United States Patent [19]

Schultz

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[45] **Dec. 10, 1974**

[54] **LOADER/UNLOADER CONVEYOR SYSTEM**

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[21] Appl. No.: **384,455**

Related U.S. Application Data

[63] Continuation of Ser. No. 167,229, July 29, 1971, abandoned.

[52] **U.S. Cl.** ..... **214/89,** 214/38 C, 214/38 CA, 214/91 R, 214/146.5

[51] **Int. Cl.** **B65g 67/02**

[58] **Field of Search** . 214/38 C, 38 CC, 518, 130 R, 214/75 R, 75 G, 77 R, 89, 91 R, 146.5

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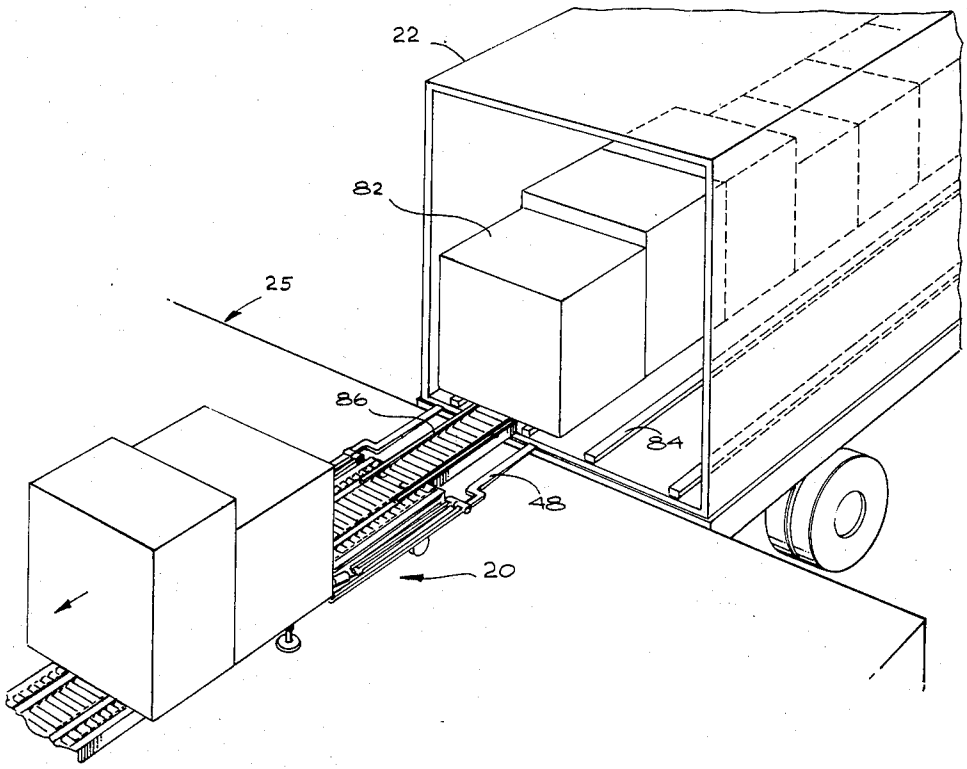
[57] **ABSTRACT**

A loader/unloader conveyor system having a main frame assembly with reversible conveyor means mounted thereon, with fork life means mounted on and horizontally slidable with respect to the main frame assembly, the fork lift means being positionable at varying vertical heights with respect to the plane of the conveyor means and adapted for engagement with a load whereby a load can be transferred between the conveyor and a point beyond the end of the conveyor. The main frame assembly is additionally provided with telescoping inflatable blade portions that permit raising from a vehicle a row of packages by inflation of the blades and placing the entire row coextensive with the conveyor onto the conveyor means, the inflatable blade portions then being deflated and retracted.

