

(19)



(11)

EP 4 741 304 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

13.05.2026 Bulletin 2026/20

(51) International Patent Classification (IPC):

B65D 1/36 (2006.01) **B65D 21/02** (2006.01)
B65D 71/52 (2006.01) **B65D 71/70** (2006.01)

(21) Application number: **24211930.3**

(52) Cooperative Patent Classification (CPC):

B65D 21/0213; B65D 71/0003; B65D 71/70(22) Date of filing: **08.11.2024**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
 GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
 NO PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA

Designated Validation States:

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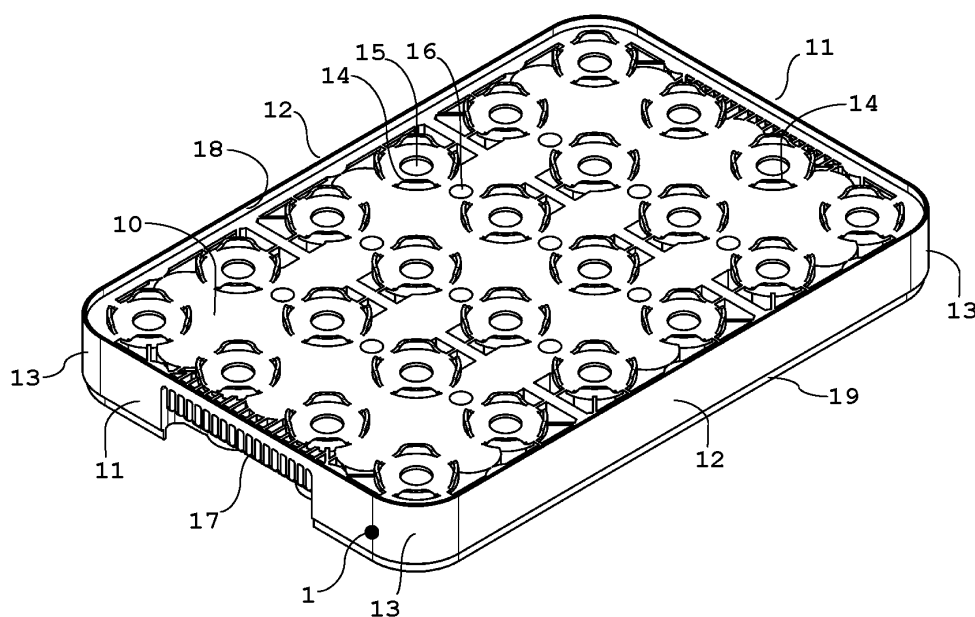
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(74) Representative: **Bihar, Zeljko****Admoveo d.o.o.****Gracanska cesta 111****10000 Zagreb (HR)**(54) **VERSATILE TRAY FOR BOTTLE PACKS**

(57) A versatile tray (1) for storing bottle packs is disclosed. The tray's upper base (10) includes a matrix of connectors (14) arranged in a repetitive pattern, preferably circular, with each pattern equidistantly distributed across the base (10). Each connector pattern aligns with grooves in the bottle pack base, allowing secure engagement with a single groove. On the underside of the tray base (10), there is a corresponding arrangement

of cylindrical bottleneck nests (25), aligned with the center points of each connector pattern on the upper side. Each bottleneck nest (25) accommodates the bottleneck of bottles within the bottle packs. This design allows for efficient stacking of multiple trays when empty, as well as stable stacking and cross-stacking when loaded with compatible bottle packs of various formats.

**Figure 1**

Description

Technical Field

[0001] The present disclosure relates to a novel tray for storing and handling bottle packs, featuring enhanced interconnectivity and stacking capabilities. These trays fall within the technical field of containers with bodies formed as a single piece, typically produced through molding or blow-molding, with or without additional compartments. In this instance, the tray is designed without standard compartments or dividers, enabling it to accommodate bottle packs of various sizes that are compatible with the tray base, i.e., connectors made on the said tray base.

Technical Problem

[0002] Beverage bottles and cans are typically transported in bottle crates, on bottle trays, or packed directly on pallets. In a bottle crate, the edges extend above the height of the bottles, allowing the crates to be stacked on top of one another. This design enables the sides of the crates to support the weight of the crates placed above them, so the stresses caused by stacking and movement are absorbed by the sturdy structure of the crate, rather than placing a load on the bottles themselves.

[0003] In these crates, individual bottles are arranged in designated spaces on the inner bottom, surrounded by supporting edges. Additionally, there are crates designed to accommodate multi-bottle packs, or multipacks, in which two or more bottles are bound together by a packaging wrapper. In such cases, at least some of the spaces for accommodating bottles at the bottom of the crate must have lower edges or, more commonly, pinnales instead of divider walls. These features help keep the bottles in place, prevent scuffing, and allow the packs to fit properly in the crate. This design, however, inherently weakens the support for individual bottles. Fortunately, this is not a significant issue, as the edges of the crate extend the entire height of the bottles, preventing them from falling out, even if they may wobble or move laterally.

[0004] A bottle tray fundamentally differs from a crate in its operational design. The upper surface of a bottle tray base typically features support elements that hold separate bottles and cans in place. Bottle trays are almost always constructed to accommodate both individual bottles or cans and multipacks. To maintain a slim profile, the edges of a bottle tray are kept low, which means they cannot support bottles or cans in the same manner as the higher edges of a crate. Consequently, the vertical load is borne by the beverage packs themselves.

[0005] To facilitate this, the underside of the bottle tray base is equipped with collars for bottles or support elements that fit the upper ends of cans, effectively locking the containers in place laterally. As a result, when using bottle trays, beverage packs are secured laterally by the tray both above and below, while the packs themselves

carry the vertical load.

[0006] The disclosure presents a specific tray designed to store bottle packs of various sizes. These packs are loaded and secured by their bottoms to the tray's base, which features repetitive patterns of connectors arranged in a rectangular matrix, allowing the tray to maintain a slim profile. The design also facilitates the placement of additional bottle packs into the upper tray, positioned over the tops of those already loaded.

[0007] Moreover, the disclosed tray allows for the reliable and secure stacking of empty trays, as well as the stacking and cross-stacking of loaded trays on standard pallets. Additionally, the solution enables easy automation for loading and unloading pallets in a robotic manner.

State of the Art

[0008] Single bottle/can trays and bottle pack trays have been on the market for some time, resulting in a crowded patent landscape. Several documents warrant close examination, particularly regarding their intended use—whether they are suitable for single bottles, bottle packs, or both.

[0009] The next consideration is the trays' stacking capabilities. While all solutions are inherently stackable, a critical aspect is the ability to cross-stack loaded trays securely.

[0010] The third issue to evaluate is top securing, specifically whether the design is focused solely on securing the tops of the bottles or if it allows the bottlenecks to fit into the upper tray that rests on the bottle packs below.

[0011] Lastly, the method of securing the bottle packs to the tray is crucial, particularly the connection between the packs and the tray's base.

[0012] International PCT patent application PCT/FI2009/050897, published as WO2010055204A1 for BOTTLE TRAY is filed in the name of HARTWALL K OY AB [FI]. The disclosed tray is designed for use with both bottle packs and single bottles, and it allows for the stacking of both empty and loaded trays. However, the description does not address the ability to cross-stack, which may pose challenges given the disclosed design's 4 x 5 uniform matrix of bottleneck nests depicted in the corresponding drawings. The versatility of this design is achieved through elements that extend from the upper base surface, dividing the inner space of the tray to secure the bottle packs in place by holding them at the sides. Importantly, there are no direct connections between the bottle packs and the tray's base. In contrast, the present disclosure connects each bottle pack bottom directly to the tray's base, eliminating the need for additional elements. This design not only secures the bottle packs more effectively but also facilitates cross-stacking.

[0013] US patent US 4,410,099 for CASE FOR MULTIPACKS OF BOTTLES is filed in the name of International Container Systems, Inc. [US]. The disclosed tray is suitable for bottle packs only, as per the present disclosure.

The capability of stacking and cross-stacking are obvious and explicitly depicted in the drawings. Bottle packs are secured to the tray by supporting pillars, i.e., the elements extending from the tray's base, and there are no connections between the mentioned bottle packs and the tray's base. On the top, the tops of the bottles are secured in shallow nests formed at the bottom of the upper tray's base. The cited solution differs from the disclosure in securing the bottle packs to the tray's base. The present disclosure connects each bottle pack bottom directly with the tray's base, without additional elements. Furthermore, upper securing via the bottleneck nests is more reliable than those using the shallow nests for bottle tops in the '099 design.

