

(19) **DANMARK**

(10) **DK/EP 3011643 T3**



(12) **Oversættelse af
europæisk patentskrift**

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **H 01 R 13/514 (2006.01)** **H 01 R 13/506 (2006.01)** **H 01 R 13/518 (2006.01)**
H 01 R 13/631 (2006.01) **H 01 R 27/02 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2017-10-09**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2017-08-09**
- (86) Europæisk ansøgning nr.: **14741190.4**
- (86) Europæisk indleveringsdag: **2014-06-12**
- (87) Den europæiske ansøgnings publiceringsdag: **2016-04-27**
- (86) International ansøgning nr.: **DE2014100194**
- (87) Internationalt publikationsnr.: **WO2014202050**
- (30) Prioritet: **2013-06-17 DE 102013106279**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **Harting Electric GmbH & Co. KG, Wilhelm-Harting-Strasse 1, 32339 Espelkamp, Tyskland**
- (72) Opfinder: **BEISCHER, Thomas, Brandenburger Ring 22, 32339 Espelkamp, Tyskland**
WOLFF, Hanno Harry, Karl-Bröger-Str. 26, 90459 Nürnberg, Tyskland
- (74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**
- (54) Benævnelse: **Holderamme til stikforbindelsesmoduler**
- (56) Fremdragne publikationer:
EP-A1- 0 756 364
WO-A1-2011/069522
DE-U1-202005 020 026
US-A- 3 576 520
US-B1- 6 196 869

Description

The invention relates to a holding frame for plug-in connector modules according to the preamble of independent claim 1.

5 Such holding frames are needed to ensure that a plug-in connector of a modular design can be provided. A plurality of different plug-in connector modules can be combined as desired and inserted into such a frame. The holding frame holds the plug-in connector modules together and fixes them to each other. Subsequently, the holding frame
10 can be inserted into a plug-in connector housing and fixed thereto. The plug-in connector can be connected to a corresponding mating plug-in connector that is also modular. Alternatively, the holding frame can be inserted and fixed to a housing or device wall as a so-called mounting frame.

15 This type of modular plug-in connectors can be used to combine and compile a multiplicity of individual plug-in connectors. All that is needed are various standardised plug-in connector modules as well as a holding frame as described in the present invention.

20

Prior Art

From EP 0 756 364 A1, a U-shaped support rail is known that is provided for a snap-on fastening of plug-in connector modules. The plug-in connector modules are held in the support rail on either side by
25 means of holding means. A spring element provided is used for fixing the plug-in connector module to the holding means.

From US 6,196,869 B1, a fastening rail for plug-in modules is known, wherein the plug-in modules are latched, by means of latching arms,
30 into recesses in the fastening rail. The plug-in modules further have laterally attached spring elements which centre the plug-in modules in the fastening rail.

DE 197 07 120 C1 shows a holding frame for mounting plug-in connector modules. The plug-in connector modules are inserted into the holding frame and holding means on the plug-in connector modules interact with recesses provided on opposite frame portions of the holding frame and hold the plug-in connector modules in the holding frame in a form-locking manner.

In the case of this and other solutions known from the prior art, expediently, a great variety of different plug-in connector modules can be inserted into such a holding frame. The various plug-in connector modules have the most varied electric and/or pneumatic and/or optical and/or hydraulic contact elements in various dimensions, which are received in the modules.

A disadvantage of the solutions known from the prior art is the multiplicity of different plug-in connector modules each having different tolerances. It is above all in the plug-in regions of the contact elements (plug and socket contacts) that different tolerances and plug-in depths are necessary and specified by design.

As a result of these design-related tolerance differences of various plug-in connector modules, mismatches of two associated plug-in connector modules may occur in a holding frame depending on the combination of the plug-in connector modules. The consequence may be both incompletely contacted plug-in connector modules and plug-in connector modules which are "over-plugged" and contacted with an excessive force.

