

[54] **DETACHABLE FORK FOR LIFT TRUCKS**

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FOREIGN PATENTS OR APPLICATIONS

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[51] Int. Cl..... B66f 9/14

[58] Field of Search..... 214/145, 620, 730,
214/731, 750

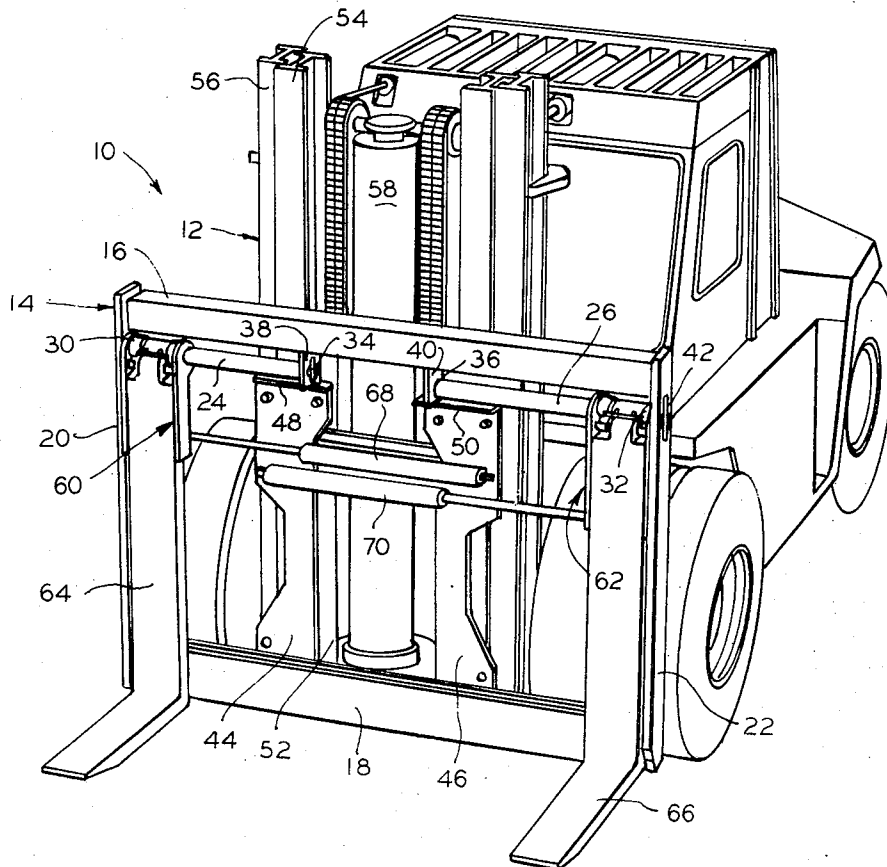
[57] **ABSTRACT**

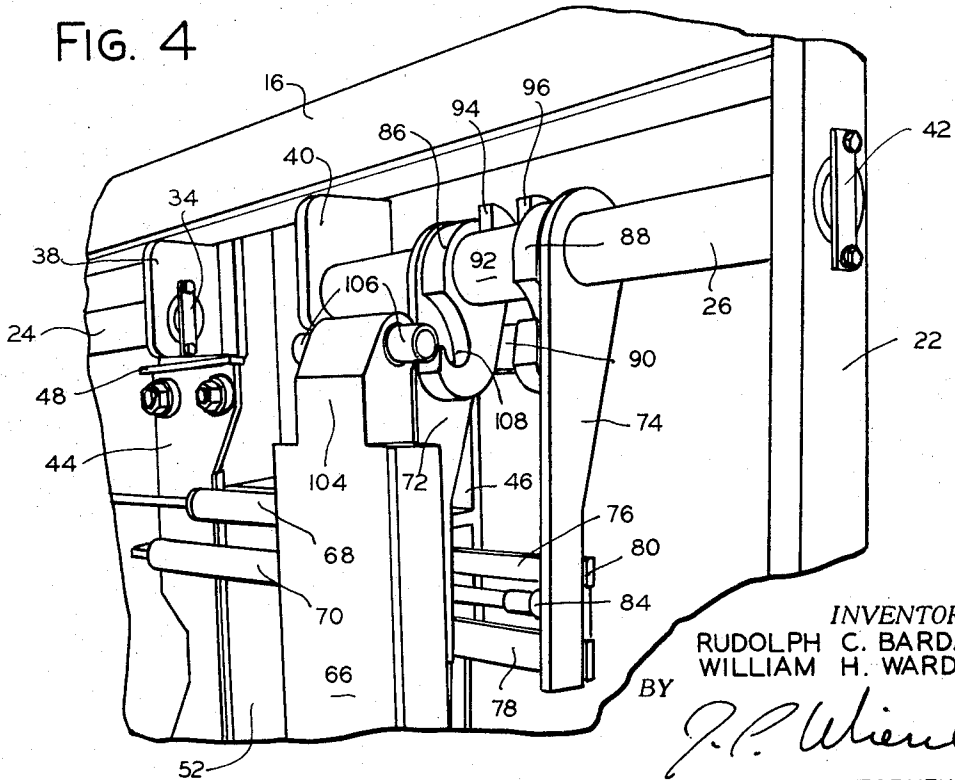
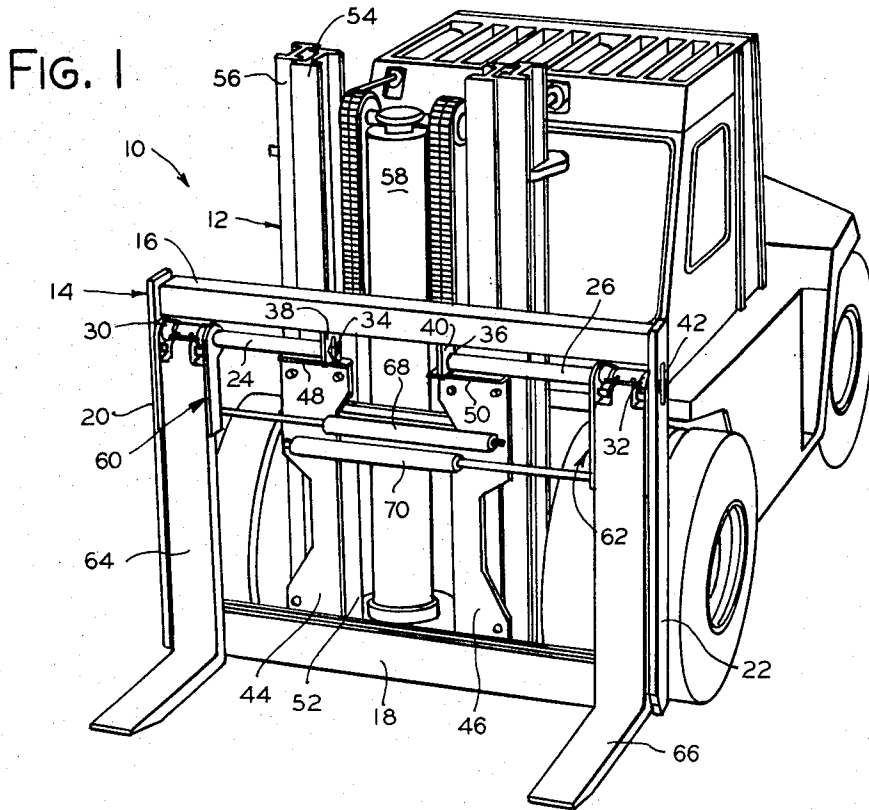
A fork mount particularly for heavy duty lift trucks which provides a side shiftable shaft mounted fork hanger bracket having hook portions for receiving stub support shafts of a rapidly detachable fork tine, and a manipulatable keeper element for retaining the stub shafts in the hook portions for operation and for permitting the rapid release thereof for detachment of the fork tines from the lift truck under selected conditions.

[56] **References Cited**
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5 Claims, 4 Drawing Figures





