United States Patent

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[54] SIDE-LOADING ARTICLE-HANDLING ATTACHMENT

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Related U.S. Application Data

[63] Continuation of Ser. No. 698,293, Jan. 16, 1968, abandoned.

[52] **U.S. Cl.** .....**214/512,** 214/75 G, 214/620, 214/670, 214/730, 214/750, 214/DIG. 3

[51] **Int. Cl.** **B66f 9/14**

[58] **Field of Search**.....214/620, 621, 670, 730, 671, 214/731, 660, 750, DIG. 4, DIG. 3, 512, 75 G

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[57] **ABSTRACT**

The side-loading article-handling means is in the form of an attachment designed to be mounted on the vertically movable fork of a conventional lift truck, such as a so-called "order picker truck" or "hi-rider," and adjacent to the conventional operator platform or cage customarily mounted on the fork of such trucks. The article-handling attachment comprises a carriage adapted to be moved at right angles to the prongs of the fork, a turntable rotatably mounted on the carriage, a mast structure rigidly secured to the turntable, a second smaller carriage mounted on the mast for vertical movement relative thereto, and an article-handling means mounted on the second carriage. Hydraulic rams are produced as exemplary structure for effecting the various movements of the operative parts of the attachment, during use, and they are operatively connected to the conventional control panel, or the like, provided in the operator's cage, to be under the control of an operator as the fork is raised, lowered, or held stationary during use.

17 Claims, 7 Drawing Figures

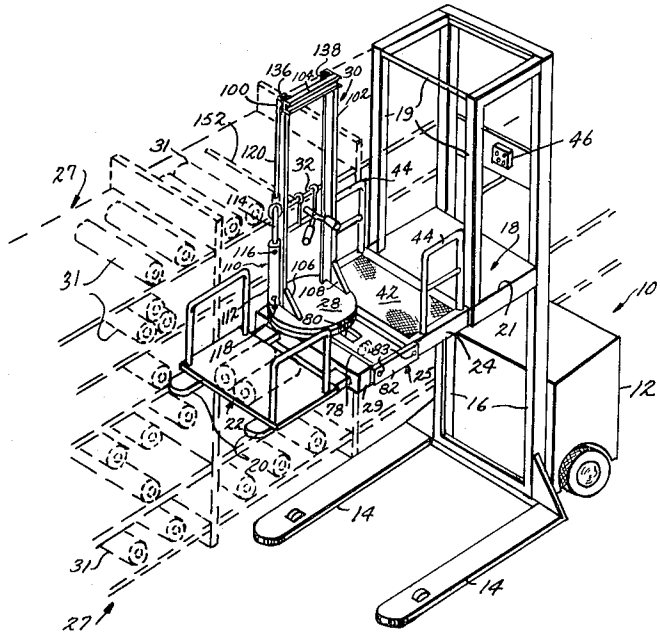
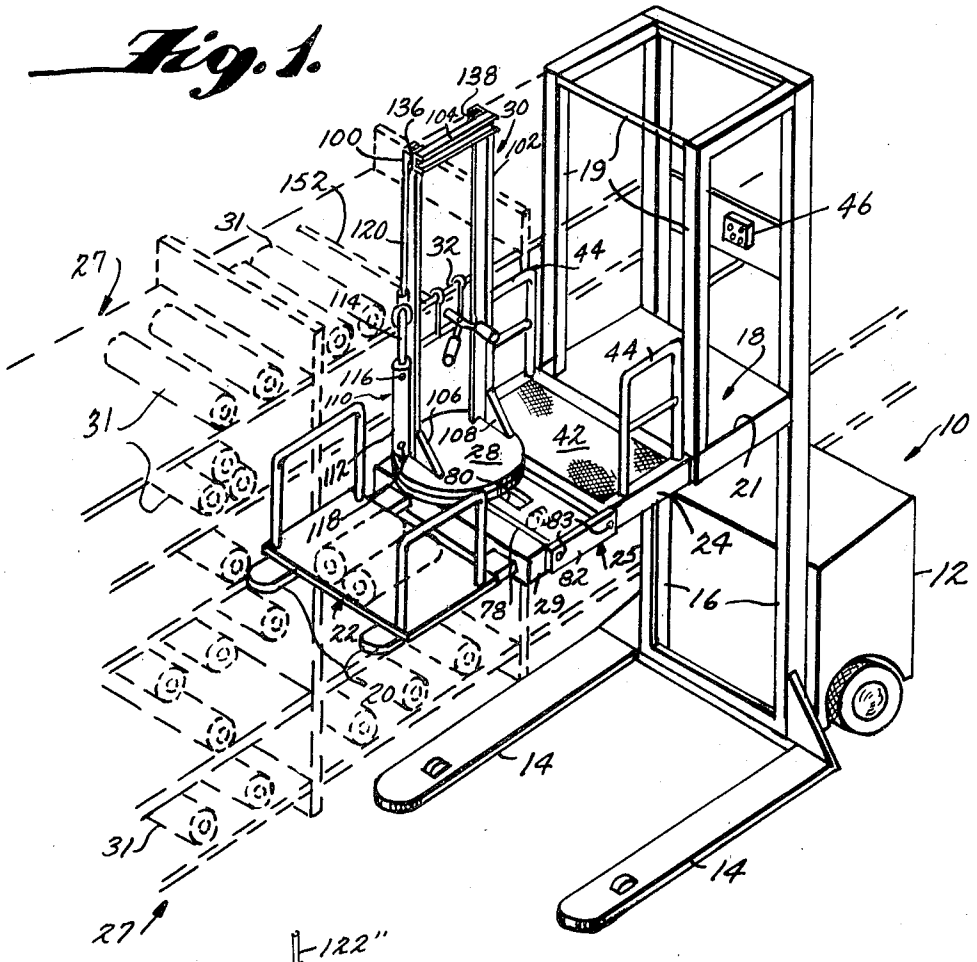


