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a corporation of Michigan
Continuation of Ser. No. 666,892,
Sept. 11, 1967, now abandoned.

[56] **References Cited**
FOREIGN PATENTS
 669,730 12/1964 Canada 214/730
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[54] **SIDE LOADER DEVICE**
26 Claims, 12 Drawing Figs.

[52] U.S. Cl. **214/16.4,**
 214/620, 214/730; 187/76
 [51] Int. Cl. **B66f 9/14**
 [50] Field of Search 187/76;
 214/620, 621, 38.2, 38.22, 38.46, 16.18B, 16.42,
 16.4, 512, 38.8, 16.16B, 730, 95

ABSTRACT: A side loader device for use with an industrial lift truck to facilitate loading and unloading of the truck lift forks from and onto storage racks adjacent the sides of the truck. The device includes a reach mechanism adapted to be supported by the lift forks for retractable extension outwardly from either side of the truck. Stabilizing bellcrank assemblies are mounted adjacent the reach mechanism and are pivotally operable to engage the adjacent material storage racks and prevent sagging and side loading moments on the truck as a load is brought onto or removed from the lift forks by the reach mechanism.

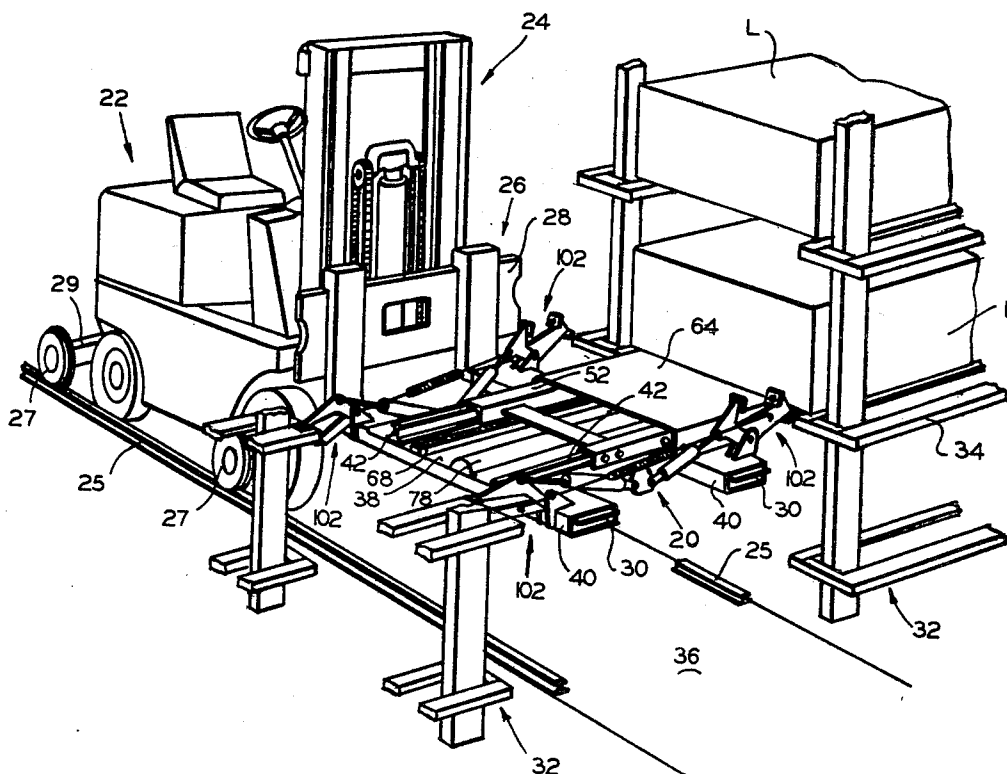


FIG. 1

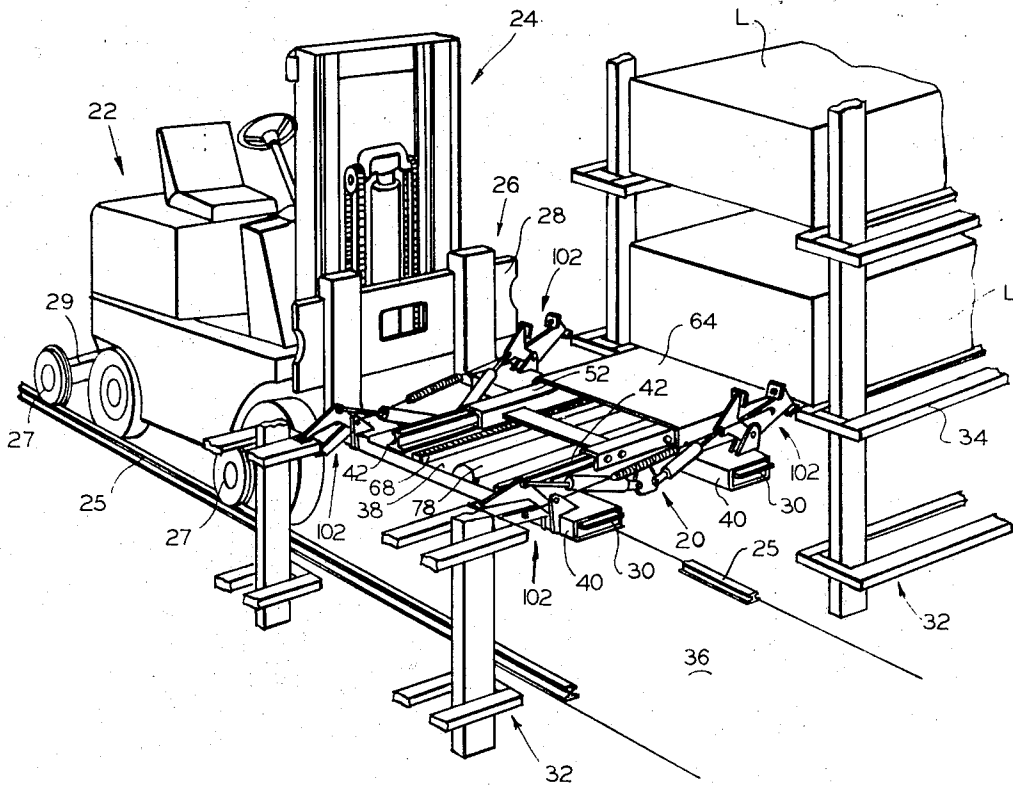


FIG. 11

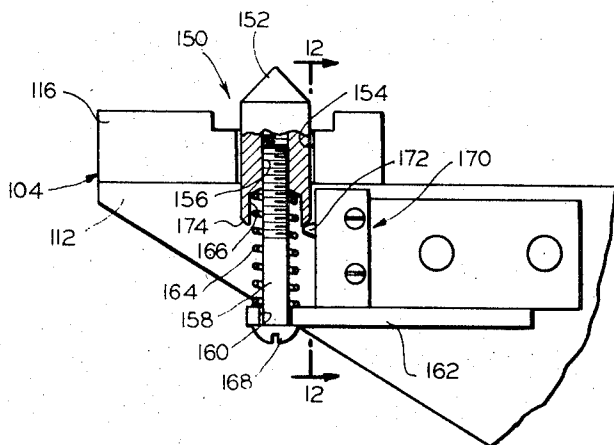
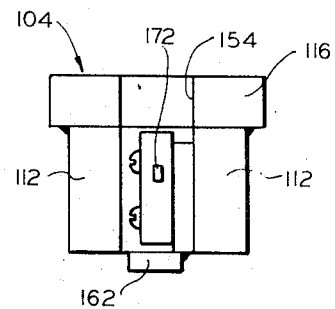


