(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 May 2017 (11.05.2017)

WIPO | PCT

(10) International Publication Number
WO 2017/076429 A1

(51) International Patent Classification:
F16B 5/02 (2006.01) *F16B 43/00* (2006.01)

(21) International Application Number:
PCT/EP2015/075554

(22) International Filing Date:
3 November 2015 (03.11.2015)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

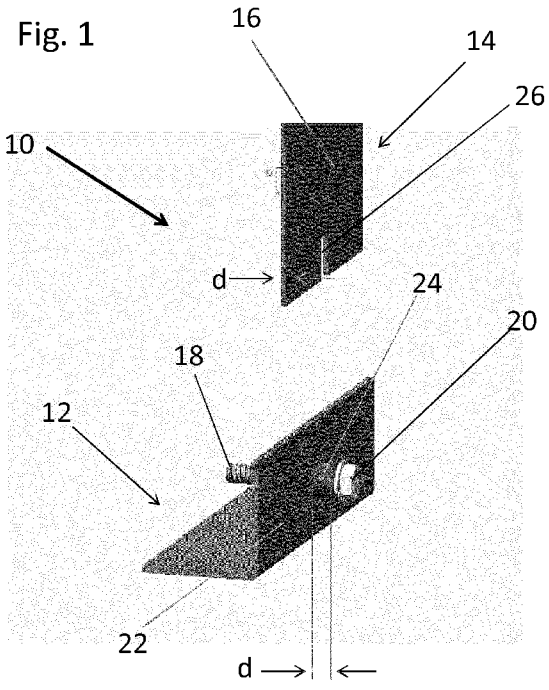
— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

WO 2017/076429 A1

(54) Title: SYSTEM OF CONSTRUCTION ELEMENTS

Fig. 1



(57) Abstract: The invention relates to a system comprising a first construction element (12) carrying a bolt (18) and at least one second construction element (12) having a slot (26), whereby the two construction elements (12, 14) are to be connected in such a manner that the slot (26) takes up the bolt (18) whereby finally the second element (12) is fixed between the first element (12) and a bolt head (20) or nut of the bolt (18). For pre- mounting purposes a one-way washer (24) made of a soft or frail material is located around the bolt (18) between the first element (12) and a nut or bolt head (20) of the bolt (18), whereby the softVfrailness of the washer (24) material is configured to lead to the destruction/removal of the washer (24) during the movement of the slot (26) in radial direction over the bolt (18) of the first element (12) as to receive it, thereby removing the washer (24) from the bolt (18).

System of construction elements

Background of the invention

The present invention relates to a system or arrangement comprising two construction elements which are to be mounted together at a building site. Such a building site could for example be an elevator shaft where components of the elevator are to be mounted together, particularly parts of the elevator doors or door jamb structures.

Description of the related art

The FR 2 897 909 A1 discloses a system or arrangement of this kind where a first element has a bolt and a second construction element has a slot configured to receive the bolt. The bolt carries between the first element and the bolt head or a nut fixed on the bolt a distance element of variable thickness which keeps the bolt head/nut in a distance from the first large enough as to receive a sheet material of the second construction element having said open slot. During the movement of the sheet material over the bolt the thickness or axial length of the washer is reduced by the thickness of the sheet material. Although this arrangement provides the advantage that the distance to take up the metal sheet part of the second construction element is kept free, a disadvantage of this arrangement is that the thickness-variable washer usually consisting of a metal spring element remains between the metal sheet part of the second construction element and the nut or the bolt. Furthermore, this washer made of metal spring material involves certain costs.

Summary of the invention

It is therefore object of the present invention to provide a cheaper and easier system which allows an easy mounting of the two construction elements as mentioned above.

The object is solved with a system or arrangement according to claim 1 as well as with a method according to claim 12. Preferred embodiments of the invention are subject-matter of the corresponding dependent claims. Preferred embodiments of the invention are also described in the description as well as in the drawings.

