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(54) Improvements in and relating to fork lift trucks

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Description

Introduction

[0001] The present invention relates to a forklift for mounting on the rear of a carrying vehicle of the type comprising a U-shaped chassis having a rear leg bridged by a pair of forwardly projecting side legs, grounding engaging wheels, a driver station mounted on one chassis leg, a motor drive mounted on the other chassis leg and forks mounted on a mast assembly located between the side legs of the chassis. The chassis invention relates particularly to the mast assembly. Such a forklift is described in NL-C-1 011 313, which correspond to the preamble of independent claim 1.

[0002] Such forklift trucks are often referred to as piggy-back forklift trucks and many constructions of such forklift trucks have been sold under the Trade Mark MOUNTY. Very often, they comprise a pair of front wheels and a rear steering wheel. However, equally well, two rear steering wheels are often used and in other embodiments, front steering wheels are used.

[0003] It is known to provide a forklift of this type in which the mast assembly comprises a mast assembly in the form of a telescopic mast that can be tilted to provide reach for the forklift. Such a construction of forklift is the telescopic boom forklift and is described in European Patent Specification No. 0 701 963 (Manitou). There are, however, certain problems with such a telescopic boom forklift which, while it allows extended reach for the forks of the forklift to engage a load, it has the disadvantage that as the height of the platform supporting load increases, it becomes increasingly difficult for the telescopic forklift to reach sufficiently far across the platform or vehicle from which the load is being removed or placed on. Obviously, the further the load is spaced-apart from the chassis, the less weight can be carried without causing the forklift to become unstable.

[0004] The present invention is directed towards providing an improved construction of such a forklift which will overcome these problems.

Statements of Invention

[0005] According to the invention, there is provided a forklift for mounting on the rear of a carrying vehicle, the forklift comprising:

a U-shaped chassis having a rear leg bridged by a pair of forwardly projecting side legs,

ground engaging wheels,

a driver station mounted on one side leg,

a motor drive mounted on the other side leg; and

forks mounted on a mast assembly located between the side legs of the chassis, whereby the mast assembly comprises an upright mast mounted on the chassis;

characterised in that the mast assembly comprises further a boom substantially orthogonal to the mast and slidable thereon;

means for raising and lowering the boom on the mast;

a fork carrier mounted on a free end of the boom carrying the forks; and

means for moving the fork carrier towards and away from the mast.

[0006] The advantage of this is that the forklift can be placed as near to the loading platform or trailer body as it can and thus will be less likely to tip than, for example, a telescopic boom forklift. Thus, the forklift according to the present invention can have the same reach as a telescopic forklift without the disadvantage inherent therein.

[0007] Ideally, the fork carrier is mounted on a free end of the boom and the boom is movable orthogonally with respect to the mast.

[0008] Preferably, the boom is telescopic and the boom may be slidably mounted by a sleeve on the mast and an actuating ram is connected between the sleeve and the free end of the boom.

[0009] In one embodiment of the invention, the mast is pivotally mounted on the chassis between the side legs and a tilting ram is providing for tilting of the mast relative to the chassis, which mast assembly may be movable between the side legs towards and away from the rear leg.

[0010] In this latter embodiment, when the mast is pivotally mounted on a support frame, a tilting ram is mounted between the support frame and the mast and the support frame is slidably mounted and movable between the side legs by a frame moving ram.

[0011] Ideally also, the mast is telescopic and when the mast is telescopic, preferably it is hollow and has an actuating ram mounted therein. A particularly suitable form of telescopic mast is a two-part mast comprising a lower inner portion and an embracing upper outer portion and an actuating ram housed in the lower inner portion and connecting the two portions together.

[0012] Ideally, with the two-part mast, the means for raising and lowering the boom on the mast comprises the actuating ram and an endless actuating chain led around a pair of vertically spaced apart pulleys in the outer portion, and secured to the inner portion intermediate the pulleys and to the boom.

[0013] In another embodiment of the invention, there is provided a forklift in which there is mounted adjacent the free end of the boom a ground engaging wheel. A ground engaging wheel may be mounted on a retractable

ram to raise and lower the wheel above and below the forks.

[0014] Preferably, the ram is mounted on the fork carrier. Ideally, there is a pair of laterally spaced apart wheels. These assist in taking some of the load and make the movement of loads across platforms easier than heretofore.

Detailed Description of the Invention

[0015] The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a forklift according to the invention,

Fig. 2 is a side view of the forklift,

Fig. 3 is a front view of the forklift,

Fig. 4 is a perspective view of a mast assembly according to the invention,

Fig. 5 is a side cut-away view of the mast assembly,

Fig. 6 is an enlarged perspective view of the rear of portion of the mast assembly,

Fig. 7 is a perspective view showing the forklift loading a trailer,

Fig. 8 is a side view of the forklift loading the trailer,

Fig. 9 is a perspective view of another construction of forklift according to the invention, and

Fig. 10 is a side view of the forklift of Fig. 9.

[0016] Referring to the drawings, there is provided a forklift, indicated generally by the reference numeral 1, for mounting on the rear of a carrier vehicle. Neither the carrier vehicle or the means for mounting the forklift 1 on it are illustrated as they have no relevant to this description. The forklift 1 comprises a U-shaped chassis, indicated generally by the reference numeral 2, having a rear leg 3 bridged by a pair of forwardly projecting side legs 4. The chassis 2 is mounted on ground engaging wheels, namely, front wheels 5 and rear wheels 6. A driver station 7 is mounted on one side leg 3 and a motor drive 8 is mounted on the other side leg 3. The driver station has a conventional steering wheel and operating equipment. Similarly, the motor drive 8 is again of conventional construction.

[0017] Forks 9 are mounted on a mast assembly, indicated generally by the reference numeral 10, between the side legs 4. The mast assembly 10 comprises an upright mast 11 carrying a boom, indicated generally by the reference numeral 12, substantially orthogonal thereto. The boom 12 is so mounted to be slidable up and down the mast 11 by means, indicated generally by the reference numeral 16, for raising and lowering the boom 12 on the mast 2. The forks are mounted on a fork carrier, indicated generally by the reference numeral 13, mounted on a free end 14 of the boom 12. Means, indicated generally by the reference numeral 17, are provided for moving the fork carrier 13 towards and away from the mast 11.

[0018] The upright mast 11 is a telescopic two-part mast comprising a lower inner portion 20 and an upper outer portion 21. The lower inner portion 20 houses a hydlaulic actuating, ram 22 connected to a bracket 30 on the upper outer portion 21. An actuating chain 3 is mounted on the exterior of the inner portion 20 by a bracket 32 and led over a pulley wheel 33 on the bracket 30 and connected to the sleeve 15 by a connector 34. The chain 31 is then led down to a pulley wheel 35 on the exterior of the lower outer portion 21 and back inside the outer portion 21 to the bracket 32. The chain 31 and ram 22 together from the means 16.

[0019] The boom 12 is also a telescopic boom having an inner section 25 slidable within an outer section 26 which are together mounted within the sleeve 15 and movable relative to the sleeve 15 by the actuating ram 17 which is mounted by a bracket 36 on the sleeve 15 and engages at its other end 31 a bracket 37 on the free end 14 of the inner section 25 of the boom 12.

