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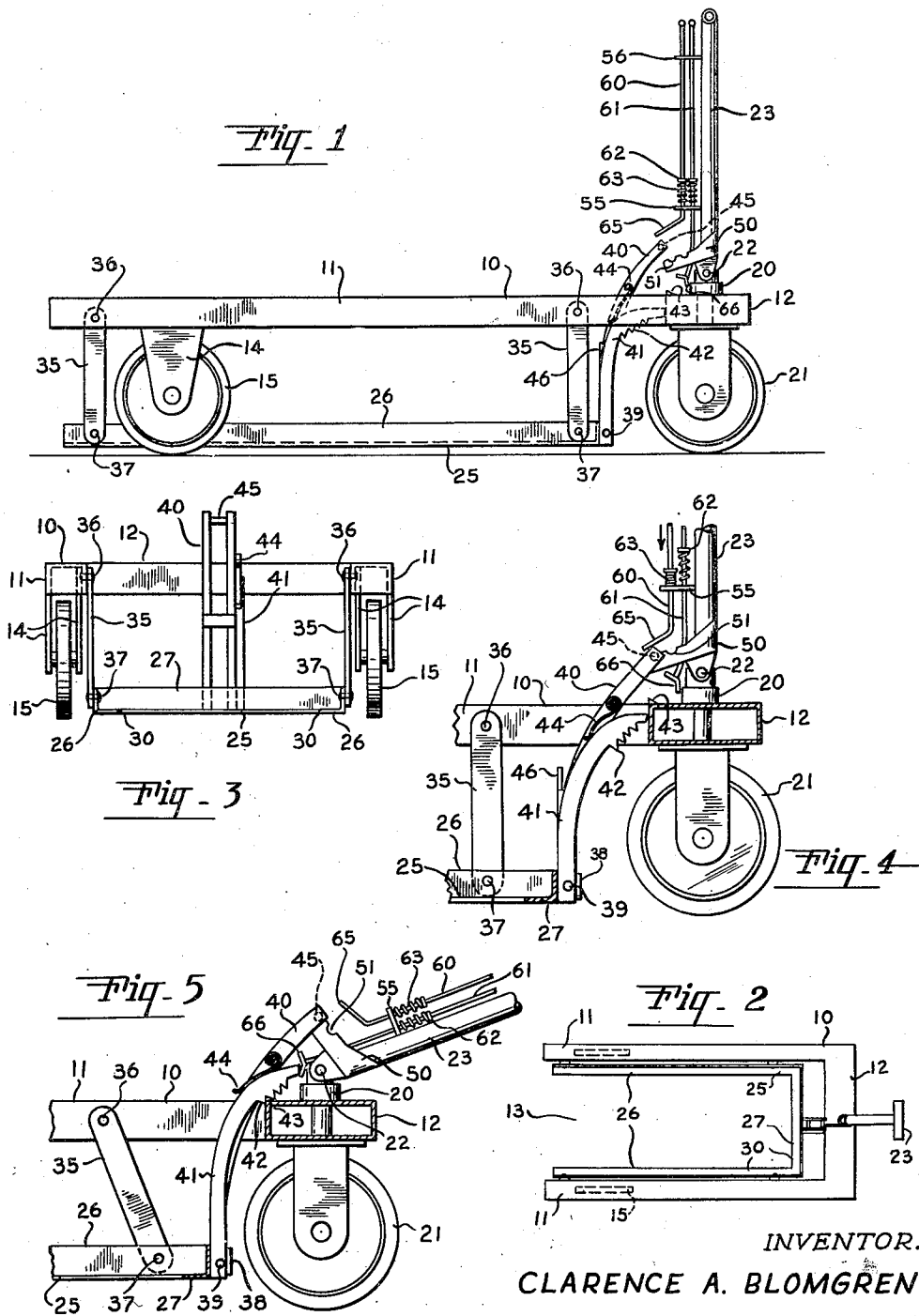
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LIFT TRUCK

