Aug. 17, 1965 J. L. BRADY ETAL 3,200,978

CRATE AND CARTON HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

Filed Dec. 3, 1958 6 Sheets-Sheet 1

FIG. 2B

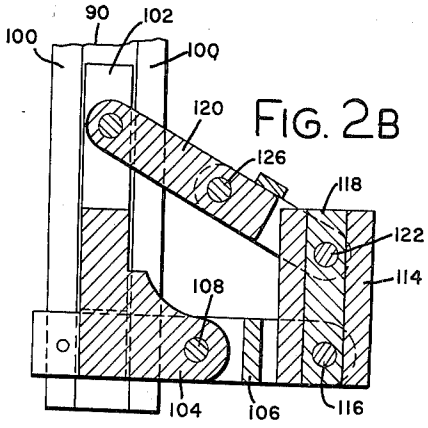

FIG. 1

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FIG. 2

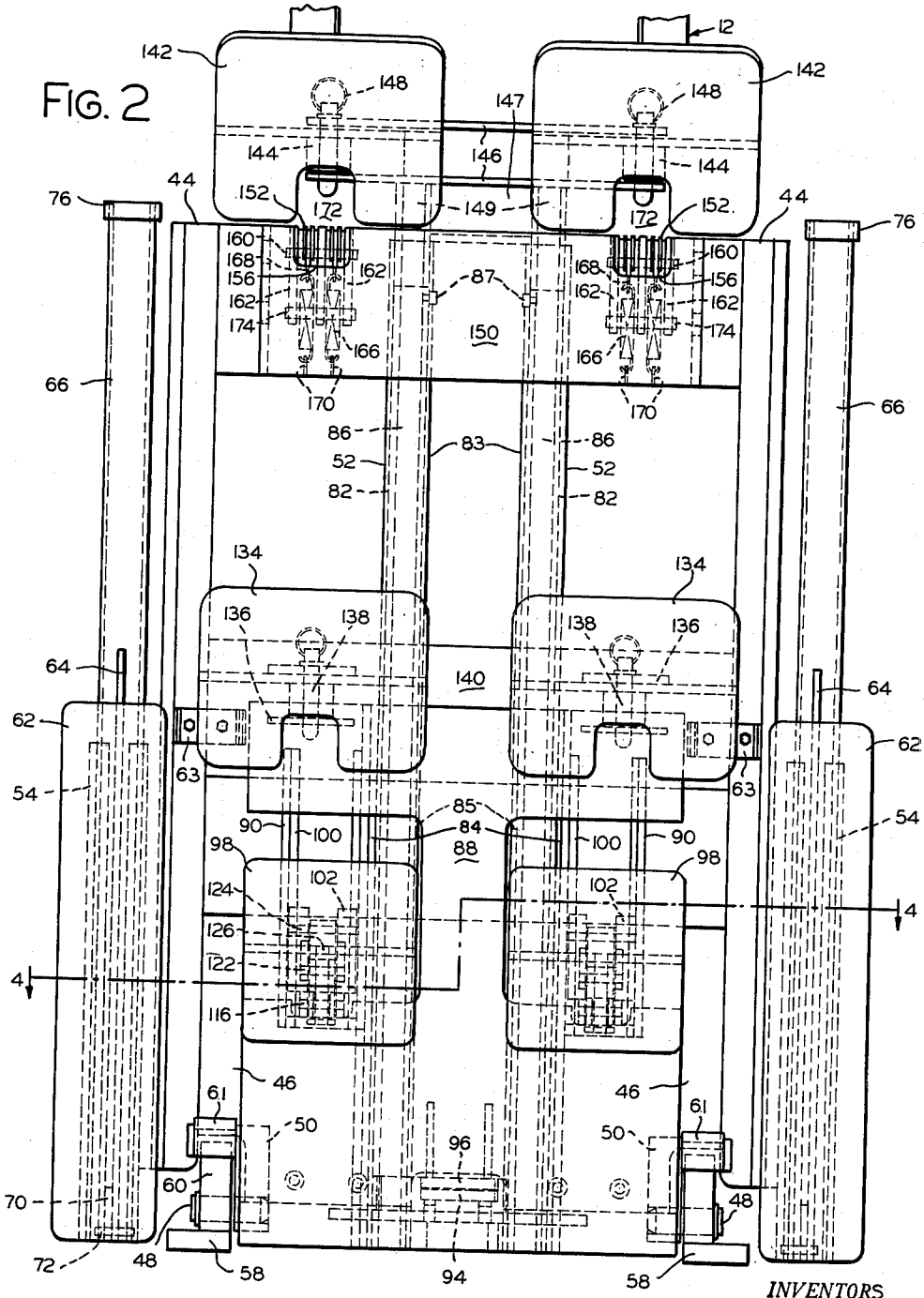

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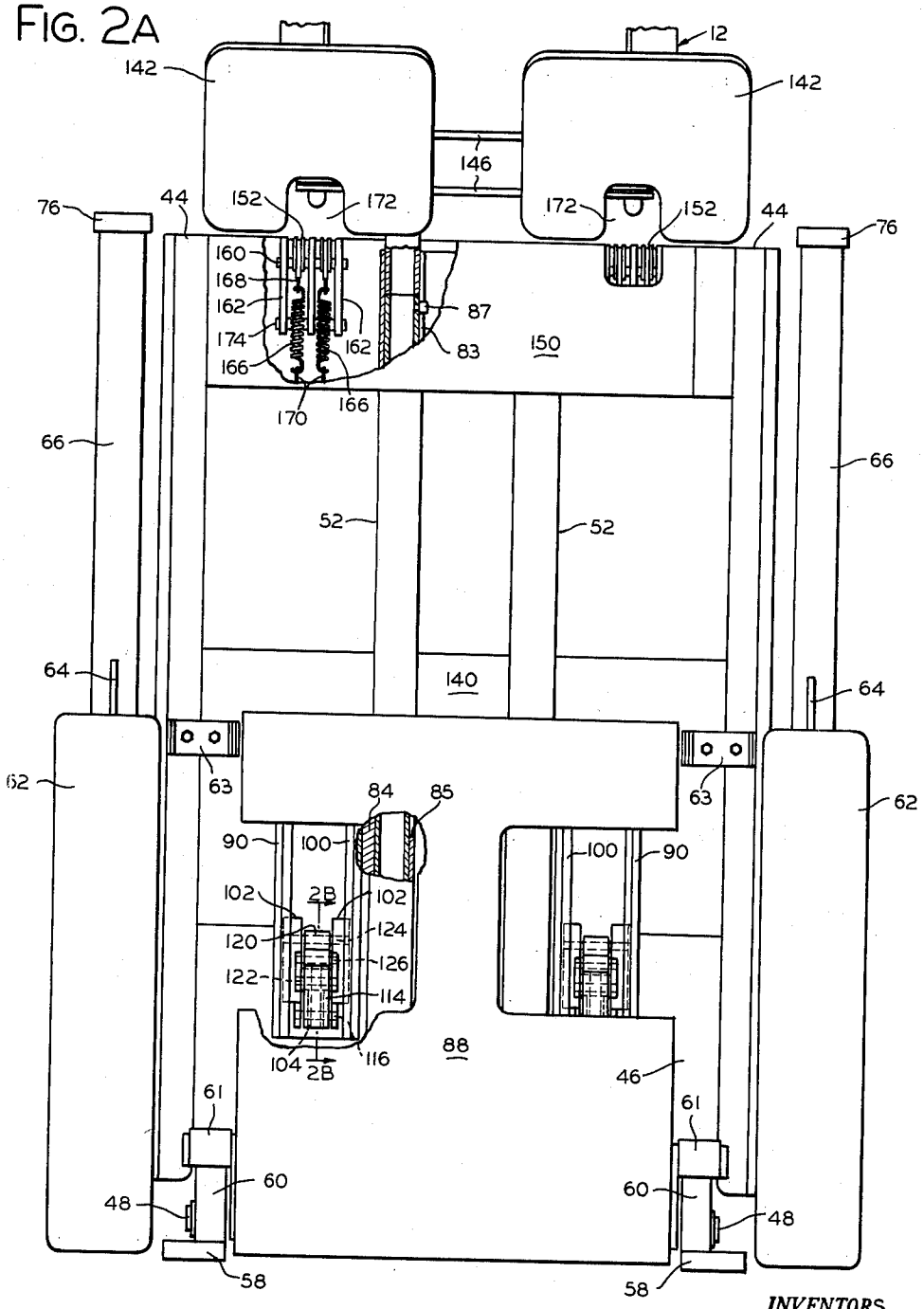
FIG. 2A



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CRATE AND CARTON HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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FIG. 3

