April 6, 1965 H. G. MEISTER, JR 3,176,866

TOP LIFT ATTACHMENT FOR LIFT TRUCK

Filed July 30, 1962 2 Sheets-Sheet 1

FIG. 1

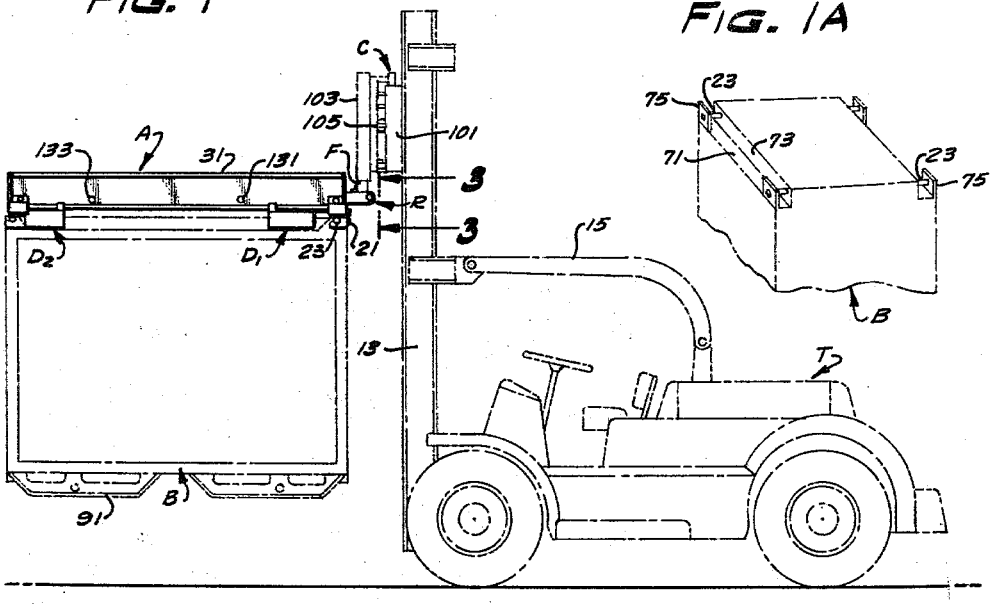

FIG. 1A

FIG. 1B

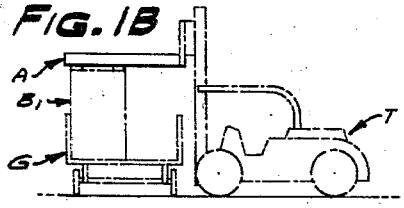

FIG. 1C

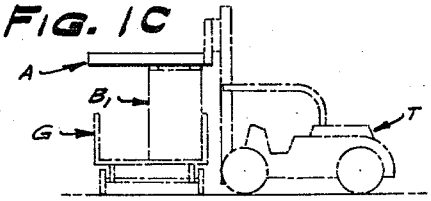

FIG. 2

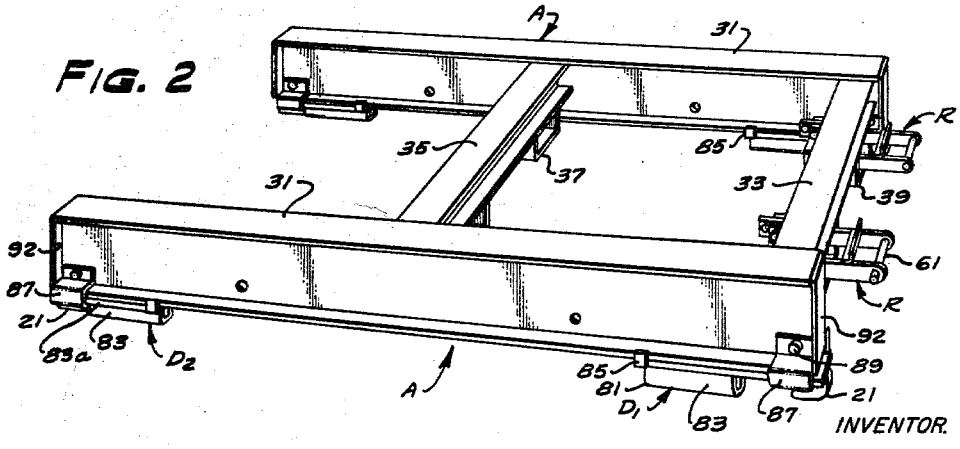

