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(54) **APPARATUS FOR USE IN A COLD VAULT**

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(57) **ABSTRACT**

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(22) Filed: **Jul. 6, 2005**

Related U.S. Application Data

(63) Continuation of application No. 10/963,196, filed on Oct. 12, 2004, now abandoned, which is a continuation of application No. 10/838,359, filed on May 5, 2004, now abandoned.

An apparatus is provided which includes a frame configured to be supported by a customer-accessible lower shelf, the lower shelf being adapted to support a plurality of items, and an upper shelf supported by the frame at an angle thereto, the upper shelf also being adapted to support a plurality of items and having an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the lower shelf, through the opening, after an item is removed from the lower shelf.

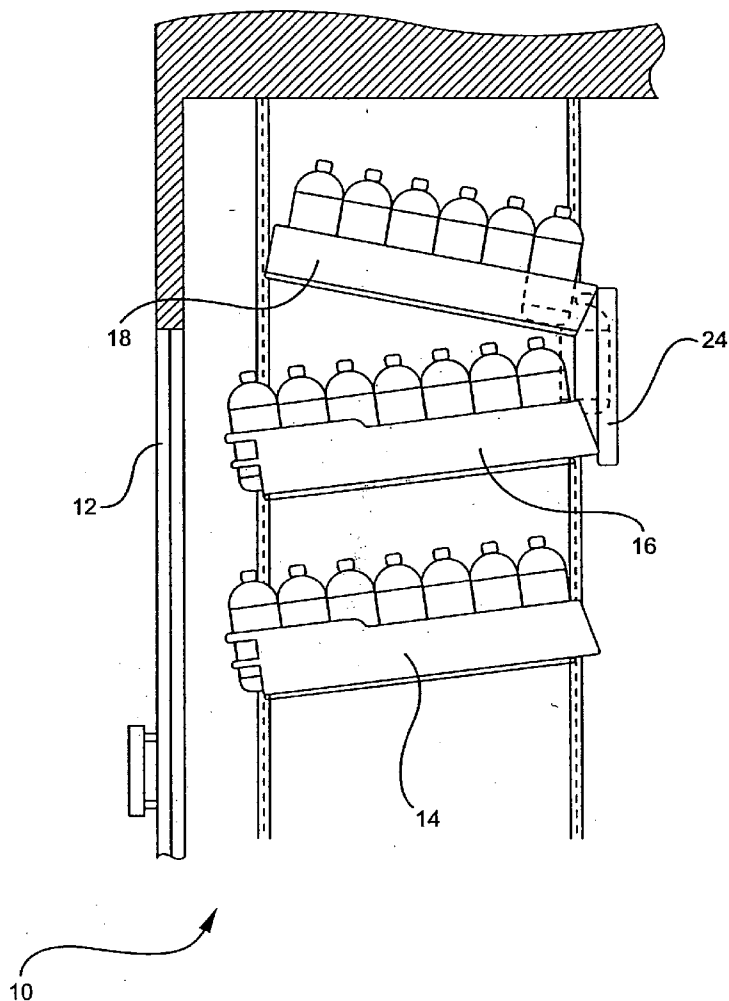


FIG. 1

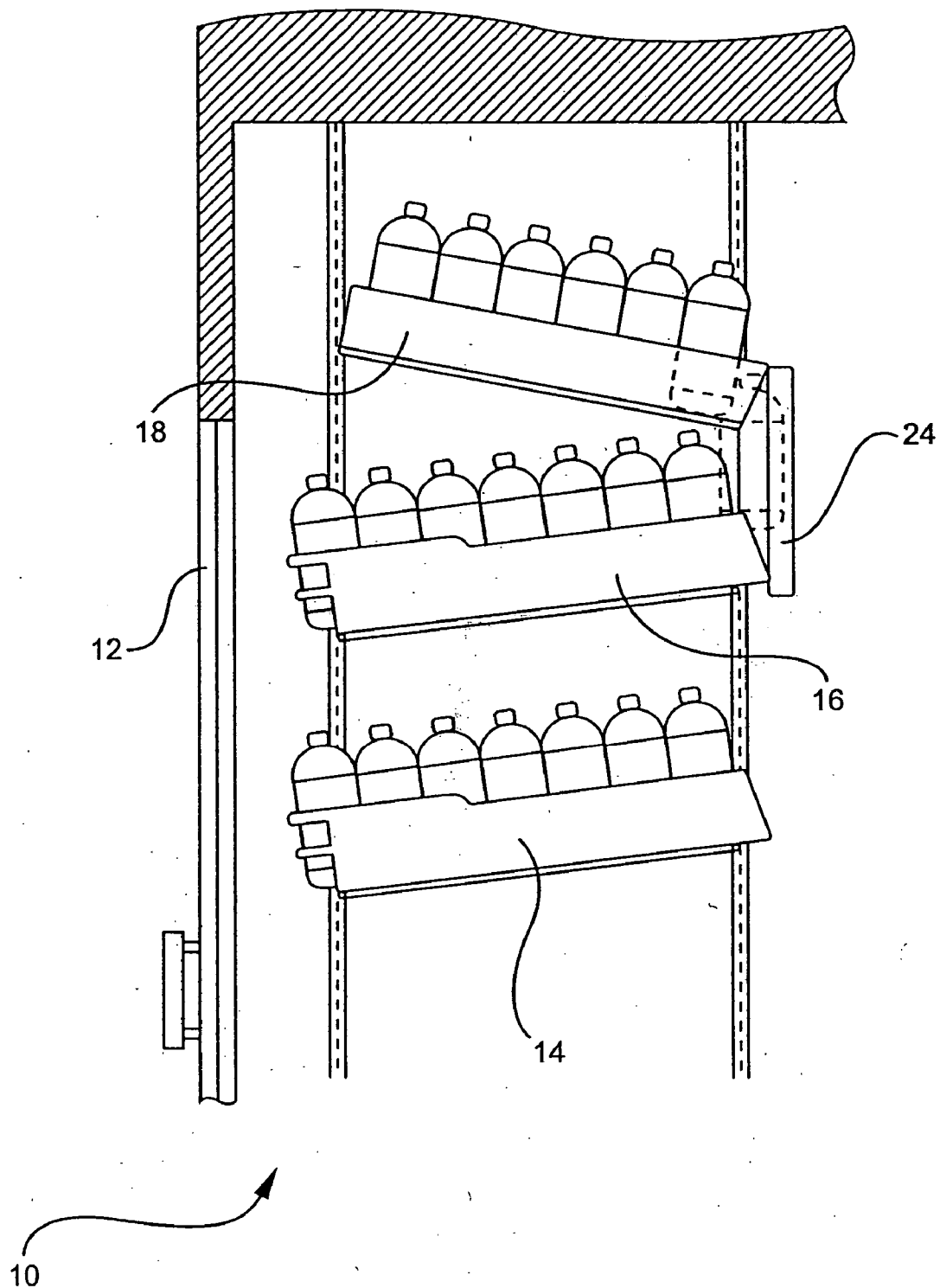


FIG. 2

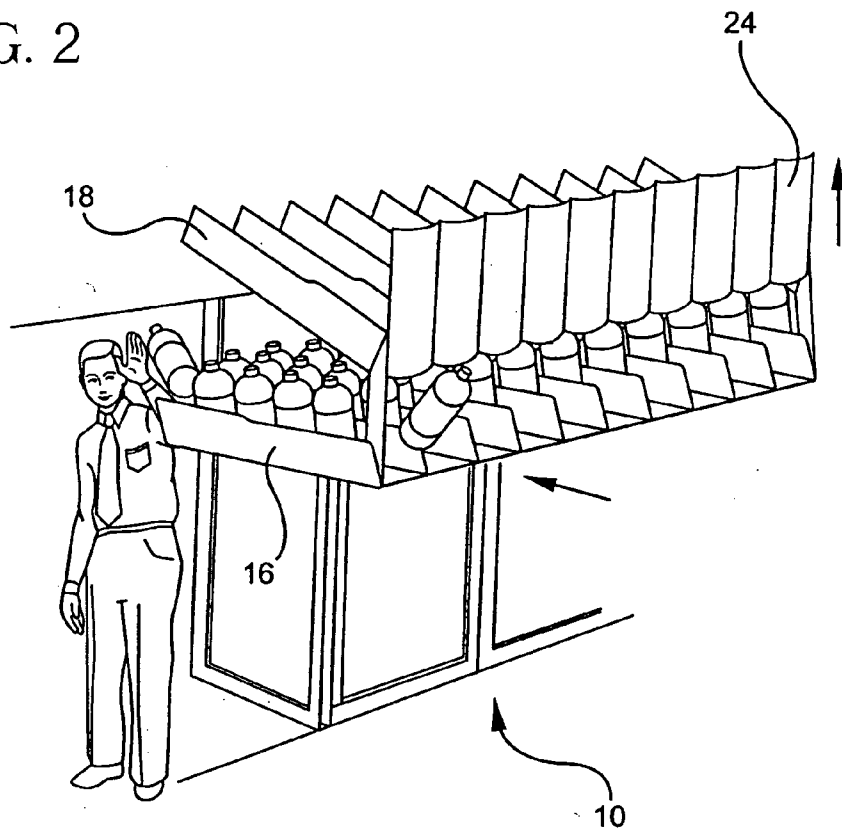


FIG. 3

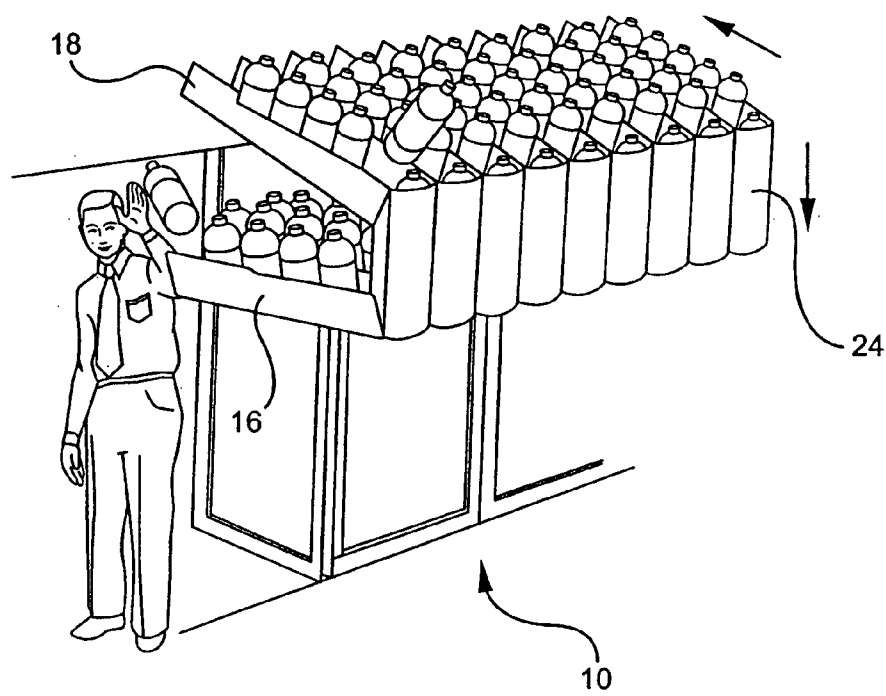


FIG. 4

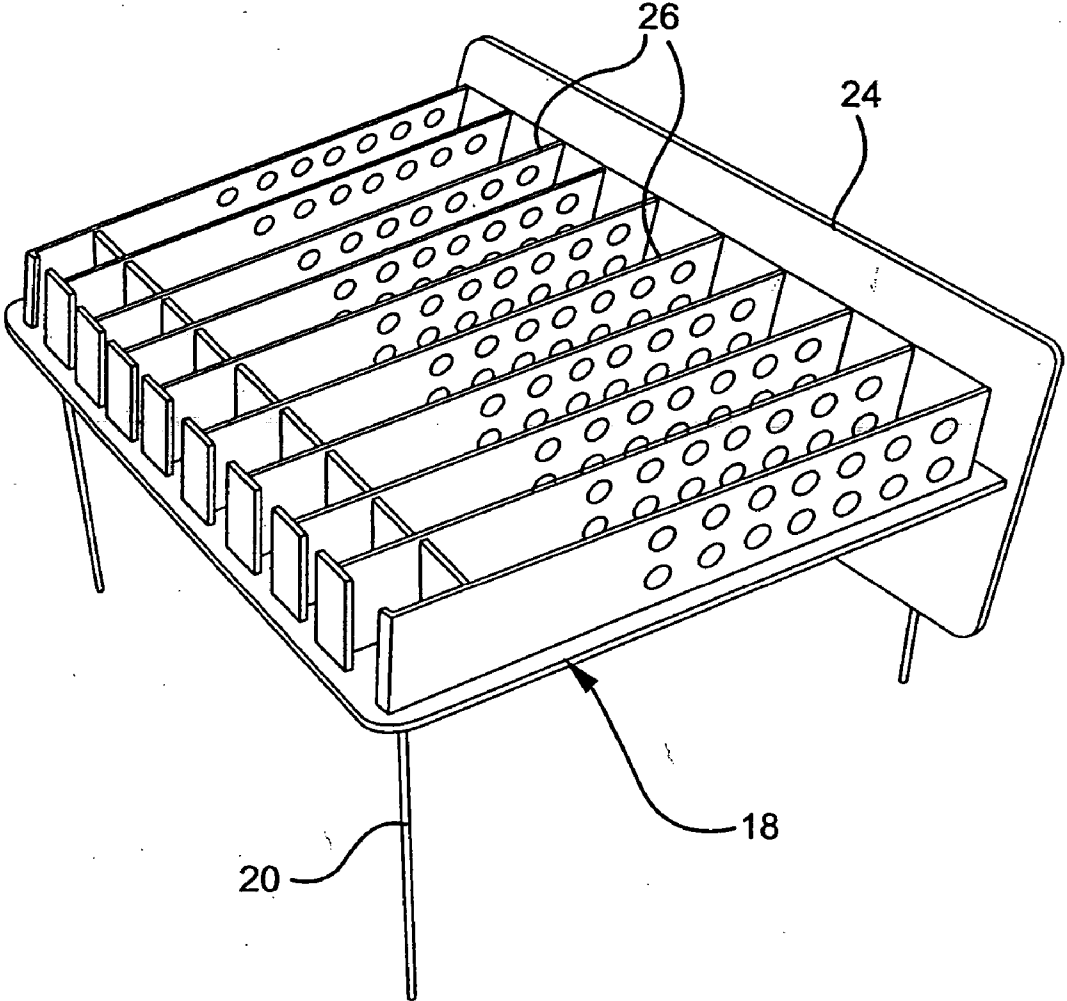


FIG. 5

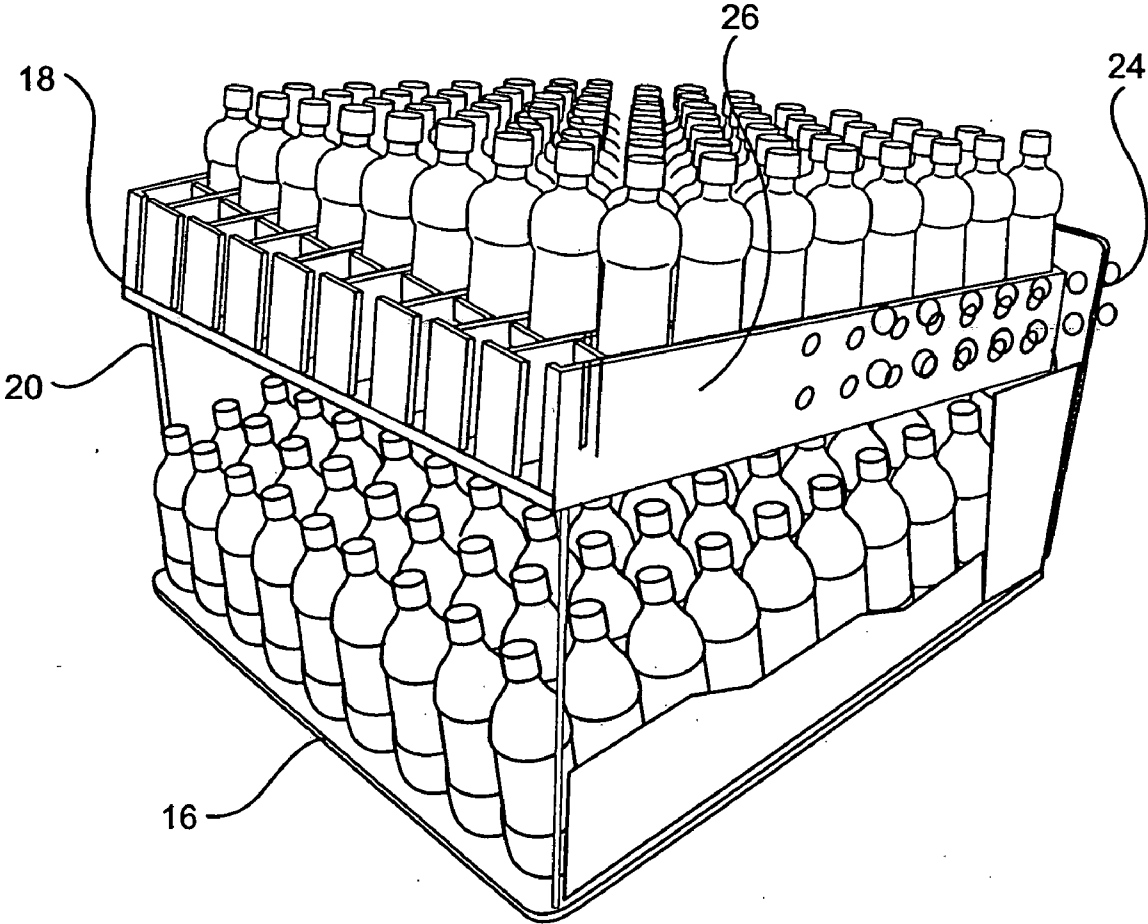


FIG. 6

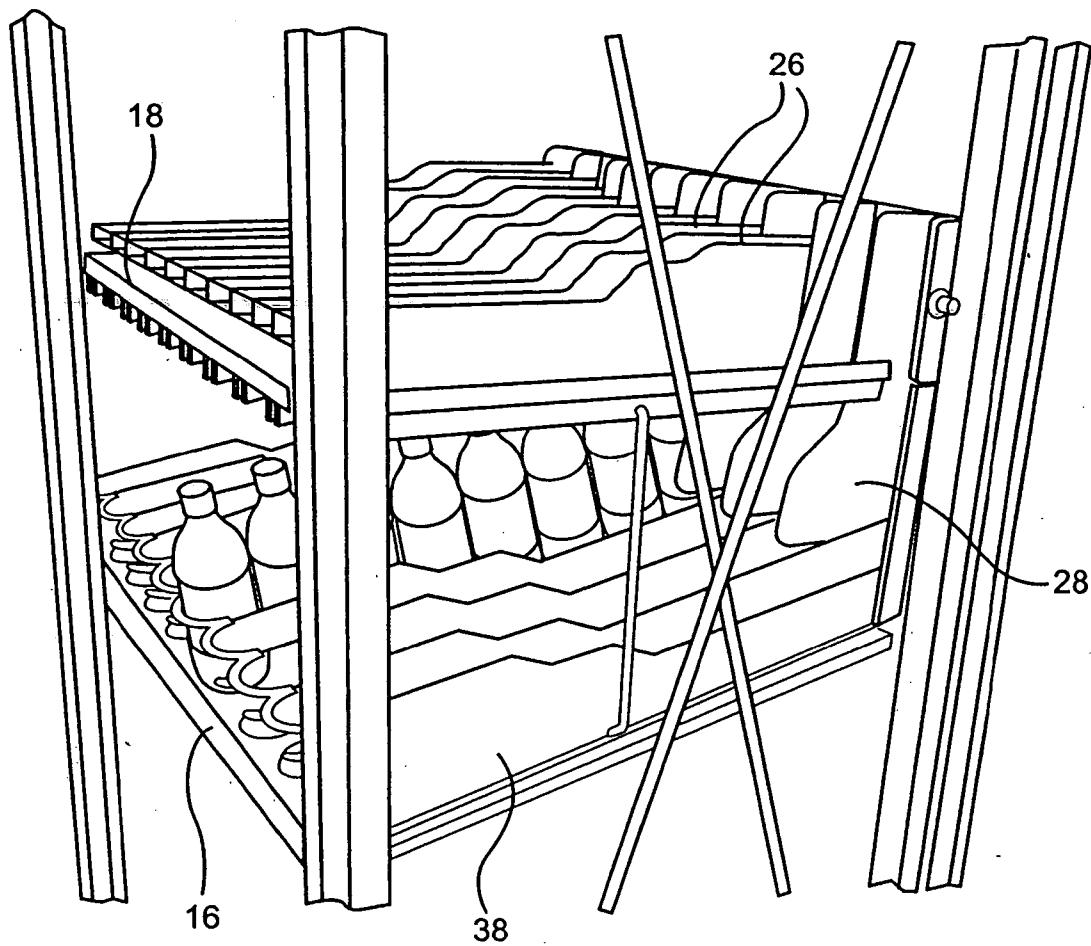


FIG. 7

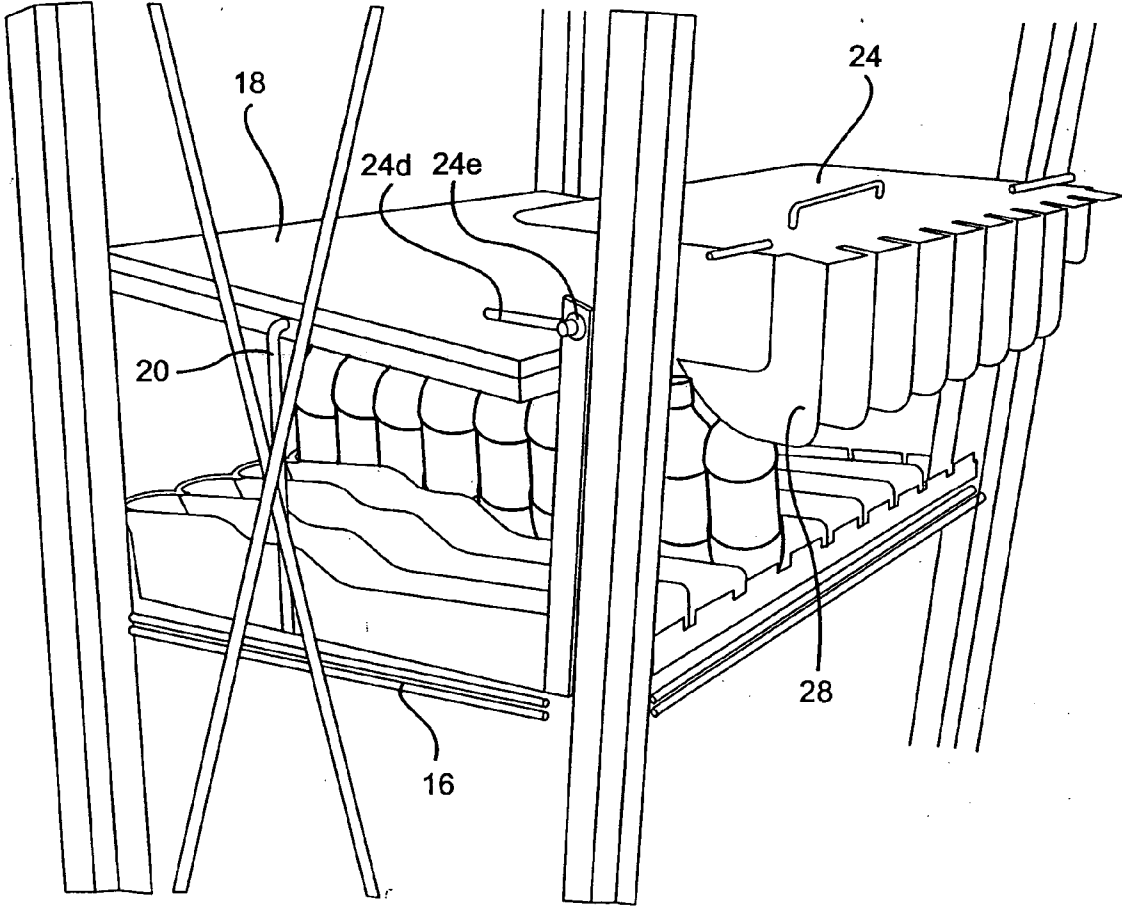


FIG. 8

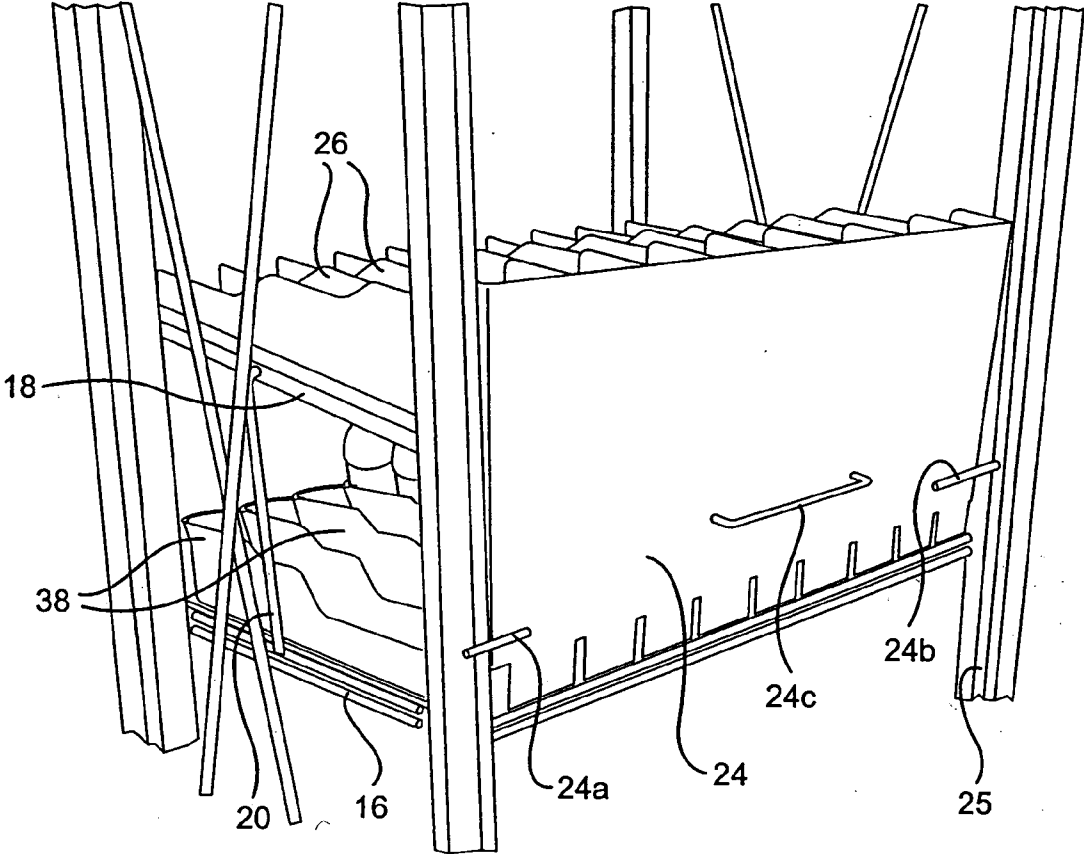
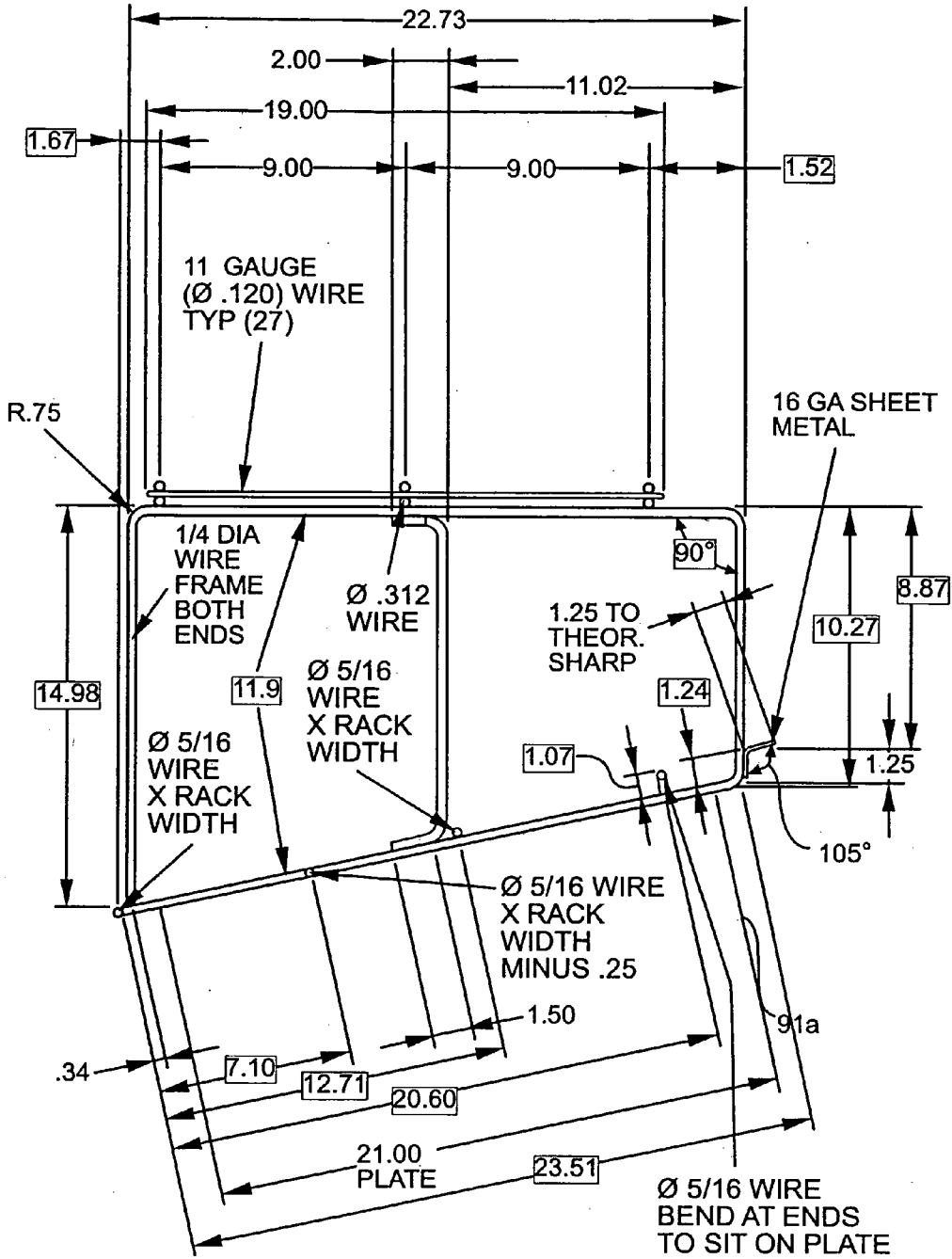


