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(54) **A lifting vehicle for stacking loads.**

(57) A lifting device for stacking goods (16) at high heights comprises a wheel-carried chassis (11) which includes a lifting mast (12), and a chassis-carried driver's place which is positioned transversely to the vehicle driving direction. A load carrier (15) for stacking the goods (16) is movable along the lifting mast and can be manoeuvred from the driver's place (13) for the loading and offloading of goods. A tilting means (21) is provided for tilting the driver's place (13) to different angular positions in relation to the chassis, more specifically between a normal vehicle driving position and a rearwardly inclined position for lifting loads to high heights. The tilting means is conveniently constructed to tilt the driver's place about a tilting axle (20) which extends parallel with the longitudinal axis of the vehicle. The driver's place (13) may comprise a cabin structure which accommodates steering and lifting controls (18). The entire cabin structure can be tilted rearwardly about the tilt axle (20).-

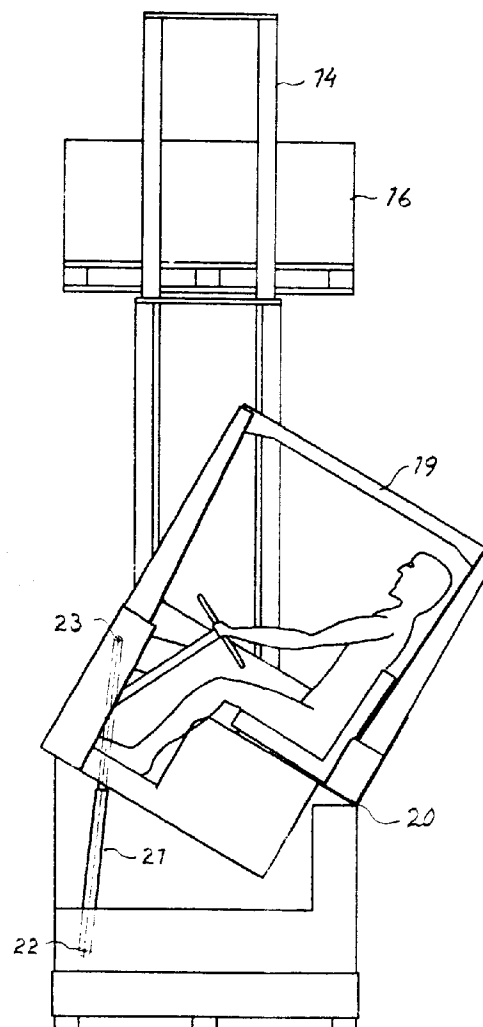


Fig. 3

The present invention relates to a lifting vehicle for stacking loads at high heights, comprising a wheeled chassis provided with a lifting mast, a driver's place mounted on the chassis and positioned transversely to the driving direction of the vehicle, and a load carrier for stacking loads, said carrier being movable along the lifting mast and capable of being manoeuvred from the driver's place for loading and offloading purposes.

One type of lifting vehicle of the aforedefined kind is often referred to as a sliding frame truck, which is used for handling pallet-carried goods in storage locations. The goods are normally stacked on pallets and when the goods are to be shifted, the forks of the truck are brought into alignment with the pallet directly from the driver's place, by driving the truck to a correct position at right angles to the goods in question and raising or lowering the forks into the correct position for lifting/lowering the goods. Such trucks work at high lifting heights, often heights of up to 10-12 m, which requires a high degree of accuracy on the part of the truck driver. The driver's work is also made more difficult by the fact that a greater part of his forward vision is obstructed by the truck frame or the mast, which must be powerfully dimensioned because of the high lifting heights involved. Furthermore, such storage locations are poorly illuminated, in order to cut down on costs. Although this poor lighting can be compensated for by fitting headlamps to the fork assembly, there are many instances when headlamps are not provided, despite the poor visibility. Another problem connected with positioning the fork assembly is that the driver's place is situated at right angles to the longitudinal axis of the truck and therewith also at right angles to the length extension of the forks. Consequently, it is necessary for the driver to twist his head through almost 90° and at the same time to lean backwards, in order to keep the goods, or load, in sight. This composite movement is unsuitable from an ergonomic aspect and is liable to result in strain injury to the driver.

