March 2, 1954 A. C. MERRICK 2,670,865

LOAD LIFTING AND MANIPULATING DEVICE FOR LIFT TRUCKS

Filed July 6, 1950

3 Sheets-Sheet 1

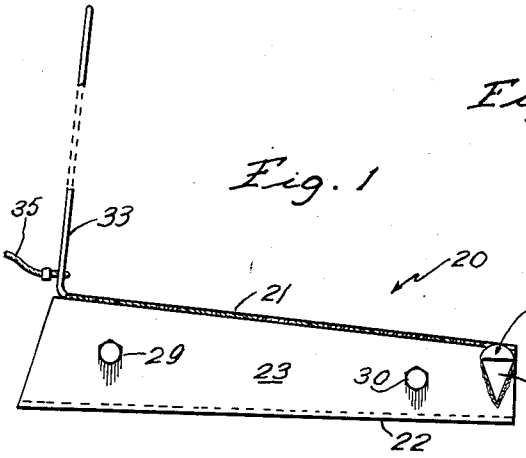


Fig. 1

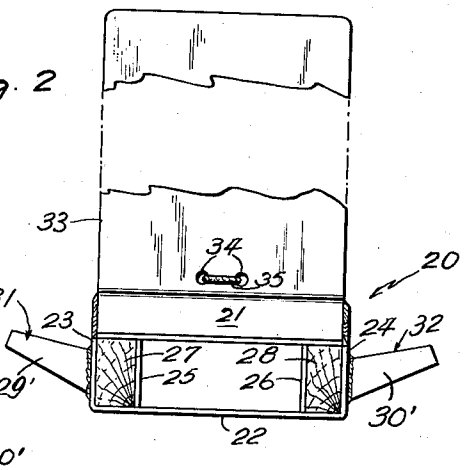


Fig. 2

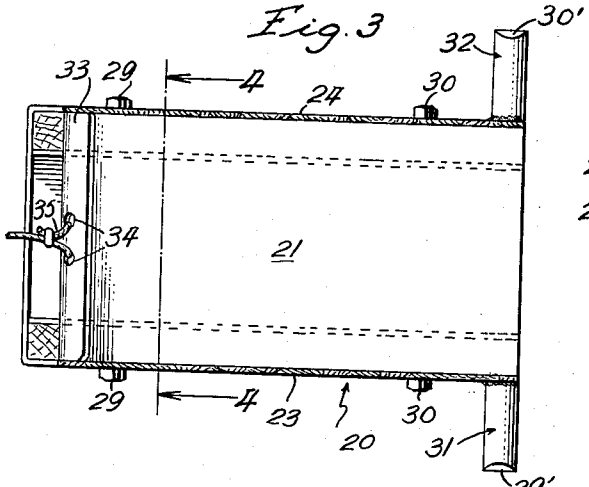


Fig. 3

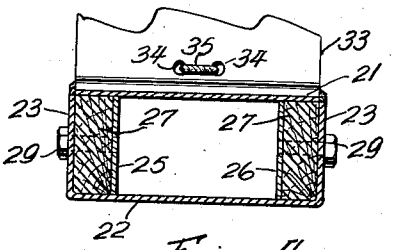


Fig. 4

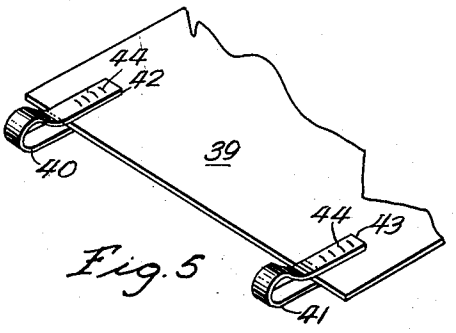


Fig. 5

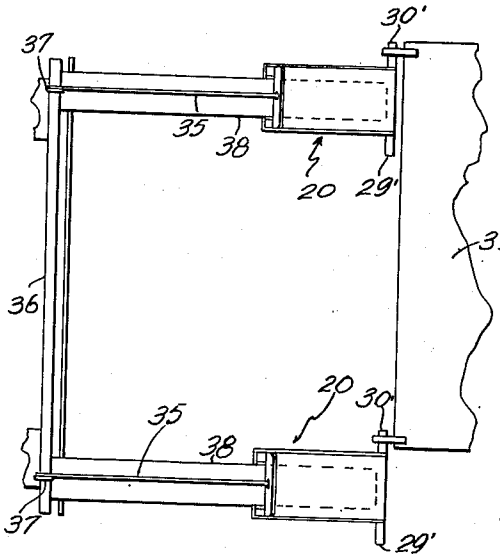


Fig. 6

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LOAD LIFTING AND MANIPULATING DEVICE FOR LIFT TRUCKS

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Fig. 8

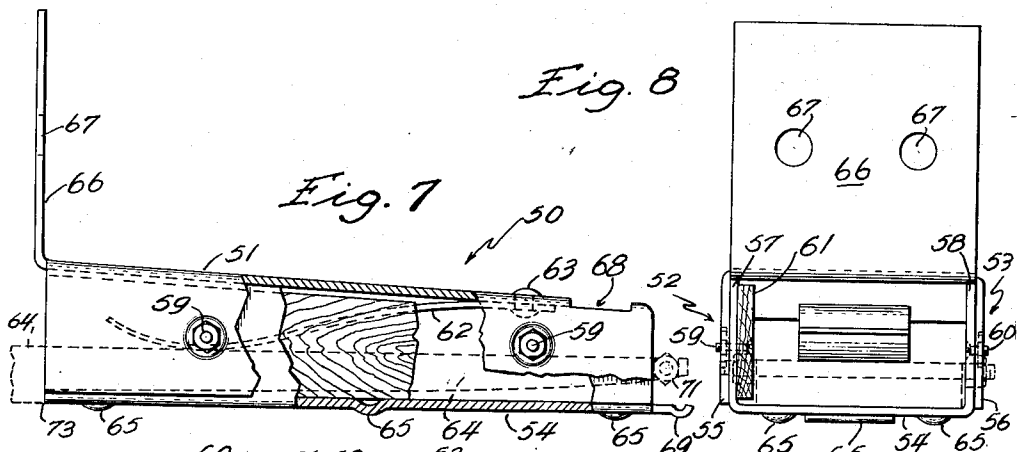


