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(54) **ONE-WAY PLASTIC PALLET**

EINWEG-KUNSTSTOFFPALETTE

PALETTE EN PLASTIQUE NON REUTILISABLE

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**Description**FIELD OF THE INVENTION

**[0001]** This invention relates to shipping and storage pallets and more particularly to pallets having a plastic construction.

US-A-5 404 829, upon which the preamble of claim 1 is based, discloses such a pallet.

BACKGROUND OF THE INVENTION

**[0002]** Pallets have traditionally been formed of wood. Wood pallets however have many disadvantages. For example, they are subject to breakage and they take up a considerable amount of valuable floor space in the warehouse when they are not in use. They are also difficult to maintain in a sanitary condition, thus limiting their usability in applications where sanitation is important, for example, in food handling application.

**[0003]** In an effort to solve some of the problems associated with wood pallets, plastic pallets have been employed with some degree of success. In one generally successful form of plastic pallet design, a twin sheet construction has been used in which upper and lower plastic sheets are formed in separate molding operations and the two sheets are then selectively fused or knitted together in a suitable press to form a reinforced double wall structure. Whereas these twin sheet plastic pallets are generally satisfactory, they tend to be more expensive than comparable wood pallets and, in particular, their relatively higher cost has precluded their use in one-way applications where the pallet, after fulfilling an initial shipping or material handling assignment, is not reused but rather is destroyed or recycled after the single use.

SUMMARY OF THE INVENTION

**[0004]** This invention is directed to the provision of a plastic pallet which is relatively inexpensive.

**[0005]** More specifically, this invention is directed to the provision of a plastic pallet that is producible at a price that makes the pallet feasible for one-way usage.

**[0006]** This invention relates to a thermoformed twin sheet pallet comprising all the features of claim 1.

**[0007]** According to an embodiment of the invention, the leg structures are formed of spaced downstanding leg portions of the upper sheet fused in vertically overlapping relation to spaced upstanding leg portions of the lower sheet and main body planar portions of the upper sheet between the spaced downstanding leg portions coact with main body planar portions of the lower sheet between the spaced upstanding leg portions to define the forklift passages. This arrangement allows the provision of an inexpensive pallet with adequate leg structures and well defined forklift passages.

**[0008]** According to a further feature of the invention, the lower sheet further includes an upstanding flange por-

tion extending around the perimeter of the lower sheet and fused to the perimeter of the upper sheet, and openings are provided in the flange portion, in alignment with the forklift passages, to provide forklift access to the forklift passages. This arrangement further strengthens the pallet while not inhibiting access to the forklift passages.

**[0009]** According to a further feature of the invention, a flap is provided in each opening which is yieldable to allow entry of a forklift into the opening for access to the respective forklift passage. This arrangement protects the forklift passages from debris, is providable at no additional cost, and does not inhibit access to the forklift passages.

**[0010]** According to the invention, the downstanding leg portions of the upper sheet comprise upper hollow protrusions opening in the upper face of the upper sheet and the upstanding leg portions of the lower sheet comprise lower hollow protrusions opening in the lower face of the lower sheet and including sidewalls fused to sidewalls of the upper protrusions. This arrangement provides an extremely thin pallet with adequate leg strength and with well defined forklift passages.

**[0011]** In the disclosed embodiment of the invention the plurality of upstanding protrusions are fused to certain of the downstanding protrusions and, specifically, at least three upstanding protrusions are fused to at least some of the downstanding protrusions and conversely, at least three downstanding protrusions are fused to at least some of the upstanding protrusions.

**[0012]** According to a further feature of the invention, main body planar portions of the upper sheet between the leg structures coact with main body planar portions of the lower sheet between the leg structures to define upper and lower boundaries of the forklift passages and the vertical boundaries of the forklift passages are defined by the leg structures. This arrangement provides totally defined forklift passages in an inexpensive manner.

**[0013]** Other applications of the present invention will become apparent to those skilled in the art when the following description of the best mode contemplated for practicing the invention is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

**[0014]** The description herein makes reference to the accompanying drawings wherein like reference numerals refer to like parts throughout the several views, and wherein:

**[0015]** Figure 1 is a perspective view of a pallet according to the invention;

**[0016]** Figure 2 is a cross-sectional view taken on line 2-2 of Figure 1;

**[0017]** Figure 3 is an end view of the pallet looking in the direction of the arrow 3 in Figure 1;

**[0018]** Figure 4 is an exploded perspective view of the pallet;

[0019] Figures 5 is a fragmentary top view of the pallet;  
 [0020] Figure 6 is a fragmentary bottom view of the pallet;  
 [0021] Figure 7 is a fragmentary cross sectional view of a pallet leg structure;  
 [0022] Figures 8 and 9 are detail views showing protrusions utilized in the leg structures;  
 [0023] Figure 10 is a fragmentary perspective view looking in the direction of the arrow 10 in Figure 1; and  
 [0024] Figure 11 is a fragmentary cross-sectional view of the pallet.

#### DETAILED DESCRIPTION

[0025] The pallet 10 of the invention, broadly considered, comprises an upper plastic sheet 12 and a lower plastic sheet 14. Sheets 12 and 14 are preferably formed of a polyethylene material and may have a thickness of approximately .070 inches. In overview, each sheet is formed in a vacuum thermoforming operation and the upper and lower sheets, while still in a heated fuseable condition, are brought together to selectively fuse portions of the upper sheet to portions of the lower sheet to form the pallet.

