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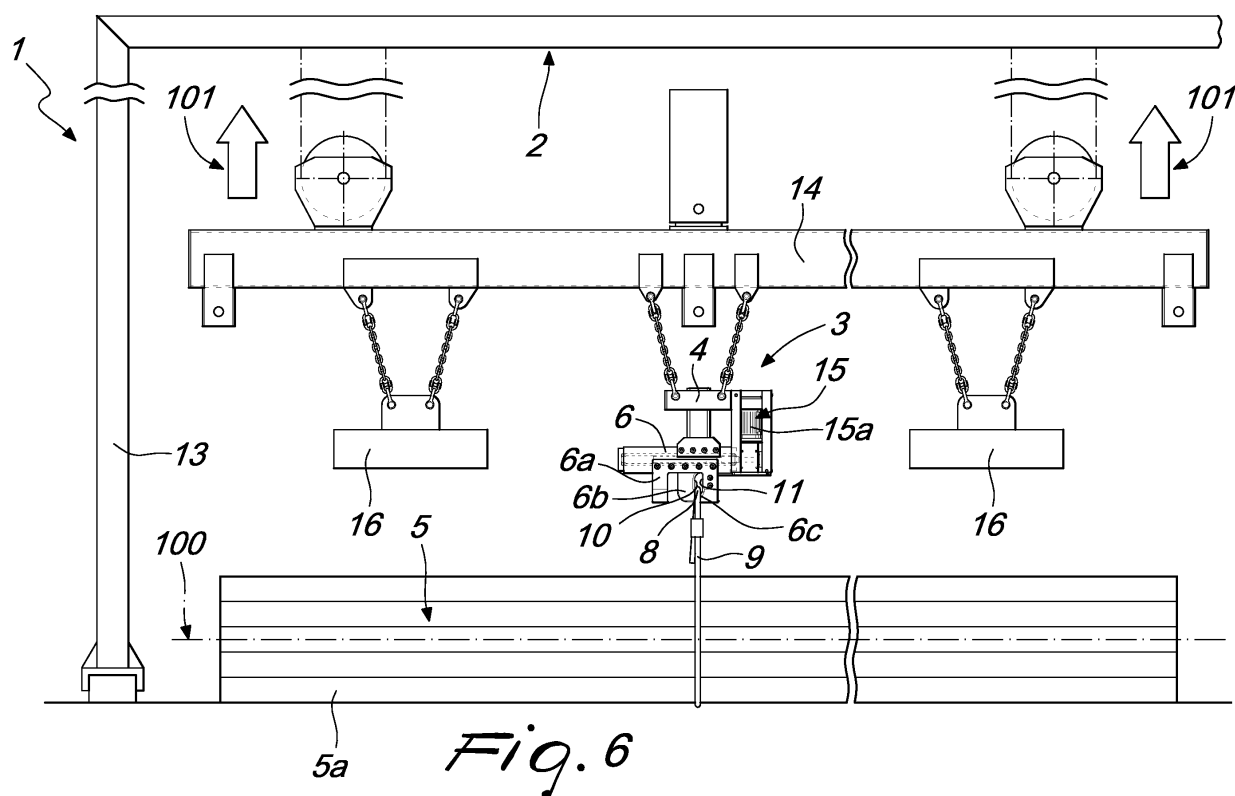
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(54) **Device for handling bundles of profiles such as beams, I-beams, pipes and the like**

(57) A handling device (1) comprising a supporting frame (2) which supports grip means (3) that can engage at least one body (5) to be moved and can move with respect to the supporting frame (2) along at least one handling direction; the grip means (3) comprise at least one lifting body (4), which has at least one anchoring element (6) that is adapted to pass on command between

an engagement condition, in which it forms an access seat (7) for an engagement portion (8) of a respective lifting element supported by the body to be moved, and an active condition, in which the engagement portion (8) is accommodated stably at an engagement region (6c) formed by the anchoring element (6) in the active condition.



Description

[0001] The present invention relates to a device for handling bundles of profiles such as, for example, beams, I-beams, pipes and generally anything else that can be lifted by means of straps, cables, rings, chains, slings, hooks or the like.

[0002] Currently, the apparatuses normally used for handling profiles made of metal are substantially constituted by bridge crane structures which support, along the longitudinal extension of the bridge, two or more engagement apparatuses provided with anchoring means for a bundle of profiles or for the individual profile.

[0003] In order to move the individual profiles, electromagnets are normally used which are arranged so as to be mutually spaced along the longitudinal extension of the centrally pivoted lifting beam kinematically connected thereto and have a transverse dimension that is similar to the one of the bridge or of the beam.

[0004] The anchoring means used instead for moving the bundles of profiles are usually of two types: large magnetic lifters or hooks with retention noose or chain.

[0005] The main drawback of magnetic lifters is their large bulk, which compromises, at the practical level, the possibility to use, on the same bridge, also the electromagnets designed to handle single profiles.

[0006] Moreover, the bundles to be handled with magnetic lifters must anyway be wrapped beforehand by means of collars that must be sized so as to be capable of bearing the weight of the whole bundle.

[0007] Even hooks with retention noose or chain, despite being widely used, are not free from drawbacks.

[0008] In particular, in order to handle bundles with this method it is necessary to have a worker climb onto the stack of bundles in order to arrange the collars or chains, supported by the respective hook, around the bundle to be handled, allow the worker to climb off the stack, handle the bundle in order to move it into the desired position (usually constituted by another stack of bundles) and finally have the worker climb again onto this last stack in order to remove the collars.

[0009] More generally, the use of the hook entails that a person performs, on a respective stack, the operations for engagement and disengagement, with an obvious waste of time and a reduction in safety conditions.

[0010] It is clear that the operations described above, besides being laborious, are quite problematic as regards safety, because it is necessary to arrange for workers climbing onto and off stacks and in any case to perform operations proximate to movable devices.

[0011] The aim of the present invention is to eliminate, or at least reduce drastically, the drawbacks cited above in known type of handling device and in general to eliminate all manual activities connected to the use of a traditional hook.

