April 24, 1962 D. E. ERICKSON ET AL 3,031,091

LIFT TRUCK

Filed Aug. 26, 1957 5 Sheets-Sheet 1

FIG. 1

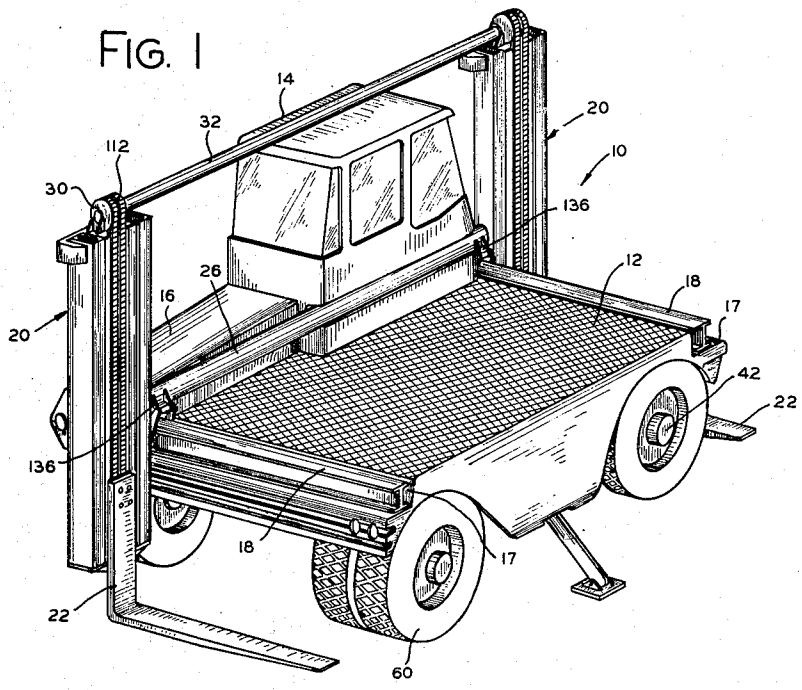
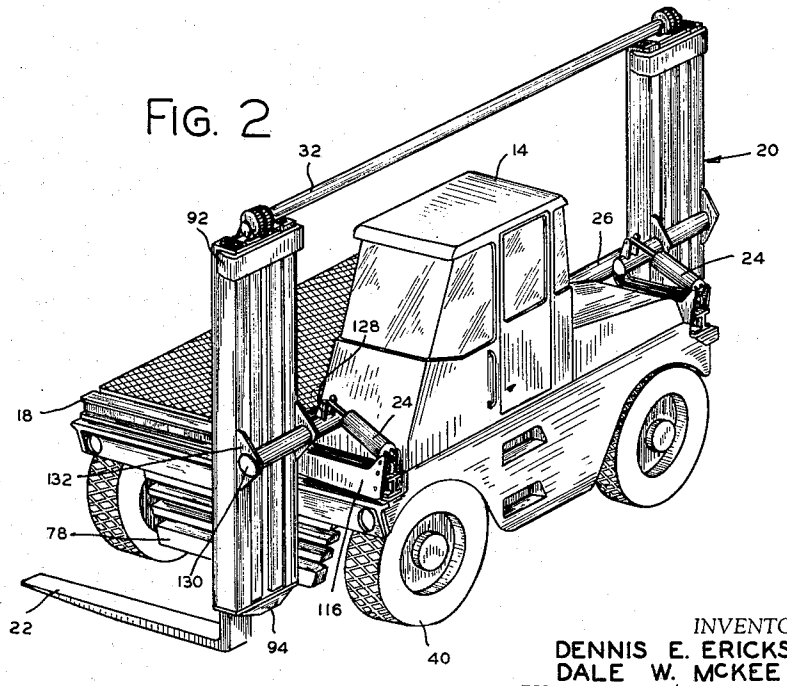


FIG. 2



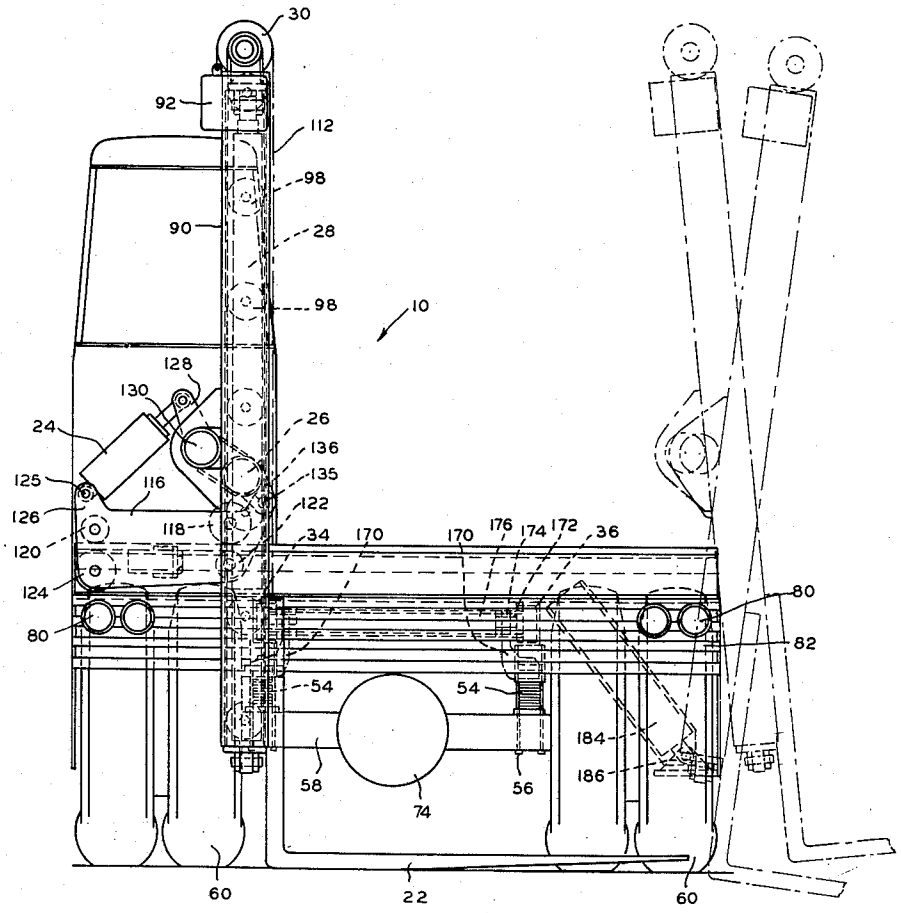
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FIG. 3



