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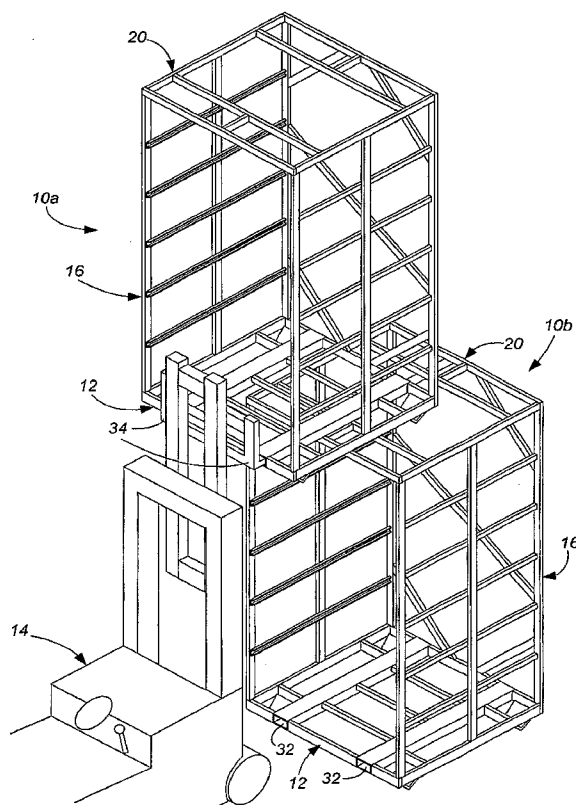
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[Continued on next page]

(54) Title: STACKABLE STORAGE APPARATUS



(57) Abstract: A shelf support apparatus (10) can be moved and stacked with a forklift (14). A front base cross member (36) has two tine openings (32) with lift tubes (30) for receiving lift tines (34) of a fork lift (14), and a bottom surface for receiving lift tines of a floor pallet jack. A generally horizontal top structure (20) includes feet-receiving openings (42) corresponding in location to base feet (38). The base feet (38) have targeting slopes (58, 60, 68, 70) both in a front-to-back direction and in a (preferably smaller) side-to-side direction, to guide the second, upper shelf support apparatus (10a) down onto the first, lower shelf support apparatus (10b), for stacking with the base feet (38) received in a nesting relationship. The top structure (20) also makes substantially perimetrical contact with the base (12) of the apparatus stacked thereon.



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STACKABLE STORAGE APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to the field of warehousing, and particularly
5 to the design and manufacture of apparatus, for storing material, which can be
stacked one on top of another and moved with a tined lift such as a forklift or
pallet lift.

It is common in a wide array of industries to store items in warehouses. In
general, the warehouse is a large, roofed structure having a horizontal floor upon
10 which a tined lift such as a forklift or pallet lift is driven. In the most common
warehouse layout, vertical supports are attached to the floor or assembled in a
grid layout spanning a significant area of the warehouse, with a number of
horizontal shelves arranged between the vertical supports. Pallets are then used
underneath the items being stored. The pallets provide tine openings for the
15 tines of the lift so the items being stored can be lifted and moved off the shelf
when desired. The vertical supports, and usually the horizontal shelves as well,
are thus a relatively permanent part of the warehouse.

To outfit a building as a warehouse, usually the vertical supports and
horizontal shelves must be assembled and set in place before storing any items.
20 The cost of purchasing and assembling the vertical supports and horizontal
shelves is considerable. In many instances, it is not known how many items
need be stored in the warehouse, and the uncertainty in how much storage
space is needed in turn leads to uncertainty in how much to spend on the vertical
supports and horizontal shelves while constructing and laying out the
25 warehouse. Better storage mechanisms are desired to reduce the initial start-up
cost of laying out and constructing the vertical supports and horizontal shelves in
the warehouse.

BRIEF SUMMARY OF THE INVENTION

30 In one embodiment the present invention is an apparatus providing a
functional unit, which could be a shelf unit for holding items, intended for
movement and stackability with other identical apparatus (or at least identical as
to the interfacing structures of the apparatus) using a tined lift such as a forklift.

The apparatus has based feet disposed lower than a front base cross member, with support uprights extending upward therefrom to a generally horizontal top structure. The front base cross member defines one or more tine openings for receiving lift tines, which could include a bottom surface of the base cross member. The top structure includes feet-receiving openings corresponding in location to the base feet, such that the apparatuses can be stacked. In one aspect, the base feet have targeting slopes both in a front-to-back direction and in a side-to-side direction, to guide the second, upper shelf support apparatus down onto the first, lower shelf support apparatus with the base feet received in a nesting relationship. The targeting slopes may act over different targeting areas. In another aspect, the top structure provides a top support perimeter which makes substantially perimetrical contact with the base of the apparatus stacked thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of a shelf storage apparatus in accordance with the present invention.

FIG. 2 is a front view of the shelf storage apparatus of FIG. 1, shown supporting two optional shelves.

