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# (54) A lifting vehicle for stacking loads

Fahrzeug zum Stapeln von Lasten

Véhicule pour stocker des charges

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## Description

The present invention relates to a sliding frame truck for stacking loads at high heights, comprising a wheel-carried chassis which includes a lifting mast, a chassis-mounted drivers place positioned transversely to the drive direction, and a load-stacking load carrier which is movable along the mast and which can be 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, manoeuvering 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.

From WO-A-9104221 and EP-A-0185928 motor driven counter weight trucks are known were the drivers cabin can be raised in order to improve visibility for the driver. In EP-A-0185928 the drivers cabin can also be moved obliquely lengthwise of the truck.

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 description. 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 aforedescribed kind which includes a tilting means which function to tilt the driver's place in relation to the chassis between a normal vehicle driving position and a rearward tilted position for high lifts, about a tilting axle which is generally parallel with the longitudinal axis of the vehicle, and located behind the drivers seat. 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 most 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 palleted 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 manouvering 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 accompanyment 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. Sliding frame truck for stacking loads (16) at high heights, comprising a wheel-carried chassis (11) which includes a lifting mast (12), a chassis-mounted drivers 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 manoeuvred from the driver's place (13) for loading and offloading purposes, **characterized by** tilting means (21) which function to tilt the driver's place (13) in relation to the chassis (11), between a normal vehicle driving position and a rearward tilted position for high lifts, about a tilting axle (20) which is generally parallel with the longitudinal axis of the vehicle, and located behind the drivers seat (17).

2. Lifting vehicle according to claim 1, **characterized in** a lifting device that is arranged to lift the front end of the cabin by means of a hydraulic piston-cylinder device coupled to or coordinated with the hydraulic circuit used to raise and lower the load carrier (15).

3. Lifting vehicle according to claim 1 or 2, **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 is raised.

4. Lifting device according to claim 2 or 3, **characterized by** a first hydraulic pump for driving the hydraulic circuit for raising and lowering the load carrier (15), and a second hydraulic pump which is connected in parallel with the first hydraulic pump and functions to deliver working fluid to the hydraulic piston-cylinder device of the lifting device (21) or hydraulic motor; and that the capacity of the second pump is adapted so that the driver's place (13) will be tilted rearward to a maximum when the load carrier is raised to its highest position.

## Patentansprüche

1. Schlitten-Lasttransportwagen zum Stapeln von Lasten (16) auf große Höhen, welcher ein auf Rädern laufendes Fahrgestell hat, welches einen Hubmast (12), einen am Fahrgestell angebrachten Fuhrerstand (13), welcher in Querrichtung zur Fahrtrichtung angeordnet ist, und einen laststapelnden Lastträger (15) umfaßt, welcher entlang des Masts bewegbar ist, und der vom Führerstand (13) aus zum Be- und Entladen bedienbar ist, **gekennzeichnet durch** eine Kippeinrichtung (21), welche derart arbeitet, daß sie den Führerstand (13) bezüglich des Fahrgestells (11) zwischen einer normalen Fahrzeugfahrtposition und einer nach hinten gekippten Position für große Hubhöhen um eine Kippachse (20) bewegt ist, welche im allgemeinen parallel zur Längsachse des Fahrzeugs ist und hinter dem Fahrersitz (17) liegt.

2. Hubfahrzeug nach Anspruch 1, **dadurch gekennzeichnet**, daß eine Hubeinrichtung vorgesehen ist, welche derart eingerichtet ist, daß sie das vordere Ende der Kabine mit Hilfe einer hydraulischen Kolben-Zylinder-Einrichtung anhebt, welche mit einer Hydraulikschaltung verbuden oder koordiniert ist, welche zum Heben und Senken des Lastträgers (15) eingesetzt wird.

3. Hubfahrzeug nach Anspruch 1 oder 2, **gekennzeichnet durch** eine Steuereinrichtung zum automatischen Einstellen der rückwärts gerichteten Kippbewegung des Führerstandes (13) in Abhängigkeit von der Höhe, auf die der Lastträger angehoben wird.

4. Hubfahrzeug nach Anspruch 2 oder 3, **gekennzeichnet durch** eine erste Hydraulikpumpe zum Betreiben des Hydraulikkreises zum Heben und Senken des Lastträgers (15), und eine zweite Hydraulikpumpe, welche parallel zu der ersten Hydraulikpumpe geschaltet ist und derart arbeitet, daß Arbeitsfluid der hydraulischen Kolben-Zylindereinrichtung der Hubeinrichtung (21) oder dem Hydraulikmotor zugeleitet wird, wobei das Leistungsvermögen der zweiten Pumpe derart angepaßt ist, daß der Führerstand (13) nach hinten auf einen Maximalwert gekippt wird, wenn der Lastträger zur höchsten Position angehoben wird.

