

**Jan. 23, 1962**

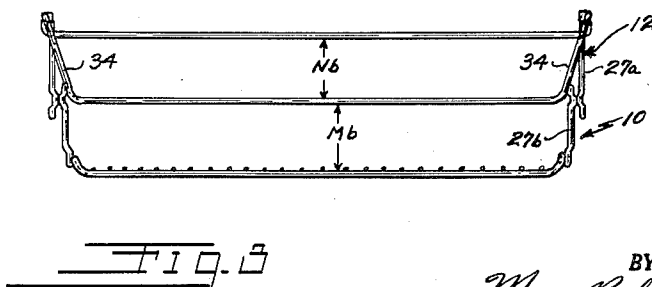
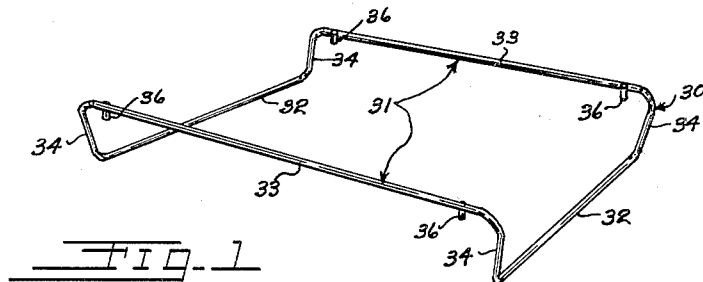
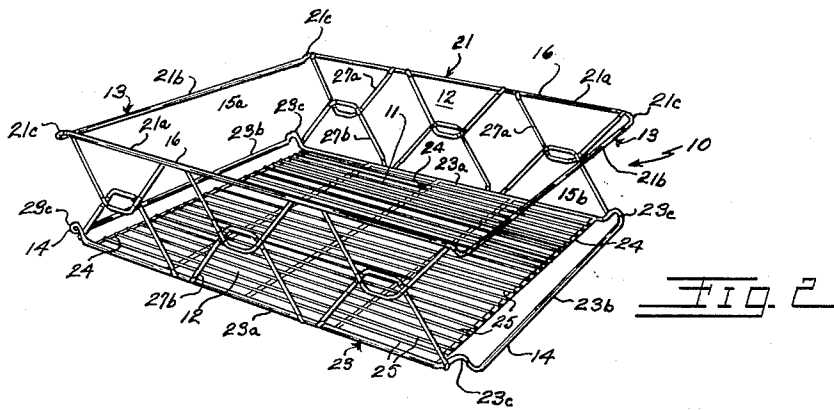
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**3,018,002**

## ADAPTER FOR STACKING CONTAINERS

Filed Jan. 4, 1960

3 Sheets-Sheet 1



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ADAPTER FOR STACKING CONTAINERS

Filed Jan. 4, 1960

3 Sheets-Sheet 2

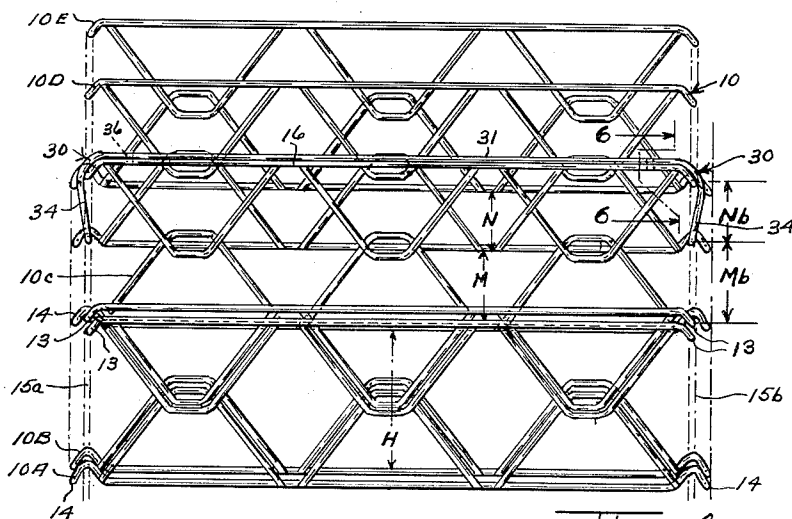


FIG. 4

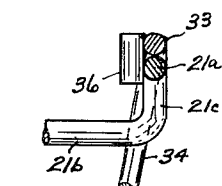


FIG. 6

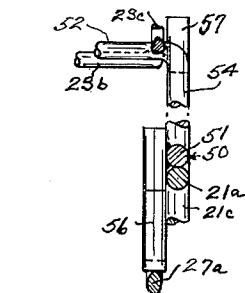


FIG. 6

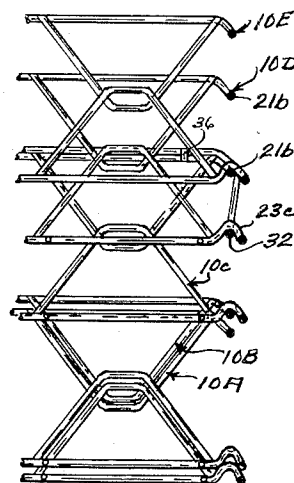


FIG. 5

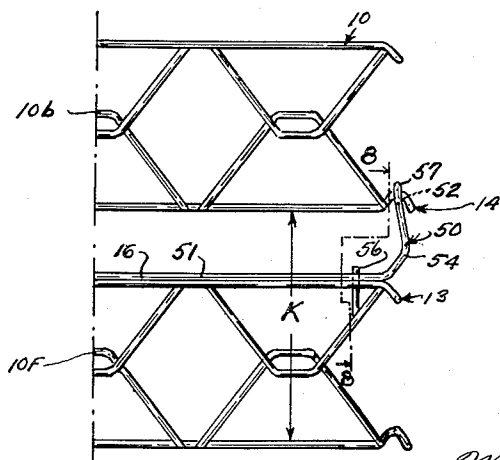


FIG. 7

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ADAPTER FOR STACKING CONTAINERS

