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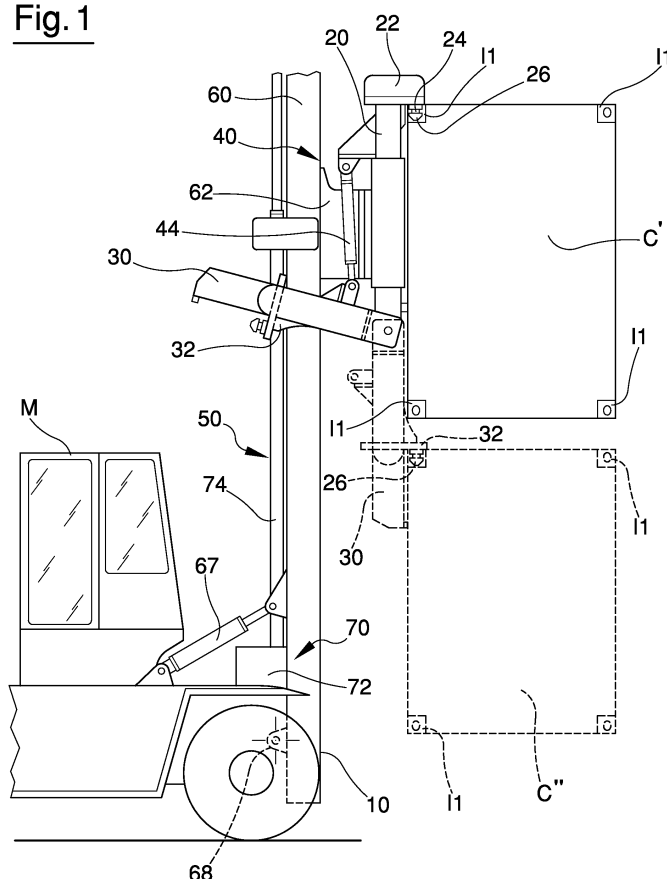
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(54) **Gripping device**

(57) A gripping device (1) for gripping substantially parallelepipedal containers (C); each container (C) presenting at the top respective first gripping interfaces (I1); the gripping device (1) comprising at least a first support

member (20) provided with respective first coupling means (22) arranged selectively to couple to an interface (I1) of a first container (C); second coupling means (32) being arranged selectively to couple to an interface (I1) of a further container (C).

Fig. 1



Description

[0001] The present invention relates to a gripping device for gripping containers for freight transport. In particular, the present invention relates to a gripping device for gripping containers for freight transport, comprising a coupling unit for coupling these containers. In more detail, the present invention relates to a gripping device for gripping containers for freight transport, comprising a coupling unit for coupling these containers, which can be installed on lift trucks or on transport means with similar function or of similar type.

BACKGROUND TO THE INVENTION

[0002] In the field of the long-distance freight transport the use of substantially parallelepipedal containers is well known; these containers are also internationally known as containers, and since a long time they have become standards, upon which the design of the so called cargo ships and of all the other road and rail transport means is based. It should be noted that the common characteristics of these containers are the metallic material with which they are produced, the elongated parallelepipedal shape and the cross section, the presence of at least an aperture in one of the respective transverse faces, which is usually closed by means of an hermetically sealed two - leaf door. Usually, the length of these containers is 20 feet, 40 feet or 45 feet, their height is comprised between 2.5 and 2.9 meters, their tare weight is comprised between 2.5 and 4.5 tons, their rating is comprised between 20 and 26 tons. These containers are handled by means of Cartesian cranes equipped with lifts provided with plates which can be magnetisable selectively or by means of mechanical devices provided with couplings which can be selectively actuated in order to interact with interfaces of the containers which are designed for gripping and are usually arranged at the vertices of the bottom face and of the upper face.

