

Aug. 15, 1961

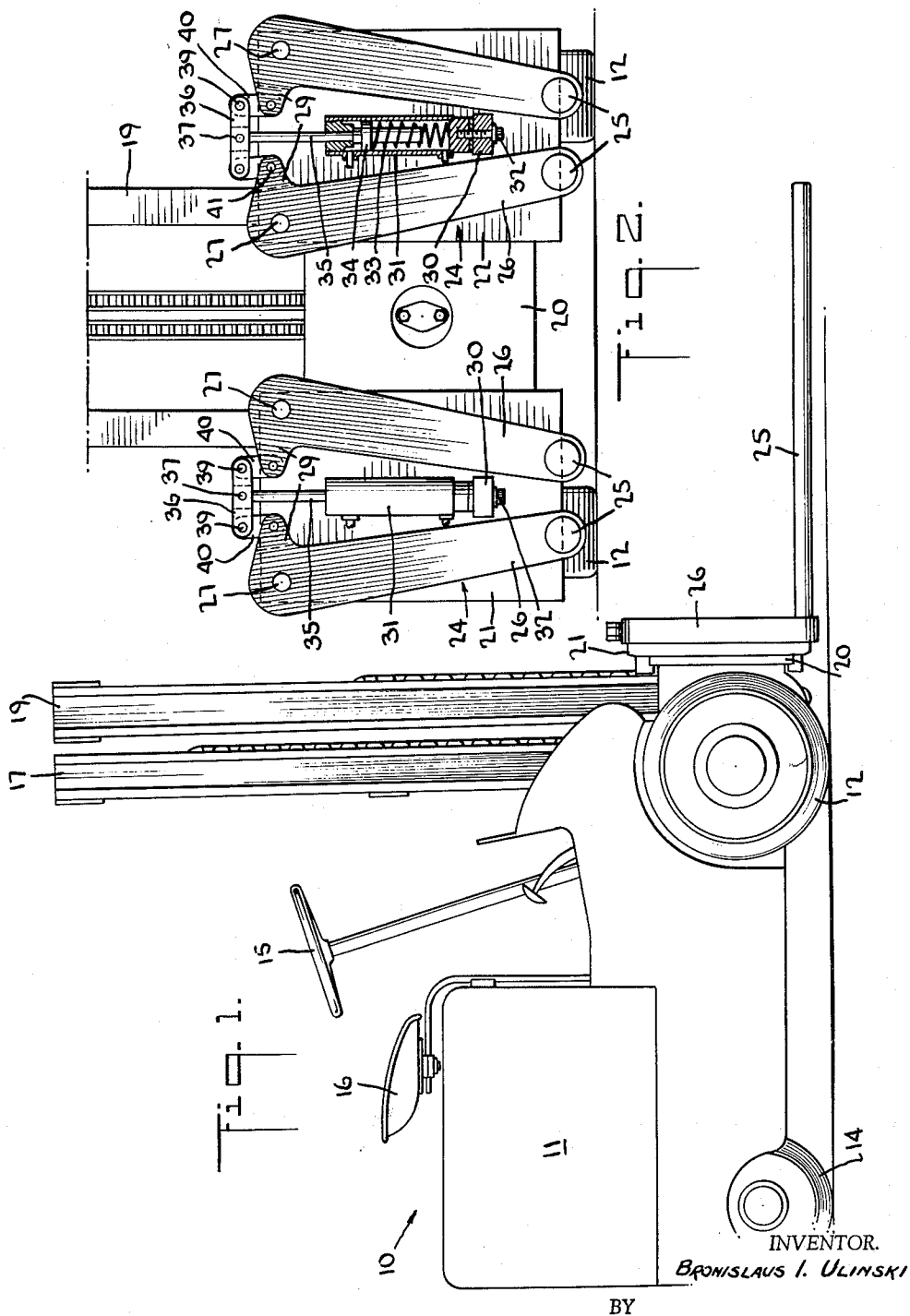
B. I. ULINSKI

2,996,205

METHOD AND APPARATUS FOR HANDLING AN INTEGRATED LOAD

Filed Feb. 5, 1958

3 Sheets-Sheet 1



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