FIG. 3 is a side view of the of the shelf storage apparatus of FIGS. 1-2.

FIG. 4 is a plan view of the base of the shelf storage apparatus of FIGS. 1-3 with uprights in cross-section taken along lines 4-4.

FIG. 5 is a perspective view showing a fork lift placing an upper shelf storage apparatus in a stacking relationship onto a lower shelf storage apparatus.

FIG. 6 is a side view showing positioning of three apparatuses in a stacking relationship.

FIG. 7 is a side view showing the apparatuses of FIG. 6 as stacked.

FIG. 8 is a side view showing lowering of a corner of an upper shelf storage apparatus in a stacking relationship onto a corner of a lower shelf storage apparatus.

FIG. 9 is a front view with the lift tine in cross-section showing lowering of the corner of the upper shelf storage apparatus in a stacking relationship onto the corner of the lower shelf storage apparatus, taken along lines 9-9 in FIG. 8.

While the above-identified drawing figures set forth preferred
5 embodiments, other embodiments of the present invention are also contemplated, some of which are noted in the discussion. In all cases, this disclosure presents the illustrated embodiments of the present invention by way of representation and not limitation. Numerous other minor modifications and
10 embodiments can be devised by those skilled in the art which fall within the scope and spirit of the principles of this invention.

DETAILED DESCRIPTION

The present invention generally relates to an apparatus that is stackable. Each of the apparatus has a base with targeting slopes and structures that are
15 adapted to receive the tines of a forklift. The apparatus also includes a structure that forms the top of the apparatus, and this top structure mates with the base of an overlying structure during stacking. When stacking two or more of the apparatuses, targeting slopes facilitate guiding the base of the upper apparatus onto the top structure of the lower apparatus. Furthermore, to provide support,
20 when two apparatuses are stacked, the base of the overlying apparatus is in contact with the top structure of the underlying apparatus. Furthermore, in one embodiment, the base is configured with feet of a height that would enable a pallet jack to be placed under the base.

A first embodiment of a shelf storage apparatus 10 in accordance with
25 one embodiment of the present invention is depicted in FIGS. 1-7. The shelf storage apparatus 10 generally includes a base section 12 which is intended to allow lifting of the apparatus 10 with a lift 14 (shown in FIG. 5), and a functional unit 16 above the base section 12. The functional unit 16 includes a number of uprights 18 (or alternatively vertically extending walls (not shown)) which support
30 a top section 20. Angled braces 22 may be fixed along the back of the apparatus 10 (as shown) and/or along the sides of the apparatus 10 (not shown) to provide stability to the uprights 18.

In one embodiment, each functional unit 16 is intended to receive and store items (not shown) such as in a warehouse setting. In that context, the functional unit 16 may be formed to further facilitate its use for storing items. In particular, the base 12 may be dimensioned to receive a standard wooden pallet (not shown). The preferred apparatus 10 has the front uprights 18 spaced about 5 48 inches apart, for an overall width of the apparatus 10 of about 50 inches. In one embodiment, the overall depth of the preferred apparatus 10 is about 47 inches. With the upright supports 18 and strengthening angled braces 22 along the back, this provides a working depth within the apparatus 10 of about 46 10 inches. With the 48 x 46 inch working floor area, the apparatus 10 can readily receive a standard wooden pallet, which typically has dimensions of about 40-44 x 44-50 inches. With the open front 24 of the apparatus 10, the standard pallet need not be pushed all the way to the back of the apparatus 10, but rather may extend slightly (a few inches) beyond the front 24 of the apparatus 10.

15 Similarly, the uprights 18 of the functional unit 16 permit the side walls to be open and not enclosed so items stored in the functional unit 16 can be viewed from the side. The front 24 of the functional unit 16 has a large area of unimpeded access and thus provides at least one shelf (which may be the top of the base 12) upon which items may be placed from the side of the apparatus 10, 20 rather than through the top of the apparatus 10. The term "shelf" as used herein particularly refers to this property of having horizontal access, as opposed to an enclosure with solid peripheral upstanding walls which would only permit items to be picked or placed through the top. To further assist in the shelf usage function of the preferred functional unit 16, the preferred shelf storage apparatus 10 has 25 a number of shelf slots or tracks 26. In one embodiment, these shelf slots 26 allow up to five shelves (two shelves 28 shown in FIG. 2) to be slid into the shelf storage apparatus 10 to break up the height of the shelf storage apparatus 10, thereby providing more horizontal shelf surfaces for storing of items. With each of these shelves 28 being readily insertable and removable relative to the shelf 30 slots 26, the shelf storage apparatus 10 provides significant flexibility in the height of items which can be stored.

While in one embodiment, shelf storage apparatus 10 is accessible from the front 24 (i.e., the primary side accessed by a fork lift 14), the shelf storage

apparatus 10 may alternatively or also be assessable through the right, left and/or rear sides (or the lift tubes 30 may be oriented in the side-to-side direction). Access through the right, left and/or rear sides is particularly beneficial if items are to be picked or placed while the apparatus 10 is on the forklift 14. As one example, the shelf storage apparatus could alternatively have only four or even only three support uprights, two of the support uprights defining the front of the apparatus, with the other support upright(s) defining the area of the apparatus extending rearward from the front, such as a middle support upright along the back of the apparatus.