[0014] US patent application US2001019063A1 for NESTABLE DISPLAY CRATE FOR BOTTLE CARRIERS is filed in the name of Rehrig Pacific Co., [US]. Nestable tray, i.e., stackable when empty, used for bottle packs is disclosed, without securing elements for the trays in any form. The solution is generic and, according to the drawings, stackable when loaded, and according to the drawings 3 and 4 - not cross-stackable. The cited solution differs from the disclosure in securing the bottle packs to the tray's base and connecting the bottle tops with the upper tray as well. Furthermore, the present disclosure enables cross-stacking which seems to be not mentioned or, it is possible in the '063 design.

[0015] EP patent EP2530024B1 for LOAD CARRIER is filed in the name of Logipack Partner Company GmbH & Co. Kg. [DE]. The disclosed tray is designed to receive bottle packs of different sizes, for instance, 2 x 2 and 2 x 3 configurations. The disclosed design allows stacking, but cross-stacking is not mentioned, and perhaps it is not possible. The bottle packs are secured with shallow supporting elements that enclose bottle bottoms, i.e., pack's members, and pinnacle-like elements that fit into the bottle packs and secure them *in situ*. The tray base is, according to the description, equipped with the elements for receiving the bottlenecks or bottle tops. The cited solution differs, at least, from the present disclosure in a way of securing the bottle packs to the tray's base. The present disclosure is without any pinnacle-like element and secures the bottom of the bottle packs directly with the tray's base in contrast to the '024 design where auxiliary pinnacle structures are present. Furthermore, the cross-stacking feature is not present in the '024 design which is a big disadvantage once the loaded trays are stacked on the pallet.

[0016] The latter feature will be obvious from the rest of the cited documents oriented solely to the bottle trays.

[0017] US patent US 10,836,534 for DAIRY TRAY SYSTEM, is filed in the name of Rehrig Pacific Co., [US]. The document reveals a stackable tray for bottles only, where the bottles are secured by the upper tray, equipped with bottleneck nests arranged in rectangular matrix 3 x 4 or similar. The deep nests secure the bottles excellently, and the upper tray is very well connected with the lower tray. However, cross-stacking seems to be

impossible with the proposed design. The cited solution is not intended to be used with the bottle packs, and the bottles are not secured, with their bottoms, to the tray's base.

[0018] EP patent EP1486423B1 for STACKABLE LOW DEPTH BOTTLE CASE, is filed in the name of Rehrig Pacific Co., [US]. The solution is designed to receive the bottles only, where each bottle has its own nest in the base. The design offers stacking and cross-stacking abilities and has nests for receiving and securing bottle tops. The mentioned cross-stacking ability significantly improves the pallet's stability when a plurality of loaded trays is stored on it. The cited solution is not intended to be used with bottle packs or even various types of bottle packs.

[0019] US patent application US2010288654A1 for BOTTLE CRATE, is filed in the name of Orbis Canada, Ltd., [CA]. The solution is designed to receive the bottles only, where each bottle bottom has its own nest in the tray's base and each bottle top has a shallow nest made within the base of the upper situated tray for accommodating the said top. The design offers stacking and cross-stacking abilities and represents an improvement over '423 solution. However, the cited solution is not intended to be used with the bottle packs, and the used bottle top nests are too shallow to offer a good connection between the lower and upper trays, mediated by the bottles in between.

[0020] EP patent EP2239201B1 for STACKABLE LOW DEPTH BOTTLE TRAY, is filed in the name of Rehrig Pacific Co., [US]. This is yet another bottle tray, where individual bottles are secured in their bottom nest, while the bottle tops again are situated in shallow nests formed in the bottom part of the tray's base. As in the above case, the cited solution is not intended to be used with the bottle packs, and the used bottle top nests are too shallow to offer a good connection among the lower and upper trays, mediated by the bottles in between.

[0021] Summarizing the above survey, it is possible to notice that there is no single solution that offers a shallow tray for storing various bottle packs without dividers, pinnacles, or similar securing elements; a solution that reliably connects the lower and upper tray via said bottle packs and enables easy stacking and cross-stacking once being loaded on a pallet. The present disclosure is therefore a long-needed solution in the field of nestable trays made in one piece via standard and cheap processes known in the art.

Summary of the Invention

[0022] The present disclosure reveals a tray designed to receive bottle packs. It comprises a base with an upper and a lower side, a pair of parallel shorter sidewalls, and a pair of parallel longer sidewalls. Each sidewall is connected with adjacent, different sidewalls by a rounded edge. All sidewalls and rounded edges enclose the base and form, in the parallel plane containing the base, a

rectangle with rounded edges.

[0023] The base has on its upper side a plurality of connectors that project upward and are grouped in a rectangular matrix of identical patterns. The adjacent patterns in the matrix are equidistantly distributed over the base, and each pattern of connectors is capable of engaging only one of the bottle pack grooves situated in the base of the bottle pack. In addition, the base has on its lower side a plurality of cylindrical bottleneck nests whose principal axes coincide with the centers of each repetitive pattern formed on the upper side of the base. Each bottleneck nest is capable of receiving the bottleneck of the bottles accommodated in the bottle pack.

[0024] The base has spaces on its lower side, which serve as handle nests for bottle pack handles. These nests are formed by a plurality of planar or curved divider surfaces, which span among the bottleneck nests alone, or between the sidewalls and bottleneck nests. Each sidewall and each rounded edge has an upper stacking edge and a lower stacking edge, which allow the bottle pack tray to be stacked, one over another, when empty.

[0025] Optionally, a desired pair of sidewalls, or all four sidewalls, are equipped with handles formed as part of the sidewalls, extending partially from the lower stacking edge towards the upper stacking edge.

[0026] In the preferred embodiment, the plurality of connectors is arranged in a matrix of repetitive circular patterns with a radius R , with the number of connectors in each circular pattern greater than 2, preferably greater than or equal to 4.

[0027] In the most preferred embodiment, the circular patterns are arranged in a 4 x 6 matrix.

[0028] In the preferred embodiment, the tray base's lower side is equipped with a plurality of identical cylindrical bottleneck nests with bores. These bores are formed coaxially with the bottleneck nests in the base from which the nests emerge. Each bore's diameter is smaller than the nests' diameter and the tops of the bottles' diameters, which are in contact with the bores.

[0029] In the most preferred embodiment, the handles are formed on the shorter sidewalls.

[0030] The disclosed tray is intended to be used with bottle packs of various bottle sizes. The bottle packs are selected from those having bottles arranged in a 2 x 2, 2 x 3, 2 x 4, 2 x 6, 3 x 4, and 4 x 4 matrix, or their combinations. The tops of all bottles in each pack lie in the same plane when stored on the tray. Each bottle pack has, beneath each bottle, a groove that engages with one pattern of connectors, preferably a circular pattern formed on the base of the tray.

[0031] According to the disclosure, the trays can be combined. A second tray can be placed entirely or partially over a first tray previously loaded with bottle packs so that the bottles' tops, situated below the second tray, enter the bottleneck nests of the second tray and are stopped by the base of the second tray or on the bores of the same tray. This allows the second tray to lie in a parallel plane elevated from the first tray by the height of

the bottle packs. Thus, the trays are stably connected via bottles situated in bottle packs and loaded on the first tray. This connection enables further stacking and cross-stacking of other identical trays on the trays within the same pallet.

Description of Figures

[0032]

Figure 1 depicts the tray from the upper perspective view with a plurality of connectors that project upward and that are grouped in a repetitive matrix of identical repetitive patterns. Figure 2 depicts the tray from the lower perspective view, where bottle nests are visible.

Figure 3 shows the top view of the tray depicted in Figure 1 or 2, and Figure 4 shows the bottom view of the same tray depicted in Figure 1 or 2.

Figure 5 shows the plurality of nested trays, i.e., stacked one over another when unloaded.

Figure 6 depicts a 3 x 2 bottle pack from the upper perspective view, and Figure 7 the same pack from the lower perspective view with grooves that cooperate with the tray's connectors. Figure 8 depicts a 2 x 2 bottle pack from the upper perspective view, and Figure 9 the same pack from the lower perspective view with grooves that cooperate with the tray's connectors.