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FIG. 2

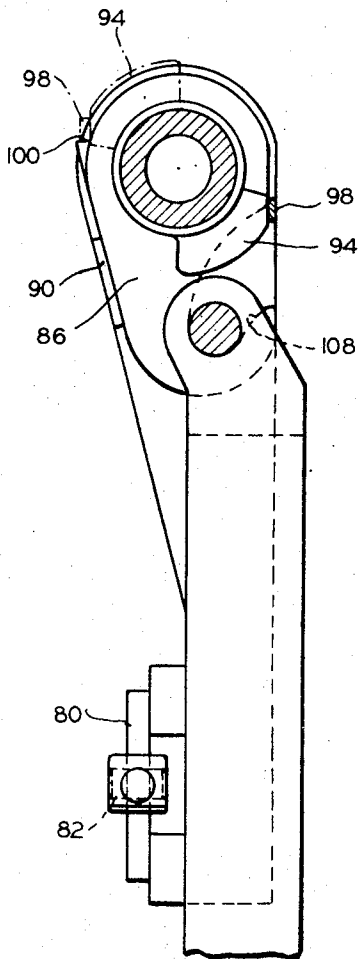
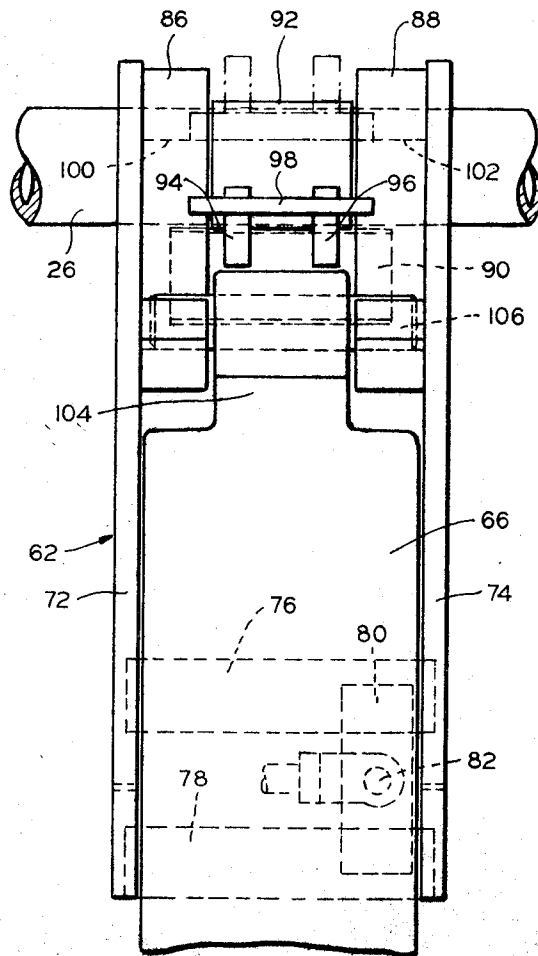


FIG. 3



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DETACHABLE FORK FOR LIFT TRUCKS

1. Background of the Invention

The field of art to which the invention pertains includes the mounting of load engaging devices, and particularly to mounting structure for fork tines.

As fork lift trucks and vehicles of similar character have become larger in load handling capacity the size and weight of load engaging means associated therewith, such as fork tines, have increased greatly, such that, for example, each fork tine of heavy duty lift trucks having lifting capacities between 50,000 pounds and 100,000 pounds may weigh between 2,500 pounds and 3,500 pounds. As a result, the handling of such load handling elements which have been heretofore not readily detachable from the vehicle has involved a considerable problem, necessitating the use of such other equipment as overhead crane equipment to handle them. Not only is such expensive capital equipment as overhead cranes engaged in relatively non-productive work, but a rather arduous procedure is required to mount and demount such fork tines and similar load handling elements, as well as causing delay in the productive use of the lift truck during such periods of time.

Large material handling equipment of the type here mainly under consideration is often used in a variety of material handling applications. For example, such large capacity lift trucks are used in the containerization industry for the handling of freight truck size shipping containers by means of special container handling attachments supported from the lifting carriage of the lift truck. Such usage requires the removal of fork tines with which the lift truck may also be utilized for different kinds of load handling applications; it is important for the equipment operator to be able to change over from one attachment or load handling device to another as quickly as possible since all such activity is non-productive. Furthermore, in situations wherein attachments such as container handling attachments are utilized, it will be understood that such operations are frequently carried out in large open yards and freight terminals where no equipment such as overhead cranes may be readily available for handling fork tines and the like.

Applicants' assignee has utilized heretofore a fork carriage construction for such heavy duty lift trucks of the type disclosed in its Feature Catalogue CY-525/625/700-1 wherein fork tines and a container handling attachment are shown in alternate use on the same lift truck, the fork tines being semi-permanently mounted from support shaft members which project through openings in the upper section of each fork tine. In order to remove such a fork tine it has been necessary heretofore to physically remove or detach from each fork tine and the fork carriage the tubular shaft support member. To reinstall the fork tine it has been necessary to support the fork tine by means of other equipment, such as a crane, and maneuver the tubular shaft through the openings provided in support members of the fork carriage and through the opening in the upper end of each fork tine.

In the line of lighter duty lift truck handling attachments applicants' assignee has heretofore developed a "quick-change" attachment device which enables lift truck operators to alternate between different kinds of load handling attachments in a very short time period, as illustrated and explained in assignee's sales brochure

SS1700. However the change-over equipment for such relatively light duty trucks and attachments is not applicable to the heavy duty equipment problem solved by the present invention.