Fig. 1.



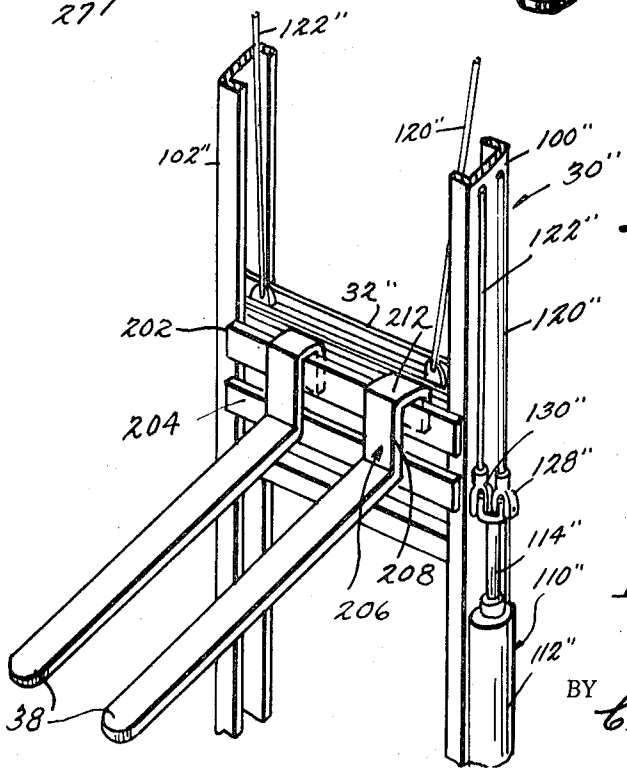


Fig. 7.

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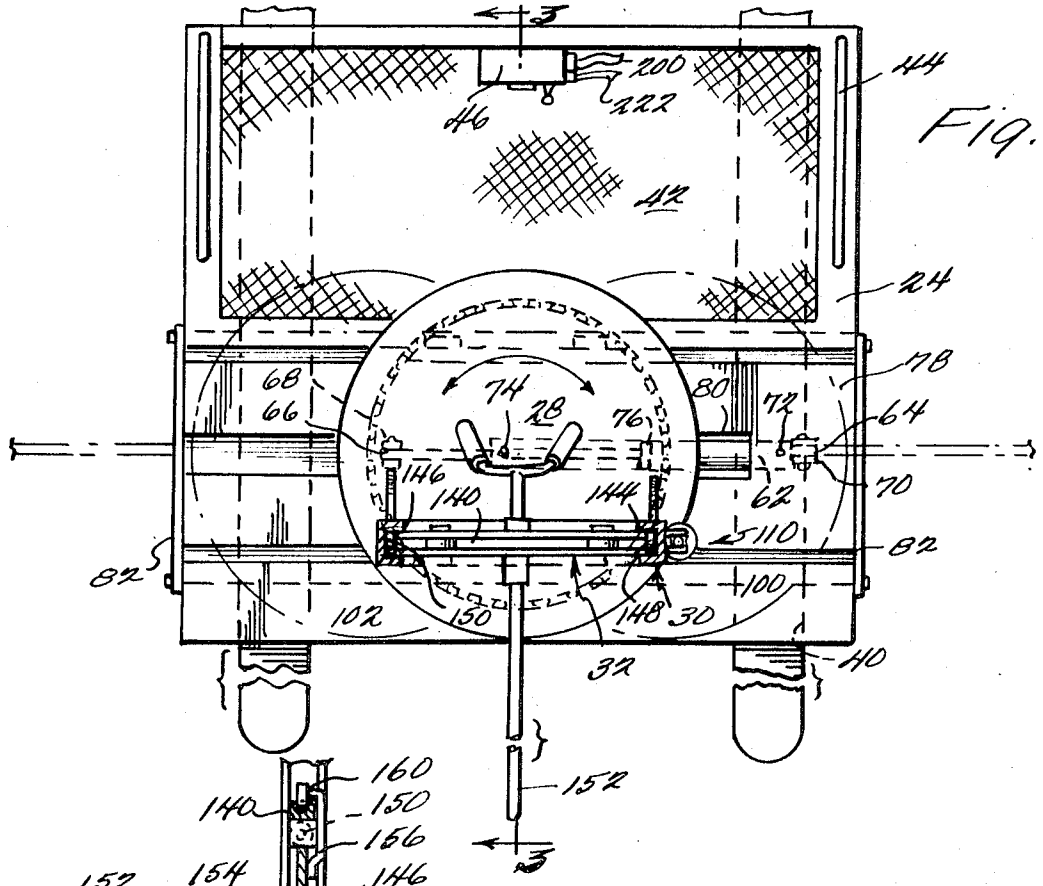