[0020] The free end 14 of the boom 12 carries a pair of depending brackets 40 between a cross member 41 which mounts the fork carrier 13. The fork carrier 13 comprises a pair of transverse fork carrying beams, namely, an upper beam 42 and a lower beam 43 connected together by brackets 44. The upper beam has conventional fork engaging slots 48. The brackets 44 are connected by fork frame guide rods 45 which project through the brackets 40. Thus, the beams 42 and 43 are laterally slidable relative to the boom 12. Mounted between the brackets 40 is a cylinder 46 of a double acting side shift ram having piston rods 47 connected to each bracket 44. Thus, the fork carrier 13 and hence the forks 9 can be moved laterally with respect to the boom 11.

[0021] Referring specifically to Figs. 1, 4 and 8, the mast 11 is illustrated mounted on a rectangular frame 50 carrying rollers 51 which engage within grooves 52 in the side legs 4. A pair of frame moving rams 53 are mounted between the frame 50 and the chassis 2 for movement of the frame 50 towards and away from the chassis 2. A tilting ram 55 is mounted by a bracket 56 on the frame 50 and is also connected to the chassis 2 to allow tilting of the mast 11.

[0022] In operation, the forklift 1 is mounted on the rear of a carrying vehicle in conventional manner such as described in Manitou BF's European Patent No. 0 701 963.

[0023] In use and referring specifically to Figs. 7 and 8, where there is illustrated a trailer 60, onto which is

placed a load 61. The forks 9 are illustrated carrying the load 61 in conventional manner. The boom 12 can be moved inwards and outwards by the ram 17 to have the fork carrier 13 assume a position, as illustrated in Fig. 2, close against the mast 11 or in the fully spaced-apart or extended position, as illustrated in Fig. 8.

[0024] The mast 11 can be extended or retracted by the actuating ram 22. As the mast 11 is extended, the chain 31 between the pulley 33 and the sleeve 15 shortens and pulls the boom 12 up the mast 11. Simultaneously the chain between the sleeve 15 and the pulley 35 extends. The reverse motion occurs when the mast 11 is retracted. Similarly, the mast 11 can be moved forwards and backwards by the frame moving ram 53. Thus, loads can be moved across platforms or vehicle bodies in an efficient and easily controlled manner. For very heavy loads, it can be advantageous to have the mast 11 as near as possible to the centre of gravity of the forklift 1. At the same time, the use of the moving support frame can be particularly advantageous where the forklift 1 can only be moved against a platform and not beneath it, where a load is being taken or removed from the platform. There is full, vertical and horizontal control of the movement of the load. This is advantageous as compared to a telescopic boom forklift, which telescopic boom forklift pivots about the vertical to allow the forks engage a load.

[0025] Referring to Figs. 9 and 10, there is illustrated an alternative construction of forklift, again identified generally by the reference numeral 1, in which parts similar to those described with reference to the previous drawings, are identified by the same reference numeral. In this embodiment, on the fork carrier 13 is mounted, by means of retractable rams 65, a pair of ground engaging wheels 66. In operation, the wheels 66 can be raised and lowered to help support the load. This will also tend to equalise the loading on the forklift and reduce the moment causing the rear wheels of the forklift 1 to raise off the ground. Suitable controls can be provided to raise and lower the wheels 66. It is envisaged that instead of being mounted, as illustrated, with the rams outside the fork carrier, preferably they may be mounted within the frame of the fork carrier.

[0026] While in the embodiment described above the boom is a telescopic boom, it is not necessary to have a telescopic boom and the forks or more strictly the fork carrier could be slidable on a rigid boom. All that is required is that the forks be movable in the x and y axis.

[0027] In the specification the terms "comprise, comprises, comprised and comprising" or any variation thereof and the terms "include, includes, included and including" or any variation thereof are considered to be totally interchangeable and they should all be afforded the widest possible interpretation and vice versa.

Claims

1. A forklift (1) for mounting on the rear of a carrying vehicle, the forklift (1) comprising:

a U-shaped chassis (2) having a rear leg (3) bridged by a pair of forwardly projecting side legs (4),
ground engaging wheels (5, 6),
a driver station mounted on one side leg (7),
a motor drive (8) mounted on the other side leg (7); and
forks (9) mounted on a mast assembly (10) located between the side legs (4) of the chassis (2), whereby the mast assembly (10) comprises an upright mast (11) mounted on the chassis (2);
characterised in that the mast assembly (10) comprises further: a boom (12) substantially orthogonal to the mast (11) and slidable thereon;
means (16) for raising and lowering the boom (12) on the mast (2);
a fork carrier (13) mounted on a free end (14) of the boom (12) carrying the forks (9); and
means (17) for moving the fork carrier (13) towards the mast to a position close against the mast and away from the mast (11).

2. A forklift (1) as claimed in daim 1, in which the fork carrier (13) is mounted on a free end of the boom (12) and the boom (12) is movable orthogonally with respect to the mast (11).

3. A forklift (1) as claimed in claim 1 or 2, in which the boom (11) is telescopic.

4. A forklift (1) as claimed in claim 3, in which the boom (11) is slidably mounted by a sleeve (15) on the mast (11) and an actuating ram (17) is connected between the sleeve (15) and the free end (14) of the boom (12).

5. A forklift (1) as claimed in any preceding claim, in which the mast (11) is pivotally mounted on the chassis (2) between the side legs (4) and a tilting ram (55) is providing for tilting of the mast (11) relative to the chassis (2).

6. A forklift (1) as claimed in any preceding claim, in which the mast assembly (10) is movable between the side legs (4) towards and away from the rear leg (3).

7. A forklift (1) as claimed in claim 5 and 6, in which the mast (11) is pivotally mounted on a support frame (50), a tilting ram (55) is mounted between the support frame (50) and the mast (11) and the support frame (50) is slidably mounted and movable between the side legs (4) by a frame moving ram (53).

8. A forklift (1) as claimed in any preceding claim, in which the mast (11) is telescopic.

9. A forklift (1) as claimed in claim 8, in which the mast (11) is hollow and has an actuating ram (22) mounted therein.

10. A forklift (1) as claimed in claim 8, in which the mast is a two-part mast comprising a lower inner portion (20) and an embracing upper outer portion (21) and an actuating ram (22) housed in the lower inner portion (20) and connecting the two portions (21, 22) together.

11. A forklift (1) as claimed in claim 10 in which the means 16 for raising and lowering the boom (12) on the mast 2 comprises the actuating ram 22 and an endless actuating chain led around a pair of vertically spaced apart pulleys in the outer portion (21), and secured to the inner portion (20) intermediate the pulleys and to the boom (12).

12. A forklift (1) as claimed in any preceding claim, in which there is mounted adjacent the free end (14) of the boom (12) a ground engaging wheel (66).

13. A forklift (1) as claimed in claim 12 in which the ground engaging wheel (66) is mounted on a retractable ram (65) to raise and lower the wheel (66) above and below the forks (9).

