May 28, 1963 T. R. MUTTO 3,091,355

TIERABLE AND NESTABLE RECEPTACLE WITH HINGED GATE MEMBER

Filed May 16, 1960 3 Sheets-Sheet 1

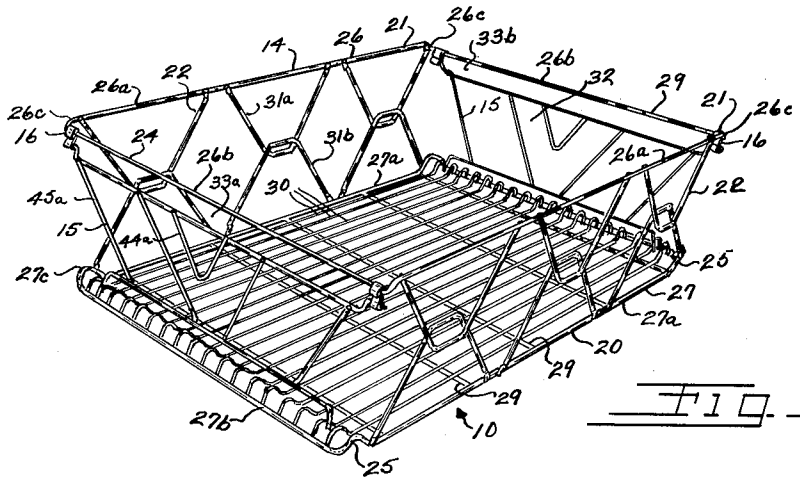



FIG. 1

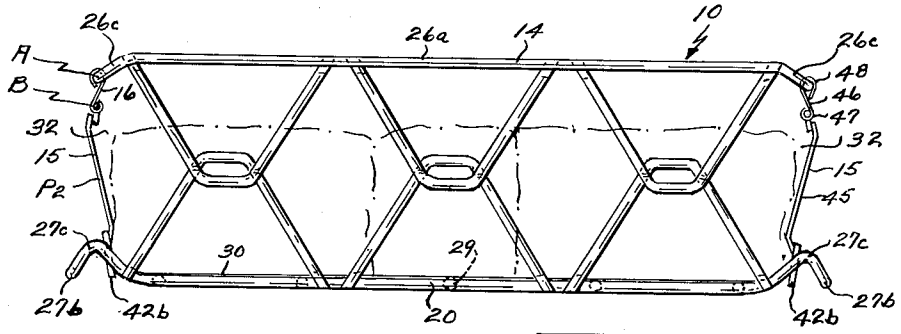



FIG. 2

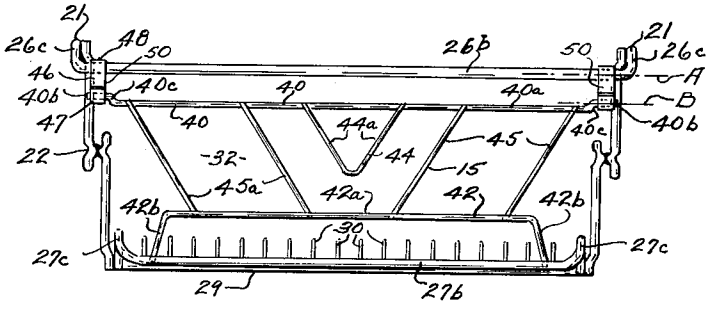



FIG. 3

INVENTOR.
THEODORE R. MUTTO

BY
Meyer, Baldwin, Doran & Young
ATTORNEYS

May 28, 1963 T. R. MUTTO 3,091,355

TIERABLE AND NESTABLE RECEPTACLE WITH HINGED GATE MEMBER

Filed May 16, 1960 3 Sheets-Sheet 2

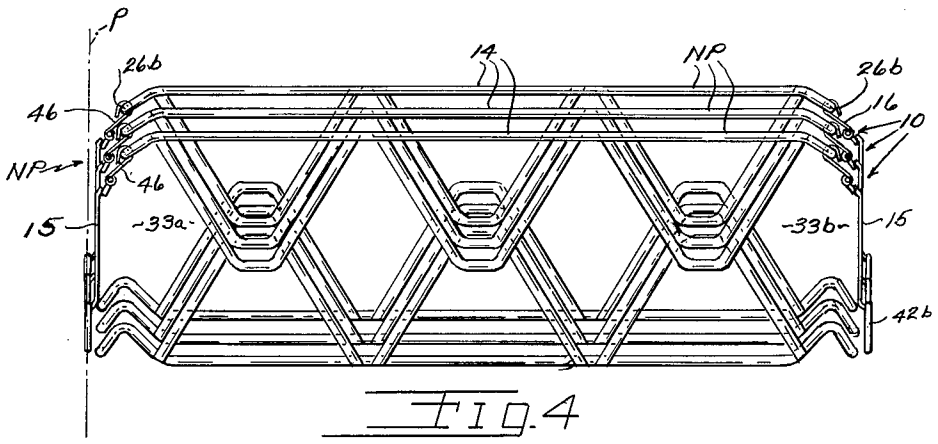



FIG. 4

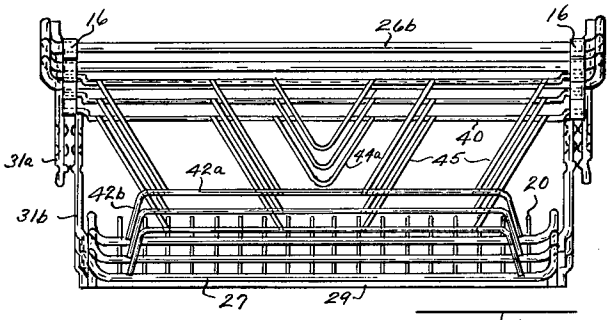



FIG. 5

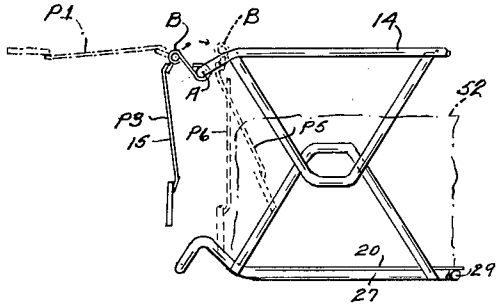



FIG. 6

INVENTOR.
THEODORE R. MUTTO

BY
Meyer, Baldwin, Doran & Young
ATTORNEYS

May 28, 1963 T. R. MUTTO 3,091,355

TIERABLE AND NESTABLE RECEPTACLE WITH HINGED GATE MEMBER

Filed May 16, 1960 3 Sheets-Sheet 3

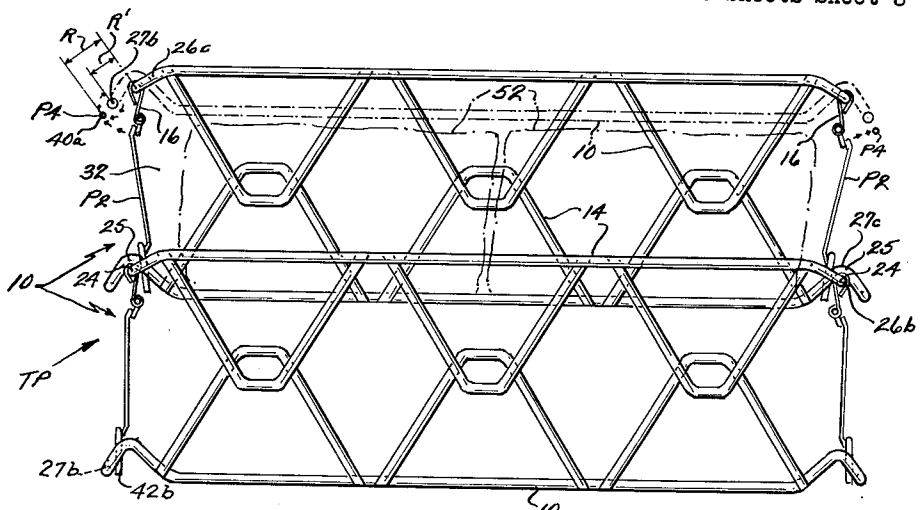



FIG. 7

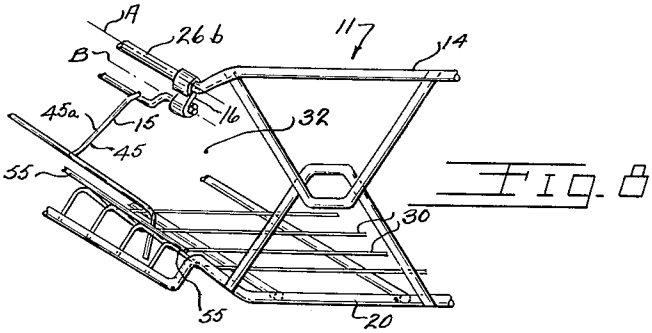



FIG. 8

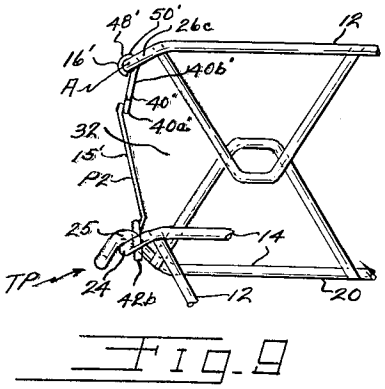



FIG. 9

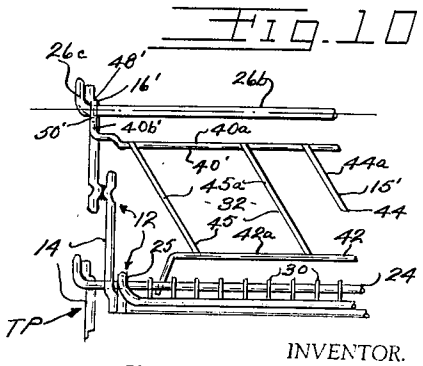



FIG. 10

INVENTOR.
THEODORE R. MUTTO

BY
Meyer, Baldwin, Doran & Young
ATTORNEYS

United States Patent Office 3,091,355 Patented May 28, 1963



3,091,355

# TIERABLE AND NESTABLE RECEPTACLE WITH HINGED GATE MEMBER

Theodore R. Mutto, Shaker Heights, Ohio, assignor to Mid-West Metallic Products, Inc., Cleveland, Ohio, a corporation of Ohio

Filed May 16, 1960, Ser. No. 29,398
15 Claims. (Cl. 220—19)

This invention relates to improvements in a tray, container or receptacle, and especially that type adapted to be tiered when in use and to be nested when empty.

Whenever in the specification and claims these trays, containers or receptacles are referred to as "receptacles," it is intended that this term includes crates, boxes, baskets, trays, skids, pallets, flats, spaced apart shelves, and similar receptacle or article carrying devices, which may be stacked one upon another in tiering position when in use and nested one within the other in nesting position when empty for conservation of space.

One of the objects of the present invention is to provide a tierable and nestable receptacle having a rigid frame and at least one movable wall connected to said frame and adapted to be moved relative to said frame.