Figure 10 shows the fully loaded tray with four identical bottle packs, where two bottle packs are loaded with bottles of different heights than the other two bottle packs.

Figure 11 shows an upper perspective view of one tray stacked over another fully loaded tray from Figure 10. Figure 12 shows a lower perspective view of one tray stacked over another fully loaded tray from Figure 10.

Figure 13 shows the cross-section A-A assigned in Figure 11. Figure 14 shows the cross-section B-B assigned in Figure 11. These figures show the different bottle types stored within the crate in the same distribution as depicted in Figure 10.

Figure 15 shows a fully loaded pallet with stacked and cross-stacked (CS) loaded trays according to the present disclosure.

Detailed Description of the Invention

[0033] This section provides a detailed explanation of the tray (10) and the compatible bottle packs designed to

fit with it.

Tray

[0034] In the perspective view, the disclosed tray (1) is illustrated in Figures 1 and 2. Figure 1 highlights the essential elements on the tray's upper side. The tray (1) comprises a base (10), enclosed by two shorter sidewalls (11) and two longer sidewalls (12), connected by rounded edges (13). In the preferred embodiment, parallel sidewalls of the same type surround the base (10), with each sidewall (11, 12) joined by two rounded edges (13) to the adjacent, differently-sized sidewalls. These rounded edges (13) not only add aesthetic appeal but also facilitate handling, reducing the risk of damage during interactions with other items or people compared to standard right-angled joints between sidewalls. Together, the sidewalls (11, 12) and rounded edges (13) enclose the base (10) to form a rectangle with rounded edges in the plane parallel to the base.

[0035] To enable nesting - allowing one empty tray to stack securely over an identical tray, as shown in Figure 5 - the sidewalls (11, 12) and rounded edges (13) are designed with an upper stacking edge (18) and a lower stacking edge (19), depicted in Figures 1 and 2. The upper stacking edge (18) extends upward from the sidewalls (11, 12) and rounded edges (13), starting at the base (10), as seen in Figure 1. Conversely, the lower stacking edge (19) extends downward from the base (10), following the contours of the sidewalls (11, 12) and rounded edges (13) and is slightly indented toward the tray's center. This construction allows the lower stacking edge of an upper tray to fit neatly within the upper stacking edge of a lower tray, securing them in place for stable stacking.

[0036] In one variant, the handles (17) are integrated into the sidewalls (11, 12). Each handle (17) is formed as a recessed area extending from the lower stacking edge (19) up to the upper stacking edge (18), without compromising the rigidity of the sidewall, as shown in Figure 2. Preferably, the handle (17) is ribbed for additional grip. In practice, two handles (17) positioned on the shorter sidewalls are most effective.

[0037] The upper side of the tray's base (10) serves as the loading surface for bottle packs, as illustrated in Figures 1, 3, and 10. The lower side of the tray's base (10) rests over the tops of bottle packs already loaded onto the tray beneath it, as shown in Figures 2 and 4.

[0038] The upper side of the tray's base (10) features a plurality of connectors (14) that project upward, arranged in a repetitive matrix of identical patterns. The adjacent patterns within this rectangular matrix are evenly spaced over the base (10), with a distance d between them, as shown in Figure 3. The preferred layout of the connectors (14) is illustrated in Figures 1 and 5. Each connector (14) is part of a circular section with radius R that rises smoothly from the base (10) to a defined connector height. In this variant, the pattern consists of four con-

nectors, equally distributed around the circle with radius R , as depicted in Figure 3. The rectangular matrix formed by these patterns is arranged in a 6×4 configuration, also shown in Figure 3. The primary function of these patterns, consisting of individual connectors (14), is to engage with grooves (34) located on the bottoms of each bottle pack (30), ensuring lateral stability for the packs against the tray base (10). The smooth edges of the connectors facilitate this locking process. A skilled person in the field will recognize that alternative connector patterns, such as rectangular configurations, can also serve the same technical purpose.

[0039] The lower side of the tray's base (10) is considerably more complex, as illustrated in Figure 2. This side features a plurality of cylindrical bottleneck nests (25), with their principal axes aligned with the centers of each repetitive pattern formed on the upper side of the base (10), directly beneath the bores (15). Each hollow bottleneck nest (25) has a larger diameter than the corresponding upper bores (15), allowing communication between the nests' interiors and the bores. Each bottleneck nest (25) is designed to accommodate the bottleneck of the bottles (70, 80) from specific bottle packs (30).

[0040] Additionally, the base (10) incorporates handle nests (26) for the handles (36) of the bottle packs. These handle nests (26) are formed by a series of planar or curved divider surfaces (27) that emerge from the base (10), spanning between the bottleneck nests (25) or extending from the sidewalls (11, 12) to the bottleneck nests (25), as shown in Figures 2 and 4. The dashed lines in Figure 4 indicate potential positions for the handles (36) within the nests (26).

[0041] The mold used to produce this tray (1) is complex, featuring numerous reinforcements that connect the sidewalls (11, 12), rounded edges (13), and any optionally formed handles (17) to the nearest bottleneck nests (25). Additionally, reinforcements may connect the divider surfaces (27) with the nests (25), auxiliary bores (16), and other elements on the lower side of the tray's base (10). The auxiliary bores (16), as seen in Figure 2, are strategically positioned to further enhance the tray's structural integrity while allowing liquid to drain from the upper side of the base (10) by gravitational force across one or more trays (1), as depicted in Figure 5.

[0042] This tray is now prepared to receive the bottle packs described below.

Bottle packs

[0043] According to the disclosure, dedicated bottle packs (30) are designed to be used with the disclosed tray (1). Figure 6 illustrates a 2×3 bottle pack (30) from the upper perspective, while Figure 7 shows the same pack from the lower perspective. An alternative variant, the 2×2 bottle pack, is presented in Figures 8 and 9. A person skilled in the art will readily recognize that this design can be generalized to a family of similar config-

urations, including 2 x 2, 2 x 3, 2 x 4, 2 x 6, 3 x 4, and 4 x 4 bottle packs (30), where each bottle is accommodated in its own designated bottle nest.

[0044] Preferably, the bottle pack (30) is formed using injection molding technique, which impose certain design restrictions. The bottle pack (30) features outer walls that enclose the bottles, a set of bottle dividers (39) that secure the bottles within their nests, and a handle (36) for carrying the pack (30). The walls enclosing the bottles are carefully designed to follow the curvature of the bottles at the edges of the pack (30), as shown in Figures 6-9, with the dividers (39) extending from the bottoms of all bottle packs.

[0045] The bottle packs (30) feature specifically designed bottoms, with a groove (34) located beneath each bottle nest to interact with the pattern of connectors (14) on the upper side of the tray's base (10). These grooves (34) must conform to the geometry and distribution of the connectors (14) to be effective. In the preferred embodiment, the grooves (34) form part of a circle with radius R and are sufficiently deep to accommodate the connectors (14), as illustrated in Figures 7 and 9. The centers of the grooves (34) are spaced apart by a distance d, which aligns with the distribution pattern of the connectors (14) on the tray's base (10). A skilled person in the art will recognize that alternative groove (34) designs are feasible, provided they correspond with the pattern distribution of the connectors (14).

[0046] In one variant, the dedicated bottle pack (30) is designed to store various bottles (70, 80), including those of different heights, as shown in Figures 13 and 14. In this example, both a Steinie bottle (70) and an APO bottle (80) are accommodated within the same 2 x 3 bottle pack (30) and loaded into the same tray (1). The technical specifications for these bottles are provided below:

1) Steinie bottle (70): 33cl, height 174 mm and diameter 70 mm. <https://glass-catalog.com/it-en/catalog/details/33cl-steinie-1>

2) APO bottle (80): 33cl, height 227 mm and diameter 60 mm. <https://glass-catalog.com/nl-en/catalog/details/33cl-apo-rb-1>

[0047] As illustrated in Figure 14, each bottle pack (30) is further equipped with a first bottle-type support (37) that supports the bottom of the Steinie bottle (70), helping to equalize the height difference between the bottles (70, 80) so that all bottle tops rest in the same plane. Figure 10 demonstrates the loading of four 2 x 3 bottle packs (30) onto the tray (1) shown in Figure 1, with each pack filled with different bottles (70, 80). Regardless of the bottle types loaded in the pack (30), a groove (34) is formed on the bottom of each bottle pack (30) beneath each bottle, which aligns with a corresponding pattern of connectors (14) on the upper side of the tray's base (10).