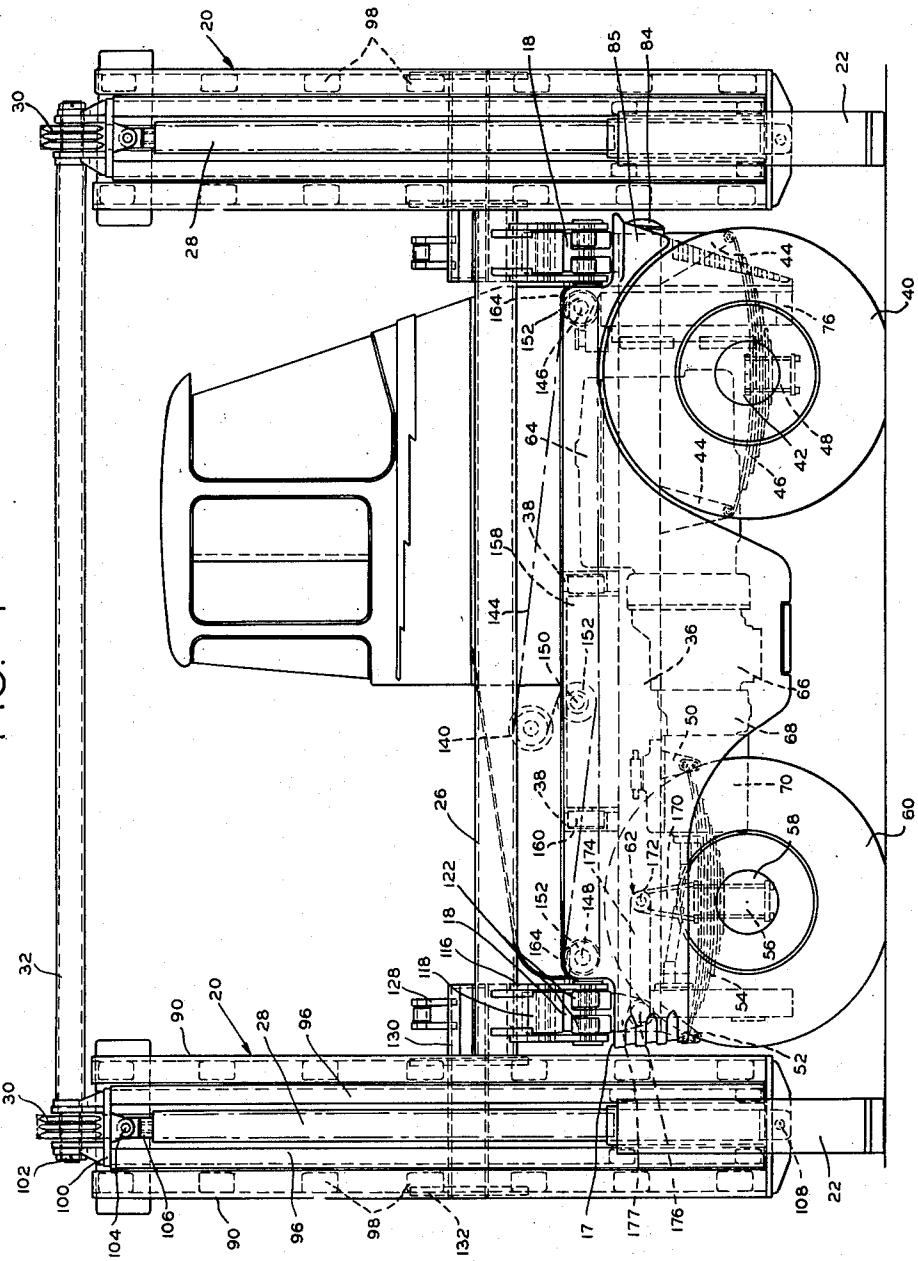
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LIFT TRUCK