14. A forklift (1) as claimed in claim 13 in which the ram (65) is mounted on the fork carrier (13).

15. A fork lift (1) as claimed in any of claims 12 to 14 in which there is a pair of laterally spaced apart wheels (66).

Patentansprüche

1. Gabelstapler (1) zum Anbringen am Heck eines Trägerfahrzeugs, wobei der Gabelstapler (1) umfasst:

ein U-förmiges Chassis (2) mit einem hinteren Bein (3), das durch ein Paar nach vorne vorstehender Seitenbeine (4) überspannt wird,
am Boden angreifende Räder (5, 6),
eine an einem Seitenbein (7) angebrachte Fahrerstation,
einen an dem anderen Seitenbein (7) angebrachten Motorantrieb (8); und
Gabeln (9) angebracht an einer Mastbaugruppe (10), die zwischen den Seitenbeinen (4) des Chassis (2) angeordnet ist, wobei die Mastbaugruppe (10) einen aufrechtstehenden Mast (11) angebracht an dem Chassis (2) aufweist:
dadurch gekennzeichnet, dass die Mastbaugruppe (10) ferner umfasst:

einen Ausleger (12), der im wesentlichen orthogonal zu dem Mast (11) und an diesem verschiebbar ist;
Mittel (16) zum Anheben und Absenken des Auslegers (12) an dem Mast (2);
einen Gabelträger (13), der an einem freien Ende (14) des Auslegers (12) angebracht ist und die Gabeln (9) trägt; und
Mittel (17) zum Bewegen des Gabelträgers (13) in Richtung auf den Mast zu einer Position dicht an den Mast und von dem Mast (11) weg.

2. Gabelstapler (1) nach Anspruch 1, bei dem der Gabelträger (13) an einem freien Ende des Auslegers (12) angebracht ist, und der Ausleger (12) orthogonal in Bezug zum Mast (11) bewegbar ist.

3. Gabelstapler (1) nach Anspruch 1 oder 2, bei dem der Ausleger (11) teleskopisch ist.

4. Gabelstapler (1) nach Anspruch 3, bei dem der Ausleger (11) verschiebbar durch eine Muffe (15) an dem Mast (11) angebracht ist, und ein Betätigungskolben (17) zwischen der Muffe (15) und dem freien Ende (14) des Auslegers (12) verbunden ist.

5. Gabelstapler (1) nach einem vorhergehenden Anspruch, bei dem der Mast (11) schwenkbar an dem Chassis (2) zwischen den Seitenbeinen (4) angebracht ist, und ein Kippkolben (55) für Kippen des Mastes (11) in Bezug zum Chassis (2) sorgt.

6. Gabelstapler (1) nach einem vorhergehenden Anspruch, bei dem die Mastbaugruppe (10) zwischen den Seitenbeinen (4) in Richtung auf das hintere Bein (3) und von diesem weg bewegbar ist.

7. Gabelstapler (1) nach Anspruch 5 und 6, bei dem der Mast (11) schwenkbar an einem Halterahmen (50) angebracht ist, ein Kippkolben (55) zwischen dem Halterahmen (50) und dem Mast (11) angebracht ist, und der Halterahmen (50) durch einen den Rahmen bewegenden Kolben (53) verschiebbar zwischen den Seitenbeinen (4) angebracht und bewegbar ist.

8. Gabelstapler (1) nach einem vorhergehenden Anspruch, bei dem der Mast (11) teleskopisch ist.

9. Gabelstapler (1) nach Anspruch 8, bei dem der Mast (11) hohl ist und einen darin angebrachten Betätigungskolben (22) aufweist.

10. Gabelstapler (1) nach Anspruch 8, bei dem der Mast ein zweiteiliger Mast ist, der einen unteren inneren Teil (20) und einen umfassenden oberen äußeren Teil (21) sowie einen Betätigungskolben (22) aufweist, der in dem unteren inneren Teil (20) unterge-

bracht ist und die beiden Teile (21, 22) miteinander verbindet.

11. Gabelstapler (1) nach Anspruch 10, bei dem das Mittel 16 zum Anheben und Absenken des Auslegers (12) an dem Mast 2 den Betätigungskolben 22 und eine Endlosbetätigungskette aufweist, die um ein Paar vertikal beabstandeter Rillenscheiben in dem äußeren Teil (21) geführt wird, und an dem inneren Teil (20) zwischen den Rillenschieben und an dem Ausleger (12) befestigt ist.

12. Gabelstapler (1) nach einem vorhergehenden Anspruch, bei dem angrenzend an das freie Ende (14) des Auslegers (12) ein am Boden angreifendes Rad (66) angebracht ist.

13. Gabelstapler (1) nach Anspruch 12, bei dem das am Boden angreifende Rad (66) an einem einziehbaren Kolben (65) angebracht ist, um das Rad (66) über die Gabeln (9) zu heben und unter diese abzusenken.

14. Gabelstapler (1) nach Anspruch 13, bei dem der Kolben (65) an dem Gabelträger (13) angebracht ist.

15. Gabelstapler (1) nach einem der Ansprüche 12 bis 14, bei dem ein Paar seitlich voneinander beabstandeter Räder (66) vorgesehen ist.

Revendications

1. Un élévateur à fourche (1) à monter à l'arrière d'un véhicule porteur, l'élévateur à fourche (1) comprenant :

un châssis en forme de U (2) ayant un montant arrière (3) raccordé par une paire de montants latéraux saillant vers l'avant (4),
des roues s'engageant avec le sol (5, 6),
un poste de conduite, monté sur un montant latéral (7),
un entraînement à moteur (8) monté sur l'autre montant latéral (7) ; et
des fourches (9) montées sur un ensemble mât (10) situé entre les montants latéraux (4) du châssis (2), où l'ensemble mât (10) comprend un mât vertical (11) monté sur le châssis (2) ;
caractérisé en ce que l'ensemble mât (10) comprend en plus :

une flèche (12) essentiellement perpendiculaire au mât (11) et pouvant être coulissée sur ce dernier ;
un mécanisme (16) pour élever et abaisser la flèche (12) sur le mât (2) ;
un support de fourches (13) monté sur une extrémité libre (14) de la flèche (12) portant les fourches (9) ; et
un mécanisme (17) pour déplacer le support de fourches (13) vers le mât à une position proche contre le mât et à distance du mât (11).

2. Un élévateur à fourche (1) selon la revendication 1, où le support de fourches (13) est monté sur une extrémité libre de la flèche (12) et où la flèche (12) est mobile perpendiculairement au mât (11).

3. Un élévateur à fourche (1) selon la revendication 1 ou 2, où la flèche (11) est télescopique.

4. Un élévateur à fourche (1) selon la revendication 3, où la flèche (11) est montée de manière pouvoir être coulissée par un manchon (15) sur le mât (11) et où un vérin de manoeuvre (17) est raccordé entre le manchon (15) et l'extrémité libre (14) de la flèche (12).

5. Un élévateur à fourche (1) selon l'une quelconque des revendications précédentes, où le mât (11) est monté de manière pivotante sur le châssis (2) entre les montants latéraux (4) et où un vérin d'inclinaison (55) est fourni pour incliner le mât (11) par rapport au châssis (2).

6. Un élévateur à fourche (1) selon l'une quelconque des revendications précédentes, où l'ensemble mât (10) est mobile entre les montants latéraux (4) en direction de et depuis le montant arrière (3).

7. Un élévateur à fourche (1) selon les revendications 5 et 6, où le mât (11) est monté de manière pivotante sur un cadre de support (50), un vérin d'inclinaison (55) est monté entre le cadre de support (50) et le mât (11) et où le cadre de support (50) est monté de manière pouvoir être coulissé et mobile entre les montants latéraux (4) par un vérin déplaçant le cadre (53).

