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(54) **Connector**

Steckverbinder

Connecteur

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GB-A- 2 304 239**

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Description**FIELD OF THE INVENTION**

[0001] The invention relates to a connector for connecting an electric conductor to an electric device, and, in particular, to a connector, through which electricity is supplied to the electric device.

DESCRIPTION OF PRIOR ART

[0002] In connection with mounting electric devices in buildings, for instance, there is a need to connect an electric device to a power supply network in a manner which makes mounting work as reliable, simple and fast as possible. In mounting work of this kind a possibility of utilizing connectors mounted in advance in cables expedites the mounting work significantly. In that case the cables used may be prefabricated to given dimensions and their ends may be furnished with suitable connectors.

[0003] In practice, the mounting of electric devices is often implemented such that power supply will have a star-like configuration, i.e. power supply is provided by a separate branch or socket with a separate cable to each electric device. Thus, the connection point of the electric device is a terminating one, i.e. at the connection point there is no need to branch supply to other devices. Because no branching is made at the connection point, this solution allows reduction in the number of components. Thus, material savings are achieved.

[0004] In connection with electric installations, it is to be noted, however, that in case the electric device has to be detached later for servicing, for instance, the cable detached from the electric device and the relating connector may be live, i.e. connected to the power supply network, which has to be considered in the structure of the connector, so that a risk of an electric shock may be eliminated.

[0005] Currently known connectors are not able to meet the above requirements in a satisfactory manner.

[0006] Document WO-A-2009/124662 discloses a connector including a moving adapter, a moving plate and an attaching mechanism close to that of the present invention.

SUMMARY OF THE INVENTION

[0007] The object of the present invention is to solve the above-described problem and to provide a new connector, which enables simple, safe and cost-effective electric connection of electric devices. This is achieved by a connector in accordance with independent claim 1.

[0008] By means of cable securing parts the connector may be secured directly to an electric cable without extra parts. By means of a spacer and a blocking plate it is made sure that there is no access to electric contacts of the connector before the connector is reliably secured to a connector counterpart. In this manner connecting be-

comes simple, safe and cost-effective.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] In the following, the invention will be described in greater detail, by way of example, with reference to the attached drawings, in which

Figure 1 is an explosion view of a first embodiment of a connector,

Figures 2 and 3 illustrate the connector of Figure 1 in a first state,

Figure 4 illustrates a counterpart of the connector and

Figures 5 and 6 illustrate the connector of Figure 1 in a second state.

DESCRIPTION OF AT LEAST ONE EMBODIMENT

[0010] Figure 1 is an explosion view of a first embodiment of a connector 1, and in Figures 2 and 3 the connector 1 is seen in a first state, where it is not connected to a counterpart of the connector 1. Figure 2 is a side view of an assembled connector, seen obliquely, and Figure 3 is a cross-sectional view of the connector 1.

[0011] The connector 1 includes a body 2, wherefrom project electric contacts 3. The body also includes a cable securing part 4, which in this example consists of parts which are arranged on opposite sides of the electric cable and whose mutual distance, and consequently pressing force exerted on the cable, is adjustable by means of screws 5. By means of the cable securing part 4 it is thus possible to implement effective strain relief for the cable. Alternatively, the cable securing part may consist of a body 2 and a cover 26 attachable thereto, between which the cable is pressed when the cover is secured to place. Securing of the cover 26 may be carried out by screws, for instance.

[0012] The connector 1 also includes conductor securing parts 22 for receiving individual conductors of the electric cable and for connecting them to the electric contacts 3. In the example of the figures, the conductor securing parts 22 are implemented by securing screws 26, which press the conductors arranged in the conductor securing parts 22 against the walls of the conductor securing parts 22 in order to provide electrical contact. Alternatively, the conductor securing parts may consist of spring connectors or clamp connectors, for instance.

[0013] To the body 2 there is movably attached a spacer 6 whose side 7 facing away from the body 2 is provided with openings 8 for electric contacts 3. The spacer is movable between a detached position and an attached position. In Figures 2 and 3 the spacer 6 is seen in the detached position, where it is when the connector 1 is not attached to the counterpart of the connector 1. In the detached position the electric contacts 3 are in a space defined by the body and the spacer 6, i.e. they do not project from the openings 8 on the side 7 of the spacer.