FIG. 10A



Typical Side View,
Full Size,
Boxed Dimensions Are Critical

FIG. 10B Top View 8 Wide Rack Half Size

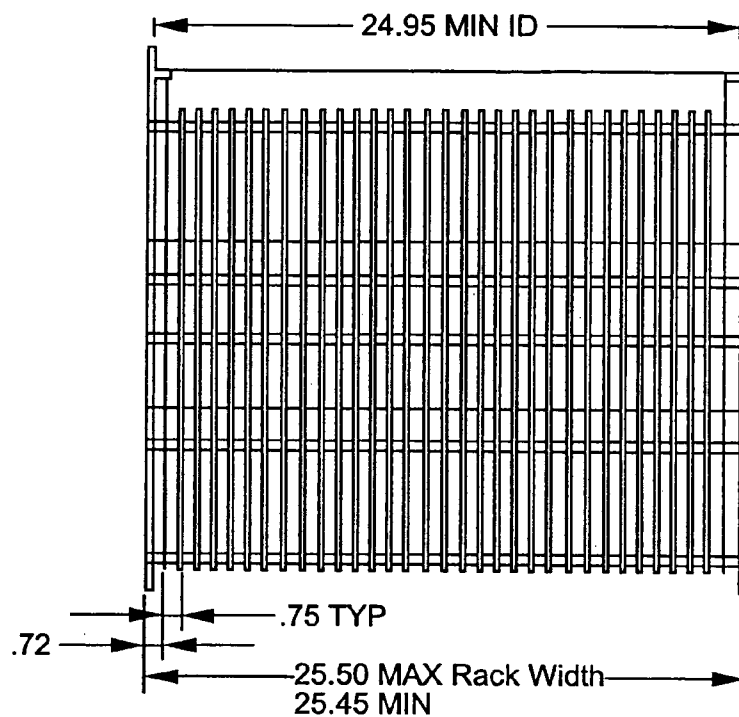


FIG. 10C Top View 7 Wide Rack Half Size

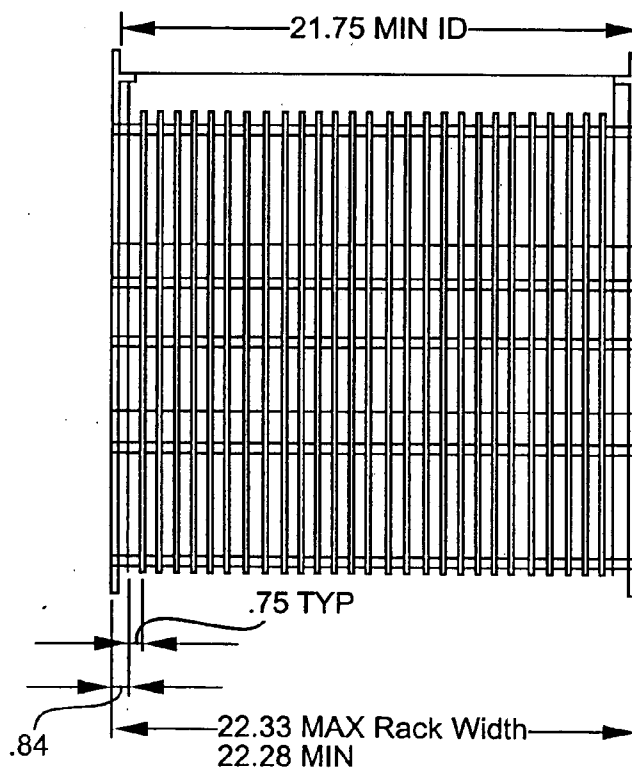


FIG. 10D Top View 9 Wide Rack Half Size

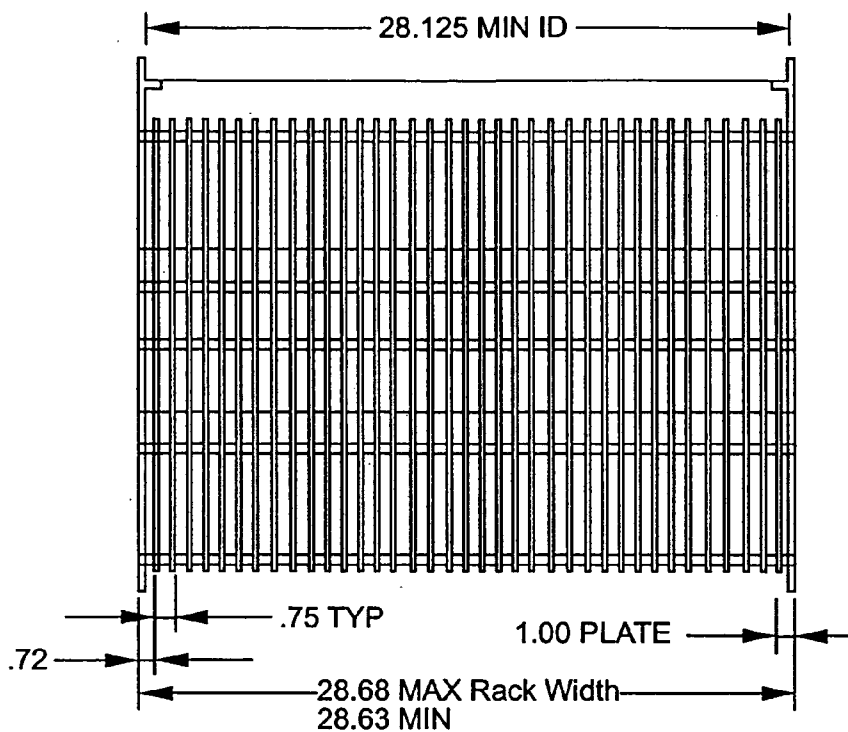
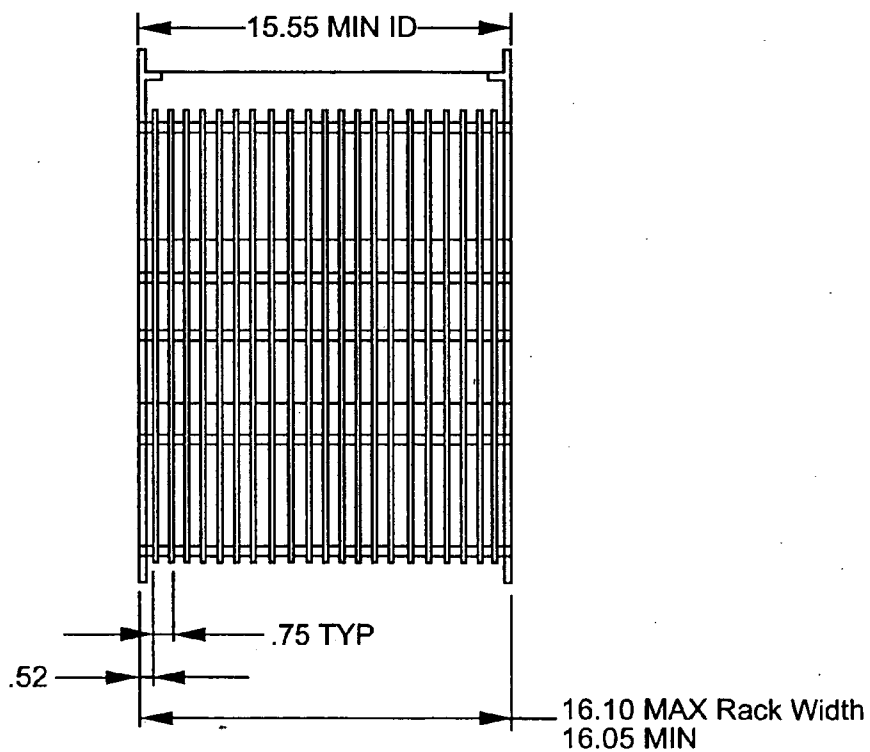


FIG. 10E Top View 5 Wide Rack Half Size



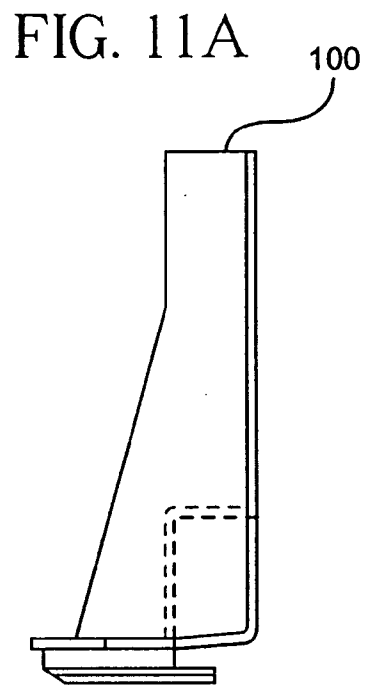


FIG. 11B

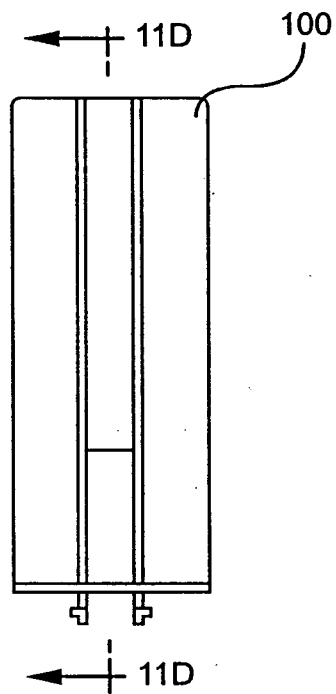


FIG. 11C

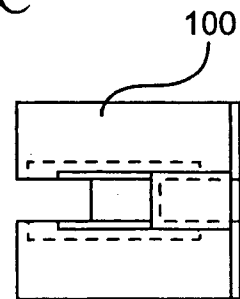


FIG. 11D

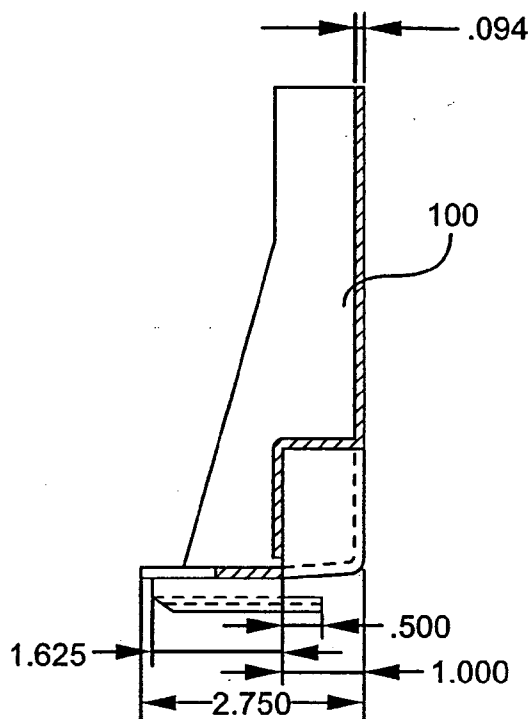


FIG. 11E

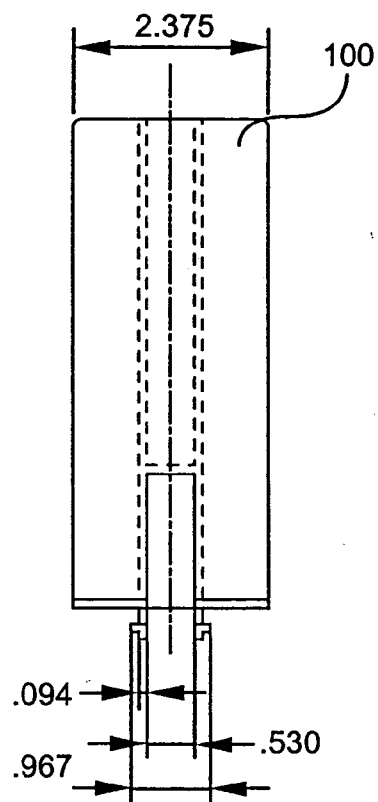


FIG. 11F

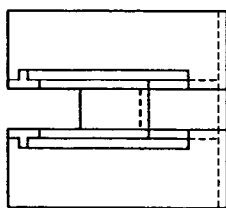
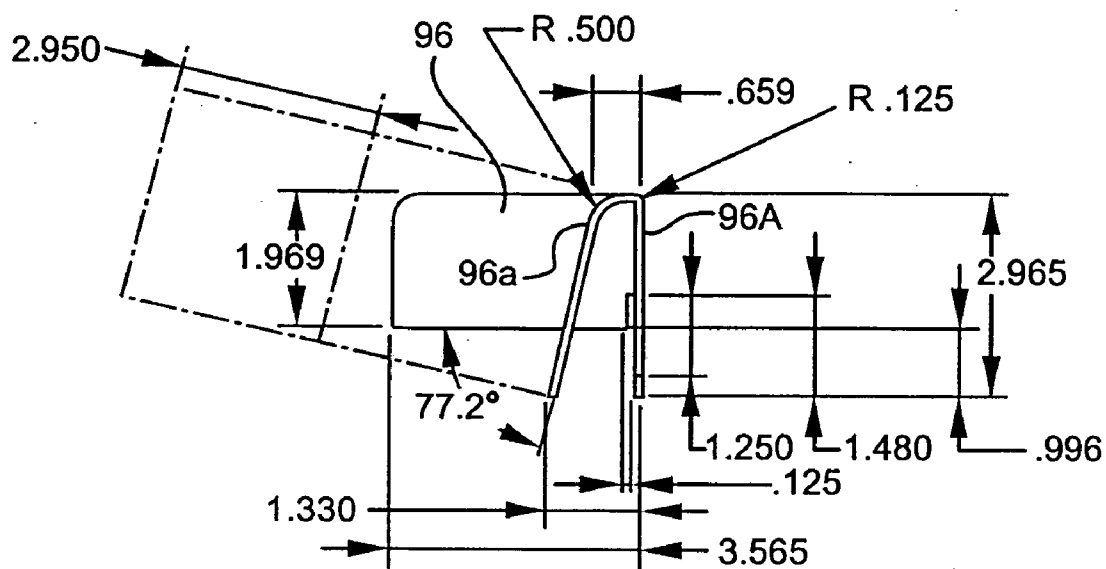


