(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 293 467 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.03.2003 Bulletin 2003/12

(51) Int Cl.[7]: **B66C 1/48**, B66C 1/42, B66C 1/04, B21C 47/24

(21) Application number: **02020476.4**

(22) Date of filing: **12.09.2002**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **14.09.2001 IT MI20011932**

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(54) Grab for conveying coils of rod

(57) A grab (1) for lifting coils (7) of rod or the like, comprising a supporting structure (2) that is suitable to form an empty central region and engagement means (4) that are pivoted to the supporting structure (2) and are suitable to grip a coil (7) of rod in order to lift it, the engagement means (4) being actuated by tension elements (9) that allow to clamp the engagement means (4) on the coil (7) and subsequently lift it.

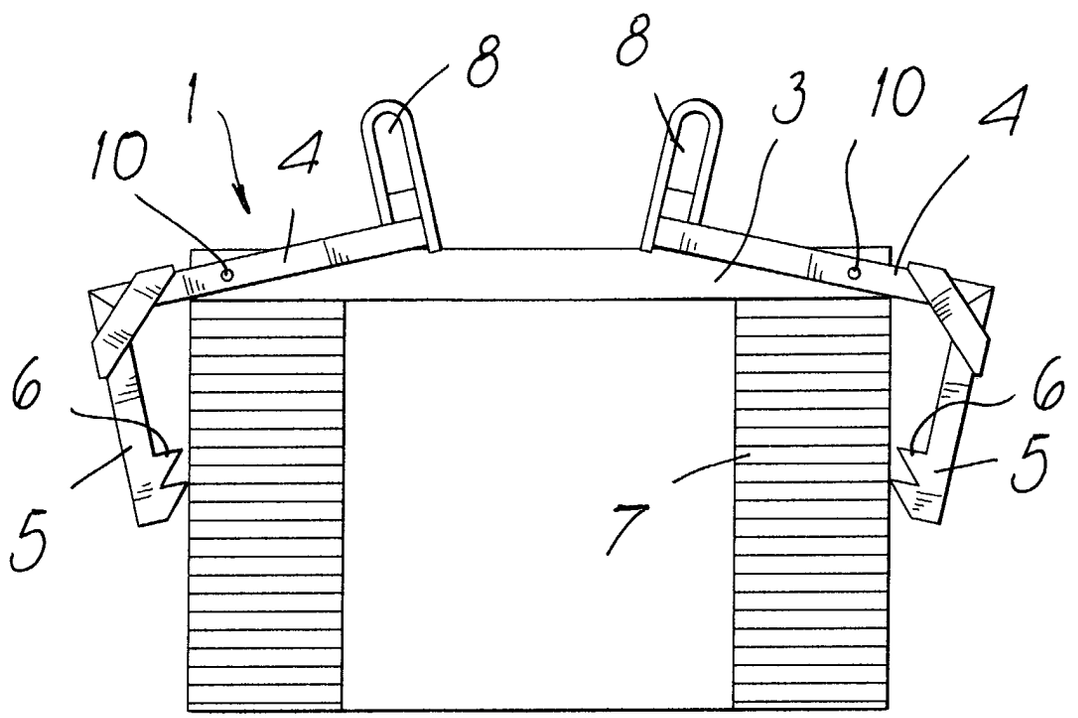

Fig. 1

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Description

[0001] The present invention relates to a grab for conveying coils of rod, particularly for conveying rod for reinforced concrete.

[0002] As is known, grabs or magnets are currently used to convey coils of rod and can be provided so as to grip the coil either on the outside or on the inside.

[0003] The coils gripped by the grabs or magnets must then be fitted on the reels, and to perform this operation it is necessary to use first the grab or magnet to lift the coil, then harness the coil with chains, lift it and then fit it over the reel.

[0004] These operations are due to the fact that the grabs or magnets that are used to lift the coil, owing to their structure, do not allow to fit the coil directly on the reel, indeed because the body of the grab is arranged at the central opening of the coil, in a position overlying said coil. In this manner it is substantially impossible to fit the coil on the reel because the reel would engage the body of the grab, thus preventing the coil from fitting over the reel.

[0005] The aim of the present invention is to provide a grab for conveying coils that allows to fit the coils directly on the reels once they have been lifted by the grab.

[0006] Within this aim, an object of the present invention is to provide a grab for conveying coils that can be used both to lift the coils from the outside and to lift the coils from the inside of the coil itself, without any constructive variation.

[0007] Another object of the present invention is to provide a grab for conveying coils that can be used with coils of different diameters.

[0008] Another object of the present invention is to provide a grab for conveying coils that is highly reliable, relatively simple to manufacture, and at competitive costs.

[0009] This aim and these and other objects that will become better apparent hereinafter are achieved by a grab for lifting coils of rod or the like, characterized in that it comprises a supporting structure that is suitable to form an empty central region and engagement means that are pivoted to said supporting structure and are suitable to grip a coil of rod in order to lift it, said engagement means being actuated by tension elements that allow to clamp said engagement means on said coil and subsequently lift it.

[0010] Further characteristics and advantages of the invention will become better apparent from the description of preferred but not exclusive embodiments of the grab according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a side elevation view of a first embodiment of the grab according to the present invention, in the active position;

Figure 2 is a side elevation view of a second embodiment of the grab according to the present invention, in the release mode;

Figure 2a is a side elevation view of the active position of the grab shown in Figure 2;

Figure 3 is a sectional view of a third embodiment of the grab according to the present invention, in the active condition;

Figure 4 is a top plan view of the grab of Figure 3;

Figure 5 is a sectional view of a fourth embodiment of the grab according to the present invention;

Figure 6 is a sectional view of a fifth embodiment of the grab according to the present invention;

Figure 7 is a sectional view of a sixth embodiment of the grab according to the present invention; and

Figure 8 is a sectional view of a variation of the first embodiment of the grab according to the present invention.