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FIG. 3

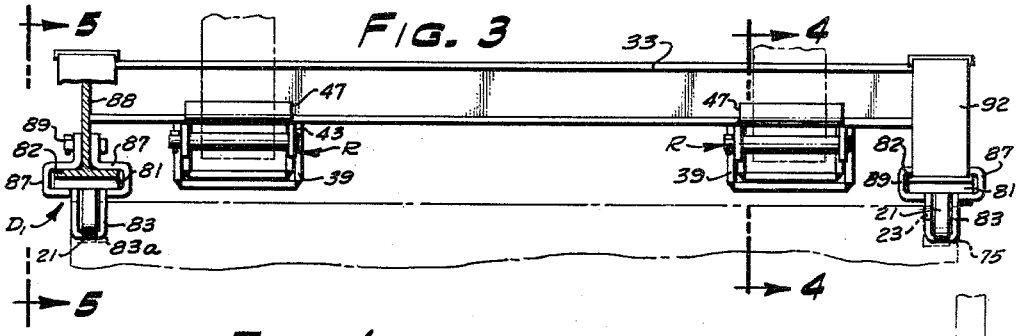


FIG. 4

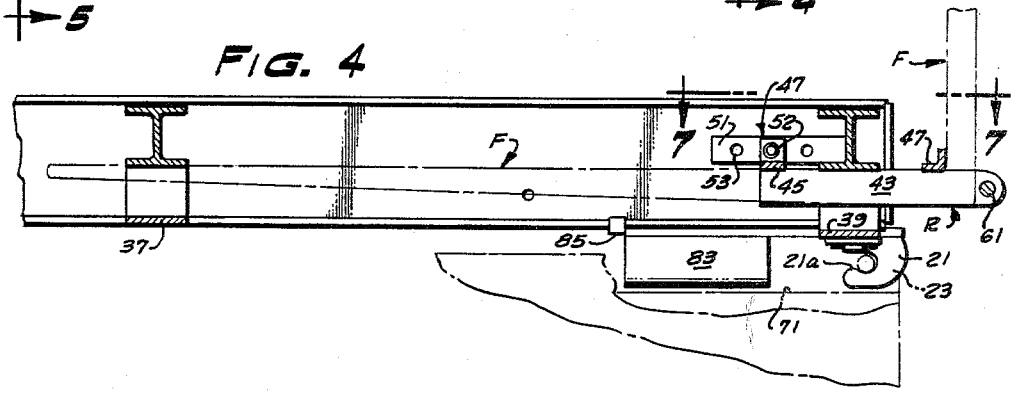


FIG. 5

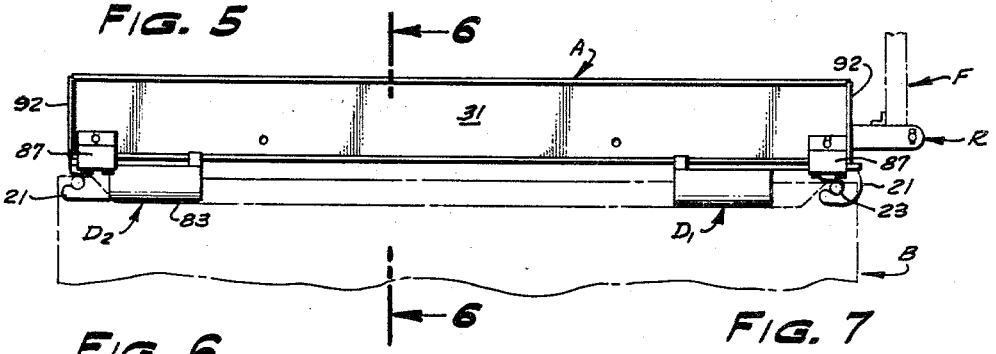


FIG. 6

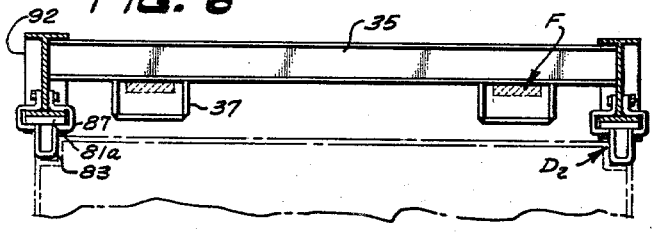
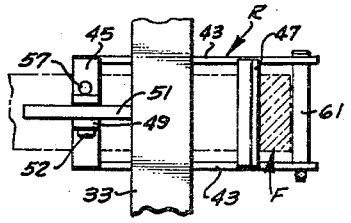


