



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.06.2017 Bulletin 2017/23

(51) Int Cl.:
E04G 11/48 (2006.01) E04G 11/50 (2006.01)

(21) Application number: **16201635.6**

(22) Date of filing: **01.12.2016**

(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

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(30) Priority: **04.12.2015 IT UB20156234**

(54) **ANTI-LIFTING COUPLING SYSTEM**

(57) An anti-lifting coupling system (10) for the reversible joining of elements for providing a formwork for floor castings, comprising:

- a first engagement body (11), to be fixed to a first beam of a formwork structure,
- a second engagement body (12), to be fixed to a second beam of a formwork structure,

the first engagement body (11) and the second engagement body (12) comprising reversible means of mutual engagement which are contoured to prevent the movement upwardly, in the configuration for use, of the second engagement body (12) with respect to the first engagement body (11).

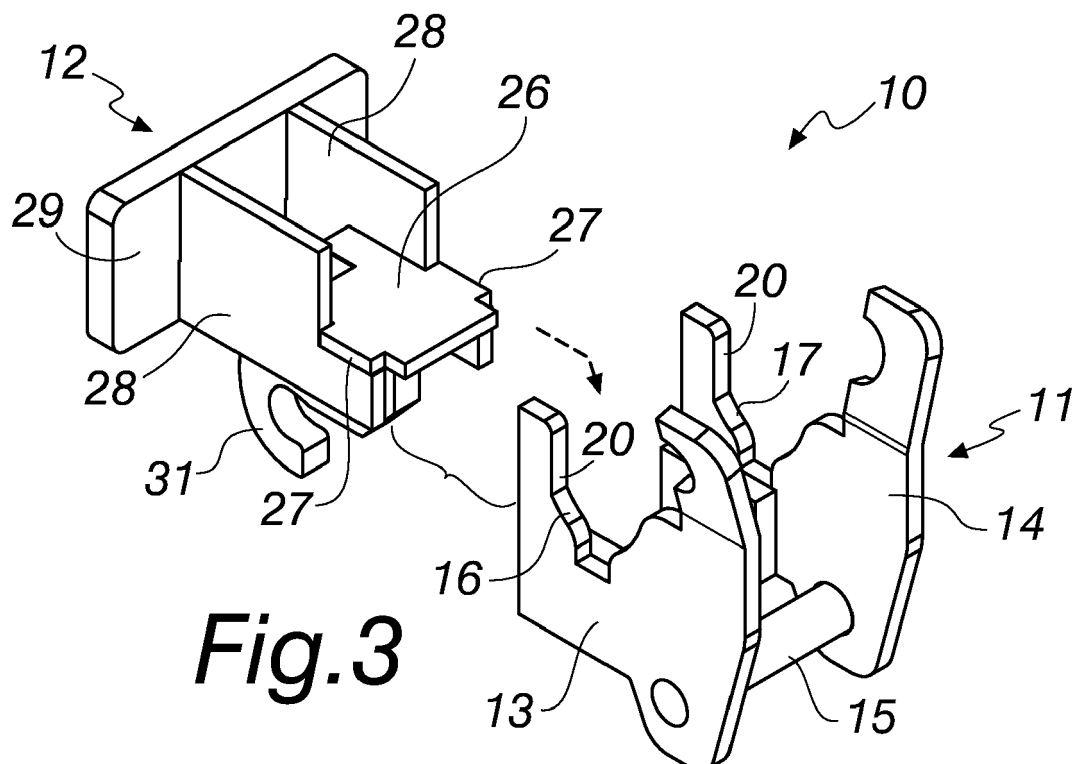


Fig. 3

Description

[0001] The present invention relates to an anti-lifting coupling system for the reversible joining of elements for providing a formwork for floor castings.

[0002] Nowadays, conventional formwork structures are constituted by a plurality of props that have, at their upper end, a head connected with various devices to the props, while the head in turn is connected to load-bearing beams that thus connect two successive heads. Formwork panels are then laid on the upper end of such beams so that the system thus described has beams that form a line, and other beams that make up the system can belong to a line parallel to the first. The panels that then define the horizontal plane of formwork represent a connection perpendicular to the directions formed by the parallel extension of two lines of beams formed by a corresponding number of groups of beams.

[0003] The system described above has evident application limitations, which arise in many practical applications.

[0004] In fact the spacing of the panels and of the beams is preset in any case, since obviously these elements are prefabricated and even though there are many and varied sizes of elements of one type or another on the market which enable a high number of combinations, this is never sufficient to cover all the possible fields of applicability. Such formwork systems are therefore never entirely sufficient to cover the technical demand for elements for every project, it therefore being necessary for the completion of applications to employ supplementary measures based on other technologies, primarily traditional technology consisting of the use of wooden materials (beams, profiles, panels etc.) which very often however must be designed and made directly during the construction phase, with traditional tools like a carpenter's hand saw, hammer, nails and the like.

[0005] These operations for local compensation and supplementary completion of a formwork system that is necessarily provided with components of preset size entails a huge investment of time and a waste of wooden materials which are used only once in the majority of cases, and in the end it entails an economic cost that has always been a considerable expenditure.

[0006] A first drawback of conventional formwork structures relates to the degree of safety of the elements that go to make it up in the assembly step, which are often assembled in a provisional manner with anti-lifting safety devices of the individual elements which can be improved in order to increase the overall level of safety during the assembly of the system.

[0007] A further drawback of conventional formwork structures arises when it is necessary to carry out an adjustment in the direction perpendicular to the direction of linear extension of the load-bearing beams in order to complete the formwork surface, and this problem is solved with local operations based on traditional technology as described above.

[0008] A further drawback of conventional formwork structures arises when it is necessary to carry out an adjustment longitudinally, i.e. in the same direction as the linear extension of the load-bearing beams in order to complete the formwork surface, and this problem is solved with local operations based on traditional technology as described above.

[0009] A further drawback of conventional formwork structures arises when it is necessary to connect two portions of formwork surface that have directions of linear extension of the load-bearing beams which are mutually perpendicular, for example in huge-scale projects it often happens for reasons of geometry of the project that one area is laid according to a certain direction and an opposite area is laid in a direction perpendicular to the first. Since the surface of formworks must be continuous even if it is made up of macro portions of elements that make up frames with different directions, and perfectly planar and perfectly flat in order to perfectly connect two portions of formwork surface of the type just described, it is very often necessary to employ traditional technology as described above.

[0010] The aim of the present invention is to provide an anti-lifting coupling system for holding together two different elements that, used in different applications, contribute to creating individual elements which are able in their entirety to overcome the above mentioned drawbacks of conventional formwork systems.

[0011] Within this aim, an object of the present invention is to devise a system that allows greater versatility by also being adapted to formwork structures that are already known.

[0012] Another object of the invention is to devise a system that allows the simplification of many operations that are carried out on site in order to complete the steps of building the floor formwork, which are particularly long and costly.

[0013] Another object of the invention is to provide an anti-lifting coupling system for the reversible joining of elements for providing a formwork for floor castings which can be made using conventional systems and technologies.

[0014] This aim and these and other objects which will become better apparent hereinafter are achieved by an anti-lifting coupling system for the reversible joining of elements for providing a formwork for floor castings, characterized in that it comprises:

- a first engagement body, to be fixed to a first beam of a formwork structure,
- a second engagement body, to be fixed to a second beam of a formwork structure,

said first engagement body and said second engagement body comprising reversible means of mutual engagement which are contoured to prevent the movement upwards, in the configuration for use, of the second engagement body with respect to the first engagement

body.

[0015] Further characteristics and advantages of the invention will become better apparent from the description of four preferred, but not exclusive, embodiments of the system according to the invention, which are illustrated by way of non-limiting example in the accompanying drawings wherein:

- Figure 1 is a perspective view of a first component of a system according to the invention in a first embodiment thereof;
- Figure 2 is a perspective view of a second component of a system according to the invention in the first embodiment thereof;
- Figure 3 is an exploded perspective view of the system according to the invention in the first embodiment thereof;
- Figure 4 is an assembled perspective view of the exploded view in Figure 3;
- Figure 5 is a side view of the assembled system as in Figure 4;
- Figure 6 is a perspective view of a first component of a system according to the invention in a second embodiment thereof;
- Figure 7 is a perspective view of a second component of a system according to the invention in a second embodiment thereof;
- Figure 8 is a sectional side view of an application of the system according to the invention in the second embodiment thereof;
- Figure 9 is a perspective view of a portion of a formwork structure that incorporates a system according to the invention in the second embodiment thereof;
- Figure 10 is a perspective view of a detail of the formwork structure shown in Figure 9;
- Figure 11 is a perspective view of a second component of a system according to the invention in a third embodiment thereof;
- Figure 12 is a perspective view of a first component of a system according to the invention in the third embodiment thereof;
- Figure 13 is a sectional side view of an application of the system according to the invention in the third embodiment thereof;
- Figure 14 is a perspective view of the application in Figure 13;
- Figure 15 is an additional perspective view of the application in Figures 13 and 14;
- Figure 16 is a perspective view of a first component of a system according to the invention in a fourth embodiment thereof;
- Figure 17 is a side view of an application of the first component in Figure 16;
- Figure 18 is a perspective view of an application of the first component in Figure 16 to a formwork structure.

[0016] With reference to the figures, an anti-lifting cou-

pling system for the reversible joining of elements for providing a formwork for floor castings according to the invention is generally designated in a first embodiment thereof with the reference numeral 10, as in Figures 3, 4 and 5.

[0017] The anti-lifting coupling system 10 comprises:

- a first engagement body 11, shown in Figure 1, to be fixed to a first beam of a formwork structure, as described in more detail hereinafter,
- a second engagement body 12, shown in Figure 2, to be fixed to a second beam of a formwork structure, as described in more detail hereinafter.