Attempts have been made to solve these problems with the aid of different technical auxiliaries. For instance, there has been proposed the use of one or more TV-cameras for assistance in bringing the forks into a correct position, manoeuvring of the forks being monitored on a display provided at the driver's place. However, this method has not functioned satisfactorily hitherto, due, among other things, to the poor lighting and because the driver still needs to rely on his own visual control.

Accordingly, one object of the present invention is to provide a lifting vehicle of the kind defined in the introduction with which problems associated with uncomfortable inclination of the driver's head and poor visibility are avoided to a significant extent. Further objects of the invention and advantages afforded thereby will be apparent from the following descrip-

tion. These objects and advantages are realized by a lifting vehicle having the characteristic features set forth in the following claims.

The invention is based on the realization that the overall viewing angle afforded to the truck driver would be improved if it were possible to situate the driver on one side of the truck, and also on the realization that if the driver's place were to be inclined backwards, the driver would need only to turn his head to one side in order to obtain a clear view of the fork assembly. Accordingly, the present invention provides a lifting vehicle of the aforescribed kind which includes a tilting device by means of which the driver's place can be tilted to different position in relation to the vehicle chassis, more specifically between a so-called normal truck driving position and a tilted, high-lift position. The tilting device is constructed conveniently to tilt the driver's place about an axle arranged along one long side of the truck, so that when the driver's place is tilted rearwardly the driver will be located slightly outside the truck confines. Furthermore, tilting of the driver's place and the height to which the load carrier is lifted may be mutually coordinated and, although not necessarily, made directly proportional so that the driver's place will be tilted to a maximum at the time the load reaches its highest position.

The invention will now be described in more detail with reference to an exemplifying embodiment of the invention illustrated in the accompanying drawings, in which:

Figure 1 is a side view of an inventive fork truck; Figure 2 is a rear view of the truck, with the driver's place located in its so-called normal position; and

Figure 3 is a view similar to Figure 2 which shows the driver's place tilted to a maximum position and the load carrier in a raised position.

The illustrated vehicle is an industrial fork-lift truck, and more specifically a sliding frame truck of the kind mentioned in the introductory part of this specification. The truck includes conventionally a wheel-carried chassis 11, a chassis-mounted lifting mast 12 and a driver's place 13 which is transversal to the longitudinal axis of the vehicle. The lifting mast 12 or the frame is normally comprised of two or more telescopically arranged sections 14 and a load carrier 15 in the form of a lifting fork, which can be moved along the full length of the lifting mast. The lifting fork 15 extends in the direction of the vehicle long axis and is intended to carry palletized loads 16.

The driver's place 13 of the illustrated embodiment includes a cabin-like construction which accommodates a driver's seat 17, a steering wheel 18 and other steering controls for manoeuvring the truck, and a driver protection frame structure 19. The driver is placed so as to sit at right angles to the longitudinal axis of the truck and to the direction in which the truck

is driven, and therewith also to the forward direction of the load carrying fork 15. The entire driver's place or cabin 13 can be tilted about a tilting axle 20 by means of a tilting device 21, in the form of some appropriate lifting device. The tilting axle 20 is placed rearwardly of the driver's seat 17 and extends along one long side of the truck. The lifting device 21 will conveniently have the form of a hydraulic piston-cylinder device mounted between a first linch pin 22 mounted on the chassis and another linch pin 23 mounted on the cabin structure, in front of the driver. When the piston rod of the hydraulic piston-cylinder device is fully extended, the driver's place is tilted rearwardly at an angle of 30-40°, to the position shown in Figure 3, this figure also showing that the driver's head will then be located outside the plane of the long side of the truck, therewith affording the driver a better viewing angle without troublesome bending of the head.