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FIG. 4



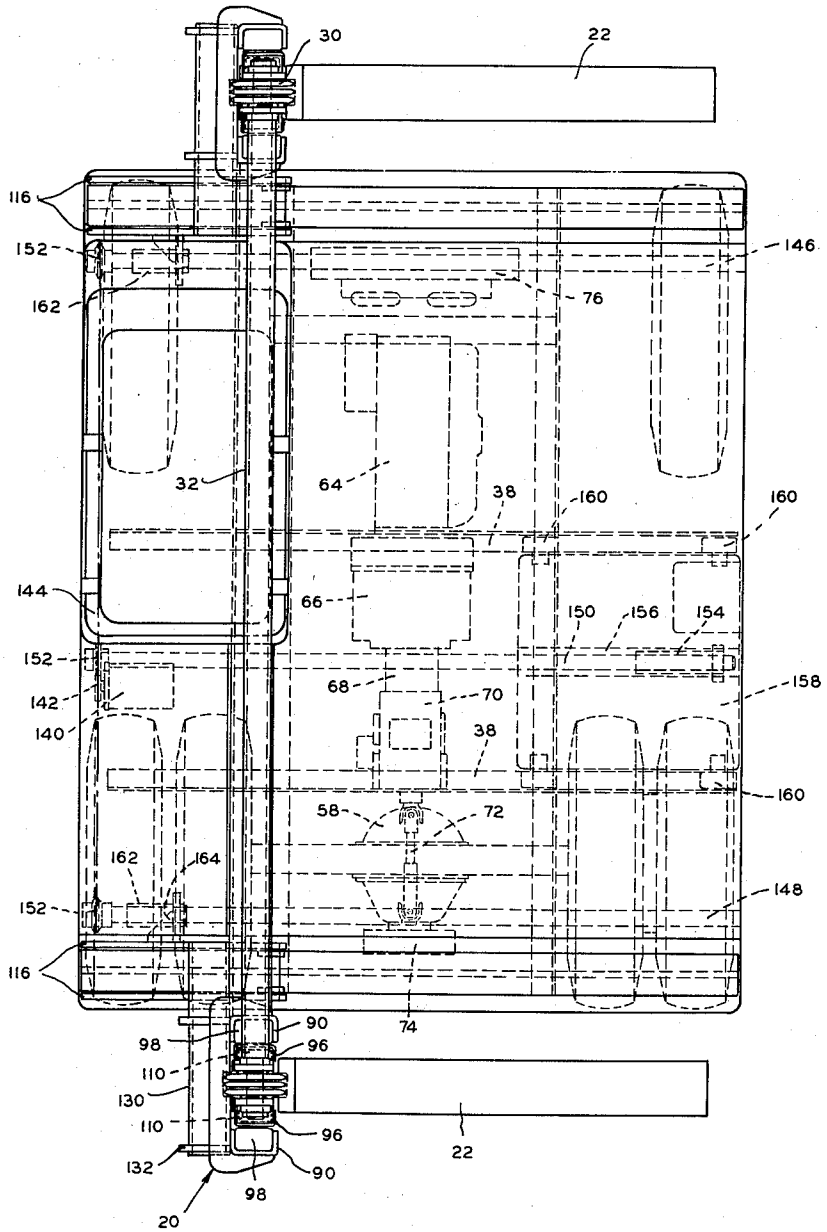
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FIG. 5



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FIG. 6

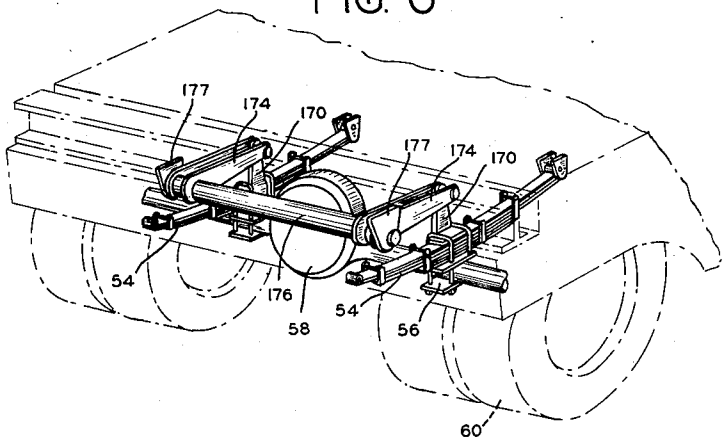
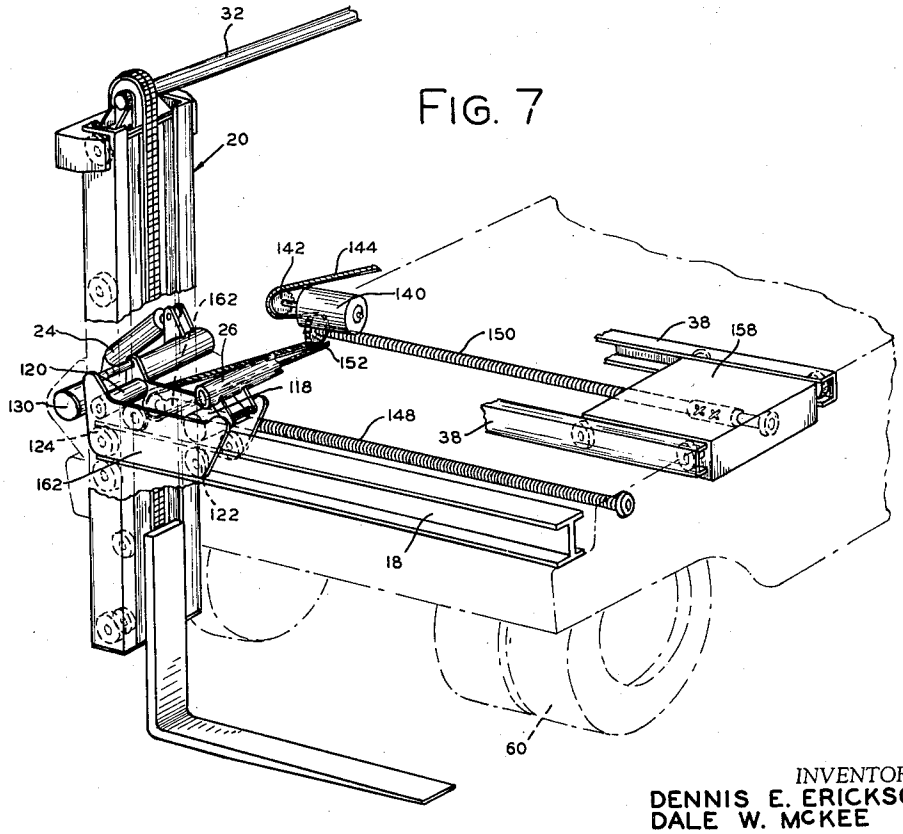


FIG. 7



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United States Patent Office 3,031,091 Patented Apr. 24, 1962

3,031,091

LIFT TRUCK

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Filed Aug. 26, 1957, Ser. No. 680,203
19 Claims. (Cl. 214—75)

This invention relates to vehicles and more particularly to a side loading lift truck type vehicle.