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3 Sheets-Sheet 3

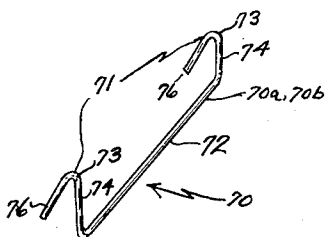


Fig. 9

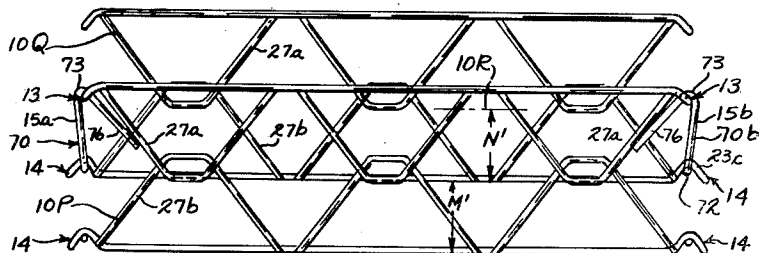


Fig. 12

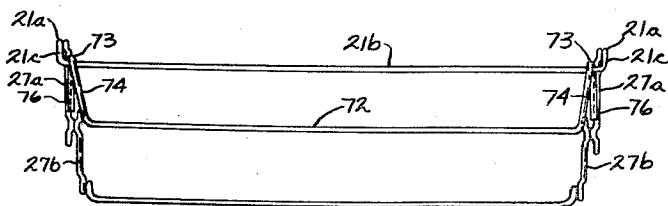


Fig. 11

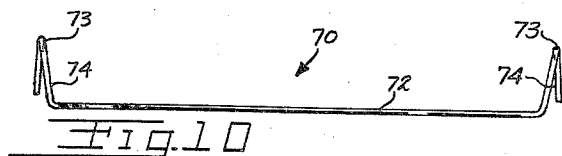


Fig. 10

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## ADAPTER FOR STACKING CONTAINERS

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20 Claims. (Cl. 211-126)

This invention relates to improvements in an adapter for trays, containers, or receptacles, especially that type adapted to be tiered when in use and to be nested when empty; and improvements in the combination of said adapter and the coacting containers, receptacles or trays.

Whenever in the specification and claims these trays, containers or receptacles are referred to as "trays" or "receptacles," it is intended that either term includes crates, boxes, baskets, trays, skids, pallets, flats, spaced apart shelves, and similar receptacles or article carrying devices, which may be tiered, or otherwise stacked, one upon another when in use and nested when empty for conservation of space. The references herein to receptacles in a "stack" or in "stacking relationship" generically refer to all types of stacks of adjacent receptacles including not only those in actual contact with each other in either "tiering" or "nesting" relationship but also those vertically spaced apart by an adapter (shown for example in FIGS. 4, 5, 7 and 12); and "stacking support members" refers generically to tiering members or adapter engaging support members.

One of the objects of the present invention is to provide an adapter for tierable and nestable receptacles wherein said receptacles are adapted to be tiered or nested without said adapter and said adapter is constructed to permit, with its use, a receptacle to be continuously stacked, to have decreased load capacity, or to have increased load capacity.

A further object of the present invention is to provide an adapter for use with tierable and nestable receptacles having no moving parts and having rigidly connected upper and lower stacking support members.

A further object of the present invention is to provide an adapter constructed to have novel coaction with two vertically spaced apart receptacles of like construction wherein said receptacles are adapted for assembling in tiering or nesting relationship without said adapter and wherein said adapter is constructed to maintain these receptacles in another stacking relationship providing a height between the receptacles different than said tiering and nesting relationship.

A further object of the present invention is to provide an adapter wherein said aforementioned different height is greater than the height in the nesting relationship, but less than the height in the tiering relationship.

A further object of the present invention is to provide an adapter wherein the aforesaid different height is greater than the height in the tiering relationship.

A further object of the present invention is to provide an adapter for a receptacle characterized by its inexpensive manufacturing cost, ease of assembly of its component parts, structural simplicity, multiplicity of functional advantages, strong and sturdy nature, compactness in stacking relationship with tiering or nesting receptacles, and/or ease of assembly with receptacles in stacking relationship.

Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and descriptions, and the essential features will be set forth in the appended claims.

In the drawings:

FIG. 1 is a perspective view of a first form of adapter;

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FIG. 2 is a perspective view of one of the many like receptacles shown in the drawings, and is illustrative of one of the many type receptacles usable with the different forms of adapters disclosed herein;

FIG. 3 is an end view of the adapter in FIG. 1 assembled on the receptacle in FIG. 2;

FIG. 4 is a side plane view of the first form of adapter from FIG. 1 and five of the receptacles from FIG. 2 assembled in stacking relationship with, when the receptacles are numbered in increasing sequence from bottom to top, the first and second receptacles in compact or grouped nesting relationship, the second and third receptacles in tiering relationship, and the third, fourth, and fifth receptacles in continuous stacking relationship with the first form of adapter located between the third and fourth receptacles;

FIG. 5 is a vertical, longitudinal sectional view through the right end of the receptacles in FIG. 4;

FIG. 6 is a vertical, transverse sectional view taken generally along the lines 6-6 in FIG. 4;

FIG. 7 is a side elevational view of two receptacles of the type shown in FIG. 2 assembled with a second form of adapter in an increased capacity stacking relationship so that the vertical height between the bottom load supporting parts of the two receptacles is greater than the vertical height between these parts when the two receptacles are in tiered relationship without use of the adapter;

FIG. 8 is a vertical sectional view taken generally along the line 8-8 in FIG. 7 through one corner of the assembly;

FIG. 9 is a perspective view of one piece of a third form of adapter having a plurality of identically shaped and separate pieces;

FIG. 10 is an elevational view of the adapter piece in FIG. 9;

FIG. 11 is an end view of the adapter piece in FIG. 9 assembled upon a receptacle from FIG. 2; while

FIG. 12 is a side elevational view of the third form of adapter, consisting of two of the adapter pieces shown in FIG. 9, and of two of the receptacles from FIG. 2 assembled in continuous stacking relationship with the two pieces of this third form of adapter located therebetween.

Before the adapters for receptacles herein illustrated are specifically described, it is to be understood that the invention here involved is not limited to the structural details or arrangement of parts here shown since adapters, and adapters combined with receptacles, embodying the present invention may take various forms. It is also to be understood that the phraseology or terminology herein employed is for purposes of description and not of limitation since the scope of the present invention is denoted by the appended claims.

Receptacle 10 in FIG. 2 is adapted for assembling in stacking relationship with receptacles of like construction with or without use of adapter 30 in FIGS. 1, 3, 4, 5 and 6; adapter 50 in FIGS. 7 and 8; or adapter 70 in FIGS. 9-12. Although receptacles 10 are identical in shape, a separate reference number has been given for clarity of explanation to each of the different positions 10A, 10B, 10C, 10D, 10E, 10F, 10G, 10P and 10Q of these like receptacles 10 in FIGS. 4, 5, 7 and 12.