23 Claims, 13 Drawing Figures



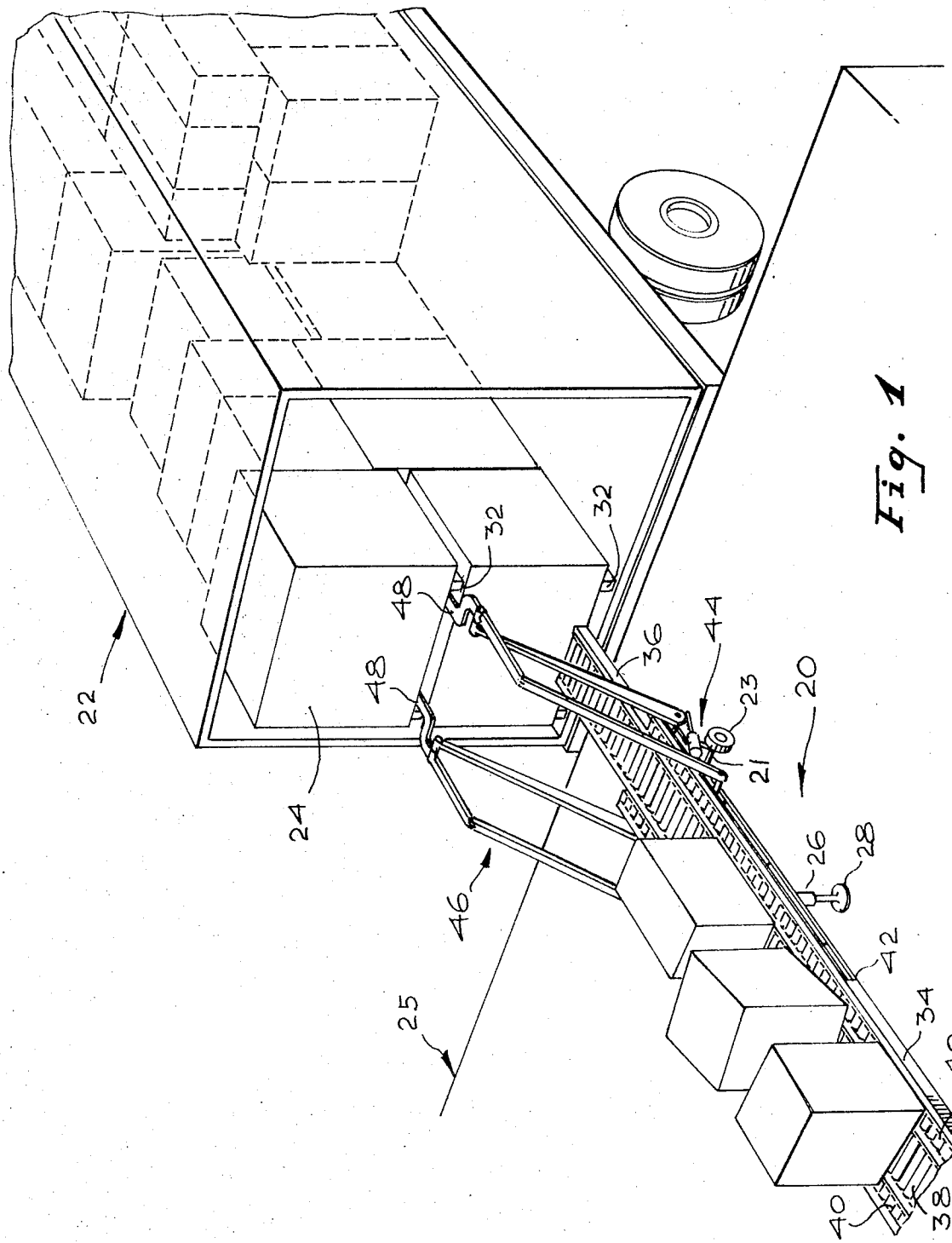


Fig. 1

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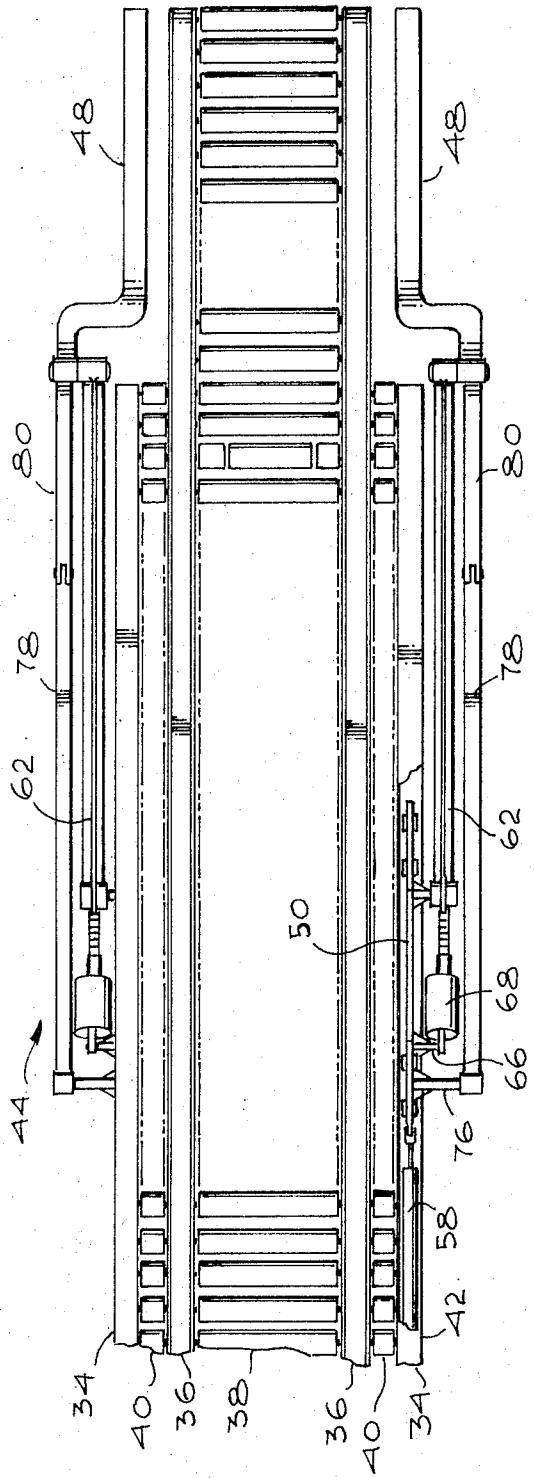

Fig. 2

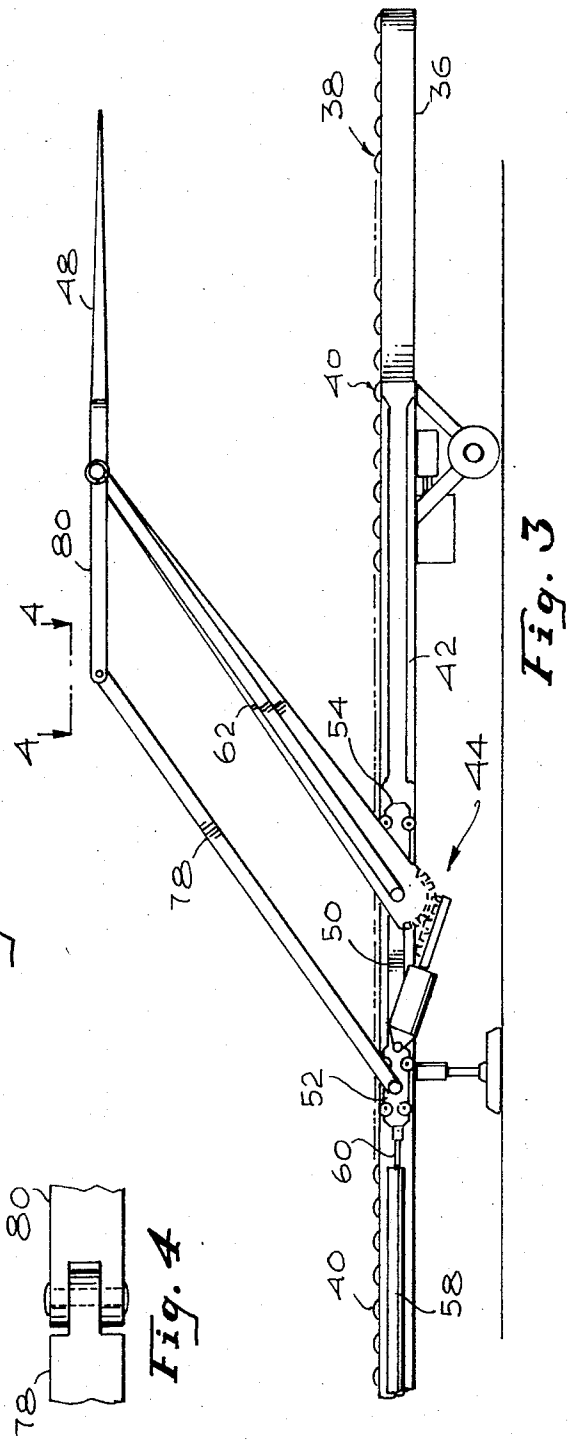

Fig. 3

Fig. 4

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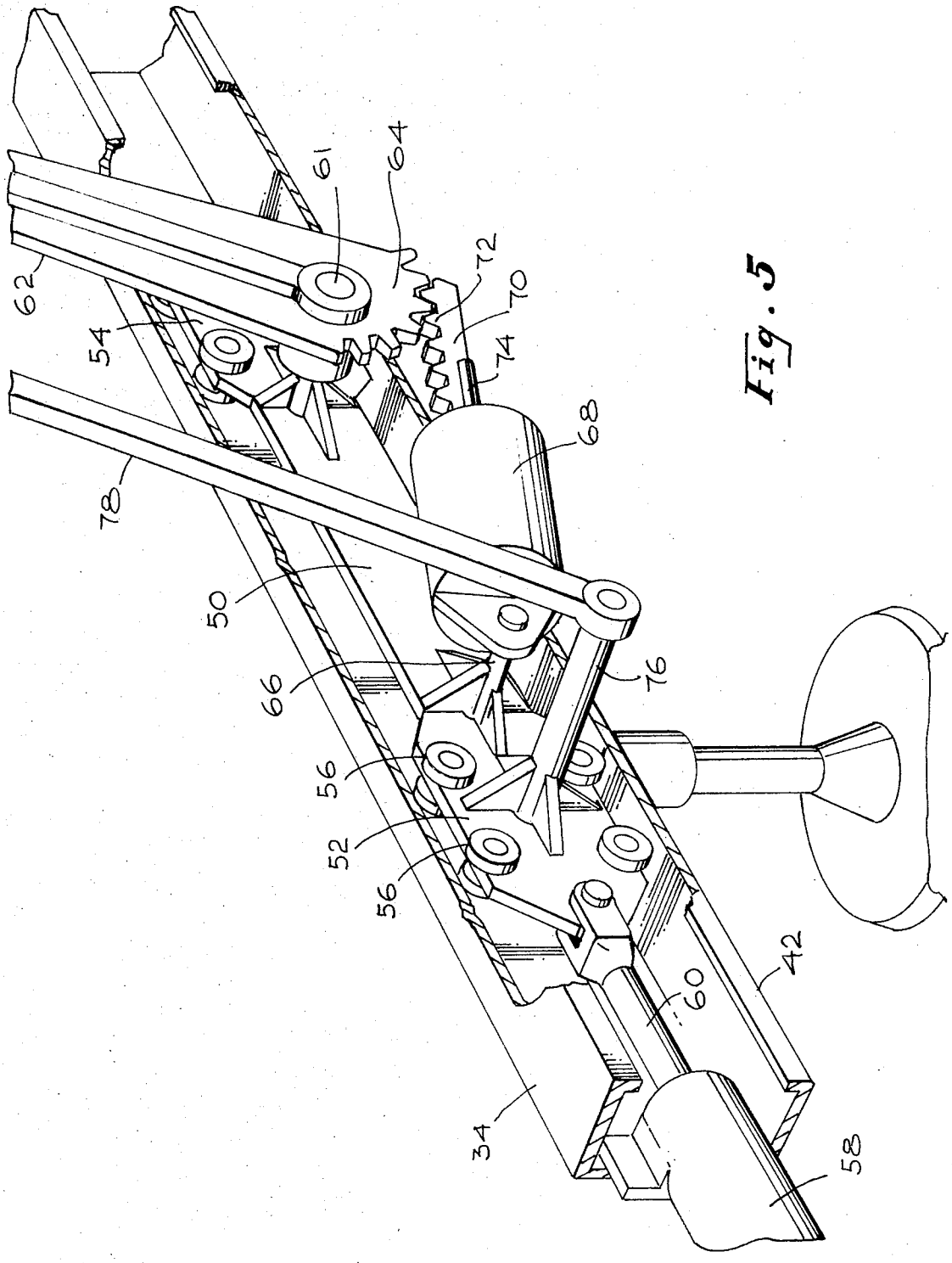