The height of the apparatus 10 may be selected as desired for the items being stored and the desired stacking height and stacking stability of multiple apparatuses 10. The apparatuses 10 are intended to be moved with a lift 14 and generally have a height which corresponds to a significant weight of a loaded apparatus 10, i.e., too heavy to be lifted or moved by hand, particularly when loaded. A preferred height is one to three times the width of the apparatus 10, for a height of about three to twenty feet. In the preferred arrangement, the overall height is about 100 inches, providing an interior working height of about 91 inches.

The materials used to form the uprights 18, the shelf slots 26 and the angled braces 22 may be selected based upon the expected loads and environment of use of the apparatus 10. In the preferred embodiment for interior warehouse use and the preferred working height of the apparatus 10, the uprights 18 and angled braces 22 may be formed of 1"x2"x14 gauge or 11 gauge ASTM A513 or ASTM A500 grade steel tubing. Alternatively, prefabricated uprights such as those provided for shelving and rack units may be used, such as those available from Steel King Industries, Inc. of Stevens Point, Wisconsin as SK2000, or the Premium Industrial Pallet Racking Upright Frames provided by Advanced Material Handling, LLC of Indianapolis, Indiana. The depicted embodiment can of course also be used in a wide variety of other settings, including outdoor warehouse use or other outdoor locations, during shipping (on a truck, boat or plane, for instance), other indoor settings, etc.

The base 12 of the apparatus 10 should be constructed to facilitate lifting of the apparatus 10 using a tined lift. The preferred apparatus 10 has two

different ways in which this is done. A first structure permitting tined lifting is provided by two lift tubes 30 providing forklift tine openings 32 accessible on the front 24 of the apparatus 10. The preferred interior size of the tine receiving tubes 30 is about 2 3/4 inches in height x 4 3/4 inches in width (exterior dimensions of about 3 x 5 inches), formed of 11 gauge or 1/8" ASTM A513 or ASTM A500 grade steel tubing for sufficient strength. The tine openings 32 need to extend for at least half of the depth of the apparatus 10, so the forklift tines 34 can gain sufficient depth for cantilevered lifting. In the preferred arrangement, the tine openings 32 extend the full depth of the apparatus 10. This not only allows for the tines 34 of a forklift 14 to be fully inserted into the base 12 of the apparatus 10, but also means that the forklift 14 can operate either on the front 24 or the rear of the apparatus 10, which ever is more conveniently accessed. If desired, a single wider lift tube could alternatively be used to provide a single tine opening for receiving both lift tines of the fork lift.

The lift tubes 30 are supported and held in place by a series of cross-members 36. In the preferred arrangement, the cross-members 36 have the same overall height as the lift tubes 30, and thus may be formed of 1 x 3 inch 14 gauge or 11 gauge ASTM A513 or ASTM A500 grade steel tubing. These cross-members 36 are conveniently placed to also support the feet 38 of the apparatus 10. The base 12 also has three interior cross members 40 to further support the lift tubes 30. In one embodiment, the interior cross-members 40 are made up of 1" x 1" x 1/8" hot rolled steel angle pieces.

A second structure permitting tined lifting is provided by the horizontal bottom surface of the lift tubes 30 and the interior cross-members 40 in conjunction with the feet 38. The feet 38 extend below the horizontal bottom surface of the lift tubes 30 and the cross-members 36, 40. By raising this horizontal bottom surface of the lift tubes 30 and the cross-members 36, 40 above the floor plane (defined by the lowest extent of the feet 38), a pallet jack or floor jack can be rolled underneath the lift tubes 30 and the interior cross-members 40 and then used to lift the entire apparatus 10. To facilitate such pallet jack or floor jack lifting, the feet 38 should have a height in the range of 2 to 12 inches. In one embodiment, the feet 38 have a height of about 4 inches.

The feet 38 of the apparatus 10 contact the floor of the warehouse and

thereby must be sufficiently strong to support the weight of the apparatus 10 when loaded, and for stacking must be sufficiently strong to support the weight of two or more stacked, loaded apparatuses 10. In one embodiment, the feet 38 are provided by angled Vs, each formed of two sides of 3/8" x 6" x 6" hot rolled steel. Using angled Vs for feet 38 causes the feet 38 to have line contact areas with the floor which define the bottom support plane or floor plane of the apparatus. The line contact areas extend generally parallel to the base cross members 36, and facilitate the nesting or tessellating relationship between stacked apparatuses as further explained below.