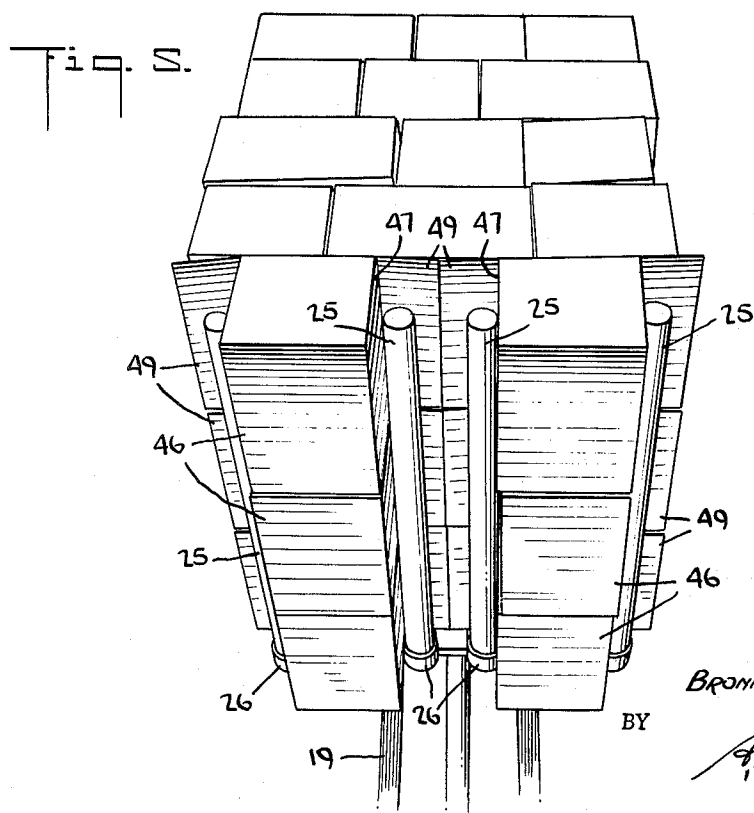
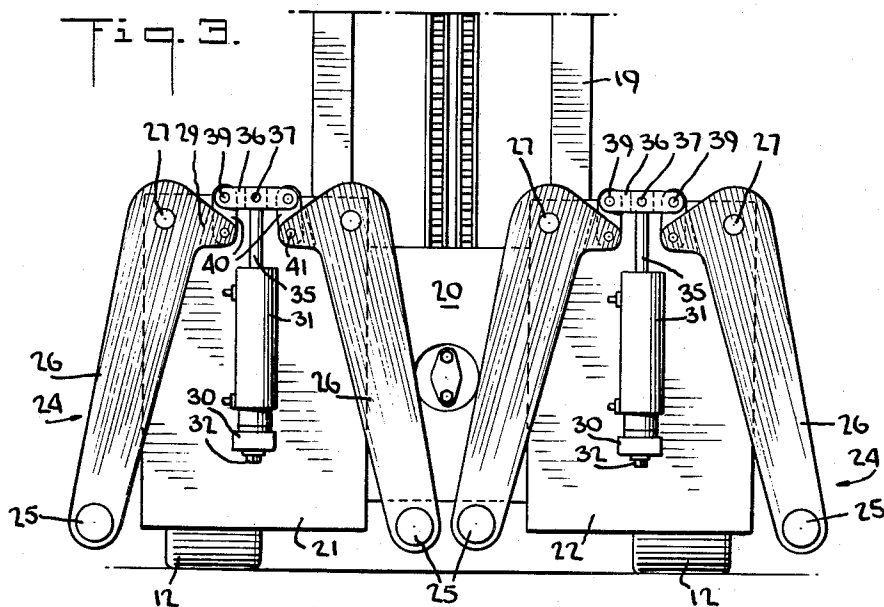
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METHOD AND APPARATUS FOR HANDLING AN INTEGRATED LOAD

