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(54) **Femal and male electrical connection devices for shelving systems with movable shelves and system**

(57) The invention relates to a female electrical connection device (1) for shelving systems with movable shelves, comprising a bearing part (11) and at least two conducting wires (12), as well as a male electrical connection device (2) for shelving systems with movable shelves, comprising at least two conducting wires (21), and at least two housings housing each of the at least two conducting wires (21). The male connection device (2) is suitable for being inserted in the at least one receiving area (13) of a female electrical connection device (1) to establish electrical contact between the conducting wires (21) of the male connection device and the conducting wires (12) of the female connection device. The invention also has a system comprising both devices.

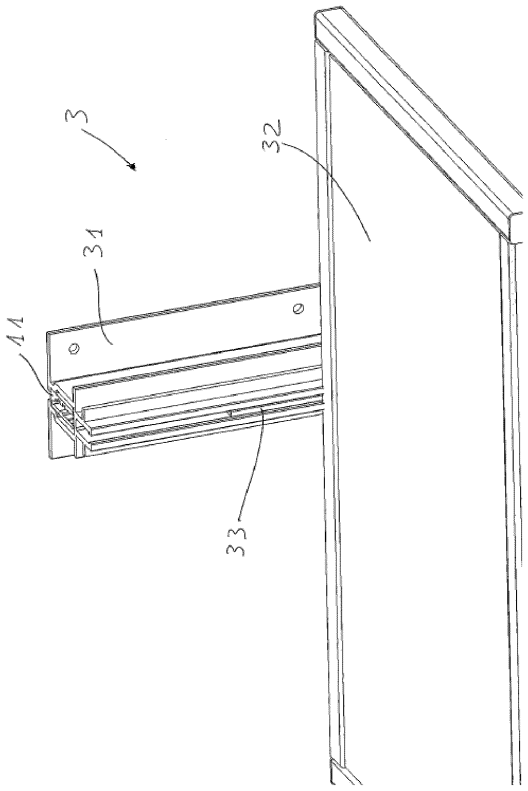

Figure 5

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Description

Object of the Invention

[0001] The present invention is comprised in the field of electricity transmission devices and to the field of domestic or industrial furniture.

Background of the Invention

[0002] The problem of how to get an electric cable, which is not elastic, to reach different positions without there being an excessive surplus amount of cable that cannot be easily concealed, and there not being any cable shortage either to reach the furthest or extreme coupling positions arises when establishing the electrical connection of an element that can be fixed to another element in several different positions.

[0003] This problem arises, for example, when electrifying a shelf of a shelving unit. In that case, each shelf can be fixed to the rail or rod of the shelving unit in different positions. If the shelf is to have some type of electrical installation, such as lighting means for example, the cable transmitting electricity through the shelving unit must be connected to the power supply, usually by means of a channel or housing in the rod or rail which allows the cable of the shelving unit to reach the power supply. The problem arises when a shelf is to be changed from its position since the cable is either not long enough to reach the highest or lowest position of the shelving unit, or a large amount of surplus cable is visible in the case of placing the shelf in a position that requires less cable, with the aesthetic and even safety problems that this entails.

Description of the Invention

[0004] The present invention proposes a solution to the preceding problems by means of a female electrical connection device according to claim 1, a male electrical connection device according to claim 6 and an electrical coupling system according to claim 10. The dependent claims define preferred embodiments of the invention.

[0005] In a first inventive aspect, the invention presents a female electrical connection device for shelving systems with movable shelves, comprising a bearing part and at least two conducting wires, **characterized in that**:

> the bearing part provides electrical insulation between the conducting wires and comprises at least one receiving area suitable for receiving a male electrical connection device, and
> the conducting wires are arranged in the bearing part such that they are substantially straight and substantially parallel to one another at least in the at least one receiving area suitable for receiving the male electrical connection device.

[0006] In a particular embodiment, the female device comprises at least two housings for each housing to house each of the at least two conducting wires, thus providing the electrical insulation between said conducting wires.

[0007] Throughout the entire document, "housing" must be understood in its broadest sense, such that a part comprising a housing for housing a conducting wire must be understood in the sense that the part is somehow suitable for at least partly containing said conducting wire by means of notches or slots, by means of integrating the conducting wire inside said part, or any similar solution.

[0008] In a particular embodiment, the female device additionally comprises guiding means, such as guiding recesses or stops, to facilitate guiding when inserting a male electrical connection device.

