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(54) **INTERLOCKING INTERFERENCE-FIT POST SYSTEM FOR INTERCONNECTING THERMOPLASTIC PLATFORMS**

(76) Inventors: **Mahyar Assadi**, Hinsdale, MA (US); **Lorene Erb Baccaro**, Dalton, MA (US)

Correspondence Address:
William F. Mufatti
GE Plastics
One Plastics Avenue
Pittsfield, MA 01201 (US)

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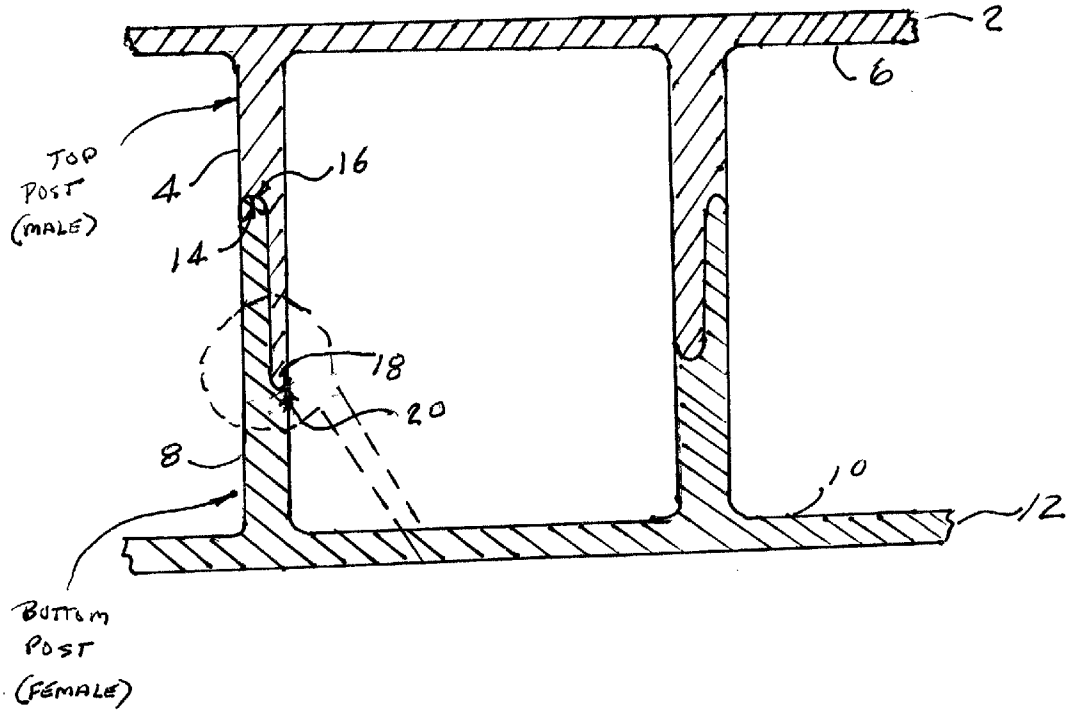
(57) **ABSTRACT**

A thermoplastic resin molded post system for joining two thermoplastic molded platforms by means of interference fitting a single cell post half protruding from the inner side of a top platform with a single cell post half protruding from the inner side of a bottom platform, each post half having walls asymmetrically stepped to create a male-female fitting when joined, each post half having a convex round at its free edge and a concave round where the wall is stepped wherein the convex round of the free edge and the concave round of the post half protruding from the underside of the top platform correspondingly engage the concave and the convex rounds of the protrusion form the inner side of the bottom platform.

Also, a thermoplastic resin molded pallet employing the interconnecting post system described above.