[0026] Upper sheet 12 has a generally rectangular configuration and includes leg portions 12a-12i and planar main body portions 12j between the leg portions. Sheet 12 also includes an upstanding flange 12k extending around the periphery of the sheet and terminating in an outwardly extending lip 12i.

[0027] Each leg portion 12a-12i is constituted by a cluster of downwardly extending hollow protrusions 12m. Each protrusion has a circular transverse cross-section and a frusto conical vertical cross-section. Specifically, each protrusion 12m includes an annular, conical sidewall 12n and a bottom wall 12p and opens in the upper face of sheet 12 at 12q. Each upper sheet protrusion cluster has a rectangular overall configuration and includes parallel, offset rows of protrusions with the circular configuration of peripheral protrusions in the cluster sacrificed or flattened as necessary, and as seen at 12r, to maintain the overall rectangular configuration of the cluster. The protrusion rows of the corner leg portion clusters 12a, 12c, 12e and 12g may extend on a bias or diagonal with respect to the side edges of the sheet and the protrusion rows of the remaining leg portion clusters may extend parallel to the side edges of the sheet.

[0028] Lower sheet 14 has a rectangular configuration conforming generally to the rectangular configuration of upper sheet 12 and includes leg portions 14a-14i, correspondingly respectively to upper sheet leg portions 12a-12i, and planar main body portions 14j between the leg portions, corresponding to upper sheet planar main body portions 12j. Sheet 14 also includes an upstanding flange portion 14k extending around the perimeter of the sheet outside of the leg portions 14a-14i and terminating in an outwardly extending lip 14l. Flange 14k is formed with a pair of spaced recessed or depressed regions 14m

along each side of the flange with the depressed regions aligned generally with planar main body portions 14j.

[0029] Each leg portion 14a-14i is constituted by a cluster of upwardly expending hollow protrusions 14n. Each protrusion has a circular transverse cross-section and a frusto conical vertical cross-section. Specifically, each protrusion 14n includes an annular conical side wall 14p and a top wall 14q and opens in the lower face of sheet 14 at 14r. Each lower sheet protrusion cluster has a rectangular overall configuration, conforming to the rectangular configuration of the respective corresponding upper sheet cluster, and includes parallel offset rows of protrusions with the circular configuration of peripheral protrusions in the cluster sacrificed or flattened as necessary, and as seen at 14s, to maintain the overall rectangular configuration of the cluster. The protrusion rows of the corner leg portion clusters 14a, 14c, 14e and 14g may extend on a bias or diagonal with respect to the side edges of the sheet and the protrusion rows of the remaining leg portion clusters may extend parallel to the side edge of the sheet.

[0030] As previously indicated, after the individual upper and lower sheets are thermoformed in a vacuum molding procedure, the sheets, while still in a heated state, are brought together to form the pallet. Specifically, flange 12k fuses to flange 14k, lip 12l fuses to lip 14l, and the upper sheet protrusion clusters mesh with and fuse to the lower sheet protrusion clusters to form a pallet in which the upper face of the upper sheet defines a platform structure for the pallet and the protrusion clusters of the upper and lower sheets are fused together to form leg structures extending downwardly from the platform structure.

[0031] The protrusion rows of the lower sheet clusters are offset with respect to the protrusion rows of the upper sheet clusters such that, as the vacuum formed and still heated sheets are brought together to form the pallet, the upstanding protrusions of the lower sheet clusters intermesh with the downstanding protrusions of the upper sheet clusters. Specifically, as best seen in Figures 5, 6 and 7, in each cluster the annular side walls of the downstanding protrusions that are central to the cluster intermesh and form a fusion line with the annular side walls of three of the upstanding protrusions and, similarly, the annular sidewalls of the upstanding protrusions that are central to the cluster intermesh with and form a fusion line with the annular sidewalls of three downstanding protrusions. The spacing of the parallel protrusion rows and the staggering of the rows are chosen such that the three fusion lines formed on the sidewalls of a central downstanding protrusion are equispaced about the circumference of that protrusion as are the three fusion lines formed on the sidewall of a central upstanding protrusion. It will be understood that protrusions that are peripheral to a cluster will, by pure geometric considerations, have fewer than three fusion lines. The protrusions are further sized to insure that, with the upstanding and downstanding protrusions intermeshed and fused together, the top

walls 14q of each upstanding protrusion abut against and fuse to the underface of the upper sheet as seen at 14t in Figure 9, and the bottom wall 12p of each downstanding protrusion abuts against and fuses to the upper face of the lower sheet, as seen at 12s. With the upper and lower sheets fused together to form the pallet, it will be seen that the leg structures of the pallet are formed of spaced downstanding leg portions of the upper sheet fused in vertically overlapping relation to spaced upstanding leg portions of the lower sheet and the main body planar portions 12j of the upper sheet coact with the main body planar portion 14j of the lower sheet to define a pair of forklift passages 16 extending transversely of the pallet and a further pair of forklift passages 16 extending lengthwise of the pallet. Specifically, the clusters are spaced apart sufficiently to insure that each passage 16 has a width sufficient to accommodate the width 18w of a forklift 18; the protuberances have a vertical dimension such that the space between the sheets, and thereby the height of each passage 16, is sufficient to accommodate the thickness 18t of a forklift 18; and the spacing between each pair of parallel forklift passages corresponds to the spacing 20 between the spaced parallel forks 18 of a forklift truck.