Stacking and cross-stacking

[0048] In addition to nesting, or stacking of empty trays (1) as shown in Figure 5, the features of stacking and cross-stacking loaded trays (1) are even more significant. Once a tray (1) is loaded, as depicted in Figure 10, or partially loaded, it can be completely covered by another tray (1'), as illustrated in the series of Figures 11-14.

[0049] Figure 11 shows the upper tray (1') resting over the bottle packs (30) situated in the lower tray (1), which was previously loaded with the same packs. Figure 12 provides a partial view of how the bottlenecks fit into the bottleneck nests (25') of the upper tray (1').

[0050] To demonstrate the versatility of the disclosed system, we can examine cross-sections A-A and B-B indicated in Figure 11, corresponding to the situation depicted in Figures 13 and 14, respectively. Figure 13 illustrates the elevated position of all first bottle types (70), specifically the Steinie bottles (70), situated within the bottle nests of the pack (30), while the second bottle types (80), namely the APO bottles (80), are fully inserted into their designated nests. Figure 13 also shows how the handles (36) are accommodated in the appropriate nests (26') within the tray (1').

[0051] In Figure 14, the same situation is depicted as in Figure 13; however, it is now clear how the bottlenecks of the various bottles (70, 80) fit into the bottleneck nests (25'). The tops of the bottles (70, 80) support the upper tray's base (10) or, in the preferred variant, the upper tray's bores (15') located above each bottleneck nest (25'), which have a diameter smaller than that of the nests (25').

[0052] It is important to note that the bottleneck nests (25') stabilize the tops of the bottle packs against lateral movements, while the bottom grooves (34) of each pack (30) provide stability at the base (10). This arrangement ensures that each bottle pack (30) securely connects the upper tray (1') with the loaded lower tray (1) beneath, with gravity aiding in this process.

[0053] Simple stacking is evident from Figures 13 and 14. However, the feature that the adjacent patterns in the connector (14) matrix are equidistantly distributed across the tray's base (10) facilitates cross-stacking. Figure 15 illustrates a fully loaded pallet with stacked and cross-stacked (CS) trays according to the present disclosure, utilizing different packs (30), specifically 2 x 3 and 2 x 2, on the top layer.

[0054] Cross-stacking refers to the ability to place a tray (1') over the bottle packs (30) loaded on one or more trays (1) in a plane that is rotated 90° relative to the trays (1) carrying those packs (30). This cross-stacking feature allows the pallet (100) to be securely loaded with numerous trays (1) and bottle packs (30), creating interconnected layers that prevent lateral movement.

[0055] In some further embodiments, partial stacking can be implemented. Partial stacking involves positioning the upper tray (1') offset by one or more rows or columns within the available matrix of bottleneck nests

(25') relative to the loaded tray below (1). This method enables the creation of pyramid-like or other complex structures from the loaded trays (1) on the pallet (100). Although this feature may not be commonly used in practice - primarily for the final layer of loaded trays in a pile - it allows for a wide variety of stacking combinations, much like the versatility offered by a LEGO® system with its building blocks.

Industrial Applicability

[0056] The present disclosure relates to trays designed for storing bottle packs, featuring enhanced stacking and cross-stacking capabilities specifically tailored for dedicated bottle packs that cooperate with these trays. The industrial applicability of this design is evident.

Reference numbers

[0057]

1	Tray	
10	Base	
11	Shorter sidewall	
12	Longer sidewall	
13	Rounded edge	
14	Connector	
15	Bore	
16	Auxiliary bore	
17	Ribbed handle	
18	Upper stacking edge	
19	Lower stacking edge	
25	Bottleneck nest	
26	Handle nest	
27	Divider surface	
30	Bottle pack	
34	Bottle pack groove	
36	Handle	
37	First bottle-type support	
39	Bottle divider	
70	First bottle type	
80	Second bottle type	
100	Palette	
R	Connector pattern's radius	
d	Distance, between patterns' centers	
CS	Cross-stacking	
'	Upper tray's references	

Claims

1. A tray (1), designed to receive bottle packs (30), which comprises a base (10) with an upper and a lower side, a pair of parallel shorter sidewalls (11), and a pair of parallel longer sidewalls (12), where each sidewall (11, 12) is connected with the adjacent different sidewalls by a rounded edge (13), where all sidewalls (11, 12) and rounded edges (13) enclose the said base (10) and form, in the parallel plane

containing the base (10), the rectangle with the rounded edges;

- wherein the base (10) has on its upper side a plurality of connectors (14) that project upward and are grouped in a rectangular matrix of identical patterns, where adjacent patterns in the said matrix are equidistantly distributed over the said base (10), where each pattern of connectors (14) is capable of engaging only one of the bottle pack grooves (34) situated in the base of the said bottle pack (30),

- wherein the base (10) has on its lower side a plurality of cylindrical bottleneck nests (25), whose principal axes coincide with all centers of each repetitive pattern formed on the upper side of the base (10), where each bottleneck nest (25) is capable of receiving bottleneck of the bottles (70, 80) of the said bottle pack (30),

- wherein the base (10) has on its lower side spaces used as handle nests (26) for bottle packs handles (36), where said nests (26) are formed by a plurality of plane or curved divider surfaces (27) which are spanned among the bottleneck nests (25) alone, or sidewalls (11, 12) and bottleneck nests (25),

- where each sidewall (11, 12) and each rounded edge (13) has an upper stacking edge (18) and a lower stacking edge (19), which allow the bottle pack tray (1) to be stacked, one over another, when empty, and,

- where, optionally, a desired pair of sidewalls (11, 12), or all sidewalls, are equipped with handles (17) formed as a part of the said sidewalls (11, 12), extending partially from the lower stacking edge (19) towards the upper stacking edge (18).

2. The tray (1) according to claim 1, wherein the plurality of connectors (14) is arranged in the matrix of repetitive circular patterns with the radius R.

3. The tray (1) according to claim 2, wherein the number of connectors (14) in each circular pattern is greater than 2, preferably greater or equal to 4.

4. The tray (1) according to claims 2 or 3, where the circular patterns are arranged in the matrix 4 x 6.

5. The tray (1) according to claim 1, wherein its base's lower side is equipped with a plurality of identical cylindrical bottleneck nests (25) with bores (15), where said bores (15) are formed coaxially with the bottleneck nests (25) in the base (10) from which the nests (25) emerge, where each bore's diameter is smaller than the nests' diameter and of the top of the bottles (70, 80) diameters which are in contact with the said bores (15).

6. The tray (1) according to any of the preceding claims where the handles (17) are formed on the shorter sidewalls (11).
7. Use of the tray (1) defined in any of the preceding claims 1-6 with the bottle packs (30) with various bottle sizes (70, 80), where packs are selected from those having bottles arranged in 2 x 2, 2 x 3, 2 x 4, 2 x 6, 3 x 4 and 4 x 4 matrix or their combinations, and where the tops of all bottles (70, 80) of each pack (30) lay in the same plane when are loaded on the tray (1), where each bottle pack (30) has beneath each bottle formed a groove (34) that is engaged with one pattern of connectors (14), preferably a circular pattern formed on the base (10) of the tray (1) .
8. Use of the tray (1) as defined in claim 7, which allows the next tray (1') to be placed entirely or partially over the tray (1) previously loaded with the bottle packs (30) so that bottles (70, 80) tops, situated below the second tray (1'), enter the bottleneck nests (25') of the said second tray (1'), and to be stopped by the base (10') or beneath the bores (15') of the same tray (1'), allowing the second tray (1') to lay in a parallel plane elevated from the first tray (1) for the height of the used bottle packs (30), where the said trays (1, 1') are stably connected via bottles (70, 80) situated in bottle packs (30) loaded on the tray (1) and the said connection enables further stacking and cross stacking of other trays on the said trays (1, 1') within the same palette (100).