Hence, a person handling the connector 1 cannot touch the electric contacts 3 by accident and a risk of electric shock can be eliminated.

[0014] The connector 1 also includes a blocking plate 9, which is movable between a blocking position and a connecting position. In the blocking position the openings are offset in relation to the electric contacts 3, i.e. even though the body 2 and the spacer 6 are pressed against one another to make the spacer shift from the detached position to the attached position, the electric contacts are not able to penetrate through the openings 10 in the blocking plate 9, but the electric contacts 3 hit the blocking plate. By contrast, when the blocking plate 9 is moved to the connecting position, the openings 10 in the blocking plate 9 are in alignment with the electric contacts 3 such that pressing the body 2 and the spacer 6 towards one another to make the spacer 6 shift to the attached position makes the electric contacts 3 penetrate through the openings in the blocking plate 9. In that case the electric contacts 3 project from the connector 1 and they may form electrical contact with corresponding contacts in the counterpart of the connector.

[0015] Figure 1 also shows a projection 24 from the blocking plate 9, which projection goes through an opening 8 on the side 7 when the connector 1 is assembled. By means of said projection 24 the blocking plate is translatable between the blocking position and the connecting position in a manner to be described later.

[0016] The body, spacer and blocking plate of the connector may be made of a suitable isolating material, such as plastic. The electric contacts and the conductor securing parts connected thereto, in turn, may be made of a suitable electrically conductive metal alloy.

[0017] Figure 4 illustrates a counterpart of the connector 1 applicable for being utilized together with the connector 1 shown in Figures 1 to 3 and 5 to 6.

[0018] In this example the counterpart 21 of the connector is attached to an electric device 11 that may be an illuminator, for instance. In this manner, electricity can be supplied to the illuminator by means of the connector.

[0019] The counterpart 21 includes a part inside the electric device, which part comprises conductor securing parts 12 for receiving the electric conductors by which the internal circuitry of the electric device is implemented. In the example of Figure 4 it is assumed that said conductor securing parts 12 are spring clips. Projections 12 having electric contacts 14 for receiving the electric contacts 3 of the connector 1 project from the counterpart 21 outside of the electric device through the openings in the electric device.

[0020] In order to attach and electrically connect the connector to the counterpart 21 the connector 1 is first set on the projections 13 of the counterpart 21. At the same time, a hook 15 (or hooks) in the body of the connector penetrates into an opening 23 in the electric device 11. In the example of Figure 4, a projection 24 of the blocking plate 9, which is in the blocking position, penetrates into an opening 25 in the middle projection 13 of

the counterpart 21. The openings 8 on the side 7 facing away from the body 2 of the connector 1 are designed to have such dimensions that in this situation the connector 1 may be moved laterally along the surface of the device 11. By the effect of this lateral movement the blocking plate 9, whose projection 24 is engaged in the opening 25 of the projection 13, remains in place with respect to the electric device 11, whereas other parts of the connector 1 move in the lateral direction. By the effect of the lateral movement the blocking plate 9 moves in the connector 1 from the original blocking position to the connecting position. So the openings 10 in the blocking plate 9 are placed in alignment with the electric contacts 3 of the connector 1.

[0021] Thanks to the lateral movement, pins 16 projecting from the body will also be aligned with openings 17 in the counterpart 21. In this situation the body 2 may be pressed towards the spacer 6 and the electric device 11, whereby the openings 10 in the blocking plate 9 allow the electric contacts 3 to penetrate out of the connector 1 and further into the electric contacts 14 in the projections 13. At the same time, the pins 16 also penetrate into the openings 17 in the counterpart 21.

[0022] In this manner the connector 1 will be attached to the counterpart 21. Thanks to the lateral movement the hook 15 or hooks have moved in the openings 23 to a position, in which they grip the electric device 11. This enhances the attachment of the connector 1 to the electric device.

[0023] Figures 5 and 6 illustrate the connector of Figure 1 in the second state. Figure 5 is a side view of an assembled connector 1, seen obliquely, and Figure 6 is a cross-sectional view of the connector 1. Figure 5 also shows an electric cable 18 that is attached to the connector 1 for providing power supply to the electric device 11 through the connector 1.