[0012] Within this aim, an object of the present invention is to provide a device for handling, particularly but not exclusively, bundles of profiles that allows to use, on

the same bridge or on the same centrally pivoted lifting beam, also the electromagnets designed to handle single profiles.

[0013] Another object of the present invention is to allow, in a reduced time and with a limited number of operations, the handling of the bundles of profiles, or anything else that can be lifted by means of straps, cables, rings, chains coupled to hooks, eliminating in practice the need for intervention on the part of workers.

[0014] Another object of the present invention is to provide a device for handling bundles of profiles that has a competitive production cost, so that its use is advantageous also from the economic standpoint.

[0015] This aim and these and other objects that will become better apparent hereinafter are achieved by a handling device comprising a supporting frame which supports grip means that can engage at least one body to be moved and can move with respect to said supporting frame along at least one handling direction, **characterized in that** said grip means comprise at least one lifting body, which has at least one anchoring element that is adapted to pass on command between an engagement condition, in which it forms an access seat for an engagement portion of a respective lifting element supported by said body to be moved, and an active condition, in which said engagement portion is accommodated stably at an engagement region formed by said anchoring element in said active condition.

[0016] Further characteristics and advantages of the invention will become better apparent from the following detailed description of some preferred but not exclusive embodiments of a handling device according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of an anchoring element used in the handling device according to the present invention;

Figure 2 is a front elevation view of the anchoring element of Figure 1;

Figure 3 is a side elevation view of the anchoring element of Figures 1 and 2;

Figure 4 is a sectional view, partially in phantom lines, of the anchoring element;

Figure 5 is a front view of a portion of the handling device with the anchoring elements in the engagement condition;

Figure 6 is a view, similar to the preceding one, with the engagement element in the active condition;

Figure 7 is a front elevation view of the handling device;

Figure 8 is a view, similar to the one in Figure 2, in which the anchoring element is associated detachably with a hook.

[0017] In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different

characteristics that exist in other exemplary embodiments.

[0018] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0019] With reference to the figures, a device for handling, particularly but non exclusively, bundles of profiles, generally designated by the reference numeral 1, comprises a supporting frame 2 which supports grip means 3 that can engage at least one body 5 to be moved.

[0020] By way of example, as shown in Figures 5 to 7, the body 5 to be moved may be constituted by a bundle of profiles 5a; nothing forbids, of course, to use the handling device 1 to move beams, I-beams, pipes and, more generally, anything else that can be lifted by means of straps, cables, rings, chains, slings, hooks or similar elements.

[0021] The grip means 3 can be moved, advantageously on command, with respect to the supporting frame 2 along at least one movement direction.

[0022] According to the present invention, the grip means 3 comprise at least one lifting body 4.

[0023] If the body 5 to be moved is constituted by a bundle of profiles 5a, the handling device 1 has, advantageously, at least two lifting bodies 4, which are mutually spaced along the direction 100 of extension of the bundle of profiles 5a to be moved.

[0024] Each lifting body 4 has an anchoring element 6 that is adapted to pass, on command, between an engagement condition (shown in broken lines in Figures 1 and 2), in which it forms an access seat 7 for a respective lifting element supported by the body 5 to be moved, constituted for example by an engagement portion 8 of a respective collar 9 fitted around the bundle of profiles 5a, and an active condition, in which the engagement portion 8 is accommodated stably at an engagement region 6c formed by the anchoring element 6 in the active condition.

[0025] Advantageously, the anchoring element 6 comprises at least one first body 6a and at least one second body 6b, which can move on command with respect to each other in order to pass between a first position, which corresponds to the engagement condition of the anchoring element 6, in which between the first body 6a and the second body 6b there is the access seat 7, and a second position, which corresponds to such active condition of the engagement element 6, in which respective abutment portions 11, 10 of the first body 6a and of the second body 6b cooperate in order to provide a closed loop 12 that forms the engagement region 6c.

[0026] According to a practical embodiment, the supporting frame 2 is constituted by a bridge crane structure 13, which can be moved on command with respect to a stack of bundles 5a to be moved or more generally with respect to the bodies 5 to be moved.

[0027] Of course it is clear that the supporting frame 2 can also be constituted by a movable arm or by a crane

structure that supports the lifting body or bodies 4.

[0028] With reference to the embodiment shown in the figures, the bridge crane structure 13 supports at least one beam 14, which in turn supports the grip means 3.

[0029] In this regard, it is possible to provide supporting chains that connect the lifting bodies to the beam 14.

[0030] However, nothing forbids to support directly the lifting bodies 4 with hooks 20 (as shown in the embodiment shown in Figure 8) which are normally used supported by the beam 14 and usually used to lift by means of chains or cables the bodies 5 to be moved. In this specific case, the lifting body 4 according to the invention may be used as an optional device of traditional handling devices.

[0031] In particular, the lifting body 4 is mounted, as under-hook equipment, in a mobile solution. This solution shows that the invention can always replace a classic hook slinging system, regardless of the load to be lifted (and thus regardless of its first practical application in the steel-working field).

[0032] The beam 14 can be moved, on command, with respect to the bridge crane structure 13 along at least one substantially vertical direction (shown by the arrow 101).

[0033] Conveniently, the beam 14, or in any case in general the grip means 3, can also be moved along a direction that is substantially parallel to the direction of longitudinal extension 100 of the bundles of profiles 5a to be moved.

[0034] In greater detail, the anchoring elements 6 are provided with actuation means 15, which can be controlled remotely and are designed to move at least the second body 6b with respect to the first body 6a, in order to move the respective anchoring element 6 from the engagement condition to the active condition and vice versa.

[0035] By way of example, the actuation means 15 can be constituted by a motor 15a whose own output shaft is kinematically connected, for example by means of a worm screw, to a linear actuator designed to move the second body 6b along a respective handling direction.

[0036] These actuation means can be powered directly by the electric mains or by batteries carried directly by the lifting body 4.