FIG. 12



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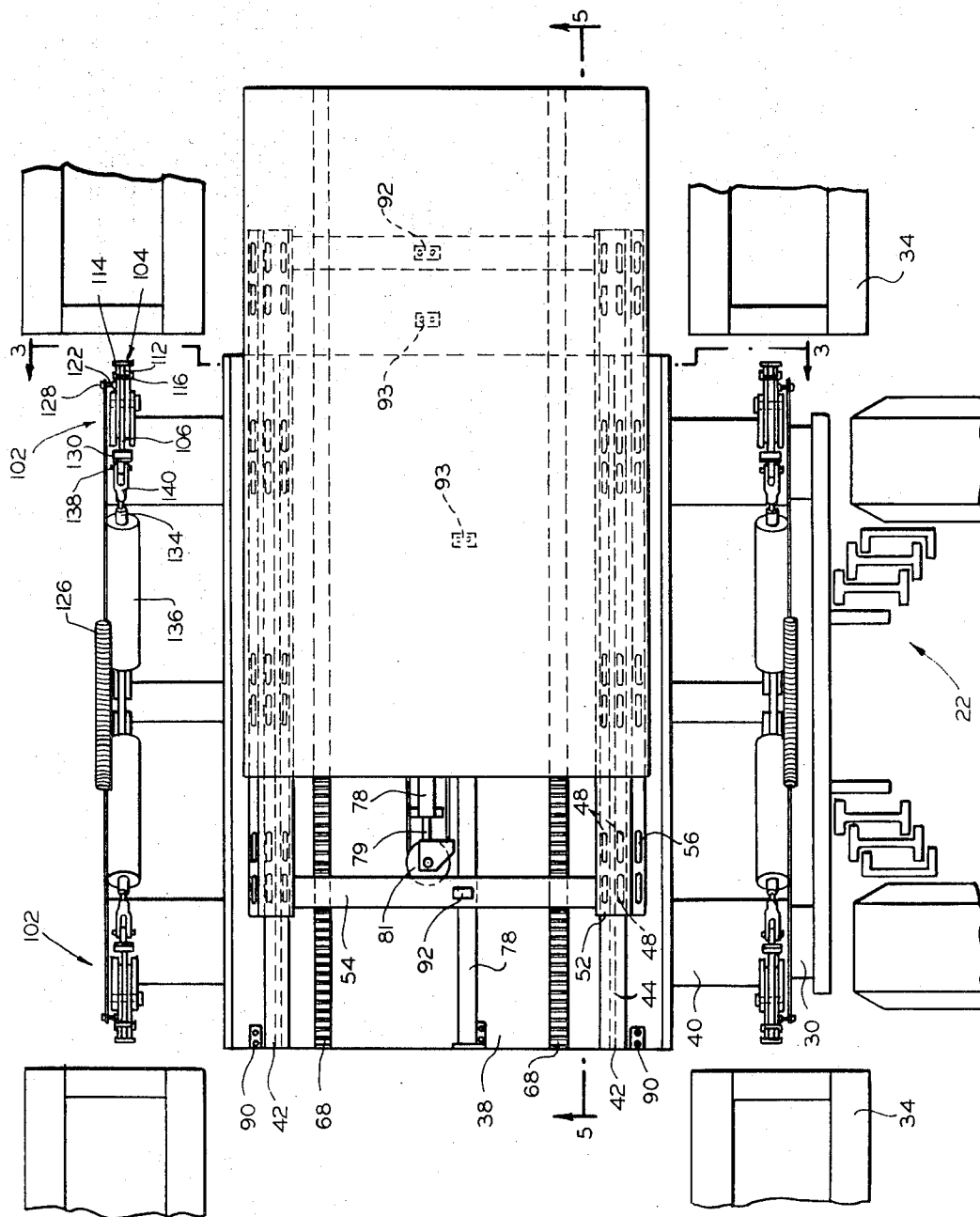


FIG. 2

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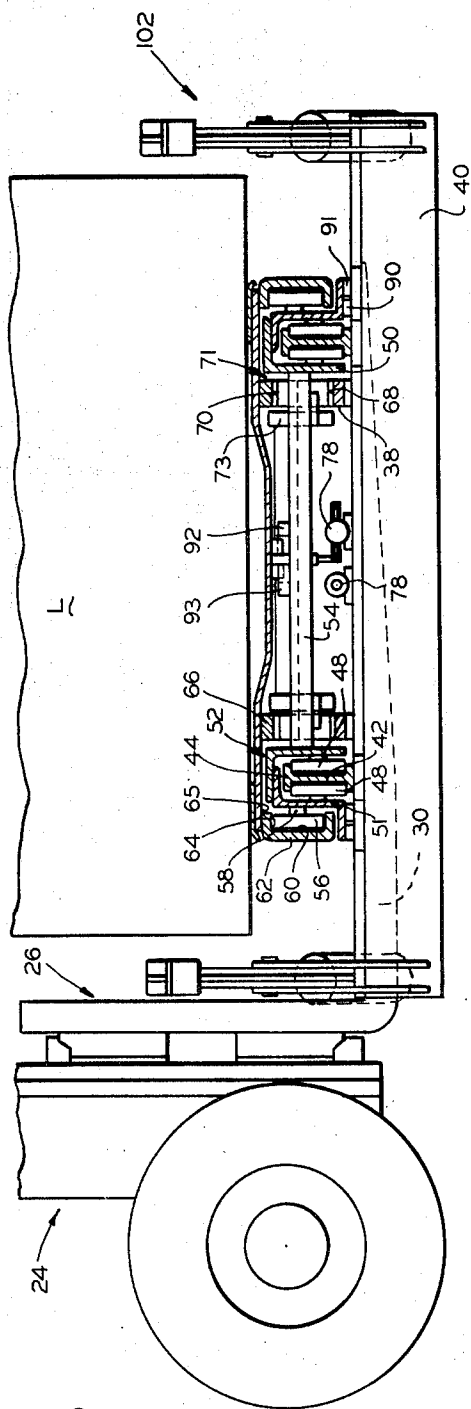


FIG. 3

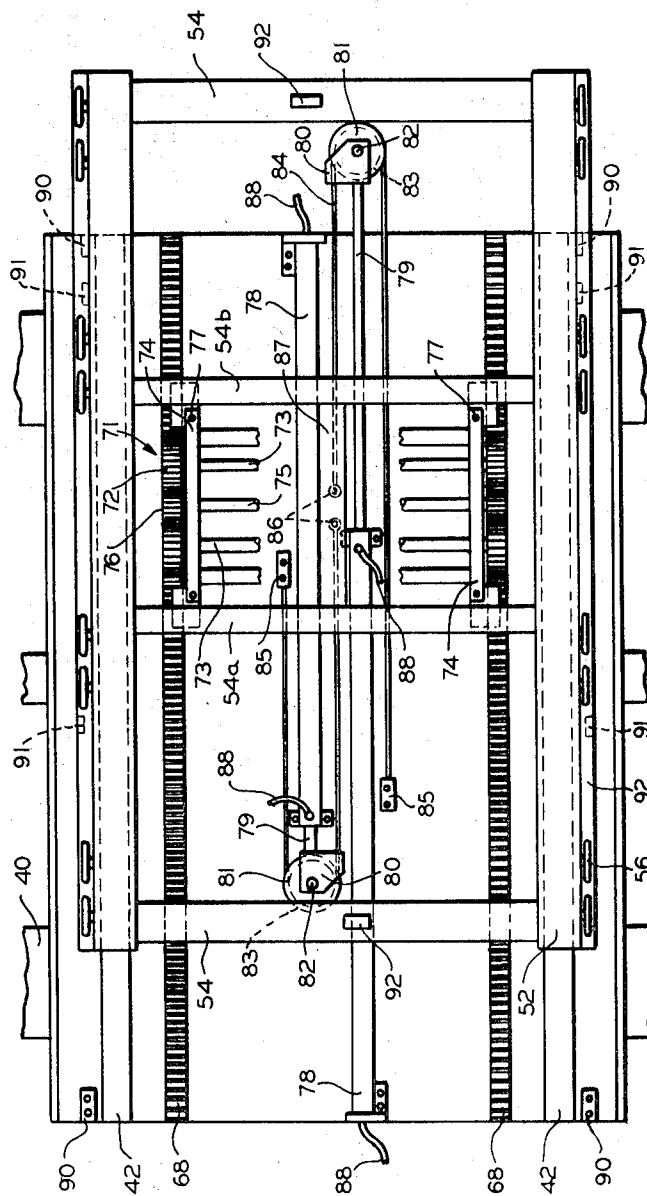
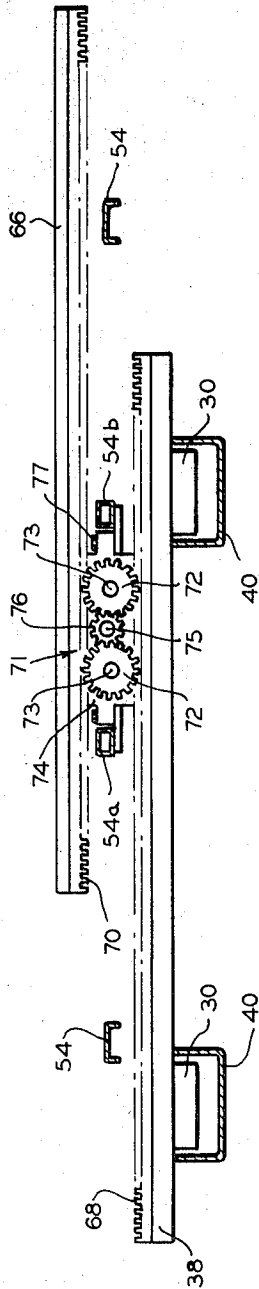


