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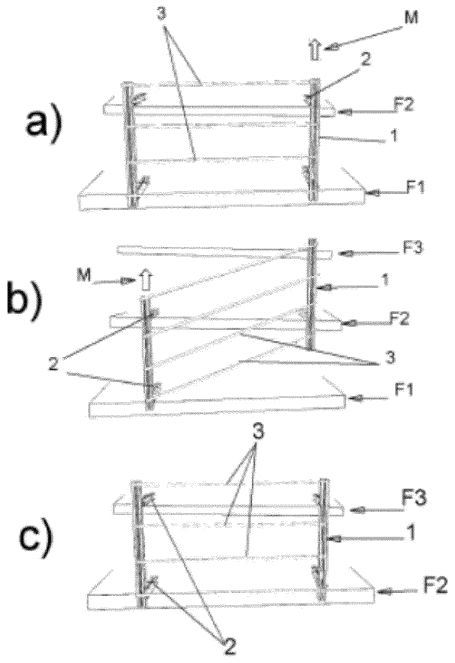
(54) **SELF-CLIMBING MODULAR SYSTEM FOR THE PROTECTION OF CIVIL WORKS AND BUILDINGS UNDER CONSTRUCTION**

(57) The invention relates to a self-climbing modular system for the protection of civil works and buildings under construction, comprising two bases (2) fixed in cantilever with respect to a slab (F) level, with each one provided at its free end with a support (5) on which an upright (1) is arranged with the possibility of guided vertical displacement with respect to the base (2) and the slab (F) level on which the base (2) is fixed, a plurality of handrails (3) articulated at their ends linking together two uprights (1) of one and the same module or of contiguous modules located at one and the same slab (F) level, and lifting means (M) for independently lifting the uprights (1) between two slabs (F1, F2) located at two different levels in such a way that upon actuating said lifting means (M), the corresponding upright (1) rises in a unidirectional manner due to the action of the corresponding support (5).

Fig. 10



EP 4 450 737 A1

Description

TECHNICAL FIELD

[0001] The object of the invention relates to a self-climbing modular system for the protection of civil works and buildings under construction.

PRIOR ART

[0002] Temporary edge protection of civil works, particularly of buildings under construction, is necessary and even mandatory and is included in various current regulations, such as, for example, Spanish standard UNE-EN 13374.

[0003] To ensure the protection of a civil work under construction in accordance with the regulations in force (particularly to ensure temporary edge protection of works in buildings under construction), various constructive solutions are known, such as those described in WO2020019092, EP2325416, ES1239398U, ES1074586U, ES1074587U and ES1074609U.

[0004] WO202001909A1 describes a perimeter system for personnel fall protection in the construction of high-rise buildings, which transforms into a tray for catching people or material and into a work platform, on the perimeter of construction sites in high-rise buildings, towers or vertical walls.

[0005] EP2325416A1 describes a perimeter protection system for construction sites which, by using (as in WO2020019092A1) posts or pillars and supports or anchors, also has screens referred to as enclosure segments.

[0006] ES1239398U describes a protection for construction voids basically being composed of an extendable crossbeam, which is repeated a plurality of times and is arranged, as needed, in the voids to prevent the accidental falling, fundamentally of people, into the void.

[0007] ES1074586U, ES1074587U, and ES1074609U describe, respectively, an adjustable fixing and coupling unit for vertically supporting railings, a clamp for supporting nets or railings, and a support for formwork closures and railings, all in reference to the temporary protection of civil works under construction.

[0008] ES1239398U discloses an extendable protection designed to cover any type of void within an ongoing construction. The protection is formed by two rectangular tubes with dimensions that allow one to be inserted over the other, thus constituting the telescopic extendable system. These two sections have a locking system so that the total length of the assembly remains fixed while the locking system has blocked the possibility of inserting one tube inside the other. When the locking system is released, the length of the assembly can be modified, having as a minimum length the longer of the two components and as a maximum length the sum of the lengths of both components.

[0009] ES2662066T3 describes a screen-type perimeter protection system comprising guides arranged around the perimeter of a building, support means configured to fix the guides to a support surface of said building, and protection means fixed to the guides. The system allows simultaneous protection of several floors.

DISCLOSURE OF THE INVENTION

[0010] The object of the invention is to provide a self-climbing modular system, as defined in the claims.

[0011] The self-climbing modular system according to the invention comprises two bases fixed in cantilever with respect to a slab level of the civil work, and each one provided at its free end with a support on which an upright is arranged with the possibility of guided vertical displacement with respect to the base and the slab level on which the base is fixed, a plurality of handrails articulated at their ends linking together two uprights of one and the same module or of contiguous modules located at one and the same slab level, and lifting means for independently lifting the uprights between two slabs located at two different levels in the civil work in such a way that upon actuating said lifting means, the corresponding upright rises, said rise being unidirectional due to the action of the corresponding support.

[0012] In the prior art, all the solutions known by the applicant require "in-situ" and customized assembly, then later require being collected so as to arrange them again at a higher level, i.e., none of the solutions known by the applicant so far is modular and self-climbing.

[0013] The system obtained is modular and self-climbing, requiring only the fixing of the bases at the different slab levels in order to hook and lift in them, with suitable means, the uprights with their handrails and, where appropriate, the safety net, which form complete modules coming from a lower slab level.

[0014] These and other advantages and features of the invention will become apparent in view of the figures and detailed description of the invention.