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2 Sheets-Sheet 1



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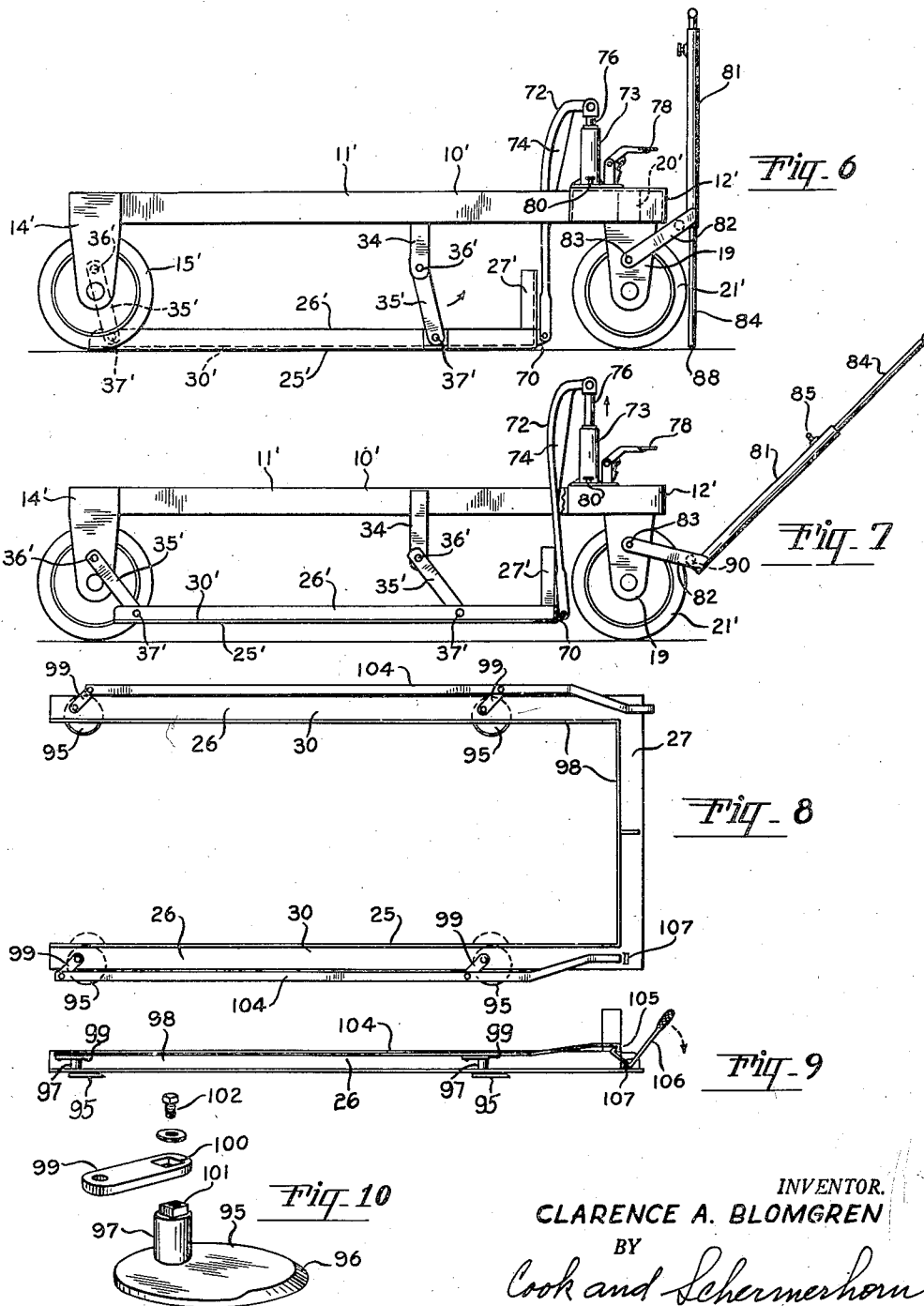
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LIFT TRUCK

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5 Claims. (Cl. 214—390)

This invention relates to a hand truck for lifting and transporting a load.

