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H. W. STOTTLEMYER

3,169,651

FORK LIFT FOR FARM TRACTORS

Filed Oct. 25, 1962

2 Sheets-Sheet 1

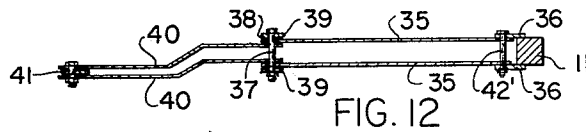


FIG. 12

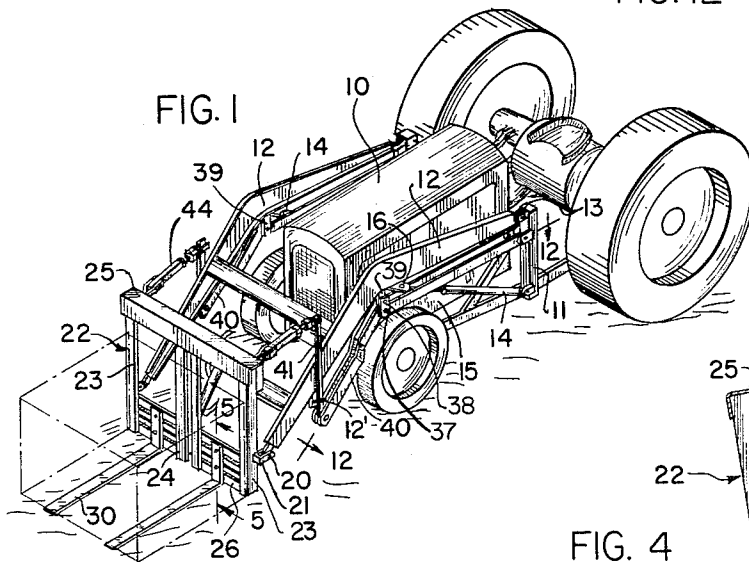


FIG. 1

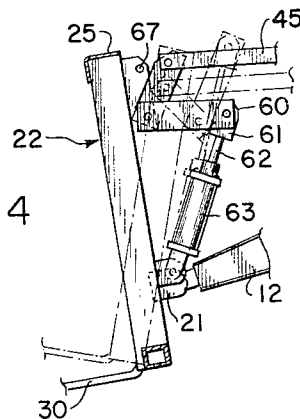


FIG. 4

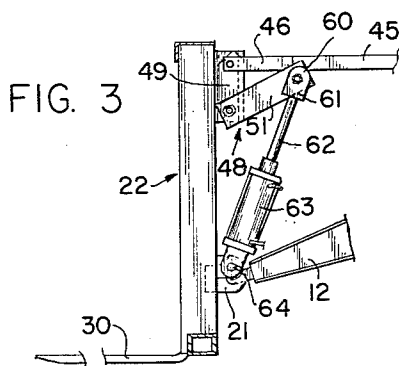


FIG. 3

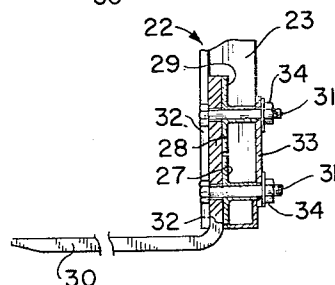


FIG. 5

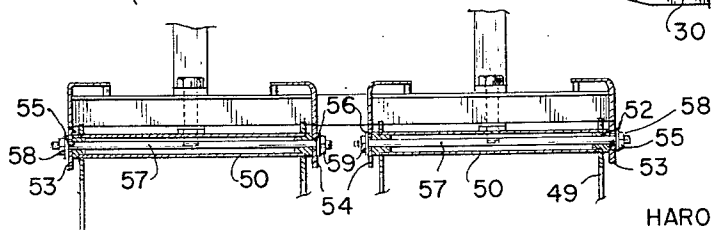


FIG. 9

INVENTOR
HAROLD W STOTTLEMYER

BY

James S. Sowell, Inc.
ATTORNEY

Feb. 16, 1965