[0032] Following the formation of the pallet, the flange 14k of the lower sheet is selectively cut or scored within the depression 14m along score lines 14t to form an opening 14u in each depression which is closed by a flap 14v having a fold line or fulcrum 14w. Each opening 14u will be seen to be aligned with a respective forklift passage 16 and each forklift passage may be readily accessed by the forklift 18 of a forklift truck by pressing the forklift against the flap 14v to pivot the flap about its fulcrum 14w and move the flap into a recess 14x defined by a bulge 14y formed in the lower face of the lower sheet proximate each depression 14m.

[0033] In the competed pallet it will be seen that the main body portions 12j of the upper sheet define an upper boundary of the forklift passages 16, the main body portions 14j of the lower sheet define the lower boundaries of the forklift passages, and the leg structures as defined by the intermeshed protrusion clusters define the vertical boundaries of the forklift passages. Note in this regard, and as best seen in Figures 5 and 6, that the flatted sides 12r and 14s of the peripheral protuberances in each cluster serve to define a generally rectangular shape for each cluster and further serve to define generally smooth vertical boundaries for the forklift passages.

[0034] It has been found that the pallet of the invention, by virtue of its simple construction and its use of thin plastic sheeting, can be produced at a cost that renders the pallet feasible for use in one way applications where the pallet, after fulfilling an initial shipping or material handling assignment, is not reused but rather is destroyed or recycled after the single use.

[0035] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be under-

stood that the invention is not to be limited to the disclosed embodiments but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims.

## Claims

1. A thermoformed twin sheet plastic pallet comprising an upper plastic sheet and a lower plastic sheet, the upper and lower sheets being fused together to form a platform structure and a plurality of leg structures downstanding from the platform structure in spaced relation and defining a plurality of forklift passages therebetween, wherein:
  - main body planar portions of the upper sheet between spaced downstanding leg portions coact with main body planar portions of the lower sheet between spaced upstanding leg portions to define the forklift passages; and **characterized in that** the leg structures are formed of spaced downstanding leg portions of the upper sheet fused in vertically overlapping relation to spaced upstanding leg portions of the lower sheet; wherein the downstanding leg portions of the upper sheet comprise upper hollow protrusions opening in the upper face of the upper sheet and the upstanding leg portions of the lower sheet comprise lower hollow protrusions opening in the lower face of the lower sheet and include sidewalls fused to sidewalls of the upper protrusions.
2. A pallet according to claim 1, wherein at least three upstanding protrusions are fused to at least one of the downstanding protrusions.
3. A pallet according to claim 1, wherein each protrusion has a frusto-conical vertical cross-section.
4. A pallet according to claim 1 wherein the lower sheet further includes an upstanding flange portion extending around the perimeter of the lower sheet and fused to the perimeter of the upper sheet; and openings are provided in the flange portion, in alignment with the forklift passages, to provide forklift access to the forklift passages.
5. A pallet according to claim 4, wherein a flap is provided in each opening which is yieldable to allow entry of a forklift into the opening for access to the respective forklift passage.
6. A pallet according to claim 1, wherein:
  - the upper and lower sheets have a generally rectangular configuration; and
  - leg structures are defined at the corners of the pallet and at intermediate locations along each side of the pallet, whereby to define a pair of

forklift passages extending lengthwise of the pallet and a pair of forklift passages extending crosswise of the pallet.

### Patentansprüche

1. Warmgeformte Doppelplattenkunststoffpalette, die eine obere Kunststoffplatte und eine untere Kunststoffplatte aufweist, wobei die obere und die untere Platte miteinander verschweißt sind, um eine Plattformstruktur und eine Vielzahl von Schenkelstrukturen zu bilden, die von der Plattformstruktur in einer beabstandeten Beziehung nach unten stehen und eine Vielzahl von Gabelstaplerdurchgängen dazwischen definieren, wobei:

ebene Abschnitte des Hauptkörpers der oberen Platte zwischen den beabstandeten nach unten stehenden Schenkelabschnitten mit den ebenen Abschnitten des Hauptkörpers der unteren Platte zwischen den beabstandeten nach oben stehenden Schenkelabschnitten zusammenwirken, um die Gabelstaplerdurchgänge zu definieren; und **dadurch gekennzeichnet, dass** die Schenkelstrukturen aus beabstandeten nach unten stehenden Schenkelabschnitten der oberen Platte gebildet werden, die in einer sich vertikal überdeckenden Beziehung zu den beabstandeten nach oben stehenden Schenkelabschnitten der unteren Platte verschweißt sind; wobei die nach unten stehenden Schenkelabschnitte der oberen Platte obere hohle Vorsprünge aufweisen, die sich in die obere Fläche der oberen Platte öffnen, und wobei die nach oben stehenden Schenkelabschnitte der unteren Platte untere hohle Vorsprünge aufweisen, die sich in die untere Fläche der unteren Platte öffnen und Seitenwände umfassen, die mit den Seitenwänden der oberen Vorsprünge verschweißt sind.

2. Palette nach Anspruch 1, bei der mindestens drei nach oben stehende Vorsprünge mit mindestens einem der nach unten stehenden Vorsprünge verschweißt sind.
3. Palette nach Anspruch 1, bei der ein jeder Vorsprung einen kegelstumpfförmigen vertikalen Querschnitt aufweist.
4. Palette nach Anspruch 1, bei der die untere Platte außerdem einen nach oben stehenden Flanschabschnitt aufweist, der sich um den Umfang der unteren Platte erstreckt und mit dem Umfang der oberen Platte verschweißt ist; und bei der Öffnungen im Flanschabschnitt in Ausrichtung mit den Gabelstaplerdurchgängen vorhanden

sind, um einen Zugang der Hebegabel zu den Gabelstaplerdurchgängen zu bewirken.