8. Un élévateur à fourche (1) selon l'une quelconque des revendications précédentes, où le mât (11) est télescopique.

9. Un élévateur à fourche (1) selon la revendication 8, où le mât (11) est creux et a un vérin de manoeuvre (22) monté à l'intérieur.

10. Un élévateur à fourche (1) selon la revendication 8, où le mât est un mât en deux parties comprenant une partie intérieure inférieure (20) et une partie extérieure supérieure enveloppante (21) et un vérin de manoeuvre (22) logé dans la partie intérieure inférieure (20) et raccordant les deux parties (21, 22) ensemble.

11. Un élévateur à fourche (1) selon la revendication 10, où le mécanisme 16 pour élever et abaisser la flèche (12) sur le mât 2 comprend le vérin de manoeuvre 22 et une chaîne de manoeuvre sans fin menée autour d'une paire de poulies écartées verticalement dans la partie intérieure (20) et fixée à la partie extérieure (21) située entre les poulies et à la flèche (12).

12. Un élévateur à fourche (1) selon l'une quelconque des revendications précédentes, où, une roue s'engageant avec le sol (66) est montée adjacente à l'extrémité libre (14) de la flèche (12).

13. Un élévateur à fourche (1) selon la revendication 12 où la roue s'engageant avec le sol (66) est montée sur un vérin rétractable (65) afin d'élever et d'abaisser la roue (66) au-dessus et au-dessous des fourches (9).

14. Un élévateur à fourche (1) selon la revendication 13 où le vérin (65) est monté sur le support de fourches (13).

15. Un élévateur à fourche (1) selon l'une quelconque des revendications 12 à 14 où il y a une paire de roues écartées latéralement (66).