Fig. 2

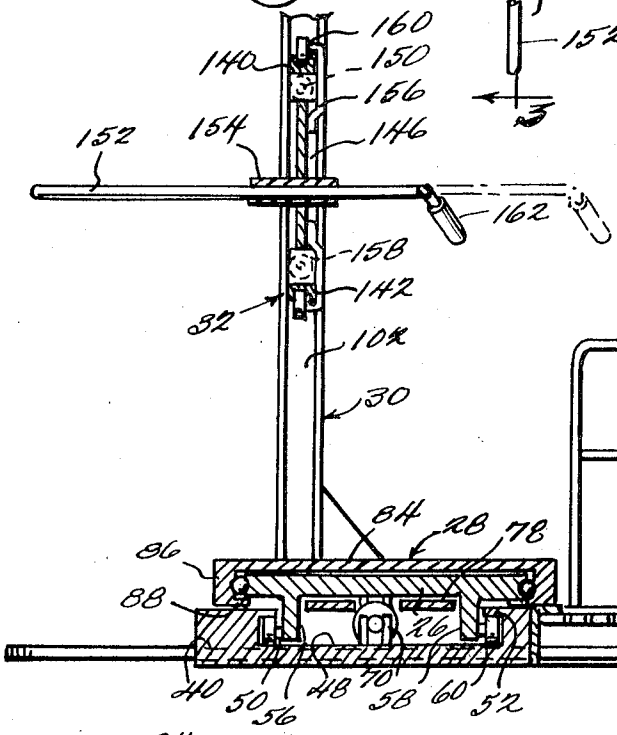
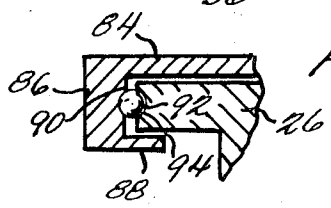