DESCRIPTION OF THE DRAWINGS

[0015]

Figure 1 shows a schematic perspective view of an embodiment of a self-climbing modular system according to the invention.

Figure 2 shows an enlarged detail according to reference A of Figure 1.

Figure 3 shows a schematic perspective view of a second embodiment of a self-climbing modular system according to the invention.

Figure 4 shows a detailed view of an upright of the self-climbing modular system shown in Figure 1.

Figure 5 shows a detailed view of a base part with a support of the self-climbing modular system shown in Figure 1.

Figure 6 shows a detailed view of the support shown in Figure 5 with a lifted grating.

Figure 7 shows a detailed view of a handrail of the self-climbing modular system shown in Figure 1.

Figures 8 and 9 depict respective enlarged details according to, respectively, references B and C in Figure 3.

Figure 10 shows the self-climbing modular system shown in Figure 1 in three operating steps a), b), and c).

Figure 11 shows a schematic perspective view of a third embodiment of a self-climbing modular system according to the invention.

DETAILED DISCLOSURE OF THE INVENTION

[0016] The self-climbing modular system for the protection of civil works and buildings under construction according to the invention comprises two bases 2 each comprising at a free end, a support 5 on which an upright 1 is arranged with the possibility of guided vertical displacement, a plurality of elongated handrails 3 articulated at their ends to the two uprights 1 of one and the same module or of contiguous modules located at one and the same slab F level, and lifting means M configured for independently lifting each upright 1 between two different levels. The self-climbing modular system comprises a safety net 4 fixed at least to two handrails 3 so as to keep it taut.

[0017] In the embodiments shown in Figures 3 and 6, the self-climbing modular system further comprises at least one extendable tie rod 6 bracing the corresponding upright 1 to the corresponding base 2 so as to ensure the rigidity of the assembly. In the embodiment shown in Figure 6, the self-climbing modular system further comprises base columns 7 supported directly on the ground when starting the work, with the corresponding upright 1 being arranged directly in each of said base columns 7 before starting the construction of the first slab level. The base column 7 and the upright 1 have sections with conjugate geometries.

[0018] Each of the bases 2 is fixed in cantilever with respect to the corresponding slab F of the civil work. Each base 2 comprises two longitudinal members 21 with a U-shaped profile defining a space of constant width b between them in which there are arranged fixing means for fixing to the corresponding slab F. The fixing means are not described in detail given that they are not the object of the invention.

[0019] Each of the bases 2 comprises, at a free end, a support 5 on which the corresponding upright 1 is arranged with the possibility of guided vertical displacement with respect to the base 2 and, accordingly, with respect to the slab F on which the base 2 is fixed.

[0020] Each support 5 comprises two lateral flanges 51 secured by means of screws 50 to the corresponding longitudinal member 21. In said flanges 51 there are arranged rollers 52 assembled with the possibility of rotating freely about a corresponding shaft 520 constituted in guides of the corresponding upright 1 in vertical displacement.

[0021] Between said rollers 52 and longitudinal members 21 there is also arranged a grating 53 assembled with the possibility of swiveling with respect to the longitudinal members 21 between a stable horizontal position and an unstable raised position in which, respectively, a bolt 12 is housed or released during the unidirectional rise of the corresponding upright 1.

[0022] In the embodiments shown, each upright 1 comprises two posts 11 with a U-shaped profile coupled to one another along their opposing webs 110 by means of a plurality of bolts 12 defining between them a space of constant width "a". Each of said posts 11 comprises a plurality of aligned holes 13 in their flanges 111.

[0023] In the embodiments shown, the handrails 3 are of variable length. Each one comprises at least two telescopically arranged portions 3a and 3b and each of the portions 3a and 3b is provided with a hole 31 at a free end.

[0024] In the embodiments shown in Figures 3 and 7, each extendable tie rod 6 comprises a tubular body 61, two flat bars 62a and 62b, and two support flanges 63a and 63b. The flat bars 62a and 62b are assembled such that they are telescopically arranged with respect to the tubular body 61, occupying the respective ends thereof. Each of these flat bars 62a and 62b comprises a plurality of aligned holes 620.

[0025] The tubular body 61 and the support flanges 63a and 63b comprise respective holes for the aforementioned to be to one another, to the uprights 1, and to the bases 2 through screw/nut assemblies 64 as shown in Figures 8 and 9.

[0026] The bases 2 are fixed in cantilever to the slab F of the civil work and each one is provided at its free end with the support 5 on which the upright 1 is arranged with the possibility of guided vertical displacement. The handrails 3 are articulated at their ends linking together two uprights 1 of one and the same module or of contiguous modules located at one and the same slab F level in such a way that upon successively actuating the lifting means M, the corresponding upright 1 rises to a higher slab F level, said rise being unidirectional due to the action of the corresponding support 5.

[0027] No detailed description is given for the specific lifting means M used (for example, human means without the need for a crane, such as winches or other similar/-known means) as they are not themselves object of the invention.

Claims

1. A self-climbing modular system for the protection of civil works and buildings under construction, **characterized in that** each module comprises two bases (2) fixed in cantilever with respect to a slab (F) level of the civil work, and each one provided at its free end with a support (5) on which an upright (1) is arranged with the possibility of guided vertical displacement with respect to the base (2) and the slab (F) level on which the base (2) is fixed, a plurality of handrails (3) articulated at their ends linking together two uprights (1) of one and the same module or of contiguous modules located at one and the same slab (F) level, and lifting means (M) for independently lifting the uprights (1) between two slabs (F1, F2) located at two different levels in the civil work in such a way that upon actuating said lifting means (M), the corresponding upright (1) rises, said rise being unidirectional due to the action of the corresponding support (5).

