(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 315 691 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.05.2018 Bulletin 2018/18

(51) Int Cl.:
E04G 5/16 *(2006.01)* ***E04G 7/30*** *(2006.01)*
E04G 7/32 *(2006.01)*

(21) Application number: **17198981.7**

(22) Date of filing: **27.10.2017**

(84) Designated Contracting States:
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
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **27.10.2016 IT 201600108828**

(71) Applicant: **Amadio & C. S.P.A.**
36050 Quinto Vincentino, VI (IT)

(72) Inventor: **AMADIO, ALESSANDRO**
36050 QUINTO VICENTINO (IT)

(74) Representative: **Maroscia, Antonio**
Maroscia & Associati Srl
Piazza del Castello, 26
36100 Vicenza (IT)

(54) **SCAFFOLDING FOR BUILDINGS AND INDUSTRIAL BUILDINGS WITH A CONNECTION SYSTEM FOR CONNECTING UPRIGHTS AND GUARD RAILS SUPPORTING A PLANKING FLOOR**

(57) A scaffolding (5) for civil and industrial buildings, comprising a plurality of uprights (2), a plurality of guard rails (3) having end portions (9) and an upper surface support (10), at least one planking floor (4) which can be secured to the surfaces (10) and a connection system (1) for connecting the uprights (2) and the guard rails (3). The system (1) comprises a first head (13) which is secured to the portions (9) and has a horizontal slot (19) and a vertical passage (20), and at least one plate (14) with an annular body (15) having a central hole (16) for receiving one of the uprights (2) and a plurality of holes (17) for connection of the head (13). The body (15) is designed to be introduced into the slot (19) for alignment of one of the holes (17) with the passage (20). At least one wedge (22) is provided, which is designed to be introduced into the passage (20) for connecting the first head (13) to the plate (14). The wedge (22) has a tapered portion (23) and an upper edge (24) and the first head (13) and the ledger (3) have the same cross section. The section has an oval shape with a with a substantially vertical major axis (d_1), and the passage (20) allows the wedge (22) to be received therein, such that its edge (24) will be substantially flush with the surface (10) and the floor (4) may be secured to the guard rails (3) against the uprights (2).

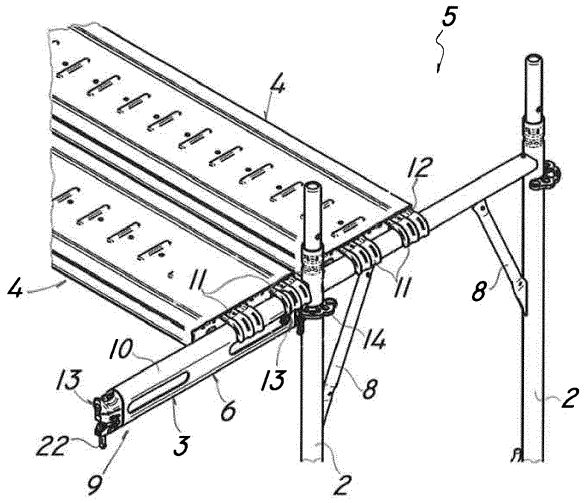

FIG. 2

EP 3 315 691 A1

Description

Field of the invention

[0001] The present invention generally finds application in the field of scaffolding for building and industry, and particularly relates to scaffolding for civil and industrial buildings having a connection system for connecting uprights and guard rails.

Background art

[0002] Scaffolding has been long known, in building and industry, to comprise a plurality of vertical uprights and guard rails which are adapted to be assembled together to form a rigid structure for supporting one or more planking floors.

[0003] The structure may be assembled using systems for connection of a plurality of guard rails to a vertical upright in radially arranged positions.

[0004] Generally, the connection systems comprise a disc that is designed to be fitted onto the upright and has a plurality of radial holes, a plurality of heads designed to be secured to the respective ends of the guard rails and a plurality of wedges designed to fit into the peripheral holes and the heads for locking the latter on the disk.

[0005] The guard rails, which are connected to the uprights in a substantially horizontal position, and the connection systems act as supports for one or more planking floors.

[0006] One drawback of such arrangements is that the shapes and sizes of the heads are different from those of the crosspieces and the wedges will likely project upwards from the upper surface of the heads. Due to this drawback, surface discontinuities will occur, which will prevent stable support of the planking floors.

[0007] Furthermore, due to this drawback, the planking floors cannot be supported by the guard rail at the upright, but at a predetermined distance therefrom, which is at least equal to the size of the connection head.

[0008] Thus, the space between the planking floor and the upright may be exposed to the build-up of water and dirt, or to the fall of materials or substances that may be a safety hazard for operators.

[0009] In an attempt to at least partially obviate these drawbacks, connection systems have been developed which limit surface discontinuities between connection heads and guard rails, for improved support of the planking floors.

[0010] CA2743832 discloses a connection system like those described above that can be mounted to a scaffold comprising a plurality of guard rails. The latter have an inverted U-shaped channel member and a partially open end portion.

[0011] The U-shaped portion partially covers the upper end of the wedge when the latter is inside the connection head, whereas the open end portion, which is smaller than the other portion, provides access thereto upon introduction and removal. Furthermore, the lateral flanges of the U-shaped channel member laterally support the planking floors.

[0012] A first drawback of this arrangement is that this system can be only used in combination with the above discussed U-shaped channel members, to provide stable support to the floors.

[0013] Therefore, this system cannot be used in combination with standard tubular guard rails, as typically used for scaffolding.

[0014] A further drawback is that to the procedure for introducing and removing the edges into and from the connection heads are very complex due to the dimensions of the channel members of the guard rails.

[0015] Another drawback is that the lower braces mounted to the same upright of the guard rails must be radially offset to the latter to avoid bulk increase.

[0016] US20140030009 discloses a system for connecting uprights and guard rails in scaffolding, which comprises at least one first head secured to a respective end of a guard rail and having a vertical slot, an annular plate that can be fitted onto an upright and has a plurality of peripheral holes and a wedge which is adapted to be fitted into the slot and into one of the holes to lock the guard rail relative to the plate, and hence relative to the upright. FIG. 1 shows a perspective view and a broken-away side view of the above described connection system.

[0017] A first drawback of this arrangement is that the guard rail and the head have a circular cross section, whereby this system is limited in its use, as compared with standard structures.

[0018] A further drawback is that the vertical passage in the head does not allow the wedge to be fully inserted therein, whereby the wedge will project upwards from the support surface of the guard rail.