[0018] The first engagement body 11 and the second engagement body 12 comprise reversible means of mutual engagement which are contoured to prevent the movement upwardly, in the configuration for use, of the second engagement body 12 with respect to the first engagement body 11.

[0019] In a first embodiment of the invention, the first engagement body 11 is constituted by two contoured plates 13 and 14, which are arranged mirror-symmetrical with respect to each other and are joined by a cylindrical crossmember 15, for coupling the second engagement body 12 as described in more detail hereinafter.

[0020] A recess 16 and 17 is defined on each one of the contoured plates 13 and 14 and is substantially U-shaped in profile, for inserting and resting a corresponding portion of the second engagement body 12.

[0021] The U-shaped profile of the recess has a flat bottom resting surface 18, two opposing inclined surfaces 19 for guiding the insertion, and a vertical portion 20, in the configuration for use, which acts as an anti-rotation abutment for a part of the second engagement body 12.

[0022] A reinforcement plate 21 and 22 respectively is fixed flush with the bottom 18 of each recess 16 and 17, and is also designed to increase the resting surface defined by each bottom 18.

[0023] The contoured plates 13 and 14 also have upper inclined hook-shaped appendages 23 and 24, bent outwardly, upward from below in the configuration for use, with respect to the overall configuration of the first engagement body 11.

[0024] Between the contoured plates 13 and 14 a space 25 is defined for inserting the second engagement body 12.

[0025] The second engagement body 12 is constituted by a central flat portion 26, horizontal in the configuration for use, which by way of two protrusions 27 interlocks onto two opposite symmetrical vertical reinforcement lateral flat portions 28.

[0026] The vertical flat portions 28 are connected by their opposite ends, i.e. opposite with respect to their ends to which the central flat portion 26 is applied, with a vertical supporting plate 29, which is adapted to be inserted into the recesses 16 and 17 of the contoured plates 13 and 14 of the first engagement body 11, and

to be rested on the bottom 18 of each recess 16 and 17.

[0027] The vertical supporting plate 29 is longer than the distance between the bottom 18 of a first recess 16 and the corresponding bottom 18 of the other, second recess 17.

[0028] The vertical supporting plate 29 is rectangular.

[0029] An anti-rotation abutment element 30 is fixed in the upper part of the supporting plate 29, and is constituted for example by a cylindrical bar with a horizontal axis with respect to the configuration for use.

[0030] The components mentioned above and indicated as mutually fixed are, by way of example, joined by welding.

[0031] A hook-shaped portion 31 is fixed below the central flat portion 26 and is adapted to engage with the cylindrical crossmember 15 of the first engagement body 11.

[0032] The hook-shaped portion 31 occupies a position that lies on the vertical plane of symmetry of the second engagement body 12 with the concavity of the hook-shaped portion directed in the opposite direction with respect to the part of space occupied by the supporting plate 29 and by the abutment element 30.

[0033] The geometric dimensions, the contours, the proportions between the elements and the methods of connection of the anti-lifting coupling system 10 for holding together the first 11 and second 12 engagement bodies should be considered to be indicative and susceptible of any suitable modification or extension, as described hereinafter.

[0034] Figure 4 shows the configuration of mutual coupling of the first engagement body 11 and of the second engagement body 12, with the second engagement body 12 inserted into the space 25 defined by the first engagement body 11.

[0035] In such configuration of coupling, the cylindrical crossmember 15 of the first engagement body 11 is inserted into the concavity of the hook-shaped portion 31 of the second engagement body 12, and at the same time the supporting plate 29 of the second engagement body 12 is inserted into the recesses 16 and 17 of the first engagement body 11, and is resting on each one of the bottoms 18 of the recesses 16 and 17; the thickness 33 of the supporting plate 29 and the transverse dimension 34 of the abutment element 30 are such that the abutment element 30 will rest against the surfaces of the vertical anti-rotation abutment portions 20 of the recesses 16 and 17.

[0036] By way of such structure of the two engagement bodies 11 and 12, the second engagement body 12 is prevented from making any movement upwardly, with respect to a configuration for use, thanks to the coupling between the hook-shaped portion 31 and the cylindrical crossmember 15, and thanks to the resting of the abutment element 30 against the vertical abutment portions 20 of the recesses 16 and 17, which prevents the second engagement body 12 from rotating in the direction of coupling beyond the position of mutual contact established;

the only rotation permitted is the rotation for uncoupling, about the axis of the cylindrical crossmember 15, in the direction of departure of the abutment element 30 from the vertical abutment portions 20 of the recesses 16 and 17.

[0037] The system of coupling 10 solves the problems of unwanted lifting of an engagement body with respect to another engagement body that is coupled thereto, typical of conventional systems and implemented by way of simple coupling of a hook-shaped portion with a coupling element, such lifting being caused by an upward-acting vertical load, a usual situation during the assembly, disassembly and use of formwork structures for providing castings for floors.

[0038] In a second embodiment of an anti-lifting coupling system according to the invention, which is generally designated with the reference numeral 110, the first engagement body 111 is constituted by two contoured plates 113 and 114, which are arranged mirror-symmetrical with respect to each other and are joined by a cylindrical crossmember 115, for coupling the second engagement body 112 as described in more detail hereinafter.

[0039] A recess 116 and 117 is defined on each one of the contoured plates 113 and 114 and is substantially U-shaped in profile, for inserting and resting a corresponding portion of the second engagement body 112.

[0040] Indicating the cylindrical crossmember 115 as being positioned in a rearward part of the first engagement body 111, the lateral contoured plates 113 and 114 extend at the front to define two opposite supporting walls 138 and 139 for a T-shaped profile 140, which extends from one supporting wall 138 to the other 139 and is adapted to engage in a longitudinal engagement channel 141 of a structural beam 142 for formworks, as in Figure 8, the structural beam 142 being of conventional type; in this manner, the first engagement body 111 is fixed to a first beam, for example a structural beam 142.

[0041] The first engagement body 111 is mounted, fixed, for example by welding, on a flat portion 144 which is in turn fitted and fixed on a tubular portion 145, which is in turn engaged on a prop 146 of a formwork structure 147 for horizontal castings, as in Figure 9.

[0042] Also fixed to the flat portion 144 are two coupling devices of conventional type, locking pins 148, which are adapted to allow an alternative connection of the flat portion 144, and hence of the first engagement body 111, with the longitudinal engagement channel 141 of a structural beam 142; with the use of the locking pin devices 148 it is possible to fix the flat portion 144 to the structural beam 142 without using the prop 146; this is possible obviously for relatively contained loads on the first engagement body 111.

[0043] In such second embodiment of the invention, the second engagement body 112 is constituted by a central flat portion 126, horizontal in the configuration for use, which by way of two protrusions 127 interlocks onto two opposite symmetrical vertical reinforcement lateral

flat portions 128.

[0044] The vertical flat portions 128 are connected with a vertical supporting plate 129, which is adapted to be inserted into the recesses 116 and 117 of the contoured plates 113 and 114 of the first engagement body 111, and to be rested on the bottom of each recess 116 and 117.

[0045] It should be understood that the vertical supporting plate 129 is longer than the distance between the bottom of a first recess 116 and the corresponding bottom of the other, second recess 117.

[0046] An anti-rotation abutment element 130 is fixed in the upper part of the supporting plate 129, and is constituted for example by a cylindrical bar with a horizontal axis with respect to the configuration for use, similarly to what is described above for the first embodiment.

[0047] A hook-shaped portion 131 is fixed below the central flat portion 126 and is adapted to engage with the cylindrical crossmember 115 of the first engagement body 111.

[0048] The peculiarity of the second engagement body 112 in such second embodiment lies in the fact that it has a bracket 149 for inserting and fixing an end of a wooden beam 150.

[0049] The bracket 149 comprises a base 151, with containment walls 152 and holes 153 adapted for nailing, and an anti-lifting U bolt 154.

[0050] The second engagement body 112 is therefore designed to be fixed to a second beam 150.

[0051] The join, as described above for the first embodiment, between the first engagement body 111, coupled to a first structural beam 142, and the second engagement body 112, in turn adapted to be fixed to a second beam 150, made of wood, makes it possible to assemble, easily and stably and safely, a wooden beam 150 in a direction perpendicular to the structural beam 142 and at any point of the length of that structural beam 142, as shown for the purposes of example in Figure 9.

[0052] The wooden beam 150 is supported by an auxiliary bracket 155, shown in Figure 10.

[0053] The auxiliary bracket 155 is in turn engaged, by way of a tubular portion 156, on a corresponding vertical prop 157.

[0054] The auxiliary bracket 155 is constituted by a circular flat portion 158 which has holes of larger diameter 159 which are adapted to provide the connection between the flat portion 158 and underlying supporting flat portion of the vertical prop 157, and which has holes of smaller diameter 160 which are adapted to allow the fixing of wooden elements with nails, in order to improve the stability of the connection and therefore of the system.

[0055] Two vertical plates 161, which are also perforated in order to allow the passage of nails in order to increase the stability of the system, extend in the upper part of the circular flat portion 158 and serve to locate the wooden beam 150.

[0056] With the application of such anti-lifting coupling system 110 a compensation is obtained that is perpen-

dicular with respect to the linear extension of the structural beams 142, with wooden beams 150 and 150a, as in Figure 9, arranged at right angles with respect to the structural beams 142 and adapted to receive wooden boards resting thereon in order to create a surface that is co-planar with the surface represented by the formwork panels 165 supported by the structural beams 142.

[0057] In a third embodiment of the invention, shown in Figures 11 to 15, the second engagement body 212 is constituted by a central flat portion 226, horizontal in the configuration for use, which by way of two protrusions 227 interlocks onto two opposite symmetrical vertical reinforcement lateral flat portions 228.