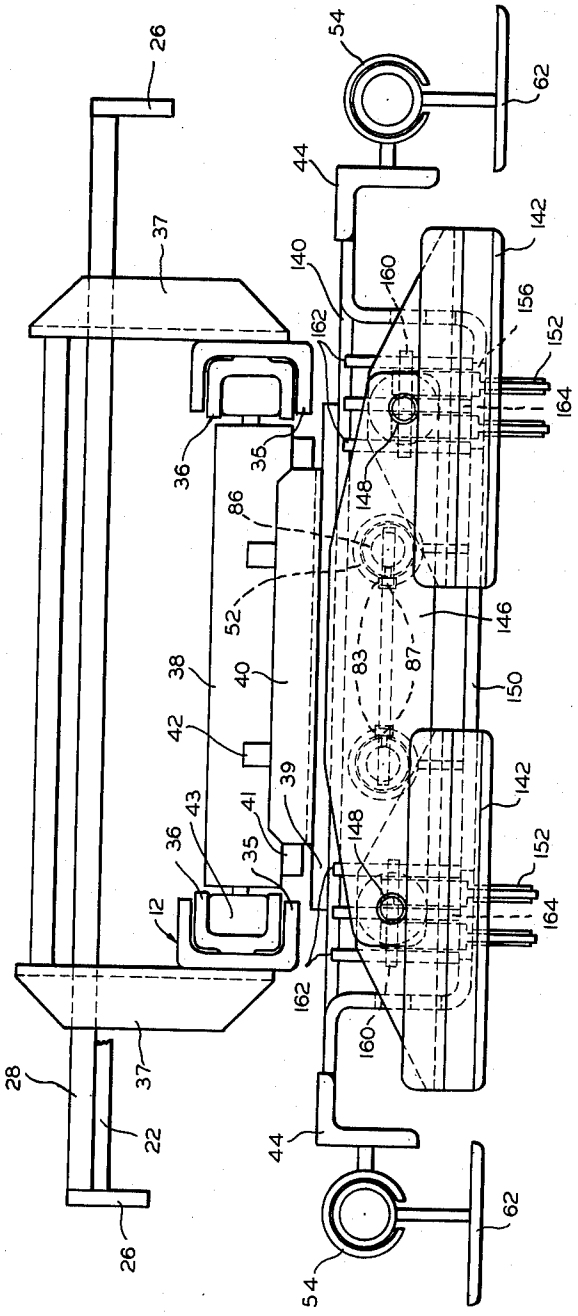

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FIG. 4

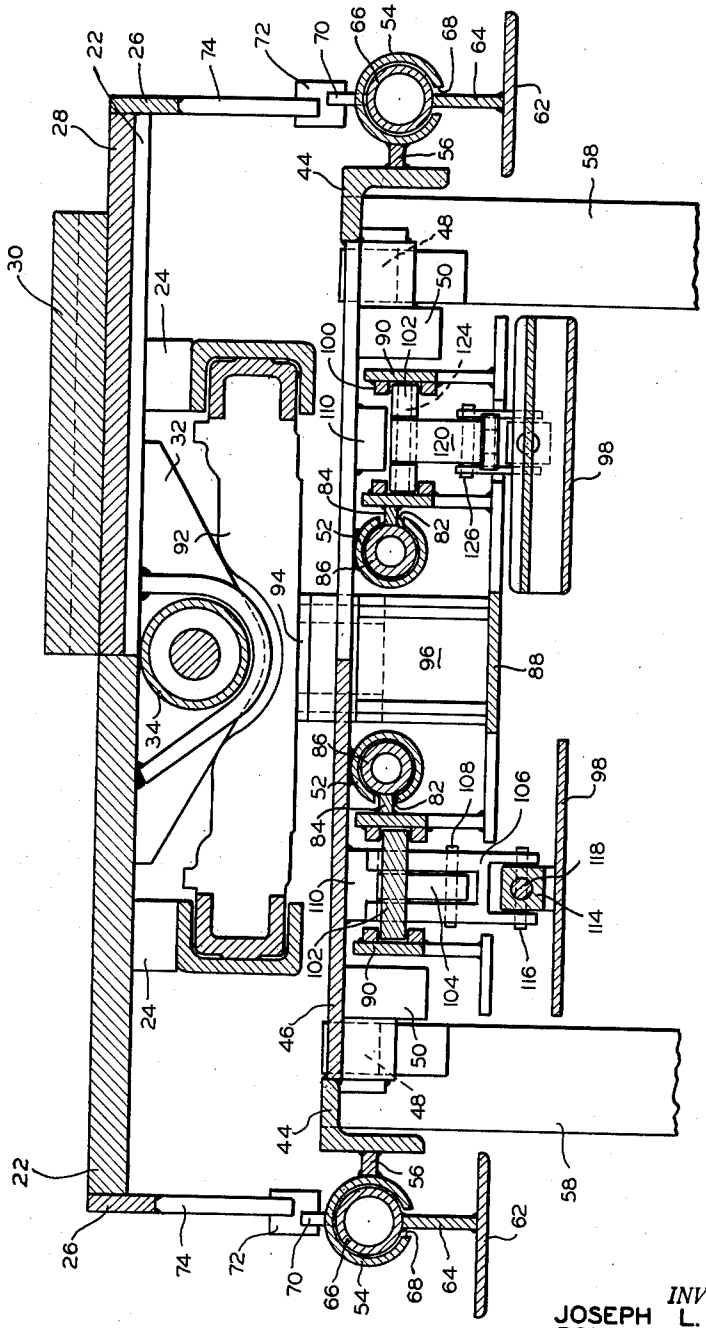

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FIG. 5

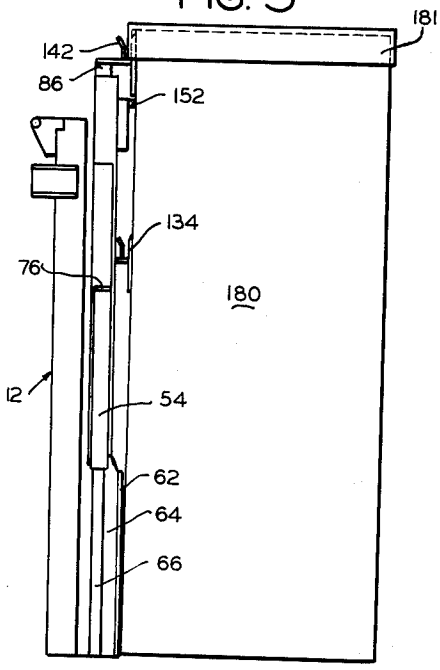


FIG. 6

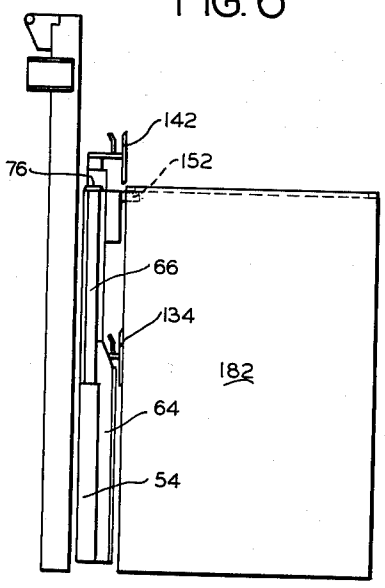


FIG. 7

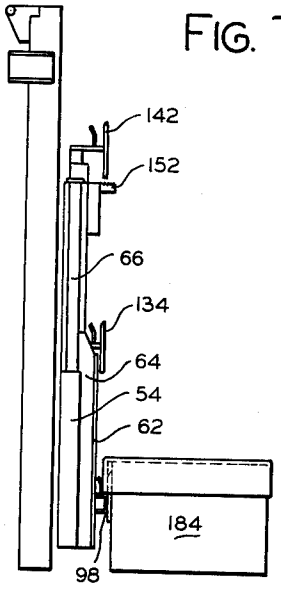
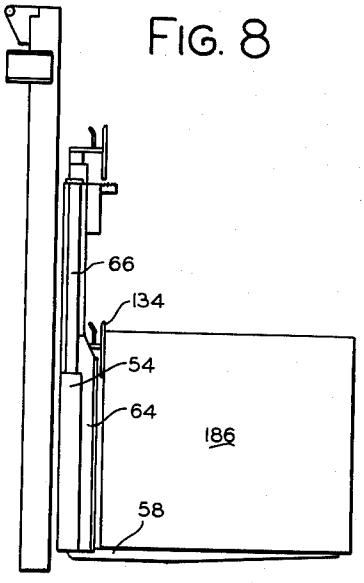


FIG. 8



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Patented Aug. 17, 1965

3,200,978

CRATE AND CARTON HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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Filed Dec. 3, 1958, Ser. No. 777,999
23 Claims. (Cl. 214—651)

This invention relates to a lift truck attachment, and particularly to a universal type of attachment which is capable of handling non-palletized cartons of various dimensions and crates.

The prior art discloses a variety of crate and/or carton handling attachments such as is shown in U.S. Patent Nos. 2,670,095 to Blatz, 2,726,000 to Quayle, and 2,826,323 to Schenkelberger. The present invention constitutes a significant improvement over all of the devices of the foregoing patents in providing not only an improved crate handler per se, but also in combining a crate handler with an improved and universalized type of carton handler which is adapted to handle various types and sizes of cartons without pallets.

It is the principal object of this invention to provide an improved device for use with lift trucks which is capable of handling a variety of types of non-palletized containers.

It is a further object of the invention to provide a universal type of container handling attachment wherein the various parts which are associatable with containers of different sizes and types may be disposed in non-interfering relation one with the other.

A further object of the invention is to provide an improved device for handling slatted crates.

It is a further object of the invention to generally improve upon devices of the type contemplated.

In broad outline, our attachment comprises a plurality of vertically spaced elements which are engageable with the upper portions of cartons of different heights in combination with means for supporting the bottom portions of such cartons, said elements being elevatable to different heights relative to the supporting means depending upon the size of the carton being handled. Certain of said elements may be disposed either in a position to engage cartons of relatively low height or retracted to non-interfering relation with other of said elements when the latter are utilized to handle larger cartons. Separate means are provided for engaging slatted crates, and are preferably located in vertically spaced relation to the carton engaging elements, being so constructed that the crate engaging means move automatically into and out of crate engaging position as required by the nature of the article being handled. This invention also provides a pair of pivoted fork tines which may be disposed in load engaging position, as required, for handling loads in a conventional manner.

