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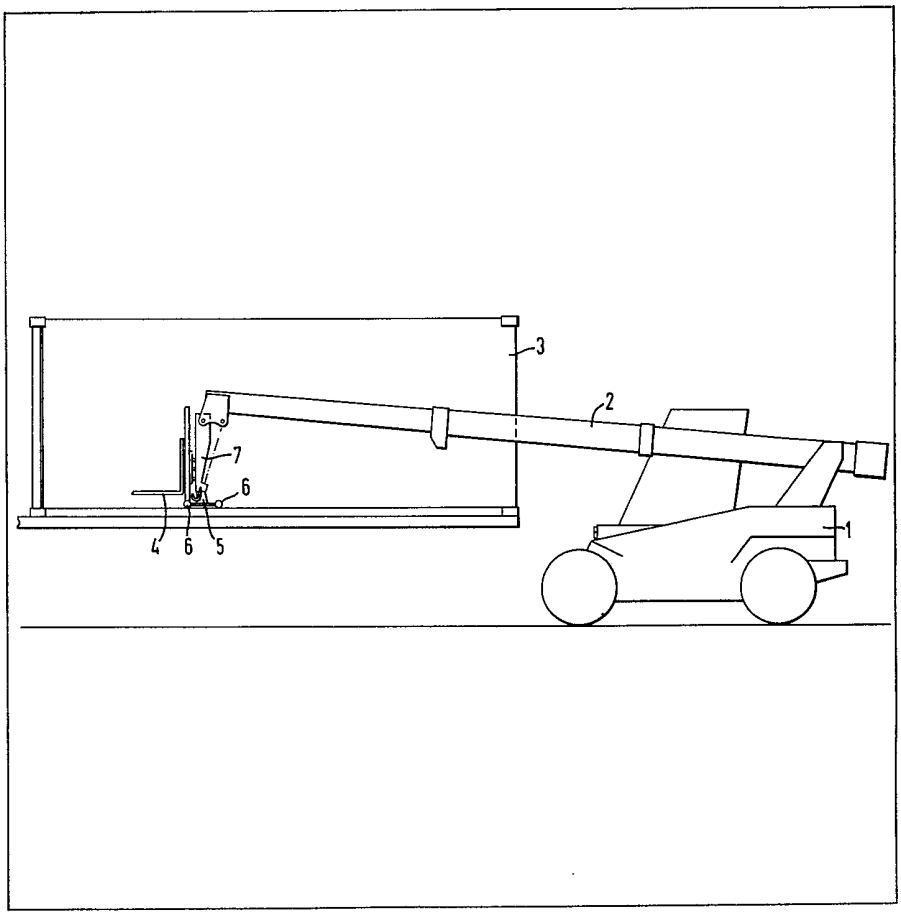
(54) Improvements in or relating to lifting trucks

