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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
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Act. 412 REPOSPRESRECU Folios: 107

Trámite 2 Evento 1 Actuación 412

RECURSO DE REPOSICIÓN

Referencia	:	Expediente No. 11.050303
Asunto	:	SOLICITUD DE PATENTE DE INVENCION "ESTIBA CON COLUMNAS Y CUBIERTAS REFORZADAS PARA PREVENIR LA DEFORMACIÓN POR IMPACTO MECÁNICO"
Solicitante	:	REHRIG PACIFIC COMPANY
Opositor	:	SCHOELLER ARCA SYSTEMS GMBH

1. Yo, Germán Marín Ruales, en mi calidad de apoderado de la sociedad **SCHOELLER ARCA SYSTEMS GMBH**, domiciliada en Sacktannen 1, 19057-Schwerin, Alemania, respetuosamente me dirijo a usted con el fin de interponer RECURSO DE REPOSICIÓN contra la Resolución No. 13036 de fecha 28 de febrero de 2014, notificada por Listado Único de Notificaciones de Propiedad Industrial No. 009 del 04 de marzo de 2014, con el propósito de que se revoque la mencionada resolución:

2. **PETICIONES**

2.1. Que se revoque la Resolución No. 13036 de fecha 28 de febrero de 2014, y en su lugar, se declare fundada la oposición radicada por la sociedad SCHOELLER ARCA SYSTEMS GMBH;

2.2. Que como resultado de la anterior petición, se niegue el derecho de patente para la totalidad de las reivindicaciones de la solicitud No. 11.050303 titulada "Estiba con columnas y cubiertas reforzadas para prevenir la deformación por impacto mecánico".

3. FUNDAMENTOS DEL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO

El Superintendente de Industria y Comercio considera que las reivindicaciones 1 a 16 presentadas junto con la respuesta al examen de patentabilidad de fecha 21 de enero de 2014, cumplen los requisitos trazados en el artículo 14 de la Decisión 486, y en consecuencia, otorga el derecho de patente para la invención solicitada.

El Superintendente de Industria y Comercio fundamenta su decisión en las siguientes consideraciones:

> *"Frente a la oposición presentada la solicitante argumenta que se realizaron modificaciones en las reivindicaciones, en todo el transcurso del trámite de esta para poder diferenciar, de manera clara, la materia que se deseaba proteger frente a los artes previos citados por la sociedad Opositora y el Examinador de esta Superintendencia, y que, para desvirtuar la afirmación hecha por la Opositora, al decir que hay características que son puramente de construcción, fue mejorada la redacción del pliego reivindicatorio.*
>
> *Analizadas las razones anteriormente expuestas, se concluye que a pesar de que la sociedad opositora entregó documentos del mismo sector tecnológico, dichas publicaciones no incluyeron las características concernientes a un canal (38) provisto por al menos una de las columnas y una barra de refuerzo (30) recibida en el canal (38), lo cual surte el efecto de aumentar la resistencia frente al impacto recibido por los dientes de los montacargas en el proceso de acople de la estiba a ellos y posterior izamiento.*
>
> *Cabe mencionar que las figuras del documento D3 presentado por el opositor, sólo permiten apreciar la ubicación de canales en la cubierta y no en las columnas, cuyos componentes proporcionan el soporte vertical de la estiba y que gracias a dichas barras de refuerzo disminuyen la deformación de las mismas frente al riesgo de impacto de los dientes de los montacargas.*
>
> *Asimismo, es de resaltar que la materia reclamada, en la presente solicitud, se diferencia de lo divulgado en el documento D5 en que el patrón de panal de las costillas se encuentra restringido únicamente a la porción periférica de la cubierta, y en que, en la porción central de la cubierta, las costillas no están en un patrón de panal, lo cual le proporciona una mayor resistencia localizada en los sitios de alta probabilidad de impacto de los dientes de los montacargas, proporcionando una solución que prevé la deformación de la estiba, y en consecuencia, la materia reclamada en el capítulo reivindicatorio allegado si posee nivel inventivo.*

En conclusión y de acuerdo con lo expuesto anteriormente, considera esta Superintendencia que los argumentos presentados por la sociedad opositora no se encuentran fundados, por lo mismo, no prosperan frente a la solicitud que aquí se analiza, como elementos que permitan desvirtuar su patentabilidad."

4. FUNDAMENTO DEL RECURSO

4.1. Objeto de la invención.

La solicitud de patente de invención bajo estudio se relaciona con una estiba que comprende una parte superior que tiene una plataforma superior; una parte inferior y una pluralidad de columnas formadas entre la plataforma superior y la parte inferior.

4.2. Requisitos de patentabilidad.

La Decisión 486 establece en su Artículo 14 que se otorgarán patentes para "*las invenciones, sean de producto o de procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial.*"

Por lo tanto, para que una invención pueda ostentar el título de patente requiere cumplir con los siguientes requisitos: Novedad, nivel inventivo y aplicación industrial. Ante la falta de uno de estos requisitos la invención no podrá obtener el título de patente.

Contrario a lo que se concluye en la Resolución 13036, la invención desarrollada por Rehrig Pacific Company no cumple con el requisito de nivel inventivo, tal y como se demostrará a continuación.

4.3. Estado de la técnica.

La fecha de prioridad de la solicitud de patente de Rehrig Pacific Company es 22 de abril de 2010.

Antes de la fecha de prioridad del 22 de abril de 2010, se encontraron las siguientes publicaciones que afectan el nivel inventivo de la solicitud de patente No. 11.050303:

a. D1. Publicación de patente MX 2008/005625 de fecha 02 de marzo de 2009, solicitante: SCHOELLER ARCA SYSTEMS GMBH, titulada: "Tarima formada por múltiples piezas".

b. D2. Publicación de patente US2003/0061974 de fecha 03 de abril de 2003, solicitante: REHRIG PACIFIC CO, titulada: "Pallet".

c. D3. Publicación de patente US2008/236454 de fecha 02 de octubre de 2008, solicitante: CHEP TECHNOLOGY PTY LTD, titulada: "Plastic pallet with sleeved reinforcing rods and associated method for making the same".

d. D4. Publicación de patente US2008/0141912 de fecha 19 de junio de 2008, solicitante/inventor: VALENTINSSON ANDERS L, titulada: "Transport Pallet".

Además, el Examinador de patentes encontró los siguientes documentos que también afectan el nivel inventivo de la invención de Rehrig Pacific Company:

e. D5. Publicación de patente US6508182 de fecha 21 de enero de 2003, solicitante: Vicfam Plastics Pty Ltd., titulada: "Plastics pallets and moulding apparatus for producing plastics pallets and other plastics articles".

f. D6. Publicación de patente US2008/017081 de fecha 24 de enero de 2008, solicitante: Rehrig Pacific Co., titulada: "Pallet assembly".

4.4. **Las reivindicaciones 1 a 16 de la patente otorgada por Resolución 13036 no cuentan con nivel inventivo debido a las divulgaciones hechas en los documentos de patente D1 a D6.**

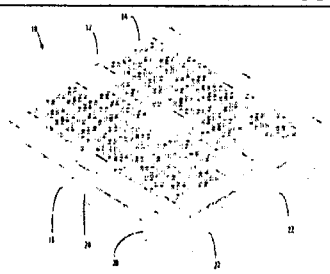
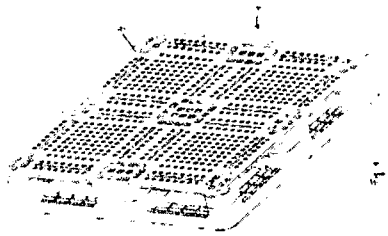
El artículo 18 establece:

"Artículo 18.- Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, ***esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica****."* (Resaltado fuera de texto).

La publicación de patente D1 divulga una tarima (1) que comprende una parte superior (3) que tiene una superficie de carga (4) y está unida con cuando menos una pieza inferior (2) y una pluralidad de columnas formadas entre la parte superior y la pieza inferior (ver figura 1).

Cada una de la pluralidad de columnas incluye una porción de columna interior formada integralmente con la porción superior y la porción inferior; y una porción de columna exterior formada integralmente con la otra porción superior y la porción inferior, en donde las porciones de columna interiores se reciben dentro de las porciones de columna exteriores (ver página 2, líneas 12 a 25; página 7, líneas 20 a 25 y pagina 8, líneas 9 a 13, así como las figuras 1 a 7).

Si se comparan las figuras aportadas por cada uno de los documentos estudiados tenemos:

Patente colombiana No. 11.050303	D1. MX 2008005625
 FIGURE 1	

Todas las características de la estiba de la patente de Rehrig Pacific Company se derivan de manera obvia de las enseñanzas suministradas por publicación MX 2008005625. De esta manera, el objeto reclamado en la reivindicación 1 de la patente No. 11-050303, y sus reivindicaciones dependientes, no cuenta con nivel inventivo frente a lo divulgado por D1.

De igual manera, el documento D2 muestra la plataforma con las mismas características que reclama la patente otorgada a Rehrig Pacific Company en su reivindicación 1 y siguientes, cuando revela una plataforma que incluye una superficie superior e inferior espaciadas, que además cuenta con una pluralidad de soportes que se proyectan de la parte inferior a la parte superior (ver parágrafo [0009] y [0010]).

Adicionalmente, el documento D3 en el parágrafo [0010] y [0011] divulga una plataforma con una pluralidad de segundos miembros de unión que se pueden proyectar hacia arriba de la plataforma inferior, con cada segundo miembro de unión incluyendo una manga interior; y en la última frase en el párrafo [0033] se muestra que la plataforma de este documento D3 cuenta con bloques (18) de soporte para las partes superior e inferior. Las figuras 1, 3, 4 y 7 también son evidencia de que el objeto de la patente de Rehrig Pacific Company no cuenta con nivel inventivo debido a las divulgaciones contenidas en el estado de la técnica.

Con respecto a la reivindicación 2 que se refiere a que las partes de columna interna incluyen cada una pluralidad de partes sobresalientes que se desfasan hacia adentro desde una periferia de la parte de columna interna para formar un hombro alrededor de la periferia de un borde superior de la parte de columna interna. Esta característica de la reivindicación 2 ya había sido divulgada en el documento D1 en las figuras 2 a 6, en el documento D2 en las figuras 7, 9, 9a y 10 y en el documento D3 en la figura 4.

Así mismo, la reivindicación 3 protege que la estiba (10) incluye adicionalmente por lo menos una barra (30) de refuerzo recibida en el canal (38); siendo esta característica derivable de una manera obvia, a partir de lo que se divulga en el documento D3 cuando establece que la plataforma de dicho documento cuenta con elementos de refuerzo como los refuerzos de Rehrig Pacific Company (ver parágrafo [0005]) y en las primeras líneas del parágrafo [0049], del mismo documento D3, se muestra la manera de mejorar la durabilidad de la plataforma por medio de insertar barras de refuerzo y en la figura 8 del documento D3 también se puede comprobar que la materia objeto de la reivindicación 3 no cumple con nivel inventivo.

De igual manera, el documento D4 enseña el uso de perfiles rígidos los cuales se posicionan dentro del perfil receptor (ver parágrafo [0052], líneas 6 a 11 y 17 a 22, también ver las figuras 3 y 18) lo cual también permite derivar de manera obvia la barra (30) de refuerzo de la patente de Rehrig Pacific Company.

La característica contenida en la reivindicación 4 dirigida a que las barras de refuerzo (30) son recibidas en los canales (38), también es obvia para una persona experta en la materia con fundamento en las figuras 23 y 24 del documento D4 y la figura 8 del documento D3.

En el documento D4 se puede observar que se forman canales para los miembros de refuerzo 107a y 107b. Así, la persona experta en la materia técnica podría partir de las enseñanzas de D4 para formar los canales en las porciones de la columna externa cuando usa los miembros de refuerzo de D4 en una plataforma de acuerdo con cualquiera de los documentos D1 o D2.

El documento D6 también anticipa las características protegidas para la estiba de Rehrig Pacific Company por cuanto divulga un conjunto de estiba que incluye una cubierta superior y una pluralidad de soportes que se extienden hacia abajo desde el piso superior. Una tapa está fijada en frente de al menos uno de los soportes para proteger el soporte. La tapa puede estar formada de un material diferente del soporte, tal como una de mayor densidad, el material es más duro o más rígido sin incrementar el costo de los materiales para los soportes y la cubierta.

Las características contenidas en las reivindicaciones 5 a 6 son características puramente de construcción que son obvias para una persona versada en esta materia técnica y que pudo haberlas desarrollado basándose en su conocimiento general sobre el tema.

La característica contenida en la reivindicación 7 referida a los rieles (22) de la estiba, se muestra previamente en el documento D1 en la figura 2, en el documento D2 en la figura 7 y 9 y en el documento D3 en la figura 4.

Con respecto a las características adicionales que se reclaman en las reivindicaciones 8 a 10, estas constituyen características de construcción

básicas que pueden haber sido desarrolladas de manera evidente por una persona con conocimientos en el campo de construcción de plataformas para transporte como la estiba de la invención.

Finalmente, las características contenidas en las 11 a 16 para la estiba según la invención se pudieron haber derivado de manera evidente de los documentos D1 a D6 citados anteriormente.

4.5. **La característica señalada como inventiva en la Resolución 13036 dirigida a un canal (38) proporcionado por al menos una de las columnas y una barra de refuerzo (30) recibido en el canal (38), no es inventiva.**

El Examinador considera que en las publicaciones aportadas por el opositor no se incluye la característica concerniente a un canal (38) provisto por al menos una de las columnas y una barra de refuerzo (30) recibida en el canal (38), lo cual surte el efecto de aumentar la resistencia frente al impacto recibido por los dientes de los montacargas en el proceso de acople de la estiba a ellos.

Contrario a lo que concluye el Examinador, esta característica ya se había incluido en la plataforma de carga del documento US2008/0236454 (D3) como se puede ver en la figura 8 de esta publicación:

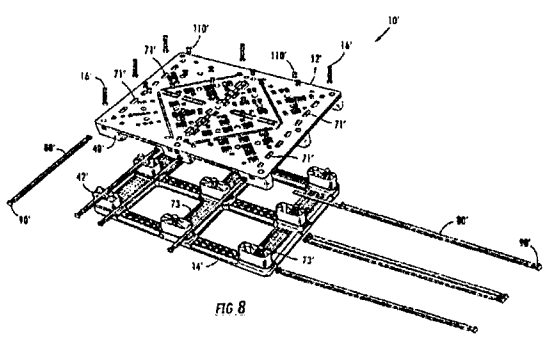


FIG.8

En este documento US2008/0236454 (D3), el párrafo [0049], se afirma lo siguiente:

> *"[0049] Otro aspecto se dirige a la mejora de la durabilidad de la paleta. Esto se logra mediante la inserción de varillas de refuerzo de manga 80' en los moldes superior y/o inferior de la bandeja de carga 10' para las cubiertas superiores y/o inferiores respectivas 12', 14'. Como apreciarán fácilmente los expertos en la técnica, la manga varillas de refuerzo 80 'se moldea de inserción".*

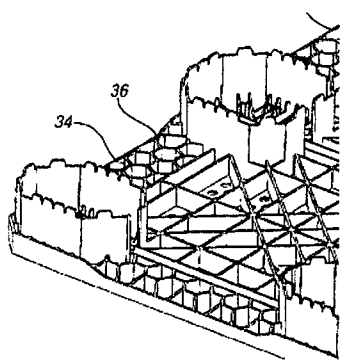
Por lo tanto, ya estaba previsto que la inserción de varillas o barras de refuerzo (como se nombran en la patente de Rehrig Pacific Company), daría mayor durabilidad a la estiba. La única diferencia es que las barras de refuerzo están

en los canales (38) en el caso bajo estudio, y en el documento D3 las barras de refuerzo están en las cubiertas superiores y/o inferiores, pero esta diferencia en la posición de las mismas no le otorga actividad inventiva a la invención de Rehrig Pacific Company.

4.6. **En relación con el patrón de panal que se reclama por la invención de Rehrig Pacific Company y que se considera que tiene nivel inventivo por parte del Examinador, es claro que esta característica es derivable de manera obvia a partir de las enseñanzas del documento D5.**

La Resolución 13036 señala que el patrón de panal de las costillas se encuentra restringido únicamente a la porción periférica de la cubierta, en el documento D5 y por lo tanto, esta configuración de panal si tiene nivel inventivo en el caso de Rehrig Pacific Company. Sin embrago, el opositor considera que esta característica del patrón de panal no cumple con nivel inventivo por cuanto esta característica era derivable de las enseñanzas contenidas en la publicación D5.

La configuración de panal evaluada en este punto se refiere a la configuración que se puede apreciar en la figura 7 de la invención de Rehrig Pacific Company así:



Sección de la figura 7 de 11.050303

El documento US6508182 (D5) divulga una estiba de construcción por moldeo que comprende una superficie de soporte de carga soportado por la estructura de soporte subyacente configurado para permitir la inserción de los dientes del tenedor de elevación, la superficie de soporte de carga está reforzada en su parte inferior por una **estructura de refuerzo celular** que comprende células de los ejes que se extienden perpendicularmente a la superficie de soporte de carga.

Por lo tanto, considero que esta característica del refuerzo por medio de una configuración de panal de abeja es derivable de las enseñanzas previstas en el documento D5 cuando en la columna 1, líneas 27 a 39 de dicho documento se divulga lo siguiente:

"Sin embargo, a fin de lograr una rigidez adecuada de la estructura general se propone reforzar la plataforma de carga por medio de moldear una multiplicidad de mallas que se cruzan en la parte inferior de la plataforma de transporte de carga en donde las costillas se intersectan para definir una estructura celular con las células distribuidas a lo largo de las partes expuestas de la parte inferior o por lo menos en aquellas partes sometidas a carga máxima. Por ejemplo, la estructura celular puede ser en forma de panal de abeja o, alternativamente, las células pueden ser de forma rectangular o de diamante. En cada caso, el eje de cada célula individual se extiende perpendicularmente al plano de la superficie de carga de transporte y cada célula estará abierta en su parte inferior."

En consecuencia, en la técnica anterior ya se prevé que con el fin de reforzar la estiba se puede tener una estructura de panal de abeja en la superficie inferior de la estiba con el fin de reforzarla. El hecho de que Rehrig Pacific Company decidió usar este patrón sólo en la sección periférica de las cubiertas, no le concede actividad inventiva a la estiba.

La Guía de Patentes desarrollada por la Superintendencia de Industria y Comercio -SIC- ofrece una definición más concreta sobre el termino obvio que se utiliza para definir el requisito de nivel inventivo: "*El término "obvio" significa que algo no va más allá del progreso de la tecnología, **sino que sigue simplemente o de forma lógica el progreso normal de la técnica**, por ejemplo, algo que no implica el ejercicio de ninguna habilidad más allá de la que se esperaría de la persona del oficio normalmente versada en la materia.*" (Subrayado fuera de texto).

Es decir, incluir la configuración de tipo panal de abeja en una sección de la parte inferior de la estiba, no implica el ejercicio de ninguna habilidad más allá de la que se esperaría de la persona del oficio normalmente versada en la materia sobre todo cuando el documento D5 ya había divulgado que este tipo de configuración le brinda refuerzo adicional a las estibas.

En esta misma línea de análisis, con las divulgaciones de D1 a D6 que se adjuntan a este escrito, y los conocimientos medios de una persona versada en la materia técnica de la fabricación de estibas y plataformas, era posible llegar de una manera **obvia** a desarrollar la estiba de Rehrig Pacific Company contenida en la patente No. 11.050303, por lo que las reivindicaciones otorgadas a Rehrig Pacific Company no cumplen con el requisito de nivel inventivo.

Es así como se ha demostrado que ninguna de las reivindicaciones 1 al 16 contenidas en el capítulo reivindicatorio de la presente solicitud podría ser patentable a la luz de la Decisión 486 -Régimen Común sobre Propiedad Industrial-.

5. NOTIFICACIONES

El suscrito recibirá notificaciones en la Superintendencia de Industria y Comercio o en mi oficina de abogado ubicada en la Carrera 13 A No. 89-38 Oficina 328 de esta ciudad.

Del Despacho,

Señor Superintendente de Industria y Comercio,

GERMAN MARIN RUALES
T.P.A. No. 64239

D711
(Ver. ant.
P 87437 MX)

TARIMA FORMADA POR MÚLTIPLES PIEZAS

CAMPO DE LA INVENCIÓN

La invención se refiere a una tarima de material sintético formada por múltiples partes con una superficie de carga y una superficie de apoyo de acuerdo con las características de la idea general de la reivindicación 1.

ANTECEDENTES DE LA INVENCIÓN

Las tarimas, por ejemplo las tarimas Europool, se utilizan en diferentes aplicaciones para el transporte y el apilamiento de artículos. Además de las tarimas de madera cada vez se utilizan más las tarimas de material sintético, el cual es mucho más fácil de limpiar y con una mayor rigidez y resistencia a la deformación, presentan un peso reducido. Por el estado de la técnica se conocen tarimas las cuales presentan una parte superior, una parte de marco y una parte de fondo, que en un proceso de soldadura de material sintético se unen permanentemente entre sí por adherencia de materiales.

Aquí lo desventajoso es que la soldadura de las partes individuales representa una etapa de trabajo complicada.

SUMARIO DE LA INVENCIÓN

La tarea de la presente invención es producir una tarima de material sintético formada por varias piezas, que por un lado presente estabilidad y resistencia a la deformación, así como una elevada capacidad de carga y además que pueda producirse con un reducido gasto.

Esta tarea se resuelve de acuerdo con la invención por medio de una tarima de material sintético de acuerdo con la reivindicación 1. Las modalidades preferidas y ventajosas son objeto de las reivindicaciones dependientes.

La tarima de acuerdo con la invención incluye una parte superior y cuando menos una parte inferior unida por acoplamiento de forma. Preferentemente se realiza la unión de las partes exclusivamente a través de ese acoplamiento de forma. En especial las partes están unidas permanentemente entre sí, esto es que no pueden separarse. Esto es las piezas que se van a unir se fijan entre sí esencialmente sin el uso de adhesivos, soldadura, tornillos o similares. Así puede omitirse esa etapa del proceso, con lo cual se ahorra trabajo de producción y costos.

Unido por acoplamiento de forma en el sentido de esta solicitud se refiere a que cuando menos se proveen dos piezas que se unen entre sí debido a su conformación geométrica (formación), evitando la separación de la unión.

De acuerdo con otra modalidad especialmente preferida se prevé que el acoplamiento de forma se logra por medio de protuberancias de fijación (clips de fijación) provistas en la parte inferior y/o en la parte superior, que colaboran con elementos de fijación correspondientes provistos en la parte superior y/o inferior, formando en conjunto una unión de enclavamiento o sujeción por su acoplamiento de formas.

Otra modalidad prevé que las protuberancias de fijación estén conformados como miembros de fijación en forma de pasarela que se extienden esencialmente de forma paralela a la superficie de carga o a la superficie de soporte de la tarima de acuerdo con la invención. Esto incluye el caso de que los miembros de fijación en forma de pasarelas presenten en su extremo libre una protuberancia en forma de aleta.