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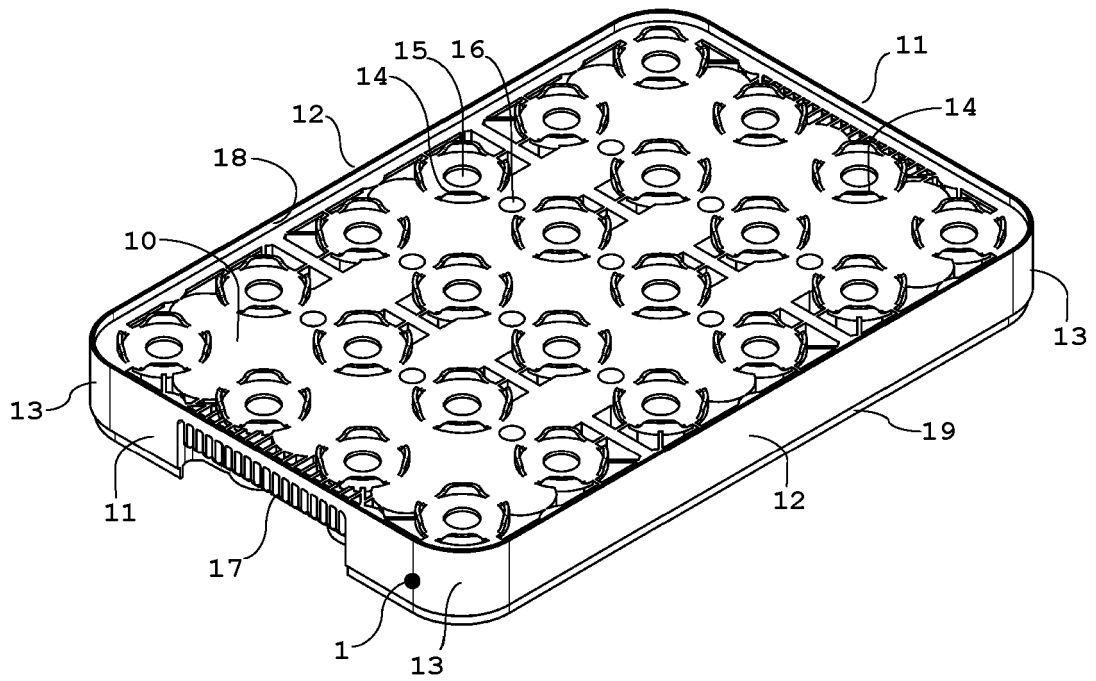