[0011] With reference to the figures cited above and initially to Figures 1 to 4, the grab according to the present invention, generally designated by the reference numeral 1, comprises a structure 2, which has for example a quadrilateral shape and is constituted by four rod-like elements 3 that are arranged with respect to each other so as to constitute a quadrilateral that is open at the center.

[0012] Engagement means are articulated to the quadrilateral structure, and each engagement means is conveniently constituted by a right-angled jaw 4 that has, at a vertical portion 5, grip means 6, constituted for example by teeth that are suitable to engage the coil of rod to be lifted, which is generally designated by the reference numeral 7.

[0013] Conveniently, there is at least one pair of jaws 4.

[0014] Conveniently, the engagement means 4, constituted by a pair of rod-like elements arranged at right angles to each other, are provided with coupling means 8 that allow the engagement of lifting means in order to achieve a rotation of the engagement means 4 about a point 10 for the pivoting of the engagement means to the rod-like elements 3 that constitute the previously described quadrilateral structure.

[0015] Substantially, as shown in Figures 1 and 3, the coupling means 8 allow the engagement of tension elements or chains 9, which allow, when conveniently subjected to traction, for example as shown by Figure 3 by means of a hook 11, to turn the engagement means 4 about their pivoting points 10, thus achieving the engagement of the teeth 6 against the outer surface of the coil 7 and therefore allowing to lift the entire coil.

[0016] The grab shown in Figures 1 and 3 can also be used to engage the coil internally instead of externally, as shown in Figures 2 and 2a.

[0017] In this case it is sufficient to reverse the orientation of the engagement means 4 about their pivoting point 10, so that the coupling means 8 are arranged out-

side the coil 7 instead of inside it, as shown in Figures 2 and 2a.

[0018] In both cases, it can be noted that the grab according to the invention is such as to leave the central region free, so that as shown in Figure 3 the coil 7 can be fitted easily over a reel 12 without said fitting being hindered by the structure of the grab.

[0019] Figure 4, which is a top plan view of the grab, clearly shows that the quadrilateral structure formed by the rod-like elements 3 allows to leave the central region suitable to be arranged above the coil 7, free to be fitted on the reel 12, so that the grab can be used to lift the coil 7 and then fit it directly onto the reel 12.

[0020] Preferably, the jaws 4 are provided at the corners of the quadrilateral and therefore there are four jaws that engage the coil 7 in positions that are diametrically opposite in pairs.

[0021] In another embodiment, shown in Figure 5, the quadrilateral structure formed by the rod-like elements 3 is replaced by a substantially annular supporting element 18, to which engagement means are pivoted; in this case, each one of said engagement means is conveniently constituted by an articulated parallelogram-like structure 19 that ends with two curved elongated portions 20 and 21 that are suitable to form a sort of tongs for gripping the coil 7.

[0022] Conveniently, one or more pairs of engagement means constituted as described above are provided.

[0023] In the case of Figure 5, the tension elements or chains 9 are connected directly to the articulated parallelogram structure 19 at the upper vertex of the structure, in the opposite position with respect to the curved extension elements 20 and 21 that constitute the tongs.

[0024] In this case also, as can be noted, the central region at the central cavity of the coil 7 is kept free, so that the grab according to the invention can pick up the coil 7 and fit it directly onto the reel 12 without any interference.

[0025] Figure 6 is a view of a fifth embodiment of the grab according to the present invention, wherein the engagement means are conveniently constituted by magnets 30 supported by a supporting structure 31 that is open centrally in order to allow the passage of the reel 12.

[0026] The electric or permanent magnets can be operated electrically or manually to allow attraction between the magnet and the coil of rod.

[0027] Furthermore, as regards the preceding embodiments, if the grab is provided by way of the grip means described above, it is possible to provide screens 32 that are supported by the supporting structure and are arranged parallel to the vertical extension of the coils of rod and externally thereto, so as to prevent the grip means from striking or jamming between the turns of the coils.

[0028] In practice it has been found that the grab according to the invention fully achieves the intended aim and objects, since it allows to lift and grip a coil 7 of rod and then directly place the coil on a reel 12, without having to harness the coil and remove the grab.

[0029] This is due to the particular structure of the grab according to the present invention, which keeps clear the central region between the jaws of the grab, so that the coil 7 can be fitted easily on the reel 12.

[0030] The very low height of the grab according to the present invention allows to use it even when the available height is limited.

[0031] The provision of a fixed structure inside which the grip arms, and particularly the jaws, retract allows to prevent them from interfering undesirably during maneuvering, causing awkward and dangerous situations.

[0032] The embodiment with a quadrilateral structure of the grab according to the present invention, as well as the structure with just two grip arms, is the most advantageous as regards ease of grab positioning. In the storage systems in which coils are placed, this embodiment in fact allows to insert the arms of the grab in the natural spaces that form, without having to space the coils in order to leave the space determined by the dimensions of said grab.

[0033] Figure 7, moreover, illustrates the use, in the grab according to the present invention, of a retention gear that allows to prevent the jaws of the grab from disengaging or engaging when this is not intended.

[0034] The retention device comprises a rod-like element 40, which is rigidly coupled to an upper ring 41, with which the coupling means 8 that allow the engagement of tension elements or chains are engaged. The rod-like element 40 is provided with a rack on which a gear 42 can mesh, said gear having a substantially L-shaped element 43 that abuts against a pivot 44 that is supported by an element 45 that protrudes at right angles to the rod-like element 40.

[0035] The gear 42 and the element 43 are rigidly coupled to an arm 45, which is in turn rigidly coupled to a ring 46 that is arranged substantially opposite to the upper ring 41 and is meant to rest on the coils of rod.