**Revendications**

1. Camion à chariot permettant d'empiler des charges (16) à des hauteurs élevées, comprenant un châssis sur roues (11) qui comprend un mât élévateur (12), un poste de conduite monté sur châssis (13) situé à la transversale du sens de la marche, et un porte-charges (15) pour l'empilement de charges, qui peut se déplacer le long du mât et qui peut être manoeuvré depuis le poste de conduite (13) pour des opérations de chargement et déchargement, caractérisé par des moyens d'inclinaison (21) qui servent à incliner le poste de conduite (13) par rapport au châssis (11) entre une position de conduite de véhicule normale et une position inclinée vers l'arrière destinée à des élévations en hauteur, autour d'un axe d'inclinaison (20) qui est globalement parallèle à l'axe longitudinal du véhicule, et situé derrière le siège du conducteur (17).

2. Camion élévateur selon la revendication 1, caractérisé par un dispositif élévateur agencé de manière à relever l'extrémité avant de la cabine au moyen d'un dispositif hydraulique à piston et cylindre couplé ou coordonné au circuit hydraulique utilisé pour lever et abaisser le porte-charges (15).

3. Camion élévateur selon la revendication 1 ou 2, caractérisé par des moyens de commande destinés à régler automatiquement l'inclinaison vers l'arrière du poste de conduite (13) en fonction de la hauteur à laquelle est élevé le porte-charges.

4. Camion élévateur selon la revendication 2 ou 3, caractérisé par une première pompe hydraulique permettant de commander le circuit hydraulique pour l'élévation et l'abaissement du porte-charges (15), et une seconde pompe hydraulique reliée en parallèle à la première pompe hydraulique et qui sert à délivrer un fluide de fonctionnement au dispositif hydraulique à cylindre et piston du dispositif élévateur (21) ou au moteur hydraulique ; et en ce que la capacité de la seconde pompe est adaptée pour permettre au poste de conduite (13) d'être incliné vers l'arrière jusqu'à un maximum quand le porte-charges est élevé jusqu'à sa position maximale en hauteur.