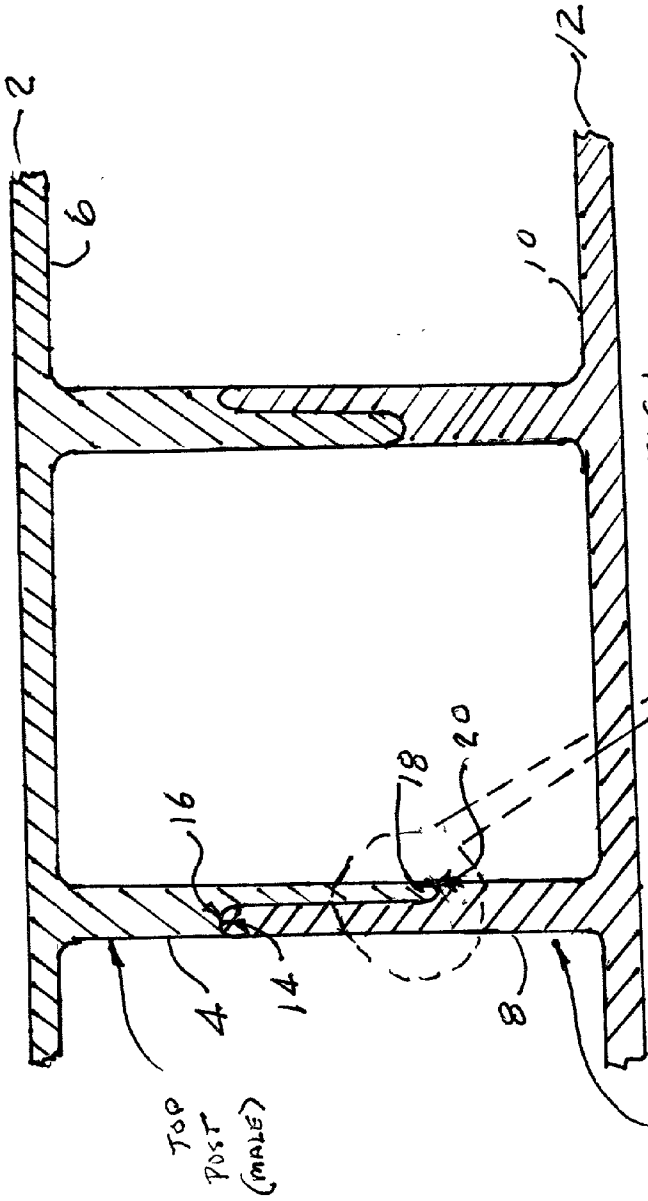


FIG. 1

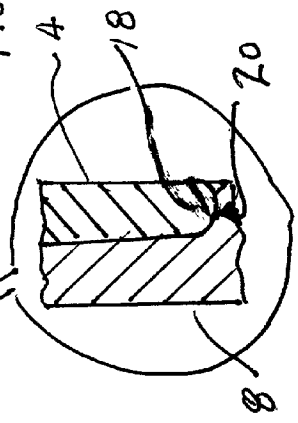
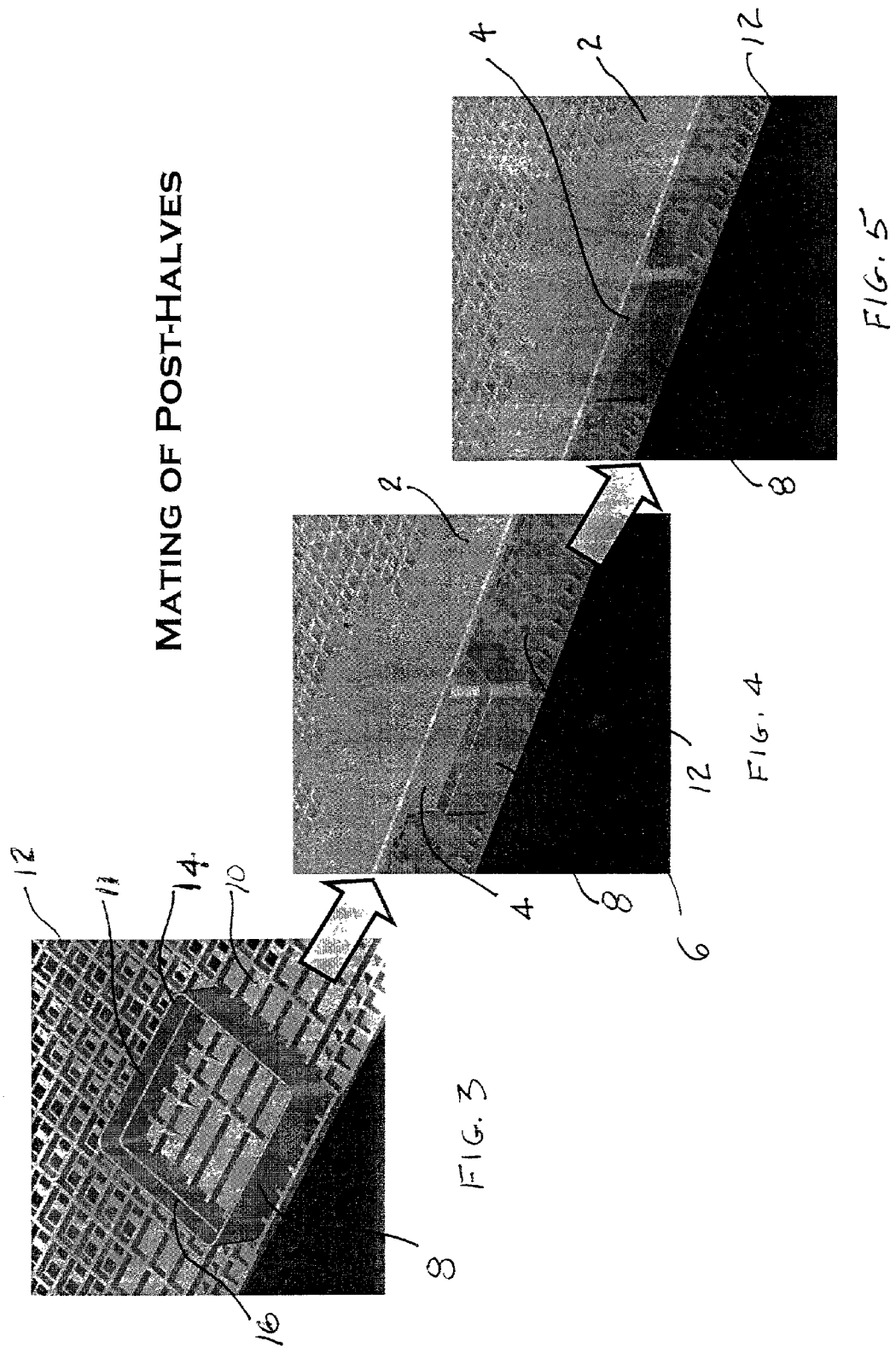