[0058] The vertical flat portions 228 are connected with a vertical supporting plate 229, which is adapted to be inserted into the recesses 216 and 217 of the contoured plates 213 and 214 of the first engagement body 211, described in more detail hereinafter, and to be rested on the bottom of each recess 216 and 217.

[0059] The vertical supporting plate 229 is longer than the distance between the bottom of a first recess 216 and the corresponding bottom of the other, second recess 217.

[0060] An anti-rotation abutment element 230 is fixed in the upper part of the supporting plate 229, and is constituted for example by a cylindrical bar with a horizontal axis with respect to the configuration for use, similarly to what is described above for the first embodiment and for the second embodiment.

[0061] A hook-shaped portion 231 is fixed below the central flat portion 226 and is adapted to engage with the cylindrical crossmember 215 of the first engagement body 211.

[0062] The peculiarity of the second engagement body 212 in the third embodiment lies in the fact that the central flat portion 226 extends at the front, with respect to a rearward position of the abutment element 230, so as to define a bracket 249 for inserting and fixing an end of a wooden beam 250. The bracket 249 comprises a base 251 which extends from the central flat portion 226 and is in one piece therewith, with containment walls 252 and holes 253 adapted for nailing, and an anti-lifting U bolt 254.

[0063] In such third embodiment, the first engagement body 211 is constituted by a portion of a drop head 270, of conventional type, as in Figures 12 and 13.

[0064] The first engagement body 211 is constituted, similarly to what is described above for the first and second embodiments, by two contoured plates 213 and 214, arranged mirror-symmetrical with respect to each other, which are joined by a cylindrical crossmember 215, for coupling the second engagement body 212.

[0065] A recess 216 and 217 is defined on each one of the contoured plates 213 and 214 and is substantially U-shaped in profile, for inserting and resting a corresponding portion of the second engagement body 212.

[0066] Indicating the cylindrical crossmember 215 as being positioned in a rearward part of the first engage-

ment body 211, the lateral contoured plates 213 and 214 extend at the front to define corresponding lateral plates 213a and 214a of an additional first engagement body 211a, which is mirror-symmetrical with the first engagement body 211 and is in one piece therewith.

[0067] The vertical portion 220, in the configuration for use, which acts as an anti-rotation abutment for the abutment element 230 of the second engagement body 212, is constituted by the central upright member 271 of the drop head 270, as can clearly be seen in Figure 13.

[0068] Thanks to the anti-lifting coupling system 210 in such third embodiment, it is possible to integrate, in a conventional formwork structure, a compensating batten 250, positioning it aligned with a structural beam 242, as in Figures 13 and 14.

[0069] The coupling of the second engagement body 212 with the first engagement body 211, which is integrated in the drop head 270, forms part of a conventional formwork system, which also comprises a vertical prop 246 and formwork panels 265, both of the latter two elements belonging to the known art.

[0070] The assembly described is finally completed by the insertion of a wooden beam 250 in the bracket 249 of the second engagement body 212 as already described above, these two parts providing a mechanism for holding the wooden beam 250 in place.

[0071] In this case the risk of falling concerns the wooden beam 250 which could fall disastrously during the assembly step of the system, leading to problems in terms of safety.

[0072] In the application just described, the vertical post 271 of the supporting device of the type with a drop head 270 makes the coupling of the second engagement body 212 to the drop head 270 to all effects an anti-lifting coupling system in the manner of what is described for the previous embodiments.

[0073] With the application of further wooden elements of suitable geometric dimensions which, arranged at right angles to these elements, connect other wooden beams 250 within the entirety of the system, and applying wooden boards to the upper part in order to create a surface that is co-planar with the surface represented by the formwork panels 265 described previously, a longitudinal compensation is therefore obtained in the same direction, with respect to the linear extension of the structural beams 242.

[0074] The compensation just described can also be achieved, with a small variation, even if the orientation of the floor to be built is skewed with respect to the frame of the formwork system. In fact in this case with the adoption of a first wooden beam 250 and of another, shorter wooden beam 250a, any type of edge orientation of the floor can be achieved with this application, as shown for the purposes of example in Figure 15.

[0075] In a fourth embodiment of the anti-lifting coupling system according to the invention, the first engagement body 311, visible in Figures 16 and 17, is constituted by two contoured plates 313 and 314, arranged mirror-

symmetrical with respect to each other, which are joined by a cylindrical crossmember 315, for coupling a second engagement body, which can be a second engagement body described above for the first, second and third embodiments.

[0076] A recess 316 and 317 is defined on each one of the contoured plates 313 and 314 and is substantially U-shaped in profile, for inserting and resting a corresponding portion of a second engagement body.

[0077] Indicating the cylindrical crossmember 315 as being positioned in a rearward part of the first engagement body 311, the lateral contoured plates 313 and 314 extend at the front to define two opposite supporting walls 338 and 339 for a T-shaped profile 340, the latter being adapted to engage in a longitudinal engagement channel 341 of a structural beam 342 for formworks, as in Figure 17, the structural beam 342 being of conventional type; in this manner, the first engagement body 311 is fixed to a first beam, for example a structural beam 342.

[0078] In such third embodiment, each of the lateral contoured plates 313 and 314 of the first engagement body 311 has a central portion 380 and 381 respectively, which extends upwardly in the configuration for use and is adapted to support an upper plate 382 for supporting a complementary wooden element that is adapted to be arranged adjacent to the structural beam 342 and interposed between the latter and a second beam coupled to the first engagement body 311 by way of a second engagement body, in a direction perpendicular to the direction of extension of the structural beam 342.

[0079] The supporting central portions 380 and 381 are for example frame-shaped with a diagonal reinforcement portion 384, as in Figure 17.

[0080] Two positioning and abutment tabs 385 and 386 extend upwardly from the supporting central portions 380 and 381, for the wooden element resting on the upper plate 382.

[0081] The first engagement body 311 is mounted, fixed, for example by welding, on a flat portion 344 which is in turn fitted and fixed on a tubular portion 345, which is in turn engaged on a prop of a formwork structure 347 for horizontal castings, or only coupled to a structural beam 342 without being supported by a prop, as in Figure 18.

[0082] Also fixed to the flat portion 344 are two coupling devices of conventional type, locking pins 348, which are adapted to allow an alternative connection of the flat portion 344, and hence of the first engagement body 311, with the longitudinal engagement channel 341 of a structural beam 342.

[0083] Thanks to the first engagement body 311 it is also possible to connect, to a first structural beam 342, a second structural beam 342a positioned perpendicular to the first, as in Figure 18, by coupling the end of the second structural beam, conventional, to the recesses 316 and 317 of the first engagement body 311.

[0084] With the application of further formwork panels, belonging to the known art, arranged so as to connect a

plurality of structural beams, a connection is obtained between two formwork surfaces that have mutually perpendicular linear extensions of the load-bearing beams.

[0085] In practice it has been found that the invention fully achieves the intended aim and objects.

[0086] In particular, with the invention an anti-lifting coupling system is devised which contributes to simplifying the above-mentioned problem of the unwanted lifting of an end of an engaged component, a problem that characterizes all formwork systems for floors known today.

[0087] In fact with the present invention a system is devised that, integrated in many applications, makes it possible to significantly increase the level of safety in the step of mounting the formwork elements on site, an anti-lifting system for such elements having been devised which is particularly safe and improving from every viewpoint with respect to all formwork systems known today.

[0088] Furthermore, with the present invention a solution is reached for many problems relating to the compensation of formwork systems that are made up of prefabricated elements, such as compensation in a direction perpendicular to the linear extension of the load-bearing beams in order to complete the formwork surface, and such as longitudinal adjustment, i.e. in the same direction as the linear extension of the load-bearing beams in order to complete the formwork surface; such system according to the invention also makes it possible to connect two portions of formwork surface that have mutually perpendicular linear extensions of the load-bearing beams.

[0089] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0090] In practice the components and the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

[0091] The disclosures in Italian Patent Application No. 102015000080362 (UB2015A006234) from which this application claims priority are incorporated herein by reference.

[0092] 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. An anti-lifting coupling system (10, 110, 210) for the reversible joining of elements for providing a formwork for floor castings, **characterized in that** it comprises:

- a first engagement body (11, 111, 211, 311), to be fixed to a first beam of a formwork structure,
- a second engagement body (12, 112, 212), to be fixed to a second beam of a formwork structure,

said first engagement body (11, 111, 211, 311) and said second engagement body (12, 112, 212) comprising reversible means of mutual engagement which are contoured to prevent the movement upwards, in the configuration for use, of the second engagement body (12, 112, 212) with respect to the first engagement body (11, 111, 211, 311).

2. The system according to claim 1, **characterized in that** said first engagement body (11) is constituted by two contoured plates (13, 14), arranged mirror-symmetrical with respect to each other, which are joined by a cylindrical crossmember (15), for coupling the second engagement body (12), on each one of said contoured plates (13, 14) a recess (16, 17) being defined, the profile of which is substantially U-shaped, for inserting and resting a corresponding portion of the second engagement body (12).
3. The system according to one or more of the preceding claims, **characterized in that** said U-shaped profile of said recess has a flat bottom resting surface (18), two opposing inclined surfaces (19) for guiding the insertion, and a vertical portion (20), in the configuration for use, which acts as an anti-rotation abutment for a part of the second engagement body (12).
4. The system according to one or more of the preceding claims, **characterized in that** a reinforcement plate (21, 22) is fixed flush with the bottom (18) of each recess (16, 17).
5. The system according to one or more of the preceding claims, **characterized in that** said second engagement body (12) is constituted by a central flat portion (26), horizontal in the configuration for use, which by way of two protrusions (27) interlocks onto two opposite symmetrical vertical reinforcement lateral flat portions (28), said vertical flat portions (28) being connected by their opposite ends, i.e. opposite with respect to their ends to which the central flat portion (26) is applied, with a vertical supporting plate (29), which is adapted to be inserted into the recesses (16, 17) of the contoured plates (13, 14) of the first engagement body (11), and to be rested on the bottom (18) of each recess (16, 17), an anti-rotation abutment element (30) being fixed in the upper part of the supporting plate (29), and a hook-shaped portion (31) being fixed below the central flat portion (26) and adapted to engage with the cylindrical crossmember (15) of the first engagement body (11).