[0019] Due to this drawback, an assembling operator cannot lock the planking floors of the scaffolding against the uprights.

Technical Problem

[0020] In the light of the prior art, the technical problem addressed by the present invention consists in providing scaffolding with a connection system for connecting vertical uprights and guard rails that can be used with standard structures and affords quick and simple assembly.

Disclosure of the invention

[0021] The object of the present invention is to solve the aforementioned problem, by providing scaffolding with a connection system for connecting vertical uprights and support crosspieces for a planking floor, that is highly efficient and relatively cost-effective.

[0022] A particular object of the present invention is to provide scaffolding as described above that provides stable support to the planking floor, while avoiding surface

discontinuities.

[0023] A further object of the present invention is to provide scaffolding as described above that can be used with guard rails and uprights of standard shapes and sizes.

[0024] Another object of the present invention is to provide a connection system as described above, that affords simple and quick assembly of the guard rails with the vertical uprights of the scaffolding.

[0025] A further object of the present invention is to provide a connection system as described above that allows simultaneous assembly of guard rails and lower and front braces on the same plate, thereby reducing the bulk.

[0026] These and other objects, as more clearly explained hereinafter, are fulfilled by scaffolding for civil and industrial buildings as defined in claim 1, which comprises a plurality of vertical uprights, a plurality of tubular guard rails having end portions and an upper support surface, at least one planking floor which can be removably secured to the upper surfaces of the guard rails and a connection system for connecting the uprights and the guard rails.

[0027] The system comprises at least one first connection head which is secured to the end portions and has a horizontal slot and a vertical passage in communication with the slot, and at least one connection plate with an annular body having a central hole for receiving one of the uprights and a plurality of holes for connection of the first head. The annular body is adapted to be introduced into the slot for alignment of one of the peripheral holes with the vertical passage.

[0028] At least one junction wedge is provided, which is adapted to be introduced into the vertical passage through a respective peripheral hole, for stable connection of the first head to the connection plate, the wedge having a tapered portion and an enlarged upper edge. The first head and the guard rail have substantially the same cross section.

[0029] The cross section substantially has an oval shape with a substantially vertical major axis and the vertical passage is configured to allow the wedge to be introduced therein, such that its upper edge will be substantially flush with and not project upwards from the support surface of the guard rails and such that the planking floor will be secured to the guard rails also against the uprights.

[0030] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief description of the drawings

[0031] Further features and advantages of the invention will be more apparent from the detailed description of a preferred, non-exclusive embodiment of scaffolding for civil and industrial buildings having a connection system for connecting uprights and guard rails according to the invention, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIG. 1 shows a perspective view and a broken-away side view of a connection system for connecting uprights and guard rails in prior art scaffolding;

FIGS. 2 and 3 show a perspective view and an enlarged side view of scaffolding comprising the connection system of the invention respectively;

FIGS. 4 and 5 show a pair of enlarged perspective views and a side view of the connection system of Figs. 1 and 2 respectively;

FIGS. 6 and 7 show a broken away side view and a broken away front view of the guard rail of the scaffolding of Fig. 1 respectively;

FIG. 8 shows a perspective view of a first detail of the connection system of the invention;

FIGS. 9 to 11 show a perspective views, a front views, and a broken away side view of a second detail of the connection assembly of the invention respectively;

FIG. 12 shows a perspective view of a third detail of the connection system of the invention;

FIG. 13 shows a perspective view of a lower brace of the scaffolding of Fig. 1, comprising a fourth detail of the connection system of the invention;

FIG. 14 shows an enlarged perspective view of the fourth detail of Fig. 12;

FIG. 15 shows a perspective view of a fifth detail of the connection system of the invention;

FIG. 16 shows a side view of the fifth detail of Fig. 14, as secured to a front brace of the scaffolding.

Detailed description of a preferred exemplary embodiment

[0032] Particularly referring to the figures, a system is shown, generally designated by numeral 1, which enables connection of vertical uprights 2 and guard rails 3 for supporting a metal planking floor 4 for scaffolding 5.

[0033] By way of example, the scaffolding 5 as shown in FIGS. 2 and 3, comprises a plurality of vertical uprights 2 and a plurality of guard rails 3 connected to the uprights 2 and may be used as is well known in building and industry.

[0034] Particularly, the guard rails 3 may comprise one or more crosspieces 6, as best shown in FIG. 3, and one or more diagonal braces, i.e. lower braces 7 and front braces 8, as shown in FIGS. 13 and 16 respectively.

[0035] The crosspieces 6 are adapted to support the planking floors 4 of the scaffolding 5 while the lower braces 7 mainly act for reinforcement and horizontal bracing of the scaffolding 5.

[0036] In a preferred embodiment of the invention, the scaffolding 5 comprises at least one substantially tubular guard rail 3 having a pair of end portions 9 and an upper support surface 10 for the planking floor 4.

[0037] The guard rail 3 is of a well-known type and is adapted for use with standard scaffolding structures 5

which comprise tubular guard rails, e.g. having a diameter of 48.3 mm. Like the vertical uprights 2, it may also be made of a metal material, e.g. iron or steel.

[0038] In addition, each planking floor 4 may comprise a plurality of couplers 11 at the longitudinal end edges 12, which are adapted to be removably coupled to the upper surfaces 10 of the guard rail 3 to lock the planking floor 4.

[0039] The connection system 1 comprises a first connection head 13, as shown in FIGS. 9 to 11, which is secured to each of the end portions 9 of the guard rail 3, and at least one connection plate 14, as shown in FIG. 8.

[0040] The plate 14 comprises an annular body 15 having a central hole 16 for receiving a vertical upright 2 and a plurality of peripheral holes 17 for engagement of the first heads 13.

[0041] The first head 13 may be welded to its respective end portion 9 of the guard rail 3, and the central hole 16 of the plate 14 may comprise appropriate retaining appendages, not shown, for friction fit of the plate 14 on the upright 2.

[0042] Furthermore, there may be provided first peripheral holes 17 and second peripheral holes 18 that are different from and angularly arranged relative to the first holes. Namely, the first peripheral holes 17 have a smaller size than the second peripheral holes 18 and allow connection of the first heads 13.

[0043] In an alternative embodiment of the invention, not shown, the connection system 1 comprises a half-plate which is adapted to allow selective engagement of the first heads 13 only at one face of the upright 2.