Each receptacle 10 has a plurality of rigidly interconnecting parts comprising bottom or bottom load supporting member 11, a plurality of side wall parts 12 (two parallel parts being shown) rigidly connected with this bottom 11, clearways 15a and 15b at opposite ends to receive like receptacles in nesting relationship, and a plurality of stacking support members rigidly connected to bottom load supporting member 11 and to the side wall parts 12.

These stacking support members permit receptacles 10 to be assembled in a plurality of different stacking relationships. Receptacles 10 are shown in positions 10A

and 10B in FIG. 4 in compact or group nesting relationship; in positions 10B and 10C in FIG. 4 in tiering relationship; in positions 10C, 10D and 10E in FIG. 4 with adapter 30 or in positions 10P and 10Q in FIG. 12 with adapter 70 in continuous stacking relationship; and in positions 10F and 10G with adapter 50 in FIG. 7 in increased capacity stacking relationship.

Although the construction will be specifically described in more detail hereinafter, it should be now noted that these stacking support members on each receptacle 10 include in FIGS. 2, 4, 7 and 12 a plurality of upper tiering support members 13 (two parallel members being shown) also used with adapters 30 and 70 as continuous stacking support members 13, a plurality of lower tiering support members 14 (two being shown), a plurality of continuous stacking support members or increased capacity stacking members 16 (two being shown).

Each receptacle 10 has as parts thereof a plurality of rod-like closed loops (two being shown) of generally rectangular shape, shown as upper edge closed loop 21 and bottom edge closed loop 23. These loops have respectively a plurality of parts or portions taking the form in loop 21 of two parallel opposite side portions 21a, two parallel bar parts 21b at opposite ends, and four bent-down portions 21c at the corners; and in loop 23 of two parallel side portions 23a, two parallel cross bars 23b at opposite ends, and four hook-like portions 23c at the corners. Hook-like portions 23c and bar parts 21b are located in vertical alignment on each of the opposite ends of receptacle 10 so that the different stacking relationship mentioned can be formed.

Bottom load support part or member 11 may be of any suitable construction, but is shown herein as including a plurality of interconnected rod parts. Parallel side portions 23a are spaced apart by five, co-planar transverse rods 24 with each rod welded at opposite ends to side portions 23a. A plurality of laterally spaced, longitudinally extending rods 25 are welded, or otherwise secured, to each of these transverse rods 24.

Each of the two parallel side parts 12 includes a plurality of interconnected parts. Loop side portions 21a and 23a extend parallel to each other in any one side part 12. Each side part 12 includes a plurality of V-shaped parts 27a and 27b (six being shown) with each formed from a bent rod and with these six arranged in three similar pairs with each pair including an upper part 27a and a lower part 27b welded together. The upper distal ends of the leg part 27a are welded to portion 21a, and the lower distal ends of part 27b are welded to portion 23a. Portions 21a and the upper edges of parts 27a provide upper edge defining portions terminating generally in a top plane spaced above bottom 11 with upper tiering support members 13 near this plane. These V-shaped parts 27a and 27b permit receptacles 10 to move into nesting relationship, as will be more apparent hereinafter.

Receptacles 10 are in tiering relationship in positions 10B and 10C in FIGS. 4 and 5. The two lower tiering support members 14 (each including two hook-like portions 23c located at opposite ends of a bar 23b) on receptacle 10 in position 10C are engaging and resting upon the corresponding two upper tiering support members 13 (each including bar part 21b receiving these two hooks 23c on an upper receptacle and portions 21c located at opposite ends of a single bar portion 21b and straddling said hooks) of the lower like receptacle 10 in position 10B to receive and hold the receptacles in this tiering relationship. Then, these receptacles in 10B and 10C are prevented from having substantial relative movement in the horizontal plane. Hook-like portions 23c of the upper receptacle in position 10C engage bar parts 21b on the lower receptacle in position 10B to prevent relative movement between the receptacles in a direction transverse to bar parts 21b in a longitudinal direction. Relative movement between the receptacles in

these positions in a transverse direction (parallel to bars 21b) is prevented by the straddling engagement of the side parts 12 and of portions 21c and 23c on the respective receptacles. When the receptacles are in this tiered relationship, note that the maximum vertical height load able to be carried by the receptacle in position 10B is equal to height H between the bottom members 11 of these receptacles in positions 10B and 10C.

Receptacles 10 are shown in their compact or group nesting relationship in positions 10A and 10B in FIGS. 4 and 5. For purposes of clarity of illustration, assume that only the receptacles in positions 10A and 10B remain in FIGS. 4 and 5, and that the receptacles in positions 10C, 10D and 10E and adapter 30 have been removed.

The two like nested receptacles 10 in positions 10B and 10A, hereinafter respectively called the upper and lower receptacles, were put into the illustrated nesting relationship by the broadly described sequentially performed steps of entering, by manipulation, bottom part 11 of the upper receptacle into clearway 15a or 15b (provided between tiering support members 13 and 14 on one side in FIGS. 1 and 4) of the lower receptacle; of entering the other end of part 11 into the other corresponding clearway 15a or 15b on the other side beneath one of the bars 21b of the lower receptacle; and of passing the load supporting part 11 of the upper receptacle downwardly in these clearways 15a and 15b of the lower receptacle into the illustrated nesting relationship shown by positions 10A and 10B.

Now, this nesting operation will be briefly described in detail step by step. First, the upper receptacle is held above and out of contact with the lower receptacle with the two receptacles being horizontal and being generally in vertical alignment.

Second, the upper receptacle is tilted either clockwise or counterclockwise about a transverse axis. For purposes of illustration, it will be assumed that the upper receptacle is swung about its right bar 21b in FIG. 4 as a pivot with its left bar 21b moving in the counterclockwise direction downwardly away from the horizontal position so that the upper receptacle is inclined downwardly toward the left in FIG. 4.

Third, the upper receptacle is now lowered vertically so that its left lower tiering support member 14 in FIG. 4 passes downwardly between bars 21b on the lower receptacle until this left tiering support member 14 is below the plane of these bars 21b.

Fourth, the upper receptacle is shifted generally horizontally toward the left in FIG. 4 so that this lower tiering support member 14 of the upper receptacle is slid through left hand clearway 15a in FIGS. 2 and 4 of the lower receptacle, which clearway is formed between left bar 21b and bottom 11, until the right hand lower tiering support member 14 on the upper receptacle is vertically to the left of right cross bar 21b of the lower receptacle.