Lift trucks which are adapted to engage loads at one side thereof have previously been devised and are in use. For example, Patent 2,621,811, which issued to Le Grand H. Lull on December 16, 1952, describes one basic type of side loader which utilizes a side opening U-shaped frame having an elevating upright and forks which is transversely movable in and out of the pocket of the frame for engaging and disengaging loads. One of the deficiencies of this type of side loading vehicle is that the longitudinal distance between the forks is limited by the width of the pocket, and it is therefore difficult to properly engage and stabilize long unwieldly loads, such as pipe, on the forks preparatory to deposit of such loads on the legs of the U-shaped frame.

One basic problem which exists in all types of side loading lift trucks of which we are aware is the heretofore inherent lack of equalization of loading on the tires and wheels thereof, the degree of unequalization is highly variable depending on the nature of the load, the lateral position of the upright and forks, the position and mass of the counterweight and other factors. This has been one of the reasons for the relatively slow growth in popularity of this type of materials handling vehicle. The normally unbalanced load condition has been simply tolerated heretofore in trucks of the side loading type. In conjunction with this same problem there has been the related problem of maintaining the platform of the truck adjacent the forks and on which a load normally rests during transport approximately level, regardless of the off-center location thereof relative to the longitudinal axis of the truck. One disadvantage of a non-self-leveling platform is apparent when it is considered that this type of truck is particularly adapted for the handling of such loads as long lengths of pipe and other similar articles.

It is, therefore, one of the primary objects of this invention to provide a side loading type lift truck in which the load supporting platform is maintained approximately level irrespective of off-center loading thereof.

It is another important object of this invention to provide in a side loading type vehicle means for maintaining the load on the various tires approximately equal irrespective of other factors which tend to unequalize such loads during operation.

It is a further object of this invention to provide a side loading type of lift truck having maximum fork spacing for a given vehicle wheelbase, and means for synchronizing the available motions of the forks relative to the truck proper.

It is another object of this invention to generally improve the construction and design of a side loading type lift truck.

Other objects and advantages of this invention will be apparent in view of the description which follows.

In carrying out our invention we provide a side loading type lift truck in which the load engaging means, such as fork tines, are located at opposite ends of the truck body and are mounted for synchronized vertical and tilting movement in upright assemblies of known general type, which upright assemblies are mounted at

said opposite ends for transverse movement relative to the truck.

In order to aid in the equalization of tire loading irrespective of the transverse position of the upright assemblies or the nature of the load carried thereby, we provide counterweight means automatically movable transversely of the truck in a direction opposite to the transverse movement of the upright assemblies. This arrangement effects two primary advantages, viz., the minimization of truck width for a given lifting capacity and the tendency toward equalization of the loading on the various tires. Both of these advantages are at least in part effected by the aforesaid arrangement since the counterweight is always acting in opposition to the resultant counter load of the truck about the longitudinal axis thereof. As an additional feature in aid of equalizing tire loading in maintaining the load carrying platform of the truck approximately level, we provide a spring suspended body and chassis wherein the springs are operatively connected to each other in such a manner that any excessive weight on one of the springs automatically transfers such excessive loading to the other spring transversely opposite thereof.

In the drawings:

FIGURE 1 is a view in perspective taken from a rear quarter of the vehicle of our invention;

FIGURE 2 is a view in perspective taken from the front quarter of the truck shown in FIGURE 1;

FIGURE 3 is a view in elevation taken from the rear of the truck shown in the previous figures;

FIGURE 4 is a side view in elevation taken from the loading side of the truck;

FIGURE 5 is a plan view of the truck;

FIGURE 6 is a partial phantom view in perspective of the rear end of the truck showing the truck suspension means in full lines; and

FIGURE 7 is a partial phantom view in perspective of the rear end of the truck showing one of the uprights and mountings and actuating means therefor in full lines.

Referring now in detail to the drawings, the truck of our invention is shown generally at numeral **10**; the body portion thereof generally comprises a body and platform **12** at the one side of which is mounted a housing **16** and an operator's cab **14** having suitable controls therein, not shown, for operating the truck and loader mechanism, and a transversely extending recess portion **17** at each of the opposite ends of the platform **12** and on each of which is rigidly secured a transversely extending I-beam member **18** which is mounted in a manner to be described. Each of two upright assemblies **20** includes hoisting mechanism for elevating and lowering one of a pair of fork tine members **22** and is mounted for transverse movement in one of the I-beam members **18** in a manner to be described. The upright assemblies **20** are tiltable about a longitudinal axis by means of a pair of longitudinally spaced tilt cylinder and piston assemblies **24**, and are synchronized in tilting movement by means of a longitudinally extending torque tube **26**. An hydraulic cylinder and piston hoist means **28** is associated with each of the upright assemblies and includes sheave means **30** mounted atop each thereof which are interconnected by means of a torque tube **32** for synchronizing vertical movement of the uprights and forks.

The truck frame to which the body structure **12**, the cab **14** and the housing **16** are suitably secured comprises a pair of main longitudinally extending and transversely spaced channel members **34** and **36** which extend substantially the entire length of the truck, longitudinally spaced and transversely extending I-beams **18** and a pair of intermediate longitudinally spaced and

transversely extending channel members 38, each of said transversely extending members being secured at a lower flange thereof to the upper flanges of the longitudinal members 34 and 36.