[0024] In Figures 5 and 6 the spacer 6 is seen in the attached position, in which it is when the connector 1 is attached to the counterpart 21 of the connector 1. When Figures 2 and 3 are compared with Figures 5 and 6, it is noted that in the attached position the spacer 6 has moved from the detached position towards the body 2. Hence, the projections 3 attached to the body 2 have been able to protrude through the openings 10 in the blocking plate and the openings 8 on the side 7.

[0025] It is also seen in Figure 5 that the body 2 and the spacer 6 include gripping parts 19 and 20, which, the spacer 6 being in the attached position, interlock the body 2 and the spacer 6 thus preventing their mutual movement. The gripping part 19 of the body 2 may consist of a hook, for instance, and the gripping part 20 of the spacer may consist of a shoulder, whereby the hook grips the shoulder, when the body and the spacer are pressed against one another such that the spacer shifts to the attached position. By bending the hook the gripping parts 19 and 20 may be detached from one another when it is time to remove the connector 1 from the counterpart 21.

[0026] By means of design and dimensions the open-

ings 8 on the side 7 of the connector 1 may be coded such that the connector 1 is connectable only to a correct counterpart 21. In other words, in case the shapes of the counterpart projections 13 and the openings 8 are not compatible, the attachment of the connector 1 to the counterpart 21 will not succeed.

[0027] It is to be understood that the above description and the relating figures are only intended to illustrate the present invention. It is apparent to a person skilled in the art that the invention may be modified and altered in a variety of ways without deviating from the scope of the invention.

Claims

1. A connector (1) for connecting an electric conductor to an electric device (11), the connector (1) comprising:

a body (2), from which electric contacts (3) project for providing electrical contact with electric contacts (14) of a connector counterpart (21), and which includes a cable securing part (4) and conductor securing parts (22) for receiving an electric cable (18) and for connecting individual conductors in said electric cable to said electric contacts (3),

a spacer (6) which is movably connected to the body (2) and whose side (7) facing away from the body (2) comprises openings (8) for the electric contacts (3) and which is movable between a detached and an attached position with respect to the body (2), whereby, the spacer (6) being in the detached position, said electric contacts (3) are located in a space defined by the body (2) and the spacer (6), and, the spacer (6) having been moved from the detached position towards the body (2) and having reached the attached position, the electric contacts (3) project from the openings (8) on the side (7) of the spacer (6), and

a blocking plate (9) which is located in the vicinity of the spacer side (7) comprising openings (8) and which comprises openings (10), whereby said blocking plate (9) is movable between a blocking position and a connecting position, whereby in the blocking position the openings (10) of the blocking plate (9) are offset in relation to the electric contacts (3) and thus the blocking plate prevents the electric contacts (3) from projecting through the blocking plate (9), whereas in the connecting position the openings (10) of the blocking plate (9) are in alignment with the electric contacts (3) enabling projection of the electric contacts (3) through the blocking plate (9) and further towards the openings (8) of the spacer (6), and

that at least one of the openings (8) on the side (7) of the spacer (6) is designed to allow penetration of a projection (24) in the blocking plate (9) into an opening (25) of a connector counterpart (21) and to allow a lateral movement of the body (2) and the spacer (6), while said projection (24) is in the opening (25) of the counterpart (21), so as to move said blocking plate (9) from the blocking position to the connecting position.

2. The connector of claim 1, **characterized in that** in the body (2) of the connector (1) there is formed a hook (15), which, the connector (1) being attached to the connector counterpart (21), grips the connector counterpart (21) or the electric device (11) to which the counterpart (21) is attached.
3. The connector of any one of claims 1 to 2, **characterized in that** the connector (1) is a power supply connector, through which electricity is supplied to an electric device (11).
4. The connector of any one of claims 1 to 3, **characterized in that** the electric device (11) is an illuminator.
5. The connector of any one of claims 1 to 4, **characterized in that** the cable securing part (4) comprises parts which are arranged on the opposite sides of the electric cable (18) and whose mutual distance, and consequently pressing force exerted on the cable, is adjustable by means of screws (5).
6. The connector of any one of claims 1 to 5, **characterized in that** the conductor securing parts (22) comprise securing screws (26) or springs for pressing the conductors against the walls of the conductor securing parts (22).
7. The connector of any one of claims 1 to 6, **characterized in that** the openings (8) on the side (7) of the spacer (6) of the connector (1) are coded, by means of their design, to be compatible only with a connector counterpart (21) having a predetermined design.
8. The connector of any one of claims 1 to 7, **characterized in that** the body (2) and the spacer (6) are provided with gripping parts (19, 20), which, the spacer (6) being in the attached position, interlock the body (2) and the spacer (6) thus preventing their mutual movement.

