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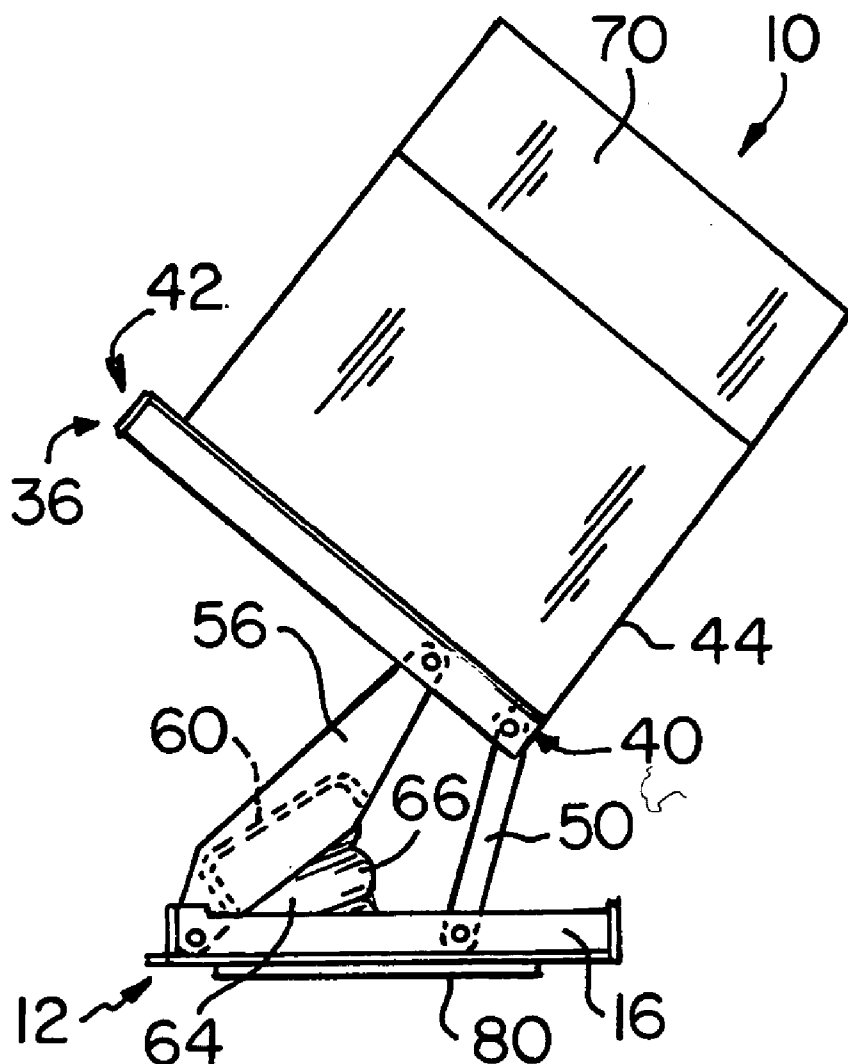
(57) **ABSTRACT**

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Related U.S. Application Data

(60) Provisional application No. 60/524,100, filed on Nov. 21, 2003.

A work platform assembly **10** of the invention has a base **12** and a work platform **36** movable with respect to the base **12**. The work platform **36** can be connected to the base **12** by at least one pivot arm. A lift device **64** is configured to move, e.g., raise and tilt, the work platform **36** with respect to the base **12**. In one particular embodiment, the work platform **36** is connected to the base **12** by a plurality of pivot arms that are pivotally connected to the base **12** and the work platform **36**. In one embodiment, the lift device **64** is a pneumatic lift bag located between the base **12** and the work platform **36**.