Fig. 5

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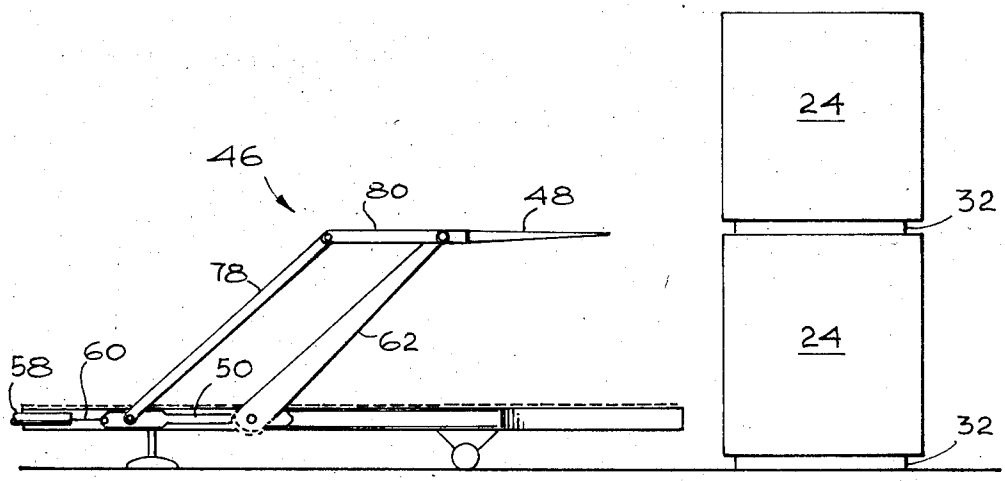

Fig. 6(a)

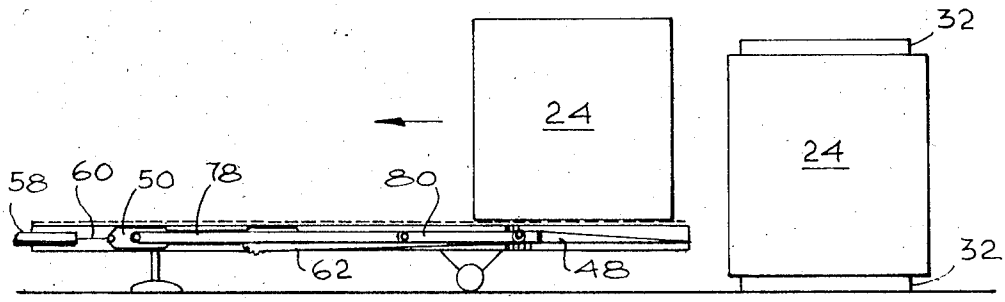

Fig. 6(b)

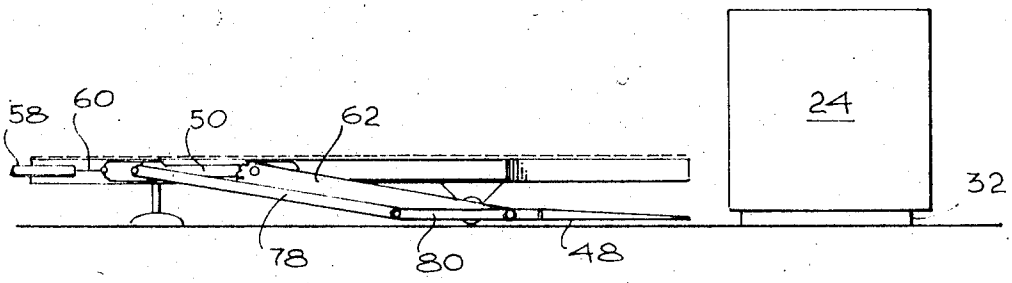

Fig. 6(c)

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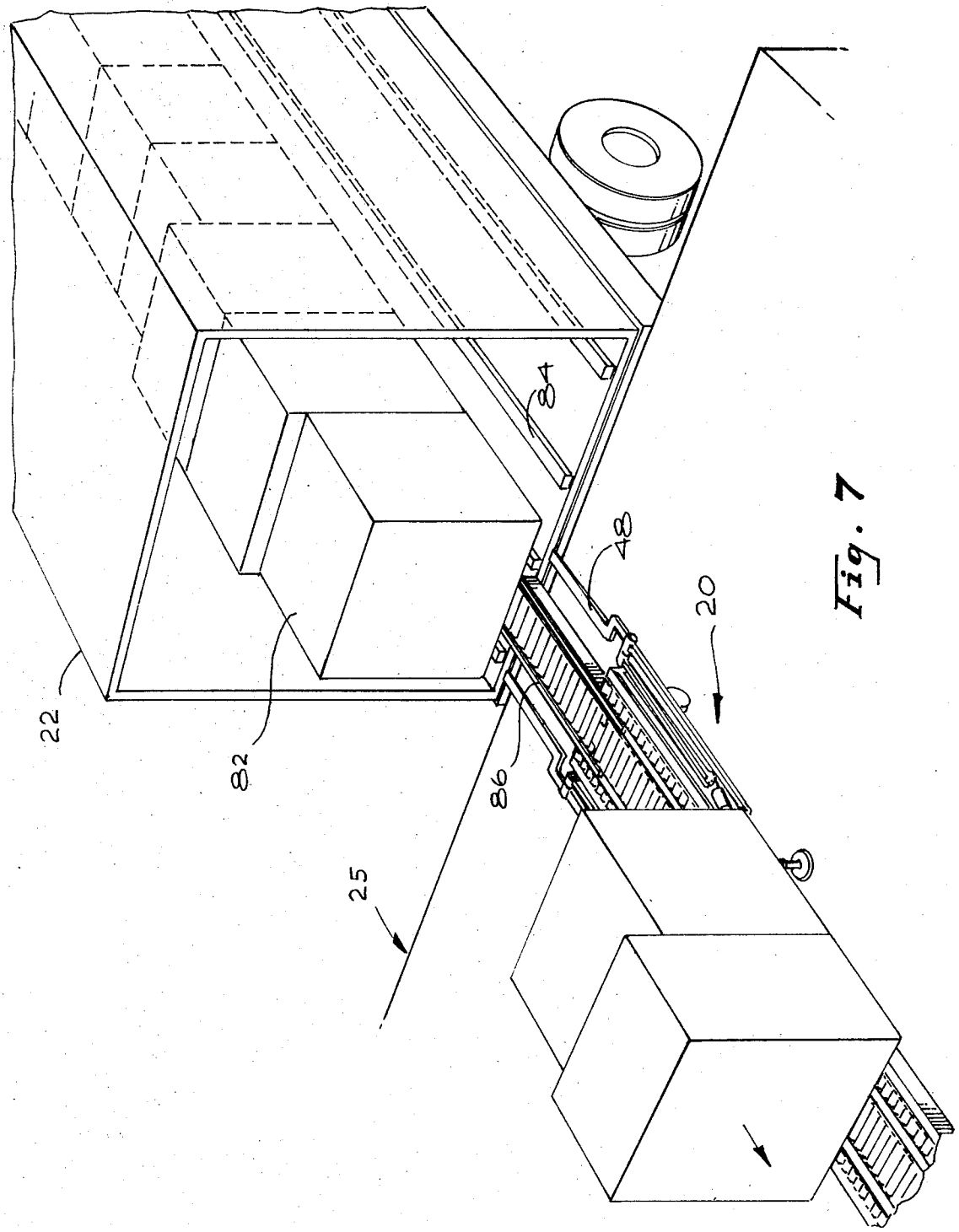