Patentansprüche

1. Ein Steckverbinder (1) zum Verbinden einer elektrischen Leitung an ein elektrisches Gerät (11), wobei

der Steckverbinder Folgendes aufweist:

einen Körper (2), von welchem elektrische Kontakte (3) hervortreten, um Kontakt mit elektrischen Kontakten (14) eines Steckverbindergegenstücks (21) zu schaffen, und welcher einen Kabelsicherungsteil (4) und Leitungssicherungsteile (22) aufweist, um ein elektrisches Kabel (18) zu empfangen und um individuelle Leitungen in dem besagten elektrischen Kabel mit den besagten elektrischen Kontakten (3) zu verbinden,

einen Abstandhalter (6), der beweglich mit dem Körper (2) verbunden ist und dessen von dem Körper (2) abgewandte Seite (7) Öffnungen (8) für die elektrischen Kontakte (3) aufweist und der zwischen einer losgelösten und einer festgemachten Position in Bezug auf den Körper (2) bewegbar ist, wobei, wenn der Abstandhalter (6) in der losgelösten Position ist, die besagten elektrischen Kontakte (3) sich in einem, durch den Körper (2) und dem Abstandhalter (6) definierten Raum befinden, und, wenn der Abstandhalter (6) von der losgelösten Position in Richtung auf den Körper (2) bewegt worden ist und die festgemachte Position erreicht hat, die elektrischen Kontakte (3) aus den Öffnungen (8) auf der Seite (7) des Abstandhalters (6) hervortreten, und

eine Blockierungsplatte (9), die in der Nähe der Seite (7) des Abstandhalters, der Öffnungen (8) aufweist, platziert ist und die Öffnungen (10) aufweist, wobei die besagte Blockierungsplatte (9) zwischen einer Blockierungsposition und einer Verbindungsposition bewegbar ist, wobei in der Blockierungsposition die Öffnungen (10) der Blockierungsplatte (9) in Bezug auf die elektrischen Kontakte (3) versetzt sind und dadurch die Blockierungsplatte die elektrischen Kontakte (3) hindern, durch die Blockierungsplatte (9) hindurchzutreten, während in der Verbindungsposition die Öffnungen (10) der Blockierungsplatte (9) mit den elektrischen Kontakten (3) übereinstimmen und das Hindurchtreten der elektrischen Kontakte (3) durch die Blockierungsplatte (9) und weiterhin in Richtung auf die Öffnungen (8) des Abstandhalters (6) erlauben, und

dass mindestens eine der Öffnungen (8) auf der Seite (7) des Abstandhalters (6) angeordnet ist, das Eindringen eines Vorsprungs (24) in der Blockierungsplatte (9) in eine Öffnung (25) eines Steckverbindergegenstücks (21) und eine seitliche Bewegung des Körpers (2) und des Abstandhalters (6) zu erlauben, während der besagte Vorsprung (24) in der Öffnung (25) des Gegenstücks (21) ist, um die besagte Blockierungsplatte (9) von der Blockierungsposition in

die Verbindungsposition zu bewegen.

