



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
31.05.2017 Bulletin 2017/22

(51) Int Cl.:
E04G 11/52 (2006.01) **E04G 11/54** (2006.01)
E04G 11/38 (2006.01)

(21) Application number: **16200671.2**

(22) Date of filing: **25.11.2016**

(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

(71) Applicant: **Faresin Building S.p.A.**
36042 Breganze (VI) (IT)

(72) Inventor: **FARESIN, Guido**
36061 BASSANO DEL GRAPPA VI (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners
Via Meravigli, 16
20123 Milano (IT)

(30) Priority: **27.11.2015 IT UB20155967**

(54) **FORMWORK FOR THE EXECUTION OF HORIZONTAL CASTINGS FOR PROVIDING FLOOR SLABS**

(57) A formwork (10) for the execution of horizontal castings for providing floor slabs, of the type comprising a series of props (11, 12, 13), and load-bearing heads (14, 15, 16) to be arranged on the props (11, 12, 13) for the support of panels (17) designed to form a supporting surface for a covering made of wooden material, each panel (17) comprising at least two longitudinal profiles (18, 19), for resting on the load-bearing heads (14, 15,

16), which are mutually connected by cross-members (20).

At least one panel (17) comprises a main frame (21), for resting on the load-bearing heads (14, 15, 16), and an auxiliary frame (22) that can be extracted reversibly from the main frame (21) in a direction parallel to the arrangement of the respective panel (17).

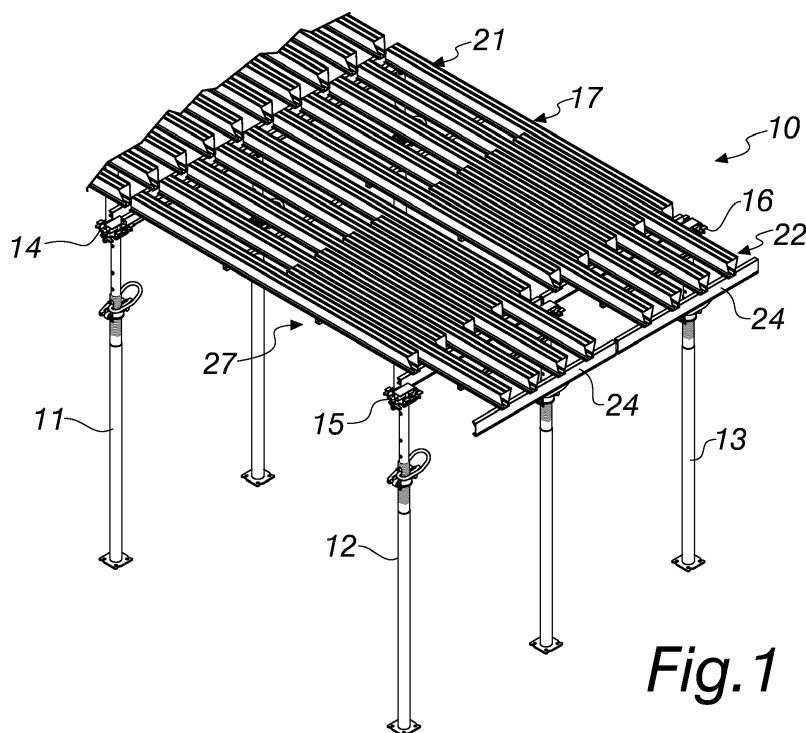


Fig. 1

Description

[0001] The present invention relates to a formwork for the execution of horizontal castings for providing floor slabs.

[0002] Nowadays, conventional formworks are constituted by a series of props that support a frame composed of supporting panels made with metallic profiles, and planks or boards made of wood or plywood are placed and nailed onto this frame.

[0003] Normally the assembly of these formworks involves the handling of the various different elements by a single operator.

[0004] A first drawback of the formworks known today consists in that the panels are inconvenient to handle owing to the weight of their wooden components, to the detriment of the rapidity of assembly of the formwork and of the safety of the operator.

[0005] A significant portion of the weight is in fact constituted by shaped wooden profiles which are usually integrated into the frame of a supporting panel, and are adapted to receive the nails for fixing the boards, planks or sheets made of wooden material, plywood or solid wood, for the provision of the casting surface.

[0006] In fact all the completion work that is carried out on the construction site, be it side walls, protrusions, end-of-casting closures, points for the pretensioning of wires etc., are provided by way of wood that is nailed, or screwed, to the main formwork.

[0007] This is why, on a formwork, including structures for floor slabs, there are areas where to fix the nails. In order to determine such areas in which to place the nails, today a number of solutions are known.

[0008] A first solution entails that the panel of the formwork for floor slabs is constituted by a frame that is covered completely by a sheet of plywood, on which nails can be used, and this solution is known and present on the market.

[0009] A second solution entails that the panel of the formwork for floor slabs is constituted by a frame to which blocks of wood are fixed, in general at its cross-members.

[0010] In a third solution, the panels for floor slabs are of simple frames without nailable parts, and the latter are provided with additional components that bear the wood block on which to use nails.

[0011] All such solutions have the problems of weight, and therefore of manageability, indicated above.