In both cases, this has a negative effect on the contacting and/or on the various components of the plug-in connector. Error-free contacting can no longer be ensured as a result of a "loose contact" or as a result of a

mechanical failure of individual components as a result of an excessive force.

Object of the Invention

5 It is the object of the invention to design a modular plug-in connector in such a way that differences in tolerances of different plug-in connector modules are compensated. A complete and secure contacting of all the plug-in connector modules present in a modular plug-in connector is to be ensured.

10

The object is achieved by means of the characterising features of independent claim 1.

15

Advantageous embodiments of the invention are indicated in the dependent claims.

20

The invention relates to a holding frame that is designed to be substantially rectangular. The holding frame has recesses on opposite frame portions. These recesses are provided for receiving holding means located on plug-in connector modules. As a result of the reception of a plurality of plug-in connector modules in the holding frame, a so-called modular plug-in connector is formed.

25

According to the invention, spring elements are provided on the holding frame, which act upon plug-in connector modules inserted into the holding frame. In doing so, the spring elements expediently generate a force acting in the plug-in direction on the plug-in connector modules.

30

As a result of the holding means of the plug-in connector modules being supported in the recesses of the holding frame with some play, the plug-in connector modules may be moved against the spring force.

The spring force of the spring elements moves the inserted plug-in connector modules again and again into an end position in the plug-in direction. When connecting a modular plug-in connector with a corresponding modular mating plug-in connector, tolerances in the plug-in connector modules can in each case and individually be compensated in this way.

Provided not all plug-in connector module pairs arrive in their fully assembled end position at the same time, an over-plugging of the pairs is prevented on account of the fact that the modules are displaced in the holding frame against the force of the spring elements in the direction opposite to the plug-in direction.

As a result of the spring-loaded support of the plug-in connector modules in the holding frame it is ensured that all of the plug-in connector modules are completely contacted with their mating plug-in connector modules and different tolerances are compensated.

Advantageous embodiments of the invention are indicated in the dependent claims.

Embodiment Example

Two embodiment examples of the invention will be explained in more detail with reference to the following drawings, wherein:

25

- Fig. 1 shows a holding frame with plug-in connector modules according to the prior art;
- Fig. 2 shows a partial section of a first embodiment of a holding frame according to the invention;
- Fig. 3 shows a cross section of the holding frame of Fig. 2;
- Fig. 4 shows a partial section of a second embodiment of a holding frame according to the invention;

Fig. 5 shows a cross section of the holding frame of Fig. 4; and
Fig. 6 shows cross sections of the holding frame of Fig. 4 in
comparison.

Fig. 1 shows a holding frame 1 with six inserted plug-in connector modules
40 as well as a plug-in compatible holding frame 1' with likewise plug-in
compatible plug-in connector modules 40' as known from the prior art. The
5 illustrated holding frames 1 and 1' are of an identical design and are
shown here only for the sake of completeness. Therefore, reference will
only be made below to holding frame 1.

Holding frame 1 is shown here in an articulated implementation. This
10 allows both of them to tilt the frame portions 10 forming the holding frame
1 along a hinge, in order to insert or to remove plug-in connector modules
40. The exact mechanics will not be discussed in any more detail because
they are not part of the present invention. All that will be mentioned at this
point is that a large number of multi-piece holding frames 1 are already
15 known from the prior art.

In the case of holding frames 1 known from the prior art, recesses 11 are
in each case provided in said frame portions 10. The recesses 11 are used
for receiving, positioning and fixing the plug-in connector modules 40. To
20 this end, the known plug-in connector modules 40 have holding means 41.
The holding means 41 correspond in their shape to the recesses 11 of the
frame portions 10.

As a result of the fact that the shapes of the recesses 11 and the holding
25 means 41 correspond to each other, a secure seating of the plug-in
connector modules 40 in the holding frame 1 is ensured. As a result, the
plug-in connector modules 40 sit firmly and without play relative to each
other.