Other objects, advantages and features of this invention will be readily apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a side view showing the attachment mounted on a lift truck with certain parts broken away;

FIGURE 2 is a front elevational view of the attachment;

FIGURE 2A is a front view in partial section of the attachment with certain parts removed;

FIGURE 2B is an enlarged sectional view taken along line 2B—2B of FIGURE 2A;

FIGURE 3 is an enlarged plan view of the attachment as shown in FIGURE 2;

FIGURE 4 is an enlarged sectional view taken on the line 4—4 of FIGURE 2; and

FIGURES 5, 6, 7 and 8 illustrate schematically the operation of our attachment in handling containers of various sizes and types.

Referring now in detail to the drawings, our invention is illustrated generally at numeral **10** in association with a secondary upright or mast structure **12**, of well known construction, of a conventional lift truck **14** having a primary mast structure **16** mounted at one end thereof. Interposed between the primary and secondary masts is a roller mounted carriage **18** of well-known construction which is elevatable in mast **16** in known manner, and to which is detachably secured the secondary mast **12** by means of bracket and plate means **20**.

The latter means comprises a pair of vertically spaced plate members **22** which extend transversely outwardly of either side of mast **12** and which are secured to mast **12** by a pair of vertical columns **24** and a pair of vertically extending plate members **26** secured to the opposite side edges of plates **22** and having a transversely extending bar **28** secured between the upper ends thereof (FIGS. 1 and 4). An inverted U-shaped bracket **30** is secured along the upper edge of bar **28** and is adapted to engage the upper edge of carriage **18** such that adjacent surfaces of plate members **22** and carriage **18** rest one against the other when the secondary mast is supported as shown. A horizontal support plate **32** is secured to lower plate member **22** for supporting a hydraulic lifting motor **34** thereon.

Mast **12** comprises generally a pair of laterally spaced outer channel members **35** having a pair of laterally spaced channel members **36** nested therein for vertical movement relative thereto (FIG. 3). Transverse brace means **37** is located adjacent the upper end of the mast.

The attachment device **10** is secured to a carriage means **38** of the secondary upright by means of a carrier plate **39** and inverted U-shaped bracket **40**, similar to bracket **30** of carrier **20**. Bracket **40** engages over the upper edge of a transverse plate **41** of carriage **38** (FIG. 3). The carriage means **38** has secured thereto anchor blocks **42** to which the chains, not shown, of lifting motor **34** are connected to effect elevating movement of the attachment device relative to the secondary mast structure in well known manner. The carriage **38** is connected to the innerslide of upright **12** by roller means **43**.

The mast assembly **12** together with the attachment device **10** are, of course, actuatable together vertically on carriage means **18** of the primary mast **16**.

The above described construction is essentially conventional, and has been described and shown rather generally in order to illustrate one environment in which the present invention may be used.

The attachment which comprises the present invention includes a welded frame assembly which consists generally of a pair of laterally spaced and vertically extending L-shaped side members **44**, a base plate **46** secured between the side members and along the rear vertical surface thereof, as by welding, to carrier plate **39**, a pair of laterally spaced fork pivot shafts **48** located for rotation in pairs of mounting members **50** which extend forwardly from the plate **46** and side members **44**, a pair of laterally spaced vertically extending inner guide tubes **52**, and a pair of laterally spaced and vertically extending outer guide tubes **54**. Inner tubes **52** are secured, as by welding, to base plate **46**, and outer tubes **54** are secured to opposite sides of the pair of side members **44** by a pair of vertically extending bars **56**.

A pair of laterally spaced fork tines **58** are mounted for pivotal movement upon respective ones of shafts **48**, the rearward end of each of said fork tines being formed to provide an upwardly extending projection **60** which engages within a detent **61** when the fork is positioned

for carrying a load, said forks being pivotable to a vertical position about shafts 48 and back into the side members 44, in which position the fork tines are held by a pair of laterally spaced clips 63 (FIG. 2).

A pair of laterally spaced and vertically extending outer drop plates 62 are secured by forwardly extending webs 64 to a pair of elongated guide tubes 66 which are nested within outer guide tubes 54. The outer guide tubes are provided in the forward portions thereof with vertically extending slots 68 through which web members 64 project, thereby permitting relative vertical movement between the outer guide tubes 54 and the elongated tubes 66 (along with drop plates 62). A vertical slot is also provided at the lower rear end portions of outer guide tubes 54, through each of which projects a stop member 70 which is secured along its one edge to the rear-lower end of each tube 66 and which normally abuts the upper surface of a cooperating stop member 72. The stops 72 are secured to forwardly extending gusset plates 74 which extend rearwardly and laterally outwardly of channel sections 35 of the secondary upright and which are secured at the rear edges thereof to opposed edges of side plate members 26 of the carriage 20. Stop members 72 are therefore always maintained in the same vertical position relative to outer channel members 35. The lowermost position of outer guide tubes 54 relative to upright structure 12 is fixed by the position of abutment between cooperating stops 70 and 72. A pair of stop rings 76 are secured to the upper ends of elongated tubes 66 for a purpose to be described.

The pair of vertically extending inner guide tubes 52 have oppositely disposed vertical slots 82 in the outer sections of the walls thereof and are secured to the forward surface of base plate 46. Extending through the respective slots are a pair of web members 84 which are secured at the one end to a pair of tubular members 86 nested within inner guide tubes 52, and at the opposite ends to a generally I-shaped center slide plate 88 by means of rearwardly and vertically extending parallel pairs of connecting plates 90 (FIGS. 2 and 4).

Vertical slots 83 (FIGS. 2 and 3) are formed in the inner wall portions of inner guide tubes 52 and extend downwardly from the top of the guide tubes to the position indicated at numeral 85. Opposed projecting pin members 87 extend through the slots 83 and are connected to opposite ones of tubular members 86. During elevation of inner guide tubes 52, slide tubes 86 remain in a lowered position until the bottoms 85 of slots 83 are elevated into a position of abutment with pin members 87, subsequent to which continued elevation of tubes 52 cause tubes 86 to be elevated therewith.

A transverse support member 92 is connected between the lower ends of the inner slide 36 of the secondary upright. Extending forwardly therefrom and centrally thereof is a fixed stop member 94. An overlapping stop member 96 extends rearwardly from the lower end of I-shaped plate 88 and abuts stop 94 to fix the lowermost position of I-shaped plate 88 and tubular members 86.