[0003] These mechanical devices are usually part of the equipment of lift trucks used in harbour warehouses. In particular, each above mentioned interface, more properly called "corner fitting" according to the industry terminology, is standardised according to the standard UNI 7012:1972 dated February 28, 1972, and therefore comprises a mechanical member obtained through welding along the edges of three portions of rectangular metal sheet on respective two adjacent sides so as to originate a substantially parallelepipedal body open on the three opposite faces so as to couple in a conjugated manner to the delimiting faces of each container at a respective vertex. For each portion of sheet, each corner fitting presents a slot which can be access transversely to the respective portion of sheet, so as to receive a suitably shaped coupling member. In particular, the horizontally oriented slot is shaped so as to receive the head of a pivot pin of a device internationally called, in the freight transport sector, with the specific English term twist-lock;

each vertex furthermore presents a front seat provided with an aperture shaped so as to house at the front a hook; and a retaining member usually comprising a pivot pin which prevents the relative motion between the hook and the seat, thus preventing the corresponding vertex of the container from being released. With particular reference to the mechanical element for the vertical coupling with the twist-lock, the aperture of the sheet presents elongated shape, for example, but without limitation, rectangular shape; the head of the pivot pin presents cross section of shape substantially conjugated to the shape of the aperture of the sheet, and longitudinal section which often presents isosceles trapezoidal shape. This combination of shapes allows initially to facilitate the axial insertion of the head and, subsequently, it allows the sheet to be coupled by means of a simple axial rotation of the pivot pin, and therefore it allows the coupling of the container. Actually, this operation allows to arrange in a transverse manner the axes of greater length of the pivot pin relative to that of the aperture of the housing, and therefore it allows to perform surely the coupling to the element which presents the corresponding housing.

[0004] The containers, due to their significant dimensions and rating, must be transported one at a time, using the above mentioned lift trucks, but it should be specified that, by using the gantry crane of the harbour warehouses it is possible to transport two containers longitudinally flanking each other. In view of the above description, significant problems can result from the swinging difficulties linked with the containers, which present extremely high moments of inertia even if they are empty. Therefore, it is obviously not recommended to produce lift trucks for transporting containers positioned side by side, analogously to what can be performed with the harbour cranes. The description above also applies to the transport of more empty containers, due to the numerous problems in controlling the inertial effects linked with the handling and due to the usually limited width of the apertures to be crossed.

[0005] In view of the above description, the problem of providing lifting devices for lift trucks which are able to transport more than one empty container at a time is currently unsolved, and represents an interesting challenge for the applicant. Furthermore, it should be specified that it would be desirable to have available an operating method, which allows to use gripping members of simple structure, if possible already known and tested, so as to minimise the costs for designing and testing the functionality of the device in its entirety. Furthermore, it should be noted that the purpose of this choice is to saturate the load capacity of each lift truck even when empty containers must be transported, whose rating is generally lower than the rating of a single fully loaded container, which, when transported singularly, does not allow to exploit the load capacity of each lift truck in an economically advantageous manner, and therefore to maximise the return on the investment made with its purchase and the man-

agement of the corresponding maintenance costs.

[0006] In view of the above description, it would be desirable to have available a gripping device for lift trucks which, in addition to enabling to limit and possibly to overcome the typical drawbacks of the prior art illustrated above, could define a new standard for these types of equipment in the container logistics and, more generally, in the transport of substantially rectangular bodies.

SUMMARY OF THE PRESENT INVENTION

[0007] The present invention relates to a gripping device for gripping containers for freight transport. In particular, the present invention relates to a gripping device for gripping containers for freight transport, comprising a coupling unit for coupling these containers. In more detail, the present invention relates to a gripping device for gripping containers for freight transport, comprising a coupling unit for coupling these containers, which can be installed on lift trucks or on transport means with similar function or of similar type.

[0008] The object of the present invention is to provide a gripping device for gripping containers for freight transport, which allows the disadvantages described above to be solved, and which is suitable to satisfy in an economically advantageous manner a plurality of requirements that to date have still not been addressed, and therefore suitable to represent a new and original source of economic interest, capable of modifying the current market of the logistics of the industrial environments and of the lift trucks.