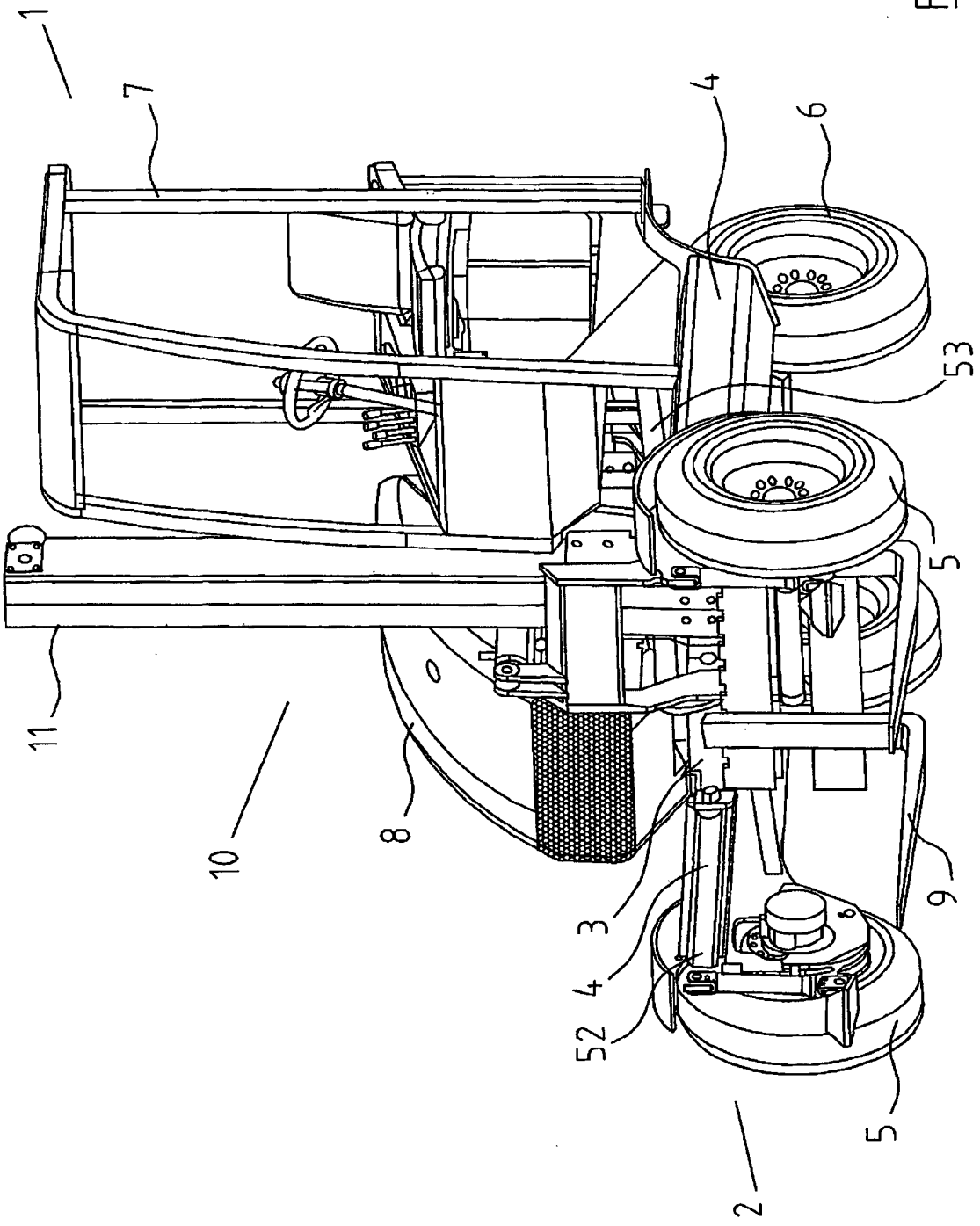


Fig. 1

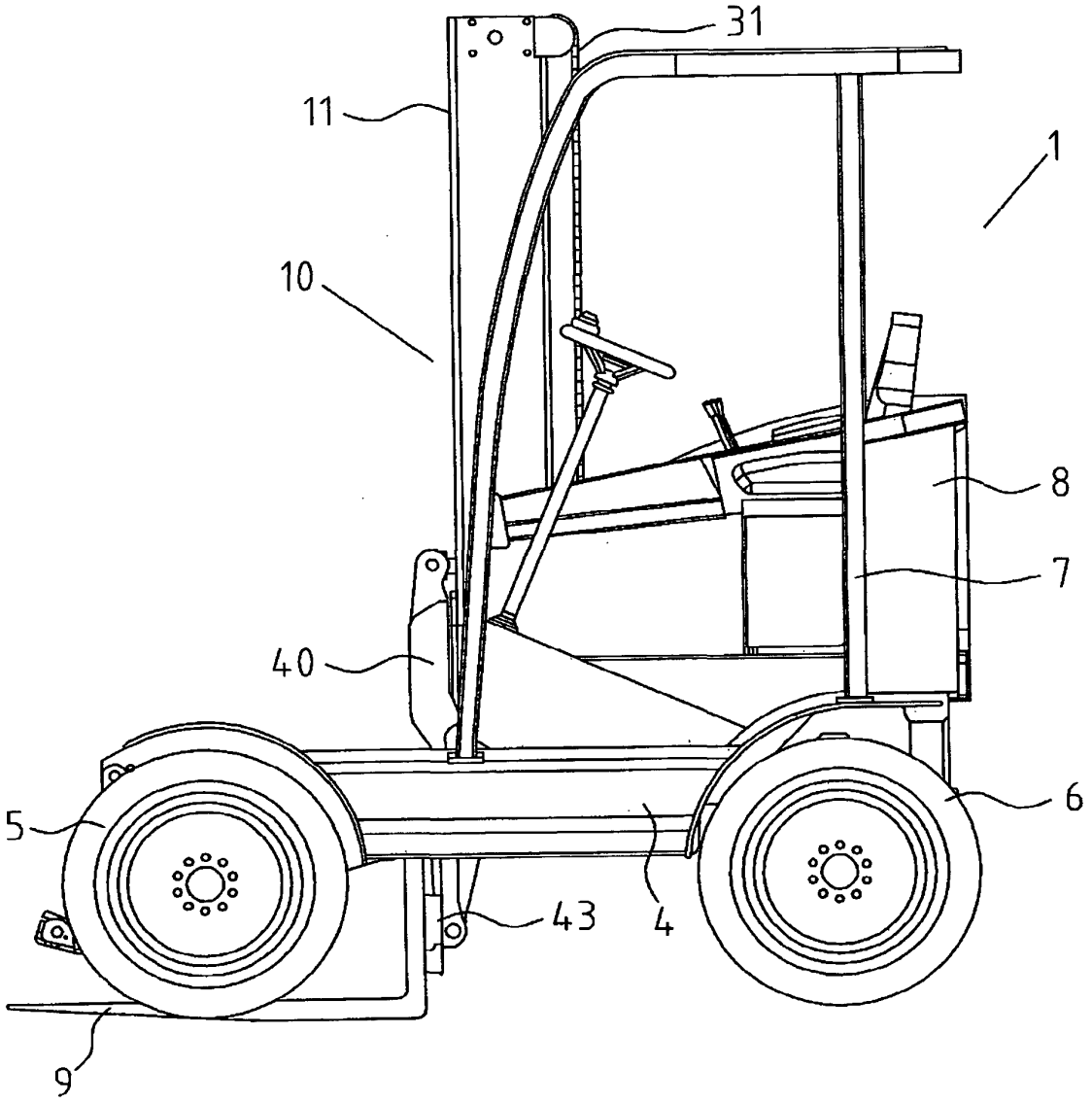


Fig. 2