[0044] As best shown in FIGS. 9 and 11, the first connection head 13 comprises a substantially horizontal slot 19 and a vertical passage 20 which communicates with the slot 19 and has an upper edge 21.

[0045] The annular body 15 of the connection plate 14 is designed to be introduced into the slot 19 for alignment of one of the peripheral holes 17 with the vertical passage 20 of its respective first head 13, as shown in FIG. 3.

[0046] Each first head 13 is designed to be stably connected to the plate 14 by means of a junction wedge 22, as shown in FIG. 12, which is adapted to be fitted into its respective vertical passage 20 through the aligned peripheral hole 17.

[0047] The wedge 22 comprises a tapered portion 23 which is adapted to be entirely introduced into the vertical passage 20 and the peripheral hole 17, and an enlarged upper edge 24 having a greater width than the vertical passage 20 and adapted to interact with the upper edge 21 of the latter to hold the wedge 22 in the locked position.

[0048] In a peculiar aspect of the invention, the first connection head 13 and the guard rail 3 have substantially equal oval cross-sectional shapes, as shown in the FIGS. 7 and 10, with a major axis d_1 in the vertical position when the connection system 1 is assembled.

[0049] The vertical passage 20 is configured to allow the wedge 22 to be introduced therein, such that its upper edge 24 will be substantially flush with and not project upwards from the support surface 10 of the guard rails, as shown in FIGS. 3 and 5.

[0050] Thus, the planking floor 4 may be locked on the guard rails 3 by the couplers 11 also against the uprights 2, as shown in FIGS. 2 and 3.

[0051] This will prevent the occurrence of surface discontinuities that affect stable support of the planking floor 4, with the latter being able to be placed on the scaffolding 5 at the vertical upright 2.

[0052] This is because the planking floor 4 is supported and locked, using the couplers 11, not only at the upper surface 10 of the guard rail 3 but also at the first head 13, as shown in FIGS. 2 and 3.

[0053] The oval cross section of the guard rail 3 and the first head 13 has a major axis d_1 and a minor axis d_2 of about 80 mm and 50 mm respectively.

[0054] In order to further facilitate introduction of the wedge 22 into its respective vertical passage 20, the upper edge 21 of the latter may include a recess 25 having a flared shape on both sides.

[0055] In addition, each vertical passage 20 has an inner front surface 26 that defines an abutment surface for the wedge 22, and particularly for the straight edge 27 of the tapered portion 23.

[0056] The front surface 26 of the passage 20 is spaced apart from the outer front surface 28 the first head 13 to form a front wall 29 with a predetermined minimum thickness s.

[0057] The predetermined thickness s may be about 8 mm and the vertical passage 20 may have a maximum dimension d_3 of about 33 mm, such that the wedge 22 can be inserted with its upper edge 24 not projecting upwards from the support surface 10.

[0058] Of course, these dimensions may also slightly vary without departure from the scope of the invention, with the aforementioned technical problem being still solved.

[0059] Advantageously, a plurality of second heads 30 may be provided, which are secured by welding at the ends 31 of the lower braces 7 and are designed to be connected to the plate 14, as shown in FIGS. 13 and 14.

[0060] In particular, the second heads 30 are connected to the plate through the second peripheral holes 18 whereas the first connection heads 13 are secured to the end portions 9 of the crosspieces 6 for connection thereof to the plate 14 through the first peripheral holes 17.

[0061] Therefore, one connection plate 14 may have a plurality of first 13 and second heads 30 fixed thereto in side-by-side relationship, for connection of a plurality of crosspieces 6 and/or lower braces 7 to the same upright 2.

[0062] For this purpose, the first heads 13 may comprise a pair of lateral recesses 32, above the slots 19, as shown in FIGS. 3, 9 and 10, for receiving a portion of the adjacent second head 30 to avoid any interference with the lower brace 7 and reduce the overall dimensions of the system 1.

[0063] As shown in FIG. 14, the second heads 30 may

comprise a rigid bracket 33 with a substantially horizontal portion 34 having a respective connection hole 35.

[0064] The horizontal portion 34 is adapted to lie over the plate 14 for its respective connection hole 35 to be aligned with a corresponding peripheral hole 18, and be able to receive a junction pin 36 with a respective tilting pawl 37.

[0065] As mentioned above, the junction pins 36 are adapted to fit into the second peripheral holes 18 and the latter may have a larger size than the first holes 17, for the second heads 30 secured to the lower braces 7 to have some freedom of movement.

[0066] As shown in FIGS. 15 and 16, third connection heads 38 may be provided, which are secured to the ends 39 of the front braces 8 for connection thereof to the plate 14 through respective junction wedges 22.

[0067] Like the first heads 13, the third connection heads 38 comprise a substantially horizontal slot 19 and a vertical passage 20 which is adapted to be aligned with a second peripheral hole 18 of the plate 14 for receiving the wedge 22.

[0068] Nevertheless, due to the different external configuration of the third heads 38 and since the latter are not adapted to support the planking floors 4, the enlarged upper edge 24 of the wedges 22 in the third heads 38 may possibly project upwards from the support surface 10.

[0069] Each of the second heads 38 defines a vertical center plane π and may comprise a substantially flat appendage 40 which is inclined to the center plane π at an angle of about 45°.

[0070] Each of the appendages 40 has a through hole 41 for receiving a bolt 42 that can be introduced into corresponding end holes 43 formed in the front braces 8, as shown in FIG. 16.

[0071] In addition, each crosspiece 6 may be adapted to connect two vertical uprights 2 of the scaffolding 5 through the first heads 13 secured to a respective end portion 8 and fixed to a corresponding plate 14 that is fitted on the uprights 2.

[0072] It will be appreciated from the foregoing that the connection system of the invention fulfills the intended objects and particularly affords very simple and quick assembly of rigid scaffolding.

[0073] The connection system of this invention is susceptible of a number of changes and variants, within the inventive concept disclosed in the appended claims.

[0074] While the connection system has been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Industrial Applicability

[0075] The present invention may find application in industry, because it can be produced on an industrial scale by civil and/or industrial scaffolding manufacturers.