Fig. 7

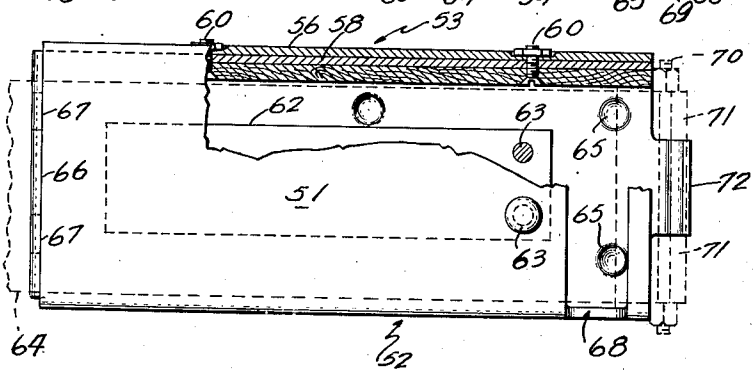


Fig. 9

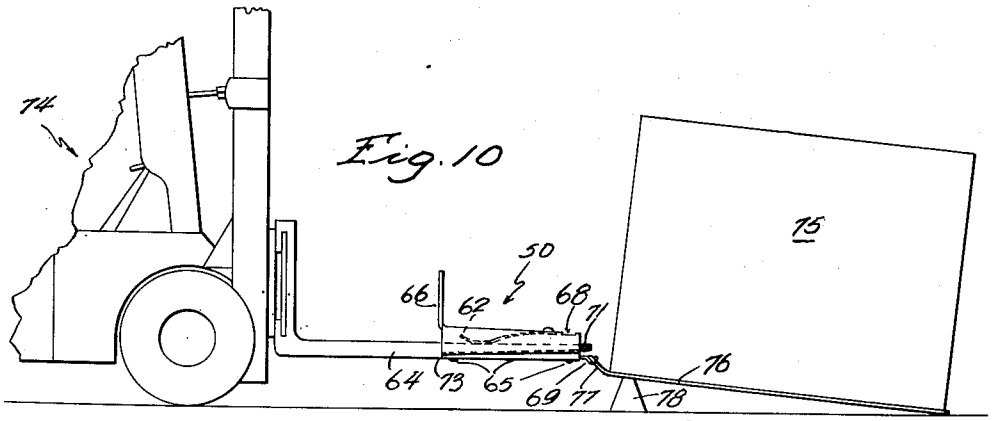


Fig. 10

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LOAD LIFTING AND MANIPULATING DEVICE FOR LIFT TRUCKS

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3 Sheets-Sheet 3

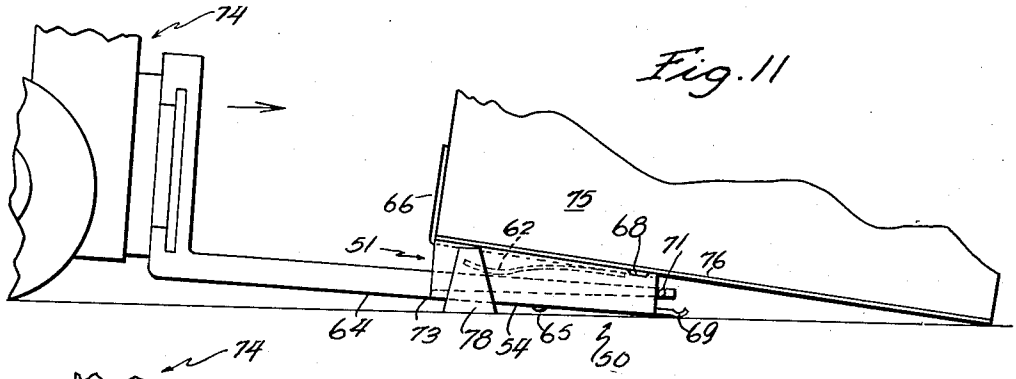


Fig. 11

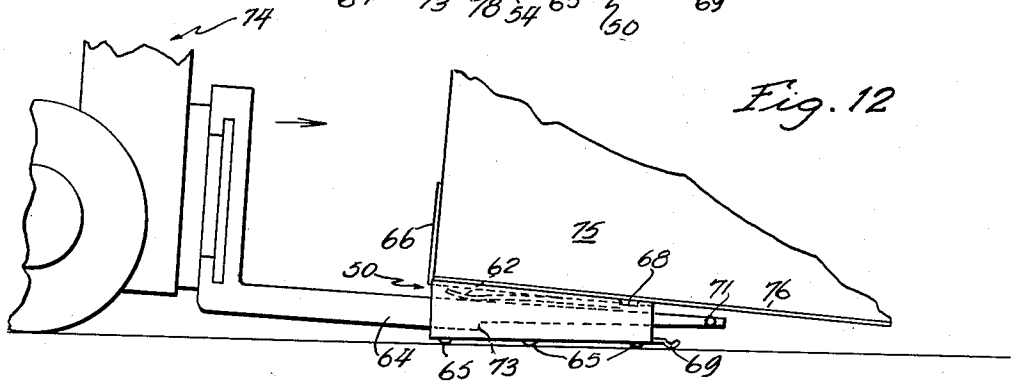


Fig. 12

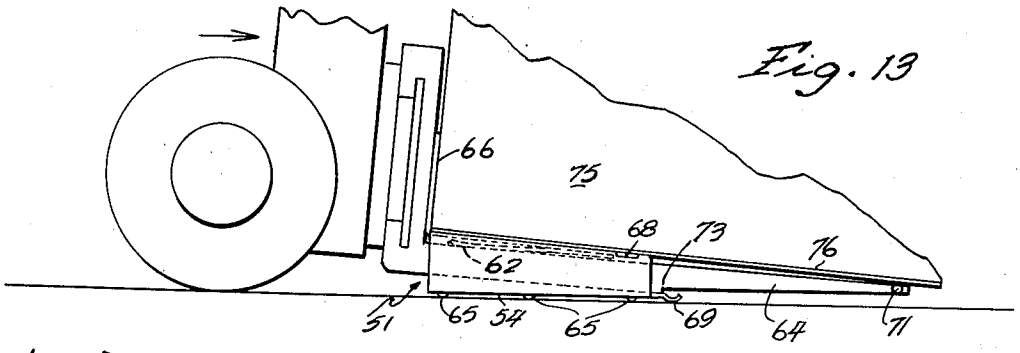


Fig. 13

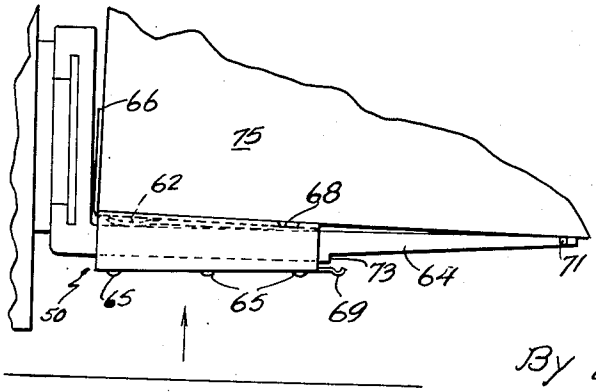


Fig. 14

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UNITED STATES PATENT OFFICE

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LOAD LIFTING AND MANIPULATING DEVICE FOR LIFT TRUCKS

Alden C. Merrick, Albany, N. Y.

Application July 6, 1950, Serial No. 172,362

18 Claims. (Cl. 214—353)

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This invention relates to improvements in industrial fork-lift trucks and, more particularly, to a load lifting and manipulating device, or pairs of such devices, adapted to be carried by the tines of the fork of such trucks, whereby to receive and transport loads thereon, and to discharge loads therefrom, and the provision of such a device, or devices, as well as the combination of such trucks therewith is a principal object of the invention.

