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(54) Title: DEVICE FOR ASSEMBLING DOWNSTAND BEAMS IN FORMWORK FOR CASTING FLOOR SLABS

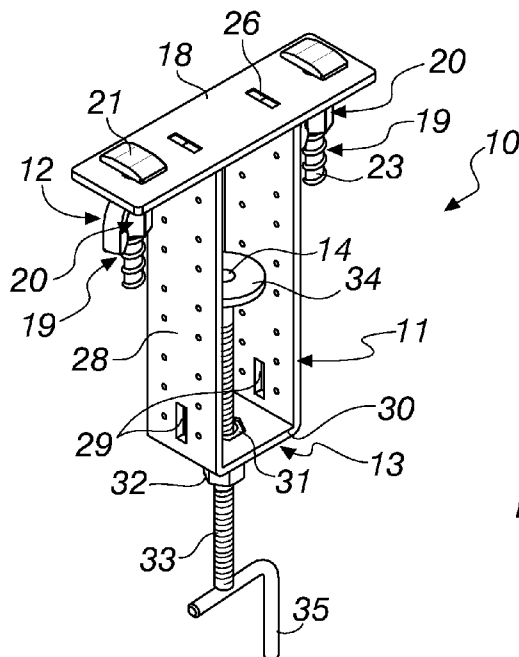


Fig. 1

(57) Abstract: A device (10) for assembling downstand beams in formwork for casting floor slabs, comprising - a bracket (11), which is contoured to support a portion of a downstand beam, - means (12) for fixing the bracket (11) to at least one beam of a formwork, - means (13) for adjusting the height of the resting point (14) of the portion of downstand beam in the bracket (11).



DEVICE FOR ASSEMBLING DOWNSTAND BEAMS IN FORMWORK FOR CASTING FLOOR SLABS

The present invention relates to a device for assembling downstand beams in formwork for casting floor slabs.

5 Known formwork systems for horizontal castings currently have a drawback constituted by the fact that since they are composed of prefabricated elements they typically provide surfaces that belong to a same plane. In order to be able to provide concrete elements that have different thicknesses with respect to those of a floor slab with these systems, which
10 are moreover very widespread commercially, these known systems must be integrated with other systems, generally by resorting to the use of wood elements such as beams, profiles, boards and other similar elements, for example to provide elements that are very common in the designs of concrete floor slabs, i.e., load-bearing beams, which have thicknesses that
15 are commonly greater than those of the floor slabs.

The operating method just described is the source of a slowdown in work, since the technology used to solve these situations is typically very cumbersome, as the necessary elements must be shaped in the yard with tools of the trade such as hand saws, hammers and nails and must be
20 designed directly on site without the possibility to prepare elements that are prefabricated and ready for use in advance. Moreover, this technology is the source of a significant economic expenditure which usually burdens significantly the budgets of companies.

The aim of the present invention is to provide a device for assembling
25 downstand beams in formwork for casting floor slabs that is capable of obviating the cited limitations of the background art.

Within this aim, an object of the invention is to provide a device that is structurally simple, achieving production economy results for them.

Another object of the present invention is to provide a device to be
30 used for the formwork of downstand beams that is particularly resistant to

the loads applied thereto.

Another object of the present invention is to provide a device for assembling downstand beams in formwork that has the safety systems required by the standards in the field.

5 A further object of the present invention is to provide a device for the formwork of downstand beams that allows, within a known formwork system, to provide concrete elements that have different thicknesses with respect to those of a floor slab.

Another object of the present invention is to render the formwork of
10 downstand beams faster, easier and simpler, obviating many typical drawbacks of currently known systems.

Another object of the present invention is to provide a device for assembling downstand beams in formwork for casting floor slabs that is easy in use.

15 This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by a device for assembling downstand beams in formwork for casting floor slabs, characterized in that it comprises:

- a bracket, which is contoured to support a portion of a downstand beam,
- 20 – means for fixing said bracket to at least one beam of a formwork,
- means for adjusting the height of the resting point of said portion of downstand beam in said bracket.

Further characteristics and advantages of the invention will become better apparent from the description of two preferred but not exclusive
25 embodiments of the device according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a device according to the invention in a first embodiment thereof;

Figure 2 is a sectional side view of the device of Figure 1;

30 Figure 3 is a perspective view of an example of application of the

device of Figures 1 and 2;

Figure 4 is a perspective view of a formwork comprising multiple devices according to the invention in its first embodiment;

Figure 5 is a perspective view of a device according to the invention
5 in a second embodiment thereof;

Figure 6 is a perspective view of a first example of application of the device of Figure 5;

Figure 7 is a transverse sectional view of the example of application of Figure 6;

10 Figure 8 is a transverse sectional view of a second example of application of the device according to the invention in its second embodiment;

Figure 9 is a view of a formwork comprising a device according to the invention in its second embodiment;

15 Figure 10 is a further view of a formwork as in Figure 9.

With reference to the figures, a device for assembling downstand beams in formwork for casting floor slabs, according to the invention, is designated generally by the reference numeral 10.