2. Der Steckverbinder gemäß dem Patentanspruch 1, **dadurch gekennzeichnet, dass** in dem Körper (2) des Steckverbinders (1) ein Haken (15) ausgebildet ist, der, wenn der Steckverbinder (1) an dem Steckverbindergegenstück (21) festgemacht ist, das Steckverbindergegenstück (21) oder das elektrische Gerät (11) greift, an dem das Gegenstück (21) festgemacht ist.
3. Der Steckverbinder gemäß einem der Patentansprüche 1 bis 2, **dadurch gekennzeichnet, dass** der Steckverbinder (1) ein kraftversorgender Steckverbinder ist, durch welchen Elektrizität an ein elektrisches Gerät (11) geliefert wird.
4. Der Steckverbinder gemäß einem der Patentansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das elektrische Gerät (11) ein Beleuchtungskörper ist.
5. Der Steckverbinder gemäß einem der Patentansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der Kabelsicherungsteil (4) Teile aufweist, die auf den entgegengesetzten Seiten des elektrischen Kabels (18) angeordnet sind und deren gegenseitiger Abstand, und daraus folgend die auf das Kabel ausgeübte Kraft mit Hilfe von Schrauben (5) regulierbar ist.
6. Der Steckverbinder gemäß einem der Patentansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Leitungssicherungsteile (22) Sicherungsschrauben (26) oder Sicherungsfedern aufweisen, um die Leitungen gegen die Wände der Leitungssicherungsteile (22) zu drücken.
7. Der Steckverbinder gemäß einem der Patentansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Öffnungen (8) auf der Seite (7) des Abstandhalters (6) des Steckverbinders (1) mit Hilfe ihrer Konstruktion kodiert sind, um nur mit einem Steckverbindergegenstück (21) mit einer vorherbestimmten Konstruktion kompatibel zu sein.
8. Der Steckverbinder gemäß einem der Patentansprüche 1 bis 7, **dadurch gekennzeichnet, dass** der Körper (2) und der Abstandhalter (6) mit Greifteilen (19, 20) versehen sind, die, wenn sich der Abstandhalter (6) in der festgemachten Position befindet, den Körper (2) und den Abstandhalter (6) an einander festmachen und somit ihre gegenseitige Bewegung verhindern.

Revendications

1. Connecteur (1) pour connecter un conducteur électrique à un dispositif électrique (11), le connecteur

(1) comprenant :

un corps (2) à partir duquel des contacts élec-
triques (3) font saillie pour fournir le contact élec-
trique avec des contacts électriques (14) d'une
contrepour partie de connecteur (21), et qui com-
prend une partie de fixation de câble (4) et des
parties de fixation de conducteur (22) pour re-
cevoir un câble électrique (18) et pour connecter
des conducteurs individuels dans ledit câble
électrique auxdits contacts électriques (3),
un dispositif d'espacement (6) qui est connecté
de manière mobile au corps (2) et dont le côté
(7) faisant face à distance du corps (2) com-
prend des ouvertures (8) pour les contacts élec-
triques (3) et qui est mobile entre une position
détachée et une position fixée par rapport au
corps (2), moyennant quoi, lorsque le dispositif
d'espacement (6) est dans la position détachée,
lesdits contacts électriques (3) sont positionnés
dans un espace défini par le corps (2) et le dis-
positif d'espacement (6) et lorsque le dispositif
d'espacement (6) a été déplacé de la position
détachée vers le corps (2) et a atteint la position
fixée, les contacts électriques (3) font saillie des
ouvertures (8) sur le côté (7) du dispositif d'es-
pacement (6), et
une plaque de blocage (9) qui est positionnée à
proximité du côté (7) du dispositif d'espacement
comprenant des ouvertures (8) et qui comprend
des ouvertures (10), moyennant quoi ladite pla-
que de blocage (9) est mobile entre une position
de blocage et une position de connexion,
moyennant quoi dans la position de blocage, les
ouvertures (10) de la plaque de blocage (9) sont
décalées par rapport aux contacts électriques
(3) et donc la plaque de blocage empêche les
contacts électriques (3) de faire saillie à travers
la plaque de blocage (9), alors que dans la po-
sition de connexion, les ouvertures (10) de la
plaque de blocage (9) sont alignées avec les
contacts électriques (3) permettant la saillie des
contacts électriques (3) à travers la plaque de
blocage (9) et en outre vers les ouvertures (8)
du dispositif d'espacement (6), et
en ce qu'au moins l'une des ouvertures (8) sur
le côté (7) du dispositif d'espacement (6) est
conçue pour permettre la pénétration d'une
saillie (24) dans la plaque de blocage (9) dans
une ouverture (25) d'une contrepour partie de con-
necteur (21) et pour permettre un mouvement
latéral du corps (2) et du dispositif d'espacement
(6), alors que ladite saillie (24) est dans l'ou-
verture (25) de la contrepour partie (21), afin de déplacer
ladite plaque de blocage (9) de la position de
blocage à la position de connexion.

ce que, dans le corps (2) du connecteur (1), on forme
un crochet (15) qui, lorsque le connecteur (1) est fixé
à la contrepour partie de connecteur (21), saisit la contre-
partie de connecteur (21) ou le dispositif électrique
(11) auquel la contrepour partie (21) est fixée.