FIG. 12A



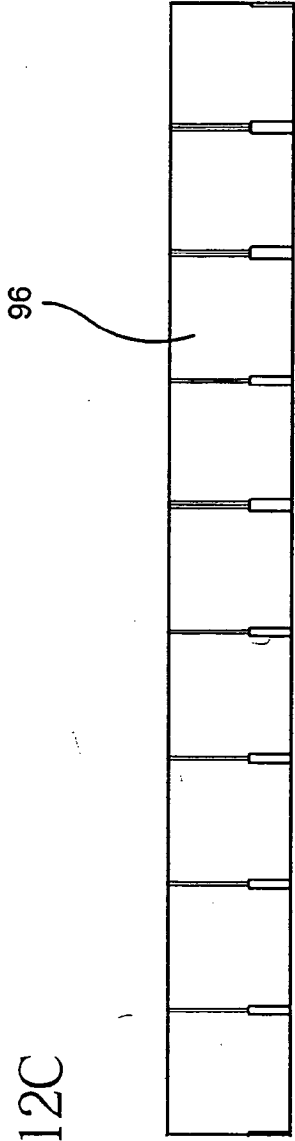


FIG. 12C

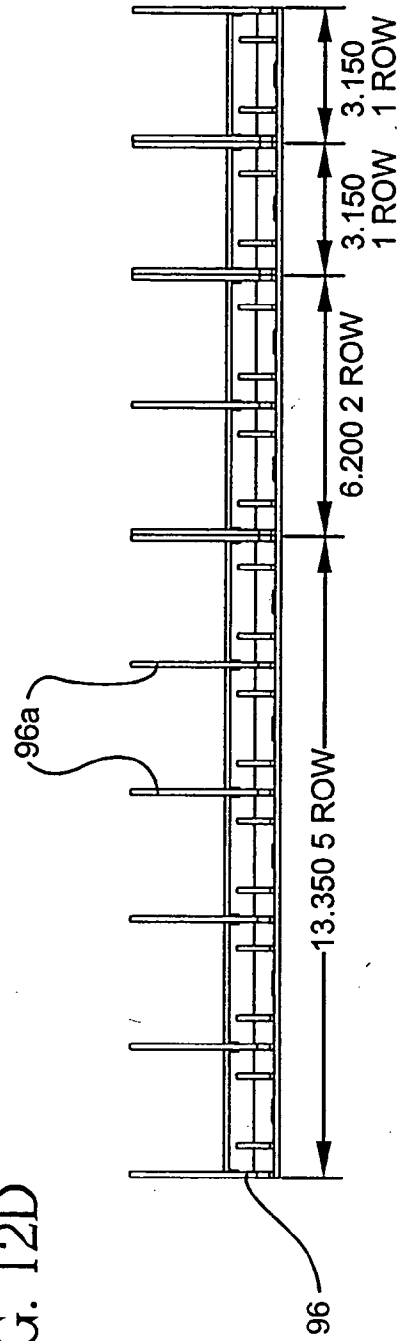
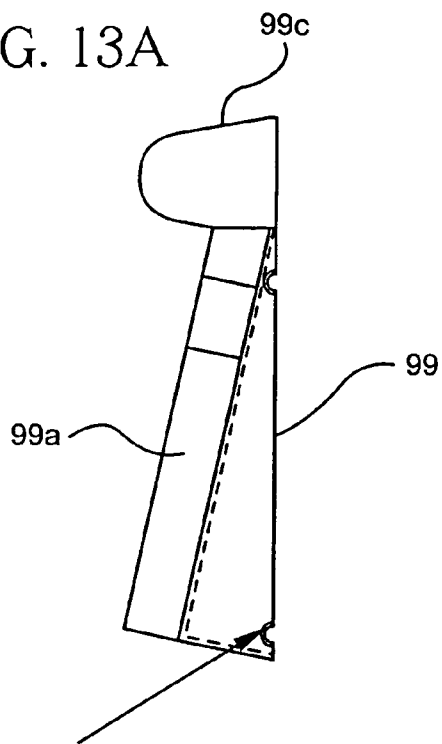