A pair of single tyred front steering wheels 40 are mounted upon a steer axle 42 and are adapted to be turned for steering by linkage means, not shown, from the operator's cab 14. Depending downwardly from the lower flange of longitudinal frame members 34 and 36 adjacent opposite sides of each of the wheels 40 are a pair of brackets 44, from the lower ends of each of which pairs is a longitudinally extending leaf spring 46 to which the steering axle 42 is connected by means of bolt and bracket means 48 of well known type. Also depending downwardly from the lower flange of the rear portion of each of frame members 34 and 36 are a pair of longitudinally spaced bracket spring members 50 and 52 from which are suspended the opposite ends of a leaf spring 54 at each side of the truck. Each of the springs 54 is connected in the center portion thereof by means of a bracket 56 to one of the arms of a drive axle housing 58. The axle housing 58 mounts at opposite ends thereof two pair of dual drive wheels 60. Truck body leveling and tire load equalizing means is shown generally at numeral 62 and will be described in detail hereinafter.

The power train of the truck comprises an internal combustion engine 64, supported at the front end thereof on steer axle 42, a fluid torque converter 66 drivably connected to the engine, a forward and reverse gearbox 68 connected to the housing of the torque converter, an automatic fluid transmission 70 drivably connected with gear box 68, a drive shaft 72 extending rearwardly from the transmission and connected to a differential gear mechanism of the drive axle 58 by means of a drop-down transmission gearbox 74 which includes a lowered drive shaft which enters the differential gear mechanism from the rear end thereof to drive the wheels 60. The entire power train is thus suspended between the axles 42 and 58.

Forwardly of the engine 64 and suitably connected thereto by conduit means, not shown, is a radiator and blower assembly 76 which is supported upon a downwardly depending frame member 78 at the front end of the truck. Illumination means 80 is secured to a transverse framework 82 at the rear end of the truck and similar means 84 to the grillwork 85, at the front end of the truck. Some of the parts of the machine which it is unnecessary to show have not been shown in the interests of clarity of illustration.

Referring now in greater detail to the more important components of the vehicle, from the standpoint of our invention, each of the upright assemblies 20 comprises a pair of longitudinally spaced and non-vertically movable channel members 90 which are held in fixed spaced relation by brace members 92 and 94. Mounted for vertical movement relative to each pair of channel members 90 are a second pair of channel members 96 which are nested intermediate the channel members 90 and which are mounted upon a plurality of opposed pairs of rollers 98, said rollers being movable vertically within the pockets of channel members 90 for guiding members 96 relative thereto. Each pair of inner slide members 96 are connected together at the upper ends thereof by a crosshead 100 to which is connected by bracket and shaft means 102 a sheave 30; each sheave is pivotally connected by a bracket and pin 104 to the upper end of a piston rod 106 of each hydraulic hoist assembly 28. Each hydraulic hoist assembly is pivotally mounted at its lower end by means of a pin 108 to the brace 94. Mounted for vertical movement within each pair of inner slide members 96 is one of the fork tines 22 which is supported by two opposed pairs of vertically spaced roller means 110 which are suitably connected in a well-known manner to each fork tine by bracket means. A double chain 112 is anchored to each of the brace members 92 at the one ends thereof and is connected to the upper leg portion of each fork tine 22.

Each pair of fixed upright members 90 is mounted for transverse movement relative to the vehicle on one of the transverse I-beam frame members 18 as follows: A pair of bracket members 116 is mounted in straddling relation to each of the I-beams 18 and extends vertically thereabove. A roller 118 is mounted between each pair of said bracket members and adjacent the one ends thereof for rolling movement on the upper surface of the upper flange of each I-beam, and a roller 120 is similarly mounted adjacent the opposite ends of the bracket members. A pair of rollers 122 is mounted between each pair of bracket members below the rollers 118 so as to afford support within each of the I-beams on opposite sides of the web thereof and a pair of rollers 124 is mounted similarly to the rollers 122 adjacent the opposite ends of the bracket members. These rollers are illustrated in FIGURES 3 and 4. Extending between upwardly extending portions of each pair of brackets 116 at the one ends thereof is a pivot pin 125 for pivotally mounting the cylinder end of each of the tilt cylinders 24, the piston rod ends thereof being pivotally connected to a bracket means 128 which is secured to a rotatable tubular member 130, said tubular member being connected to a pair of laterally spaced brackets 132 which are secured to opposite rear flanges of the channel members 90.

Operator control means, not shown, are located in the operator's compartment 14 and suitable connections therefrom are provided to the tilt cylinders 24 and the hoist cylinders 28 so that the lower ends of the cylinder assembly 28 may be pressurized to raise the fork tines 22 at a 2:1 ratio relative to the various upright channel members and to also raise the inner slide members 96 with the fork tines relative to the outer channel members 90. The fork tines lower by force of gravity. The tilt cylinder assemblies 24 are double-acting and when extended rotate the uprights 20 with the tubular members 130 in a clockwise direction (FIGURE 3) about pivot shafts 135 of a pair of pivoted bracket connections 136, said brackets 136 being pivotally connected at the one ends thereof to the pivot shafts 135 and rigidly secured at the other ends thereof to opposite ends of the synchronizing tubular member 26. In other words, each of the uprights 20 is mounted for pivotal movement about a pivot shaft 135, the shafts 135 being secured to bracket means 116 which support said upright assemblies in I-beam members 18 by means of the roller sets 118, 120, 122 and 124; the roller sets provide also for effective rolling transverse movement of the uprights relative to the truck. The torque tube 32 insures that vertical movement of the forks 22 and inner slides 96 of the uprights is synchronized so that neither one of the fork tines is able to move vertically at a faster rate than the other. Likewise, the torque tube 26, which is connected between the webs of the facing outer channel members 90, synchronizes tilting movement of the uprights when the cylinder assemblies 24 are pressurized in either direction.