Fig. 2 shows a partial cut-out of a first embodiment of a holding frame 1 according to the invention. What is shown is a partial cut-out of the frame portion 10 in a lateral view. In the frame portion 10, a recess 11 is shown as an example. In the recesses 11, as is also known from the prior art, holding means 41 of a plug-in connector module 40 are received.

However, contrary to the prior art as shown in Fig. 1, the recess 11 according to the invention is dimensioned to be larger opposite to the plug-in direction S than the holding means 41. Thus, the holding means 41 do not sit in the recess 11 in a play-free manner, as has been known so far. The enlarged recess 11 allows a linear movement of the holding means 41 in the recess 11 along the plug-in direction S.

Further, the holding frame 1 according to the invention has a spring element 12 that is received in the recess 11. This is preferably provided on the wall section 13 that is located opposite to the plug-in direction S.

The spring element 12 is disposed in such a way that it exerts a force on the holding means 41 that acts in the plug-in direction S. As a result of the effect of a force in the direction opposite to the plug-in direction S on the plug-in connector module 40, the latter can be displaced. Once the force is removed, the plug-in connector module 40 is displaced back by the spring element 12.

The partial cut-out of the holding frame 1 from Fig. 2 is shown again in Fig. 3 in a sectional view A-A. What can be seen is the plug-in connector module 40 (only indicated) with the holding means 41. The holding means 41 have been inserted into the recesses 11 of the frame portion 10. The spring element 12 is attached to the wall section 13 of the recesses 11 that is located opposite to the plug-in direction S.

The fixing of the spring element 12 to the wall section 13 can be realised for example by riveting, gluing, latching, screwing or welding.

5 From the wall section 13, the spring element 12 exerts a force on the holding means 41, which acts in the plug-in direction S. This force effects a forced movement of the holding means 41 and thus of the entire plug-in connector module 40 in the plug-in direction S.

10 Fig. 4 and Fig. 5 show a second embodiment, corresponding to Fig. 2 and Fig. 3, of the holding frame 1 according to the invention. Fig. 4 is a partial cut-out of the frame portion 10 in correspondence with Fig. 2; Fig. 5 is a cross section of the partial cut-out from Fig. 4.

15 In this second embodiment, the spring element 12 is not provided in the recess 1 of the frame portion 10 but is formed by a planar base portion 12.1. This base portion 12.1 substantially corresponds to the shape of the frame portion 10 and is disposed on the inside thereof, facing the plug-in connector modules 40.

20 From the base portion 12.1, spring arms 12.0 extend into the recesses 11. These spring arms are provided for transmitting force onto the holding means 41. For transmitting the counter-force onto the frame portion 10, the base portion 12.1 moreover has an angled holding region 12.2. The holding region 12.2 encompasses the holding frame 10 in the plug-in direction S. Thus, a force acting in the plug-in direction S from the holding
25 frame 10 can be transmitted onto the holding means 41.

In a particular embodiment it would also be possible to go without the holding region 12.2 and to fix the base portion 12.1 instead to the frame
30 portion 10 using screws, rivets, by welding or by gluing.

Fig. 6, finally, shows the holding frame 1 from Fig. 5 in a comparison of two conditions. Fig. 6a corresponds to Fig. 5 in which the holding means 41 and thus also the plug-in connector module 40 are located in a position that is foremost in the plug-in direction S. As a result of the spring arm 12.0 of the spring element 12, the holding means 41 experiences a forced movement into this position.

By comparison with this position, the holding means 41 and the plug-in connector module 40 in Fig. 6b are located in a position that is rearmost if viewed in the plug-in direction S. In the case of a force acting on the plug-in connector module 40 in the direction opposite the plug-in direction S, the spring element 12 according to the invention, here the spring arm 12.0 of the spring element 12, allows the plug-in connector module 40 to be displaced.

Thus, according to the invention, tolerances of plug-in connector modules 40 of different types can be compensated. A spring-loaded plugging in of plug-in connector modules 40 is possible, as a result of which a secure contacting of the contact elements can be ensured.