[0009] In a particular embodiment, the female device additionally comprises at least one connecting stop arranged substantially facing the housings of the conducting wires, intended for favoring the approach to said conducting wires of a male connection device envisaged for being inserted in the female device.

[0010] In a particular embodiment, the female device is manufactured from a polymeric material, preferably PVC.

[0011] In a second inventive aspect, the invention presents a male electrical connection device for shelving systems with movable shelves, comprising
at least two conducting wires, and
at least two housings,
wherein each housing houses each of the at least two conducting wires
the male device being suitable for being inserted in the at least one receiving area of a female electrical connection device according to any of the preceding claims to establish electrical contact between the conducting wires of the male connection device and the conducting wires of the female connection device.

[0012] In a particular embodiment, the male connection device is divided into at least two portions, such that each of the portions comprises a conducting wire and a housing for housing said conducting wire.

[0013] In a particular embodiment, the male device comprises at least one stop or recess suitable for serving as an insertion guide.

[0014] In a particular embodiment, the male device comprises at least two faces, a connecting face and a transmitting face, each of the at least two housings comprising at least a first housing portion in the connecting face and a second housing portion in the transmitting face, the first housing portion and the second housing portion of each of these housing portions being connected through a connecting window connecting the connecting face and the transmitting face of said male electrical connection device.

[0015] In a particular embodiment, the male device comprises a connection terminal at one of its ends for

connecting with the at least two conducting wires.

[0016] In a third inventive aspect, the invention presents an electrical coupling system for shelving systems with movable shelves, **characterized in that** it comprises:

a female electrical connection device according to the first inventive aspect, and
a male electrical connection device according to the second inventive aspect.

[0017] In a particular embodiment, the system comprises:

a post or rack suitable for housing the female electrical connection device, and
an element comprising the male electrical connection device.

[0018] In a particular embodiment, the element comprising the male electrical connection device is a shelf additionally comprising at least one securing flange suitable for fixing the shelf to the post or rack.

[0019] All the features described in this specification (including the claims, description and drawings) can be combined in any way with the exception of combinations of such mutually excluding features.

Description of the Drawings

[0020] These and other features and advantages of the invention will be better understood from the following detailed description of a preferred embodiment given only by way of illustrative and non-limiting example in reference to the attached drawings.

Figure 1 shows a general view of a female electrical connection device for shelving systems with movable shelves according to the invention.
Figure 2 shows the cross-section of a female electrical connection device for shelving systems with movable shelves according to the invention.
Figure 3a-3b show two views of a male electrical connection device for shelving systems with movable shelves according to the invention, each of the views being seen from a face of said device.
Figure 4 shows a plan view of a coupling between a male electrical connection device for shelving systems with movable shelves according to the invention and a female electrical connection device for shelving systems with movable shelves according to the invention
Figure 5 shows a perspective view of an electrical coupling system according to the invention.

Detailed Description of the Invention

[0021] Figure 1 shows an embodiment of a female electrical connection device (1) for shelving systems with movable shelves according to the invention.

[0022] In this figure it can be observed how this female device (1) in this particular example is a straight and elongated part comprising two housings (14) spanning the part from one end to the other in its inner portion, each of them housing each of the two conducting wires (12) providing power supply to the device.

[0023] In a particular embodiment, instead of two housings (14), there could be more than two housings (12) for housing three-phase supply wires, the ground connection, etc.

[0024] Figure 2 shows the cross-section of this part (1) in which the slots forming the housings (14) and how the section offers a continuous open receiving area (13) that allows inserting objects into the part (1), such as a male connector for example, such that they reach the conducting wires (12) and can establish electrical connection with them, can be seen. This cross-section also shows how there are guiding recesses and stops (15) in this part which allow more easily guiding the insertion of said objects. In a particular embodiment, in addition to these guiding recesses and stops (15) intended for guiding the insertion of objects into the part, there is a connecting stop (16) the purpose of which is to facilitate the connection between an object having conducting wires that can be inserted into the part (1) and the conducting wires (12) housed in the housings (14) of the part (1).

[0025] In a particular example, instead of a continuous open receiving area (13) the part comprises specific receiving areas, such that objects can only be inserted into the part in said specific areas. Given that the most common arrangement of the female device is a vertical arrangement, the presence of said specific areas will establish that objects may be inserted at determined heights of said part.

