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

(11) **EP 4 201 870 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.06.2023 Bulletin 2023/26

(21) Application number: **22215384.3**

(22) Date of filing: **21.12.2022**

(51) International Patent Classification (IPC):
B66F 9/14 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B66F 9/148

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **23.12.2021 IT 202100032576**

(71) Applicant: **L.T.E. Lift Truck Equipment S.p.A.**
44020 Ostellato (Ferrara) (IT)

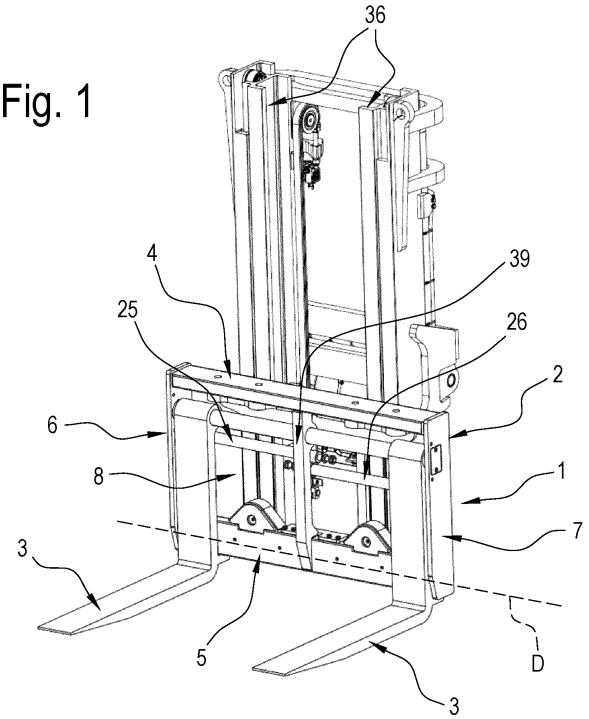
(72) Inventors:
- **ZANELLA, Matteo**
  44124 FERRARA (IT)
- **BONELLI, Giovanni Paolo**
  40068 SAN LAZZARO DI SAVENA (IT)
- **BUZZONI, Marco**
  44124 SAN MARTINO (FERRARA) (IT)

(74) Representative: **Casadei, Barbara**
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

(54) A POSITIONING DEVICE FOR POSITIONING FORKS FOR A LIFT TRUCK

(57) A positioning device for positioning forks for a lift truck comprising:
a supporting structure (2) configured to support a pair of forks (3) which comprises at least one upper bar (4) and a lower bar (5), which have a main longitudinal extension, and a first side bar (6) and a second side bar (7), which connect the upper bar (4) and the lower bar (5);
the supporting structure (2) has a viewing window (8) defined at least by the upper bar (4), by the lower bar (5) and by the first side bar (6) and by the second side bar (7);
a movement unit (9) for moving the supporting structure (2) configured to translate the supporting structure (2) along a horizontal direction (D) parallel to the longitudinal direction of extension of the upper bar (4) and of the lower bar (5) of the supporting structure (2);
the movement unit (9) is positioned at the lower bar (5) of the supporting structure (2), in particular outside the viewing window (8).

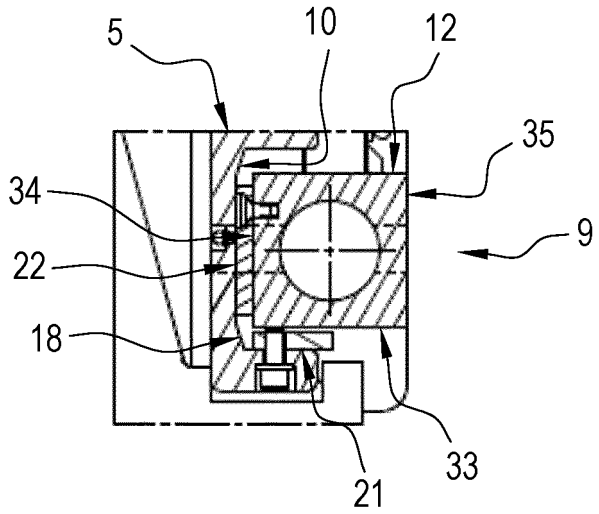
Fig. 1



EP 4 201 870 A1

(Cont. next page)

Fig. 5



Description

[0001] This invention relates to a device for positioning forks for a lift truck.