Fig. 7

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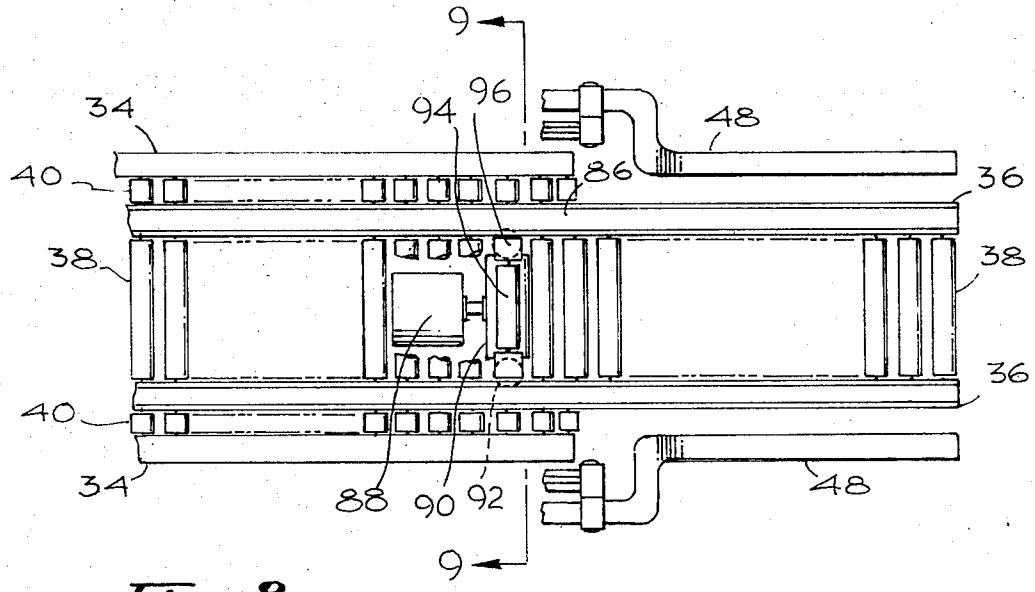

Fig. 8

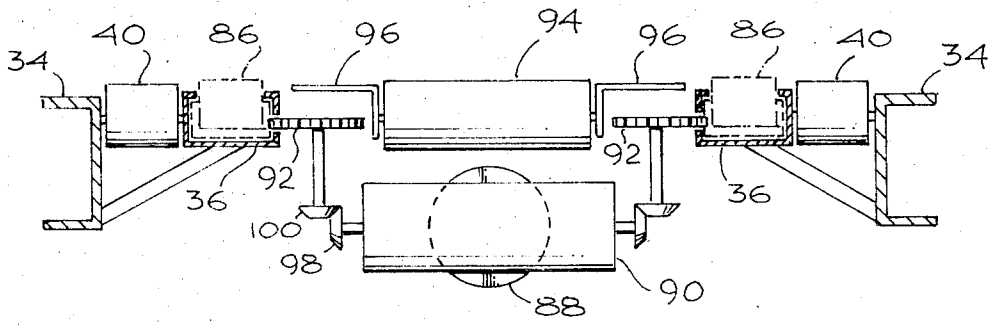

Fig. 9

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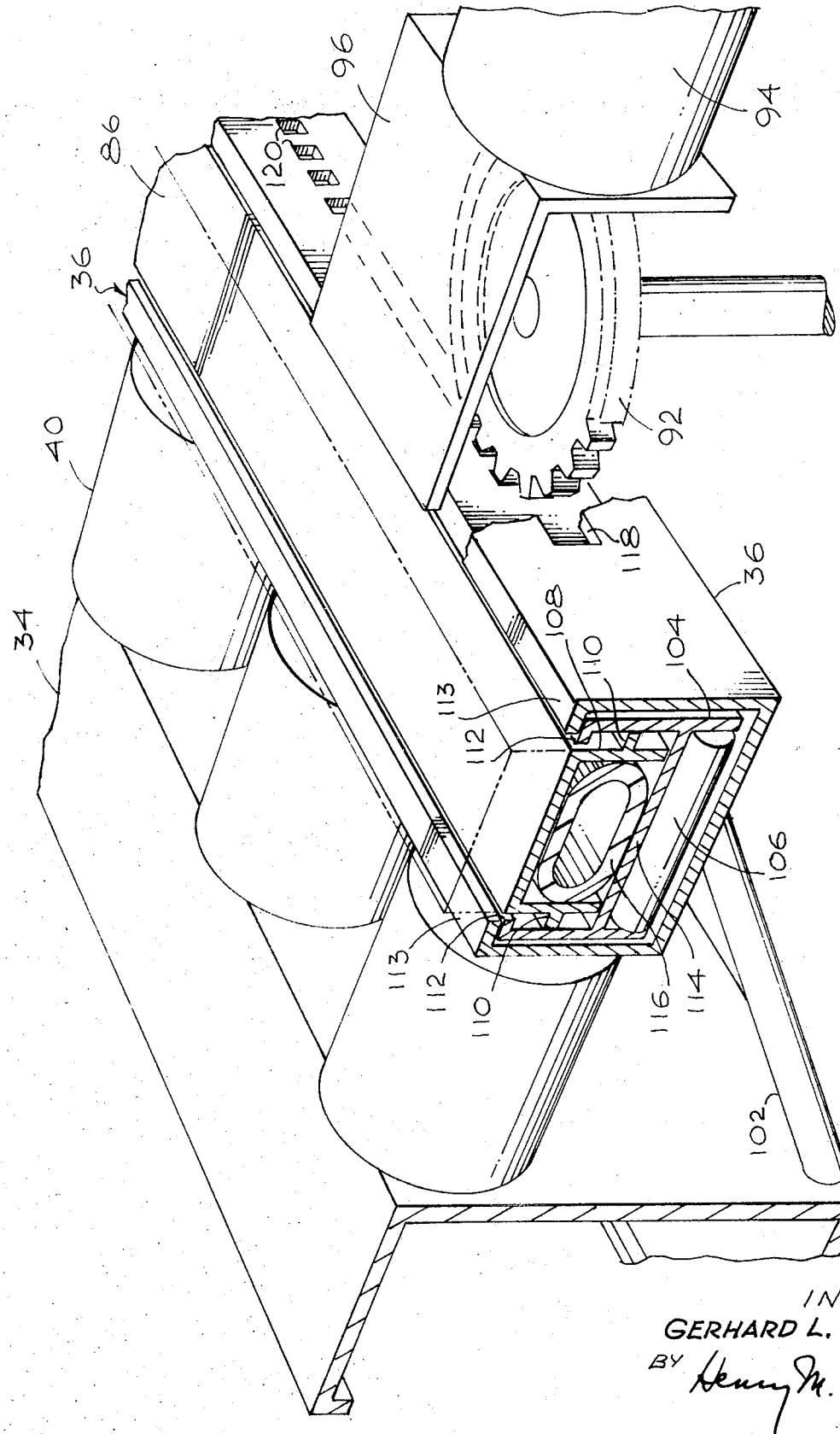