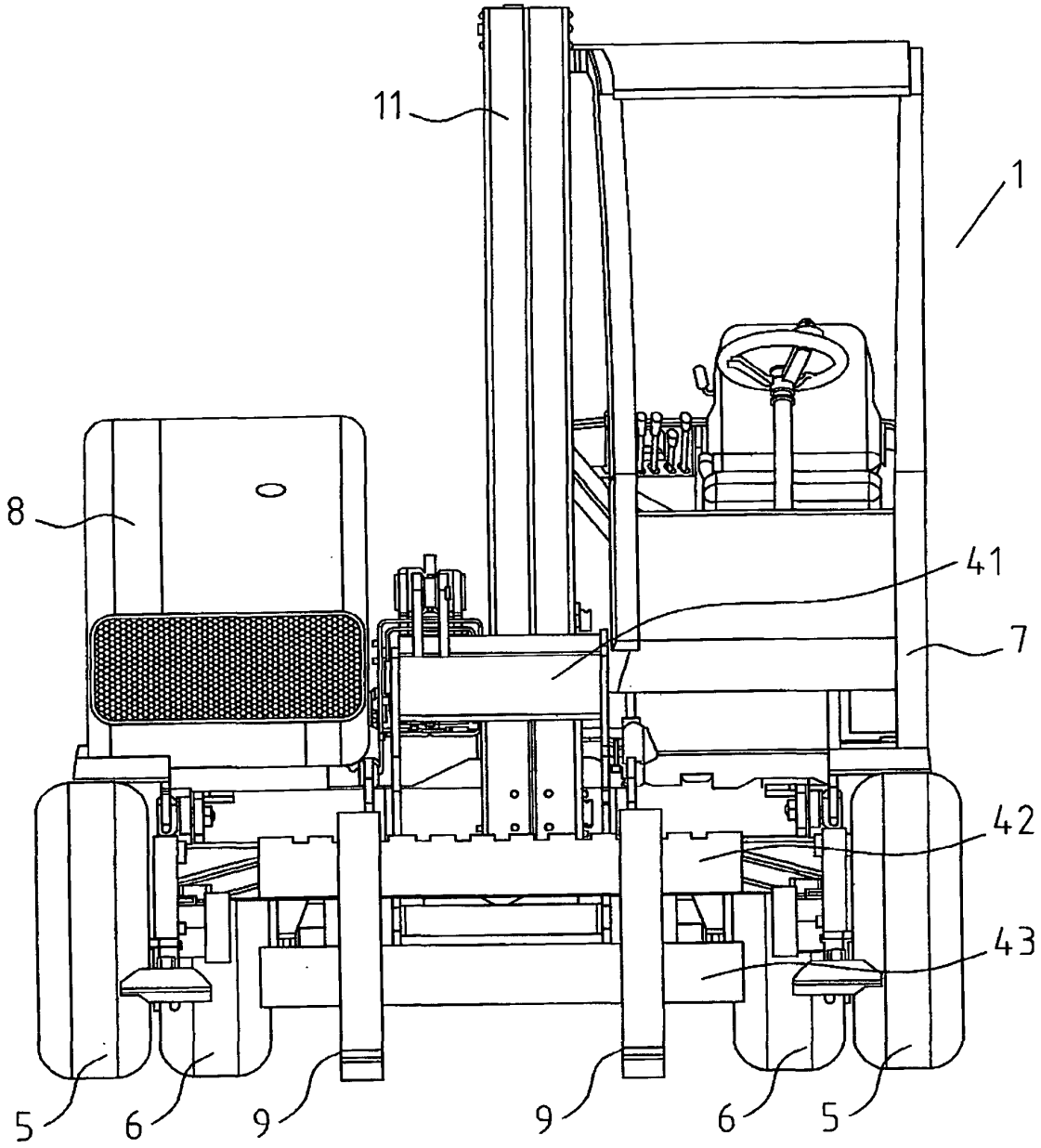


Fig. 3

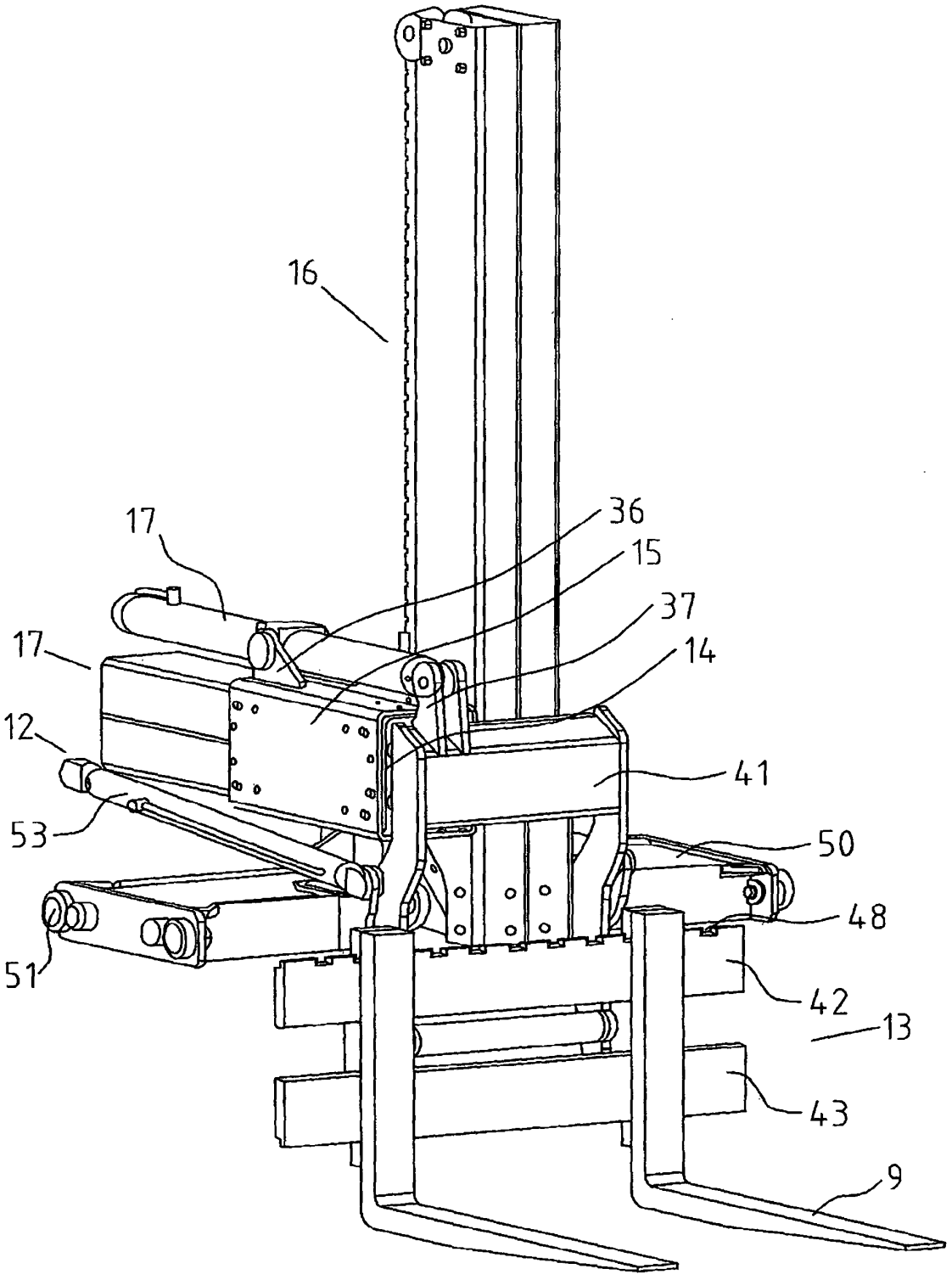
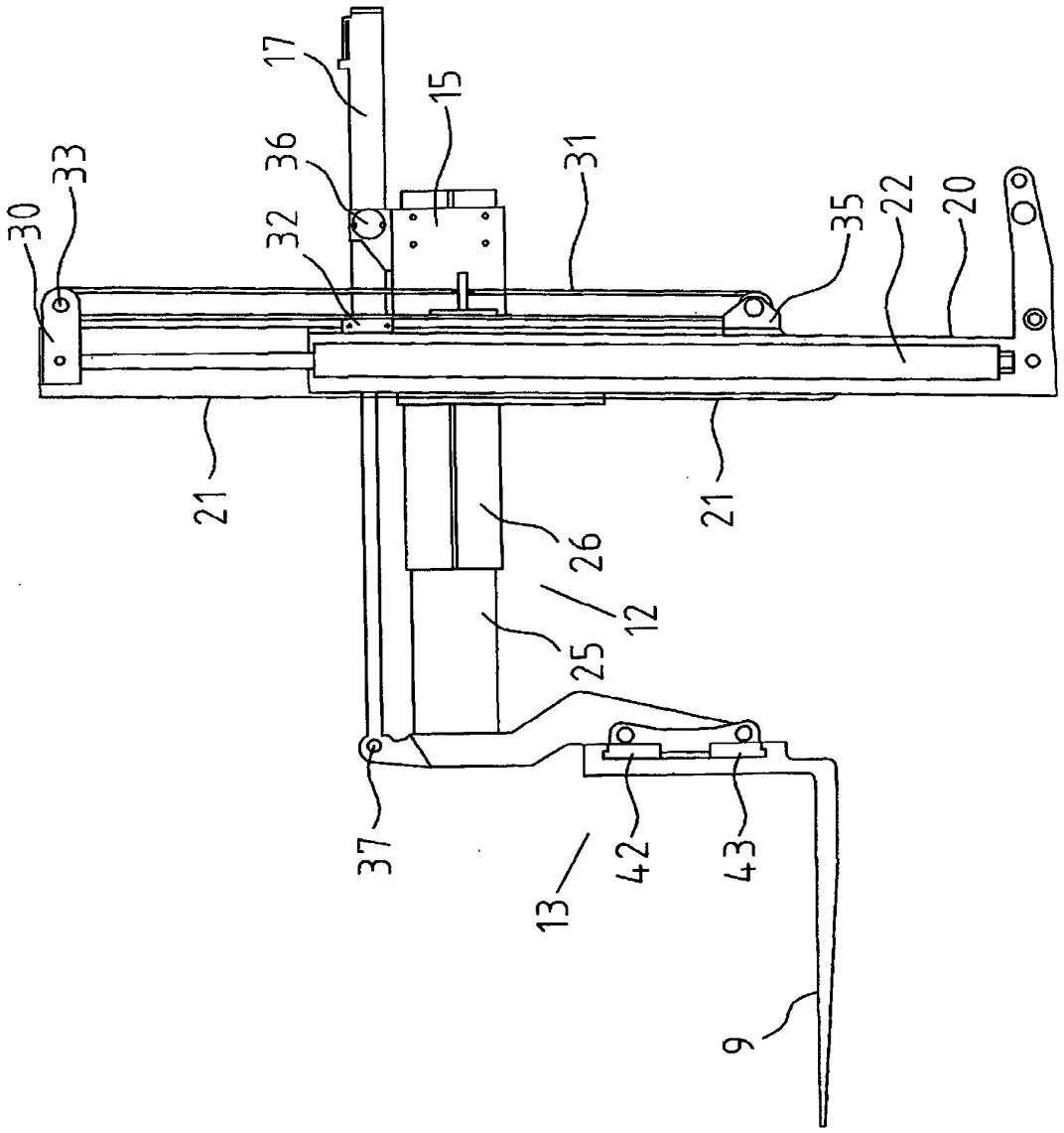