In the handling of certain types of material, such as piled sheet material of uniform size, it is advantageous to handle the material in pile lots in order to eliminate hand carrying of small quantities and hand loading and unloading of the material for short distance transportation by conventional conveyances. The present invention is particularly suited for this use in building and construction work where large quantities of sheet materials must be transported short distances in warehouses and on the site where the material is to be used.

Important objects of the invention are to provide an improved hand truck for lifting and transporting a load, to provide a lift truck for carrying piles of sheet material of any height without a pallet, to provide a lift truck of the type described having large wheels to roll freely on an uneven surface and having convenient means to control the lifting and lowering of the load, and to provide a truck of the type described which is simple and inexpensive to manufacture and rugged and durable in operation.

Additional objects of the invention are to provide a lift truck having novel means for anchoring said truck when it is not in use and to provide novel means for braking said truck.

The present truck is equipped with a U-shaped lift frame which may be backed into partially surrounding relation to a load and lowered to a position closely adjacent the floor. The lift frame has load engaging portions adapted to pass under the side edges and one end of a pile of sheet material or the like supported only an inch or so above the floor. The framework of the truck is arranged to surround three sides of the load and imposes no limitation on the height thereof. In one form of the invention the truck is pulled and steered by a tongue which is equipped with a pair of control rods, enabling the load to be raised or lowered by a single simple manipulation of the tongue. The lift frame may be provided with alternative load engaging means comprising eccentric plate members mounted on the bottom of the frame for engaging under a load which is seated flat on the floor. In another form of the invention the lift frame is operated by an hydraulic jack unit. It is also within the contemplation of the invention to provide means for anchoring the truck in a set position when the truck is not in use, and to provide means for braking the truck.

The invention will be better understood and these and other objects will be appreciated as the description proceeds with reference to the preferred embodiment of the invention illustrated on the accompanying drawing. The drawing is not intended to limit the invention, however, as various changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as defined in the appended claims.

In the drawing:

Figure 1 is a side elevational view of a truck embodying the principles of one form of the invention;

Figure 2 is a plan view of the truck of Figure 1;

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Figure 3 is a rear elevation view of the truck;

Figure 4 is a fragmentary view showing the lift frame in its lower position;

Figure 5 is a view similar to Figure 4 showing the lift frame in raised position;

Figure 6 is a side elevational view of a modified form of the invention with the lift frame in lowered position;

Figure 7 is a view similar to Figure 6, showing the lift frame in raised position;

Figure 8 is a plan view of the lift frame with eccentric load engaging plate members mounted thereon;

Figure 9 is a side elevational view of the lift frame of Figure 8; and

Figure 10 is an exploded view of the eccentric plate member of Figures 8 and 9, showing parts thereof in disassembled relation.

The main truck frame 10 is of U-shape having two longitudinal side members 11 and a front cross member 12, all integrally formed or united to form a rigid and sturdy unit. The rear end of the frame is open at 13 to allow the side members 11 to pass on opposite sides of the load to be carried when the truck is backed toward the load. A pair of brackets 14 extend downwardly beneath each of the side members 11 near the rear end thereof to support the frame 10 on a pair of large rear wheels 15.

At the front end of the truck, the cross member 12 is equipped with suitable bearing means for the swivel post 20 of a front wheel 21. A transverse pin 22 in the upper end of swivel post 20 provides pivotal connection for a tongue 23 for pulling and steering the truck.

Beneath the truck frame 10 there is suspended a U-shaped lift frame 25 having a pair of horizontal side members 26 and a front cross member 27, all integrally formed or united to form a rigid unit. The members 26 and 27 preferably comprises L-shaped angle irons having horizontal lips 30 to engage under marginal portions of the load for lifting and supporting the load. Lift frame 25 is suspended from a plurality of pendent hanger arms 35 having pivotal connections at 36 with the side members 11 of the truck frame 10 and pivotal connections 37 at their lower ends with the side members 26 of the lift frame 25. The hanger arms 35 are of such length that when they hang vertically, as shown in Figures 1 and 4, the load supporting lips 30 are spaced only a fraction of an inch above the floor whereby the lips 30 may pass under the edges of a pile of sheet material or the like an inch or so above the floor.