[0037] In order to facilitate the engagement operations for the operator, the engagement element may be advantageously associated with image acquisition means (usually a video camera), which are adapted to view remotely the access seat 7 during the steps of relative movement between the engagement element 6 and the collar 9.

[0038] As an alternative, the device 1 can be provided with devices for recognizing the mutual position of the engagement element 6 and of the collar 9, constituted, for example, by respective transponders.

[0039] These mutual recognition devices can be associated with means for the automatic control of the actuation means 15.

[0040] According to a preferred embodiment, the first body 6a comprises at least one fixed lateral shoulder and the second body 6b comprises an L-shaped body.

[0041] The L-shaped body can be moved by the actuation means 15 toward/ away from the fixed lateral shoulder in order to form, in cooperation with it, respectively the engagement region 6c and the access seat 7.

[0042] The first body 6a may, as an alternative, be constituted by an inverted U-shaped body; in this case the second L-shaped body 6b can be moved between a first position, in which is arranged externally to the inverted U-shaped body in order to form the access seat 7, and a second position, in which it cooperates with one of the vertical elements that constitute the inverted U-shaped body in order to form the engagement region 6c and, in particular, the closed loop 12.

[0043] Advantageously, the inverted U-shaped body extends downward more than the second L-shaped body 6b: in this manner it is possible to rest the two lower regions of the inverted U-shaped body on the body to be moved in order to arrange the lifting element through the access seat 7.

[0044] At this point, when the second L-shaped body 6b is moved (in order to pass the engagement element 6 from the engagement condition to the active condition), it is spaced (and, in particular, raised) with respect to the body 5 to be moved, with the result of avoiding any jamming of the second body 6b or damage of the body 5 to be moved.

[0045] Advantageously, along the beam 14 there are electromagnets 16 designed to lift single profiles.

[0046] The electromagnets 16 can be arranged along the beam 14 so as to be alternated with the grip means 3.

[0047] This particular arrangement allows to move, in a completely automated manner, the single profiles (with the electromagnets 16) or the bundles of profiles by way of the actuation of the grip means 3.

[0048] The operation of the device for handling bundles of profiles according to the present invention is evident from what has been described above.

[0049] In particular, the operator controls the movement of the beam 14 in order to move a first engagement element 6 proximate to one of the collars 9 fitted around the bundle of profiles 5a to be moved.

[0050] In this step the engagement element 6 is in the engagement condition so as to form the access seat 7; the operator, with the optional aid of the video camera, moves the engagement element 6 with respect to the collar 9 so as to pass the engagement portion 8 of the collar 9 through the access seat. At this point one acts on the actuation means 15 in order to pass the engagement element 6 into the active condition, so that the engagement portion 8 of the collar 9 is accommodated stably in the engagement region 6c and in particular inside the closed loop 12.

[0051] The operator acts, in the same manner, on the other engagement element 6 and therefore moves the beam in a vertical direction in order to lift the bundle of

profiles 5a and the bridge crane to reach the destination region of the bundle.

[0052] All the characteristics of the invention mentioned above as advantageous, convenient or the like may be omitted or be replaced with equivalents.

[0053] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0054] In practice it has been found that in all its embodiments, the invention has achieved its intended aim and objects.

[0055] In particular, as shown in the figures, it is possible to move the bundles 5a without the need for an operator to climb onto the stacks of bundles 5a.

[0056] Moreover, the space occupations of the lifting bodies 4 are extremely reduced and also because of this it is possible to alternate with the lifting bodies 4 traditional electromagnets 16, to be used optionally to move the individual profiles.

[0057] In practice, the materials used, as well as the dimensions, may be any according to requirements.

[0058] All the details may further be replaced with other technically equivalent elements.

[0059] The disclosures in Italian Patent Application No. VR2009A000111, from which this application claims priority, are incorporated herein by 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