(57) A fork lift truck 1 with an extendible boom 2 has fork apparatus 4 mounted on a trolley 5 with wheels 6. The fork apparatus 4 is supported at the end of the boom 2 by depending pivotally mounted arms 7, the trolley 5 having a sliding connection with the arms 7 as by a key and slot arrangement. The fork apparatus 4 can thus move vertically relative to the boom 2, within predetermined limits, so that it may be supported by the floor of the container 3 despite irregularities in the floor, or in positioning of the boom 2, to avoid possible tipping of the truck 1. Local control of raising and lowering of the forks may be provided,together with slewing, to facilitate control of the trolley 5 inside the container 3.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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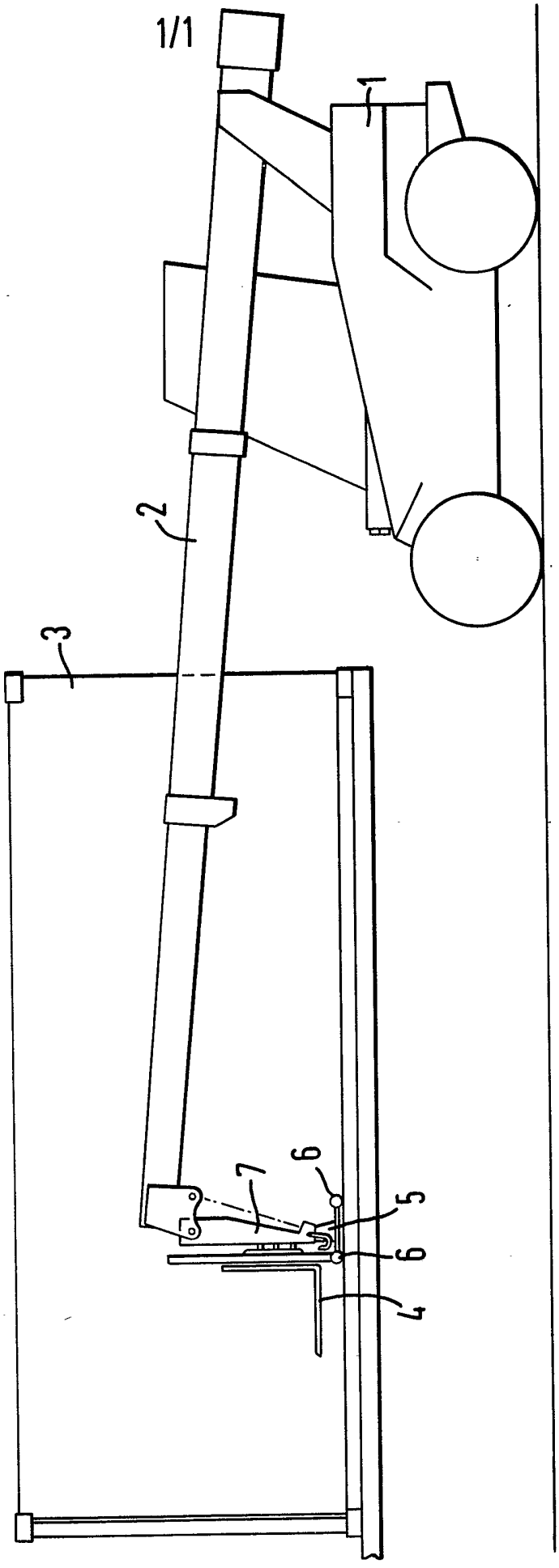

SPECIFICATION

Improvements in or relating to lifting trucks

This invention is concerned with the provision of apparatus for use in manipulating goods within containers used for transportation.

It is well known that in recent years the use of containers for the transportation of goods has increased greatly. In many cases containers can be packed at a factory and moved from there to a customer without having to disturb the contents of the container. This is a great advantage but there is often a problem in packing and unpacking containers. It would be a considerable advantage if fork lift trucks with extensible booms could be used for this purpose but our experiments have shown that there are problems in the use of such trucks for this purpose.

In the first place it must be realised that when the boom of a fork lift truck is loaded with a weight on the end of the forks and is moved into a container the load can be moved out only so far before the truck will topple over. To overcome this difficulty it is proposed to fit supports such as wheels on the forks so that the supports can rest on the container floor whereby the floor will take the load on the forks. However that in itself has proved to be insufficient because however good the truck driver may be when he extends the forks he is almost bound either to push the weight through the container floor or to lift it away from the floor so that the weight may either crush the floor or lift off the floor, leading to toppling.

In accordance with the present invention therefore we provide a fork lift truck having a telescopic or other type of extendable boom with the forks at or near to the end of the boom characterised in that the forks are provided with supports to rest on the floor of a container, the supports being movable up and down e.g. in a directly vertical plane to compensate for driver error.

In one embodiment we may provide what may be called a clip-on fork-lift trolley adapted for sliding movement up and down within predetermined limits e.g. over a range of 12" (inches). In this way the driver can operate by placing the trolley at the front of a container and then pushing the load to the back of the container, the amount of "play" in the system taking up any irregularities in the container floor or in the out of horizontal position of the extendable boom.