6. The system according to one or more of the preceding claims, **characterized in that** said hook-shaped portion (31) occupies a position with the concavity of the hook-shaped portion directed in the opposite direction with respect to the part of space occupied by the supporting plate (29) and by the abutment element (30).
7. The system according to one or more of the preceding claims, **characterized in that** the thickness (33) of the supporting plate (29) and the transverse dimension (34) of the abutment element (30) are such that the abutment element (30) will rest against the surfaces of the vertical anti-rotation abutment portions (20) of the recesses (16, 17).
8. The system according to one or more of the preceding claims, **characterized in that** said first engagement body (111) is constituted by two contoured plates (113, 114), which are arranged mirror-symmetrical with respect to each other and are joined by a cylindrical crossmember (115), on each one of the contoured plates (113, 114) a recess (116, 117) being defined, the profile of which is substantially U-shaped, for inserting and resting a corresponding portion of the second engagement body (112), said lateral contoured plates (113, 114) extending at the front to define two opposite supporting walls (138, 139) for a T-shaped profile (140), which extends from one supporting wall (138, 139) to the other and is adapted to engage in a longitudinal engagement channel (141) of a structural beam (142) for formworks.
9. The system according to one or more of the preceding claims, **characterized in that** said first engagement body (111) is mounted, fixed, on a flat portion (144) which is in turn fitted and fixed on a tubular portion (145), which is in turn engaged on a prop (146) of a formwork structure (147) for horizontal castings.
10. The system according to claims 8 and 9, **characterized in that** said second engagement body (112) is constituted by a central flat portion (126), horizontal in the configuration for use, which by way of two protrusions (127) interlocks onto two opposite symmetrical vertical reinforcement lateral flat portions (128), said vertical flat portions (128) being connected with a vertical supporting plate (129), which is adapted to be inserted into the recesses (116, 117) of the contoured plates (113, 114) of the first engagement body (111) and to be rested on the bottom of each recess (116, 117), an anti-rotation abutment element (130) being fixed in said upper part of the supporting plate (129), and a hook-shaped portion (131) being fixed below the central flat portion (126) and adapted to engage with the cylindrical crossmember (115) of the first engagement body (111), said second engagement body (112) having a bracket (149) for inserting and fixing an end of a wooden beam (150).
11. The system according to one or more of the preceding claims, **characterized in that** said bracket (149) comprises a base (151), with containment walls (152) and holes (153) adapted for nailing, and an anti-lifting U bolt (154).
12. The system according to one or more of the preceding claims, **characterized in that** said second engagement body (212) is constituted by a central flat portion (226), horizontal in the configuration for use, which by way of two protrusions (227) interlocks onto two opposite symmetrical vertical reinforcement lateral flat portions (228), said vertical flat portions (228) being connected with a vertical supporting plate (229), which is adapted to be inserted into the recesses (216, 217) of the contoured plates (213, 214) of the first engagement body (211) and to be rested on the bottom of each recess (216, 217), an anti-rotation abutment element (230) being fixed in the upper part of the supporting plate (229), and a hook-shaped portion (231) being fixed below the central flat portion (226) and adapted to engage with the cylindrical crossmember (215) of the first engagement body (211), said central flat portion (226) extending at the front to define a bracket (249) for inserting and fixing an end of a wooden beam (250).
13. The system according to one or more of the preceding claims, **characterized in that** said first engagement body (211) is constituted by a portion of a drop head (270).
14. The system according to one or more of the preceding claims, **characterized in that** a vertical portion (220), in the configuration for use, which acts as an anti-rotation abutment for the abutment element (230) of the second engagement body (212), is constituted by the central upright member (271) of the drop head (270).
15. The system according to one or more of the preceding claims, **characterized in that** said first engagement body (311) is constituted by two contoured plates (313, 314), which are arranged mirror-symmetrical with respect to each other and are joined by a cylindrical crossmember (315), for coupling a second engagement body, on each one of the contoured plates (313, 314) a recess (316, 317) being defined, the profile of which is substantially U-shaped, for inserting and resting a corresponding portion of a second engagement body, said lateral contoured plates (313, 314) extending at the front to define two opposite supporting walls (338, 339) for a T-shaped profile (340), the latter being adapted to engage in a longitudinal engagement channel (341) of a structural beam (342) for formworks.

tudinal engagement channel (341) of a structural beam (342) for formworks, each of said lateral contoured plates (313, 314) having a central portion (380, 381) which extends upwardly in the configuration for use and is adapted to support an upper plate (382) for supporting a complementary wooden element that is adapted to be arranged adjacent to the structural beam (342) and interposed between the latter and a second beam coupled to the first engagement body (311) by way of a second engagement body, or directly, in a direction perpendicular to the direction of extension of the structural beam (342).