FIG. 7



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TOP LIFT ATTACHMENT FOR LIFT TRUCK

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2 Claims. (Cl. 214—620)

This invention relates to an attachment for a fork lift truck, and particularly to an attachment which enables the truck to lift, by the top, a box or container having top lifting lugs.

Certain kinds of boxes or containers are constructed with passages or spaces therebeneath to receive the forks of a lift truck so that a box may be more readily handled by such a truck. During the many handling and transporting operations of such a box, there are times when the lower portions of a box are not accessible to the forks of a lift truck, such as for instance when the box occupies a position in a railway gondola car. To enable the box to be lifted under these circumstances, the box is provided with lugs at its top, which are accessible and which facilitate lifting of the box by a crane with the aid of cables connected to the lugs. However, after a box is removed from the gondola by the crane, the box can be transported and handled more easily and rapidly by a fork lift truck. Thus, it is common practice to utilize a crane to lift the boxes out of a gondola, and then to utilize a fork lift truck to handle the boxes thereafter.

It is a main object of the present invention to provide an attachment for a fork lift truck which will enable the above described top lifting operations to be readily carried out, thereby eliminating the necessity for a crane.

It is a more specific object of the present invention to provide an attachment for a fork lift truck which can be readily mounted on the forks of the lift truck by the operator without the aid of other equipment, and which will enable boxes of the type under discussion to be lifted from the top and unloaded from places of the type described above, and which attachment can then be readily detached from the forks to enable the boxes to be lifted from the bottom.

Various other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

FIG. 1 is a side elevational view of a fork lift truck having an attachment of the invention shown as lifting a box from the top;

FIG. 1A is a fragmentary perspective view of a box of the type to be picked up;

FIGS. 1B and 1C are views like FIG. 1 but on a small scale, and show handling a half-width container;

FIG. 2 is a perspective view of the attachment on a scale larger than that employed in FIG. 1;

FIG. 3 is a rear elevation of the attachment taken in the direction of the arrows 3—3 of FIG. 1, showing in broken lines portions of the box and fork arms;

FIG. 4 is a fragmentary vertical sectional view taken along line 4—4 of FIG. 3, showing in broken lines portions of the box and fork arms;

FIG. 5 is a side elevational view of the attachment, on a reduced scale from that employed in FIGS. 3 and 4, showing in broken lines its relationship to the fork arms and the box;

FIG. 6 is a vertical sectional view taken along line 6—6 of FIG. 5; and

FIG. 7 is a fragmentary plan view taken in the direction of the arrows 7—7 of FIG. 4.

Referring to FIG. 1 the lift truck T has the usual mast 13 which is tiltable back and forth under the influence of a tilt mechanism 15. Movable along the mast under the influence of the usual ram (not shown) is a load carriage C having a pair of fork arms F. The arms support an attachment A of the present invention, which attachment has hooks 21 engaging lugs 23 provided on the top of a box B.

The attachment is best shown in FIG. 2 and comprises an open frame or body including two spaced parallel side members 31 connected by two spaced parallel cross members 33 and 35. Cross member 33 is disposed at the right-hand or rear ends of the side members, whereas cross member 35 is consideralby spaced from the left-hand or front ends of the side members.

The side and top members are shown in the form of I beams (or wide flanges in the case of the cross members), with the cross members being of lesser thickness than the side members and positioned with their upper surfaces near the upper surfaces of the side members to substantially space the lower surfaces of the cross members above the lower surfaces of the side members.

Secured to the underside of the front cross member 35 are a pair of U-shaped guides 37 (FIGS. 1 and 6) providing slots to receive the horizontal portions of the fork arms F. The guides are located just inwardly of the side members 31 and have a depth substantially greater than the thickness of the fork arm, and a width somewhat greater than the width of a fork arm for purposes to appear presently.