[0009] According to the present invention, a gripping device is provided, whose main characteristics will be described in at least one of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Further characteristics and advantages of the gripping device according to the present invention will be more apparent from the description below, set forth with reference to the accompanying drawings, which illustrate at least one non-limiting example of embodiment, in which identical or corresponding parts of the device are identified by the same reference numbers. In particular:

- figure 1 is a side elevation view of a first preferred embodiment of the gripping device according to the present invention, installed on a lift truck;
- figure 2 is a view in enlarged scale and with some parts removed for the sake of clarity of figure 1;
- figure 3 is a front view of figure 1 in reduced scale and with some parts removed for the sake of clarity; and
- figure 4 is a side elevation view of a second preferred embodiment of figure 1.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0011] In figure 1, number 1 indicates, in its entirety, a gripping device for gripping containers C; these containers are also internationally known as containers, are substantially parallelepipedal, and are well known as they are particularly suitable for freight transport by means of cargo ships and all the other road and rail transport means. In particular, always with reference to figure 1, this device 1 is designed so as to be installed on a lift truck M for freight transport, even if it should be specified that, as it will be described more clearly below, the particular simplicity of the means used for allowing this installation makes the gripping device 1 suitable to be installed on any other transport means, suitable dimensioned to support a load of containers C.

[0012] It should be noted that each container C presents, at each vertex V, a first gripping interface I1, substantially equivalent to a corner fitting according to the above mentioned standard UNI 7012:1972, which presents a plurality of slots which can be access on three mutually orthogonal directions parallel to the sides of the container C and therefore accessible also from the top according to the vertical. Each interface I1 therefore presents a slot which can be access vertically in figure 1, designed so as to couple to a first gripping member 22 of the known type and therefore only partially illustrated, which is internationally named, in the freight transport sector, with the specific English term twist-lock. In particular, this first coupling member 22 presents a pivot pin 24, which is longitudinally delimited by a head 26 illustrated in a simplified manner and presenting elongated cross section at the axis of the pivot pin 24. The rotation of each pivot pin 24 can be controlled by means of the use of a rotary actuator, known and therefore not illustrated, which engages a box, visible in the attached figures 1 - 4, from which the pivot pin 24 projects. For the sake of simplicity of the description, this detail is not illustrated, and it is intended to be widely comprised in the known art.

[0013] In particular, the gripping device 1 comprises at least a first support member 20 provided, at the top in figure 1, with a respective twist-lock coupling member 22, and in particular, but without limiting the scope of protection of the present invention, from figure 3 it is clearly apparent that the gripping device 1 comprises two first support members 20, and therefore the twist-locks 22 are two, horizontally aligned in figure 3, as it will be better described hereunder. The gripping device 1 further comprises a second coupling member 32 of the twist-lock type, is supported by the first support member 20 and is designed so as to couple selectively to an interface I1 of a further container C' arranged below the first container C. In view of the above description it is easy to understand that the gripping device 1 allows to transport simultaneously a pair of containers C and C' mutually superimposed without any reciprocal contact and using gripping

members of simple conformation and with load capacity limited to only a single container, therefore of limited cost and respecting the maximum safety requirements. In particular, with reference to figure 1 again, the gripping device 1 comprises a second support member 30 actuated by means of a lever 30 pivoted to the first support member 20 around an axis 80, arranged at the opposite side to the coupling member 22. To this support member 30 a second coupling member 32 is coupled, which is substantially identical to the first coupling member 22, and which therefore comprises a so called twist-lock.

[0014] Furthermore, it should be noted that the gripping device 1 comprises an articulated group 40 designed to align selectively the first coupling member 22 and the second coupling member 32, in such a manner so as to allow the transport of at least two containers C and C' mutually superimposed with corresponding faces substantially parallel. In particular, the articulated group 40 comprises, for each first support member 20, a linear actuator 44 which connects the first support member 20 and the lever 30 in a position intermediate between the coupling means 22 and the axis 80, in order to cause alternate rotations of the lever 30 about the axis 80 measuring an angle of maximum width substantially approximating 105°. As shown in figure 1 and 2, this allows to tilt each second support member 30 backwards and in a position above the axis 80.

[0015] According to figure 1-3, the gripping device comprises a frame 10 which supports the first support member 20; this frame 10 presents an assembling group 50 designed for coupling with the lift truck M in a selectively swinging manner. This group 50 comprises at least an upright 60. Each upright 60 is coupled to the lift truck M by means of a rocker arm 67 and a hinge coupling 68. The rocker arm 67 presents adjustable length so as to adjust at will the inclination of the frame 10, and therefore the inclination of the containers C, which, in particular configurations of the frame 10, must follow the orientation of the uprights 60. In particular, each rocker arm 67 can be actuated by means of a linear actuator 67.

[0016] A slide 62 is associated with each upright 60, and is coupled to the upright 60 in a longitudinally movable manner.