[0036] The operation of the retention device shown in Figure 7 is as follows.

[0037] When the upper ring 41 is moved upward by the action of the tension elements engaged with the coupling elements 8, the rod-like element 40 rises and the gear 42 does not mesh with the rack and the L-shaped element 43 that is pivoted to the gear 42 abuts against the pivot 44; accordingly, the upper ring 41 and the lower ring 46 are mutually coupled, thus allowing to lift the jaws.

[0038] In the opposite case, i.e., when the rod-like element 40 moves downward, the gear 42 meshes with the rack and the L-shaped element 43 overturns through 180°, disengaging the upper ring 41 from the lower ring 46. In this manner the jaws can engage the coils.

[0039] From this position, when the rod-like element 40 is again moved upward, the gear 42 is engaged

again, while when the rod-like element 40 is lowered again, the gear 42 meshes with the rack.

[0040] Finally, Figure 8 illustrates a variation of the first embodiment, in which identical reference numerals designate identical elements.

[0041] Said figure shows that each jaw, again designated by the reference numeral 4, is constituted by a vertical portion 5 that has at least one tooth 6, and the vertical portion is shaped like a right-angled lever and is pivoted, at one end 50, to a fixed point of the grab and, at the pivot 51, to an arm 52, to which an additional rod-like element 53 is in turn pivoted, the tension element being connected to such additional rod-like element.

[0042] In this case, traction on the tension element allows to grip the coil 7 by engagement of the tooth 6 with the coil, while the release of the tension element allows to turn the rod-like element 53 about the point where it is pivoted to a fixed point of the grab, thus allowing the consequent rotation, transmitted by the arm 52, of the right-angled lever constituted by the vertical portion 5. The rotation of the right-angled lever about the pivot 50 allows it to open and allows to release the coil 7.

[0043] The grab thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0044] Thus, for example, the grab according to the present invention can be provided with a suitable coupling for the prongs of a fork-lift truck that allows to use the grab even at sites that are not equipped with fixed lifting means.

[0045] All the details may furthermore be replaced with other technically equivalent elements.

[0046] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0047] The disclosures in Italian Patent Application No. MI2001A001932, from which this application claims priority, are incorporated herein by reference.

[0048] 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 scope of each element identified by way of example by such reference signs.

Claims

1. A grab for lifting coils of rod or the like, **characterized in that** it comprises a supporting structure that is suitable to form an empty central region and engagement means that are pivoted to said supporting structure and are suitable to grip a coil of rod in order to lift it, said engagement means being actuated by tension elements that allow to clamp said engagement means on said coil and subsequently lift it.

2. The grab according to claim 1, **characterized in that** said supporting structure comprises a quadrilateral structure that is formed by rod-like elements arranged so as to form an open central region, said engagement means being pivoted to said rod-like elements.

3. The grab according to claim 1, **characterized in that** each one of said engagement means comprises at least one jaw that is suitable to grip the outer or inner surface of said coil.

4. The grab according to one or more of the preceding claims, **characterized in that** said jaw is constituted by two arms arranged substantially at right angles, said tension element being connected to a first one of said arms, a second one of said arms being provided with locking means that are suitable to engage the external or internal surface of said coil.

5. The grab according to one or more of the preceding claims, **characterized in that** said locking means comprise at least one tooth that is suitable to engage the external or internal surface of said coil.

6. The grab according to one or more of the preceding claims, **characterized in that** said support is substantially annular and is suitable to form centrally an open region.

7. The grab according to one or more of the preceding claims, **characterized in that** said locking means comprise an articulated parallelogram structure that has two curved sides in order to form tongs for gripping said coil.

8. The grab according to one or more of the preceding claims, **characterized in that** said articulated parallelogram structure of said locking means is pivoted to said substantially annular supporting structure.

9. The grab according to one or more of the preceding claims, **characterized in that** it comprises at least one pair of locking means constituted by said articulated parallelogram structure.

10. The grab according to one or more of the preceding claims, **characterized in that** said free central region of said supporting structure is suitable to be fitted over a reel onto which said coil is to be fitted.

11. The grab according to claim 1, **characterized in that** said engagement means comprise electrical or permanent magnets that are suitable to lift said coil.

12. The grab according to one or more of the preceding claims, **characterized in that** it comprises protective screens that are supported by said supporting structure and are arranged substantially parallel to the vertical extension of the coils and externally thereto.

13. The grab according to one or more of the preceding claims, **characterized in that** it comprises a retention device that is connected between an upper ring, to which said coupling means are rigidly fixed, and a lower ring, which is designed to rest on the coils of rod, and to which said jaws are pivoted.

14. The grab according to claim 13, **characterized in that** said retention device comprises a rod-like element that is rigidly coupled to said upper ring, a rack formed on said rod-like element, and a gear that is suitable to engage said rod-like element and is provided with an L-shaped element pivoted thereto, said gear being connected to an arm that is rigidly coupled to said ring that is suitable to rest on the coils.

15. The grab according to claim 14, **characterized in that** said rod-like element is provided with an element that protrudes at right angles thereto and is provided with a pivot that is suitable to abut against said L-shaped element that is pivoted to said gear suitable to engage the rack of said rod-like element.