[0002] In particular, the device for positioning forks according to the invention is of the integrated translating-positioning type, but without thereby limiting the scope of the invention.

[0003] In the prior art devices for positioning of forks, a single-acting hydraulic cylinder moves a fork-holder carriage along a horizontal direction, parallel to the longitudinal direction of extension of the carriage.

[0004] In other words, the carriage performs a lateral translation of the forks, which maintain a fixed position during their translation.

[0005] The fork-carrier carriage is a rectangular frame equipped with an upper bar, a lower bar and a pair of side bars which connect the top bar to the lower bar.

[0006] The carriage has a window whose frame is defined by the bars which constitute it.

[0007] The window defines the field of vision of the driver of the lift truck when the carriage is positioned in a raised position relative to the ground.

[0008] The single-acting cylinder which performs the lateral translation of the carriage, in the prior art solutions, is positioned in a zone of the window close to its centre line.

[0009] This obviously obstructs the field of vision of the lift truck driver when the carriage is lifted off the ground.

[0010] The need has therefore been felt of clearing the single-acting cylinder from the window of the carriage by making a device for positioning forks for a lift truck comprising a supporting structure configured to support a pair of forks which comprises an upper bar, a lower bar, a first side bar and a second side bar for connecting the upper bar and the lower bar wherein the upper bar and the lower bar have a main longitudinal extension.

[0011] The top bar, the lower bar, the first side bar and the second side connecting bar define a viewing window.

[0012] A means for moving the supporting structure along a horizontal direction parallel to the longitudinal direction of extension of the upper bar and the lower bar wherein the movement means is positioned at the lower bar. Advantageously, the viewing window defined by the bars of the supporting structure of the forks is larger than in prior art solutions, allowing greater visibility for the driver when moving the positioning device.

[0013] Further features and advantages of the invention are more apparent from the non-limiting description which follows of a preferred embodiment of a device for positioning forks for a lift truck as illustrated in the accompanying drawings, in which:

- Figure 1 is a schematic perspective view of a device for positioning forks for a lift truck according to the invention;
- Figure 2 shows the device of Figure 1 in a further schematic view;
- Figure 3 is an exploded view of Figure 2;
- Figure 4 is a schematic view of a detail of the device of Figure 3;
- Figure 5 is a first schematic cross-section of Figure 2;
- Figure 6 is a second schematic cross-section of Figure 2;
- Figure 7 is an alternative embodiment of the device of Figure 1.

[0014] The numeral 1 denotes a device for positioning forks for a lift truck according to the invention, see Figures 1 to 3.

[0015] The positioning device 1 comprises a supporting structure 2 configured for supporting a pair of forks 3.

[0016] The supporting structure 2 comprises an upper bar 4, a lower bar 5, a first side bar 6 and a second side bar 7 for connecting the upper bar 4 and the lower bar 5 wherein the upper bar 4 and the lower bar 5 have a main longitudinal extension.

[0017] The upper bar 4, the lower bar 5, the first side bar 6 and the second side bar 7 define a viewing window 8.

[0018] The viewing window 8 according to the embodiment illustrated is divided into two parts by a middle bar 39.

[0019] The positioning device 1 comprises a movement unit 9 for moving the supporting structure 2 along a horizontal direction D parallel to the longitudinal direction of extension of the upper bar 4 and of the lower bar 5 of the supporting structure 2.

[0020] According to the invention, the movement unit 9 is positioned at the lower bar 5.