A further object of the present invention is to provide a receptacle, as set forth in the preceding parapgraph, with said wall adapted to hold articles within the receptacle in tiering position but adapted to move relative to the rigid frame for permitting the receptacle to be moved into nesting position; said wall adapted to be locked in closed position in receptacle tiering position to prevent lateral removal of the articles from said receptacle; said wall adapted to be unlocked and moved to open position in tiering position for lateral removal of the articles from the receptacle from between tiered like receptacles; and/or said wall being attached to the rigid frame by a specific hinge construction.

A further object of the present invention is to provide a receptacle, adapted for tiering and nesting with other like receptacles, 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 tiering and nesting positions with like receptacles, ease of assembly with like receptacles in tiering and nesting positions, providing an enclosure around all four sides of an article carried thereby while still permitting not only movement into nesting position with like receptacles but also lateral loading and unloading of each like receptacle in tiering position.

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 accompanying drawings and description, 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 receptacle;

FIG. 2 is a side elevational view of the receptacle in FIG. 1;

FIG. 3 is an end view of the receptacle in FIG. 1;

FIGS. 4 and 5 are respectively side elevational and end views of a plurality of receptacles, each like the receptacle shown in FIG. 1, in nesting position;

FIG. 6 is a side elevational view of the left portion of the receptacle in FIG. 2 with the left-hand movable wall shown in three different positions;

FIG. 7 is a side elevational view of a plurality of receptacles, each like the receptacle in FIG. 1, in tiering



position with only the bottom of the uppermost or third receptacle shown and with the end walls of the middle receptacle locked in closed position;

FIG. 8 is a perspective view of a portion of a second form of receptacle similar to the receptacle in FIG. 1 except for the slight change in construction shown in FIG. 8 relating to the stop bar on the bottom portion of the receptacle for locking a movable wall in closed position; while

FIGS. 9 and 10 are respectively side elevational and end views of a portion of a third form of receptacle, similar to the receptacle in FIG. 1 except for the hinge construction, with two like receptacles in tiering position in the manner shown in FIG. 7.