FIG 2


MATING OF POST-HALVES
12
11
14
10
16
8
FIG. 3
2
4
8
6
12
FIG. 4
4
2
12
8
FIG. 5

INTERLOCKING INTERFERENCE-FIT POST SYSTEM FOR INTERCONNECTING THERMOPLASTIC PLATFORMS

FIELD OF THE INVENTION

[0001] The instant invention is directed to an interference-fit post system for interconnecting multi-deck load carrying thermoplastic molded platforms such as pallets and containers. Because the interconnecting post system is an interference-fit post system, the system produces a fastener-free joint. In addition, the interconnecting post can be monolithically molded as part of the thermoplastic molded platform.

BACKGROUND OF THE INVENTION

[0002] Thermoplastic multi-deck load-carrying platforms are becoming increasingly popular since they are lightweight and can be molded by injection molding or vacuum forming. Wooden platforms or pallets require labor intensive assembly which takes time and is costly. Also, wooden platforms or pallets have low durability, can damage goods on the platforms, and are heavy often weighing more than a desired weight of 50 pounds.

[0003] However, molded thermoplastic platforms require interconnecting means to interconnect platforms to form a strong pallet or container. With structural thermoplastic platforms, rigidity is a critical factor since thermoplastic platforms can creep or deflect under load, particularly at elevated temperatures. Interconnecting thermoplastic platforms can involve external fastening means such as blocks or posts to form or interconnect the platforms. Further, in order to obtain rigidity and structural strength, the thermoplastic platform pallet is thickened and the weights thereof becomes significantly higher than a desired less than 50 pounds per pallet. Some designs have incorporated profile extruded rods or metal rod reinforcement to obtain structural strength and/or rigidity. These various reinforcements offset the cost of a thermoplastic pallet, can readily increase the cost of recycling the thermoplastic pallet and may adversely affect their weight.

SUMMARY OF THE INVENTION

[0004] In accordance with the present invention, there is provided a novel and improved interconnecting system for attachment of multi-deck load carrying thermoplastic molded platforms. The interconnecting system consists of interference-fitting posts each comprising two single-cell section post halves to create a male-female fitting. The two post halves are then aligned and pressed against each other to produce a fastener-free joint. Each post half is monolithically molded with a deck platform. As such, the rigidity of each platform and the assembled platforms is increased significantly.