The tipping device 21 may also have the form of some other type of hydraulic motor, or alternatively of some form of drive motor mounted in connection with the tilting axle 20, such that the rotary shaft of the motor and the tilting axle will essentially coincide. The arrangement may also include guide means which function to adjust automatically the rearwardly inclined position of the driver's place in relation to the height to which the load carrier is raised. This setting, or adjustment, need not be directly proportional, but may vary from case to case, so that different drivers are afforded the best possible comfort. This automatic accompaniment of the hydraulic lifting device may conceivably be achieved by coupling a hydraulic pump in parallel with the hydraulic pump conventionally provided with delivering working fluid to the lifting piston-cylinder devices (not shown) of the load carrier or fork 15. This arrangement will result in automatic coordination of the size and direction of the hydraulic flows without needing to involve complicated control technology. Thus, the additional pump may be given a capacity in which the driver's place will be tilted rearwardly to a maximum when the load carrier has reached its highest point.

It will be understood that the described and illustrated embodiment of the invention can be modified in many ways within the scope of the following claims. For instance, the lifting device may comprise a motor-driven ball screw and the tilting movement of the driver's place can be combined in some suitable manner with means which will enable the whole or parts of the driver's place to be swung to one side.

Claims

1. A lifting vehicle for stacking loads (16) at high heights, comprising a wheel-carried chassis (11) which includes a lifting mast (12), a chassis-

mounted driver's place (13) positioned transversely to the drive direction, and a load-stacking load carrier (15) which is movable along the mast and which can be manouvered from the driver's place for loading and offloading purposes, **characterized** by tilting means (21) which function to tilt the driver's place (13) to different positions in relation to the chassis (11), between a normal vehicle driving position and a rearwardly tilted position for high load-lifts.

2. A lifting vehicle according to Claim 1, **characterized** in that the tilting means is intended to tilt the driver's place about a tilting axle (20) which is generally parallel with the longitudinal axis of the vehicle; and in that the driver's place (13) includes a cabin provided with steering and lifting controls (18), and in that the entire cabin can be tilted rearwardly about the tilting axle (20).
3. A lifting vehicle according to Claim 1 or Claim 2, **characterized** in that the tilting means includes a lifting device (21) which is mounted between the driver's place (13) and the chassis (11).
4. A lifting vehicle according to Claim 3, **characterized** in that the tilting axle (20) is located behind the driver's seat (17) and extends along one long side of the vehicle; and in that the lifting device (21) is located forwardly of the driver's seat.
5. A lifting vehicle according to Claim 3 or 4, **characterized** in that the lifting device (21) is a hydraulic piston-cylinder device or some other hydraulic motor.
6. A lifting vehicle according to Claim 5, **characterized** in that the hydraulically operated lifting device (21) is coupled to or coordinated with the hydraulic circuit used to raise and lower the load carrier (15).
7. A lifting vehicle according to any one of the preceding claims, **characterized** by control means for automatically adjusting the rearward tilt of the driver's place (13) in relation to the height to which the load carrier (15) is raised.
8. A lifting vehicle according to Claim 6 or Claim 7, **characterized** by a first hydraulic pump for driving the hydraulic circuit for raising and lowering the load carrier (15), and by a second hydraulic pump which is connected in parallel with the first hydraulic pump and which functions to deliver working fluid to the hydraulic piston-cylinder device of the lifting device (21) or hydraulic motor; and in that the capacity of the second pump is adapted so that the driver's place (13) will be tilt-

ed rearwardly to a maximum when the load carrier is raised to its highest position.