SUMMARY

Our invention provides a quickly mountable and demountable load engaging means for heavy duty material handling vehicles, as in the mounting of fork tines on the carriage of a lift truck, wherein the truck operator alone may readily engage and disengage each fork tine, no external equipment or machines of extra personnel being required. Following engagement or mounting of the fork tines, means is provided at the mounting location for preventing unintentional disengagement of the fork tines, which means is quickly manipulatable into position by the operator.

It is a primary object of the invention to provide improved means for mounting load engaging elements on material handling vehicles.

It is an important object to provide in heavy duty lift truck equipment, means enabling the engagement and disengagement of heavy fork tines by means of operator maneuvering of the lift truck.

Other objects, features and advantages of the invention will become apparent to persons skilled in the art in view of the following description.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a heavy duty lift truck having mounted thereon a fork carriage and fork tines which embody our invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 3;

FIG. 3 is a partial front view in elevation of a fork tine and mounting means therefor; and

FIG. 4 is a partial view in perspective of the fork carriage, fork tine and mounting means shown in FIG. 1 with the fork tine disengaged from the mounting means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A large heavy duty lift truck is illustrated generally at numeral 10. It includes a lifting mast assembly 12 on which is mounted for elevation a carriage assembly 14. The carriage assembly comprises a generally rectangular framework having upper and lower transverse beams 16 and 18 connected to side plate members 20 and 22, connected between which are a pair of tubular support shaft members 24 and 26 which are located in the upper corner portions of the fork carriage in transversely spaced and substantially coaxial relation. Shaft members 24 and 26 are spaced below upper beam 16 and are supported at opposite outer ends in openings 30 and 32 formed in side plates 20 and 22, and at the inner ends in a second pair of openings 34 and 36 formed in a pair of transversely spaced brackets 38 and 40 which depend from beam 16. A plate member 42 is secured as by bolting over each end of each support shaft 24 and 26 thereby maintaining each shaft rigidly mounted in said openings.

The fork carriage includes a pair of vertical plate members 44 and 46 connected between beams 16 and 18 having flanges 48 and 50 near the upper ends of the plates supporting brackets 38 and 40 and the support

shafts and fork tines associated therewith. Connected to the inner corner portion of each plate 44 and 46 is a fork bracket, one of which is shown at 52; they mount the entire carriage and fork assembly in a well-known manner from guide rollers supported from the fork brackets and mounted in the inner channels of the pair of inner telescopic I-beams 54 of upright 12 for elevating movement in relation to both inner I-beams 54 and outer fixed I-beams 56 by means of a lift cylinder 58 and associated lifting mechanism.

The pair of fork hanger brackets 60 and 62 are mounted upon shaft members 24 and 26, respectively, for supporting a pair of fork tines 64 and 66. Each of the fork hangers is adapted for transverse sliding movement along the shaft 24 or 26, being actuatable transversely to selected spaced positions between the ends of the shafts by means of a pair of opposed hydraulic side shift cylinder assemblies 68 and 70 which are suitably secured at the base ends thereof to respective ones of plates 44 and 46 and at the rod ends to the fork hangers, as will be described below.

The pair of fork hanger bracket assemblies are of the same construction except that the connections for the side shift piston rods thereto are for right and left-hand units; therefore, a description of one hanger bracket assembly will suffice for both. FIGS. 2-4 disclose the details in partial view of the right side assembly, as seen in FIG. 1, of the fork 66, fork hanger 62, and carriage.

Fork hanger 62 comprises a pair of spaced side plate members 72 and 74 having openings in the upper ends for slidably receiving shaft 26 from which the members depend, being connected together at the lower end portions by a pair of transverse connector plates 76 and 78 to which is connected a mounting block 80 having an opening 82 for receiving a connector pin which engages a bifurcated bracketed end 84 on the piston rod end of cylinder assembly 70 (FIG. 4). The upper end portion of plates 72 and 74 are held in fixed spaced relation by a pair of transversely spaced fork hanger hook-like members 86 and 88 which are secured, as by welding, to the inner side surfaces of plates 72 and 74, respectively, and which are in turn secured together by a welded on plate 90 which is secured to the back surfaces of the hanger block members.

A rotatable sleeve member 92 is mounted on shaft 26 between hanger blocks 86 and 88. Secured in transversely spaced relation to a portion of the periphery of sleeve 92 are a pair of curved stop members 94 and 96 having the configuration shown in the drawing and being interconnected by a transverse bar 98 which may be utilized as an operator's hand hold for adjusting the sleeve and stops rotationally on shaft 26 between the solid and broken line positions shown in FIGS. 2 and 3 for a purpose to be described. When sleeve 92 is rotated so that the stop members are located in the upper or broken line position, the ends of hand bar 98, which overlap a portion of hanger members 86 and 88, engage transverse notches 100 and 102 formed transversely of the upper back surfaces of the hanger blocks, which retain by gravity the stop members in the position illustrated. The center of gravity of the sleeve assembly and stop members is such that when rotated clockwise to the solid line position, as seen in FIG. 2, the stop assembly remains in that position by gravity.