Fifth, the upper receptacle may be swung in a clockwise direction about its left hand cross bar 21b so that its right hand hook-like portions 23c clear the right hand cross bar 21b of the lower receptacle for manipulation into nesting relationship.

Sixth, the upper receptacle is shifted generally horizontally toward the right in both clearways 15a and 15b of the lower receptacle until these receptacles assume the nesting relationship shown by positions 10A and 10B in FIG. 4.

Successive receptacles may be moved into nesting relationship in this manner until the clearance between the bars 21b of the receptacle in position 10A and the top-most receptacle in the tier is such that an additional receptacle cannot be manipulated into position under these bars 21b by the aforescribed nesting procedure. Then, this maximum height nested stack has a total height not greater than twice the height of one receptacle 10.

The upper receptacle in position 10B may be easily disengaged from this nesting relationship by performing the reverse of the aforesaid nesting steps.

Use of adapter 30 permits the receptacles to be assembled in the continuous stacking relationship shown by positions 10C, 10D and 10E in FIGS. 4 and 5, and makes the respective heights M and N between the receptacles in positions 10C and 10D and in positions 10D and 10E different than height H. Adapter 30 is a generally rectangular continuous rigid bar frame with an upper pair or group of elements 31, each comprising a portion 33 and two lugs 36, and a lower pair or group of elements or bars 32 adapted for engaging respectively in stacking relationship stacking support members 16 and 14 on vertically spaced apart receptacles 10, as shown in positions 10C and 10D in FIG. 4. This frame has a plurality of adapter portions including mutually parallel co-planar adapter portions 33; downwardly bent, downwardly converging adapter portions 34 at opposite ends of each portion 33; and parallel bar portions or bars 32 joining these bent down portions 34; and has a plurality of lugs 36 (four being shown) welded to portions 33.

In continuous stacking relationship shown in positions 10C and 10D, the component parts are easily assembled into the positions illustrated.

Adapter 30 is assembled onto receptacle 10 in position 10C by being placed slightly above its position illustrated in FIG. 4 and to one side of the receptacle, being moved transversely (from above the plane of the drawings down into this plane) to telescope over the top of the receptacle until it is vertically aligned therewith, and then being lowered into the position shown in FIG. 4. Now, at least some of these adapter portions 33 and 34 rest on the top surface of at least some of the receptacle parts 12, 21a, 21c and 27a. Adapter portions or lugs 36 are straddled by portions 21a of parts 12. Hence, these last mentioned adapter portions 33, 34 and 36 take the form of elements 31 engaging stacking support members or parts 16 (including at least some of the aforementioned parts 21a and 27a) on receptacle 10 in position 10B to locate firmly adapter 30 on this receptacle against substantial relative movement.

Another receptacle can be moved into position 10D in substantially the same manner as previously described for moving the upper receptacle into nesting position 10B, except now this upper receptacle is manipulated only in the upper portion of clearways 15a and 15b located above bars 32 of adapter 30 and below bars 21b of the receptacle in position 10C. The receptacle is moved to the position 10D by having the lower tiering support members 14 of this upper receptacle entered into the clearways of the lower receptacle in position 10C by manipulation in the same manner as described in nesting and then passed downwardly to engage and rest upon group of elements or bars 32 on adapter 30 to assume the continuous stacking relationship shown in positions 10C and 10D. Receptacle 10 in position 10D is held against substantial relative horizontal movement by its hook-like portions 23c of its lower tiering support members 14 hooked over bars 32 to prevent movement perpendicular to these bars and adapter portions 34 straddle these hook-like portions 23c to prevent movement parallel to these bars. Now, elements or bars 32 of adapter 30 and the hook-like portions 23c of lower tiering support members 14 of the upper receptacle in position 10D are located above the nesting position, with respect to the receptacle in position 10C, and are located below the bar parts 21b of the lower receptacle in position 10C so as to be, with respect to position 10C, below the tiering position of these last mentioned lower tiering support members. Hence, bars 32 of adapter 30 are held at a level with respect to the receptacle in position 10C between bottom 11 and upper tiering support members 13 thereof, and vertically beneath these upper tiering sup-

port members so that they will provide the stacking function.

Now it should be apparent that adapter 30 vertically spaces the receptacles in positions 10C and 10D to permit continuous stacking of receptacles to any height, including greater than twice the height of one receptacle obtained as a maximum height by the group nesting shown in position 10A and 10B. Now the lower tiering support members 14 of all receptacles 10 sequentially added to the top of this stack may be manipulated in the same manner into engagement with the upper tiering support members 13 of the receptacles in positions 10C, 10D, 10E, etc. The vertical heights or spaces M and N between the receptacles in the stack have been established by a single adapter 30, which heights are each greater than the height in group nesting relationship and less than the height H in tiered relationship.

Use of adapter 50 permits the receptacles to be assembled in the increased capacity stacking relationship shown by positions 10F and 10G in FIG. 7, and makes height K between the receptacles different than height H. Adapter 50 is similar in form to adapter 30 and has a generally rectangular continuous rigid bar frame with an upper pair or group of elements or bars 52 and a lower pair or group of elements 51 adapted for engaging respectively in stacking relationship stacking support members 16 and 14 on vertically spaced apart receptacles 10, as shown in positions 10F and 10G in FIG. 7. This frame has a plurality of adapter portions including mutually parallel, co-planar adapter portions 51, upwardly bent adapter portions 54 at opposite ends of each portion 51, and parallel bar portions or bars 52 joining these bent up portions 54 near the four corners of adapter 50; has a plurality of lugs 56 (four being used herein) welded to portions 51 near opposite ends thereof; and has a plurality of lugs 57 (four being used herein) welded to opposite ends of bars 52.

In the stacking relationship shown in positions 10F and 10G, the component parts are easily assembled into the positions illustrated.

Adapter 50 is assembled onto receptacle 10 in position 10F by being placed slightly above the receptacle, and then being lowered into the position shown in FIG. 7. Now, adapter portions 51 rest on the top surface of at least some of the receptacle parts 12 and 27a; adapter portions or lugs 56 are straddled by loop portion 21a in side wall 12; and legs of part 27a straddle and are co-planar with the bottom of lugs 56. Hence, elements 51 and lugs 56 engaging stacking support members 16 (including at least some of the aforementioned parts 21a and 27a) on receptacle 10 in position 10F to locate firmly adapter 50 on this receptacle against substantial relative movement.