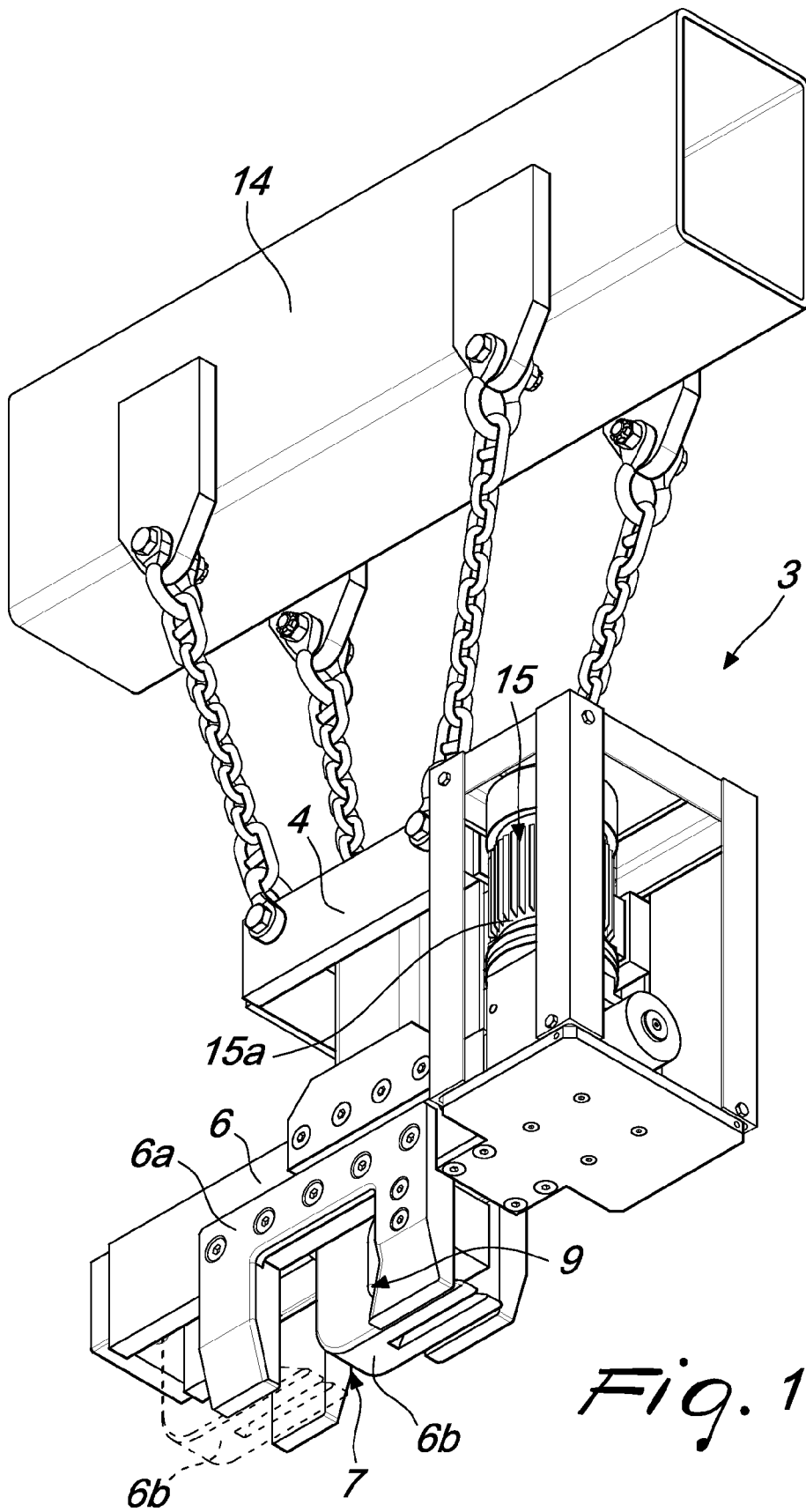
1. A device (1) for handling bundles of profiles and generally anything else that can be lifted by means of straps, cables, rings, chains or the like, comprising a supporting frame (2) which supports grip means (3) that can engage at least one body (5) to be moved and can move with respect to said supporting frame (2) along at least one handling direction, **characterized in that** said grip means (3) comprise at least one lifting body (4), which has at least one anchoring element (6) that is adapted to pass on command between an engagement condition, in which it forms an access seat (7) for an engagement portion (8) of a respective lifting element supported by said body to be moved, and an active condition, in which said engagement portion (8) is accommodated stably at an engagement region (6c) formed by said anchoring element (6) in said active condition.
2. The handling device (1) according to claim 1, **characterized in that** said anchoring element (6) comprises at least one first body (6a) and at least one

second body (6b), which can move on command with respect to each other in order to pass between a first position, which corresponds to said engagement condition of said anchoring element (6), in which between said first body (6a) and said second body (6b) there is said access seat (7), and a second position, which corresponds to said active condition of said engagement element (6), in which respective abutment portions (11, 10) of said first body (6a) and of said second body (6b) cooperate in order to provide a closed ring (12) that forms said engagement region (6c).

3. The handling device (1) according to one or more of the preceding claims, **characterized in that** said body to be moved (5) comprises a bundle of profiles (5a), said grip means (3) comprising at least two lifting bodies (4), which are mutually spaced along the longitudinal direction (100) of said bundle of profiles (5a) to be moved.
4. The handling device (1) according to one or more of the preceding claims, **characterized in that** said lifting element comprises a respective collar (9), which is fitted around said bundle of profiles (5a).
5. The handling device (1) according to one or more of the preceding claims, **characterized in that** said supporting frame (2) comprises a bridge crane structure (13), which can be moved on command with respect to a stack of bundles (5) to be handled.
6. The handling device (1) according to one or more of the preceding claims, **characterized in that** said bridge crane structure (13) supports at least one beam (14), which supports said grip means (3) and can be moved with respect to said bridge crane structure (13) along at least one substantially vertical direction (101).
7. The handling device (1) according to one or more of the preceding claims, **characterized in that** it comprises, along the extension of said beam (14), at least one electromagnet (16) designed to move a single profile (5a).
8. The handling device (1) according to one or more of the preceding claims, **characterized in that** said grip means (3) can move on command along a direction that is substantially parallel to the direction of longitudinal extension (100) of said bundle to be handled (5).
9. The handling device (1) according to one or more of the preceding claims, **characterized in that** said anchoring element (6) comprises actuation means (15), which can be controlled remotely and are designed to move at least said second body (6b) with

respect to said first body (6a), in order to move said anchoring element (6) from said engagement condition to said active condition and vice versa.

10. The handling device (1) according to one or more of the preceding claims, **characterized in that** said engagement element (6) comprises image acquisition means adapted to view remotely said access seat (7) during the steps for relative movement between said engagement element (6) and said collar (9).
11. The handling device (1) according to one or more of the preceding claims, **characterized in that** it comprises devices for recognizing the mutual position of said engagement element (6) and of said collar (9), said mutual recognition devices being associated with means for the automatic control of said actuation means (15).
12. The handling device (1) according to one or more of the preceding claims, **characterized in that** said first body (6a) comprises at least one lateral fixed shoulder and **in that** said second body (6b) comprises an L-shaped body, which can be moved by said actuation means (15) toward/away from said at least one fixed lateral shoulder in order to form, in cooperation with said at least one fixed lateral shoulder, respectively said engagement region (6c) and said access seat (7).
13. The handling device (1) according to one or more of the preceding claims, **characterized in that** said first body (6a) comprises an inverted U-shaped body and said second body (6b) comprises a L-shaped body, said inverted U-shaped body extending downward more than said second L-shaped body (6b).