[0026] Figures 3a and 3b show two views of an embodiment of a male electrical connection device (2) for shelving systems with movable shelves according to the invention. In this particular example, this device is a part having two faces (24, 25), one of them is the connecting face (24), since it is intended for facing the conducting wires (12) of a female device (1) when it is inserted therein, and the other face is the transmitting face (25) .

[0027] This male electrical connection device (2) comprises two housings, each of them for housing a conducting wire (21). Since in this particular embodiment these conducting wires (21) are intended to establish an electrical connection with the conducting wires (12) of the female electrical connection device (1), the number of conducting wires (21) of this male electrical connection device (2) is the same as the number of conducting wires (12) of the female electrical connection device (1).

[0028] In other particular embodiments, the conducting wires are connected differently, so it is possible for there to be differences between the wires of the male device and of the female device.

[0029] In other particular embodiments, the male con-

nection device (2) can be presented in several portions, such that each of the portions can contain a housing for a conducting wire.

[0030] These housings have two housing portions, one for each face of the part. The first housing portions (26), which are in the connecting face (24), are parallel to one another and are at the same distance from one another as the housings (14) of the female electrical connection device (1), such that the conducting wires (12) comprised in the female electrical connection device (1) are facing the conducting wires (21) comprised in the male electrical connection device (2), an electrical connection being able to be established between both pairs of conducting wires. In addition to these first housing portions (26), the device comprises second housing portions (27), each of them being connected with each of the first housing portions (26) by means of windows (28) connecting the connecting face (24) and the transmitting face (25) of the male connection device (2).

[0031] In the example of the figure, a series of recesses (23) are also observed in the male connection device (2) which facilitate the coupling thereof with the guiding stops and recesses (15) of the female connection device (1).

[0032] Figure 4 shows a plan view of an electrical coupling system (3) according to the invention, where the following can be observed: a male connection device (2) according to the invention, a female connection device (1) according to the invention, a post (31) surrounding the female connection device (1) and a shelf (32) comprising the male connection device (2).

[0033] In this figure it can be seen how the conducting wires (21) of the male connection device (2) are in electrical connection with the conducting wires (12) of the female connection device (1). This electrical connection is favored by the connecting stop (16) comprised in the female connection device (1).

[0034] The post (31) provides physical support to the female connection device (1), and provides fixing spots for the shelf (32) comprising the male connection device (2), such that the flange (33) comprised in the shelf (32) is mechanically coupled with the post (31) in a manner that is known in the state of the art.

[0035] Figure 5 shows a perspective view of an electrical coupling system (3) according to the invention. Said figure shows the elements that are visible once coupled together. The female connection device (1) is located inside the post (31), and the shelf (32) is coupled to said post (31) by means of a flange (33). The electric current is therefore not accessible from the outside unless an object is inserted through the receiving area (13). This is how the shelf (32) has access to the electrical connection as a result of the male connection device (2) associated with it which is inserted into the female connection device (1), so it is concealed in this figure. As described in the preceding figure, the male electrical connection device (2) is electrically coupled to the female electrical connection device (1). Since the female electrical connection device (1) is connected to power supply means, the shelf (32) comprising the male electrical connection device (2) is connected to the power supply, regardless of the height of the post (32) to which it is connected.

[0036] Therefore, to establish the electrical-mechanical coupling of the shelf (32) at a different height of the post (31), it would be sufficient to remove the flange (33) of the shelf (32) from the post (31) and fit it in at a different height, since by inserting the male electrical connection device (2) in the receiving area (13) of the female electrical connection device (1), the electrical connection between the conducting wires (12, 21) of both devices takes place such that the shelf (32) will be electrically powered at the height at which it is fitted in.

Claims

1. A female electrical connection device (1) for shelving systems with movable shelves, comprising a bearing part (11) and at least two conducting wires (12), **characterized in that**:

   the bearing part (11) provides electrical insulation between the conducting wires (12) and comprises at least one receiving area (13) adapted to receive a male electrical connection device, and
   the conducting wires (12) are arranged in the bearing part (11) such that they are substantially straight and substantially parallel to one another at least in the at least one receiving area (13) adapted to receive the male electrical connection device.

2. The female electrical connection device (1) according to claim 1, comprising at least two housings (14) for each housing to house each of the at least two conducting wires (13), thus providing the electrical insulation between said conducting wires (13).