5. Palette nach Anspruch 4, bei der eine Klappe in einer jeden Öffnung vorhanden ist, die nachgiebig ist, um den Eintritt einer Hebegabel in die Öffnung für einen Zugang zum jeweiligen Gabelstaplerdurchgang zu gestatten.

6. Palette nach Anspruch 1, bei der:

die obere und untere Platte eine im Allgemeinen rechteckige Konfiguration aufweisen; und wobei die Schenkelstrukturen an den Ecken der Palette und an Zwischenstellen längs einer jeden Seite der Palette definiert werden, um dadurch ein Paar Gabelstaplerdurchgänge, die sich in Längsrichtung der Palette erstrecken, und ein Paar Gabelstaplerdurchgänge zu definieren, die sich quer zur Palette erstrecken.

### Revendications

1. Palette à double feuille en plastique thermoformée, comprenant une feuille plastique supérieure et une feuille plastique inférieure, les feuilles supérieure et inférieure étant assemblées par fusion pour former une structure de plate-forme, et plusieurs structures de branche s'étendant vers le bas à partir de la structure de plate-forme, dans une relation espacée, et définissant plusieurs passages pour chariot élévateur à fourche entre elles ;  
des parties de corps principal planes de la feuille supérieure entre des parties de branche espacées s'étendant vers le bas coopérant avec des parties de corps principal planes de la feuille inférieure entre des parties de branche espacées s'étendant vers le haut pour définir les passages pour chariot élévateur à fourche, et **caractérisée en ce que** les structures de branche sont formées de parties de branche espacées s'étendant vers le bas de la feuille supérieure, assemblées par fusion dans une relation à chevauchement verticale, à des parties de branche espacées s'étendant vers le haut de la feuille inférieure ; les parties de branche s'étendant vers le bas de la feuille supérieure comprenant des saillies creuses supérieures ouvertes vers la face supérieure de la feuille supérieure, les parties de branche s'étendant vers le haut de la feuille inférieure comprenant des saillies creuses inférieures ouvertes vers la face inférieure de la feuille inférieure et englobant des parois latérales assemblées par fusion aux parois latérales des saillies supérieures.
2. Palette selon la revendication 1, dans laquelle au moins trois saillies s'étendant vers le haut sont assemblées par fusion à au moins une des saillies

s'étendant vers le bas.