[0005] The instant invention can be further understood from the following details and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] **FIG. 1** is a cutaway of post halves monolithically molded on the inner side of each thermoplastic molded platform.

[0007] **FIG. 2** is an enlarged section of the joined post halves of **FIG. 1**, depicting both the interference-fit at side walls and the interlocking feature at free edge of each post half.

[0008] **FIG. 3** is a schematic of the inner side of a thermoplastic molded platform with a post half extruding from the inner side thereof.

[0009] **FIG. 4** is a schematic of assembling of two platforms each with a post half molded on the inner side of each platform.

[0010] **FIG. 5** is a schematic of fully assembled post halves forming a single-cell closed-section interconnecting interference-fit post system interconnecting two thermoplastic molded platforms.

DETAILED DESCRIPTION OF THE INVENTION

[0011] The invention herein described can be used with any thermoplastic molded load-carrying platform for joining two platforms together to form a pallet or container without the need for fasteners. Each platform has an outer and an inner side. The joining of the two platforms is by means of an interlocking interference fit post system. The system comprises two single-cell closed sections that join to form a single rigidly connected post. Each half post is a protrusion from the inner side of a thermoplastic molded platform wherein the protrusion is monolithically molded with the platform as a single unit. Each protrusion is stepped. The end of each half post protrusion is convex round along the free edge thereof and concave round where the wall is stepped, which concave round receives the convex round of an opposite protrusion on the underside of an opposing platform. The post halves of opposing platforms are then aligned and pressed against each other creating a male-female fitting. The resulting post interconnects two platforms to produce a fastener-free joint. With rectangular or square shaped thermoplastic molded platforms, at least four (4) such posts should be used i.e., at least one at each corner. The novel post system of this invention increases rigidity of the entire structure and is capable of resisting bending, shear, compression and tension loads under externally applied loading.

[0012] The following description of the drawings will illustrate the instant novel interference-fit post system of the invention. Referring to **FIG. 1** which is a cutaway of the interconnecting post, upper thermoplastic molded platform **2** has molded therewith a half post protrusion section **4** from inner side **6** of platform **2** which interference fits with half-post protrusion **8** from inner side **10** of thermoplastic molded platform **12**. The convex round free edge **14** of protrusion edge **8** fits into concave round **16** of protrusion **8**. Conversely, convex round **18** of protrusion **4** fits into concave round **20** at the stepped point of protrusion **4**. The male post protrusion **4** fits over female post protrusion **8**. Each protrusion is drafted inwardly i.e. toward the center of the protrusion to further enhance interference-fit of the protrusion.

[0013] **FIG. 2** is an enlarged cutaway illustrating the fit of the convex round free end **18** of protrusion **4** and concave round **20** of protrusion **8**.

[0014] **FIG. 3** illustrates the underside **10** of platform **12** with a female half post protrusion **8** illustrating convex round **14** along its free edge and concave round **16** where wall **1** is stepped.

[0015] **FIG. 4** illustrates the assembling of platform **2** with protrusion post **4** from inner side **6** of platform **2** ready to engage with protrusion half post **8** from the inner side **10** of platform **12**.

[0016] **FIG. 5** illustrates the assembled platform **2** and platform **12** with protrusion post **4** engaging protrusion post **8** in a fully interference-fit locked position.

[0017] As disclosed previously, an important feature of the instant invention is the interconnecting post system for joining two platforms together to form a pallet or a base for a container. The novel feature of the invention lies in the interference-fit and interlock details which produce a strong sealed fastener free joint. The interlocking action of the convex and concave rounds of each post half combined with the relatively large contact pressures and friction forces at the contacting interface between the post halves when joined yield a connection that is capable of resisting bending by increasing rigidity, shear, compression and tension loads. As such, pallets employing the interconnecting system of this invention can sustain large imposed loads even at elevated temperatures. Further, the protrusion posts halves can be monolithically molded with the platform so as to provide a single molded part without the need for separately providing posts to join two platforms. When the posts are joined by interference fit, they are essentially water tight allowing them to be used in hygienic applications wherein cavities must be sealed from ingress of fluid and dirt.

