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(54) A self-propelled lift truck, in particular for handling palletized loads.

(57) With the self-propelled lift truck disclosed, full pallets (9) can be loaded and unloaded into and from containers (16) or covered trucks affording rear access only, and manoeuvred internally of the enclosed stowage space; the truck (1) has the usual fork assembly (8) mounted to the end of a boom (4) anchored to the truck body (3), and in addition, at least one wheel (13) or a trolley associated with the fork end of the boom, which can be moved from an at-rest raised position to a lowered position in such a way as to enter into rolling contact with the loading deck (15) of the container and take the weight of the handled load.

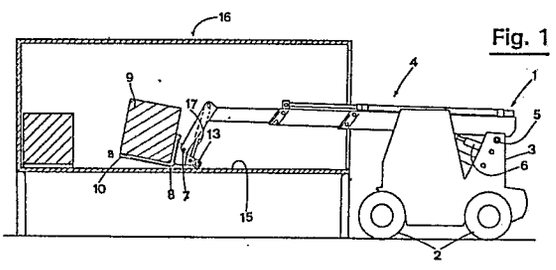

Fig. 1

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Description

A self-propelled lift truck, in particular for handling palletized loads

The present invention relates to a self-propelled lift truck, in particular for palletized goods. Such a piece of equipment is intended specifically, though by no means exclusively, for loading and unloading palletized materials or merchandise into and from containers, covered vehicles, enclosures or warehouse space affording a rear access point only. Whether loading or unloading, the need exists in all such situations for the palletized load to be transferred through an essentially horizontal path. With the conventional lift trucks currently in use, internal loading and unloading operations are ruled out for the most part, due mainly to the fact that the lift boom is required to operate under the most unfavourable conditions, namely, extended to its maximum outreach while disposed in a horizontal or sub-horizontal position. It would of course be possible, in theory, to overcome the difficulty by appropriate enlargement of the boom, hence of the lift truck to which it is fitted; this would result in a considerably large and heavy item of equipment, however, quite out of proportion with the sizes of load it is required to handle. Given the unsuitability of such an expedient, therefore, the need necessarily arises for a dual operation when loading and unloading palletized goods into and from containers, covered trucks, enclosures or warehouse space, namely:

1 - transfer of the palletized load to (or from, when unloading) a part of the container or vehicle body deck near to the rear access opening, effected by a self-propelled lift truck detailed to external handling duties;

2 - transfer of the palletized load set down on the deck by the self-propelled truck to a prescribed stowing position inside the container, for example, utilizing a manually operated transpallet, (or when unloading, transfer from the stowed position to a point on the deck near the rear access opening and within easy reach of the external handling truck).

The object of the invention is to obtain a notable simplification of the procedure thus described by eliminating the deck transfer operation effected with the manual transpallet and entrusting this same duty to a self-propelled lift truck which is able to operate externally of the enclosed stowing space utilizing a boom and fork assembly with the same dimensional, weight, lift capacity and reach specifications as those of equipment employed for loading and unloading in the conventional manner described above.

The stated object is realized with a self-propelled lift truck according to the invention, intended in particular for palletized loads, of the type having a cantilevered boom arm of which the projecting end carries a fork assembly and the remaining end is anchored to the body of the truck; the lift truck disclosed is characterized in that it comprises means arranged in such a way as to create at least one additional support for the cantilevered boom and fork assembly, which consist in at least one load-bearing component associated permanently with the cantilevered assembly and capable of movement in a vertical direction relative thereto between two limit positions: a raised, inactive position, and a lowered position in which the component fulfils its prescribed function of a simple means of support capable of rolling on a surface beneath. Among the advantages of the invention is that of its simplicity in construction.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

fig 1 is the schematic representation of a first embodiment of the invention, seen in elevation from the side;

fig 2 is a detail of fig 1, showing the invention in a different working configuration;

fig 3 is the plan of fig 2, from above;

fig 4 shows a further embodiment of the invention in the same view as that of fig 2;

fig 5 shows the embodiment of fig 4 in a different working configuration.

With reference to the drawings, 1 denotes a self-propelled lift truck running on wheels 2, to the body 3 which of a telescopic boom arm 4 is mounted. The boom 4 is anchored hingedly to the body 3 about a horizontally disposed pivot 5, the axis of which lies parallel to the axes of the paired wheels 2; the boom is caused to rotate about the axis of the pivot 5, hence raised and lowered, by a hydraulic cylinder 6 mounted between the body 3 of the truck and the boom itself.