Fig. 10

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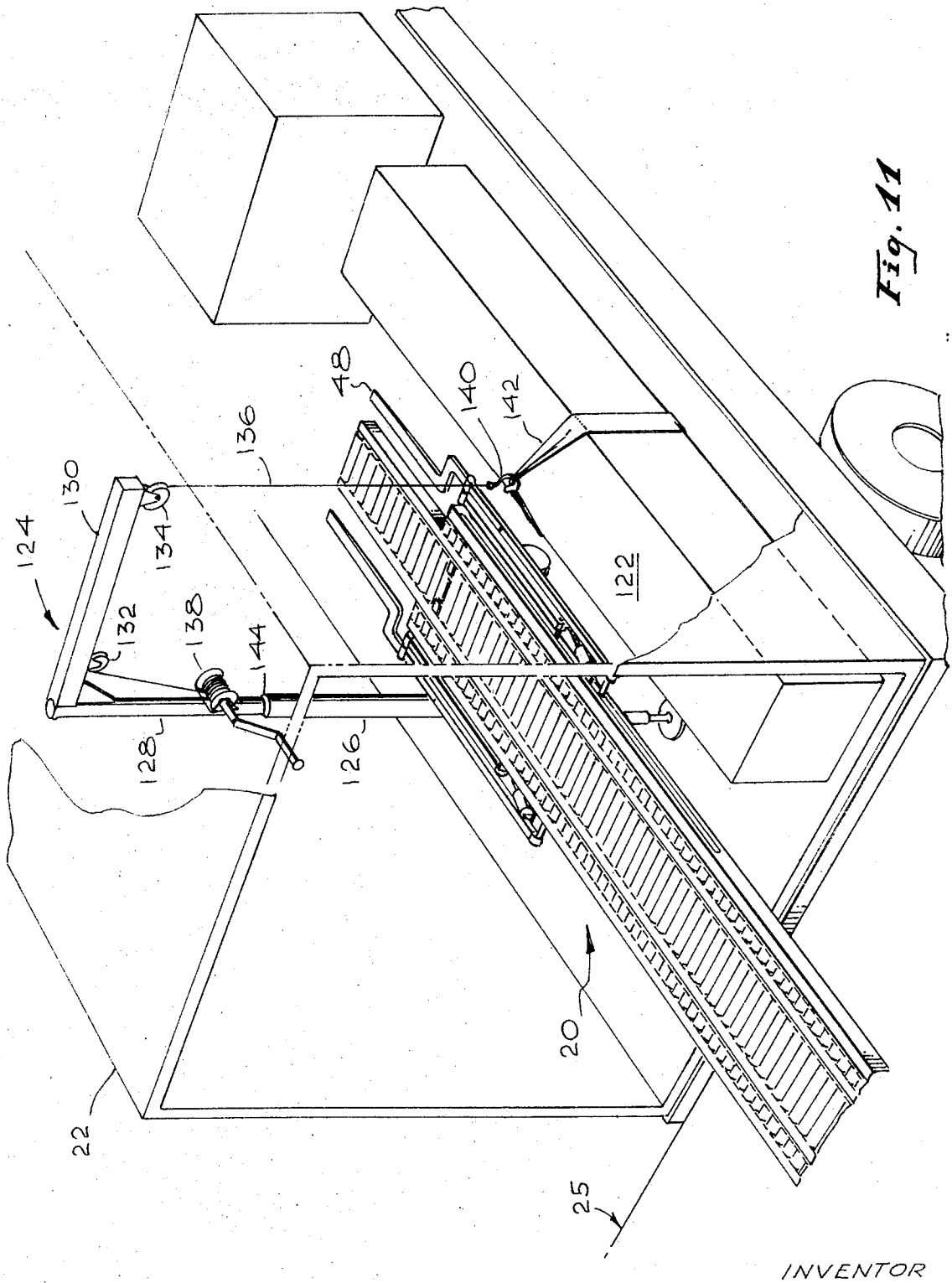

Fig. 11

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LOADER/UNLOADER CONVEYOR SYSTEM

This application is a continuation of applicant's prior co-pending application Ser. No. 167,229, filed July 29, 1971, for LOADER/UNLOADER CONVEYOR SYSTEM, now abandoned.

BACKGROUND OF THE INVENTION

In a typical loading, unloading operation at a shipping dock or the like where a mix of lightweight, heavy or large bulky packages are transferred from or to a conveyor a typical method now employed utilizes a conveyor system terminating at a point well beyond the incoming or outgoing vehicle such as a truck or van which contains the mix of lightweight and heavy bulky packages. Extra time and space is necessary in order to permit the utilization of a fork lift truck. In the loading of the conveyor the sequence usually entails the operation of the fork lift truck to a position adjacent the package, positioning of the forks at a level for cooperating with the bottom of the package, a forward advance of the fork lift truck to engage the bottom portion of the package, a lifting of the package by raising the fork, a forward or backward movement of the fork lift truck, an advance of the fork lift truck to the conveyor means with the forks positioned to straddle the conveyor means, and a lowering of the package to the conveyor for transporting the package to its destination. In the opposite sequence where the packages are to be shipped the conveyor means brings the package to a point at the end thereof, the forks of the fork lift truck are positioned at a point beneath the package, the forks are lifted to engage the bottom of the package and lift it from the conveyor means, the fork lift truck is set in backward motion away from the conveyor means a distance sufficient to clear the conveyor and permit turning of the fork lift truck, the fork lift truck then advances a given distance to the vehicle, usually a truck, used for shipping. Lightweight packages which are mixed with heavy bulky packages are usually manually loaded on the conveyor by carrying the packages to the conveyor or placing an additional conveyor section into the truck.

SUMMARY OF THE INVENTION

In arrangements in accordance with the present invention the distance, time and space requirements are minimized by providing a main frame assembly having a reversible conveyor thereon. On each side of the main frame assembly straddling the conveyor is an actuating arm, the two actuating arms being simultaneously pivotable with respect to a given axis through the main frame assembly. Adjacent the pivot axis is an extension of the actuating arm which engages a gear assembly for rotating the actuating arms in unison about the pivot. The actuating arms and the gear assembly are mounted on a carriage assembly which is slidably movable horizontally on rails secured to the sides of the main frame assembly so that the actuating arm mechanism is movable in the plane of the conveyor means. Pivotally secured to the free ends of the actuating arms is a fork lift apparatus for engaging the cargo. Each tine of the fork lift apparatus has a rearwardly extending portion pivotally secured to one end of a stabilizing arm. The other end of the stabilizing arm is pivotally secured to the carriage assembly in such a fashion that a parallelogram is formed having a first pair of opposite sides being the stabilizing bar and the actuating arm with the rearwardly extending portion of each tine forming a third leg with the fourth leg of the parallelogram being an imaginary line through the two pivots on the carriage assembly. In this manner the fork lift apparatus is so coupled to the actuating arm so that for a given angular displacement of the actuating arm the forks are angularly displaced the same amount to maintain a generally parallel relation of the forks to the plane of the conveyor as the plane of the forks is displaced vertically. Operation of the carriage assembly in the horizontal plane coupled with operation of the forks in a vertical plane thereby permits transfer of packages from the conveyor to a point beyond the end of the conveyor for transfer of packages from a point beyond the end of the conveyor to a position on the conveyor.

A modification in accordance with the invention includes a pair of telescoping inflatable blades coupled to the main frame assembly so that the blades can be extended beyond the end of the conveyor, positioned beneath a row of packages in general alignment therewith, inflated to raise the row of packages off the spacers between the bottoms thereof and the floor, retracted to a position where the packages are above the conveyor, and deflated to lower the row of packages onto the conveyor.