[0021] Advantageously, by positioning the movement unit 9 at the lower bar 5, the viewing window 8 is free from visual obstructions.

[0022] The lower bar 5 comprises a seat 10 for housing at least part of the movement unit 9.

[0023] Preferably, the housing seat 10 is configured to house the entire movement unit 9.

[0024] In particular, the movement unit 9 comprises a liner 11, inserted at least partly in the seat 10 for housing the lower bar 5.

[0025] The liner 11 comprises at least one flat top surface 12 configured for the sliding of rolling elements 13 connected to the lower bar 5.

[0026] The liner 11 has a flat bottom surface 33, opposite the top surface 12

[0027] The liner 11 has at least a first flat side surface 34 and a second flat side surface 35, positioned opposite each other.

[0028] The first side surface 34 and the second side surface 35 connect the top surface 12 and the bottom surface 33.

[0029] The liner 11 has a polygonal cross-section, in particular square.

[0030] The movement unit 9 comprises a first rod 14, connected to the first side bar 6, and a second rod 15, connected to the second side bar 7, positioned on oppo-

site sides of the liner 11.

[0031] The liner 11 has a first chamber 37 in which the first rod 14 is partly inserted and a second chamber 38 in which the second rod 15 is partly inserted, as illustrated in Figure 4.

[0032] Each between the first rod 14 and the second rod 15 is movable in the respective first chamber 37 and second chamber 38 from a retracted position to an extended position, and vice versa.

[0033] The movement of the first rod 14 and of the second rod 15 from the retracted position to the extended position, and vice versa, is controlled in an alternating fashion.

[0034] The movement of the first rod 14 from the retracted position to the extended position allows a translation of the supporting structure 2 in a first direction, for example towards the right of the driver.

[0035] The movement of the second rod 15 from the retracted position to the extended position allows a translation of the supporting structure 2 in a second direction, opposite the first direction, for example towards the left of the driver.

[0036] The actuation of the first rod 14 or of the second rod 15 is performed by means of a hydraulic system not illustrated.

[0037] The positioning device 1 comprises a unit 16 for supporting the supporting structure 2 slidably constrained to it.

[0038] The supporting structure 2 is movable relative to the supporting unit 16. During the relative movement between the supporting structure 2 and the supporting unit 16, the rolling elements 13 slide on the top surface 12 of the liner 11.

[0039] The liner 11 of the movement unit 9 is connected at least partly to the supporting unit 16.

[0040] Preferably, the liner 11 is connected to the supporting unit 16 at two coupling zones, the coupling zones being preferably positioned symmetrical to each other.

[0041] The supporting unit 16 comprises a first bar 27 and a second bar 28 positioned parallel to each other along a vertical direction and a third bar 29, joining the first bar 27 and the second bar 28, positioned along a horizontal direction.

[0042] The first bar 27 and the second bar 28 comprise respective rolling elements 30 designed to slide in respective guides of an upright 36 of the lift truck, see Figure 1.

[0043] The third bar 29 comprises a plurality of rolling elements 31 designed to slide in a seat 32 made in the upper bar 4 of the supporting structure 2.

[0044] In order to reduce the friction during the relative translation between the supporting structure and the supporting unit 16, the translation-positioning device comprises anti-friction elements 22 interposed between them.

[0045] In particular, the anti-friction elements 22 are interposed between the liner 11 of the movement unit 9 and the lower bar 5 of the supporting structure 2.

[0046] Yet more specifically, the anti-friction elements 22 are interposed between the first side surface 34 of the liner 11 and the lower bar 5 of the supporting structure 2, as shown in Figure 5.

[0047] The antifriction elements 22 are preferably in the form of bronze runners.

[0048] The positioning device 1 comprises first means 17 for coupling the supporting structure 2 and the movement unit 9 configured to prevent a relative rotation of the supporting structure 2 with respect to the supporting unit 16.

[0049] The relative rotation is understood as rotation about a horizontal axis parallel to the longitudinal direction of extension of the upper bar 4 and of the lower bar 5 of the supporting structure 2.