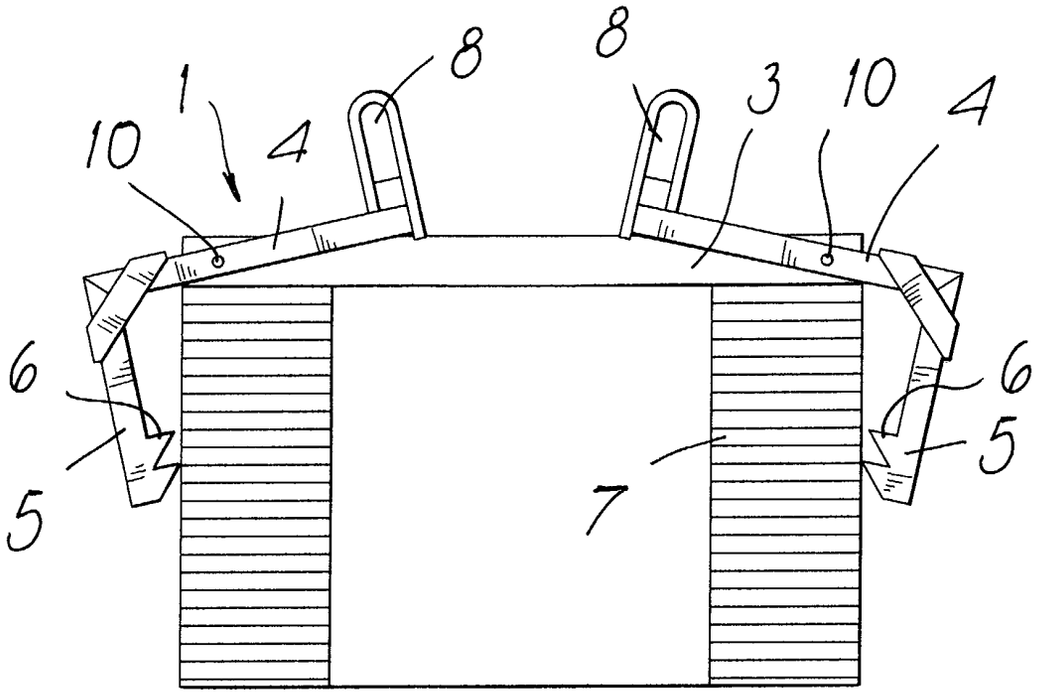

Fig. 1

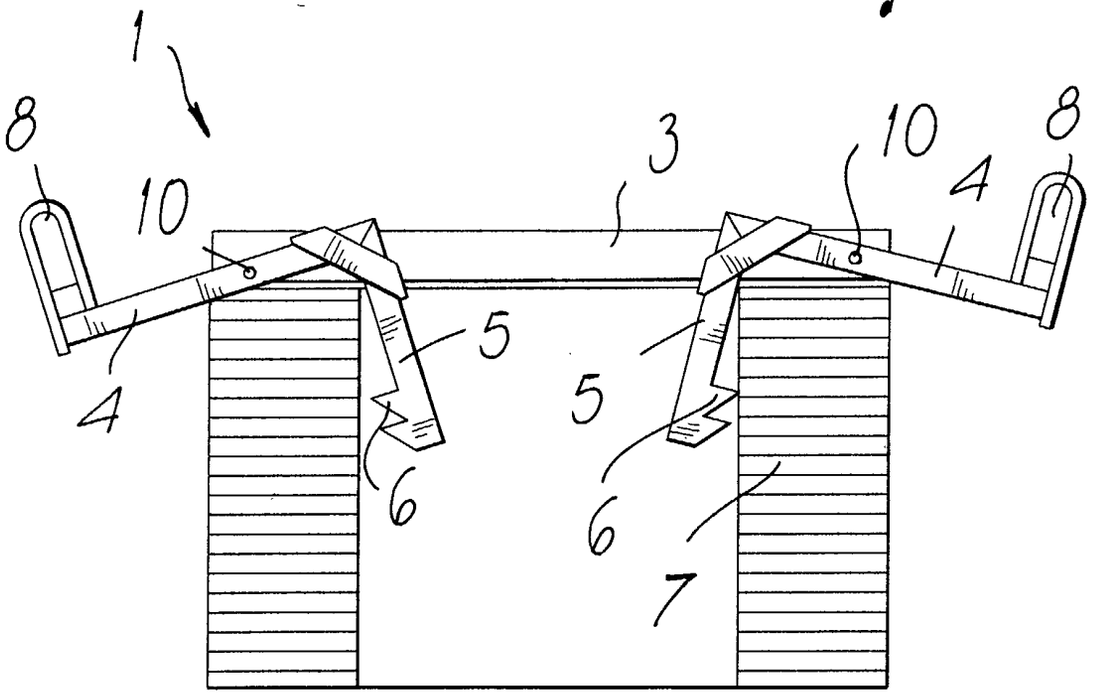

