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(54) **A LOAD CARRIER LOCKING ARRANGEMENT FOR SECURING A LOAD CARRIER ON A LOAD HOLDER OF A LIFT TRUCK**

(57) A load carrier locking arrangement (100) for securing a load carrier (10) on a load holder (4) of a lift truck (1);

- a gripping device (200) having first and second grip claws (201, 202) with a respective gripping portion (201.1, 202.2) arranged to hold a portion (15) of a load carrier (10), and movable towards and away from each other so that a portion (15) of a load carrier (10) may be received there between, wherein the load carrier locking

arrangement (100) comprises an actuator (400) with a movable locking element (402) that may be brought into engagement with the gripping device (200), wherein the gripping device (100) is arranged such that the first and the second gripping portions (201.1, 202.1) are prevented from moving away from each other when the locking element (402) is in engagement with the gripping device (100).

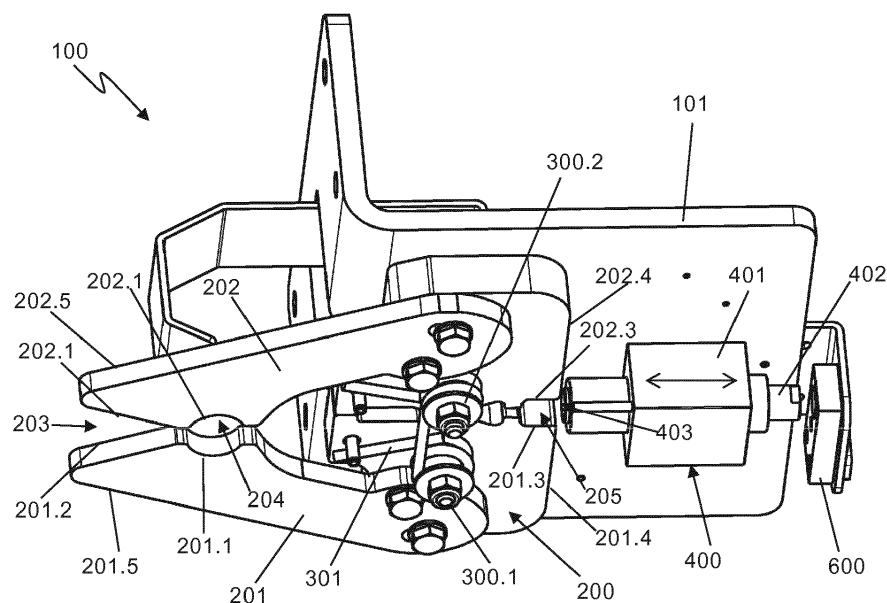


Fig.4

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Description

Technical field

[0001] The present disclosure relates to a load carrier locking arrangement for securing a load carrier on a load holder of a lift truck. The present disclosure also relates to a lift-truck comprising a load carrier locking arrangement.

Background art

[0002] Transportation of various types of load carriers such as roll cages or pallets by lift trucks may require that the load carrier is secured onto the load holder, such as forks of the lift truck. The load carrier may thereby be clamped by a device on the lift truck so that the load pallet is prevented from moving along the forks of the lift truck.

[0003] A known pallet clamping device is shown in WO2007009084 and comprises two horizontally movable claws for engaging a pallet that is carried on the forks of a lift truck. The claws may be opened and closed by a mechanism that includes linkages and springs and that is connected to a pedal which may be operated by the foot of the driver. In closed position, two springs biases the claws towards each other with sufficient force to securely clamp the pallet. Problems associated with the known pallet clamping device is that it is of complex construction and that clamping of the pallet is dependent on the condition of the springs in the linkage which may impair over time.

[0004] Thus, it is an object of the present disclosure to provide a load carrier engagement arrangement for a lift truck that solves at least one of the problems of the prior art.

[0005] In particular it is an object of present disclosure to provide a load carrier locking arrangement for a lift truck that secures a load carrier on the load holder of the lift truck with high reliability. Yet a further object of the present disclosure is to provide a load carrier locking arrangement for a lift truck that safely locks a load carrier on the load holder of a lift truck. Yet a further object of the present disclosure is to provide a load carrier locking arrangement for a lift truck that is simple and robust. Yet a further object of the present disclosure is to provide a load carrier locking arrangement for a lift truck that may be manufactured at low cost.

Summary of the invention

[0006] According to the present disclosure at least one of the aforementioned objects is met by a load carrier locking arrangement for securing a load carrier on a load holder of a lift truck, comprising: - a gripping device having a first and a second grip claw with a respective gripping portion arranged to hold a portion of a load carrier, and arranged movable towards and away from each other so that a portion of a load carrier may be received between

the gripping portions, characterized in that the load carrier locking arrangement comprises an actuator with a movable locking element that may be brought into engagement with the gripping device, wherein the gripping device is arranged such that the first and the second gripping portions are prevented from moving away from each other when the locking element is in engagement with the gripping device.

[0007] The load carrier locking arrangement according to the present disclosure comprises few constructional parts and any motion of the grip claws is prevented by the locking element. The use of a locking element that may be selectively moved into engagement with the grip claws by the actuator provides easy and reliable securing of a load carrier on the forks of a lift-truck. The actuator may be connected to the controller of the lift-truck which in turn makes it possible to control certain functions of the lift-truck in dependency of state of the actuator. For example, vertical movement of the forks may be disabled until the actuator has moved the locking element into engagement with the grip claws. This increases safety and makes operation of the lift-truck less cumbersome for the driver.