3. The female electrical connection device according to any of the preceding claims, further comprising guiding means, such as guiding stops or recesses (15), to facilitate guiding when inserting a male electrical connection device.

4. The female electrical connection device (1) according to any of the preceding claims, further comprising at least one connecting stop (16) arranged substantially facing the housings (14) of the conducting wires (12), intended to favor the approach to said conducting wires (12) of a male connection device envisaged for being inserted in the female connection device (1).

5. The female electrical connection device (1) according to any of the preceding claims, manufactured from a polymeric material, preferably PVC.

6. A male electrical connection device (2) for shelving systems with movable shelves, comprising
at least two conducting wires (21), and
at least two housings,
wherein each housing houses each of the at least two conducting wires (21),
the male connection device (2) being adapted to be inserted in the at least one receiving area (13) of a female electrical connection device (1) according to any of the preceding claims to establish electrical contact between the conducting wires (21) of the male connection device and the conducting wires (12) of the female connection device.

7. The male electrical connection device (2) for shelving systems with movable shelves according to the preceding claim, divided into at least two portions, such that each of the portions comprises a conducting wire (21) and a housing for housing said conducting wire (21).

8. The male electrical connection device (2) for shelving systems with movable shelves according to any of claims 6 or 7, comprising at least one stop or recess (23) adapted to serve as an insertion guide.

9. The male electrical connection device (2) for shelving systems with movable shelves according to any of claims 6 to 8, comprising at least two faces, a connecting face (24) and a transmitting face (25), each of the at least two housings comprising at least a first housing portion (26) in the connecting face (24) and a second housing portion (27) in the transmitting face (25), the first housing portion (26) and the second housing portion (27) of each of these housing portions being connected through a connecting window (28) connecting the connecting face (24) and the transmitting face (25) of said male electrical connection device (2).

10. The male electrical connection device (2) for shelving systems with movable shelves according to any of claims 6 to 9, comprising a connection terminal at one of its ends for connecting with the at least two conducting wires.

11. An electrical coupling system (3) for shelving systems with movable shelves, **characterized in that** it comprises:

a female electrical connection device (1) according to any of claims 1 to 5, and
a male electrical connection device (2) according to any of claims 6 to 9.

12. The electrical coupling system (3) for shelving systems with movable shelves according to the preceding claim, comprising:

a post or rack (31) suitable for housing the female electrical connection device (1), and
an element (32) comprising the male electrical connection device (2).

13. The electrical coupling system (3) for shelving systems with movable shelves according to claim 12, wherein the element (32) comprising the male electrical connection device (2) is a shelf additionally comprising at least one securing flange (33) suitable for fixing the shelf to the post or rack (31).