Fig. 2

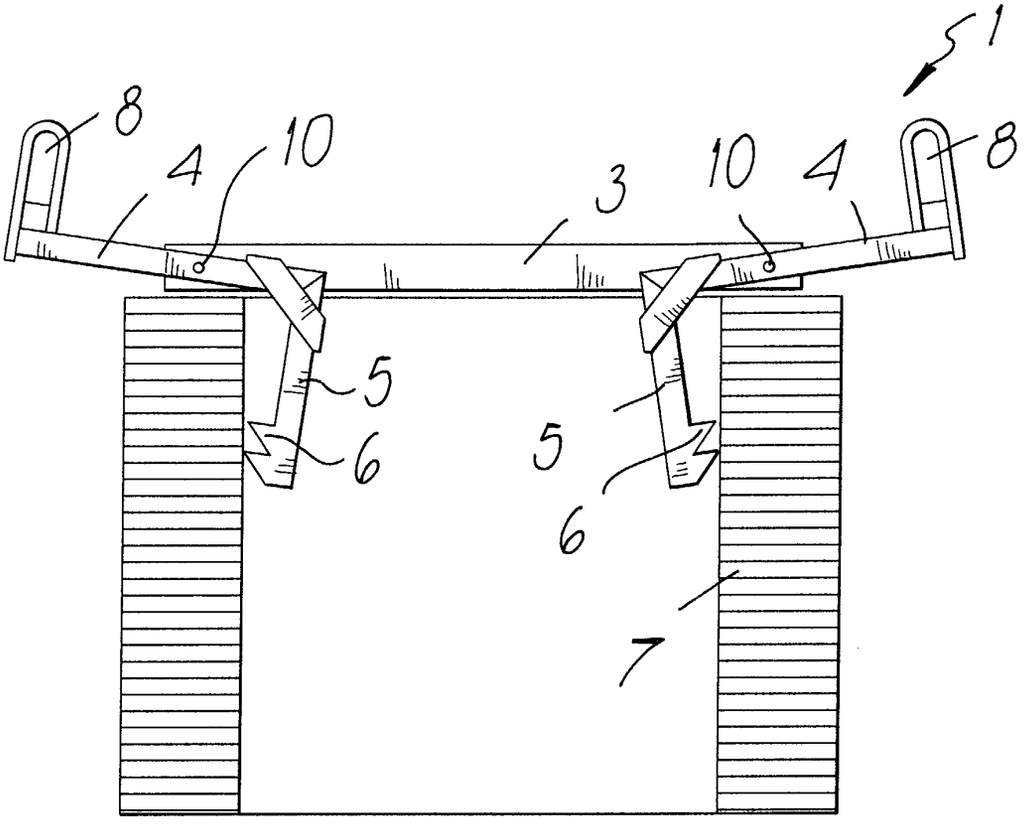

Fig. 2a

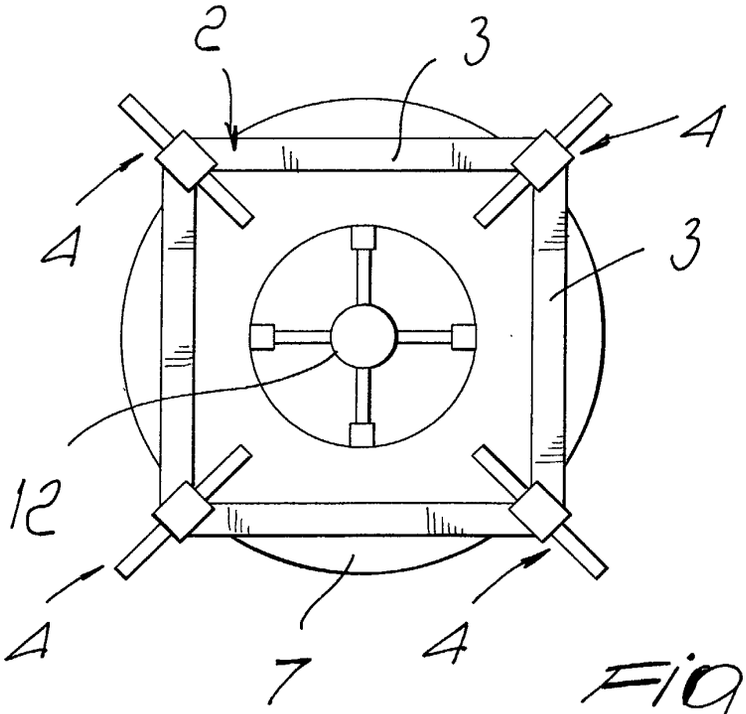