This extremely low loading position of the lift frame 25 thus requires no pallets or special handling of the material, such as is ordinarily required with conventional trucks for such materials. It is customary with many types of building materials to support the piles on boards to hold the bottom of the pile a short distance above the floor, especially where the floor may be damp. The lips 30 in the present truck require no greater spacing of the bottom of the load from the floor than would be necessary for manual handling to enable a workman to place his fingers under the bottom of the pile, or than would be necessary to avoid contact with a damp floor.

A bracket 38 on the front cross member 27 carries a pivot pin 39 for a lifting arm 40 and a locking arm 41. The latter is equipped with teeth 42 to engage a lip or catch plate 43 on the inner edge of the front cross member 12 of the truck frame 10 when the lift frame is raised to its Figure 5 position. The lifting arm 40 is equipped with a spring 44 which bears against the rear side of arm 41 to urge the arm 41 forwardly and the arm 40 rearwardly. The upper end of arm 40 is equipped with a cross pin 45. A stop 46 on the cross member 27 prevents the upstanding arms 40 and 41 from swinging rearwardly

whereby both arms tend to fall forwardly against cross member 12 of the truck frame.

Tongue 23 is equipped with a lifting bracket arm 50 extending rearwardly substantially at right angles to the tongue and equipped with notches 51 to engage the pin 45. Lift frame 25 is raised by turning the tongue and wheel 21 straight forward and then swinging the tongue up to vertical position and engaging pin 45 in one of the notches 51, as shown in Figure 4. Then, as the tongue is swung forward and down about its pivot 22, the lifting arm 40 pulls the lift frame 25 forward and upward to its Figure 5 position to raise the load off its original support on the floor. As the hanger arms 35 swing forward from their vertical positions, the tongue 23 inclines toward a horizontal position whereby a workman applying his weight to the end of tongue 23 can raise a very heavy load on the lift frame 25. Spring 44 insures engagement of teeth 42 of the locking arm 41 with the lip 43 to hold the lift frame in raised position. A slight upward movement of the tongue 23 then allows the spring 44 to move the lifting arm 40 rearwardly a short distance to clear the lifting bracket 50 so that this bracket will not interfere with steering movements of the tongue in pulling the truck.

For convenience of the operator, instrumentalities are provided on the tongue 23 to manipulate the two arms 40 and 41 in the raising and lowering of the lift frame. Mounted on the tongue are a pair of guides 55 and 56 for two push rods 60 and 61. Each of these rods is equipped with a thrust washer 62 and spring 63 to return the push rod after it has been depressed. Push rod 60 has a lower end 65 to engage behind the cross pin 45 in lifting arm 40 and press the pin into one of the notches 51 of lifting bracket 50 when the tongue is elevated as shown in Figures 1 and 4. As soon as the tongue 23 is swung downwardly to start raising the lift frame 25, the pin 45 retains itself in the notch 51 in which it is engaged and the push rod 60 may be released.

Push rod 61 has a lower end 66 shaped to engage the end of locking arm 41 to move the teeth 42 out of engagement with lip 43, as shown in Figure 5, preparatory to lowering the lift frame. If the pin 45 is first engaged in one of the notches 51 and the tongue 23 pressed down from its Figure 5 position, the weight of the load will be transferred from locking arm 41 to lifting arm 40 permitting the teeth 42 to be disengaged easily from lip 43, and held disengaged, while the lift frame is lowered.

Thus the improved form of construction of the present lift truck facilitates the lifting and transportation of pile units of sheet material supported only a short distance above the floor. Such a pile may extend to any height without interference with any portion of the frame of the truck. Because of the relatively short lift of the lift frame 25 and the great mechanical advantage of tongue 23, a very heavy load may be handled by a single workman.

Figures 6 and 7 show a modified form of the invention comprising hydraulic means for operating the lift frame. There is provided a main truck frame 10' having a U-shape. The frame 10' has a pair of longitudinal side members 11' and a front cross member 12', these members being integrally formed or united to form a rigid and sturdy unit similar to the first embodiment. The rear end of the frame is open. The frame has a pair of downwardly extending brackets 14' at the rear thereof for mounting a pair of rear wheels 15'. The front of the truck is supported by a wheel 21' mounted in a yoke member 19 having an upwardly extending swivel post 20' journaled in the cross member 12' by suitable bearings.

Suspended from the frame 10' is a U-shaped lift frame 25' having a pair of side members 26' and a front cross member 27', these members forming a rigid unit. The members 26' and 27' preferably comprise L-shaped angle irons having horizontal lips 30' adapted to engage under marginal portions of the load to be carried. Side members 11' have integral downwardly extending brackets 34

and pendent hanger arms 35' having pivotal connections at 35' and 37' with the brackets 34 and side members 26', respectively, for supporting the front end of the lift frame 25'. The rear end of the lift frame is supported by similar hanger arms 35' pivotally connected at 36' and 37' with the brackets 14' and the side walls 26', respectively.

The front end of lift frame 25' is provided with a lug 70 to which is pivotally connected a lift arm 72 pivotally connected at its upper end to a jack unit 73, the lift arm 72 having a reinforcing web 74 at its upper end. Jack unit 73 is of a conventional type, having a piston rod 76 therein operable by fluid pressure acting on a piston head in a vertical cylinder. A foot lever 78 connected with a pump piston is operable to raise the piston rod and a lever 80 is provided for opening a relief valve for lowering the piston rod. When the lift truck has been moved into engagement with a load, the foot lever 78 is manipulated to cause the piston rod 76 to move upwardly and apply lifting force to the lifting arm 72. As seen in Figure 7, as the lifting arm moves upwardly the lifting frame 25' pivots forwardly on the hanger arms 35' and at the same time moves upwardly to lift the load off the floor surface. In a lifting operation, the arm 72 tilts rearwardly to permit said pivoted lifting action. When the load is to be dropped the lever 80 is operated to relieve the pressure in the jack. In the lowered position of the lift frame, the hanger arms 35 or 35' preferably are slightly inclined toward the rear to obtain the necessary mechanical advantage and so that the rate of rise of the lift frame will be quite rapid in a lifting operation.

The present embodiment utilizes a two-piece tongue comprising a tubular portion or post 81 having integral angular arms 82 pivotally mounted on the yoke 19 at 83 and having a rod or handle portion 84 slidable therein. Rod 84 is held in relative adjusted positions in the tubular portion 81 by a setscrew 85 in the tubular portion.

As best seen in Figure 6, rod 84 is longer than the tubular portion 81 and is adapted to project through the bottom thereof. The bottom end of rod 84 has a friction foot 88 adapted to engage the floor surface for anchoring the truck when not in use. A more effective anchoring method comprises lifting the front end of the truck, and while the truck is thus tilted, the rod portion 84 is moved downwardly into engagement with the floor and the setscrew 85 tightened.

In this anchored position the front portion of the lift truck is raised off the floor and the weight of said portion is on the rod 84 and friction foot 88.

Mounted between the arm portions 82 of the tongue is a pin 90 adapted to engage the front wheel 21' in a lowered position of the tongue. The parts are arranged so that in normal pulling and steering operations of the truck the pin 90 is not engageable with the wheel, but when it is desired to apply a braking effect to the truck, the tongue is moved downwardly sufficiently so that the pin 90 engages the wheel to apply a frictional retarding force thereto. Thus, a braking effect can be provided while the truck is in use, by means of the pin 90, and a braking or anchoring effect can be produced while the truck is not in use or is being transported, by means of the rod 84.