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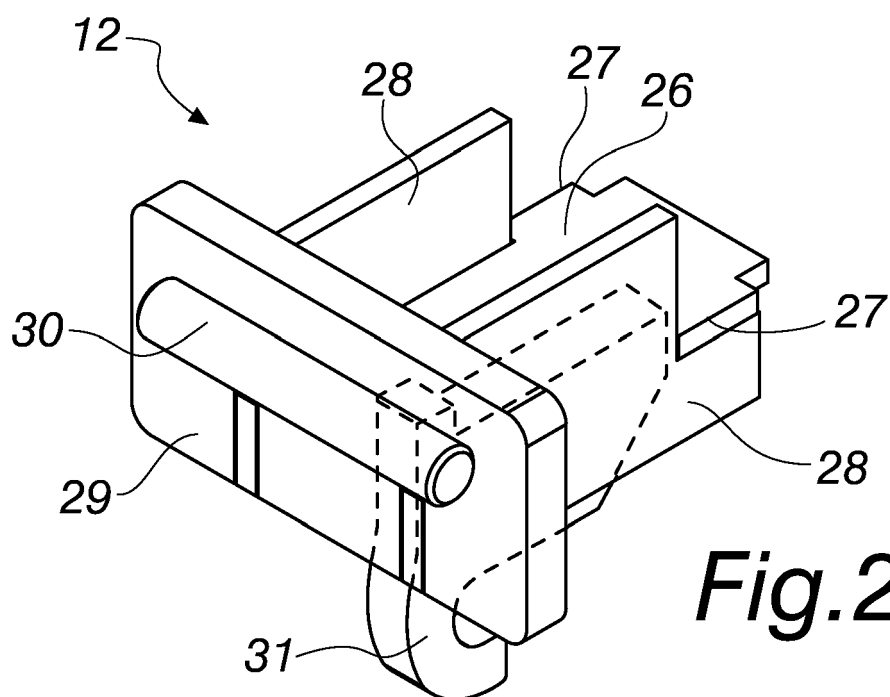
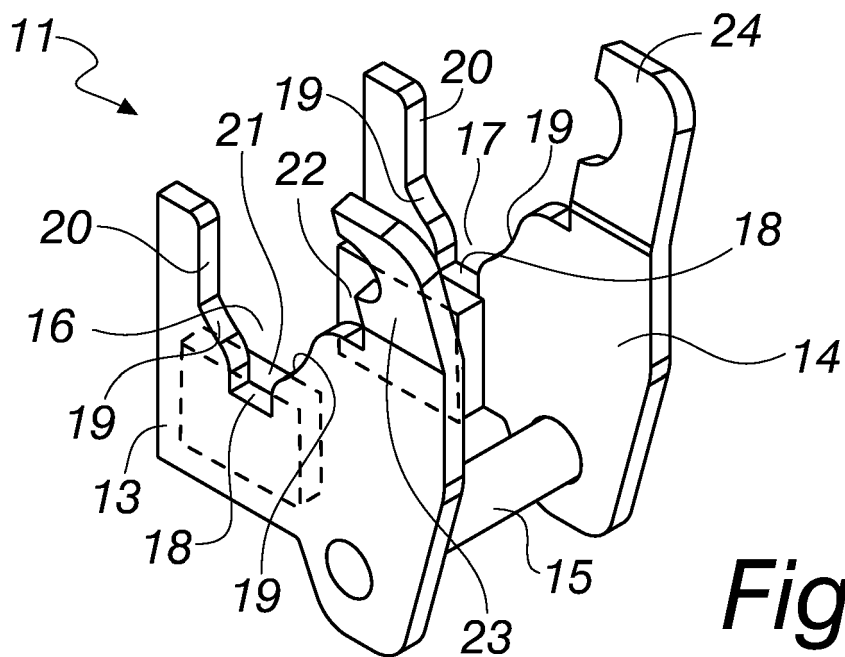
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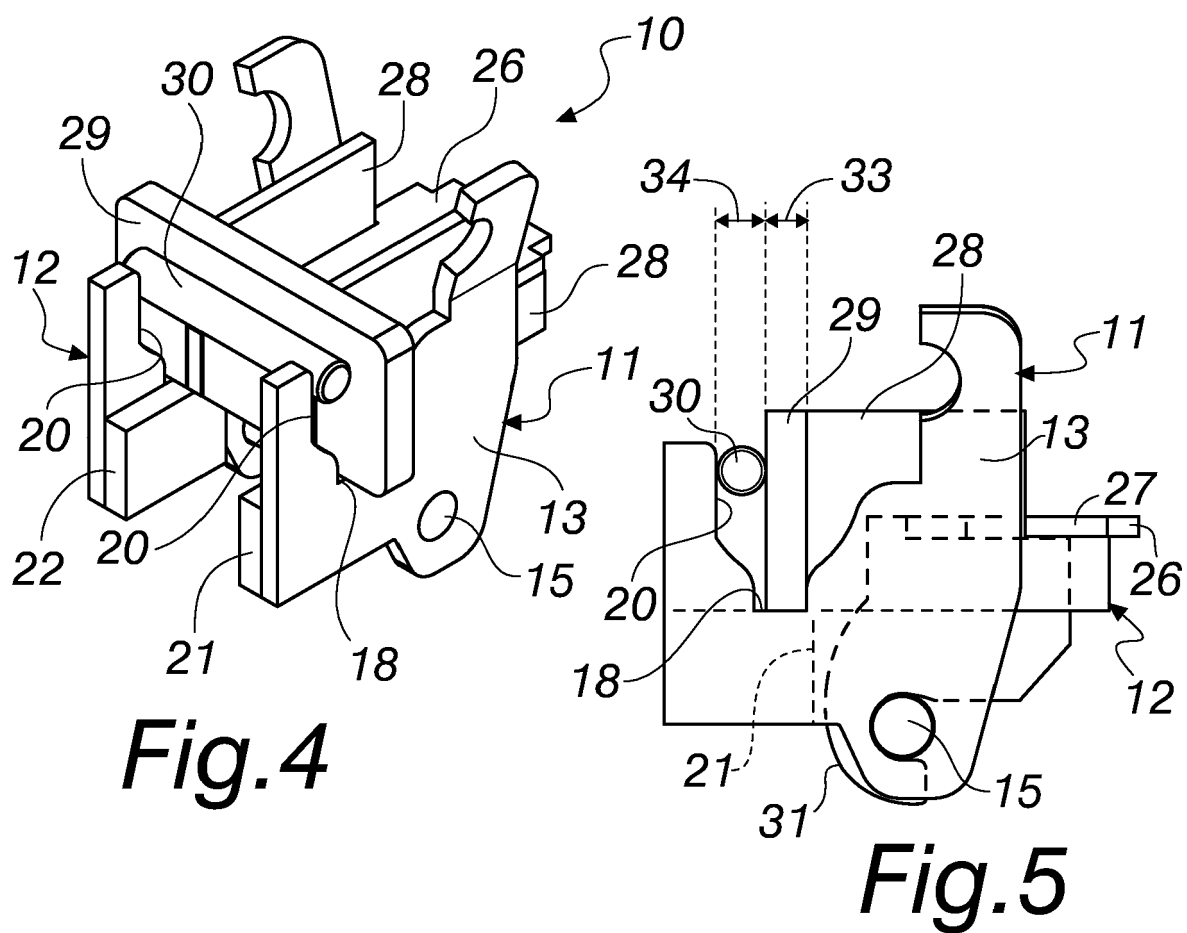
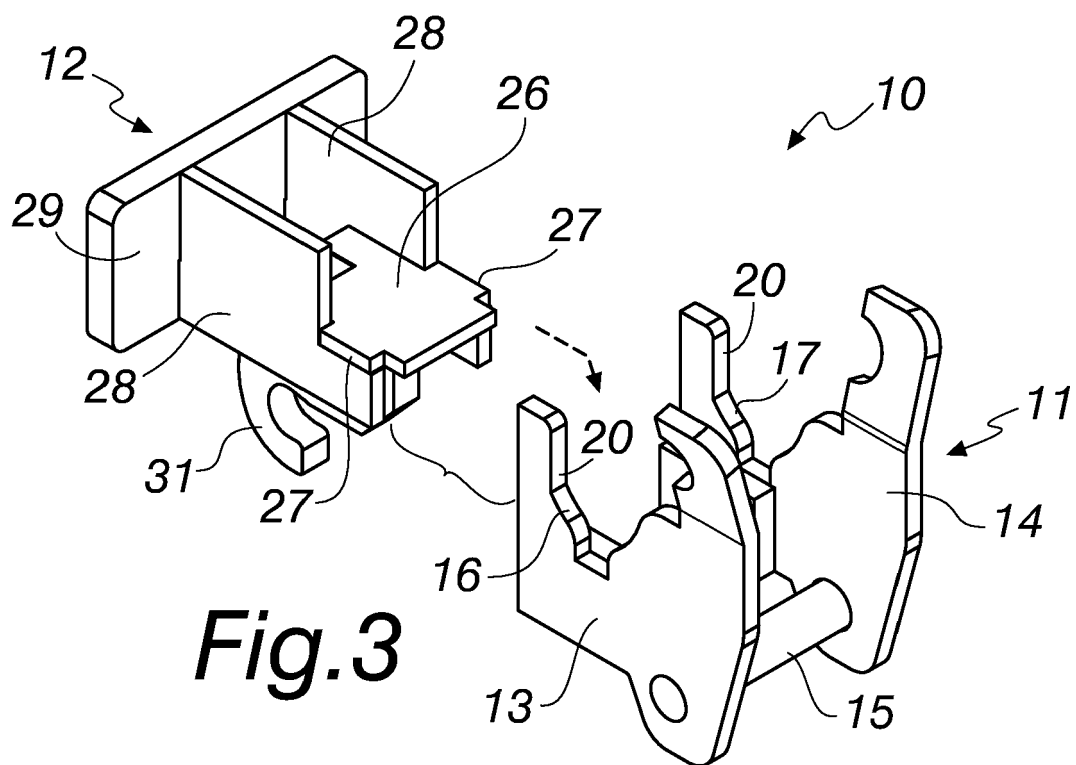
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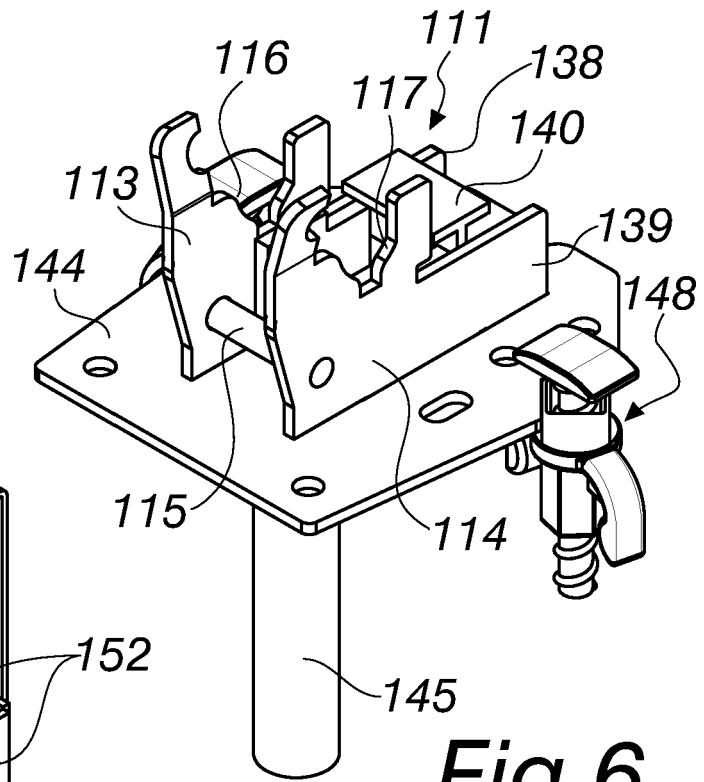