Fig. 4

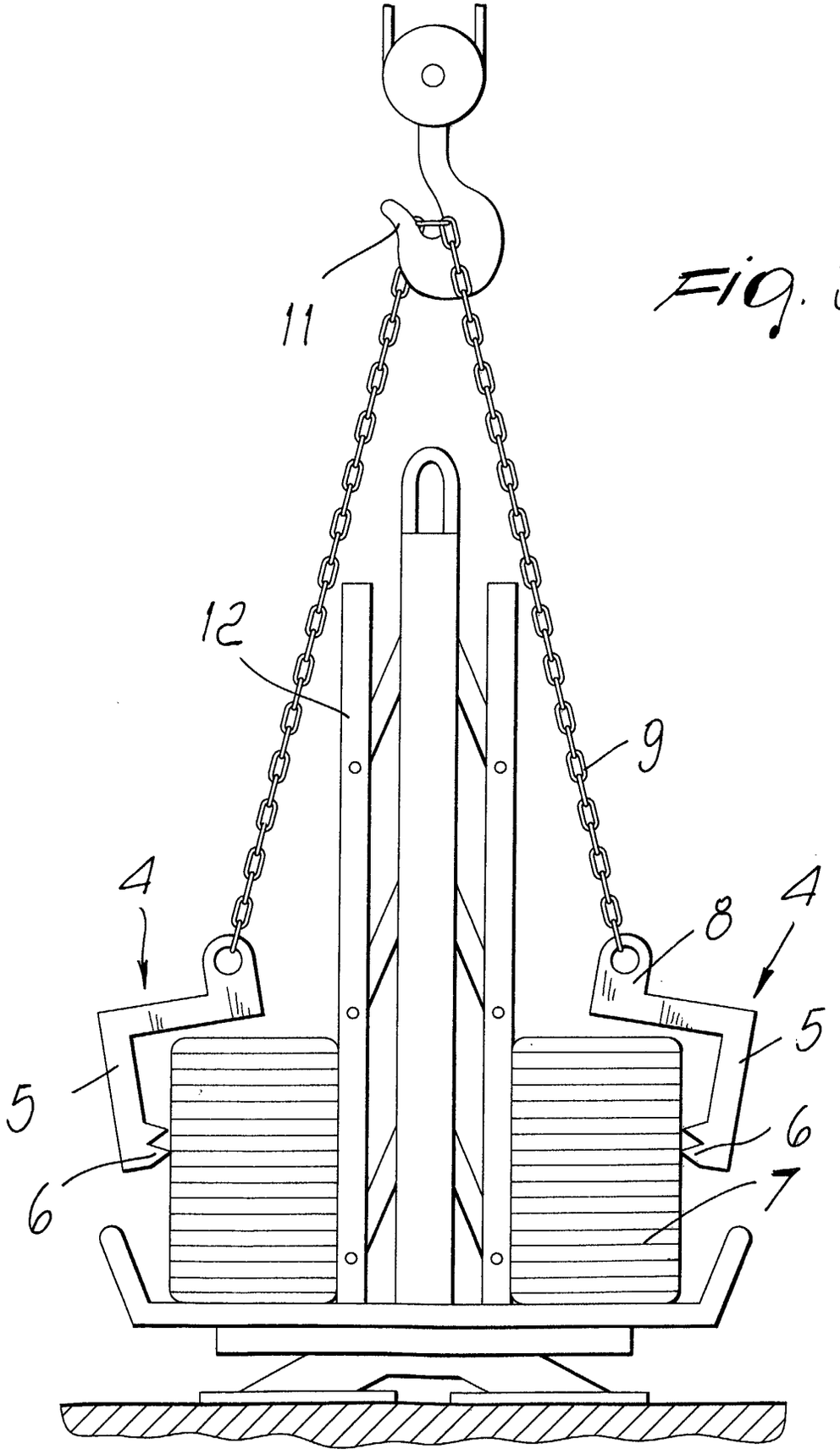

Fig. 3