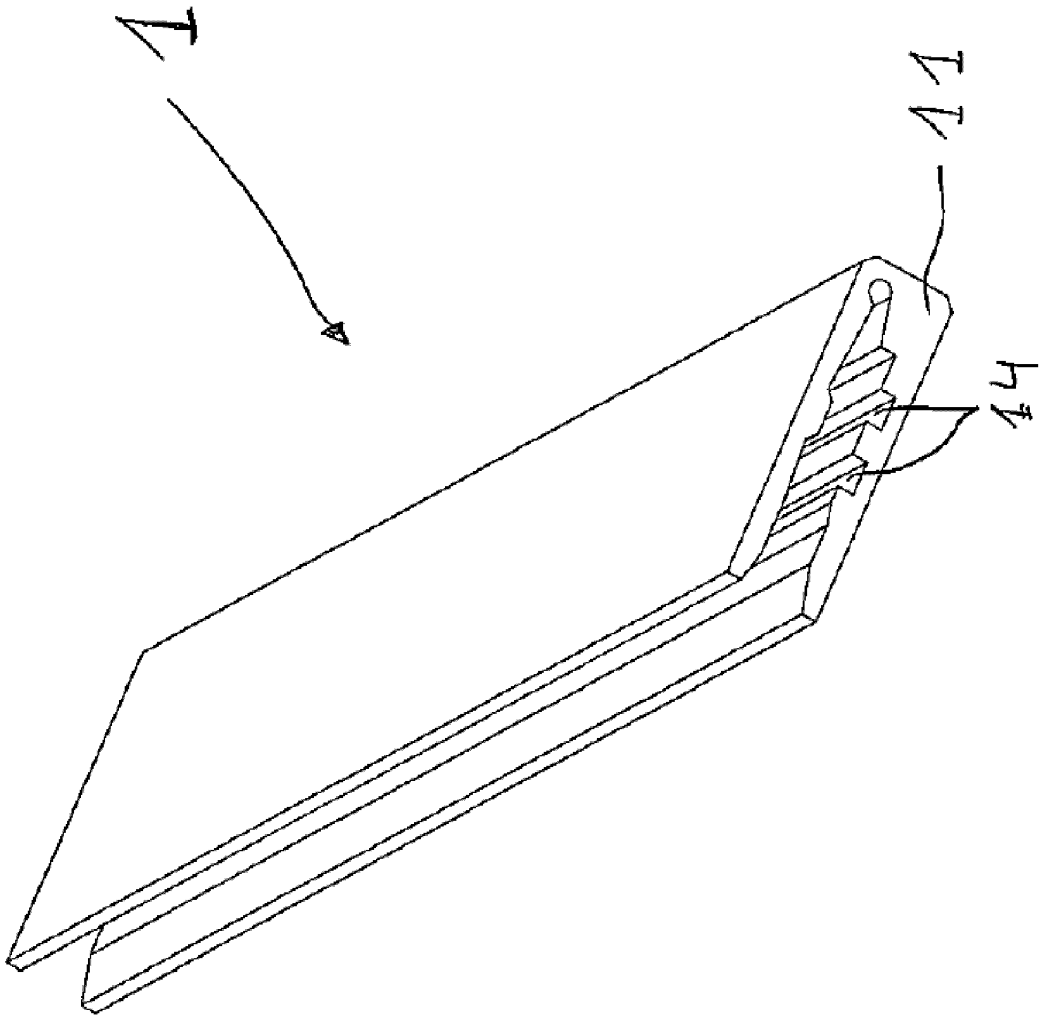

Figure 1

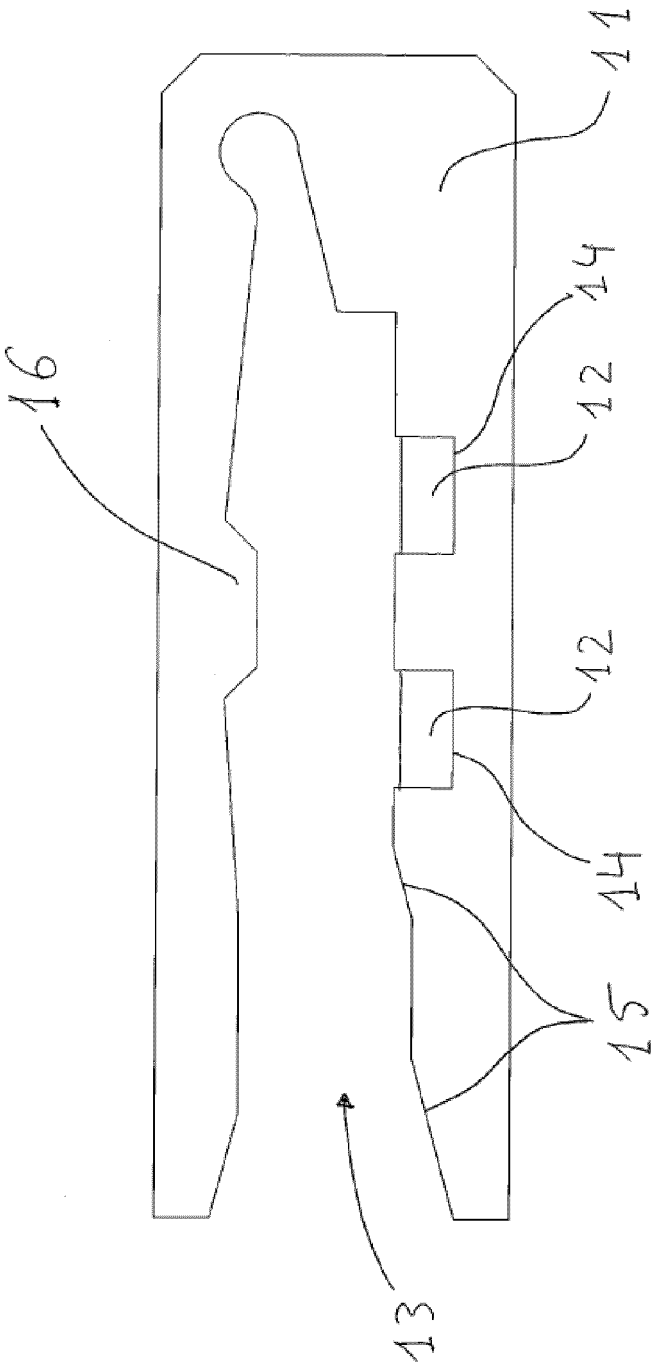

Figure 2

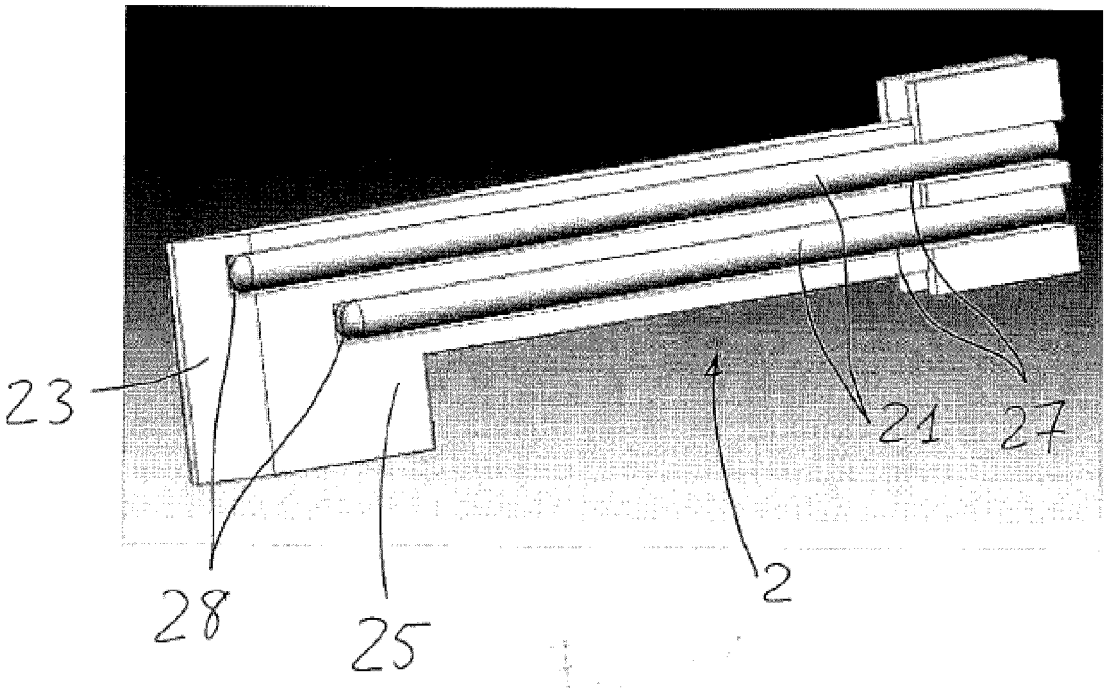

Figure 3a

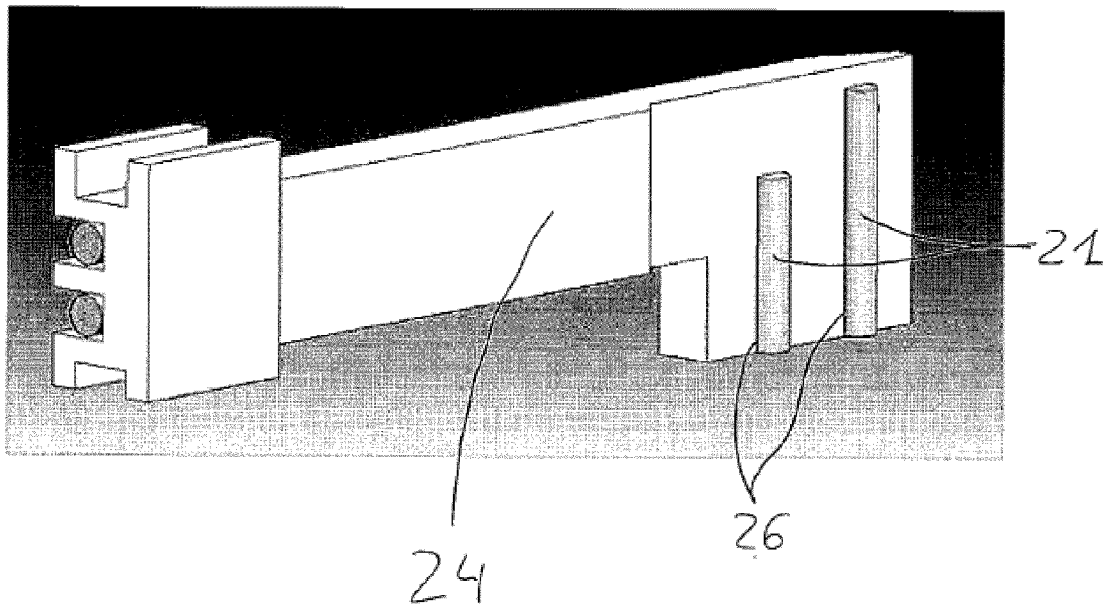