[0012] A further problem of the conventional formworks is represented by the compensations that are necessary in order to cover the entire extent of the floor slab to be provided. In fact, since the formwork is composed of modular elements, often it does not have the dimensions and precision needed to enable on its own the provision of all of the floor slab, and instead for each specific application of the modular formwork it is necessary to complete the formwork system with elements created to measure in order to cover the distances that need to be covered for the perimetric closure of the floor slab, due

both to irregular edges of the floor slab (inclined edges, protruding edges, generally irregular perimeters and the like) and to natural compensations that represent a completion of the formwork, i.e. to fill the spaces that are not reached by the modular formwork elements, such as for example small protruding extensions of floor slab, modest overlaps and other, similar situations.

[0013] The problem of compensation of modular formwork elements is usually solved with traditional operations in carpentry in wood that is shaped and assembled to measure for each individual particular application.

[0014] Such solution, obviously, although it is now traditionally considered the simplest, is also the source of major delays in terms of the time necessary for formwork operations, and likewise it is the source of not insignificant costs given the local, specific and particular nature of each individual intervention.

[0015] The aim of the present invention is to provide a formwork for the execution of horizontal castings for the provision of floor slabs, which is capable of overcoming the above mentioned drawbacks of conventional formwork systems.

[0016] Within this aim, an object of the invention is to provide a formwork that is much more versatile and quick to assemble, but which at the same time has identical functionality in terms of nailability for the fixing of boards, planks or sheets of wooden material.

[0017] Another object of the invention is to devise a formwork that is lighter and easier to handle with respect to conventional formwork systems.

[0018] This aim and these and other objects which will become better evident hereinafter are achieved by a formwork for the execution of horizontal castings for providing floor slabs, of the type comprising a series of props, and load-bearing heads to be arranged on said props for the support of panels designed to form a supporting surface for a covering made of wooden material, each panel comprising at least two longitudinal profiles, for resting on said load-bearing heads, which are mutually connected by cross-members, characterized in that at least one panel comprises a main frame, for resting on said load-bearing heads, and an auxiliary frame that can be extracted reversibly from said main frame in a direction parallel to the arrangement of the respective panel, said auxiliary frame being adapted to increase in an adjustable manner the extension of the surface for supporting a covering made of wooden material.

[0019] Further characteristics and advantages of the invention will become better apparent from the description of a preferred, but not exclusive, embodiment of the formwork according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings, wherein:

- Figure 1 is a perspective view of a formwork according to the invention;
- Figure 2 is a perspective view of a panel of the formwork according to the invention;

- Figure 3 is an exploded perspective view of the panel of Figure 2;
- Figure 4 is a perspective view of a part of the panel of Figures 2 and 3;
- Figure 5 is a longitudinal cross-sectional view of a detail of the part of the panel of Figure 4;
- Figure 6 is a perspective view of a detail of a panel according to the invention;
- Figure 7 shows a variation of application of a formwork according to the invention.

[0020] With reference to the figures, a formwork for the execution of horizontal castings for providing floor slabs according to the invention is generally designated with the reference numeral 10.

[0021] The formwork 10 comprises a series of props, for example 11, 12 and 13 in Figure 1, and load-bearing heads 14, 15, 16 to be arranged on such props 11, 12, 13 for the support of panels, for example two panels 17 and 27 in Figure 1, which are designed to define a supporting surface for a covering made of wooden material.

[0022] Each panel 17 and 27 comprises at least two longitudinal profiles 18 and 19, for resting on the load-bearing heads 14, 15, 16.

[0023] The longitudinal profiles 18 and 19, clearly visible in Figure 2 in which a panel 17 is shown by way of example, are mutually connected by cross-members 20.

[0024] Each one of the two panels 17 and 27 comprises a main frame 21, for resting on the load-bearing heads 14, 15, 16, and an auxiliary frame 22 that can be extracted reversibly from the main frame 21 in a direction X parallel to the arrangement of the respective panel 17; such auxiliary frame 22 is designed to increase in an adjustable manner the extension of the surface for supporting a covering made of wooden material.

[0025] The main frame 21 is constituted by the longitudinal profiles 18 and 19, by the cross-members 20 and by optional additional longitudinal reinforcement elements 23, for example tubular profiles, which are fixed below the cross-members 20 with respect to a configuration for use.

[0026] The auxiliary frame 22 is constituted by cross-members 25, which are fixed at one end to a longitudinal profile 24, with optionally one or more longitudinal reinforcement elements 26 which are fixed below the cross-members 25 with respect to a configuration for use.

[0027] The cross-members 20 are mutually spaced apart in a longitudinal direction, i.e., in the direction of extension of the longitudinal profiles 18 and 19, by such a distance as to allow the passage between two neighboring first cross-members 20 of the main frame 21 of a second cross-member 25 of the auxiliary frame 21.

[0028] The auxiliary frame 22 can be extracted with respect to the main frame 21 by virtue of sliding means for the translation of the auxiliary frame 22 on the main frame in the direction X of extension of the cross-members.

[0029] Such sliding means comprise at least one slider

for each one of the second cross-members 25 of the auxiliary frame 22, each one of the sliders, better described below, being adapted to slide in a corresponding guide that is integral with a first cross-member 20 of the main frame 21.

[0030] In the present, non-limiting embodiment of the invention, each one of the sliders is constituted by a cross-bar 28 fixed to the opposite end of a respective second cross-member 25 with respect to the longitudinal profile 24.