Another receptacle is moved to the position 10G in substantially the same manner as previously described for moving the upper receptacle into tiering position 10C. Now, elements or bars 52 of adapter 50 are engaged by hook-like portions 23c of lower tiering support members 14 of the upper receptacle in position 10G with transverse movement of this upper receptacle on adapter 50 prevented by lugs 57 straddling hook-like portions 23c in position 10G. Hence, bars 52 of adapter 50 and hook-like portions 23c in position 10G are held at a level with respect to the receptacle in position 10F above upper tiering support members 13 thereof, and vertically above these upper tiering support members so that they will provide the stacking function. Now it should be apparent that adapter 50 vertically spaces the receptacles in positions 10F and 10G for increased capacity because vertical height or space K between the receptacles has been established by adapter 50 to provide a height between adjacent receptacles greater than the height H in tiered relationship.

Use of adapter 70 permits the receptacles to be assembled in the continuous stacking relationship shown by

positions 10P, 10Q and 10R in FIG. 12, and makes the respective heights M' and N' between the receptacles different than the height H in FIG. 4. Only a portion of the bottom of a receptacle in position 10R is shown in dot-dash lines in FIG. 12. Adapter 70 includes a plurality of separate pieces (here shown as two separate and identically shaped pieces 70a and 70b arranged as mirror images in the stacking relationship in FIG. 12). These two pieces of adapter 70 include an upper pair or group of two elements 71 and a lower pair or group of two elements or bars 72. The language "element 71" covers two hooks 73 which really perform a single or combined function. In FIG. 12, the left and right sides of receptacles 10 each have one element 71 and 72 from each of these pairs. Elements 71 and 72 are adapted to engage respectively in stacking relationship stacking support members 13 and 14 on vertically spaced apart receptacles 10, as shown in position 10P and 10Q in FIG. 12. Each of the adapter pieces 70a and 70b has one of the elements 71 and one of the elements 72 from the two aforementioned pairs. Each of the adapter pieces 70a and 70b has a plurality of adapter portions including two mutually parallel and spaced apart adapter hook-like adapter portions 73, downwardly bent and downwardly converging adapter portions 74 at corresponding ends of portions 73, bar portion on bar 72 joining these bent down portions 74, and lugs or portions 76.

In continuous stacking relationship shown in positions 10P and 10Q, the component parts are easily assembled into the positions illustrated.

Adapter 70 is assembled onto receptacle 10 in position 10P by each piece 70a or 70b being placed slightly above its position in FIG. 12, and then being lowered into the position shown in FIG. 12. Now, each piece 70a or 70b has in FIG. 12 its hook-like portions 73, serving as one of the elements 71, engageably hooked on one of the bar parts 21b forming one of the upper tiering support members 13 on the receptacle in position 10P, and has adapter bar or element 72 engageable in the hook-like portions 23c of one of the lower tiering support members 14 of the receptacle in position 10Q in the stacking relationship shown in FIG. 12. Bar parts 72 extend parallel to bar parts 21b on the receptacle in position 10P and are spaced below and out of the horizontal plane formed by these last mentioned bar parts engaged by the bight of the hook-like adapter portions 73.

Another receptacle is moved to the position 10Q in substantially the same manner as previously described for moving the upper receptacle into nesting position 10B, except now this upper receptacle is manipulated only in the upper portion of clearways 15a and 15b located above bars 72 of adapter 70 and below bars 21b of the receptacle in position 10P. The receptacle is moved to the position 10Q by having the lower tiering support members 14 of this upper receptacle entered into the clearways of the lower receptacle in position 10P by manipulation and then passed downwardly to engage and rest upon the group of elements or bars 72 on adapter 70 to assume the continuous stacking relationship shown in positions 10P and 10Q. Now, elements or bars 72 of adapter 70 and the hook-like portions 23c of lower tiering support members 14 of the upper receptacle in position 10Q are located above the nesting position, with respect to the receptacle in position 10P, and are located below the bar parts 21b of the lower receptacle in position 10P so as to be, with respect to position 10P, below the tiering position of these last mentioned lower tiering support members. Hence, bars 72 of adapter 70 are held at a level with respect to the receptacle in position 10P between bottom 11 and upper tiering support members 13 thereof, and vertically beneath these upper tiering support members so that they will provide the stacking function.

Now it should be apparent that adapter 70 vertically spaces the receptacles in positions 10P and 10Q to permit continuous stacking of receptacles to any height, in-

cluding greater than twice the height of one receptacle obtained as a maximum height by the group nesting shown in positions 10A and 10B. Now the lower tiering support members 14 of all receptacles 10 sequentially added to the top of this stack may be manipulated in the same manner into engagement with the upper tiering support members 13 of the receptacles in positions 10P, 10Q, etc. The vertical heights or spaces M' and N' between the receptacles in the stack having been established by a single adapter 70, which heights are each greater than the height in group nesting relationship and less than the height H in tiered relationship.

Each adapter piece 70a or 70b has a receptacle engageable portion preventing substantial relative horizontal movement between the receptacles in positions 10P and 10Q in the stacking relationship in FIG. 12. Receptacle 10 in position 10Q is held against substantial relative horizontal movement by its hook-like portions 23c of its lower tiering support members 14 hooked over bars 72 to prevent movement perpendicular to these bars; and by adapter portions 74 straddling these hook-like portions 23c and/or by lugs 76 straddling the legs of V-shaped parts 27b on the receptacle in position 10Q to prevent movement parallel to these bars. Each adapter piece 70a and 70b has two outwardly extending lugs 76 fixed to corresponding ends of the hook-like adapter portions 73. These lugs 76 coact with side wall parts 12 of any one of the receptacles, shown specifically herein as the receptacle in position 10P, for preventing substantial horizontal relative movement between these adapter pieces 70a and 70b and the receptacles in positions 10P and 10Q by movement of the hook-like adapter portions 73 on bar parts 21b of the receptacle in position 10P. Substantial relative movement along the length of bar parts 21b is prevented by straddling loop portions 21a and 21c on the receptacle in position 10P. Horizontal relative movement in the direction perpendicular to bar parts 21b is prevented because the weight of the receptacle in position 10Q pulls the bars 72 downwardly and in a horizontal approach direction in FIG. 12 so as to swing lugs 76 on adapter pieces 70a and 70b respectively counterclockwise and clockwise about their supporting bar parts 21b until these lugs engage against the outer surfaces of the downwardly converging legs on upper V-shaped parts 27a of the side wall parts 12 of the receptacle in position 10P. This engagement prevents any substantial horizontal relative movement between the receptacles in the plane of the drawings in FIG. 12. Even if one of the adapter pieces 70a or 70b is swinging about its support bar 21b as a pivot while the upper receptacle in FIG. 12 is being manipulated and lowered into position 10Q, lugs 76 will not interfere with this positioning action. The lugs 76 will swing in two parallel planes generally coplanar with V-shaped parts 27a on the receptacle in position 10P because loop portions 21a and 21c in FIG. 11 prevent substantial endwise movement. No interference exists because this plane of swing is parallel to but laterally out of the vertical path of movement followed by V-shaped parts 27b of the upper receptacle during its movement by manipulation downwardly into position 10Q.