H. W. STOTTLEMYER
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2 Sheets-Sheet 2

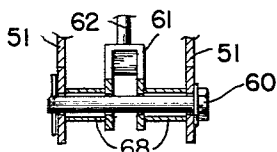


FIG. 7

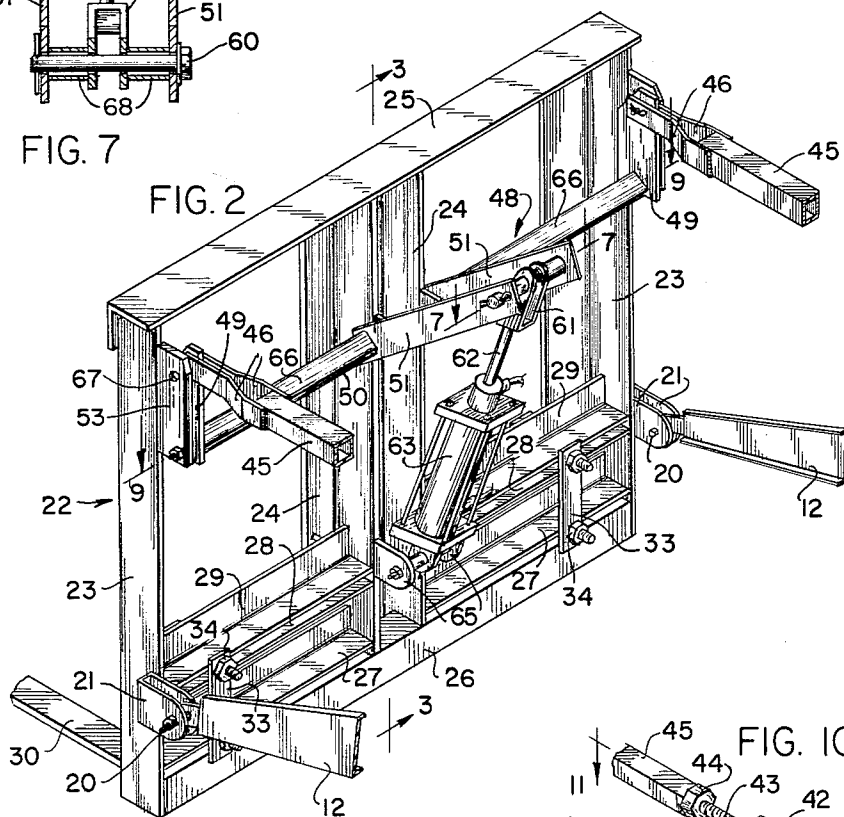


FIG. 2

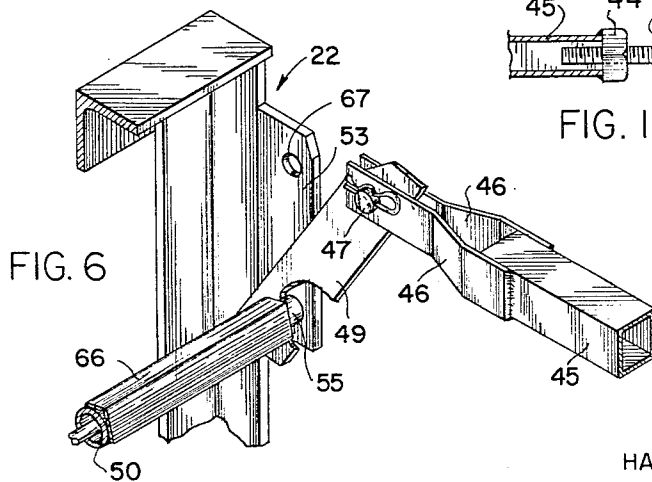


FIG. 6

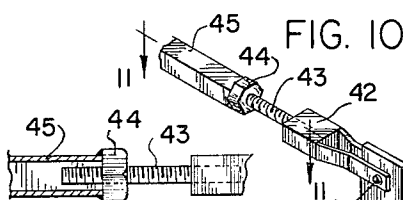


FIG. 10

FIG. 11

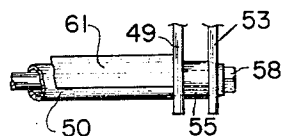


FIG. 8

INVENTOR
HAROLD W. STOTTLEMYER

BY

Hyatt & Lowrey
ATTORNEY

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3,169,651

FORK LIFT FOR FARM TRACTORS

Harold W. Stottliemyer, R.D. 3, Waynesboro, Pa.