7 denotes a pivot afforded by the projecting end of the farthest section of the telescoping boom 4, disposed with its axis parallel to that of the anchor pivot 5 and serving to carry a rotatable fork assembly 8 which provides a platform on which to lift a palletized load 9, i.e. materials or merchandise stacked on wooden pallets 10; as is well known, these pallets afford a space capable of receiving the prongs 11 of the fork assembly 8. 12 denotes a furcated support attached to the rear of the fork assembly 8, the members of which carry two identical wheels 13 rotatable about a common horizontal axis; the wheels 13 occupy an at-rest position, in relation to the fork assembly 8, above the level of a horizontal plane 14 tangential with the underside of the prongs 11 (see fig 2).

The entire fork assembly 8 is able to rotate about the pivot 7 between a lowered position denoted A, in which the prongs 11 are horizontally disposed, and a raised position, denoted B, in which the prongs are angled marginally from the horizontal.

The wheels 13 are proportioned and positioned on the fork assembly 8 in such a way as to lie at least in part below the level of the lowest point of the fork assembly whenever the prongs 11 are in the raised position B. More exactly, it can be seen from fig 1 that, in position B, the combined weight of the forks 8, the load 9 and the boom 4 is taken by the wheels

13, which simply rest on a surface 15 afforded by and constituting the loading deck of the container 16 in which the full pallets 10 are stowed. Thus, the lift truck 1, and the boom 4 in particular, are provided with an extra support by way of which to exploit the surface 15 afforded by the deck 15 of the container 16. In position A, shown in fig 2, the wheels 13 are not and cannot come into contact with the loading surface 15 by dint of their being totally above the level of the tangential plane 14 aforementioned; accordingly, the position in question ensures correct insertion and extraction of the prongs 11 into and from the spaces provided in the pallet 10: in position A, in fact (fig 2), the boom 4 is free to manoeuvre and subject only to its own unladen weight, so that the prongs 11 can be inserted into and withdrawn from the pallet 10 even at the maximum extended length. Once the prongs 11 are slotted into the pallet 8, rotation of the fork assembly 8 from position A to position B causes the prongs 11 to rise from the loading deck 15, and the wheels 13 to drop into contact with the deck, thereby "resting" the weight that currently bears down on the arm.

Rotation of the fork assembly 8 in either direction between position A and position B is produced by a hydraulic cylinder 17 mounted between the farthest projecting end of the boom 4 and the fork assembly itself. Thus, the truck 1 can proceed to handle palletized loads 9 internally of the container 16 with no difficulty as regards the load-bearing capacity of the boom 4. In effect, the additional support provided by the wheels 13 becomes available each time the configuration of fig 1 is reached, and the boom 4 can be manoeuvred without undergoing flexural stresses that would certain bear heavily upon it if cantilevered from the body 3 of the truck 1 with the far end unsupported. Once having assumed the configuration of fig 1, in fact, and free of any force exerted by the lift cylinder 6, the boom 4 operates as a simple beam supported by the wheels 13 on the one hand, and the anchor pivot 5 on the other.

In the embodiment of figs 4 and 5, the wheels 13 are mounted rotatably to a support 18 associated with the fork assembly 8 by way of a vertical slide, and the fork assembly 8 is traversed in the one direction and the other between a lowered and a raised position denoted A′ and B′ respectively, in relation to the support 18 and the wheels 13. In the lowered position A′, the wheels 13 lie fully above a horizontal plane disposed tangential to the underside of the prongs 11, whereas in position B′, the wheels 13 lie at least in part below the same tangential plane, and are thus able to rest on the surface 15 afforded by the loading deck on which the pallets are stowed.

In a further possible embodiment, not illustrated in the drawings though substantially equivalent to that just described, the wheels 13 might be mounted to an oscillating support, i e. pivotable about a horizontal axis and associated hingedly with the fork assembly or with the end of the boom 4. Such a support would be rotated up and down by a hydraulic cylinder, or by another component able to perform the identical function, installed between the support and the fork assembly 8 or the end of the boom 4, in such a way as to permit of positioning the wheels 13 entirely above or at least partly below the level of the prongs 11.