[0031] The cross-bar 28 takes the form for example of a cylindrical tube with the ends covered by a plug 29 made of plastic material, which is adapted to facilitate sliding in the corresponding guide.

[0032] The cross-bar 28, with the respective plugs 29, defines two lateral symmetrical sliders extending in the transverse direction Y so as to protrude laterally, on opposite sides, from the second cross-member 25 that supports them, as can clearly be seen in Figures 4 and 5.

[0033] Each guide integral with a first cross-member 20 of the main frame 21 is constituted, in the present embodiment, by a sliding slot 30 defined in the direction of the length of each first cross-member 20.

[0034] Each first cross-member 20 comprises a metallic profile with a cross-section shaped like an isosceles trapezoid 32, with the shorter parallel side on the side of the longitudinal profiles 18 and 19 to which it is fixed.

[0035] In the configuration for use, below the metallic profile with cross-section shaped like an isosceles trapezoid 32, extends a portion that has a narrower cross-section 33, which defines two opposite and symmetrical sliding slots 30, and a flat base portion 34 that widens out with lateral flaps 35 for stiffening the cross-section and improving the stability of the connection, by way of welding, of the first cross-member 20 with the respective longitudinal profiles 18 and 19.

[0036] Each one of the second cross-members 25 is constituted by a metallic profile that is substantially identical to the metallic profiles of the first cross-members 20.

[0037] The first cross-members 20 and the second cross-members 25 have, on their walkable face, which is directed upward in the configuration for use, a plurality of protrusions 36, for example ribbing that extends longitudinally, i.e. in the lengthwise direction of the same cross-member; the function of such protrusions is to increase friction resistance while the cross-members 20 and 25 are being walked on by workers during construction work, thus increasing the level of safety of the formwork system.

[0038] The longitudinal metallic profiles 18 and 19 of a main frame 21 have an upper flat surface 37, for resting and fixing the flat portion 34 of the first cross-members 20, and a lower flat surface 38, for resting the main frame 20 on supports such as the load-bearing heads 14, 15 and 16.

[0039] A translation-preventing abutment 40, which is constituted for example by an L-shaped body, for example fixed by welding, as in Figure 6 is fixed to each lon-

gitudinal profile 18 and 19, at at least one end; such translation-preventing abutment 40 prevents the unwanted movement of the longitudinal profile 18 and 19 once this is mounted between two load-bearing heads.

[0040] Use of the formwork 10 according to the invention is the following.

[0041] The coupling of the main frame 21 with the auxiliary frame 22 occurs by way of insertion of the sliders, which are defined by the ends of the cross-bars 28 of the auxiliary frame 22, into the sliding slots 30 defined on the first cross-members 20 of the main frame 21.

[0042] Such coupling determines a bond between the two panels that prevents vertical movements, with respect to a configuration for use, and allows horizontal translation movements.

[0043] The nature of such coupling generates a structure that is statically stable, since support is ensured:

- by the connection between the sliders of the auxiliary frame 22 with the sliding slots 30 of the main frame 21 in the manner described above,
- and also by the support that ensues upon contact between the cross-members 25 of the auxiliary frame 22 and the upper flat surface 37 of the longitudinal profiles 18 or 19 of the main frame 21.

[0044] The formwork according to the invention, for the execution of a floor slab with adjustable extension, finds application in several different fields of implementation of formwork systems.

[0045] In a first field of application, shown for the purposes of example in Figure 1, the main frame 21 is assembled on a formwork system made up of vertical props 11, 12 and 13 coupled to load-bearing heads 14, 15, 16. The main frame 21 in this case rests directly on the load-bearing heads without the use of any supporting beam.

[0046] The formwork system without beams thus composed is suitable for mounting auxiliary frames to make up a formwork system for the execution of a floor slab with adjustable extension.

[0047] In another field of application, shown for the purposes of example in Figure 7, the formwork 110 comprises vertical props 111, 112, 113 on which are fixed load-bearing heads 114, 115, 116 between which are placed load-bearing beams 150 and 151; the main frame 21 is therefore mounted on the load-bearing beams 150 and 151.

[0048] A formwork system with load-bearing beams thus composed is also suitable for mounting main frames 21 to make up a formwork system for the execution of a floor slab with adjustable extension.

[0049] In each application of a formwork 10 and 110, according to the invention, for the execution of a floor slab with adjustable extension, the auxiliary frames 22 can in turn be supported by vertical props, either along their longitudinal profile 24 or along the cross-members 25 thereof.

[0050] The cantilevered operation of the system is

therefore understood, from the applicative point of view, to be for the purposes of non-limiting example.

[0051] In each application of the formwork system for the execution of a floor slab with adjustable extension, compensation is necessary with wooden beams, and horizontal wooden closing panels connected thereto which can be of various shape, measurement, length and quality which are not given here, but which contribute to the objective of creating a perfect horizontal formwork surface.

[0052] In practice it has been found that the invention fully achieves the intended aim and objects.

[0053] In fact, with the invention a formwork has been devised that is much more versatile by virtue of panels constituted by a main frame and by an auxiliary frame that can be extracted from the main frame, so as to enable the extension of the surface for supporting a covering made of wooden material, and which at the same time has identical functionality in terms of nailability for the fixing of boards, planks or sheets of wooden material.