Mounted in the open sections of I-shaped drop plate 88 is a pair of laterally spaced, retractable spades 98 which are adapted, when extended as shown, to engage beneath the lip portion of a tube and cap type carton, for example, of relatively low height (FIG. 7). Laterally spaced pairs of vertically extending bars 100 are secured inwardly of each pair of plates 90 to form guide means for a pair of vertical slide members 102 having forwardly extending projections 104 located at the lower central portions thereof. A generally H-shaped link member 106 is pivotally secured by a pin 108 to each of the projections 104, the rearwardly extending legs of each of said link members being disposed vertically intermediate its respective slide member 102 and a stop 110 which is secured to the base plate 46. The legs of each link member underlie the respective slide member and overlie the respective stop 110. Each pair of forwardly extending legs of the

link members is fastened to a pivot block 114 by a pin 116, the respective spade 98 being secured to block 114 by a vertical pin 118. An upper toggle link 120 is pivotally secured at its opposite ends to each block 114 by a pin 122 and to each slide 102 by a pin 124, the connected adjacent ends of each toggle being connected by a pin 126.

The spades 98 may be folded manually upwardly and rearwardly into the pockets of I-shaped center slide plate 88, in which position the forward surfaces of the spade members are preferably flush with the slide plate. Such folding action is readily accomplished by simply breaking the toggle links about the center pin connections 126 and then rotating the spade members upwardly and rearwardly about the pivot pin connections 108 and 124. A bracket 130 is provided on the inner surface of the lower transverse section of the I-shaped slide plate (FIG. 1). The bracket has an opening therein which registers with an opening at the one end of link 106 when the spade is in a retracted position. A pin may be then inserted through the openings for insuring retention of the spades in retracted position. The retracted position of links 106 and 120, and of block 114 is illustrated by phantom lines in FIG. 1.

As will be explained more fully hereinafter, each spade assembly 98 moves vertically with the I-shaped drop plate 88 at all times when the spade members are in retracted position. When, however, the spade members are extended to an operative position, the link members 106 extend horizontally rearwardly, whereby upward movement of abutment or stop blocks 110 move vertically with base plate 46 to engage the rear ends of said links which lifts the spades to the top of the open sections of the center drop plate. In other words, when, and only when, the retractable spade members are extended for engaging a carton the center drop plate 88 drops in relation to the spade members for a purpose to be described.

A pair of fixed, laterally spaced intermediate spade members 134 are secured to pairs of vertically spaced and forwardly extending hanger plates 136 by means of pull-out pins 138. The hanger plates are secured at the rear edges thereof to a supporting plate 140 which is substantially coplanar with the base plate 46 and which is secured at its opposite ends to L-shaped side members 44.

Each of a pair of uppermost spade members 142 includes a pivot block 144 which is held in position by means of a pull-out pin 148 between a pair of vertically spaced and transversely extending plates 146. The lower plate 146 is connected to the upper ends of the inner guide tubes 52 by a plate 147 which rests on inner peripheral edge portions of tubes 52 (FIG. 2). A pair of short tubes 149 depend downwardly from the lower plate 146 and telescope within the upper ends of tubes 52, thereby stabilizing spades 142. Plate 147 is connected to tubes 149 at its opposite ends. Spades 142 always move vertically with tubes 52 and base plate 46.

Located immediately below spade members 142 is a transverse plate member 150 having a generally U-shaped cross-section with the outer leg portions thereof turned laterally outwardly for connection, as by welding, with L-shaped side members 44 (FIG. 3). Pairs of laterally spaced lifting fingers 152 having serrated edges 154 in the upper forward portions thereof, extend rearwardly through cut-out sections 156 in member 150. Longitudinal slotted portions 158 are formed in each such finger through which extend pivot pins 160. Each pivot pin extends through openings in a pair of downwardly depending hanger plates 162 which are secured along the forward edges thereof to the inner surface of plate 150. A center hanger plate 164 is interposed between each pair of plates 162 for separating adjacent ones of each pair of finger members 152. A tension spring 166 is associated with each of the lifting fingers 152, and is attached to an upper bracket 168 which depends from each finger 152 and to a lower bracket 170 which is attached to plate 150.

The springs **166** urge the finger members **152** to the forwardly extending positions thereof shown in FIGURES 1 and 3. The slots **158** permit rectilinear movement of the fingers **152** relative to pivot pins **160**, whereas said pivot pins permit the fingers to be rotated upwardly in a counterclockwise direction (FIG. 1) and against the tension of springs **166** so that said fingers can be moved to a flush position with the forward surface of spade members **142**, cut-out portions **172** being provided in the spades so that the finger members can be so rotated. A pin member **174** extends through the lower portion of each set of hanger plates **162** and is positioned to abut the side of springs **166**. The purpose of pins **174** is to cause respective springs **166** to bend rearwardly over the pins as the springs are stretched during rearward rectilinear movement of fingers **152**. In other words, when the fingers **152** are moved rearwardly to a position wherein pivot pins **160** lie adjacent the forward ends of slots **158**, the upper portion of each spring **166** has been not only stretched, but also bent to extend angularly upwardly and rearwardly to bracket **168**, whereby the springs effect return movement of fingers **152** when rearwardly directed pressure thereon is released. In the event the fingers should be lowered downwardly upon the top of a carton or other object, the fingers rotate as aforesaid against respective springs **166**, and no breakage or undue strain of any parts will occur. Therefore, any one or more of the fingers **152** can be actuated to an inoperative or flush position with spade members **142** either by means of rectilinear or rotational movement thereof, or by a combination of the two movements.

Considering now the operation of the foregoing structure, and referring first to FIGURE 5, let it be assumed that the operator desires to engage and transport a relatively tall carton **180** of the tube and cap type. As is well known, such a carton includes a reinforced annular cover portion **181** which fits tightly over the upper end of the carton and which is sufficiently flexible to permit entry between the inner and outer peripheries of the cap and carton, respectively, of lifting spade members, such as shown at numerals **142**, **134** and **98**. The carton may, of course, be square or rectangular in cross-section, for example, rather than tubular, with the cap having a similar shape.

The truck approaches carton **180** with the elements of the attachment device **10** in the following condition: fork tines **58** are in an inoperative position, having been rotated upwardly about shaft members **48** and held in a vertical position by clip members **60**, and the lower retractable spade members **98** are rotated to a retracted position within the open sections of I-shaped center drop plate **88**, the rear portion of links **106** thereof being secured to bracket members **130**. As the lift truck is moved toward one side of carton **180** lifting fingers **152** move first into contact therewith, continued movement of the truck causing the carton to actuate said lift fingers longitudinally rearwardly on pivot pins **160** until the side of the carton abuts spade members **142**. Lift motor **34** is then energized to actuate the spade members upwardly so that the forward plates thereof are moved under cap **181**, whereupon continued extension of the lift motor in mast **12** and of mast **12** in mast **16** actuates spade members **142** and the carton upwardly together to any desired elevation within the maximum obtainable elevation. The carton may, of course, be transported to any desired destination while held above the floor or other truck support surface.