The device 10 comprises:

20 – a bracket 11, which is contoured to support a portion of a downstand beam, for example the downstand beam 15 in Figure 3;

– means 12 for fixing said bracket 11 to a beam 16 of formwork 17, as in Figures 3 and 4;

25 – means 13 for adjusting the height of the resting point 14 of the portion of downstand beam 15 in the bracket 11.

In this first embodiment of the invention, which is to be understood as a nonlimiting example thereof, the bracket 11, which is U-shaped, is fixed by its free ends to an upper plate 18.

30 The means 12 for fixing the bracket 11 to a formwork beam 16 comprise the plate 18, to the sides of which two opposite locking pins 19 are

coupled by means of two corresponding holes provided in the plate 18, closure plates 20 being associated with said pins.

The locking pins 19 each comprise

- an insertion and engagement head 21, which is adapted to be inserted in a corresponding longitudinal engagement channel 22, which is formed on the lower edge of a formwork beam 16, as shown in Figure 2,
- a threaded stem 23, for supporting the insertion and engagement head 21,
- and a closure plate 20.

Each closure plate 20 comprises a sleeve 24 which is threaded complementarily internally with respect to the stem 23 and is adapted to be screwed onto the stem 23, and at least one lateral actuation tab, for example two lateral actuation tabs 25.

The sleeve 24 is adapted to be screwed onto the stem 23 in order to lock between itself and the insertion and engagement head 21 both the plate 18 and the lower edge 27 of the beam 16.

Each closure plate 20 comprises the sleeve 24 and at least one lateral actuation tab, for example two lateral actuation tabs 25.

The plate 18 is further provided with two rectangular holes 26, which are adapted to receive the free ends of the bracket 11; the connection is ensured by means of an appropriate welding process.

The bracket 11 is constituted by a metal plate bent into a U-shape with side walls 28 perforated with holes for the passage of nails for locking a portion of beam inserted in the bracket 11.

In the lower part of the bracket 11, and specifically in the lower part of the side walls 28, there are two other rectangular holes 29 adapted for the passage of elements required for the activity of fixing completion elements (wood profiles or others).

The means 13 for adjusting the height of the resting point 14 of the portion of downstand beam 15 in the bracket 11 comprise, on the central

portion 30 of the bracket 11, a through hole 31 at and coaxially to which an internally threaded polygonal nut 32 is fixed for example by welding.

The polygonal nut 32 is threaded internally so that it is compatible for the insertion therein, and therefore for the passage of, a threaded bar 33.

5 The threaded bar 33 supports, in its upper end, a circular plate 34, which forms the resting point 14 for the downstand beam 15.

By rotating the threaded bar 33, the adjustment, in a vertical direction in the configuration for use, of the distance of the circular plate 34 from the central portion 30 of the bracket 11 is achieved.

10 The vertical bar 33 has, in its lower end, i.e., in the end that is opposite the one where the circular plate 34 is arranged, an actuation handle 35, which has the practical and intuitive function of facilitating rotation about its own axis of the threaded bar 33 so as to make the upward and downward adjustment of the position of the circular plate 34 simple and
15 fast.

Figures 3 and 4 show an example of application of a device 10 according to the invention.

In this first example of application, multiple devices according to the invention 10 are set up in a formwork 17 that belongs to the background art,
20 composed of elements that belong to the background art such as vertical props 37, supports of the falling head type 38 for the formwork beams 16, the formwork beams 16 themselves, and formwork panels 39.

In this field of application, the device 10 according to the invention for assembling downstand beams is connected to the load-bearing beam 16
25 as described above and as shown in Figure 2. The coupling thus provided allows to position elements such as wood profiles, or wood beams 15, or secondary beams of limited length, inside the bracket 11, to be used for the formwork of the downstand beams 10.

The chosen element is positioned between the upper surface of the
30 circular plate 34, i.e., the resting point 14, and the plate 18, which in turn is

adjacent to the lower edge 27 of the formwork beam 16, adjusting appropriately, by means of the handle 35, the position of the circular plate 34 with respect to the plate 18, the combination of these two elements thus constituting an actual coupling in all directions.

5 Integration of other elements that belong to the background art, such as complementary wood profiles 40 to be arranged vertically on the downstand beams 15, for example by means of optional fixing brackets 41, and finally wood boards 42, 43 and 44 adapted to define a recessed casting compartment, complete the formwork system.