De acuerdo con una modalidad especialmente ventajosa, los elementos de acoplamiento que colaboran con los miembros de acoplamiento están rodeados, cuando menos por un lado, por una nervadura de refuerzo que al mismo tiempo funciona como nervadura guía. Con ésta se guía a la protuberancia (16) o al miembro de acoplamiento (10) para unir las piezas, lo que facilita el proceso de enclavamiento. Además al encontrarse unidas las piezas pueden transferirse ventajosamente las fuerzas de

introducción laterales.

Además se provee que los miembros de fijación y los elementos de fijación estén provistos en pilares distanciadores resaltados, que en especial separan a la superficie de carga y a la superficie de soporte de la tarima y forman un espacio hueco para la introducción de las uñas del montacargas (en forma de tenedor), las cuales están colocadas a lo largo de la periferia de las superficies frontales de los pilares distanciadores. En especial se provee que los pilares distanciadores presenten una superficie frontal esencialmente paralela a la superficie de carga o a la superficie de soporte, la cual es interrumpida parcialmente por superficies oblicuas, formando un ángulo con la superficie frontal de 10° a 45°, preferentemente de aproximadamente 15-°-25°, y este ángulo se mide en un plano obtenido en uno de los ejes medios de los pilares distanciadores. Así al encontrarse montadas las superficies de carga y soporte, o sea al encontrarse en un estado armado, a través de esas superficies oblicuas pueden transferirse las fuerzas de soporte lateral por medio del acoplamiento en forma dentada.

De acuerdo con una modalidad muy preferida se prevé que la zona de los miembros o los elementos de fijación cuando menos presenten una parte inferir de cuando menos un elemento guía plano y la parte superior

cuando menos presente un elemento guía plano correspondiente, en donde esos elementos guía se deslizan entre sí al unir las piezas. Aquí parece ser especialmente ventajoso que las superficies guía correspondientes de los elementos guía presenten cuando menos una nervadura longitudinal o una ranura longitudinal (o similares), de tal forma de constituir una acoplamiento dentado, a través del cual pueden transferirse las fuerzas de soporte lateral no sólo durante la unión de las piezas.

Una modalidad especialmente ventajosa y económica prevé que la tarima de acuerdo con la invención este formada en dos partes, en donde cada parte conjuntamente con los elementos de unión formados en ella preferentemente se produzcan por medio de un procedimiento de moldeo por inyección.

BREVE DESCRIPCIÓN DE LOS DIBUJOS O FIGURAS

Otras ventajas de la invención se desprenden de la siguiente descripción de una modalidad preferida con ayuda de las figuras. Las figuras muestran:

La figura 1: una tarima de acuerdo con la invención en una vista en perspectiva;

La figura 2: la parte inferior de una tarima de acuerdo con la invención en una vista superior en perspectiva;

La figura 3: la parte superior de una tarima de acuerdo con la invención en una vista superior en perspectiva;

La figura 4: la parte superior de una tarima de acuerdo con la invención en una vista inferior en perspectiva;

La figura 5: una vista detallada en perspectiva de la parte inferior en la región en donde se encuentra un distanciador;

La figura 6: una vista detallada en perspectiva de la parte superior en la región en donde se encuentra un distanciador;

La figura 7: un corte en perspectiva a través de un pilar distanciador de dos partes superior e inferior unidas entre sí.

DESCRIPCIÓN DETALLADA DE LA INVENCIÓN

La figura 1 muestra de forma tridimensional la tarima de material sintético de acuerdo con la invención 1, la cual incluye la parte inferior 2 y una parte superior 3, que se unen entre sí por acoplamiento de forma. En la figura 1 se muestra adelante a la derecha, la superficie de carga 4 de la parte superior 3. La parte superior 3 presenta una pluralidad de orificios redondos, los cuales están formados para reducir el peso general de la tarima de

material sintético. No se representa la superficie de apoyo o la superficie de soporte, las cuales están provistas en el lado contrario de la superficie de carga 4 de la tarima de material sintético 1. Habitualmente se utiliza una tarima de material sintético con una superficie de soporte colocada sobre preferentemente una base plana y horizontal que recibe a los artículos en la superficie de carga 4 horizontal. A continuación se tomará como referencia esta definición de horizontal y vertical. Los pilares distanciadores 5 definen así un espacio entre la zona de la superficie de carga y la zona de la superficie de apoyo, espacio que se utiliza para el transporte de la tarima por medio de un montacargas o de un vehículo elevador. Por medio del pilar distanciador están desplazados los cuerpos base entre sí en dirección vertical. Los cuerpos base están conformados ventajosamente de forma plana.

La parte inferior representada en la figura 2 está unida con la parte superior 2 representada en las figuras 3 y 4 en la zona donde se encuentra el pilar distanciador 5. Para esto, la parte superior como también la parte inferior están provistas con pilares distanciadores 5 que se encuentran en las esquinas, en las partes medias de los cantos exteriores y en el centro, y al estar montados quedan dirigidos uno hacia el otro y su altura esencialmente es idéntica. Las figuras 5 y 6

muestran como vista detallada un pilar distanciador de la parte inferior y de la parte superior 3. Los pilares distanciadores presentan una forma básica rectangular con esquinas redondeadas y una superficie frontal, que limita al pilar distanciador en dirección vertical. Esta superficie frontal tiene la forma de un borde anular periférico con un grosor de material del pilar distanciador de cuando menos 3 mm y máximo 18 mm. Preferentemente el borde tiene una anchura de 6 mm a 10 mm. Dentro de ese anillo están colocadas estructuras de unión, entre ellas pueden mencionarse ganchos de sujeción o miembros de acoplamiento 10, los elementos de refuerzo 11, los elementos 20 y las nervaduras de compresión 12. En la figura 7 se puede ver claramente cómo los ganchos de sujeción o el miembro de acoplamiento en forma de pasarela 10 con una aleta de acoplamiento 16 formada en el extremo libre se introduce en el elemento de acoplamiento 30 y con esto se engancha por medio de acoplamiento de forma. Durante le proceso de montaje ambas piezas se juntan de arriba hacia abajo (verticalmente). Aquí se mueve el gancho de sujeción 10 hacia la derecha y al final del proceso de unión el gancho de sujeción retrocede elásticamente a su posición inicial o posición de sujeción, de tal forma que las partes superior e inferior ya no pueden separarse entre sí.

El elemento de refuerzo o de guía 11 en forma de nervadura de acuerdo con la figura 7 es una parte de la parte superior 3 representada arriba y en él está fijo el elemento de fijación 30. El elemento de refuerzo 11 está adyacente a la pata del gancho de sujeción 10, con el cual el gancho de sujeción está unido a la parte inferior 2. Cuando sobre la parte superior actúan fuerzas, las cuales (de acuerdo con la figura 7) actúan hacia delante, así la parte superior se desplaza ligeramente con referencia a la parte inferior, hasta que el elemento de refuerzo 11 entra en contacto con la pata del gancho de sujeción 10 y así se transfieren las fuerzas a la parte inferior 2. La anchura del gancho de sujeción es claramente mayor que su grosor, con lo cual en la dirección de sujeción (en la dirección en la cual se mueve la aleta de acoplamiento 16) se obtiene una mayor elasticidad que en la dirección horizontal que es perpendicular a ésta. En esta sección no se muestra otro elemento de refuerzo, el cual según la figura 7 se asienta antes del gancho de sujeción 10, y con el elemento de refuerzo representado 11 forma un espacio, dentro del cual puede moverse el gancho de sujeción con una determinada holgura. Esta holgura es necesaria para que el gancho de sujeción después del montaje pueda recuperar su forma gracias a la tensión o fuerza de retroceso elástica, y pueda actuar sobre el elemento de acoplamiento 30.

La figura 5 muestra cuatro elementos guía 20 de un pilar distanciador 4 de la pieza inferior 2, que están acoplados con los cuatro elementos guía 20' de la pieza superior representados en la figura 6. En los elementos guía se definen superficies de contacto provistas aquí con tres nervaduras longitudinales o ranuras longitudinales (21). Dos de esos pares de elementos guía tienen superficies de contacto paralelas que forman un ángulo de 90° con las superficies de contacto de los otros dos pares de elementos guía. Con esto se evita un desplazamiento en todas las direcciones del plano horizontal.

Además, las nervaduras longitudinales o ranuras longitudinales 21 sirven para posicionar ambas partes sin holgura. Su altura tiene una dimensión mayor que la separación nominal entre los elementos guía que interactúan entre sí. Por ejemplo la separación nominal puede ser 0.5 mm y la altura de las nervaduras longitudinales puede ser de 2 mm, de tal forma que las tres nervaduras longitudinales 21 al unir las piezas superior e inferior se deforman plástica y elásticamente aproximadamente 1.5 mm.

Además la figura 5 muestra una nervadura de compresión 12 colocada de tal forma que al unir las partes superior e inferior se deforma esencialmente de forma elástica, y después de que el gancho de sujeción 10 que atrapado en su posición de sujeción también puede retraerse

elásticamente. Ya que la orientación de la nervadura de compresión 12 es contraria a la dirección del orificio del gancho de sujeción 10, por medio de la nervadura se produce una sujeción firme del gancho en su posición de sujeción.

La figura 6 muestra que el borde frontal periférico 14 del pilar distanciador 4 está interrumpido por zonas de superficies oblicuas 15a y 15b. Mientras que las zonas del borde 14, que se extienden paralelas a la superficie de carga, son muy adecuadas para recibir las fuerzas del peso de los productos que se encuentran sobre la tarima, el efecto de la fuerza sirve para que la parte superior 3 pueda centrarse por medio del desplazamiento sobre las superficies oblicuas 15a y 15b en sentido contrario a las manecillas del reloj. Las superficies oblicuas se inclinan aproximadamente 20° de hacia arriba y abajo de la superficie frontal. Dicho de otra manera: cuando actúan fuerzas laterales perturbadoras entre la parte superior e inferior, la fuerza de gravedad actúa sobre la carga que se encuentra sobre la tarima, de tal forma que la parte superior 3 con la carga no se mueve en contra de la dirección de la gravedad en las superficies oblicuas 15a o 15b y permanecen centradas entre sí las partes superior e inferior, y se absorben cuando menos parcialmente las fuerzas dañinas que pueden actuar sobre los ganchos de sujeción.

La figura 6 muestra que periféricamente a una superficie dirigida hacia adentro del pilar distanciador 5 están provistos tres ganchos de sujeción 10 así como tres elementos de acoplamiento 30, para recibir a los correspondientes ganchos de sujeción de la pieza que se va a unir. Con esto, en la zona de esos pilares distanciadores de las piezas superior e inferior se unen con seis ganchos en total. Los pilares distanciadores que se encuentran en la esquina de las tarimas, están provistos con el mismo número de ganchos de sujeción. Sin embargo todos los separadores que se encuentran en el canto lateral de la tarima son más anchos y presentan 8 pilares distanciadores. En los pilares distanciadores en el centro de la tarima están provistos seis ganchos de sujeción. Correspondientemente también están adaptados los elementos guía 20 a las dimensiones de los pilares distanciadores en cuestión.

Esencialmente la parte superior 3 es simétrica la parte inferior 2, pero la pieza superior presenta cuatro aberturas amplias para recibir a los rodillos de un vehículo elevador durante el transporte. En una modalidad alternativa de una tarima también es posible una forma de realización en la cual la parte inferior es idéntica a la parte superior, o sea carece de las amplias aberturas.

La figura 4 muestra una vista inferior de la

parte superior 3, que incluye un cuerpo base del cual se extienden los pilares distanciadores 4. El cuerpo base se extiende sobre toda la superficie de la tarima con un grosor preferentemente de 30 mm +/- 3 mm, pero de cuando menos 15 mm y máximo 45 mm. Para reducir el peso del cuerpo base, éste se forma con una estructura de barras que se extienden paralelas y que se cruzan entre sí para definir una pluralidad de cavidades o depresiones. Para reducir adicionalmente el peso se han proviso orificios redondos en las bases de las depresiones, las cuales de acuerdo con la figura 1 pueden observarse desde arriba de la tarima, o sea desde la superficie de carga 4. Estos orificios permiten también eliminar la humedad que se encuentra sobre la tarima por medio de goteo o flujo hacia abajo. Además en la superficie de la tarima en la zona de los pilares distanciadores 5 están visibles orificios rectangulares, los cuales se producen por medio de técnicas de inyección de material sintético desde los núcleos que forman los ganchos de sujeción 20 y los elementos de acoplamiento 30.

La parte inferior 2 está realizada de forma correspondiente a la parte superior 3, en la cual, debido a los extensos orificios, la superficie base se reduce a pasarelas que unen a los pilares distanciadores 5.

En los cantos exteriores laterales de la tarima, o sea en los lados en los cuales se introducen las uñas de

un vehículo elevador o montacargas, el grosor del material de la tarima aumenta para elevar la protección contra los daños.

Como material para la tarima puede utilizarse cualquier material sintético termoplástico, preferentemente se utiliza polietileno o polipropileno. Para reducir adicionalmente el peso, ventajosamente se utiliza un material sintético espumoso, cuyo material forma espuma en la herramienta de inyección durante el proceso de inyección. Tanto la parte superior como también la parte inferior son de una sola pieza. Esto es que los mencionados ganchos de sujeción 10 están formados directamente con aletas de sujeción 16, elementos de refuerzo 11 o elemento guía 20 directamente durante el proceso de inyección. Por medio de la aplicación adecuada de temperatura y presión dentro de la herramienta de inyección se logra que la superficie de la tarima se encuentra al mayor grado posible libre de poros, pero se reduce la densidad del material dentro de las zonas con mayores grosores de pared. La aplicación de presión puede ser apoyada por medio de núcleos móviles, que después de llenar la herramienta pueden retraerse en una segunda etapa en una determinada cantidad y así liberar el volumen para hacer espumoso al material sintético. Gracias a esa técnica puede por ejemplo lograrse que la parte superior y la parte inferior de la

región de los ganchos de sujeción presenten una densidad claramente mayor, y con esto una mayor rigidez que en la zona de los cantos laterales.

REIVINDICACIONES:

1. Una tarima de material sintético (1) con una parte superior (3) que tiene una superficie de carga (4), y cuando menos una parte inferior (2) unida a la parte superior (3); la parte inferior sirve como superficie de apoyo para la tarima de material sintético (1), en donde la parte superior (3) y la cuando menos una parte inferior (2) preferentemente están unidas entre sí exclusivamente por acoplamiento de forma y particularmente de manera inseparable.

2. La tarima de material sintético (1) según la reivindicación 1, en donde el acoplamiento de forma entre la parte superior (3) y la cuando menos una parte inferior (2) se forma por medio de aletas de sujeción (16) que están colocadas en la parte inferior (2) y/o en la parte superior (3) y colaboran con elementos de acoplamiento (30) correspondientes que se encuentran en la parte superior (3) y/o en la parte inferior (2).

3. La tarima de material sintético (1), según la reivindicación 2, en donde las aletas de acoplamiento están formadas como miembros de acoplamiento (10) en forma de pasarelas que se extienden esencialmente de forma perpendicular a la superficie de carga (4) o la superficie de soporte.

4. La tarima de material sintético (1), según

la reivindicación 2 o 3, en donde los elementos de acoplamiento (30) están rodeados por una nervadura guía (11), que durante la unión conduce a la aleta de sujeción (16) o al miembro de acoplamiento (10) y también al estar unidas transmiten las fuerzas laterales.

5. La tarima de material sintético (1), según la reivindicación 3 o 4, en donde los miembros de acoplamiento (10) y los elementos de acoplamiento (30) están colocados en pilares distanciadores (5) sobresalientes, y estando colocados en las superficies frontales de esos pilares distanciadores (5) periféricamente a lo largo de su perímetro.

6. La tarima de material sintético (1), según la reivindicación 5, en donde los pilares distanciadores (5) presentan una superficie frontal (14) esencialmente paralela a la superficie de carga (4) o la superficie de soporte, la cual es interrumpida parcialmente por superficies oblicuas (15a, 15b), formando un ángulo con la superficie frontal de 10° a 45°, preferentemente de aproximadamente 15° a 25°, y este ángulo se mide en un plano obtenido en uno de los ejes medios de los pilares distanciadores (5), de tal forma que al encontrarse montados los pilares distanciadores, a través de esas superficies oblicuas (15a, 15b) pueden transferirse las fuerzas de soporte lateral por medio del acoplamiento en

forma dentada.

7. La tarima de material sintético (1), según las reivindicaciones 3 a 6, en donde los miembros de acoplamiento (10) están formados de tal forma que pueden moverse elásticamente en dirección horizontal y presentan una fuerza de recuperación definida.

8. La tarima de material sintético (1), según las reivindicaciones 3 a 7, en donde en la región los miembros de acoplamiento (10) o los elementos de acoplamiento (3), la cuando menos una parte inferior (2) presenta cuando menos un elemento guía plano (20) y la parte superior (3) cuando menos presenta un correspondiente elemento guía plano (20'), los cuales durante la unión se deslizan entre sí.

9. La tarima de material sintético (1), según la reivindicación 8, en donde las superficies de guía correspondientes de los elementos guía (20, 20') presentan cuando menos una nervadura longitudinal (21), de tal forma que constituye un acoplamiento dentado, a través del cual pueden transferirse también las fuerzas laterales.

10. La tarima de material sintético (1), según las reivindicaciones anteriores, en donde esta tarima está formada por dos partes.

RESUMEN DE LA INVENCIÓN

La invención se refiere a una tarima de material sintético (1) formada por varias piezas con una parte superior (3) que tiene una superficie de carga (4) y está unida con cuando menos una pieza inferior (2), de acuerdo con la invención se prevé que la pieza superior (3) y la o las piezas inferiores (2) estén unidas entre sí por medio de acoplamiento de forma, preferentemente con la ayuda de elementos de sujeción, y en espacial estén unidas entre sí de forma permanente.