The trolley may have supports in the form of wheels, skids or the like and in a preferred arrangement has two or four wheels. The operation of the forks may be effected by hydraulic means in accordance with our usual practice. If desired limit switches operated electrically may be provided at the top and bottom of the "play" movement to give the driver two signals to raise or lower the boom when the possible vertical free movement of the trolley has almost been taken up.

In the accompanying drawing given by way of example a truck 1 has a boom 2, shown in its fully extended position projecting into a container 3. Fork apparatus 4 is mounted on a trolley 5 with wheels 6. The trolley 5 is supported at the end of the boom 2 by a depending pivotally mounted arm or arms 7 in such a way that the trolley 5 and fork apparatus 4 is slidable up and down relatively to the arm or arms 7. Any suitable sliding connection can be provided between the fork apparatus 4 and the arm or arms 7. For example the front of the arm or arms 7 may be vertically slotted to form a key-way and the rear of the fork apparatus may be provided with projecting key member to fit into the or each key way.

We have therefore provided an automatic means for compensating for inaccuracies in the movement of the boom of a fork lift truck of the type described above, the fork members being slidably mounted relatively to the boom so that the forks can move up and down as required within predetermined limits. Conveniently the boom is provided with two depending arms 7, one at each side, each arm being slotted or otherwise shaped to provide a sliding connection between the arm and the fork apparatus which as described is preferably mounted on a trolley or the like.

In some cases it may be required to provide local control of the forks in the raising and lowering function particularly in longer containers where the driver of the extensible boom fork life is too far away to control accurately the vertical lift means may therefore be provided to facilitate local up and down control of the forks by the driver. A vertical pivot to the trolley may also be included with or without power slew again to facilitate better control of the trolley inside the container.

CLAIMS

1. A fork lift truck having a telescopic or other type of extendable boom with fork apparatus at or near to the end of the boom characterised in that the fork apparatus is provided with supports to rest on the floor of a container, the supports being movable up and down e.g. in a directly vertical plane, to compensate for driver error.

2. A fork lift truck having a telescopic or other type of extendable boom with fork apparatus at or near to the end of the boom characterised by the provision of automatic means for compensating for inaccuracies in the movement of the boom of the truck, the fork apparatus being slidably mounted relatively to the boom so that the forks can move up and and down as required within predetermined limits.

3. A fork lift truck according to claim 1 or 2 provided with a clip-on fork lift trolley adapted for sliding up and down movement.

4. A fork lift truck according to any of the preceding claims wherein the trolley has supports in the form of wheels.

5. A fork lift truck according to claim 2 wherein limit switches are provided at the top and bottom of the "play" movement to give the driver signals to raise or lower the boom when the amount of "play" has been almost taken up.

6. A fork lift truck according to claim 1 or 2 wherein the fork apparatus is mounted on a trolley

which is supported at the end of the boom by a depending pivotally mounted arm or arms in such a way that the trolley and fork apparatus is slidable up and down relatively to the arm or arms.

7. A fork lift truck according to claim 6 wherein the arm or each arm is vertically slotted to form a key-way and the rear of the fork apparatus is provided with a projecting key member or members to fit into the key way (3).

8. A fork lift truck according to claim 6 wherein the boom is provided with two depending arms, one at each side, each arm being slotted or otherwise shaped to provide a sliding connection between the arm and the fork apparatus.

9. A fork lift truck according to claim 1 wherein local control means is provided to control the raising and lowering function of the fork apparatus to facilitate local up and down control of the forks by the driver.

10. A fork lift truck according to claim 6 wherein the trolley is pivotally connected to the boom with or without power slew to facilitate movement of the trolley inside a container.

11. A fork lift truck substantially as hereinbefore described with reference to the accompanying drawings.

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