Fig. 4

Fig. 5



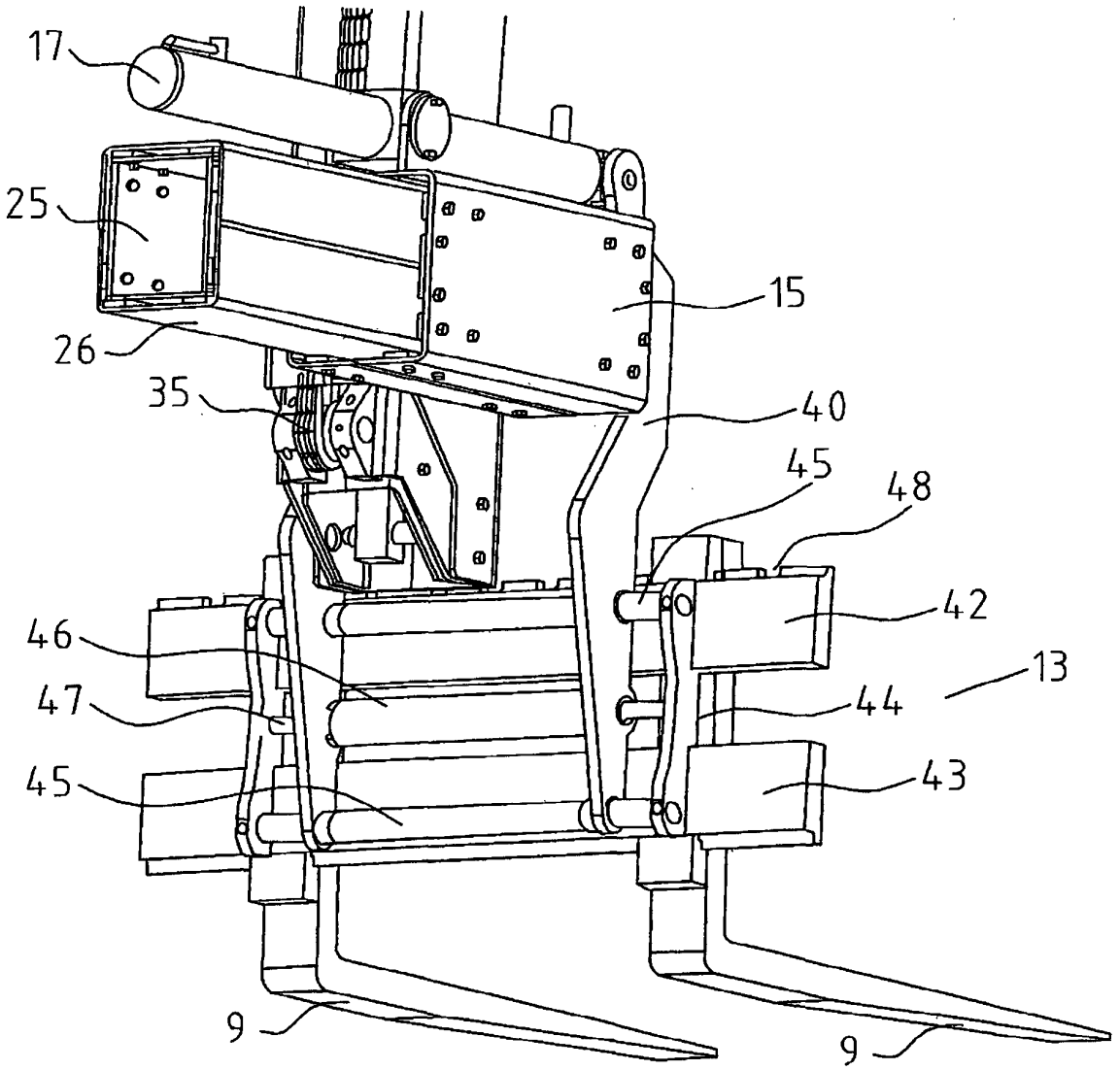


Fig. 6

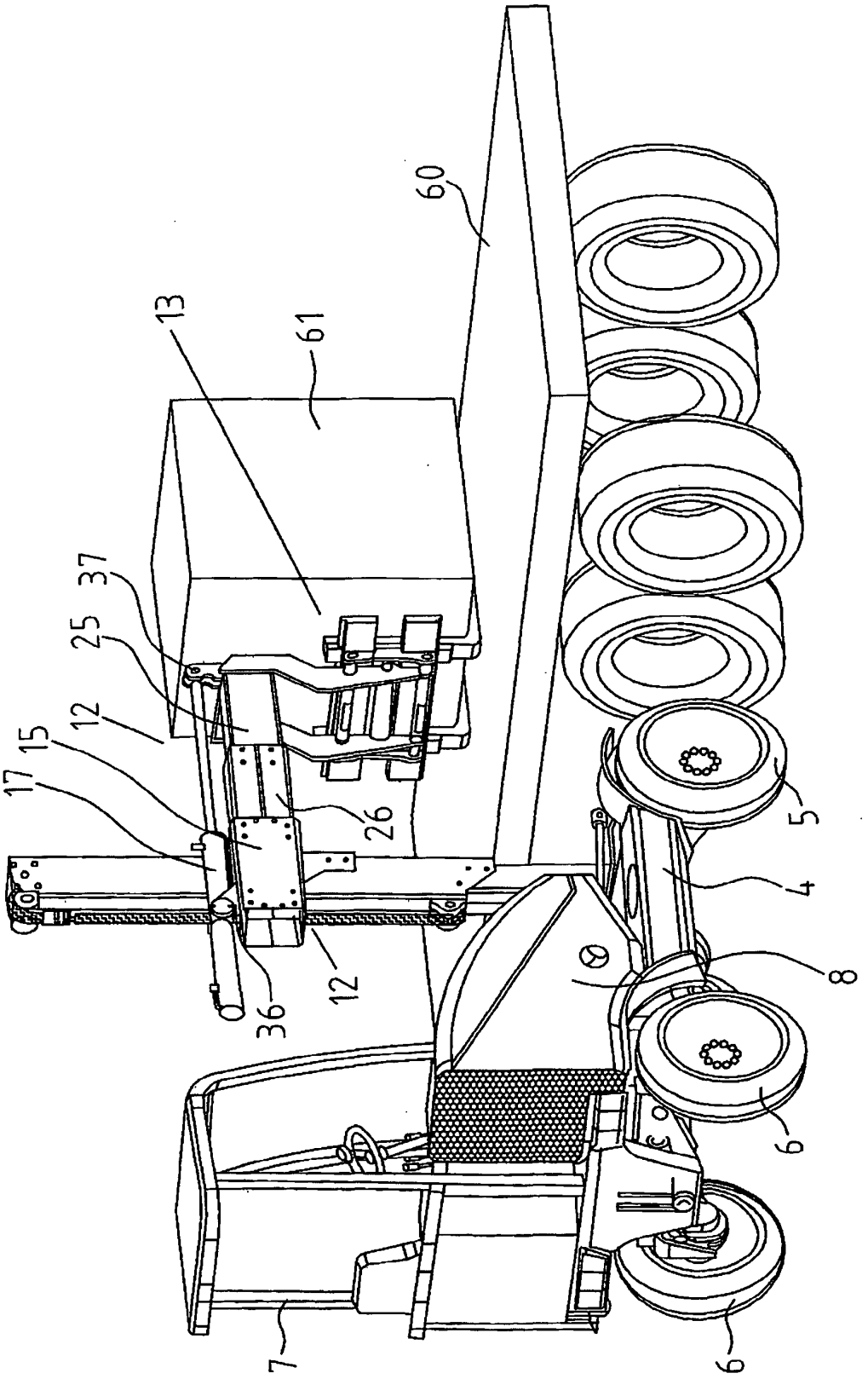
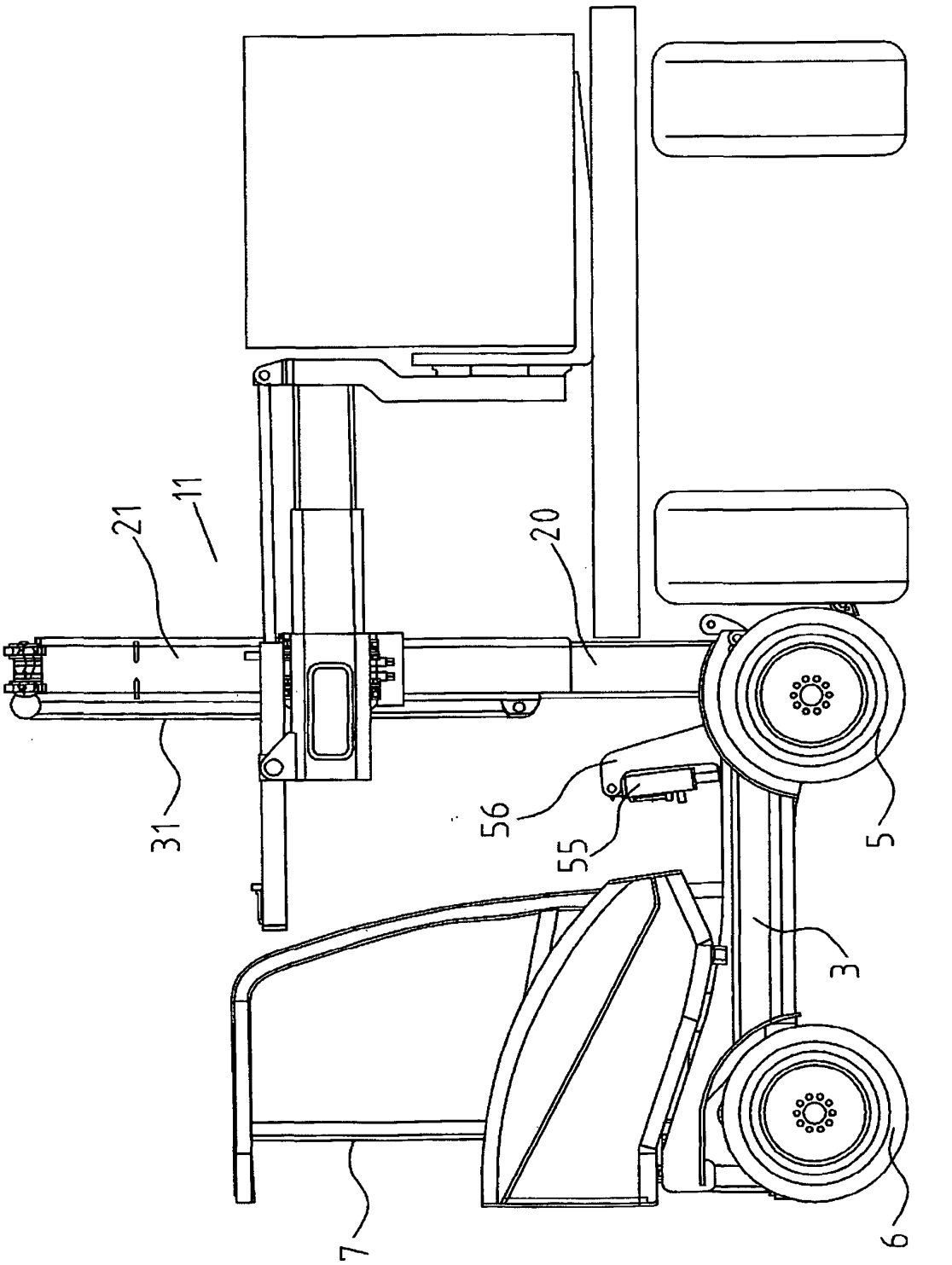