The mechanism for actuating the upright assemblies 20 transversely of the vehicle is best shown in FIGURES 4 and 5, wherein a rotatable hydraulic motor means 140 of known construction is securely mounted within the housing 16 upon bracket means, said motor means being driven by hydraulic pump means, not shown. A sprocket 142 is mounted on the motor drive shaft and is drivably connected by means of a chain 144 to a pair of longitudinally spaced and transversely extending worm screws 146 and 148 which are located adjacent opposite ends of the truck and which are suitably mounted for rotation in bushings at opposite sides of the truck. A transversely extending worm screw 150 is located intermediate the worm screws 146 and 148 and is mounted for rotation with worm screws 146 and 148. At the left end of each worm screw, as seen in FIGURE 5, is mounted a sprocket

152; over each sprocket is trained the continuous chain 144, as shown in FIGURE 4. It will be noted that the chain 144 when driven by hydraulic motor 140 effects like rotation of worm screws 146 and 148 and opposite rotation of worm screw 150.

The worm screw 150 carries a meshing translatable block member 154 thereon which is secured in a groove 156 of a counterweight member 158. The counterweight member 158 is mounted along its longitudinally spaced sides upon pairs of rollers 160 which register with the pocket portions of transverse frame members 38.

Each of the worm screws 146 and 148 is associated with a meshing translatable block member 162 which is connected by a bracket member 164 to the adjacent pair of bracket members 116.

Rotation of the hydraulic motor means 140 in a counterclockwise direction, as seen in FIGURE 4, will, through the action of chain 144, drive the worm screws 146 and 148 in the same or counterclockwise direction and will simultaneously drive the worm screw 150 in a clockwise direction. The result is that the block members 162 on worms 146 and 148 will be driven transversely of the truck from the left hand side thereof to the right hand side thereof, thereby actuating both of the upright assemblies 20 and both pairs of upright mounting brackets 116 and parts associated therewith toward the right hand side of the truck (FIGURE 3), while at the same time translating the block member 154 and the counterweight 158 connected thereto from the right hand side of the truck toward the left hand side thereof.

From the above it will be apparent that irrespective of the transverse location of the upright assemblies 20 and associated parts, the counterweight 158 will always be located at a corresponding opposite position in a transverse direction so that it always tends to balance or equalize the load of the truck on opposite sides thereof. The selected mass of the counterweight is largely determined by the over-all truck configuration and weight distribution thereof.

Referring now to the platform leveler and load equalizer assembly shown generally at numeral 62, it will be recalled that each of the dual rear wheels 60 are independently sprung from the truck frame by leaf springs 54 and bracket means 56. Secured to the upper end of each axle bracket 56 and centrally of the spring 54 is a generally triangular shaped pivot block 170, at the upper vertex of which is pivotally mounted on a pin 172 a rearwardly extending arm 174 which is connected at its opposite or rear end to a transversely extending torque tube 176. The torque tube 176 is supported for rotation at its opposite ends by a pair of laterally spaced brackets and bushings 177 which depend downwardly from the lower flange of the rear I-beam 18. As the load on either of the springs 54 is increased and the spring tends to deflect, part of the load is imposed on the arm 174 adjacent the loaded spring; the arm 174 transmits its load through torque tube 176 to the arm 174 on the opposite side of the truck which imposes additional force on the other spring 54, thus producing essentially equal spring loads and maintaining a substantially level platform irrespective of the manner of load distribution on the truck frame. For example, if a heavier load is imposed on the right hand spring 54 than on the left hand spring 54 (FIGURE 3) the right hand spring will tend to deflect downwardly to a greater degree than will the left hand spring 54. Such additional deflection of the right hand spring will initially actuate downwardly the pivot block 170 a correspondingly greater amount than the left hand pivot block 170, thereby tending to rotate the torque tube 176 in a clockwise direction in brackets 177. Clockwise rotation of torque tube 176 imposes a force on the left hand spring 54 which is proportional to the initial difference in the load on the springs 54. Thus, it is seen that irrespective of variations in location or mass of load, the load equalizer means 62, by twisting the body and chassis in one direction or the other about the longitudinal axis of the truck, will always tend to maintain level the platform of the body 12 by tending to maintain equal the vertical distance between each pin 172 and the platform of the truck body 12 on opposite sides of the truck.

An hydraulic cylinder and piston outrigger assembly 184 is mounted at its upper end to the frame of the truck by bracket means, not shown, and extends downwardly and outwardly of the truck body, having a pivoted pad 186 located at the outer end of the piston rod. Extension of the piston rod of the assembly 184 will project the pivoted pad into contact with the truck supporting surface (from the position shown in FIGURE 3 to the position shown in FIGURE 1) for providing truck stabilizing means additional to the counterweight 158, as when the uprights 20 are located at the right side of the truck and the forks located beneath the load for engaging same.

In operation, the truck 10 is driven alongside of a load to be transported, in which position the outrigger means 184 is moved outwardly and downwardly until the pad is bearing on the supporting surface. The fork tines 22 are then lowered to approximately ground level by relieving the pressure in the lower ends of hydraulic hoists 28, and the hydraulic motor means 140 then energized to rotate the worm screws 146 and 148 in a direction to actuate the uprights rightwardly of the truck with bracket means 116. During such transverse motion the torque tube 26 maintains the uprights in longitudinal alignment; as they progress to the right side of the truck the forks may be tilted downwardly with the uprights, as desired, by means of the tilt cylinder assemblies 24 in order to engage the underside of a load to be transported (see FIGURE 3). During such traversing movement of the uprights, the counterweight 158, as hereinbefore explained, will be actuated toward the extreme left hand side of the truck in order to stabilize the truck and to aid in equalizing the load on opposite sides thereof as the hydraulic hoists 28 are energized to raise a load on the fork tines. The load is normally raised slightly above platform level by the fork tines, while the torque tube 32 assures that the load will remain parallel to the truck supporting surface during raising movement thereof. The hydraulic motor 140 is then actuated in the opposite direction which returns the uprights with the load to the original retracted position, wherein the load is lowered to rest on the platform of the truck. During such return movement, of course, the counterweight 158 is returned to its initial right hand position. The outrigger is then retracted to the position shown in FIGURE 3 and the truck is ready to move. While transporting the load, the fork tines may be lowered partially to the ground to reduce the over-all height of the truck, or, more conveniently, may be left at platform level and tilted rearwardly by means of cylinder assemblies 24 to aid in stabilizing the load, such as may be necessary with a load of long loose pipe or other unbound material.