Ever since the development of industrial fork-lift trucks it has been customary to carry loads on various conventional types of pallets. Until recently, one of the most popular types of pallet has been the well-known hard wood pallet in which cross boards are fastened to the narrow edges of spaced-apart stringers or cleats to provide a raised platform, whereby the fork or tines of an industrial fork-lift truck could readily be passed thereunder to pick up the palleted load. The use of such lift trucks with hard wood pallets has produced tremendous savings in the handling of merchandise in industrial plants, warehouses, or when loading or unloading vehicles, especially motor trucks, trailers, freight cars, barges or boats, and other similar industrial transportation equipment. However, it has not generally been possible to extend these savings to the shipment of goods in such vehicles because hard wood pallets are too expensive to risk a loss thereof in transit and in returning them. Also, the freight rate on such pallets is the same as that on the goods which they carry, and the return freight is also excessive because such pallets carry the same high rate.

Another type of pallet, perhaps not so well-known as the hard wood pallet, is the so-called "expendable" pallet consisting of a sheet of heavy corrugated board to which built-up or rolled strips providing legs of corrugated board or other inexpensive materials are secured to maintain the same in elevated position so that the fork of an industrial lift truck can pass thereunder to pick up the load and the pallet simultaneously as in the case of the hard wood pallet. Such pallets are also relatively expensive and unless properly handled often break down in transit.

A further type of pallet which may soon come into widespread use comprises a construction constituting a flat sheet of inexpensive material not intended to be held in raised spaced relation from the floor or ground surface as is the case with the preceding types of pallet. Such pallet preferably is made of corrugated paperboard,

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or other suitable material, through which is laced or otherwise secured, for example, strands of wire having one or more loops extending from the edges thereof in order that such a pallet when supporting a load thereon can be lifted to an inclined position by engaging such loops with the free ends of the tines of the fork of a lift truck. The pallet is then blocked in this position, the fork passed thereunder to lift the same with the load thereon and carried to a selected place to be unloaded. This type of pallet is disclosed in a co-pending application of Lawrence F. McDonald and Charles J. Grace, Serial No. 85,315, filed April 6, 1949, now abandoned. A modified but more simplified and economical form of such a pallet is described in connection with the instant specification and which is particularly adaptable for use in conjunction with one form of the present invention herein disclosed. However, it should be understood that the present invention is designed to handle all forms of the foregoing types of pallets, including baled or wirebound loads which can be lifted without the use of any pallets, and the provision of such a device to accomplish this purpose is a general object of this invention.

Another general object of the invention is the provision of a device, or devices, which are simple but sturdy and durable of construction, which are economic of manufacture, readily and easily applied to the forks of industrial lift trucks, which will operate with relative freedom from wear and tear, and other mechanical difficulties, and which otherwise are well suited to the purposes for which they are intended.

More specifically, it is an object of the invention to produce a load lifting and manipulating device adapted to be carried by the fork of an industrial fork-lift truck which is equipped to receive, transport and discharge loads therefrom, comprising a sleeve member having a load supporting portion adapted to overlie the fork, a ground-engaging portion, connected to the supporting portion, underlying the fork, and means adapted to engage lifting elements on a load supporting pallet, temporarily to lift one end thereof from the ground surface while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated position, whereby the fork of the truck can move the device beneath the raised end of the pallet until the ground-engaging portion thereof contacts the ground and the load-supporting portion thereof receives the weight of the load, so that the fork can pass along the sleeve and progressively trans-

fer the entire palleted load into position on the sleeve and fork.

Another object of the invention is to produce such a device having a laterally directed lug, or lugs, connected to the side, or sides, of the sleeve at its forward end in order to engage projecting lifting elements on a load supporting pallet.

Another object of the invention is to provide such a device in which the sleeve portion is provided with a transversely extending cut-out section adjacent the forward edge of the load supporting portion for the purpose of engaging lifting elements on the load itself or certain types of pallets.

Another object of the invention is the provision of such a device in which the sleeve is provided with a forwardly projecting member, or lug, which is adapted to raise various types of pallets such as those above described, including bales or wire-bound loads, including slatted crates etc., or any irregular projections on such loads by engaging the same to raise them to such position.

Another object of the invention is the provision of such a device which is adapted for use with an industrial fork lift truck having limit stops at the free ends of the tines of the fork, whereby to arrest the outward movement of the device and to maintain the same in position thereon, and in which such tines are preferably provided with intermediate limit stops intermediate their ends to engage and arrest inward movement of the sleeves, until a load is applied thereto, and a compression member cooperatively associating each tine and sleeve in order that the latter will be held in abutting relation with such intermediate limit stop and disengaged therefrom when a load is applied thereto.