The top section 20 of the apparatus 10 includes openings 42 which are areally located in a position in plan view corresponding to the position of the feet 38. In the preferred apparatus 10, these openings 42 are provided between two front cross-members 44, 46 and between two rear cross-members 48, 50, and to the inside of two fore-aft top edge members 52. In one embodiment, the top section 20 is provided by 1"x2"x14 gauge or 11 gauge ASTM A513 or ASTM A500 grade steel tubing. Two additional fore-aft stubs or cripples 54 may be provided to further strengthen the cross-members 44, 46, 48, 50. The top section 20 of the apparatus 10 defines a flat planar top with unimpeded access from above. Thus, the top section 20 can be used as a planar top shelf to receive items of virtually any size, including sizes which overhang the support uprights 18.

As best shown in FIGS. 5-9, the apparatuses 10 are particularly intended to permit stacking of identical apparatuses 10, for use in a warehouse space without requiring permanent uprights or support columns extending from the floor of the warehouse and without requiring separate floor to ceiling supports for shelving to be installed. That is, the preferred apparatuses 10 facilitate stacking in an open warehouse space, without requiring any particular permanent shelving or supporting structure be constructed in the warehouse space prior to use. By enabling this stacking feature, the apparatuses 10 significantly reduce the build-out cost for warehouse space prior to use in a shelving arrangement. Further, the apparatuses 10 permit stacking in a tessellating relationship, i.e., any apparatus 10 can be placed on the warehouse floor as a bottom apparatus, and any other identical apparatus 10 can then be stacked thereon. Each

apparatus 10 can be used either on the bottom, middle or top as the apparatuses 10 are stacked.

As particularly shown in FIGS. 8 and 9, the feet 38 separately have side surfaces that provide targeting areas 56, 58 during stacking placement of a top apparatus 10a down onto a bottom apparatus 10b. The nature of these targeting areas 56, 58 is quite important, because the operator of the fork lift 14 is likely to have some difficulty in seeing and targeting of the upper apparatus 10a into exact alignment onto the lower apparatus 10b.

As best shown in FIG. 8, the feet 38 have a front targeting area 56 and a rear targeting area 58. Each of these targeting areas 56, 58 interacts with the cross-members 44, 46, 48, 50 of the lower apparatus 10b to assist in alignment of the apparatuses 10 during stacking. In particular, the front targeting area 56 has a targeting slope 60 sufficient to, during forklift stacking, cause rearward sliding of the top apparatus 10a into alignment down on the bottom apparatus 10b. To enable such sliding during forklift lowering, the front targeting slope 60 should be at least 30° relative to horizontal. In the preferred embodiment, the front targeting slope 60 is about 45° to horizontal.

This front targeting slope 60 must extend over a sufficient depth of the apparatus 10 that the forklift operator can readily hit the fore-aft target area. To facilitate such depth placement of the upper apparatus 10a down onto the lower apparatus 10b, the front targeting slope 60 should provide a targeting area 56 of at least one inch. In the preferred embodiment, the front targeting area 56 is about 4 inches. The front targeting slope 60 thus has a significant area for the forklift operator to hit so the targeting slope 60 rides on the corner of the front cross-member 44, sliding the top apparatus 10a rearward down onto alignment with the bottom apparatus 10b.

Like the front targeting area 56, the rear targeting area 58 has a targeting slope 62 sufficient to, during forklift stacking, cause sliding of the top apparatus 10a forward into alignment down on the bottom apparatus 10b. In the preferred embodiment, the rear targeting slopes 62 have the same slope and size as the front targeting slopes 60, with preferred values of about 45° to horizontal, extending over a rear targeting area 58 of about 4 inches. Thus, to seat the upper apparatus 10a down onto the lower apparatus 10b, the fork lift operator

must hit the depth target plus or minus 4 inches. Provided the fork lift operator can hit this depth target, the front and/or rear targeting slopes 60, 62 will automatically align the upper apparatus 10a as it slides into a nesting relationship onto the lower apparatus 10b.

5 While the preferred embodiment has front targeting slopes 60 and rear targeting slopes 62 on each of the feet 38, this is not necessarily required. If desired, for instance, the front feet could have front targeting slopes with no rear targeting slopes, and the rear feet could have rear targeting slopes with no front targeting slopes. For instance, the feet of the apparatus 10 could alternatively
10 be provided by two fore-aft runners, with each fore-aft runner providing only one front targeting slope and only one rear targeting slope. If one or more runners are provided, at least one of the runners must be sufficiently long to provide two spaced feet areas, so the apparatus still essentially has at least three feet to stand on.