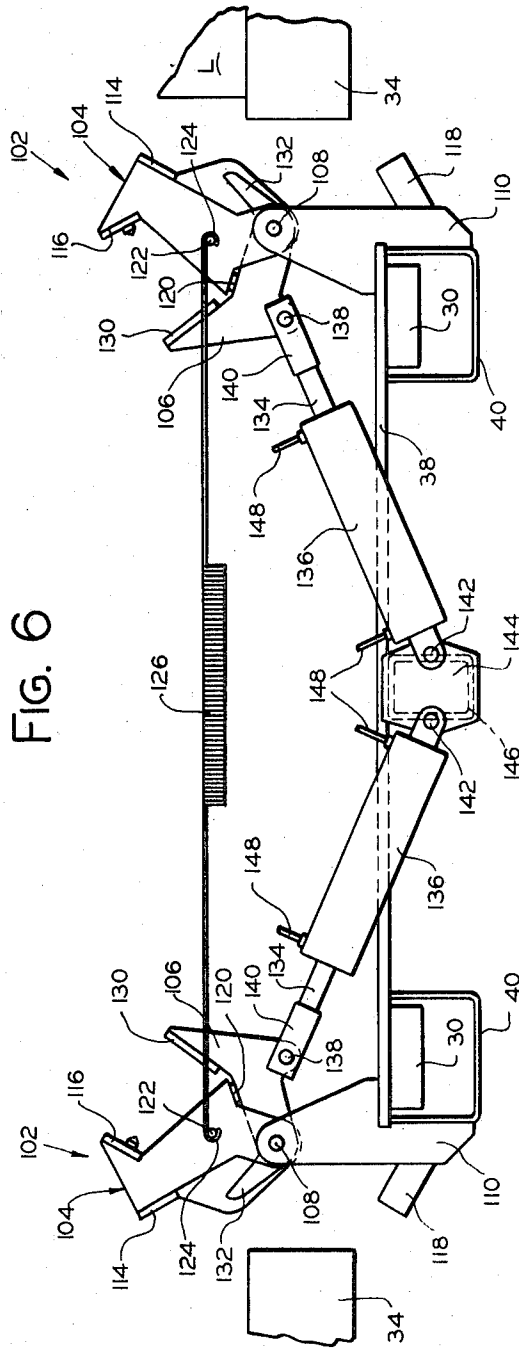
FIG. 4

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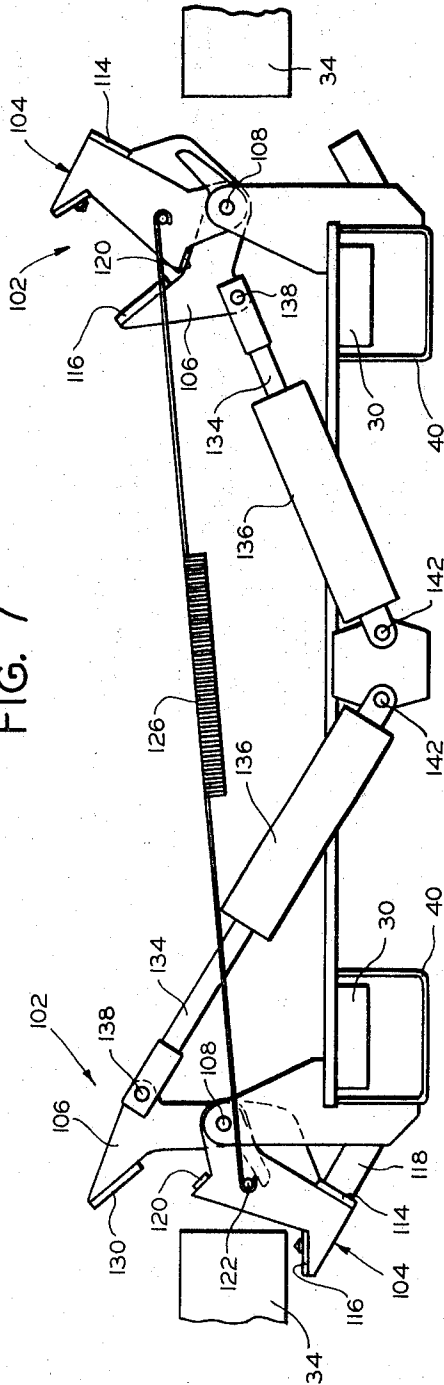
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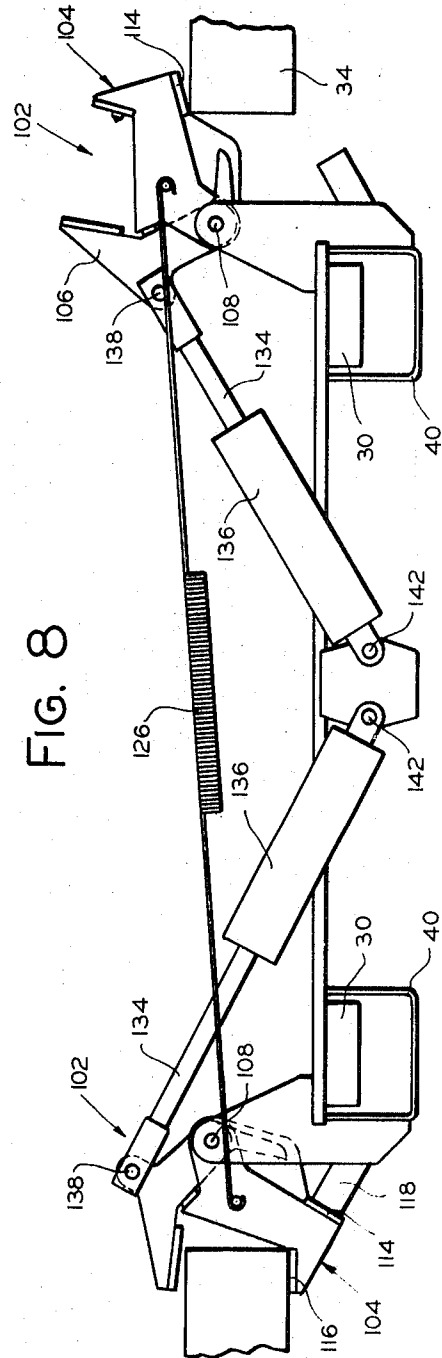
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Fig. 7



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SIDE LOADER DEVICE

This application is a continuation of application Ser. No. 666,892, filed Sept. 11, 1967 and now abandoned.

BACKGROUND OF THE INVENTION

It is a common practice in material handling to utilize industrial lift trucks to move materials and other loads between storage areas or between a storage area and a work area. Such trucks generally have lift forks mounted for vertical movement on the forward portion of the truck to support and carry the loads. In the case of material storage, it is desirable to use tiered storage racks to obtain maximum utilization of available storage space. The storage racks are generally positioned as close together as possible while being spaced to provide aisles therebetween for the movement of material handling devices such as lift trucks. Recent advances in material retrieval system utilize tiered storage racks with narrow aisles therebetween which have tracks or guide means therein upon which automatically or remotely operated material retrieval devices may be supported and guided. Such narrow aisles make it difficult, if not impossible, for conventional lift trucks to turn so as to face a material supporting rack head on and allow the lift forks to be inserted directly beneath the load to be removed from the supporting racks. The narrow aisles thus eliminate or substantially reduce the usefulness of conventional lift trucks in areas employing automated retrieval systems.

SUMMARY OF THE INVENTION

Accordingly, one of the primary objects of the present invention is to provide a side loader device which is particularly suited for use with an industrial lift truck, and which side loader device facilitates operation of the lift truck in aisles only a few inches wider than the truck.

Another object of the present invention is to provide a side loader device which is particularly suited for use with an industrial lift truck and includes novel stabilizing means for preventing side loading moments on the truck as a load is removed from the truck lift forks or is brought onto the lift forks from material storage racks disposed adjacent a side of the truck.

Another object of the present invention is to provide a side loader device for use with an industrial lift truck, which device includes a reach mechanism operable for retractable extension from either side of the lift truck and novel means for raising and lowering the reach mechanism to facilitate unloading and loading of the truck lift forks from material storage racks disposed in side relation to the lift truck.

A further object of the present invention is to provide a side loader device as described wherein the means for raising and lowering the reach mechanism is adapted to eliminate side loading moments on the lift truck during loading and unloading of the truck lift forks.

Another object of the present invention is to provide a side loader device as described wherein the means for raising and lowering the reach mechanism comprises pairs of bellcrank lever assemblies mounted on opposite sides of the lift truck and adapted to selectively engage adjacent storage racks.

Another object of the present invention is to provide a novel stabilizing apparatus for use with an industrial lift truck, which stabilizing apparatus employs a combination of bellcrank levers adapted to eliminate side loading moments on the truck and prevent sagging of the truck as a load is brought onto the truck lift forks or removed therefrom.

In a preferred embodiment of a side loader device constructed in accordance with the present invention, a support plate member is adapted to be mounted on the lift forks of a conventional industrial lift truck. The support plate member serves to support a reach mechanism having a support platform member which may be retractably extended on either side of the lift truck in a direction generally transverse to the longitudinal axis of the truck. A bellcrank lever assembly is pivotally mounted adjacent each corner of the support plate

member such that a pair of bellcrank lever assemblies are provided on each side of the lift truck slightly outwardly of each of the lift forks. Each bellcrank assembly is pivotally operable through a hydraulic piston assembly. The bellcrank assemblies comprising each side pair of assemblies are operatively associated with each other such that each side pair may be moved simultaneously. The bellcrank lever assemblies each comprise upper and lower bellcrank lever members supported for pivotal movement about a common axis. The bottom bellcrank lever of each lever assembly is adapted to engage the upper or lower surface of a material storage rack disposed adjacent the aisle along which the lift truck is maneuvered. The upper and lower bellcrank lever members of each assembly are operatively associated with each other such that movement of the upper bellcrank through its associated hydraulic piston assembly will effect a corresponding pivotal movement of the lower bellcrank lever.

When it is desired to remove a load from material storage racks adjacent one side of the lift truck, the side loader device is raised to a position slightly below the bottom surface of the load by vertical movement of the lift forks. The bellcrank lever assemblies opposite the side storage racks from which the load is to be retrieved are thereupon moved to positions wherein the adjacent storage racks are received between the upper and lower bellcrank levers. The bottom bellcrank levers adjacent the load are then caused to engage the upper surfaces of the racks supporting the load simultaneously with extension of the support platform member of the reach mechanism to a position underlying the load. The last-mentioned lower bellcrank lever members are thereupon moved further downwardly to effect raising of the load from the support racks by the platform member whereupon the platform member is caused to be retracted to bring the load to a center position on the lift forks. The respective bellcrank lever assemblies are thereupon disengaged from their associated storage racks to allow the lift truck to remove the load to another storage area or to a work area. The bellcrank assemblies thus provide a means to stabilize the side loader reach mechanism and raise the platform member with the load thereon for movement onto the lift forks. It will be understood that the side loader device of the present invention may be operated in similar fashion to place a load from the lift forks onto material storage racks adjacent either side of the lift trucks.