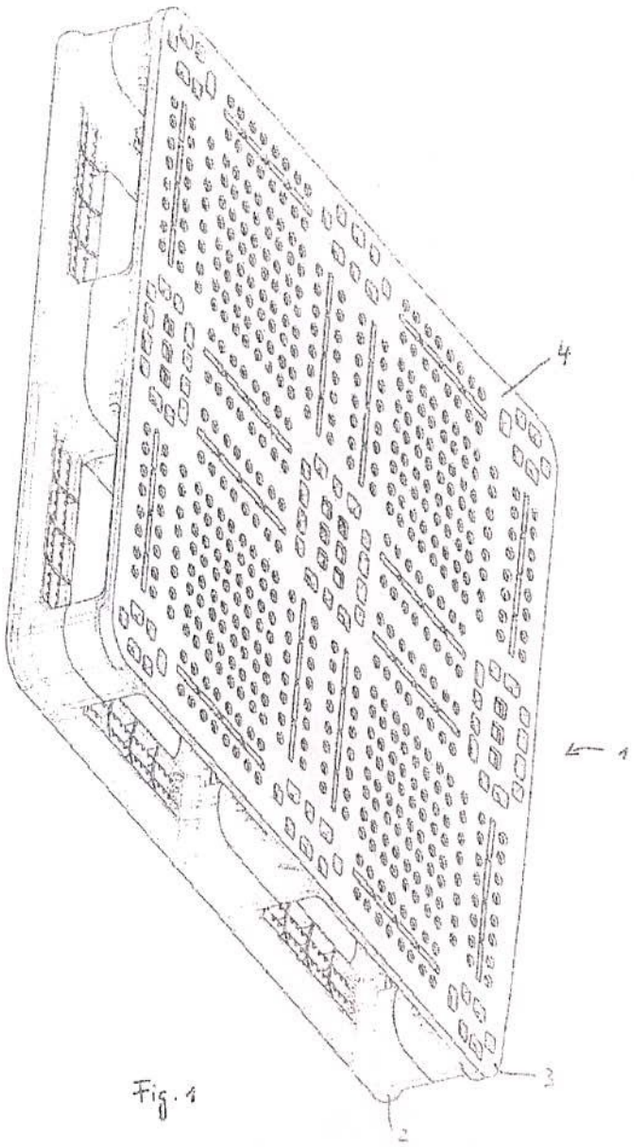


Fig. 1

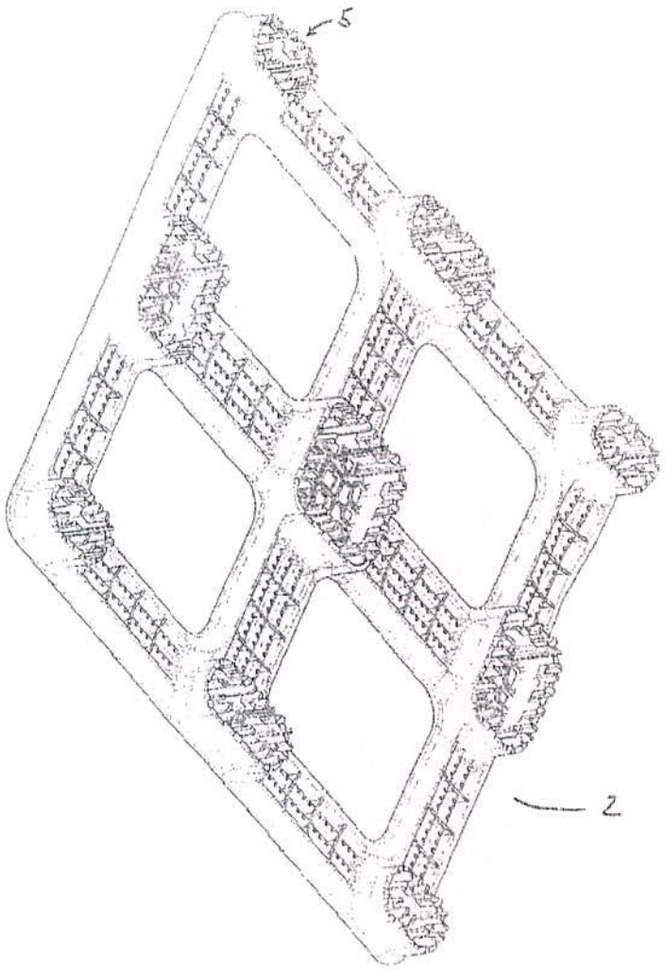


Fig. 2

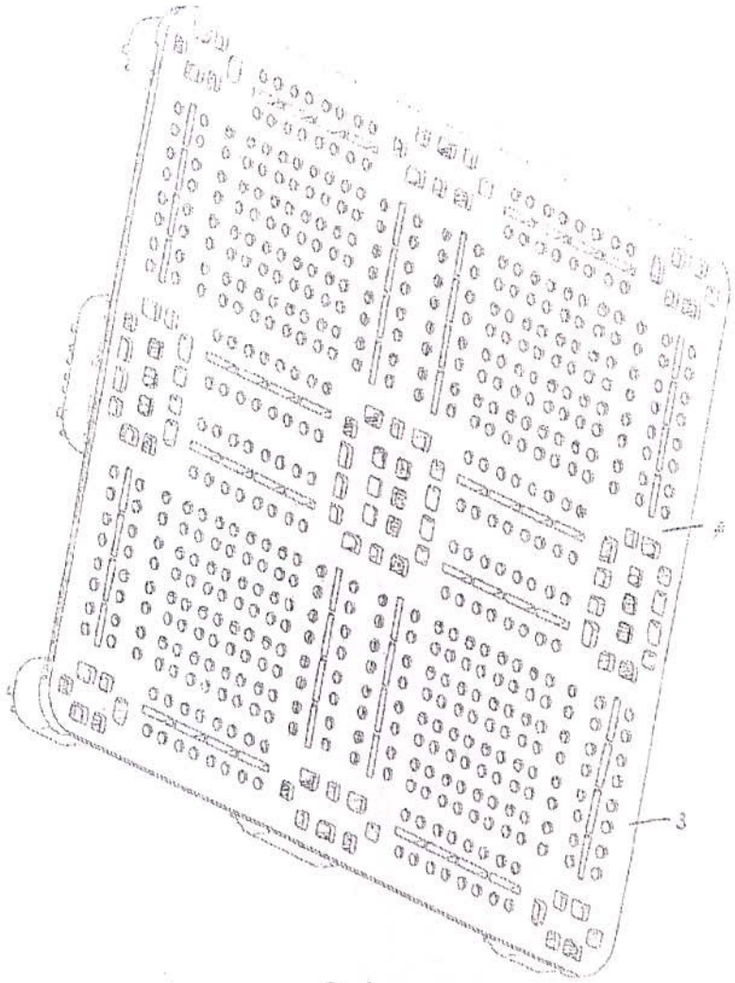


Fig. 3

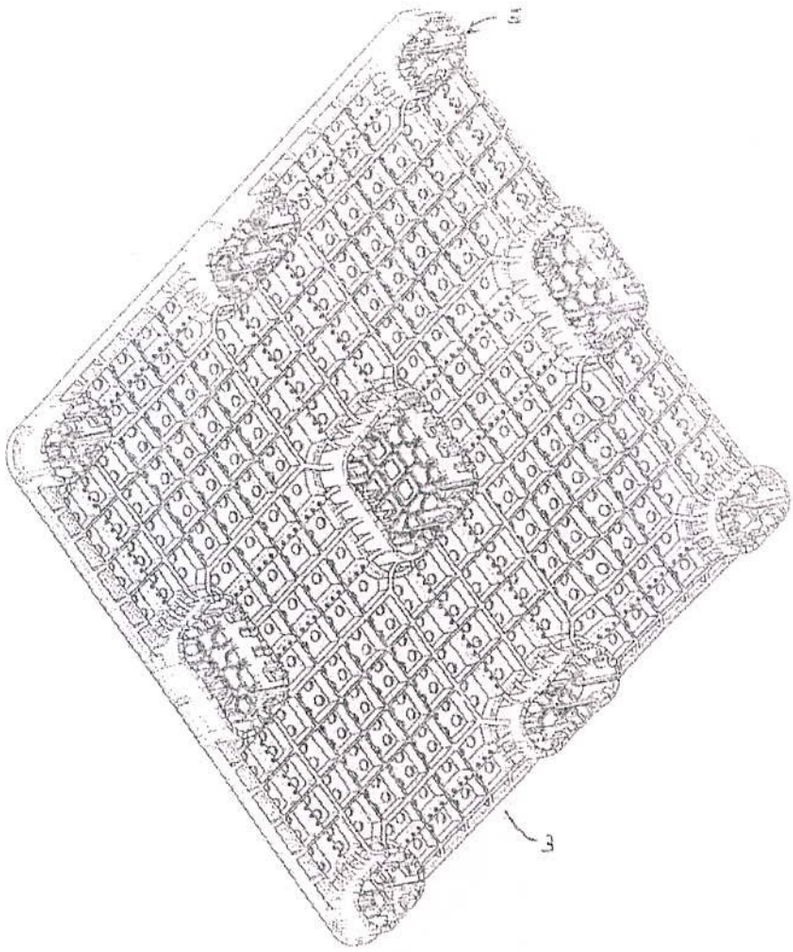


Fig 4

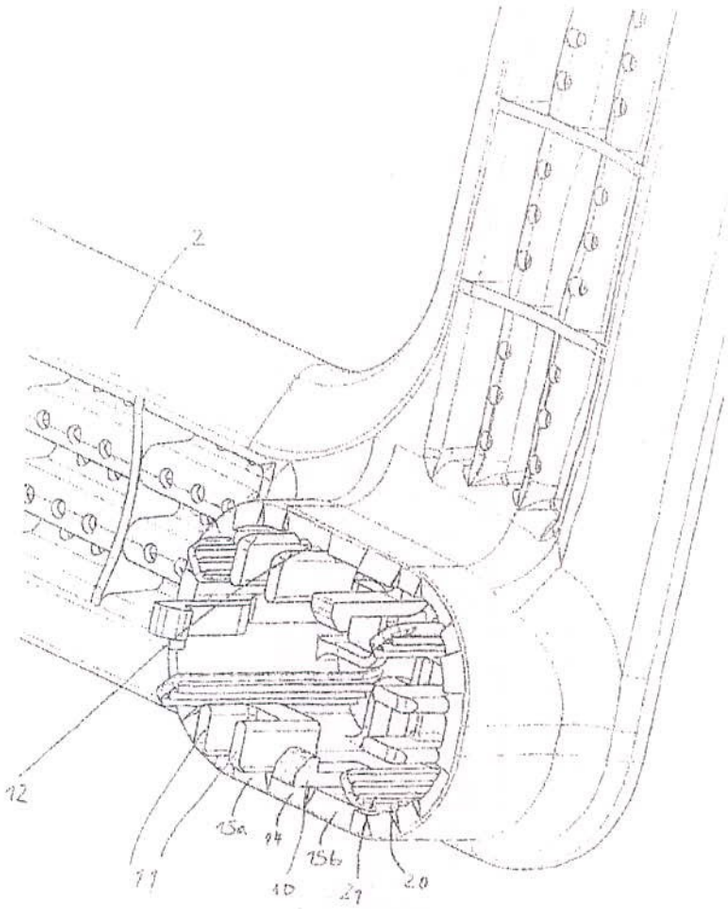


Fig. 5

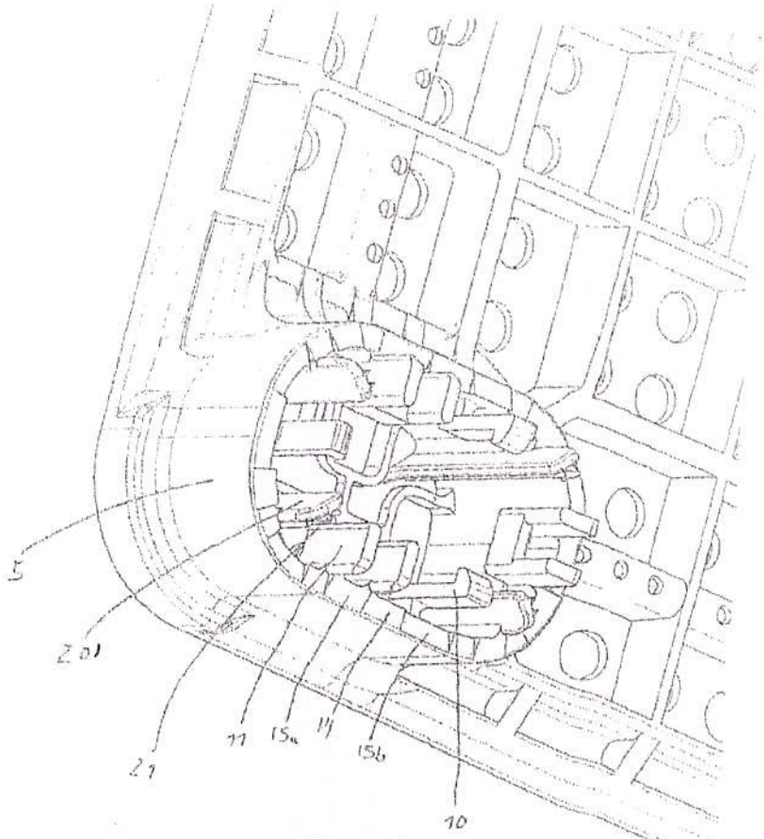


Fig. 6

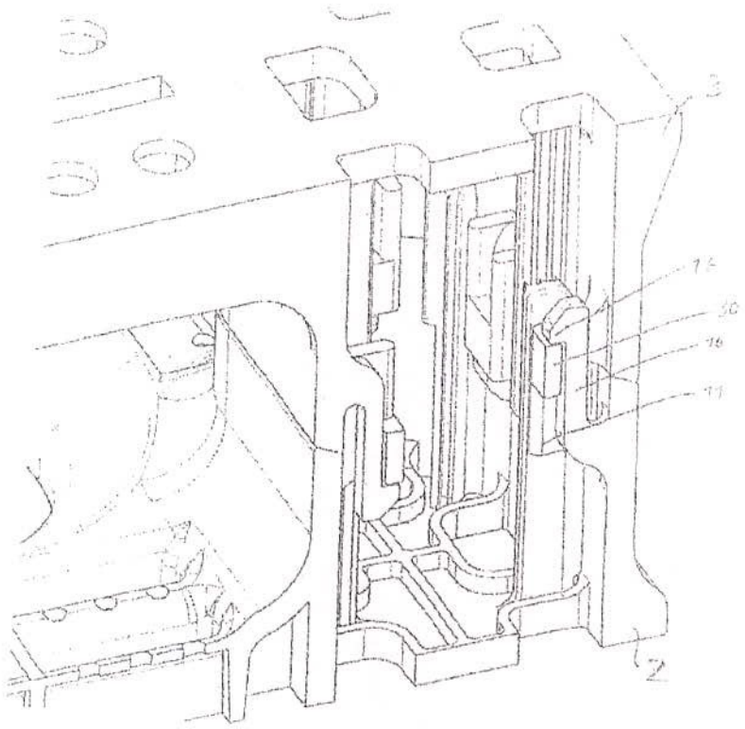


Fig 7

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(54) **PALLET**

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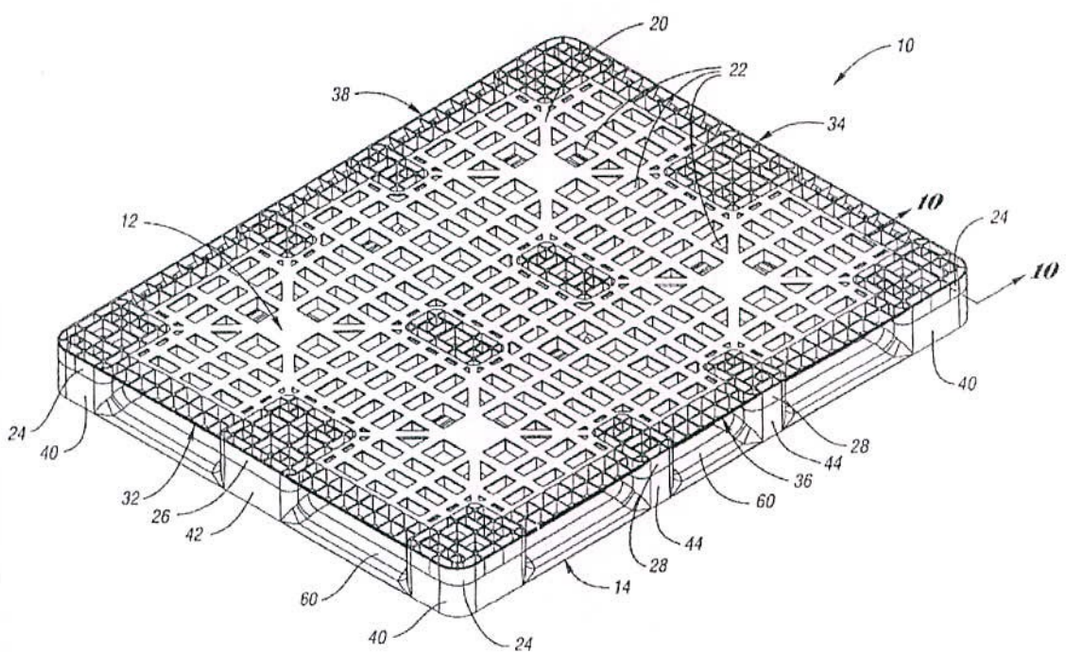
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(57) **ABSTRACT**

A pallet is provided which includes spaced upper and lower decks. A plurality of receiving areas are formed in one of the upper and lower decks, where each receiving area includes at least one latch member extending therefrom. A plurality of corresponding supports extend from the other of the upper and lower decks, where each support includes at least one latch receiver extending therefrom, each latch receiver having a plurality of spring arms. The latch receiver is adapted to receive the latch member such that engagement of the receiving areas and corresponding supports securely joins the upper and lower decks in an assembled configuration.



PALLET

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to pallets for supporting freight, goods, or other materials.

[0003] 2. Background Art

[0004] Current plastic pallets have upper and lower decks that are optimally designed to serve their diverse purposes. Equally important to the specific structure of the upper and lower decks is the latching mechanism which secures the decks together in an assembled configuration. During handling, lateral movement of the upper and lower decks with respect to one another can cause the two decks to become disengaged. Therefore, a need exists for a pallet which provides a more secure latching feature as well as sufficient lateral constraint for the latching feature to enhance the attachment of the upper and lower decks so that they cannot be separated during use.

SUMMARY OF THE INVENTION

[0005] Therefore, it is an object according to the present invention to provide a pallet which includes more secure latching of the upper and lower decks in the assembled configuration.

[0006] It is another object according to the present invention to provide a pallet having improved lateral stability of the top and bottom decks with respect to each other.

[0007] It is another object according to the present invention to provide a pallet having guide features which improve alignment of the upper and lower decks for assembly.

[0008] It is still another object according to the present invention to provide a plastic pallet which is lightweight, strong, and durable.

[0009] Accordingly, a pallet is provided which includes spaced upper and lower decks. A plurality of receiving areas are formed in one of the upper and lower decks, where each receiving area includes at least one latch member extending therefrom. A plurality of corresponding supports extend from the other of the upper and lower decks, where each support includes at least one latch receiver extending therefrom, the latch receiver having a plurality of spring arms. The latch receiver is adapted to receive the latch member such that engagement of the receiving areas and corresponding supports securely joins the upper and lower decks in an assembled configuration.

[0010] In accordance with a preferred embodiment of the present invention, the receiving areas are integrally formed within a bottom surface of the upper deck, and the supports are integrally formed with and project upwardly from a top surface of the lower deck. Each receiving area includes a plurality of ribs, and each latch member extends outwardly from one of the ribs at a lower end thereof. In addition, each latch member preferably tapers upwardly and outwardly from the lower end of the rib and terminates in a generally horizontal shoulder portion.

[0011] Correspondingly, each support includes a plurality of ribs, and the plurality of spring arms includes two arms attached to one of the ribs at an upper end thereof. The arms are connected by a receiving face or bridge portion such that the latch receiver has a generally U-shaped appearance, where the bridge portion is adapted to receive the shoulder portion of the latch member thereunder. The latch receivers are preferably flexible, such that engagement of the receiving areas and corresponding supports causes the latch member to contact the receiving face and deflect the latch receiver outwardly from its resting position, and passage of the shoulder portion past the bridge portion allows the latch receiver to return to its rest position and securely retain the latch member therewithin.

[0012] In further accordance with a preferred embodiment of the present invention, guide members at least partially surrounding each latch receiver. Each guide member includes a wall structure having a first portion extending generally parallel to at least one latch receiver and a second portion extending along at least one side of one latch receiver. Guide members located at the corners of the pallet each include a curved wall which at least partially surrounds two adjacent latch receivers. The guide members are preferably tapered with the lower end of each guide member being wider than the upper end thereof. Correspondingly, each receiving area includes compartments which are sized to receive the individual guide members, where each compartment preferably includes one latch member. Engagement of the guide members with the receiving area compartments provides lateral stability for the assembled upper and lower decks.

[0013] The pallet according to the present invention is generally rectangular and includes twelve supports and twelve corresponding receiving areas. The lower deck includes a generally rectangular perimeter portion, an integrally formed longitudinal rail joined to the perimeter portion and extending along a longitudinal axis of the pallet, and two integrally formed transverse rails joined to the perimeter portion and the longitudinal rail and extending parallel to a transverse axis of the pallet. Together, the perimeter portion, the longitudinal rail, and the transverse rails define six large openings in the lower deck. Corner supports project from the four corners of the perimeter portion, medial supports project from each end of the longitudinal rail, and transverse supports project from the ends and midpoint of each transverse rail. In a preferred embodiment, the corner supports and medial supports each include eight spaced latch receivers, and the transverse supports each include six spaced latch receivers.

[0014] In addition, a pallet according to the present invention is provided having an upper deck including a plurality of receiving areas formed therein, each receiving area including at least one latch member extending therefrom. The pallet further includes a lower deck including a plurality of supports extending upwardly therefrom, each support including at least one latch receiver extending therefrom, where the latch receiver includes a plurality of spring supports. The latch receiver is adapted to receive the latch member such that engagement of the receiving areas and corresponding supports securely joins the upper and lower decks in an assembled configuration.

[0015] Still further, a latch assembly is provided according to the present invention for securely joining the upper and lower decks in an assembled configuration. The latch assembly includes at least one latch member disposed within each

receiving area, the latch members each including a generally horizontal shoulder portion which tapers downwardly and inwardly toward a bottom surface of the receiving area. The latch assembly further includes at least one flexible latch receiver extending upwardly from each support, the latch receivers each having a plurality of spring arms connected to the support and a receiving face attached to the arms, wherein the receiving face is adapted to receive the shoulder portion of the latch member thereunder. In operation, engagement of the receiving areas and corresponding supports causes the latch member to contact the receiving face and deflect the latch receiver outwardly from its resting position, and passage of the shoulder portion past the receiving face allows the latch receiver to return to its rest position and securely retain the latch member therewithin, thereby securing the upper and lower decks in the assembled configuration.

[0016] The above objects and other objects, features, and advantages of the present invention are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] **FIG. 1** is a top perspective view of an assembled pallet according to the present invention;

[0018] **FIG. 2** is a bottom perspective view of the pallet of **FIG. 1**;

[0019] **FIG. 3** is a top plan view of the pallet of **FIG. 1**;

[0020] **FIG. 4** is a bottom plan view of the pallet of **FIG. 1**;

[0021] **FIG. 4*a*** is an enlarged bottom plan view of a corner portion of the pallet shown in **FIG. 4**;

[0022] **FIG. 5** is a front elevational view of the pallet of **FIG. 1**, the rear elevational view being a mirror image thereof;

[0023] **FIG. 6** is a left side elevational view of the pallet of **FIG. 1**, the right side elevational view being a mirror image thereof;

[0024] **FIG. 7** is a top perspective, exploded view of the pallet of **FIG. 1**, showing the upper and lower decks aligned for assembly;

[0025] **FIG. 8** is a bottom perspective view of the upper deck of the pallet of **FIG. 7**;

[0026] **FIG. 8*a*** is an enlarged perspective view of a corner portion of the upper deck of **FIG. 8**;

[0027] **FIG. 9** is a top perspective view of the lower deck of the pallet of **FIG. 7**;

[0028] **FIG. 9*a*** is an enlarged perspective view of a corner portion of the lower deck of **FIG. 9**, wherein the lower deck corner portion is adapted to engage the corresponding upper deck corner portion shown in **FIG. 8*a***;

[0029] **FIG. 10** is a cross-sectional view taken along line **10-10** of **FIG. 1** showing the upper and lower decks prior to assembly; and

[0030] **FIG. 11** is a cross-sectional view taken along line **11-11** of **FIG. 7** showing the upper and lower decks in an assembled configuration.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0031] Referring first to FIGS. **1-6**, a pallet according to the present invention is illustrated and designated generally by reference numeral **10**. Pallet **10** includes two separately molded parts, namely an upper deck **12** and a lower deck **14**. Upper deck **12** and lower deck **14** are injection molded of a suitable plastic material, such as high density polyethylene, polypropylene, or filled polypropylene. In plan view (**FIGS. 3 and 4**), pallet **10** is generally rectangular in shape with rounded corners and has symmetry about a longitudinal axis **16** and a transverse axis **18** thereof. The symmetrical two-piece injection molded plastic construction of pallet **10** affords substantial strength and durability, simplicity, and easy assembly. As explained below, upper and lower decks **12, 14** are adapted to be easily snapped together to form the assembled pallet illustrated in FIGS. **1-6**.

[0032] Referring now to **FIGS. 1, 3**, and **7-8**, upper deck **12** has a solid top surface **20** interrupted by a series of apertures **22** which reduce the weight of upper deck **12** and allow for drainage in the event that pallet **10** becomes wet. As shown in **FIG. 8**, a plurality of receiving areas **24, 26, 28** are integrally formed within the bottom surface **30** of upper deck **12**. More specifically, at each of the four corners of the upper deck **12**, a generally rectangular corner receiving area **24** is formed. At the mid-point of the left side **32** and right side **34** of the pallet **10**, generally square medial receiving areas **26** are formed. In addition, on either side of transverse axis **18**, generally rectangular transverse receiving areas **28** are formed. Transverse receiving areas **28** are located along front side **36** of pallet **10**, rear side **38** of pallet **10**, and centrally intersecting with longitudinal axis **16**. As shown in **FIG. 8**, receiving areas **24, 26, 28** all preferably have rounded corners. Of course, other shapes and configurations of receiving areas **24, 26, 28** are fully contemplated in accordance with the present invention. These twelve receiving areas **24, 26, 28** are adapted to receive twelve corresponding supports **40, 42, 44** which are integrally molded with lower deck **14**, as described below with reference to **FIGS. 7 and 9-11**.

[0033] As shown in **FIG. 8**, ribs **46** on the bottom surface **30** of upper deck **12** form an orthogonal pattern which runs parallel and perpendicular to the sides **32, 34, 36, 38** while still other ribs **48** form another orthogonal pattern that is set at 45° to the first pattern. Ribs **46, 48** collectively form interconnected grid-like structures which span the spaces between receiving areas **24, 26, 28**. As can be seen in **FIG. 8**, the bottom surface **30** of upper deck **12** is substantially planar in that receiving areas **24, 26, 28** and ribs **46, 48** generally lie in a common plane.