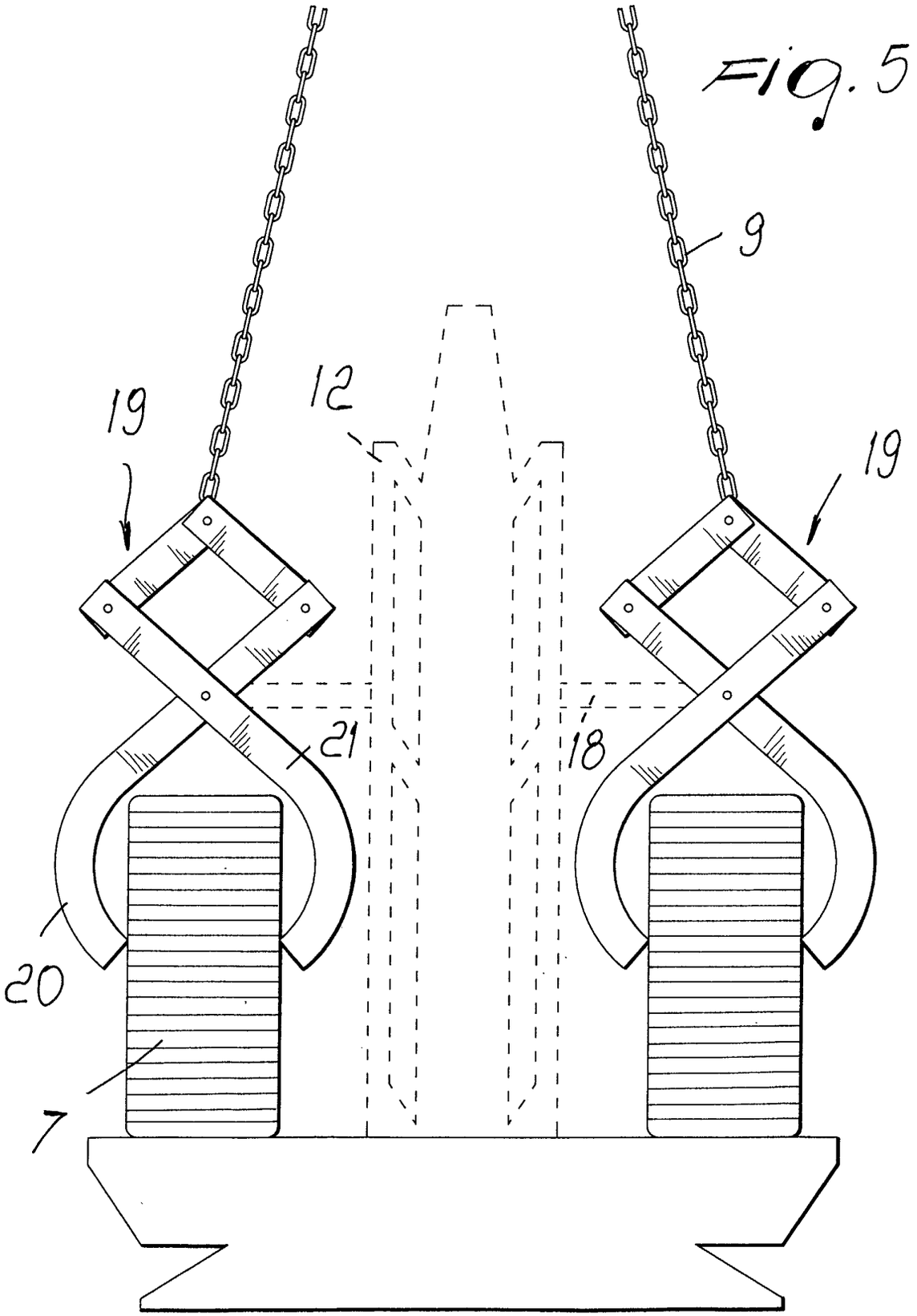

Fig. 5

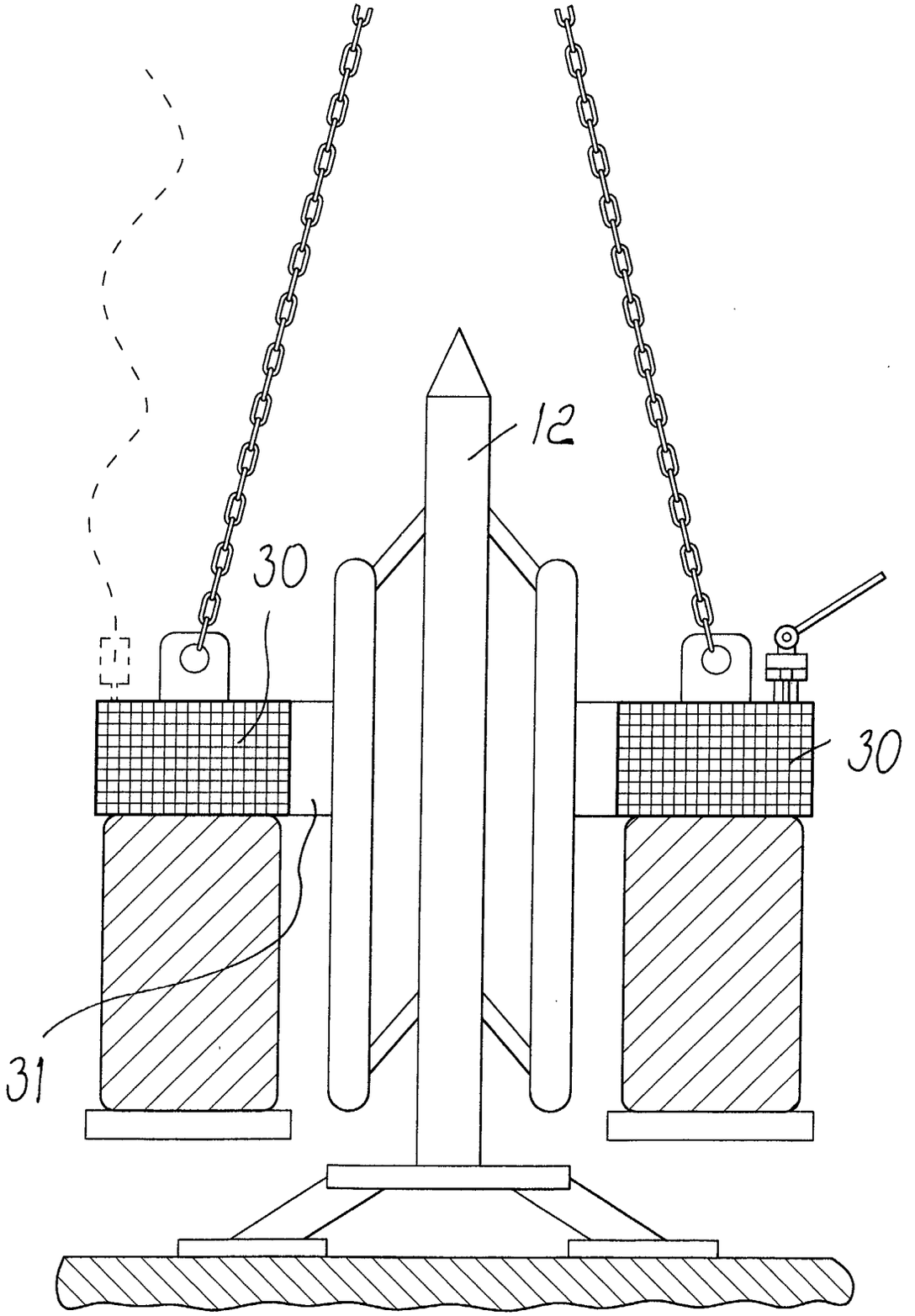

Fig. 6