20

Holding Frame for Plug-In Connector Modules

List of Reference Numerals

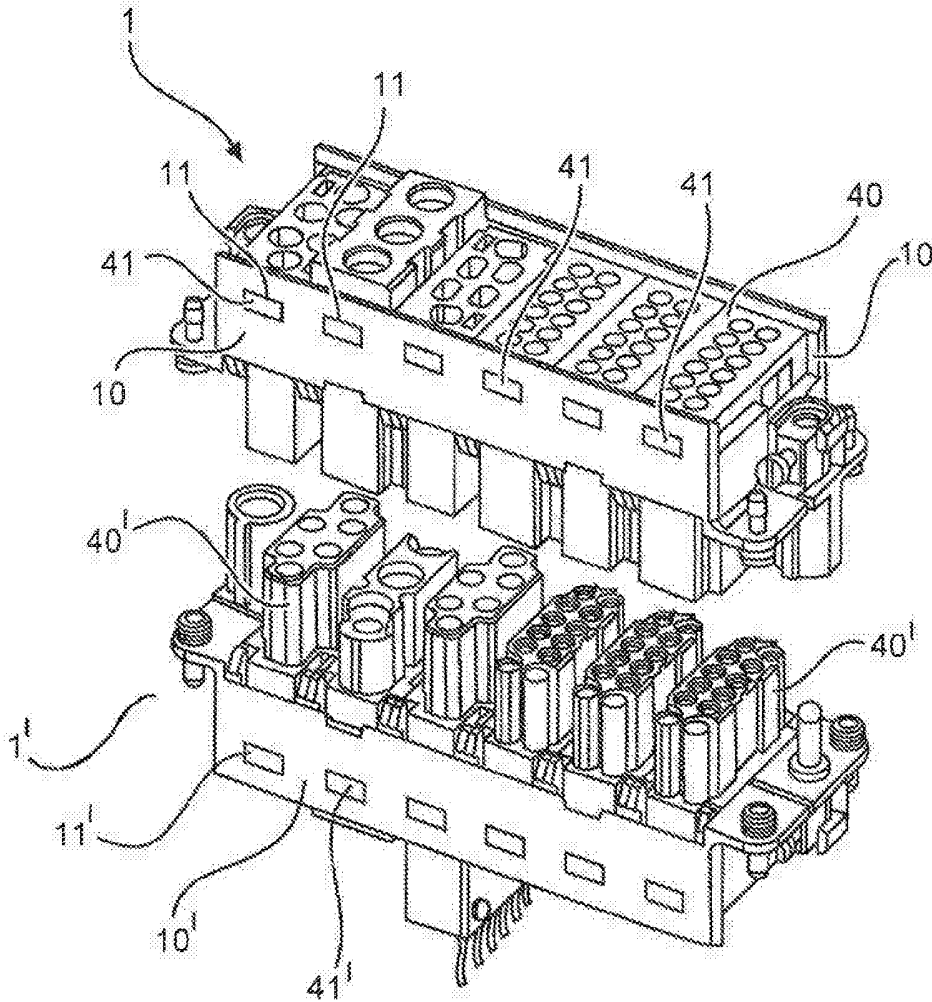
- | | | |
|----|------|--------------------------|
| 5 | 1. | Holding frame |
| | 10. | Frame portion |
| | 11. | Recess |
| | 12. | Spring element |
| | 12.0 | Spring arm |
| 10 | 12.1 | Base portion |
| | 12.2 | Holding region |
| | 13. | Wall section |
| | 40. | Plug-in connector module |
| 15 | 41. | Holding means |