FIG. 12D

FIG. 13A



ENDS Walls
Need Clearance
For Welds on
Frame

FIG. 13B

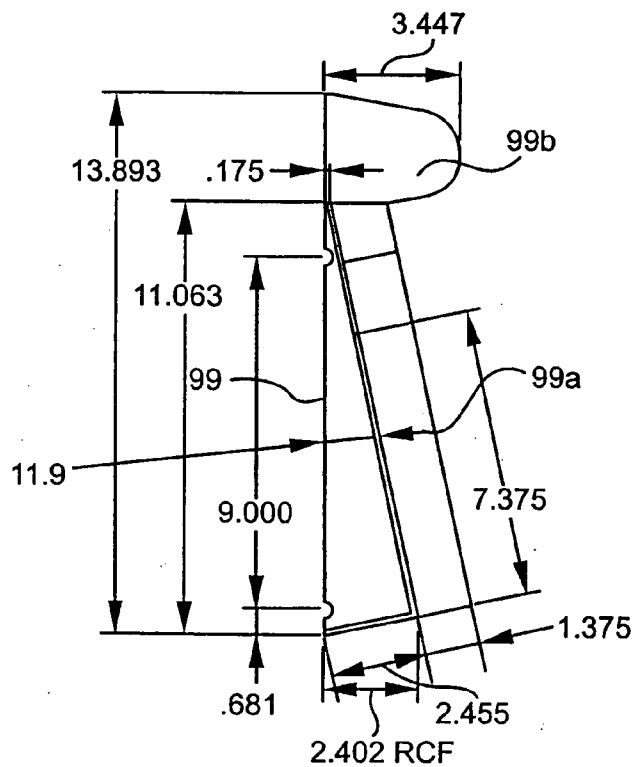


FIG. 13C

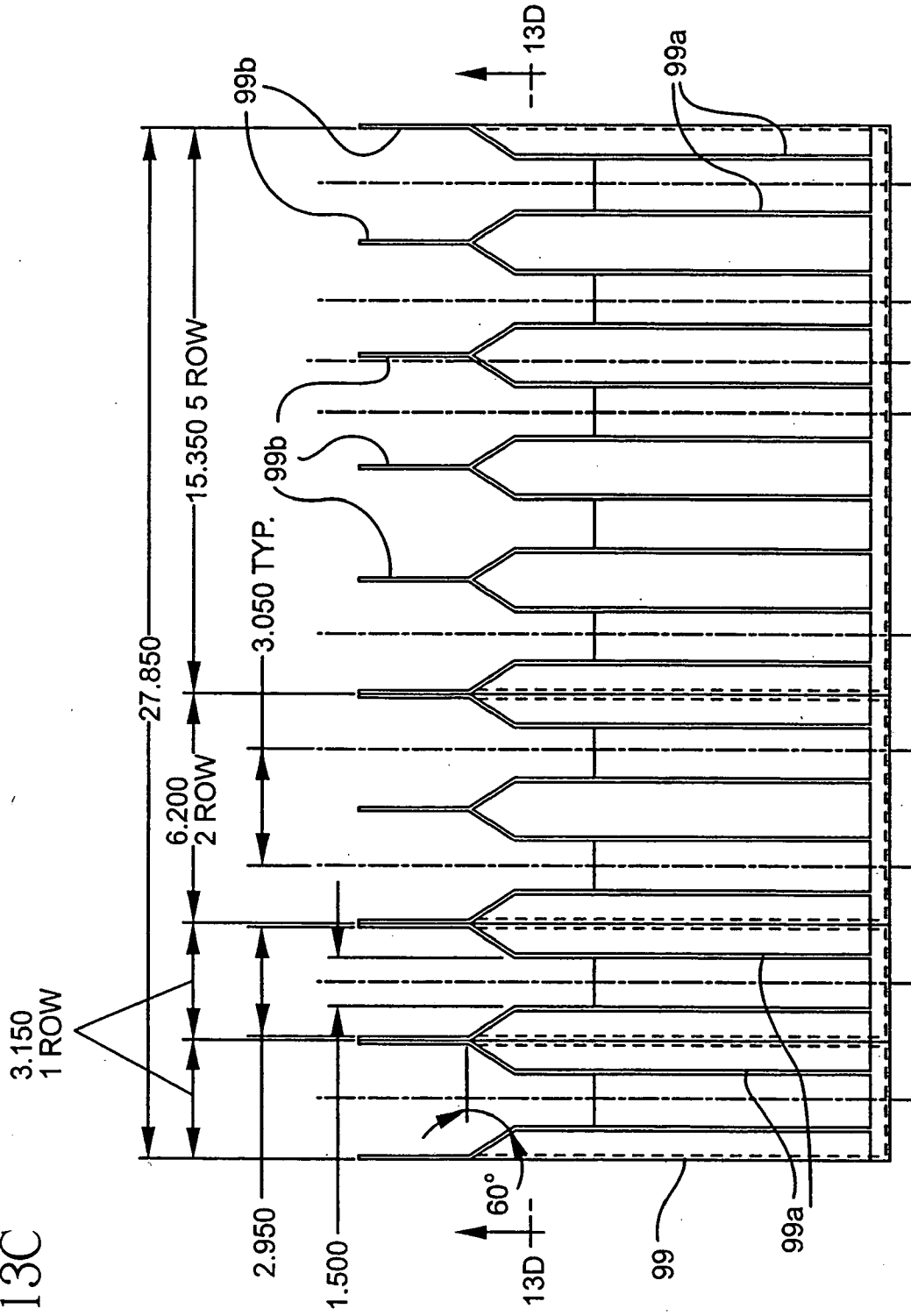


FIG. 13D

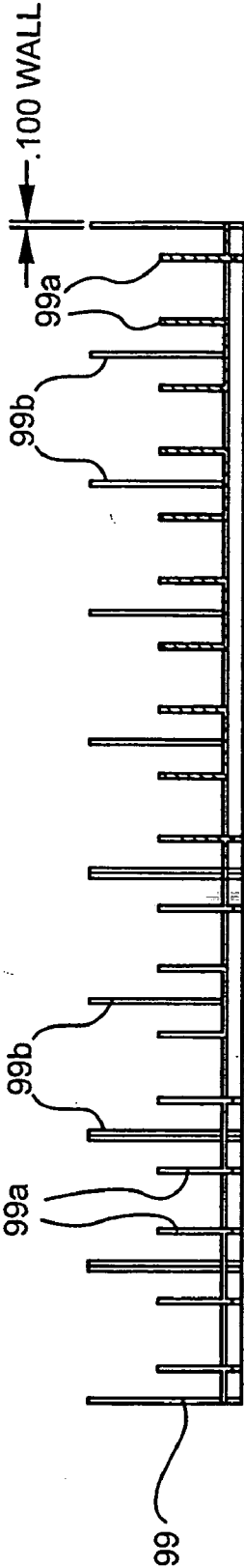


FIG. 14A

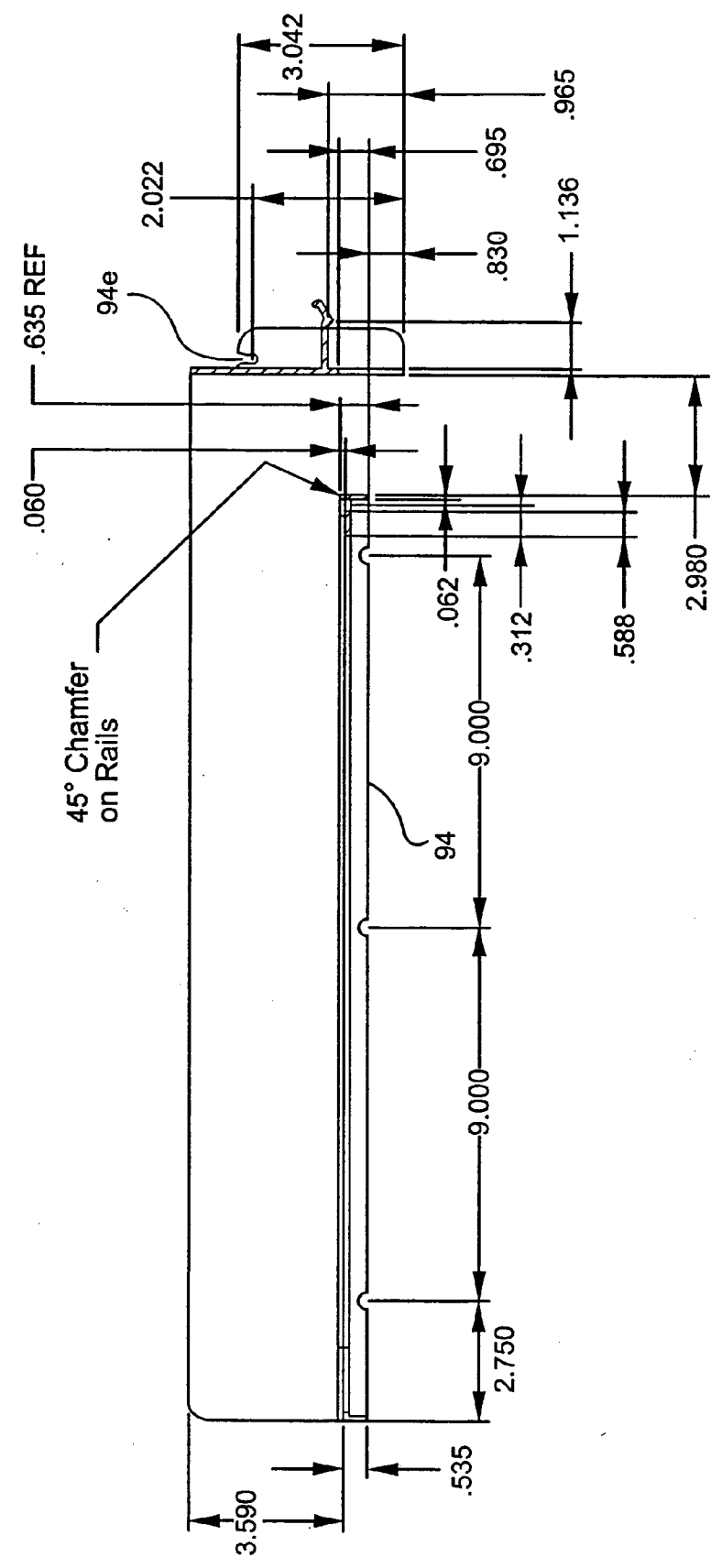


FIG. 14B

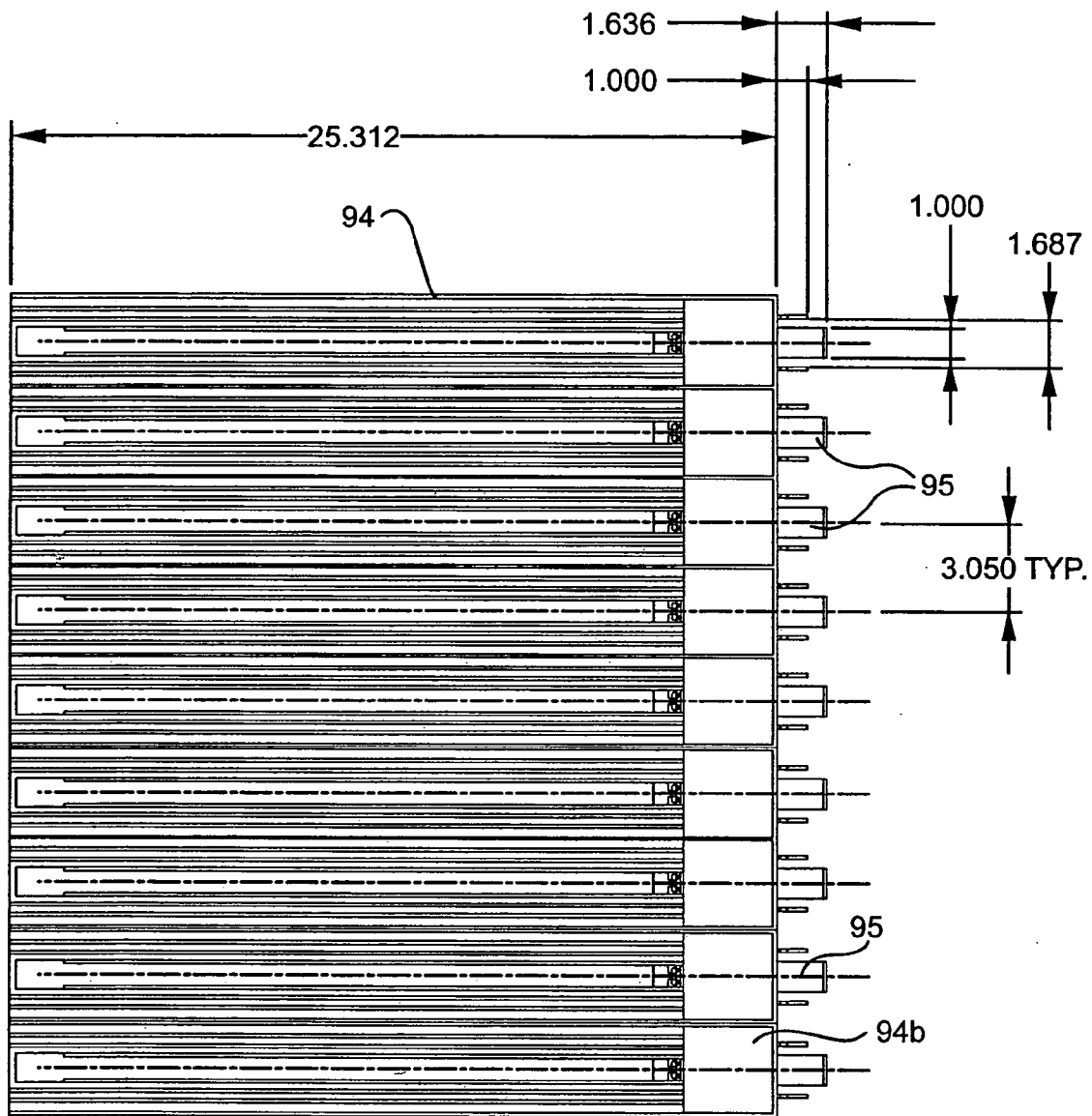


FIG. 14C

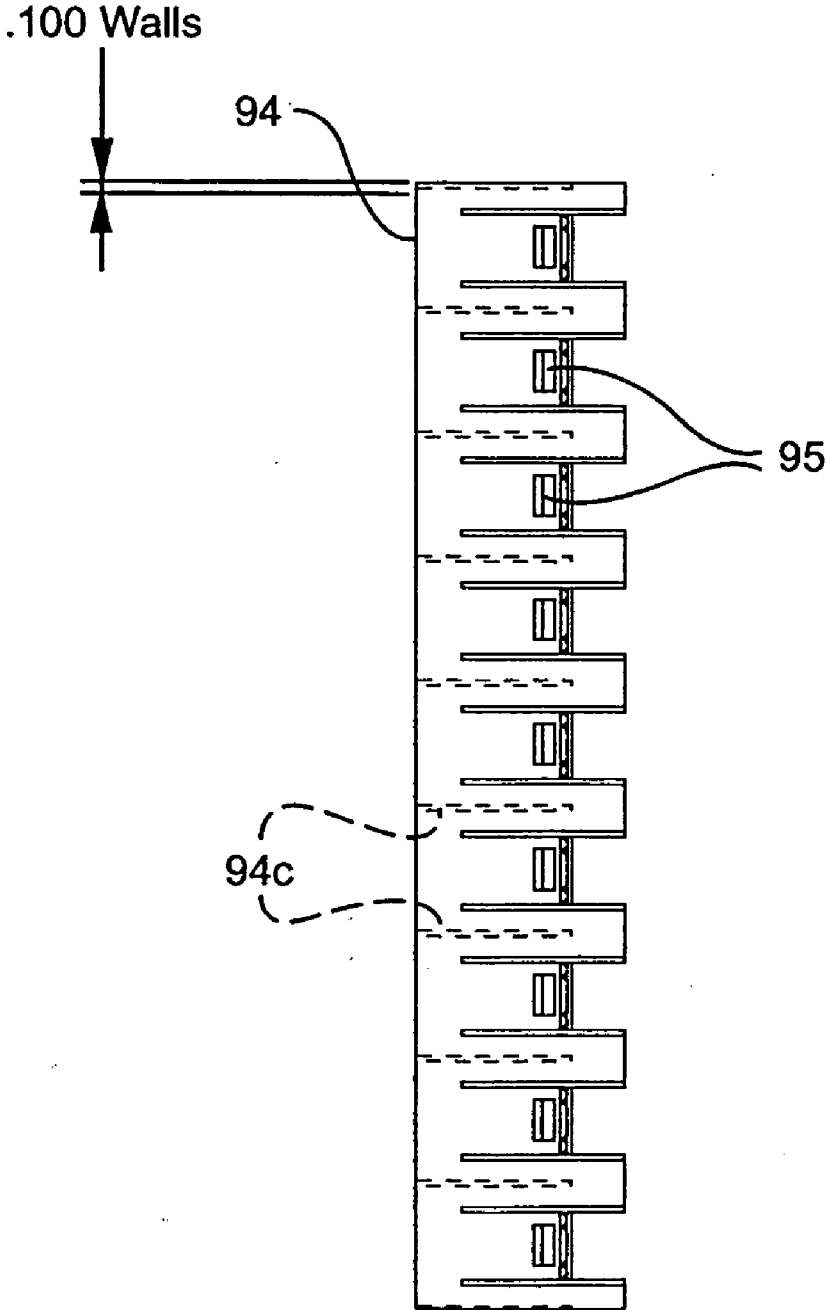


FIG. 14D

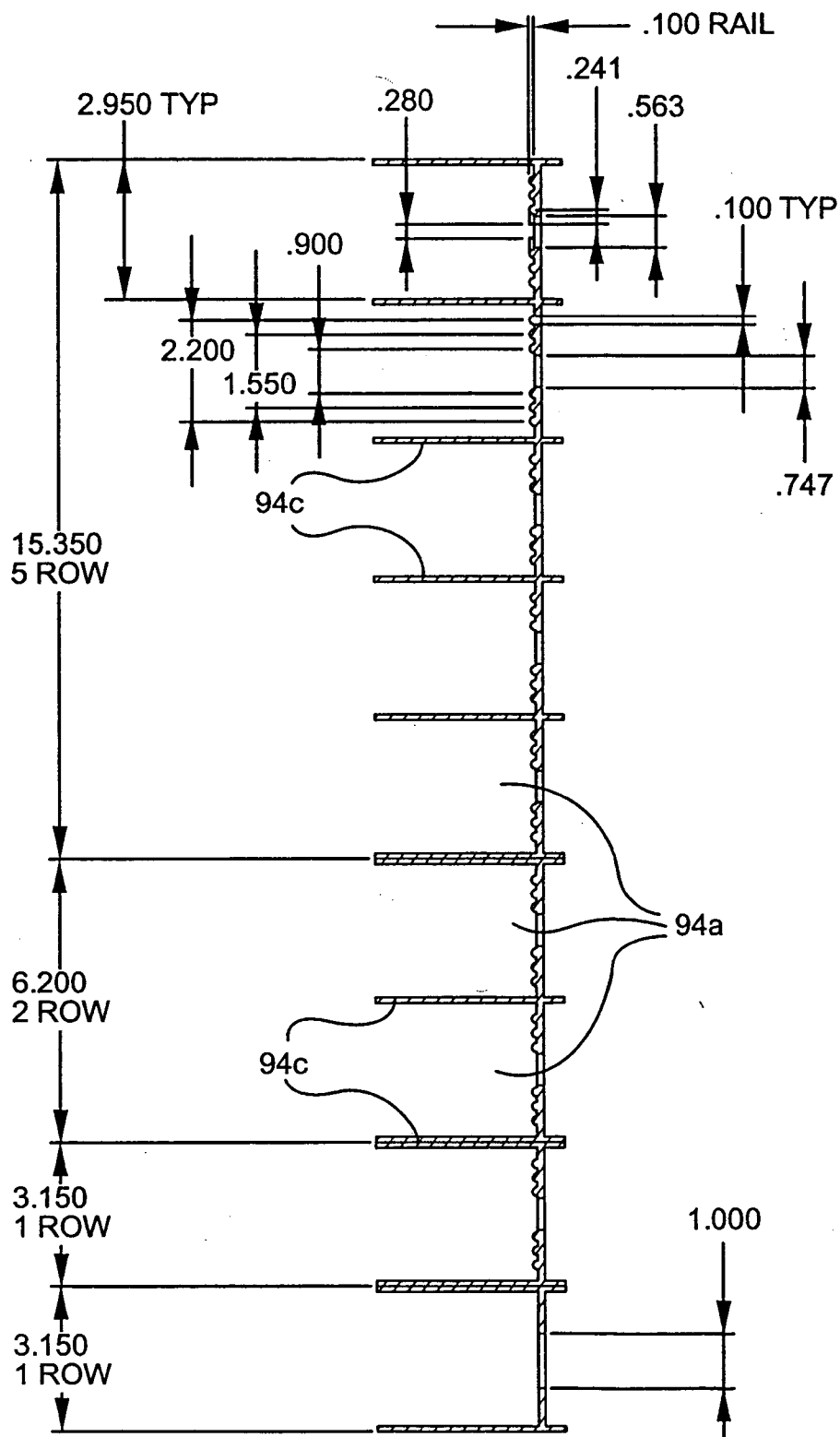


FIG. 15A

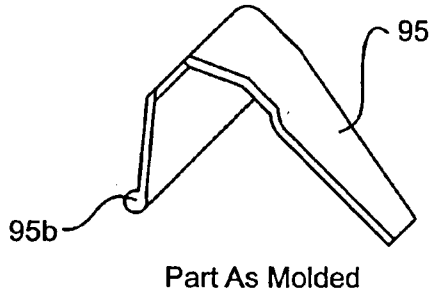


FIG. 15B

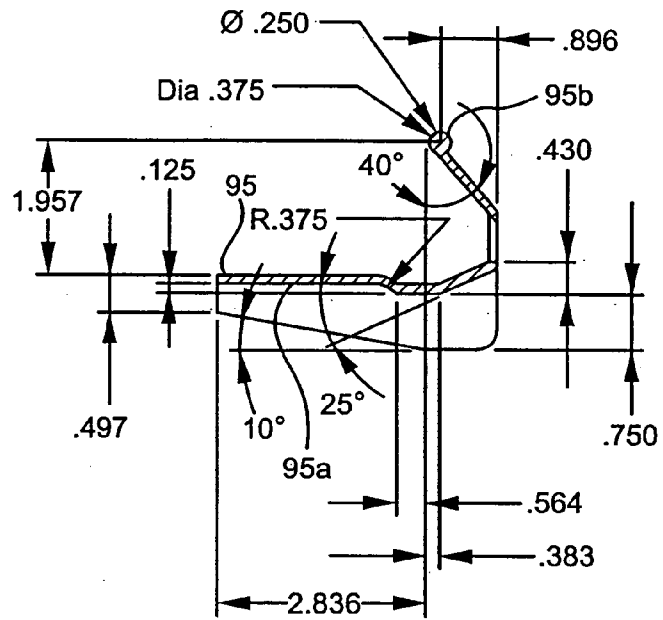


FIG. 15C

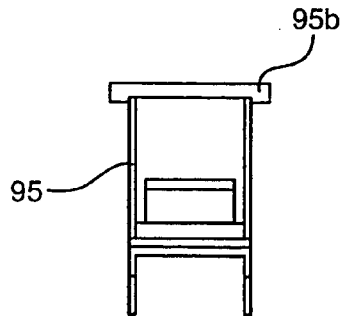


FIG. 15D

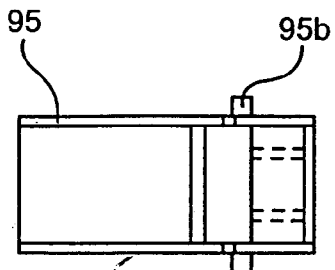


FIG. 15E

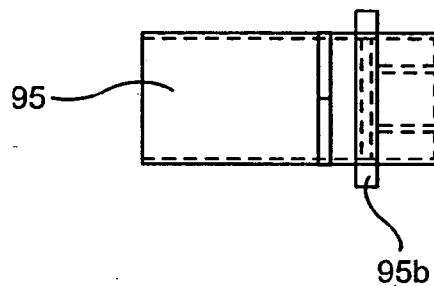


FIG. 15F

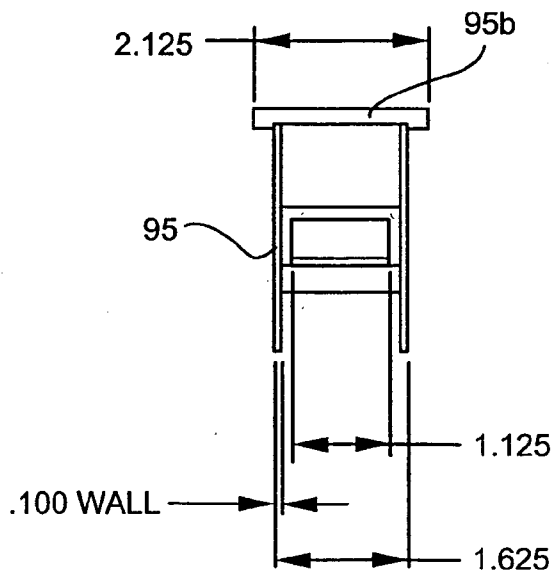