Further object and advantages of my invention, together with the organization and manner of operation thereof, may best be understood by reference to the following description of preferred embodiments of the invention when taken in conjunction with the accompanying drawings, in which like reference numerals designate like parts throughout the several views and where:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an industrial lift truck having a side loader device in accordance with the present invention operatively associated therewith, the side loader device being shown in a position prior to removing a load from storage racks disposed adjacent the side of the truck;

FIG. 2 is a top view of the side loader device illustrated in FIG. 1, with the reach mechanism being extended slightly outwardly from one side of the lift truck;

FIG. 3 is a partial side view, partly in section, taken substantially along the line 3-3 of FIG. 2;

FIG. 4 is a top view, similar to FIG. 2, of the reach mechanism with the upper support platform member removed to illustrate the means for effecting extension and retraction of the reach mechanism;

FIG. 5 is a vertical sectional view taken substantially along the line 5-5 of FIG. 2 and illustrates the interconnection between the extendable elements of the reach mechanism to effect extension of the support platform member;

FIG. 6 is a front elevational view of the side loader device of FIG. 1 and illustrates the forward stabilizing bellcrank lever assemblies in their raised inoperative positions;

FIG. 7 is a front elevational view similar to FIG. 6 but showing the bellcrank lever assembly opposite the load in an intermediate position as the bellcrank levers are moved toward a position to receive the adjacent storage rack therebetween;

FIG. 8 is a front elevational view similar to FIG. 6 but illustrating the front bellcrank lever assemblies in their operative stabilizing positions relative to adjacent material storage racks;

FIG. 9 is a front elevational view illustrating an alternative embodiment of a bellcrank lever stabilizing assembly, with the bellcrank lever opposite the load to be retrieved being illustrated in dash lines in its raised inoperative position;

FIG. 10 is a front elevational view similar to FIG. 9 but illustrating the front bellcrank levers in their operative stabilizing positions engaging adjacent storage racks;

FIG. 11 is a detail sectional view illustrating a control switch on a lower bellcrank lever to indicate when the lever engages a storage rack; and

FIG. 12 is a sectional view taken substantially along the line 12-12 of FIG. 11, but with the contact member and its support stud removed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and in particular to FIG. 1, there is illustrated a side loader device, indicated generally at reference numeral 20, being used in conjunction with a conventional industrial lift truck 22. The lift truck has a mast assembly, indicated generally at 24, mounted on the forward end of the lift truck and adapted to support a load engaging and supporting means 26 including an apron 28 and a pair of lift fork arms 30 for upward and downward movement in a conventional manner. For a more detailed description of the mast assembly 24, reference may be had to U.S. Pat. No. 3,213,967, issued Oct. 26, 1965, and assigned to the assignee of the present invention. The conventional lift truck 22 is maneuverable to receive a load on the lift forks 30 for transporting the load to a desired location whereupon the load may be placed on storage racks or otherwise unloaded from the lift forks. There are, however, instances where it is difficult to directly engage a load with the lift forks in a conventional manner. For example, in the more recent automated material handling systems, material storage or supporting racks such as those shown generally at 32 are disposed in side-by-side relation to support materials or loads L upon generally horizontally disposed storage rack members 34. The storage racks 32 are positioned such that a relatively narrow aisle 36 is formed between the ends of adjacent racks with the aisle being slightly wider than the width of the lift truck 22. The narrow aisles 36 provide for maximum utilization of storage area, but prevent conventional maneuverability of the lift truck when removing material from or placing material upon the storage racks 32. The side loader device 20 in accordance with the present invention finds particular application where such lift truck maneuverability is limited and allows side loading and unloading of the lift forks 30 from the narrow aisle 36 between the storage racks 32.

Because the narrow aisles 36 make it difficult to accurately steer a lift truck 22 within the narrow aisles, means are preferably provided to assist in guiding the lift trucks within the aisles. Such means may include a pair of parallel spaced guide rails 25 suitably secured to the floor surface of each aisle, with one rail being disposed at the base of each tier of storage racks 32. The guide rails 25 are adapted to cooperate with rail wheels 27 on the lift truck. The rear rail wheels 27 are rotatably supported by a cross axle member 29 on the lift truck, while the forward rail wheels 27 preferably are suitably secured in axial relation to the front drive wheels of the lift truck such that they serve as guide and drive wheels for the truck when disposed on the guide rails 25.

The side loader device 20 includes a support plate or base member 38 having a pair of generally U-shaped members 40 suitably secured to the underside thereof so as to form rectangular hollow channels. The channel members 40 serve to receive the generally horizontally disposed lift fork arms 30 and thereby provide a means for horizontally supporting the side loader device 20 on the load engaging means 26 of the lift truck 22 for upward and downward movement with the lift fork arms. The channel members 40 have lengths substantially equal to the lengths of the horizontally disposed portions of the lift fork arms 30, while the length of the support plate member 38, considered in a direction along the longitudinal axis of the lift truck 22, is slightly less than the lengths of the channel members 40 such that the ends of the channel members extend beyond the edge portions of the support plate member 38.

Referring now to FIGS. 2 and 3, taken in conjunction with FIG. 1, the support plate member 38 of the side loader device 20 has a width, considered in a direction transverse to the longitudinal axis of the lift truck 22, generally equal to or slightly greater than the width of the lift truck 22. The maximum allowable width of the support plate member 38 will be dependent upon the width of the aisle 36 which in turn is determined by the relative distance between the ends of the load storage racks 32. The support plate member 38 has a pair of guide rail members 42 suitably secured to the upper surface thereof such that the guide rail members extend the width of the support plate member 38 in a direction transverse to the longitudinal axis of the lift truck 22. The support plate member 38 and guide rails 42 serve to support and guide a reach mechanism in a manner to be described more fully hereinbelow.

Noting FIG. 3, the guide rail members 42 are generally I-shaped in cross section with the web portions thereof combining with adjacent surfaces of the upper and lower flange portions 44 and 46, respectively, to form guide channels. The guide channels so formed receive a plurality of roller members 48 which are suitably rotatably mounted on inner and outer depending flange portions 50 and 51, respectively, of inverted U-shaped channel members 52. The diameters of the rollers 48 are slightly less than the distance between the opposing surfaces of the flange portions 44 and 46 of the guide rail members 42 such that the rollers 48 will be guided in rolling relation on the lower flange portions 46 of the guide rails 42, thereby allowing the channel members 52 to be moved longitudinally along the guide rails. The channel members 52 are maintained in fixed parallel relation to each other on their respective guide rails 42 by a plurality of cross struts 54 which are suitably secured to the opposing downwardly projecting flange portions 50 of the channel members. Noting FIG. 2, it is desirable that the roller members 48 be provided in sets of two along the longitudinal length of each of the channel members 52, with four such sets of rollers being spaced along each of the channel members on either side of the webs of the guide rails 42 to insure engagement of at least two opposing sets of rollers with each of the guide rails during extension of the channel members 52, as will be more fully described hereinbelow. The interconnected channel members 52 comprise a first intermediate extension element of the reach mechanism.

The outer depending flange portions 51 of the channel members 52 also rotatably support a plurality of conical roller members 56 on the outer surfaces thereof through pin supports 58 in similar fashion to the mounting of the roller members 48. The rollers 56 are preferably provided in sets of two spaced along the longitudinal axes of the channel members 52 as are the sets of roller members 48. The axes of rotation of the roller members 56 are disposed in a horizontal plane spaced above the plane containing the axes of rotation of the cylindrical rollers 48. The rollers 56 are received within recesses 60 provided in a pair of channel members 62 and serve to support the channels 62 for movement in a longitudinal direction. The heights of the recesses 60 in the channels 62 are made slightly greater than the diameters of the rollers

56 such that upper surface portions 64 of the recesses 60 will engage the peripheral surfaces of the rollers 56 in rolling relation. The channel members 62 are secured to the underside 65 of a support platform member 66 and, through rollers 60, provide means to support the platform member 66 for movement relative to guide rails 42. The channel members 62 and support platform 66 comprise a second extensible element of the reach mechanism. The upper surface of the support platform member 66 forms a support surface for a load L to be brought onto or removed from the lift forks 30 in a manner to be described below. The interconnected channel members 52 and the support platform 66, along with the associated roller members 48 and 56 and the channels 62, comprise the extension elements of the reach mechanism which is adapted for retractable extension relative to the support plate member 38 in a direction generally transverse to the longitudinal axis of the lift truck 22.