Claims

1) A self-propelled lift truck, in particular for handling palletized loads, of the type comprising a cantilevered boom arm (4) of which the projecting end carries a fork assembly (8) and the remaining end is anchored to the body (3) of the truck (1), characterized
in that it further comprises means, arranged in such a way as to create at least one additional support for the cantilevered boom (4) and fork assembly (8) and consisting in at least one load-bearing component associated permanently with the cantilevered assembly and capable of movement in a vertical direction relative thereto between two limit positions: a raised, inactive position, and a lowered position in which the component fulfils its prescribed function, namely, of a simple means of support capable of rolling on a surface beneath.

2) A lift truck as in claim 1, wherein the load-bearing component comprises at least one wheel (13) mounted rotatably to a support (12) permanently associated with the cantilevered boom (4) and fork assembly (8).

3) A lift truck as in claim 2, comprising at least one wheel (13) mounted to a support (12) associated rigidly with the fork assembly (8) and disposed in such a way that the wheel (13) lies entirely above the level of a horizontal plane tangential with the underside of the prongs (11) constituting the load platform of the fork assembly (8), wherein the fork assembly is hinged about a horizontal axis to the projecting end of the boom (4) and able to rotate a short distance in opposite directions between a lowered position in which the prongs (11) are horizontally disposed, and a raised position in which the prongs are angled from the horizontal, and the wheel (13) is positioned in such a way as to lie at least partly beneath the lowest point of the fork assembly (8) whenever the prongs (11), hence the plane (14) tangential to the underside of the prongs, occupy the angled position.

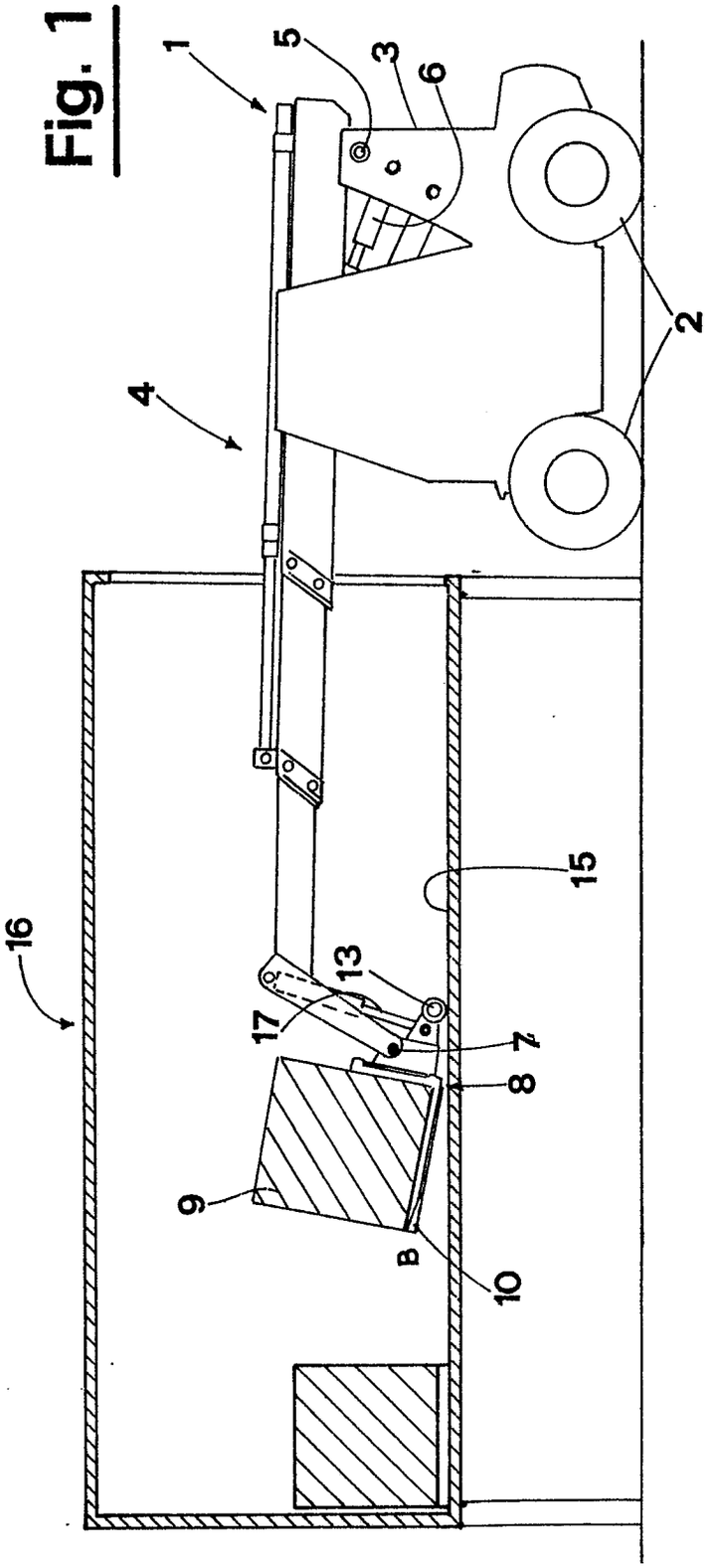
4) A lift truck as in claim 2, comprising at least one wheel (13) mounted rotatably about its own axis to a support (12) that is associated permanently with the boom (4) and fork assembly (8) in such a way that it can be moved between a lowered position, in which the wheel lies entirely above a plane (14) tangential to the underside of the prongs (11), and a raised position in which the wheel lies at least partly below the same plane (14).