Further objects of the invention are the provision of such a device in which the load supporting portion of the sleeve is inclined so that its rear end is higher than its front end and at a suitable angle to receive a tilted load substantially squarely thereon, said device having a tapered opening through the sleeve to accommodate the taper of a conventional fork of such a lift truck; in which the sleeve is provided with a spacer member secured to the inner sidewall thereof to decrease the size of the opening provided by the sleeve in order to compensate for forks of smaller cross-sectional area, and also thereby to limit tilting of the sleeve around the longitudinal axis of the fork; in which the sleeve is provided with an upstanding abutment member connected to the rear of the sleeve to abut the load and to limit the distance to which the sleeve can be moved under a load, and in which a link member is connected at one end of the sleeve, and adapted to be connected to such a truck at its other end, to limit movement of the sleeve outwardly toward the end of the fork.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of one form of such device embodied by the invention;

Fig. 2 is a front elevational view, with a portion broken away, of Fig. 1;

Fig. 3 is a plan view of Fig. 1;

Fig. 4 is a transverse sectional view, taken along the line 4—4 of Fig. 3, looking in the direction of the arrows;

Fig. 5 is a perspective view of a fragmentary end portion of a flat type of pallet provided with lifting elements particularly adapted for use in connection with the embodiment of the invention illustrated in Figs. 1 through 4;

Fig. 6 is a plan view of the fork of a lift truck with each tine of the fork being provided with a device of the type above described, illustrating the manner in which a pallet, such as that shown in Fig. 5, is initially engaged by such devices when carried by the fork of such a truck;

Fig. 7 is a side elevational view, partly in section, and with parts broken away, of a modified form of the invention depicted in Fig. 1;

Fig. 8 is a rear elevational view, looking from left to right of Fig. 7;

Fig. 9 is a plan view, partly in section and with parts broken away, of Fig. 7;

Fig. 10 is a side elevational view of a device such as that depicted in Figs. 7 through 9 mounted on the fork of a lift truck, the latter being illustrated fragmentarily, and depicting an initial step in raising a load mounted upon a pallet, of the type disclosed in the co-pending application hereinbefore mentioned, showing the load blocked in an inclined position;

Fig. 11 is a view similar to Fig. 10, but somewhat enlarged, illustrating the device moved into position underneath the blocked palleted load;

Fig. 12 is a view similar to Fig. 11 illustrating the fork of the lift truck passing through the sleeve of the device progressively to shift the palleted load to position thereon;

Fig. 13 is a view similar to Fig. 12 illustrating the palleted load completely shifted into position onto the sleeve and fork; and

Fig. 14 shows the palleted load and sleeve being lifted vertically upwardly for transportation and subsequent unloading.

Referring now more particularly to Figs. 1 through 6 of the drawings, there is indicated generally at **20** a preferred form of load lifting and manipulating device embodied by the invention and adapted to be carried by the fork of an industrial lift truck. The device comprises a sleeve constituting a load supporting portion or plate **21** adapted to overlie the tine of a fork, a ground-engaging portion or plate **22** adapted to underlie the fork, and side plates **23** and **24** connecting both of the foregoing members. Preferably the side plates **23** and **24**, and the ground-engaging plate **22**, are made in a single piece which is U-shaped in cross-section and the load supporting plate **21** may be secured thereto as by welding. It will be observed that the plate **21** is higher at the rear end so that it is forwardly inclined in order more readily initially to engage a load in substantially flush position as will more fully appear hereinafter.

In order to accommodate the tines of a fork lift truck which are narrower in cross-section, removable inner plates **25** and **26** are provided between which and the outside walls **23** and **24** are secured spacer blocks **27** and **28** secured in position by means of bolts **29** and **30**. It will be understood that the plates **25** and **26** are removably mounted within the sleeve portion of

the device and that various sizes of blocks 27 and 28 can be utilized to increase or decrease the diameter of the sleeve in order to accommodate a wide range of differently sized tines comprising the fork of such an industrial lift truck.

Laterally projecting from the forward end of the device are one or more lugs or horns 29' and 30'. It will be observed that the surfaces thereof preferably are rounded, and angularly disposed to the sleeve so as to be inclined downwardly toward the walls 23 and 24 as indicated generally at 31 and 32. Preferably, these lugs or horns are welded into the position illustrated in the drawings.

Upwardly projecting from the inclined plate 21 is a wall or limit stop or other suitable member 33 which preferably is disposed at right angles to the plate 21. Suitable openings may be provided at the bottom of the plate 33 to accommodate a limit stop cable 35, or other suitable chain or linkage arrangement secured to the plate 33 at one end, the other end of said linkage arrangement being adapted to be secured to a portion of the lift truck 36 as indicated at 37 (Fig. 6). A pair of such devices is there shown mounted on the tines 38 of such an industrial lift truck.

