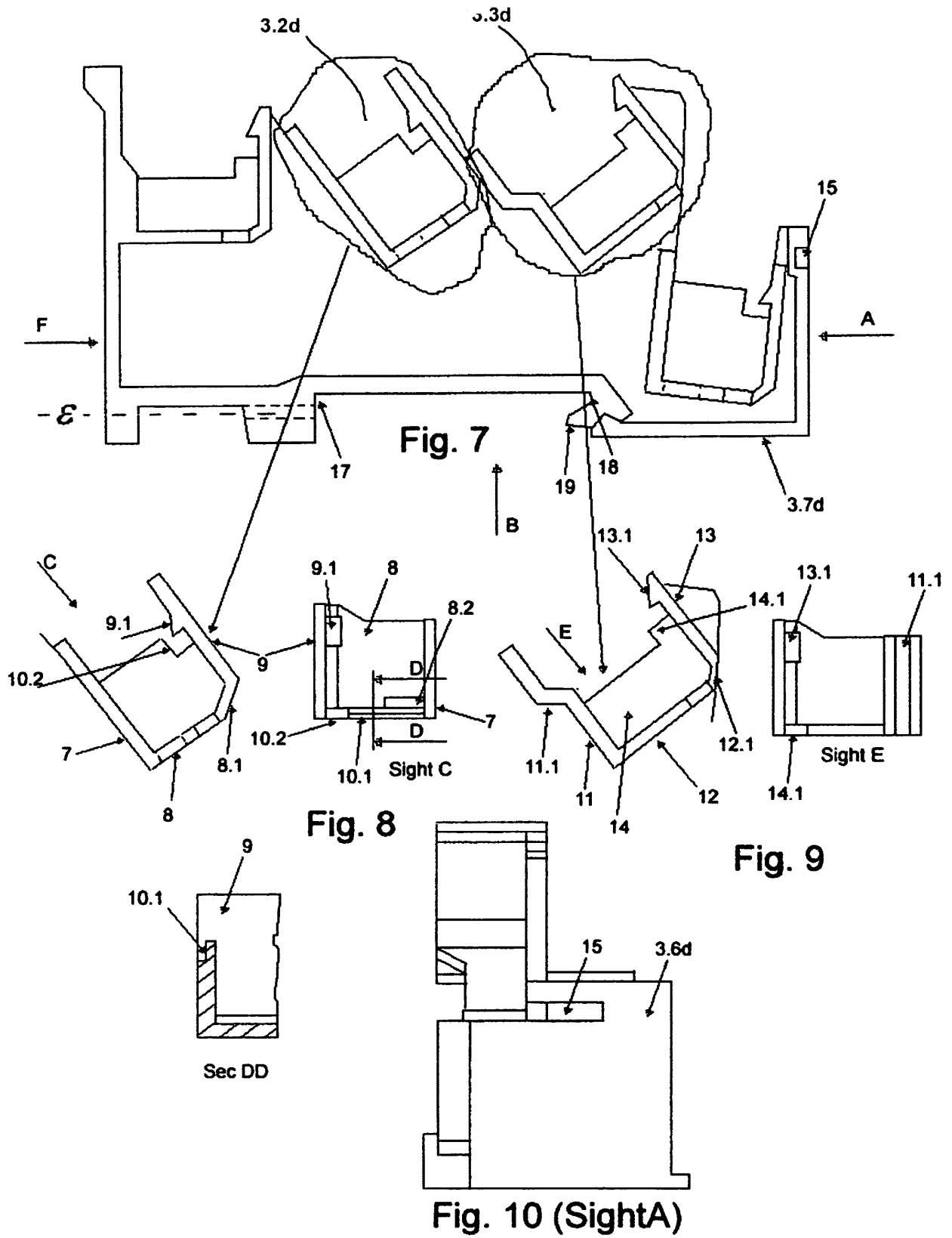
45

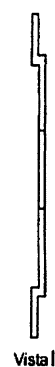
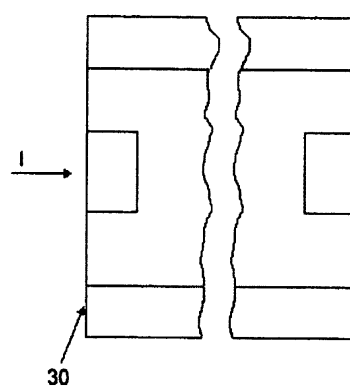
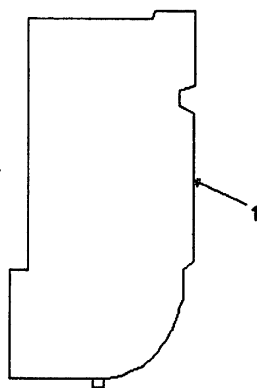
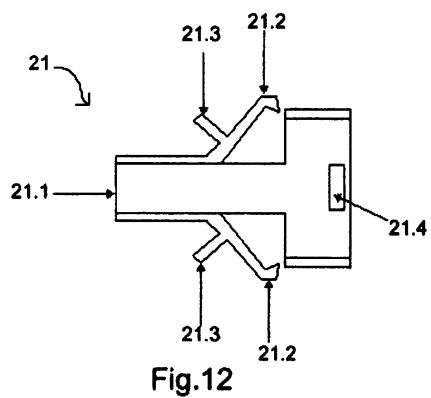
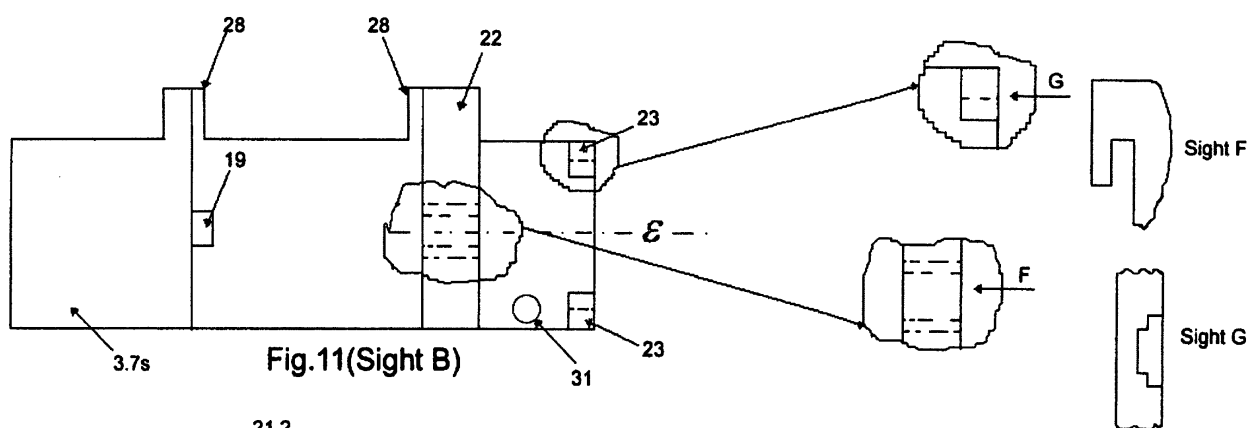
50