2. The self-climbing modular system according to the claim 1, wherein each upright (1) comprises two posts (11) with a U-shaped profile linked to one another along their opposing webs (110) by means of a plurality of bolts (12) defining between the posts (11) a space having a constant width (a), each of said posts (11) comprising a plurality of aligned holes (13) in their flanges (111).

3. The self-climbing modular system according to any of the preceding claims, wherein the handrails (3) are of variable length, structured in at least two telescopically arranged portions (3a, 3b), each portion being provided with a hole (31) at its free end which is arranged facing a hole (13) of the corresponding upright (1) such that by inserting pins, the handrails (3) are arranged articulated to the corresponding upright (1) and adapt to different separation widths between the uprights (1) that they link together.

4. The self-climbing modular system according to any of the preceding claims, wherein each base (2) comprises two longitudinal members (21) with a U-shaped profile defining a space of constant width (b) between them in which there are arranged fixing means for fixing to the corresponding slab (F), a support (5) arranged at a free end of the base (2) in cantilever, the support (5) comprising two lateral flanges (51) secured by means of screws (50) to the corresponding longitudinal member (21) and in which there are arranged rollers (52) assembled on said lateral flanges (51) with the possibility of rotating freely about a corresponding shaft (520) and constituted in guides of the corresponding upright (1) in a vertical displacement, and a grating (53) assembled with the possibility of swiveling with respect to the longitudinal members (21) between a stable horizontal position and an unstable raised position in which, respectively, a bolt (12) is housed or released during the unidirectional rise of the corresponding upright (1).

5. The self-climbing modular system according to any of the preceding claims, comprising a safety net (4) fixed to at least two handrails (3) so as to keep it taut.

6. The self-climbing modular system according to any of the preceding claims, further comprising at least one extendable tie rod (6) bracing the corresponding upright (1) to the corresponding base (2) so as to ensure the rigidity of the assembly.

7. The self-climbing modular system according to any of the preceding claims, further comprising base columns (7) supported directly on the ground when starting the work, with the upright (1) being arranged directly in each of said base columns (7) before starting the construction of the first slab level.