In Fig. 5, there is shown a platform or ground-engaging pallet 39 to which is secured, at opposite ends thereof, aligned loops 40 and 41. Preferably, such loops may constitute any strong flexible material, even in the form of tough fibers, or strips of heavy paper now available on the market for such purposes. The ends 42 and 43 of such loops are secured to the pallet 39 by means of, for example, staples 44.

In order to raise such a pallet having a load thereon to an inclined position, a pair of devices such as that shown at 20, after having been mounted on the tines 38, are moved to the extreme ends thereof, being limited by the length of the cables or links 35, so that the horns or lugs 29' and 30' may simultaneously engage the loops 40 and 41, respectively, by a slight pivotal movement of the truck. The particular type pallet 39 herein disclosed has been designed especially for use with this type of device, but the device can also be used to pick up hard wood pallets, or expendable types of pallets, such as those hereinbefore described.

Referring now to Figs. 7 through 9, there is illustrated generally at 50 another form of the device shown in Figs. 1 through 4 which has a wider range of application in that it is adapted to pick up loads mounted on pallets of the type described in the above-mentioned co-pending application, as well as baled or wired types of loads, and also loads carried on conventional hard wood or expendable pallets. Such a device also preferably constitutes an inclined load supporting portion or plate 51, side walls indicated generally at 52 and 53, and a ground-engaging portion or plate 54. In the construction illustrated the top plate 51 and bottom plate 54 each have extending side wall plates 55, 56, 57 and 58 which are so constructed and arranged that they respectively form channels with the plates 51 and 54, being U-shaped in cross-section and adapted interfittingly to engage each other. The legs 55 and 57 of each U-shaped member provide the side wall 52 and are secured in position by bolts 59, and the legs 56 and 58 constituting the side wall 53 of each U-shaped member are secured together by bolts 60 on the other side thereof.

In the illustration shown there is also disclosed a spacer block 61 which may be of any suitable diameter in order to accommodate a different size of tine comprising the fork of a lift truck. It will be understood that such spacer blocks can be placed on one or both sides within the sleeve portion comprising the device and that they may be of varying thicknesses in order also to accommodate a wide range of forks of different cross-sectional diameter.

Mounted within the sleeve is a compression member preferably in the form of a leaf spring 62 and this preferably is secured to the under-surface of the load supporting portion 51, for example, by means of rivets 63. The free end of the spring bears against the top of the tine 64 of the fork and holds the device 50 in snug inclined position as shown in Fig. 7. The bottom of the device comprising the ground-engaging portion 54 preferably is provided with projecting members 65 in order more firmly to engage a ground surface or floor to prevent slipping. There is also provided an upstanding member in the form of a plate 66 projecting from the load supporting portion or plate 51 and this preferably is disposed at substantially right angles to the latter. This plate, like the plate 33 described in connection with the modification shown in Figs. 1 through 4 is intended to abut the load when the device is put into operation.

Transversely extending along the outer marginal edge of the device along the load supporting portion 51 is a cut-out portion or groove 68, whereby pallets having extending loop portions may be engaged to lift the same to an inclined position. Also, preferably projecting from the ground-engaging portion 54 is an extension member or hook 69 adapted for the same purpose. The plate 66 may have, for example, openings or holes 67 for the reception of a chain or cable, the opposite end of which may be attached to the lift truck for the purpose of limiting the outward movement of the device in the manner disclosed in connection with the cable 35 shown attached to the plate 33 in Fig. 1. However, such an arrangement may be dispensed with in the event it is desired to alter the tines of the fork of the truck for accomplishing the same purpose. In other words, the ends of the tines may transversely be drilled so that a long bolt 70, with elements 71, may be secured to the end thereof. Or the ends of the tines can be manufactured with projections 72 such as that shown in Fig. 9 for the reception of such a bolt and spacer members or other desirable laterally extending wings to prevent the device 50 from falling off the ends of the tines.

It will also be observed that the tines disclosed in the drawings (see Figs. 12, 13 and 14) are provided with an abutment or shoulder 73. Such a shoulder may be formed during the manufacture of the tines but it will be understood that conventional tines of this character, which have already been manufactured, or those already in use, may be provided with abutments or limit stops by securing a transversely extending piece of metal thereto, either by welding or by machine screws, or by providing an equivalent shoulder in any other suitable manner. The function of such a shoulder, or abutment, is to maintain the device in position on the outer end of the tine. In order to do this, the lower portion of the device, or sleeve section thereof, must be urged upwardly so that the inner end thereof

will abut the shoulder 73 and this is accomplished by means of the compression member or leaf spring 62.