In the assumed condition of operation, vertical movement of the lift motor **34** first effects simultaneous vertical movement of the attachment carriage **38**, lifting chain anchors **42**, carrier plate **39**, base plate **46** and all parts connected to and supported from the base plate including fork members **58**, vertical side members **44** and outer guide tubes **54**, inner guide tubes **52**, plate **140** and associated intermediate spade members **134** and plate **150** and associated upper spade members **142** and lifting fingers **152**. During elevation of these parts of the attachment out drop plates **62** and attached inner tubular members **66** remain in a down position on stop members **72** until outer guide tubes **54** are elevated into abutment with cap rings **76** of the tubes **66**, following which inner and outer tube assemblies **54**, **66** rise together during continued extension movement of lift motor **34**. Thus, the outer drop plates **62** function to support the bottom portion of the carton **180** during lifting movement on uprights **12** and **16**, including support of the bottom edge portion of the carton which is an area of maximum strength. Likewise, during such elevation the inner I-shaped drop plate **88** and attached inner tubular member **86**, along with retracted spades **98** and the linkage mechanism connecting same to the guide members **100**, will remain in a lowered position with stop members **96** resting on stop member **94** until the bottom portion **85** of slots **83** in inner guide tubes **52** engage pins **87** in inner tubular members **86**, wherein the inner tube assemblies **52**, **86**, inner drop plate **88**, lower spades **98**, and associated parts, rise together during continued extension movement of lift motor **34**. Thus, the inner drop plate **88** functions also to support the bottom side portion of the carton **180** during lifting movement on uprights **12** and **16**. The distance between the bottom of slots **83** and pins **87** is preferably equal to the distance between the top edge of outer guide tubes **54** and cap members **76**, whereby with lower spade members **98** in a retracted position, the outer and center drop plates **62** and **88** will begin upward movement simultaneously; i.e., at the time of engagement of pins **87** by the bottom portions **85** of slots **83** and engagement of cap **76** by outer guide tubes **54**. It will therefore be apparent that substantially the entire bottom side portion of varoous size cartons having various heights and widths will be supported by said plurality of drop plates upon engagement thereof by either of spade members **142** or **134** and during transport and lifting movement thereof upon masts **12** and **16**.

If it is desired to engage and transport a carton of any intermediate height between the upper end of intermediate spades **134** and the upper ends of upper spades **142**, such as may be represented by the height of the slatted crate **182** in FIGURE 6, spade members **134** are moved into adjacent relation with one side of such a carton with the lower spade members **98** remaining in a retracted position within the open sections of center drop plate **88**. If desired, upper spade members **142** may be removed to reduce the overall height of the device for loading of freight cars and the like. As before, fork tines **58** remain in a retracted or inoperative position. Transverse plate member **140**, to which intermediate spade members **134** are secured, being connected to side members **44** moves upwardly therewith immediately upon actuation of the lift motor **34**. It will be noted that whenever the attachment is used with lower spade members **98** in retracted position, as during the handling of cartons either of large or intermediate size, such as illustrated in FIGURES 5 and 6, the stop members **110** pass by and do not engage link members **106** of spade members **98** so that the center drop plate and spade members **98** remain in a lowered position against stop members **94** along with outer drop plates **62** and associated structure until engaged as described above in detail in connection with FIGURE 5. As elevation of the intermediate spade members **134** continues the cap portion of the carton is engaged and the carton elevated, the same as previously described, with the center and outer drop plates again supporting substantially the entire bottom side portion of the carton.

Referring now to FIGURE 7, let it be assumed that a relatively short carton **184** of similar type is to be engaged and transported. In this instance retractable spade members **98** are moved to an extended position as shown in FIGURES 1 and 4. As before, fork tines **58** remain in an inoperative position, and, if desired, upper spade

members 142 may again be removed to reduce overall height. After moving into adjacency with the side of carton 184, the lift motor is energized to elevate base plate 46 and the structure connected hereto, as described above in connection with FIGURE 5. It will be recalled that inner guide tubes 52, as well as stop members 110, are actuated upwardly with the base plate, while sliding inner tubular members 86 remain temporarily in a down position along with I-shaped center drop plate 88. It will be noted that upward movement of stop members 110 actuates same into engagement with the rear portions of link members 106 when the spade members 98 are extended following a relatively small initial upward movement of stop members 110 prior to abutment with the link members, as best seen in FIGURE 1.

During initial upward movement of lower spade members 98 following engagement thereof by stop members 110, said spade members and associated linkages move in the guides formed by bars 100 while the center drop plate 88 and inner tubular members 86 remain in the lowered position described above. However, the center drop plate begins to move upwardly with the extended spade members following maximum free movement of the spade members in the open sections of the I-shaped drop plate. Toggle links 120 of spade members 98 pick up drop plate 88 following said upward free movement of the spade members, after which the entire center drop plate assemblage, including inner tubular members 86, move upwardly together.

It is during initial upward movement of the lower spade members that the cap portion of carton 184 is engaged by said spade members. In handling relatively small cartons such as 184 it has been found unnecessary to provide for separate support along the lower edge portion thereof, spade members 98 providing the necessary support therefor. Carton 184 may, of course, be elevated to any desired height within the limitations of lift of the masts 12 and 16, outer drop plates 62 and associated parts of the device 10 being non-interferingly elevated in the sequence above described with respect to FIGURE 5.

FIGURE 6 illustrates schematically engagement of a slatted crate by serrated lift fingers 152, said crate being held by spade members 134 against a tendency to rotate forwardly during lifting movement. It will be apparent that lift fingers 152 cannot be damaged by lowering same onto the top of a load since counterclockwise rotation thereof, as seen in FIGURE 1, will be effected against the tension of springs 166. For example, as seen in FIGURE 5, it may be assumed that the attachment device was lowered from an elevated position into position for engaging carton 180. During such lowering movement lift fingers 152 came into contact with cap portion 181 which caused said lift fingers to be rotated to the position shown without damage to either the carton or the attachment device. Normally, of course, the attachment device will be brought into engagement with the side of a carton from a lowered position, in which instance relatively tall cartons will engage the lift fingers forwardly thereof to cause same to be actuated rectilinearly rearwardly as described hereinbefore.