[0034] In each of the receiving areas **24, 26, 28**, there are a number of depending latch members or tabs **50**, details of which are best shown in the enlarged view of **FIG. 8*a*** and the cross-sectional views of **FIGS. 10 and 11**. Each receiving area **24, 26, 28** includes a plurality of ribs **52**, and each latch tab **50** is integrally and rigidly formed with one of the ribs **52** and extends outwardly therefrom at a lower end **54** thereof. Each latch tab **50** preferably has a tapered portion **56**

which tapers upwardly and outwardly from the rib lower end **54** and terminates in a generally horizontal shoulder portion **58** which is received by components of the mating support **40, 42, 44** of lower deck **14** as described below. By way of example, in the embodiment shown each corner receiving area **24** and medial receiving area **26** includes eight latch tabs **50**, with two latch tabs **50** disposed on each side thereof. Each transverse receiving area **28** includes six latch tabs **50**, with two tabs **50** disposed on each of the sides disposed parallel to transverse axis **18** and one tab **50** disposed on each of the sides disposed parallel to longitudinal axis **16**. Of course, other numbers and placements of latch tabs **50** within receiving areas **24, 26, 28** may be utilized in practicing the present invention.

[0035] Referring next to **FIGS. 7 and 9**, lower deck **14** has a footprint which substantially matches that of upper deck **12**, but differs substantially in structure. Lower deck **14** includes a generally rectangular perimeter portion **60**, an integrally formed longitudinal member or rail **62** joined to the perimeter portion **60** along the left side **32** and right side **34** of pallet **10** and extending along longitudinal axis **16**. In addition, two integrally formed transverse members or rails **64** are joined to the perimeter portion **60** along the front side **36** and rear side **38** of pallet **10**. Transverse rails **64** are also joined with the longitudinal rail **62** and extend parallel to transverse axis **18** on either side thereof. Together, perimeter portion **60**, longitudinal rail **62**, and transverse rails **64** define six relatively large openings **66** in lower deck **14**. Perimeter portion **60** and rails **62, 64** preferably have beveled edges, and may optionally include apertures formed therein (not shown). The substantial amount of open area strategically placed within lower deck **14** minimizes the amount of material required without compromising structural rigidity.

[0036] As shown in **FIGS. 7 and 9**, twelve supports **40, 42, 44** corresponding respectively to receiving areas **24, 26, 28** are integrally formed with and project upwardly from a top surface **68** of lower deck **14**. Corner supports **40** project from the four corners of perimeter portion **60**, medial supports **42** project from each end of longitudinal rail **62**, and transverse supports **64** project from the ends and midpoint of each transverse rail **64**. In the embodiment depicted herein, corner supports **40** and transverse supports **44** are generally rectangular in cross-section, while medial supports **42** are generally square in cross-section. Supports **40, 42, 44** preferably have smooth, rounded outside surfaces to prevent damage from the forks of a fork lift and, as with recesses **24, 26, 28**, can have shapes other than those illustrated herein. With reference to the assembled pallet views of FIGS. **1-2** and **5-6**, the areas between supports **40, 42, 44** are fork-receiving regions which are intended to rest on the forks of a fork lift that can engage pallet **10** from any side **32, 34, 36, 38** thereof.

[0037] As best shown in the enlarged view of **FIG. 9***a* and the cross-sectional views of **FIGS. 10 and 11**, each support **40, 42, 44** includes at least one latch receiver **70** extending therefrom. Latch receiver **70** is spring-loaded, having a plurality of spring supports or arms **74** which attach the latch receiver **70** to the support **40, 42, 44**. In the embodiment shown herein, each support **40, 42, 44** includes a plurality of ribs **72**, and each latch receiver **70** includes two spaced arms **74** attached to one of the ribs **72** at an upper end **76** thereof. Arms **74** are connected by a receiving face or bridge portion **78** disposed therebetween, such that latch receiver **70** has a generally U-shaped appearance. Of course, latch receiver **70** can include any number of spring arms **74** in accordance with the present invention.

[0038] As described below, latch receivers **70** are flexible, leaf springs that are adapted to receive latch tabs **50** of upper deck **12** to form a latch assembly **79** (see **FIG. 11**), such that engagement of the receiving areas **24, 26, 28** and corresponding supports **40, 42, 44** securely joins the upper and lower decks **12, 14** in an assembled configuration. Advantageously, having two spring supports **74** provides a twice greater holding force compared with a single arm **74** without increasing the stress upon the material. In the embodiment shown herein, corner supports **40** and medial supports **42** each include eight spaced latch receivers **70** and transverse supports **44** each include six spaced latch receivers **70**, wherein the placement of latch receivers correspond in position to the placement of latch tabs **50** formed on opposed receiving areas **24, 26, 28**.

[0039] In further accordance with the present invention, guide members **80** are provided which at least partially surround each latch receiver **70** (**FIGS. 9 and 9***a*). Each guide member **80** includes a wall structure having a first portion **82** extending generally parallel to latch receiver **70** and second portions **84** extending along the sides of latch receiver **70**. Guide members **80** located at the corners of pallet **10** additionally include a curved wall **86** which at least partially surrounds two adjacent latch receivers **70** and includes a support rib **87** extending inwardly therefrom at the corner of pallet **10**. Referring again to **FIG. 8***a*, ribs **52** within each receiving area **24, 26, 28** form compartments **53** which are sized to receive the individual guide members **80**, where each compartment **53** preferably houses one latch member **50**. Guide members **80** are inset from lower portion **88** of each support **40, 42, 44** for easier insertion into compartments **53** of corresponding receiving areas **24, 26, 28**. In addition, guide members **80** are preferably tapered with the lower end **90** of each guide member **80** being wider than the upper end **92** thereof.

[0040] Advantageously, guide members **80** provide locating capability and alignment for engagement of supports **40, 42, 44** with corresponding receiving areas **24, 26, 28** during assembly of the upper and lower decks **12, 14** of pallet **10**. Once the upper and lower decks **12, 14** are fully seated in an assembled position, the engagement of guide members **80** with receiving area compartments **53** provides lateral constraint preventing upper and lower decks **12, 14** from transverse movement with respect to one another which could cause the disengagement of the latch tabs **50** and latch receivers **70**. The configuration of pallet **10** according to the present invention wherein many guide members **80** are provided to at least partially surround each individual latch receiver **70** greatly improves the lateral stability of the assembled pallet **10**. Furthermore, guide members **80** protect the latch assembly **79** (**FIG. 11**) and limit the relative freedom of movement and reduce the forces that each latch assembly **79** will encounter.

[0041] **FIGS. 7, 8***a*, and **10** depict how the two pallet decks **12, 14** are aligned for assembly. In **FIGS. 8***a* and **10**, corner support **40** and receiving area **24** are shown for exemplary purposes to illustrate the engagement of the upper and lower decks **12, 14**, wherein their engagement is

representative of the engagement between other receiving areas **24, 26, 28** and corresponding supports **40, 42, 44**.

[0042] With reference now to **FIGS. 4***a*, *8a*, *9a*, and the cross-sectional views of FIGS. **10-11**, bridge portion **78** of latch receiver **70** is adapted to receive shoulder portion **58** of latch tab **50** thereunder. Engagement of receiving area **24** and corresponding support **40** causes tapered portion **56** of latch tab **50** to contact bridge portion **78** and deflect latch receiver **70** outwardly (to the left in **FIG. 10**) from its resting position. As decks **12, 14** are further advanced toward each other, passage of shoulder portion **58** past bridge portion **78** allows latch receiver **70** to spring inwardly to return to its rest position and securely capture latch tab **50** therewithin (**FIGS. 4***a* and **11**).

[0043] In operation, therefore, latch receiver **70** acts like a leaf spring. Due to the configuration of latch receiver **70** wherein two arms **74** are attached to each support rib **72**, the force required to deflect latch receiver **70** is distributed over a large area, thereby decreasing the stress imparted to the plastic material.

[0044] Engagement of each of the twelve receiving areas **24, 26, 28** and corresponding supports **40, 42, 44** is accomplished simultaneously in the manner described above. Since each engaged receiving area **24, 26, 28** and support **40, 42, 44** includes multiple latch assemblies **79**, a very secure connection between upper and lower decks **12, 14** is provided. Additionally, upper deck **12** completely covers the supports **40, 42, 44**, thereby preventing debris from collecting therein.

[0045] As shown in **FIGS. 2 and 4**, the bottom surface **94** of lower deck **14** has several series of reinforcing ribs **96** which provide structural rigidity for the deck **14** and properly distribute the load carried by the upper deck **12** and the supports **40, 42, 44**.

[0046] While a rectangular pallet **10** has been illustrated and described in the preferred embodiment, other shapes, e.g., square, are fully capable of embodying the features of the invention. The cross-sectional shapes of the receiving areas **24, 26, 28** and the supports **40, 42, 44** also may vary somewhat from those shown.

[0047] While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A pallet, comprising:

spaced upper and lower decks;

a plurality of receiving areas formed in one of the upper and lower decks, each receiving area including at least one latch member extending therefrom; and

a plurality of corresponding supports extending from the other of the upper and lower decks, each support including at least one latch receiver extending therefrom, the at least one latch receiver having a plurality of spring arms,

wherein the at least one latch receiver is adapted to receive the at least one latch member such that engagement of the receiving areas and corresponding supports securely joins the upper and lower decks in an assembled configuration.

2. The pallet according to claim 1, wherein the receiving areas are integrally formed within a bottom surface of the upper deck, and the supports are integrally formed with and project upwardly from a top surface of the lower deck.

3. The pallet according to claim 1, wherein each receiving area includes a plurality of ribs, and the at least one latch member extends outwardly from one of the ribs at a lower end thereof.

4. The pallet according to claim 3, wherein the latch member tapers upwardly and outwardly from the lower end of the rib and terminates in a generally horizontal shoulder portion.

5. The pallet according to claim 1, wherein each support includes a plurality of ribs, and the plurality of spring arms includes two arms attached to one of the ribs at an upper end thereof, the arms being connected by a bridge portion which is adapted to receive the shoulder portion of the latch member thereunder.

6. The pallet according to claim 5, wherein the latch receiver is flexible, such that engagement of the receiving areas and corresponding supports causes the latch member to contact the bridge portion and deflect the latch receiver outwardly from its resting position, and passage of the shoulder portion past the bridge portion allows the latch receiver to return to its rest position and securely retain the latch member therewithin.

7. The pallet according to claim 1, further including guide members at least partially surrounding each latch receiver.

8. The pallet according to claim 7, wherein each guide member includes a wall structure having a first portion extending generally parallel to at least one latch receiver and a second portion extending along at least one side of one latch receiver.

9. The pallet according to claim 7, wherein guide members located at the corners of the pallet each include a curved wall which at least partially surrounds two adjacent latch receivers.

10. The pallet according to claim 7, wherein the guide members are tapered with the lower end of each guide member being wider than the upper end thereof.

11. The pallet according to claim 7, wherein each receiving area includes compartments which are sized to receive the individual guide members.

12. The pallet according to claim 11, wherein the at least one latch member is disposed in one of the compartments.

13. The pallet according to claim 1, wherein the pallet is generally rectangular and includes twelve supports and twelve corresponding receiving areas.

14. The pallet according to claim 13, wherein corner supports project from the four corners of the perimeter portion, medial supports project from each end of the longitudinal rail, and transverse supports project from the ends and midpoint of each transverse rail.

15. The pallet according to claim 14, wherein the corner supports and medial supports each include eight spaced latch receivers, and the transverse supports each include six spaced latch receivers.

16. The pallet according to claim 1, wherein the at least one latch receiver is generally U-shaped.

17. A pallet, comprising:

a first deck including a plurality of receiving areas formed therein, each receiving area including at least one latch member extending therefrom; and

a second deck including a plurality of supports extending therefrom, each support including at least one latch receiver extending therefrom, the at least one latch receiver including a plurality of flexible spring supports;

wherein the at least one latch receiver is adapted to receive the at least one latch member such that engagement of the receiving areas and corresponding supports securely joins the first and second decks in an assembled configuration.

18. The pallet according to claim 17, wherein the plurality of flexible spring supports includes two arms, wherein the arms are connected by a receiving face such that the latch receiver is generally U-shaped.

19. The pallet according to claim 18, wherein the at least one latch member includes a generally horizontal shoulder portion adapted to be received by the receiving face of the at least one latch receiver.

20. The pallet according to claim 19, wherein engagement of the receiving areas and the corresponding supports causes the at least one latch member to contact the receiving face and deflect the at least one latch receiver outwardly from its resting position, and passage of the shoulder portion past the receiving face allows the at least one latch receiver to return to its rest position and securely retain the at least one latch member therewithin.

21. The pallet according to claim 17, further including guide members at least partially surrounding each latch receiver.

22. The pallet according to claim 21, wherein each receiving area includes compartments which are sized to receive the individual guide members.

23. A two-piece plastic pallet, comprising:

a first deck including a plurality of receiving areas formed in a first mating surface, wherein each receiving area includes a plurality of outwardly projecting latch tabs; and

a second deck including a plurality of supports formed in a second mating surface, each support including a plurality of projecting latch receivers and guide wall structures that at least partially surround each latch receiver,

wherein the latch receivers are adapted to receive the latch tabs such that engagement of the receiving areas and corresponding supports securely joins the first and second decks in an assembled configuration, and engagement of the guide wall structures with the receiving areas provides lateral stability for the assembled first and second decks.

24. The pallet according to claim 23, wherein each receiving area includes a plurality of ribs, and the latch tabs taper upwardly and outwardly from lower ends of the ribs and terminate in generally horizontal shoulder portions.

25. The pallet according to claim 24, wherein each support includes a plurality of ribs, and the latch receivers each include two arms attached to one of the ribs at an upper end thereof, the arms being connected by a bridge portion such that each latch receiver has a generally U-shaped appearance, wherein the bridge portion is adapted to receive the shoulder portion of the latch tab thereunder.

26. The pallet according to claim 25, wherein the latch receiver is flexible, such that engagement of the receiving areas and corresponding supports causes the latch tab to contact the bridge portion and deflect the latch receiver outwardly from its resting position, and passage of the shoulder portion past the bridge portion allows the latch receiver to return to its rest position and securely retain the latch tab therewithin.

27. The pallet according to claim 23, wherein the guide wall structures are tapered with the lower end of each guide wall structure being wider than the upper end thereof, and wherein each receiving area includes a plurality of compartments which are sized to receive the individual guide wall structures.

28. The pallet according to claim 23, wherein the pallet is generally rectangular and includes twelve supports and twelve corresponding receiving areas, the second deck having a perimeter portion and cross rails connected thereto to define large openings in the second deck, the cross rails including a longitudinal rail joined to the perimeter portion and extending along a longitudinal axis of the pallet, and two transverse rails joined to the perimeter portion and the longitudinal rail and extending parallel to a transverse axis of the pallet, wherein corner supports project from the four corners of the perimeter portion, medial supports project from each end of the longitudinal rail, and transverse supports project from the ends and midpoint of each transverse rail.

29. In a pallet comprising upper and lower decks spaced apart by a plurality of supports, wherein the supports project upwardly from the lower deck and are adapted to be received in receiving areas formed in a bottom surface of the upper deck, a latch assembly for securely joining the upper and lower decks in an assembled configuration, the latch assembly comprising:

at least one latch member disposed within each receiving area, the latch members each including a generally horizontal shoulder portion which tapers downwardly and inwardly toward a bottom surface of the receiving area; and

at least one flexible latch receiver extending upwardly from each support, the latch receivers each having a plurality of spring arms connected to the support and a receiving face attached to the arms, wherein the receiving face is adapted to receive the shoulder portion of the latch member thereunder,

wherein engagement of the receiving areas and corresponding supports causes the latch member to contact the receiving face and deflect the latch receiver outwardly from its resting position, and passage of the shoulder portion past the receiving face allows the latch receiver to return to its rest position and securely retain the latch member therewithin, thereby securing the upper and lower decks in the assembled configuration.

30. The latch assembly according to claim 29, further including guide members at least partially surrounding each latch receiver.

31. The latch assembly according to claim 30, wherein each guide member includes a wall structure having a first portion extending generally parallel to at least one latch receiver and a second portion extending along at least one side of one latch receiver.

32. The latch assembly according to claim 30, wherein the guide members are tapered with the lower end of each guide member being wider than the upper end thereof.

33. The latch assembly according to claim 32, wherein the individual guide members are adapted to be received in corresponding compartments formed in each receiving area to provide lateral stability for the assembled upper and lower decks.