3. Connecteur selon l'une quelconque des revendica-
tions 1 à 2, **caractérisé en ce que** le connecteur (1)
est un connecteur d'alimentation de courant, à tra-
vers lequel l'électricité est amenée à un dispositif
électrique (11).
4. Connecteur selon l'une quelconque des revendica-
tions 1 à 3, **caractérisé en ce que** le dispositif élec-
trique (11) est un dispositif d'éclairage.
5. Connecteur selon l'une quelconque des revendica-
tions 1 à 4, **caractérisé en ce que** la partie de fixa-
tion de câble (4) comprend des parties qui sont agen-
cées sur les côtés opposés du câble électrique (18)
et dont la distance mutuelle et par conséquent la
force de pression exercée sur le câble, est ajustable
au moyen de vis (5).
6. Connecteur selon l'une quelconque des revendica-
tions 1 à 5, **caractérisé en ce que** les parties de
fixation de conducteur (22) comprennent des vis de
fixation (26) ou des ressorts pour comprimer les con-
ducteurs contre les parois des parties de fixation de
conducteur (22).
7. Connecteur selon l'une quelconque des revendica-
tions 1 à 6, **caractérisé en ce que** les ouvertures
(8) sur le côté (7) du dispositif d'espacement (6) du
connecteur (1) sont codées, au moyen de leur con-
ception, pour être compatibles uniquement avec une
contrepour partie de connecteur (21) ayant une concep-
tion prédéterminée.
8. Connecteur selon l'une quelconque des revendica-
tions 1 à 7, **caractérisé en ce que** le corps (2) et le
dispositif d'espacement (6) sont prévus avec des
parties de préhension (19, 20) qui, lorsque le dispo-
sitif d'espacement (6) est dans la position fixée, blo-
quent mutuellement le corps (2) et le dispositif d'es-
pacement (6), empêchant ainsi leur mouvement mu-
tuel.