[0054] In particular, with the invention a formwork has been devised that is much more versatile and lighter with respect to conventional systems, by virtue of the particular shape structure of the two longitudinal metallic profiles, and of the cross-members.

[0055] Furthermore, with the present invention a formwork has been devised that can be integrated both with systems that entail supporting the panels with load-bearing beams, and also with systems that entail the panels being placed directly onto adapted load-bearing heads.

[0056] Furthermore, with the present invention the level of safety of workers during construction work is increased, by virtue of the particular shape of the cross-section of the cross-members and in particular the presence of anti-slipping upper protrusions.

[0057] 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.

[0058] 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.

[0059] The disclosures in Italian patent application no. 102015000077559 (UB2015A005967), the priority of which is claimed in the present application, are incorporated as a reference.

[0060] 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 formwork (10) for the execution of horizontal castings for providing floor slabs, of the type comprising a series of props (11, 12, 13), and load-bearing heads (14, 15, 16) to be arranged on said props (11, 12, 13) for the support of panels (17) designed to form a supporting surface for a covering made of wooden material, each panel (17) comprising at least two longitudinal profiles (18, 19), for resting on said load-bearing heads (14, 15, 16), which are mutually connected by cross-members (20), **characterized in that** at least one panel (17) comprises a main frame (21), for resting on said load-bearing heads (14, 15, 16), and an auxiliary frame (22) that can be extracted reversibly from said main frame (21) in a direction (X) parallel to the arrangement of the respective panel (17), said auxiliary frame (22) being adapted to increase in an adjustable manner the extension of the surface for supporting a covering made of wooden material.
2. The formwork according to claim 1, **characterized in that** said main frame (21) is constituted by said longitudinal profiles (18, 19), by the cross-members (20) and by optional additional longitudinal reinforcement elements (23) which are fixed below the cross-members (20) with respect to a configuration for use.
3. The formwork according to one or more of the preceding claims, **characterized in that** said auxiliary frame (22) is constituted by cross-members (25), which are fixed at one end to a longitudinal profile (24), with optionally one or more longitudinal reinforcement elements (26) which are fixed below the cross-members (25) with respect to a configuration for use.
4. The formwork according to one or more of the preceding claims, **characterized in that** said cross-members (20) are mutually spaced apart in a longitudinal direction, i.e., in the direction of extension of the longitudinal profiles (18, 19), by such a distance as to allow the passage between two neighboring first cross-members (20) of the main frame (21) of a second cross-member (25) of the auxiliary frame (21).
5. The formwork according to one or more of the preceding claims, **characterized in that** said auxiliary frame (22) can be extracted with respect to the main frame (21) by virtue of sliding means for the translation of the auxiliary frame (22) on the main frame in the direction (X) of extension of the cross-members.
6. The formwork according to one or more of the preceding claims, **characterized in that** said sliding means comprise at least one slider for each one of said second cross-members (25) of the auxiliary frame (22), each one of said sliders being adapted to slide in a corresponding guide that is integral with a first cross-member (20) of the main frame (21).
7. The formwork according to one or more of the preceding claims, **characterized in that** each one of said sliders is constituted by a cross-bar (28) fixed to the opposite end of a respective second cross-member (25) with respect to the longitudinal profile (24).
8. The formwork according to one or more of the preceding claims, **characterized in that** said cross-bar (28) is constituted by a cylindrical tube with the ends covered by a plug (29) made of plastic material, which is adapted to facilitate sliding in the corresponding guide.
9. The formwork according to one or more of the preceding claims, **characterized in that** each guide that is integral with a first cross-member (20) of the main frame (21) is constituted by a sliding slot (30) defined in the direction of the length of each first cross-member (20).
10. The formwork according to one or more of the preceding claims, **characterized in that** each first cross-member (20) comprises a metallic profile with a cross-section shaped like an isosceles trapezoid (32), with the shorter parallel side on the side of the longitudinal profiles (18, 19) to which it is fixed, below, in the configuration for use, the metallic profile with an isosceles trapezoid cross-section (32) also having a portion that has a narrower cross-section (33), which defines two opposite and symmetrical sliding slots (30), and a flat base portion (34) that widens out with lateral flaps (35) for stiffening the cross-section and improving the stability of the connection of the first cross-member (20) with the respective longitudinal profiles (18, 19).
11. The formwork according to one or more of the preceding claims, **characterized in that** said second cross-members (25) are each constituted by a metallic profile that is substantially identical to the metallic profiles of the first cross-members (20).
12. The formwork according to one or more of the preceding claims, **characterized in that** said first cross-members (20) and said second cross-members (25) have, on their walkable face, which is directed upward in the configuration for use, a plurality of protrusions (36), the function of said protrusions being to increase friction resistance while said cross-members (20, 25) are being walked on.
13. The formwork according to one or more of the pre-

ceding claims, **characterized in that** said longitudinal metallic profiles (18, 19) of a main frame (21) have an upper flat surface (37), for resting and fixing the flat portion (34) of the first cross-members (20), and a lower flat surface (38), for resting the main frame (20) on supports such as the load-bearing heads (14, 15, 16). 5