Figure 1

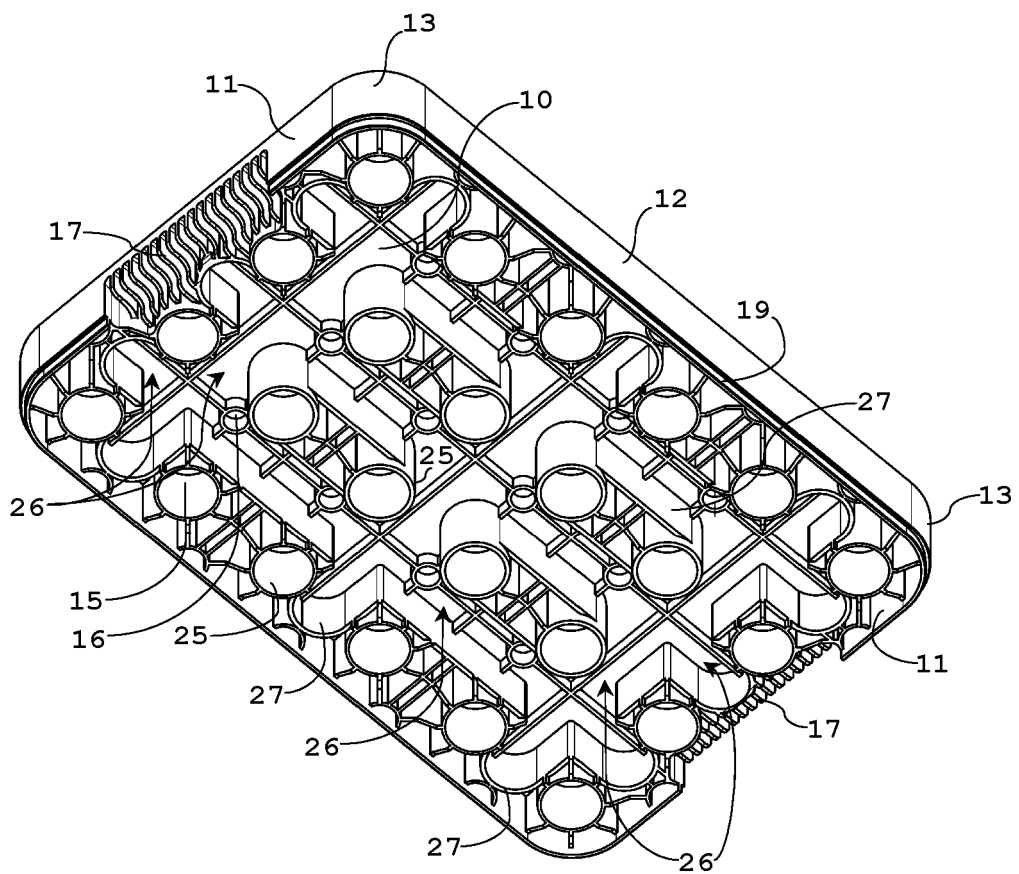


Figure 2

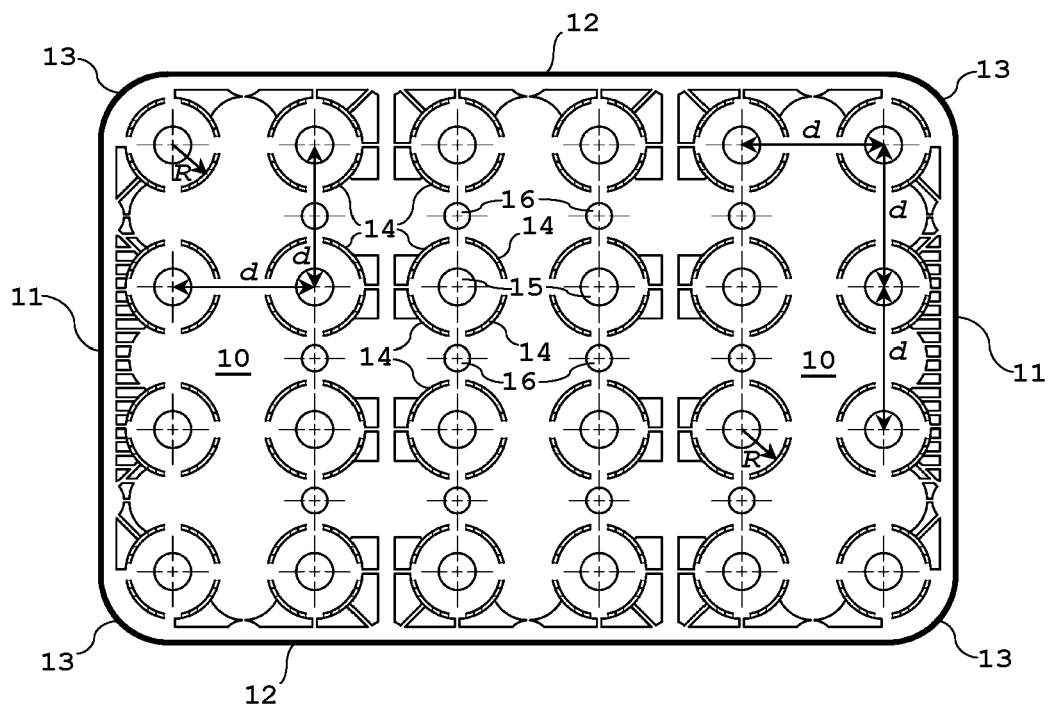


Figure 3

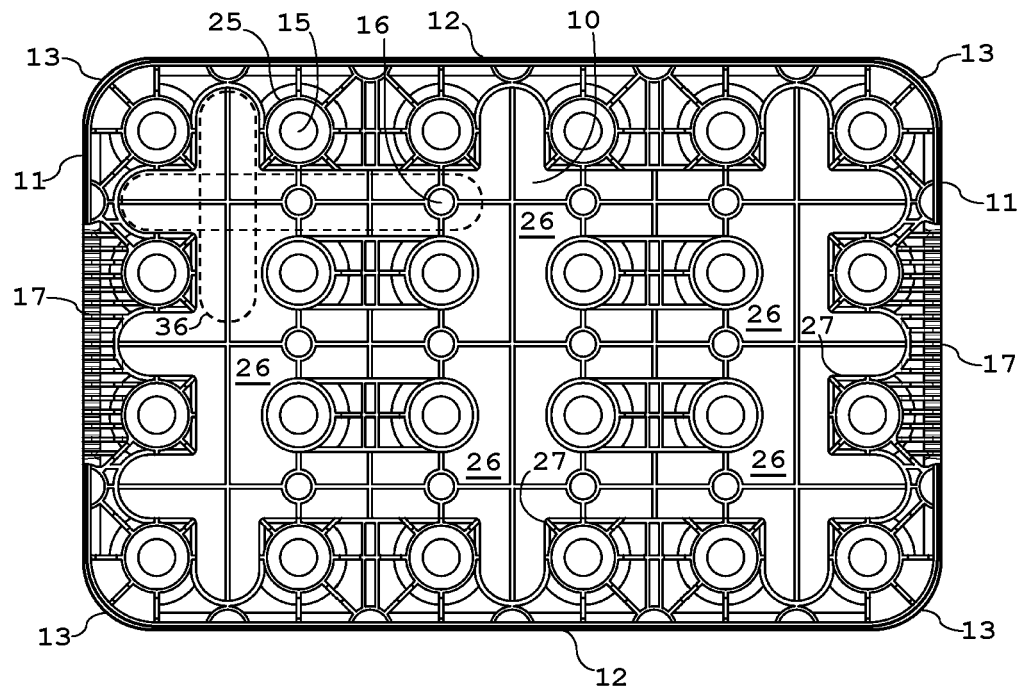


Figure 4

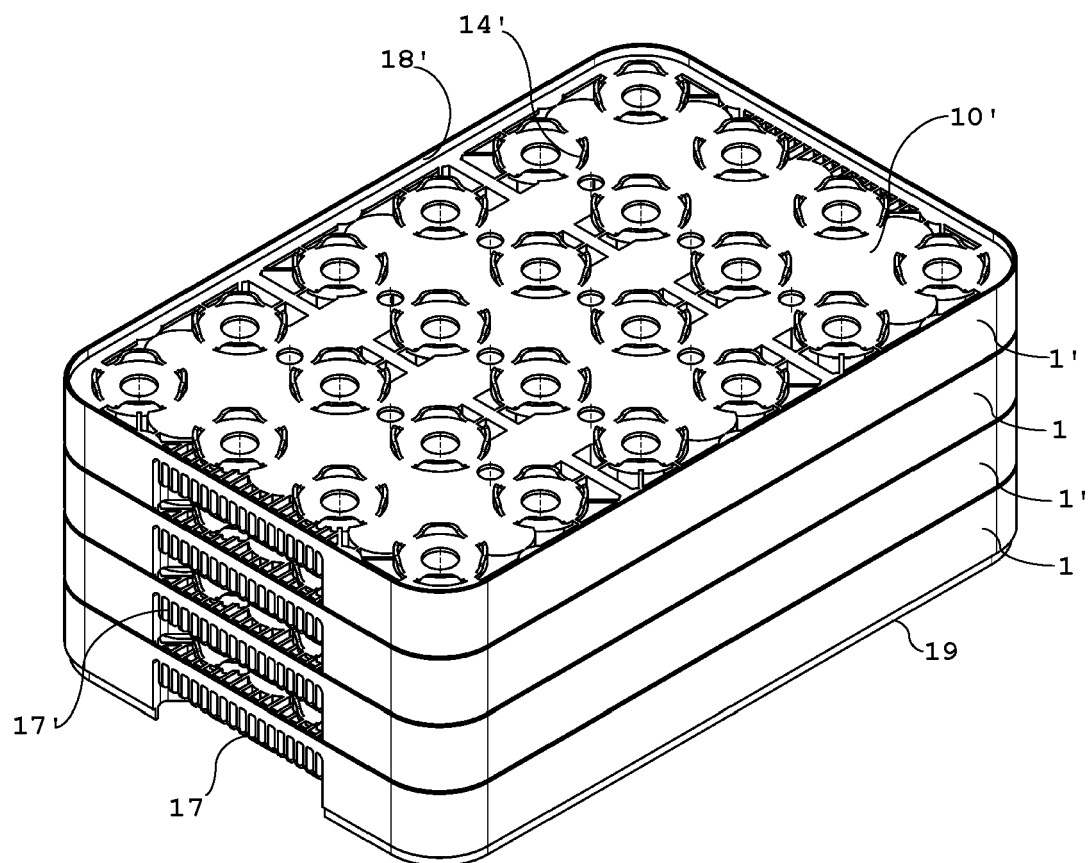


Figure 5

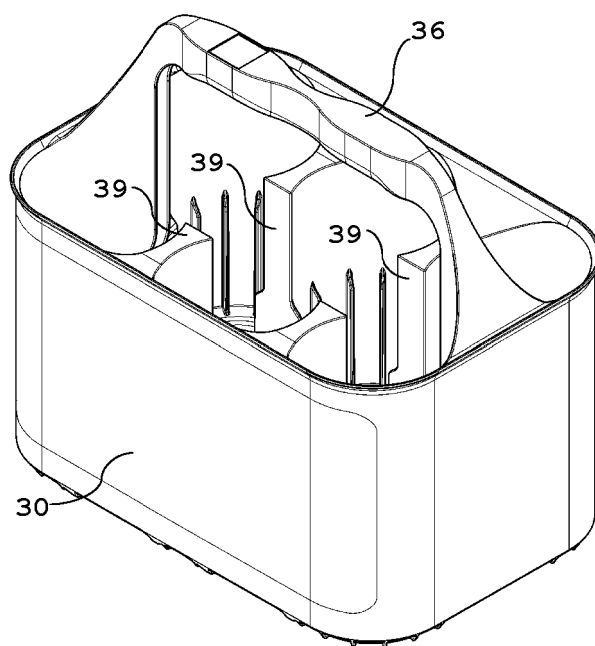


Figure 6

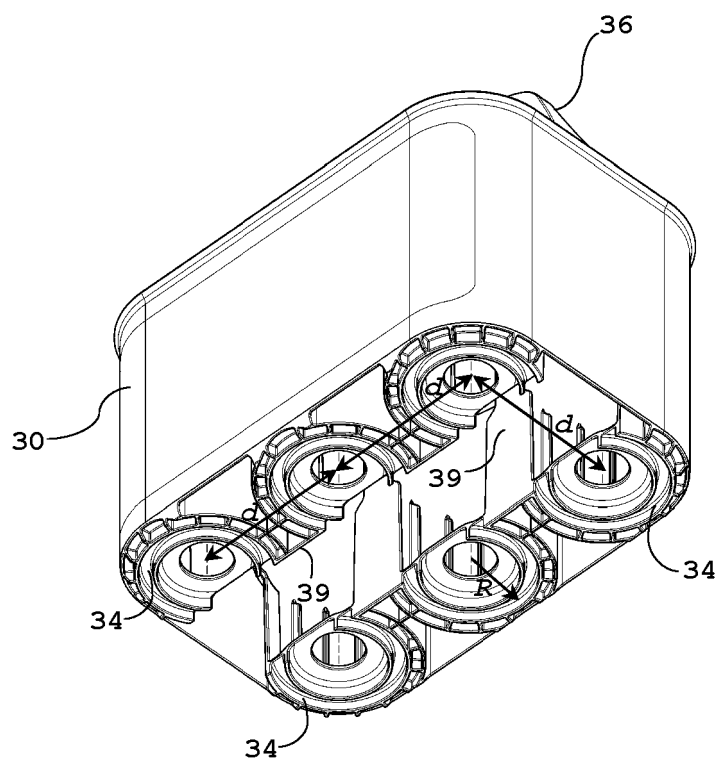


Figure 7

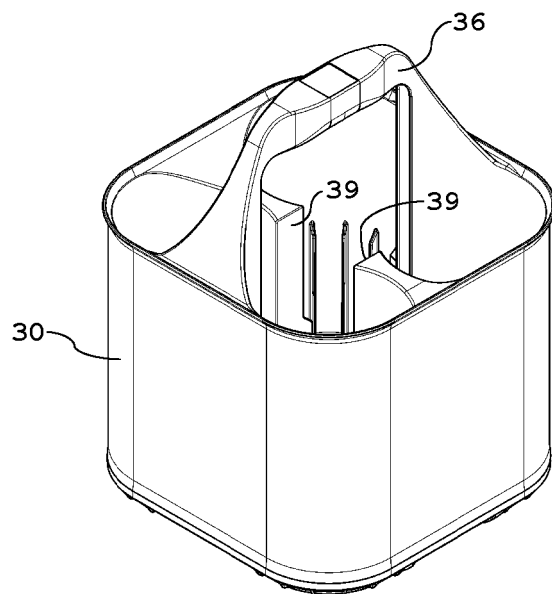


Figure 8

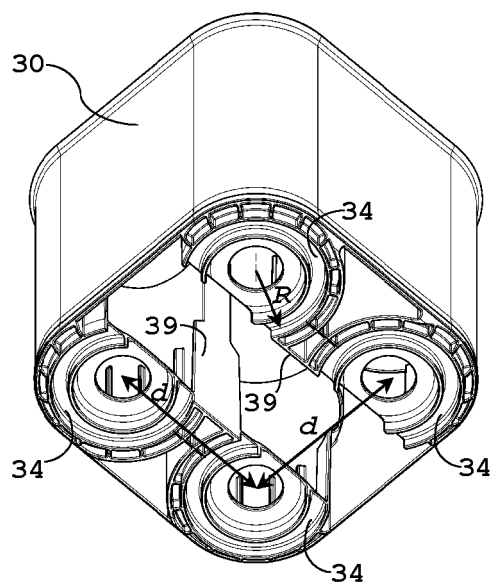