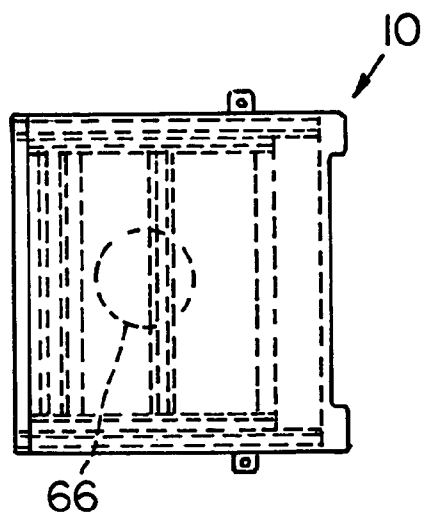


FIG. 6

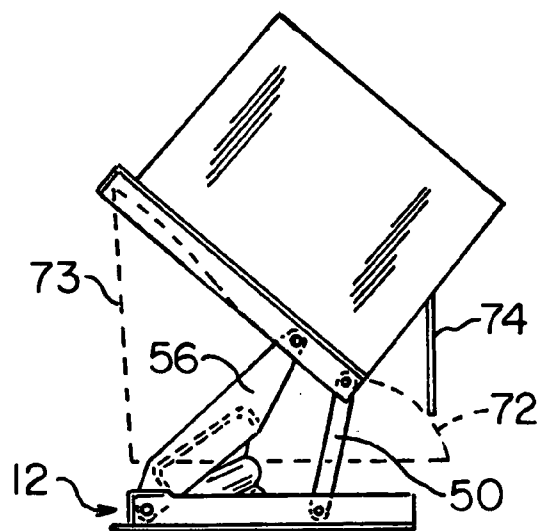


FIG. 7

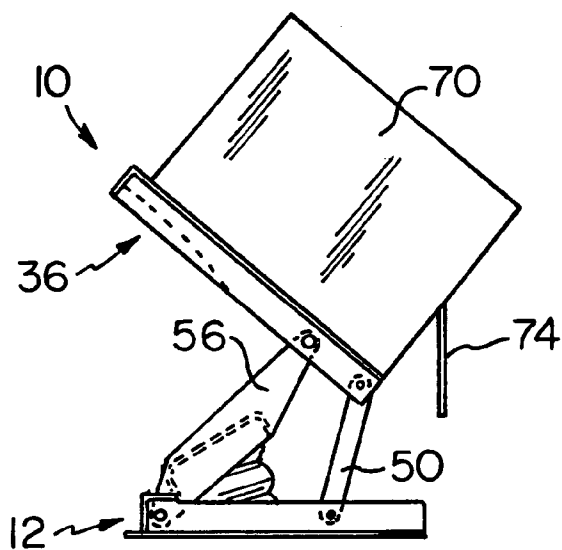


FIG. 8

TILTABLE WORK PLATFORM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefits of U.S. Provisional Application Ser. No. 60/524,100, filed Nov. 21, 2003, and is related to U.S. patent application Ser. No. **10/349,503**, filed Jan. 22, 2003, which claims priority to U.S. Provisional Application Ser. No. 60/351,492, filed Jan. 24, 2002, all of which applications are herein incorporated by reference in their entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates generally to industrial work platforms and, more particularly, to a work platform assembly having a tiltable work platform.

[0004] 2. Description of the Currently Available Technology

[0005] In many industrial applications, manufacturing components, such as parts for use on an assembly line, are packed in large shipping containers and shipped from one location to another, such as from a manufacturer to an assembly facility. Typically, the parts are placed in layers in the shipping container with the layers separated by packing material. The shipping container is moved to a workstation at the assembly facility where the parts are unpacked and used by a worker on an assembly line. This movement is typically done using a conventional motorized vehicle, such as a forklift truck. At the workstation, the container is typically removed from the vehicle and placed on the floor. The container is opened and the top packing layer is removed to expose the top layer of parts. This top layer of parts can then be removed from the shipping container until all of the parts in this layer are gone. The next layer of packing material can then be removed to expose the underlying layer of parts and these parts can also be removed. Depending upon the size of the parts and the size of the shipping container, several layers of parts can be packed in one container.

[0006] One drawback of this system is that as the upper layers of parts are removed, the remaining layers of parts become more and more inaccessible since they are lower in the container. If the container is simply placed on the floor near the workstation, the worker removing the parts must bend lower and lower to access and remove each successive layer of parts. Further, as the layers of parts are removed, the lower layers of parts on the side of the container opposite to where the worker is standing may be beyond the reach of the worker. Therefore, the worker may have to walk around the container to get the parts on the other side. This consumes valuable time which could be more productively used in the actual manufacturing or assembly process.

[0007] In order to reduce this problem, tiltable work platforms have been developed. These conventional work platforms typically have a lift table with a lifting device configured to elevate the lift table and a tilt table with a separate tilting device configured to tilt the tilt table with respect to the lift table. While these conventional systems work well, there are some drawbacks. For example, the use of separate lift and tilt tables, as well as separate lifting and

tilting devices, increases the mechanical complexity and manufacturing costs for these devices.