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3 Sheets-Sheet 2



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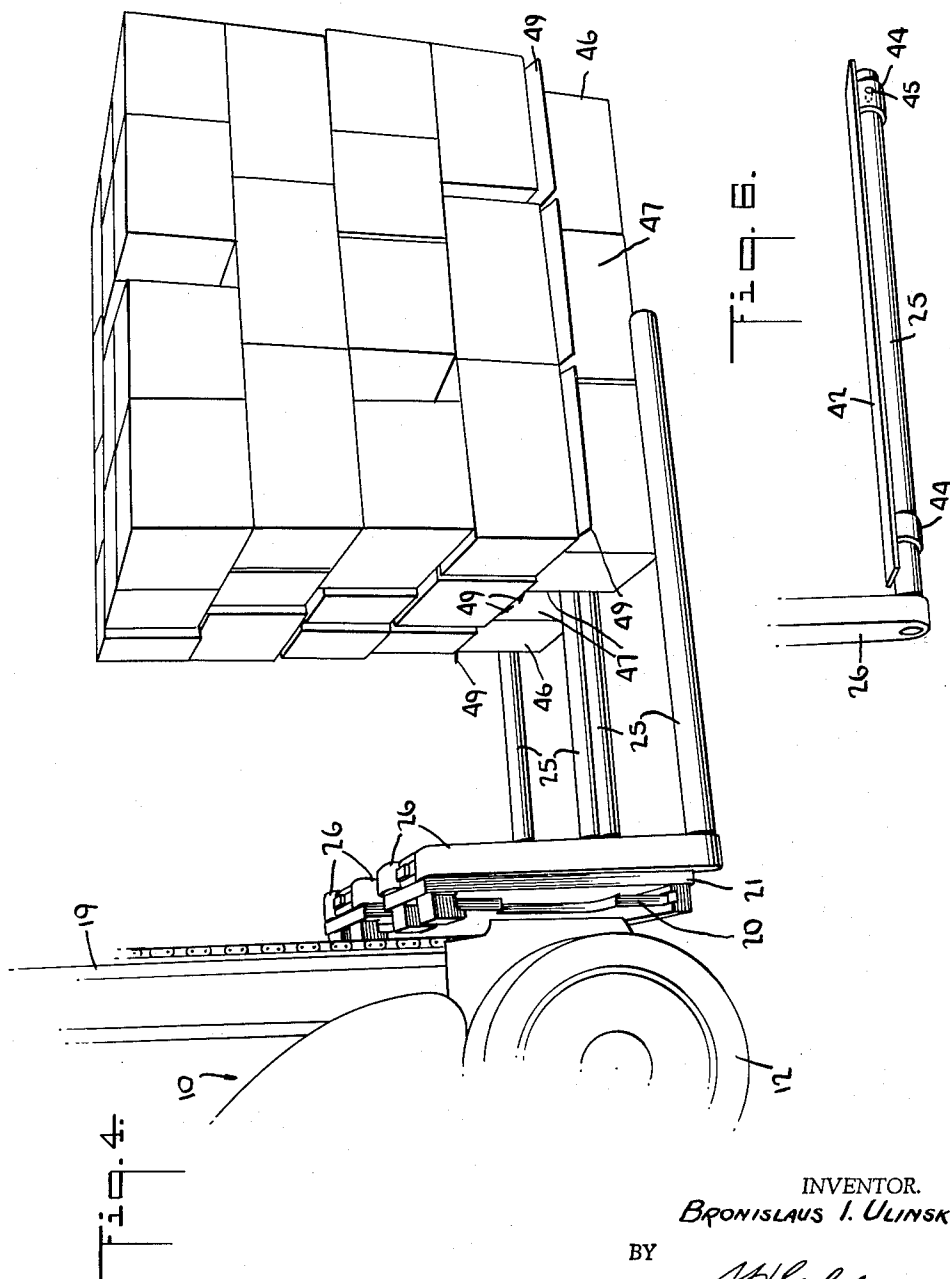
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METHOD AND APPARATUS FOR HANDLING AN INTEGRATED LOAD

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3 Sheets-Sheet 3



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2,996,205

**METHOD AND APPARATUS FOR HANDLING
AN INTEGRATED LOAD****Bronislaus I. Ulinski, Flossmoor, Ill., assignor to The
Yale and Towne Manufacturing Company, Stamford,
Conn., a corporation of Connecticut****Filed Feb. 5, 1958, Ser. No. 713,326****5 Claims. (Cl. 214—653)**

This invention relates to lift trucks and, more particularly, to lift trucks for lifting, transferring and depositing integrated or unit loads.

Heretofore, it has been the frequent practice to stack integrated loads on skids or pallets for handling by a lift truck. This practice has several very considerable disadvantages, including the cost of the pallets or skids, as well as loss of space occupied by the dunnage in warehouses and the like. Further, the consignee must either return the pallets, or if dunnage is used, he is required to pay the cost of the dunnage, and thereafter dispose of it. Accordingly, it has long been the desire of those skilled in the art to develop means for handling stacked, integrated or unit loads so as to reduce or eliminate dunnage and skids, and some considerable success has been achieved in a number of industrial fields. Thus, this aim has been achieved to some extent by clamping goods laterally between clamping means attached to lift trucks. This method of handling has thus far been effective only where the goods are of a crush-resistant nature, as in the case of cement blocks, for example, for which purpose laterally moving forks were developed to exert great force on the bottom course of the blocks to hold them together frictionally while lifting that course together with a load stacked above it.