Before the 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 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.

Three different receptacle forms are illustrated, and these are shown as like receptacles **10** in FIGS 1–7, receptacle **11** in FIG. 8, and like receptacles **12** in FIGS. 9 and 10. Each of these receptacles is adapted for assembling with other like receptacles in either tiering position, as shown for example in FIGS. 7, 9 and 10, or in nesting position, as shown for example in FIGS. 4 and 5. Each of these receptacles includes an identically constructed rigid frame **14**; two movable walls with each wall taking the form of either movable wall **15** in FIGS. 1–8 on receptacles **10** and **11** or the form of movable wall **15'** in FIGS. 9 and 10 on receptacle **12**; and a connecting means or hinge means for each wall taking the form of connecting means or hinge means **16**, **16** or **16'** respectively shown on receptacles **10** and **11** in FIGS. 1–8 and on receptacle **12** in FIGS. 9 and 10.

Each rigid frame **14** includes a plurality of rigidly interconnected portions. Rigid frame **14** includes a bottom portion **20** for supporting articles **52**, upper edges **21** on the receptacle spaced above bottom portion **20**, two parallel side wall portions **22** rigidly connecting bottom portion **20** and upper edges **21**, and tiering support means including a plurality of upper tiering support portions **24** rigid with upper edges **21** and a plurality of lower tiering support portions **25** rigid with bottom portion **20**.

Each rigid frame **14** has as parts thereof a plurality of rod-like closed loops (two being shown) of generally rectangular shape, such as upper edge closed loop **26** and bottom edge closed loop **27**. These loops have respectively a plurality of parts or portions taking the form in loop **26** of two parallel opposite side portions **26***a*, two parallel bars **26***b* at opposite ends, and four bent-down portions **26***c* at the corners; and in loop **27** of two parallel side portions **27***a*, two parallel cross bars **27***b* at opposite ends, and four hook-like portions **27***c* at the corners.

Bottom portion **20** may be of any suitable construction, but is shown herein as including a plurality of interconnected rod parts. Parallel side portions **27***a* are spaced apart by a plurality of co-planar transverse rods **29** with each rod welded at opposite ends to side portions **27***a*. A plurality of laterally spaced, longitudinally extending rods **30** are welded, or otherwise secured, to each of these transverse rods **29** and at opposite ends to bars **27***b*.

Each of the two parallel side wall portions **22** includes a plurality of interconnected parts. Loop side portions **26***a* and **27***a* extend parallel to each other in any one side wall portion **22**. Each side wall portion **22** includes a

plurality of V-shaped parts 31*a* and 31*b* (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 31*a* and a lower part 31*b* welded together. The upper distal ends of the legs on part 31*a* are welded to side portion 26*a*, and the lower distal ends of part 31*b* are welded to portion 27*a*. These V-shape parts 31*a* and 31*b* permit like rigid frames 14, and the like receptacles of which they compose, to be moved into nesting position NP, as shown for example in FIGS. 4 and 5, as will be more apparent hereinafter.

Rigid frame 14 also has other parts. An open side 32 is formed on each of the opposite ends of rigid frame 14 with each of these open sides located below one of the bars 26*b*, above bottom portion 20, and between side wall portions 22. Also, each rigid frame 14 has two clearways 33*a* and 33*b*, located at opposite ends of frame 14 and each including one of the open sides 32, for receiving like receptacles in nesting position, as will be more apparent hereinafter.

Each movable wall 15 on the receptacles 10 in FIGS. 1–8 has a plurality of interconnected parts. Each wall 15 is adapted to extend over an open side 32 of rigid frame 14, as shown in FIGS. 1, 2, 3 and 7. Two movable walls 15 are provided on each of these receptacles with these walls being end walls located at opposite edges of bottom portion 20. Each movable wall 15 includes top bar 40 in FIG. 3 having a center bar portion 40*a*; bottom bar 42 having center bar portion 42*a* and two parallel turned down end portions 42*b*; and a plurality of wire bars 44 and 45 respectively including upwardly diverging portions or members 44*a* and 45*a* welded or otherwise secured at their upper ends to bar portion 40*a* while the lower ends of bars 45 are welded or otherwise secured to center bar portion 42*a* to form rigid wall 15.

Connecting means 16 in receptacle 10 in FIG. 1 operatively connects each movable wall 15 and rigid frame 14 so that each wall 15 is movable relative to frame 14 between a side open position P1 in FIG. 6 uncovering rigid frame open side 32 to thus permit lateral loading and unloading of articles on bottom portion 20 through its open side 32 and a side closed position P2 in FIG. 2 covering its open side 32 to block removal of the articles through its open side 32. Each of the two movable walls 15 on receptacle 10 is provided with such connecting means 16 taking the form of a hinge means. This hinge means 16 includes one of the bars 26*b*, extending parallel to bottom portion 20; and includes one or more loops 48 (here shown as two) carried by wall 15, surrounding bar 26*b*, and spaced along hinge axis A formed by cylindrical bar 26*b*. This construction permits wall 15 to move by swinging movement about axis A, extending coaxial with one of the bars 26*b* and parallel to the other bar 26*b*.

Each connecting means 16 also includes suitable stop means 50 for preventing endwise movement of movable wall 15 along hinge axis A relative to rigid frame 14. Each bar 26*b*, forming hinge axis A, has laterally extending bends 26*c* on opposite ends. The two hinge loops 48 for each wall 15 are abutted on their laterally outer sides by bends 26*c* to prevent substantial endwise movement of movable wall 15 along hinge axis A. This provides the stop means 50.

As will be apparent hereinafter, a description of the structure and mode of operation of frame 14, wall 15, connecting means 16 and stop means 50 in the preceding paragraphs applies equally well to the same named or numbered parts and axes in FIGS. 8–10.