[0008] Therefore, it would be advantageous to provide an apparatus and/or method of improving the access of a worker to the open container at a workstation that reduces or eliminates at least some of the problems associated with conventional systems. It would also be desirable to provide a work platform assembly that provides a more ergonomically advantageous positioning of a container utilizing a less mechanically complex apparatus than is currently utilized.

SUMMARY OF THE INVENTION

[0009] A work platform assembly of the invention comprises a base and a work platform movable with respect to the base. The platform can be connected to the base by at least one pivot arm. A lift device is configured to move, e.g., tilt and/or raise, the platform with respect to the base.

[0010] In one particular embodiment, the platform is connected to the base by a plurality, e.g., four, pivot arms that are pivotally connected to the base and the platform. For example, a forward or first set of pivot arms and a second or rear set of pivot arms can be connected to the base and platform. The lift device can be any device configured to move, elevate, and/or tilt the platform with respect to the base. In one embodiment, the lift device comprises a pneumatic lift bag located between the base and the platform.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The general concepts of the invention will be described with reference to the following drawing figures wherein like reference numbers identify like parts throughout.

[0012] **FIG. 1** is a side view of a work platform assembly of the invention in a lowered position;

[0013] **FIG. 2** is a perspective view of the work platform assembly of **FIG. 1**;

[0014] **FIG. 3** is a perspective view of the work platform assembly of **FIG. 2** in an elevated position;

[0015] **FIG. 4** is a side view of the work platform assembly of **FIG. 3** showing the position of a carton on the platform;

[0016] **FIGS. 5 and 6** are top and bottom views, respectively, of the work platform assembly of **FIG. 1**; and

[0017] **FIGS. 7 and 8** are side views of the work platform assembly of **FIG. 4** showing various dimensions of a particularly preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] As used herein, spatial or directional terms, such as "top", "bottom", "left", "right", "up", "down", "front", "rear", and the like, relate to the invention as it is shown in the drawing figures. However, it is to be understood that the invention can assume various alternative orientations and, accordingly, such terms are not to be considered as limiting. Further, all numbers expressing dimensions, physical characteristics, and so forth, used in the specification and claims are to be understood as being modified in all instances by the term "about". Accordingly, unless indicated to the contrary, the numerical values set forth in the following specification and claims can vary depending upon the desired properties sought to be obtained by the present invention. At the very

least, and not as an attempt to limit the application of the doctrine of equivalents to the scope of the claims, each numerical parameter should at least be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Moreover, all ranges disclosed herein are to be understood to encompass any and all subranges subsumed therein. For example, a stated range of "1 to 10" should be considered to include any and all subranges between (and inclusive of) the minimum value of 1 and the maximum value of 10; that is, all subranges beginning with a minimum value of 1 or more and ending with a maximum value of 10 or less, e.g., 5.5 to 10. The dimensions shown on the attached drawings represent one embodiment of the invention and should not be considered as limiting.

[0019] An exemplary work platform assembly of the invention will first be described and then a method of utilizing the work platform assembly to retrieve parts from a shipping carton will be described. However, it is to be understood that the exemplary work platform assembly described in the following discussion and specifically shown in the drawings is presented simply to disclose the general concepts of the invention and the invention is not limited to the specifically disclosed embodiment.

[0020] As shown in FIGS. 1-4, an exemplary work platform assembly 10 of the invention includes a base 12. In the illustrated exemplary embodiment, the base 12 includes a flat bottom 14 with a left side wall 16, a right side wall 18, a front wall 20, and a rear wall 22 each extending upwardly from the bottom 14. As shown particularly in FIG. 3, an inner left side wall 24 can be located inwardly from the left side wall 16 to form a slot or space 26 between the inner left side wall 24 and the outer left side wall 16. Similarly, an inner right side wall 28 can be spaced inwardly from the outer right side wall 18 to form a slot or space 30 between the inner right side wall 28 and outer right side wall 18. The base components can be made of any suitable material, such as but not limited to metal, and can be of any desired dimensions.

[0021] A work platform 36 is movable relative to the base 12. In the illustrated embodiment, the work platform 36 includes a flat top 38 having a front 40 and a rear 42. A stop 44 is attached to the front 40 of the work platform 36. In the disclosed embodiment, the stop 44 can be a metal plate extending upwardly from the front 40 of the work platform 36. The work platform 36 can be of any desired material, such as but not limited to metal, and can be of any desired dimensions.