FIGURE 8 illustrates conventional handling of the load on the fork tines 58 which are located in operative positions, in which position the fork tines are maintained by detents 62 and upwardly extending end portions 60.

In characterizing this invention in relatively broad terms, the upper, intermediate and lower spade members, along with the outer and center drop plates, may each be referred to as "load engaging means," and the said drop plates may be referred to in the alternative as "abutment elements." The outer drop plates 62 and the inner drop plate 88 each has a lost motion connection with both the upper and intermediate spade members during carton handling operations by either of said spade members; i.e., all of said drop plates remain in a lowered position during predetermined elevation of said upper and intermediate spade members, such elevation being equal to the distance of travel of guide tubes 54 and 52 from a lowered position to a position in which said guide tubes contact members 76 and 87, respectively. The lower spade members 98 follow the movements of center drop plate 88 so long as said spade members remain in a retracted position. However, when the spade members 98 are extended, the lost motion of the upright 12 and the upper and intermediate spade members with the base plate 46 relative to lower spade members 98 and drop plate 88, is greatly reduced in that stop members 110 on the base plate move through only a small initial distance prior to contact with link members 106 and lifting of spade members 98. Relatively small subsequent upward movement of the spade members 98 within the open sections of the I-shaped drop plate then takes place prior to lifting of the drop plate with the lower spade members. The unique construction of load grabs 152 is also provided in combination with the foregoing structure, as well as adjustable fork tines 58, for handling other specialized types of loads, as well as conventional palletized types of loads.

It will be appreciated that any size of carton between, for example, the exemplary cartons illustrated in FIGS. 5 and 7, may be readily handled by our attachment in the manner described above. In the handling of cartons by means of either upper or intermediate spade 142 or 134, drop plates or abutment elements 62 and 88 may also be utilized as means for aligning the sides of cartons which are stacked vertically. For example, let it be assumed that carton 180, FIG. 5, is of somewhat lesser height, the bottom thereof being represented by the broken line. With such a carton elevated as shown, abutment elements 62 and 88 will extend a significant distance below the bottom of the carton during subsequent elevation of the carton and may be utilized for aligning the side of the carton which is engaged by spade 142 with the adjacent side of another carton upon which carton 180 is to be stacked. In fact, the only instance in which abutment elements 62 may not be so used as article aligning means is in the event that the carton being handled is of such a height that substantially full lost motion movement of spades 142, for example, relative to elements 62 is required prior to engagement with the cap 181 of the carton. Thus, when upright 12 is operated to stack a first such carton upon a second carton, the forward face of the lower portion of each abutment element 62 (and also element 88 when spade 98 is in a retracted position) will engage the adjacent side surface of the second carton thereby aligning the first carton therewith, whereupon the first carton may be deposited on the second carton in true vertically stacked relation thereto.

From the above it will now be readily understood that we have devised a universal type of attachment device, particularly useful in conjunction with lift trucks, but not limited to such use. By means of the singular and extremely novel attachment of our invention, operators are enabled to handle cartonized or crated loads of widely varying dimensions with a high degree of safety, since for any such load desirable support means are provided in the nature of engaging members for lifting the load as well as supporting drop plates. In addition, conventional load engaging means, illustrated as fork tines, are provided for use at the will of the operator while being movable to a non-interfering position when not in use.

Although only one embodiment of the invention has been shown and described, it will be apparent to persons skilled in the art that various changes in the form and relative arrangement of parts may be made to suit requirements without departing from the scope of the invention.

We claim:

1. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertical-

ly in the mast including plate means extending transversely of the truck, a pair of transversely spaced and vertically extending guide means connected to the plate, a vertically extending opening formed in one side of each guide means, a pair of cooperating transversely spaced and vertically extending members slidable relative to the pair of guide means and supported thereby, drop plate means having connection with said pair of members through said openings, cooperating abutment portions associated with said pairs of guide means and members, and at least one load engaging member secured to the lifting frame, said pair of guide means being elevatable with the frame and load engaging means a pre-determined distance relative to said drop plate means following which said cooperating abutment means engage to elevate said drop plate with said load engaging means.

2. A device as claimed in claim 1 wherein stop means are associated with a fixed portion of the load lifting mast and with the drop plate for establishing a normal lowered position of the drop plate prior to lifting thereof following engagement of said cooperating abutment means.

3. A device as claimed in claim 1 wherein said guide means and cooperating vertically extending members comprise telescopical tubular elements, said drop plate being mounted forwardly thereof to provide an abutment surface, and said load engaging means is formed to engage an overlapping portion of a load container and is essentially coplanar in a vertical plane with said drop plate, said drop plate extending substantially below the load engaging means, whereby engagement of a load container by the load engaging means and subsequent lifting thereof affords support of the lower portion of that side of the container in abutment with said drop plate as relative vertical movement between the load engaging means and drop plate is effected.

4. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast including transverse plate means extending laterally outwardly of either side of the mast, transversely spaced outer guide means supported from and extending vertically of opposite end portions of said plate means, transversely spaced inner guide means supported from and extending vertically of said plate means transversely inwardly of said outer guide means, first and second load engaging means associated with said plate means and outer guide means, respectively, and movable vertically a pre-determined distance one relative to the other, and third and fourth load engaging means associated with said plate means and inner guide means, respectively, also movable vertically a pre-determined distance one relative to the other, said first and third load engaging means being spaced vertically relative to each other and cooperable with said second and fourth load engaging means, respectively, for supporting at the upper and lower portions load containers of various dimensions.

5. A device as claimed in claim 4 wherein said second and fourth load engaging means are essentially coplanar and are spaced transversely of each other, said relative vertical movement between said first and second and said third and fourth load engaging means, respectively, being effected by lost motion movement of said outer and inner guide means, respectively.

6. A device as claimed in claim 5 wherein said lost motion movement permits essentially equal vertical movement of said first and third load engaging means prior to vertical movement therewith of said second and fourth load engaging means.

7. A device as claimed in claim 4 wherein retractable fifth load engaging means is operably connected to said fourth load engaging means and vertically below said third load engaging means and is adapted to engage load containers of different dimensions than any engaged by either said first or third load engaging means.

8. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast, laterally spaced and forwardly extending load engaging members, pivot means securing said members to opposite side portions of the frame, said members being movable out of forward load engaging position to vertically disposed inoperative position, load engaging means operatively connected to the lifting frame, said operative connection including means enabling the load engaging means to be actuated in a longitudinal direction to operative or inoperative position relative to the lifting frame, said load engaging means being disposed normally above the load engaging members and selectively extensible to operative position when said load engaging members are located in inoperative position, and means separate from the load lifting frame for actuating the load engaging means upwardly when the latter is in inoperative position, said load lifting frame actuating the load engaging means upwardly when the latter is disposed in operative position.

9. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast, a series of crate lifting grabs having surfaces adapted to be applied to the underside of the rail of a crate and having longitudinal slots formed therein, transverse mounting means extending through the slot of each grab for connecting same to the lifting frame and for permitting rectilinear movement of each grab relative to the frame, and resilient means connected to the grabs and to the lifting frame in such a manner that each grab is urged to its outward operative position relative to the lifting frame.

10. A device as claimed in claim 9 wherein a member extends transversely of the resilient means and is secured to the lifting frame such that rectilinear inward movement of a grab causes the resilient means to bend over said latter member thereby exerting an outward force thereon urging the grab to its outward position upon release of an inwardly directed force thereon.

11. A device as claimed in claim 10 wherein the means connecting the grabs to the lifting frame comprises pivot means permitting upward pivotal movement of each grab in opposition to the urging of said resilient means, said upward pivotal movement being independent of or combined with rectilinear movement dependent upon the direction of an outside force imposed upon each grab.

12. A device as claimed in claim 10 wherein load engaging means are secured to the lifting frame above the lifting grabs, said lifting grabs extending longitudinally outward of said load engaging means for engaging the underside of the rail of a crate, and being actuated inwardly thereof to inoperative position by container means upon engagement therewith by said load engaging means, said inward actuation being effected either rectilinearly in said slot as when the grab is moved into abutment with a side of a container to be handled by the load engaging means, or rotationally upwardly as when the grab is actuated downwardly with the lifting frame into abutment with an upper surface of the container.

13. In a truck having a load lifting mast at one end thereof, a lifting member, a series of crate lifting grabs having surfaces adapted to be applied to the underside of a rail of a crate, each of said grabs having a longitudinal slot formed therein, pivot means extending through the slot of each grab for connecting each grab to the lifting member, and resilient means connecting said grabs to the lifting member for urging said grabs to outward operative position, each grab being actuatable inwardly or upwardly on the pivot means against the resilient means upon the application of an outside force.

14. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast, vertically extending load engaging spade means secured to the lifting frame, vertically extending drop plate means operatively connected to the lifting

frame and disposed beneath the spade means, said operative connection including vertically extending lost motion means between the lifting frame and said drop plate means for permitting pre-determined vertical movement of the spade means on the lifting frame prior to vertical movement of the drop plate means, whereby relatively tall containerized loads may be engaged at the upper portion thereof by the upper spade means while said drop plate means maintains its vertical position during pre-determined upward movement of the spade means with said load, following which the spade means and plate means move vertically together to effect support at the upper and lower portions of the container.

15. A device as claimed in claim 14 wherein a series of crate lifting grabs having surfaces adapted to be applied to the underside of a rail of the crate are secured for inward rectilinear and upward rotational movement relative to the lifting frame, said grabs normally extending outwardly of the spade means until said spade means is actuated into engaging position with a load whereupon said grabs are actuated to an inoperative or non-load engaging position.

16. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast, a first load engaging means operatively connected to and disposed forwardly of said lifting frame, the operative connection including lost motion means whereby said load lifting frame is movable vertically a predetermined distance prior to vertical movement of said load engaging means, and second load engaging means selectively first movable vertically with either the load lifting frame or the first load engaging means.

17. A device as claimed in claim 16 plus means connecting said second load engaging means to said first load engaging means in such a manner that said second means is selectively movable within and without the plane of said first means to inoperative and operative positions, respectively.

18. A device as claimed in claim 16 wherein said second load engaging means when placed in inoperative position is first movable vertically with the first engaging means, and when placed in operative position is first movable vertically with the load lifting frame and relative to the first engaging means.

19. A device as claimed in claim 16 plus third load engaging means secured to the load lifting frame and above said second engaging means, said third engaging means being movable vertically with the lifting frame a pre-determined distance relative to the first engaging means, and said second engaging means being movable also with the load lifting frame when said second engaging means is located in a load engaging position.

20. A device as claimed in claim 16 plus load engaging fork tines pivotally connected to the load lifting frame for selective placement in operative or inoperative load engaging positions.

21. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast, first vertically extending load engaging means secured to the frame and movable vertically therewith to engage an overlapping portion of a load container, second load engaging means extending vertically beneath the first load engaging means adapted to abut and support one

vertically extending side of a load container when the latter is engaged by the first load engaging means, and lost motion means interconnecting said first and second load engaging means such that said first load engaging means may be elevated a pre-determined distance with said frame prior to elevation of said second load engaging means, said lost motion means including a first vertically extending tubular guide member having a vertically extending slot formed in the wall thereof and connected to the frame, a second vertically extending tubular member nested within the first member for relative sliding movement therewith and guided thereby, abutment means associated with said first and second members, the abutment means of said first member being normally disposed beneath the abutment means of the second member and actuatable upwardly with the frame to engage the abutment means of the second member, whereafter said first and second members are elevatable together with the load lifting frame, and an element extending through said slot for securing said second member to the second load engaging means.

22. In a truck having a load lifting mast at one end thereof, an upright load lifting frame movable vertically in the mast, laterally spaced and forwardly extending load engaging members, pivot means securing said members to opposite side portions of the frame, said members being movable out of forward load engaging position to vertically disposed inoperative position, load engaging means operatively connected to the lifting frame, said operative connection including means enabling the load engaging means to be actuated in a longitudinal direction to operative or inoperative position relative to the lifting frame, said load engaging means being disposed normally above the load engaging members and selectively extendible to operative position when said load engaging members are located in inoperative position, drop plate means, said load engaging means being movable longitudinally relative to said drop plate means, and lost motion means operatively connecting said drop plate means to the lifting frame, said load engaging means being first movable upwardly with the lifting frame when located in an inoperative position and being first movable upwardly with the drop plate means when located in an inoperative position.

23. A device as claimed in claim 22 wherein said drop plate means comprises a generally I-shaped member, said load engaging means being retractable to inoperative position within the confines of the open sections of the drop plate means.

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