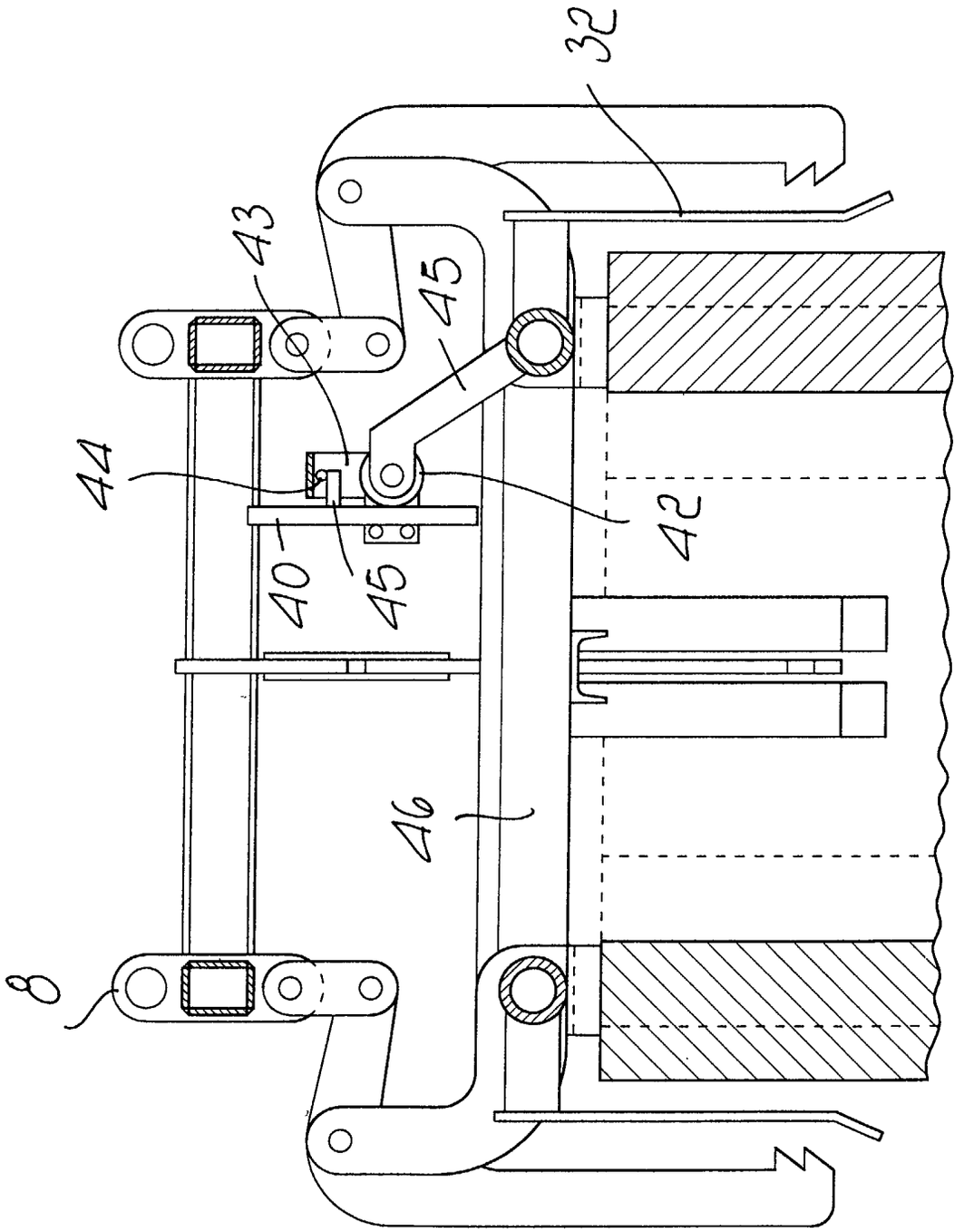

Fig. 7

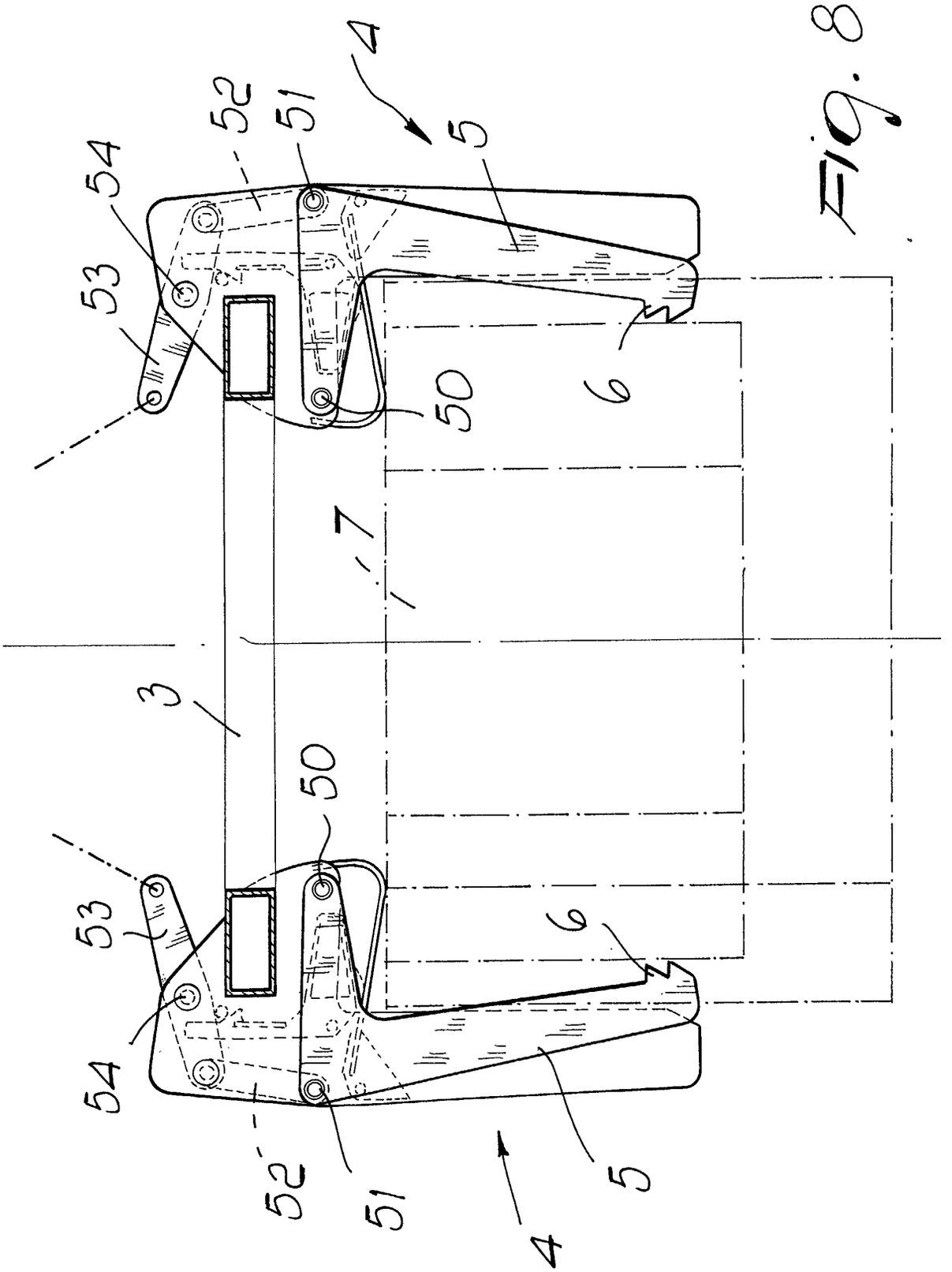

Fig. 8