[0022] The work platform assembly 10 includes means for tilting and/or elevating the work platform 36 with respect to the base 12. In the broad practice of the invention, any conventional tilting means can be utilized, such as scissors mechanisms, hydraulic devices, hinge assemblies, one or more pivot arms, and the like. For example, the work platform assembly 10 can include one or more supports extending between and pivotally connected to the base 12 and the work platform 36. In the illustrated embodiment, the work platform assembly 10 includes a first forward support 50 spaced from a second forward support 52. In the illustrated embodiment, the forward supports 50, 52 can be metal strips or arms, with one end of each arm pivotally connected to the base 12 and the other end of each arm pivotally connected to the work platform 36. As shown particularly in FIG. 3, the forward supports 50, 52 can be attached to the base 12 between the inner and outer side walls, i.e., can pivot

in the spaces 26, 30 between the inner and outer side walls. The upper end of each support 50, 52 is attached to the work platform 36, e.g., near the front 40 of the work platform 36.

[0023] The work platform assembly 10 can further include at least one rear support, such as at least one pivotable metal arm. In the illustrated embodiment, a first rear support 56 is spaced from a second rear support (not shown in the figures). The upper ends of the rear supports are pivotally connected to the work platform 36, e.g., at a position spaced from the upper ends of the forward supports 50, 52. The upper ends of the rear supports are connected to the work platform 36 rearwardly of the upper ends of the forward supports 50, 52. The lower ends of the rear supports are pivotally connected to the base 12. The rear supports can form or can be connected to a receiver 60 configured to receive one end, e.g., the upper end, of a lift device as described in more detail below. In the illustrated embodiment, the receiver 60 (FIG. 4) is a substantially inverted U-shaped (in cross section) member located between the rear supports. For example, the receiver 60 can be located on or formed in a metal piece extending between the rear supports.

[0024] A lift device 64 is positioned between the base 12 and the work platform 36 and is configured to elevate, tilt, or move the work platform 36 with respect to the base 12. The lift device 64 can be of any conventional type, such as but not limited to a mechanical screw, a scissors-type lifting mechanism, a hydraulic jack, an electrical lifting arm, or a pneumatic lift device, just to name a few. In the illustrated embodiment, the lift device 64 is a pneumatic device comprising one or more conventional lifting bags 66 which, when inflated, lift, tilt, and/or elevate the work platform 36 with respect to the base 12. Suitable lifting bags are commercially available from Carter Lift Bag, Inc. of Enumclaw, Wash. In the illustrated embodiment, the bottom of the lift device 64 is attached to or rests on the base 12. The top of the lift device 64 is connected to at least one of the rear supports. For example, the top of the lift device 64 can extend into the receiver 60, e.g., when inflated. The lift bag can be, for example, a wedge-shaped lift bag. By "wedge-shaped lift bag" is meant a lift bag that, when inflated, forms a wedge shape such that the top surface of the lift bag is inclined or angled with respect to the lift bag bottom. In another embodiment, the receiver 60 can be connected to or formed on the bottom of the work platform 36 rather than connected to the rear supports.

[0025] An exemplary method of utilizing the work platform assembly 10 of the invention will now be described. As shown in FIGS. 1 and 2, with the work platform assembly 10 in the lowered position, the front or upper ends of the front and rear supports are pivoted forward with respect to the base 12, and the bottom 14 of the work platform 36 rests on or is adjacent to the top of the base 12 (i.e., the upstanding walls of the base 12). As shown in FIGS. 4, 7, and 8, a carton 70 containing parts to be unloaded can be placed on top of the work platform 36 with the front of the carton 70 adjacent to or abutting the inner surface of the stop 44. To elevate the work platform 36 and provide access to the contents of the carton 70, the lift device 64 is activated. As will be understood particularly from FIGS. 4 and 7, as air is introduced into the pneumatic lift device, the lift device 64 pushes or applies a pressure upwardly against the rear supports, e.g., into the receiver 60. As the lift device 64 pushes upwardly against the receiver 60 (or rear supports), the work platform 36 is pivoted upwardly on the front and rear supports, with the front of the work platform 36 moving in the path 72 and the rear of the work platform 36 moving in the path 73

shown in dashed lines in **FIG. 7**. When the work platform **36** reaches a desired elevation and/or angle, the lift device **64** can be stopped to hold the work platform **36** at the desired elevation and/or angle. The stop **44** prevents the carton **70** from sliding off the front of the work platform **36**. The work platform **36** can be held in place by the pressure of the lift bag, or a conventional locking device, such as a metal rod or metal latch, can be used to hold the work platform **36** in place.