[0050] The first coupling means 17 comprise a male element 19, positioned on the liner 11 of the movement unit 9, and a female element 20, shaped to match the male element 19, connected to the lower bar 5 of the supporting structure 2, as illustrated in Figure 6.

[0051] Preferably, the male element 19 has a polygonal cross-section, in particular a right-angled trapezium cross-section.

[0052] The positioning device 1 comprises second coupling means 18 configured to prevent a relative translation of the supporting structure 2 relative to the supporting unit 16 along a vertical direction.

[0053] The second coupling means 18 comprise a plurality of plate-shaped elements 21 interposed between the liner 11 of the movement unit 9 and the lower bar 5.

[0054] The plate-shaped elements 21 are interposed between the bottom surface 33 of the liner 11 and the lower bar 5, as shown in Figure 5.

[0055] The plate-shaped elements 21 are connected to the lower bar 5 by fixing means.

[0056] The positioning device 1 comprises a first actuator unit 25 and a second actuator unit 26 each configured to move a respective fork 5.

[0057] This movement allows the forks 3 to be positioned relative to each other. The movement is a relative translation along the horizontal direction D parallel to the longitudinal direction of extension of the upper bar 4 and of the lower bar 5 of the supporting structure 2.

[0058] A first actuator unit 25 and a second actuator unit 26 comprise a respective single-acting hydraulic cylinder.

[0059] Alternatively, as illustrated in Figure 7, the positioning device 1 comprises at least one actuator unit 23 and transmission means 24 of the actuator unit 23 for moving the forks 3 relative to each other.

[0060] The actuator unit 23 comprises a single-acting hydraulic cylinder.

[0061] The transmission means 24 comprise a transmission chain.

Claims

1. A positioning device for positioning forks for a lift truck comprising:

   a supporting structure (2) configured to support a pair of forks (3) which comprises at least one upper bar (4) and a lower bar (5), which have a main longitudinal extension, and a first side bar (6) and a second side bar (7), which connect the upper bar (4) and the lower bar (5);
   the supporting structure (2) has a viewing window (8) defined at least by the upper bar (4), by the lower bar (5) and by the first side bar (6) and by the second side bar (7);
   a movement unit (9) for moving the supporting structure (2) configured to translate the supporting structure (2) along a horizontal direction (D) parallel to the longitudinal direction of extension of the upper bar (4) and of the lower bar (5) of the supporting structure (2);
   the device **characterised in that** the movement unit (9) is positioned at the lower bar (5) of the supporting structure (2), outside the viewing window (8).

2. The device according to independent claim 1, **characterised in that** the lower bar (5) comprises a seat (10) for housing at least part of the movement unit (9).

3. The device according to claim 2, **characterised in that** the movement unit (10) comprises a liner (11), inserted at least partly in the seat (10) for housing the lower bar (5).

4. The device according to claim 3, **characterised in that** the liner (11) comprises at least one flat top surface (12) configured for the sliding of rolling elements (13) connected to the lower bar (5).

5. The device according to claim 3 or 4, **characterised in that** the liner (11) has a polygonal cross-section, in particular square.

6. The device according to any one of claims 3 to 5, **characterised in that** the movement unit (9) comprises a first rod (14), connected to the first side bar (6), and a second rod (15), connected to the second side bar (7), positioned on opposite sides of the liner (11); the liner (11) has a first chamber (37) in which the first rod (14) is movable and a second chamber (38) in which the second rod (15) is movable.

7. The device according to any one of claims 3 to 6, **characterised in that** it comprises a unit (16) for supporting the supporting structure (2) and slidably constrained to it; the liner (11) of the movement unit (9) being connected to at least part of the supporting unit (16).