The above-described sequence of operation is reversed when it is desired to discharge a load at a selected location.

As explained hereinbefore, regardless of the manner of distribution of a load upon the truck platform, the load equalizing means 62 functions to insure that the body of the truck will remain approximately level and that the loading on the various tires will be approximately equal.

In the interests of conciseness and clarity of illustration, all of the details of some of the parts have not been illustrated, and the mechanism of our invention has been shown somewhat schematically. Thus, it is our intention to promote ready understanding of our invention by persons skilled in the art.

While we have shown and described but one embodiment of our invention, it will be readily understood by persons skilled in the art that many variations in the construction and arrangement of parts may be made without departing from the scope of our invention.

We claim:

1. An industrial truck comprising a longitudinally extending frame construction having a first pair of transversely extending frame members adjacent opposite ends of the frame and a second pair of transversely extending frame members intermediate said first pair of frame members, a load lifting upright assembly operatively connected to each one of said first pair of frame members for movement therealong longitudinally outwardly of said first frame members, load counterbalance means operatively connected to said second pair of frame members for movement therealong between the first frame members, and means for actuating each of said upright assemblies transversely of the frame construction and said counterbalance means transversely of the frame construction in a direction opposite to the direction of movement of said upright assemblies.

2. In an industrial truck having a longitudinally extending wheeled frame construction which includes a first pair of transversely extending frame members adjacent opposite ends thereof, a second pair of transversely extending frame members intermediate said first pair of frame members, wheel carrier axle means adjacent opposite ends of the truck, means connecting said axle means to the frame construction, and a power train extending longitudinally of said truck between the axle means and having a portion thereof beneath said second pair of transverse frame members, a load lifting upright assembly operatively connected to each one of said first pair of frame members for movement longitudinally thereof outwardly of the respective ones of said first frame members, load counterbalance means operatively connected to said second pair of frame members for movement therealong between the first frame members, and means for actuating said upright assemblies and said counterbalance means transversely of the frame construction in directions one opposite to the other.

3. An industrial truck comprising a longitudinally extending wheeled frame construction which includes a pair of transversely spaced and longitudinally extending frame members, a first pair of transversely extending frame members connected to said longitudinal frame members adjacent opposite ends thereof and a second pair of transversely extending frame members intermediate said first pair of frame members and connected to said longitudinal frame members, said first and second pairs of frame members extending in both directions transversely beyond said longitudinal frame members, a load lifting upright assembly operatively connected to each one of said first pair of frame members for movements transversely of the truck outwardly of said first frame members, load counterbalance means connected to said second pair of frame members for movements transversely of the truck between the first frame members, and means for simultaneously actuating said upright assemblies and said load counterbalance means transversely of the truck and in opposite directions relative to each other.

4. An industrial truck as claimed in claim 3 wherein said upright assemblies and said counterbalance means are movable to positions adjacent either end of said first and second pairs of transversely extending frame members, respectively, each of said upright assemblies including a vertically movable load engaging means for engaging a load at one side of the truck.

5. In an industrial truck having a longitudinally extending wheeled frame construction which includes a pair of longitudinally extending frame members and a plurality of transversely extending frame members in longitudinally spaced relation connected to said longitudinal frame members between the opposite ends thereof, a load lifting upright assembly connected to a transverse frame member at each end of the truck for movement therealong transversely of the truck and outwardly of said latter frame members, load counterbalance means connected to the frame construction intermediate the opposite ends of the truck for transverse movement relative thereto between said latter frame members, and power means operatively connected to said upright assemblies and to said counterbalance means for simultaneously actuating same transversely of the truck and in opposite directions relative to one another.

6. An industrial truck as claimed in claim 5 wherein said power means includes a plurality of interconnected motor elements which are variously connected to said upright assemblies and said counterbalance means for actuating same as aforesaid.

7. An industrial truck as claimed in claim 6 wherein said motor elements comprise transversely extending screw means for actuating said upright assemblies and said counterbalance means transversely of the truck during rotation of the screw means, and power means operatively connected to each of the screw means for rotating those screw means which are connected to the upright assemblies in a direction opposite to the direction of rotation of the screw means which is connected to the counterbalance means.

8. In an industrial truck having a wheeled frame, a pair of upright assemblies connected to the frame for traversing movement relative thereto, said upright assemblies being mounted in spaced relation to each other, each of said upright assemblies comprising a pair of channelled upwardly extending members, brace means connected to said channelled members for maintaining same in fixed spaced and facing relation, a pair of channelled upwardly extending members mounted between said first pair of channelled members for vertical guided telescoping movement relative thereto, brace means connected to said movable channelled members for maintaining a spaced relation thereof, a load engaging means connected to said movable channelled members for vertical guided movement relative thereto, hydraulic hoist means mounted within the upright assembly and extending upwardly between said movable channelled members, the movable end of said hoist means being connected to the upper end of the movable channelled members for elevating same relatively to the first mentioned channelled members, wheel means connected to the upper end of the movable channelled members, and cable means fixedly anchored at one end thereof and trained over the wheel means for connection to the load engaging member at the opposite end thereof for elevating same relative to the movable channelled members, each of said load engaging members being movable downwardly below the lowermost portion of the various channelled members and interconnecting means between the wheeled means of the upright assemblies for synchronizing upward movements thereof.