The operation of the device is illustrated in Figs. 10 through 14 in which an industrial fork lift truck, indicated generally at 74, is shown having mounted on the tines of the fork such a device as that indicated at 50. In Fig. 10 it will be observed that the device is first moved to the end of the tine until it is in abutting relation with the abutment 71, or to the end of a cable if such a linkage arrangement is used, with the leaf spring 62 urging the inner sleeve in abutting relation with the shoulder 73. In lifting a palleted load 75, laden on a pallet 76 of the type described in the above mentioned co-pending application, the extension member or hook 69 on the device first engages the wires or loops 77 of such a pallet and upwardly tilts the palleted load at one end to the position shown. A block 78 is then placed under the upraised pallet. The fork of the truck is then lowered substantially to ground or surface contacting position and the truck is advanced in such a manner that the device 50 moves under the palleted load until the upraised member or plate 66 comes into contact with the load 75, whereupon the device 50 is held in such position. The truck continues to advance, the tines 64 of the fork moving forwardly through the opening in the device 50 forming the sleeve portion thereof as shown in Fig. 12. The forward motion of the truck is continued and it will be observed that the weight of the load 74 progressively is transferred to the load supporting portion of the device 50, thereby depressing the spring 62 which disengages the inner end of the ground-engaging portion 54 of the sleeve from the abutment or shoulder 73. As the truck continues to advance, the load 74 continues progressively to be transferred toward the truck and toward the rear or inner end of the fork. As the fork or tines continue to advance, the ends thereof engage the underside of the pallet, thereby raising the entire load from the ground or floor surface until the palleted load is shifted onto the load supporting portion 51 of the device and fork of the truck in substantially abutting relation with the vertical mast or fork portions of the truck. Thereupon the entire load is caused to be raised vertically upwardly by the fork and the load transferred to any desired place for unloading. The unloading is accomplished by a reversal of the above described operational steps.

It will thus be seen that the objects hereinbefore set forth may readily and efficiently be attained and since certain changes may be made in the above construction and different embodiments of the invention could be made without departing fromthe scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A load lifting and manipulating device normally adapted to be carried by the free end of the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to pick up, transport and discharge loads, which comprises a slidable sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, a laterally directed lug connected to one side of said sleeve at its forward end adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting portion thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

2. A load lifting and manipulating device normally adapted to be carried by the free end of the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to pick up, transport and discharge loads, which comprises a slidable sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, said ground-engaging portion comprising a member that is U-shaped in cross-section, the upstanding legs of which are connected to said load supporting portion, a spacer member secured to the inside of a leg of said U-shaped member to decrease the size of the opening provided by said sleeve, whereby the latter is adapted to accommodate forks of a fork-lift truck of smaller cross-sectional area and to limit tilting of said sleeve around the long axis of said fork, and laterally directed lugs connected to opposite sides of said sleeve at its forward end and adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting portion thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

3. A load lifting and manipulating device adapted to be carried by the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to receive, transport and discharge loads, which comprises a sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, means connected to the underside of said load supporting portion and adapted to engage the top of said fork to hold the sleeve in upwardly spaced relation thereto and to maintain the bottom of the sleeve, at its rear end, in contact with the underside of the fork, and further adapted to hold the bottom rear edge of said sleeve in locked relation to an abutment on the bottom of said fork, whereby said first named

means, when depressed, will cause said bottom rear edge of said sleeve to become disengaged from said abutment, and means adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting surface thereof will receive the weight of the load, so that the fork can pass along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

4. A device as described in claim 3, and further characterized in that said first mentioned means constitutes a leaf spring.

5. A device according to claim 3, and further characterized in that said sleeve comprises two generally U-shaped members having their legs in overlapped relation and secured together to provide the sides of said sleeve, with the base of one of said members providing said load supporting portion, and the base of the other of said members providing the ground-engaging portion.

6. A device as defined in claim 3, and further characterized in that said ground-engaging portion of said sleeve is provided with a plurality of downwardly projecting ground-engaging frictional elements to maintain said sleeve firmly in position as said load progressively is being transferred thereto and onto said fork.

7. A load lifting and manipulating device removably and slidably to be mounted on the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to receive, transport and discharge loads, which comprises a sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, and means, including a sleeve end portion having a cut-out section extending transversely of the longitudinal axis of said sleeve adjacent the forward edge of the load supporting portion of said sleeve, adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting portion thereof will receive the weight of the load, so that the fork can pass along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

8. A load lifting and manipulating device removably and slidably to be mounted on the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to receive, transport and discharge loads, which comprises a sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, and means, including a fixed outwardly projecting lug extending from the forward edge of said sleeve, adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting portion thereof will receive the weight of the load, so that the fork can pass along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

9. The combination of an industrial fork-lift truck with a load lifting and manipulating device mounted on the tine of the fork of said truck and relatively movable with respect to the longitudinal axis thereof and cooperatively connected thereto to pick up and transport loads thereon, said device comprising a slidable sleeve having a load supporting portion overlying each tine, a ground-engaging portion, connected to said supporting portion, underlying the tine, and fixed means on the sleeve adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged with respect to the fork of said truck that the fork can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting surface thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

10. A device according to claim 9, and further characterized in that said means includes a lifting hook forwardly extending from said sleeve whereby to engage said projecting lifting elements on load supporting pallets.