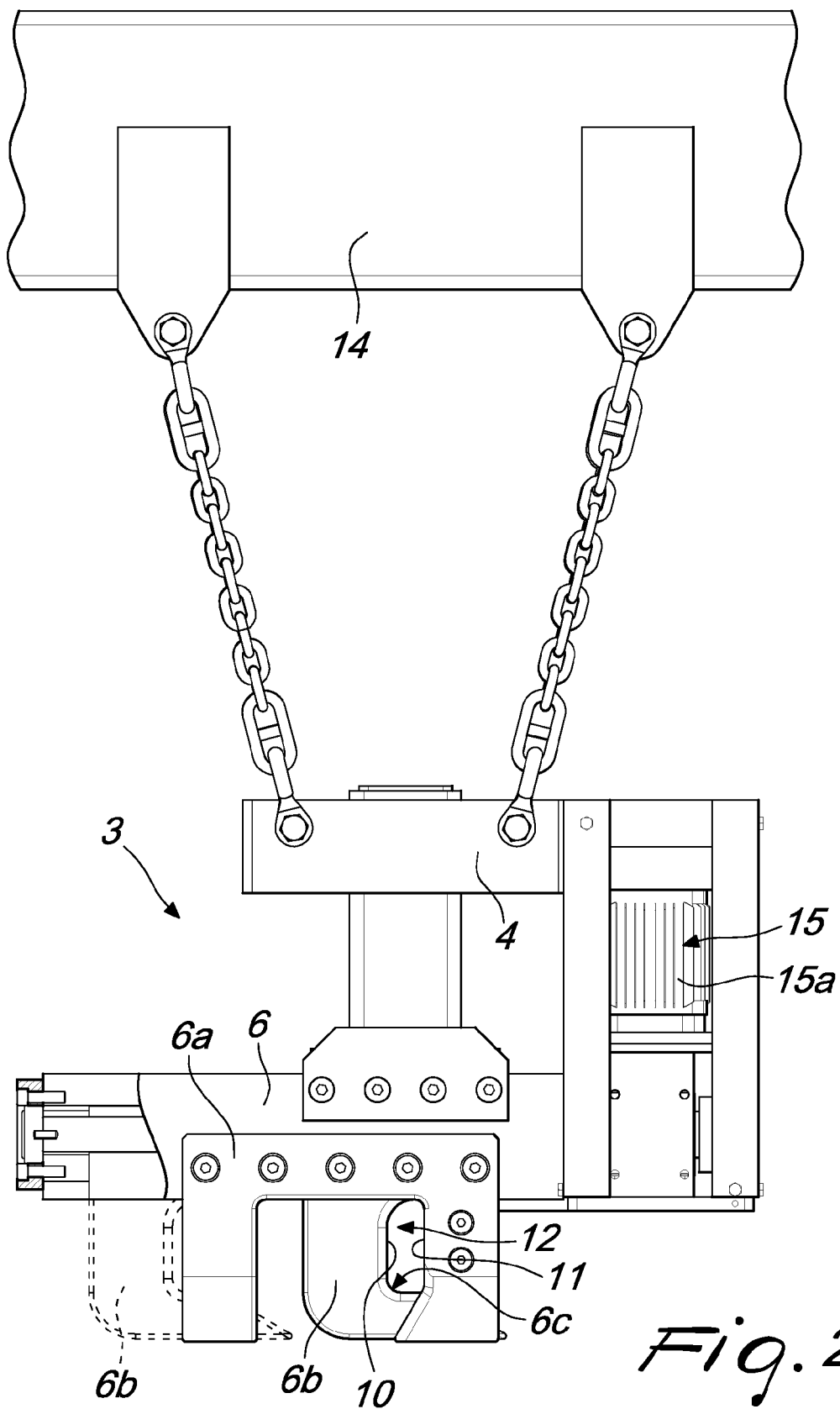
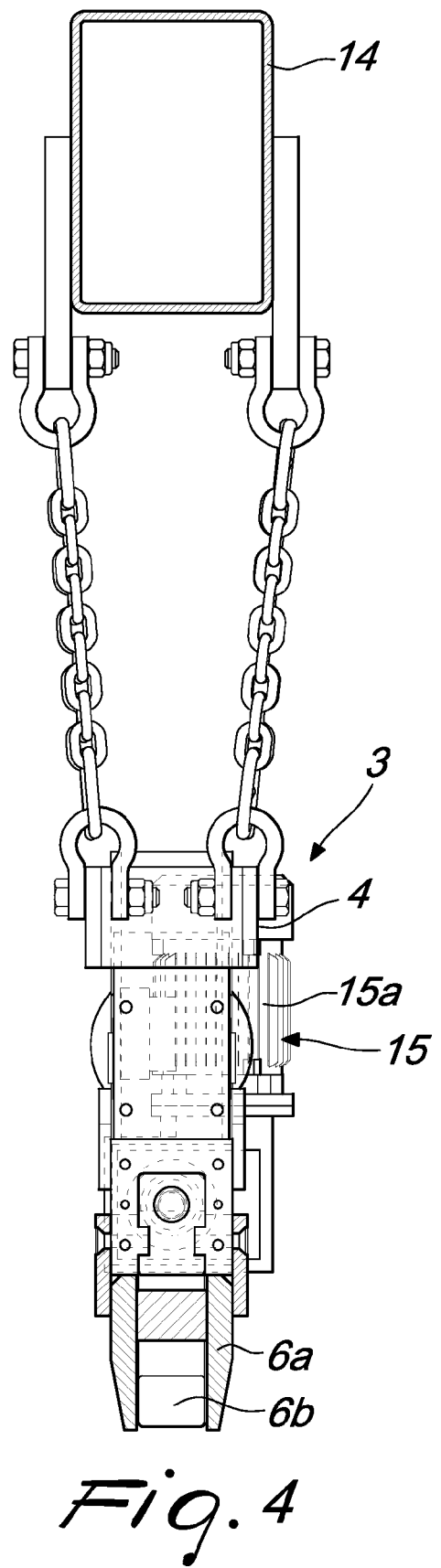