Receptacles 10 and 11 in FIGS. 1–7 and in FIG. 8 respectively have construction not shown on receptacles 12 in FIGS. 9 and 10. In FIGS. 1–7, hinge means 16 includes at opposite ends of movable wall 15 two double action link hinges with each comprising a link 46 pivotally connected at opposite ends by link loops 48 and 47 respectively to bar 26*b* of rigid frame 14 and to bar portions 40*b* of movable wall 15 so as to operatively connect this wall and frame by two, parallel, spaced apart, hinge axes A and B in FIGS. 3 and 6. Link 46 has axis A formed by bar 26*b* and loop 48, and has axis B formed by each loop 47 and each of the coaxial end portions 40*b* of top bar 40. This structure permits movable wall 15 to move by swingable movement about axis A and/or axis B, as shown in FIG. 6, with each of these axes extending parallel to at least one of the bars 26*b*. Referring to FIG. 3 of the drawings, it will be noted that the end gate 15 is suspended from the top cross bar 26*b* by the hinge means consisting of two links 46, each having an upper loop 48 pivotally connecting the link to the bar 26*b* and each having a lower loop 47 pivotally connected to the portion 40*b* of the gate 15. Referring to the lower part of this drawing, it will be noted that the member 27*b* of the bottom has upwardly extending hooks 27*c* at each end thereof which extend backwardly away from the plane of the drawing in planes at right angles to the upper bar 26*b*. It will be noted that the outside dimensions between the two hook members 27*c* is less than the distance across the bar 26*b* of the spacing of the two links 46. In other words, when two receptacles are tiered, the number 27*b* takes up less than the full length of the bar 26*b* so as to leave spaces at the opposite ends thereof for the mounting of the two links 46. It results from this construction that when two or more like receptacles are tiered, there is no obstruction to movement of gate 15 to the position P4 in FIG. 7 or to the positions P1 and P3 indicated in FIG. 6.

In FIGS. 1–8, stop means 50, for preventing substantial endwise movement of wall 15 along axis A, also includes structure not found in FIGS. 9 and 10. Wire member or top bar 40, rigid with movable wall 15, has on opposite ends in FIG. 3 parallel portions 40*c* closely straddled by links 46 to minimize endwise movement of wall 15. It should now be apparent that bar 40 has integrally connected together a center bar portion 40*a*, parallel portions 40*c* located on opposite ends of center portion 40*a*, and coaxial end portions 40*b* extending outwardly from parallel portions 40*c*.

Two like receptacles 10 are in tiering position TP in FIG. 7. Each receptacle 10 has its lower tiering support portions 25, including four hook-like portions 27*c*, located substantially vertically beneath upper tiering support portions 24, including two parallel bars 26*b*, at each of the opposite ends of receptacle 10 so that like receptacles 10 may be placed in this tiering position TP. Hook-like portions 27*c* of the upper receptacle in FIG. 7 are positioned to rest vertically down upon bars 26*b* in the lower like receptacle so as to receive and hold these receptacles in tiering position TP in FIG. 7 with like parts of each upper receptacle substantially vertically aligned above like parts of the lower receptacle.

Also, receptacles 10 in FIG. 7 are prevented from having substantial relative movement in the horizontal plane. Hook-like portions 27*c* of the upper receptacle in FIG. 7 engage bars 26*b* on the lower receptacle to prevent relative movement between receptacles 10 in a direction transverse to bars 26*b* in a horizontal plane. Relative movement between the receptacles 10 in a direction parallel to bars 26*b* is prevented by the close straddling engagement of side wall portions 22, shown as the lower ends of parts 31*b* on the upper receptacle closely straddled by the upper ends of parts 31*a* on the lower receptacle.

In tiering position TP in FIG. 7, movable walls 15 of upper receptacle 10 are each locked in closed position P2. The component parts of receptacle 10 are so constructed that the distal end of each movable wall of the upper receptacle 10 in FIG. 7, shown specifically as turned down end portions 42*b* on the lower end of this wall, abuts against the inner surface of a bar 26*b* on the lower like receptacle 10 in FIG. 7 in tiering position TP so as to lock one or both of the movable walls 15 of the upper receptacle in closed position P2. In this closed position P2, bars 26*b* of the lower receptacle prevent outward

movement of walls 15 to open position P1. On the bottom receptacle in FIG. 7, parts 42*b* of the end gate are prevented from swinging freely outwardly by striking bars 27*b*. In position P2, all articles 52 supported on bottom portion 20 of upper receptacle 10 in FIG. 7 are held in proper position by being surrounded by walls 15 and 22 on all four sides, and these articles are prevented from escaping laterally from bottom portion 20 through either open side 32 of rigid frame 14.

One or both walls 15 of upper receptacle 10 in FIG. 7 are locked in closed position P2 automatically when the upper receptacle in FIG. 7 is lowered into tiering position engagement with its lower like receptacle. Then, articles 52 are completely enclosed and retained on bottom portion 20. This locking action may be caused to occur in any of a variety of methods, including the following two methods. First, one of the bars 26*b* in upper receptacle 10 in FIG. 7 is grasped in each hand, at least one finger of each hand pushes the lower end of each wall 15 inwardly, and upper receptacle 10 in FIG. 7 is lowered vertically downwardly into tiering position TP wherein the lower ends of walls 15 on the upper receptacle are straddled by bars 26*b* on the lower receptacle so that both walls 15 are locked in closed position P2. Second, one bar 26*b* of upper receptacle 10 in FIG. 7 is grasped in each hand, the upper receptacle is tilted about a horizontal axis parallel to one of its bars 26*b* so that its bottom portion 20 is inclined downwardly toward the right in FIG. 7, the upper receptacle is lowered until its right-hand hook-like portions 27*c* engage upon right-hand bar 26*b* of the lower receptacle in FIG. 7. Then, upper receptacle 10 in FIG. 7 is swung counterclockwise about this right-hand bar 26*b* on the lower receptacle until the left-hand hook-like portions 27*c* of the upper receptacle engage upon left-hand bar 26*b* of the lower receptacle so that the left-hand wall 15 on the upper receptacle is brought downwardly against the inner surface of left-hand bar 26*b* on the lower receptacle into locked and closed position P2 by a gravity action. Then, the right-hand end of the upper receptacle is raised and then lowered (swung counterclockwise and then clockwise about the axis of left-hand bar 26*b* on the lower receptacle) into tiering position TP so that right-hand wall 15 on the upper receptacle is also moved down into locked and closed position P2 by a gravity action.