Additionally the conveyor may be provided with a cantilevered suspension hoist apparatus for loading or unloading long packages at a position alongside the conveyor.

It is therefore an object of the invention to provide a new and improved conveyor system.

It is a particular object of this invention to provide dock located equipment that can load and unload mixed cargo without modifications to the dock, shipping equipment or cargo.

It is a further object of this invention to provide a new and improved conveyor system that can load and unload a mix of lightweight or heavy packages.

It is still another object of this invention to provide a new and improved conveyor system having a pair of forks straddling the conveyor adjacent the end thereof.

It is yet another object of this invention to provide a new and improved conveyor system having lifting apparatus mounted on a carriage straddling the conveyor for providing longitudinal movement in the plane of the conveyor as well as vertical movement of the lifting apparatus to positions above or below as well as beyond the end of the conveyor.

It is a still a further object of this invention to provide a new and improved conveyor system having telescoping inflatable blade portions for transferring rows of packages between the conveyor and a cargo container.

It is yet a further object of this invention to provide a new and improved conveyor system having a cantilever suspension hoist apparatus for loading or unloading long packages from positions alongside the conveyor.

DESCRIPTION OF THE DRAWINGS

The foregoing and other objects of the invention become apparent with reference to the drawings, in which:

FIG. 1 is an isometric view (with some phantom illustration) of a conveyor system according to the invention;

FIG. 2 is a plan view of the loader/unloader conveyor system shown in FIG. 1 according to the invention;

FIG. 3 is a side view of the system of FIG. 1;

FIG. 4 is a partial plan view of a pivot along lines 4—4 of FIG. 3;

FIG. 5 is an enlarged isometric view (partially cut away) of the carriage assembly and actuating drive mechanism utilized in the system of FIGS. 1, 2 and 3;

FIGS. 6*a* to 6*c* are diagrammatic side views of the front end of the conveyor system with the forks shown in various positions during the conveyor loading process;

FIG. 7 is an isometric view (portions shown in phantom illustration) of a telescoping inflatable blade portion of the conveyor system of FIGS. 1, 2 and 3;

FIG. 8 is a plan view of a telescoping inflatable blade portion of the system of FIG. 7;

FIG. 9 is a partial plan view along lines 9—9 of FIG. 8;

FIG. 10 is an enlarged isometric view (partially cut away and portions shown in phantom illustration) showing the details of the telescoping blade system of the modified conveyor system of FIG. 7; and

FIG. 11 is an isometric view (with portions shown in phantom illustration) of a modification of the conveyor system interfacing with cargo.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and particularly to FIG. 1, there is shown a conveyor system generally designated 20 positioned adjacent a cargo truck or container 22 for the loading or unloading of the packages 24 contained therein at a dock 25. The conveyor system 20 according to the invention is movable from dock to dock, container to container for multiple dock or container 22 positioning. Further, with a motive device the system can be made mobile for multiple warehouse utility. The system can interface with the shipping and receiving dock functions of an automated or semi-automated warehouse system. The conveyor system 20 is provided with a pair of pneumatic wheels 23 connected to a strut assembly 21 which can be affixed to the conveyor's underside about a vertical pivot so that the wheels 23 are steerable. Positioned rearwardly of the wheels 23 are a pair of extendable struts 26 having at the end thereof glide air pads 28. The glide air pads 28 can have air pressure applied thereto so that an air cushion is formed between the undersurface thereof and the ground (preferably a smooth floor) to act as a bearing surface when it is desired to relocate the conveyor system 20. The pads 28 can also be used for stabilizing the conveyor 20 by extending the struts 26 until the pads 28 are in contact with the ground and the chamber underneath the pad 28 is then evacuated to lock the pads to the floor. Additional pads 28 (not shown) are provided at the other end of the conveyor system 20.

The truck 22 is positioned at dock 25 adjacent the end of the conveyor system 20 with the truck or container 22 in position for the loading or unloading operations. Spacers 32 are positioned in parallel alignment along the length of the floor of the truck 22 to provide a space between the bottom of the package 24 and the container floor.

The conveyor system 20 is provided with a main frame assembly including a pair of parallel side beams 34 and a pair of intermediate beams 36 positioned between and extending beyond the ends of side beams 34. POsitioned between and perpendicular to interrelated beams 36 are a plurality of parallel rollers 38 which are powered and reversible by suitable drive means (not shown). Rotatably secured between side beams 34 and intermediate beams 36 are a plurality of idler rollers 40. The side beams 34 have secured to the outer surfaces thereof a pair of generally channel-shaped rail members 42 which extend a predetermined distance adjacent the end portion thereof. Sliding within the rail members 42 is a carriage assembly generally designated 44 which carries a fork lift mechanism generally designated 46 having a pair of tines 48 adapted for engaging packages 24 as shown in FIG. 1. As will be hereinafter explained, the carriage assembly 44 is movable longitudinally with respect to the rails 42 to thereby carry fork lift apparatus 46 with it along with package 24 which is engaged by forks 48. The fork lift apparatus 46 is constructed to permit raising and lowering of forks 48 while maintaining the plane of the forks generally parallel to the plane of the conveyor 20.

Referring now to FIGS. 2 and 3, the details of the carriage assembly 44 and the fork lift apparatus 46 is better illustrated. As shown in FIG. 3, the carriage assembly includes a longitudinal carriage member 50 having enlarged portions 52 and 54 at the ends thereof of a width slightly smaller than the distance between the upper and lower arms of the rail 42 (see also FIG. 5). Rotatably secured to the enlarged portions 52 and 54 of the longitudinal carriage member 50 is a plurality of rollers 56 positioned in close mating relationship with the upper and lower arms of the rails 42 to permit rolling movement of the carriage assembly 44. Secured to each side beam 34 rearwardly of the rails 42 is a hydraulic cylinder 58 having extending therefrom a longitudinal ram 60 with a clevis at the free end thereof secured to the adjacent enlarged portion 52 of the longitudinal carriage member 50. Actuation of the hydraulic cylinder 58 causes longitudinal movement of the carriage member 50 in rolling relationship with the rail 42 within the design limits of the hydraulic cylinder 58. Extending out from the surface of the carriage member 50 adjacent the other enlarged portion 54 thereof is a pivot pin 61 extending beyond the arms of the rails 42. Pivotally affixed thereto is an actuating arm 62 having a portion 64 extending rearwardly of the pivot pin 61. The portion 64 is configured as a sector gear for reasons which will hereinafter be discussed.

Extending out from the enlarged portion 52 of carriage member 50 is a boss 66 having secured thereto a second hydraulic cylinder 68. The hydraulic cylinder 68 has extending therefrom a rotational ram 70 having linearly arranged thereon rack gear teeth 72 in mating coacting relationship with the gear teeth of the sector gear 64 of the actuating arm 62. In order to maintain the actuation of the rotational ram 70 along a given line to maintain the gear teeth 72 in engagement with the sector gear 64 the ram 70 rests in a cradle 74 which is an extension of and an integral part of carriage member 50 adjacent the mid portion thereof. The carriage member 50 is so configured and offset outwardly from rail 42 that the cradle 74 extends out from beyond and

below the rail **42.** Extending out from the enlarged portion **52** of longitudinal carriage member **50** is a second pivot pin **76** of a length sufficient to extend beyond the outer limits of the second hydraulic cylinder **68.** Pivotally secured thereto is a stabilizing arm **78** which is maintained in generally parallel relationship with the center line of actuating arm **62** by means of a fork extension arm **80** being pivotally secured at two points to the free ends of actuating arm **62** and stabilizing arm **78** (as best shown in FIG. **3**). As shown in FIGS. **1, 2** and **3,** the extension arm **80** is axially aligned and integral with fork tine **48.** The extension arm **80** is journaled to stabilizing arm **78** (as shown in FIG. **4**) by means of the extension arm **80** being provided with a clevis having inserted therein a reduced width portion of stabilizer bar **78** to provide a suitable pivot. The distance between the pivot points of stabilizer bar **78** is the same as the distance between the pivot points of actuating arm **62** or the extension arm **80** is the same length as the spacing between the pivot points on the carriage member **50** of the stabilizer bar **78** and actuating arm **62** to thereby effect a parallelogram arrangement to maintain forks **48** substantially parallel to the conveyor means at any vertical height.