FIG. 16A

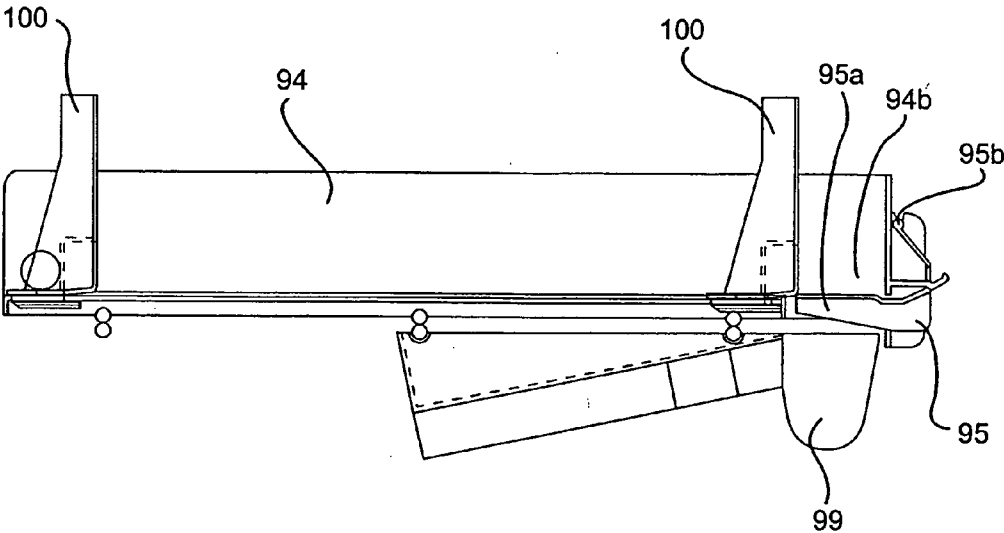


FIG. 16B

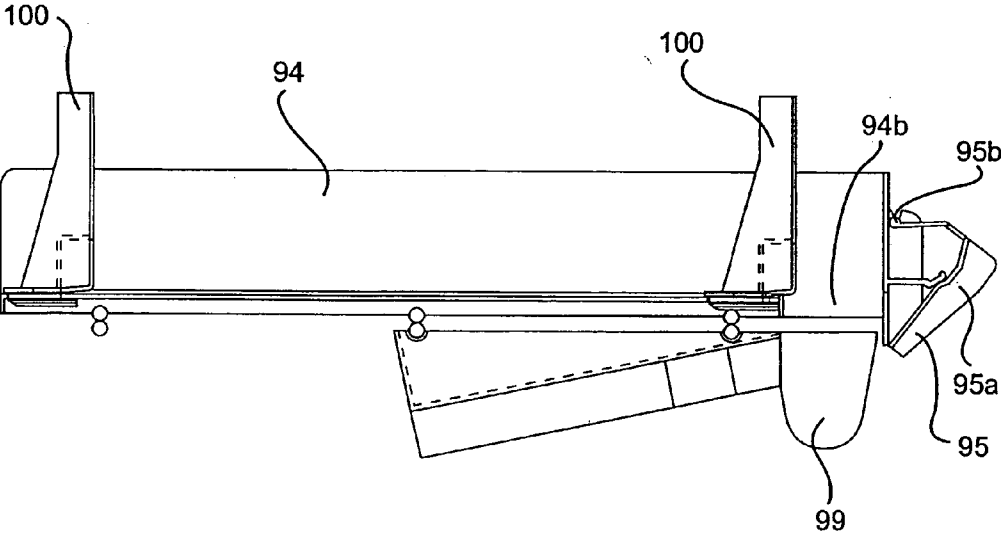


FIG. 16C

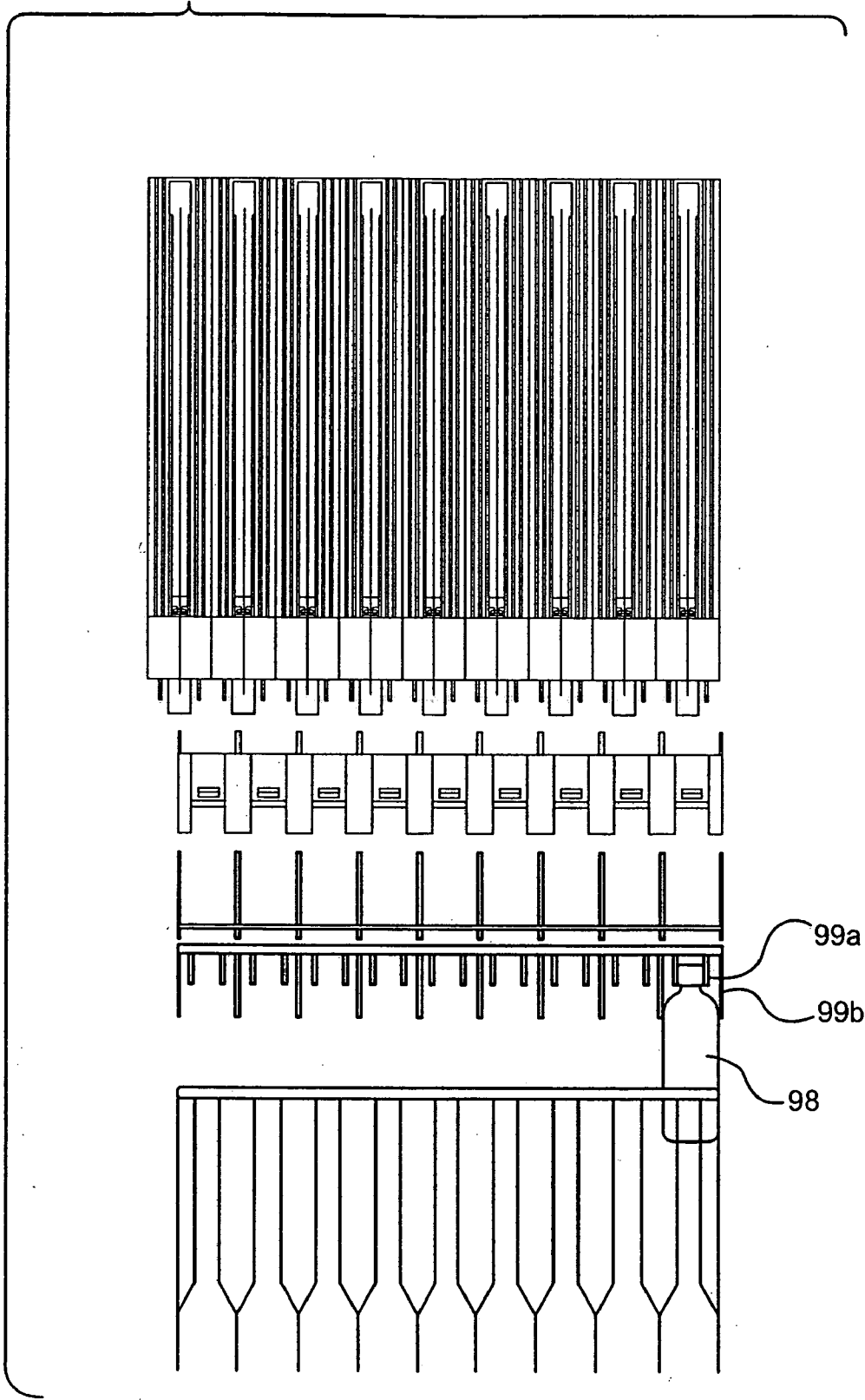


FIG. 17A

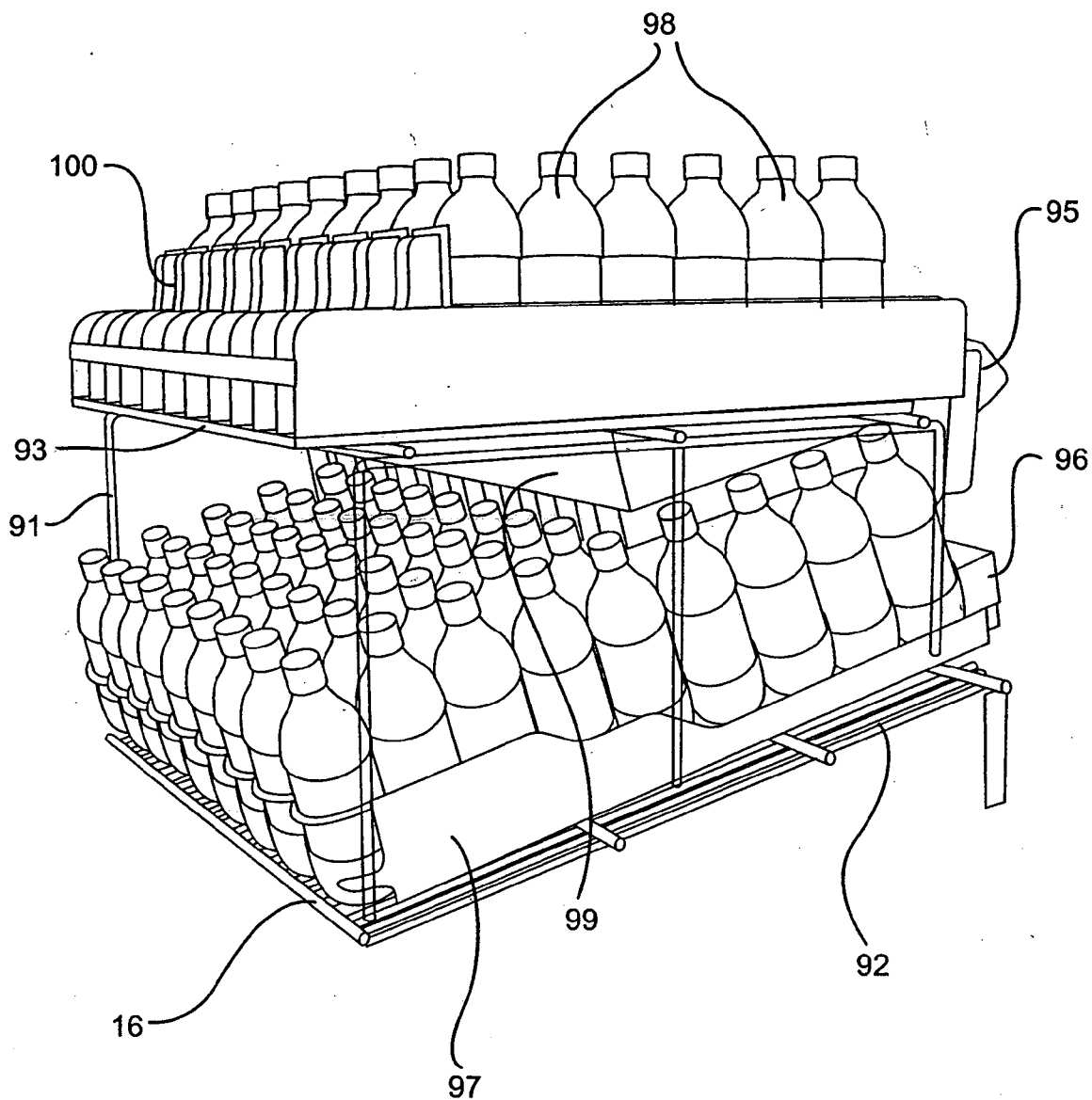
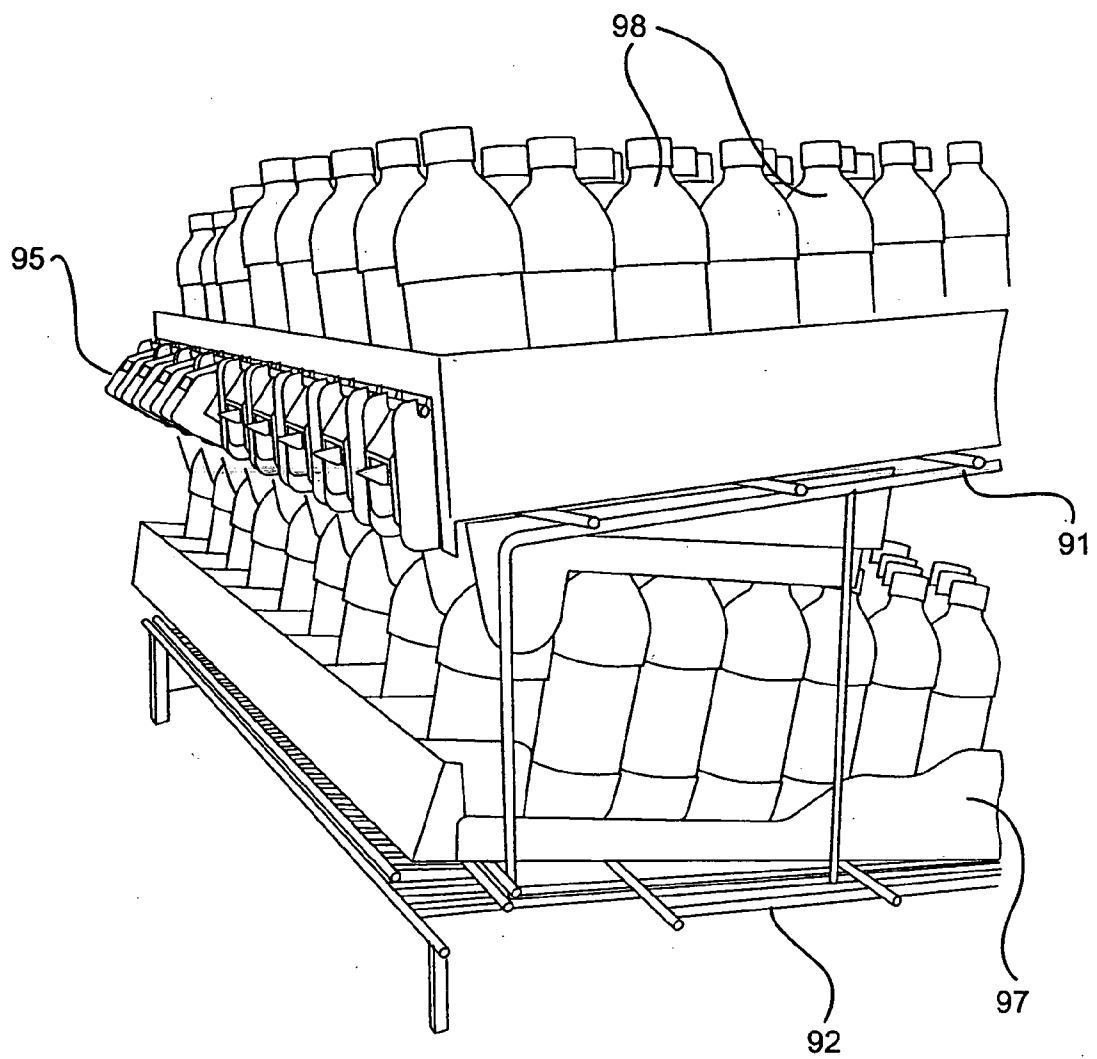


FIG. 17B



APPARATUS FOR USE IN A COLD VAULT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation under 37 C.F.R. § 1.53(b) of application Ser. No. 10/838,359, filed May 5, 2004, the entire disclosure of which is incorporated herein by reference, which in turn claims the benefit of U.S. provisional Application Ser. No. 60/468,025, filed May 5, 2003.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to various apparatuses used to increase storage capacity in a cold vault.