According to the invention, a one-way washer made of a soft or frail material is located around the bolt between the first element and a nut or bolt head for pre-mounting purposes, e.g. for transport to a building site where the elements are to be mounted together. The softness or frailness of the washer material is thereby configured as to lead to the destruction or removal of the washer during the movement of the slot in radial direction over the bolt of the first element as to receive it. During this movement, the washer is removed from the bolt. The choice of the soft or frail material for the washer ensures that the washer is destroyed and/or removed when the slot of the second construction element is pushed over the bolt of the first construction element or vice versa. After connection of the construction elements, the part of the second construction element comprising the slot, preferably a sheet part, in particular a metal sheet part, is fixed to the first construction element by rotating the bolt head or a nut fitted on the thread of the bolt in the direction of the first construction element. Therefore, via the one-way washer, the distance of the bolt shaft between the first construction element and the bolt head or nut can be maintained as to receive the thickness of the sheet part of the second construction element when the slot is moved with respect to the bolt. Therefore, no manual adjustment by unscrewing the bolt head or nut have to be performed to enable the movement of the slot to fit around the bolt which is not possible when the distance between the first element and the bolt head or nut is smaller than the thickness of the sheet material comprising the slot. Accordingly, the one-way washer acts as a distance element keeping the thickness of the metal sheet comprising the slot free between the first construction element and the bolt head or nut fitted on the bolt.

In a preferred embodiment of the invention, the first and/or second element are made of metal. In this connection, the part of the second construction element comprising the slot is preferably a metal sheet part which is pushed over the bolt as to connect the first and second construction elements.

Following terms are used as a synonym: element = construction element; sheet material = metal sheet = sheet part. Of course, instead moving the slot over the bolt also the blot can be pushed against the open den of the slot. The slot is supposed to be open at least at one end as to allow it to be pushed over the bolt or vice versa.

In a preferred embodiment of the invention, the one-way washer is made of plastics, cardboard or of a wood-comprising material. Such a material can be made sufficiently soft or frail as to be pushed away or destroyed when the metal sheet part is pushed over the bolt or vice versa.

Preferably, the washer is made of a recycled material which is easily possible as no requirements are made to the mechanic properties e.g. the rigidity or mechanical strength of the washer. In contrast, the use of such materials is advantageous for the desired material properties as frailness and/or softness.

In a preferred embodiment of the invention, the one-way washer is made of a bio-degradable material. This preferred embodiment has the advantage that when the one-way washer is removed it can be left on the building site and does not need to be removed as it is self-degrading over the time. Therefore, the removal or deletion of these washers and their accumulation in a pit of the elevator shaft will not lead to a lasting pollution of the shaft pit.

In a preferred embodiment of the invention, the washer is non-rotatably fixed between the first element and the bolt head. Further, the moving direction of the slot with respect to the bolt is given. The one-way washer has a gap or recess in the direction from which the slot is moved to the bolt. This embodiment ensures that during the movement of the second construction element with the slot over the bolt, the washer opens at that gap or recess or it even brakes at this position so that the washer is easily pushed with the second construction element away from the bolt as to be removed when the slot is going to receive the bolt of the first construction element.

In this connection it is to be emphasized that the bolt does not necessarily have to be a part of the first construction element but it can be a separate element which is connected to the first construction element.

Preferably, the washer comprises at least one rated breaking point to ensure the removal of the washer when the two elements are mounted together. Rated breaking points can easily be provided at the one-way washer via cracks, fractures, gaps or recesses. The reduced material thickness at these points and/or the notch effect acting at these points lead(s) to a destruction of the washer at the rated breaking points. Therefore, the destruction and removal of the washer can be ensured during the movement of the slot over the bolt.

In a preferred embodiment of the invention, the slot is arranged in a metal sheet part of the second construction element having a thickness d, whereby the washer has in the direction of the bolt an axial length (in bolt direction) of at least the thickness d of the metal sheet thereby acting as a distance element. In short terms, the thickness of the washer is at least the thickness of the sheet part of the second construction element so that the washer keeps enough room for the thickness of the sheet part to be pushed over the bolt. Afterwards, the bolt head or nut on the bolt can be screwed with few turns to tighten the sheet part of the second construction element tight between a wall of the first construction element and the bolt head or nut.

Preferably, the washer has an axial length of 1.5 times the thickness of the metal sheet at the maximum. Via this measure, it is ensured that after moving the slot over the bolt, the remaining distance between the bolt head or nut and the sheet part of the second construction element is 0.5 d at the maximum so that the bolt head or nut needs only few turns to tighten the sheet part against a wall of the first construction element.