[0008] In an embodiment the gripping portions are arranged in a front end of the first and the second grip claw. The first and the second grip claw further comprises respectively a rear end that is pivotally attached to a base such that the first and the second gripping portions may pivot in a common plane towards and away from each other. The first and the second grip claw are thereby arranged such that their rear ends pivot away from each other when their gripping portions pivot towards each other. This is advantageous, because an engagement space is formed between the rear ends of the grip claws when these pivot apart. By moving the locking element into the engagement space, the gripping portion of the grip claws are effectively prevented from moving away from each other. This ensures very strong and secure locking of the grip claws.

[0009] Preferably, the respective rear end of the first and the second grip claw comprises a recess, wherein the recesses mutually faces each other and form the engagement space. The actuator may thereby be arranged behind the rear end of the first and the second grip claw, such that the locking element may be moved into the engagement opening. This provides a compact gripping device and ensures that reliable engagement between the grip claws and the locking element is achieved.

[0010] The load carrier locking arrangement may further comprise a sensor arrangement for detecting whether a portion of a load carrier is received between the first and second gripping portions. The sensor arrangement may be connected to the actuator such that the locking element may be moved into engagement with the gripping device when the sensor arrangement detects the presence of a portion of a load carrier in a predetermined position between the first and the second gripping portions of the first and second gripping claws. The sensor

arrangement and the actuator may be connected to the control system of the lift-truck to allow control of functions of the lift-truck in dependency of the position of the portion of the load carrier and the state of the actuator.

[0011] The present disclosure also relates to a lift-truck having a load carrier holder and a load carrier locking arrangement according to anyone of claims 1 - 10 for securing a load carrier on the load carrier holder.

Brief description of the drawings

[0012]

Figure 1: A side view of a lift truck and a load carrier.

Figure 2: A view from below of a lift truck and a load carrier

Figure 3: A detailed view showing a load carrier locking arrangement according to a first embodiment of the present disclosure in engagement with a load carrier.

Figure 4: A views from below of load carrier locking arrangement according to a first embodiment of the present disclosure.

Figure 5: A view from above of a load carrier locking arrangement according to a first embodiment of the present disclosure.

Figure 6: A view from below of a load carrier locking arrangement according to a first embodiment of the present disclosure in engagement with a load carrier.

Figure 7: A view from below of a load carrier locking arrangement according to a first embodiment of the present disclosure disengaging from a load carrier.

Figure 8: A schematically view of a grip claw according to an alternative of the present disclosure.

Figures 9,10: Views from above and below of a load carrier locking arrangement according to a second embodiment of the present disclosure.

Detailed description of embodiments

[0013] The load carrier locking arrangement according to the present disclosure will now be described more fully hereinafter. The load carrier locking arrangement according to the present disclosure may however be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the present disclosure to those persons skilled in the art. Same reference numbers refer to same elements throughout the description. The embodiments may be combined.

[0014] Figure 1 shows schematically a lift-truck 1 according to the present disclosure in side view. The lift-truck of figure 1 is an order picker lift-truck. However, other lift-trucks are also contemplated within the scope of the present disclosure, for example stacker lift-trucks, reach lift-trucks and walk-behind lift-trucks such as tiller-

arm trucks.

The lift-truck 1 comprises a mainframe 2 which in its forward portion extends into two forward support legs 3 carrying support wheels 4. A drive wheel 5 is arranged in the rear of the mainframe 2. Since figure 1 is a side view only one of the support legs and the support wheels is shown. The lift-truck comprises a drive motor for propelling the drive wheel 5 and a hydraulic system for providing hydraulic power to movable parts on the lift-truck is accommodated (the motor and the hydraulic system are not shown in figure 1). The lift-truck 1 further comprises a lifting mast 6 with a movable load carriage 7. The lift truck further comprises a load holder 8 for holding or supporting a load carrier 10, such as a pallet or roller cage. The load holder 8 may be arranged on the load carriage 7 and thus movable along the mast 6. In the embodiment shown in figure 1, the load holder 8 is a lifting fork. However, the lift-truck may comprise other load holders, such as gripping arms or shelf-like supports. The lift truck 1 further comprises a driver's compartment 9, comprising a seat and controls for driving and controlling the lift-truck (not shown in figure 1). In the embodiment shown in figure 1, the driver's compartment 9 is movable along the mast 6.

[0015] A load carrier 10 is positioned in front of the lift-truck 1. The load carrier 10 is a device configured to support goods that are to be transported by the lift-truck. The load carrier 10 is therefore configured to be engaged by the load holder 8 of the lift-truck 1 so that it may be raised from the ground by the load holder 8. In the embodiment shown in figure 1, the load carrier 10 is a roller cage. A roller cage typically comprises a bottom 11 onto which a load may be supported and side gratings 12. The bottom 11 comprises rollers 13 and is configured to engage the load holder 8 of the lift truck.

[0016] Figure 2, shows the load carrier 10 in a view from below. Thus, tunnels 14 are arranged on the bottom 11 of the load support. In operation, the tunnels 14 may receive load holders 8 in the form of lift-forks. Partially visible in figure 2 is a load carrier locking arrangement 100 for securing the load carrier on the load holder 10 of the lift truck. The load carrier locking arrangement 100 will be described in detail hereinafter and may be arranged in the front of the lift-truck such that it is aligned with the load holder 8. In figure 1, the load carrier locking arrangement 100 is arranged on the load carriage 7, between the forks 8 of the lift-truck and extends parallel with the forks 8. The load carrier 10 further comprises a portion 15 which is configured to be held by the load carrier locking arrangement 100.