A similar pair of U-shaped guides 39 (FIGS. 1 and 3) are secured to the underside of a rear cross member 33. Each of the guides provides slots to receive the horizontal portions of the fork arms F and also movably receives the forward portion of a retainer unit R (FIGS. 1, 4 and 7) of open rectangular form. Each retainer unit has a pair of side pieces 43 (FIG. 7) which are spaced apart a distance greater than the width of a fork arm F, and a pair of cross pieces 45 and 47 which are secured to the top edges of the side pieces. The cross piece 45 (FIGS. 4 and 7) has an upstanding clevis 49 which straddles a fixed locating arm 51 on the cross member 33. A pivot pin 52 fits through the clevis 49 and through one of several longitudinally spaced holes 53 (FIG. 4) provided in the arm 51.

The retainer units R are dimensioned so that the fork arm F received by the retainer units engage the lower surfaces of the cross member 33 in generally parallel load transmitting relation thereto as is apparent from FIG. 4.

Preferably each of the pivot pins 52 is of the quick detach type and is tied by a short wire or cable (not shown) to the retainer, and has a hole to receive a lock pin 57 (FIG. 7) which preferably is also tied to the retainer to prevent loss of the parts when separated from each other and from the clevis and arm.

The rear cross piece 47 (FIG. 4) of each retainer is disposed in spaced relation to the rear ends of the side pieces 43 to accommodate the vertical portion of the associated fork arm F.

At the rear ends of the side pieces 43 of each retainer R is a retaining pin 61 which is preferably of the quick detach type. This pin is located below the level of the cross piece 47 by a distance less than the thickness of the horizontal portion of the fork arm F, and is spaced rearwardly from the cross piece by a distance slightly greater than the thickness of the vertical portion of the associated fork arm so as to accommodate the fork arm and releasably connect the fork arm to the retainer R and thus releasably connect the attachment A to the fork arm F. Thus the pins 61, cross pieces 47 and side pieces 43 constitute latches releasably connecting the attachment A to the fork arm F.

Slidably mounted on the side members 31 of the frame of the attachment A are a pair of rear box engaging devices D_1, and a pair of front box engaging devices D_2. To more readily understand the construction of the devices

D_1 and D_2 and their purposes, a brief description of the type of box B to be picked up will be given.

Referring particularly to FIG. 1A, the box B is recessed or grooved along two of the upper edges thereof to provide at each edge a horizontal shoulder 71 and a vertical face 73 which together define a recess or groove. An upstanding ear 75 is provided at each end portion of each horizontal shoulder and each ear is located so that it is spaced from the associated face 73. In fact, the ears are shown located so that the outer face of an ear is substantially flush with the adjacent side of the box. The lifting lugs 23 (previously mentioned) are in the form of horizontal rods which connect the ears 75 to the vertical faces 73 in spaced relation above the horizontal shoulder 71 to enable the hooks 21 to fit therebeneath in a fashion to presently appear.

Now, returning to the box engaging devices and referring particularly to FIGS. 2 and 3, each rear device D_1 comprises an elongated base plate 81 of a width substantially the same as the lower flange 82 of the associated side member 31 and of a length several times its width. Secured to the underside of the base plate in symmetrical relation to the side edges of the base plate is an elongated gauge pad 83 which is shown in the form of a U-shaped piece of metal. The pad is located in spaced relation from the rear end of the base plate but adjacent the front end thereof. At the front end of the base plate, there are a pair of upstanding guide lugs 85 disposed in sliding contact with the side edges of the lower flange 82 of the associated side member 31.

Referring particularly to FIG. 3, disposed at the rear portion of the base plate 81 in spaced relation from the gauge pad 83 are a pair of hanger brackets 87 of roughly sickle shape, which embrace the lower flange 82 of the member 31 and also the base plate, and are bolted to the base plate. The hanger brackets 87 have upper portions disposed on opposite sides of the web 88 of the associated member 31 in clevis-like fashion. A quick detach pin 89 fits through holes in such upper portions and through a hole in such web to releasably retain the device D_1 in a desired position.

Secured centrally to the underside of the base plate at its rear portion is the hook 21 for the box engaging device, the hook facing forwardly toward the associated pad 83.