Referring now to FIGS. 2-5, the side loader device 20 includes a means for extending and retracting the support platform member 66 relative to the support plate member 38 outwardly from either side of the lift truck 22. The extension and retraction means includes a pair of rack gear members 68 suitably secured to the upper surface of the support plate member 38. The rack gear members 68 are disposed slightly inwardly from and parallel to the guide rails 42 and extend the width of the support plate member 38. A similar pair of rack gear members 70 are fixedly secured to the undersurface 65 of the support platform member 66 in overlying relation to the rack gear members 68. A pair of cross struts 54a and 54b are fixedly secured between the channel members 52 to support a pair of gear train means, shown generally at 71. The gear train means 71 serve to interconnect the rack gear members 68, the reach mechanism intermediate extension element comprising channel members 52, and the rack gear members 70 such that movement of cross struts 54a and 54b and the channel members 52 will effect movement of the support platform member 66 in a direction corresponding to the direction of movement of the channel members. Each of the gear train means 71 includes a pair of identical pinion gears 72 fixedly secured on the ends of parallel spaced cross shafts 73 which in turn are rotatably supported by plate members 74 suitably secured in transverse relation to the cross struts 54a and idler gears b. The pinion gears 72 have pitch diameters such that the pinion gears matingly engage the teeth of corresponding rack gear members 68 and 70. The plate members 74 also rotatably support a cross shaft 75 having an idler gear 76 secured on each outer end thereof such that the idler gears 76 matingly engage the associated pinion gears 72 but do not engage either of the rack gear members 68 or 70. It will be understood that the circular pitch of the teeth of the rack gear members 68 and 70, the pinion gears 72 and the idler gears 76 must be identical to provide proper engagement between the respective gear teeth. It will be further understood that as the channel members 52 and their associated cross struts 54a and 54b are moved relative to the fixed rack members 68 in a direction transverse to the longitudinal axis of the lift truck 22, the support platform member 66 will be moved in a corresponding direction a distance equal to twice the distance moved by the channel members 52. The cross struts 54a and 54b are preferably positioned relative to the ends of the channel members 52 such that the gear train means 71 will be generally centered relative to the width of the support plate member 38 when the support platform 66 is retracted to a position directly overlying the support plate member 38. By so centering the gear train means 71, the support platform 66 may be extended an equal distance outwardly from either side of the support platform member 38. The plate members 74 may be secured between the cross strut members 54a and 54b in any suitable manner such as by screw means 77 which allow the gear train means 71 to be readily assembled or disassembled from the cross struts. As each gear train means 71 is comprised of a pair of pinion gears 72 with an idler gear 76 interconnecting the pinion gears, one of the pinion gears 72 of each of the gear

train means 71 may, if desired, be caused to overtravel the corresponding rack gear member 68 to allow overtravel of the support platform member 66 beyond a side edge portion of the support plate member 38, with the idler gears 76 serving to maintain the integrity of the gear train means 71.

A pair of hydraulically actuated piston assemblies 78 are suitably secured to the upper surface of the support plate member 38 such that the closed end portions of the piston assemblies are disposed adjacent opposite side edge portions of the support plate member. Each of the piston assemblies 78 includes a piston rod 79 which may be extended outwardly from the piston assembly beyond the corresponding edge portion of the support plate member 38. The outer end portion of each of the piston rods 79 has a support bracket 80 supported thereon. The support brackets 80 are U-shaped and serve to rotatably support pulley members 81 through support pins 82. Each of the pulley members 81 has an annular groove 83 provided in the peripheral edge surface thereof to receive a flexible cable 84 about a portion thereof. Each cable 84 has one end suitably secured to the support plate member 38 at 85 and its opposite end secured at 86 to a cross member 87 fixedly secured between the cross strut members 54a and 54b of the reach mechanism intermediate extension element comprising the channel members 52. Each of the piston assemblies 78 and the respective ends 85 and 86 of the associated flexible cables 84 are supported such that the flexible cables 84, the pulley members 81 and the piston rods 79 lie in coplanar relation in substantially horizontal planes disposed intermediate the plane of the support plate member 38 and the plane containing the cross struts 54a and 54b.

The piston assemblies 78 are preferably hydraulically coupled to a suitable hydraulic control valve (not shown) through hydraulic conduits 88 in a manner to allow extension and retraction of the piston rods 79. It will be understood that outward extension of one of the piston rods 79 will effect movement of the channel members 52 through the associated pulley 81 and flexible cable 84 in a direction corresponding to the extended piston rod 79. Actuation of one of the piston rods 79 to effect movement of the channel members 52 will require a simultaneous retraction of the opposite piston rod 79 within its piston assembly 78. It will be appreciated that movement of the channel members 52 in either direction as described will effect a corresponding extension of the support platform member 66 through the gear train means 71 above described.

The hydraulic circuit utilized to control the above-described piston assemblies 78, and thus the extension of the support platform member 66 outwardly from the support plate member 38, can readily control the limits of extension of the support platform through limiting the movement of the respective piston rods 79. Preferably, however, auxiliary stop means are provided to limit outward extension of the support platform member 66. Means for limiting movement of the channel members 52 in either direction outwardly from the support plate member 38 comprise stop members 90 suitably secured to the upper surface of the support plate member 38 adjacent the side edge portions thereof, and stop members 91 secured to the undersurface of a horizontally disposed flange portion 92 of the channel members 52. Preferably, two pairs of stop members 91 are provided on the channel members 52 with each pair being disposed inwardly from the ends of the channel members 52 so as to engage a corresponding pair of stop members 90 provided on the support plate member 38 when the channel members reach the selected limit of movement.

A stop member 92 is provided on the upper surface of each of the end cross struts 54 between the channel members 52 with each of the stop members 92 serving to engage a stop member 93 fixedly secured to the undersurface 65 of the support platform member 66 when the support platform member has been extended through the gear train means 71 to its desired maximum extended position. If desired, the stop members 92 and 93 may be eliminated as the gear train means 71 will provide a positive limit of extension of the support plat-

form member 66 upon movement of the channel members 52 through the piston assemblies 78.

Referring now to FIGS. 6—8, taken in conjunction with FIGS. 2 and 3, the side loader 20 includes stabilizing means for counteracting or offsetting loading moments acting on the lift truck as loads are brought onto the lift truck or removed therefrom, such moments being created when the loads are spaced from the longitudinal axis of the truck. The stabilizing means comprises a plurality of stabilizing bellcrank assemblies, indicated generally by reference numeral 102, one of which is provided adjacent each corner of the side loader device 20. Each bellcrank assembly 102 is mounted on one of the afordescribed extended portions of the channel members 40. With the stabilizing bellcrank assemblies 102 so positioned on the side loader device 20, it will be seen that a pair of bellcrank assemblies are supported generally adjacent each of the lift forks 30. Each pair of bellcrank assemblies may be operated in unison to accomplish their stabilizing function as more fully described hereinafter. Each of the stabilizing bellcrank assemblies 102 includes lever means including a lower bellcrank lever 104 and an upper bellcrank lever 106. The lower and upper bellcrank levers 104 and 106, respectively, of each bellcrank assembly 102 are supported for pivotal movement relative to the lift truck about a common support pin 108 which is secured to and supported by a pair of spaced parallel vertically disposed support brackets 110 suitably secured to a corresponding channel member 40.

Each of the lower bellcrank levers 104 comprises a pair of parallel spaced sideplates 112 which are spaced sufficiently to allow an upper bellcrank lever 106 to be freely slidably received therebetween. A pair of storage rack engaging plates 114 and 116 are suitably secured to outer edge portions of the sideplates 112 and serve to secure the sideplates in fixed spaced relation while providing stabilizing plates which engage the load storage rack shelves 34 during operation of the stabilizing assemblies 102, as will be more fully described hereinbelow. Each of the rack engaging plates 114 and 116 has a width greater than the outside dimension of the spaced sideplates 112 so as to provide a sufficient contact surface against the material storage racks 34 during stabilizing engagement therewith. The lower rack engaging plate 114 is positioned relative to the pivotal axis 108 to selectively engage the upper surface of a material storage rack 34 during operation, while the rack engaging plate 116 is positioned to selectively engage the bottom surface of a material supporting rack 34. The rack engaging plate 114 also serves to limit downward pivotal movement of the lower bellcrank lever 104 through engagement with a suitable stop member 118 secured to the support brackets 110. The configuration of the bellcrank lever 104 and the position of the stop member 118 are selected such that when the lower bellcrank lever is pivoted downwardly until the rack engaging plate 114 abuts the stop member 118, the rack engaging plate 116 will lie in a substantially horizontal plane (FIG. 7). A stop means comprising a block 120 is suitably secured between the sideplates 112 of the lower bellcrank lever 104 to abut the upper bellcrank lever 106 upon upward pivotal movement of the lower bellcrank lever 104 and thereby limits such upward movement. The uppermost pivotal position of the lower bellcrank lever 104 is thus determined by the relative position of the upper bellcrank lever 106. The stop blocks 120 also serve to limit downward pivotal movement of the upper bellcrank levers 106 when the lower bellcrank levers 104 are in engagement with their respective stop member 118.

Each of the lower bellcrank levers 104 has a pin member 122 suitably secured between the spaced sideplates 112 and extending outwardly from the outer surface of the outermost sideplate 112, when considered relative to the direction of extension of support platform 66, to provide a means to receive an end 124 of an overcenter spring 126. The overcenter spring 126 serves to resiliently couple each lower bellcrank lever 104 to the corresponding lower bellcrank lever disposed adjacent the opposite lift fork 30 and urge the so coupled lower bell-

crank levers toward each other about their respective pivotal axes. It will be understood that each of the lower bellcrank levers 104 will be urged in a clockwise pivotal direction or a counterclockwise pivotal direction about its respective support pin 108 dependent on the position of its pin member 122 relative to the support pin. The outer end portion of each of the pin members 122 is provided with an enlarged head portion 128 to retain the associated end 124 of the overcenter spring 126 on the pin member.