[0017] In the embodiment of figure 2, the portion 15 is a pin, typically made of steel such as a steel rod, which extends perpendicular from the bottom 11 in direction downwards. The pin may have any cross-sectional form such as circular or rectangular. Figure 3 shows a situation in which the load holder 8, in the form of lift-forks are inserted into the tunnels 14 of the load support 10 and wherein the load carrier locking device 100 is holding the

pin 15 such that the load carrier 10 is prevented from moving along the load holder 8 of the lift-truck 10. Other load carriers than the roll cage are possible within the present disclosure. For example, the load carrier 10 may be pallet (not shown). In that case the portion 15 which is configured to be held by the load carrier locking arrangement 100 may be a pallet stringer.

[0018] The load carrier locking arrangement 100 will now be described in detail.

[0019] Turning to figure 4, the load carrier locking arrangement 100 comprises a base 101, typically a steel plate, and a gripping device 200 and an actuator 400 with a movable locking element 402.

[0020] The gripping device 200 comprises a first grip claw 201 and a second grip claw 202 that respectively has a front end 201.5, 202.5 with a gripping portion 201.1, 202.1 which are configured to hold a portion 15 of a load carrier (not shown) between them. The grip claws 201, 202 are movable such that the gripping portions 201.1, 202.1 may move towards and away from each other. A portion 15 of a load support (not shown) may thus enter between the gripping portions 201.1, 202.1 and exit from the gripping portions. In the embodiment shown in figure 4, the first and second gripping claws 201, 202 are pivotally attached to the base 101 by a respective pivot shaft 300.1, 300.2. The pivot shafts 300.1, 300.2 may be arranged between a rear end 201.4, 202.4 and the front end 201.5, 202.5 of the grip claws 201, 202. The gripping portions 201.1, 202.1 of the first and the second grip claw 201, 202 are thereby arranged to pivot towards and away from each other in a common plane, typically a horizontal plane. The gripping portions 201.1, 202.1 of the first and the second grip claw 201, 202 are further biased towards each other. This allows a portion 15 of a load carrier (not shown) to easily enter between the gripping portions 201.1, 202.1 of the grip claws 201, 202 and it also ensures that the gripping portions 201.1, 202.1 close at least partially around the portion 15 of the load support. It also allows the portion 15 of the load carrier to easily exit from the grip claws, when the load carrier locking arrangement 100 is to be disengaged from the portion 15 of the load carrier. Biasing of the first and second grip claws 201, 202 may be achieved by a biasing arrangement 301. Turning to figure 7. The biasing arrangement may be a spring arrangement, for example one or more coil springs arranged on the pivot shafts 300.1, 300.2. One end 301.1, 301.2 of each coil may abut an abutment pin 302.1, 302.2 on a respective grip claw 301, 302. The second ends of each coil spring may be interconnected into an intermediate coil piece 303.

[0021] Returning to figure 4. The gripping portions 201.1, 202.1 may each be configured to hold the portion 15 of the load carrier support (not shown). In the embodiment of figure 4, the respective gripping portion 201.1, 202.1 comprises a recess, that form an gripping opening 204 when the gripping portions are moved towards each other. The gripping opening 204 may be configured to receive the securing pin 15 of a load carrier. However,

the gripping portions 201.1, 202.1 may be configured to hold portions of other types of load carrier, such as stringers of pallets (not shown). In figure 4, the gripping opening 204 is circular, however other configuration, such as rectangular is feasible. The recess in the respective gripping portion 201.1, 202.1 may thereby, for instance be semi-circular or partially rectangular. Figure 8 shows schematically a grip claw 201 having a partially rectangular gripping portion 201.1 that will form a substantially rectangular gripping opening together with an identical second grip claw (not shown).

[0022] Returning to figure 4. The first and the second grip claw 201, 202 may further comprise a respective guiding section 201.2, 202.2 which extends from the distal tip of the grip claws 201, 202 towards the respective gripping portion 201.1, 202.1. The guiding sections 201.2, 202.2 are chamfered to form a V-shaped guide recess 203 when the gripping portions 201.1, 202.1 are moved towards each other. The V-shaped guide recess 203 facilitates engagement between the load carrier locking arrangement 100 and the portion 15 of the load carrier 10.

[0023] Turning to figure 6, the gripping device 100 may comprise a connection link comprising a protrusion 207 extending from one of the grip claws 201 and corresponding receiving recess 208 in the other grip claw 202 for receiving the protrusion 207. The protrusion 207 and the recess 208 may be of semi-circular or triangular shape. The connection link provides an advantage in that the pivotal movement of the first and second grip claw is synchronized. When pivoting the first and the second grip claw is thereby caused by the same ratio.

[0024] Returning to figure 4. The load carrier locking arrangement 100 further comprises an actuator 400 with a movable locking element 402. The actuator 400 may comprise a housing 401 in which the locking element 402 is received. The locking element 402 is elongated and is arranged to move axially in the housing. The locking element may thereby be a locking piston that is axially movable in the housing 401, such as in a bore (not shown) in the housing. The actuator 400 is arranged such that the locking element 402 may be moved towards and away from the gripping device 200. In the embodiment shown in figure 4, the actuator 400 is arranged behind the rear ends 201.4, 202.4 of the grip claws 201, 202, seen in direction towards the gripping portion 201.1, 202.1. The locking element 402 may thus be moved axially towards, and away, from the rear ends 201.4, 202.4 of the grip claws 201, 202. The actuator 400 may be realized by a locking solenoid, for example a CM40SY43V24c commercially available from the company System di Rosati Srl. However, the actuator 400 may also be in the form of hydraulic or pneumatic piston/cylinder arrangement. An actuator sensor 600, such as an inductive sensor, may be arranged to detect the position of the locking element and thus the state of the actuator. In the embodiment of figure 4, the actuator sensor 600 is arranged behind the actuator 400.