[0004] 2. Related Art

[0005] Displaying and storing items for sale is an important aspect in how stores do business with their customers. Stores display what is on sale, and customers can then make a choice as to which product to buy, if any. There are various ways of storing and displaying items for sale. For example, a convenience store selling cold drinks in cans, bottles, or other containers will typically place such items in a refrigerator or cold vault which has a number of shelves inside for housing the items, as well as a glass door so that the customer can see the items that are for sale before opening the door. The customer looks through the glass decides which item to buy (if any), opens the glass door, and takes the selected item.

[0006] Of course, cold vaults have to be continually stocked and re-stocked so that an adequate supply of items is available for selection and purchase. And it is preferable to have a number of different selections available to the customer, and to stock enough of each selection in the cold vault. Moreover, it is important that the drinks are cold when the customers select them from the cold vault for purchase.

[0007] Several cold vaults exist today which display and store items for sale. However, these cold vaults do not provide certain features that would be helpful to their users in housing and displaying items for sale. For example, there is a need for more space in a cold vault for merchandising an expanding portfolio of new products. There is also a need to increase space-to-sales inequalities which may result from inadequate space in the cold vault. There is also a need to reduce labor inefficiencies associated with existing cold vaults, for example by reducing the loading time associated therewith. And there is a need for optimization of "sku" (stock keeping unit) assortment by enabling consolidation of existing facings to make more room for other sku's and/or reduce out-of-stocks of existing sku's.

[0008] There exists, therefore, a need for an apparatus which address these and other drawbacks of prior art cold vaults.

SUMMARY OF THE INVENTION

[0009] To overcome the drawbacks associated with the prior art, various apparatuses are provided for use in cold vaults, or any other similar storage systems.

[0010] In one aspect of the present invention, an apparatus includes a frame supporting an upper shelf at an angle thereto. The frame is configured to be supported by a customer-accessible lower shelf. Both the upper and lower shelves are adapted to support a plurality of items. The upper shelf has an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the lower shelf, through the opening, after an item is removed from the lower shelf.

[0011] In another aspect of the present invention, an apparatus includes a frame supporting a customer-accessible lower shelf disposed at a first angle thereto, and an upper shelf disposed at a second angle thereto and above the lower shelf. Both the upper and lower shelves are adapted to support a plurality of items. The upper shelf has an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the lower shelf, through the opening, after an item is removed from the lower shelf.

[0012] In yet another aspect of the present invention, an apparatus includes a housing for supporting from top to bottom a plurality of customer-accessible lower shelves each disposed at a first angle thereto, and for supporting an upper shelf disposed at a second angle thereto and above the topmost lower shelf. Both the upper shelf and lower shelves are adapted to support a plurality of items. The upper shelf has an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the topmost lower shelf, through the opening, after an item is removed from the topmost lower shelf.

[0013] The items are maintained in a substantially upright position on the upper and lower shelves. Because of the angles at which the upper and lower shelves are disposed on the frame or housing, the items on the upper shelf are tilted downward toward the back of the cold vault, while the items on the lower shelf or shelves are tilted downward toward the front of the cold vault.

[0014] The upper shelf may have a plurality of tracks (or upper guides), the tracks' openings corresponding to the upper shelf's openings. The tracks are adapted to feed the items positioned on the upper shelf towards the tracks' openings. The upper shelf's tracks may use spring-loaded pushers to assist in feeding the items toward the openings. The lower shelf, positioned below the upper shelf, may also have a corresponding plurality of tracks (or visislides). The lower shelf's tracks are adapted to feed the items towards the front door of the cold vault.

[0015] A gate may be disposed off the lower end of the upper shelf, in a position such that when the lower shelf is full, there is a predetermined amount of space between a rearmost item in the lower shelf (that is, an item positioned closest to the upper shelf's opening) and the gate, so that an item dropping from the upper shelf to the lower shelf is wedged between the gate and the rearmost item of the lower shelf. When an item is subsequently removed from the lower shelf, the wedged item falls onto the lower shelf as its (new) rearmost item, and another item from the upper shelf becomes wedged between the gate and the (new) rearmost item of the lower shelf.

[0016] The gate may comprise a plurality of panels, each panel corresponding to a track.

[0017] The gate may be vertically slidably and pivotably mounted to the cold vault frame, such that in a raised and

horizontally pivoted position, the lower shelf is ready for loading, and in a lowered and vertically pivoted position the upper shelf is ready for loading. Alternatively, the gate may be vertically slidably mounted to the frame, such that in a raised position the lower shelf is ready for loading, and in a lowered position the upper shelf is ready for loading.

[0018] The gate may have a handle to raise and lower it.

[0019] The gate may also have a plurality of flaps to align items dropping from the upper shelf onto the lower shelf in a substantially vertical position, and to keep the dropping items in the corresponding tracks of the upper and lower shelves.

[0020] A rear guide may be disposed at an upper end of the lower shelf to align items dropping from the upper shelf onto the lower shelf in a substantially vertical position, and to keep the dropping items in the corresponding tracks of the upper and lower shelves.

[0021] A lower guide may be disposed below and toward the rear of the upper guide to align items dropping from the upper shelf onto the lower shelf in a substantially vertical position, and to keep the items in the lower shelf in their tracks and in a substantially upright position. The lower guide may guide items, such as bottles, in the lower shelf by their caps, by their shoulders, or by both.

[0022] A lifter may be disposed at a lower end of each upper guide's track. When the lifter is in a locked position, a portion of the lifter forms a floor which covers an opening in the upper shelf, preventing items from falling through the opening. When the lifter is in an unlocked position, no floor is formed to cover the opening, allowing items to fall through the opening.

[0023] A pusher may be disposed in each of the upper guide's tracks, the pusher being biased by a spring, in which the pusher is adapted to push the items supported by the upper guide towards the opening.

[0024] An adaptor rod may be disposed at a lower end of the lower shelf, adapted to position the items on the lower shelf.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The invention will be more clearly understood by reference to the following detailed description of exemplary embodiments in conjunction with the accompanying drawings, in which:

[0026] FIG. 1 illustrates a side view of an apparatus according to an embodiment of the present invention;

[0027] FIGS. 2 and 3 illustrate perspective views of the apparatus of FIG. 1, with FIG. 2 showing gate 24 in a raised position and FIG. 3 showing gate 24 in a lowered position;

[0028] FIG. 4 illustrates an apparatus according to an embodiment of the present invention;

[0029] FIG. 5 illustrates the apparatus of FIG. 4 disposed above a topmost customer-accessible shelf;

[0030] FIG. 6 illustrates a perspective view of an apparatus according to an embodiment of the present invention;

[0031] FIG. 7 illustrates the apparatus of FIG. 6, with the gate 24 in a raised and horizontally pivoted position;

[0032] FIG. 8 illustrates the apparatus of FIG. 6, with the gate 24 in a lowered and vertically pivoted position;

[0033] FIG. 9 illustrates an apparatus in an embodiment of the present invention;

[0034] FIG. 10A illustrates a side view of frame 91 of the apparatus of FIG. 9, and FIGS. 10B-10E illustrate top views of various width shelves 92/93 (racks) of the apparatus of FIG. 9.

[0035] FIGS. 11A-F illustrate various views of pusher 100 of the apparatus of FIG. 9.

[0036] FIGS. 12A-D illustrate various views of rear guide 96 of the apparatus of FIG. 9.

[0037] FIGS. 13A-D illustrate various views of lower guide 99 of the apparatus of FIG. 9.

[0038] FIGS. 14A-D illustrate various views of upper guide 94 of the apparatus of FIG. 9.

[0039] FIGS. 15A-F illustrate various views of lifter 95 of the apparatus of FIG. 9.

[0040] FIGS. 16A-C respectively illustrate a locked and unlocked lifter 95 of the apparatus of FIG. 9, as well as the guidance of a bottle by lower guide 99.

[0041] FIGS. 17A-B respectively illustrate front and rear views of the apparatus of FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

[0042] The invention will next be described in connection with certain exemplary embodiments; however, it should be clear to those skilled in the art that various modifications, additions, and subtractions can be made without departing from the spirit or scope of the claims.

[0043] The apparatuses of the present invention allow for more space to be utilized in a cold vault and to merchandise an expanding portfolio of products. For example, the storage capacity of each cold vault can be increased by as much as 20% or more. Consequently, the present invention may:

[0044] (a) increase space-to-sales inequalities which may result from inadequate space in pre-existing cold vaults;

[0045] (b) improve labor efficiency in reducing the time needed to load the cold vault;

[0046] (c) optimize sku assortment by enabling consolidation of existing facings to make room for other sku's and/or reduce out-of-stocks of existing sku's;

[0047] (d) increase the number of sales of the products stored and displayed in a cold vault; and

[0048] (e) keep more products cold for the customers.

[0049] As shown in FIG. 4, one apparatus of the present invention includes a frame that holds an extra ("drop rotation") shelf to occupy the traditionally dead space above the topmost customer accessible (shopable) shelf of a cold vault, the topmost shelf supporting the apparatus, as shown in FIG. 5. Items, such as beverage cans and bottles, are stored on the drop rotation shelf, and product gravity and/or a spring-loaded track feeds these items down onto the topmost shelf through one or more openings in the drop rotation shelf, as space becomes available on the topmost shelf when

items are removed therefrom. In this way, the capacity within a cold vault can be increased by at least one entire shelf. The increased capacity in the cold vault can accommodate an increased number of items for storage and sale, and can accommodate increased sku needs and flexibility. Moreover, the extra shelf can enhance product rotation and improve upon stocking efficiency, since more items can be stocked at once, thereby reducing the frequency at which the cold vault needs to be re-stocked. Back-stock inventory can be reduced as well, and labor costs can be reduced by virtue of reduction in product handling. Further, the present invention is particularly advantageous in that it re-fills automatically the topmost shelf, which is often the most shopped shelf. Existing cold vaults can be modified (retrofitted) with the present invention, or new cold vaults can be manufactured with the present invention.

[0050] In particular, **FIG. 4** shows the drop rotation shelf **18** positioned on wire stand or frame **20**, which in turn is supported by and straddles the top customer-accessible shelf **16**. The drop rotation shelf **18** has spring-loaded tracks which operate in conjunction with gravity to push the bottles back toward the gate **24**, after which they drop onto the uppermost customer-accessible shelf **16** as space becomes available on that shelf. Dividers (or upper guide) **26** are provided to divide the shelf into tracks, and are adjustable to allow for differently sized bottles, cans, or other containers or items which are positioned on the tracks. **FIG. 5** illustrates the drop rotation shelf **18** of **FIG. 4** disposed above the top customer-accessible shelf **16**.

[0051] As seen from these figures, two angularly-related shelves are adapted to hold beverage bottles or other items in a substantially vertical position with a gate **24** disposed at the rear of the two shelves (that is, the topmost customer accessible shelf **16** and the drop rotation shelf **18**). When the topmost shelf **16** is filled, there is a sufficient space between the rearmost bottle in that shelf and the gate **24** so that a bottle from the upper shelf will fall and be "wedged" between the gate **24** and the rearmost bottle (this will occur on a track-by-track basis). When a bottle is removed from the front of the topmost shelf **16**, for example, by a consumer, the bottles feed downwardly in the topmost shelf toward the front, and the "wedged" bottle falls into the topmost shelf, becoming the new rearward bottle. Another bottle from the drop rotation shelf **18** falls into a wedged position between the new rearward bottle and the gate **24**.

[0052] **FIG. 1** illustrates a side view of the apparatus of **FIG. 4** inside a cold vault **10**. Customers open front door **12** of the cold vault **10**, which contains numerous shelves **14**, **16**, and **18** supporting plastic bottles for sale. Of course, although plastic bottles are used in this embodiment, the apparatuses of the present invention are intended to support other well-known containers (cans, cartons, glass bottles, etc.), products (soda, juice, beer, etc.), and sizes (12 oz., 16 oz., 20 oz., 2 liters, etc.). Further, the cold vault **10**, may have multiple columns of shelves and corresponding front doors **12**, each column of shelves having a corresponding apparatus as described herein.

[0053] Shelves **14** and **16** are accessible through the front door to the customer, and are angled downward towards the front door **12**. Shelf **14**, and similar shelves below shelf **14**, operate in a conventional manner. As the customer takes a bottle from shelf **14**, gravity forces the remaining bottles on

the shelf **14** to move one spot closer to the front door **12**, thus filling the space created by the removed bottle.

[0054] The operation of shelves **16** and **18** will now be discussed. As shown in **FIG. 5**, stand **20**, which is preferably wire but could also be made from plastic or from another suitable material, sits on the topmost customer-accessible (shopable) shelf **16**. Stand **20** straddles shelf **16** and supports a drop rotation shelf **18**, which is configured at an angle generally opposite to that of shelf **16**; that is, the drop rotation shelf **18** is angled downward and toward the back of the cold vault, rather than downward toward the front of the cold vault as are shelves **14** and **16**. The absolute angles (with respect to the horizontal plane) of shelves **16** and **18** may differ. The drop rotation shelf **18** is preferably made out of metal, but of course other suitable materials could be used.

[0055] The drop rotation shelf **18** in this embodiment has a plurality of tracks (glides), which may be plastic injection-molded glides, but of course other suitable materials may be used. The glides gravity-feed bottles supported by the drop rotation shelf **18** in the general direction from the front door **12** to the back of the cold vault, and each bottle discharges through a corresponding opening in the rear of the drop rotation shelf **18**, in a manner that will be described in further detail below, as space opens up below on shelf **16**. Thus, the glides help transfer the bottles from the drop rotation shelf **18** to shelf **16**. A spring-loaded mechanism can also be incorporated into the drop rotation shelf **18** to further assist the movement of bottles from front to back toward the track opening.

[0056] As shown in **FIG. 1**, gate **24** functions as a back-stop to keep the bottles from toppling out of the shelves as they are being transferred, and assists in guiding bottles from the drop rotation shelf **18** to shelf **16**. The gate **24** can also be, for example, raised and lowered to allow for product loading. The gate **24** may be vertically slidably mounted, as shown in **FIGS. 2 and 3**, or vertically slidably and pivotably mounted, as shown in **FIGS. 6-8**, on the cold vault housing. Other gate mountings are within the scope of the art, such as a hinged mounting (not shown). The gate **24** may be made of metal, plastic, or other suitable material.