The pre-mounting purposes understood by the present invention are any handling steps which are necessary before the two construction elements are mounted together at a building site. These handling steps comprise at least one of the following steps: sorting, packing, transport and aligning the parts before they are mounted.

As mentioned already above, the two construction elements are preferably components of a car- and/or landing door structure of an elevator, particularly also door jamb structures of these elevator doors.

Preferably the material strength of the construction elements is higher than that of the one-way washer.

The invention further refers to a method for connecting at least two construction elements wherein a one-way washer is placed around a bolt arranged at a first of said construction elements designed to co-act with a slot of a second of said construction elements. With the moving of the slot in radial direction of the bolt, the one-way washer is removed by a sheet part of the second construction element when the slot is going to receive the bolt. The features and advantages of this method are the same as mentioned in connection with the inventive system or arrangement as mentioned above.

In a preferred embodiment of this method, the one-way washer is arranged for pre-mounting purposes as for example the transport of the construction elements to a building site. Further pre-mounting steps have been mentioned above.

Preferably, the washer is hold tightly via the bolt head or nut against the first construction element, e.g. a wall thereof so that the bolt does not become loose during any pre-mounting steps.

The skilled person understands that several bolts can be provided between the first and second construction element whereby the bolts can be arranged at both elements. In any case, each bolt takes up at least one slot of another construction element.

Of course, it is further possible that one bolt takes up two or more metal sheet parts having corresponding slots of two or more other construction elements. Therefore, the invention can of course be applied in cases where more than two construction elements are to be connected.

Description of the preferred embodiments

The invention is shortly described in connection with the enclosed drawing. In this drawing

Fig. 1 shows a perspective view of a first embodiment of two construction elements to be mounted together,

Fig. 2 shows a perspective view of a second embodiment of a vertical car door jamb structure to be mounted on a car floor.

Fig. 1 shows an arrangement or system 10 comprising a first construction element 12 and a second construction element 14 from which only a metal sheet part 16 is shown.

The first construction element 12 carries a bolt 18 having a bolt head 20. The bolt can either be screwed in a thread of a hole in the wall 22 of the first construction element or it can be counter-fixed by a nut which is then located behind said wall 22 (not visible) . Between the wall 22 of said first construction element 12 and the bolt head 20, a one-way washer made of recycling plastics 24 is located. In the metal sheet part 16 of the second construction element 14, a slot 26 is provided. The metal sheet part 16 has a thickness d and the axial length of the one-way washer 24 in the direction of the bolt axis is at least as large as this thickness d of the metal sheet part 16 of the second construction element. This fact enables the metal sheet part 16 to be moved over the bolt 18 at the position where the one-way washer 24 is located. During this movement, the one-way washer is deleted or removed by the metal sheet part 16 because of the frail or soft material properties of the one-way washer 24. After mounting the first construction element 12 and the second construction element 14 together in this way, the bolt 18 takes up the slot 26 or vice versa the slot 26 of the second construction element 14 receives the bolt 18. As the thickness or axial length of the one-way washer 24 is preferably equal or preferably only slightly larger than the thickness d of the metal sheet part 16 of the second construction element, the bolt head 20 needs only to be rotated few turns before the metal sheet part 16 of the second construction element 14 is tightly fixed between the wall 22 of the first construction element 12 and the bolt head 20.

Accordingly, the one-way washer 24 on one hand acts as a distance element keeping the thickness d of the thickness of the metal sheet part 16 of the second construction element 14 free to be inserted between the wall 22 of the first construction element and the bolt head 20. It is apparent that the first and second construction elements 14 or the sheet part 16 thereof do not necessarily need to be made from metal but they

can also be made of plastics or wood etc. Further, instead of the bolt head, a nut can be placed to fix the one-way washer 24 on the bolt 18 tightened against the wall 22.

Fig. 2 shows an arrangement 30 comprising a vertical door jamb 32 to be mounted to a car floor 34 in the vicinity of a door sill 36. The jamb 32 has a lower horizontal base plate 40 comprising a slot 42 for the mounting of the jamb 32 to the car floor 34. On this behalf, the jamb 32 has to be pushed horizontally in the direction y so that its base plate 40 gets under a mounting arrangement 43 comprising of two bolts 44 and a rectangular connecting washer 46. This is fixing of the construction elements together is done at the building site.