9. An industrial truck as claimed in claim 8 wherein the frame construction of the truck extends longitudinally and includes a pair of transversely extending frame members adjacent the opposite ends thereof, said upright assemblies being operatively connected to opposite ones of said transversely extending frame members for movement therealong transversely of the truck.

10. An industrial truck as claimed in claim 9 wherein load supporting platform means extends between said transverse frame members, said upright assemblies being actuatable adjacent opposite ends of the truck transversely thereof for engaging a load adjacent one side thereof and raising the load above the platform level, subsequent opposite transverse movement of the upright assemblies permitting the load to be suspended immediately above the platform and then lowered to a position of repose upon said platform.

11. An industrial truck comprising a generally longitudinally extending frame construction having longitudinal members and transverse end members extending a substantial distance outwardly to either side of said longitudinal members, wheel and axle means supporting the frame construction, the wheel means being located adjacent each corner of the frame construction transversely

outwardly of the adjacent longitudinal member and generally below the adjacent end member, load lifting upright assemblies located longitudinally outwardly from opposite ends of said frame construction and operatively connected in cantilever fashion to corresponding end members for transverse movement relative to the truck, each of said latter operative connections including bracket means mounted upon one of said end members for guided movement therealong and means connecting the upright assembly to said bracket means, and motor means operatively connected to said bracket means for each actuating each said bracket means and upright assemblies transversely of the truck selectively in either direction.

12. An industrial truck as claimed in claim 11 wherein each upright assembly is pivotable about its connection to said bracket means, and motor means connected between each of said bracket means and upright assemblies for tilting each upright assembly in either direction from a vertical position thereof about its pivoted connection to the bracket means.

13. An industrial truck as claimed in claim 12 wherein a longitudinally extending connecting member is secured to both said upright assemblies for synchronizing tilting movements thereof.

14. An industrial truck as claimed in claim 11 wherein the said motor means includes a pair of rotatable screw elements extending transversely of the truck at opposite ends thereof and operatively connected to respective ones of said bracket means for actuating same with said upright assemblies transversely of the truck during rotation of the screw elements.

15. An industrial truck comprising a longitudinally extending wheeled frame having a pair of transversely spaced and longitudinally extending frame members, an I-shaped frame member extending transversely of the truck and connecting said longitudinal frame members adjacent opposite ends thereof, said I-shaped frame members extending outwardly beyond opposite sides of said longitudinal frame members, bracket means mounted upon each of the I-shaped frame members for movement therealong, said bracket means including a plurality of vertically and longitudinally spaced roller members mounted to engage opposite sides of the upper flange of each I-shaped frame member for permitting effective rolling engagement of the bracket means along the corresponding frame member, a load lifting upright assembly cantilevered longitudinally beyond each of the I-shaped frame members and operatively connected to each of said bracket means for movement therewith relative to the said I-shaped frame members.

16. An industrial truck as claimed in claim 15 wherein motor means is provided for actuating the bracket means and connected upright assembly transversely of the truck along the respective I-shaped frame member for engaging a load outwardly of one side of the truck.

17. An industrial truck as claimed in claim 16 plus a pair of longitudinally spaced and transversely extending channelled members intermediate said I-shaped frame members and connected between said longitudinally extending frame members, and a counterbalance means mounted between said intermediate frame members for movement relative thereto in a direction opposite to the movement of said upright assemblies.

18. An industrial truck comprising a generally longitudinally extending frame construction having longitudinal members and transverse end members extending a substantial distance outwardly to either side of said longitudinal members, wheel and axle means supporting the frame construction, the wheel means being located adjacent each corner of the frame construction transversely outwardly of the adjacent longitudinal member and generally below the adjacent end member, load lifting upright assemblies located longitudinally outwardly from opposite ends of said frame construction and operatively connected in cantilever fashion to corresponding end members for transverse movement relative to the truck, each of said latter operative connections including bracket means mounted upon one of said end members for guided movement therealong and means connecting the upright assembly to said bracket means, motor means operatively connected to said bracket means for actuating said bracket means and upright assemblies transversely of the truck selectively in either direction, said motor means including a pair of rotatable screw elements extending transversely of the truck at opposite ends thereof and operatively connected to respective ones of said bracket means for actuating same with said upright assemblies transversely of the truck during rotation of the screw elements, transversely movable counterbalance means in the center portion of the truck, and additional motor means for actuating the counterbalance means simultaneously with actuation of the upright assemblies but in a direction opposite thereto.

19. An industrial truck comprising a longitudinally extending wheeled frame having a pair of transversely spaced and longitudinally extending frame members, an I-shaped frame member extending transversely of the truck and connecting said longitudinal frame members adjacent opposite ends thereof, said I-shaped frame members extending outwardly beyond opposite sides of said longitudinal frame members, bracket means mounted upon each of the I-shaped frame members for movement therealong, said bracket means including a plurality of vertically and longitudinally spaced roller members mounted to engage opposite sides of the upper flange of each I-shaped frame member for permitting effective rolling engagement of the bracket means along the corresponding frame member, a load lifting upright assembly cantilevered longitudinally beyond each of the I-shaped frame members and operatively connected to each of said bracket means for movement therewith relative to the said I-shaped frame members, means for pivotally connecting each upright assembly to the respective bracket means, and motor means connected between each bracket means and the corresponding upright assembly for tilting the latter in either direction from a vertical position about said pivoted connection thereof.

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