9. A lifting vehicle according to any one of Claims 1-4, **characterized** in that the tilting means includes a motor-driven ball-screw. 5

10. A lifting vehicle according to any one of Claims 2-4, **characterized** in that the tilting means includes a rotary motor which is mounted adjacent the tilting axle (20), so that the rotational axis of the motor and the tilting axle will essentially coincide. 10

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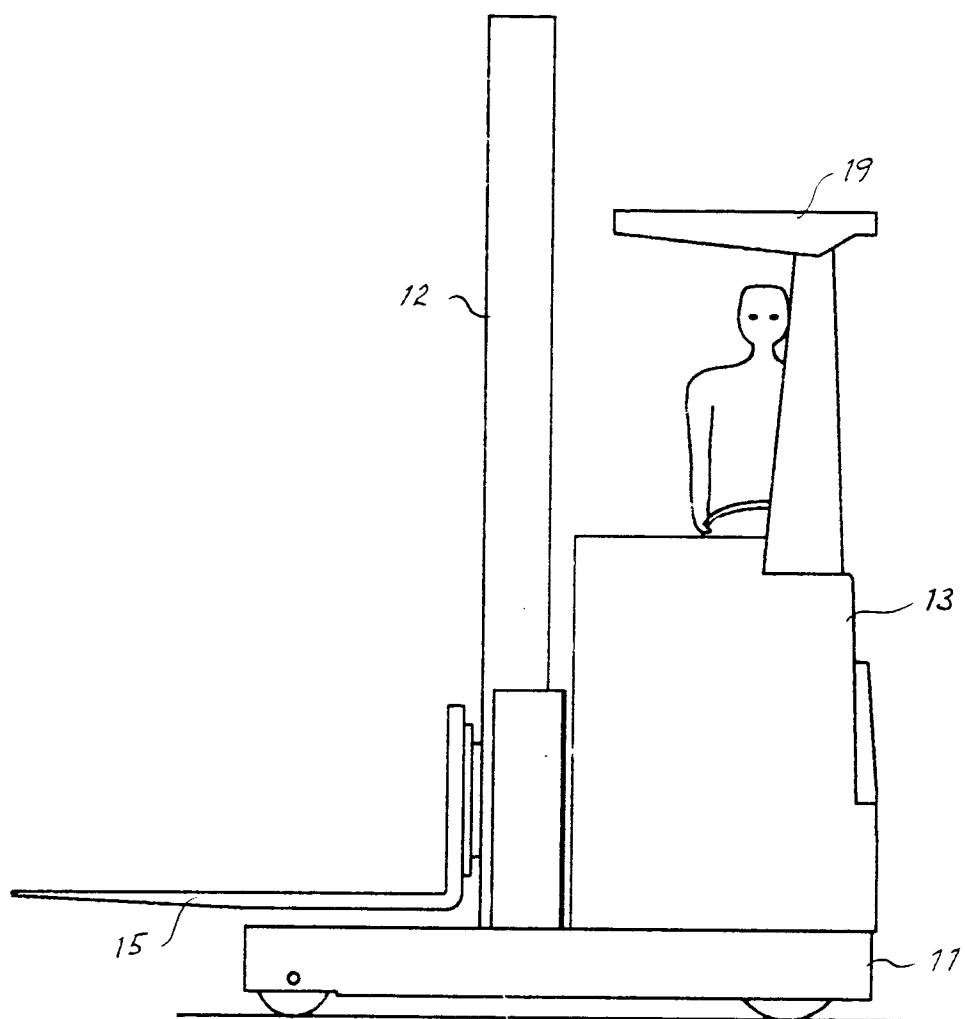