To keep the distance of the connecting washer 46 from the car floor 42 a rectangular one-way washer 48 having two slots for taking up the bolts 44 is pushed in the direction x of the slot openings under the connecting washer 46 and is slightly fixed by loosely tightening the bolts 44 beforehand, preferably already at the factory. The one-way washer 48 has a thickness which is slightly larger than the thickness of the base plate 40 of the vertical door jamb 32. Thus the jamb 32 can be mounted to the floor by pushing the base plate 40 in the direction y of its slot opening against the mounting arrangement 43 thereby destroying the one-way washer 48 and pushing it away from its location between the arrangement 43 and the car floor 34. Now the bolts 44 only need to be tightened by rotating them a few turns to fix the jamb 32 tightly to the car floor 34.

The invention is not restricted to the above embodiment but may be varied within the scope of the appended patent claims.

List of reference numbers

10	system of construction elements
12	first construction element
14	second construction element
16	sheet part of the second construction element
18	bolt
20	bolt head
22	wall of the first construction element
24	one-way washer
26	slot
30	arrangement of construction elements
32	vertical door jamb
34	car floor
36	door sill
40	base plate of door jamb
42	slot in base plate
43	mounting arrangement
44	bolts
46	rectangular connecting washer
48	rectangular one-way washer

Patent claims

1. System comprising a first construction element (12) carrying a bolt (18) and at least one second construction element (12) having a slot (26), whereby the two construction elements (12, 14) are to be connected in such a manner that the slot (26) takes up the bolt (18) whereby finally the second element (12) is fixed between the first element (12) and a bolt head (20) or nut of the bolt (18), characterized in that for pre-mounting purposes a one-way washer (24) made of a soft or frail material is located around the bolt (18) between the first element (12) and a nut or bolt head (20) of the bolt (18), whereby the soft-/frailness of the washer (24) material is configured to lead to the destruction/removal of the washer (24) during the movement of the slot (26) in radial direction over the bolt (18) of the first element (12) as to receive it, thereby removing the washer (24) from the bolt (18).

2. System according to claim 1 wherein the first and/or second element (12) are made of metal.

3. System according to claim 1 or 2, wherein the washer (24) is made of plastics, cardboard or of a wood-comprising material.

4. System according to one of the preceding claims, wherein the washer (24) is made of a recycled material.

5. System according to one of the preceding claims, wherein the washer (24) is made of a bio-degradable material.

6. System according to one of the preceding claims, wherein the washer (24) is rotatably fixed between the first element (12) and the bolt head (20), wherein the moving direction of the slot (26) with respect to the bolt (18) is given, and wherein the washer (24) has a gap or recess in the direction from which the slot (26) is moved to the bolt (18).

7. System according to one of the preceding claims, wherein the washer (24) comprises at least one rated breaking point to ensure the removal of the washer (24) when the two elements (12, 14) are mounted together.

8. System according to one of the preceding claims, wherein the slot (26) is arranged in a particularly metal sheet (16) having a thickness d, and whereby the washer (24) has an axial length of at least the thickness d of the sheet (16), thus acting as a distance element.

9. System according to claim 8, wherein the washer (24) has an axial length of 1,5d of the thickness of the metal sheet (16) at the maximum.

10. System according to one of the preceding claims, wherein the pre-mounting purposes are the transport of the components to a building site, where the components are going to be mounted together.

11. System according to one of the preceding claims, wherein the two construction elements (12, 14) are components of a car- and/or landing door structure of an elevator.

12. Method for connecting at least two construction elements (12, 14) wherein a one-way washer (24) is placed around a bolt (18) arranged at a first (12) of said construction elements (12, 14), designed to co-act with a slot (26) of a second (14) of said construction elements (12, 14), whereby with the relative moving of the slot (26) in radial direction of the bolt (18) the one-way washer (24) is removed/deleted.

13. Method according to claim 12, wherein the one-way washer (24) is arranged for pre-mounting purposes as e.g. transport of the construction elements (12, 14) to a building site.