* * * * *

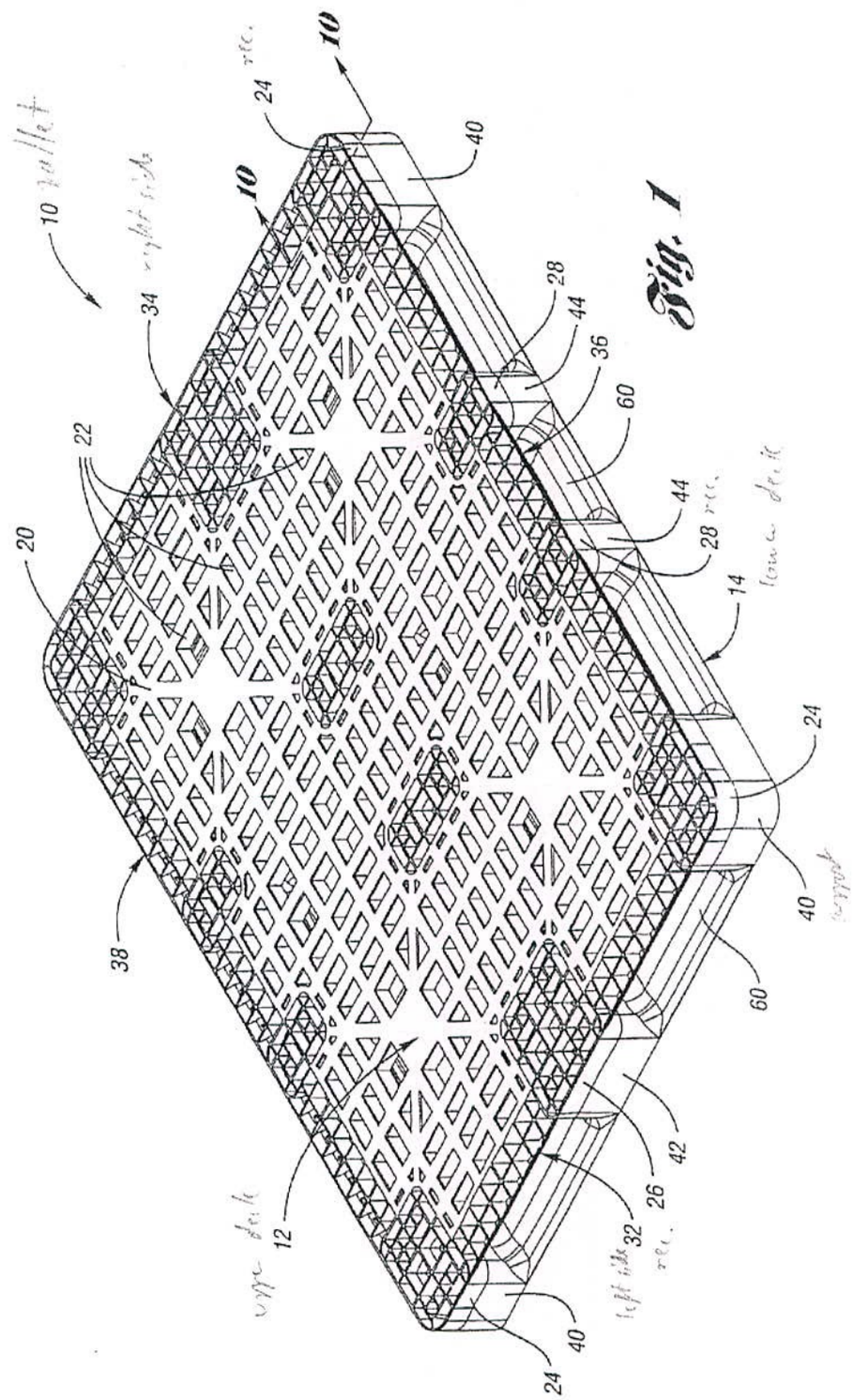


Fig. 1

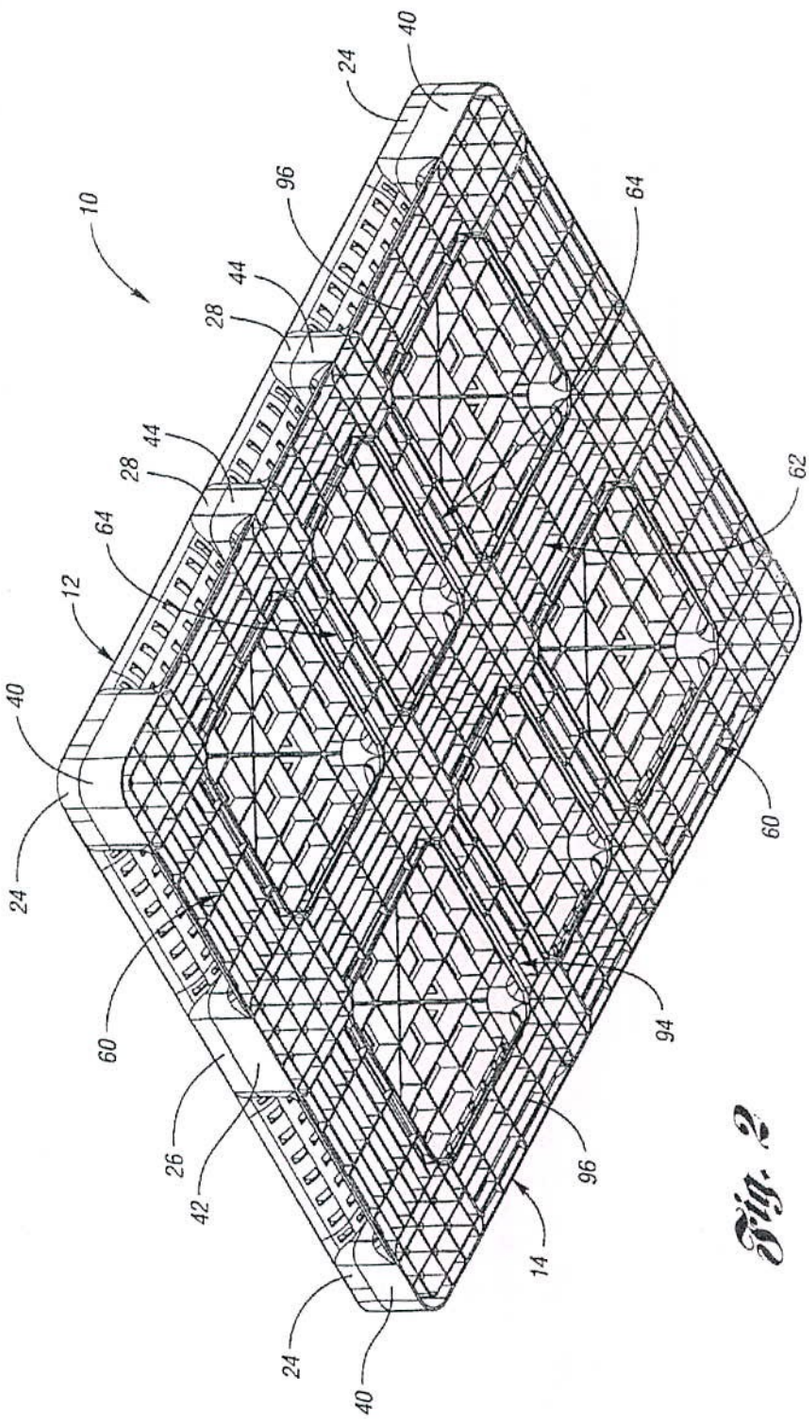


Fig. 2

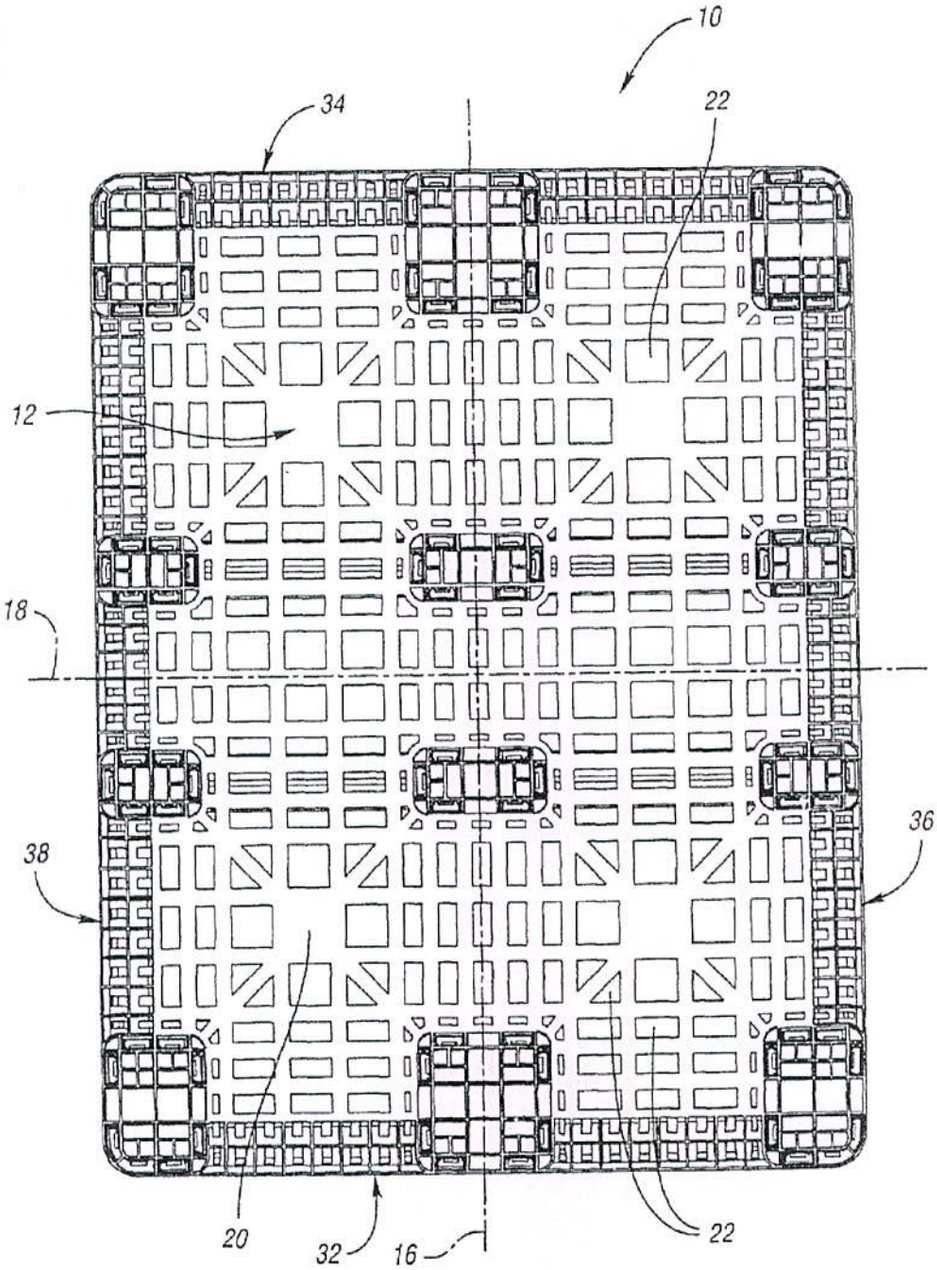


Fig. 3

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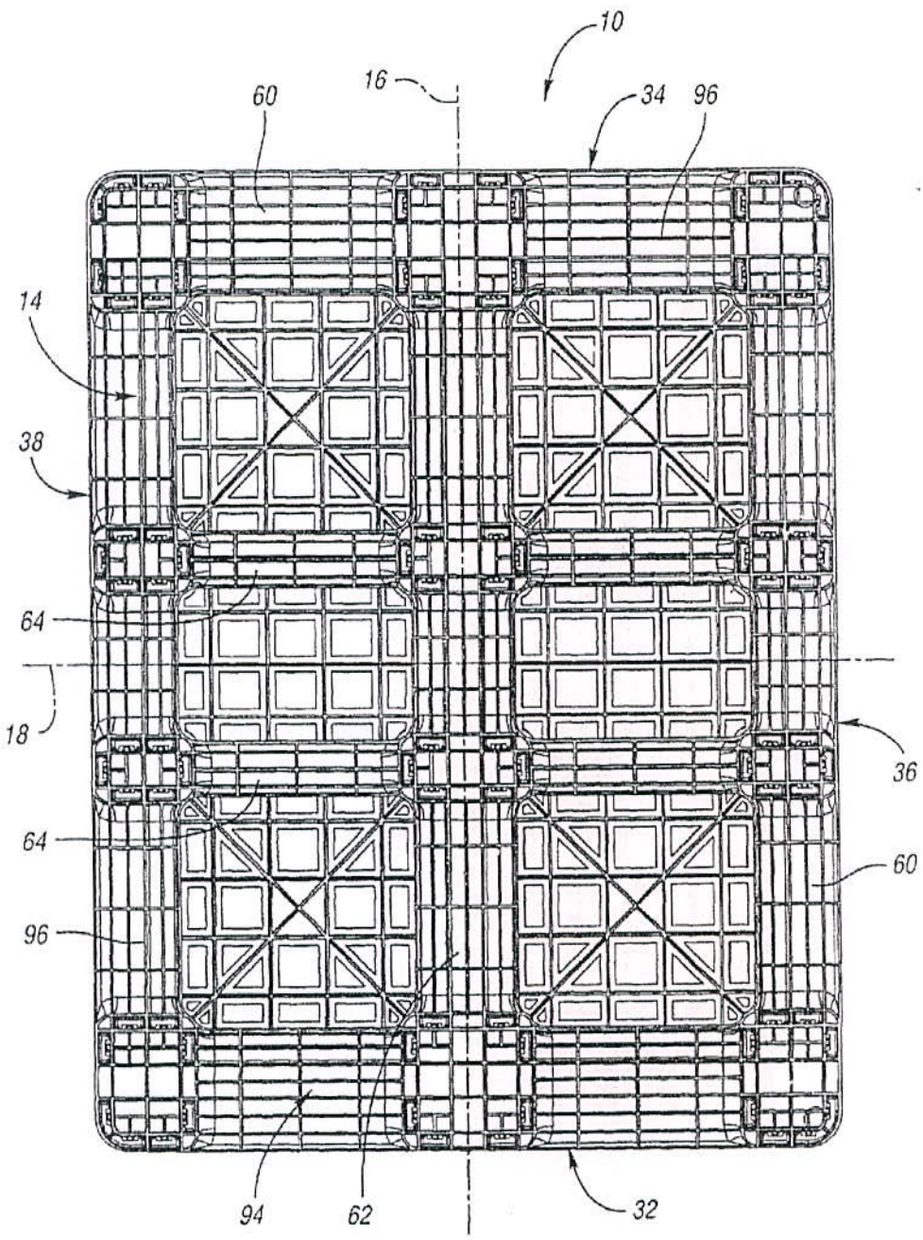