Fig. 1

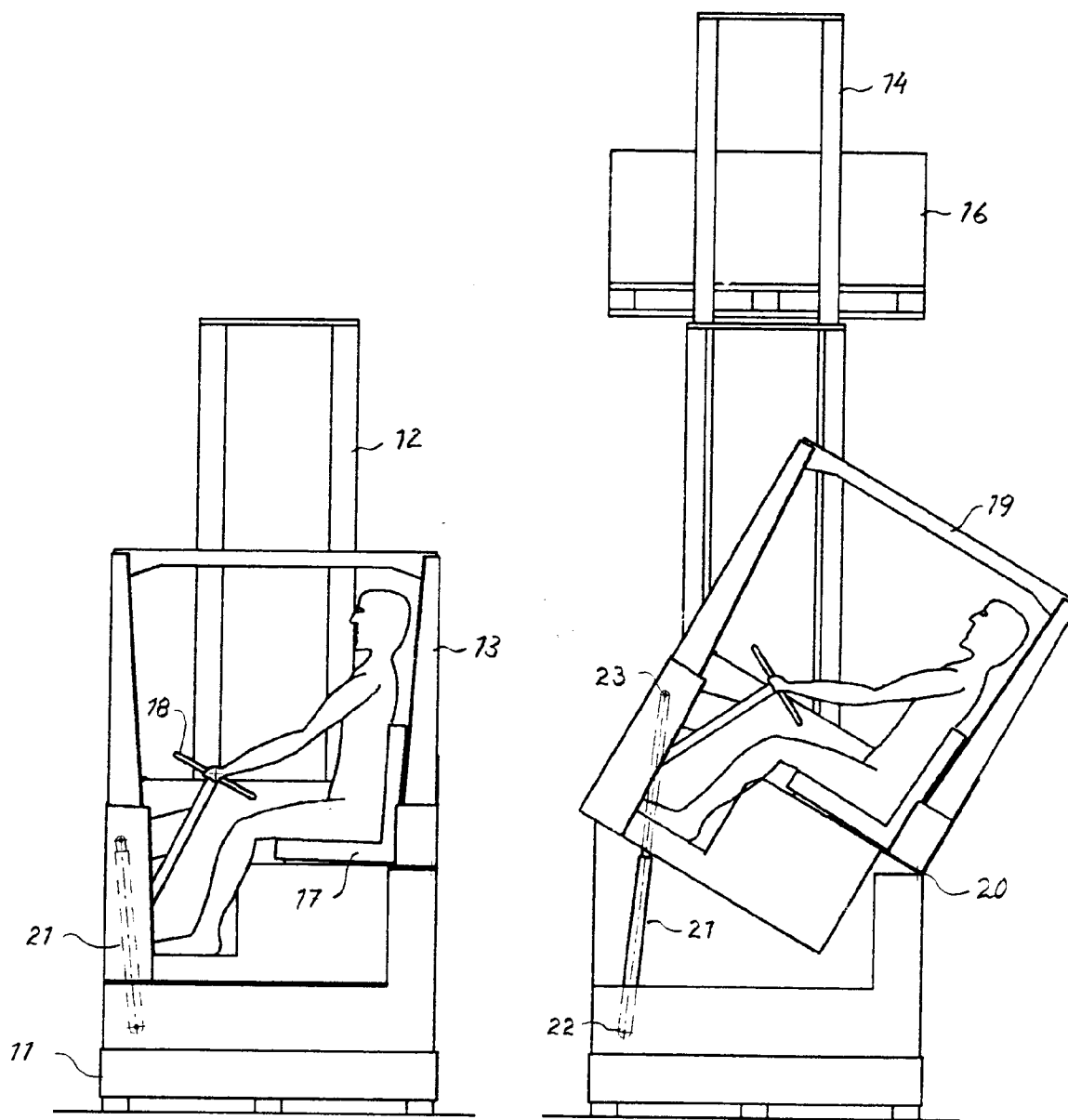


Fig. 2

Fig. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 85 0273

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	DE-A-1 924 223 (LANCER BOSS) * page 4, paragraph 3 - page 7, paragraph 1 *	1, 2, 3, 5	B66F9/075
Y	US-A-4 436 169 (JENNERJOHN) * the whole document *	1, 2, 3, 5	
A	FR-A-2 591 701 (JIDOSHA KIKI CO.) * abstract; figures 1-28 *	9	
A	EP-A-0 185 928 (KALMAR LMV)		
A	WO-A-9 104 221 (BRUBAKKEN)		
A, P	FR-A-2 664 556 (BRISAUD)		
A	US-A-4 331 419 (PERROTT)		
A	US-A-4 120 375 (SHINODA)		
A	DE-A-3 602 762 (CLAAS OHW)		
A	EP-A-0 383 278 (ANTON SCHLÜTER MÜNCHEN & CO.)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B66F B62D B66C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 JANUARY 1993	Examiner VAN DEN BERGHE E.
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