The upper bellcrank lever 106 of each bellcrank lever assembly 102 comprises a plate member which, as above noted, is received between the sideplates 112 of its associated lower bellcrank lever 104 and is pivotally supported on its associated pivot pin 108 for pivotal movement thereabout. The upper bellcrank lever 106 has a storage rack engaging plate 130 secured on the upper end thereof in generally normal relation to the plane of the bellcrank lever 106, which plate 130 is adapted to engage the upper surface of a material support rack 34 during operation as will become apparent hereinbelow. Each of the upper bellcrank levers 106 includes a projecting arm portion 132 having a length at least equal to the radial distance of the above described pin members 122 from the respective pivotal axes 108 of the lower bellcrank levers 104. The projecting arm portion 132 serves to selectively engage the portion of the pin member 122 disposed between the side plates 112 of the corresponding lower bellcrank lever 104 and thereby effects upward pivotal movement of the lower bellcrank lever 104 during operation as will become apparent hereinbelow.

Each of the upper bellcrank levers 106 has a piston rod 134 of a cylinder piston assembly 136 suitably pivotally secured thereto as at 138 to effect selective pivotal movement of the upper bellcrank lever. Preferably, a yoke connector member 140 is threadedly secured to the outer end of the piston rod 134 and pivotally connected at 138 to the upper bellcrank lever 106. The threaded connection of the yoke connector member 140 to the piston rod 134 allows the effective length of the piston rod to be varied to thereby control the relative angular position of the upper lever 106 upon extension and retraction of the piston rod 134. As noted above, downward pivotal movement of the upper bellcrank levers 106 is limited through engagement with the stop blocks 120 on the corresponding lower bellcrank levers. The configuration of each upper bellcrank lever 106 is such that when the upper bellcrank levers engage the stop blocks 120 on the lower bellcrank levers 104, the rack engaging plates 116 and 130 on the lower and upper bellcrank levers, respectively, will be spaced apart a distance slightly greater than the thickness of the storage rack shelves 34. Thus, when the bellcrank levers 104, 106 are in their lowermost pivotal positions (FIG. 8) with the rack engaging plates 116 engaging the undersurfaces of the adjacent storage racks 34, there will be a clearance space between the upper surfaces of the storage racks and the adjacent rack engaging plates 130 of the upper bellcrank levers.

The ends of the cylinder piston assemblies 136 opposite the extendable piston rods 134 are suitably pivotally connected at 142 to plates 144 secured to the respective ends of a channel member 146 which in turn is secured to the bottom surface of the support plate member 38 in parallel relation to the side channels 40 and central therebetween. Suitable hydraulic fluid hoses or conduits 148 are connected to the cylinder piston assemblies 136 adjacent the ends thereof to allow fluid under pressure to be introduced into the assemblies to effect extension or retraction of the piston rods 134 for effecting pivotal movement of the upper bellcrank levers 106 about their respective support pins 108. A suitable means (not shown), such as a conventional control valve arrangement, is provided within reach of the lift truck operator to control the aforementioned actuation of the piston rods 134. The control valve is preferably adapted to operate the pair of piston rods 134 on each side of the side loader device in a manner to obtain identical simultaneous movement thereof.

Having thus described the elements comprising a preferred embodiment of a side loader device in accordance with the present invention, its operation will now be briefly described. Assume, for purposes of illustration, that it is desired to remove a load L from the storage racks 34 for transporting the load on the lift truck 22. FIG. 6 illustrates the stabilizing apparatus including the bellcrank assemblies 102 in their uppermost nonoperating positions during maneuvering of the lift truck 22 into an aisle 36 adjacent the material storage racks 34 from which the load L is to be retrieved. The upward positions of the bellcrank assemblies in FIG. 6 allow the lift forks and side loader device to be raised or lowered within the aisle 36 between the opposing material storage racks 34 without interference or engagement of the bellcrank assemblies with the storage racks. In the raised positions of the bellcrank assemblies 102, the piston rods 134 are retracted to positions wherein the upper bellcrank levers 106 are disposed generally inwardly toward each other. When the upper bellcrank levers 106 are in such raised positions, the overcenter springs 126 will urge the lower bellcrank levers 104 upwardly about their pivot axes 108 until the stop blocks 120 abut the corresponding upper bellcrank levers.

As the lift forks and side loader device are raised to a position just below the storage racks 34 containing the load L to be retrieved (FIG. 7), the cylinder piston assemblies 136 opposite the load L are actuated to extend their associated piston rods 134 thereby pivoting their associated upper bellcrank levers 106 outwardly about their respective pivot axes 108. This effects a corresponding pivotal movement of the lower bellcrank levers 104 through engagement of the stop blocks 120 thereon with the upper bellcrank levers. When the lower bellcrank levers 104 reach a position wherein their associated overcenter springs 126, through their connections to the pin members 122, pass below the pivotal axes 108, the overcenter springs will cause the lower bellcrank levers 104 to pivot downwardly independent of the upper bellcrank levers 106 until the rack engaging plates 114 abut their respective stop members 118. In this position, the rack engaging plates 116 will be disposed in a generally horizontal plane underlying the adjacent storage rack 34 opposite the load L to be retrieved. Continued upward movement of the lift forks 30 and side loader device 20 causes the so positioned rack engaging plates 116 to engage the bottom surface of the adjacent storage rack. The corresponding piston rods 134 are then further extended to effect further downward pivotal movement of the upper bellcrank levers 104 until the levers 106 abut the stop blocks 120 of the lower bellcrank levers whereupon the rack engaging plates 130 overlie the upper surfaces of the adjacent storage racks 34 in spaced relation thereto (FIG. 8).

After the bellcrank assemblies opposite the load L to be retrieved have been moved to their lowermost pivotal positions to receive the adjacent storage racks 34 therebetween as above described, the lower bellcrank levers 104 adjacent the load L to be retrieved are caused to pivot downwardly through extension of the corresponding piston rods 134 and downward pivotal movement of the corresponding upper bellcrank levers 106 in a similar manner to that above described. The rack engaging plates 114 on the lower bellcrank levers 104 will thereupon engage the upper surfaces of the adjacent storage racks. Simultaneously, with the downward pivotal movement of the lower bellcrank levers 104 adjacent the load L, the side loader reach mechanism comprising the support platform 66 and the interconnected channel members 52 is extended outwardly to a position underlying the load L. Such extension is effected through actuation of the corresponding piston assembly 78 and the gear train means 71 in a manner as above described. When the support platform 66 has been sufficiently extended, the cylinder piston assemblies 136 adjacent the load L being retrieved will be further actuated such that the lower bellcrank levers 104 will be forced further downwardly. As the material storage racks 34 are fixed in relation to the floor surface of the storage area, such further extension of the piston rods 134 and downward pivotal movement of the associated

lower bellcrank levers 104 will cause the support platform 66 of the reach mechanism to be raised relative to the corresponding lift fork 30, thereby raising the load L from the storage racks 34. The support platform 66 and channel members 52 may then be retracted by actuation of the appropriate cylinder piston assembly 78 to bring the load L to a position generally central to the lift forks 30 of the lift truck.

After the load L has been removed from its supporting racks 34 onto the center of the lift forks 30 through the side loader device 20, the cylinder piston assemblies 136 associated with the levers 104 used to effect lifting of the load from its racks are actuated to pivot the associated upper bellcrank levers 106 upwardly and inwardly about their pivotal axes 108. Pivotal movement of these upper bellcrank levers 106 causes the associated lower bellcrank levers 104 to be pivoted upwardly through engagement of the projecting arm portions 132 of the upper bellcrank levers with the portions of the pin members 122 disposed between the plates 112 of the lower bellcrank levers. When the last-mentioned lower bellcrank levers 104 reach a position such that the overcenter springs 126 pass above the pivotal axes 108, the overcenter springs will urge the lower bellcrank levers upwardly, with such upward movement being limited by engagement of the stop blocks 120 against the associated upper bellcrank levers 106. Simultaneously, with the just-described raising of the lower bellcrank levers 104 used to effect lifting of the load from its storage racks, the opposite pair of cylinder piston assemblies 136 are actuated to pivot the upper bellcrank levers to positions as illustrated in FIG. 7. The lift forks 30 are then lowered to allow the associated lower bellcrank levers 104 to be pivoted upwardly through engagement of the arms 132 on the upper levers 106 with the pin members 122 as above described. After the load L has been centered on the lift forks 30 and the bellcrank assemblies 102 have been moved to their upward positions as illustrated in FIG. 6, the lift truck operator may raise or lower the load L through the load supporting means 26 for movement to another storage location or to a work area.

The above-described operation of the side loader device in accordance with the present invention concerned retrieving a load L from load supporting or storage racks. The operation of the side loader is substantially the same when placing a load from the lift forks 30 onto the storage racks 34. In the latter operation, however, the lower bellcrank levers 104 adjacent the storage racks upon which the load L is to be placed are pivoted downwardly to raise the support platform 66 prior to extending the platform with the load thereon. After the support platform is extended to a position wherein the load L overlies the storage racks 34, the adjacent lower bellcrank levers are pivoted upwardly through their associated piston assemblies 78 to lower the load onto the racks. The support platform 66 is then retracted and the bellcrank assemblies returned to their upward inoperative positions as above described, thus allowing the lift truck to be moved to another location.