Figure 9

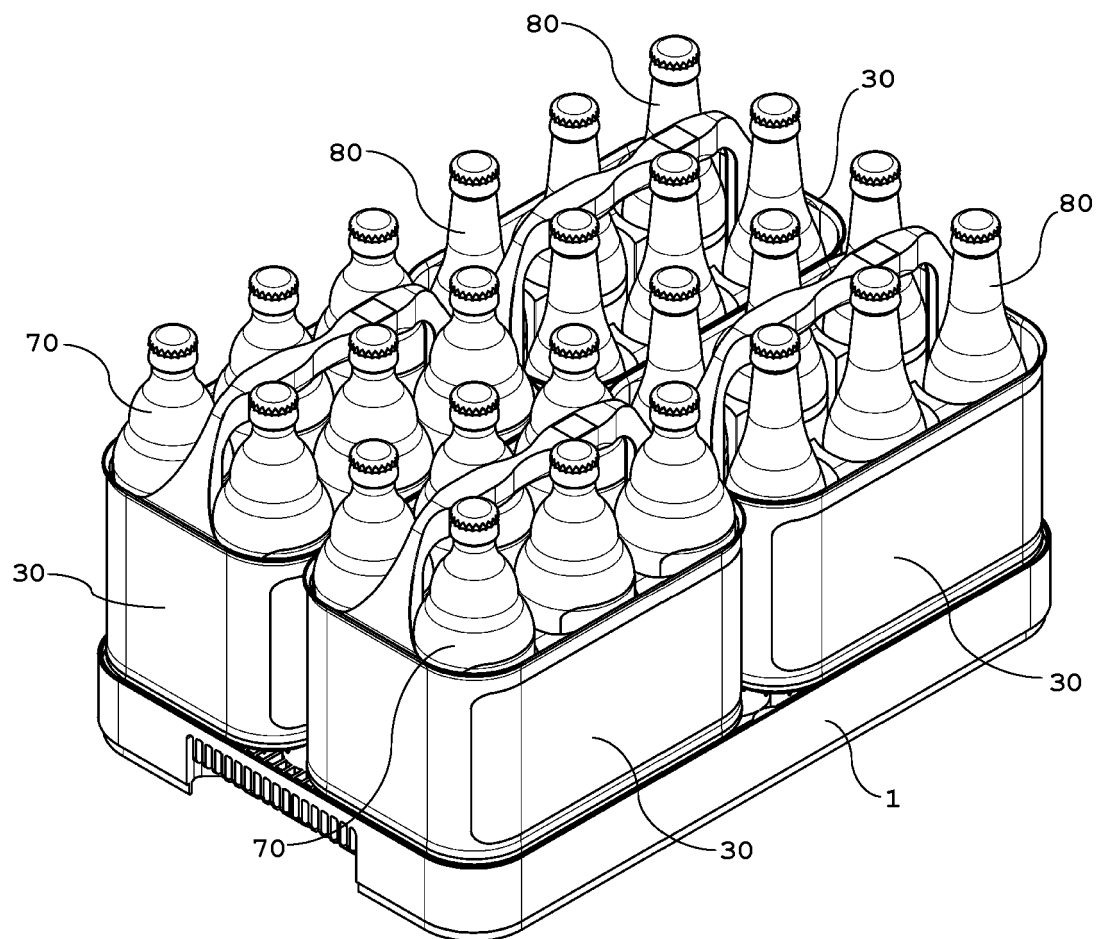


Figure 10

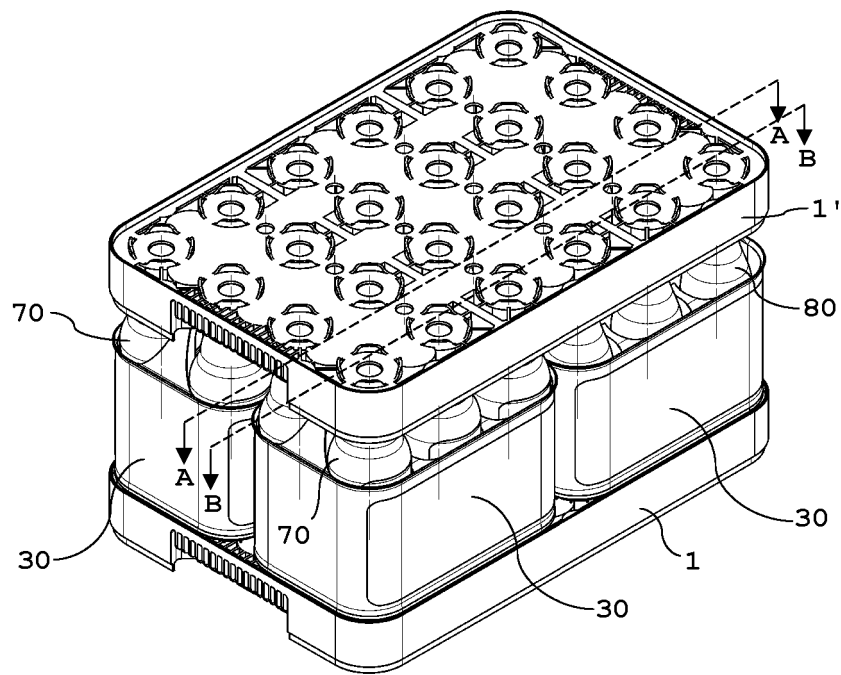


Figure 11

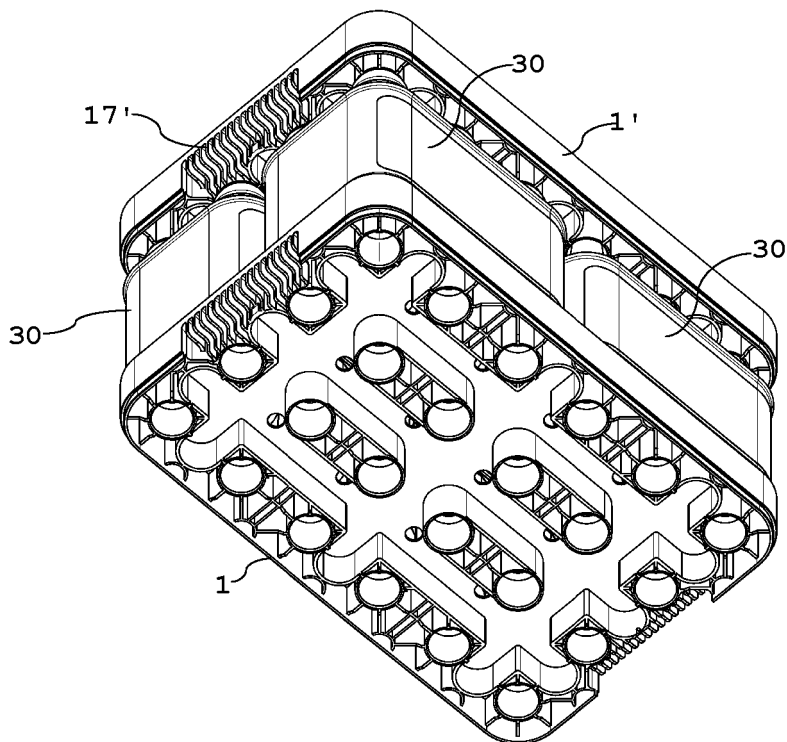


Figure 12

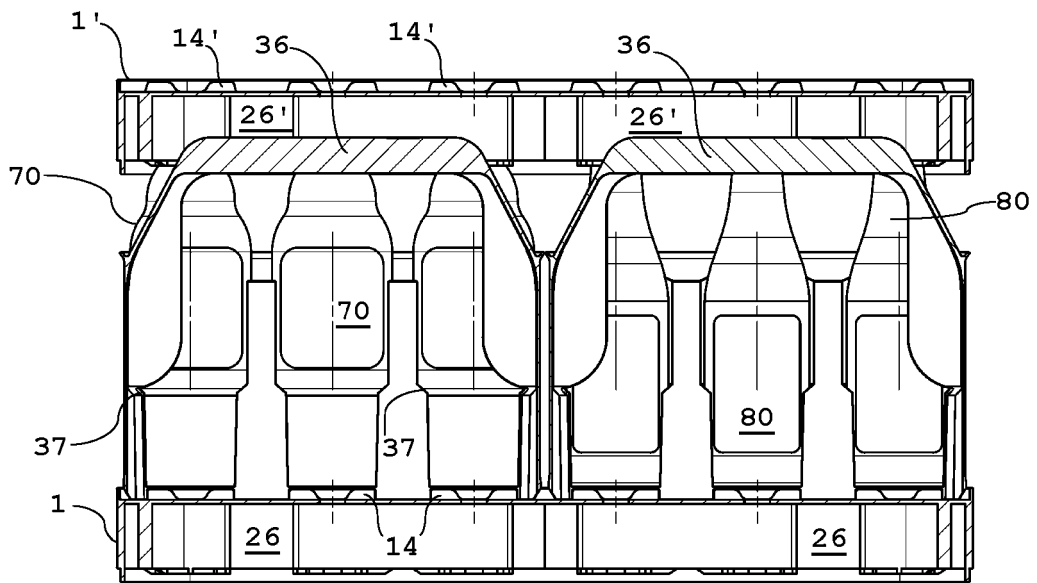


Figure 13

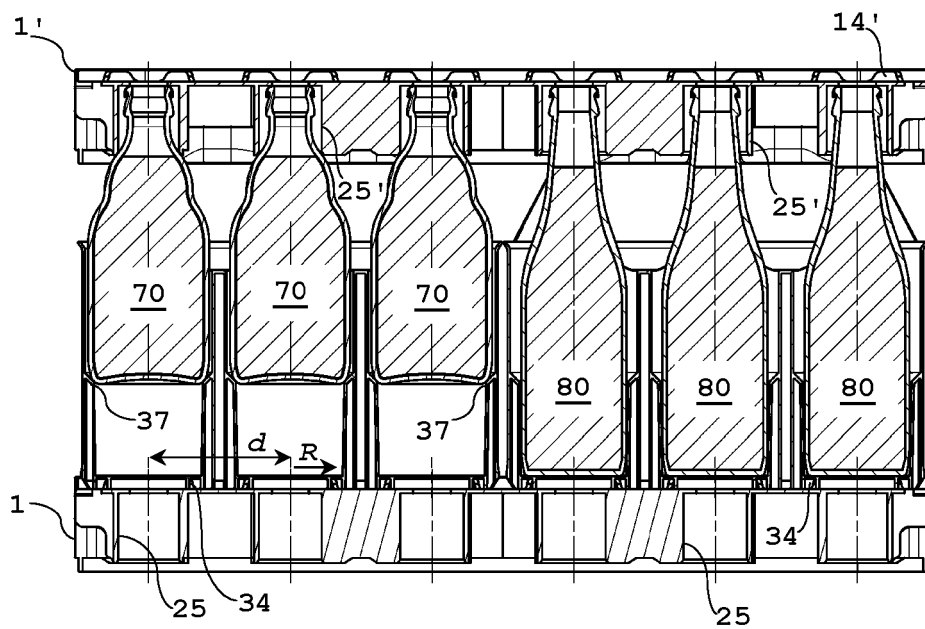


Figure 14

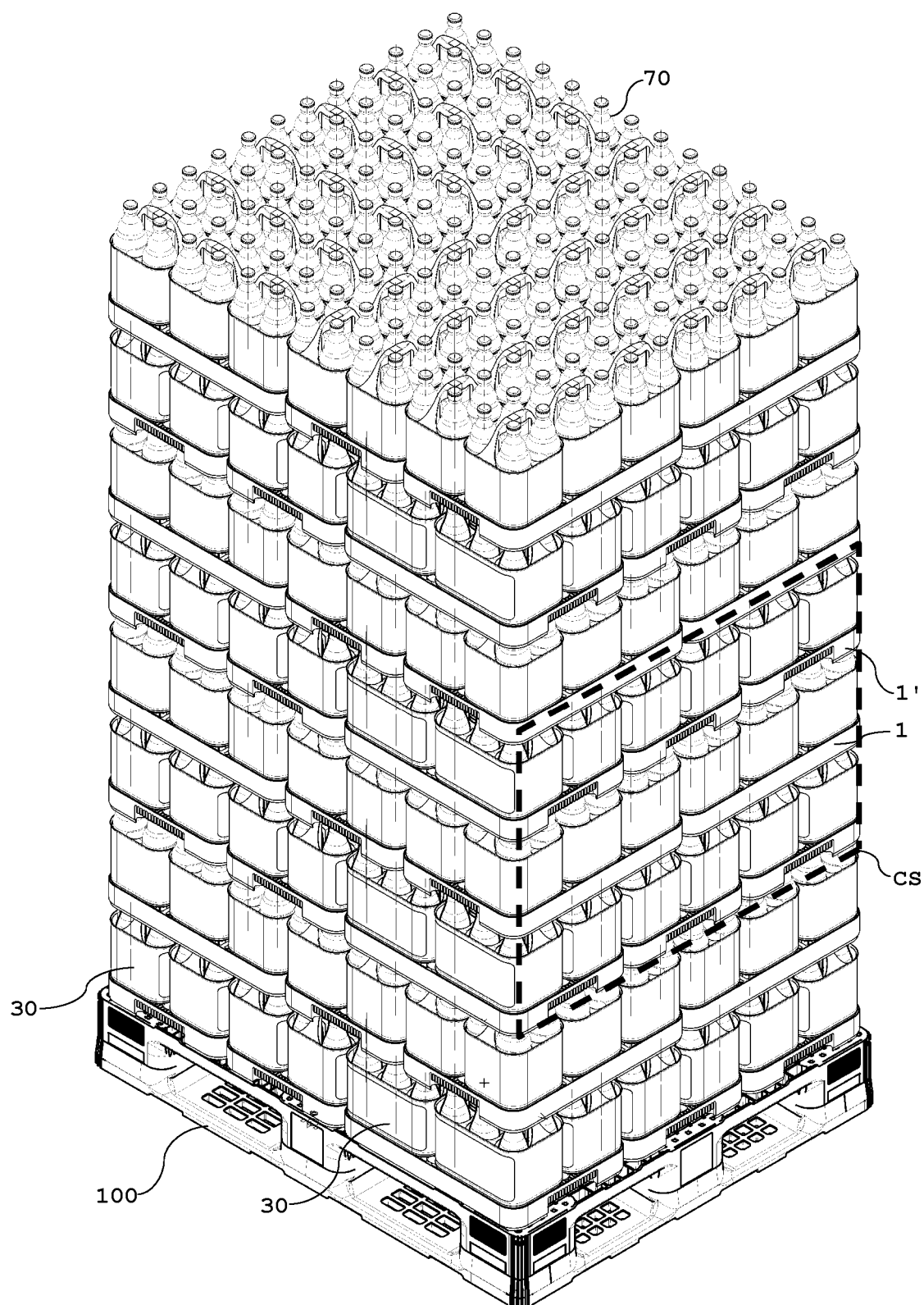


Figure 15



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Application Number

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X	WO 00/58173 A1 (OYJ HARTWALL ABP [FI]; AIKIO VEIJO [FI]) 5 October 2000 (2000-10-05) * page 3, lines 18-22 * * page 4, lines 16-21 * * page 5, lines 8-13, 20-23; figures 1-5 *	1,5,7,8	
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		17 April 2025	Gabrich, Katharina
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