AMENDED CLAIMS
received by the International Bureau on 07 July 2016 (07.07.2016)

1. System comprising a first construction element (12) carrying a bolt (18) and at least one second construction element (12) having a slot (26), whereby the two construction elements (12, 14) are to be connected in such a manner that the slot (26) takes up the bolt (18) whereby finally the second element (12) is fixed between the first element (12) and a bolt head (20) or nut of the bolt (18), characterized in that for pre-mounting purposes a one-way washer (24) made of a soft or frail material is located around the bolt (18) between the first element (12) and a nut or bolt head (20) of the bolt (18), whereby the soft-/frailness of the washer (24) material is configured to lead to the destruction/removal of the washer (24) during the movement of the slot (26) in radial direction over the bolt (18) of the first element (12) as to receive it, thereby removing the washer (24) from the bolt (18).

2. System according to claim 1 wherein the first and/or second element (12) are made of metal.

3. System according to claim 1 or 2, wherein the washer (24) is made of plastics, cardboard or of a wood-comprising material.

4. System according to one of the preceding claims, wherein the washer (24) is made of a recycled material.

5. System according to one of the preceding claims, wherein the washer (24) is made of a bio-degradable material.

6. System according to one of the preceding claims, wherein the washer (24) is rotatably fixed between the first element (12) and the bolt head (20), wherein the moving direction of the slot (26) with respect to the bolt (18) is given, and wherein the washer (24) has a gap or recess in the direction from which the slot (26) is moved to the bolt (18).

7. System according to one of the preceding claims, wherein the washer (24) comprises at least one rated breaking point to ensure the removal of the washer (24) when the two elements (12, 14) are mounted together.

8. System according to one of the preceding claims, wherein the slot (26) is arranged in a particularly metal sheet (16) having a thickness d, and whereby the washer (24) has an axial length of at least the thickness d of the sheet (16), thus acting as a distance element.

9. System according to claim 8, wherein the washer (24) has an axial length of 1,5d of the thickness of the metal sheet (16) at the maximum.

10. System according to one of the preceding claims, wherein the two construction elements (12, 14) are components of a car- and/or landing door structure of an elevator.

11. Method for connecting at least two construction elements (12, 14) wherein a one-way washer (24) is placed around a bolt (18) arranged at a first (12) of said construction elements (12, 14), designed to co-act with a slot (26) of a second (14) of said construction elements (12, 14), whereby with the relative moving of the slot (26) in radial direction of the bolt (18) the one-way washer (24) is removed/deleted.

12. Method according to claim 11, wherein the one-way washer (24) is arranged for pre-mounting purposes as e.g. transport of the construction elements (12, 14) to a building site.