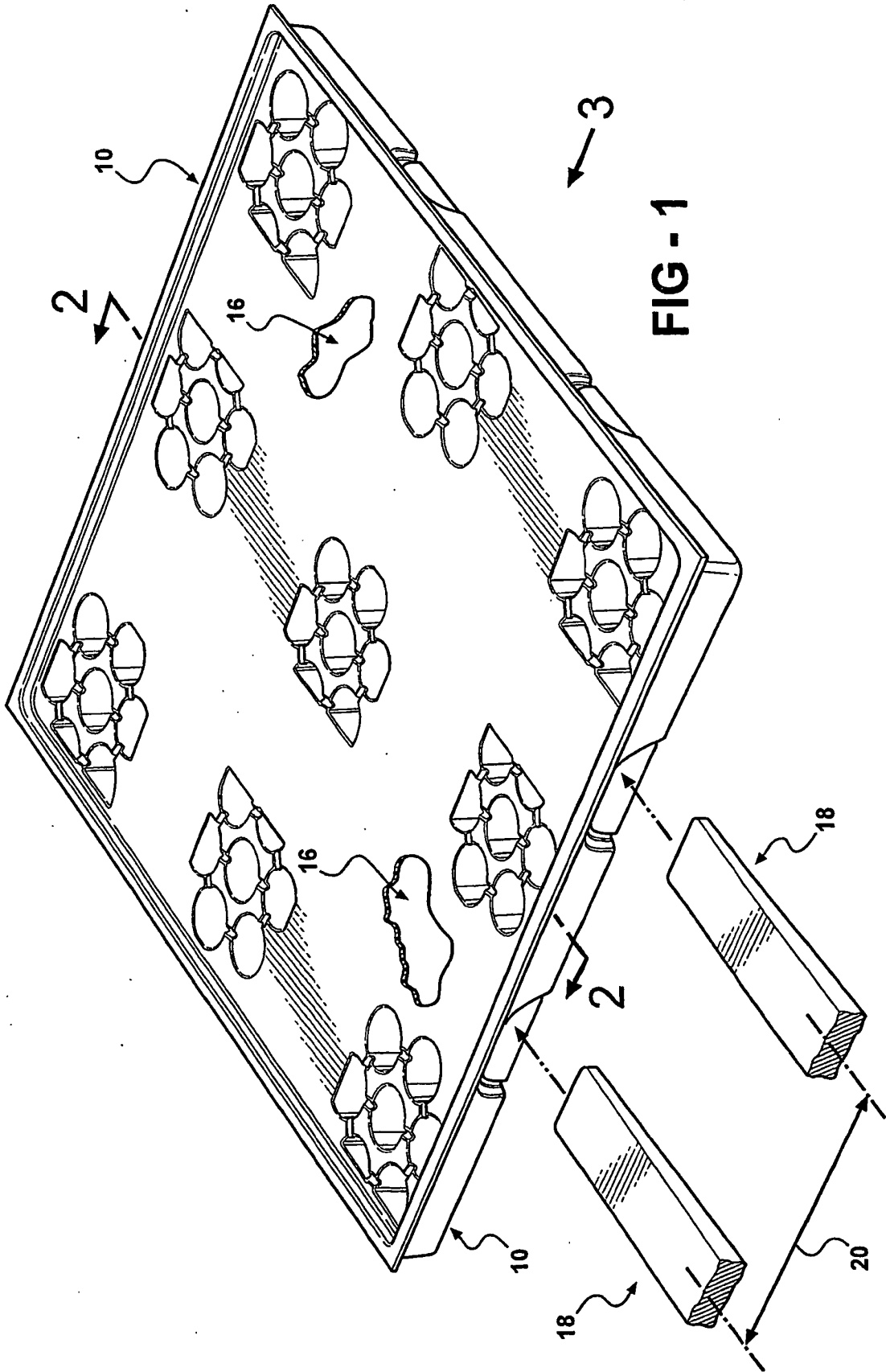
3. Palette selon la revendication 1, dans laquelle chaque saillie a une section transversale verticale an tronc de cône. 5
4. Palette selon la revendication 1, dans laquelle la feuille inférieure englobe en outre une partie de bride s'étendant vers le haut, entourant le périmètre de la feuille inférieure et assemblée par fusion au périmètre de la feuille supérieure ; et 10  
des ouvertures étant formées dans la partie de bride, en alignement avec les passages pour chariot élévateur à fourche, pour établir l'accès du chariot élévateur à fourche aux passages pour chariot élévateur à fourche. 15
5. Palette selon la revendication 4, dans laquelle un rabat est agencé dans chaque ouverture, pouvant être déformé pour permettre l'entrée d'un chariot élévateur à fourche dans l'ouverture en vue de l'accès au passage du chariot élévateur à fourche respectif. 20
6. Palette selon la revendication 1, dans laquelle : 25  
les feuilles supérieure et inférieure ont une configuration généralement rectangulaire, les structures de branche étant définies au niveau des coins de la palette et au niveau d'emplacements intermédiaires le long de chaque côté de la palette, pour définir ainsi une paire de passages pour chariot élévateur à fourche s'étendant dans le sens de la longueur de la palette, et une paire de passages pour chariot élévateur à fourche s'étendant dans le sens de la largeur de la palette. 30  
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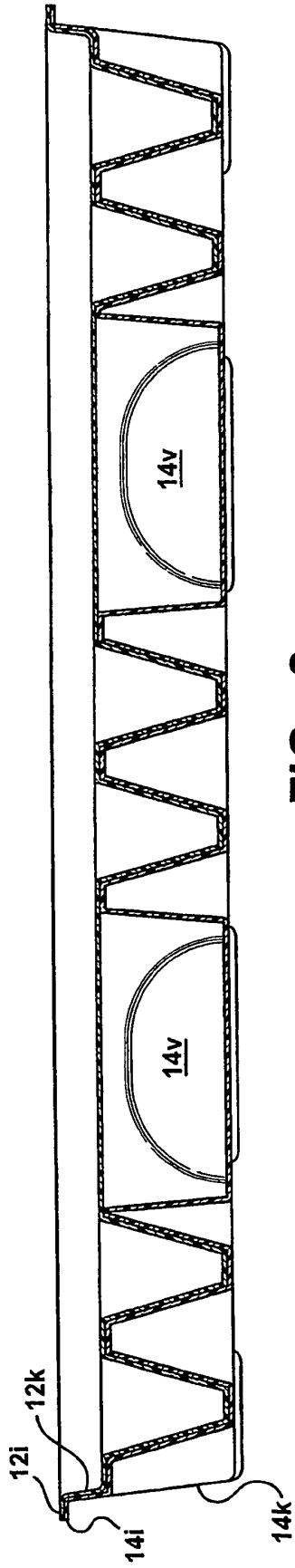