It will be apparent hereinafter that the description, the structure and the mode of operation in the preceding paragraphs relating to the tiering position TP in FIG. 7, and the locking action of walls 15 in closed and locked positions P2 in tiering position TP, applies equally well to the same named or numbered parts, positions, directions and movements in FIGS. 8–10.

When more than two like receptacles 10 are stacked in tiering position TP, as shown by the two receptacles in FIG. 7, it may be desirable to load or unload articles 52 through one of the open sides 32 onto bottom portion 20 within one of the intermediate receptacles 10 in the stack located between the topmost and lowermost receptacle. Although, it is possible to load and unload this receptacle through its open top after disassembling the tiered stack of receptacles, it is far easier to load and unload this intermediate receptacle with articles 52 through its open side 32. For example, the intermediate receptacle 10 in FIG. 7 cannot be loaded and unloaded through its open top because of the receptacle (only the bottom being shown in dot-dash lines) being tiered thereon. Then, each movable wall 15 on this intermediate receptacle 10 may be unlocked, and swung outwardly from locked and closed position P2 to open position P1 even though the tiered stack has not been disassembled. Note links 46 on lower receptacle 10 straddle hook portions 27*c* on upper receptacle 10 in FIG. 6 (compare the vertical alignment of links 46 and portions 27*c* in FIG. 3) to permit links 46 to be swung between positions P2 and P1.



Wall 15 is moved from position P2 to position P1 in the following two steps. First, wall 15 is moved from locked position P2 in FIG. 2 through position P4 in FIG. 7 to unlocked position P3 in FIG. 6 by simultaneously swinging its links 46 clockwise in FIG. 6 about hinge axis A relative to rigid frame 14 while wall 15 is swung counterclockwise about axis B relative to links 46 until position P3 is reached. This action lifts the lower end of wall 15 over stop 26*b* previously holding wall 15 locked in closed position P2 wherein this wall was held downwardly by gravity so as to abut against said stop to prevent, without this lifting action, movement out of position P2 toward position P1. Note that the radius dimension R in FIG. 7 from hinge axis A to center bar portion 40*a* is always greater than the corresponding radial dimension R′ from axis A to the adjacent cross bar 27*b* on the like receptacle immediately above this wall 15. In position P4, links 46 have been stopped with bar portions 40*b* generally coaxial with bar 27*b* so that the offset between bar portions 40*a* and 40*b* will permit swinging wall 15 about this coaxial alignment (axis B) in the direction of the arrows in the upper left-hand portion of FIG. 7 even though links 46 remain stationary. Wall 15 is forced to swing outwardly to position P3 and cannot swing inwardly to position P6, generally corresponding to position P3 in FIG. 6 but on the other side of axis A, because link loops 47 abut against bottom portion 20 of the like receptacle 10 thereabove before the turned down end portions 42*b* are unlocked from bar 26*b* of like receptacle 10 therebelow. This action forces wall 15, when being moved from position P2 to P1, to be swung to position P3 so that this action can easily occur even though bottom portion 20 is fully loaded with articles 52. In contrast, if wall 15 could be unlocked by moving to position P6, difficulty might be obtained by having wall 15 strike against any articles 52 located closely adjacent the edge of bottom portion 20. Also, it should be noted that wall 15 is normally kept properly locked in position P2 by a plurality of forces. In order to move wall 15 from position P2 to position P3, wall 15 must be moved upwardly against the force of gravity and along a specific movement pattern by a properly moving force. Also, if bottom portion 20 is fully packed with articles 52, the outer edge of these articles tend to keep wall 15 downwardly in closed position P2 and to prevent any accidental movement of wall 15 upwardly to position P3. Second, after wall 15 reaches position P3 in FIG. 6, wall 15 may be swung clockwise about axis B relative to link 46 from position P3 to open position P1. It should be noted that the positions P1, P2, and P3 shown in the drawings are respectively merely illustrative of open, locked and unlocked positions; and wall 15 may assume any of a plurality of inclinations or locations in FIGS. 2, 6 and 7 while still being respectively open, locked or unlocked. It will be apparent hereinafter that the description of the structure and mode of operation in this paragraph applies generically to the same named or numbered parts, positions, directions, and movements in FIGS. 1–8.

FIG. 4 shows three like receptacles 10 in nesting position NP. Each receptacle 10 has its side wall portions 22, and other component portions, constructed and arranged so that like receptacles will nest one within another, as shown in FIG. 4. The upper receptacle in FIG. 4, hereinafter called the upper receptacle, and the lowermost two receptacles in FIG. 4, hereinafter called the lower receptacles, were put into the illustrated nesting position NP by the broadly described sequentially performed steps of entering, by manipulation, bottom portion 20 and lower tiering support portions 25 of the upper receptacle into clearways 33*a* and 33*b* of the lower receptacles, and then passing downwardly in these clearways 33*a* and 33*b* of the lower receptacles the bottom portion 20 and lower tiering support portions 25 of the

upper receptacle into nesting position NP shown in FIG. 4.

This nesting action is possible because a definite structural relationship exists between clearways 33*a* and 33*b*, movable walls 15, and their connecting means 16. Each receptacle 10 in FIG. 1 has clearways 33*a* and 33*b* located at opposite ends of the receptacle with each clearway provided between bottom portion 20, upper edges 21, and side wall portions 22 downwardly from one of the upper tiering support portions or bars 26*b*. In FIGS. 1 and 2, each movable wall 15 has at least a portion extending downwardly across one of these clearways 33*a* or 33*b* in which location it would normally interfere with the nesting action. For example, if walls 15 were rigidly secured to frame 14, nesting would not be possible. However, the hinge type connecting means 16 permits each wall 15 to be moved out of clearway blocking relationship in its closed position P2 during receptacle movement into nesting position NP.

Now, this nesting operation will be briefly described in detail step by step.

First, upper receptacle 10 in FIG. 4 is held above and out of contact with the lower receptacles, but with all receptacles being horizontal and generally in vertical alignment. It is preferred that the upper receptacle be held with one hand on each bar 26*b* with at least some fingers of the hands holding the walls 16 outwardly in a downwardly and outwardly inclined position.

Second, upper receptacle in FIG. 1 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 26*b* in FIG. 4 as a pivot with its left bar 26*b* moving in the counterclockwise direction downwardly away from the horizontal position so that upper receptacle 10 is inclined downwardly toward the left in FIG. 4.