5) A lift truck as in claim 4, comprising at least one wheel (13) mounted rotatably about its own axis to a support (12) thar is associated with the fork assembly (8) by way of a substantially

vertical slide, and hydraulic actuator means (19) by which the fork assembly (8) is traversed in opposite directions, relative to the wheel (13), between the lowered position and the raised position.

6) A lift truck as in claim 4, comprising at least one wheel (13) mounted rotatably about its own axis to a support associated pivotably with the fork assembly (8) or with the boom (4) and rotatable about a non-vertical axis, and hydraulic actuator means associated with the support on the one hand and with the fork assembly (8) or the boom (4) on the other, by which the support is rotated in opposite directions about the non-vertical axis between the lowered and raised positions.

Fig. 1



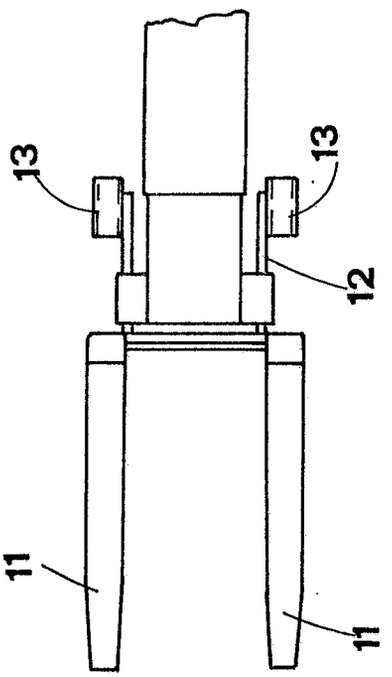


Fig. 3

Fig. 2

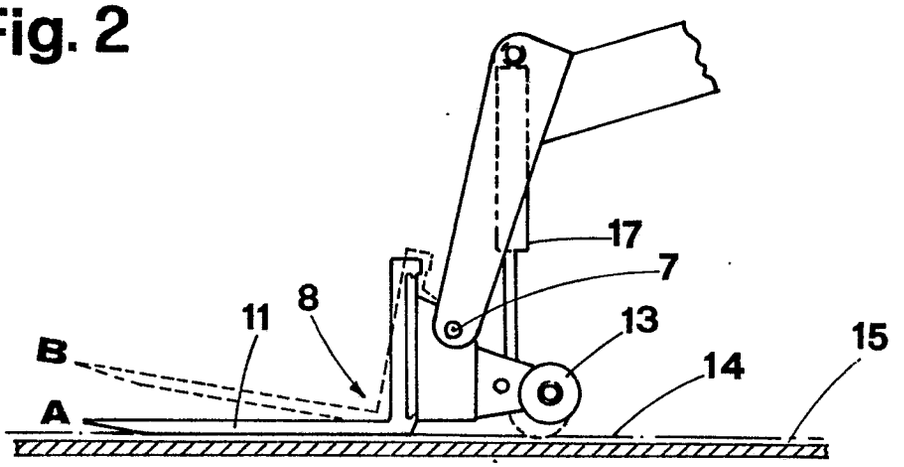


Fig. 4

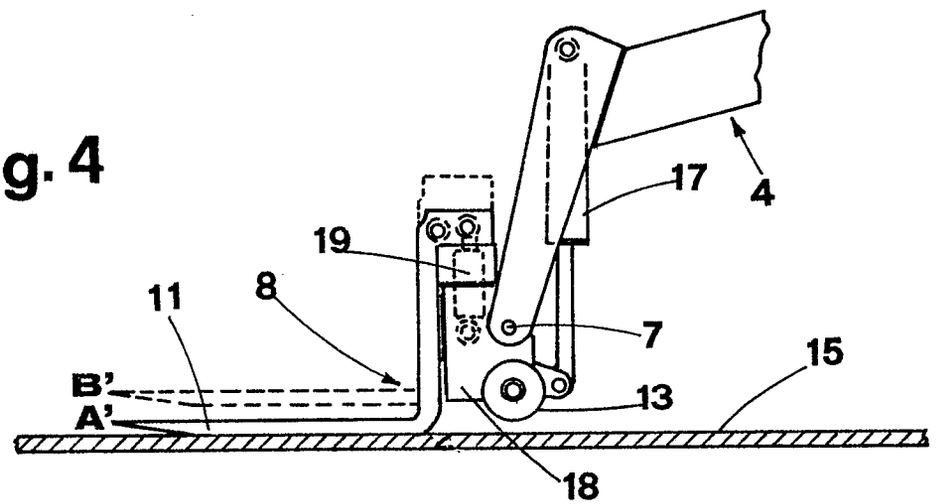
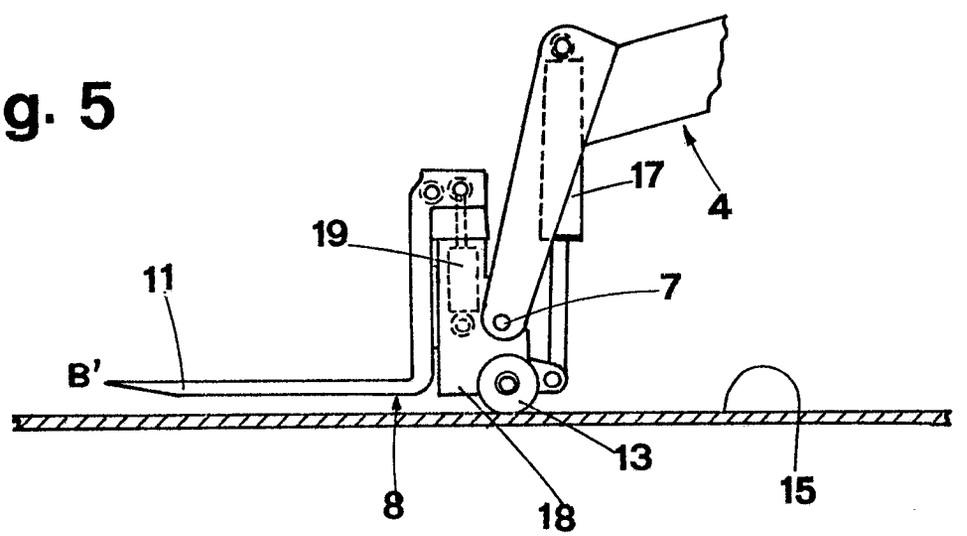


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number

EP 89 83 0214

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.4)
X	US-A-4 289 442 (STEVENS) * Abstract; figures; column 1, lines 48-68; column 2, lines 41-56; column 3, lines 35-62; column 4, lines 20-63 *	1-5	B 66 F 9/065 B 66 F 9/16
A		6	
X	DE-A-2 128 073 (H.F.M. HOHENLOHER FAHRZEUGE- UND MASCHINENVERTRIEB GmbH) * Page 2, lines 1-22; page 3, line 26 - page 4, line 19; page 7, line 1 - page 8, line 29; figures 1,2 *	1-4	
Y	GB-A-2 033 871 (LINER LTD) * Abstract; figure; page 1, lines 35-98 *	1-4	
Y	FR-A-2 090 093 (FORK LIFT TRUCK PATENTEES ESTABLISHMENT) * Page 1, lines 24-33; page 3, lines 5-11; page 3, line 21 - page 4, line 9; figures *	1-4	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	DE-A-3 020 055 (INGENIEURGESELLSCHAFT HÖLTER & DAMANN mbH) * Figures; page 4, line 21 - page 6, line 22 *	1,2	B 66 F
A	FR-A-2 545 468 (KOEHRING CO.)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31-08-1989	GUTHMULLER J.A.H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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