Fig. 7

Fig. 8



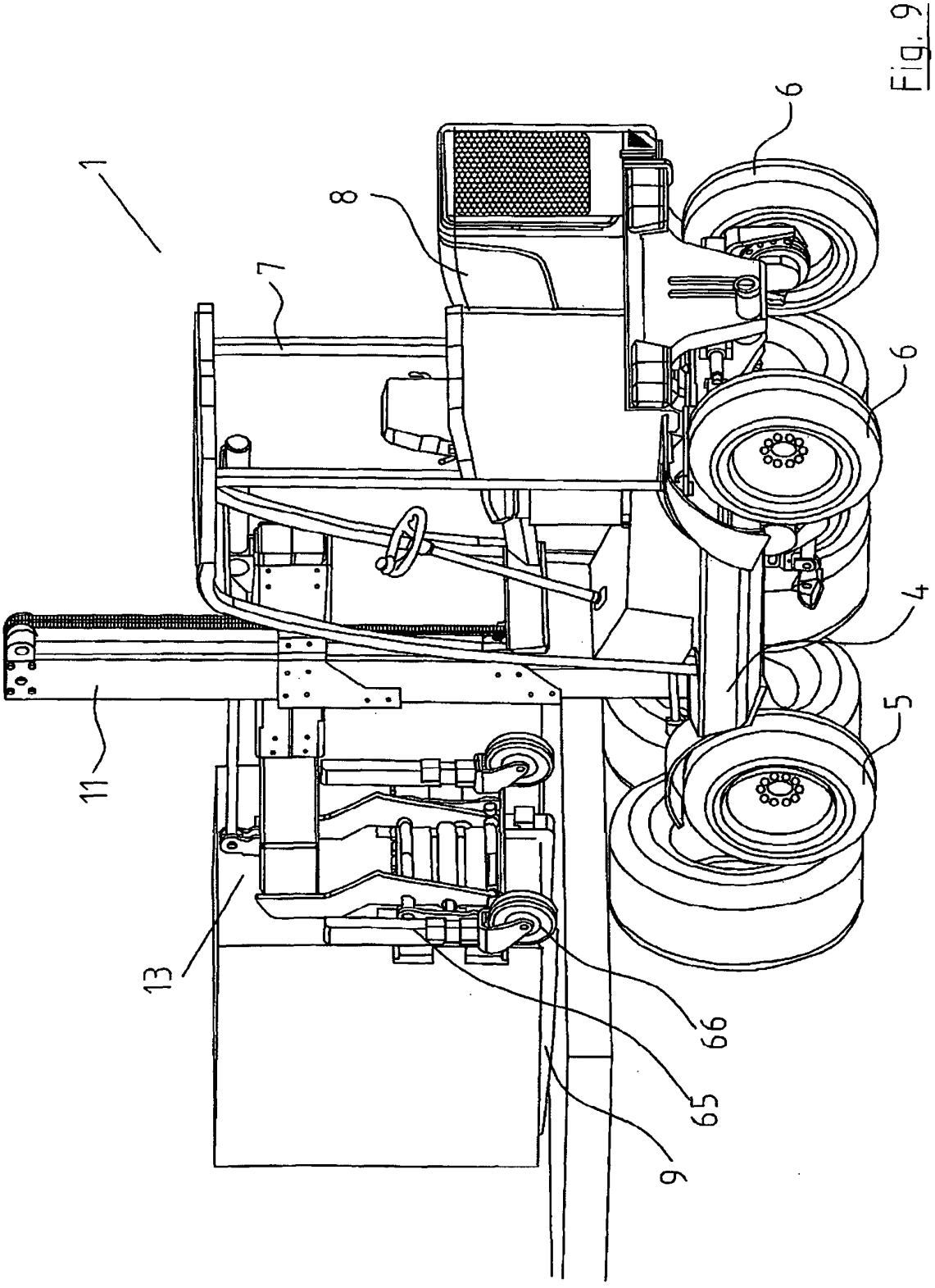


Fig. 9

Fig. 10