Figure 3b

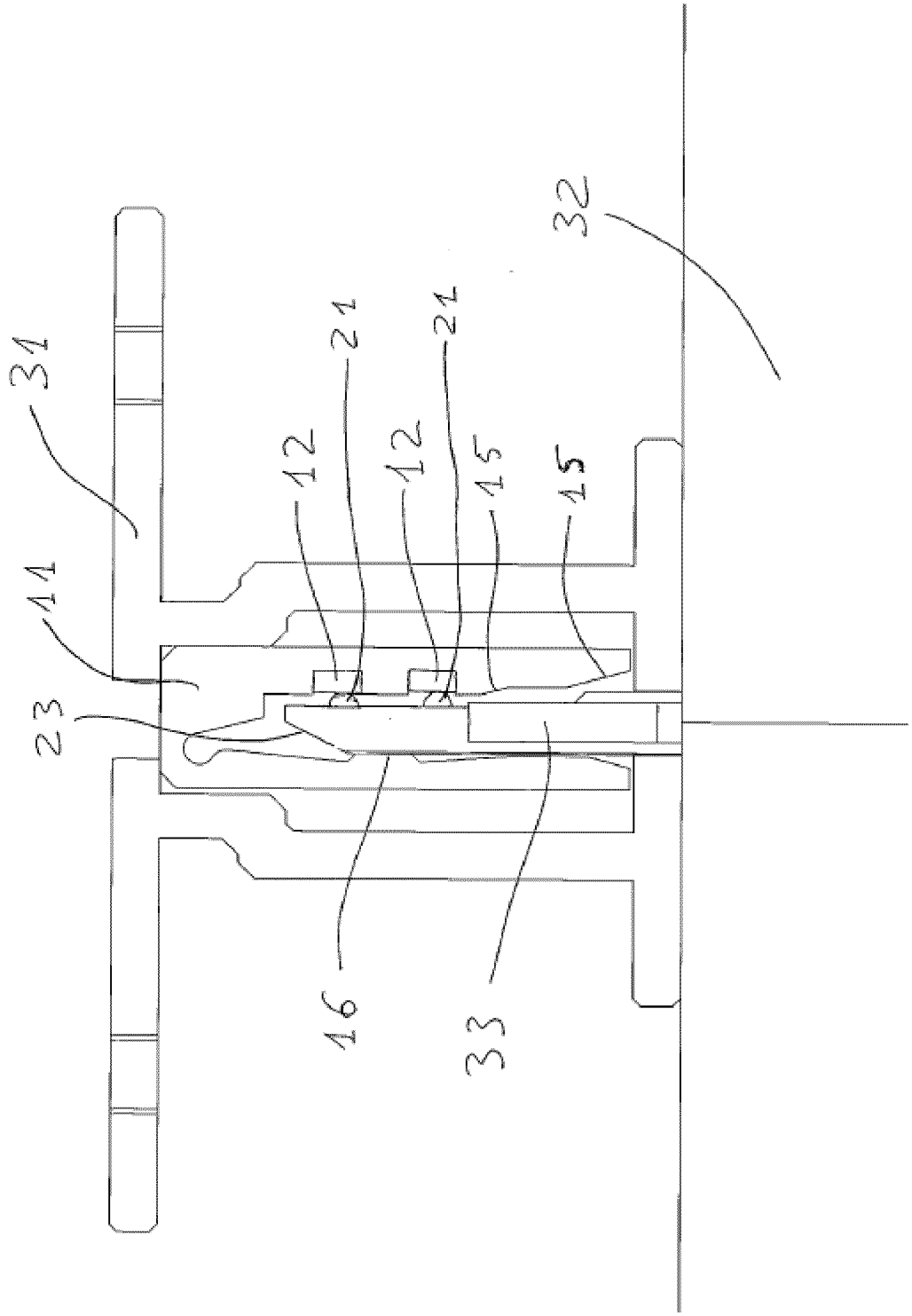

Figure 4

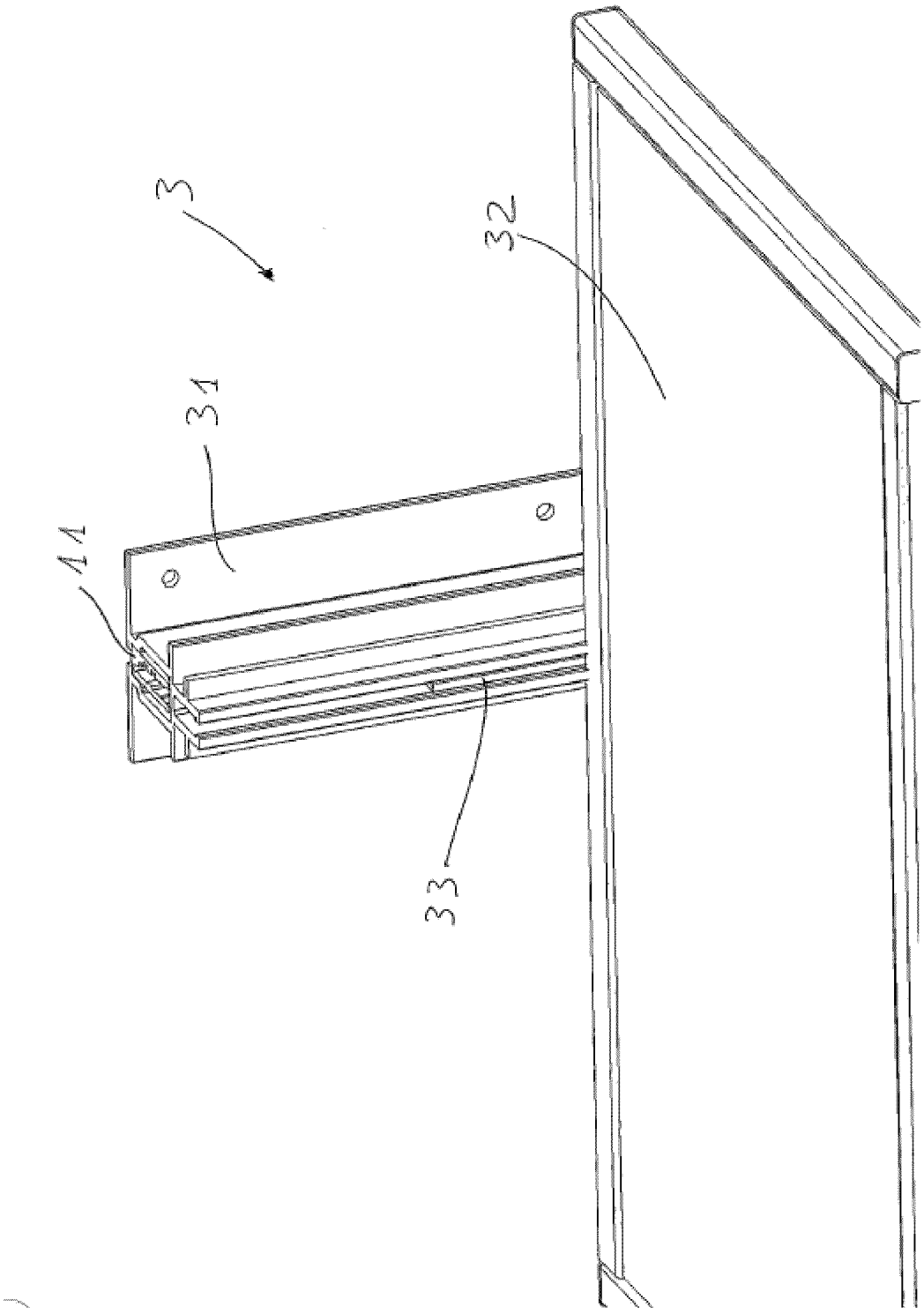

Figure 5

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EUROPEAN SEARCH REPORT

Application Number
EP 13 38 2086

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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H01R
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 July 2013	Jiménez, Jesús

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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