Fig. 4

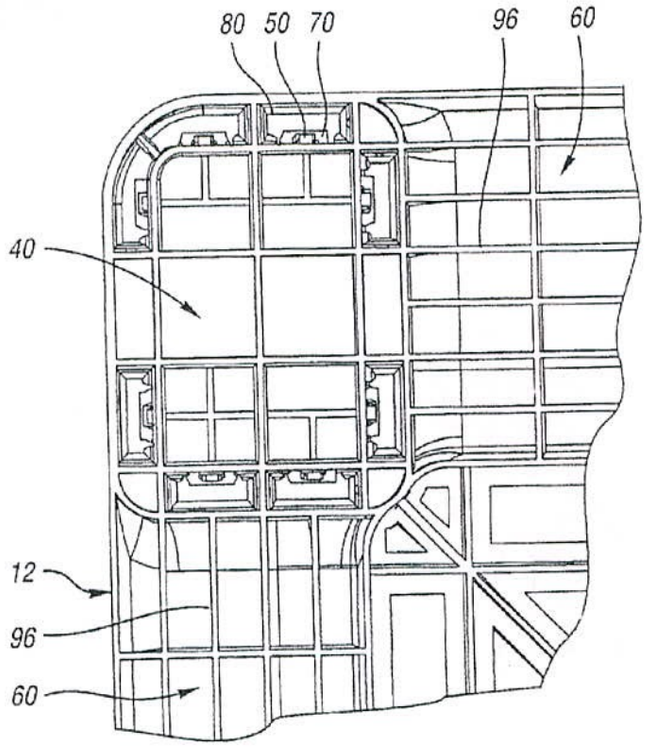


Fig. 4a

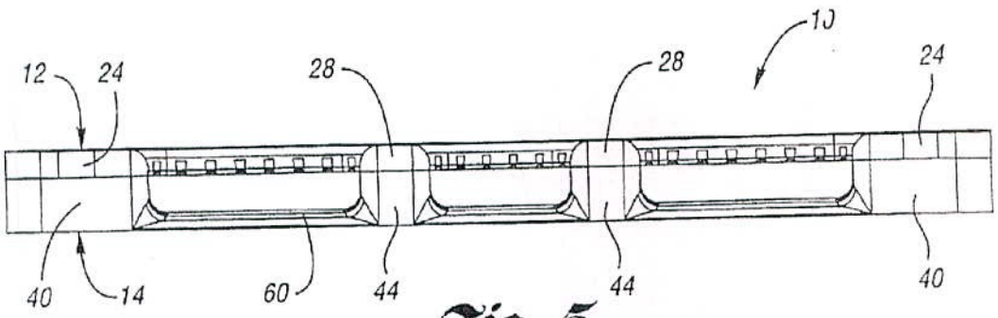


Fig. 5

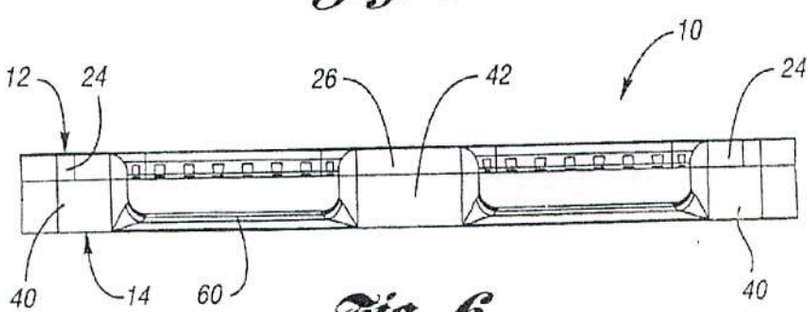


Fig. 6

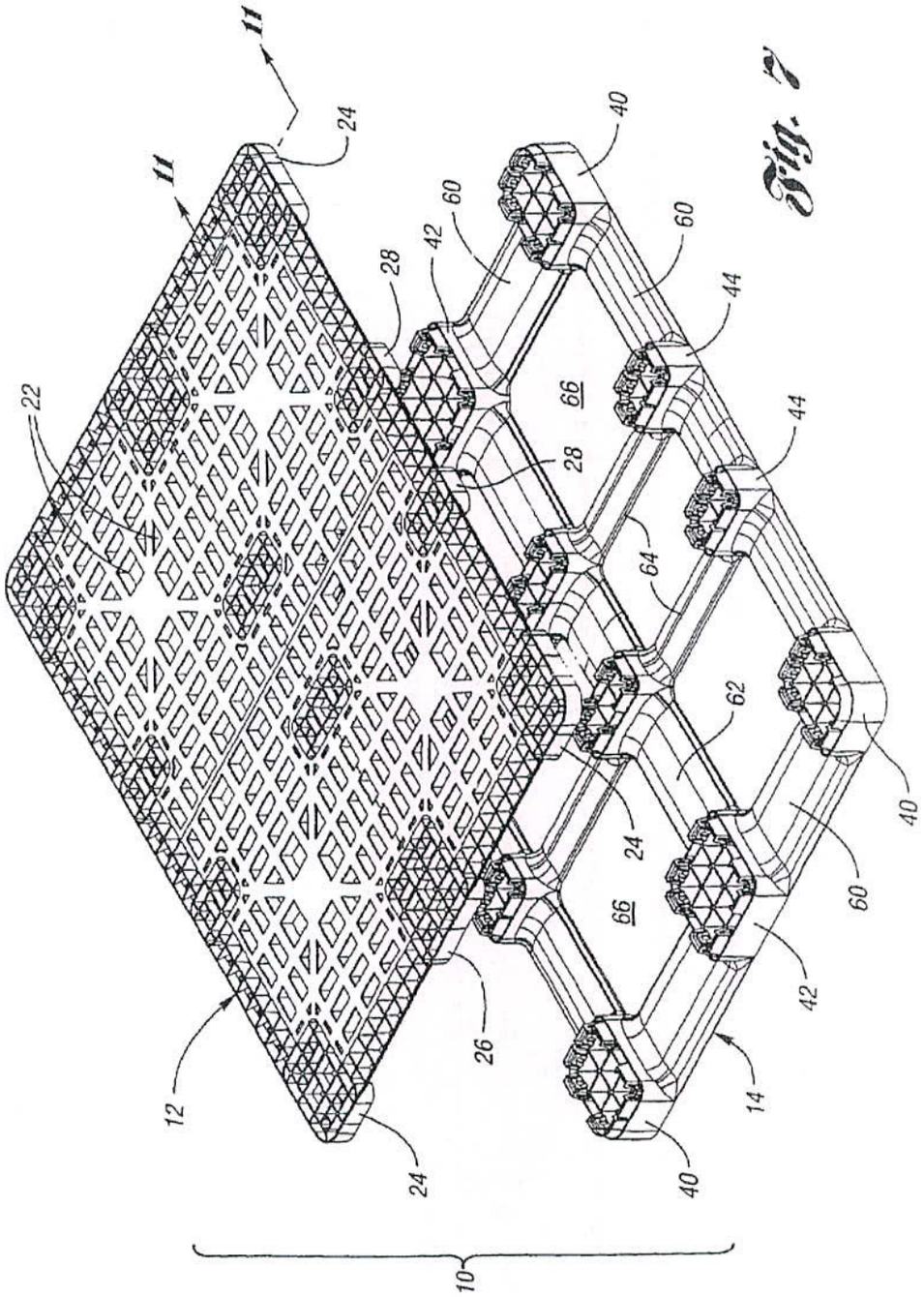

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Fig. 2

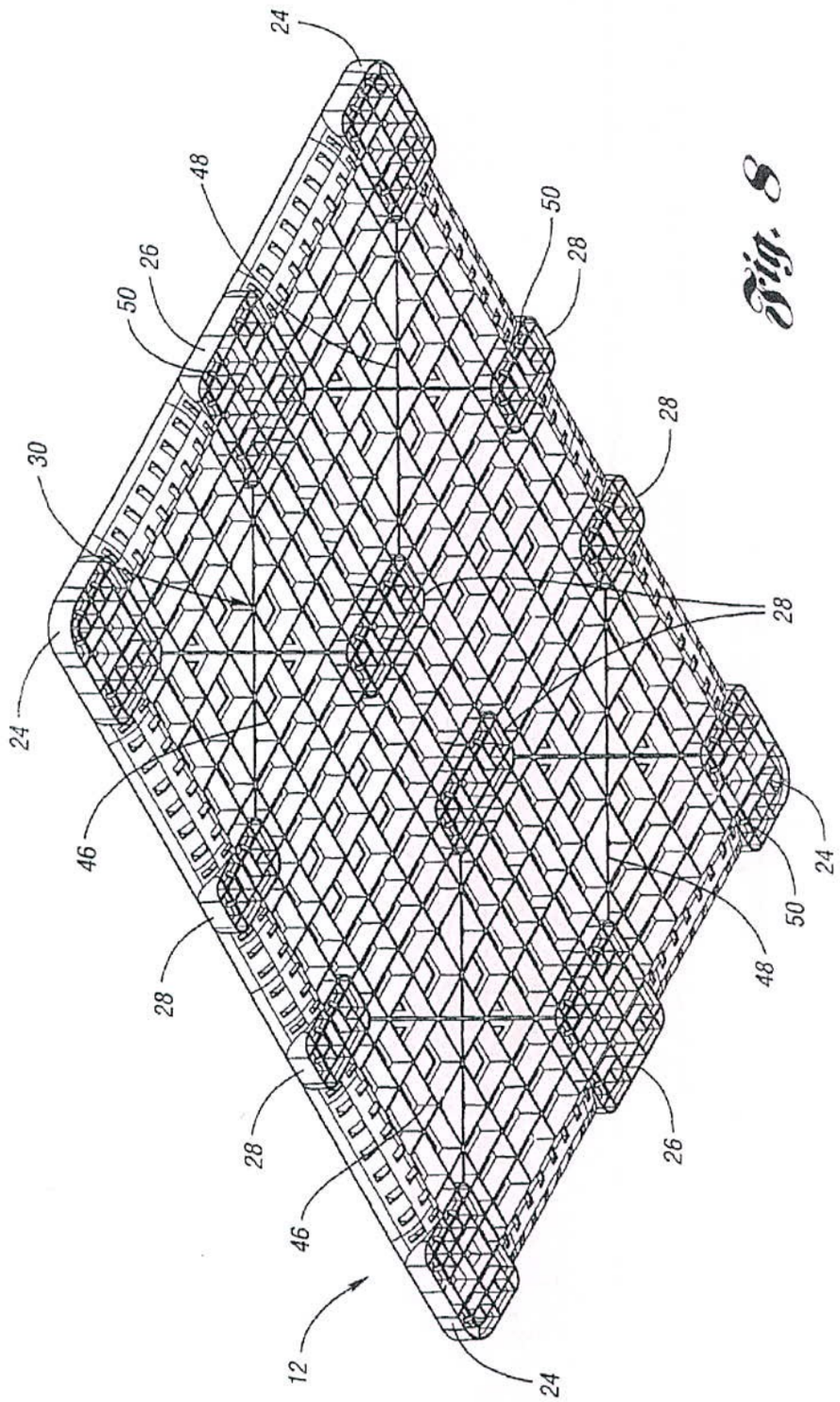


Fig. 8

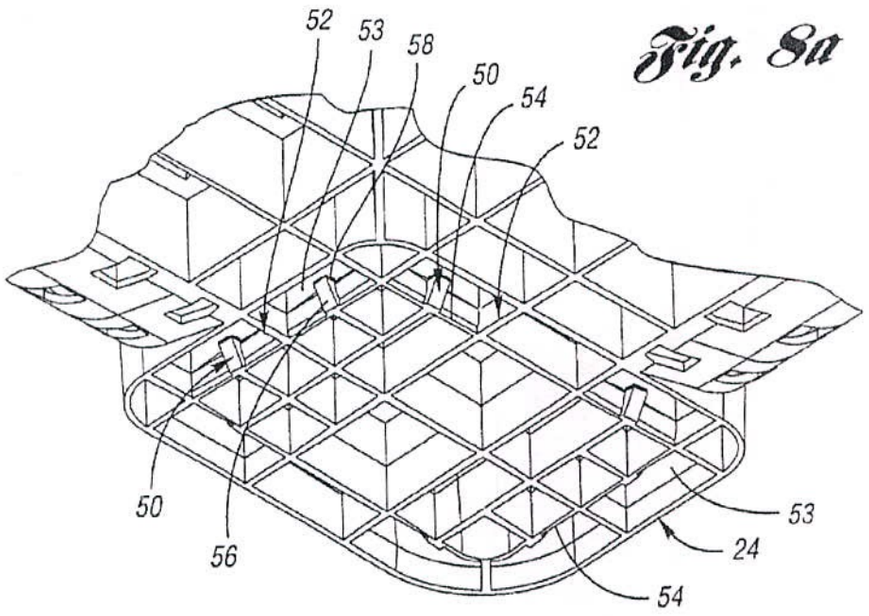

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Fig. 8a

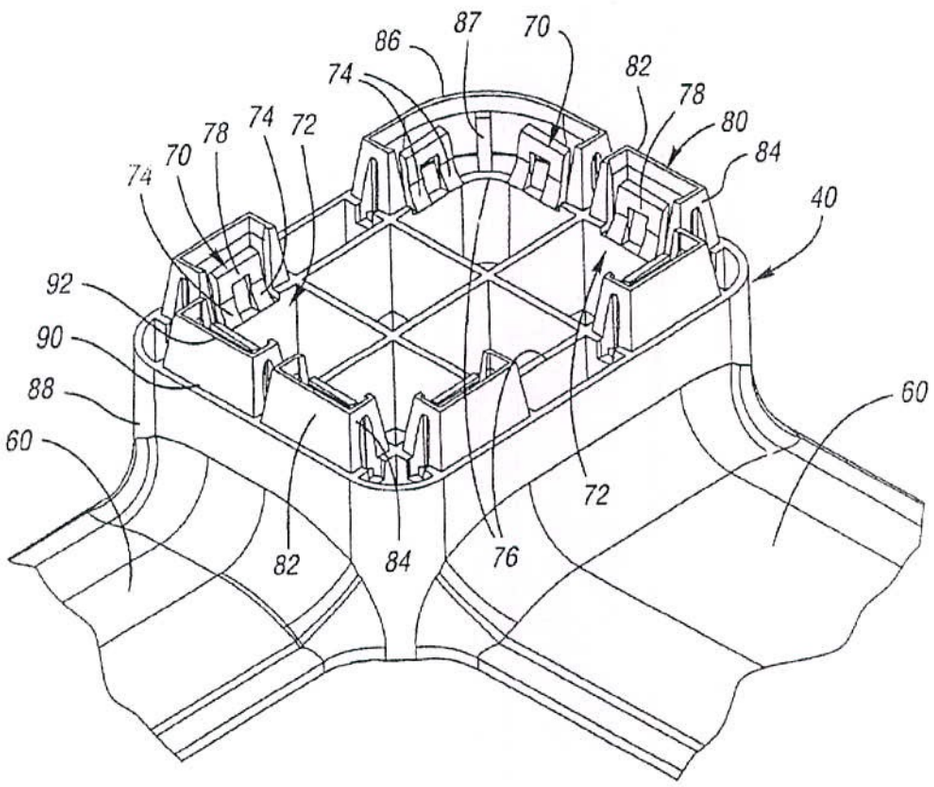

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Fig. 9a

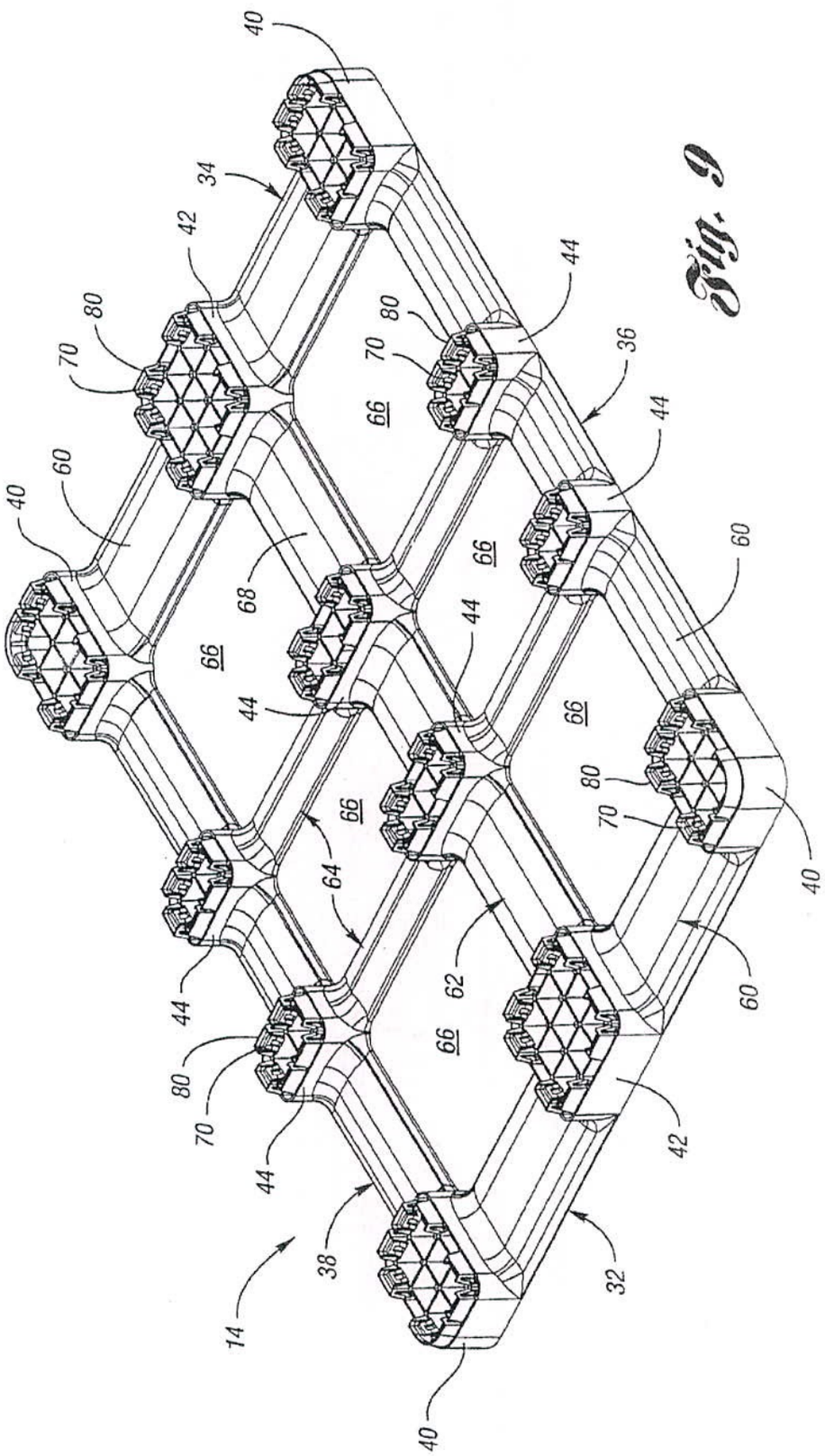


Fig. 9

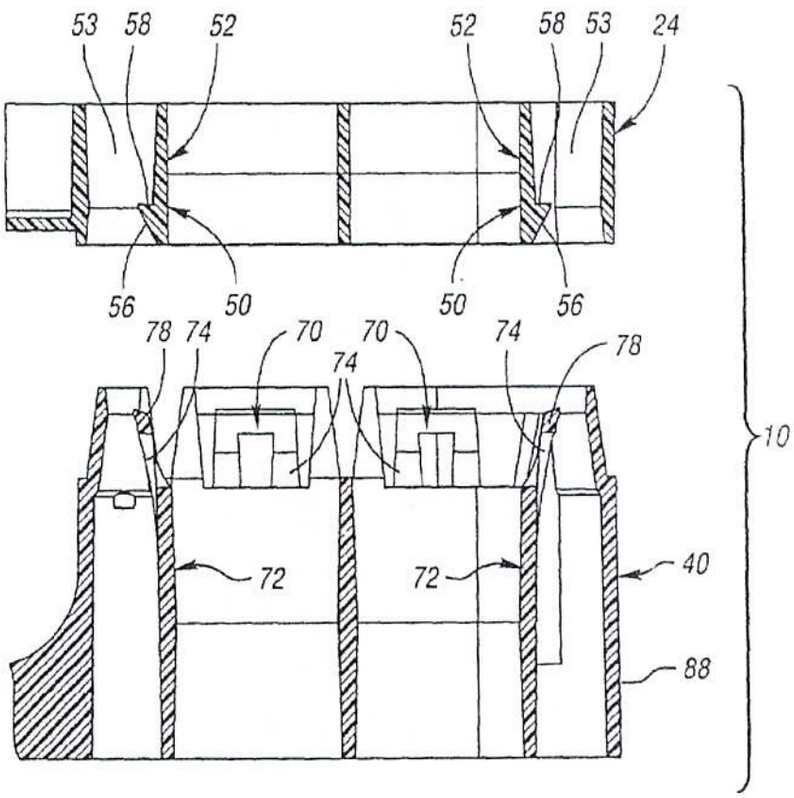

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Fig. 10

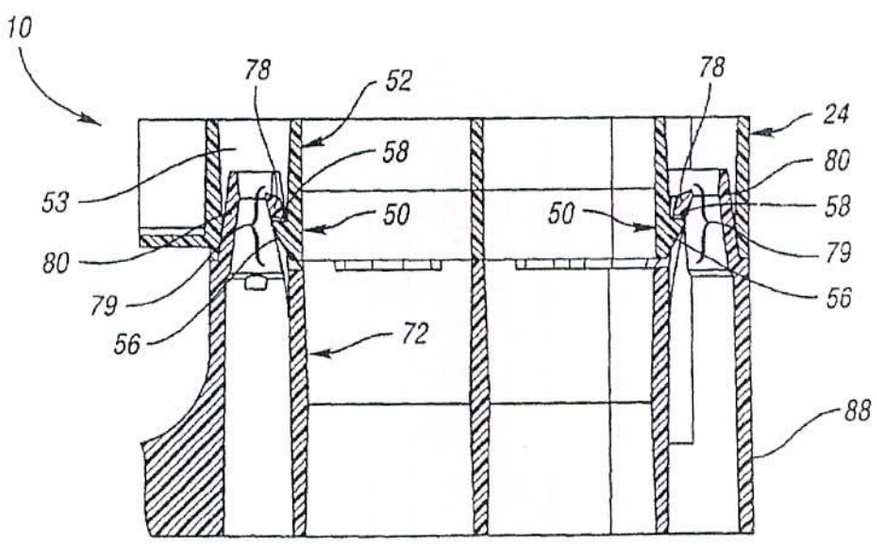

10
78
52
78
24
58
80
53
50
50
58
80
79
79
56
56
72
88

Fig. 11

US 20080236454A1

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NAIDU et al.

(54) **PLASTIC PALLET WITH SLEEVED REINFORCING RODS AND ASSOCIATED METHOD FOR MAKING THE SAME**

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Related U.S. Application Data

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Publication Classification

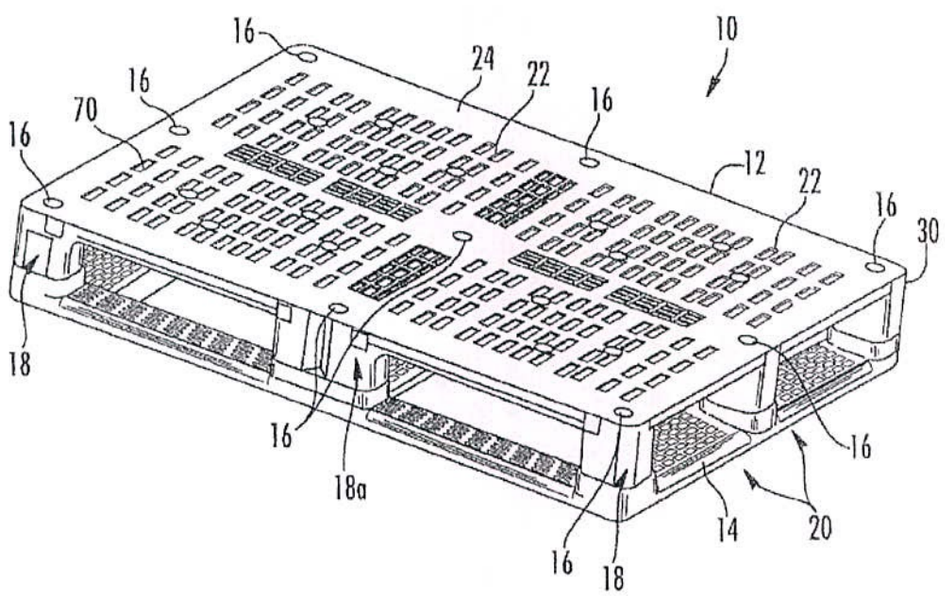
(51) **Int. Cl.**

B65D 19/06	(2006.01)
B65D 19/18	(2006.01)
F16B 19/00	(2006.01)
B23P 19/04	(2006.01)

(52) **U.S. Cl.** **108/56.1**; 108/57.25; 24/453; 29/700

(57) **ABSTRACT**

A pallet includes an upper and lower deck. The upper deck includes first joining members that project downwardly from the upper deck, with each first joining member including an outer sleeve. The lower deck includes second joining members that project upwardly from the lower deck, with second joining member including an inner sleeve. At least one of the upper and lower decks includes channels between top and bottom surfaces thereof, with each channel extending from a side edge to an opposing side edge of the corresponding deck. Sleeved reinforcing rods are in the channels. Each sleeved reinforcing rod includes a reinforcing rod having opposing ends and side surfaces therebetween, and a sleeve enclosing the side surfaces of the reinforcing rod, with there being relative movement between the sleeve and the reinforcing rod. The inner sleeves of the second joining members receive the outer sleeves of the first joining members to define a plurality of support blocks joining the upper and lower decks.



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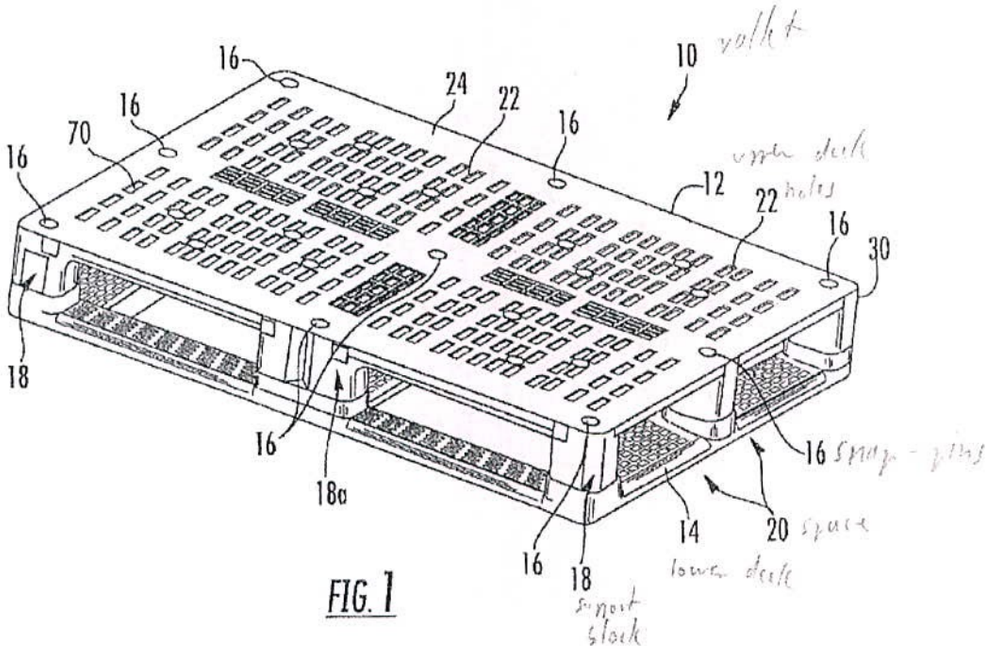