It should be noted that these V-shapes of parts 27a provide a dual function by providing engagement stops for adapter lugs 76 and for permitting the nesting action of the receptacles into the positions 10A and 10B in FIG. 4.

A two piece adapter 70 has advantages over the one piece adapter 30. Its manufacturing cost is less, it is less awkward to handle, and it takes up less storage space when not mounted on the receptacles in the stacking relationship.

Adapters 30, 50 and 70 have many generic features. The adapters are of different construction than receptacles 10, are located respectively in stacking relationship between vertically spaced apart upper and lower receptacles

in positions 10C and 10D in FIG. 4, in positions 10F and 10G in FIG. 7, and in positions 10P and 10Q in FIG. 12. Adapters 30, 50 and 70 have parts or elements 31, 51, 71 and 32, 52, 72, respectively, operatively spaced apart and held in spaced relationship and engageable in FIGS. 4, 7 and 12 with continuous stacking support members or increased capacity stacking support members 16 and continuous stacking support members 13, and with tiering support members 14 on receptacles 10 so as to place adjacent receptacles at height M, N, K, M' and N' different than tiering height H and the nesting relationship shown by positions A and B, so as to change the stacking height of receptacles 10. Elements 31, 51 and 71 engage respectively stacking support members 16 and 13 of the lower receptacles in positions 10C, 10F and 10P with adapter portions 33, 51 and 73; and have bent adapter portions 34, 54 and 74 located at ends of these adapter portions 33, 51 and 73. Adapters 30, 50 and 70 respectively have elements or bars 32, 52 and 72 of the same shape as bar parts 21b of the upper tiering support members 13 of the receptacles so as to be located below and to engage in the same manner the hook-like portions 23c in the lower tiering support members 14 in positions 10D, 10G and 10Q.

Adapters 30 and 50 have many generic features. Each adapter is a rigid, one piece adapter formed as a generally rectangular rigid frame, and has rigidly connected parts or elements 31 and 32 or 51 and 52. Elements 31 and 51 are located above receptacle side wall parts 12 of the lower receptacles in positions 10C and 10F and along, and in the plane of, the side parts 12 of both the upper and lower receptacles; and have bent adapter portions 34 and 54 located at opposite ends of adapter portions 33 and 51 so that at least some of these adapter portions (shown as portions 33, 34 and 51) rest on at least some of the receptacle parts 21b, 21c and 27a. Vertically extending lugs 36 and 56 are fixed to opposite ends of portions 33 and 51 for telescopically coacting with side wall parts 12 of the lower receptacles in positions 10C and 10F in straddling relationship for laterally locating adapters 30 and 50 on these lower receptacles. Adapter elements or bars 32 and 52 are spaced out of the planes of the coplanar adapter portions 33 and 51, and join bent portions 34 and 54 as parallel bars 32 and 52 so as to be located below and to engage in the same manner the hook-like portions 23c in the lower tiering support members 14 in positions 10D and 10G.

It should now be apparent that the use of an adapter 30, 50 or 70 makes receptacles 10 more versatile. Tiered receptacles 10 in positions 10B and 10C can carry two load layers with each load layer having a maximum height H. If the load height is less, such as of height M or N in FIG. 4 or height M' or N' in FIG. 12, use of adapter 30 or 70 will permit storing more load layers in a given vertical height because receptacles 10 are stacked closer together in positions 10C, 10D and 10E in FIG. 4 or in positions 10P and 10Q in FIG. 12 than in positions 10B and 10C in FIG. 4. If the load height is considerably greater, such as a height K, adapters 50 in FIG. 7 or suitable modification of adapter 70 may be used. When receptacles 10 are not in use, they may be assembled into a compact or group nesting relationship shown by positions 10A and 10B in FIG. 4. Although the height of such nested group of receptacles 10 is limited to less than twice the height of receptacle 10 because bar 21b in position 10A will prevent insertion therebelow of any more bars 23b in FIG. 4, no such limitation occurs when adapter 30 or 70 is used so continuous stacking can continue to any desired height by sequentially stacking receptacles on bars 21b in FIGS. 4 and 5 in position 10C, position 10D, position 10E and receptacles higher in the stack, or in like manner in FIG. 12 in positions 10P and 10Q.

Slight modifications of adapter 30 or 70 should be readily apparent as being within the scope of this invention. Since the principles to be discussed apply in substantially the same manner to both adapters 30 and 70,

only adapter 30 will be discussed in detail. Adapter 30 maintains in FIG. 4 dimensions M and N between adjacent stacked receptacles as determined by the respective vertical distances Mb and Nb between bars 21b in position 10B, adapter bars 32, and bars 21b in position 10C; and these dimensions are maintained alternatively throughout the stack height by using a single adapter 30 because this series of distances Mb and Nb is repeated throughout the stack height. If portions 34 of adapter 30 are of such length that dimensions Mb and Nb are equal, as shown in FIG. 3, distances M and N are equal so that so called "half stacking" occurs and equal height loads may be placed on each bottom 11. If one dimension is larger than the other, such as dimension Mb is larger than dimension Nb in FIG. 4, articles of different heights may be arranged on different bottoms, such as, larger articles of height M placed on the odd numbered bottoms 11 and smaller articles of height N placed on the even numbered bottoms 11 located therebetween. Height H may be divided into any number of parts, instead of only into the two parts shown by dimensions M and N, if there is sufficient room for manipulation in clearways 15a and 15b of receptacles into stacking position between bars 21b, 23b and 32. Height H may be divided into four parts for "quarter stacking" by using only three adapters 30 on the three lowest receptacles 10 with each adapter having the same length portion 34 and with the downward convergence of portions 34 in FIG. 3 permitting vertical nesting to eliminate interference. It should now be apparent that a maximum number of receptacles may be continuously nested to any height (greater than twice the height of receptacle 10) in minimum vertical space by thus dividing height H into a maximum number of approximately equal parts of the minimum size still permitting the manipulation required for continuous stacking and by using a plurality of adapters one less in number than said equal parts (note that half stacking required only one adapter and quarter stacking required only three adapters so each used one less adapter than the number of parts into which height H was divided).