P a t e n t k r a v

- 5 1. Holderamme (1) til optagelse af stikforbindelsesmoduler (40), bestående af
to over for hinanden liggende rammedele (10) med deri tilvejebragte udspa-
ringer (11),
hvor der i udsparingerne (11) kan indsættes holdemidler (41) af de stikforbin-
delsesmoduler (40), der skal optages,
kendetegnet ved, at
10 der på holderammen (1) er tilvejebragt fjederelementer (12), fjederelemen-
terne (12) kan indvirke på stikforbindelsesmoduler (40), der er optaget i hol-
derammen (1), og
fjederelementerne (12) udøver mindst en kraft, der virker i stikretningen (S),
på optagne stikforbindelsesmoduler (40).
- 15 2. Holderamme (1) ifølge krav 1,
kendetegnet ved, at
udsparingerne (11) i stikretningen (S) er dimensioneret større end de holde-
midler (41), der skal optages.
- 20 3. Holderamme (1) ifølge et af de foregående krav,
kendetegnet ved, at
fjederelementerne (12) indvirker på holdemidlerne (41) af de optagne stikfor-
bindelsesmoduler (40).
- 25 4. Holderamme (1) ifølge et af de foregående krav,
kendetegnet ved, at
fjederelementerne (12) er anbragt i udsparingerne (12).
- 30 5. Holderamme (1) ifølge krav 4,
kendetegnet ved, at
fjederelementerne (12) er tilvejebragt på en vægsektion (13) af udsparinger-
ne (12), der ligger modsat stikretningen (S).
- 35 6. Holderamme (1) ifølge et af kravene 1 til 3,
kendetegnet ved, at fjederelementerne (12) er anbragt på holderammen (1)

uden for udsparingerne (12) og rager ind i udsparingerne (12).

- 5 **7.** Holderamme (1) ifølge krav 6,
kendetegnet ved, at
fjederelementerne (12) er anbragt på indersiden af rammedelene (10).
- 10 **8.** Holderamme (1) ifølge krav 6,
kendetegnet ved, at
fjederelementerne (12) er anbragt på ydersiden af rammedelene (10).
- 15 **9.** Holderamme (1) ifølge krav 6 til 8,
kendetegnet ved, at
en flerhed af fjederelementer (12) er udformet ud i et på hver af rammedele-
ne.
- 20 **10.** Holderamme (1) ifølge krav 9,
kendetegnet ved, at
de ud i et udformede fjederelementer (12) kan låses fast på rammedelene
(10).
- 25 **11.** Holderamme (1) ifølge et af kravene 9 eller 10,
kendetegnet ved, at
fjederelementet ud i et (12) består af en basisdel (12.1), som er udformet flad
og i det væsentlige har form som rammedelen (10) og er lagt inde- eller ude-
fra mod rammedelen (10), og hvor basisdelen (12.1) har en flerhed af fjeder-
arme (12.0), som rager ind i udsparingerne (11).
- 30 **12.** Holderamme (1) ifølge krav 11,
kendetegnet ved, at
basisdelen (12.1) har et vinklet eller rundet holdeområde (12.2).
- 35 **13.** Halterahmen (1) ifølge et af kravene 1 til 12, **kendetegnet ved, at** fjeder-
elementerne (12) er fastgjort aftageligt på holderammen (1).
- 35 **14.** Halterahmen (1) ifølge et af kravene 1 til 12, **kendetegnet ved, at** fjeder-
elementerne (12) er fastgjort ikke-aftageligt på holderammen (1).