Obviously, this method of handling is ineffective for goods packed in paperboard cartons, since any gripping force that will support the entire load on the lower course of cartons will crush the said lower course. Recently, it has been proposed that the supporting cartons be lifted by flaps, separate or integral with the cartons, and turned outwardly in wing-like attitude so as to lie directly beneath portions of the remainder of the load. The forks of the lift truck enter the spaces between the supporting cartons and, upon elevation, engage the wing-like flaps to lift the supporting cartons along with the remainder of the load. While this method of stacking represents an important contribution to the art, it has been exceedingly difficult to utilize it practically. My invention covers a concept whereby I may effectively lift a unit integrated load of the type outlined.

I have actually constructed a successfully operating and commercially desirable truck based on that concept.

In essence, my invention resides in the utilization of a lift truck having a pair of vertically movable forks, and means for first moving the forks to a laterally spaced position to permit entry of the forks beneath portions of an integrated load supported on spaced load supporting cartons having their upper lateral flaps turned outwardly under the load.

As a most important feature of my invention, I provide means for urging the forks towards one another with a predetermined limited force sufficient only to bring the forks into engagement with the cartons substantially below the level of the flaps. The engagement of the forks with the cartons is so light that the forks when elevated will slide along the sides of the load supporting cartons until they engage the underside of the flaps substantially at the line where the flaps extend from the cartons whereby the forks, upon being raised further, will lift both the supporting cartons and the remainder of the load.

As one means for urging the forks towards one another

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and the supporting cartons, I prefer to employ spring means in order to obtain the required predetermined limited force. As another means, I utilize a hydraulic ram for spacing the forks laterally as well as for urging them towards one another, using a pressure valve for limiting the force of both with which the forks are pressed against the cartons.

As another feature of my invention, I provide equalizing means for allowing movement of one of the forks towards the other when movement of either of the forks is obstructed as by its engaging one side of a load supporting member. In this manner, the apparatus automatically compensates for irregularities in alignment of the supporting cartons.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claim appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

An illustrative embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings forming a part of the specification.

In the drawings:

FIG. 1 is an elevational view of a truck embodying my invention;

FIG. 2 is an end view of a portion of the truck shown in FIG. 1 illustrating the forks in normal position;

FIG. 3 is a view similar to FIG. 2, but showing the forks in spread position;

FIG. 4 is a perspective view of a portion of the truck illustrating my invention being applied to a stacked unit load;

FIG. 5 is a bottom perspective view showing my invention applied to and lifting the load illustrated in FIG. 4; and

FIG. 6 is a perspective view illustrating a modified form of fork.

Referring to the drawings, and more particularly to FIGS. 1 and 2 thereof, there is shown an industrial truck 10 of the type having a battery compartment 11 adapted to supply power through a traction unit (not shown) to the drive wheel 12. The truck is provided with suitable trailer and steering wheels 14 under the control of a manual steering wheel 15 disposed opposite an operator's seat 16. Other necessary controls are accessible by an operator seated in the seat 16.

The truck 10 is provided with a pair of primary uprights 17 and secondary uprights 19. The primary uprights 17 may be mounted on the truck for tilting movement and the secondary uprights 19 are supported by the primary uprights for vertical movement, all in a manner well-known to those persons skilled in the art, and as illustrated in my earlier Patent No. 2,528,401, for example. I also provide an elevating carriage 20 adapted to move vertically relatively to the secondary uprights 19.

It may be well at this point to indicate that the structure so far described is not the invention claimed herein, and therefore, is not here described in greater detail.

I shall hereinafter point out the particular contribution of this application.

A pair of back plates 21 and 22 are slidably mounted on the carriage 20 in side-by-side relation and may be moved laterally towards or away from each other by a pair of horizontal rams (not shown) mounted on the rear face of the carriage.

Each back plate carries a pair of forks 24 for pivotal movement about axes that extend parallel to the longitudinal axis of the truck. The forks each include a horizontal member or tine 25 and a vertically disposed crank member 26 extending upwardly from the inner end of the member 25. The crank members are mounted on the back plate by a pivot 27, and are nosed inwardly towards each other at their upper ends, as at 29.