14. The formwork according to one or more of the preceding claims, **characterized in that** a translation-preventing abutment (40) is fixed, at at least one end, to each longitudinal profile (18, 19). 10

15

20

25

30

35

40

45

50

55

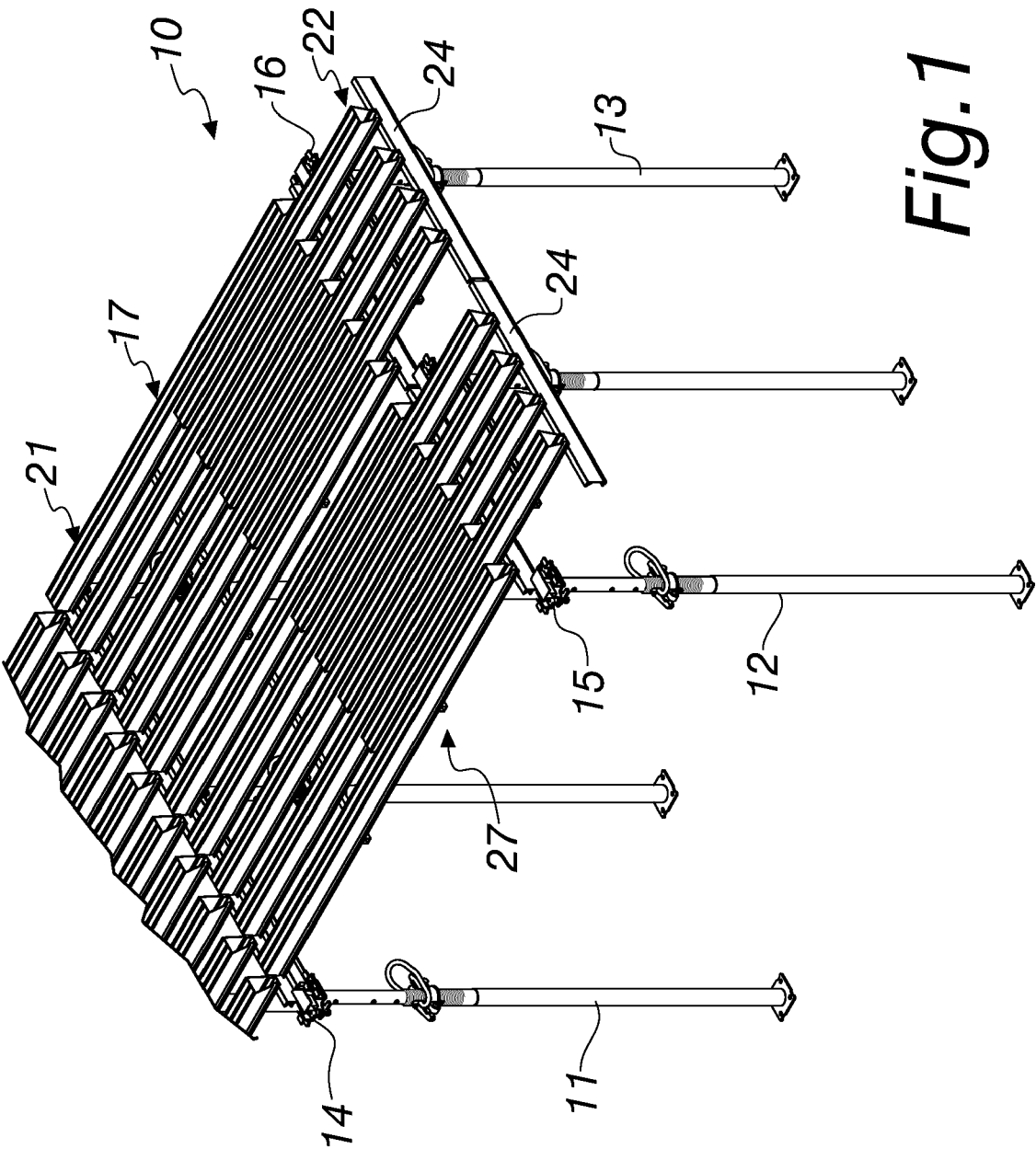