Third, upper receptacle 10 is now lowered vertically so that its left lower tiering support portion 25 in FIG. 4 passes downwardly between bars 26*b* on the lower receptacles until this lower left tiering support portion 25 is below the plane of bars 26*b* on the lowermost receptacle 10 in FIG. 4. During this lowering movement, the left hand can release wall 15 as soon as portions 42*b* thereof will strike left wall 15 on the middle receptacle in FIG. 4 so that this wall will be properly guided into the nesting position NP shown in FIG. 4.

Fourth, upper receptacle 10 is shifted generally horizontally toward the left in FIG. 4 so that the left lower tiering support portion 25 of upper receptacle 10 is slid through left-hand clearway 33*a* of the lower receptacles, which clearway is formed between the lowermost left bar 26*b* and the uppermost bottom portion 20 of the lower receptacles, until the right-hand lower tiering support portion 25 on upper receptacle 10 is vertically to the left of right-hand bars 26*b* of the lower receptacles.

Fifth, upper receptacle 10 may be swung in a clockwise direction about its left-hand cross bar 26*b* so that it right-hand lower tiering support portion 25 clears the right-hand cross bars 26*b* on the lower receptacles. During this movement, the right-hand may release the right-hand wall 15 on the upper receptacle as soon as it can fall to a resting position on right-hand wall 15 of the middle receptacle to get proper guiding action into the nesting position NP in FIG. 4.

Sixth, upper receptacle 10 is shifted generally horizontally toward the right in both clearways 33*a* and 33*b* of the lower receptacles into a vertically aligned position. Then, upper receptacle 10 is released to fall by gravity into nesting position NP shown in FIG. 4.

Successive receptacles may be moved into this nest in this same manner to increase the number of receptacles 10 in the nesting stack.

In nesting position NP in FIGS. 4 and 5, the component parts of each receptacle 10 are constructed to permit the distal or lower end portion of movable walls 15 to extend generally vertically in nesting position NP in FIG. 4 so as to minimize the horizontal dimension of the nested receptacles in FIG. 4 by minimizing outward spread of these movable walls 15. Hence, receptacles in nesting position NP take up minimum floor or storage space. Several structural features coact together to make possible this compact nesting of walls 15. The upper portion 46 of the assembly, formed of side wall 15 and hinge or connecting means 16, located adjacent bar 26*b* is downwardly and outwardly inclined relative to a plane P in FIG. 4, extending perpendicular to bottom portion 20 of that receptacle, when the lower portion is located generally in this plane P when like receptacles 10 are in nesting position NP in FIG. 4. Each wall 15 has its component members 44*a* and 45*a* upwardly diverging in FIG. 5 so they nest with corresponding members in nesting position NP on an adjacent like receptacle 10 in nesting position NP. Now, an examination of FIGS. 4 and 5 will reveal that the aforedescribed parts in walls 15 nest together so well because the same vertical spacing, maintained between bars 26*b* on vertically adjacent nested receptacles 10 by V-shaped side portion parts 31*a* and 31*b*, is also maintained as vertical spacing increments for inclined upper portions 46 and the corresponding component parts 44*a* and 45*a* of movable walls 15.

Upper receptacle 10 in FIG. 4 may be easily disengaged from nesting position NP by performing the reverse of the aforedescribed nesting steps. However, walls 15 do not now have to be manually held in outwardly diverging positions because they do not interfere with the nest disassembly action.

As will be apparent hereinafter, the description of the structure and mode of operation in the preceding paragraphs (relating to the steps required to nest, the relationship of the parts in the nesting position, and the disengagement of each nested receptacle from the nesting position) applies equally well to the same named or numbered parts, positions, directions and movements in FIGS. 8–10.

The structure in FIGS. 1–8 differs from the structure in FIGS. 9 and 10. In FIGS. 1–8, the downwardly and outwardly inclined upper portion 46 in nesting position NP in FIG. 4 is link 46, and the pivotal movements about axes A and B makes this inclination possible.

A single receptacle 10 in FIGS. 1, 2, 3 or 6 will have the two following operating characteristics.

First, the distal or lower end of each movable wall 15 is freely swingable on its support bar 26*b* about hinge axis A between its open position P1 and closed position P2 when this receptacle 10 is out of both tiering position TP and nesting position NP. Unlocked position P3 in FIG. 6 need not be assumed, but wall 15 and its links 46 may retain generally the same angular orientation about axis B during swinging movement between positions P2 and P1. During this movement, turned down end portions 42*b* at the lower or distal end of wall 15 swing between longitudinal rods 30 during movement between positions P2 and P1. It will be apparent hereinafter that the description of the structure and mode of operation in this paragraph also applies generically to the same named or numbered parts, positions, directions and movements in FIGS. 9 and 10.

Second, wall 15 may be swung clockwise in FIG. 6 about axis A through position P1 to position P5. In position P5, loops 47 rest upon the tops of the distal ends of V-shaped parts 31*a* to maintain links 46 in position P5 and one or more of the bars 44 and 45 abut against their associated bar 26*b* to maintain wall 15 in position P5. It will be apparent hereinafter that the description of the structure and mode of operation in this paragraph also applies generically to the same named or numbered parts, positions, directions and movements in FIG. 8.

Receptacle 11 in FIG. 8 includes rigid frame 14 and

two movable walls **15**, and two connecting means or hinge means **16** with one of these walls and connecting means at each end to form generally the same construction as shown in FIG. 1 on receptacle **10**. Receptacle **11** is exactly like receptacle **10** except that two stop bars **55**, one at each end (only one bar **55** being shown), is welded or otherwise rigidly secured to the tops of longitudinal rods **30** and extend generally parallel to bar **26***b*. Each bar **55** is located so that the distal or lower end of its associated movable wall, and especially turned down end portions **42***b* thereof, abut against stop bar **55** in closed position P2 to prevent outward movement of movable wall **15** to open posiiton P1 when receptacle **11** is out of tiering and nesting positions, as shown in FIG. 8. This abutting action against stop bar **55** provides a locking action generally the same as provided by each bar **26***b* in tiering position TP in FIG. 7. However, if wall **15** in FIG. 8 is first unlocked by movement from locked position P2 to unlocked position P3 in FIG. 6, wall **15** can then be moved to open position P1 because this action lifts the lower end of wall portions **42***b* up over stop bar or stop **55**.