[0025] The locking element 402 is arranged to be

moved into engagement with the gripping device 200. According to the described embodiment, engagement between the locking element 402 and the gripping device may be achieved in that the end portion 403 of the locking element 402 is received in an engagement space 205 of the gripping device 100. The gripping device 200 may thereby be arranged such that a space 205 is provided between the first and the second gripping claws 201, 202. The space 205 is open in the rear ends 201.4, 202.4 of the grip claws 201, 202 so that an end portion 403 of the locking element 402 may move into the space 205 or out thereof. In the embodiment shown in figure 4, the space 205 is formed by two mutually facing engagement recesses 201.3, 202.3 in the rear end 201.4, 202.4 of the grip claws 201, 202. However, the space 205 may also be formed by sufficiently separating the grip claws apart from each other or by various geometrical designs of the rear ends 201.4, 202.4 of the grip claws 201, 202. The space 205 may be dimensioned such that its width corresponds to the width of the end portion 403 of the locking element 402. Possibly with a minor play.

[0026] The first and the second gripping portions 201.1, 202.1 are prevented from moving away from each other when the locking element 402 is in engagement with the gripping device 100. The principle of this feature will in the following be described with reference to figures 6 and 7.

[0027] Figure 6 shows a detailed view from below of a situation in which the load carrier locking arrangement 100 is in engagement with a cage pin 15 of a roller cage (not shown). Figure 3 shows this situation its complete context in which a load carrier locking arrangement on a lift-truck is engaging a cage pin 15 of a roller cage 10.

[0028] Returning to figure 6, the cage pin 15 is held between the gripping portions 201.1, 202.1 of the first and the second grip claw 201, 202 which are biased towards each other by the biasing element 301. The end 403 of the locking element 402 is moved into engagement with the gripping device 100 so that the end portion 403 is received in the space 205 between the first and the second grip claw 201, 202. This results in that the gripping portions 201.1, 202.1 of the grip claws 201, 202 are prevented from moving away from each other and thereby are prevented from releasing the cage pin 15 from the load carrier locking arrangement 100. In the shown embodiment, the pivot shafts 300.1, 300.2 are arranged between the gripping portions 201.1, 202.1 and the rear ends 201.4, 202.4 of the grip claws 201, 202. Due to this arrangement, any movement of the gripping portions 201.1, 202.2 away from each other will result in that the rear ends 201.4, 202.4 are moved towards each other and closes the space 205. However, the locking element 402 fills the space 205 and blocks effectively any movement of the rear ends 201.4, 202.4 of the grip claws 201, 202 towards each other.

[0029] Figure 7 shows a situation in which the cage pin 15 of the roller cage (not shown) is disengaged from load carrier locking arrangement 100. In this situation, the end

403 of the locking element 402 has been moved out of the space 205 and allows thus the rear ends 201.4, 202.4 of the gripping claws to pivot towards each other when the cage pin 15 presses the gripping portions 201.1, 202.1 away from each other. The roller cage may thus be removed from the forks of the lift-truck (see figure 2).

[0030] Other engagement between the locking element 402 and the gripping device 200 is possible. For example, the end portion 403 of the locking element may be brought into engagement with merely one of the first and the second grip claws 201, 202.

[0031] Figure 9 and 10 shows a second embodiment of the load carrier locking arrangement 100 according to the present disclosure. With reference to figure 9, the actuator 400 may thereby be arranged on the upper side of the base plate 101 and oriented in a position normal to the plane of the of base plate 101. Turning to figure 10, the base plate 101 and one of grip claws 201/202 may be provided with engagement spaces in the form of through going bores 205 that are concentrically arranged when the grip claws have been moved towards each other. Thereby allowing the end portion 403 of the locking element to pass through both bores 205. The gripping device 200 is configured such that the first and the second gripping portions are prevented from moving away from each other when the locking element is in engagement with one of the grip claws. This may be achieved by the connection link discussed under figure 4 and having a protrusion 207 extending from one of the grip claws 201 and a receiving recess 208 for receiving the protrusion 207 in the other grip claw. 202. The connection link synchronizes the pivotal movement of the two grip claws 201, 202 so that they are forced to pivot in unison, i.e. simultaneous. Thus, when the first grip claw is blocked by the locking element, the other grip claw can also not move and the gripping portions of the grip claws cannot move away from each other. It is also possible to use two actuators 400 (not shown), wherein one actuator is arranged to engage one grip claw and the other is arranged to engage to other grip claw.

[0032] Turning to figure 5. The load carrier locking arrangement 100 may also comprise a sensor arrangement 500 for detecting whether a portion 15 of a load carrier (not shown) is received between the first and second gripping portions of the grip claws.

[0033] The sensor arrangement may comprise a probe 501, such as a rod or a rigid strip that is resiliently attached by one end to the base 101. The other end of the probe 501 extends over the gripping portions 201.1, 202.2. The sensor arrangement 500 may comprise a detection sensor 503, such as an inductive proximity sensor and an activator element 502 which is arranged on the probe. When the probe 501 is pushed back by the portion 15 of the load carrier the activator 502 arrives in front of the detection sensor 503, which is activated. The sensor arrangement 500 may be connected to the actuator 400 (see figure 4). For example, via the controller of the lift-truck (not shown). The controller of the lift-truck may

thereby be configured to activate the actuator 400 to move the locking element 402 into engagement with the gripping device 200 when the detection sensor 502 is activated and the operator push the lock/unlock button. The probe 501 may be designed such that the sensor arrangement 500 detects the presence of a portion 15 of a load carrier in a predetermined position between the first and the second gripping portions 201.1, 202.1 of the first and second gripping claws 201, 202. For example such that the detection sensor 503 is activated when the portion of the load carrier is received in the gripping opening 204.