[0017] Each slide 62 and the respective first support member are mutually coupled in a rigid manner. To at least an upright 60 an actuating group 70 is associated, which is connected to the slide 62 in such a manner that the first support member 20 can be longitudinally positioned at will along the upright 60. The actuating group 70 comprises a mover 72 of the rotatable type and an elongated actuating member 74, arranged parallel to the upright 60 and coupled in a worm manner to the slide 62.

[0018] With particular reference to figure 3, the frame 10 rigidly supports the first and second support members 20/30 by means of two uprights 60 flanking each other and connected at a given distance by means of at least a crossbeam 64 arranged between the uprights 60, and in particular a pair of crossbeams 64 connected to each

other in a longitudinally adjustable manner, so as to allow to position the first support member 20 and the lever 30, and therefore the corresponding first and second coupling members 22 and 32, at a transverse distance which can be defined at will so as to adapt to the longitudinal dimensions of the containers C and to provide the adequate distances between the heads 26 of the twist-locks 22 and 32, so as to couple the interfaces I1 of 20', 40' and / or 45' containers.

[0019] The use of the gripping device 1 is clearly apparent from the description above and requires no further explanations. However, it would be appropriate to specify that, in order to pick up a first container C, the actuating device 70 is actuated so as to configure the gripping device 1 with the slide 62 in lowered position; this allows to couple a first container C with the twist-locks 22, used by rotating axially the pivot pin 24 by 90°. As the slide 62 has been lifted from the floor by a sufficient height, in a known manner, the linear actuator 44 of the articulated group 40 can be actuated and therefore the lever 30 can be rotated so as to align the axes of the pivot pins 24 of each pairs of twist-locks 22 / 32 and align them parallel to the uprights 60. As the height of the slide 62 allows it, it will be possible to actuate the twist-locks 32 of the lever 30, so as to couple a second container C' in a manner substantially identical to that described above with reference to the first container C. At this point, the gripping device 1 picks up a pair of containers C and C' mutually superimposed but without contact.

[0020] Obviously, the use in combination of the two rocker arms 67 allows to incline at will the frame 10 relative to the fulcrum axis of the hinge couplings 68, and therefore to facilitate the gripping operations by means of the first and second coupling members, i.e. of the twist-locks 22 and 32.

[0021] Lastly, it is apparent that modifications and variants can be made to the gripping device 1 described and illustrated with reference to figures 1-3, without however departing from the protective scope of the present invention.

[0022] In particular, as the load capacity of each lift truck M exceeds at least three times the weight of a load formed by two containers C, it is possible to modify the gripping device 1 so as to exploit in a more efficient manner its load capacity and therefore to support and handle empty containers 3.

[0023] According to what is illustrated in figure 4, each interface I1 is shaped so that it can be access at the rear, or also at the front, by a hook 220 of a first coupling member 22 adequately modified, and presents a retaining member generally formed by a pivot pin, known and therefore not shown, which is suitable to avoid the relative motion between the hook 220 and a container C, so as to prevent the corresponding vertex of this container C from being released.

[0024] Furthermore, to each support member 20 a shoulder 222 is associated at the opposite side from the axis 80, so as to define a rear abutment in figure 4 for a

coupled container C.

[0025] In view of the above description, it is easy to understand that the problem of having available lifting devices for lift trucks which are able to transport more than one empty container at a time is originally solved by means of the present invention.

[0026] Furthermore, it should be noted the particular economic convenience of the second version of the gripping device 1, which, with a simplified equipment relative to that described with reference to the first version, allows to lift three containers C, C' and C'', as shown in figure 4. In particular, two containers C and C' will be mutually superimposed, and the container C'' will hang from a pair of twist-locks, and therefore with lower maintenance costs relative to the costs necessary for arranging a gripping device by applying by extension the same configuration of the first version, with reference to figures 1-3, and therefore by using three pairs of twist-locks.

[0027] In view of the above description it is clearly apparent that the gripping device 1 described above in the respective versions, corresponding respectively to the figures 1 - 3 and to figure 4, allows to transport more than one container at a time by using gripping members of simple conformation, already known and tested, and therefore at significantly low costs. This technical solution is particularly interesting in the cases in which these containers are empty; actually, in these cases it is clearly understood the desire to move two or more empty containers contemporaneously, so as to tend to saturate the load capacity of lift trucks usually suitable to load and transport masses much more significant than that of a single empty container.