Fig. 1

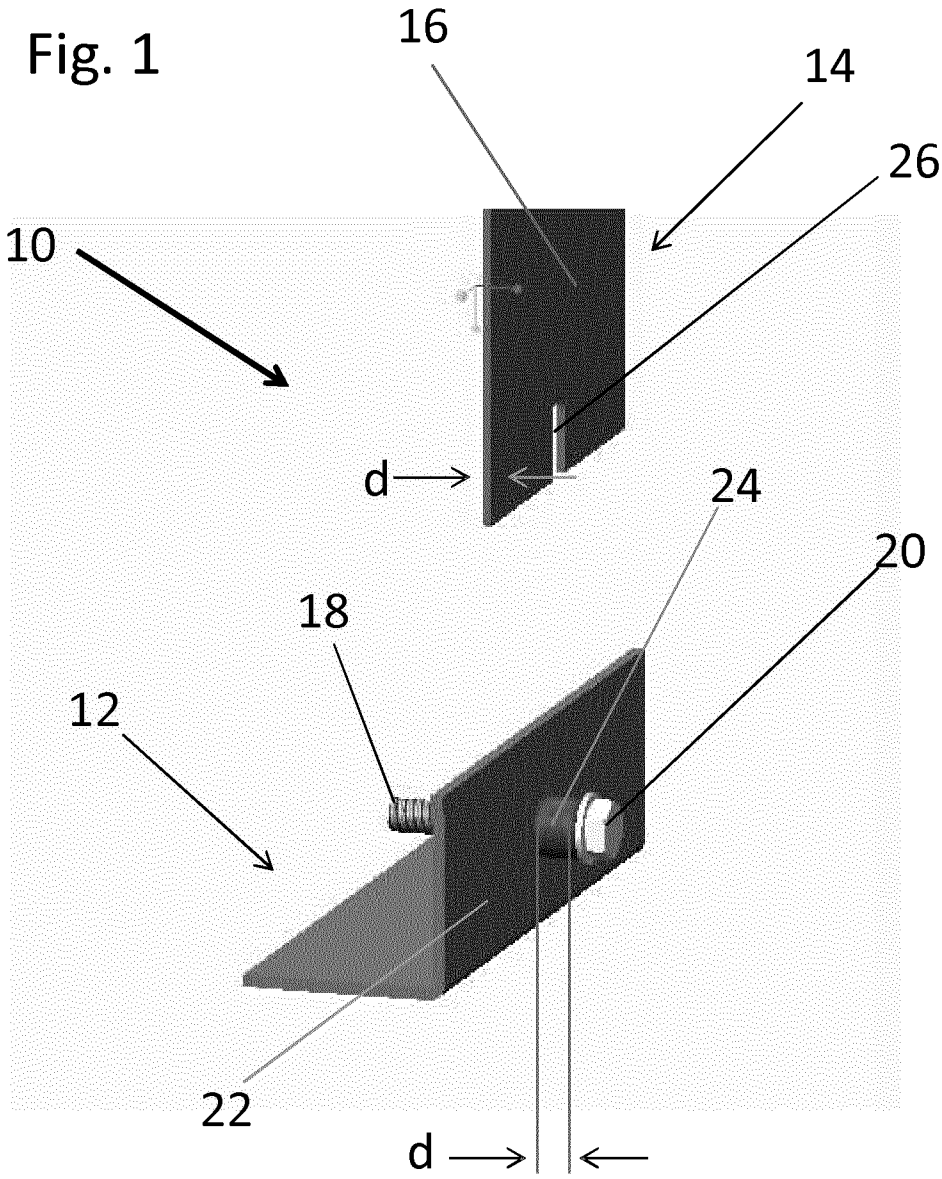
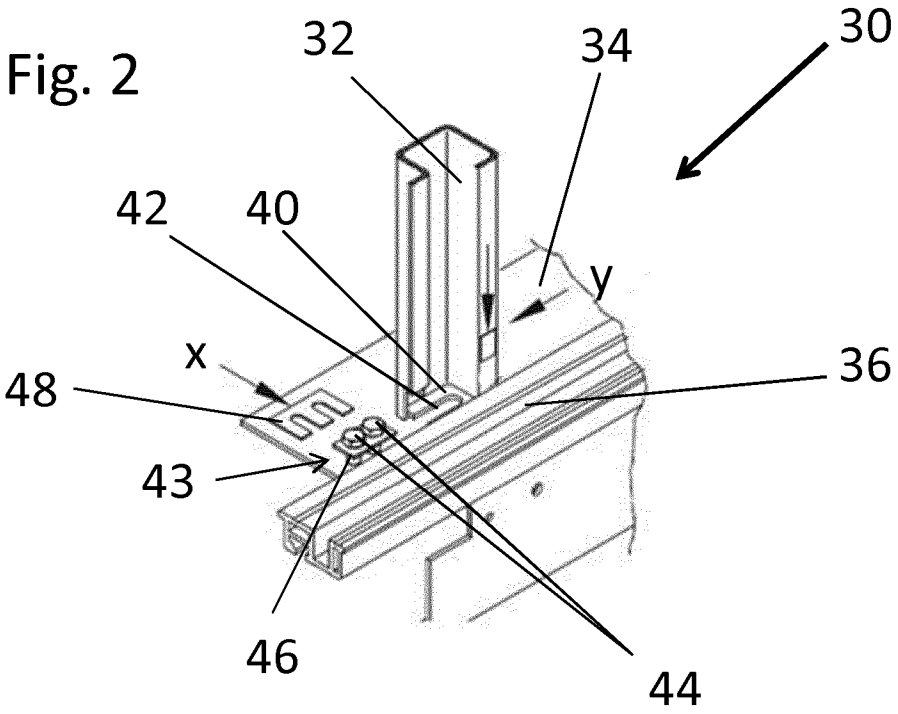


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/075554

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16B5/02 F16B43/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 897 909 A1 (VALEO SYSTEMES ESSUYAGE [FR]) 31 August 2007 (2007-08-31) cited in the application page 5, line 15 - page 6, line 31 -----	1-13

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 June 2016	01/07/2016

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2015/075554

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2897909 A1	31-08-2007	NONE	