8. The device according to claim 7, **characterised in that** it comprises first means (17) for coupling the supporting structure (2) and the movement unit (9) configured to prevent a relative rotation of the supporting structure (2) relative to the supporting unit (16) about a horizontal direction (D) parallel to the longitudinal direction of extension of the upper bar (4) and of the lower bar (5) of the supporting structure (2).

9. The device according to claim 8, **characterised in that** the first coupling means (17) comprise a male element (19), positioned on the liner (11) of the movement unit (9), and a female element (20) connected to the lower bar (5) of the supporting structure (16).

10. The device according to any one of claims 7 to 9, **characterised in that** it comprises second means (18) for coupling the supporting structure (2) and the movement unit (9) configured to prevent a relative translation of the supporting structure (2) with respect to the supporting unit (16) along a vertical direction.

11. The device according to claim 10, **characterised in that** the second coupling means (18) comprise a plurality of plate-shaped elements (21) interposed between the liner (11) of the movement unit (9) and the lower bar (5).

12. The device according to any one of the preceding claims, **characterised in that** it comprises at least one actuator unit (23) and transmission means (24) of the actuator unit (23) for moving relative to each other the forks (3) along a horizontal direction (D) parallel to the longitudinal direction of extension of the upper bar (4) and of the lower bar (5) of the supporting structure (2).

13. The device according to any one of claims 1 to 11, **characterised in that** it comprises a first actuator unit (25) and a second actuator unit (26) each configured to move a respective fork (3) along a horizontal direction (D) parallel to the longitudinal direction of extension of the upper bar (4) and of the lower bar (5) of the supporting structure (2).