Claims

1. A gripping device (1) for gripping substantially parallelepipedal containers (C) for lift trucks (M); each said container (C) presenting at the top respective first gripping interfaces (I1); said gripping device (1) comprising at least a first support member (20) provided with respective first coupling means (22) arranged selectively to couple to a said interface (I1) of a first said container (C); **characterised by** comprising second coupling means (32) supported by said first support member and arranged selectively to couple to a said interface (I1) of a further said container (C).
2. A gripping device according to claim 1, **characterised by** comprising a second support member (30) carried movable by said first support member (20), with which said second coupling means (32) are associated; articulated means (40) being provided for selectively aligning said first coupling means (22) and said second coupling means (32), in such a way so as to allow the transport of at least two containers (C) mutually superimposed with substantially paral-

lel corresponding faces.

3. A gripping device according to claim 2, **characterised in that** said articulated means (40) comprise, for each said first support member (20), a lever (30) pivoted to said first support member (20) around a given axis (80) at the opposite side to said first coupling means (22); said articulated means (40) further comprising a linear actuator (44) arranged between said first support member (20) in an intermediate position between said coupling means (22) and said axis (80) and said lever (30), in order to cause alternate rotations thereof around said axis (80).
4. A gripping device according to claim 3, **characterised in that** said second support member (30) comprises said lever (30); each said rotation measuring an angle of width substantially approximating 105°.
5. A gripping device according to claim 3 or 4, **characterised by** comprising a frame (10) which supports said first support member (20); said frame (10) presenting an assembling group (50) designed for coupling with said lift truck (M) in a selectively swinging manner.
6. A device according to claim 5, **characterised in that** said group (50) comprises at least an upright (60) to which a slide (62) is coupled in a longitudinally movable manner; said slide (62) and said first support member (20) being mutually coupled in a rigid manner.
7. A gripping device according to claim 6, **characterised by** comprising actuating means (70) connected to said slide (62) in such a way so that said first support member (20) can be longitudinally positioned at will along said upright (60).
8. A gripping device according to claim 7, **characterised in that** said actuating means (70) comprise a mover (72) of the rotatable type and an elongated actuating member (74), arranged parallel to said upright (60) and coupled in a worm manner to said slide (62).
9. A gripping device according to any one of claims 4-8, **characterised in that** said frame (10) rigidly supports said first and second support members (20) (30) by means of two uprights (60) flanking each other and connected at a given distance by at least a crossbeam (64) arranged between said uprights (60).
10. A gripping device according to any one of the previous claims, **characterised in that** said second coupling means (22) comprise a twist-lock unit (22) for each said second support member (20).

11. A gripping device according to claim 10, **characterised in that** said first coupling means (22) comprise a twist-lock unit (22) for each said first support member (20).

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12. A gripping device according to claim 10, **characterised in that** each said interface (11) is horizontally accessible; said first coupling means (22) comprising a hook (220) designed so as to couple to a said container (C), in a corresponding interface (11); each said first support member (22) presenting at the opposite side to said axis (80) at least a shoulder (222) suitable to define a lateral abutment for a said coupled container (C).

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13. A gripping device according to any one of claims 10-12, **characterised by** comprising two uprights (60) flanking each other and connected at a given distance by a pair of crossbeams (64) which can be connected to each other in a longitudinally adjustable manner in order to allow to position said first / second members (20)(30) at a transverse distance which can be defined at will based upon the longitudinal dimensions of said containers (C).