State of the art

Fig. 1

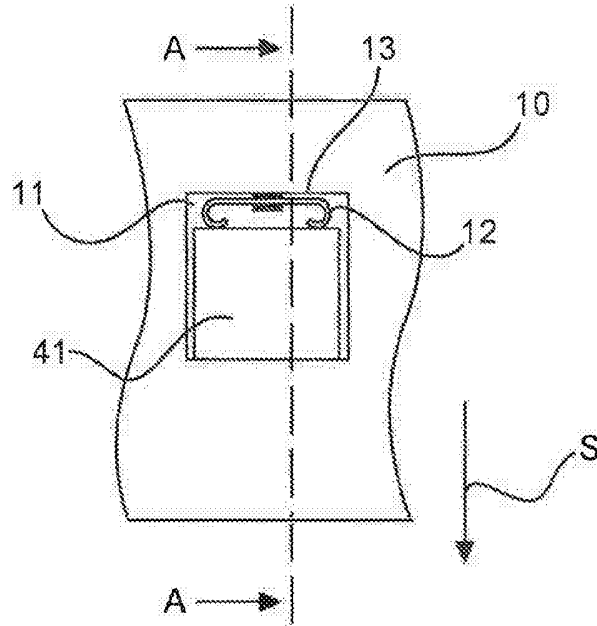


Fig. 2

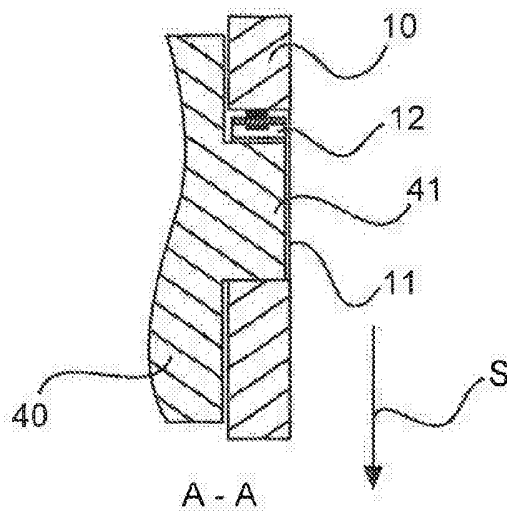


Fig. 3

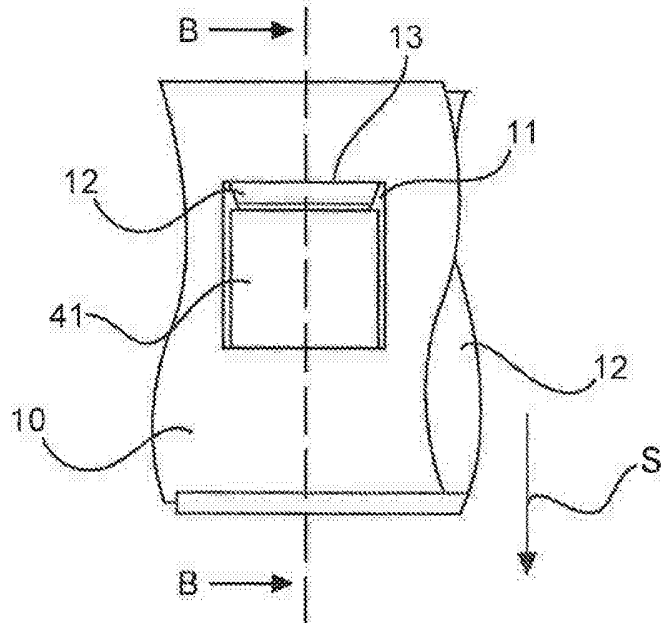


Fig. 4

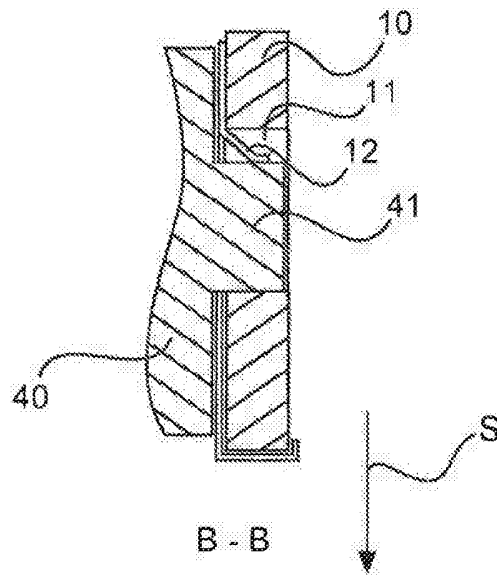


Fig. 5