15 The feet 38 also have a right targeting area 64 and a left targeting area 66. Each of these targeting areas 64, 66 interacts with the edge members 52 of the lower apparatus 10b to assist in right to left alignment of the apparatuses 10 during stacking. Like the front and rear targeting areas 56, 58, the right and left targeting areas 64, 66 should have targeting slopes 68, 70 which are at least 30°
20 relative to horizontal to enable side-to-side sliding of an upper apparatus 10a down into nesting alignment onto a lower apparatus 10b during forklift lowering. The right and left targeting slopes 68, 70 must extend over a sufficient width of the apparatus 10 that the forklift operator can readily hit the side-to-side target area. To facilitate such side-to-side placement of the upper apparatus 10a down
25 onto the lower apparatus 10b, the right and left targeting slopes 68, 70 should each provide a targeting area of at least 1/2 inch. To provide a sufficient side-to-side targeting area, the right and left targeting slopes 68, 70 should be 88° or less relative to horizontal. Note that the right and left targeting areas 64, 66 can be smaller than the front and rear targeting areas 56, 58, because side-to-side
30 accuracy of the lift operator is generally better than fore-aft accuracy. The preferred right and left targeting slopes 68, 70 are about 80° relative to horizontal, providing right and left targeting areas 64, 66 of about ¾ inch each.

An aspect for the stackability of the apparatuses 10 is that the base 12 of

the upper apparatus 10a provide a substantially complete periphery of contact with the top 20 of the lower apparatus 10b. The feet 38 are received in openings 42 within the substantially complete periphery of contact. In the preferred embodiment, a complete periphery of contact is provided between the lower
5 faces of the cross-members 36 and fore-aft bottom edge members 72 and the top faces of the cross-members 44, 50 and edge members 52. By having a substantially complete periphery of encircling contact, the stability of the apparatuses 10 when stacked is greatly improved.

If stacking is not involved, the apparatuses 10 can be lifted and moved
10 with a fork lift 14 without using the lift tubes 30 by using only the bottom of the base 12. The lift tubes 30 are particularly important for stacking, however, when the lower apparatus 10a, 10b obstructs access to the bottom of the base 12 of the upper apparatus 10b, 10c due to the substantially complete periphery of encircling contact.

15 The various steel pieces of the apparatus 10 can be welded together utilizing a C.V. transformer based G.M.A.W. welder (not shown). The filler metal for the welding process can be an ER70S-6 filler metal with .035 wire thickness.

While the preferred functional unit is a shelf unit 16, the base 12 and top 20 of the apparatus 10 can be used with a wide range of other functional units as
20 desired to permit stacking of functional units in a warehousing situation using a lift 14, or in any other site having a generally horizontal floor where a lift 14 might be present. As additional examples, the functional unit could be a container, a portable toilet ("porta-potty"), a safe with a locking door, a gaylord or any of a wide variety of other functional units.

25 Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

CLAIM(S):

1. A shelf support apparatus for movement with a lift, comprising:
at least three support uprights extending upward, two of the support
uprights defining a front of the apparatus and being front
support uprights;
at least three base feet supporting the support uprights, the at least
three base feet being designed to rest on a generally flat floor;
a front base cross member extending between the front support
uprights, the front base cross member defining one or more tine
openings for receiving lift tines extending above the floor;
a generally horizontal top structure adjoining support uprights, the
generally horizontal top structure defining a top support plane of
the apparatus, with feet-receiving openings defined in the top
support plane corresponding in location to the base feet, for
receiving the base feet of an identically-constructed shelf
support apparatus, such that a first, lower shelf support
apparatus can support a second, upper shelf support apparatus
thereabove, with the front base cross member of the second,
upper shelf support apparatus being in contact with the top
support plane of the first, lower shelf support apparatus;
wherein the base feet have targeting slopes both in a front-to-back
direction and in a side-to-side direction, the targeting slopes
mating relative to the feet-receiving openings to guide the
second, upper shelf support apparatus down onto the first, lower
shelf support apparatus with the base feet received in a nesting
relationship.
2. A stackable apparatus for movement with a lift, comprising:
at least three support uprights extending upward, two of the support
uprights defining a front of the apparatus and being front
support uprights;
at least three base feet supporting the support uprights, the at least
three base feet being designed to rest on a generally flat floor,

- with a front two of the base feet being V-shaped bars running between the two front support uprights;
a front base cross member extending between the front support uprights, the front base cross member defining one or more tine openings for receiving lift tines extending above the floor;
5 a functional unit supported above the front base cross member;
a generally horizontal top bar adjoining the front support uprights, the top bar defining a top support plane; and
feet-receiving openings defined in a top of the stackable apparatus
10 immediately behind the top bar and corresponding in location to the base feet, for receiving the base feet of an identically-constructed stackable apparatus, such that a first, lower stackable apparatus can support a second, upper stackable apparatus thereabove, with the feet of the second, upper
15 stackable apparatus extending lower than the top support plane of the first, lower stackable apparatus, with front edges of the V-shaped bars received immediately behind the top bar.
3. A stackable apparatus for movement with a lift, comprising:
- 20 at least three base feet, the at least three base feet being designed to rest on a generally flat floor;
a base support perimeter suspended by the base feet to a height within a range of two to twelve inches above the floor, the base support perimeter having a bottom surface for receiving a pallet
25 jack thereunder;
one or more tine openings for receiving lift tines of a fork lift, the one or more tine openings being defined above the base support perimeter, the one or more tine openings having a depth of at least one half of a depth of the stackable apparatus;
30 a functional unit supported above the base support perimeter;
a top support perimeter provided above the functional unit and connected to the functional unit, the top support perimeter providing a support surface corresponding in plan location to the

base support perimeter for substantially perimetrical support of the base support perimeter of an identically constructed stackable apparatus,