11. A device according to claim 9, and further characterized in that the tines of the fork are provided at their free ends with limit stop members adapted to engage and arrest the outward movement of said sleeves and maintain them in mounted position on said tines.

12. A device according to claim 9, and further characterized in that said tines are provided with limit stops intermediate their ends and adapted to engage and arrest inward movement of said sleeve until a load is applied thereto, and a compression member cooperatively associating each tine and sleeve, whereby said sleeve is held in abutting relation with said limit stop, and disengaged therefrom when said load is applied thereto.

13. A load lifting and manipulating device removably and slidably mounted upon the free end of the fork of an industrial fork-lift truck and to be cooperatively associated therewith, whereby to pick up, transport and discharge loads, which comprises a slidable sleeve member having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, and fixed means directly connected to and laterally projecting from said sleeve adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and in-

clined position, said device being so constructed and arranged with respect to the fork of said truck that the fork can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve contacts the ground, and the load supporting portion thereof receives the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

14. A load lifting and manipulating device adapted normally to be carried by the free edge of a fork of an industrial fork-lift truck and to be cooperatively associated therewith, whereby to pick up transport and discharge loads, which comprises a slidable sleeve member having a load supporting portion adapted to overlie said fork, a ground-engaging portion connected to said supporting portion, and adapted to underlie said fork, said load supporting portion being inclined so that its rear end is higher than the front end and at an angle to receive a tilted load substantially flush thereon, said sleeve having a tapered opening therethrough to accommodate the taper of a fork, and fixed means directly connected to and outwardly projecting from said sleeve adapted to engage projecting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting surface thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

15. A load lifting and manipulating device adapted normally to be carried by the free end of the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to pick up transport and discharge loads, which comprises a slidable sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, side plates connecting said portions to hold them in spaced relation and to provide a passage therebetween for said fork, a spacer member removably secured to the inside of at least one of said plates to decrease the size of the opening provided by said sleeve, whereby said sleeve is adapted to accommodate forks of smaller cross-sectional area and to limit tilting of said sleeve around the longitudinal axis of said fork, and fixed means directly connected to and outwardly projecting from said sleeve adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting portion thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

16. A load lifting and manipulating device adapted normally to be carried by the free end of the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to pick up transport and discharge loads, which comprises a slidable sleeve having a rearwardly inclined load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, an upstanding abutment member integral with the rear of said inclined load supporting portion and normal thereto, adapted to abut said load and to limit the distance to which said sleeve can be moved underneath a load prior to lifting such load, and fixed means directly connected to and outwardly projecting from said sleeve adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting surface thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

17. A load lifting and manipulating device adapted normally to be carried by the free end of the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to pick up transport and discharge loads, which comprises a slidable sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, said ground-engaging portion comprising a U-shaped member, the upstanding legs of which are rearwardly inclined and connected to said load supporting portion which is similarly inclined, and means directly connected to and outwardly projecting from said sleeve adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting surface thereof will receive the weight of the load, so that the fork can pass forwardly along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

18. A load lifting and manipulating device adapted normally to be carried by the free end of the fork of an industrial fork-lift truck and cooperatively associated therewith, whereby to pick up transport and discharge loads, which comprises a slidable sleeve having a load supporting portion adapted to overlie said fork, a ground-engaging portion, connected to said supporting portion, and adapted to underlie said fork, a link member connected at one end to said sleeve and adapted to be connected to said truck

at its other end, said link being of a length adapted to cause said sleeve to be limited in its movement outwardly toward the end of said fork and to maintain the same in position thereon, and fixed means directly connected to and outwardly projecting from said sleeve adapted to engage projecting lifting elements on a load supporting pallet temporarily to lift one end thereof from the ground while the other end thereof remains in contact therewith so that the raised end can be blocked in an elevated and inclined position, said device being so constructed and arranged that the fork of said truck can move the same beneath the raised end of said pallet until the ground-engaging portion of the sleeve will contact the ground, and the load supporting surface thereof will receive the weight of the load, so that the fork can pass forwardly

along the sleeve and progressively transfer the entire palleted load into position on the sleeve and fork.

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