Claims

1. A scaffolding (5) for civil and industrial buildings, comprising:

- a plurality of vertical uprights (2);
- a plurality of guard rails (3) having end portions (9) and an upper support surface (10);
- at least one planking floor (4) removably securable to said upper surfaces (10) of said guard rails (3);
- a connection system (1) for connecting said uprights (2) and said guard rails (3),

wherein said system (1) comprises:

- at least one first connection head (13) secured to each of said end portions (9) of said guard rails (3), said first head (13) having a horizontal slot (19) and a vertical passage (20) in communication with said slot (19);
- at least one connection plate (14) with an annular body (15) having a central hole (16) for the passage of one of said vertical uprights (2) and a plurality of peripheral holes (17) for connection of said at least one first head (13), said annular body (15) being adapted to be introduced into said slot (19) for alignment of one of said peripheral holes (17) with said vertical passage (20);
- at least one junction wedge (22) which is adapted to be introduced into said vertical passage (20) through a respective peripheral hole (17) for stable connection of said first head (13) to said connection plate (14), said wedge (22) having a tapered portion (23) and an enlarged upper edge (24);

wherein said first head (13) and said guard rail (3) substantially have the same cross section;
characterized in that said cross section substantially has an oval shape with a substantially vertical major axis (d_1), said vertical passage (20) being configured to allow said wedge (22) to be introduced therein, such that its upper edge (24) will be substantially flush with and not projecting upwards from said support surface (10) of said guard rails (3) and to allow said planking floor (4) to be secured to said guard rails (3) also proximate to the uprights (2).

2. Scaffolding as claimed in claim 1, **characterized in that** each planking floor (4) has a plurality of couplers (11) at its longitudinal end edges (12), which are adapted to be removably coupled to the support surface (10) of a respective guard rail (3) for securing said planking floor (4) also at said first head (13).

3. Scaffolding as claimed in claim 1, **characterized in that** said first connection head (13) comprises a recess (25) at the upper edge (21) of said vertical passage (20).

4. Scaffolding as claimed in claim 1, **characterized in that** said substantially oval cross section has a minor axis (d_2), said major axis (d_1) and said minor axis (d_2) being about 80 mm and about 50mm respectively.

5. Scaffolding as claimed in claim 1, **characterized in that** said vertical passage (20) has an inner front surface (26) that defines an abutment surface for said wedge (22), and that is spaced apart from the outer front surface (28) of said first head (13) to form a front wall (29) with a predetermined minimum thickness (s).

6. Scaffolding as claimed in claim 4, **characterized in that** said predetermined minimum thickness (s) is about 8 mm and said vertical passage (20) has a maximum dimension (d_3) of about 33 mm.

7. Scaffolding as claimed in claim 1, **characterized in that** it comprises a plurality of guard rails (3) comprising one or more crosspieces (6) and one or more lower braces (7), each crosspiece (6) having end portions (9) with respective first heads (13) secured thereto and each lower brace (7) having respective end portions (31) with respective second heads (30) secured thereto, and designed to be connected to said connecting plate (14).

8. Scaffolding as claimed in claim 6, **characterized in that** each of said second heads (30) comprises a rigid bracket (33) having a substantially horizontal portion (34) with a respective connection hole (35), which is designed to be aligned with one of said peripheral holes (18) of the plate (14) to receive a respective junction pin (36).

9. Scaffolding as claimed in claim 6, **characterized in that** each of said first heads (13) has a pair of recesses (32) above said slot (19), for receiving a portion of an adjacent second head (30), to thereby reduce the overall dimensions of the system (1).

10. Scaffolding as claimed in claim 6, **characterized in that** said connection plate (14) comprises first peripheral holes (17) for connection of said first heads (13) and second peripheral holes (18), differing from the first holes, for connection of said second connection heads (30).

11. Scaffolding as claimed in claim 6, **characterized in that** said first heads (13) and said second heads (30) are secured to respective ends (9, 31) of said crosspieces (6) and said lower braces (7) by welding.