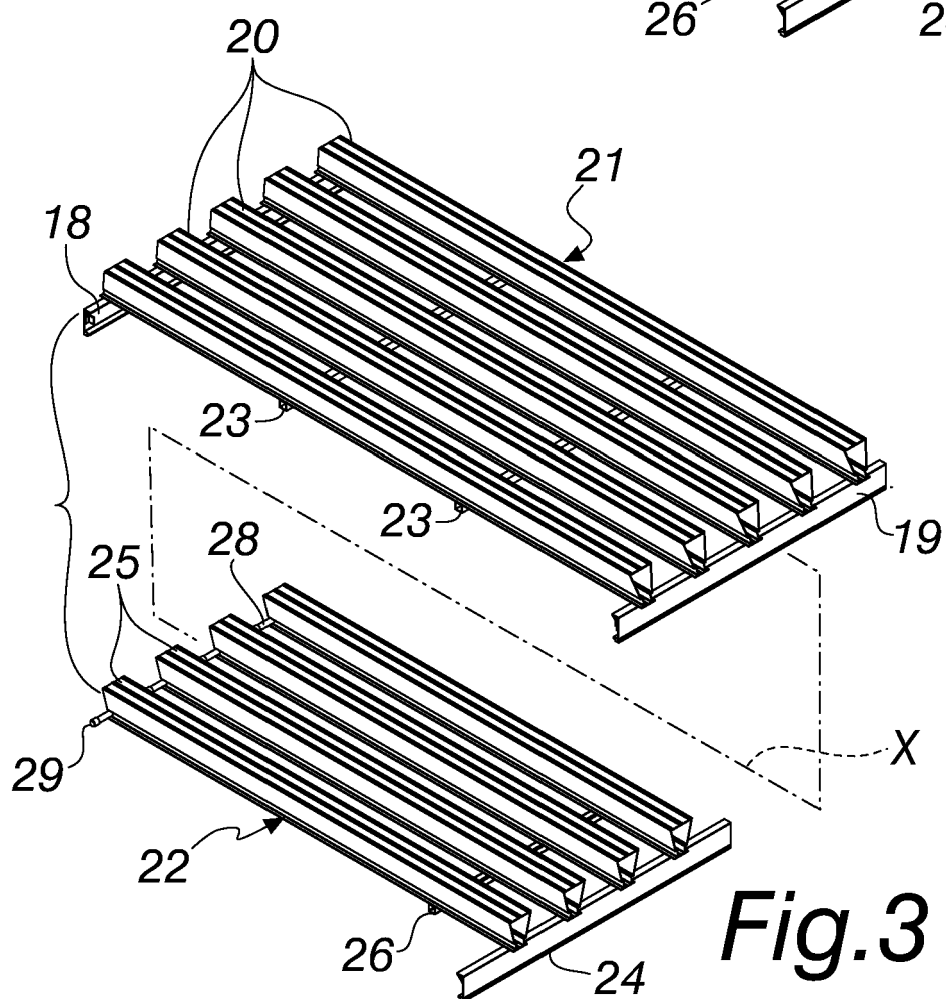
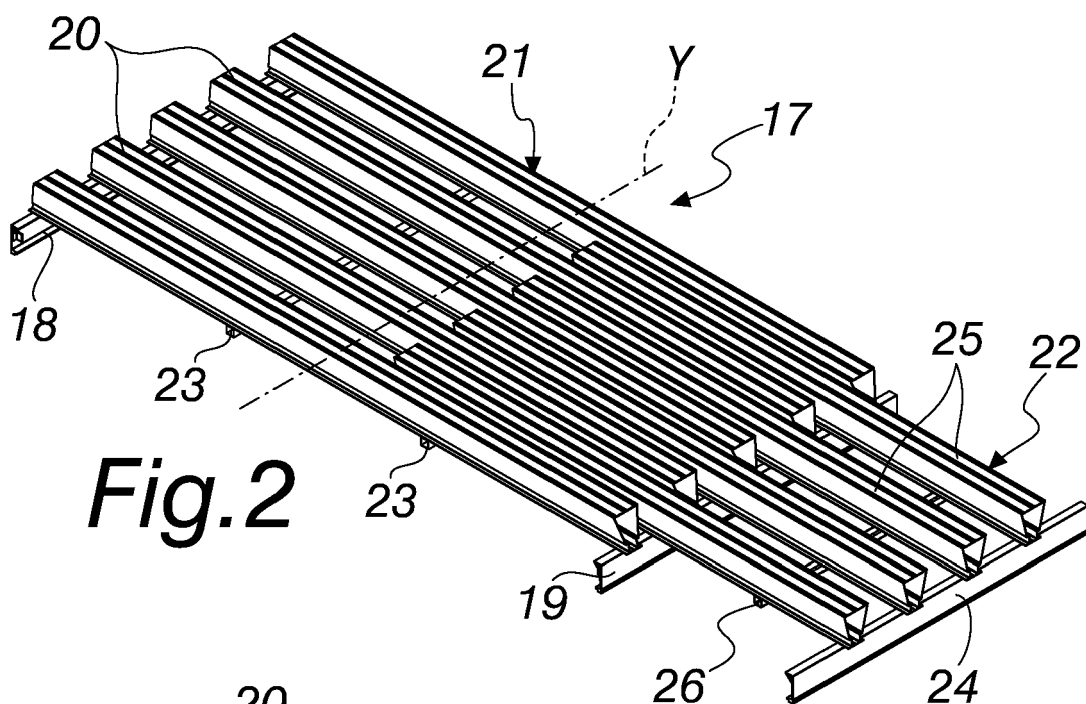
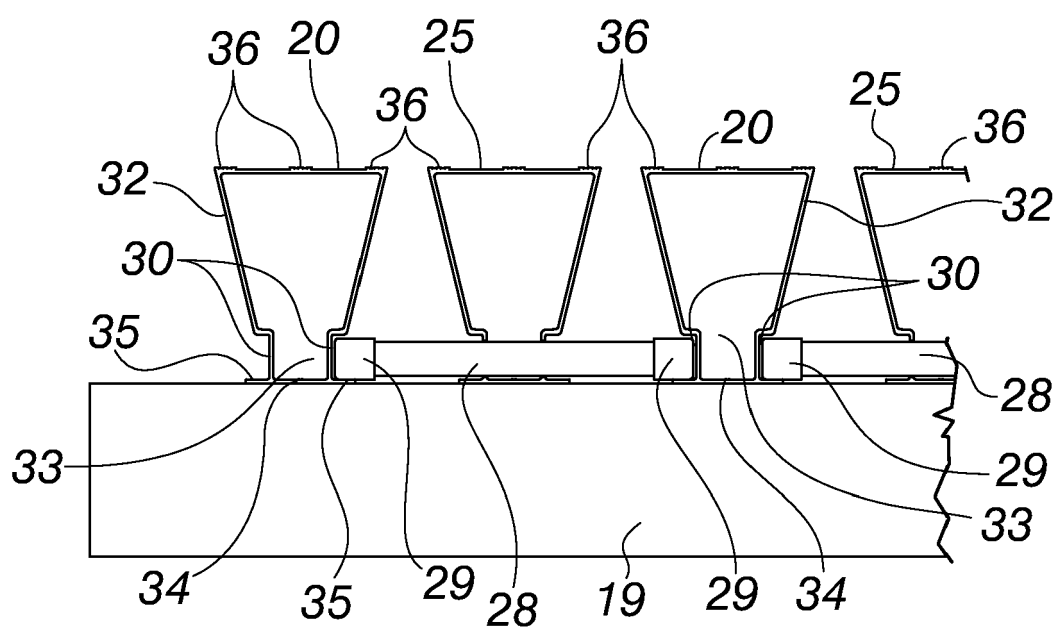
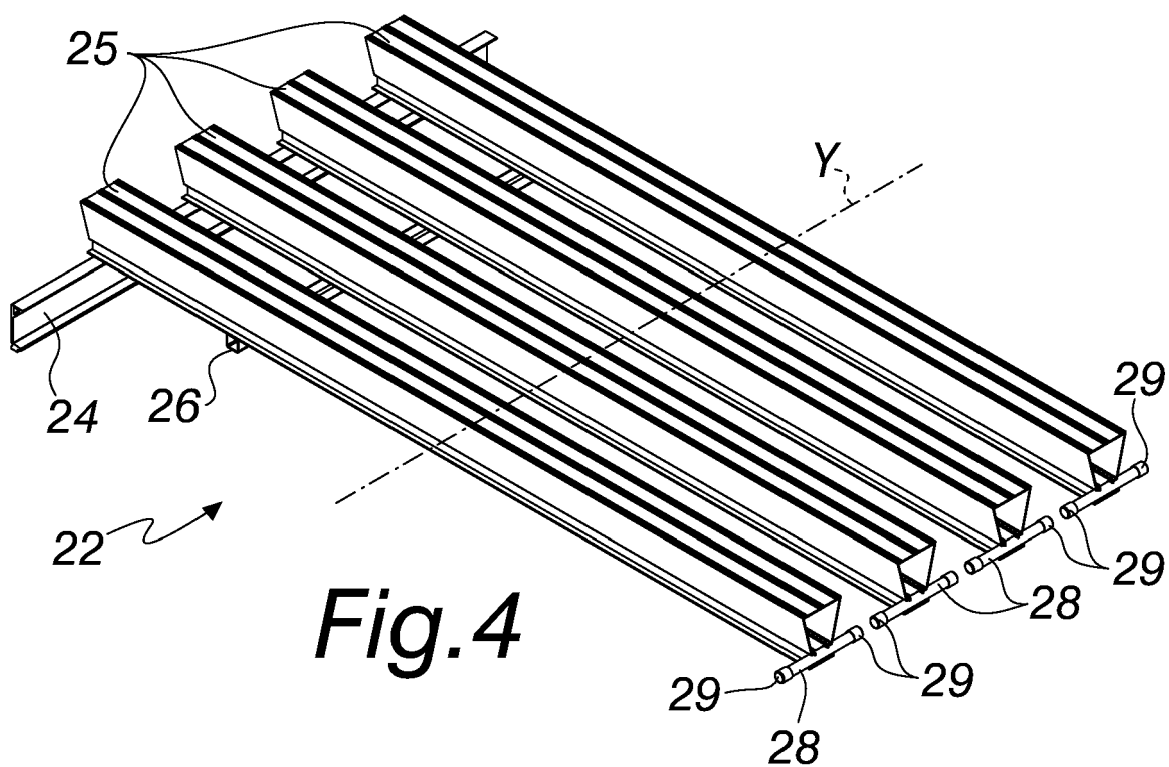