The upper end of fork 66 is formed to provide an upwardly extending reduced section projection 104 having the configuration illustrated. Secured in a trans-

verse opening formed in the upper end of the projection is a support shaft 106 which extends outwardly in opposite directions from the projection 104 to form notched portions between the shaft and the main body of the fork tines for reception in the hook portions 108 of the fork hangers as shown in figures.

In operation, when it is desired to engage the fork tines, such as following detachment of another attachment from the fork carriage, it is merely required that the truck be maneuvered into a confronting relationship with fork tines located and spaced upon a support surface such that the truck with the carriage lowered may approach the fork tines and engage the shaft 106 in the hook portions 108, as best shown in FIG. 4. Following registry of the shaft in the hook portions the carriage is raised which causes the shaft to be fully engaged in the recess of the hook portions as shown in FIGS. 2 and 3, whereupon the operator manually rotates sleeve 92 from the broken line to the solid line position shown in FIGS. 2 and 3, in which latter position stop members 94 and 96 are juxtaposed in overlying relationship to the upper end of fork projection 104, thereby preventing the possibility of disengagement of the fork tine in the event it engages an obstruction upon lowering thereof or the like.

In order to disengage the fork it is merely necessary that the fork carriage be lowered to a ground or floor level position wherein the fork carriage is lowered below the position at which the forwardly projecting tines of the fork engage the supporting surface. This causes each shaft 106 to be raised above the hook engaging portions 108, in which position the truck is backed away from the fork tines causing the relationship between the fork hangers 86 and 88 and the fork tines to assume the position shown in FIG. 4. The fork truck may then be utilized for any other purpose in association with any other attachment with which the carriage may be associated.

It will be apparent to those skilled in the art that various changes in the structure and relative arrangement of parts may be made without departing from the scope of our invention.

We claim:

1. In a lift truck having a fork carriage mounted for elevation in an upright, a fork mounting means including a transverse fork support, a pair of transversely spaced fork hanger brackets depending from said support, a fork tine having at the upper end a projection receivable between said fork hanger brackets, said fork hanger brackets including a pair of forwardly opening hook portions, oppositely outwardly extending shaft means on said fork tine projection receivable in and disengageable from said hook portions, said adjustable means including a sleeve rotatable on the fork support and having a stop means secured thereto and rotatable with the sleeve into and out of inhibiting relation to the upper projection of said fork tine whereby to prevent the accidental disengagement of the fork tine during operation of the lift truck when the stop means is rotated to a first position and to permit disengagement of the fork tine from said pair of fork hanger brackets when it is rotated to a second position, said fork tine being readily engageable and disengageable by said fork brackets when said stop means is in said second position by manipulation of the fork carriage up and down in relation to the engageable shaft means on the

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fork tine projection when the fork tine is self-supported on the truck supporting surface.

2. A fork mounting means as claimed in claim 1 wherein means are provided for actuating said fork hanger brackets axially of said fork support shaft either with or independ-ently of said fork tine.

3. A fork mounting means as claimed in claim 1 wherein said fork hanger brackets comprises a pair of forwardly opening hook members, said fork tine having extended outwardly in opposite directions from the upper end thereof shaft means adapted to be received in said hook members from an upright ground supported position of the fork tine.

4. A fork mounting means as claimed in claim 1 wherein said fork hanger brackets each includes outer downwardly depending side plates secured to the bracket and also depending from said fork support

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shaft, and said actuating means is connected to the fork carriage and to the side plates.

5. In a lift truck having a fork carriage mounted for elevation in an upright, a fork mounting means including a transversely extending fork support shaft, a pair of transversely spaced fork hanger brackets depending from said support shaft, a fork tine adapted to be received in said pair of fork hanger brackets, and adjustable means located between said pair of hanger brackets comprising a sleeve mounted on said shaft for rotation between two operative positions and stop means secured to said sleeve and rotatable therewith for preventing disengagement of the fork tine from said brackets in one operative position of said sleeve and for permitting disengagement thereof in the other operative position thereof.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,754,673 Dated 8/28/73

Inventor(s) Rudolph C. Barda and William H. Ward

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 49, after "port," and before "a fork tine" insert
-- an adjustable means located between said pair of brackets,--

Signed and sealed this 9th day of July 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents