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LIFT TRUCK

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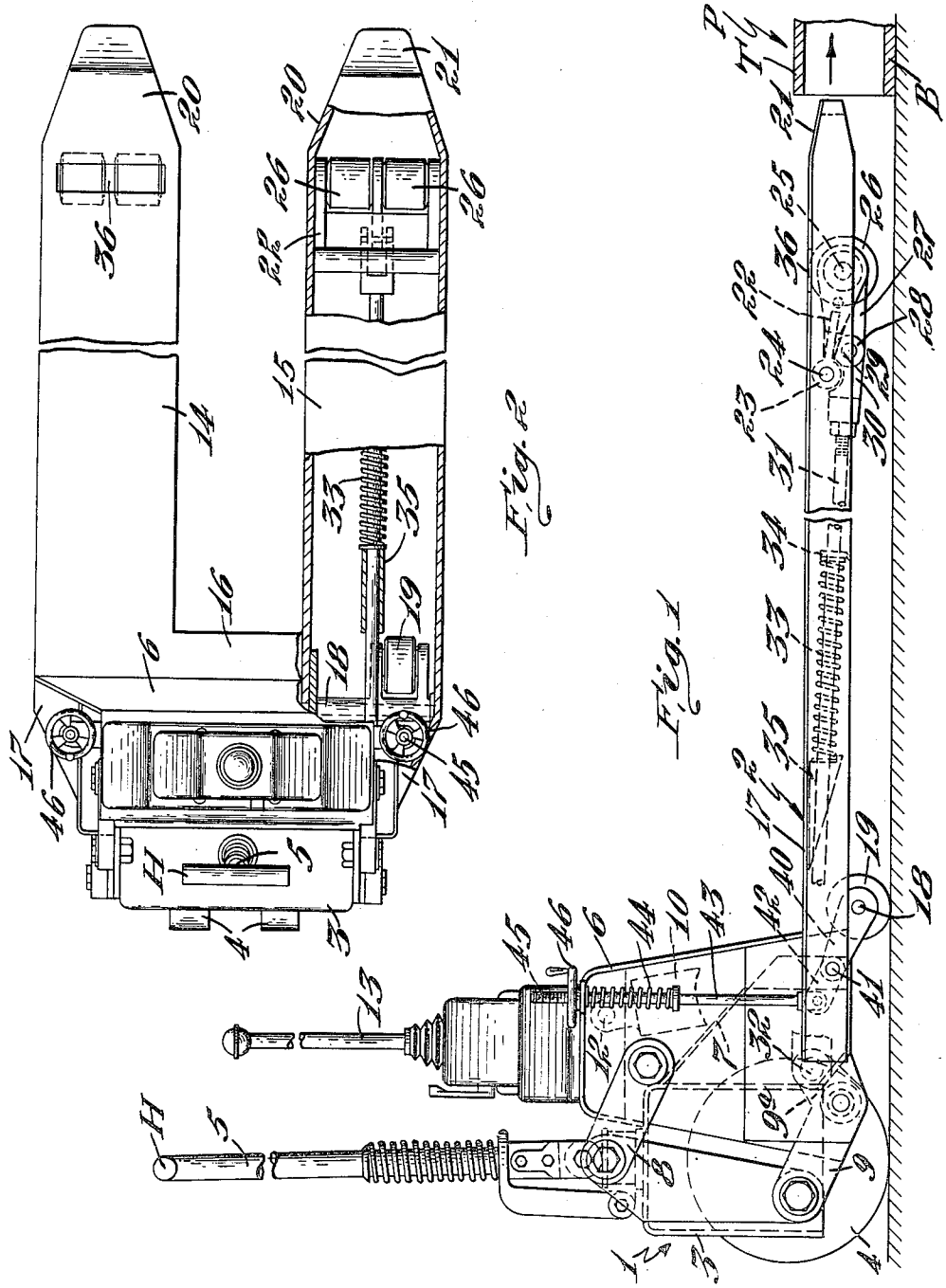

Fig. 2

Fig. 1

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LIFT TRUCK

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3 Claims. (Cl. 254—2)

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This invention pertains to lift trucks such as are commonly employed in warehouses and factories for moving material from one location to another. To facilitate the transfer of certain types of material, for example boxes or cartons, it is usual to stack such articles upon a portable platform or "pallet," and preparatory to moving the stacked articles, the "fork" or lift arm of the truck when in normal load-receiving position is inserted beneath the platform having the articles stacked thereon and is then raised, and holds the platform elevated above the floor while the truck is moved to the delivery point. Pallets of the so-called "single face" type comprise a horizontal platform provided with short legs or equivalent elements for holding it spaced above the floor sufficiently to admit the fork or lift arm of the truck beneath it. Pallets of the so-called "double face" type have two horizontal platforms vertically spaced apart to admit the fork or lift arm of the truck between the platforms. Usually each platform comprises a plurality of transversely extending planks, some of the planks of the lower platform being spaced far enough apart to permit the foldable lifting wheel of the fork or lift arm to project down between them so as to contact the floor.

While pallets of either the "single face" or "double face" type are supposed to come in standard dimensions, these dimensions often vary, particularly in the vertical height of the upper platform from the floor or the vertical height of the upper and lower platforms with relation to each other. Because of this situation the problem is often encountered that with prior art lift trucks in which the level of the normal load-receiving position of the lift arm is fixed at the time of manufacture, it is extremely difficult if not impossible to introduce the lift arm beneath the upper platform of the "single face" pallet or between the upper and lower platforms of "double-face pallets" without a laborious change in the relationship between the level of the normal load-receiving position of the lift arm and the respective vertical heights of the platforms.

The principal object of the present invention is to obviate the aforesaid difficulty of prior art lift trucks by providing a lift truck of the character described wherein the height of the fork or lift arm, when in its normal load-receiving position, may be conveniently and expeditiously varied. A further object is to provide an improved lift truck which is easy to operate, light in weight and of rugged, durable construction. Other and further objects and advantages of the invention will

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be pointed out in the following more detailed description and by reference to the accompanying drawings wherein

Fig. 1 is a diagrammatic side elevation of the improved truck of the present invention, certain parts being broken away, the lift arm being shown in load-receiving position;

Fig. 2 is a plan view of the truck shown in Fig. 1 with certain parts broken away and others in horizontal section.

Referring to the drawings the numeral 1 designates the main carriage of the truck and the numeral 2 indicates the lift arm, pickup arm or fork. The carriage 1 comprises a hollow, rigid box-like body or chassis 3 made from fabricated steel plates welded together, and is provided with bearings for a vertical steering post having a forked lower end having bearings for a horizontal shaft which carries a pair of supporting and steering wheels 4. The upper end of the steering post is provided with a horizontal pin which receives the forked lower end of the steering tongue 5 provided with a handle H at its upper end. The specific details of the steering post and tongue form no part of the present invention and need not be further described, these parts being more or less conventional in devices of this type.

The body or chassis 3 of the truck carriage supports the vertically movable motor housing 6 which is connected to the chassis 3 by means of parallel links 8 and 9 arranged at each side of the chassis. Within the housing 6 there is arranged a motor device 10, preferably a conventional hydraulic motor comprising inner and outer telescoping parts interconnecting the housing 6 and chassis 3. The upper of the relatively movable motor parts is provided with a transverse pin 12 (Fig. 1) by means of which it is pivotally connected to the upper part of the motor housing 6. A suitable pump, within the upper part of the motor housing, actuable by the handle 13, provides for forcing pressure fluid into the motor so as to expand the latter vertically and thus to raise the housing 6 relatively to the chassis 3.

The lift arm or fork 2 comprises parallel rigid load-supporting members 14 and 15 (Fig. 2) united at their forward ends by the transverse member 16. The parts 14, 15 and 16 are formed of fabricated metal plates having horizontal upper surfaces lying in the same plane. Each of the parts 14 and 15 has vertical stiffening flanges at its opposite sides, thus forming a shallow inverted box-like structure. The parts 14 and 15 have integral forwardly extending portions 17 which lie at opposite sides of the motor housing and which,

together with the transverse member 16, are rigidly welded to the motor housing 6.

The rear supporting wheels 19 are mounted on shafts 18 carried by lever arms 40 pivotally secured at 41 to the parts 17 of the lift arm. The levers 40 have forwardly extending arms 42 which are pivotally connected to the lower ends of rods 43 which are urged downwardly by springs 44. These rods are screw threaded at 45 at their upper ends to receive hand wheels 46 having threaded axial bores. Normally, when the lift arm is in the load-receiving position it is unsupported rearwardly of the wheels 19, the lift arm, pickup arm or fork 2 thus being in the nature of a cantilever supported at one end only and being free from contact with the ground or floor rearwardly of the wheels 19 except when actually supporting the load. The weight of the chassis and housing 6 (located forwardly of the wheel 19) is sufficient to sustain the unsupported portion of the lift arm in load-receiving position. The unsupported portion of the lift arm, between the wheel 19 and the free end of the arm, preferably should approximate or exceed the length of the pallet with which the truck is to be used.

Preferably, the rear free ends of the members 14 and 15 taper horizontally, as shown at 20, and their extreme rear ends also taper vertically, as shown at 21, in order to facilitate the introduction of the free ends of these members into the interior space of the pallet.

Each of these members 14 and 15 is provided near its free, rear end with a lift wheel assembly comprising a rigid frame having an arm 22 provided with a horizontally elongate tubular bearing member 23 at its forward end. The tubular bearing 23 is pivotally supported by a horizontal shaft 24 which is fixed at its opposite ends in the vertical flanges of the member 14 or 15 respectively. The rear end of each lifting wheel assembly is provided with bearings for a shaft 25 which carries a pair of wheels or rolls 26. The frame of each lift wheel assembly also comprises a rigid forward extending arm 27 which diverges downwardly from the arm 22, the arm 27 being provided with a bearing 28 at its forward end which receives a pin 29 (Fig. 1). A fork 30 is pivoted on this pin 29. This fork 30 is fixed to the rear end of an actuating rod 31 whose forward end is pivotally connected by a pin 32 to a rigid, upwardly directed rearward extension 9^a (Fig. 1) of the lower link 9 by means of which the motor housing 6 is connected to the chassis. A collar 34, fixed on the rod 31, forms an abutment for one end of a compression spring 33 whose other end bears against a fixed abutment 35 within the respective member 14 or 15. The spring 33 tends to push the pin 29 rearwardly and thus to swing the foldable lift wheel assembly upwardly to the normal position shown in Fig. 1. To accommodate the wheels or rolls 26, when the lift wheel assembly is folded, the horizontal platform of each of the parts 14 and 15 is provided with a transverse opening 36.

The load-receiving pallet P (Fig. 1) is here illustrated as of the double-face type having the upper load-receiving platform T usually made of heavy boards or planks, and the lower platform comprising horizontally spaced, transversely extending lower members B. Usually these lower members B are boards of approximately or slightly less than one inch in thickness. By rotating the hand wheels 46 to the left or right, the rods 43 may be moved upwardly or downwardly, respectively, thus swinging the arms 40 downwardly or upwardly respectively and thereby elevating or lowering the lift arm so as to adjust the height of the free end of the lift arm, when in its normal load-receiving position, so that the lowermost element of the wheel 26 is at a level to freely clear the upper face of the lower member B of the pallet and the upper surface of the lift arm 2 is at a level to freely clear the lower face of the upper load-receiving platform T of the pallet.