5 the stackable apparatus having feet-receiving recesses defined within the top support perimeter corresponding in plan location to the base feet, for receiving the base feet of an identically-constructed stackable apparatus, such that a first, lower stackable apparatus can support a second, upper stackable apparatus thereabove, with the top support perimeter of the first, lower stackable apparatus being in substantially perimetrical contact with the base support perimeter of the second, upper stackable apparatus, and with the base feet of the second, upper stackable apparatus extending lower than the top support perimeter of the first, lower stackable apparatus;

10

15 wherein the base feet have targeting slopes both in a front-to-back direction and in a side-to-side direction, the targeting slopes mating relative to the feet-receiving recesses to guide the second, upper stackable apparatus down onto the first, lower stackable apparatus with the base feet received in a nesting relationship.

20

4. The apparatus of any of the preceding claims, further comprising a rearward cross member extending behind the front base cross member, with the rearward cross member disposed to receive lift tines jointly with the front base cross member.

25

5. The apparatus of any of the preceding claims, with a front base cross member-defined first tine opening located underneath the front base cross member for receiving lift tines of a pallet jack, and one or more second tine openings for receiving lift tines of a fork lift, with the second tine openings being located at higher elevation than the first tine opening.

30

6. The apparatus of claim 5, wherein the second tine openings are provided

by tubes running front-to-back on the apparatus and sized to receive tines of a lift therewithin.

7. The apparatus of any of the preceding claims, wherein the base feet
5 comprise angled Vs, with front and rear extents of the angled Vs having a different slope than side-to-side extents of the angled Vs.

8. The apparatus of any of the preceding claims, wherein the base feet
10 comprise angled Vs with line contact areas for floor contact.

9. The apparatus of claim 8, wherein the line contact areas extend generally
parallel to the front base cross member.

10. The apparatus of any of the preceding claims, wherein the top structure
15 defines a flat planar top of the apparatus with unimpeded access from above to the flat planar top.

11. The apparatus of any of the preceding claims, wherein the feet provide
20 an elevation within the range of 2 to 12 inches above the floor for the apparatus to be lifted with a pallet jack thereunder.

12. The apparatus of any of the preceding claims, wherein targeting slopes
provided by the feet provide a front-to-back targeting area of at least one inch,
25 wherein the targeting slopes provide a side-to-side targeting area of at least one inch.

13. The apparatus of any of the preceding claims, wherein targeting slopes
provided by the feet extend at an angle of at least 30° relative to horizontal
and no more than 88° relative to horizontal.

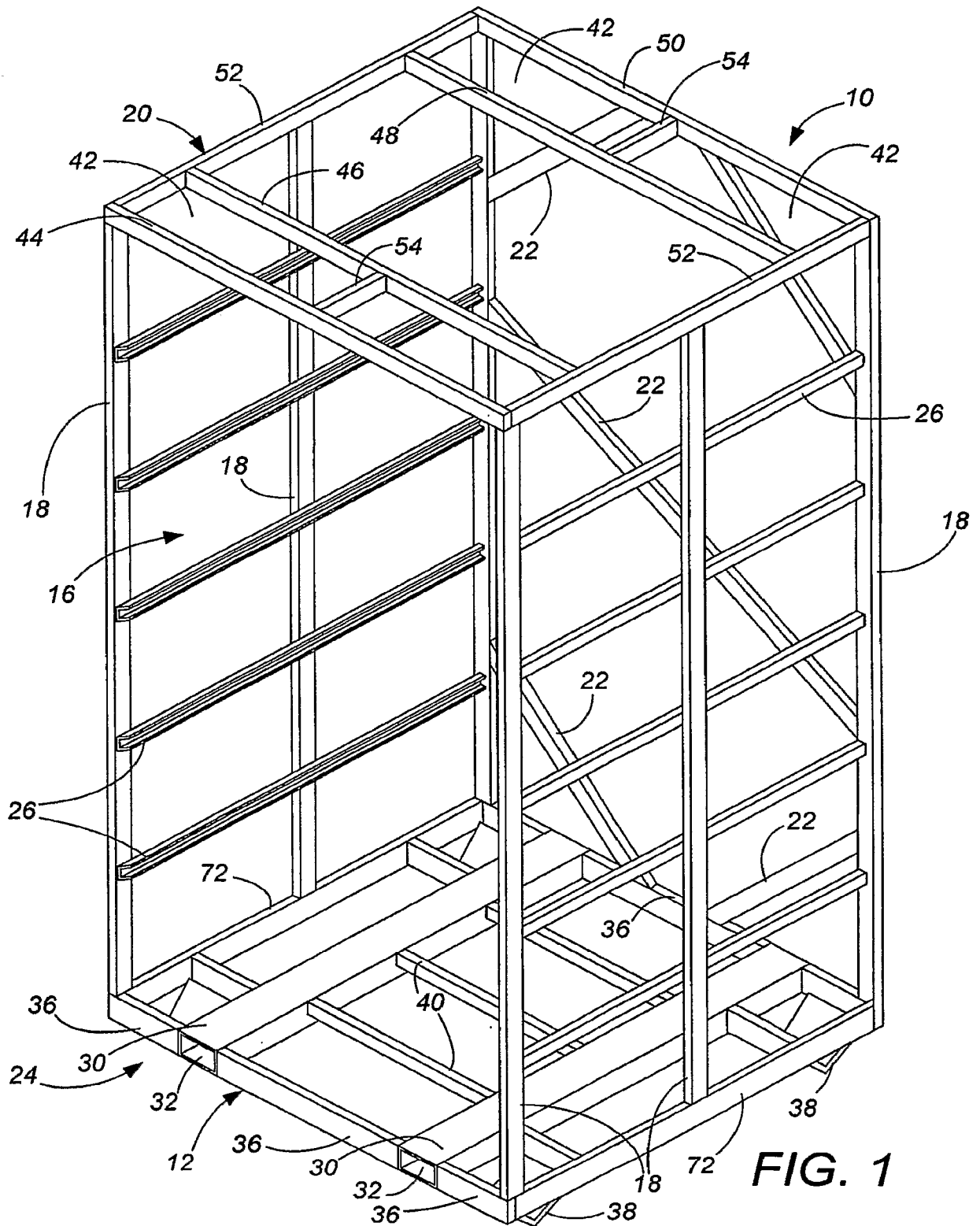
14. The apparatus of any of the preceding claims, wherein support uprights
30 are sufficiently spaced to receive a standardly sized pallet above and substantially behind the front base cross member and between front support