Claims

A load carrier locking arrangement (100) for securing a load carrier (10) on a load holder (4) of a lift truck (1), comprising;

- a gripping device (200) having a first and a second grip claw (201, 202) with a respective gripping portion (201.1, 201.2) arranged to hold a portion (15) of a load carrier (10), and arranged movable towards and away from each other so that a portion (15) of a load carrier (10) may be received between the gripping portions (201.1, 202.1), **characterized in that** the load carrier locking arrangement (100) comprises an actuator (400) with a movable locking element (402) that may be brought into engagement with the gripping device (200), wherein the gripping device (100) is arranged such that the first and the second gripping portions (201.1, 202.1) are prevented from moving away from each other when the locking element (402) is in engagement with the gripping device (100).

2. The load carrier locking arrangement (100) according to claim 1, wherein the gripping device (200) comprises an engagement space (205), configured to receive at least a portion (403) of the locking element (400).

3. The load carrier locking arrangement (100) according to claim 1 or 2, wherein the gripping portions (201.1, 202.1) are arranged in a front end (201.5, 202.5) of the first and the second grip claw (201, 202) and wherein the first and the second grip claw (201, 202) respectively comprises a rear end (201.4, 202.4) that is pivotally attached to a base (101) such that the first and the second the gripping portions (201.1, 202.1) may pivot in a common plane towards and away from each other.

4. The load carrier locking arrangement (100) according to claim 3, wherein the first and the second grip claw (201, 202) are arranged such that the rear

ends (201.4, 202.4) pivot away from each other when the gripping portion (201.1, 201.2) pivot towards each other.

5. The load carrier locking arrangement (100) according to claim 2 and 3, wherein the respective rear end (201.4, 202.4) of the first and the second grip claw (201, 202) comprises a recess (201.3, 202.3), wherein the recesses mutually faces each other and form the engagement space (205).

6. The load carrier locking arrangement (100) according to claim 5, wherein the actuator (400) is arranged behind the rear end (201.4, 202.4) of the first and the second grip claw (201, 202), such that the locking element (402) may be moved into the engagement opening (205).

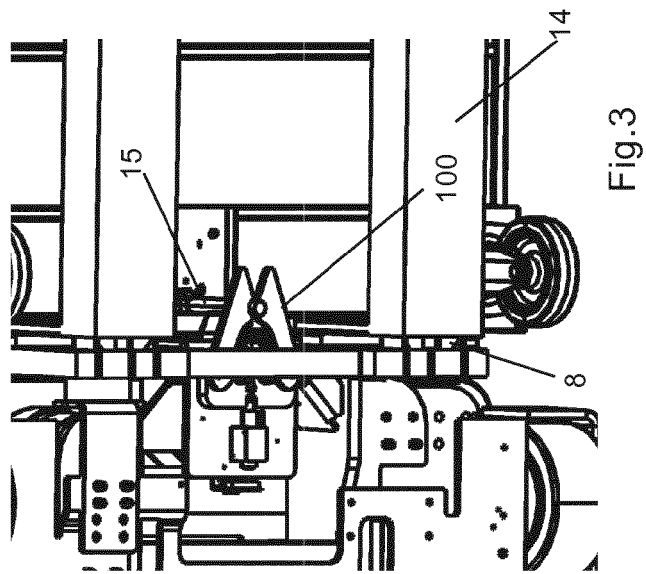
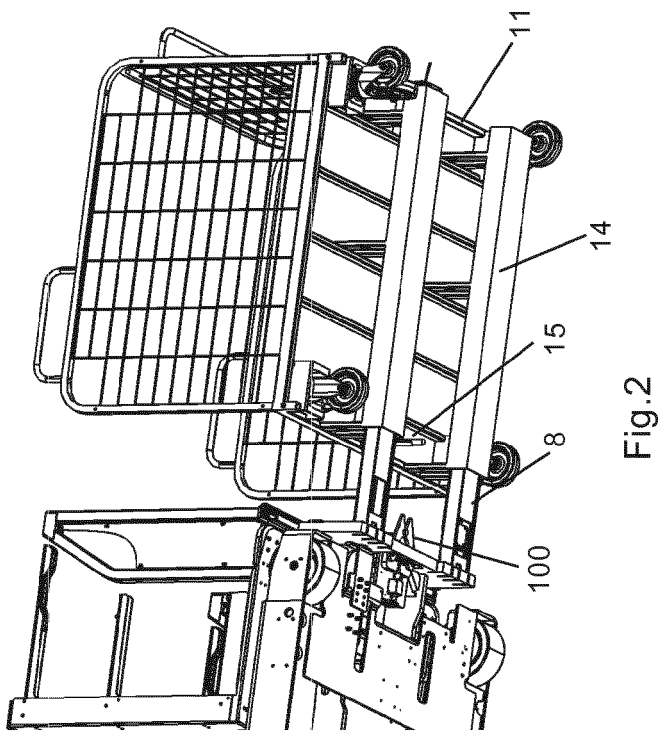
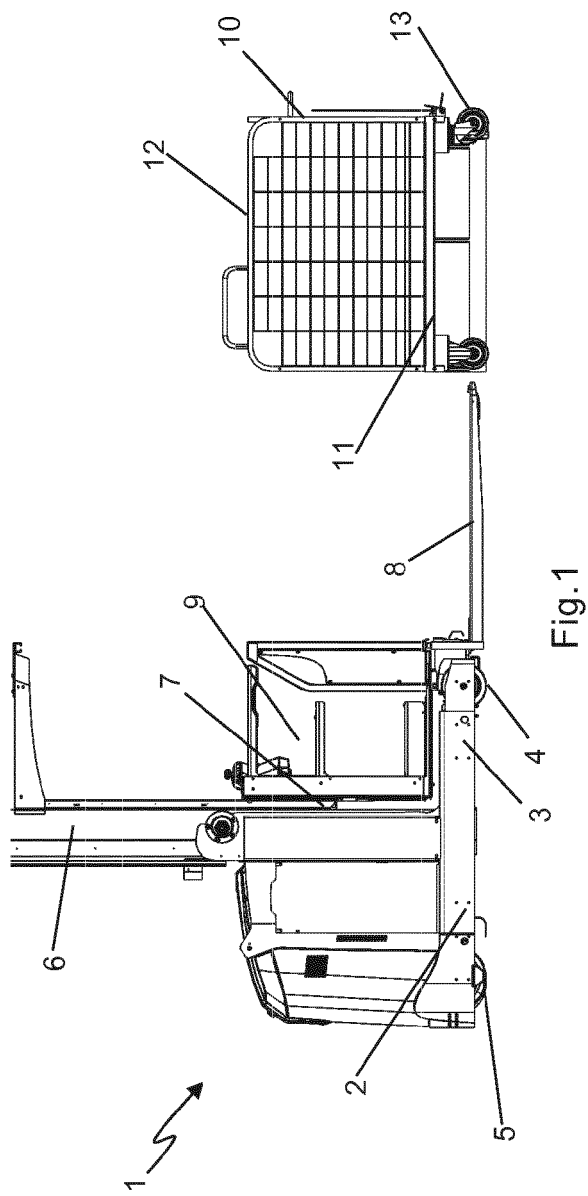
7. The load carrier locking arrangement (100) according to anyone of claims 1-6 wherein the first and second grip claws (201, 202) are pivotally attached to the base (101) by a respective pivot shaft (300.1, 300.2) and wherein a biasing arrangement (301) is arranged on the pivot shafts such that the first and second grip claws (201, 202) are biased towards each other.