Fig. 3

Fig. 4



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Fig. 5

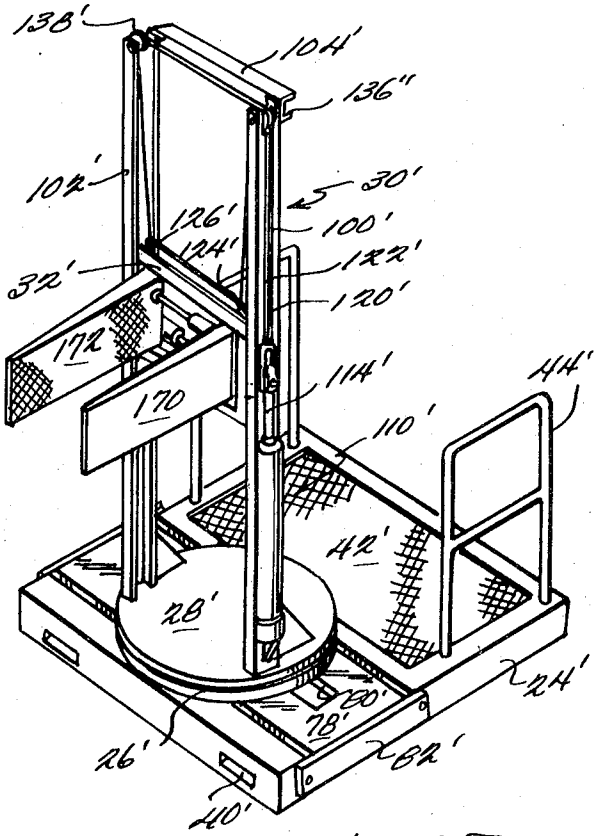
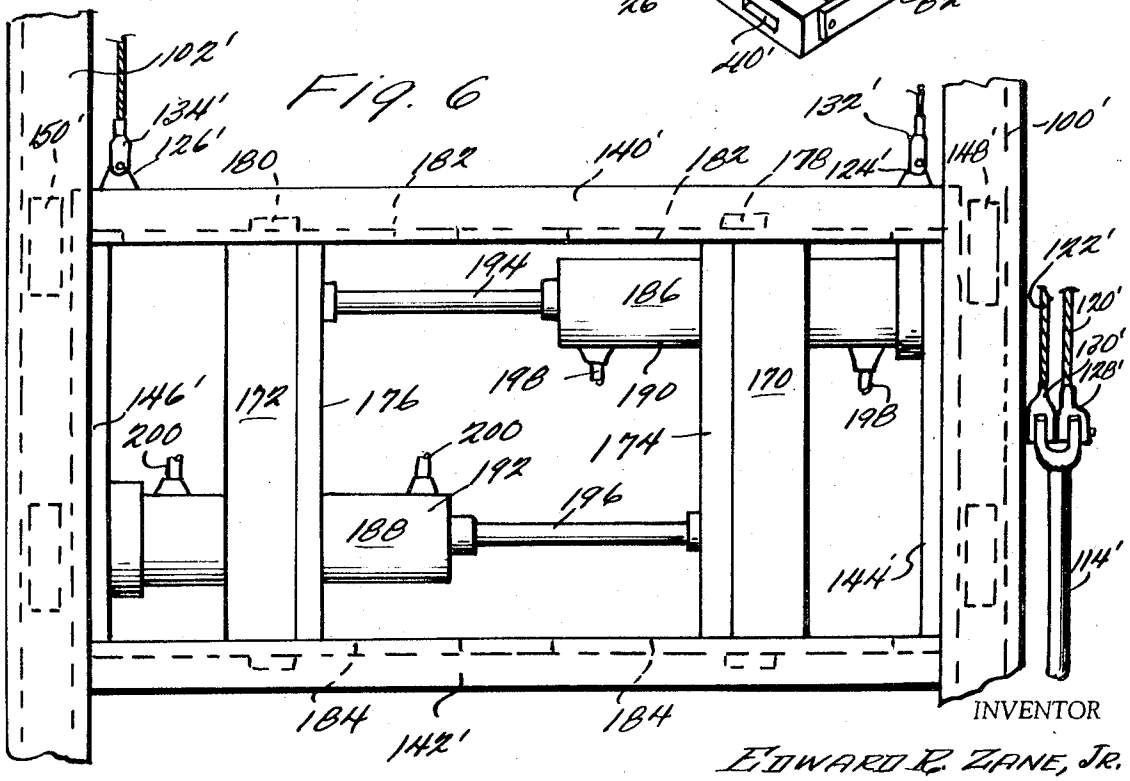


Fig. 6



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SIDE-LOADING ARTICLE-HANDLING ATTACHMENT

This is a continuing application based on my copending application, Ser. No. 698,293, filed Jan. 16, 1968, now abandoned.

BRIEF DESCRIPTION OF THE INVENTION

The present invention relates to side-loading article handlers and, more particularly, to a side-loading article-handling attachment adapted to be mounted on the fork of a conventional forklift truck adjacent to a conventional operator platform structure or cage mounted on such fork, as in an order picker or hi-rider truck.

Many industries have been plagued with problems of inadequate storage space for relatively heavy articles, such as large rolls of cloth and cases. There is the problem of the safety of personnel during the handling and transfer of such articles, and the excessive time required to place such articles in storage areas or removing them therefrom, especially when the storage areas or bins extend to inconvenient or inaccessible heights for a man standing on the floor. It is not uncommon for an order picker truck or hi-rider to be used wherein the operator will stand on the platform on the fork of the truck, elevate the platform to the desired height of the storage area, and then manually remove the heavy articles from the shelves and place them on the fork. As will be appreciated, this is not only time consuming and arduous work, particularly where the articles in question are quite heavy, but it is also hazardous.

Accordingly, it is a primary objective of the present invention to provide a novel structural attachment for conventional forklift trucks, such as the type referred to above, designed to be conveniently attached to the fork of the truck, adjacent the operator's platform, and especially adapted to facilitate the safe handling of heavy articles, particularly where they are arranged in storage areas at varying heights. Related and more specific objects of the invention reside in various structural combinations and subcombinations providing an efficient, sturdy, durable and safe-to-operate construction, of the character referred to.

In the illustrative embodiment of the invention, to be described in more detail hereinbelow, the side-loading article-handling attachment includes a base carriage movably mounted on a base member adapted to be mounted on the fork of a forklift truck of the type referred to. The carriage is adapted to be moved transversely of those fork. A turnable is provided on the carriage having a mast structure mounting a second, smaller carriage having the article-handling or gripping structure carried thereby. Hydraulic rams may conveniently be provided for moving the base carriage transversely of the fork and for moving the second carriage vertically, such rams being designed to be under the control of an operator standing on a platform carried by the attachment and adjacent the conventional operator's cage or platform carried by the truck.