Each of the back plates 21 and 22 has a forwardly extending bored projection 30 secured to it for supporting a hydraulic ram 31 in upstanding relation to the projection. A securing bolt 32 passes through the bore in the projection and is threaded into the base of the ram. The rams each have the usual piston 34 and piston rod 35, as shown in FIG. 2, but I also place a helical compression spring 33 in each ram between the piston and the base of the ram to urge the piston rod into protracted position.

The free end of each piston rod 35 has a cross-arm 36 connected to it by a pivot 37, and the ends of the cross-arm are connected through pivot pins 39 to one end of links 40, the other end of each of these links 40 being, in turn, connected to the nosed-in portions 29 of one of the crank members 26 by pivot pins 41.

While the horizontal members or tines 25 of my forks may be constructed in any desirable contour, I prefer to employ cylindrical tines with flat plates 42 supported on the tines by spaced circular collars 44 connected to the tines by removable dowels 45 as shown in FIG. 6. This arrangement provides a large, flat load supporting area, as well as sharp edges for cornering at the inner edges of the flaps.

In operation, to lift an integrated load stacked in the manner already described, the back plates 21 and 22 are spaced laterally to the desired positions depending upon the size of the units constituting the load to be handled. The piston rods 35 are then retracted causing the links 40 to depress the nosed-in portions 29 of the crank members 26 thereby pivoting the crank members about the pivots 27 to rock the tines 25 away from each other to the position shown in FIG. 3. In this manner, the tines are laterally spaced until each pair of fork tines is adapted to receive one or several aligned supporting cartons of an integrated load between them, as shown in FIG. 4.

After the forks are extended beneath the full length of the load, the fork spacing pressure on the rams is released allowing the springs 33 to raise the pistons 34 to move the forks in a direction towards each other until they abut the sides of the load supporting members or cartons 46. At this point it is important to note that the means for moving the forks towards each other, such as the springs 33, are so selected or arranged that they exert a predetermined limited force sufficient only to bring the forks into sliding relation with the sides 47 of the load supporting members.

The carriage 20 may then be elevated relatively to the secondary uprights 19 that may also be elevated for added lift if desired. The forks will slide upwardly relatively to the sides of the load supporting members until they engage the underside of the carton or carrying flaps 49, whereupon the supporting members are lifted along with the remainder of the load, as shown in FIG. 5.

Because of the linkage arrangement between the piston rods and their respective crank members, should movement of one of a cooperating pair of forks be obstructed by one side of the supporting members before the other fork engages the opposite sides of those members, the cross-arm 36 will rock about the pivot 37 tilting upwardly

on the side of the unobstructed fork to permit that fork to continue movement towards the load while the obstructed fork is permitted to remain in its obstructed position without exerting any greater force upon the supporting members than is provided by its respective spring 33.

From the foregoing description, it will be seen that I have provided an industrial truck for palletless handling of an integrated load stacked upon supporting members constituting a part of the load itself. It will further be seen that I have also provided means for urging the forks of my truck together with a predetermined limited force so as to slidably engage the sides of the supporting members without damaging them. I have also provided equalizing means for allowing movement of one of the forks towards the other when movement of either is obstructed by its engagement with one side of a load supporting member.

I believe that the construction and operation of my novel fork will now be understood, and that the advantages of my invention will be fully appreciated by those persons skilled in the art.

I claim:

1. An industrial truck for lifting an integrated load of the class in which cartons are stacked on spaced load supporting members that constitute part of the load and have wing-like portions extending under the remainder of the load, comprising a carriage, means on said truck for moving said carriage vertically, a pair of forks, means supporting said forks on said carriage to move vertically therewith and also for lateral movement relatively to one another, a ram on said carriage, means through which said ram when actuated moves said forks away from one another to laterally spaced positions to permit entry of said forks beneath portions of the load supported on the spaced load supporting members, surfaces on said forks for sliding engagement with the sides of the load supporting members, spring means yielding when the ram moves the forks and effective when the ram is not actuated to urge said forks towards one another to bring said fork surfaces into engagement with the sides of the load supporting members, said spring means constructed to exert a predetermined limited force enabling said fork surfaces while engaged with the sides of the load supporting members to slide thereon upon elevation of said forks with said carriage until said forks engage the underside of the wing-like portions, an equalizing lever through which said spring acts when urging the forks toward one another, and means connecting each end of the lever to one fork to enable the spring to move one of said forks towards the other of said forks when movement of said other of said forks is obstructed as by its engaging one side of a load supporting member.