10 In a second embodiment of the assembly device according to the invention, designated by the reference numeral 110 in Figure 5, to be understood as exemplifying and not limiting said invention, the bracket 111, which is U-shaped, is fixed by its free ends to an upper plate 118, as already described above for the first embodiment.

15 The means 112 for fixing the bracket 111 are preset for fixing to two laterally adjacent load-bearing beams that have a double-T or double-H shaped cross-section, designated in Figure 6 by the numerals 144 and 145.

The load-bearing beams 144 and 145 are laterally side by side in a horizontal direction in the configuration for use.

20 The fixing means 112 comprise, in this second embodiment, an upper contrast plate 146, which is adapted to be arranged above the two load-bearing beams 144 and 145, the plate 118 and the contrast plate 146 being connected by two threaded tension bars 147 and 148, which are preset to be arranged between the two laterally adjacent beams 144 and 145, as in
25 Figures 6 and 7.

The fixing means 112 also comprise a closure plate 120 for each threaded tension bar 147 and 148, each closure plate 120, as described above for the closure plates 20, being adapted to be screwed to the respective threaded tension bar 147 or 148 so as to push the contrast plate
30 146 and pull the plate 118 against the two interposed load-bearing beams

144 and 145.

The threaded tension bar 147 and 148 can have an extraction-preventing head 149, as in Figures 7 and 8, so as to be able to act by traction on the plate 118.

5 The contrast plate 146 is provided with two centering shoulders 150 and 151, which are adapted to prevent the mutual sliding of the fixing means 112 with respect to the load-bearing beams 144 and 145.

The means 113 for adjusting the height of the resting point 114 for a downstand beam are identical to the above described adjustment means 13
10 of the first embodiment of the device 10 according to the invention.

The device 110, in its second embodiment, is shown in Figure 8 fixed to a pair 216 of laterally adjacent steel beams that have a C-shaped sectional profile and between which an interspace 260 is formed for the passage of the threaded tension bars 147 and 148.

15 Figures 9 and 10 show an example of application of a device 110 according to the invention.

In this second example of application of the invention, the device 110 is incorporated in a formwork structure 117, of a per se known type, which is composed of vertical props 137, which are provided at their upper end
20 with a fork-shaped head 138, for the connection of the props 137 to horizontal load-bearing elements such as wooden load-bearing beams 144 and 145, which constitute a primary framework, and on which other wood beams 170, which in turn constitute a secondary framework, act at right angles.

25 Usually, the formwork structure 117 is completed by wood boards 142, 143 and 144 which are placed on the downstand beams 115 and between the facing ends of facing beams 170 of the secondary framework, as in Figures 9 and 10.

The wood boards 142, 143 and 144 form a compartment the lower
30 internal surface of which is recessed with respect to the upper surface of the

beams 170 of the secondary framework.

It is deemed appropriate to specify that the material and the shape of the wood beams 144 and 145 is an example, since other equivalent load-bearing elements made of a different material and having a different shape, for example steel beams 216 with cross-sections that are typically commercially available and of course belong to the background art, can be part of the application being considered.

In practice it has been found that the invention achieves the intended aim and objects.

In particular, the invention provides a device that is structurally simple and allows to achieve production economy results.

Moreover, the invention provides a device to be used for the formwork of downstand beams which is particularly resistant to the loads applied thereto.

Furthermore, the invention provides a device for assembling downstand beams in formwork which is provided with the safety systems required by the standards of the field.

Moreover, the invention has provided a device for the formwork of downstand beams that allows, within a known formwork system, to provide concrete elements that have different thicknesses with respect to those of a floor slab.

Moreover, the invention provides a device that makes the formwork of downstand beams faster, simpler and easier, obviating many drawbacks that are typical of currently known systems.

Moreover, the invention provides a device for assembling downstand beams in formwork for casting floor slabs that is easy in use.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. All the details may further be replaced with other technically equivalent elements.

In practice, the components and the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements and the state of the art.

5 The disclosures in Italian Patent Application no. 102015000085707 (UB2015A009687), from which this application claims priority, are incorporated herein by reference.

10 Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

CLAIMS

1. A device (10, 110) for assembling downstand beams in formwork for casting floor slabs, characterized in that it comprises

- a bracket (11, 111), which is contoured to support a portion of a
5 downstand beam,
- means (12, 112) for fixing said bracket (11, 111) to at least one beam of a formwork,
- means (13, 113) for adjusting the height of the resting point (14, 114) of said portion of downstand beam in said bracket (11, 111).

10 2. The device according to claim 1, characterized in that said bracket (11), which is U-shaped, is fixed by its free ends to an upper plate (18).