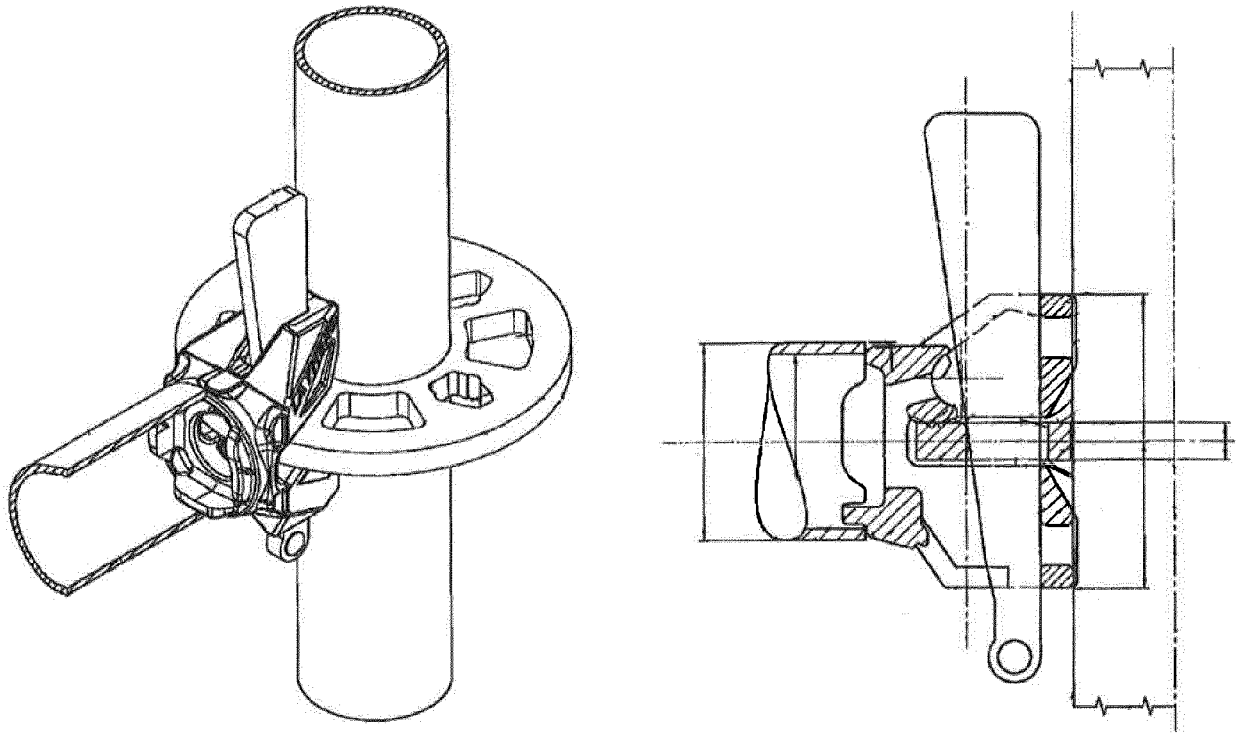

FIG. 1 - PRIOR ART

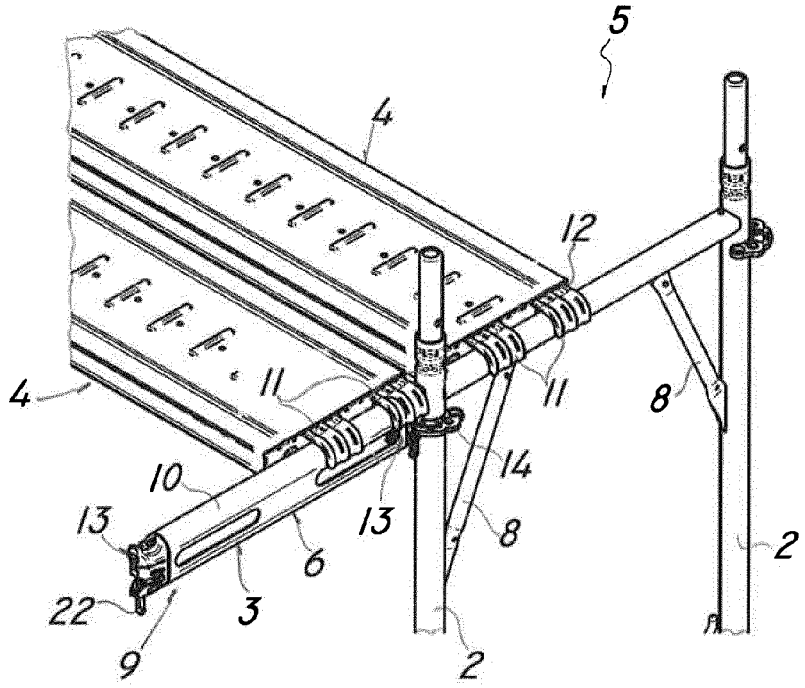

FIG. 2

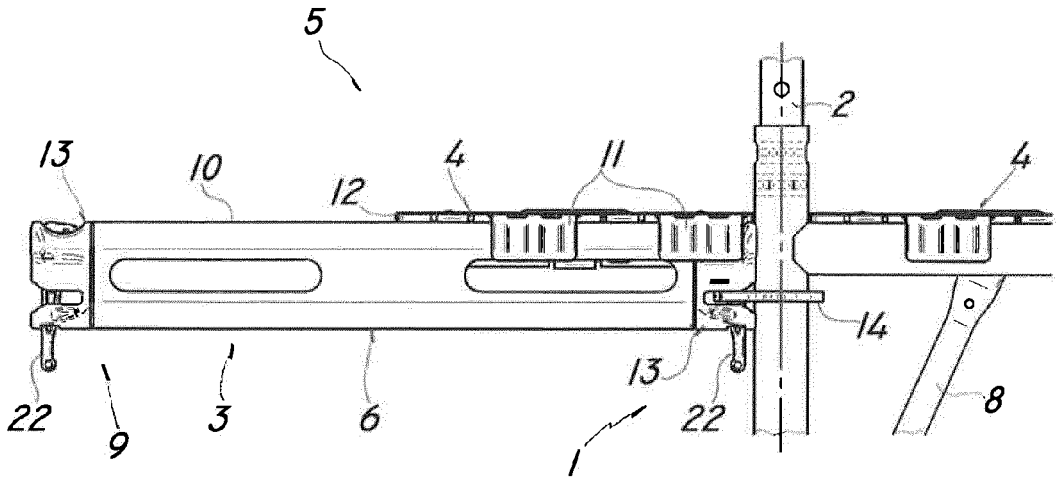
5
2
13
10
12
4
11
4
14
13
22
9
3
6
22
1
8

FIG. 3

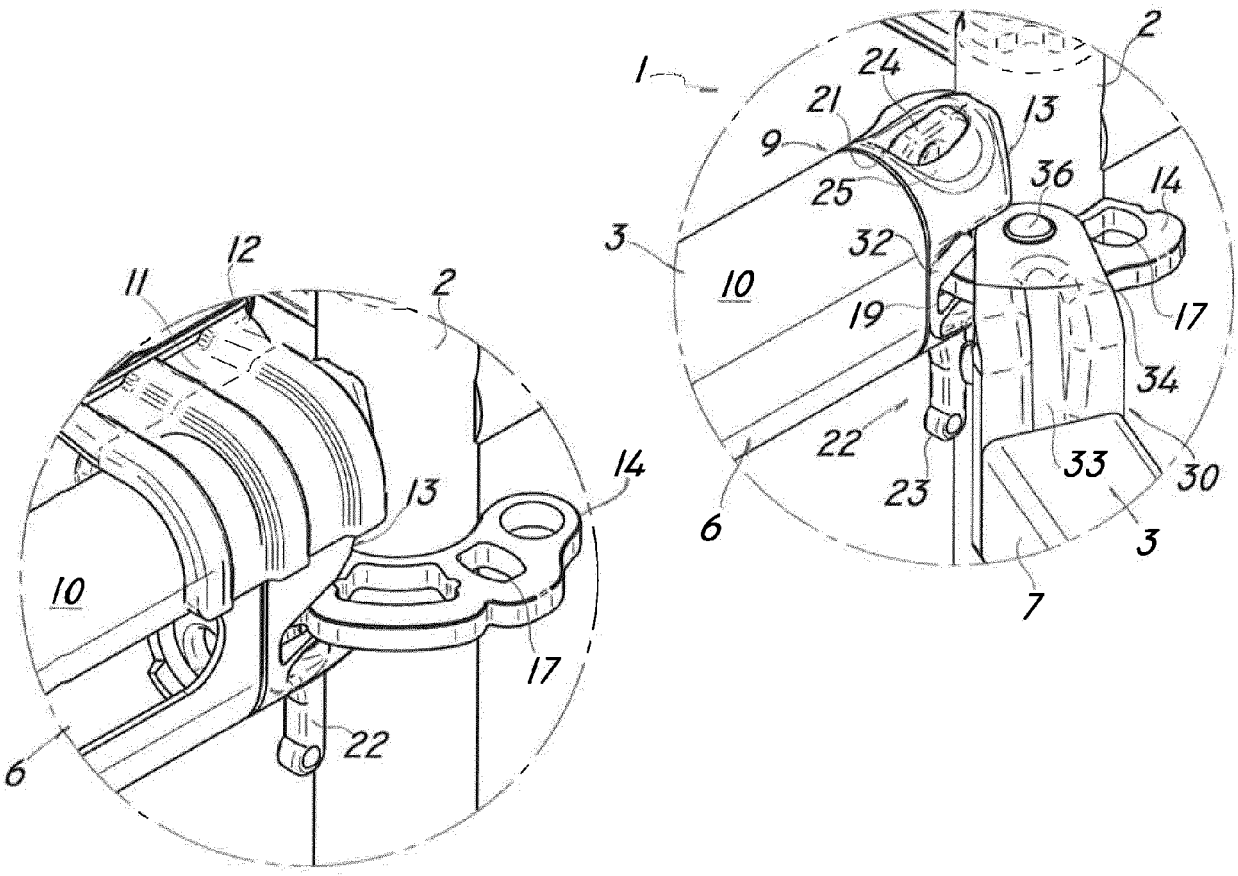
1
24
2
21
13
9
36
14
25
3
32
10
19
17
34
22
33
30
23
6
3
7
11
12
2
14
13
10
17
22
6