As best shown in FIG. **2,** each fork tine **48** is offset and disposed inwardly toward intermediate beams **36** to thereby straddle intermediate beams **36.** It can also be seen that pivot pin **76** for stabilizing bar **78** projects out from transverse carriage member **50** a sufficient distance beyond hydraulic cylinder **68** so that ample spacing is provided between stabilizer bar **78** and actuating arm **62** as they pass each other during the raising or lowering of forks **48.**

While there is shown in FIG. **2** only one-half of the fork lift apparatus **46** and carriage **44,** it is to be understood that the other half thereof is substantially a mirror image and movement of the carriage assembly **44** longitudinally within the rails **42** is accomplished by simultaneous actuation of the pair of hydraulic cylinders **58.** Similarly, raising and lowering of the fork lift apparatus **46** is accomplished by simultaneous actuation of the pair of hydraulic cylinders **68** to thereby displace rotational rams **70** to rotate actuating arms **72.**

FIGS. **6***a*, *b* and *c* diagrammatically illustrate the "top," "null" and "bottom" positions of the fork lift apparatus **46** in relation to packages **24** separated by spacers **32.** (Although shown, the use of the spacers **32** is not necessary for effective operation of the fork lift apparatus **46.**) As shown in FIG. **6***a*, the forks **48** are elevated to the desired height for insertion between packages **24** adjacent spacers **32.** The ram **60** is fully retracted within hydraulic cylinder **58.** Forward motion of forks **48** is then accomplished by actuating hydraulic cylinder **58** to displace ram **60** and thereby move the carriage member **50** along with the fork lift apparatus **46** until the forks **48** are positioned beneath the top package **24.** The second hydraulic cylinders **68** are then actuated to slightly raise forks **48** along with package **24** to permit it to clear lower package **24,** or spacers **32,** if used. With forks **48** still in this elevated position hydraulic cylinder **58** is acutated to retract ram **60** bringing carriage member **50,** forks **48,** and package **24** along with it. The second hydraulic cylinder **68** is then actuated in a reverse direction to rotate actuating arm **62** in a clockwise direction as shown in FIG. **6***a*. The actuating arm **62** is rotated until the forks **48** are in the null position coextensive with the conveyor shown in FIG. **6***b*. In this position all portions of the fork lift assembly **46** are below the top edge of the rollers **38** to permit movement of the package **24** on the conveyor in the direction of the arrow. The rollers **38** are powered and reversible so that energization of the driving means (not shown) need not be accomplished until the package **24** is positioned on the conveyor although the conveyor rollers **38** can be operated continuously, if desired. The actuating arm **62** is then rotated further clockwise as shown in FIG. **6***c* until the forks **48** are at their bottom position for insertion beneath the bottom of the lower package **24.** Thus it can be seen the fork lift apparatus **46** in conjunction with the carriage assembly **44** permits the transfer of cargo between the conveyor **20** and positions beyond the end of the conveyor regardless of the level of the package **24.**

Referring now to FIG. **7,** there is shown a modification of the conveyor system of FIG. **1.** A cargo container or truck **22** is positioned at shipping/receiving dock **25** adjacent the end of the conveyor system **20** with the bottom of the row of packages **82** at about the same height as the plane of the conveyor **20.** The packages **82** in the row are spaced from the floor of the container **22** by means of suitable spacers **84** which may be, for example, standard wood **2** by **4** strips. Coupled to the main frame assembly in telescoping relationship is a blade subsystem **86** which in its normal position has blades of height sufficient for insertion in the space between the floor of the container **22** and the bottom of the packages **82.**

The details of the blade subsystem **86** can be better understood with reference to FIGS. **8, 9** and **10.** With reference to FIG. **8,** the intermediate beams **36** contain the blade subsystem **86** therein which can be longitudinally displaced within the plane of the conveyor by a suitable drive mechanism such as motor **88** coupled to gear box **90** which actuates a pair of drive gears **92.** As can be seen in FIG. **8,** the roller **94** immediately above gear box **90** is shorter than the other rollers **38** on either side thereof to permit space for the drive gears **92,** the roller **94** being suspended at either end thereof by an angle member **96.** As better illustrated in FIGS. **9** and **10,** the drive gear **92** is coupled to the gear box **90** by means of intermediate bevel gears **98** and **100.** In this modification the intermediate beam **36** has a generally U-shaped cross section and is coupled to side beams **34** by means of angularly displaced sway bars **102.** Inserted in slidable relationship within intermediate beams **36** is an extrusion **104** having a generally H-shaped cross section. Pivotally secured between the lower arms of extrusion **104** is a plurality of rollers **106** in rolling coacting relationship with the bottom portion of intermediate beam **36.** Positioned between the upper arms of extrusion **104** is a blade **108** having an inverted generally U-shaped cross-sectional configuration having a pair of aligned projections **110** extending outwardly from the legs thereof, the total width of blade **108** being slightly smaller than the width between the upper arms of extrusion **104.** Adjacent the top portions of the arms of extrusion **104** are a pair of inwardly extending aligned shoulders **112.** The shoulders **112** are adapted for engagement with projections **110** when blade **108** is in its uppermost position. Additionally the upper surfaces of shoulders **112** coact with inwardly extending aligned shoulders **113** on the free ends of intermediate beam **36** in close sliding relation, the operation of which will be hereinafter explained.

Inserted within the opening formed by the cross portion 114 of extrusion 104 and the inverted generally U-shaped blade 108 is an inflatable air bag 116 extending the length of blade 108. In the normal deflated condition of air bag 116 the legs of blade 108 rest on the cross portion 114 of extrusion 104, and the upper surface of blade 108 is spaced below the uppermost portion of the rollers 38, 40 and roller 94 adjacent gear box 90. When the air bag 116 is inflated blade 108 rises until projections 110 thereon coact with shoulders 112 of extrusion 104, thereby raising the upper surface of blade 108 a predetermined distance above the uppermost points of rollers 38, 40 and 94.

In order to drive the blade subsystem 86 so that extrusion 104 is displaced longitudinally with respect to intermediate beam 36, intermediate beam 36 has an aperture 118 in one leg thereof through which drive gear 92 extends to engage a plurality of aligned evenly spaced slots 120 in the adjacent surface of extrusion 104 which slots 120 coact with the gear teeth of drive gear 92.

Referring back to FIG. 7, it can be seen that the blade subsystem 86 with the air bag 116 in its deflated condition can be telescoped outwardly from the end of the conveyor 20 by energization of the motor 88 so that the blades 108 in their fully extended position are beneath a row of packages 82. It is to be understood that the vertical height of the blade subsystem 86 with the air bag 116 deflated is less than the height of spacers 84 on the floor of the cargo container 22. The air bag 116 is then inflated by suitable means (not shown) to raise the row of packages 82 above the spacers 84. The blade subsystem 86 is then retracted by reversing the direction of motor 88, thereby bringing a row of packages 82 to a position immediately above the conveyor system 20. The air bags 116 are then deflated so that the packages 82 now rest on roller 38 of the conveyor system 20 for transportation thereon.