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Fig. 1

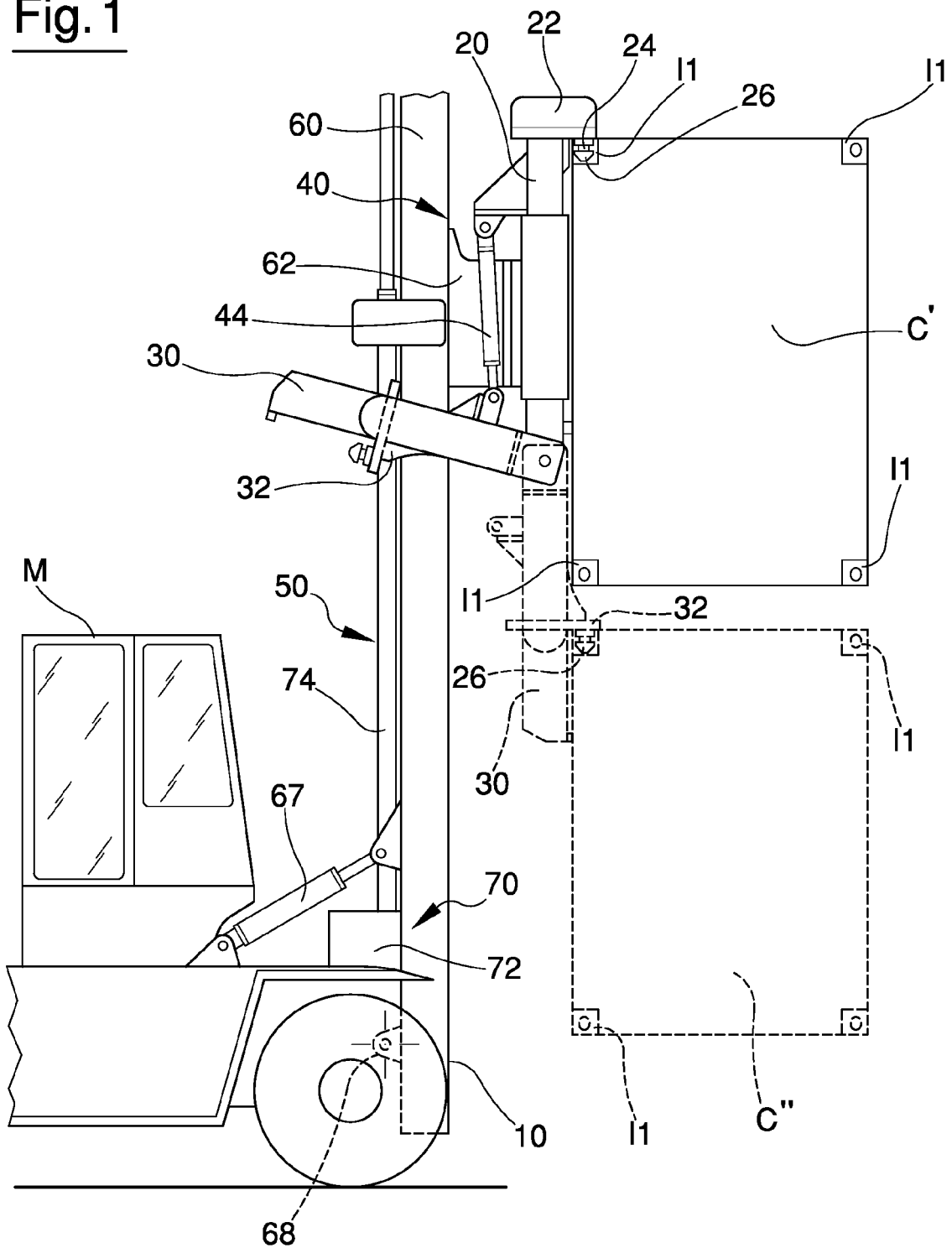


Fig. 2

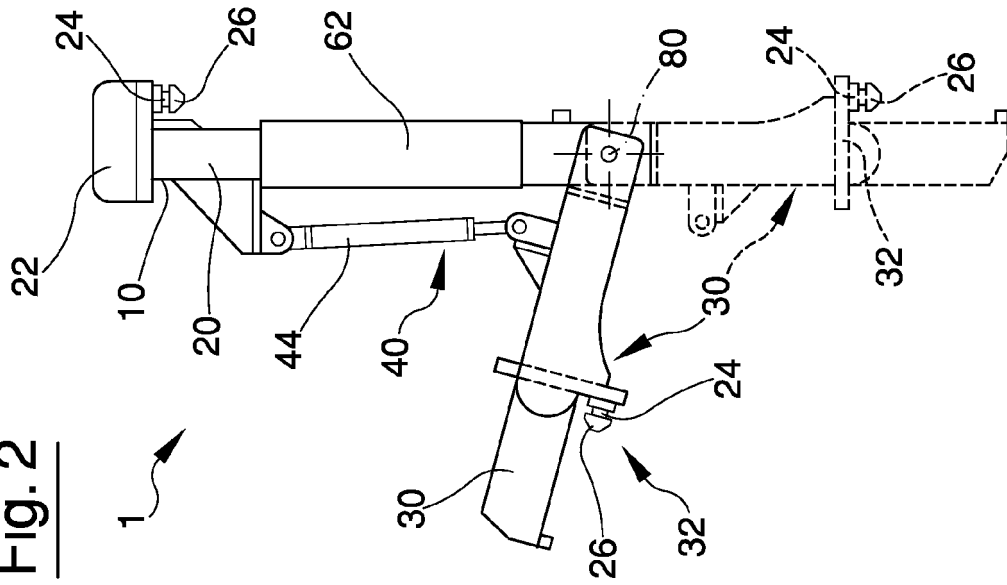


Fig. 3

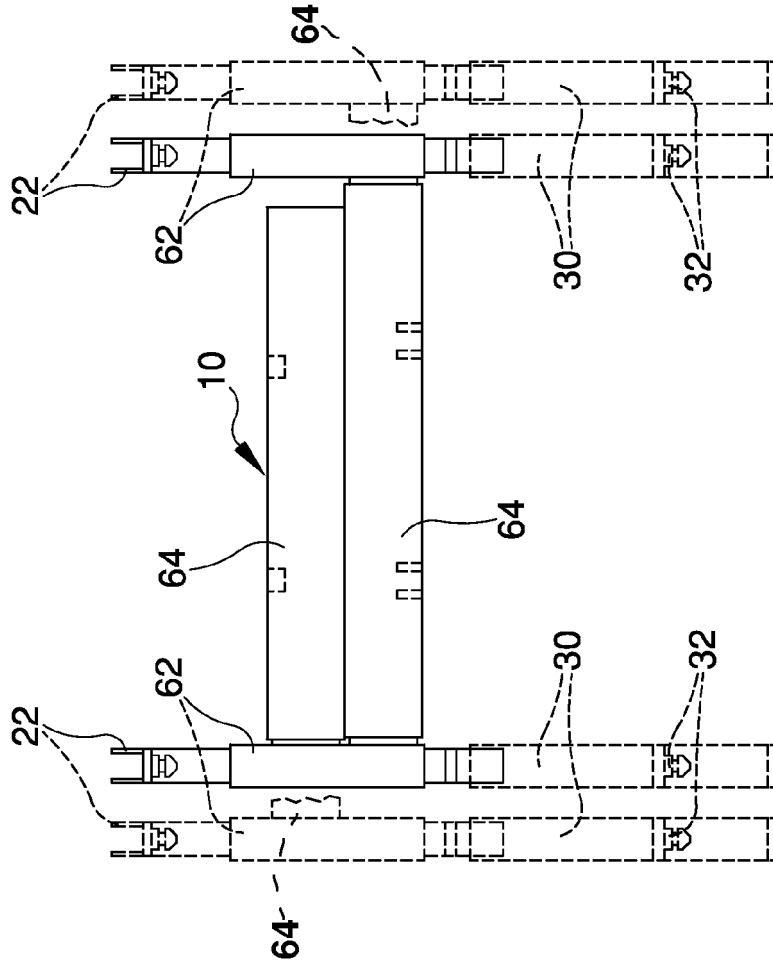
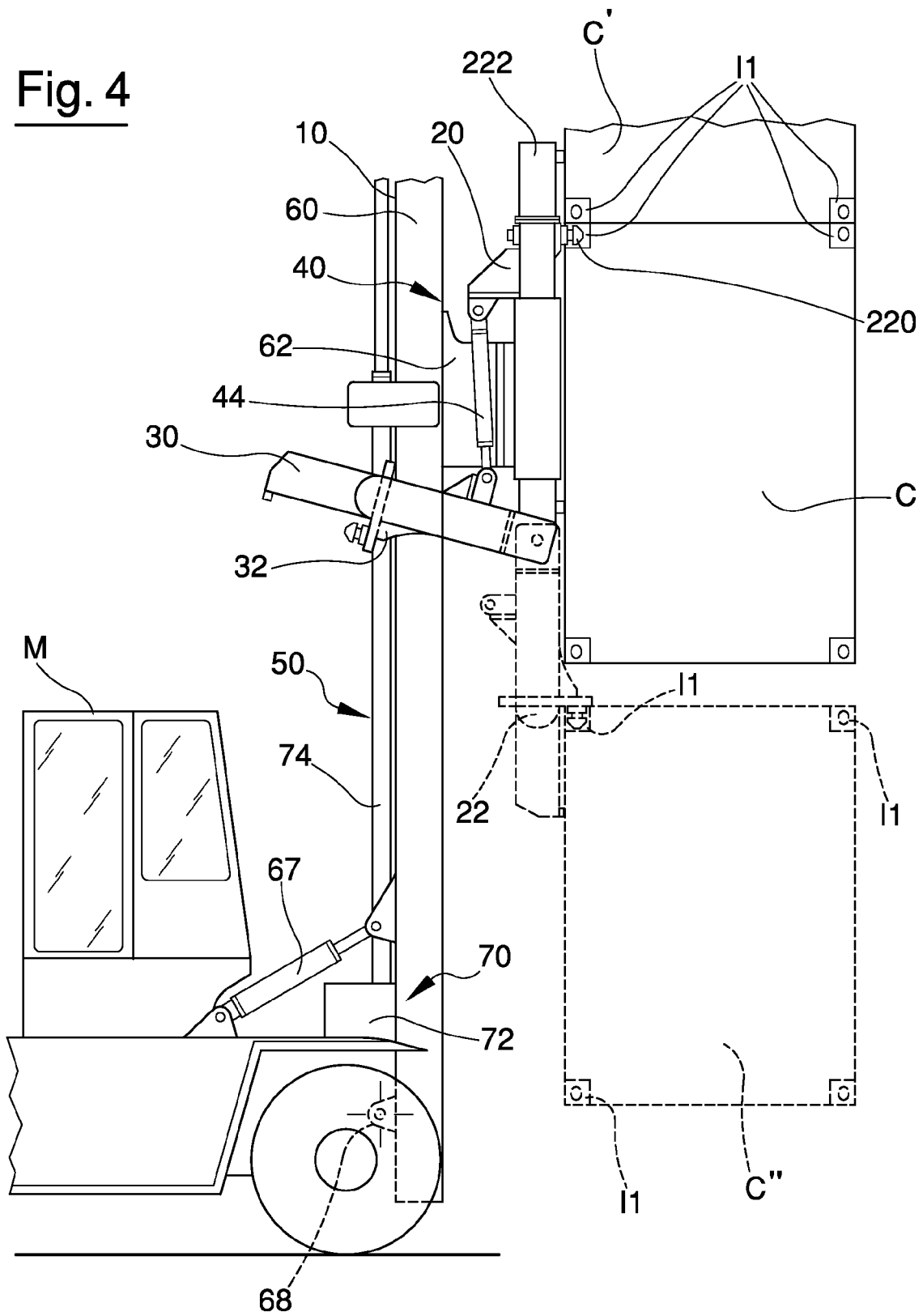


Fig. 4





EUROPEAN SEARCH REPORT

Application Number
EP 09 16 7460

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 97/30928 A (HYCO CASCADE PTY LTD [AU]; SUNDERMEIJER JAN [AU]) 28 August 1997 (1997-08-28) * abstract * * figures 1-5 *	1	INV. B66F9/18
A	US 3 387 729 A (EUGENE HINDIN ET AL) 11 June 1968 (1968-06-11) * the whole document *	1	
A	DE 31 29 105 A1 (DREHTAINER CONTAINER TECH [DE]) 10 February 1983 (1983-02-10) * abstract * * figure 1 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B66F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		9 November 2009	Sheppard, Bruce
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			

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

EP 09 16 7460

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
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09-11-2009

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9730928	A	28-08-1997	CA 2258181 A1	28-08-1997
			EP 1005437 A1	07-06-2000
			US 6086316 A	11-07-2000

US 3387729	A	11-06-1968	BE 692798 A	03-07-1967
			DE 1456906 A1	12-06-1969
			DE 6605272 U	21-05-1970
			FR 1508709 A	05-01-1968
			GB 1144987 A	12-03-1969
			NL 6615635 A	26-01-1968

DE 3129105	A1	10-02-1983	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82