Receptacle **12** in FIGS. 9 and 10 includes rigid frame **14**, two movable walls **15'**, and two connecting means or hinge means **16'** with one wall and hinge means located on each end of rigid frame **14**.

Each wall **15'** includes welded or otherwise rigidly connected top bar **40'** having center bar portion **40***a'*, bottom bar **42** having center bar portion **42***a* and turned down end portions **42***b*, and bars **44** and **45** having respectively upwardly diverging members **44***a* and **45***a*.

Hinge means **16'** in FIGS. 9 and 10 is a single action hinge while hinge means **16** in FIG. 6 was a double action or link hinge. Hinge means **16'** in FIGS. 9 and 10 has only a single pivot axis A with this axis being coaxial with bar **26***b*. Top bar or wire **40'** of wall **15'** extends along the top dimension of movable wall **15'**, and has its opposite ends bent into the form of two hinge leafs or portions **40***b'*. Each leaf **40***b'* on this wire **40'**, rigid with movable wall **15'**, has a loop **48'** looped around bar **26***b* to provide a pivotal mount on this bar around hinge axis A for movable wall **15'**. Loops **48'** are straddled by bends **26***c* to provide stop means **50'** for preventing endwise movement of wall **15'** along axis A relative to frame **14**. This construction permits receptacles **12** in tiering position TP in FIGS. 9 and 10 to have the distal or lower end of each wall **15'** on upper receptacle **12** locked in closed and locked position P2, and permits movable walls **15'** of nested receptacles to nest in generally the same manner as shown by walls **15** in FIGS. 4 and 5. However, when receptacles **12** are in tiering position TP in FIGS. 9 and 10, the wall **15'** on the upper receptacle cannot be moved from locked position P2 to open position P1 without at least partially lifting the associated one end of the tiered receptacle to permit the lower ends of its wall portions **42***b* to clear bar **26***b* on the receptacle therebelow to permit wall **15'** to move from position P2 to position P1. This difference in mode of operation is caused because walls **15** in FIG. 6 are mounted on double action, link hinges having movement about two axes A and B, while walls **15'** in FIGS. 9 and 10 are mounted by single action hinges having pivotal movement only about axis A. In nesting position, upper portions **40***b'* are downwardly and outwardly inclined relative to members **44** and **45** at about the same angle as similar portions or links **46** in FIG. 4 to provide similar nesting action of side walls **15'**.

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. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, lock means responsive to tiering position engagement between upper and lower like receptacles for locking the movable wall of one of these receptacles in said closed position against movement in an outward direction to said open position, said movable wall being locked only when said receptacle is tiered with another like receptacle.

2. A receptacle, as set forth in claim 1, with hinge means responsive to movement of said lock means to unlocked position in said tiering position from said locked position for permitting outward movement of said movable wall from said closed to open position for loading or unloading said bottom portion.

3. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, said connecting means including a hinge means operatively connecting said movable wall to said rigid frame, said hinge means including a bar extending generally parallel to said bottom portion, said bar being one of said upper tiering support portions on said rigid frame.

4. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said

upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, said connecting means including a hinge means operatively connecting said movable wall to said rigid frame, said hinge means including a bar extending generally parallel to said bottom portion, said bar, movable wall and connecting means being constructed so that the distal end of said movable wall abuts against said bar on a like receptacle in tiering position to lock said movable wall in said closed position to prevent outward movement of said movable wall to said open position, said distal end of the movable wall being freely swingable about said bar between its open and closed positions when said receptacle is out of tiering position.

5. A receptacle, as set forth in claim 4, with said hinge means including a link hinge with two, parallel, spaced apart hinge axes; one of said axes being formed by said bar.

6. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, said connecting means including a hinge means operatively connecting said movable wall to said rigid frame, said hinge means including a bar extending generally parallel to said bottom portion, said receptacle having a stop bar rigid with said bottom portion, extending generally parallel to the bar of said hinge means, and located so that the distal end of said movable wall abuts against said stop bar in said closed position to prevent outward movement of said movable wall to said open position when said receptacle is out of tiering position said hinge means including a link having a pair of parallel spaced apart hinge axes operatively connected to said frame and said movable wall, said hinge means also including two loops surrounding said bar spaced along the hinge axis and closely straddled by said bends to prevent substantial endwise movement of the movable wall along the hinge axis.

7. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portions, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, said connecting means including a hinge means operatively connecting said movable wall to said rigid frame, said hinge means including a bar extending generally parallel to said bottom portion, stop means preventing endwise movement of said movable wall relative to said rigid frame along the axis of said hinge means, said bar having laterally extending bends on opposite ends, said hinge means including two loops surrounding said bar spaced along the hinge axis and closely straddled by said bends to prevent substantial endwise movement of said movable wall along the hinge axis.

8. A receptacle structure, including a frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges; a movable wall adapted to extend at least partially over an open side of said frame; hinge means operatively connecting said movable wall and said frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side; said hinge means including a link hinge with two, parallel, spaced apart, generally horizontally extending, hinge axes respectively connected to said movable wall and to said frame; and a stop associated with one of said portions, said stop and hinge means constructed and positioned so that gravity holds said movable wall downwardly with the path of movement of a portion of said wall adapted to abut against said stop during movement out of said closed position toward said open position to hold said wall locked in closed position and so that said wall may be lifted over said stop by action of said link hinge to permit wall movement from closed to open position.

9. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, said connecting means including a hinge means operatively connecting said movable wall to said rigid frame, said hinge means including a bar extending generally parallel to said bottom portion, stop means preventing endwise movement of said movable wall relative to said rigid frame along the axis of said hinge means, said bar having laterally extending bends on opposite ends, said hinge means including two loops surrounding said bar spaced along the hinge axis and closely straddled by said bends to prevent substantial endwise movement of said movable wall along the hinge axis.

8. A receptacle structure, including a frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges; a movable wall adapted to extend at least partially over an open side of said frame; hinge means operatively connecting said movable wall and said frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side; said hinge means including a link hinge with two, parallel, spaced apart, generally horizontally extending, hinge axes respectively connected to said movable wall and to said frame; and a stop associated with one of said portions, said stop and hinge means constructed and positioned so that gravity holds said movable wall downwardly with the path of movement of a portion of said wall adapted to abut against said stop during movement out of said closed position toward said open position to hold said wall locked in closed position and so that said wall may be lifted over said stop by action of said link hinge to permit wall movement from closed to open position.

9. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle; a movable wall adapted to extend at least partially over an open side of said rigid frame; and connecting means operatively connecting said movable wall and said rigid frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side, said connecting means including a hinge means operatively connecting said movable wall to said rigid frame, said hinge means including a bar extending generally parallel to said bottom portion, stop means preventing endwise movement of said movable wall relative to said rigid frame along the axis of said hinge means, said bar having laterally extending bends on opposite ends, said hinge means including two loops surrounding said bar spaced along the hinge axis and closely straddled by said bends to prevent substantial endwise movement of said movable wall along the hinge axis.

8. A receptacle structure, including a frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges; a movable wall adapted to extend at least partially over an open side of said frame; hinge means operatively connecting said movable wall and said frame so that said movable wall is movable relative to said frame between a side open position uncovering said open side and permitting loading and unloading articles on said bottom portion through the open side and a side closed position at least partially covering said open side to block removal of the articles through said open side; said hinge means including a link hinge with two, parallel, spaced apart, generally horizontally extending, hinge axes respectively connected to said movable wall and to said frame; and a stop associated with one of said portions, said stop and hinge means constructed and positioned so that gravity holds said movable wall downwardly with the path of movement of a portion of said wall adapted to abut against said stop during movement out of said closed position toward said open position to hold said wall locked in closed position and so that said wall may be lifted over said stop by action of said link hinge to permit wall movement from closed to open position.

9. A receptacle adapted for tiering with other like receptacles, including a rigid frame comprising a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, tiering position support means including a plurality of upper tiering support portions rigid with said upper edges and a plurality of lower tiering support portions rigid with said bottom portion, said lower tiering support portions being located substantially vertically beneath said upper tiering support portions, said lower tiering support portions of an upper receptacle being positioned to rest vertically down upon said upper tiering support portions of a lower like receptacle in tiering position with like parts of said upper receptacle substantially vertically aligned above like parts of the lower receptacle, there being an opening provided at at least one end and extending between said bottom portion and upper edges and side wall portions, a movable gate adapted to extend at least partially over said end opening of said rigid frame, connecting means operatively

connecting said gate and said rigid frame adjacent said upper edges so that said gate is movable relative to said frame between an open position uncovering said open end and a closed position at least partially covering said open end, said connecting means including hinge means connecting the top of said gate to said rigid frame so that it hangs by gravity in closed position, a portion of said frame abutting said gate in free-swinging motion to prevent its opening, and said hinge means constructed and arranged to provide for a generally vertical lifting movement of said gate sufficient to clear said abutting frame portion.

10. A receptacle as set forth in claim 9, wherein said upper tiering support portions comprises a bar across the top of said end opening, said bottom portion is dimensioned so that said portion of an upper receptacle will pass downwardly into and endwise outwardly below said bar of a lower like receptacle to nest them, said side wall portions being so constructed and arranged that two like receptacles will nest vertically one within another, and with said gate including vertically inclined members adapted to nest in a common plane with corresponding inclined members of the gate of a like receptacle in nesting position of two like receptacles.

11. A receptacle as set forth in claim 9, wherein said upper tiering support portions include a bar extending generally parallel to said bottom portion and said hinge means comprises a link operatively connected by two parallel spaced apart hinge axes, respectively, to said gate and to said rigid frame, said gate and rigid frame and link being so constructed that said gates on like receptacles have minimum horizontal outward spread in nesting position, the distal end of at least some of said gates on tiered like receptacles being locked in said closed position by the bar on an adjacent like receptacle acting as a stop in tiering position, and each of said some gates may be unlocked and swung outwardly from closed position to open position when two receptacles are in tiering position.

12. A receptacle, as set forth in claim 11, in which said gate and hinge means form an assembly, an upper portion of said assembly located adjacent said bar being downwardly and outwardly inclined relative to a plane perpendicular to said bottom portion, when the lower portion of said gate is located generally in said plane with like receptacles in nesting position, so as to minimize the horizontal dimension of the receptacle, and said hinge means including a hinge leaf pivotally mounted on said bar and rigid with said gate.

13. A receptacle adapted for tiering and nesting with other like receptacles, including a rigid frame comprising



a bottom portion, means defining upper edges spaced above said bottom portion, side wall portions rigidly connecting said bottom portion and upper edges, said frame having an opening at at least one end giving access to the interior of said receptacle when like receptacles are stacked, said means defining said upper edges including a horizontal bar across the top of said end opening, the bottom portion of said receptacle extending endwise beyond a line vertically beneath said bar, whereby the bottom portion of one receptacle will rest upon said bar of a like receptacle to tier them, the bottom portion of an upper receptacle being dimensioned to pass downwardly into and endwise outwardly below said bar of a lower like receptacle to nest them, said side wall portions being so constructed and arranged that two like receptacles will nest vertically one within another, a gate adapted to close said open end against loss of material out of said receptacle, hinge means connecting the top of said gate to said horizontal bar so that it hangs by gravity in closed position, a portion of said frame abutting said gate in free-swinging motion to prevent its opening, and said hinge means constructed and arranged to provide for a generally vertical lifting movement of said gate sufficient to clear said abutting frame portion.

14. A receptacle as defined in claim 13 wherein said frame has said end opening and said gate closure therefor duplicated at an end opposite said first named end.

15. A receptacle as defined in claim 13 wherein said extending bottom portion is dimensioned to leave a clear space along said horizontal bar of a like receptacle when two such receptacles are tiered, and said hinge means including a link pivotally mounted in said space on said bar and pivotally connected to said gate, whereby to provide for said generally vertical lifting movement of said gate of said receptacle when a like receptacle is tiered above it.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| D. 178,183 | Glezen | July 3, 1956 |
| 762,328 | Lundstrom | June 14, 1904 |
| 1,205,521 | Doble | Nov. 21, 1916 |
| 2,172,266 | Whitaker | Sept. 5, 1939 |
| 2,478,883 | Willis et al. | Aug. 9, 1949 |
| 2,635,786 | Wickson | Apr. 21, 1953 |
| 2,831,599 | Groffeo | Apr. 22, 1958 |
| 2,892,562 | Smithson | June 30, 1959 |
| 2,970,714 | Glezen | Feb. 7, 1961 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 694,312 | Great Britain | July 15, 1953 |