[0026] As will be appreciated by one skilled in the art, the work platform assembly **10** of the invention provides both a lifting and tilting function without the need for separate lift and tilt tables nor the need for separate lifting and tilting devices. The present invention combines both the lifting and tilting functions into one simple mechanical design. The lifting and tilting functions occur in one continuous or progressive motion rather than in two separate stages, as with previous work platforms.

[0027] As shown by lines **72** and **73** in **FIG. 7**, the work platform **36** initially begins to lift when the lifting device is activated and then smoothly lifts and tilts until a final desired position is achieved. A majority of the tilting motion occurs near the end of the lifting motion.

[0028] Most shipping cartons have drop doors **74** which fold down to allow easier access to parts at the bottom of the carton. A worker can begin to remove parts from the carton **70** and, when the level of parts is below the level of the drop door **74**, can open the drop door **74** as shown in **FIGS. 7 and 8** to allow the worker easier access to the parts near the bottom of the carton **70**. When the required parts have been removed, the locking device (if present) can be unlocked and the lift device **64** can be deactivated or reversed to pivot the work platform **36** downwardly towards the base **12** on the support arms. The carton **70** can then be removed and another carton placed on the top of the work platform **36** and the work platform **36** again elevated to allow the worker access to the parts in the container.

[0029] As shown particularly in **FIG. 4**, the present invention provides a more ergonomically advantageous positioning of a container than is possible with conventional devices. The container is positioned at a higher elevation, requiring less bending to access the parts, and also does not extend into the workstation as much as previous devices, which increases the work space available to a worker.

[0030] It will be readily appreciated by those skilled in the art that modifications may be made to the invention without departing from the concepts disclosed in the foregoing description. For example, a turntable **80** (**FIG. 4**) could be attached to the bottom of the base **12** to allow the base **12** and, hence, the work platform assembly **10** to be pivoted or turned at the workstation. Accordingly, the particular embodiments described in detail herein are illustrative only and are not limiting to the scope of the invention, which is to be given the full breadth of the appended claims and any and all equivalents thereof.

What is claimed is:

1. A work platform assembly, comprising:

a base;

a work platform movable with respect to the base, wherein the platform is connected to the base by at least one pivotable support; and

at least one lift device configured to both lift and tilt the platform with respect to the base.

2. The work platform assembly of claim 1, wherein the work platform is connected to the base by at least one forward support and at least one rear support.

3. The work platform assembly of claim 2, wherein the forward supports are connected at or near the front of the work platform.

4. The work platform assembly of claim 3, wherein the rear supports are connected to the work platform rearwardly of the front supports.

5. The work platform assembly of claim 1, wherein the lift device includes at least one pneumatic lifting bag.

6. The work platform assembly of claim 1, including a turntable connected to the base.

7. The work platform assembly of claim 2, including a receiver operably connected to the at least one rear support and configured to engage the lift device.

8. A work platform assembly, comprising:

a base;

a work platform movable with respect to the base;

a first forward support spaced from a second forward support, with one end of each forward support pivotally connected to the base and the other end of each forward support pivotally connected near the front of the work platform;

a first rear support spaced from a second rear support, with one end of each rear support pivotally connected to the base and the other end of each rear support pivotally connected to the work platform rearwardly of the front supports; and

a pneumatic lifting device configured to lift and tilt the work platform with respect to the base.

9. The work platform assembly of claim 8, including a receiver operably connected to the rear supports and configured to engage the lifting device.

10. The work platform assembly of claim 8, including a turntable connected to the base.

11. The work platform assembly of claim 8, including a stop connected to the work platform.

12. The work platform assembly of claim 8, wherein the lifting device is a pneumatic lift bag.

13. The work platform assembly of claim 12, wherein the lift bag is a wedge-shaped lift bag.

14. A work platform assembly, comprising:

a base;

a work platform connected to the base by a pair of first supports spaced from a pair of second supports, with one end of the first and second supports pivotally connected to the base and the other end of the first and second supports pivotally connected to the work platform; and

a pneumatic lift bag positioned between the base and the work platform such that inflation of the lift bag raises and tilts the work platform with respect to the base.

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