3. The device according to one or more of the preceding claims, characterized in that said means (12) for fixing the bracket (11) to a formwork beam comprise said plate (18), to the sides of which two opposite
15 locking pins (19), which comprise closure plates (20), are coupled by means of two corresponding holes provided in said plate (18).

4. The device according to one or more of the preceding claims, characterized in that each one of said locking pins (19) comprises

- an insertion and engagement head (21), adapted to be inserted in a
20 corresponding longitudinal engagement channel formed on the lower edge of a formwork beam,
- a threaded stem (23) for supporting the insertion and engagement head (21),
- and said closure plate (20).

25 5. The device according to one or more of the preceding claims, characterized in that each closure plate (20) comprises a sleeve (24) that is internally threaded complementarily with respect to the stem (23) and is adapted to be screwed onto the stem (23), and at least one lateral actuation tab.

6. The device according to one or more of the preceding claims, characterized in that said bracket (11) is constituted by a plate that is bent into a U-shape with side walls (28) perforated with holes for the passage of nails for locking a beam portion inserted in the bracket (11).

5 7. The device according to one or more of the preceding claims, characterized in that said means (13) for adjusting the height of the resting point (14) of a portion of downstand beam in the bracket (11) comprise, on the central portion (30) of the bracket (11), a through hole (31), at which and coaxially to which a polygonal nut (32) is fixed, said nut being threaded
10 internally for the insertion of a threaded bar (33), said threaded bar (33) supporting at its upper end a circular plate (34) that forms the resting point (14) for the downstand beam.

8. The device according to one or more of the preceding claims, characterized in that said vertical bar (33) has, in the lower end, i.e., in the
15 end that lies opposite the one where the circular plate (34) is located, an actuation handle (35).

9. The device according to one or more of the preceding claims, characterized in that said means (112) for fixing the bracket (111) are preset for fixing to two laterally adjacent load-bearing beams having a double-T or
20 H-shaped cross-section (144, 145).