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5 Claims. (Cl. 214-140)

This invention relates to apparatus for elevating and transporting articles and to equipment by which such functions are performed from a remote position.

The invention relates particularly to a fork lift type of apparatus adapted for use with a conventional farm vehicle to raise and lower articles and to maintain such articles substantially level regardless of the attitude of the vehicle during the raising, lowering and transporting of the same and using the hydraulic power of the vehicle.

Heretofore, many attempts have been made to provide a fork lift type of attachment for a farm vehicle which could be tilted in a longitudinal direction to maintain the load substantially level. These devices have not been successful due to complexities of design, expense, maintenance, required skilled operators, or were not tiltable.

It is an object of the present invention to provide a fork lift type of apparatus which can be mounted on a conventional vehicle and which can be tilted by mechanism on the apparatus from a source of power carried by the vehicle.

Another object of the invention is to provide a fork lift type of apparatus which can be tilted in a longitudinal plane relative to the vehicle, or which can be connected as a parallelogram linkage to maintain the load in the same plane as the vehicle.

Still another object of the invention is to provide a fork lift for a vehicle in which the spacing of the forks is adjustable and the means for tilting the apparatus is mounted on the movable frame and operable from a source of power on the vehicle.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a front perspective of the invention mounted on a conventional farm vehicle;

FIG. 2, an enlarged rear perspective of front portion of the device;

FIG. 3, a vertical section of the front portion taken on the line 3-3 of FIG. 2;

FIG. 4, a vertical section similar to FIG. 3 and illustrating the extreme tilted positions of the device;

FIG. 5, an enlarged fragmentary section taken on the line 5-5 of FIG. 1;

FIG. 6, an enlarged fragmentary rear perspective of one side of the tiltable connection;

FIG. 7, an enlarged section taken on the line 7-7 of FIG. 2;

FIG. 8, an enlarged fragmentary elevation of one of the connections;

FIG. 9, a section taken on the line 9-9 of FIG. 2;

FIG. 10, an enlarged fragmentary perspective of one of the leveling arm connections;

FIG. 11, an enlarged vertical section taken on the line 11-11 of FIG. 10; and

FIG. 12, an enlarged section on the line 12-12 of FIG. 1.

Briefly stated the present invention is a fork lift attachment for a farm vehicle which can be tilted in a longitudinal plane or which may be connected as a paral-

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lelogram linkage for raising, lowering and transporting various articles. The device comprises a frame having laterally adjustable forks or tines and the lower portion of such frame is pivotally mounted on one end of a pair of lift arms, the opposite ends of which are pivotally connected to the tractor. The upper portion of the frame is connected to a pair of levelling arms by a rocker assembly operable by a fluid cylinder carried by the frame and such fluid cylinder is controlled from a source of power on the vehicle. If desired, the levelling arms may be connected directly to the upper portion of the frame to provide a parallelogram linkage in case the fluid cylinder should malfunction.

With continued reference to the drawings, a tractor or vehicle 10 having an upright post 11 on each side is provided and each of such posts supports a lift arm 12 by means of a pivot 13. Each of the arms 12 is adapted to be raised and lowered by a fluid cylinder 14 having a piston rod 15 the free end of which is connected to a lug 16 depending from the arm 12 intermediate its length.

The free ends of the lift arms 12 are connected by pivots 20 to brackets 21 welded or otherwise attached to the lower portion of a frame 22. Such frame includes a pair of outer posts 23 and a pair of spaced inner posts 24 connected by top and bottom members 25 and 26 respectively. The outer posts 23 and inner posts 24 on each side of the frame are connected by angle braces 27, 28 and 29 with the brace 27 being spaced from the bottom member 26 a predetermined distance to provide a lower slot and the braces 28 and 29 being spaced a corresponding distance to provide an upper slot. A pair of L-shaped forks or tines 30 are adjustably mounted on the frame 22 by bolts 31 passing through openings 32 in the up-standing leg of each of the tines and contained within the upper and lower slots of the frame. Such bolts pass through clamp plates 33 at the rear of the frame and are threadedly engaged by nuts 34 to secure the tines in adjusted position. It is noted that the tines may be independently located between the inner and outer posts of the frame.