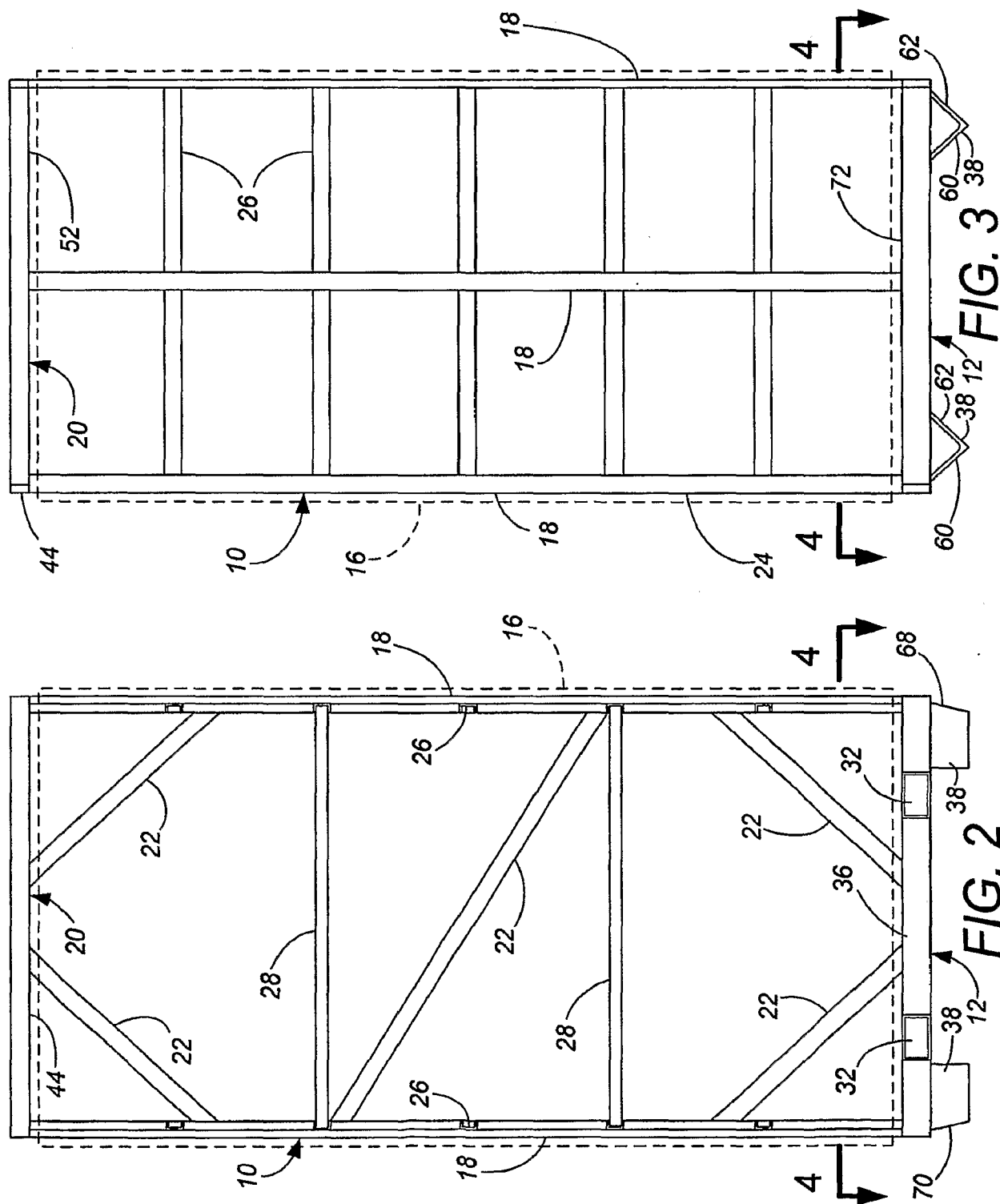
uprights.