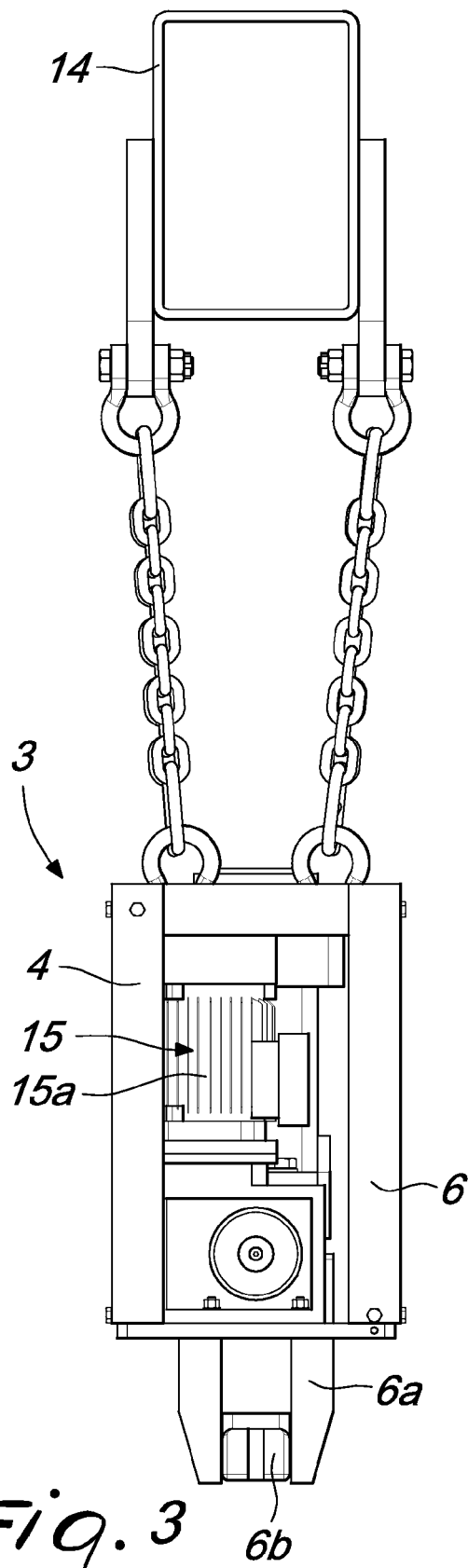