Fig. 1

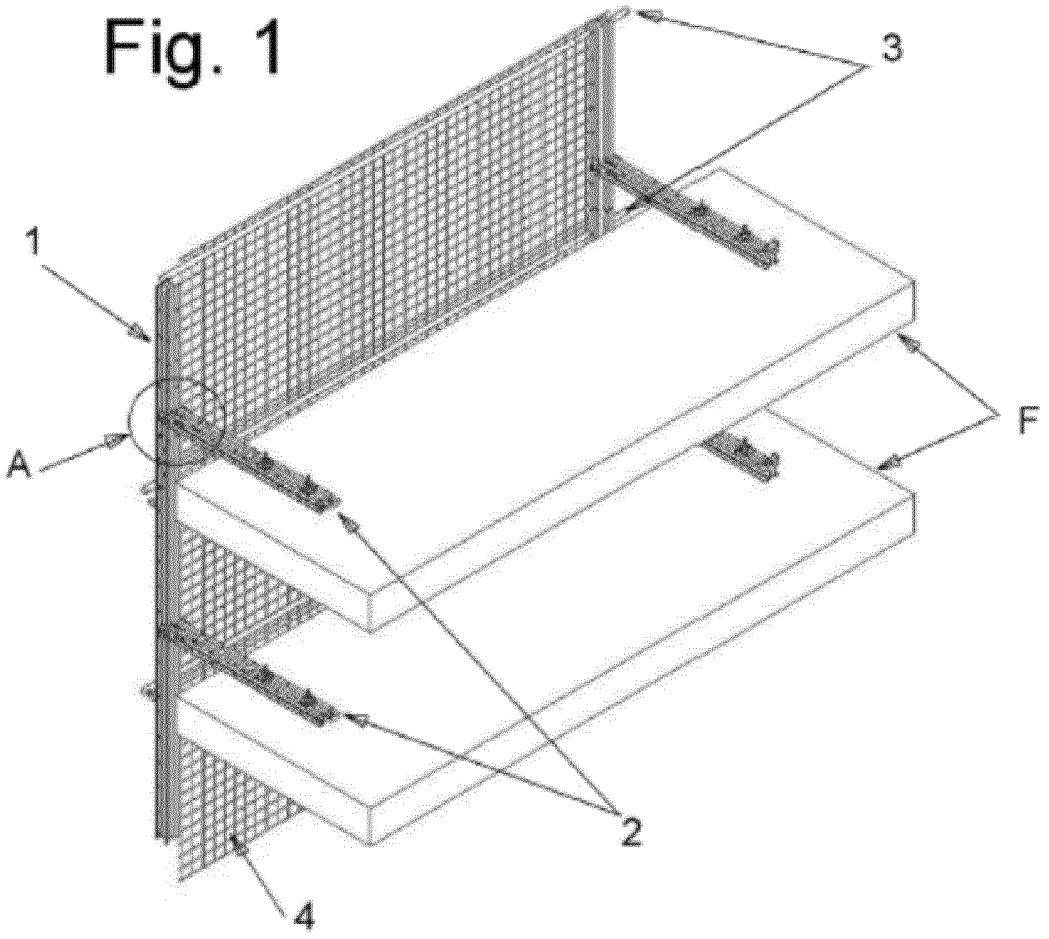


Fig. 2

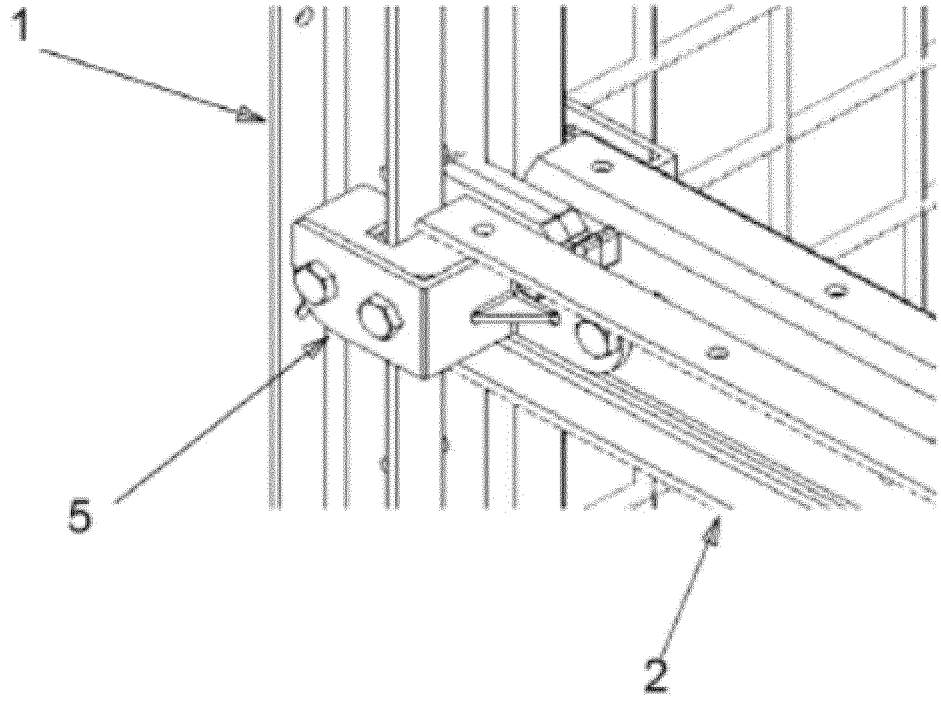


Fig. 3