The present invention is of such design that it will enable a conventional forklift truck to work advantageously in very narrow aisle space thereby minimizing the aisle space required for placing or removing articles in or from storage. Additionally, the attachment of the present invention minimizes the hazards of the loading and unloading operations by enabling them to be performed mechanically rather than manually. Furthermore, the present attachment is so designed as to enable the operator to remove numerous heavy articles from a given storage height while the operator's cage or platform is at a given height. This obviously results in substantial savings in cost and time over previous practice of elevating the platform to the desired storage height, removing a single article and then returning to the floor level, for each article to be removed.

Other novel features and advantages of the present invention will become better understood from the following detailed description of the invention when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a conventional forklift or hi-rider truck with a side-loading article-handling attachment of the invention mounted thereon, and shown adjacent to a conventional storage bin for rolls of cloth, the latter being shown in phantom lines;

FIG. 2 is a plan view of the article-handling attachment of FIG. 1;

FIG. 3 is a sectional view taken substantially along lines 3—3 of FIG. 2;

FIG. 4 is a detailed view of one mode of attaching the turntable to the carriage of the article-handling attachment;

FIG. 5 is a perspective view of another embodiment of the side-loading article-handling attachment of the invention;

FIG. 6 is an enlarged view of the clamp shown in FIG. 5; and

FIG. 7 is a perspective view of another embodiment of the side-loading article handler of the invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS OF THE INVENTION

Referring now to the drawings, wherein similar reference numerals have been used to designate similar parts throughout the various Figures, the illustrative embodiments of the side-loading article handler of the invention are shown as being adapted for attachment to a conventional electric forklift or hi-rider truck **10**. Truck **10** is shown as including a motor casing **12**, stabilizing extensions **14**, and a mast structure including parallel vertical channel members **16** slidably mounting structure carrying the fork **20**, as is understood. Such structure is movable vertically along the channel members **16**, by suitable structure such as a rack and pinion (not shown), as understood. The truck **10** also includes a conventional operator's cage or platform **18** suitably mounted on and carried by the fork **20** and including a frame structure **19**, a base or floor **21**, and suitable control panel **46** for operation of the truck and the various components, as is conventional.

Referring now to FIGS. **1–3**, the side-loading article-handling attachment **25** is shown as being mounted on the two prongs of fork **20**, forwardly of the operator's cage **18**, and a floor truck **22** is also shown as being provided on the outer ends of the prongs of fork **20**, for a purpose that will become apparent. Attachment **25** includes a base member **29** and frame **24** carrying a platform **42** with handrails **44**. Base member **29** and frame **24** are suitably connected together as by plates **82** and bolts **83** (and welding, if desired) and they are shown as being provided with spaced and aligned holes **40**, **40'** for slidable mounting reception of the prongs of fork **20**. Suitable structure, for example, large setscrews (not shown) may be provided for locking the attachment **25** in position on the fork **20**.

For illustrative purposes, the truck **10** is shown in FIG. **1** adjacent to a storage bin **27** containing rolls **30** of cloth arranged on shelves at different elevations. It will be understood that the present invention is designed to facilitate arranging the rolls of cloth in proper storage position in the bin and removing them therefrom, as desired.

Mounted on base member **29** of the side-loading article handler **25** are carriage **26**, turntable **28**, mast **30**, carriage **32** mounted on the mast **30**, and an article-handling implement which, in FIGS. **1** to **3**, is shown as a ram pole **152**. While FIGS. **5**, **6** and **7** show different article-handling implements such as the hydraulic clamp **36** of FIGS. **5** and **6** and fork **38** of FIG. **7**, the following description of the attachment **25** shown in FIGS. **1** through **4** including the base **29**, carriage **26**, turntable **28** and mast **30** applies to the sideload article handlers of FIGS. **5** through **7**, as will be evident.

The base member **29** is shown as including a transverse guideway or recessed portion **48** and flanges or lips **50** and **52** extending toward each other in a common plane from the upper ends of the sidewalls of the guideway, forming tracks for rollers **60** carried by carriage **26**. Carriage **26** is shown as being generally disc-shaped with a planar upper surface and flanges **56** and **58** depending from the lower surface. Flanges

56 and 58 are spaced inwardly from the outer edges of carriage 26 and extend in a direction parallel to the sidewalls of guideway 48. The wheels 60 are rotatably mounted on axles extending outwardly from the lower portions of flanges 56 and 58 and are arranged to roll on the guideway 48 below lips 50, 52, thereby restricting movement of the carriage 26 to a direction at right angles to fork 20.