2. Connecteur selon la revendication 1, **caractérisé en**

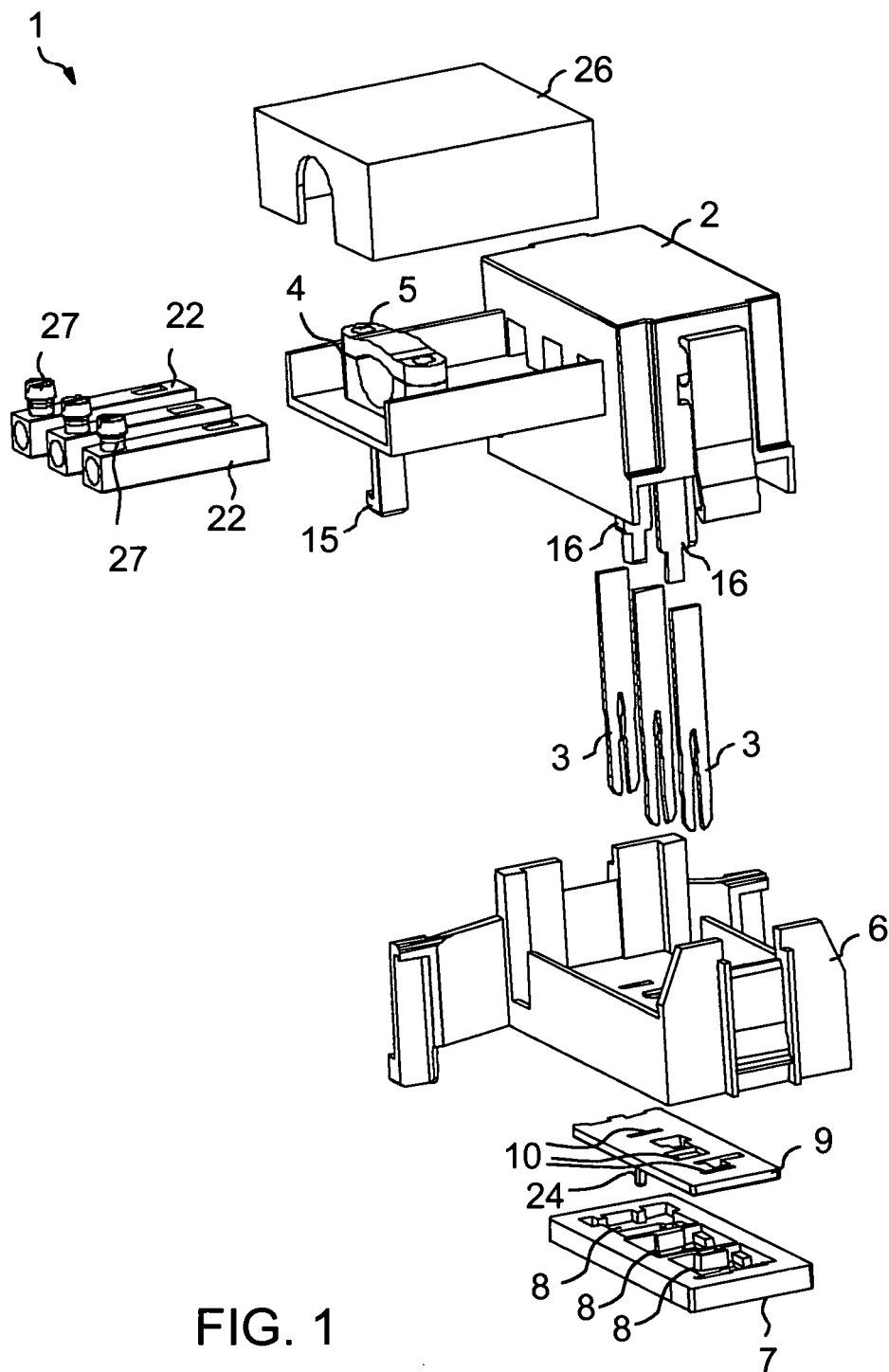


FIG. 1

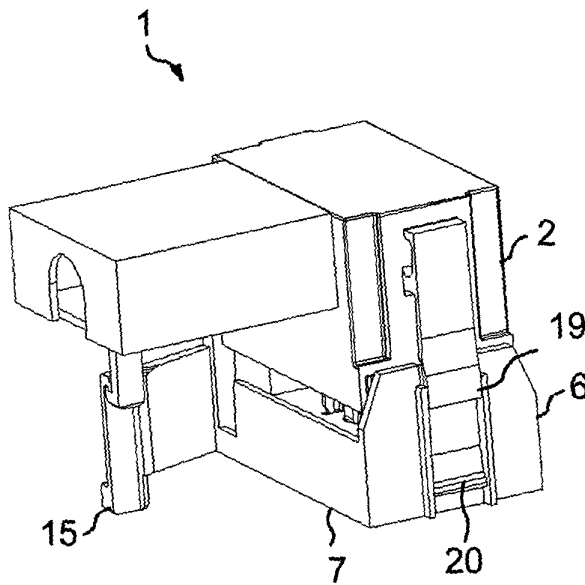


FIG. 2

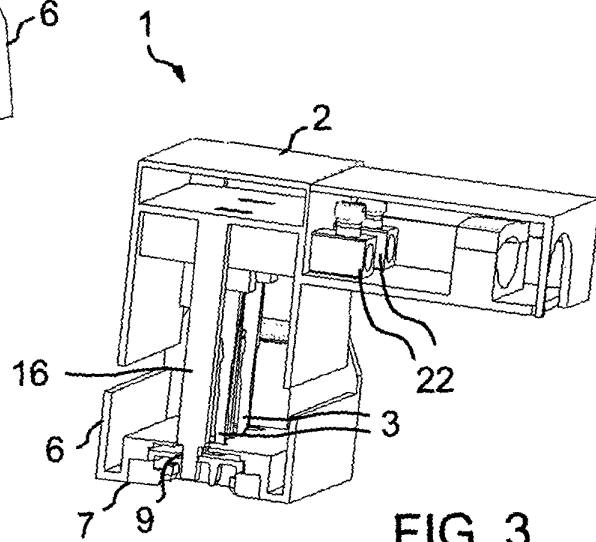


FIG. 3