Fig. 6

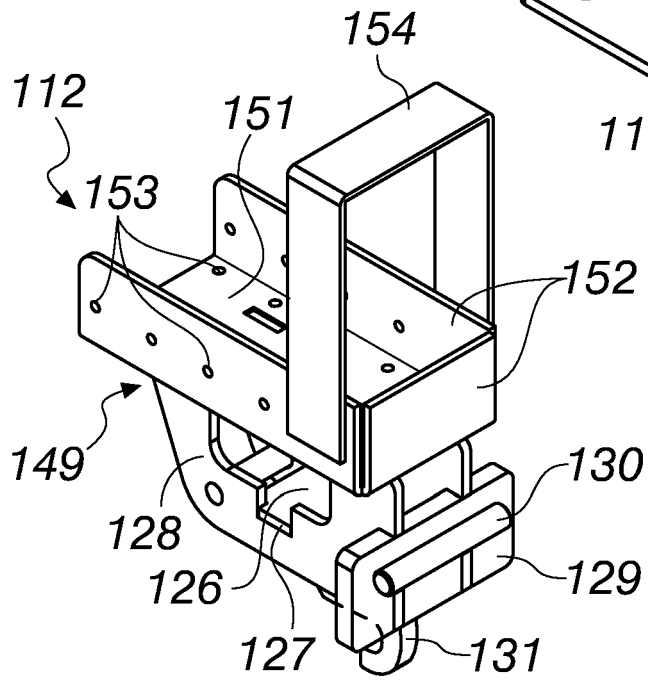


Fig. 7

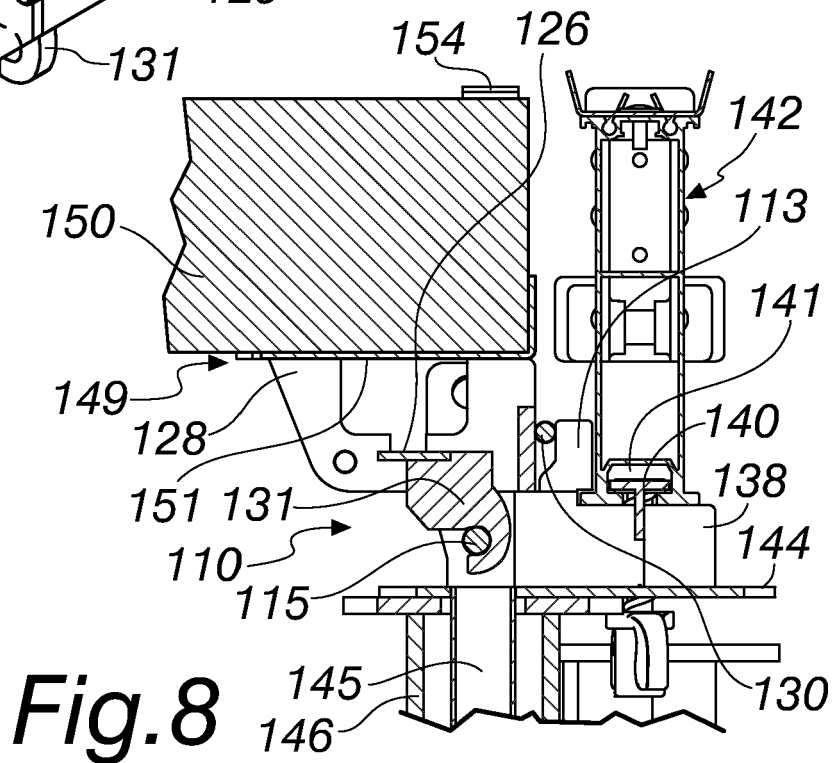


Fig. 8

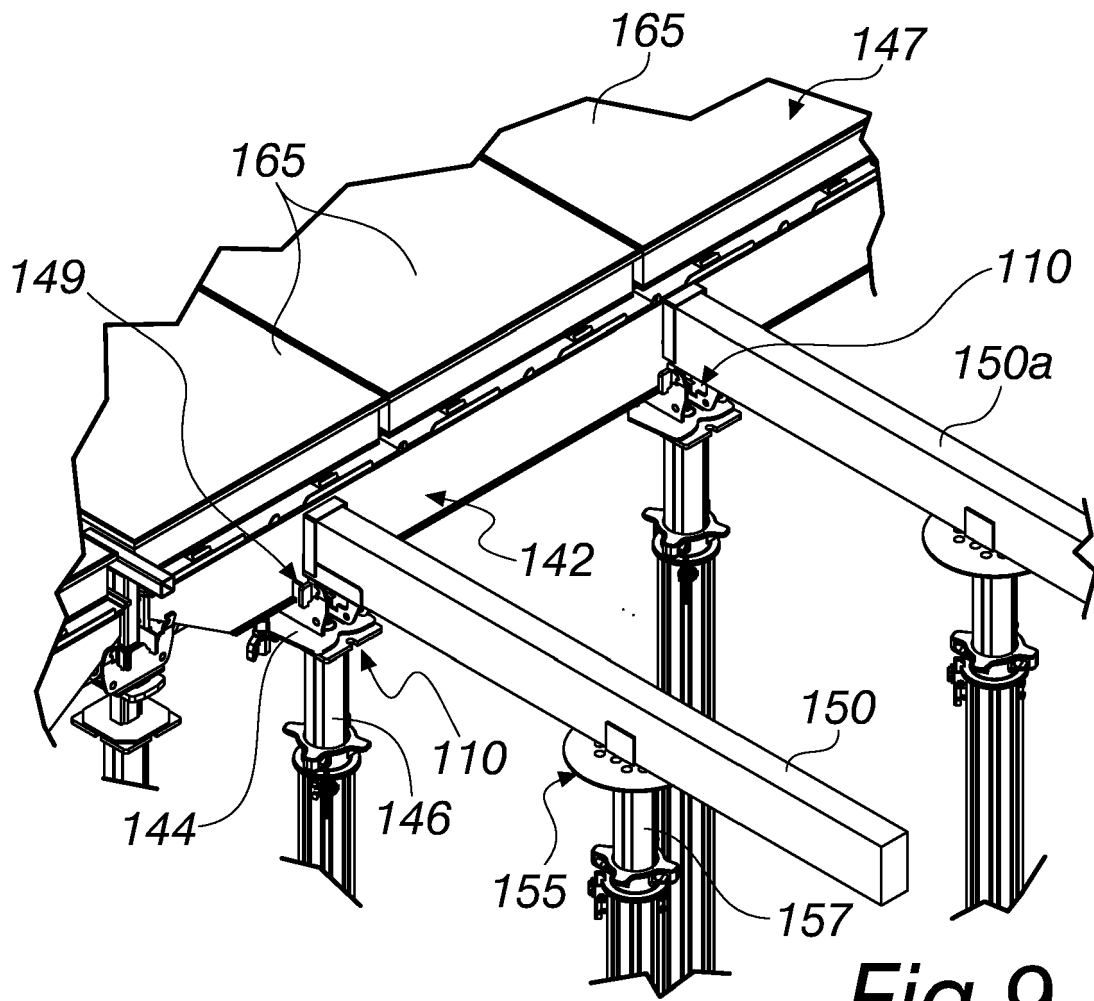


Fig.9

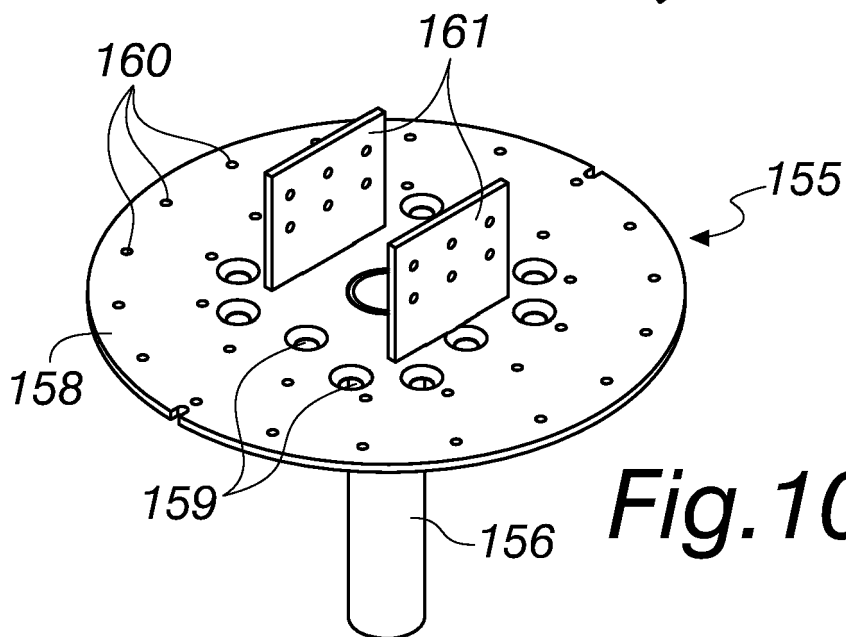
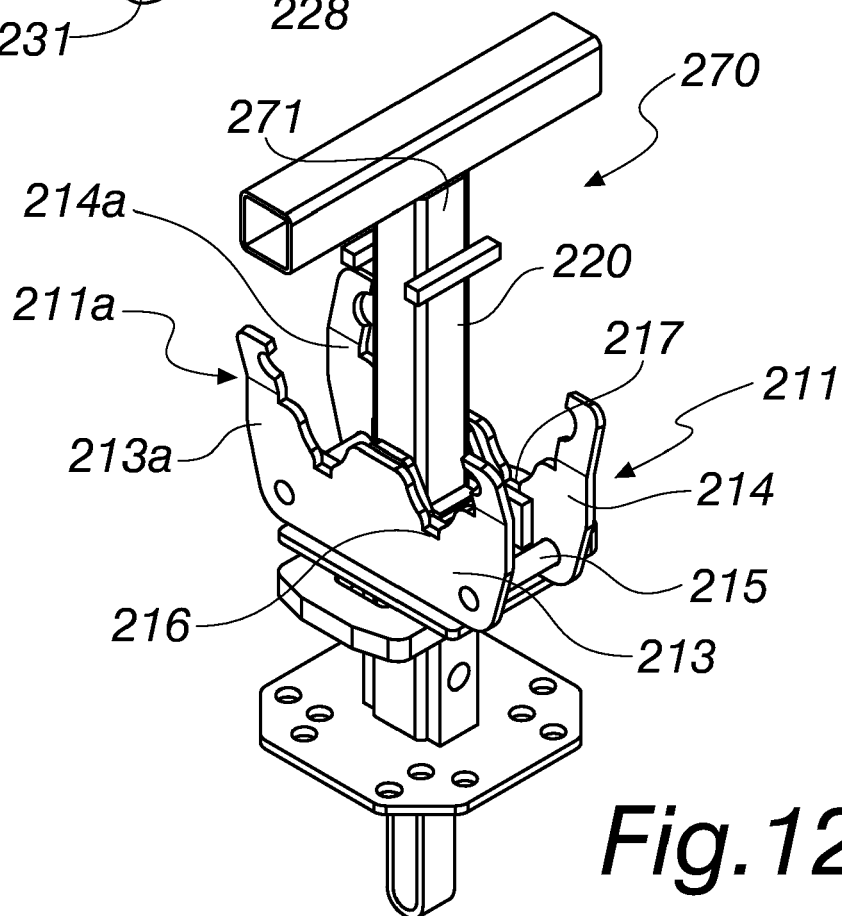
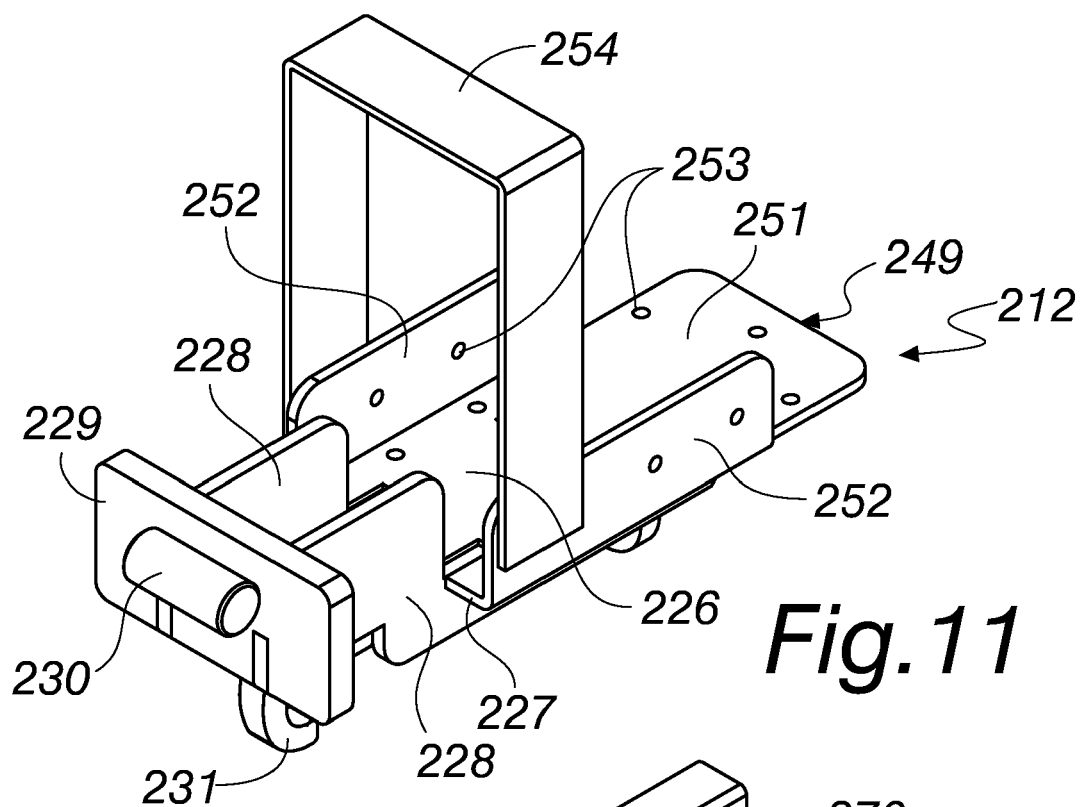
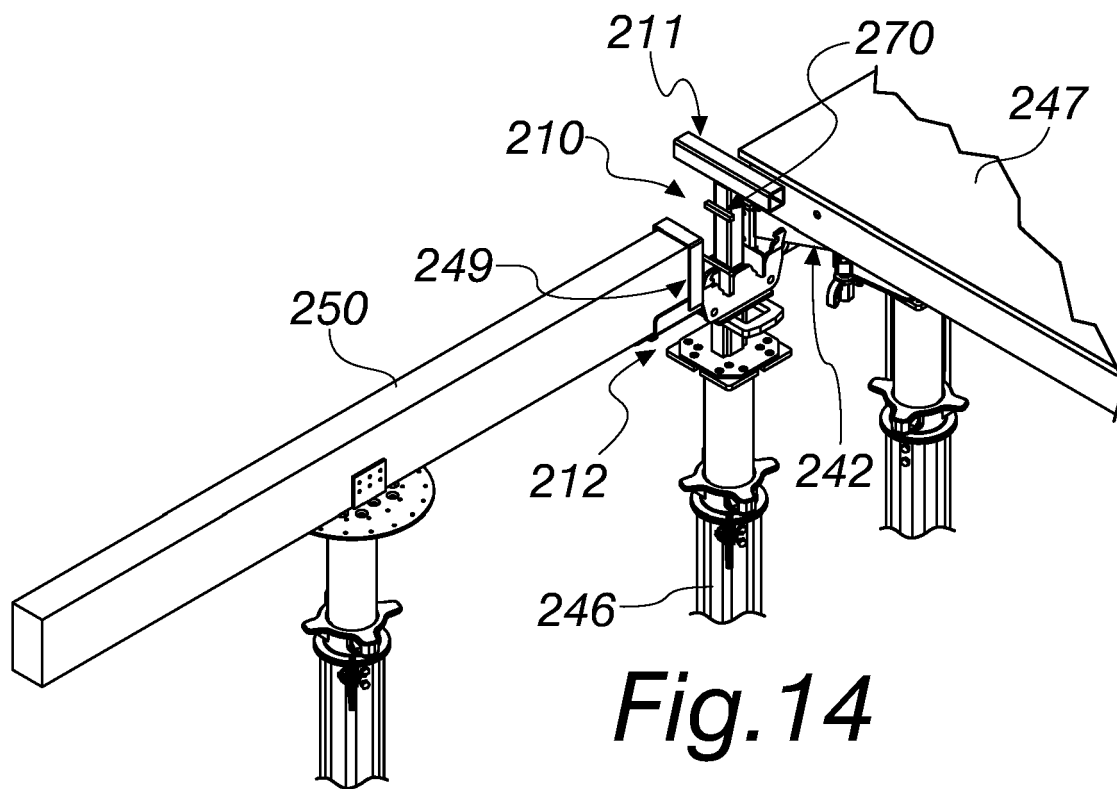
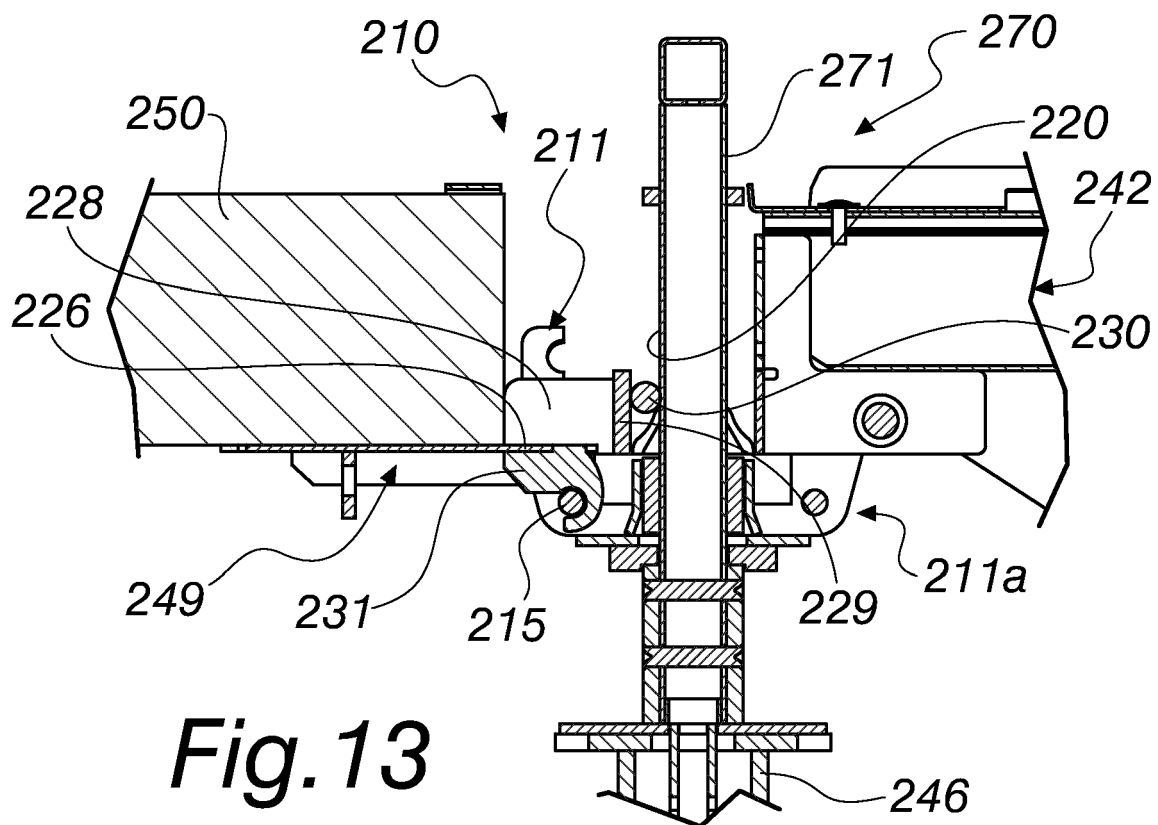
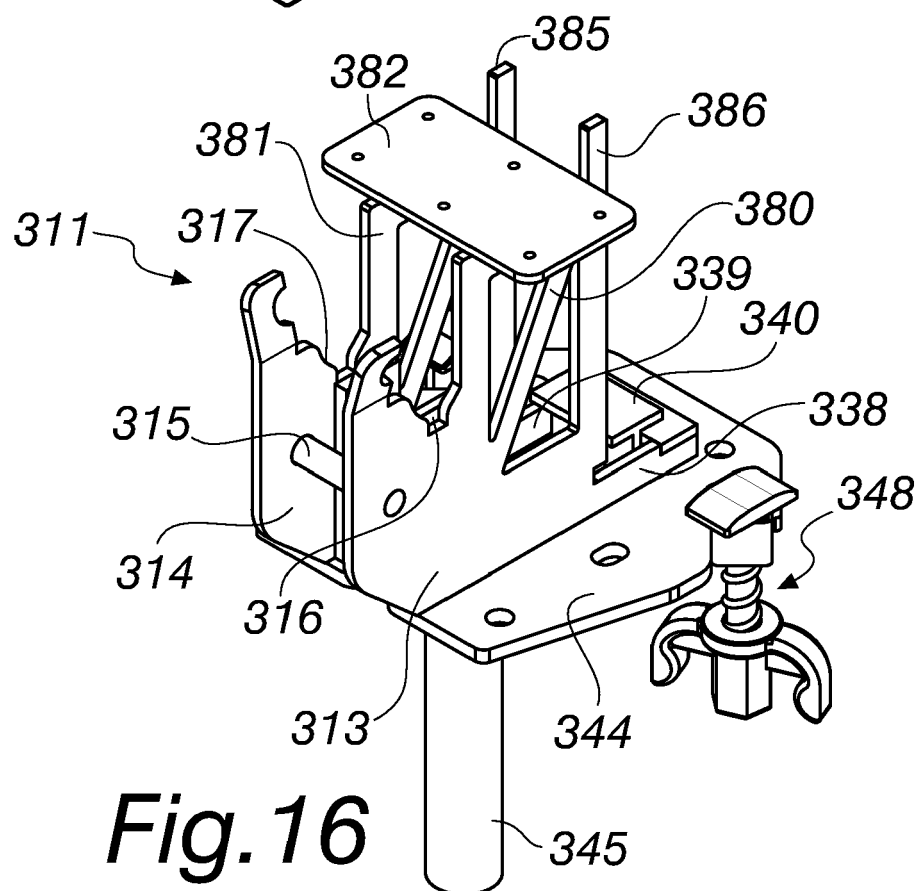