As best shown in FIGS. 2 and 3, a hydraulic piston and cylinder assembly 62 extends between and is anchored to one end of guideway 48 and at the other end to the underside of carriage 26. In the preferred form of the invention, one end of the cylinder and the outer end of the piston rod of assembly 62 are each provided with lugs 64, 66 which are pinned or otherwise secured to pairs of lugs 68, 70 projecting from the underside of carriage 26 and from the bottom wall of guideway 48, respectively. The cylinder is provided with a pair of inlet-outlet ports 72, 74 on either side of the piston 76 so that by regulating the flow of hydraulic fluid to and from opposite sides of piston 76, carriage can be moved to any position in guideway 48 between the ends thereof. With the piston rod of the assembly completely retracted, the carriage 26 and turntable 28 assume the position indicated in phantom to the right in FIG. 2, and with the piston rod completely extended, the carriage 26 and turntable 28 assume the position indicated in phantom to the left in FIG. 2. While the actuating mechanism shown is hydraulic, it will be appreciated that pneumatic, electrical or electromechanical mechanisms may be used, if desired.

A plate 78, with an upper surface substantially level with the upper surface of the plateform 42, is suitably mounted on guideway 48 and extends between the ends thereof. The longitudinal edges of plate 78 are spaced from flanges 50, 52 to allow movement of flanges 56, 58 and carriage 26, as indicated. In addition, a slot 80 is provided in plate 78 so that the lug 68 on the undersurface of carriage 26 may pass through the plate to be connected to the end of piston 76. With this arrangement, there is no danger of an operator getting his foot caught between carriage 26 and the sidewall of guideway 48 or the hydraulic actuating mechanism.

As best shown in the FIGS. 2 through 4, turntable 28 comprises a circular plate 84 having a downturned annular flange 86 at its perimeter. An inturned annular lip 88 extends inwardly from the lower edge of the flange 86 and an annular groove 90 is provided on the inner surface of flange 86 as shown.

Bearings 92 are suitably mounted in annular groove 90 of turntable 28 and annular groove 94 of carriage 26. These bearings not only enable turntable 28 to rotate freely relative to carriage 26 but, due to their positioning in annular grooves 90, 94, they will maintain turntable 28 on carriage 26 even when the load-handling implement on mast 30 is subjected to large forces. In addition to the bearings 92, annular flange 88 of turntable 28 extends beneath carriage 26 as an added safety precaution.

Mast 30 is shown as comprising two vertically extending spaced-apart channel members 100 and 102 which are welded or otherwise secured at their lower ends to turntable 28 and connected at their upper ends by horizontally extending channel member 104. To lend additional stability to mast 30, triangular braces 106 and 108 are shown as extending between and welded to the channels 100, 102 of the mast and the upper surface of the turntable 28.

Carriage 32 is shown mounted on mast 30 for vertical movement under the action of a hydraulic piston-cylinder assembly 110. Cylinder 112 has inlet-outlet ports 116, 118 on either side of the head of piston 114 so that by regulating the flow of hydraulic fluid to and from ports 116, 118, piston 114 can be extended or retracted thereby moving carriage 32 relative to mast 30. The cylinder 112 is welded, bolted or otherwise secured to channel member 100. The free end of the piston 114 of the hydraulic cylinder assembly is shown as being connected by cables 120 and 122 to lugs 124, 126 on the upper surface of carriage 32. Cables 120, 122 are provided with yokes 128, 130 and 132, 134 at each end thereof which are pinned to the end of piston 114 and the lugs 124, 126, respectively. The cables pass over double pulley 136 and pulley 138 which guide the cables between the piston and the lugs 124, 126 on the carriage. While the preferred form of the actuator for carriage 32 has been shown and described, it will be appreciated that the carriage may be operated by electrical, pneumatic or manual means, if desired.

Carriage 32 comprises upper and lower horizontal channel members 140 and 142, extending between channels 100 and 102 of mast 30, and vertical channel members 144 and 146 extending between and welded to the upper and lower horizontal frame members 140, 142. Vertical frame members 144 and 146 open inwardly and have pairs of rollers 148 and 150 externally mounted thereon for reception between the flanges of channels 100 and 102 to facilitate the vertical movement of the carriage within the vertical channel members of the mast 30. Upper horizontal channel member 140 opens upwardly while the lower horizontal channel member 142 opens downwardly so as to provide tracks or guideways for a purpose to become apparent.

The ram pole assembly shown in FIGS. 1 through 3 comprises a rectangular plate 159 which extends between the upper and lower channel members 140, 142 of carriage 32, and a ram pole 152 preferably made from high tensile steel which is slidably mounted within an oillite bushing 154 passing through the vertical plate 159 in a direction at the right angles thereto. The rectangular plate has pairs or brackets 156 and 158 welded to the corners thereof as shown. These brackets each have a first portion, which is welded or otherwise secured to the vertical plate, an intermediate portion, extending angularly outwardly from the plate, and a vertically extending terminal portion which has a roller 160 rotatably mounted thereon. These rollers 160 are received within the upper and lower horizontally extending channels 140, 142 of carriage 32 and permit the ram pole to be moved laterally relative to mast 30. To enable the operator to easily manipulate ram pole 152, a pair of handles 162 are provided at one end of the ram pole.