Although adapters 30, 50 and 70 are shown with only receptacles 10 movable into a nesting relationship by a tilting or rocking movement, it should be readily apparent that these adapters, and the principles illustrated herein, are usable with nesting and tiering type receptacles of other construction, whether the receptacles have rigidly connected parts and members or have relatively movable ones. Also, it should be readily apparent that the adapters, and the principles illustrated herein, could be used with slight modification with receptacles movable to a nesting position by a side inserting movement, by a rotating movement about a vertical axis instead of about the horizontal axis illustrated herein, etc.

Various changes in details and arrangement of parts can be made by one skilled in the art without departing from either the spirit of this invention or the scope of the appended claims.

What is claimed is:

1. In combination, two receptacles of like construction adapted for assembling in stacking relationship including tiering or nesting relationship; each receptacle comprising a bottom load supporting member, and comprising stacking support members rigidly connected to said bottom load supporting member, said stacking support members including upper tiering support members and lower tiering support members, whereby the lower support members of the upper of said receptacles are adapted to engage and rest upon the corresponding upper support members of the lower of said like receptacles in tiering relationship, there being clearways provided between some of said aforementioned members enterable by said load supporting member of the upper like receptacle by manipulation after which said load supporting member of said upper receptacle may pass downwardly in said clearways to nesting relationship in said lower receptacle; and an adapter



of different construction than said receptacles, located between the upper and the lower of said receptacles, and having elements operatively spaced apart a distance different than the corresponding distance between said upper and lower tiering support members and respectively engaged with some of the stacking support members on upper and lower receptacles in another stacking relationship of said receptacles having a height between said receptacles different than said tiering and nesting relationships.

2. In combination, as set forth in claim 1, with one group of said elements engaging stacking support members on said lower receptacle in said other stacking relationship, another group of said elements being of the same shape as said upper tiering support members on one of said receptacles, whereby the lower tiering support members of said upper receptacle are enterable into the clearways of said lower receptacle by manipulation and then may be passed downwardly to engage and rest upon said other group of elements in said other stacking relationship.

3. In combination, as set forth in claim 2, with said other element group and the lower tiering support members of said upper receptacle being located in said other stacking relationship above the nesting position and below the tiering position of said last mentioned lower tiering support members, whereby said adapted vertically spaces said receptacles for continuous stacking to a height greater than twice the height of one receptacle and with the height between said receptacles being greater than the height in nesting relationship and less than the height in tiered relationship.

4. In combination, as set forth in claim 1, with one group of said elements engaging stacking members on said lower receptacle in said other stacking relationship, another group of said elements being of the same shape as said upper tiering support members on one of said receptacles, said other element group and the lower tiering support members of said upper receptacle being located in said other stacking relationship above the upper tiering support members of the lower receptacle, whereby said adapter vertically spaces said receptacles with the height between said receptacles being greater than the height in tiered relationship.

5. In combination, as set forth in claim 1, with one group of said elements engaging stacking support members on said lower receptacle, and another group of said elements being of the same shape as said upper tiering support members on one of said receptacles and engaging the lower tiering support members of said upper receptacle in said other stacking relationship.

6. In combination, two receptacles of like construction adapted for assembling in stacking relationship including tiering or nesting relationship; each receptacle comprising a bottom load supporting member, and comprising stacking support members rigidly connected to said bottom load supporting member, said stacking support members including upper tiering support members and lower tiering support members, whereby the lower support members of the upper of said receptacles are adapted to engage and rest upon the corresponding upper support members of the lower of said like receptacles in tiering relationship, there being clearways provided between some of said aforementioned members enterable by said load supporting member of the upper like receptacle by manipulation after which said load supporting member of said upper receptacle may pass downwardly in said clearways to nesting relationship in said lower receptacle; and an adapter of different construction than said receptacles, located between the upper and the lower of said receptacles, and having elements operatively spaced apart and respectively engaged with some of the stacking support members on upper and lower receptacles in another stacking relationship of said receptacles having a height between said receptacles different than said tiering and nesting relationships,

ships, one group of said elements engaging stacking support members on said lower receptacle, and another group of said elements being of the same shape as said upper tiering support members on one of said receptacles and engaging the lower tiering support members of said upper receptacle in said other stacking relationship, each receptacle including opposite side wall parts rigid with said support members, two parallel bar parts as said upper tiering support members, and two hook-like portions as said lower tiering support members with said bar parts and hook-like portions located in vertical alignment on the opposite ends of the receptacle; said adapter being a generally rectangular continuous rigid bar frame with two opposite sides having mutually parallel co-planar adapter portions locatable above said side wall parts of said lower receptacle and along said side wall parts of both said receptacles, and having bent adapter portions at opposite ends of said two parallel portions with at least some of said adapter portions resting on at least some of said parts of said lower receptacle as said one group of elements; said adapter having its other two opposite sides spaced out of the plane of the co-planar portions of said first mentioned two opposite sides, joining said bent portions as parallel bar portions forming said other group of elements and located under said two hook-like portions of said upper receptacle; said adapter having a vertically extending lug fixed to each end of said first mentioned two opposite sides coacting with the side wall parts of said lower receptacle in straddling relationship for laterally locating said adapter on said lower receptacle.

7. In combination, as set forth in claim 6, with said bent adapter portions being downwardly bent from said two parallel adapter portions, said parallel bar portions being located below said bar parts of said lower receptacle, and said downwardly bent adapter portions resting on said parallel bar parts of said lower receptacle.

8. In combination, as set forth in claim 6, with said bent adapter portions being upwardly bent from said two parallel adapter portions, said parallel bar portions being located above said bar parts of said lower receptacle.