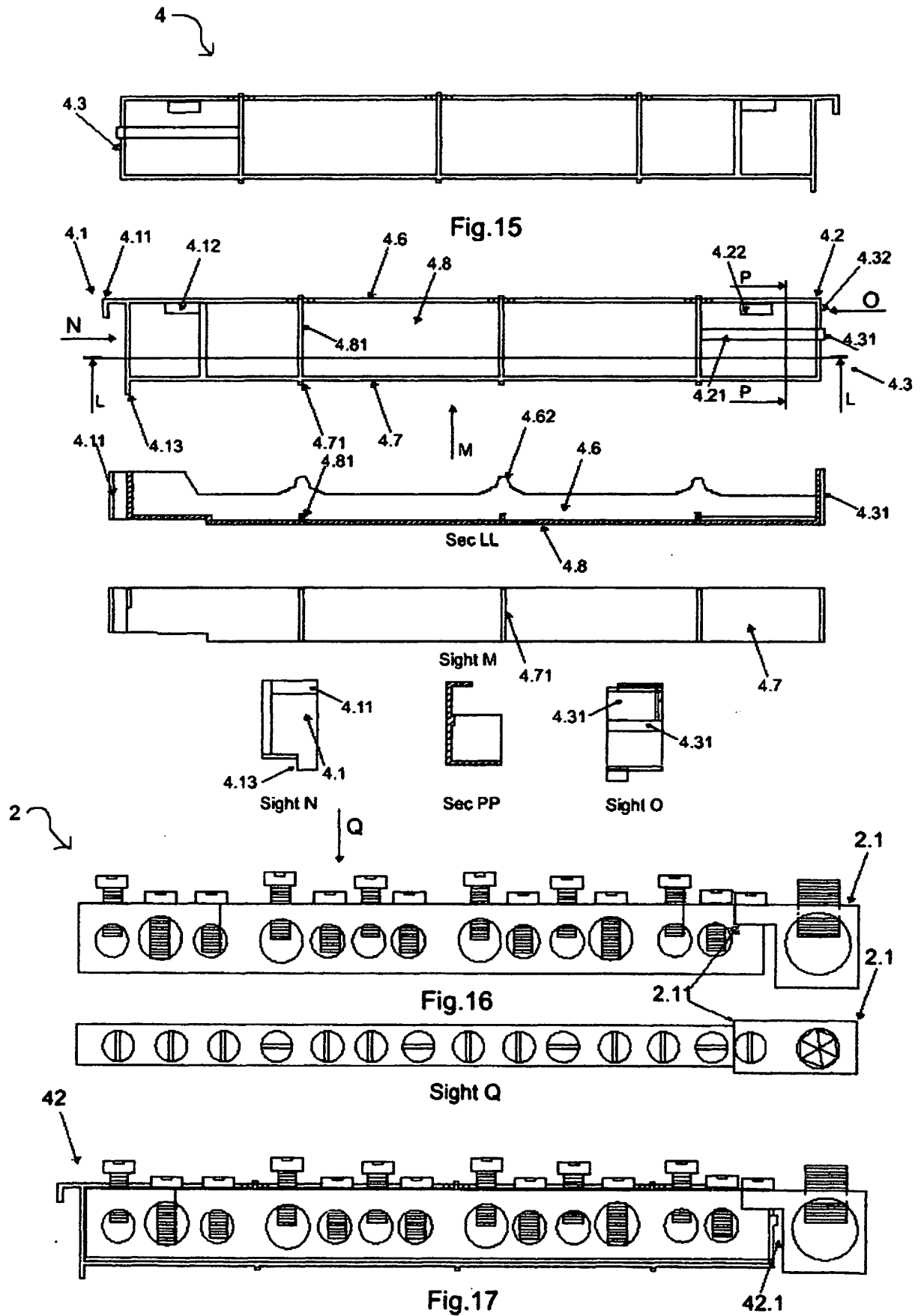
55











REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 8526328 U [0004]