With the handling of extremely long or awkward packages such as long package 122 shown in FIG. 11, a Gantry crane 124 can be utilized. In FIG. 11 the conveyor 20 is positioned within the cargo container 22 right alongside the package 122. The Gantry crane 124 has a main vertically extending tubular member 126 having inserted therein telescopic fashion a second tubular 128 adapted for pivotal movement. At the upper end of tubular member 128 is a cantilevered member 130 extending at right angles thereto over the conveyor. Secured at opposite ends of the cantilevered member 130 are a pair of pulleys 132 and 134 having strung therethrough a cable 136 coupled at one end thereof to a cable reel 138 secured to tubular member 128. The other end of cable 136 has a hook 140 engaging a sling 142 positioned around the mid portion of package 122. The package 122 is then raised by rotating handle 144 of cable reel (powered or manual) 138 until the box 122 is positioned above the rollers 38. The cantilevered member 130 is then rotated in a transverse plane to position box 122 at a position immediately above the conveyor 20. The package 122 is then lowered and sling 142 removed so that the conveyor 20 can be operated for movement of package 122 to its destination.

While there have been shown and described preferred embodiments according to the invention, it is to be understood that various other modifications and adaptations may be made within the spirit and scope of the invention.

I claim:

1. In a dock located conveyor system for loading and unloading cargo in a cargo shipping device by slidably engaging the underside of the cargo, the combination comprising:
   a. an elongate horizontal main frame assembly with front and rear ends;
   b. conveyor means with a horizontal top plane mounted on and extending longitudinally of said frame assembly;
   c. fork-type lift means mounted at the front end portion of said frame assembly means mounting said lift means on said frame assembly for vertical and longitudinal movement relative to said frame assembly:
   d. first drive means to move the lift means longitudinally relative to the frame assembly and the conveyor means between an extended position where it projects forward from the front end of the frame assembly and conveyor means and a retracted position where it occurs coextensive with the front end portion of the frame assembly and conveyor means; and
   e. second drive means to move the lift means vertically relative to said frame assembly and conveyor means from a down position where said lift means occurs below the top plane of the conveyor means to elevated positions where it occurs above the top plane of the conveyor means.

2. The combination according to claim 1 wherein said conveyor means includes a plurality of powered reversible rollers spaced longitudinally of the frame assembly.

3. The combination according to claim 1 wherein said lift means includes at least a pair of laterally spaced, elongate, horizontal, generally wedge-shaped tines extending longitudinally of the axis of the frame assembly

4. The combination according to claim 3 wherein there are two tines positioned generally parallel to each other and positioned at opposite sides of the conveyor means.

5. The combination according to claim 1 wherein the main frame assembly includes a pair of parallel generally C-shaped longitudinal rail members and the lift means includes movable carriage means having portions thereof positioned within the rail members for longitudinal movement therein.

6. The combination according to claim 5 wherein the movable carriage means carries a pair of elongate actuating arms with ends pivotally connected with the carriage means and having a free end connected with said tines for limited pivotal movement.

7. The combination according to claim 6 wherein the actuating arms and the tines occur on laterally spaced vertical planes spaced laterally outward of the conveyor means.

8. The combination according to claim 7 wherein at least one of said actuating arms has a sector gear portion adjacent the actuating arm pivotable mounting thereof, said sector gear portion engaging a rack gear having drive means associated therewith for varying the elevation of the tines.

9. The combination according to claim 8 wherein said lift means includes stabilizing means for maintain-

ing the tines generally horizontal and parallel to the plane of the conveyor means.

10. The combination according to claim **9** wherein said stabilizing means includes a stabilizing arm pivotally mounted at one end thereof to the carriage means, said tines include an oppositely disposed aligned extension arm with the free end thereof pivotally secured to the other end of said stabilizing arm; the stabilizing arm, the actuating arm and the extension arm being so connected to form a parallelogram with a line intersecting the pivotal mounting points of the stabilizing arm and the actuating arm on the carriage member.

11. The combination according to claim **1** wherein the main frame assembly includes a pair of elongate telescoping members to engage the underside of cargo and means for moving the said members longitudinally of the frame assembly from a position within the frame assembly to a position where they project from the front end of the frame assembly.

12. The combination according to claim **11** wherein the telescoping members are shiftable between a first position below the top plane of the conveyor means and a second position above the top plane of the conveyor means.

13. The combination according to claim **12** wherein each of the telescoping members includes a first inverted generally U-shaped blade positioned within and slidable with respect to the upper arms of a generally H-shaped extrusion, the blade and the extrusion being substantially coextensive with an inflatable bag extending the length thereof in the space between the bight portion of the blade and the cross portion of the extrusion.

14. The combination according to claim **13** wherein the main frame assembly includes a generally U-shaped rail member and the lower arms of the extrusion have a plurality of rollers rotatably secured thereto for coacting with the bight portion of the generally U-shaped rail member.

15. In a dock located conveyor system for loading and unloading cargo in a shipping device by slidably engaging the underside of the cargo, the combination comprising:

a. an elongate horizontal main frame assembly with front and rear ends and including a pair of generally paralled beams;

b. longitudinally extending powered reversible conveyor means with a cargo supporting top plane mounted on said frame assembly and positioned between said beams;

c. rail members secured to said beams;

d. carriage means movable on said rail members;

e. lift means having a first member pivotally secured at one end thereof to said carriage means, said lift means having a pair of elongate horizontal tines secured to the other end of said member for limited pivotal movement, said tines occurring at opposite sides of the conveyor means at least partially straddling said beams and being adapted for slideably engaging the underside of cargo;

f. first drive means coupled to said carriage means for moving said carriage means between a first position where said tines extend forwardly beyond the front ends of said beams and a second position where said tines are positioned rearwardly of the front ends of the beams;

g. second drive means for rotating said first member of said lift means about its pivot point to shift the tines above and below the top plane of the conveyor means; and

h. stabilizing means coacting with said first member of said lift means and said tines to maintain said tines generally parallel to said beams as said first portion is rotated about its pivot point, whereby cargo engaged and supported on the tines can be transferred between the top plane of the conveyor means and a position spaced forward of said conveyor means.

16. The combination according to claim **15** wherein the rail members are generally C-shaped in cross-section and the carriage member is provided with a plurality of rollers engaging the upper and lower arms of the rail members.

17. The combination according to claim **15** wherein said stabilizing means includes a stabilizing bar pivotally mounted at one end thereof to said carriage means, said tines include an oppositely disposed aligned extension arm with the free end thereof pivotally secured to the other end of said stabilizing bar, the stabilizing bar, the first member, and the extension arm being so connected to form a parallelogram with a line intersecting the pivotal mounting points of the stabilizing bar and the first member on the carriage means.

18. The combination according to claim **15** wherein the first drive means is a hydraulic cylinder mounted on the main frame assembly and having a ram coupled to the carriage means.

19. The combination according to claim **18** wherein the second drive means includes a second hydraulic cylinder having a ram-operated rack gear driven thereby, the first member of the lift means having a sector gear portion adjacent its carriage means pivot, the sector gear engaging the rack gear to provide angular displacement of the first member about its pivot.

20. A combination conveyor and forklift system comprising:

an elongate horizontal main frame assembly with front and rear ends including an elongate conveyor means with a cargo supporting top plane mounted thereon and extending longitudinally thereof;

a plurality of laterally spaced, horizontal longitudinally extending cargo supporting tines mounted relative to said frame assembly for independent vertical and longitudinal movement relative to said frame assembly and conveyor means; and

drive means for driving the tines vertically between positions above and below the top plane of the conveyor means and longitudinally between positions rearward and forward of the front ends of the frame assembly and conveyor means.

21. The combination of claim **20** wherein the drive menas includes means for driving the tines to transfer cargo between the conveyor means and a storage position beyond the front end of the conveyor and above the top plane thereof.

22. The combination of claim **21** wherein said last-mentioned means establishes a transfer path for said cargo which does not rise higher than said storage position upon longitudinal movement of the cargo from or to said storage position.

23. The combination of claim **20** wherein the drive means includes means for moving the tines to transfer cargo between the conveyor means and a storage position beyond the front end of the conveyor means and below the top plane thereof.

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