9. In combination, two receptacles of like construction adapted for assembling in stacking relationship including tiering or nesting relationship; each receptacle comprising a bottom load supporting member, and comprising stacking support members rigidly connected to said bottom load supporting member, said stacking support members including upper tiering support members and lower tiering support members, whereby the lower support members of the upper of said receptacles are adapted to engage and rest upon the corresponding upper support members of the lower of said like receptacles in tiering relationship, there being clearways provided between some of said aforementioned members enterable by said load supporting member of the upper like receptacle by manipulation after which said load supporting member of said upper receptacle may pass downwardly in said clearways to nesting relationship in said lower receptacle; and an adapter of different construction than said receptacles, located between the upper and the lower of said receptacles, and having elements operatively spaced apart and respectively engaged with some of the stacking support members on upper and lower receptacles in another stacking relationship of said receptacles having a height between said receptacles different than said tiering and nesting relationships, one group of said elements engaging stacking support members on said lower receptacle, and another group of said elements being of the same shape as said upper tiering support members on one of said receptacles and engaging the lower tiering support members of said upper receptacle in said other stacking relationship, each receptacle including opposite side wall parts rigid with said support members, two parallel bar parts as said upper tiering support members, and two hook-like portions as said lower tiering support members

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with said bar parts and hook-like portions located in vertical alignment on the opposite ends of the receptacle; said adapter including two separate and identically shaped pieces; each piece including two mutually parallel hook-like adapter portions hooked over a bar part of said lower receptacle as an element in said one group of elements and having bent adapter portions at corresponding ends of said two parallel hook-like portions and a bar portion spaced out of the plane of the bight of said hook-like portions joining said bent portions and extending parallel to said bar part and forming an element in said other group of elements and located under said two hook-like portions of said upper receptacle; said adapter having on each piece an outwardly extending lug fixed to one end of some of said hook-like adapter portions and coacting with the side wall parts of one of said receptacles for preventing substantial horizontal relative movement between said adapter and receptacles by movement of said hook-like adapter portions on said bar parts in said other stacking relationship.

10. In combination, as set forth in claim 9, with said lugs and side parts being constructed so that said lugs are swingable on their supporting bar parts in planes abutting against at least one side wall part of the lower receptacle to help prevent said movement and spaced laterally out of the movement path followed by the upper receptacle during its movement into said other stacking relationship.

11. An adapter for changing the stacking height of receptacles of like construction adapted for stacking in tiering or nesting relationship wherein each receptacle includes a bottom load supporting member having connected thereto stacking support members including upper tiering support members and lower tiering support members, said adapter being of different construction than said receptacles and comprising an upper pair of elements and a lower pair of elements for engaging in stacking relationship stacking support members on vertically spaced apart receptacles with said elements held in spaced relationship a distance apart different than the corresponding distance between said upper and lower tiering support members, at least one pair of said elements comprising approximately parallel bars adapted to extend across one dimension of one of said stacked receptacles and to engage one of the stacking support members of said last mentioned one stacked receptacle.

12. An adapter for changing the stacking height of receptacles of like construction adapted for stacking in tiering or nesting relationship wherein each receptacle includes a bottom load supporting member having connected thereto stacking support members including upper tiering support members and lower tiering support members, said adapter being of different construction than said receptacles and comprising an upper pair of elements and a lower pair of elements for engaging in stacking relationship stacking support members on vertically spaced apart receptacles with said elements held in spaced relationship, said adapter comprising a generally rectangular continuous rigid frame with two opposite sides having one pair of said elements with mutually parallel co-planar portions locatable along side walls of one receptacle, said frame having its other two opposite sides spaced out of the plane of the co-planar portions of said first mentioned co-planar portions and adapted to engage as the other pair of said elements under stacking support members of the other receptacle in stacking relationship above said one receptacle.

13. An adapter, as set forth in claim 12, with said frame formed of a continuous rod, and vertically extending lugs on said parallel portions for coacting with the side walls of said one receptacle in straddling relationship for laterally locating said adapter on said lower receptacle.

14. An adapter for changing the stacking height of receptacles of like construction adapted for stacking in tiering or nesting relationship wherein each receptacle includes a bottom load supporting member having con-

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nected thereto stacking support members including upper tiering support members and lower tiering support members, said adapter being of different construction than said receptacles and comprising an upper pair of elements and a lower pair of elements for engaging in stacking relationship stacking support members on vertically spaced apart receptacles with said elements held in spaced relationship, said adapter comprising two separate pieces; one of said pieces including one element of one pair of said elements having two mutually parallel and spaced apart adapter portions engageable with one of said tiering support members of one of said receptacles, having one element of the other pair connecting said two parallel portions and engageable with the other of said tiering support members on another receptacle in stacking relationship, and having a receptacle engageable portion preventing substantial relative horizontal movement between said receptacles in stacking relationship.

15. An adapter for use with a receptacle having a bottom and edge-defining portions terminating generally in a top plane spaced above said bottom, there being upper tiering support members near said upper plane adapted to receive and hold the bottom of a like receptacle when two receptacles are tiered, said adapter having receptacle engageable parts for engageable attachment to a receptacle and having other receptacle engageable parts providing adapter receptacle stacking support members held by said first named receptacle engageable parts at a level between said bottom and said upper tiering support members and vertically beneath said upper tiering support members.

16. An adapter, as set forth in claim 15, comprising two separate pieces, each of said pieces being of identical shape and including some of said first mentioned receptacle engageable parts and some of said other receptacle engageable parts.

17. An adapter, as set forth in claim 15, comprising a rigid, one piece frame.

18. An adapter for use with a receptacle having a bottom and being adapted to stack upon a like receptacle and said receptacle having for that purpose a first set of upper tiering support portions positioned to receive lower members of an upper receptacle in stacked relationship, said adapter having receptacle engageable parts shaped to fit upon and maintain a substantially fixed position upon a lower receptacle, and said adapter having other receptacle engageable parts held in place by said first named receptacle engageable parts, said other receptacle engageable parts providing a second set of tiering support portions positioned similarly to said first named set of support portions to receive lower members of an upper receptacle in stacked relationship, said second set of support portions being located at a different level than said first set with respect to the bottom of said lower receptacle.

19. In combination, as set forth in claim 1, with said tiering support members on said receptacles constructed to limit the stack height of a plurality of containers in said nesting relationship to less than twice the height of one receptacle in a group nest, said other stacking relationship having a height less than said tiering relationship but greater than said nesting relationship, and said adapter and clearways being constructed so that a continuous nest-like stack of receptacles is formed by said adapter to a height greater than said group nest by sequentially placing the lower tiering support members of additional receptacles of like construction on the vertically upwardly spaced upper tiering support members in said other stacking relationship or on receptacles similarly stacked thereon.

20. An adapter for changing the stacking height of receptacles of like construction adapted for stacking in tiering or group nesting relationship wherein each receptacle includes a bottom load supporting member having connected thereto stacking support members including upper tiering support members and lower tiering support

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members, said adapter being of different construction than said receptacles and comprising an upper pair of elements and a lower pair of elements for engaging in stacking relationship stacking support members on vertically spaced apart receptacles with said elements held in spaced relationship for forming the bottom of a continuous nest-like stack of receptacles.

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