[0018] The wall of the protrusion posts have a slight taper which enhances a tight fit. The taper may be usually a 0.5 degree taper or whatever is designed. A 0.5 degree taper is preferred. In other words, each post half has drafted walls that are asymmetrically stepped so as to create a male-female fitting. Generally the protrusion post of the inner side of the top platform is considered as the male component and the protrusion post form the inside surface of the bottom platform is considered as the female component. Obviously, the male-female fitting can be reversed, even for each instance of this interconnect design within the same product or application.

[0019] The platforms and post halves are preferably molded of a thermoplastic resin and may be injection molded, or if not an intricate design, may be vacuum formed from sheet plastic. Depending on the ultimate application, the platforms and attending posts may be molded from any thermoplastic resin that is injection moldable. Such thermoplastics include aromatic carbonate polymers, generally synthesized from bisphenol-A and a carbonyl chloride, copolymers of a polycarbonate and another polymer co-polymerized therewith, aryl polyesters such as polybutylene terephthalate, polyethylene terephthate, and the like, polysulfones, acrylates such as polyethyl methacrylates, polymethyl methacrylates and such other acrylates, blends thereof with other polymers and blends thereof with other ingredients such as fillers, reinforcing fillers and the like such as glass fibers, carbon fibers, mineral fillers, flame retardant, heat and light stabilizers, and the like. Preferably, the thermoplastic is a carbonate homo-polymer or copolymer or a polyphenylene ether or a polyphenylene ether in combination with another polymer such as a styrene polymer.

[0020] An assembled unit may consist of at least two platforms with at least four interconnecting posts, one at each corner, or may have more than four posts or may have a combination of the interconnecting posts of this invention and an other types of interconnecting or support posts.

[0021] Although the invention has been described by reference to particular illustration embodiments thereof, many variations and modifications of this invention may become apparent to those skilled in the art without departing from the spirit and scope of this invention as set forth in the appended claims hereto.

What is claimed is:

1. A thermoplastic molded post system for interconnecting two thermoplastic molded platforms consisting of a top platform having an outer side and an inner side and a bottom platform having an outer side and an inner side by means of a fastener-free interference-fit of two single cell thermoplastic post halves, one half of which protrudes downward from the inner side of the top platform and the other half protrudes upwards from the inner side of the bottom platform, each post half having drafted walls asymmetrically stepped to create a male-female fitting when joined with each free edge of said post half having a convex round and concave round where the wall is stepped wherein the convex round of the free edge and the concave round of the post half protruding from the inner side of the top platform engage the concave and the convex rounds, respectively, of the protrusion from the inner side of the bottom platform.

2. The thermoplastic molded post system of claim 1 where in each said post half is monolithically molded with the thermoplastic platform.

3. The thermoplastic molded post system of claim 1 wherein the walls of each post half protrusion has walls drafted to enhance interference-fit.

4. The thermoplastic post system of claim 1 wherein the thermoplastic employed is an aromatic polycarbonate.

5. The thermoplastic post system of claim 1 wherein the thermoplastic employed is a polyester carbonate polymers.

6. The thermoplastic post system of claim 1 wherein the thermoplastic employed is an aromatic polycarbonate in combination with at least one other thermoplastic polymer.

7. The thermoplastic post system of claim 1 wherein the thermoplastic resin has in combination a reinforcing filler.

8. The thermoplastic post system of claim 7 wherein the reinforcing filler is selected from the group consisting of glass fibers, carbon fibers and mineral reinforcing fillers.

9. A multi deck load carrying thermoplastic structure comprised of a top and a bottom thermoplastic platform interconnected by interference fit with the post system of claim 1, said load carrying multi-deck thermoplastic structure has increased rigidity and resists bending, shear, compression and tension under externally applied loading.

10. The load carrying multi-deck thermoplastic structure of claim 9 wherein the thermoplastic is an aromatic polycarbonate.

11. The load carrying multi-deck thermoplastic structure of claim 9 wherein the thermoplastic is a polyester carbonate polymer.

12. The load carrying multi-deck thermoplastic structure of claim 7 wherein the thermoplastic is aromatic polycarbonate in combination with at least on other thermoplastic polymer.

13. The load carrying multi-deck thermoplastic of claim 9 wherein the thermoplastic resin has in combination a reinforcing filler selected from the group consisting of glass fibers, carbon fibers, mineral reinforcing fillers, and mixtures thereof.

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