In order to support the upper portion of the frame 22, a pair of links 35 are pivotally attached at one end to lugs 36 carried by each of the posts 11 and at the opposite end such links are pivotally attached by a pivot pin 37 to spacer bars 38 which in turn are pivotally supported by lugs 39 fixed to the central portion of the lift arms 12. A second pair of links 40 are pivotally mounted at one end to the pivot pin 37 and the opposite ends of such links 40 are pivotally connected to one end of a lever 41. Such lever is connected to the lift arm 12 on each side of the device by a pivot pin 12'. To the opposite end of the lever 41 is connected a clevis or yoke 42 by a pivot pin 42' and such yoke has a reduced threaded portion 43 at its opposite end. The reduced portion 43 is threadedly received within a nut 44 which is welded to one end of leveling arms 45. The opposite end of each of the leveling arms is provided with a pair of yoke-forming plates 46 permanently attached thereto by welding or the like. The plates 46 are pivotally attached by pivot pins 47 to a rocker assembly 48, which includes an arm 49 at each end welded or otherwise attached to one end of a sleeve 50 and to the opposite end of each of the sleeves is welded or otherwise attached an operating lever 51 projecting outwardly from the sleeve at an angle radially displaced from the arms 49. Each of the sleeves 50

is provided with a bearing 52 and each end of such bearing is welded or otherwise attached to the arms 49 and the outward lever 51 at opposite ends of the sleeve.

In order to mount the rocker assembly 48 on the frame, a relatively large lug 53 is welded to the upper portion of each of the outer posts 23 and a smaller lug 54 is welded to the upper portion of each of the inner posts 24 with the lugs 54 being substantially in alignment with the lower portion of the lugs 53. Lugs 53 and 54 are provided with openings 55 and 56 respectively for the reception of a pair of aligned shafts or rods 57. Each of the rods 57 is secured at one end to the lugs 53 by a nut 58 and at its opposite end to the lugs 54 by a nut 59. Each of the rods 57 rotatably supports one of the sleeves 50 by means of bearings 52 at each end thereof. As illustrated in FIGS. 2, 3, 4 and 7 the outer ends of the operating levers 51 are connected by a pin 60 to a yoke 61 mounted on one end of a piston rod 62 carried by a fluid cylinder 63 the opposite end of which is connected by a pin 64 to a pair of lugs 65 extending outwardly from the inner posts 24. If desired a pair of spacers 68 may be interposed between the operating levers 51 and the yoke 61 to maintain such yoke substantially in the center between the operating levers so that an equal force will be exerted on both levers. If desired each of the sleeves 50 may have an angle member 66 welded or otherwise fixed along its length and welded to the rocker arms 49 to strengthen the sleeve and reduce the amount of torque applied thereto.

Each of the lugs 53 may have an opening 67 in its upper portion so that if desired the pins 47 may be removed from the yoke forming plates 46 and the rocker arms 49 and thereafter the leveling arms 45 may be attached to the lugs 53 by passing the pins 47 through the yoke forming plates 46 and the opening 67 to form a parallelogram linkage with the lifting arms 12.

In the operation of the device the forks or tines 30 are moved laterally to any desired position and secured in such fixed position by tightening the nuts 34. The piston rod 15 is then retracted to lower the frame 22 and permit the vehicle to move forward so that the forks will be disposed below an article to be lifted. The lifting arms 12 are then raised by extending the piston rod 15 and the raising of such lifting arms will raise the frame with the article thereon. After the frame has been raised it is desirable to maintain the article in substantially level position regardless of whether the vehicle is going uphill or downhill. When the frame is in the position illustrated in FIG. 3 the article is substantially in the same plane as the vehicle which would be its normal position when the vehicle is on level ground. As illustrated in full lines in FIG. 4 when the vehicle is inclined uphill the piston rod 62 will be retracted within the cylinder 63 to cause the forks 30 to be inclined at a downward angle relative to the vehicle. This is accomplished since the outer ends of the rocker arms 49 are pivotally attached to the ends of the leveling arms 45 and when the outer ends of the operating levers 51 are moved downwardly the shafts 57 will be moved forwardly and pivot the frame 22 about the pins 20 at the lower portion of the frame. When the vehicle is traveling down an incline the piston rod 62 will be extended as shown in phantom in FIG. 4 with the shafts 57 being moved rearwardly and the forks being inclined on an upward angle relative to the vehicle.