The front box engaging devices D_2 are similar to the rear devices D_1, but have several differences. The base plates 81*a* thereof are shorter than the base plates 81 of the rear devices. In fact, they are sufficiently shorter that the hooks 21 thereof abut against the pads 83 thereof, as is apparent from FIG. 5. Also, the hooks 21 and the hanger brackets 87 are disposed forwardly of the pads 83 rather than behind the pads. Such hooks, however, face in the same direction as do the hooks 21 of the rear devices D_1, i.e., forwardly.

It is apparent, from FIGS. 3 and 6, the distance between the inner faces of the gauge pads 83 of the devices D_1 and D_2 is somewhat greater than the distance between the vertical faces 73 of the recesses of the box B to enable the pads to readily fit into the recesses of the box B. It is obvious that the spacing between the pads 83 is such that they will conceivably engage the shoulders 71, that is to say, the pads are spaced a distance approximately the same as that of the shoulders 71.

It is apparent from FIG. 4 that the height of a pad 83 is about the same as that of the associated hook 21. It is further apparent that the pad heights is such that the lower surface thereof is spaced slightly above the associated shoulder 71 when the associated hook 21 is in fully operative engagement with the associated lug 23. This means that when the pad 83 rests against the shoulder 71, the associated hook 21 will be disposed slightly below its fully operative position. This enables the raised end portion 21*a* (FIG. 4) of the hook 21 to readily pass beneath the lug 23 when the attachment A is being maneuvered into engagement with the box B.

FIG. 4 also shows that when the hook 21 is in fully operative engagement with the lug 23, the pad 83 of the device D_1 is spaced forwardly of the associated ear 75 of the box B. This spacing is such that the hook 21 can occupy an inoperative position substantially behind the lug 23 while the pad 83 is in engagement with the shoulder 73 at a place forwardly of the ear 75. This relationship of parts is not necessary for the front devices D_2, because the hooks 21 of such devices are in front of the associated pads 83, rather than behind such pads.

End plates 92 are provided for the members 31 and strengthen the members. They also function as stops to limit travel of the devices D_1 and D_2.

Operation

It may be assumed that it is desired to remove a number of boxes B from one or more gondola cars, and it may be further assumed that the attachment A is resting on the ground or other supporting surface in a condition like that in FIG. 2. The pins 61 are removed, and the fork lift truck driven up to the attachment and maneuvered to insert the horizontal portions of the fork arms F through the retainers R (and thus through the rear guides 39) and then through the front guides 37, until the vertical portions of the fork arms F abut against the cross pieces 47. Then the retainer pins 61 are reinserted into place so that the attachment A is now connected to the fork arms F. It is apparent that this operation of mounting the attachment A on the fork arms F can be carried out by the operator of the truck without assistance from others and without requiring the use of tools.

The lift ram of the truck is now operated to lift the carriage C, the fork arms F and attachment A, and the truck is driven to a gondola and maneuvered to locate the attachment A in a position overlying a box B with the pads 83 approximately aligned with the recesses of the box, and to locate the pads 83 and the associated hooks 21 in straddling relation to the rear ears 75 of the box. Now, the attachment A is lowered to bring the pads 83 into engagement with the shoulders 71 of the recesses. This serves to locate the hooks 21 behind the lifting lugs 23 and at the proper level for engagement with such lugs upon forward movement of the attachment. The truck is now driven forwardly a short distance to bring the hooks into engagement with lifting lugs. Thereafter, the attachment is elevated slightly to bring the hooks into fully operative engagement with the lugs.

Continued elevation of the attachment will lift the box B out of the gondola car. The truck may now be backed up and then driven to a desired depositing station. Instead, the box B may be unloaded on the ground or other supporting surface near the gondola car to permit another fork lift truck to lift the box by engagement of fork arms under the box in suitable passages provided by runners 91 (FIG. 1) or a number of boxes may be removed from one or more gondola cars and deposited on the ground near the cars. Thereafter, the attachment A can be readily removed from the forks by lowering the attachment A to the ground, removing the retainer pins 61 and backing the truck up to withdraw the fork arms from the attachment. Now, the same truck that removed the boxes B from the gondola cars can be used to lift the boxes B from the bottoms thereof and transport them elsewhere for individual deposit, stacking or the like.