FIG. 4

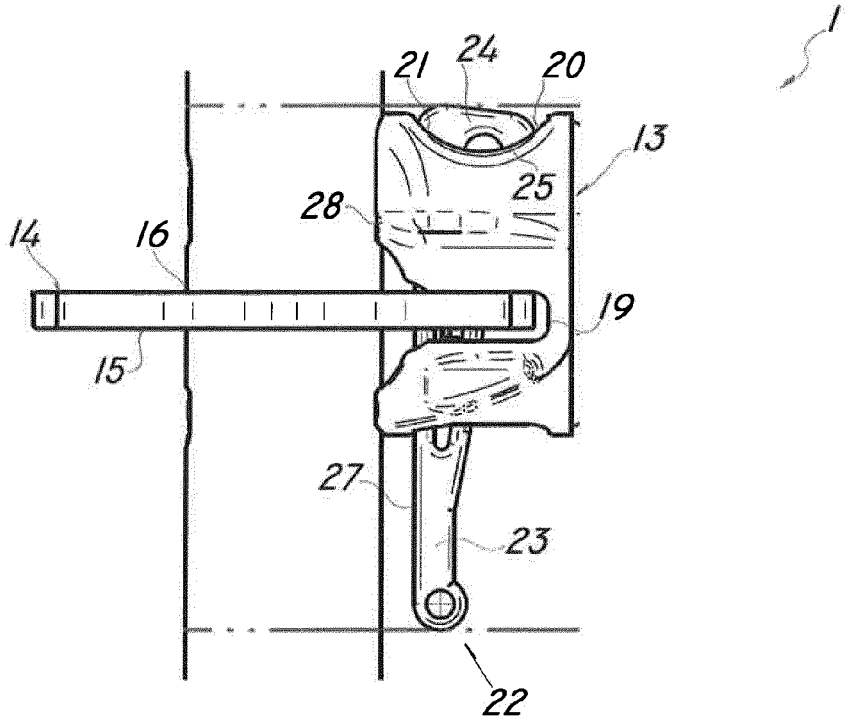

FIG. 5

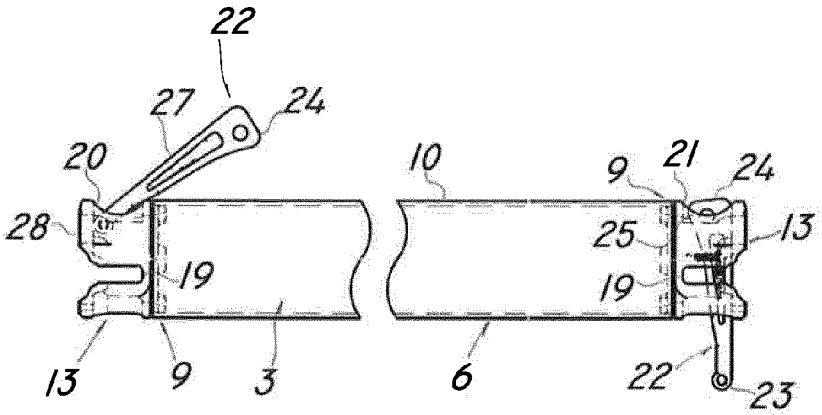

FIG. 6

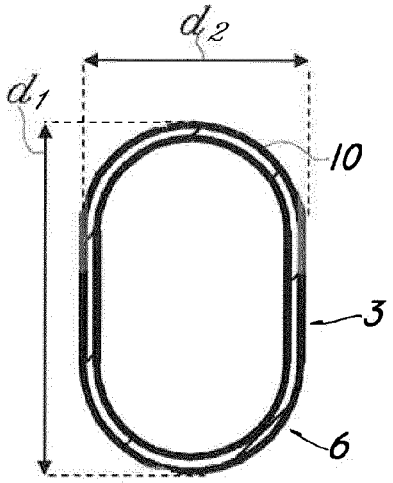

FIG. 7

BE310

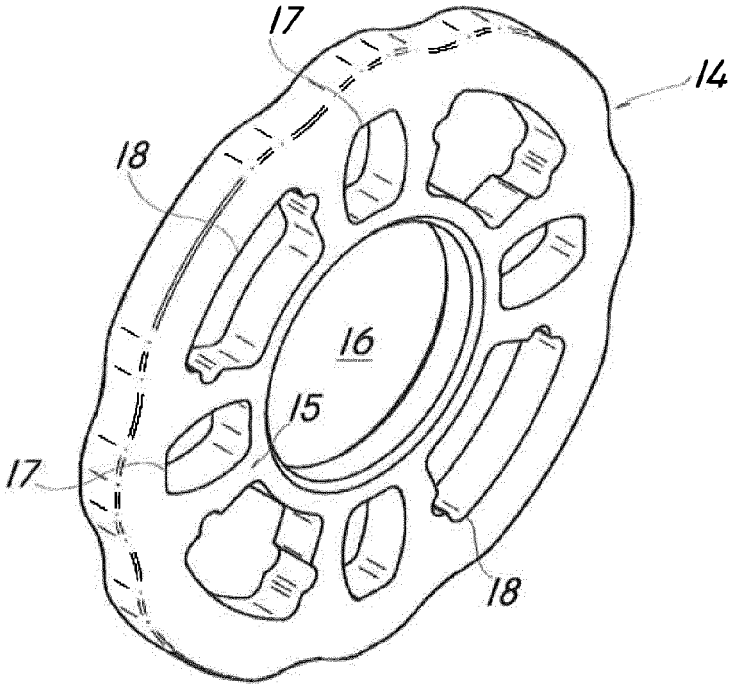

FIG. 8

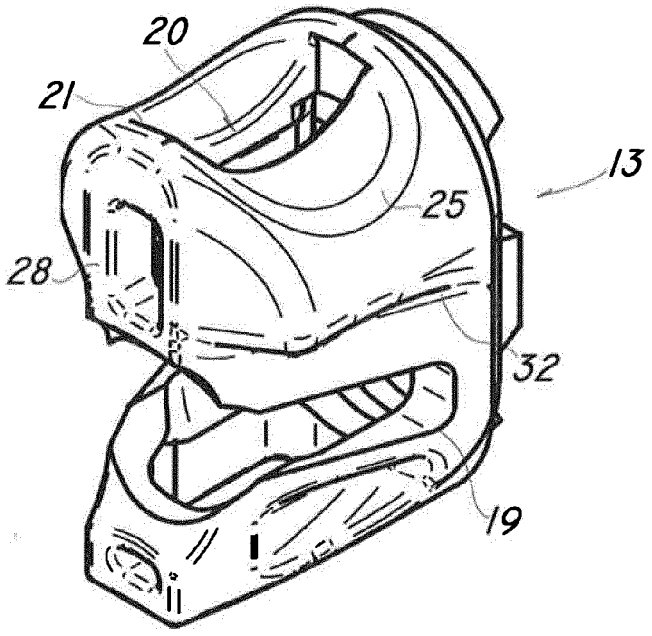

FIG. 9

BE310

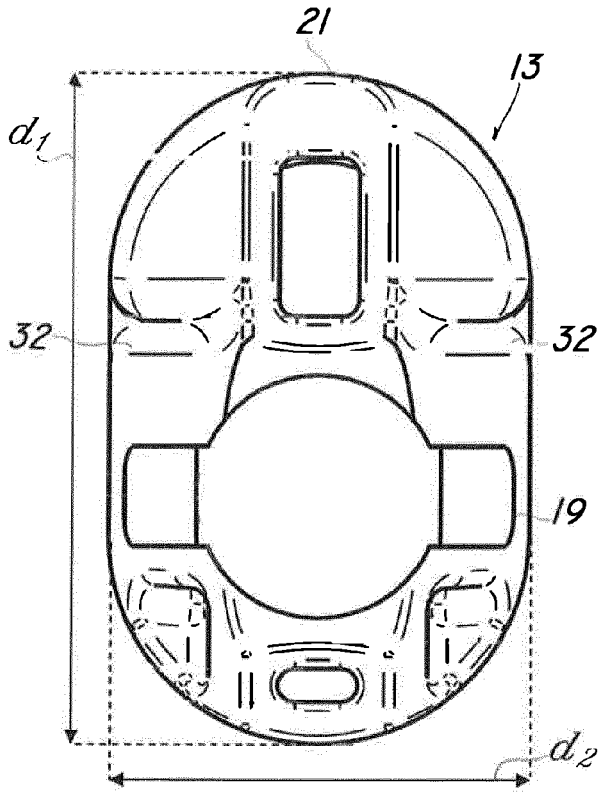

FIG. 10

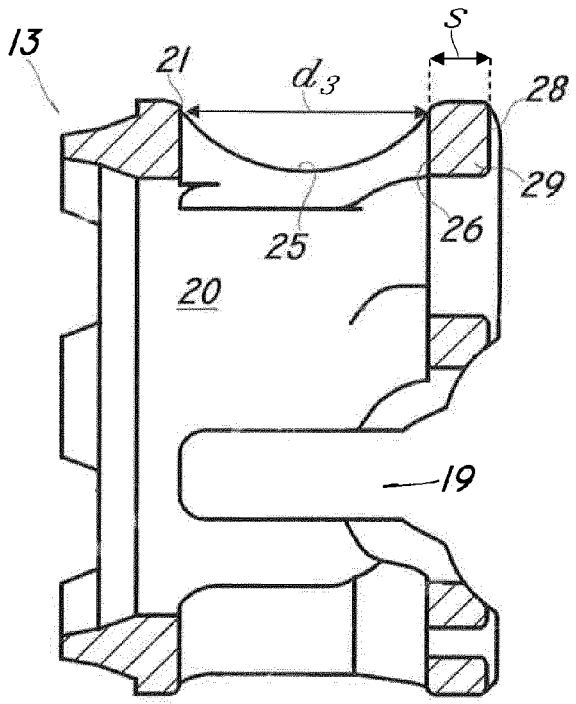

FIG. 11

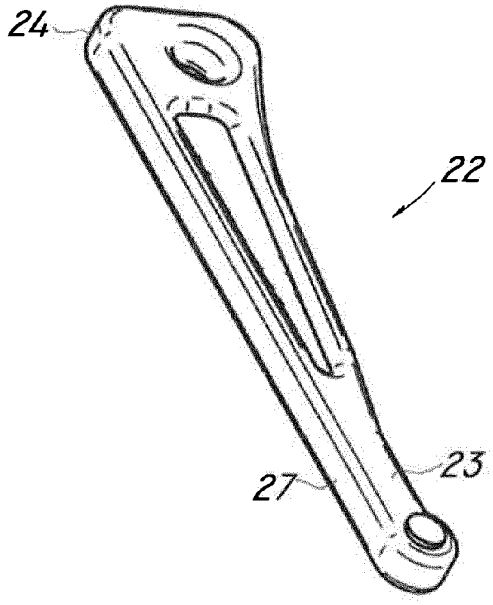

FIG. 12

BE310

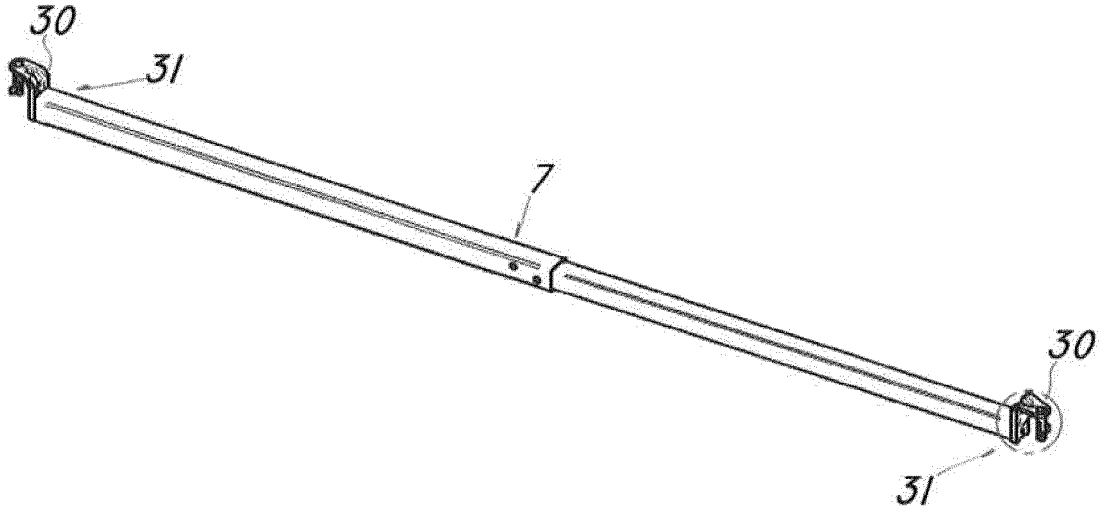

FIG. 13

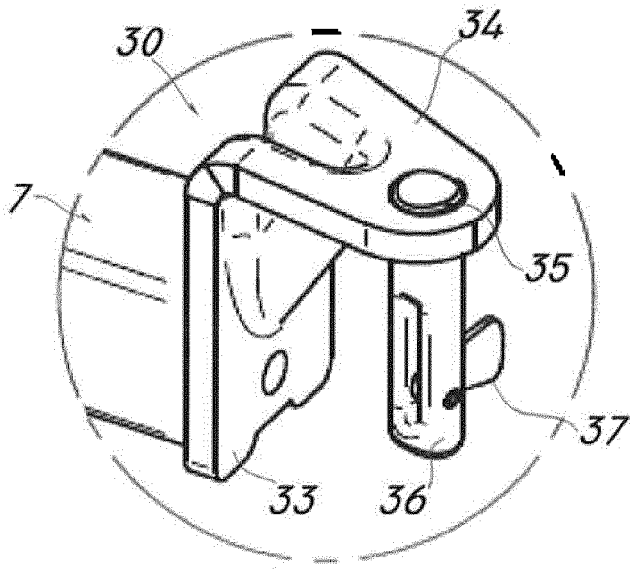

FIG. 14

BE310

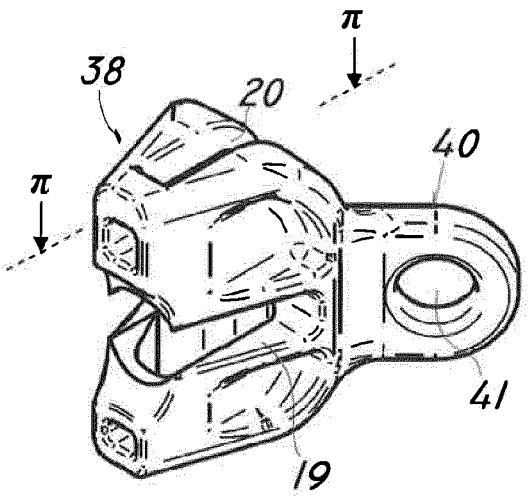

FIG. 15

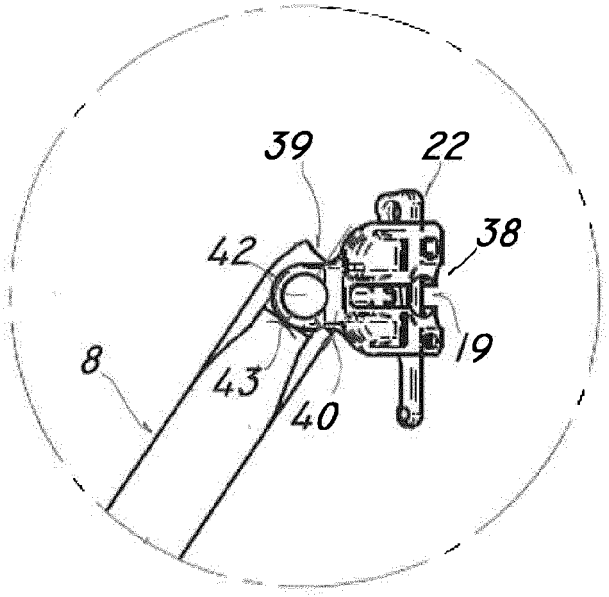

FIG. 16

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 19 8981