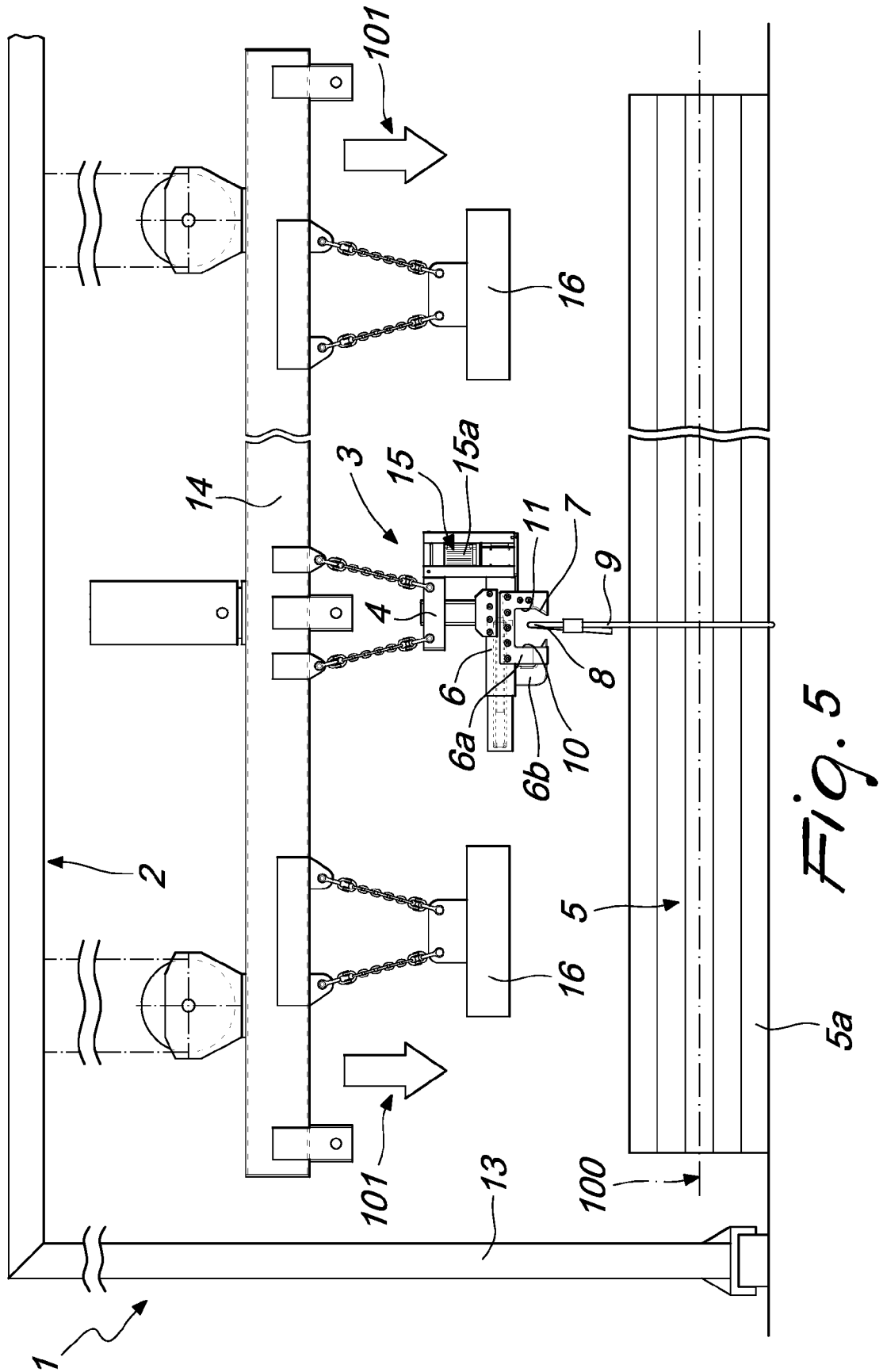
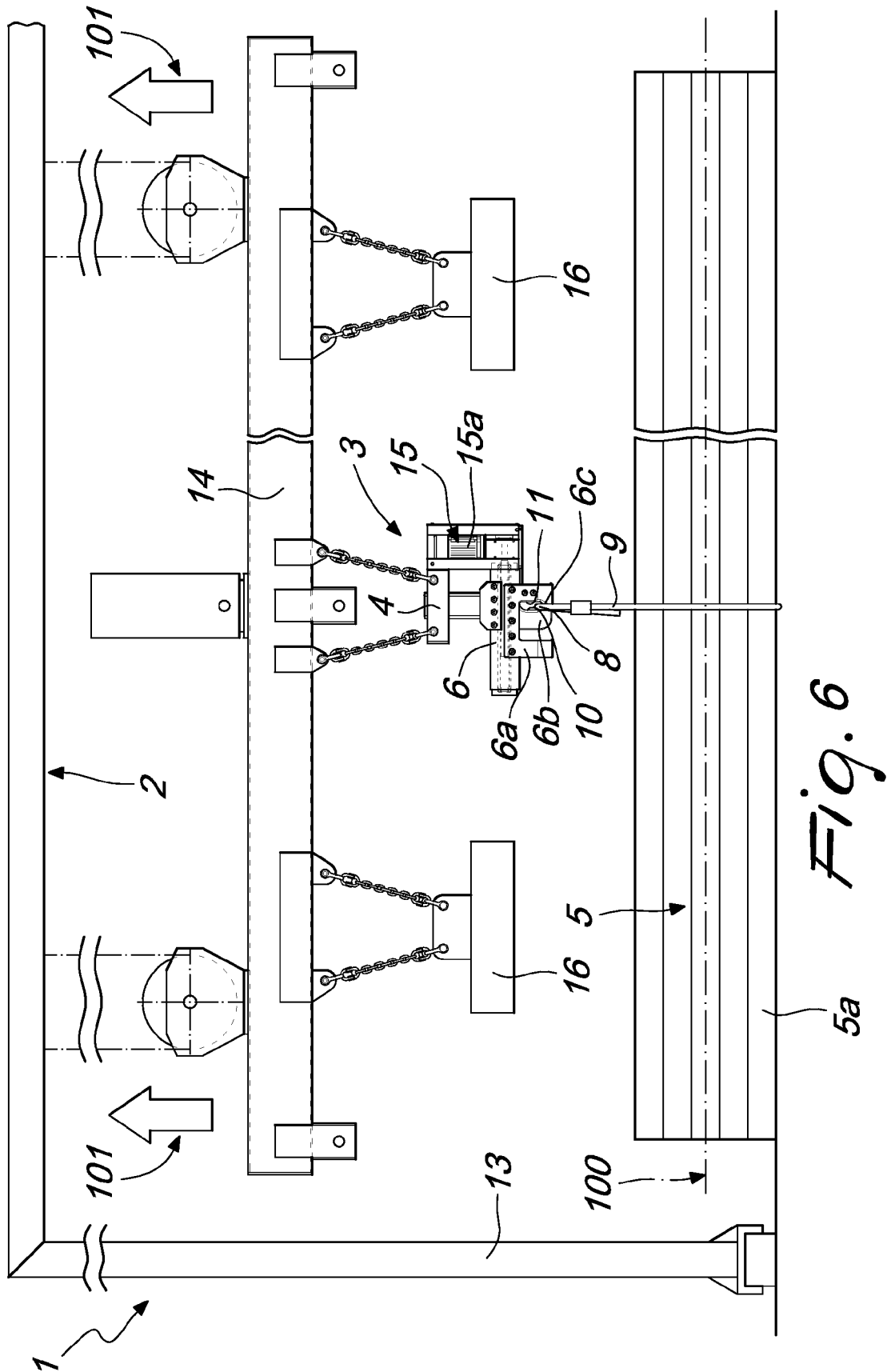