It has been assumed in describing the above operations that the operator of the truck initially maneuvered the truck so that the attachment A was disposed in superposed relation to the box B with the pads 83 substantially directly above the shoulders 71, so that the attachment need only be lowered to locate it in a desired position on the box. A skilled operator will undoubtedly be able to so locate the attachment A many times at the initial try. However, at other times, such alignment of

the pads and shoulders will not be attained, and this will occur more often with unskilled operators than with skilled ones.

The attachment A is so constructed that proper alignment can be obtained, despite initial misalignment, without requiring the operator to try again and again for proper alignment by driving the truck back and forth.

Referring to FIG. 3, it was previously mentioned that the pads **83** are of U-shape, and thus the lower inner corners **83***a* thereof are curved or rounded. It follows that when lowering the attachment onto the box from a misaligned position above the box, if the rounded corners **83***a* engage the upper inner corners of the box (i.e., those corners located at the upper edges of the faces **73**), the rounded corners **83***a* will tend to cam the attachment A sideways to obtain proper alignment of the pads **83** and the shoulders **71**. Since the attachment A loosely fits on the fork arms F, particularly in a lateral direction, lateral shifting movement of the attachment relative to the fork arms is permitted. Therefore, despite an initial misalignment, final proper alignment can be obtained.

Also, it may be assumed that the attachment is located slightly askew with relation to the box. The pads **83** that happen to be in approximately their correct positions will tend to cam the attachment into alignment with the box thus shifting the attachment into a slightly askew position relative to fork arms F. The somewhat loose fit of the retainers **61** and cross pieces **47** on the fork arms F will permit this.

Still further, it is pointed out that if the misalignment is more severe than that above assumed, rather than entirely relocating the truck for a second try at alignment, another procedure may be followed. This comprises lowering the fork arms F an extent to bring the attachment into engagement with the top of the box and continuing lowering the fork arms until they assume intermediate positions in the guides **37** and **39**. The retainers R permit this since the pins **61** and the cross pieces do not prevent downward movement of the fork arms. This operation substantially frees the attachment from the fork arms and leaves the attachment lying relatively loosely on the top of the box. Under these circumstances, most or all of the pads **83** will rest on the top portions of the box B inwardly of the faces **73**, if the misalignment is primarily of the askew type, or one pair of the pads will rest on such top portions and the other pair will rest on the associated shoulder or even be located outwardly of such shoulder, if the misalignment is primarily of the laterally offset type.

Since fork lift trucks usually have steerable rear wheels for greater maneuverability of the fork arms, the rear wheel may now be turned in a desired direction and the truck moved slightly to bump the attachment A toward its aligned position. As soon as the misaligned pads come close to their proper positions, they will cam the attachment toward an aligned condition with the top of the box. The relative freeness of the attachment from the fork arms permits such movement. Yet the freeness is not such as to interfere with normal handling operations of a box.

It is further contemplated that the carriage C may be of the side shift type having a rear portion **101** engaging the mast **13**, and a front portion **103** mounted for transverse movement relative to the rear portion. A suitable piston and cylinder unit **105** connects the portions **101** and **103** to effect a desired side shifting of the front portion.

Thus, if proper lateral alignment of the pads **83** and the shoulders **71** is not obtained initially, and this misalignment is more substantial than that heretofore described, the fork arms F and the attachment A can be side shifted to obtain the desired alignment. However, it is contemplated that an operator may become sufficiently skilled that he will not require the side shifting carriage.

The operations above described have been concerned with handling so-called full size boxes. Half-width or size boxes frequently have to be handled. Referring to FIG. 1A, the half-width box B_1 is shown resting in a gondola car G on the far side of the car from the truck T. To handle this box, the rear devices D_1 must be shifted forwardly and locked in holes **131** (FIG. 1) formed in the side members **31**. If the box B_1 is loaded normally, the box may be lifted after the hooks of the attachment have been brought into proper engagement with the lifting lugs of the box B_1.

If the box is loaded very heavily, so that lifting it at such a distance forwardly of the mast **13** would tend to tip the truck T, a lifting force may be exerted on the box and the truck T backed up to drag the box B_1 to the near side of the gondola G as shown in FIG. 1B. Thereafter, the attachment can be disengaged from the box B_1, and the devices D_1 and D_2 relocated as shown in FIG. 1B to enable the heavily loaded box to be safely lifted, since it is now much closer to the mast **13**. Holes **133** (FIG. 1) are provided in the members **31** to enable the front devices D_2 to be locked in the intermediate positions (FIG. 1C) along the members **31**.