Referring to FIGS. 5 and 6, hydraulic clamp 36 is shown mounted on carriage 32' which, as indicated above, is of the same construction as carriage 32. Clamp arms 170 and 172 extend between horizontal channel members 140' and 142' of carriage 32'. The clamp arms are tapered toward their outer extremities and have inner surfaces 174, 176 which are substantially parallel with respect to each other. Pairs of elongated protrusions 178, 180 extend from the upper and lower surfaces of clamp arms 170, 172 through pairs of slots 182 and 184 in the upper horizontal channel member 140' and lower channel member 142'. The elongated protrusions 178, 180 within slots 182, 184 not only guide the clamp arms in their movement toward or away from each other when the assembly is actuated by hydraulic cylinders 186 and 188, but also maintain inner surfaces 174, 176 of the clamp arms in parallel relationship when a load is gripped by the clamp arms. Hydraulic piston and cylinder assemblies 186 and 188, which actuate the clamp arms, are conventional in form comprising cylinders 190, 192 with pistons 194, 196 mounted therein. The free outer end of each of the piston rods is suitably rigidly connected to clamp arms 170 and 172, while the cylinders 190, 192 are welded to carriage frame members 144', 146'. The cylinders 190, 192 are provided with pairs of inlet-outlet ports 198 and 200 on either side of pistons 194, 196. By regulating the flow of hydraulic fluid to ports 198, 200, the relative position of clamp arms 170 and 172 can be controlled thereby enabling cases to be gripped by or released from the clamp arms, as will be evident.

FIG. 7 illustrates the present invention with fork 38 being utilized as the article-handling means, and for use with conventional pallet loads, as is evident. A pair of horizontally extending plates 202, 204 are welded, bolted or otherwise secured to spacer blocks (not shown) which are, in turn, welded to vertical members 144'', 146'' of carriage 32''. Each prong of fork 38 is provided with a hook portion 206 at its inner end which hooks over elongated plate 202. These hook

portions **206** comprise vertical extensions **208** and **210** plus an intermediate section **212**. As shown in FIG. **7**, flanges **208** abut the outer surfaces of elongated plates **202**, **204**, while the flanges **210** engage both the inner surface of elongated plate **202** and the outer surface of channel member **140''** so that the forks are maintained in place when loaded at their outer ends.

Control panel **46** is connected by suitable hydraulic lines having quick-disconnect hydraulic fittings to a source of hydraulic fluid under pressure and a sump (not shown). The control panel is also connected by hydraulic lines (not shown) to hydraulic cylinders **62**, **112** and also to cylinders **190**, **192** when the hydraulic clamp **36** is utilized. A plurality of conventional valves may be provided in the control panel with suitable operating levers to regulate the flow of hydraulic fluid between the various hydraulic cylinders of the system, the source of pressurized hydraulic fluid and the sump, as will be appreciated. In addition, conventional controls are provided for raising or lowering the fork **20** of truck **10**. These controls may be electric, hydraulic, pneumatic or manual depending on the power source utilized to move carriage **18**.

When operating the sideload case and roll handler of the present invention, the operator will stand in cage **18** or on platform **42** and raise the fork **20** to the approximate level desired, for example, as indicated in FIG. **1**. Next, the turntable **28** is manually rotated (either to the left or right depending on which side of the aisle is being worked) to face in the desired direction and the carriage **26** is moved by hydraulic assembly **62** in a transverse direction relative to the fork **20** to any position between the ends of guideway **48** necessitated by the loading operation. The operator can then adjust the height of the carriage **32** by means of hydraulic cylinder **112** to the exact height required and engage the article, as by inserting the ram pole **154** in the roll **30** (or actuating the hydraulic clamp **36** of FIGS. **5** and **6** to engage a case, or inserting the fork **38** of FIG. **7** into a pallet). After the article has been so engaged, carriage **32** will be elevated to lift the roll **30** from the shelf, after which carriage **26** may be withdrawn from the storage bin to a position where the turntable **28** can be rotated, carriage **32** lowered, and the article deposited on floor truck **22**, as indicated in FIG. **1**.

After the desired number of articles have been loaded onto the floor truck **22**, the operator may lower the fork **20** to adjacent floor level and drive the truck **10** to a packing and shipping area where he may discharge the loaded floor truck **22** and pick up an empty one. The same general procedure outlined above is followed in the reverse order, when unloading articles from floor trucks and placing them in storage.