FIG. 1

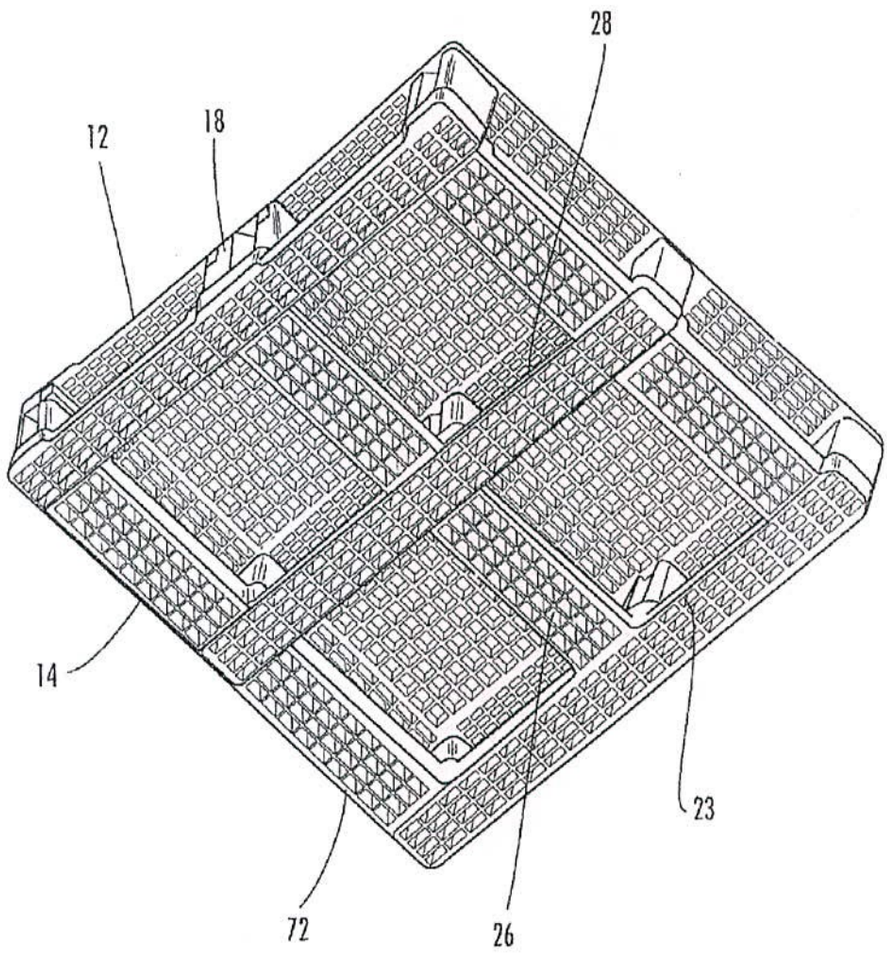


FIG. 2

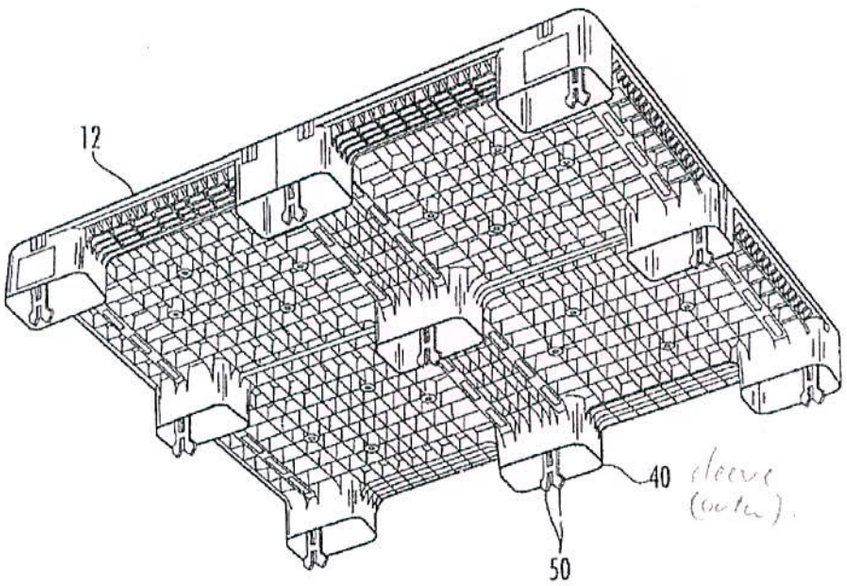


FIG. 3

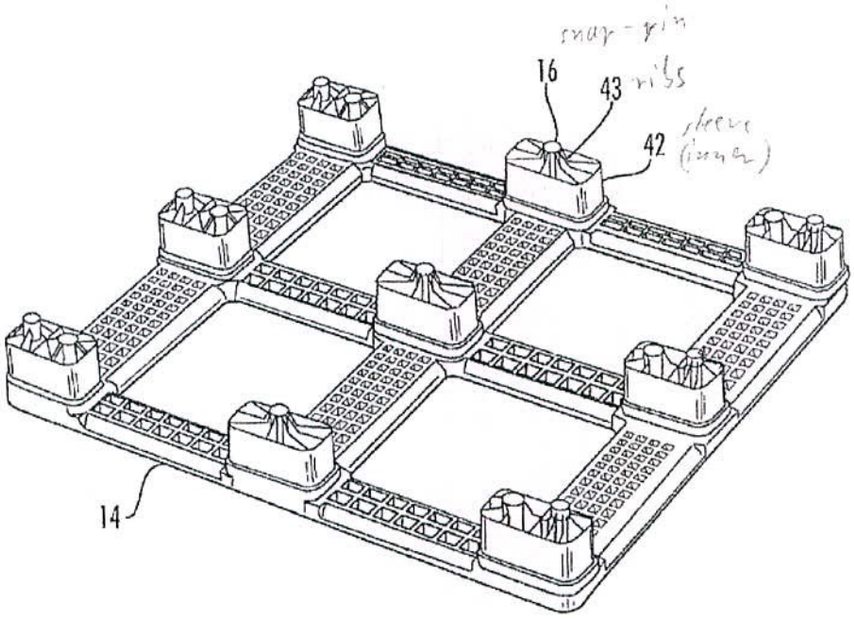


FIG. 4

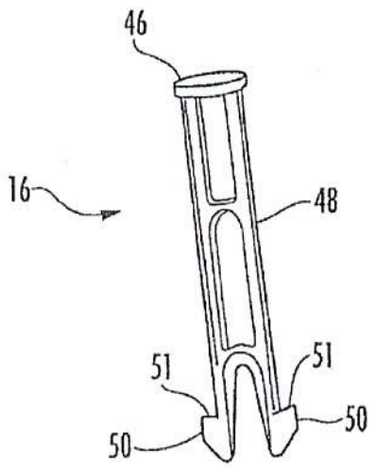


FIG. 5

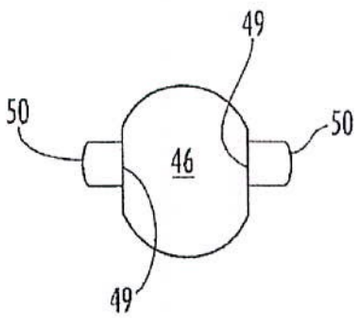


FIG. 6

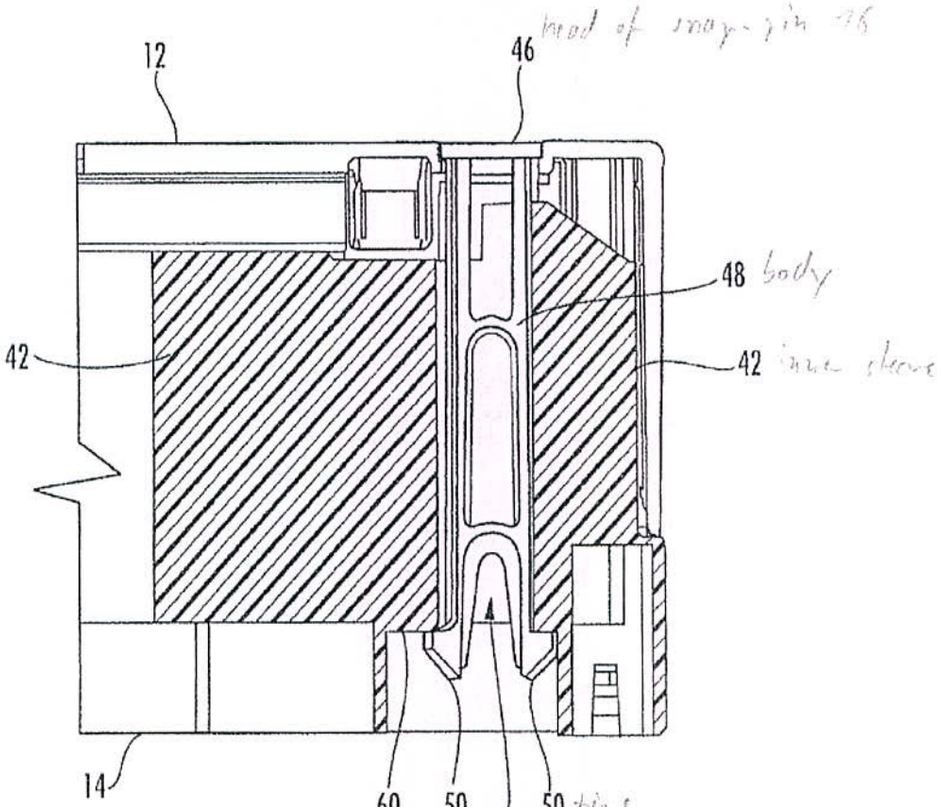


FIG. 7

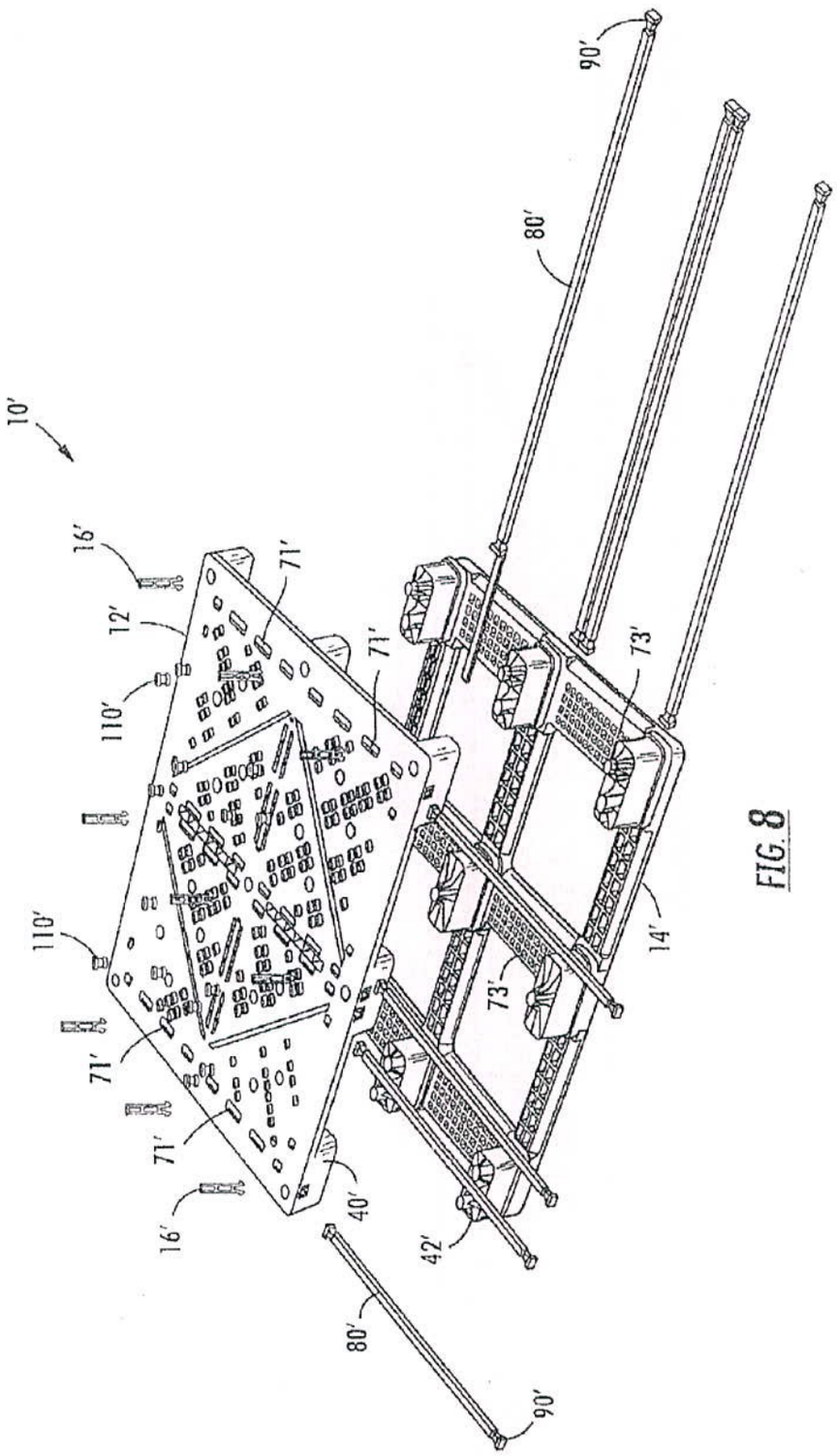


FIG. 8

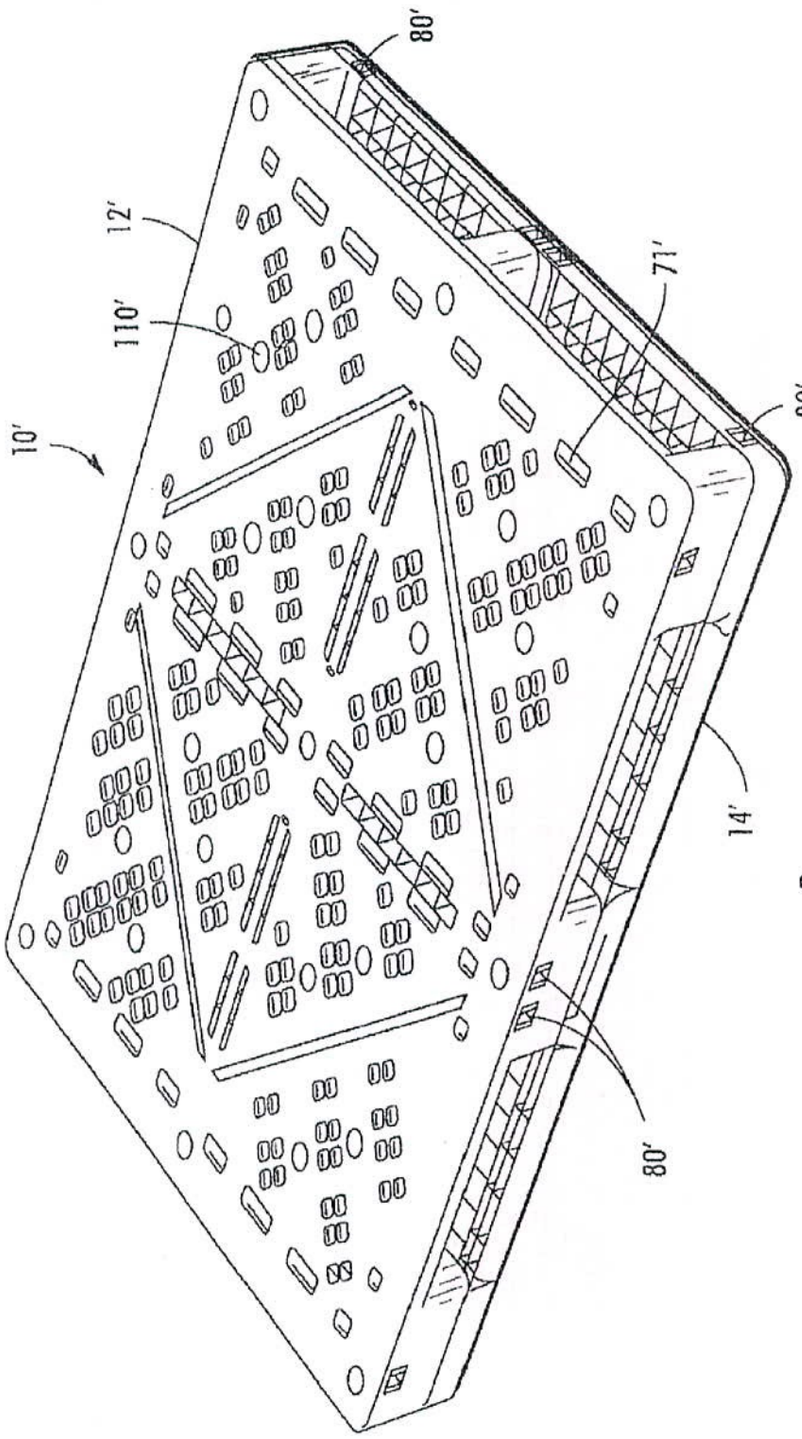


FIG. 9

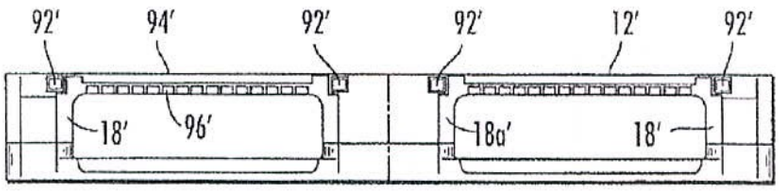


FIG. 10

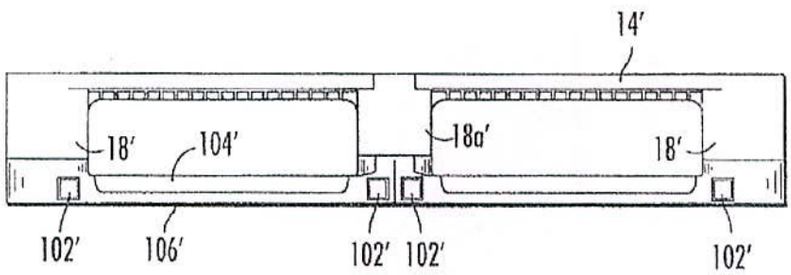


FIG. 11

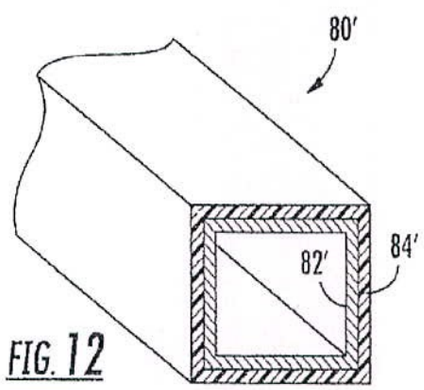


FIG. 12

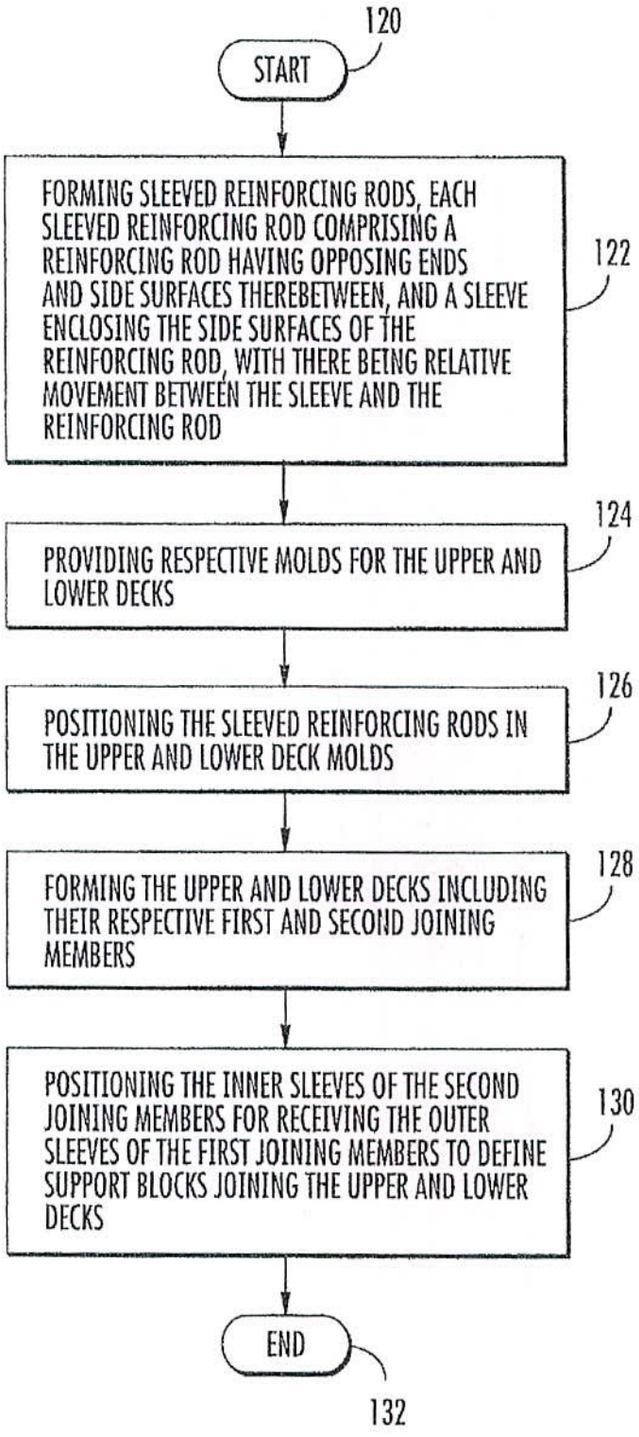

120
START
FORMING SLEEVED REINFORCING RODS, EACH SLEEVED REINFORCING ROD COMPRISING A REINFORCING ROD HAVING OPPOSING ENDS AND SIDE SURFACES THEREBETWEEN, AND A SLEEVE ENCLOSING THE SIDE SURFACES OF THE REINFORCING ROD, WITH THERE BEING RELATIVE MOVEMENT BETWEEN THE SLEEVE AND THE REINFORCING ROD
122
PROVIDING RESPECTIVE MOLDS FOR THE UPPER AND LOWER DECKS
124
POSITIONING THE SLEEVED REINFORCING RODS IN THE UPPER AND LOWER DECK MOLDS
126
FORMING THE UPPER AND LOWER DECKS INCLUDING THEIR RESPECTIVE FIRST AND SECOND JOINING MEMBERS
128
POSITIONING THE INNER SLEEVES OF THE SECOND JOINING MEMBERS FOR RECEIVING THE OUTER SLEEVES OF THE FIRST JOINING MEMBERS TO DEFINE SUPPORT BLOCKS JOINING THE UPPER AND LOWER DECKS
130
END
132

FIG. 13

PLASTIC PALLET WITH SLEEVED REINFORCING RODS AND ASSOCIATED METHOD FOR MAKING THE SAME

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application 60/909,094 filed Mar. 30, 2007, the entire contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to the field of pallets useful in material handling, and more particularly, to a multi-piece plastic pallet designed for use with forklift equipment.

BACKGROUND OF THE INVENTION

[0003] Pallets are customarily used to transport and store goods. A pallet typically includes an upper deck and a lower deck separated by support blocks. Pallets have traditionally been formed of wood. While advantageous in terms of cost, wood pallets have many disadvantages. For example, they are subject to breakage and are therefore reusable only over a short period of time. Wooden pallets are also difficult to maintain in a sanitary condition, thereby limiting their usability in applications where sanitation is important, such as in food handling applications.

[0004] With the growth of the plastics industry a wide variety of plastics have been investigated to determine their suitability for use in producing pallets. Plastic pallets can easily be molded and are stronger and lighter weight than wooden pallets. They can also be made with recyclable materials. Furthermore, plastic pallets are more durable than wooden pallets.

[0005] To increase the durability of plastic pallets, reinforcing elements or rods have been used. For example, U.S. Pat. No. 6,199,488 discloses a reinforced plastic pallet comprising an upper deck formed of a plastic material having a first coefficient of thermal expansion, and a lower deck formed of a plastic material having substantially the first coefficient of thermal expansion. The lower deck includes a plurality of channels formed in its upper surface, and a plurality of reinforcing elements having a second coefficient of thermal expansion different from the first degree of expansion are in the plurality of channels. The channels are provided with retainers to retain the reinforcing elements therein.

[0006] U.S. Pat. No. 5,868,080 discloses a reinforced plastic pallet with reinforcing rods. At least some of the reinforcing rods have an exposed surface at a top surface of the pallet. In addition to functioning as a reinforcing member, the exposed surfaces of the reinforcing rods comprise an anti-skid surface for maintaining positioning of a payload on the pallet.

[0007] Yet another approach to increase the durability of plastic pallets is disclosed in U.S. Pat. No. 4,735,154. The '154 patent provides a reinforced loading pallet comprising two essentially rectangular matching panels one superposed over the other, with each panel having a rigid frame including ties equipped with hollow, polygonal feet arranged at four outer corners of the frame. At least some of the ties in at least one of the frames are provided with channels, with at least some of the channels intersecting in a single plane. Rods are inserted into the channels for reinforcing the pallet.

[0008] While plastic pallets offer several advantages over wood pallets, there is still a demand to increase durability and strength of plastic pallets.

SUMMARY OF THE INVENTION

[0009] In view of the foregoing background, an object of the present invention is to increase the durability of plastic pallets.

[0010] This and other objects, advantages and features in accordance with the present invention are to provide a plastic pallet comprising an upper and lower deck. A plurality of first joining members may project downwardly from the upper deck, with each first joining member including an outer sleeve. A plurality of second joining members may project upwardly from the lower deck, with each second joining member including an inner sleeve. At least one of the upper and lower decks may include a plurality of channels between top and bottom surfaces thereof, with each channel extending from a side edge to an opposing side edge of the corresponding deck.

[0011] A plurality of sleeved reinforcing rods may be in the plurality of channels. Each sleeved reinforcing rod may comprise a reinforcing rod having opposing ends and side surfaces therebetween, and a sleeve enclosing the side surfaces of the reinforcing rod. There is preferably relative movement between the sleeve and the reinforcing rod. The inner sleeves of the second joining may members receive the outer sleeves of the first joining members to define support blocks joining the upper and lower decks.

[0012] The channels may be in the lower deck only, in the upper deck only, or in both the upper and lower decks. When the sleeved reinforcing rods are in both decks, the sleeved reinforcing rods in the upper deck may be orthogonal to the sleeved reinforcing rods in the lower deck. All of the sleeved reinforcing rods in a same deck may be co-planar and parallel to one another.

[0013] The sleeved reinforcing rods are inserted into upper and/or lower deck molds before the upper and lower decks are formed. The sleeved reinforcing rods are thus insert molded. Plastic pallet manufacturers typically add reinforcing rods to a pallet after the pallet is formed. This requires the pallet to be molded first, and then add the reinforcing rods. In accordance with the present invention, the sleeved reinforcing rods are inserted into the pallet mold.

[0014] The plastic of the sleeve may have a melting point that is slightly higher than the melting point of the plastic used to form the upper and lower decks. As a result, the outside surface of the sleeves will partially melt or bond to the plastic of the upper and lower decks while still allowing movement of the reinforcing rods therein. Alternatively, the melting point of the sleeve may be the same as the melting point of the upper and lower decks, but cooling characteristics of the molten plastic during manufacturing may still result in the outside surface of the sleeves partially melting or bonding to the plastic of the upper and lower decks layers without melting down to the reinforcing rods.

[0015] Each reinforcing rod may be hollow so that an opening extends between the opposing open ends thereof. The plastic pallet may further comprise a plurality of end caps inserted into the open ends of the reinforcing rods. Each reinforcing rod may comprise fluorine-containing polymers to assist with the relative movement with its sleeve.

[0016] The upper deck may further include a plurality of snap-pin openings, with each outer sleeve projecting down-

wardly from the upper deck surrounding a respective snap-pin opening. Each second joining member projecting upwardly from the lower deck may include a snap-pin receiving cavity positioned therein. Snap-pins may be inserted may be into the snap-pin openings in the upper deck, with each snap-pin extending through the snap-pin receiving cavity for engaging a backside of the inner sleeve associated therewith.

[0017] Another aspect is directed to a method for making a pallet as described above. The method may comprise forming a plurality of sleeved reinforcing rods, with each sleeved reinforcing rod comprising a reinforcing rod having opposing ends and side surfaces therebetween, and a sleeve enclosing the side surfaces of the reinforcing rod. There is relative movement between the sleeve and the reinforcing rod. The method may further comprise providing respective molds for the upper and lower decks, and positioning the sleeved reinforcing rods in the respective decks. The upper and lower decks including their respective first and second joining members are formed. The inner sleeves of the second joining members may be positioned for receiving the outer sleeves of the first joining members to define the support blocks joining the upper and lower decks.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** is a top perspective view of an assembled pallet in accordance with the present invention.

[0019] FIG. **2** is a bottom perspective view of the pallet shown in FIG. **1**.

[0020] FIG. **3** is a bottom perspective view of the upper deck of the pallet shown in FIG. **1**.

[0021] FIG. **4** is a top perspective view of the lower deck of the pallet shown in FIG. **1**.

[0022] FIG. **5** is a perspective view of a snap-pin used within each support block in accordance with the present invention.

[0023] FIG. **6** is a top view of the snap-pin shown in FIG. **5**.

[0024] FIG. **7** is a partial cross-sectional side view of a pallet illustrating a snap-pin within a support block in accordance with the present invention.

[0025] FIG. **8** is a perspective view of the pallet unassembled in accordance with the present invention.

[0026] FIG. **9** is a perspective view of the pallet shown in FIG. **8** assembled.

[0027] FIG. **10** is a side view of the pallet illustrating positioning of the channels in the upper deck in accordance with the present invention.

[0028] FIG. **11** is a side view of the pallet illustrating positioning of the channels in the lower upper deck in accordance with the present invention.

[0029] FIG. **12** is a cross-sectional view of a sleeved reinforcing rod in accordance with the present invention.

[0030] FIG. **13** is a flow chart illustrating a method for making a pallet in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0031] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout, and prime notation is used to indicate similar elements in alternative embodiments.

[0032] FIGS. **1-4** illustrate top and bottom perspective views of a pallet **10** having upper and lower decks **12**, **14** that are held together using snap-pins **16**. The upper deck **12** is also known as the cargo layer, and the lower deck **14** is also known as the base layer.

[0033] The upper deck **12** includes a plurality of first joining members that project downwardly from the upper deck, with each first joining member including an outer sleeve **40**. The lower deck **14** includes a plurality of second joining members that project upwardly from the lower deck, with each second joining member including an inner sleeve **42**. The inner sleeves **42** of the second joining members receive the outer sleeves **40** of the first joining members to define support blocks **18**, **18***a* joining the upper and lower decks **12**, **14**.

[0034] The support blocks **18**, **18***a* define a space **20** between the upper and lower decks **12**, **14** for receiving at least one lifting member, such as a tine of a pallet jack. An advantage of the snap-pins **16** is that they act as fusible links in the event a separation force is applied between the upper and lower decks **12**, **14** of the pallet **10**. This separation force may result when the wheels of the pallet jack are resting on the lower layer **14**, and the tines extending from the pallet jack are lifted upwards. This causes the upper deck **12** to become separated from the support blocks **18**, **18***a*. The tabs **50** on the fusible links **16** will snap or break when the separation force becomes too excessive. Consequently, instead of replacing the entire upper deck **12**, the snap-pins **16** with the broken tabs **50** are replaced.

[0035] As will be discussed in greater detail below, the support blocks **18**, **18***a* are formed by the outer and inner sleeves **40**, **42** extending from the respective upper and lower decks **12**, **14**. The outer and inner sleeves **40**, **42** are molded as part of their respective upper and lower decks **12**, **14**. However, the upper and lower decks **12**, **14** are separately molded.

[0036] The upper deck **12** includes a generally flat, planar surface having a plurality of holes **22** extending therethrough. Likewise, the lower deck **14** includes a generally flat, planer surface having a plurality of holes **23** extending therethrough. The holes **22**, **23** provide several benefits including a reduced surface area of the upper and lower decks **12**, **14**, increased air circulation for items placed on the upper deck, and a reduced weight of the pallet, for example. An example plastic pallet with upper and lower decks is disclosed in U.S. published patent application number 2007/0256609. This patent is assigned to the current assignee of the present invention, and is incorporated herein by reference in its entirety.

[0037] The upper deck **12** may include an outer perimeter **24** of the planar surface that does not include any holes **12**. This area may be about 3 to 5 inches wide, for example. The lower deck **14** has a perimeter shape that substantially matches the perimeter shape of the upper deck **12**. The lower deck **14** may include a rectangular perimeter shape having cross members **26**, **28** that intersect a center portion of each side of the rectangular perimeter, midway between the corners of the pallet **10**.