While the unloading operations have been described with reference to boxes loaded in a gondola car, this is, of course, merely illustrative, and unloading operations may readily be carried out with the boxes loaded so that the bottom portions are inaccessible, or at any time it is desired to lift the boxes by the tops thereof.

The holes **53** (FIG. 4) enable the attachment to be located farther from the mast, when reaching a remotely located load is required, or closer to the mast when the load is heavy and close location to the mast is desirable.

Having described the invention in what is considered to be the preferred embodiment thereof, it is desired that it be understood that the invention is not to be limited other than by the provisions of the following claims.

I claim:

1. An attachment for a pair of fork arms of a fork lift truck to enable the truck to pick up a rectangular container which is wider than the distance between the forks and which has shoulders and vertical faces defining a pair of grooves along two of the upper opposite corner portions of the container, and wherein the container has a horizontal, laterally projecting top lifting lug at each end of each groove in spaced relation to the associated shoulder,

said attachment comprising a generally rectangular frame including a pair of spaced, parallel side members connected by a pair of cross members,

means providing spaced, parallel slots beneath said cross members for slidably receiving the fork arms,

latch means for releasably retaining said fork arms in said slots and beneath said cross members,

a forward and a rearward load engaging unit for each side member, each unit being mounted for sliding movement lengthwise of its side member,

each unit including a hook opening in a forward direction for engaging a lug,

each unit also including a gauging means,

the spacing between the two forward gauging means being slightly narrower than the spacing between the vertical faces of said grooves so that said forward gauging means will seat in said grooves and locate the associated hooks in positions for engaging the associated lugs,

the rearward gauging means being similarly located in relation to said grooves,

each forward gauging means being disposed rearwardly of its hook,

each rearward gauging means being disposed forwardly of its hook so that such gauging means and hook can straddle the associated lug to assist in positioning said attachment on said container,

and means for detachably holding said units in different positions along said side member for engaging different size containers,

said cross members being located substantially above said hooks and said gauging means so that said fork arms will assume a position above the container at the time the attachment is applied to the container.

2. An attachment for a pair of angular fork arms of a fork lift truck to enable the truck to pick up a rectangular container which is wider than the distance between the forks and which has shoulders and vertical faces defining a pair of grooves along two of the upper opposite corner portions of the container, and wherein the container has a horizontal, laterally projecting top lifting lug at each end of each groove in spaced relation to the associated shoulder,

said attachment comprising a generally rectangular frame including a pair of spaced, parallel side members connected by a pair of cross members,

means providing spaced, parallel slots beneath said cross members for slidably receiving the horizontal portions of the fork arms,

latch means for releasably retaining said fork arms in said slots and beneath said cross members, said latch means including abutment means to engage the forward faces of the vertical portions of the fork arms, and latch elements for engaging the rear faces of such vertical portions,

a forward and a rearward load engaging unit for each side member, each unit being mounted for sliding movement lengthwise of its side member,

each unit including a hook opening in a forward direction for engaging a lug,

each unit also including a gauging means,

the spacing between the two forward gauging means being slightly narrower than the spacing between the vertical faces of said grooves so that said forward gauging means will seat in said grooves and locate the associated hooks in positions for engaging the associated lugs,

the rearward gauging means being similarly located in relation to said grooves,

each forward gauging means being disposed rearwardly of its hook,

each rearward gauging means being disposed forwardly of its hooks so that such gauging means and hook can straddle the associated lug to assist in positioning said attachment on said container,

and means for detachably holding said units in different positions along said side member for engaging different size containers,

said cross members being located substantially above said hooks and said gauging means so that said fork arms will assume a position above the container at the time the attachment is applied to the container.

References Cited in the file of this patent

UNITED STATES PATENTS

1,828,308	Been	Oct. 20, 1931
1,838,139	Fitch	Dec. 29, 1931
2,547,502	Smith et al.	Apr. 3, 1951
2,558,388	Richardson	June 26, 1951
2,696,317	Toffolon	Dec. 7, 1954
2,807,493	Ryan et al.	Sept. 24, 1957

FOREIGN PATENTS

1,001,473	Germany	June 24, 1957
1,047,718	Germany	Dec. 24, 1958