In introducing the lift arm into the pallet, the parts are first arranged as shown in Fig. 1, the lift wheel assembly being folded up. The truck is then moved rearwardly in the direction of the arrow (Fig. 1) and, as it moves rearwardly, the rear end of the arm 2 enters the interior space of the pallet, the folded up wheel 26 entering this space without contacting the forward edge of the pallet member B. The movement of the truck continues rearwardly until the wheel 19 comes into contact with the forward edge of the part B of the pallet, thus indicating to the operator that the arm has been fully entered into the pallet. The operator now actuates the pump handle 13, thus causing the fluid motor 10 to lift the housing 6 and the lift arm 2 relatively to the chassis. Concomitantly with this movement and by reason of the upward swing of the link 9, the rod 31 is pulled forwardly, thus swinging the lift wheel assembly downwardly so that the wheel 26 contacts the floor and then assists in raising and supporting the free rear end of the lift arm. The rising lift arm is thus brought into contact with the under surface of the platform T and as the lift arm continues to rise, the entire pallet with its superposed load is lifted. The operator now ceases to actuate the pump handle and, grasping the handle H of the steering tongue, swings the latter downwardly and by means of the tongue pulls the truck to the desired point for unloading. A valve, conventional in devices of this type, is now actuated so as to release the pressure fluid from the motor, thus permitting the lift arm to descend until the pallet rests upon the floor or ground. During this time the foldable lift wheel assembly moves up, assisted by spring 33, to its initial position, as shown in Fig. 1. By moving the truck forwardly it is readily disengaged from the pallet, the wheels 26 passing over the part B of the pallet without substantial contact with said parts so that the disengagement of the truck from the pallet is readily accomplished without damage to the pallet and without putting undue strain on the truck or requiring undue effort on the part of the user.

When the truck is empty and resting upon the large front wheels 4 and the auxiliary supporting wheels 19, as illustrated in Fig. 1, the effective wheel base is quite short, thus permitting the truck to be turned completely around in a very small space, for example in any normal aisle where the truck would be used.

While a desirable embodiment of the invention has been illustrated by way of example, together with certain suggested modifications, it is to be understood that the invention is broadly inclusive of any and all arrangements falling within the terms of the appended claims.

I claim:

1. A lift truck comprising a chassis, a motor housing, parallel links connecting the housing to the chassis whereby the housing may be raised and lowered relatively to the chassis, a motor device within the housing operative to raise and lower the housing, a lift arm rigidly fixed at its forward end to the housing, and movable up and

down with the latter, a supporting wheel for the housing located adjacent to the junction of the arm and housing, said wheel determining the normal load-receiving level of the arm, and means for vertically adjusting the axis of the wheel thereby to vary the normal load-receiving level of the arm, that portion of the length of the arm which is rearwardly of the supporting wheel being without support when the arm is in the normal load-receiving position.

2. A lift truck comprising a chassis, a motor housing, parallel links connecting the housing to the chassis whereby the housing may be raised and lowered relatively to the chassis, a motor device within the housing operative to raise and lower the housing, a lift arm rigidly fixed at its forward end to the housing, and movable up and down with the latter, a lever arm pivotally connected intermediate its ends to the forward end of the lift arm, a supporting wheel for the housing mounted at one end of the lever arm, said wheel determining the normal load-receiving level of the lift arm, that portion of the length of the lift arm which is rearwardly of the supporting wheel being without support when the lift arm is in the normal load-receiving position, and means for vertically adjusting the opposite end of the lever arm thereby to vertically adjust the axis of the wheel to vary the normal load-receiving level of the lift arm.

3. A lift truck comprising a chassis, a motor housing, parallel links connecting the housing to the chassis whereby the housing may be raised and lowered relatively to the chassis, a motor device within the housing operative to raise and lower the housing, a lift arm rigidly fixed at its

forward end to the housing, and movable up and down with the latter, a lever arm pivotally connected intermediate its ends to the forward end of the lift arm, a supporting wheel for the housing mounted at one end of the lever arm, said wheel determining the normal load-receiving level of the lift arm, that portion of the length of the lift arm which is rearwardly of the supporting wheel being without support when the lift arm is in the normal load-receiving position, a rod pivotally connected at one end to the opposite end of the lever arm and extending upwardly and projecting through the top of the housing and having a collar below the top of the housing, a helical spring having opposite ends engaging the collar and top of the housing respectively and normally urging the rod downwardly, the projecting end of the rod having screw threads, and a hand wheel threadedly mounted on said projecting end accessible from the top of the truck and operative, on rotation, to vertically adjust the rod, thereby to vertically adjust the axis of the wheel to vary the normal load-receiving level of the lift arm.

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