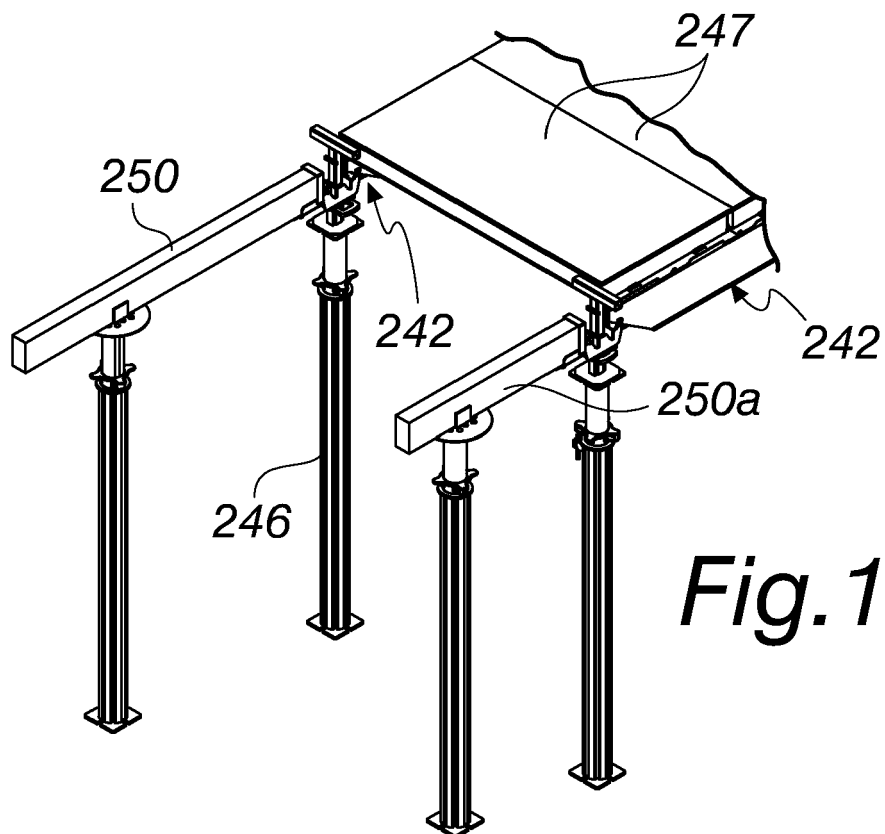
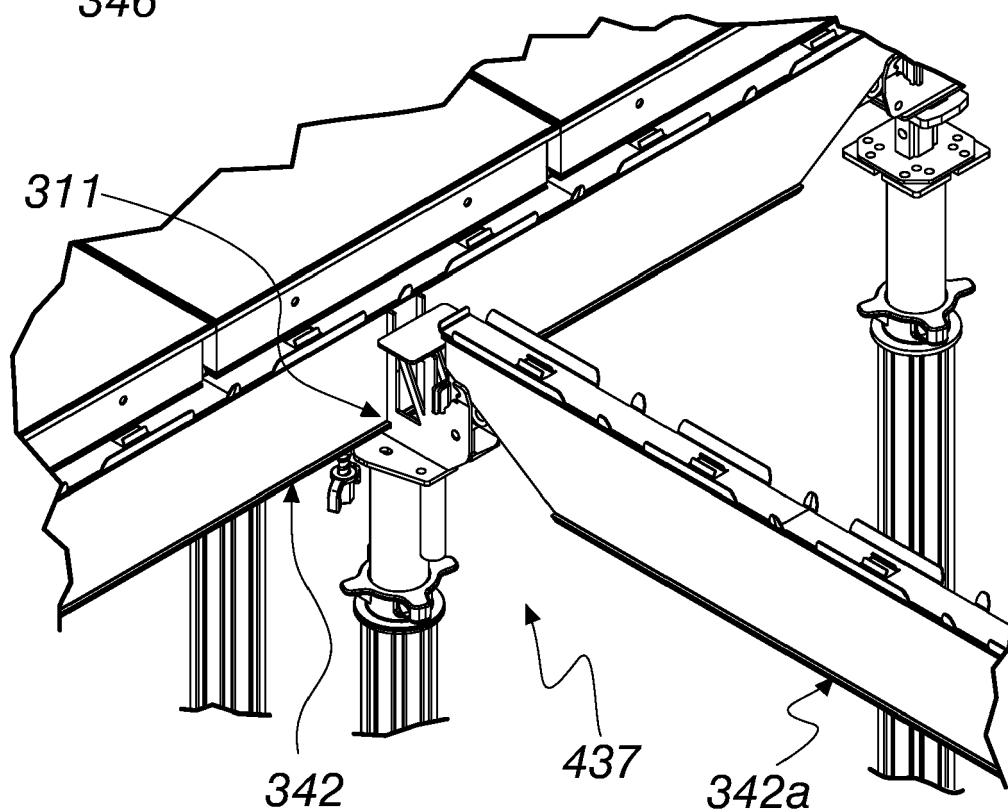
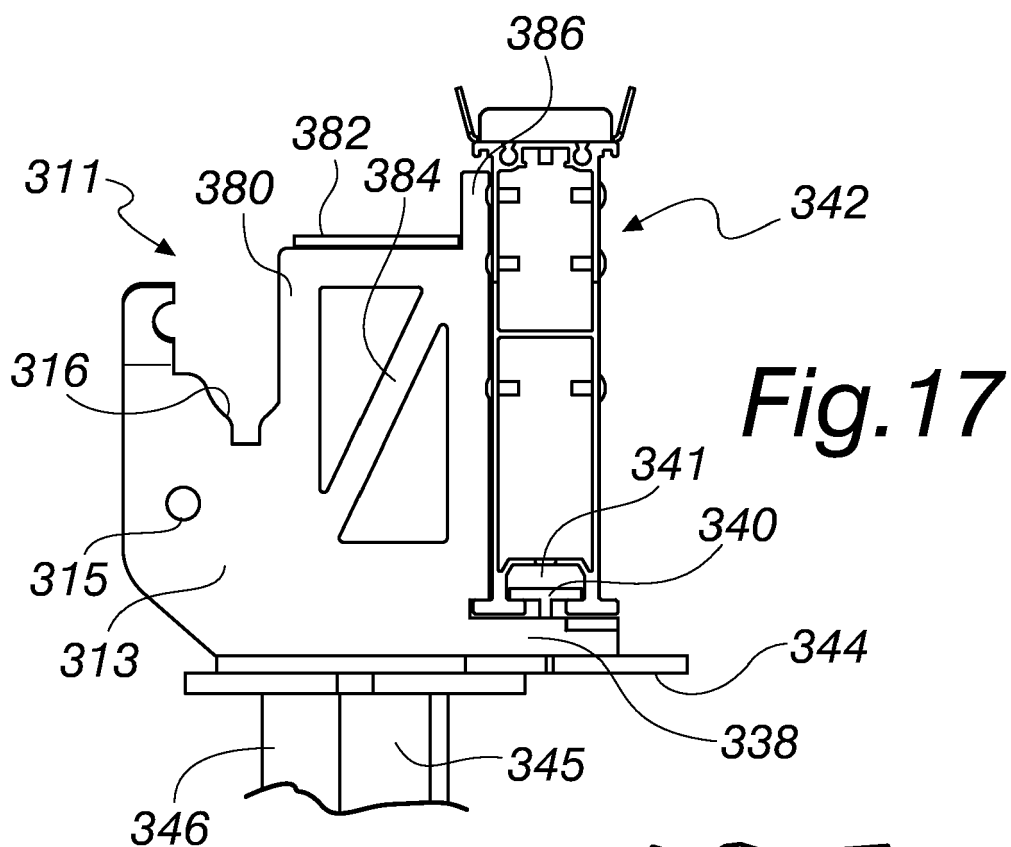


Fig.10











EUROPEAN SEARCH REPORT

Application Number
EP 16 20 1635

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2006/100694 A1 (FARESIN BUILDING DIVISION S P [IT]; FARESIN GUIDO [IT]) 28 September 2006 (2006-09-28) * figures 1, 2 *	1-4,8,9, 13-15	INV. E04G11/48 E04G11/50
A	* figures 1, 2 *	5-7, 10-12	
A	----- DE 42 04 788 A1 (PERI GMBH [DE]) 26 August 1993 (1993-08-26) * figures 1, 2 *	1-15	

			TECHNICAL FIELDS SEARCHED (IPC)
			E04G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 December 2016	Examiner Tryfonas, N
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21-12-2016

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