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 1 672 140 A2 (PERUGINO ENGINEERING S R L [IT]) 21 June 2006 (2006-06-21) * paragraph [0005]; figures 7-13 * * column 3, line 19 - column 4, line 34 *	1-8,10, 11 9	INV. E04G5/16 E04G7/30 E04G7/32
X A	EP 1 544 375 A1 (FRACASSO METALMECCANICA [IT]) 22 June 2005 (2005-06-22) * paragraph [0017]; figures 1-6 * * paragraph [0027] - paragraph [0028] *	1,3,5,7, 8,10 4,6,9,11	
X A	US 4 273 463 A (DOBERSCH GERHARD) 16 June 1981 (1981-06-16) * column 2, line 19 - line 63; figures 1-2 *	1,3,5,7, 8,10,11 4,6,9	
X A	WO 2005/052283 A1 (PERI GMBH [DE]; SCHWOERER ARTUR [DE]) 9 June 2005 (2005-06-09) * page 13, line 24 - page 16, line 28; figures 2a-2b,4a,4b *	1,3,5,7, 8,10,11 4,6,9	

TECHNICAL FIELDS SEARCHED (IPC)

E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 January 2018	Manera, Marco

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 19 8981

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-01-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1672140 A2	21-06-2006	AT 555264 T	15-05-2012
		EP 1672140 A2	21-06-2006
		IT FI20040079 U1	14-03-2005
EP 1544375 A1	22-06-2005	NONE	
US 4273463 A	16-06-1981	NONE	
WO 2005052283 A1	09-06-2005	DE 10355495 A1	21-07-2005
		WO 2005052283 A1	09-06-2005

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- CA 2743832 **[0010]**
- US 20140030009 A **[0016]**