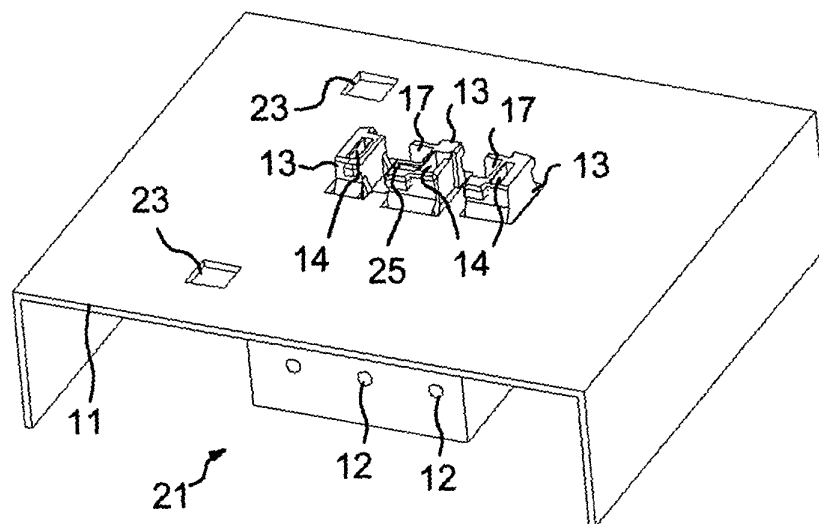
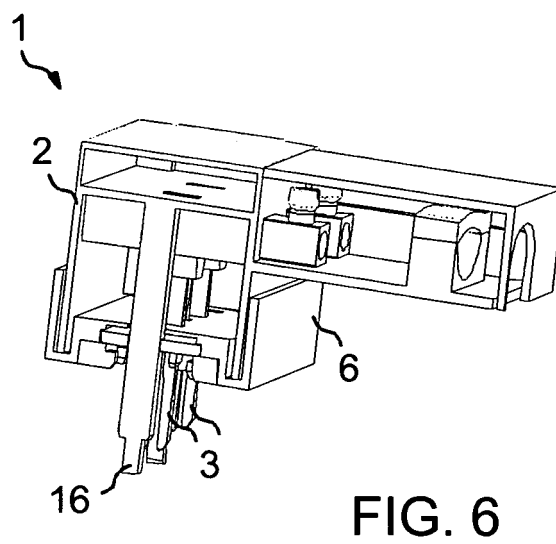
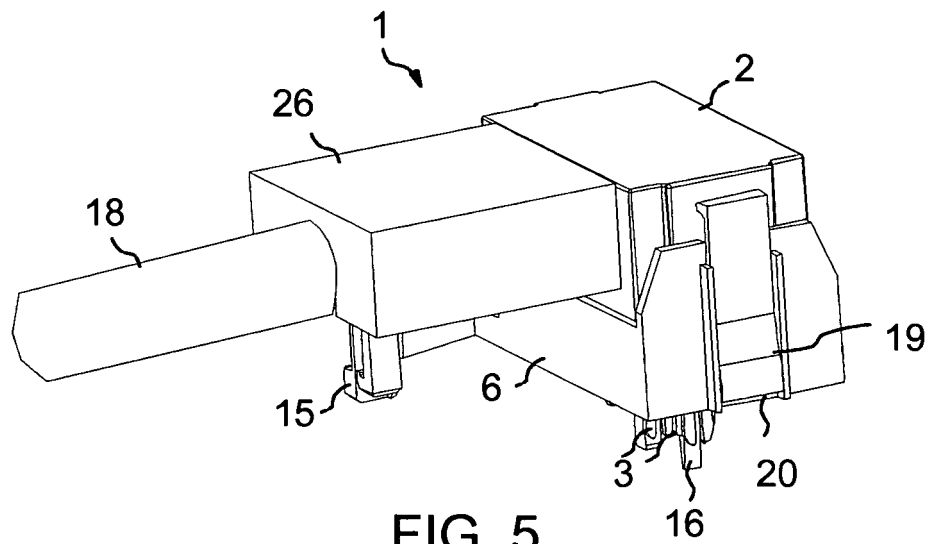


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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