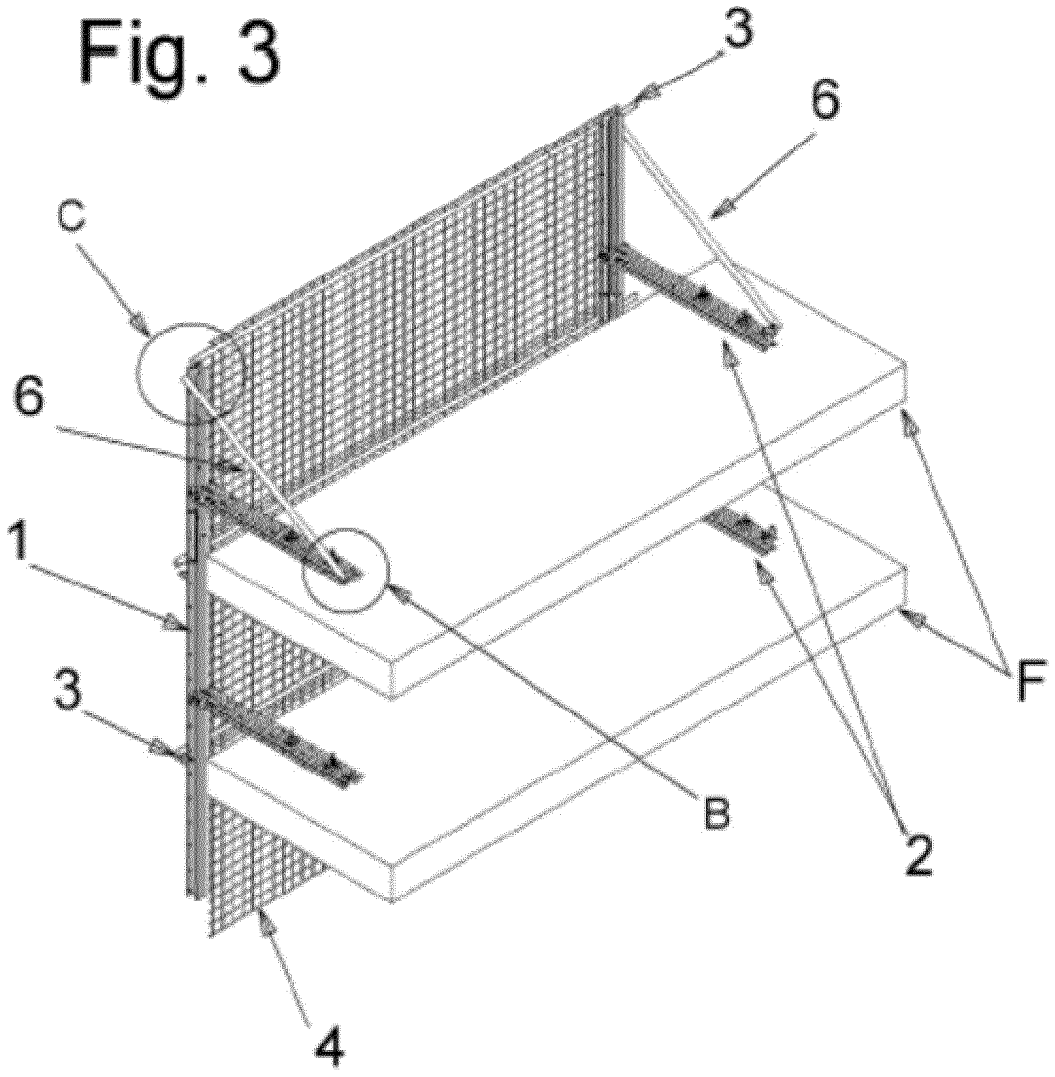


Fig. 4

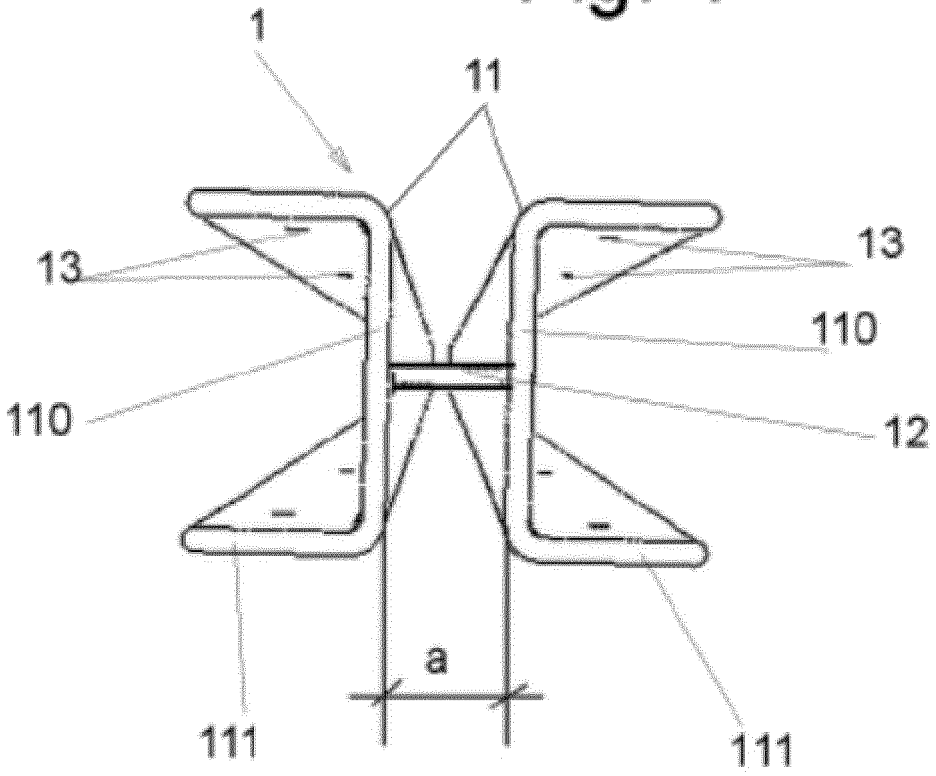
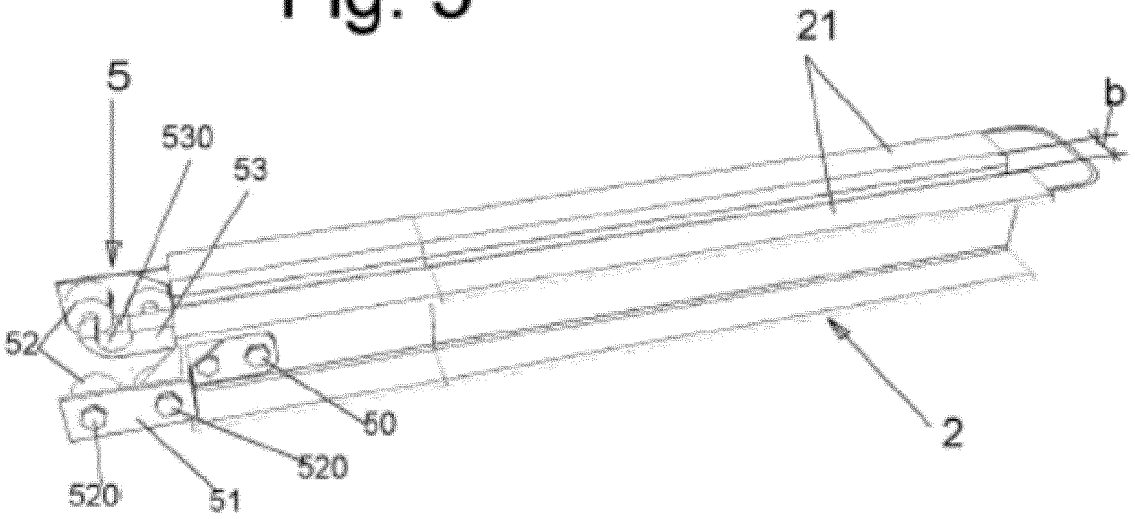