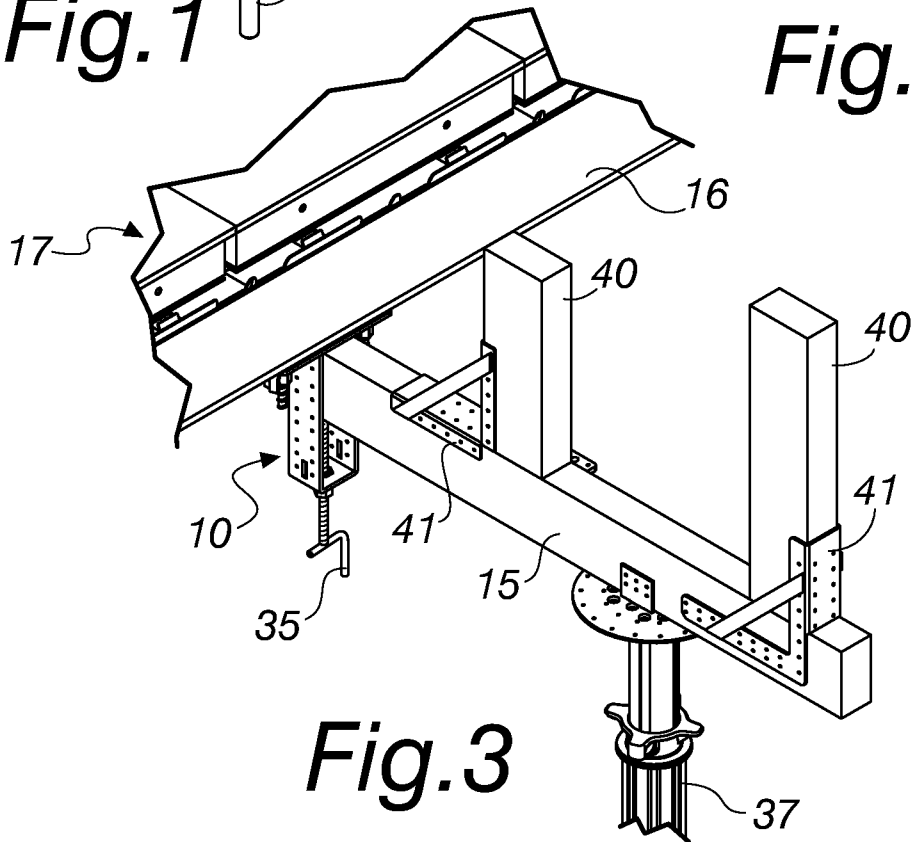
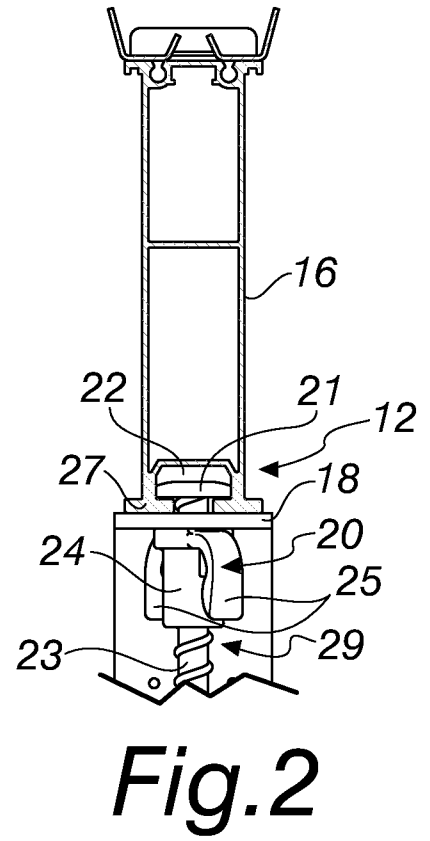
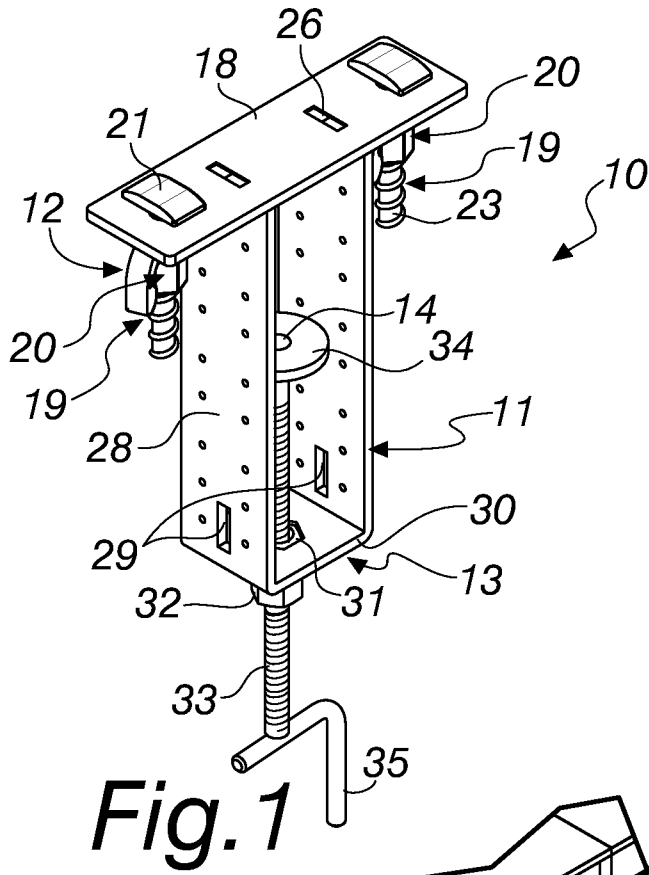
10. The device according to one or more of the preceding claims, characterized in that said fixing means (112) comprise an upper contrast plate (146), which is adapted to be arranged above the two load-bearing beams (144, 145), the plate (118) and the contrast plate (146) being
25 connected by two threaded tension bars (147, 148), which are preset to be arranged between the two laterally adjacent beams (144, 145).

11. The device according to one or more of the preceding claims, characterized in that said fixing means (112) comprise a closure plate (120) for each threaded tension bar (147, 148), each closure plate (120) being
30 adapted to be screwed to the respective threaded tension bar (147, 148), so

as to push the contrast plate (146) and pull the plate (118) against the two interposed load-bearing beams (144, 145).

12. The device according to one or more of the preceding claims, characterized in that said threaded tension bar (147, 148) has an extraction-
5 preventing head (149) so that it can act by traction on the plate (118).

13. The device according to one or more of the preceding claims, characterized in that said contrast plate (146) is provided with two centering shoulders (150, 151), which are adapted to prevent the mutual sliding of the fixing means (112) with respect to the load-bearing beams (144, 145).