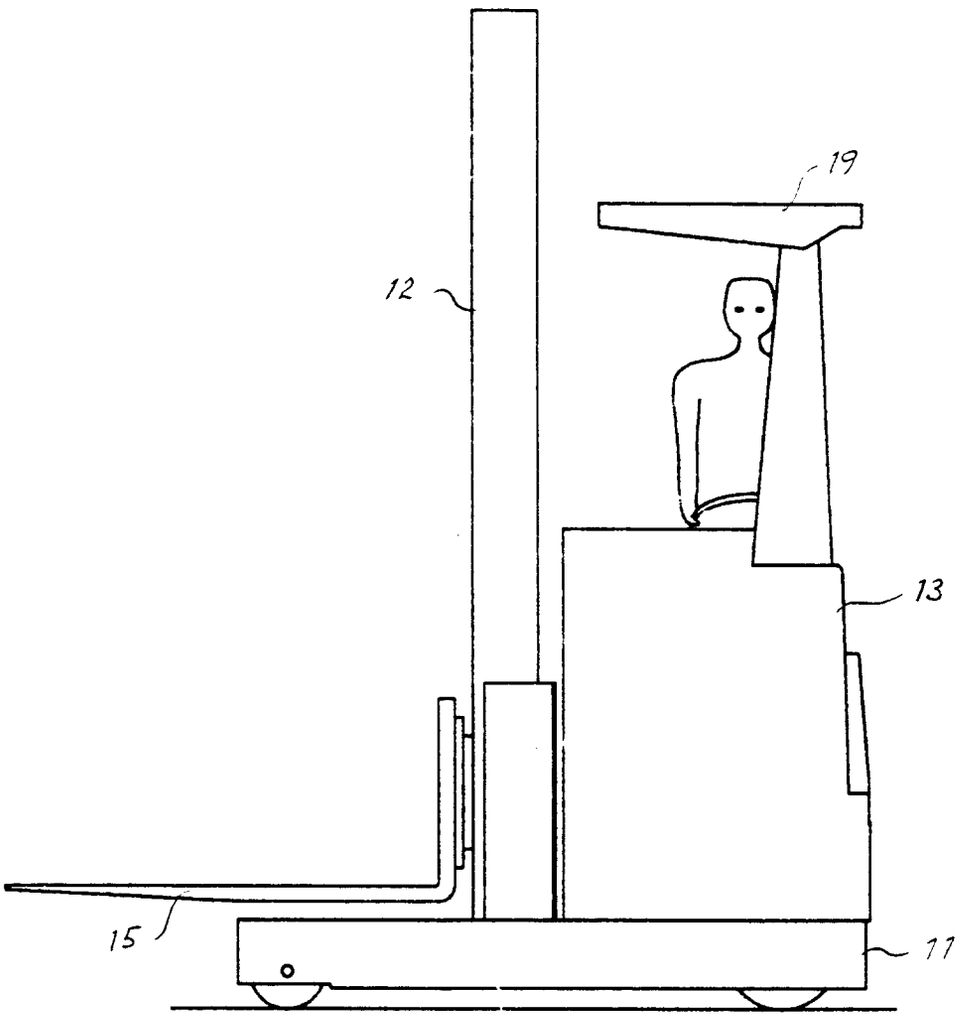


Fig. 1

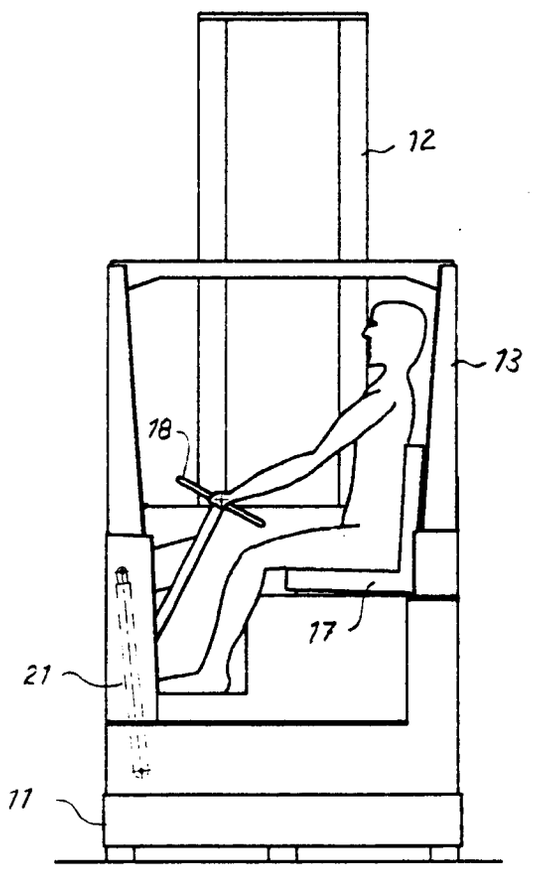


Fig. 2

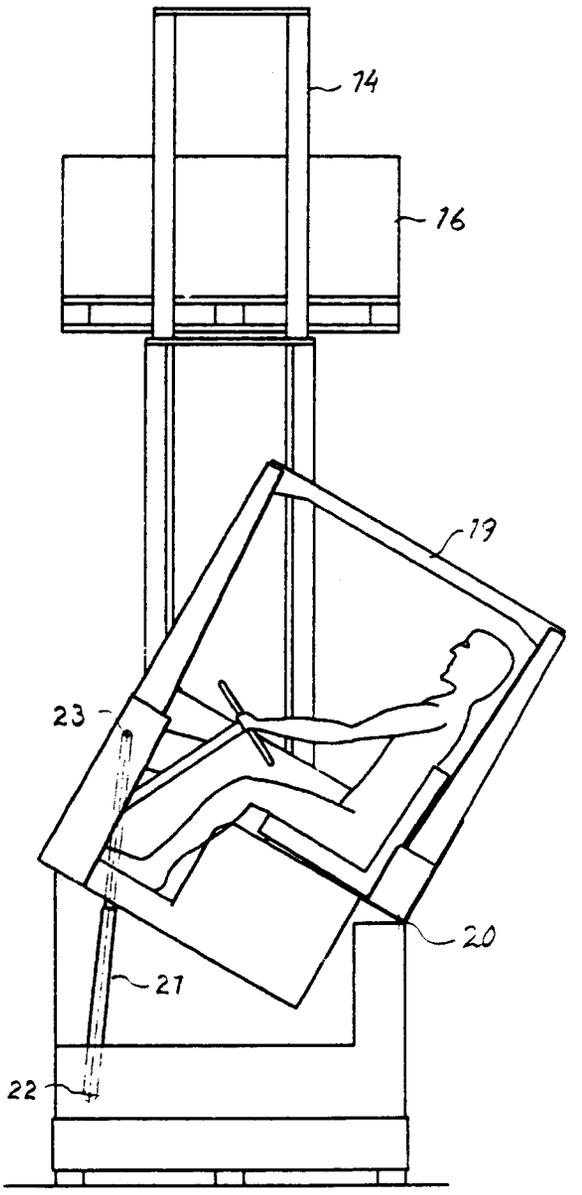


Fig. 3