It is noted that due to arcuate path of the operating lever connection, the forks will move from a level to an upwardly inclined position more rapidly than they will move from a level to a downwardly inclined position. This variation in speed affords the advantage of quickly lifting a load and permitting more accurate control during the downward tilting of the load when the load is to be discharged. In the event of a malfunction of the cylinder 63 the leveling arms 45 may be attached to lugs 53 so that when the frame is raised and lowered by the lifting arms 12 such arms will function as a parallelogram

and will maintain the article substantially in the plane of the vehicle at all times.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. A fork lift attachment for a vehicle comprising a frame having spaced outer and inner posts connected by top and bottom members, a plurality of braces connecting said outer and inner posts and being spaced to provide a pair of slots, a pair of forks adjustably mounted on said frame by bolts passing through said slots, multiple lift arms pivotally connected at one end to the lower portion of said frame and at the opposite end to said vehicle, fluid means for raising and lowering said lift arms, a rocker assembly pivotally mounted on the upper portion of said frame, said rocker assembly including a shaft mounted on said frame, a pair of sleeves rotatably carried by said shaft, a rocker arm fixed to the outer end of each of said sleeves and an operating lever secured to the inner end of each of said sleeves, a pair of levelling arms each being pivotally attached to one of said rocker arms and to said vehicle, fluid operating means connected at one end to the free ends of said operating levers and at the opposite end to said frame whereby said frame may be raised and lowered relative to said vehicle by the operation of said lift arms and may be tilted in a longitudinal direction by the operation of said rocker assembly.

2. A fork lift attachment for a vehicle comprising a frame, a pair of forks adjustably carried by said frame, multiple lift arms each pivotally connected at one end to the lower portion of said frame and at the opposite end to said vehicle, fluid means for raising and lowering said lift arms, a rocker assembly pivotally mounted on the upper portion of said frame, said rocker assembly including a pair of sleeves rotatably mounted on said frame, a rocker arm mounted on each of said sleeves, an operating lever mounted on each of said sleeves and being radially displaced from said rocker arms, a pair of levelling arms each being pivotally attached to one of said rocker arms and to said vehicle, and fluid operating means connected to the free end of said operating levers and to said frame whereby when said fluid operating means is activated said frame will be tilted in a longitudinal direction relative to said vehicle.

3. In a fork lift attachment for a vehicle, the combination of a frame and a rocker assembly, said frame including a pair of laterally adjustable tines, means for mounting said frame for up and down movement relative to said vehicle, said rocker arm assembly being pivotally mounted on said frame and including a pair of spaced rocker arms, a sleeve secured to each of said rocker arms, an operating lever fixed to the opposite end of each of such sleeves and projecting outwardly from said sleeves at an angle radially displaced from said rocker arms, fluid operating means connecting the free ends of said operating levers and said frame, and a pair of levelling arms one being connected to each of said rocker arms and the opposite end of each of said levelling arms being attached to said vehicle whereby when said fluid operating means is energized said frame will be tilted in a longitudinal direction relative to said vehicle.

4. A fork lift attachment for a vehicle comprising a frame, fork means carried by said frame, a pair of lift arms each pivotally connected at one end to said frame and at the opposite end to said vehicle, means for swinging said lift arms about said connection to the vehicle, a rocker assembly pivotally mounted on said frame, said rocker assembly including at least one rocker arm, a sleeve attached to one end of said rocker arm, an operating lever mounted on said sleeve and being radially displaced from said rocker arm, means pivotally mounting said sleeve

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on said frame, at least one levelling arm pivotally connected at one end to the opposite end of said rocker arm and pivotally connected at its opposite end to said vehicle, and fluid operated means pivotally connected to the free end of said operating lever whereby said fluid operating means will tilt said frame about said lift arm connection and relative to said levelling arm connection.

5. The structure of claim 4 including means for connecting one end of said levelling arm to said frame.

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HUGO O. SCHULZ, *Primary Examiner.*