Fig. 2







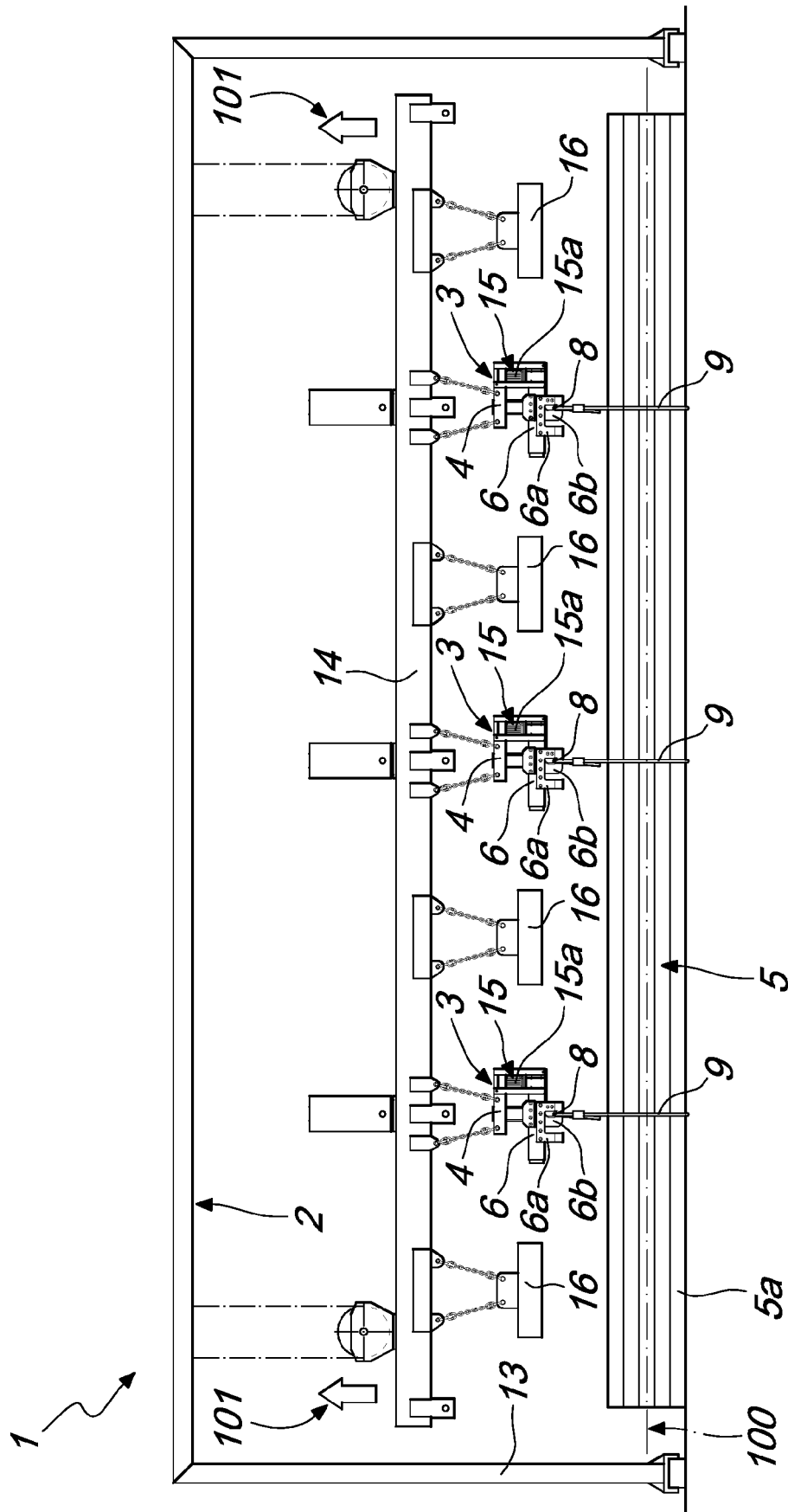
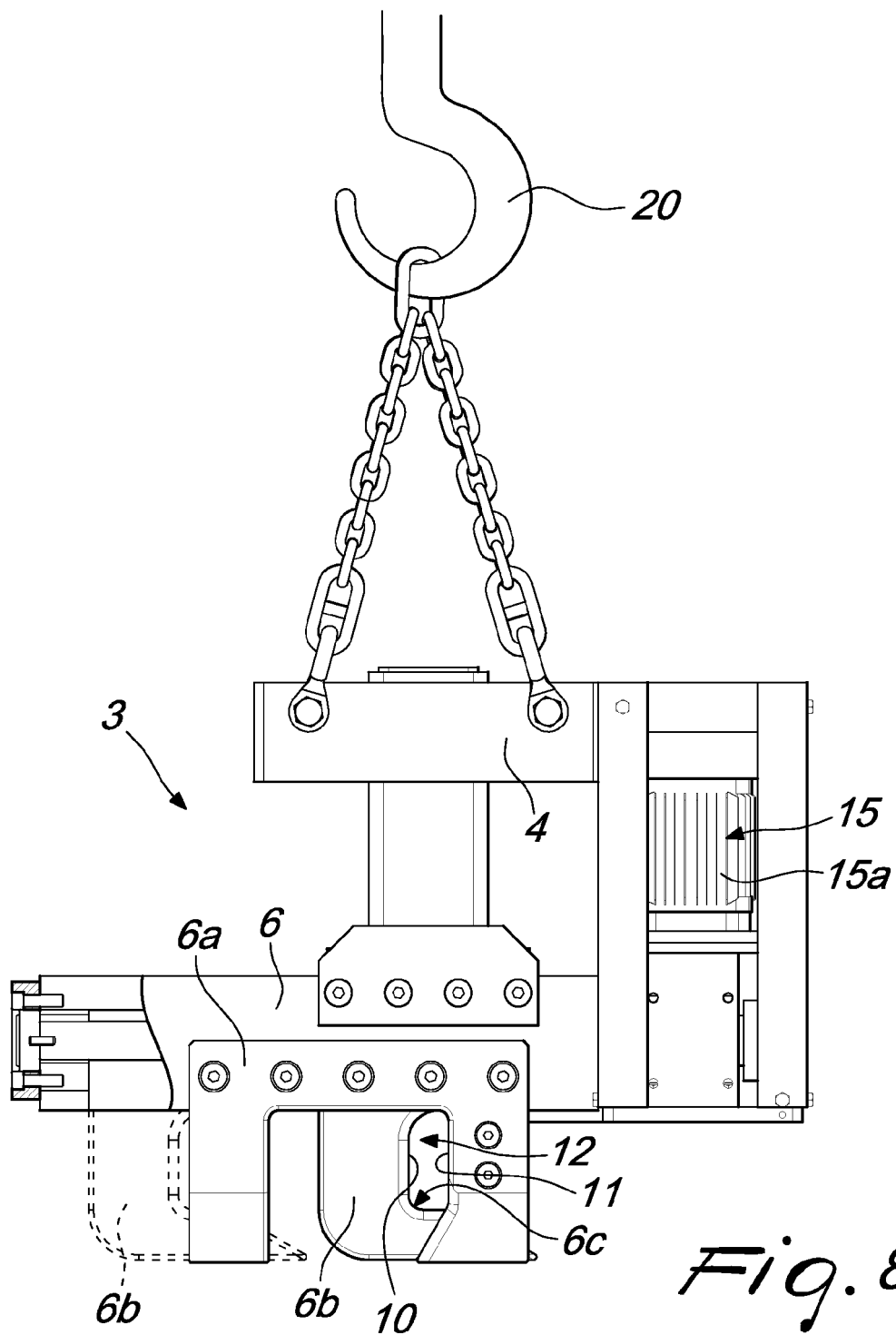


Fig. 7





EUROPEAN SEARCH REPORT

Application Number
EP 10 17 0450

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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