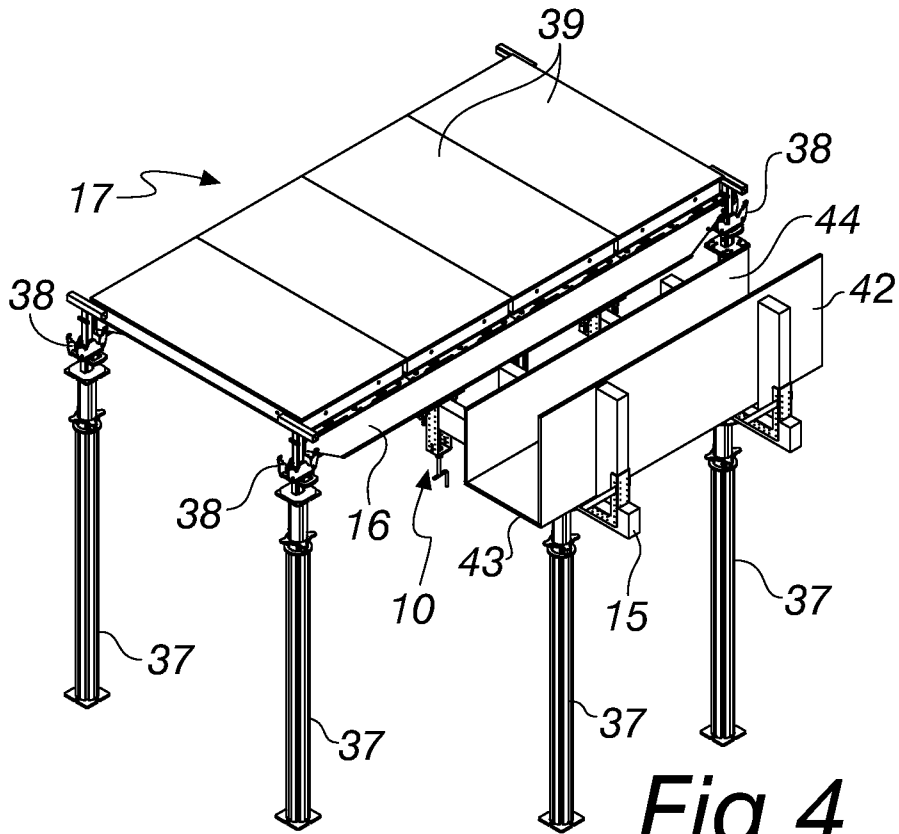


Fig. 4

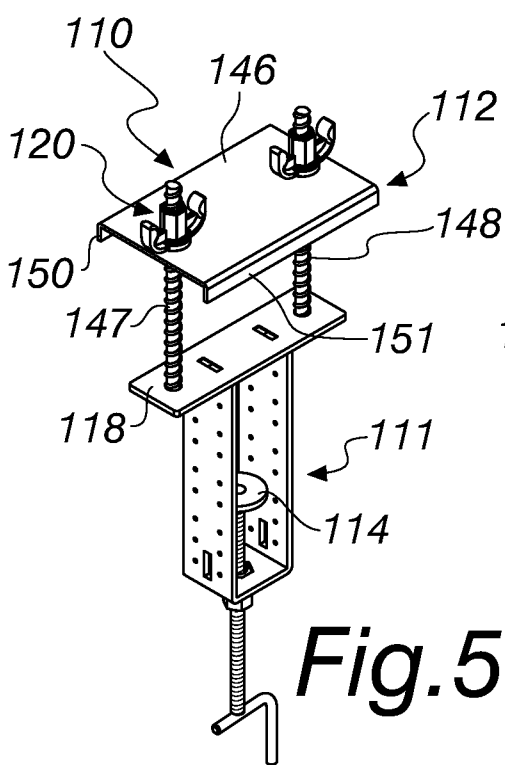


Fig. 5

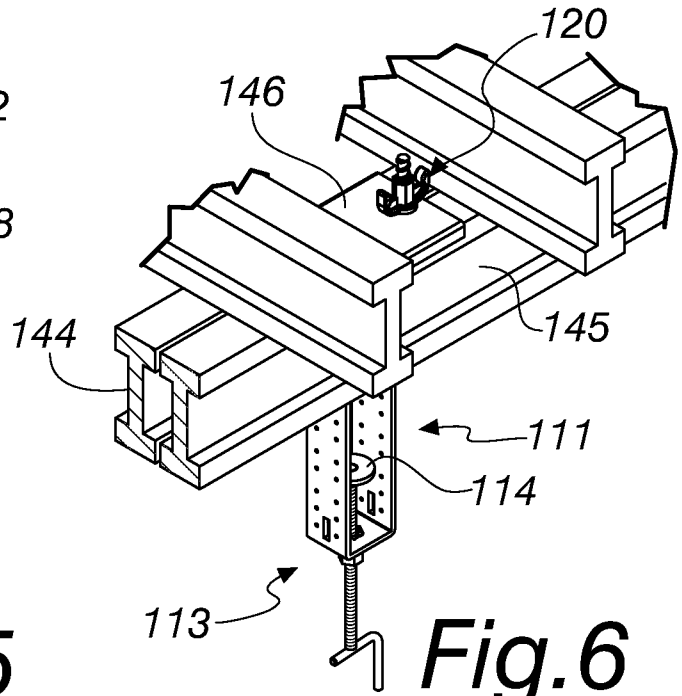


Fig. 6

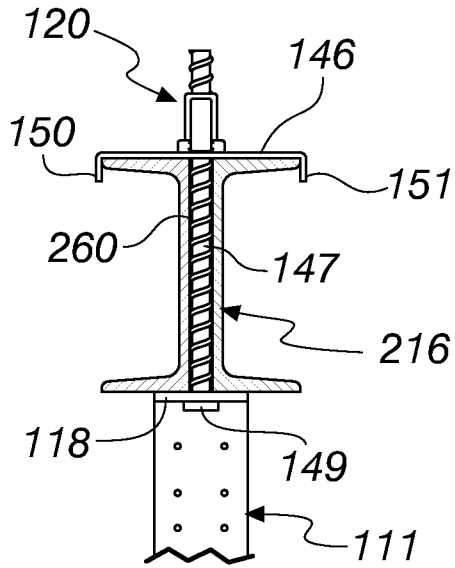


Fig.7

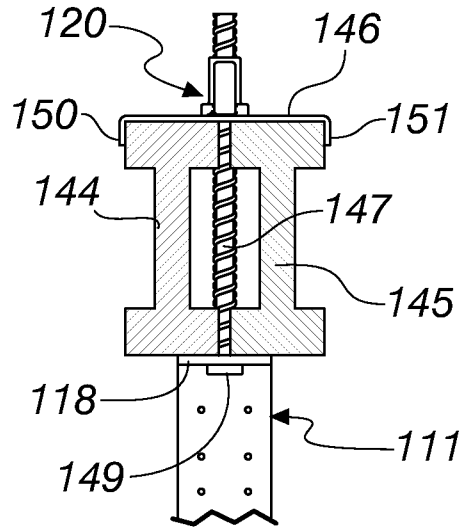


Fig.8

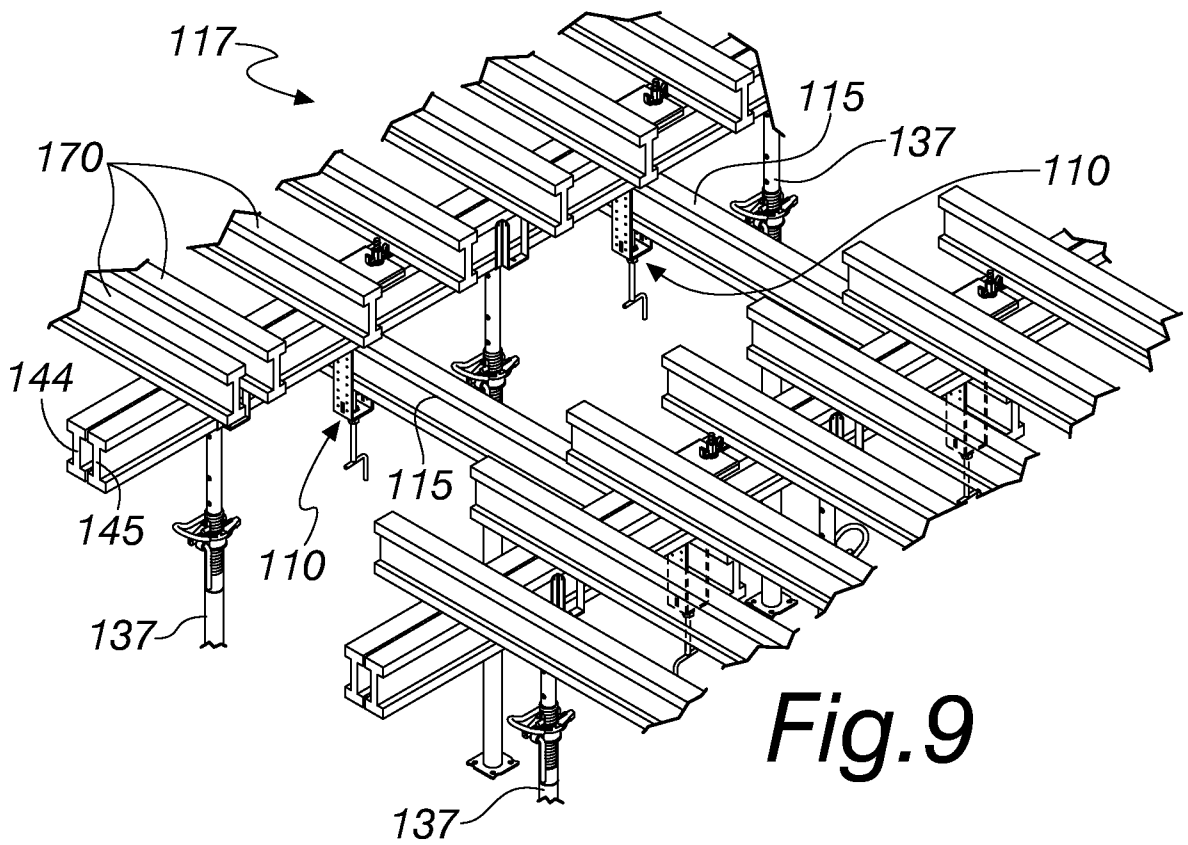


Fig.9

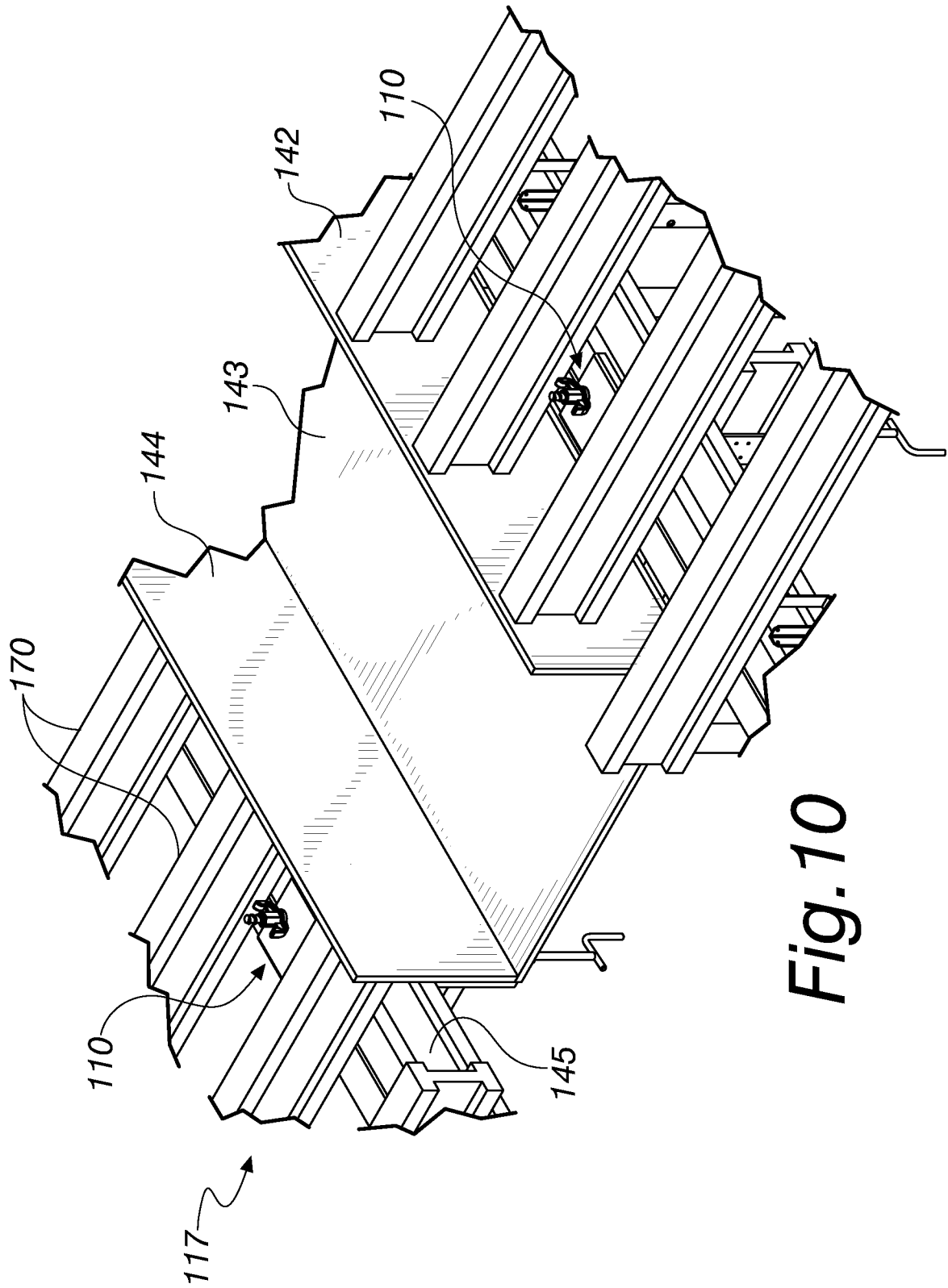


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No PCT/IB2016/057809

A. CLASSIFICATION OF SUBJECT MATTER INV. E04G11/50 E04G17/04 E04G13/04 E04G11/48 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) E04G E04B				
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, WPI Data				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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			
28 February 2017	08/03/2017			
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Manera, Marco			

INTERNATIONAL SEARCH REPORT

International application No
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Information on patent family members

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