It will be understood that, absent the stabilizing bellcrank assemblies 102, extension of the support platform 66 to remove a load L from the storage racks 34 would create a side loading moment acting about the longitudinal axis of the lift truck through the lift forks 30. By utilizing a pair of the above-described bellcrank assemblies 102 adjacent each side of the lift truck, means are provided for eliminating the side loading moments so created from acting on the lift truck. More specifically, it can be seen that by causing the lower bellcrank levers 104 opposite the load L to engage the bottom surfaces of their adjacent storage racks 34, and causing the lower bellcrank levers 104 adjacent the load L to engage the upper surfaces of the corresponding load storage racks as above described, the moment created by the load L when the load is positioned on the platform 66 outwardly spaced from the longitudinal axis of the lift truck and the adjacent lower bellcrank levers will act through the respective pairs of lower bellcrank levers on the storage racks 34 and not on the lift truck. The

use of the upper bellcrank levers 106 in conjunction with the lower bellcrank levers 104 opposite the load L to be retrieved prevents sagging of the corresponding side of the lift truck through the associated lift fork 30 when the load L is brought onto the side loader device to a position central to the lift forks 30. As noted above, when the upper bellcrank levers 106 opposite the load L being retrieved are in their downward positions, the plates 130 thereon are spaced above the corresponding support racks 34. When the load L is brought to a position central to the forks 30, the plates 130 will move downwardly due to the weight of the load to engage the upper surfaces of the racks 34, thereby precluding sagging of the corresponding side of the lift truck. The lever means comprising upper and lower bellcrank levers 106 and 104, respectively, are thus adapted to counteract or offset the loading moments created by the load L when positioned on platform 66 in spaced relation from the longitudinal axis of the lift truck, and to prevent sagging of the truck as a load is removed therefrom or placed thereon.

The internal openings defined by the channel members 40 have a greater vertical depth than the vertical thickness of the associated lift forks 30 to allow upward movement of the side loader device relative to the lift forks 30 when the aforesaid load lifting operation through the bellcrank assemblies 102 is effected.

Referring now to FIGS. 9 and 10, an alternative embodiment of stabilizing bellcrank assemblies for use in conjunction with the side loader device 20 of the present invention is illustrated. The alternative bellcrank assemblies find particular application where the loads to be retrieved from or placed on the storage racks in a storage area are relatively light such that they will not create excessive sagging effects on the lift truck when they are brought onto the lift forks by the reach mechanism. The below-described alternative stabilizing bellcrank assemblies are mounted on the side loader device 20 in similar fashion to the mounting of the above-described stabilizing bellcrank assemblies 102 on the channel members 40. Basically, the alternative embodiment illustrated in FIGS. 9 and 10 differs from that above described and illustrated in FIGS. 1-8 through the elimination of the upper bellcrank levers 106 and modification of the lower bellcrank levers 104.

The alternative stabilizing bellcrank assemblies are indicated generally at reference numeral 170 and comprise single bellcrank levers 172 mounted for pivotal movement about support pins 174 between pairs of upwardly extending spaced support brackets 110 which are suitably secured to the channel members 40 in similar fashion to the support brackets above described. The inward end of each of the bellcrank levers 172 is suitably pivotally connected at 176 to a yoke connector member 140 disposed on the end of a piston rod 134 for pivotal actuation in similar fashion to the above-described actuation of the upper bellcrank levers 106. The extent of downward pivotal movement of the bellcrank levers 172 is determined by the stroke of each corresponding piston rod 134, with the levers being locked in their pivoted positions by the piston assemblies 136. The end of the bellcrank lever 172 opposite the pivotal connection 176 is suitably recessed to receive a rack engaging plate 116 disposed in similar relation to the pivotal axis 174 as was the corresponding rack engaging plate 116 described above in conjunction with a lower bellcrank lever 104. A second rack engaging plate 178 is pivotally supported on the end of the bellcrank lever generally adjacent the rack engaging plate 116 through a U-shaped bracket member 180 and a support pin 182. As was above described in conjunction with the stabilizing bellcrank assemblies 102, the alternative bellcrank assemblies 170 are preferably mounted in sets of two on either side of the longitudinal axis of the lift truck 22 such that each set is disposed generally adjacent a corresponding lift fork 30.

In operation, the bellcrank levers 172 are pivoted through actuation of piston rods 136 such that the outer end portions having the rack engaging plates 116 thereon are disposed in generally vertical directions as illustrated in FIG. 7. After the

lift truck 22 has been moved to a position in side relation to a load L to be removed from the material storage racks 34, the lift forks 30 are raised to a position such that the side loader device is just below the load L. The operator may then actuate the cylinder piston assemblies 136 on the side of the side loader opposite the load L to effect pivotal movement of the rack engaging plates 116 to a position disposed below the adjacent storage racks 34. The lift forks 30 and side loader device 20 are then raised to a position wherein the previously lowered rack engaging plates 116 engage the lower surfaces of the adjacent racks 34. The bellcrank levers 172 adjacent the load L are then lowered by actuation of their associated cylinder piston assemblies 136 until the rack engaging plates 178 engage the upper surfaces of the adjacent storage racks 34. At this time, the reach mechanism including the support platform 66 is extended to underlie the load L. The operator then further actuates the cylinder piston assemblies 136 associated with the bellcrank levers 172 adjacent the load L to further lower the rack engaging plates 178 against the upper surfaces of the adjacent support racks 34. This causes support platform member 66 to be raised and thereby lifts the load from its storage racks 34 whereupon it may be moved to a position central to the lift forks 30. The operator then retracts or raises the bellcrank levers 172 adjacent the storage racks 34 which supported the load L and lowers the lift forks 30, thereby allowing the opposite bellcrank levers 172 to be pivoted or raised to their original upwardly extending positions. The operator may then move the lift truck and load L to another desired location.

When it is desired to place a load onto the storage racks from the lift forks, the sequence of lowering the bellcrank levers adjacent the storage racks upon which the load is to be placed and extending the support platform 66 with the load thereon is reversed, as was above described with respect to the embodiment of the side loader device illustrated in FIGS. 1-8.

While the above-described embodiments of the present invention have described the stabilizing bellcrank assemblies 102 (FIGS. 1 and 6-8) and the bellcrank assemblies 170 (FIGS. 9 and 10) as being operative to engage adjacent material storage racks 34 for stabilizing the lift truck and preventing sagging thereof during loading and unloading, it will be understood that the bellcrank assemblies could readily engage means other than the storage racks to effect their stabilizing functions.

It is desirable to provide a means on the lower bellcrank levers 104 for indicating when the said lower bellcrank levers have engaged the lower surfaces of their adjacent storage racks 34. FIG. 11 illustrates an embodiment of an indicating means wherein a switch device is mounted between the side plates 112 of a lower bellcrank lever 104 adjacent the rack engaging plate 116. The switch device, indicated generally at reference numeral 150, comprises a generally cylindrical depressible contact member 152 having an upper conical point thereon. The contact member 152 is supported for movement within an aperture 154 provided in the rack engaging plate 116. The contact member has a threaded central bore 156 to threadedly receive the threaded end of a stud 158, the outer end portion of which is slidably received through a guide aperture 160 provided in a support plate 162. A coil compression spring 164 is disposed about the stud 158 between the support plate 162 and the bottom of a recess 166 provided in the lower end of the contact member 152 so as to urge the contact member upwardly relative to the support plate 162. The stud 158 has a length sufficient to allow the contact member to project above the upper surface of plate 116 and includes a head portion 168 to limit upward movement of the contact member. The support plate 162 is secured between the sideplate members 112 of the lower bellcrank lever 104. A conventional microswitch 170 is suitably secured to one of the sideplate members 112 generally adjacent the contact member 152 such that a projecting contact member 172 of the microswitch underlies a conical surface 174 pro-

vided on the contact member 152. It will be seen that when the rack engaging plate 116 of the lower bellcrank lever 104 is brought into engaging relation with the bottom of a material storage rack 34 as above described, the contact member 152 will be depressed thereby actuating the microswitch contact 172 which in turn will close a circuit (not shown) to an indicating means suitably positioned on the lift truck to indicate to the operator that the lower bellcrank lever has engaged the material support rack. The aforescribed switch means 150 provides a convenient indication to the operator of when the lower bellcrank levers have contacted or engaged the material storage racks whereupon he may actuate the appropriate cylinder piston assemblies 136 to bring the corresponding upper bellcrank levers 106 into overlying relation with the adjacent storage racks.

While I have described my invention as being particularly suitable for use in conjunction with a conventional industrial lift truck, my invention will also find ready application with other material handling apparatus wherein it is desired to provide a means for loading the material handling apparatus from a position adjacent the side of the apparatus. It is further contemplated within the scope of my invention that the stabilizing bellcrank assemblies can be readily adapted to engage material storage racks other than those immediately underlying the load to be retrieved or upon which a load is to be placed. Moreover, the above-described bellcrank assemblies may be readily adapted for use with the truck lift forks to prevent side loading and sagging of the truck during loading and unloading thereof without being used in combination with the above-described reach mechanism.