FIG - 2

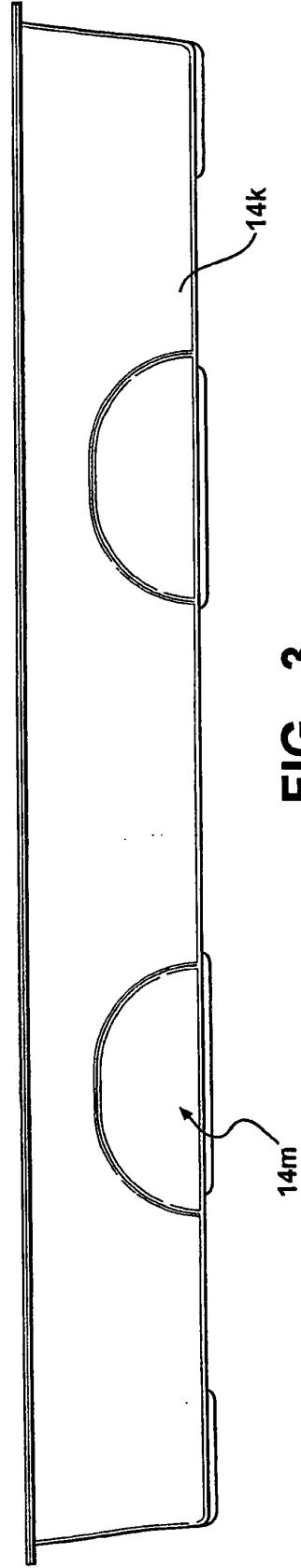
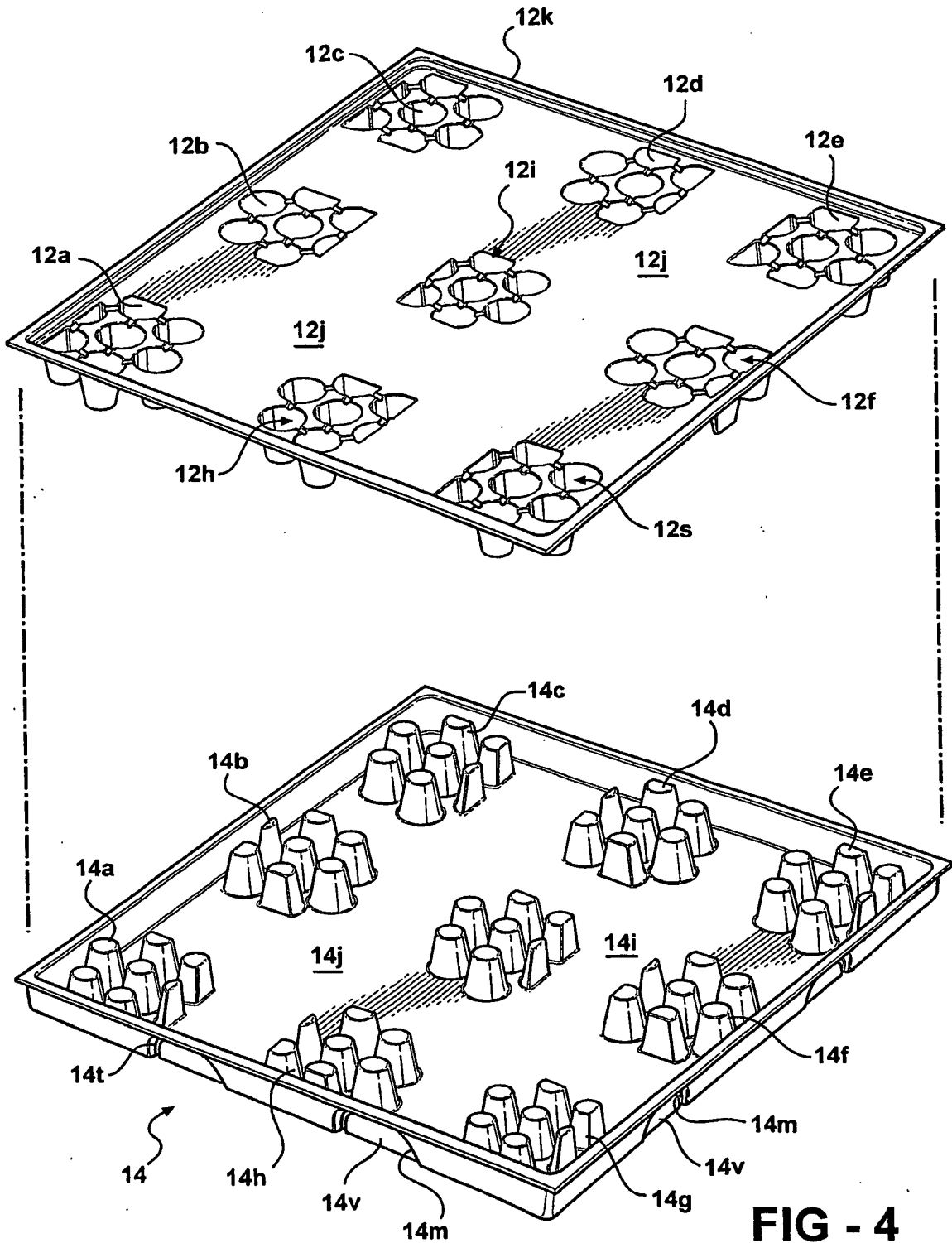
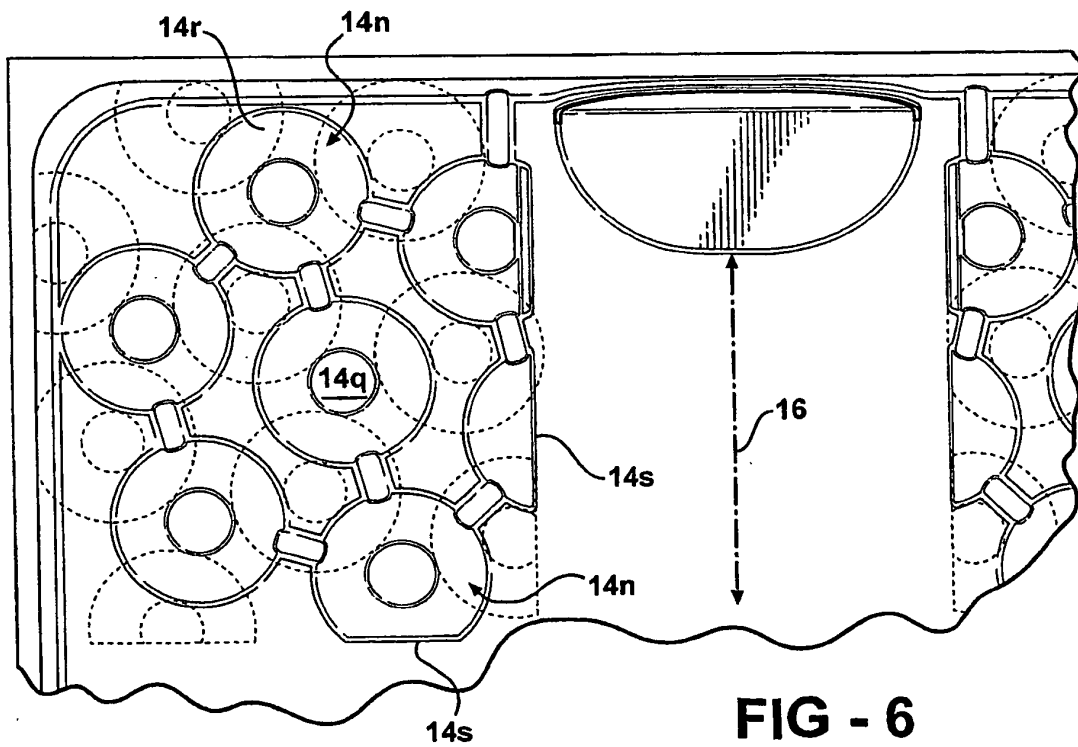