Fig. 1

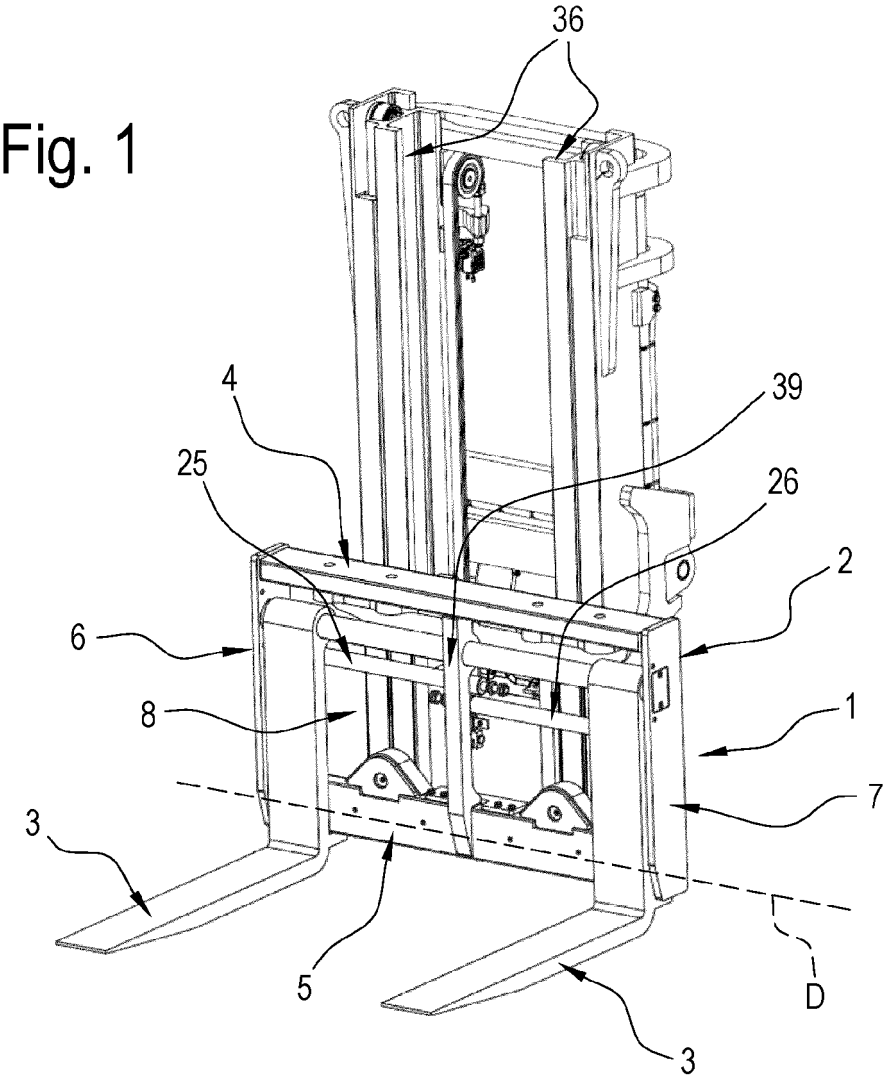


Fig. 2

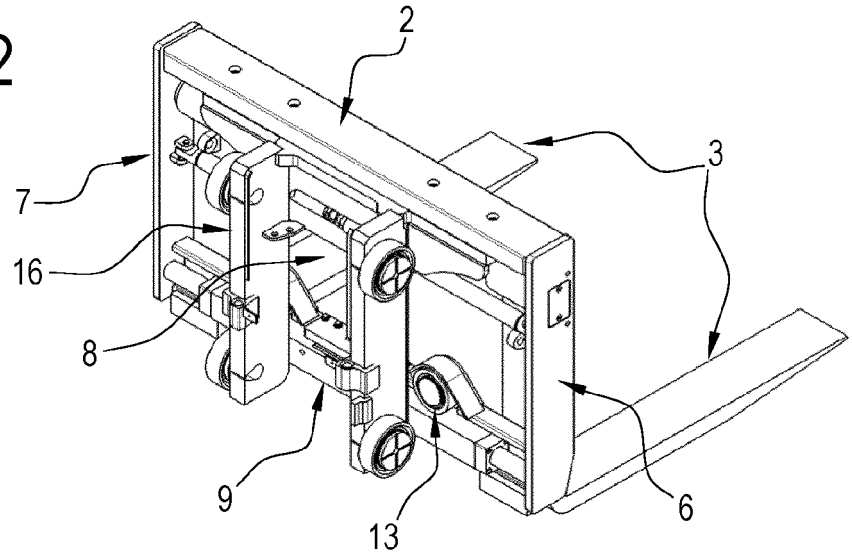


Fig. 3

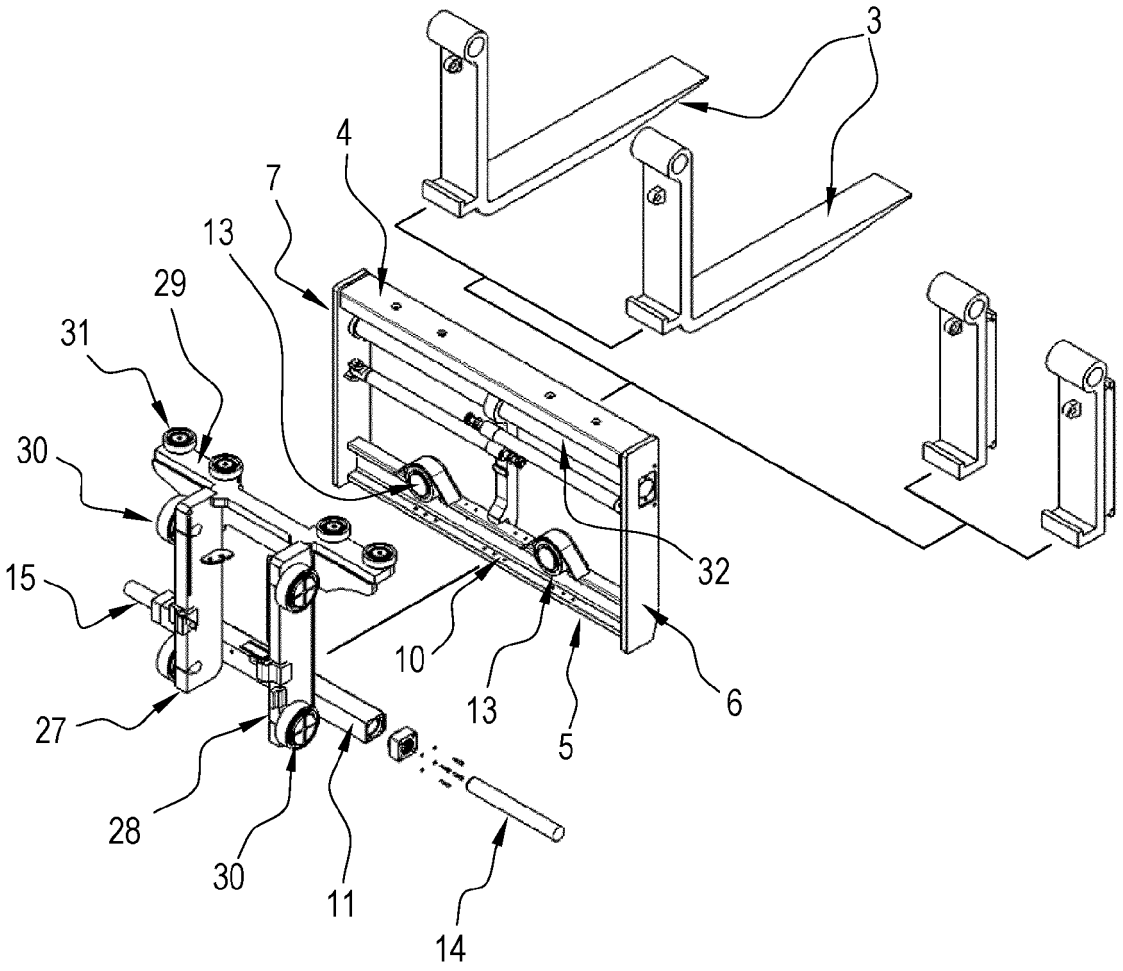


Fig. 4

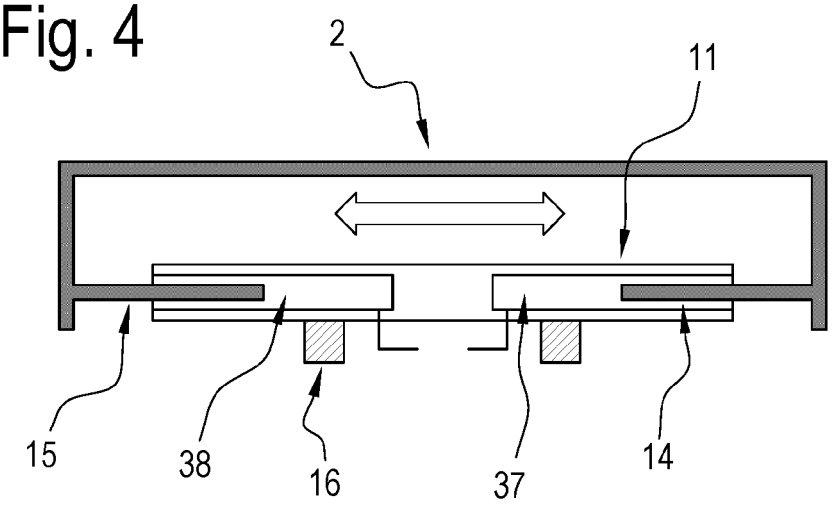


Fig. 5

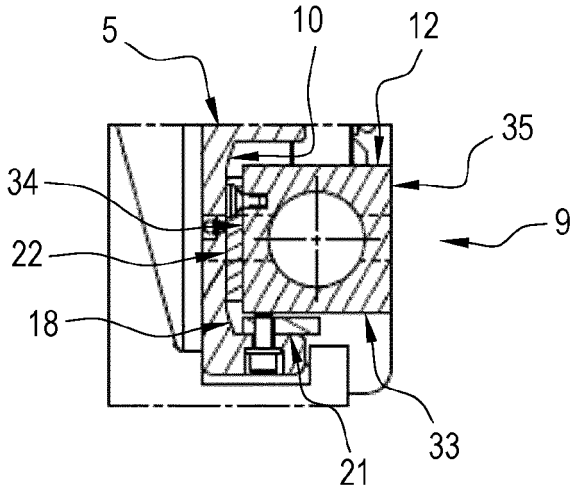


Fig. 6

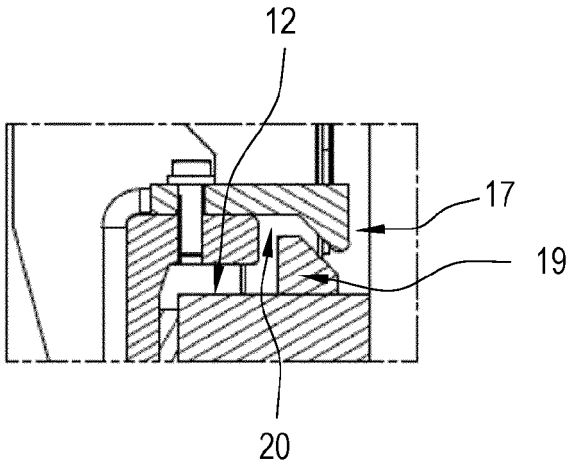
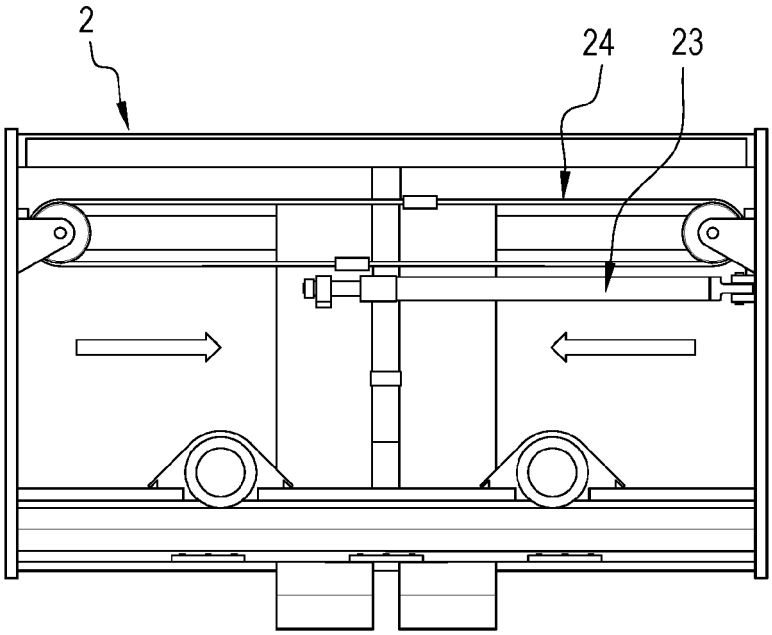


Fig. 7



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 21 5384

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 2005/186059 A1 (FORONI PIETRO [IT]) 25 August 2005 (2005-08-25) * paragraph [0029]; figures 5,8,10 *	1,12,13	INV. B66F9/14
X	JP H01 174396 U (KOMATSU FORKLIFT CO) 12 December 1989 (1989-12-12) * the whole document *	1,12,13	
A	US 5 707 201 A (HAMLIK JIM D [US]) 13 January 1998 (1998-01-13) * figures 4,5 *	1-13	

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	27 April 2023	Serôdio, Renato

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 21 5384

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-04-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005186059 A1	25-08-2005	DE 102005007106 A1	13-10-2005
		US 2005186059 A1	25-08-2005
JP H01174396 U	12-12-1989	NONE	
US 5707201 A	13-01-1998	NONE	

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