While preferred embodiments of my invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made therein without departing from the invention in its broader aspects, and therefore, the appended claims are intended to cover all such changes and modifications as fall within the true spirit and scope of my invention.

I claim:

1. For use in stabilizing a material handling lift truck having a load supporting means thereon during loading and unloading of the load supporting means when the truck is positioned between and adjacent opposed spaced material storage rack shelves and the like, the load supporting means being such that loads supported thereon in outwardly spaced relation from the longitudinal axis of the truck tend to create loading moments thereabout, the improvement comprising, stabilizing means including rack engaging means supported by the lift truck for movement outwardly from the lift truck, said rack engaging means being disposed on opposite sides of the longitudinal axis of the truck and adapted to engage upper and lower generally horizontal surface portions of the adjacent material storage rack shelves disposed on opposite sides of the truck in overlying and underlying relation upon outward movement of said rack engaging means in a manner to offset loading moments about the longitudinal axis of the truck when a load is disposed on the load supporting means outwardly from said rack engaging means, and means for effecting engagement of said rack engaging means with said upper and lower surface portions of said oppositely disposed adjacent storage rack shelves in said overlying and underlying relation.

2. Stabilizing apparatus as defined in claim 1 wherein said rack engaging means comprise bellcrank lever assemblies disposed on opposite sides of the longitudinal axis of the load supporting means.

3. Stabilizing apparatus as defined in claim 2 wherein said bellcrank lever assemblies comprise pivotally supported single bellcrank levers, said single bellcrank levers being adapted to engage adjacent storage racks disposed in opposite side relation to the lift truck in a manner to offset loading moments acting on the lift truck from a load disposed on the load supporting means outwardly from said bellcrank levers.

4. Stabilizing apparatus as defined in claim 3 wherein said means for effecting outward movement of said rack engaging

means includes hydraulically actuated means operatively associated with said single bellcrank levers.

5. Stabilizing apparatus as defined in claim 2 wherein said bellcrank lever assemblies comprise upper and lower pivotally supported bellcrank levers operatively associated with each other such that pivotal movement of said upper bellcrank levers selectively effects corresponding pivotal movement of the associated lower bellcrank levers.

6. Stabilizing apparatus as defined in claim 5 wherein said means for effecting pivotal movement of said lever means includes hydraulically actuated means operatively associated with said upper bellcrank levers for effecting pivotal movement thereof.

7. Stabilizing apparatus as defined in claim 5 including over-center spring means operatively associated with said lower bellcrank levers to urge said lower bellcrank levers to upward and downward pivotal positions dependent upon the positions of said lower bellcrank levers relative to their respective pivotal axes.

8. Stabilizing apparatus as defined in claim 7 including means for limiting upward and downward pivotal movement of said lower bellcrank levers.

9. Stabilizing apparatus as defined in claim 2 wherein said bellcrank lever assemblies comprise upper and lower pivotally supported bellcrank levers, said upper bellcrank levers being selectively adapted to engage adjacent material storage racks in a manner to prevent sagging of the load supporting means during loading and unloading of the load supporting means.

10. Stabilizing apparatus as defined in claim 9 wherein said means for effecting pivotal movement of said lever means includes hydraulically actuated means operatively associated with said upper bellcrank levers to selectively effect pivotal movement thereof to material storage rack engaging positions.

11. In a side loader device for use with a material handling lift truck having a reach mechanism adapted for retractable outward extension relative to the lift truck to underlie a load supported on an adjacent material storage rack when the lift truck is positioned between spaced storage racks in adjacent side relation thereto, the storage racks having generally horizontal surface portions, the reach mechanism being adapted to move the load to a position generally central of the truck, the improvement comprising, stabilizing means supported by the lift truck and including lever means adapted for movement to engage the generally horizontal surface portions of adjacent storage racks on opposite sides of the lift truck, and means operative to effect movement of said lever means to engage generally horizontal surface portions of the adjacent storage racks such that the lever means opposite the racks supporting the load to be retrieved engage the undersides of the generally horizontal surface portions of the corresponding racks and the lever means adjacent the racks supporting the load to be retrieved engage the uppersides of the generally horizontal surface portions thereof in a manner to offset loading moments acting on the truck when the load is disposed on the reach mechanism in spaced relation from the longitudinal axis of the truck.

12. In a side loader device for use with a material handling lift truck having a reach mechanism adapted for retractable outward extension relative to the lift truck to underlie a load supported on material storage racks disposed in adjacent side relation to the truck and to move the load to a position generally central of the truck, the improvement comprising, stabilizing means supported by the lift truck and including lever means operatively associated with the reach mechanism and operable to engage the adjacent storage racks, and means operative to effect movement of said lever means to raise the reach mechanism in a manner to lift a load from the storage racks prior to moving the load to a position generally central to the truck.

13. The improvement as defined in claim 12 including hydraulically actuated means to effect said movement of said lever means.

14. In a side loader device for use with a material handling lift truck having a reach mechanism adapted for retractable outward extension relative to the lift truck to underlie a load supported on material storage racks disposed in side relation to the truck and to move the load to a position generally central of the truck, the improvement comprising stabilizing means operatively associated with the reach mechanism and including a pair of bellcrank lever assemblies disposed on opposite sides of the side loader device, said bellcrank lever assemblies comprising upper and lower bellcrank levers selectively pivotally movable to positions to receive adjacent storage racks therebetween, each pair of bellcrank lever assemblies being operable simultaneously, and including hydraulically actuated means to effect pivotal movement of said bellcrank lever assemblies in a manner to offset loading moments acting on the truck from a load disposed on the reach mechanism in spaced relation from the longitudinal axis of the truck.

15. The improvement as defined in claim 14 wherein said pair of bellcrank lever assemblies opposite the storage racks supporting a load to be retrieved are pivotally movable to positions to receive adjacent storage racks therebetween, said pair of bellcrank lever assemblies adjacent the storage racks supporting a load to be retrieved being pivotal to positions wherein the lower bellcrank levers engage the adjacent storage racks in a manner to offset loading moments acting on the lift truck due to the load being disposed on the reach mechanism in spaced relation from the longitudinal axis of the truck during movement of the load to a position central of the truck.

16. The improvement as defined in claim 14 wherein said bellcrank lever assemblies comprise upper and lower bellcrank levers, said upper and lower bellcrank levers being operatively associated such that pivotal movement of said upper bellcrank levers selectively effects a corresponding pivotal movement of said lower bellcrank levers.

17. The improvement as defined in claim 14 wherein said upper bellcrank levers opposite the load to be retrieved are adapted to engage the adjacent storage racks in a manner to prevent sagging of the lift truck during movement of the load to a position generally central of the lift truck.

18. The improvement as defined in claim 14 including over-center spring means operatively associated with the opposing lower bellcrank levers of said pairs of bellcrank levers and adapted to urge said lower bellcrank levers to said upward and downward pivotal positions dependent upon the positions of said lower bellcrank lever members relative to their respective pivotal axes.

19. The improvement as defined in claim 18 including means for limiting upward and downward pivotal movement of said lower bellcrank lever members.

20. The improvement as defined in claim 1 wherein said rack engaging means are further adapted to offset loading mo-

ments about the longitudinal axis of the truck during movement of a load on the supporting means from a position on one side of the longitudinal axis of the truck to a position on the opposite side of the longitudinal axis of the truck.

21. The improvement of claim 12 wherein said lever means include at least one lever supported on each side of the longitudinal axis of the truck, said oppositely disposed levers being adapted to engage storage racks disposed in adjacent side relation to the truck in overlying and underlying relation and being movable to effect said raising of said reach mechanism.

22. The improvement of claim 12 wherein said lever means include two levers supported on each side of the longitudinal axis of the truck, said levers disposed on the side of the truck opposite the load to be retrieved being adapted to engage the adjacent storage racks in underlying relation, and said levers disposed on the side of the truck adjacent the load being adapted to engage the adjacent storage racks in overlying relation.

23. The improvement as defined in claim 21 wherein said oppositely disposed levers are adapted to effect raising of the reach mechanism when extended outwardly from either side of the lift truck.

24. For use in stabilizing a material handling lift truck having a load supporting means adapted for retractable outward extension relative to the lift truck to discharge a load onto or retrieve a load from material storage racks when the truck is positioned between and adjacent opposed spaced storage racks, the improvement comprising, stabilizing means supported by the lift truck and including storage rack engaging means operatively associated with load supporting means, said rack engaging means being adapted to engage the material storage racks disposed on opposite sides of the truck in overlying and underlying relation in a manner to offset loading moments about the longitudinal axis of the truck when a load is disposed on the load supporting means outwardly from said rack engaging means, said rack engaging means being operative to raise and lower the load supporting means in a manner to lift a load from or lower a load onto the adjacent storage racks, and means for effecting said engagement of said rack engaging means with the adjacent storage racks.

25. Stabilizing means as defined in claim 24 wherein said rack engaging means comprise lever means supported on opposite sides of the longitudinal axis of the truck and movable outwardly from the truck to engage the adjacent storage racks in overlying and underlying relation.

26. Stabilizing means as defined in claim 25 wherein said lever means are pivotally supported, said lever means adjacent the storage racks upon which a load is to be discharged or retrieved therefrom being operable to engage the adjacent racks in overlying relation and to raise or lower the load supporting means relative to the adjacent racks.

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