Fig. 5



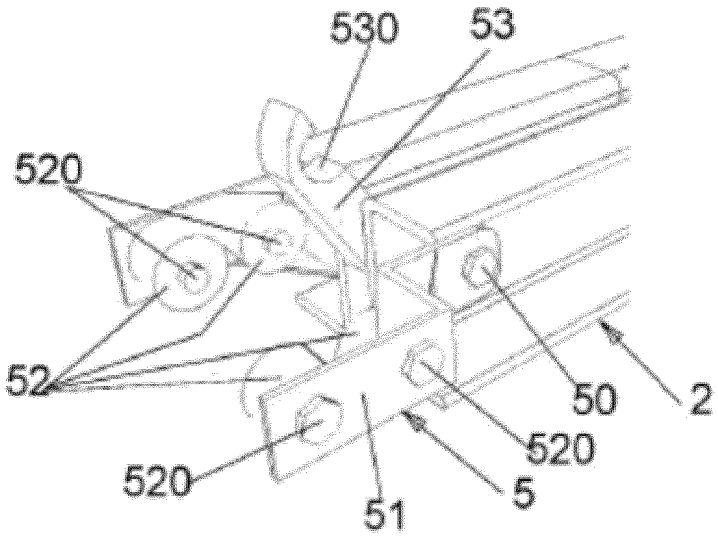


Fig. 6

Fig. 7

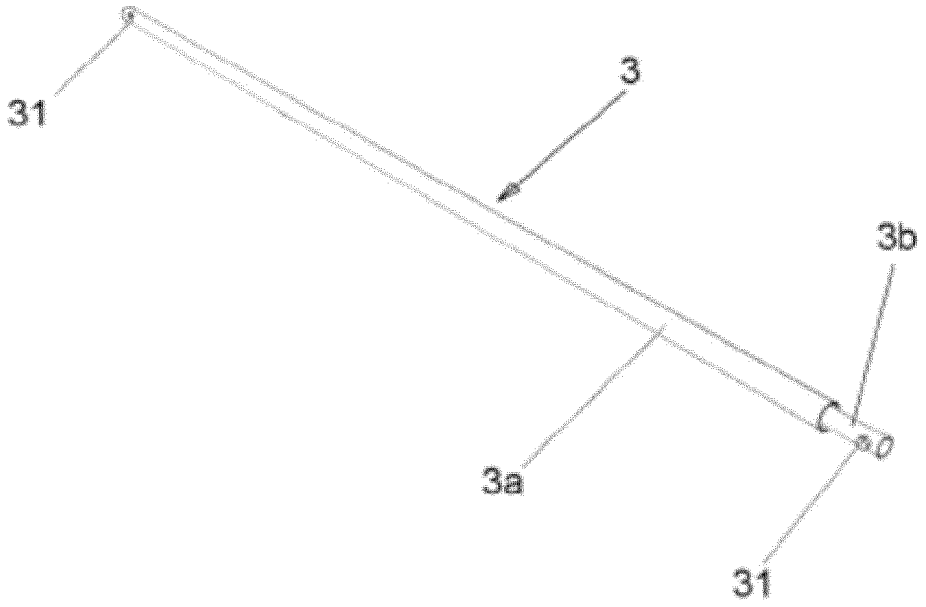


Fig 8

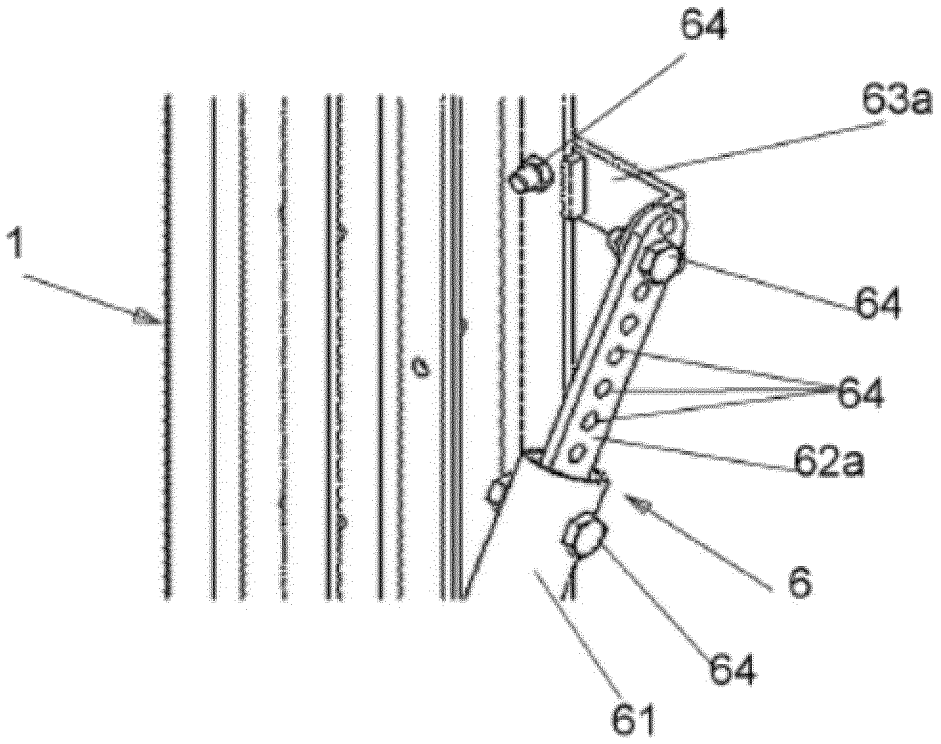


Fig. 9

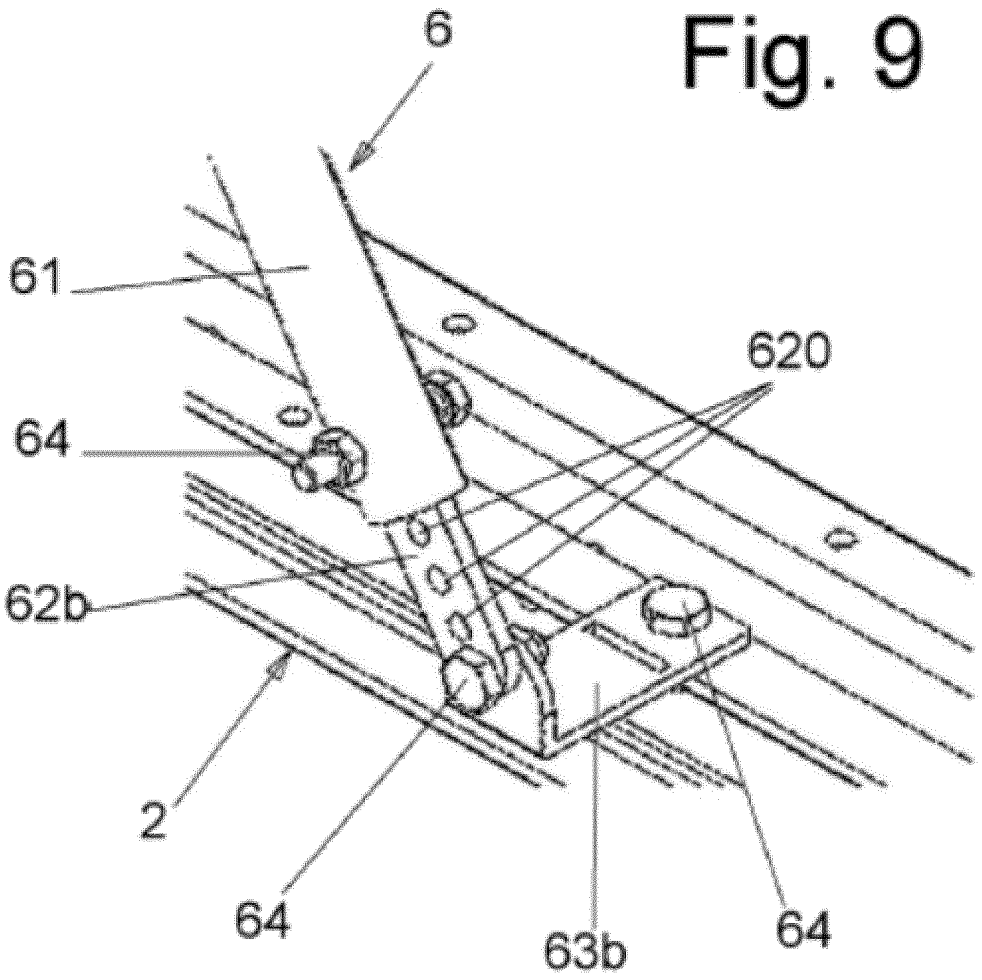


Fig. 10

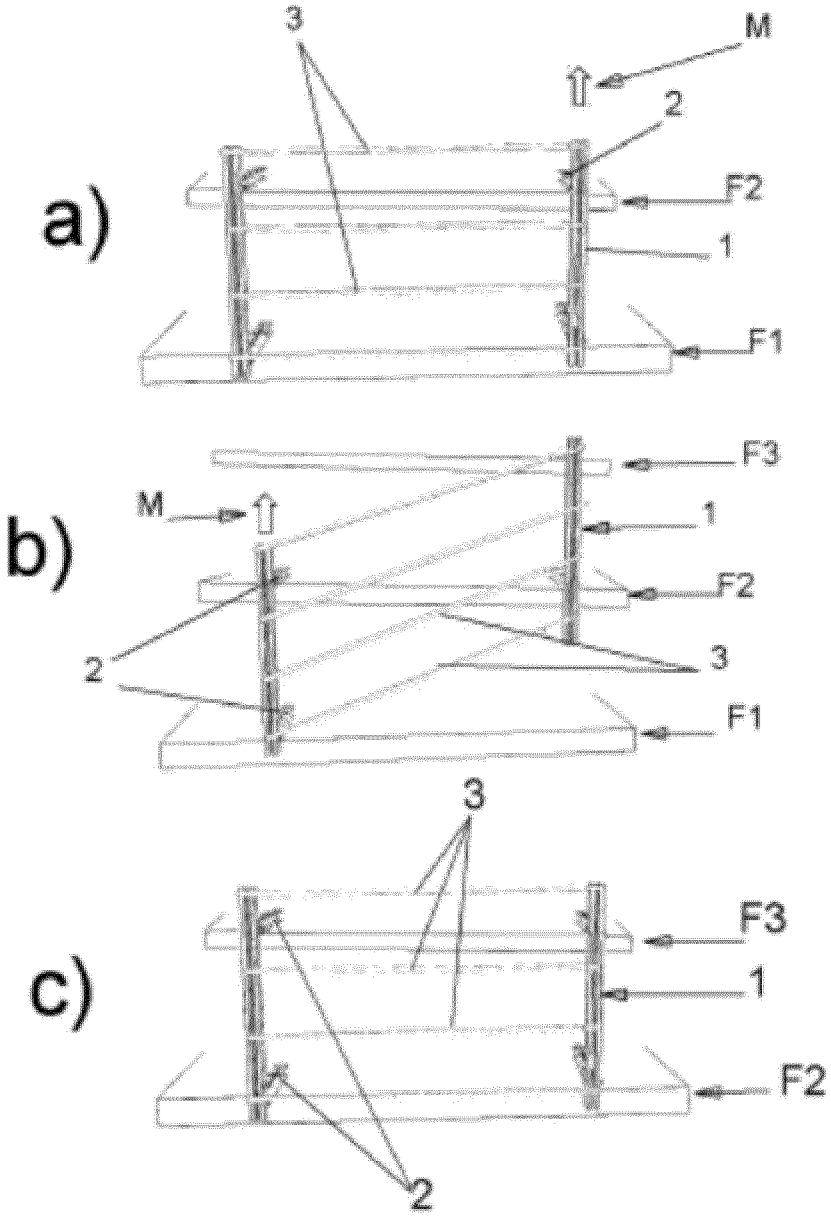
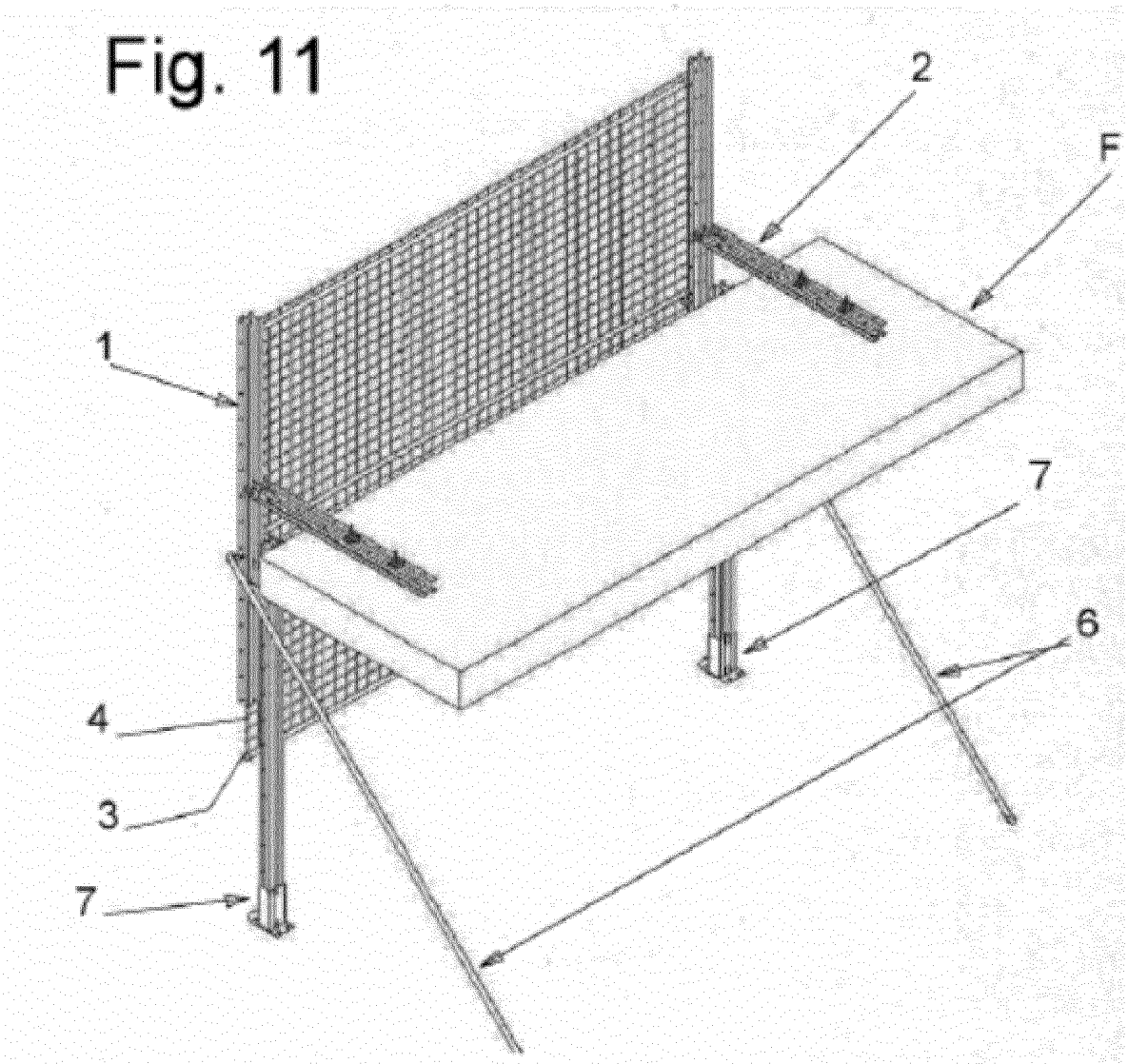


Fig. 11



INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2022/070801

A. CLASSIFICATION OF SUBJECT MATTER
INV. E04G21/32
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

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

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X	WO 01/53630 A1 (AXESS SYSTEMS LTD CONST [GB]; HUME JAMES [GB]; LEAF STEPHEN [GB]) 26 July 2001 (2001-07-26) pages 2-9; figures 1-11	1,2,5-7
X	DE 21 63 110 A1 (STREIF OHG) 5 July 1973 (1973-07-05) the whole document	1
A	GB 2 465 985 A (SGB SERVICES LTD [GB]) 9 June 2010 (2010-06-09) figures 2-5	7

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
5 April 2023	18/04/2023

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). 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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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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- EP 2325416 A1 **[0005]**
- WO 2020019092 A1 **[0005]**
- ES 2662066 T3 **[0009]**