15. The apparatus of claim 14, having a height within the range of 3 to 20 feet.

5

16. The apparatus of any of the preceding claims, further comprising:
one or more pairs of shelf receiving tracks extending rearwardly from
each front support upright; and
a shelf removeably received by each pair of shelf receiving tracks.





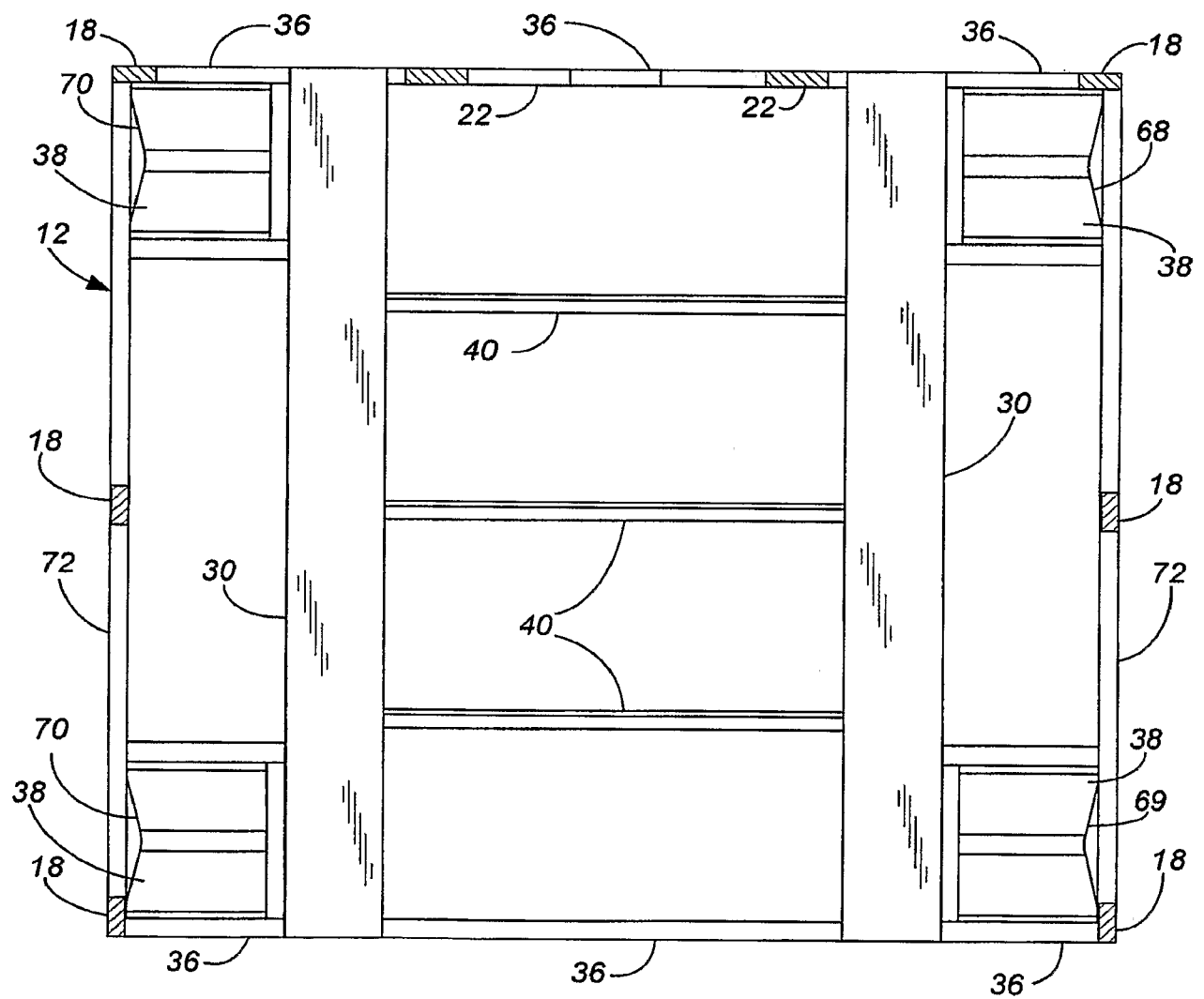


FIG. 4