Another feature of the present invention, shown in Figures 8, 9 and 10, comprises a lifting frame 25 having auxiliary means for engaging a load to be carried, this structure being applied to either the manually or hydraulically liftable frame. This feature comprises the use of a plurality of disc-shaped eccentric plates 95 having a sharpened portion 96. Integral with each of the eccentrics 95 is an upstanding bearing member 97 adapted to be journaled in the lip portion 30 of the frame side members 26, the lip portions 30 having a vertical flange 98 thereon. Mounted on the bearing 97 for imparting rotational movement thereto is a crank arm 99 mounted on said bearing by means of a socket 100 therein engageable with a correspondingly shaped projection 101 on the

bearing. The crank arm 99 is held in place by a screw 102 threaded in the projection 101, the projection 101 comprising, preferably, a nut welded on the bearing.

Crank arms 99 are connected to a link 104 having at its front portion a hook 105 arranged to be engaged by a lever arm 106 fulcrumed at 107. Referring to Figure 8, one of the links 104 is shown in retracted position whereby the eccentrics 95 do not project beyond the inner edge of the side members 26, the lever arm 106 being omitted from the figure. The other link 104 is shown in its forward position whereby the eccentrics project inwardly beyond the edge of the side members 26. For picking up a load the truck is moved into straddling position with the load and the links 104 moved to their forward position by means of the lever arm 106. The sharpened portion 96 of the eccentrics 95 permits the eccentrics to wedge or force themselves under the load. This structure is especially adaptable for engaging under a load which seats flat on the floor. Vertical flanges 98 prevent accidental engagement of lip portions 30 under the load so that the load cannot become hung up on the frame 25 when the load is dumped.

The present lift truck is especially useful for hauling Gypsum lath or concrete blocks. For material requiring pallets, the present truck offers a special advantage. Instead of the conventional high pallets which are rather expensive and bulky, the present truck requires only a single wide board with cleats on the bottom to hold it a fraction of an inch above the floor. Such pallets are very inexpensive, light in weight, and may be piled compactly when not in use. Since the wheels are not required to pass under the pallets, they may be made as large as desired for easy rolling over a rough floor or uneven surface.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A lift truck comprising a U-shaped truck frame and a U-shaped lift frame, said truck and lift frames being adapted to surround three sides of a load to be lifted and carried, a plurality of pendent hanger arms suspending said lift frame beneath said truck frame, a pulling and steering tongue having a pivotal mounting to swing in a vertical plane, lifting and locking arms on the front of said lift frame, a bracket arm on said tongue engageable with said lifting arm for swinging said lift frame and hanger arms to raised position, means on said truck frame engageable with said locking arm to hold said lift frame in raised position, a first push rod on said tongue arranged to engage said lifting arm with said bracket arm, and a second push rod on said tongue arranged to disengage said locking arm from said truck frame.

2. A lift truck for carrying a tall stack of sheet material and the like comprising a U-shaped truck frame and a U-shaped lift frame, each frame having a pair of longitudinal members and a cross member only at its front end so that the truck may be backed into a position surrounding three sides of a load of indefinite height to be carried, a rear wheel mounted under each of said longitudinal truck frame members, a steerable front wheel mounted under said truck frame cross member having a tongue for pulling and steering the truck, a plurality of pendent hanger arms having their lower ends pivotally connected with said longitudinal lift frame members and their upper ends pivotally supported from said longitudinal truck frame members, a generally vertical lifting link having a vertical lower end pivotally connected with said lift frame cross member and a forwardly directed upper end extending above said truck frame cross member, and means for lifting said upper end of said lifting link to swing said lift frame forward and upward on said hanger arms.

3. A lift truck as defined in claim 2, said tongue being pivotally mounted for vertical movement, and a bracket arm on said tongue arranged to extend over said truck frame cross member and engage said upper end of said lifting link when said tongue is raised upright and to lift and pull said link forward when said tongue is depressed forwardly.

4. A lift truck as defined in claim 2, including an hydraulic lift cylinder mounted on said truck frame cross member, and a piston in said cylinder arranged to lift said upper end of said lifting link.

5. A lift truck as defined in claim 2, including horizontal beveled edge eccentric plate members rotatably mounted on said longitudinal lift frame members and arranged to force themselves, when rotated in contact with a floor, under the side edge portions of a load resting on the floor to transfer support of the load from the floor to said lift frame.

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