2. An industrial truck for lifting an integrated load of the class in which upper cartons are stacked on lower load supporting cartons or the like that constitute a part of the load and that have opposed sides offset from the sides of the upper cartons to leave overhanging bottom surfaces on said upper cartons, said lower cartons or the like having wing portions extending from their opposed sides laterally under said overhanging bottom surfaces of the upper cartons, comprising a vertically moving load carriage, a pair of forks mounted for movement laterally toward and away from one another on said load carriage and adapted for entry beneath said wing portions of the lower cartons, said forks having side surfaces that are formed for sliding on the opposed sides of said lower cartons when in contact therewith, mechanism connected to said forks and effective when the forks have entered beneath the wing portions of the lower cartons for moving said forks on their mounting toward the opposed sides of those cartons, and said mechanism including power means exerting a predetermined limited force sufficient to bring the side surfaces of the forks into contact with the sides of the lower cartons without substantial clamp-

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ing of the cartons, so that an upward movement of the load carriage will act by sliding the forks on the lower cartons to place the forks in lifting contact with the wing portions at points that are juxtaposed to the sides of the lower cartons.

3. An industrial truck for lifting an integrated load of the class in which upper cartons are stacked on lower load supporting cartons or the like that constitute a part of the load and that have opposed sides offset from the sides of the upper cartons to leave overhanging bottom surfaces on said upper cartons, said lower cartons or the like having wing portions extending from their opposed sides laterally under said overhanging bottom surfaces of the upper cartons, comprising a vertically moving load carriage, a pair of forks mounted for movement laterally toward and away from one another on said load carriage and adapted for entry beneath said wing portions of the lower cartons, each fork having an upper lifting surface for lifting engagement with a wing portion, and also a side surface in opposed relation to the other fork and formed for sliding one side of said lower cartons when in contact therewith, mechanism connected to said forks and effective when the forks have entered beneath the wing portions of the lower cartons for moving said forks on their mounting toward the opposed sides of those cartons, and said mechanism including spring means exerting a predetermined limited force sufficient to bring the side surfaces of the forks into contact with the sides of the lower cartons without substantial clamping of the cartons, so that the forks by sliding on the lower cartons when the load carriage moves upwardly will place their lifting surfaces in contact with the wing portions at points that are juxtaposed to the sides of the lower cartons.

4. The method of handling an integrated load of the class in which cartons are stacked on a load supporting member that constitutes a part of the load and that has opposed sides offset from the sides of the stacked cartons to leave overhanging bottom surfaces on said cartons, said load supporting member having wing portions extending from its sides laterally under the overhanging bottom surfaces of the cartons, comprising driving a fork carrying industrial truck to a position opposite the load, moving the forks and the truck to place the forks beneath the overhanging carton surfaces, moving the forks toward one another with a predetermined limited force sufficient only to bring the forks into contact with the

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opposed sides of the load supporting member without substantial clamping of the member, sliding the forks upwardly on the sides of the load supporting member so that said member guides each fork until it moves into a lifting position at the juncture between the corresponding side and wing portion of the load supporting member, and moving the forks further upwardly whereby to lift the load supporting member and cartons through forces applied to the wing portions at points that are juxtaposed to the sides of said member.

5. The method of handling an integrated load of the class in which cartons are stacked on a load supporting member that constitutes a part of the load and that has opposed sides offset from the sides of the stacked cartons to leave overhanging bottom surfaces on said cartons, said load supporting member having wing portions extending from its sides laterally under the overhanging bottom surfaces of the cartons, comprising driving a fork carrying industrial truck to a position opposite the load, moving the forks and the truck to place the forks beneath the overhanging carton surfaces, applying to said forks a force to move the forks toward one another and into contact with the opposed sides of the load supporting member, while limiting said force to a predetermined value that will not effect substantial clamping of the member and that will allow the forks to slide on the sides of the member, moving the forks upwardly while applying said predetermined limited force to maintain the forks in sliding contact with the sides of said member, said sides of the member thereby guiding each fork into the juncture between a corresponding side and wing portion of the member, and moving the forks further upwardly whereby to lift the load supporting member and cartons through forces that are applied to the wing portions at points juxtaposed to the sides of said member.

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