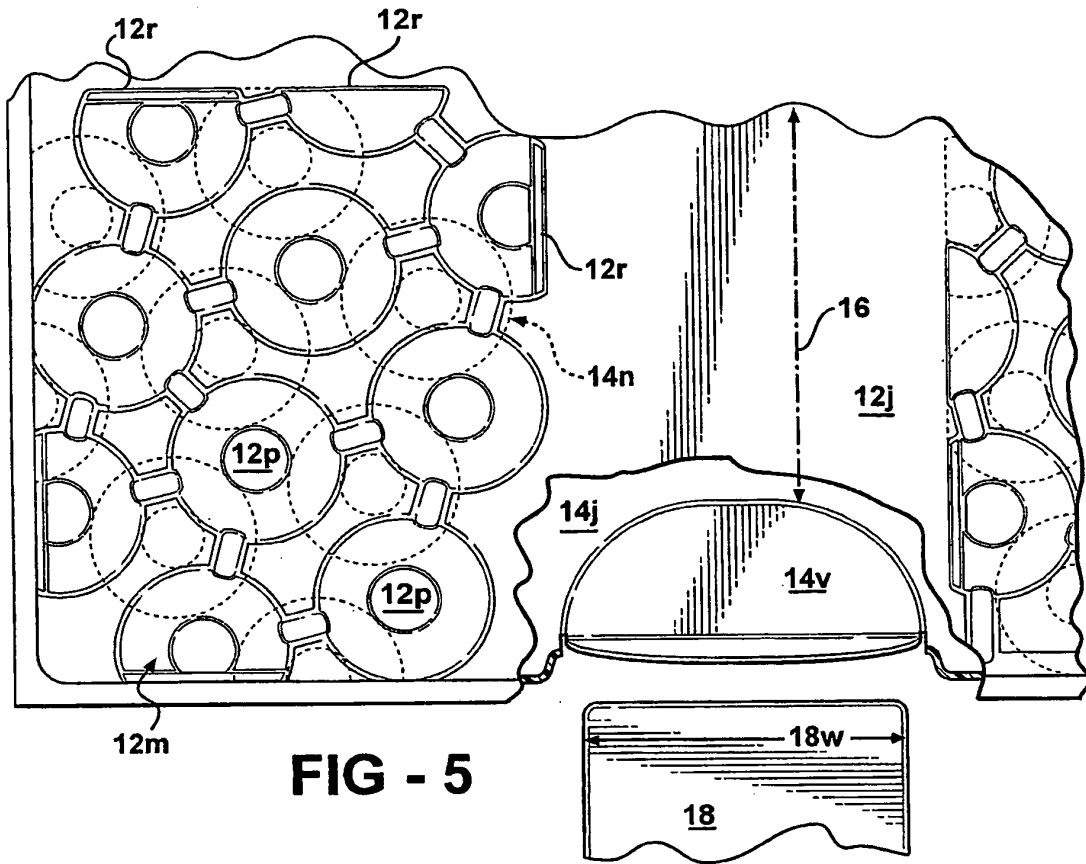
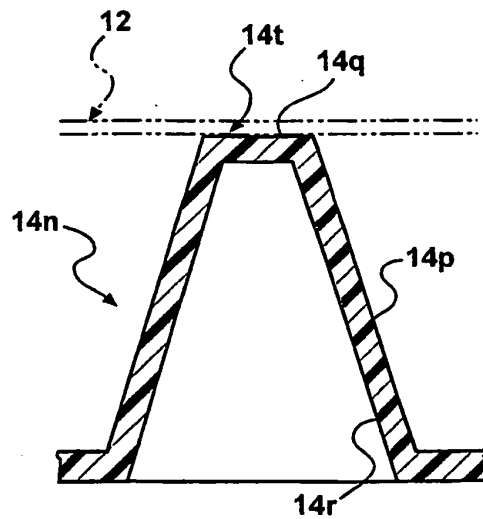
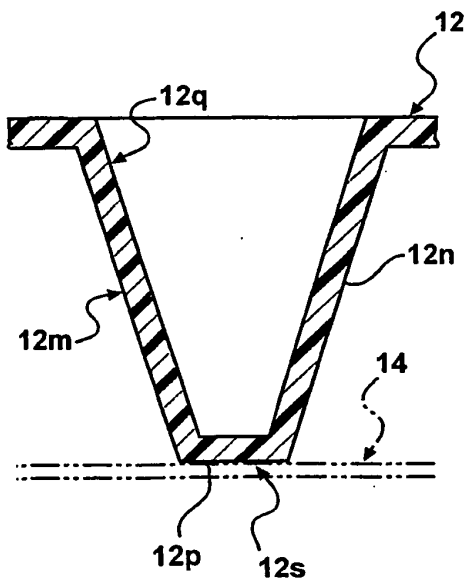
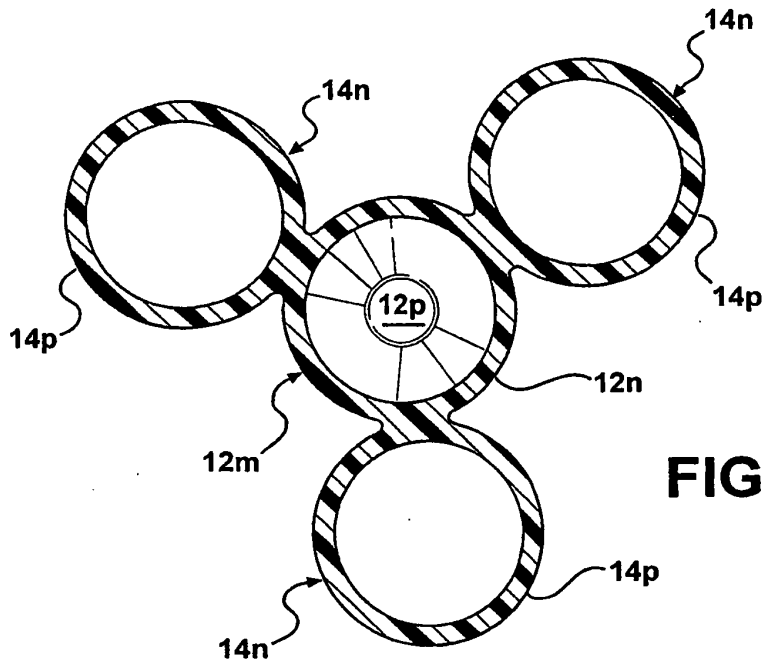