An exemplary range or rolls of cloth that may be conveniently and safely handled by the FIGS. **1–4** embodiment are rolls ranging from 48 to 72 inches in length and from 250–800 pounds in weight. The clamp **36** of the FIGS. **5**, **6** embodiment is adapted to handle heavy cases, cartons or boxes, while the fork **38** of the FIG. **7** embodiment is designed to handle pallet loads, as mentioned above.

It will be appreciated that, if desired, the frame **24**, platform **42** and handrails **44** may be omitted entirely from attachment **25**, whereby the latter will comprise the base member **29** and the structure mounted thereon, as described above. In that case, the base member **29** will be mounted on the prongs of fork **20** in a suitable position adjacent or near the operator's cage **18**.

While the preferred form of the invention has been shown and described, it is to be understood that all suitable modifications and equivalents may be resorted to which fall within the scope of the invention as claimed.

What is claimed is:

1. A side-loading article-handling attachment, of the character described adapted to be arranged on the vertically movable fork of a forklift truck and disposed adjacent an operator's platform mounted on said fork, said attachment comprising: a base member having means adapted to be engaged to the fork of a forklift truck for mounting the base member thereon; a first carriage member mounted on said base member for adjustable slidable movement relative thereto and in a direction substantially at right angles to said fork, a turntable mounted on said first carriage member for rotation about a vertical axis, a mast structure mounted on said turntable, and a second carriage member mounted on said mast structure for vertical movement relative thereto and including a ram pole assembly, said assembly comprising a plate carried by said second carriage, a bushing mounted in said plate, and a ram pole slidably carried in said bushing to enable the ram pole to be extended or retracted relative to the plate.

2. The structure defined in claim **1** wherein said base member and said first carriage member include cooperating guideway and roller structure, and actuating means operatively connected between said first carriage member and said base member for moving said carriage member to and fro on said base member.

3. The structure defined in claim **2** wherein said base member includes a recessed portion extending transversely of said fork and defining said guideway, and further wherein said first carriage member includes a disclike portion disposed above said base member with depending flange means disposed in said recessed portion, and said roller structure including rollers carried by said flange means and in rolling contact with said guideway.

4. The structure defined in claim **3** wherein said actuating means includes a hydraulic cylinder and piston disposed in said recessed portion below said first carriage member and connected to said base member and said first carriage member.

5. The structure defined in claim **1** wherein said mast structure includes two laterally spaced vertical members stationarily mounted on said turntable, said second carriage member being disposed between and in engagement with said vertical members with means permitting vertical movement of said second carriage member.

6. The structure defined in claim **5** wherein said means permitting vertical movement of said second carriage member includes cooperating guideway and roller structure arranged on said vertical members and said second carriage member.

7. The structure defined in claim **6** and further including actuating means operatively connected between said mast structure and said second carriage member for effecting vertical adjusting movements of said second carriage member relative to said mast structure.

8. The structure defined in claim **7** wherein said actuating means includes: a hydraulic cylinder and piston arrangement carried by one of said vertical members, two elongated relatively flexible tension members connected at one end to said piston and at the other end to said second carriage member, two pulleys arranged on one of said vertical members above said second carriage member and another pulley arranged on the other of said vertical members above said second carriage member, one of said tension members being trained around one of said pulleys and the other of said tension members being trained around the other two pulleys and extending between said vertical members.

9. The structure defined in claim **1** wherein said mast structure includes two laterally spaced vertical members stationarily mounted on said turntable, said second carriage member being disposed between and in engagement with said vertical members with means permitting vertical movement of said second carriage member.

10. The structure defined in claim **9** wherein said means permitting vertical movement of said second carriage member includes cooperating guideway and roller structure arranged on said vertical members and said second carriage member.

11. The structure defined in claim **10** and further including actuating means operatively connected between said mast structure and said second carriage member for effecting vertical adjusting movements of said second carriage member relative to said mast structure.

12. The structure defined in claim 3 wherein said mast structure includes two laterally spaced vertical members stationarily mounted on said turntable, said second carriage member being disposed between and in engagement with said vertical members with means permitting vertical movement of said second carriage member.

13. The structure defined in claim 12 wherein said means permitting vertical movement of said second carriage member includes cooperating guideway and roller structure arranged on said vertical members and said second carriage member.

14. The structure defined in claim 13 and further including actuating means operatively connected between said mast structure and said second carriage member for effecting vertical adjusting movements of said second carriage member relative to said mast structure.

15. The structure defined in claim 1 wherein said means adapting said base member to be mounted on the fork of a forklift truck includes spaced holes in said base member for slidably receiving the prongs of the fork.

16. The structure defined in claim 1 wherein said attachment further includes means providing a flat platform connected to said base member and adapted to be arranged in adjacent abutting relation to the operator's platform when said attachment is arranged on the fork of the truck.

17. The structure as defined in claim 1 further including an article storage means mounted upon said fork adjacent said base member for receiving articles from said ram pole assembly.

* * * * *