[0057] **FIGS. 2 and 3** illustrate perspective views of the cold vault **10**. In these figures, the gate **24** is made up of integrated, individual cylindrical panels corresponding to each shelf track. In order to load bottles onto shelf **16**, the gate **24** is slid up into a raised position, and then the topmost customer accessible shelf **16** is loaded with items from the cold vault's interior, as shown in **FIG. 2**. In order to load bottles onto the drop rotation shelf **18**, also from the cold vault's interior, the gate **24** is slid down into a lowered position, as shown in **FIG. 3**.

[0058] In **FIGS. 6-8**, gate **24** is vertically slidable and pivotable mounted on the cold vault's frame. **FIG. 7** shows the gate **24** in a raised and horizontally pivoted position, which allows the topmost customer accessible shelf **16** to be loaded with items from the cold vault's interior. **FIGS. 6 and 8** shows gate **24** in a lowered and vertically pivoted position, which allows the drop rotation shelf **18** to be loaded from the cold vault's interior. In this embodiment, gate **24** is flat, and has a handle **24c** attached thereto for raising and lowering it. The gate has two pins **24a** and **24b** located on its sides which, when the gate is in the lowered

position, rest against frame 25 to limit the gate's forward movement toward shelf 16 as shown. Pins 24e in slots 24d (a pin/slot pair on each side of the gate) allow the gate when it is raised to pivot and slide forward toward the front door 12 at a predetermined frame location.

[0059] FIGS. 6 and 7 also show flaps 28 on gate 24, which help keep the bottles in line as they drop from the drop rotation shelf 18 to the shelf 16. FIG. 6 also shows the "visislide" guide 38, which provides a plurality of tracks in the topmost shelf. 16. The tracks 38 feed the items toward the front door of the cold vault.

[0060] FIG. 9 illustrates another embodiment of the present invention. Front and views of this apparatus are also shown respectively in FIGS. 17A and 17B. A frame 91 rests upon an existing wire shelf 90. The frame 91 supports both a lower (customer accessible) shelf (or "rack") 92 and an upper drop rotation shelf (or "rack") 93. The lower shelf 92 has plastic "visislides" 97, and the upper shelf 93 has plastic upper guides 94, which provide tracks for each shelf. The tracks support, for example, bottles 98. When a customer takes bottle 98c from a visislide track 97 of the lower shelf 92, gravity operates to move each bottle on that track forward, including bottle 98b, to close the space where bottle 98c was. As that happens, bottle 98a drops down onto the visislide track 97 of the lower shelf 92 to fill the space where bottle 98b was. Meanwhile, bottle 98d in upper guide 94 of the upper shelf 93, as acted upon by spring-biased pusher 100 and gravity moves into the space previously occupied by bottle 98a, and so on.

[0061] In particular, while gravity operates to feed the bottles on the lower shelf 92, the bottles on the upper shelf 93 are assisted by negator springs (not shown) disposed on each upper guide track 94 of the upper shelf 93. The negator springs are preferably made of spring steel, and bias each track's pusher 100 toward the rear of the upper shelf 93. Thus, resting bottles 98 in each track of the upper shelf 93 have a potential energy caused by the negator spring force and gravity, while resting bottles in the lower shelf 92 have a potential energy caused by gravity. When a customer takes away bottle 98c, for example, the potential energy for each bottle 98 in that bottle's track changes to kinetic energy, and the bottles are fed one drop rotation. Once movement is complete (new bottle 98c reaches and is stopped by the end of the visislide 97), the forces acting on each bottle revert to potential energy.

[0062] The downward angle of the upper shelf 93 (as compared to horizontal) is less than the downward angle of the lower shelf 92 (as compared to horizontal), in this embodiment, to reduce the space the upper shelf 93 occupies in the cold vault. However, because the gravity component in the direction of the upper shelf's downward angle is lesser at this smaller angle, the tracks of the upper shelf 93 preferably use the negator spring-loaded pushers 100 to assist in feeding the bottles 98 positioned on the upper shelf 93 to the lower shelf 92. The downward angle of the upper shelf 93 is preferably greater than zero (that is, non-horizontal), because otherwise the gravity component in that direction would be zero and the negator springs would have to provide the entire force for feeding the bottles along the upper shelf 93. This could create a problem, in that the force of the pusher 100 required to move the bottles on the upper shelf 93 might be so great that it would pin bottle 98a against

the rear wall of the upper guide 94 and not allow bottle 98a to drop to the lower shelf 92. FIGS. 11A-F illustrate various views of pusher 100 of the apparatus of FIG. 9.

[0063] A graphic panel or point-of-sale panel (not shown) may be attached to the front of the lower guide 99 to display advertisements or product/company labeling.

[0064] (see, for example, FIG. 17A).

[0065] FIG. 10A illustrates a side view of frame 91 of the apparatus of FIG. 9. The frame 91 is preferably constructed of 11 gauge crs steel wire, but other known sizes and materials may be used. A bracket 91a, preferably made of 16 gauge sheet metal and welded or otherwise attached to the rear of the frame 91 as shown, is used to support the lower shelf 92 on the frame 91, and to maintain the lower shelf 92 at a proper downward angle. The frame has various substantially cross members and vertical members, in the relationship shown, to provide sufficient strength to support loaded lower and upper shelves.

[0066] FIGS. 10B-10E illustrate top views of various width shelves 92/93 (racks) attached to the frame 91. For example, FIG. 10B shows an "8 wide" rack, FIG. 10C a "7 wide" rack, FIG. 10D a "9 wide" rack, and FIG. 10E a "5 wide" rack. These racks may used for the upper shelf 93 or lower shelf 92, or both.

[0067] FIGS. 12A-D illustrate various views of rear guide 96 of the apparatus of FIG. 9. Rear guide 96 is disposed at an upper end of the lower shelf 92 to align items dropping from the upper shelf 93 onto the lower shelf 92 in a substantially vertical position, and to keep the dropping items in the visislide track 97 that corresponds to upper guide's track 94 from which the item dropped. The rear guide 96 has a curved component 96a which attaches to the rear of the lower shelf 92 and the visislide 97.

[0068] FIGS. 13A-D illustrate various views of lower guide 99 of the apparatus of FIG. 9. Lower guide 99 is disposed below and toward the rear of the upper guide 94 to align items dropping from the upper shelf 93 onto the lower shelf 92 in a substantially vertical position, and to keep the items in the lower shelf 92 in their tracks 97, also in a substantially upright position. For each track 97, a pair of relatively short vertical members 99a extending downward from the lower guide 99 and more than halfway down the track 97 (that is, the length of the lower guide 99), guide bottles 98 in the lower shelf's tracks by their caps. The caps ride between the pair of short vertical members 99a, preventing the bottles from tipping. The short vertical members 99a eventually taper outwards to meet vertical members 99b, as shown in FIG. 16C. In addition, also for each track 97, a pair of relatively longer vertical members 99b extending downward from the lower guide 99 and more than halfway down the track 97 (that is, the length of the lower guide 99), guide bottles 98 in the lower shelf's tracks by their shoulders, as also shown in FIG. 16C. When combined with the guidance provided to the bottle's bottoms by the visislide track 97, the bottle are well-guided in a substantially upright position down the lower shelf 92 to the front door of the cold vault. The lower guide also has a flap 99c, which guides the bottles when they first drop onto the lower shelf 92, prevents the falling bottles from tipping over, and ensures that the falling bottle's cap and shoulders are positioned within the guides 99a and 99b.

[0069] FIGS. 14A-D illustrate various views of upper guide 94 of the apparatus of FIG. 9. Upper guide 94, via barriers 94c, provides a plurality of tracks 94a to carry the bottles 98. At the front of each track is a spring-biased pusher 100 (which in operation moves from the front toward the rear), and at the rear of each track is a lifter 95. Also at the rear of each track is an opening 94b. As shown in FIGS. 14A-D, the upper shelf 93 does not extend as far to the rear as the openings 94b of the upper guide 94. Consequently, there is no upper shelf 93 below the openings 94b, so that the bottles 98 may freely drop through the openings to the lower shelf 92.

[0070] FIGS. 15A-F illustrate various views of a hook-shaped lifter 95 of the apparatus of FIG. 9. Each lifter 95 is pivotably attached by lifter pins 95b to slots 94e of the upper guide 94, so that it may pivot between a locked position (see FIG. 16A) when pushed toward the upper guide and an unlocked position (see FIG. 16B) when pulled away from the upper guide. When the lifters are in the locked position, the upper guide 94 can be loaded with bottles 98. The lifter may be molded in the shape and dimensions shown in FIGS. 15A-F, or manufactured and sized in any known equivalent manner.

[0071] When the lifter is pushed, a “false floor” is created by the bottom 95a of the lifter over the opening 94b through which the bottles fall in normal operation (see FIG. 16A). The floor allows the corresponding track 94a of the upper guide 94 to be loaded without the bottles falling through the opening 94b. The bottom of the first bottle 98 loaded onto the track 94a rests on the floor and against the pusher 100, and then is pushed forward along the track 94a as the next bottle 98 is loaded, and so forth. This is advantageous because typically the upper guide 94 will be high off the ground (e.g., 7 feet), and with this configuration, a person more easily may load the upper guide 94. Upon unlocking the lifter 95 by pulling it (see FIG. 16B), placing the lifter into its normal operation position, the floor is removed on that track 94a, thereby uncovering the corresponding opening 94b. The rearmost bottle in the track (e.g., bottle 98a) then settles partly down into the opening 94b.

[0072] When a lifter 95 is unlocked and the rearmost bottle (e.g., bottle 98a) settles into position partly down the opening 94b, the bottle 98a may come to rest in a particular resting position. Specifically, it is preferable for bottle 98a and bottle 98b to be sitting “bottom to cap”; that is, the bottom of bottle 98a should preferably be resting on the cap of bottle 98b. This is preferable to the bottom of bottle 98a resting on the shoulder of bottle 98b, because in that case bottle 98a’s potential energy will be lower. The lower potential energy may prevent the bottle 98a from being able to fall all the way down to the visislide 97 of the lower shelf 92, and might instead fall and rest upon, disadvantageously, only as far as the hip of bottle 98b. Bottle 98a will thus be out of alignment in the visislide 97 and lower guide 99. This situation may require servicing to re-align the bottles properly. Flap 99c of the lower guide 99 and rear guide 96, both discussed above, helps guide the bottles 98a and 98b to the preferred “bottom to cap” position.

[0073] An adaptor rod (not shown) may also be included in the apparatus of the present invention. The adaptor rod may be positioned at the front of the lower shelf 92, between existing supporting rod 89 (extending into the drawing

figure) and the bottles. The adaptor rod can further assist in creating the preferred “bottom to cap” alignment between dropping bottle 98a and the bottle 98b below, by pushing the bottles 98 on the lower shelf 92 towards the rear guide 96, so that the dropping bottle 98a may rest on the bottle 98b below in the preferred “bottom to cap” alignment. The adaptor rod may or may not be used, depending on such factors as the ambient temperature of the cooler, the barometric pressure, whether the beverage is carbonated or non-carbonated, etc. For example, carbonated bottles tend to expand, while non-carbonated bottles do not, and so the adaptor rod might be used with non-carbonated bottles. Of course, this is just an example, and may not apply to all situations. Essentially, the alignment may (or may not) be altered slightly by factors such as those mentioned, and the adaptor rod may (or may not) be used. The adaptor rod is preferably made out of metal, though other suitable materials are envisioned.

[0074] Components that are not steel may be injection-molded plastic. For example, the rear guide 96, the lower guide 99, visislide 97 and upper guide 94 are preferably made of polypropylene, while lifter 95 and pusher 100 are preferably made of polyurethane. It is noted that upper guide 94 and visislide 97 may be configured for the various sized racks (e.g., 9-wide, 8-wide, 7-wide, 5 wide etc.). In addition, the dimensions shown in the drawing figures are generally representative of apparatuses used to support 20 ounce beverage bottles, as shown in FIGS. 17A and 17B. As will be appreciated by those skilled in the art, other dimensions may be used for other container types and sizes.

[0075] The various configurations permit the apparatus of the present invention to be retrofitted to existing cold vaults. The apparatus may also be integrated in the manufacture of a cold vault, including a cold vault frame, a drop rotation shelf, and a plurality of lower (customer-accessible) shelves.

[0076] While the invention has been particularly shown and described with respect to preferred embodiments thereof, it will be understood by those skilled in the art that changes in form and details may be made therein without departing from the scope and spirit of the invention.

We claim:

1. An apparatus comprising:
 - a frame configured to be supported by a customer-accessible lower shelf, the lower shelf being adapted to support a plurality of items; and
 - an upper shelf supported by the frame at an angle thereto, the upper shelf also being adapted to support a plurality of items and having an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the lower shelf, through the opening, after an item is removed from the lower shelf.
2. An apparatus according to claim 1, wherein a gate is disposed off the lower end of the upper shelf.
3. An apparatus according to claim 2, wherein the gate comprises a plurality of panels.
4. An apparatus according to claim 2, wherein the gate is vertically slidably and pivotably mounted.
5. An apparatus according to claim 2, wherein the gate is vertically slidably mounted.
6. An apparatus according to claim 2, wherein the gate comprises a plurality of flaps.

- 7. An apparatus comprising:
a frame;
a customer-accessible lower shelf supported by the frame and disposed at a first angle thereto; and
an upper shelf disposed at a second angle to the frame and above the lower shelf, wherein the upper and lower shelves are adapted to support a plurality of items, and wherein the upper shelf has an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the lower shelf, through the opening, after an item is removed from the lower shelf.
- 8. An apparatus according to claim 7, wherein the items are maintained in a substantially upright position on the upper and lower shelves.
- 9. An apparatus according to claim 7, wherein the upper shelf comprises a plurality of tracks formed by an upper guide, the opening in the upper shelf corresponding to a plurality of openings in the tracks.
- 10. An apparatus according to claim 9, wherein each track has a spring-loaded pusher.
- 11. An apparatus according to claim 9, wherein the lower shelf has a corresponding plurality of tracks formed by a visislide.
- 12. An apparatus according to claim 7, further comprising a rear guide disposed at an upper end of the lower shelf.
- 13. An apparatus according to claim 9, further comprising a lower guide disposed below and toward the rear of the upper guide.

14. An apparatus according to claim 9, further comprising a plurality of lifters, each lifter pivotably attached to the upper guide at a lower end of each track.

15. An apparatus according to claim 14, wherein when one of the lifters is in a locked position, a portion of said lifter forms a floor which covers a corresponding track opening.

16. An apparatus according to claim 14, wherein when one of the lifters is in an unlocked position, no floor is formed to cover a corresponding track opening.

17. An apparatus according to claim 7, further comprising an adaptor rod disposed at a lower end of the lower shelf, and adapted to position the items on the lower shelf.

18. An apparatus comprising:

a housing;

a plurality of customer-accessible lower shelves supported from top to bottom by the housing, each lower shelf disposed at a first angle thereto; and

an upper shelf supported by the housing and disposed at a second angle thereto and above the topmost lower shelf, wherein both the upper shelf and lower shelves are adapted to support a plurality of items, and wherein the upper shelf has an opening at a lower end thereof, so that an item supported by the upper shelf drops onto the topmost lower shelf, through the opening, after an item is removed from the topmost lower shelf.

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