8. The load carrier locking arrangement (100) according to anyone of claims 1 - 7, wherein the locking element (402) is elongated and arranged to move axially.

9. The load carrier locking arrangement (100) according to anyone of claims 1 - 8, comprising a sensor arrangement (500) for detecting whether a portion (15) of a load carrier (10) is received between the first and second gripping portions (201.1, 202.1), wherein the sensor arrangement (500) is connected to the actuator (400) such that the locking element (402) is moved into engagement with the gripping device (200) when the sensor arrangement (500) detects the presence of a portion (15) of a load carrier (14) in a predetermined position between the first and the second gripping portions (201.1, 202.1) of the first and second gripping claws (201, 202).

10. The load carrier locking arrangement (100) according to anyone of claims 1 - 9, wherein the portion (15) of the load carrier is a cage pin or a pallet stringer.

11. A lift truck (1) having a load carrier holder (4) and a load carrier locking arrangement (100) according to anyone of claims 1 - 10 for securing a load carrier on the load carrier holder (4).



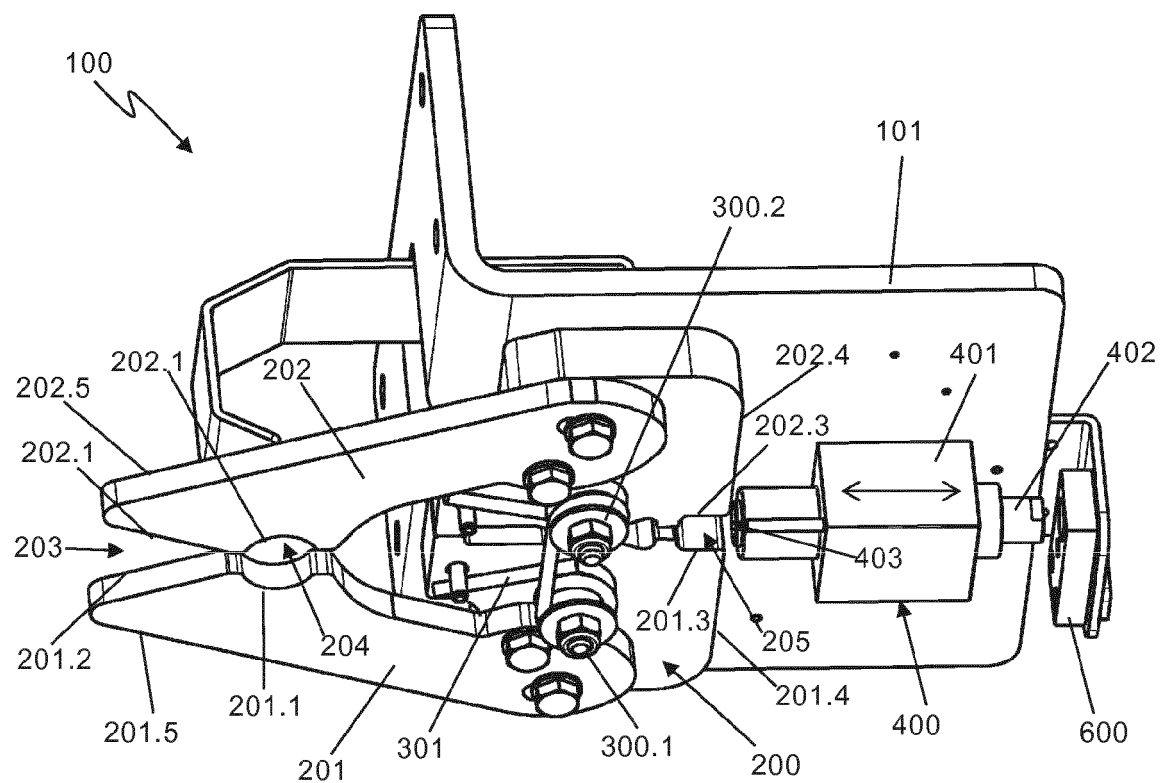


Fig.4

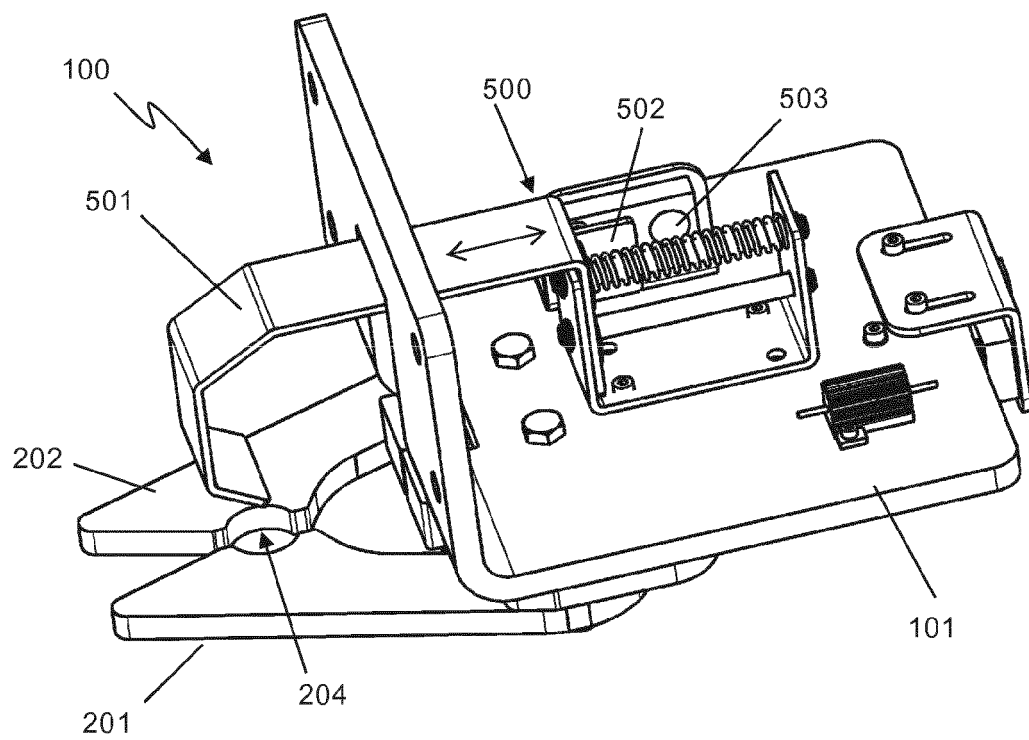


Fig.5

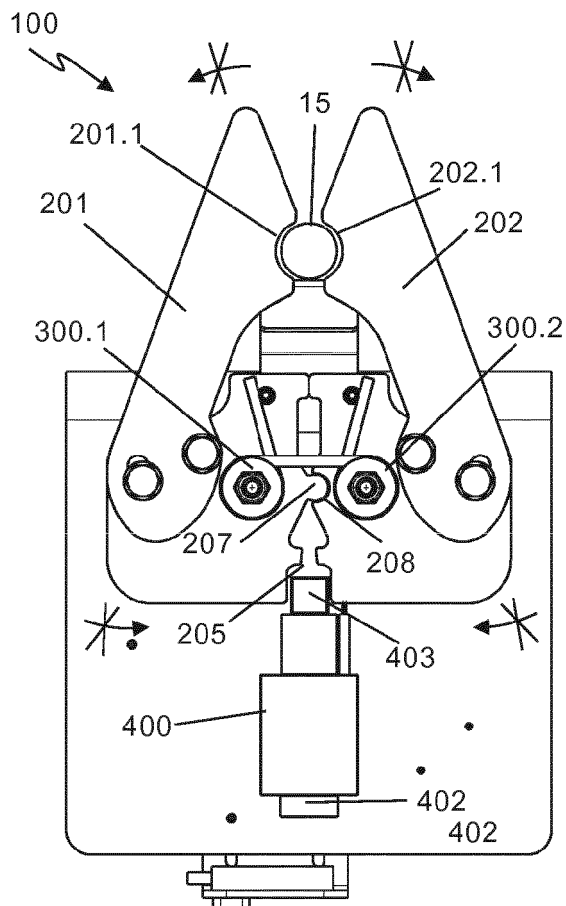


Fig. 6

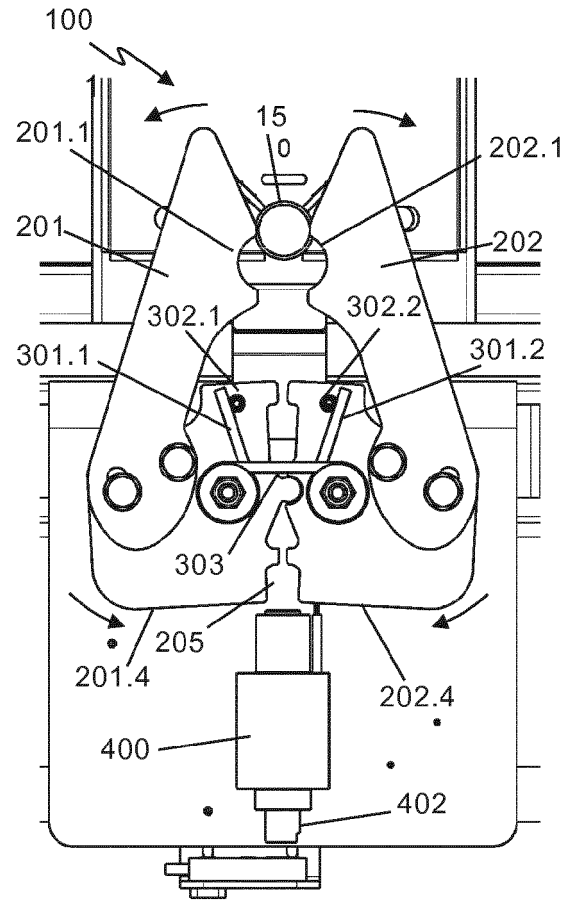


Fig. 7

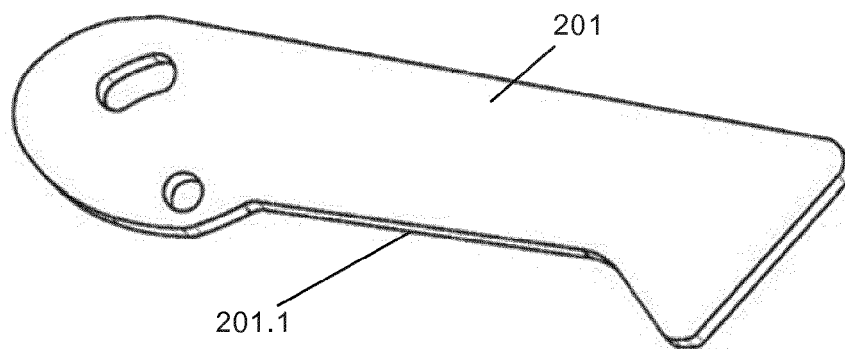


Fig. 8

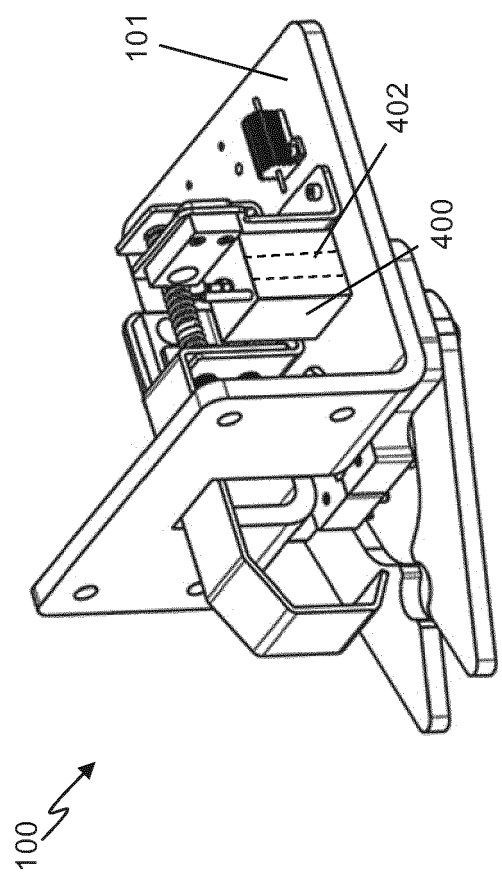


Fig.9

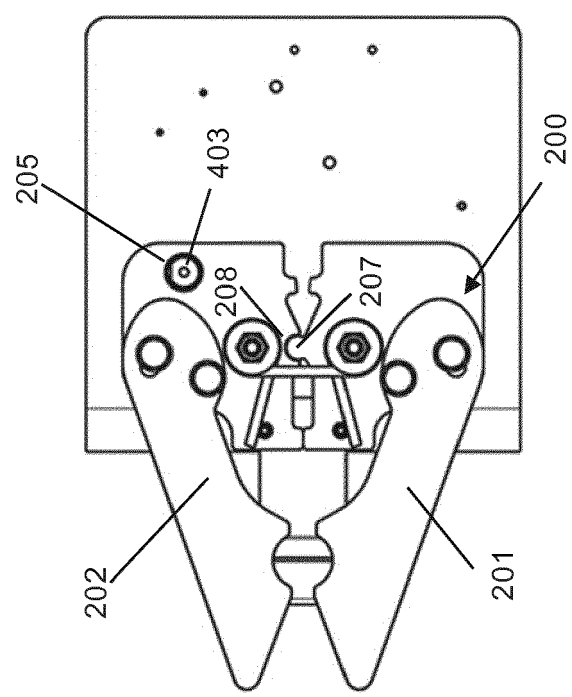


Fig.10



EUROPEAN SEARCH REPORT

 Application Number
 EP 18 20 8118

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/175134 A1 (SCHONAUER MICHAEL [DE]) 10 August 2006 (2006-08-10) * paragraphs [0017], [0037] * * claim 5 * * abstract * * figures *	1-11	INV. B66F9/18
X	DE 10 2014 109892 A1 (KION WAREHOUSE SYSTEMS GMBH [DE]) 27 August 2015 (2015-08-27) * paragraphs [0063], [0066] - [0068], [0081] * * abstract * * figures *	1-6,8, 10,11	
			TECHNICAL FIELDS SEARCHED (IPC)
			B66F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 May 2019	Examiner Colletti, Roberta
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 EPO FORM 1503 03.02 (P04C01)

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

EP 18 20 8118

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