Fig. 1





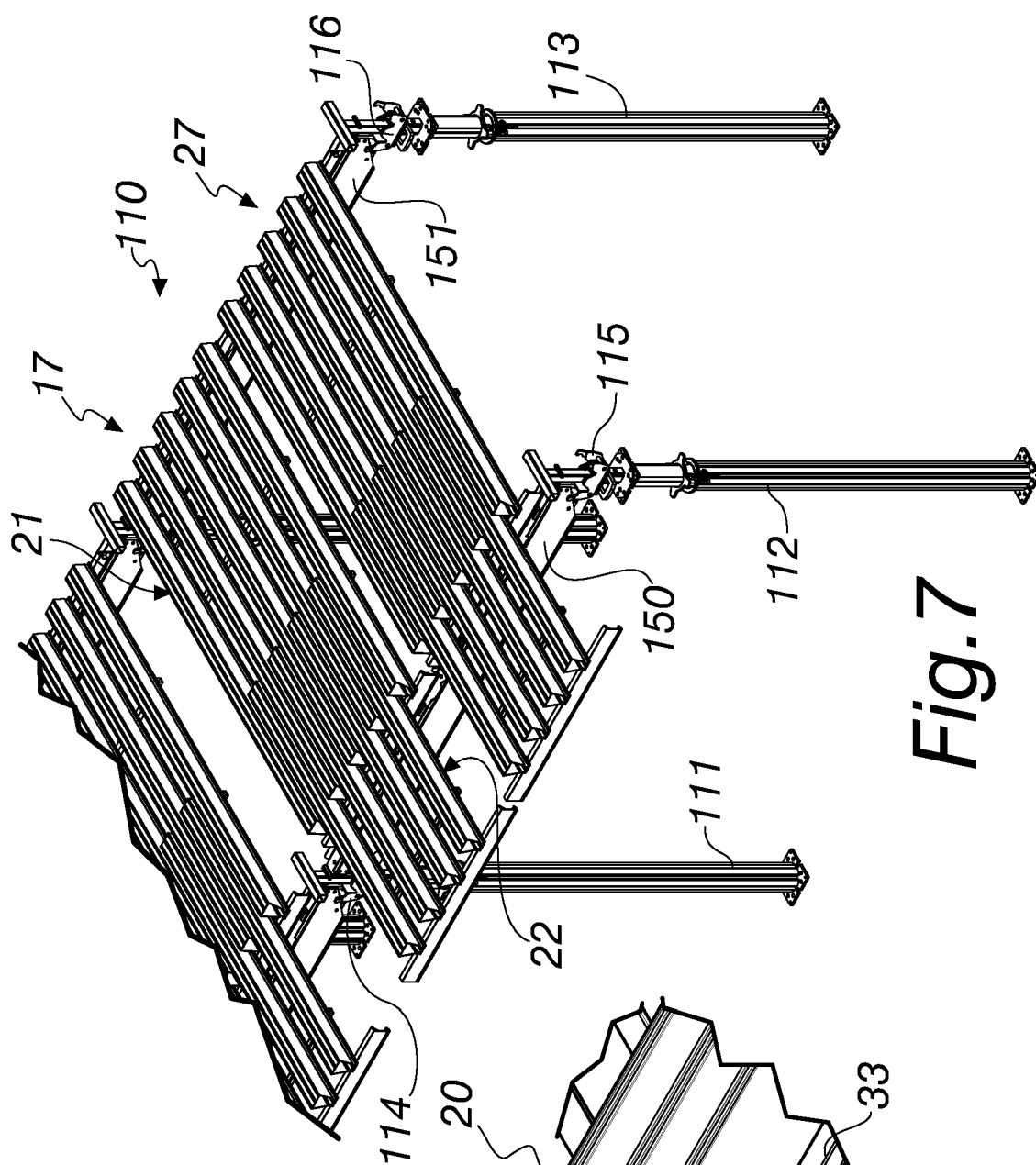


Fig. 7

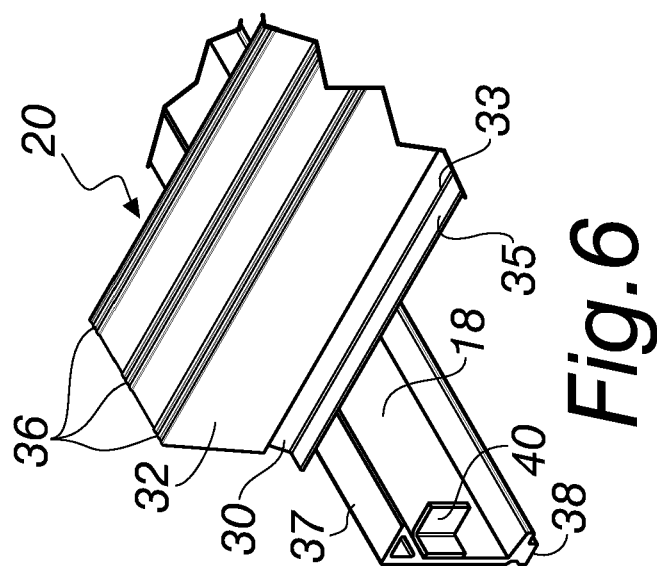


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 16 20 0671

5

10

15

20

25

30

35

40

45

50

55

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	DE 10 2005 031153 A1 (PERI GMBH [DE]) 18 January 2007 (2007-01-18)	1-5,12, 14	INV. E04G11/52
A	* figures 5, 6b *	6-11,13	E04G11/54 E04G11/38
X	FR 2 842 848 A1 (PERI GMBH [DE]) 30 January 2004 (2004-01-30)	1-5,12, 14	
A	* figure 1 *	6-11,13	
			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 27 March 2017	Examiner Tryfonas, N
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			

 1
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 20 0671

5 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.

27-03-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102005031153 A1	18-01-2007	CN 101213345 A	02-07-2008
		DE 102005031153 A1	18-01-2007
		ZA 200710689 B	26-11-2008
FR 2842848 A1	30-01-2004	DE 10234445 A1	12-02-2004
		FR 2842848 A1	30-01-2004

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

- IT 102015000077559 [0059]
- IT UB2015005967 A [0059]