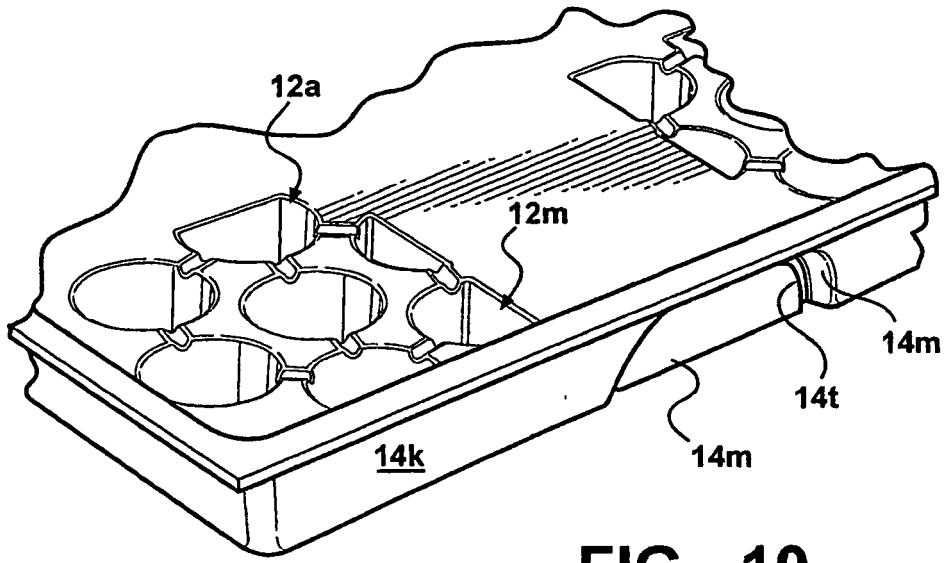
FIG - 3



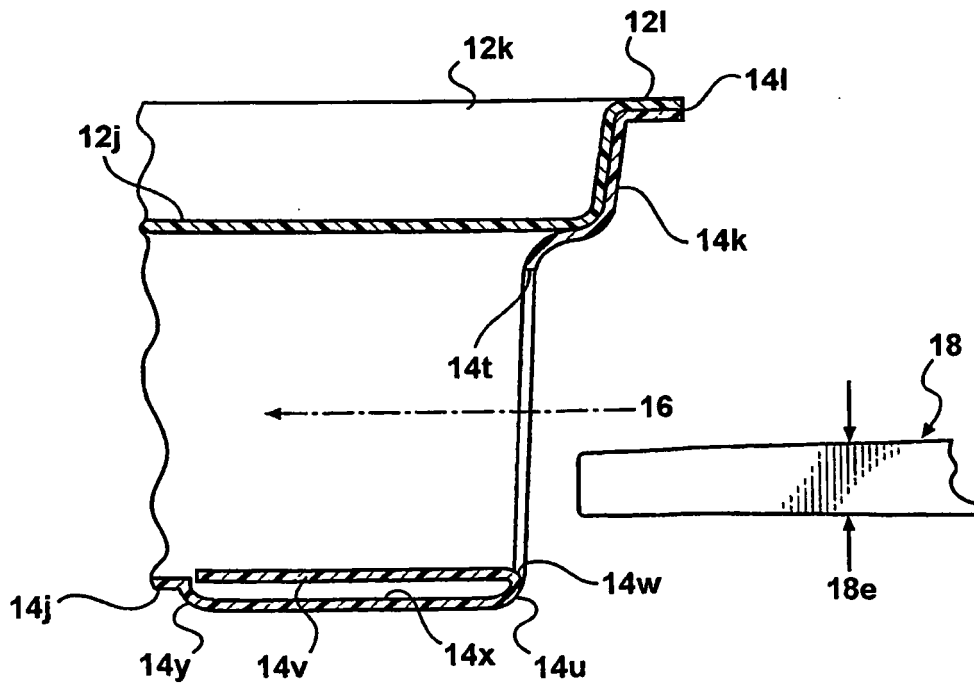








**FIG - 10**



**FIG - 11**

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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