[0038] The upper and lower decks **12**, **14** may be molded from thermoplastic or other polymer materials, including high density polyethylene (HDPE), polypropylene (PP), among other polymer materials. As may be appreciated by

those skilled in the art, the polymer materials may be filled or unfilled and/or may include particulate or fibrous, natural or synthetic materials, among other features. For example, unfilled HDPE may provide improved impact strength, PP having strengtheners (i.e., long glass fibers) may provide improved structural properties, and unfilled PP with random copolymers may provide improved reinforcement qualities.

[0039] The upper and lower decks **12**, **14** may be molded from different thermoplastics or polymer materials. For example, the upper deck **12** may be molded from a first type of thermoplastic or polymer material, while the lower deck **12** may be molded from a second type of thermoplastic or polymer material. According to alternative embodiments, all or a portion of the upper and lower decks **12**, **14** may be constructed from materials other than plastic, such as wood and/or metal, for example.

[0040] The illustrated pallet **10** is substantially square-shaped. An example size of the pallet **10** is 48 inches by 48 inches, for example. As readily appreciated by those skilled in the art, the pallet **10** may also be formed with other rectangular shapes, such as 40 inches by 48 inches, for example. The pallet **10** may include rounded corners/edges **30** along the perimeter thereof. Rounded corners/edges **30** help to reduce and/or deflect damage during impact with the tines of a forklift, as well as providing an improved aesthetic appearance.

[0041] The illustrated pallet **10** includes a plurality of support blocks **18**, **18***a* that are provided to join the upper and lower decks **12**, **14** together as well as providing separation so that the tines of a pallet jack can be inserted therebetween. For example, the illustrated pallet **10** includes nine support blocks **18**, **18***a* that are located at the corners of the pallet, as well as between the corners of the pallet along the outer edges of the pallet. A support block **18***a* is also provided in a center of the pallet **10** at the intersection of cross members **26**, **28** in the lower deck **14**.

[0042] Each support block **18**, **18***a* is defined by an outer sleeve **40** projecting downwardly from the upper deck **12** and an inner sleeve **42** projecting upwardly from the lower deck **14**. The outer and inner sleeves **40**, **42** are molded with their respective upper and lower decks **12**, **14**. The outer and inner sleeves **40**, **42** are sized so that they overlap one another when joined together. The shapes of the outer and inner sleeves **40**, **42** are not limited to any particular shape. The outer and inner sleeves **40**, **42** may be square-shaped, triangular-shaped, oval-shaped or cross-shaped, for example. The edges of the outer sleeves **40** may be rounded.

[0043] The upper deck **12** includes a plurality of snap-pin openings for receiving the snap-pins **16**. Each outer sleeve **40** surrounds a respective snap-pin opening. The lower deck **14** includes a snap-pin receiving cavity **44** positioned within each inner sleeve **42**. A plurality of radial ribs **43** extending between the snap-pin receiving cavity **44** and the inner sleeve **42**.

[0044] An advantage of the support blocks **18**, **18***a* is that the impact energy from contact with the tines of the forklift can be dissipated among the following elements: the outer sleeve **40**, the inner sleeve **42**, the radial ribs **43** and the cylindrical core defined by the snap-pin receiving cavity **44** in the inner sleeve. The fork tines strike the outer sleeve **40** first, which absorbs most of the impact energy. The impact energy may then be transmitted to the inner sleeve **42**, which also absorbs some of the impact energy. More absorption of the impact energy takes place at the radial ribs **43**. The remaining impact energy reaches the snap-pin receiving cavity **44** for dissipation.

[0045] Each snap-pin **16** includes a head **46**, a body **48** and spaced apart tips **50**, as best illustrated in FIG. **5**. The head **46** is for engaging a snap-pin opening in the upper deck **12**. The head **46** of each snap-pin **16** may be shaped to include spaced apart straight edges **49**, as illustrated in FIG. **6**. Each snap-pin opening in the upper deck **12** is correspondingly shaped the same. This helps to hold the snap-pins **16** in place. The snap-pins **16** are typically inserted into the pallet **10** after the upper and lower decks **12**, **14** have been joined together to form the support blocks **18**, **18***a*.

[0046] The spaced apart tips **50** extend through the snap-pin receiving cavity **44** for engaging a backside **50** of the inner sleeve, as best illustrated in FIG. **7**. The snap-pin receiving cavity **44** does not extend all the way from the top of the inner sleeve **42** to the bottom of the lower deck **14**. This is to allow room for the tabs **50** on the snap-pin **16** to clear and engage the backside **60** of the inner sleeve **42**.

[0047] Even though the upper and lower decks **12**, **14** are separated in FIGS. **3** and **4**, the snap-pins **16** are positioned accordingly for illustration purposes. As illustrated in FIG. **3**, the snap-pins **16** extend within and past the outer sleeves **40**. As illustrated in FIG. **4**, the heads **46** of the snap-pins **16** are raised above the inner sleeve **42** and the snap-pin receiving cavities **44** without the lower deck **14** in place. This allows clearance for the head **46** of each snap-pin **16** to engage a snap-pin opening in the upper deck **12**, while the spaced apart tips **50** extend through the snap-pin receiving cavity **44** for engaging a backside **60** of the inner sleeve **42** associated therewith.

[0048] The spaced apart tips **50** of each snap-pin **16** resiliently extend outwards from the body **48** after having passed through the snap-pin receiving cavity **44** for engaging the backside **50** of the inner sleeve **42** associated therewith. The spaced apart tips **50** of each snap-pin **16** may be angled to facilitate insertion thereof through the snap-pin receiving cavity **44**. The spaced apart tips **50** of each snap-pin comprise a respective lip **51** for engaging the backside of the inner sleeve. The respective lips **51** are configured to break off based on an excessive separation force applied between the upper and lower decks **12**, **14**. The snap-pins **16** are also formed out of plastic. Alternatively, the snap-pins **16** may be formed out any of the materials used to form the upper and lower decks **12**, **14** as discussed in detail above.

[0049] Another aspect is directed to improving the durability of the pallet. This is accomplished by inserting sleeved reinforcing rods **80'** into the upper and/or lower molds of the pallet **10'** for the respective upper and/or lower decks **12'**, **14'**. As readily appreciated by those skilled in the art, the sleeved reinforcing rods **80'** are insert molded.

[0050] As best illustrated by the exploded view of the pallet **10'** in FIG. **8**, four sleeved reinforcing rods **80'** are used in the lower deck **14'**, and four sleeved reinforcing rods **80'** are used in the upper deck **12'**. The actual number of sleeved reinforcing rods **80'** will vary depending on the size of the pallet **10'** and its intended use, as well as on the actual number of support blocks **18'**, **18***a'*. As noted above, the sleeved reinforcing rods **80'** may be in the lower deck **14'** only, in the upper deck **12'** only, or in both the upper and lower decks. For illustration purposes, both the upper and lower decks **12'**, **14'** include sleeved reinforcing rods **80'**. The assembled pallet **10'** is illustrated in FIG. **9**.

[0051] The upper deck 12' includes channels 92 between its top and bottom surfaces 94', 96', as illustrated in FIG. 10. The upper surface of the sleeved reinforcing rod 80' is below the top surface 94' of the upper deck 12', and is above the bottom surface 96' of the upper deck 12'. Each channel 92' extends from a side edge to an opposing side edge of the upper deck 12'.

[0052] Similarly, the lower deck 14' includes channels 102' between its top and bottom surfaces 104', 106', as illustrated in FIG. 11. The upper surface of the sleeved reinforcing rod 80' is below the top surface 104' of the lower deck 14', and is above the bottom surface 106' of the lower deck 14'. Each channel 102' extends from a side edge to an opposing side edge of the lower deck 12'.

[0053] The illustrated channels 92', 102' are positioned so that they are on top or bottom of the support blocks 18', 18a'. The center support blocks 18a' may be wider than the other support blocks 18' so that the two sleeved reinforcing rods 80' in the channels 92' in the center portion of the upper deck 12' and the two sleeved reinforcing rods 80' in the channels 102' in the center portion of the lower deck 14' can each be supported by a support block yet still provide strength to the upper and lower decks. Alternatively, all of the support blocks 18', 18a' are the same size.

[0054] Referring now to FIG. 12, a sleeved reinforcing rod 80' comprises a reinforcing rod 82' having opposing ends and side surfaces therebetween, and a sleeve 84' enclosing the side surfaces of the reinforcing rod. The ends of the reinforcing rod 82' are exposed. The sleeved reinforcing rod 80' allows relative movement between the sleeve 84' and the reinforcing rod 82'.

[0055] The reinforcing rod 82' is made of metal, for example, and the sleeve 84' is made of plastic, for example. The metal may comprise steel. However, other types of metals may be used. Alternatively, the reinforcing rod 82' may comprise non-metal materials, such as reinforced fiberglass, for example.

[0056] As the pallet 10' is flexed or as the metal contracts, relative movement is needed between the reinforcing rod 82' and the plastic sleeve 84'. Consequently, the reinforcing rod 82' is simply not coated in plastic. Otherwise, the local plastic around the reinforcing rod 82' can be over stressed, resulting in cracks.

[0057] The illustrated reinforcing rod 82' has a rectangular shape, and is hollow so that an opening extends between the opposing ends thereof. In one embodiment, the sleeve 84' is extruded over the reinforcing rod 82' to form the sleeved reinforcing rod 80'. The shape of the reinforcing rod 82' may vary, and may even be filled in other embodiments. To assist with the relative movement between the reinforcing rod 82' and the sleeve 84', the reinforcing rod may comprise fluorine-containing polymers. Fluorine-containing polymers are also known as Teflon®, and includes the following: polytetrafluoroethylene (PTFE), perfluoroalkoxy (PFA) and fluorinated ethylene proplene (FEP).

[0058] Plastic pallet manufacturers typically add reinforcing rods to a pallet after the pallet is formed, as is the case for the prior art patents discussed in the background section. This requires the pallet to be molded first, and then add the reinforcing rods. In sharp contrast, the sleeved reinforcing rods 80' are inserted into the pallet mold before the upper and lower decks 12', 14' are formed therein.

[0059] The plastic of the sleeve 84' has a melting point that is slightly higher than the melting point of the plastic used to form the upper and lower decks 12', 14'. As a result, the outside surface of the sleeves 84' will partially melt or bond to the plastic of the upper and lower decks 12', 14' while still allowing movement of the reinforcing rods 82' therein. Alternatively, the melting point of the sleeve 64' is the same as the melting point of the upper and lower decks 12', 14', but cooling characteristics of the molten plastic during manufacturing still results in the outside surface of the sleeves 84' partially melting or bonding to the plastic of the upper and lower decks 12', 14' without melting down to the reinforcing rods 82'.

[0060] After the upper and lower decks 12', 14' have been formed with the sleeved reinforcing rods 80' therein, end caps 90' are used to enclose the ends of the reinforcing rods 82'. Alternatively, the ends of the sleeved reinforcing rods 80' may be closed as a result of being formed. If a plastic pallet 10' is to be recycled, the ends of the sleeve 84' are punctured or the end caps 90' are removed so that the reinforcing rod 82' can be removed therefrom for use in another pallet.

[0061] The upper and lower decks 12', 14' include additional holes 71', 73' for exposing the sleeved reinforcing rods 80'. This also allows the sleeves 84' to be punctured from the side to help in removing the reinforcing rods 82' therefrom.

[0062] The illustrated pallet 10' further includes friction plugs 110' to prevent a load from sliding over the top surface 94' of the upper deck 12'. The friction plugs 110' are inserted through corresponding openings in the upper deck 12' after the pallet 10' has been formed.

[0063] Another aspect is directed to a method for making a pallet 10' as described above. Referring now to the flow chart illustrated in FIG. 13, the method comprises from the start (Block 120), forming at Block 122 a plurality of sleeved reinforcing rods 80', with each sleeved reinforcing rod comprising a reinforcing rod 82' having opposing ends and side surfaces therebetween, and a sleeve 84' enclosing the side surfaces of the reinforcing rod. There is relative movement between the sleeve 84' and the reinforcing rod 82'.

[0064] The method further comprises providing respective molds for the upper and lower decks 12', 14' at Block 124, and positioning the sleeved reinforcing rods 80' in the respective decks at Block 126. The upper and lower decks 12', 14' including their respective first and second joining members 40', 42' are formed at Block 128. The inner sleeves of the second joining members 42' are positioned at Block 130 for receiving the outer sleeves of the first joining members 40' to define the support blocks 18', 18a' joining the upper and lower decks 12', 14'. The method ends at Block 132.

[0065] Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included as readily appreciated by those skilled in the art.

That which is claimed:

1. A pallet comprising:

an upper deck;

a plurality of first joining members that project downwardly from said upper deck, each first joining member including an outer sleeve;

a lower deck;

a plurality of second joining members that project upwardly from said lower deck, each second joining member including an inner sleeve;

at least one of said upper and lower decks including a plurality of channels between top and bottom surfaces thereof, each channel extending from a side edge to an opposing side edge of said corresponding deck;

a plurality of sleeved reinforcing rods in the plurality of channels, each sleeved reinforcing rod comprising

a reinforcing rod having opposing ends and side surfaces therebetween and

a sleeve enclosing the side surfaces of said reinforcing rod, with there being relative movement between said sleeve and said reinforcing rod; and

the inner sleeves of said plurality of second joining members receiving the outer sleeves of said plurality of first joining members to define a plurality of support blocks joining said upper and lower decks.

2. The pallet according to claim 1, wherein the plurality of channels is in both of said upper and lower decks.

3. The pallet according to claim 2, wherein said sleeved reinforcing rods in said upper deck are orthogonal to said sleeved reinforcing rods in said lower deck.

4. The pallet according to claim 1, wherein all of said sleeved reinforcing rods in said corresponding deck are coplanar and parallel to one another.

5. The pallet according to claim 1, wherein each reinforcing rod is hollow so that an opening extends between the opposing open ends thereof.

6. The pallet according to claim 5, further comprising a plurality of end caps inserted into the open ends of said plurality of sleeved reinforcing rods.

7. The pallet according to claim 1, wherein each reinforcing rod has a rectangular shape.

8. The pallet according to claim 1, wherein the at least one of said upper and lower decks including the plurality of channels comprises a material having a first melting point; and wherein each sleeve comprises a material having a second melting point higher than the first melting point.

9. The pallet according to claim 1, wherein each reinforcing rod comprises fluorine-containing polymers.

10. The pallet according to claim 1, wherein said upper deck includes a plurality of snap-pin openings, with each outer sleeve projecting downwardly from said upper deck surrounding a respective snap-pin opening; wherein each second joining member projecting upwardly from said lower deck including a snap-pin receiving cavity positioned therein; and further comprising a plurality of snap-pins inserted into the plurality of snap-in openings in said upper deck, with each snap-pin extending through the snap-pin receiving cavity for engaging a backside of the inner sleeve associated therewith.

11. The pallet according to claim 10, wherein each snap-pin comprises a head at one end thereof for engaging a snap-pin opening, and spaced apart tips at an opposite end thereof for extending through the snap-pin receiving cavity for engaging a backside of the inner sleeve associated therewith.

12. The pallet according to claim 11, wherein the spaced apart tips resiliently extend outwards from the snap-pin receiving cavity after having passed therethrough.

13. The pallet according to claim 12, wherein the spaced apart tips of each snap-pin are angled to facilitate insertion thereof through the snap-pin receiving cavity.

14. The pallet according to claim 11, wherein the spaced apart tips of each snap-pin comprise a respective lip for engaging the backside of the inner sleeve; and wherein the respective lips of each snap-pin are configured to break off based on a separation force applied between said upper and lower decks.

15. The pallet according to claim 1, wherein said upper and lower decks, said plurality of first and second joining members, and said sleeves comprise plastic.

16. A plastic pallet comprising:

an upper deck comprising plastic having a first melting point;

a plurality of first joining members that project downwardly from said upper deck, each first joining member including an outer sleeve;

a lower deck comprising plastic having the first melting point;

a plurality of second joining members that project upwardly from said lower deck, each second joining member including an inner sleeve;

at least one of said upper and lower decks including a plurality of channels between top and bottom surfaces thereof;

a plurality of sleeved reinforcing rods in the plurality of channels, each sleeved reinforcing rod comprising

a reinforcing rod having opposing ends and side surfaces therebetween, and

a sleeve enclosing the side surfaces of said reinforcing rod, with there being relative movement between said sleeve and said reinforcing rod, said sleeve comprising plastic having a second melting point higher than the first melting point; and

the inner sleeves of said plurality of second joining members receiving the outer sleeves of said plurality of first joining members to define a plurality of support blocks joining said upper and lower decks.

17. The plastic pallet according to claim 16, wherein the plurality of channels is in both of said upper and lower decks.

18. The plastic pallet according to claim 17, wherein said sleeved reinforcing rods in said upper deck are orthogonal to said sleeved reinforcing rods in said lower deck.

19. The pallet according to claim 16, wherein each reinforcing rod is hollow so that an opening extends between the opposing open ends thereof.

20. The plastic pallet according to claim 19, further comprising a plurality of end caps inserted into the open ends of said plurality of sleeved reinforcing rods.

21. The plastic pallet according to claim 16, wherein each reinforcing rod has a rectangular shape

22. The plastic pallet according to claim 16, wherein each reinforcing rod comprises fluorine-containing polymers.

23. The plastic pallet according to claim 16, wherein said upper deck includes a plurality of snap-pin openings, with each outer sleeve projecting downwardly from said upper deck surrounding a respective snap-pin opening; wherein each second joining member projecting upwardly from said lower deck including a snap-pin receiving cavity positioned therein; and further comprising a plurality of snap-pins inserted into the plurality of snap-in openings in said upper deck, with each snap-pin extending through the snap-pin receiving cavity for engaging a backside of the inner sleeve associated therewith.

24. The plastic pallet according to claim 23, wherein each snap-pin comprises a head at one end thereof for engaging a snap-pin opening, and spaced apart tips at an opposite end

thereof for extending through the snap-pin receiving cavity for engaging a backside of the inner sleeve associated therewith.

25. A method for making a pallet comprising an upper deck; a plurality of first joining members that project downwardly from the upper deck, each first joining member including an outer sleeve; a lower deck; a plurality of second joining members that project upwardly from the lower deck, each second joining member including an inner sleeve; at least one of the upper and lower decks including a plurality of channels between top and bottom surfaces thereof, the method comprising:

forming a plurality of sleeved reinforcing rods, each sleeved reinforcing rod comprising a reinforcing rod having opposing ends and side surfaces therebetween, and a sleeve enclosing the side surfaces of the reinforcing rod, with there being relative movement between the sleeve and the reinforcing rod;

providing respective molds for the upper and lower decks;

positioning the plurality of sleeved reinforcing rods in at least one of the deck molds corresponding to the at least one upper and lower deck including the plurality of channels;

forming the upper and lower decks including their respective first and second joining members; and

positioning the inner sleeves of the plurality of second joining members for receiving the outer sleeves of the plurality of first joining members to define a plurality of support blocks joining the upper and lower decks.

26. The method according to claim 25, wherein the plurality of channels is in both of the upper and lower decks so that the plurality of sleeved reinforcing rods are positioned in both of the upper and lower deck molds.

27. The method according to claim 26, wherein the sleeved reinforcing rods in the upper deck are orthogonal to the sleeved reinforcing rods in the lower deck.

28. The method according to claim 25, wherein each reinforcing rod is hollow so that an opening extends between the opposing open ends thereof; and further comprising inserting a plurality of end caps into the open ends of the plurality of sleeved reinforcing rods.

29. The method according to claim 25, wherein forming each sleeved reinforcing rod comprises extruding the sleeve over the reinforcing rod.

30. The method according to claim 25, wherein the at least one of the upper and lower decks including the plurality of channels comprises a material having a first melting point; and wherein each sleeve comprises a material having a second melting point higher than the first melting point.

31. The method according to claim 25, wherein each reinforcing rod comprises fluorine-containing polymers.

32. The method according to claim 25, wherein the upper deck includes a plurality of snap-pin openings, with each outer sleeve projecting downwardly from the upper deck surrounding a respective snap-pin opening; wherein each second joining member projecting upwardly from the lower deck including a snap-pin receiving cavity positioned therein; and further comprising inserting a plurality of snap-pins into the plurality of snap-in openings in the upper deck, with each snap-pin extending through the snap-pin receiving cavity for engaging a backside of the inner sleeve associated therewith.

33. The method according to claim 25, wherein the upper and lower decks, the plurality of first and second joining members, and the sleeves comprise plastic.

* * * * *

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(54) TRANSPORT PALLET

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(22) Filed: **Dec. 19, 2006**

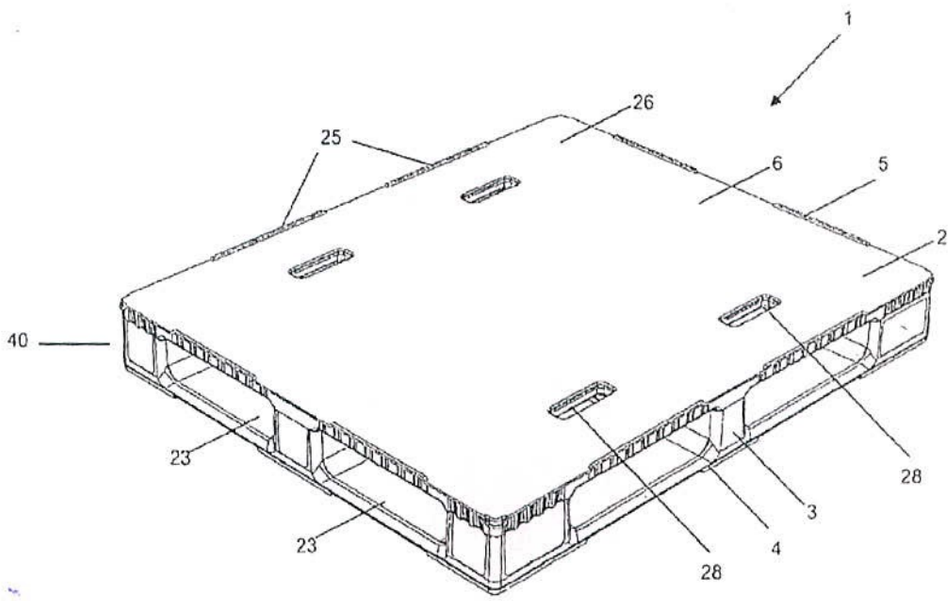
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(57) ABSTRACT

Pallet for the movement of goods with several individual parts, which are connected to each other: A loading part 6 comprises a planar slab and the goods to be transported are placed on a loading surface 26 of the loading part. Underneath the loading part are arranged a reinforcement section 5, a frame center section 3 and a frame floor section 4. A flame protection coating of the individual parts of the pallet effects fire resistance in the event of a fire.



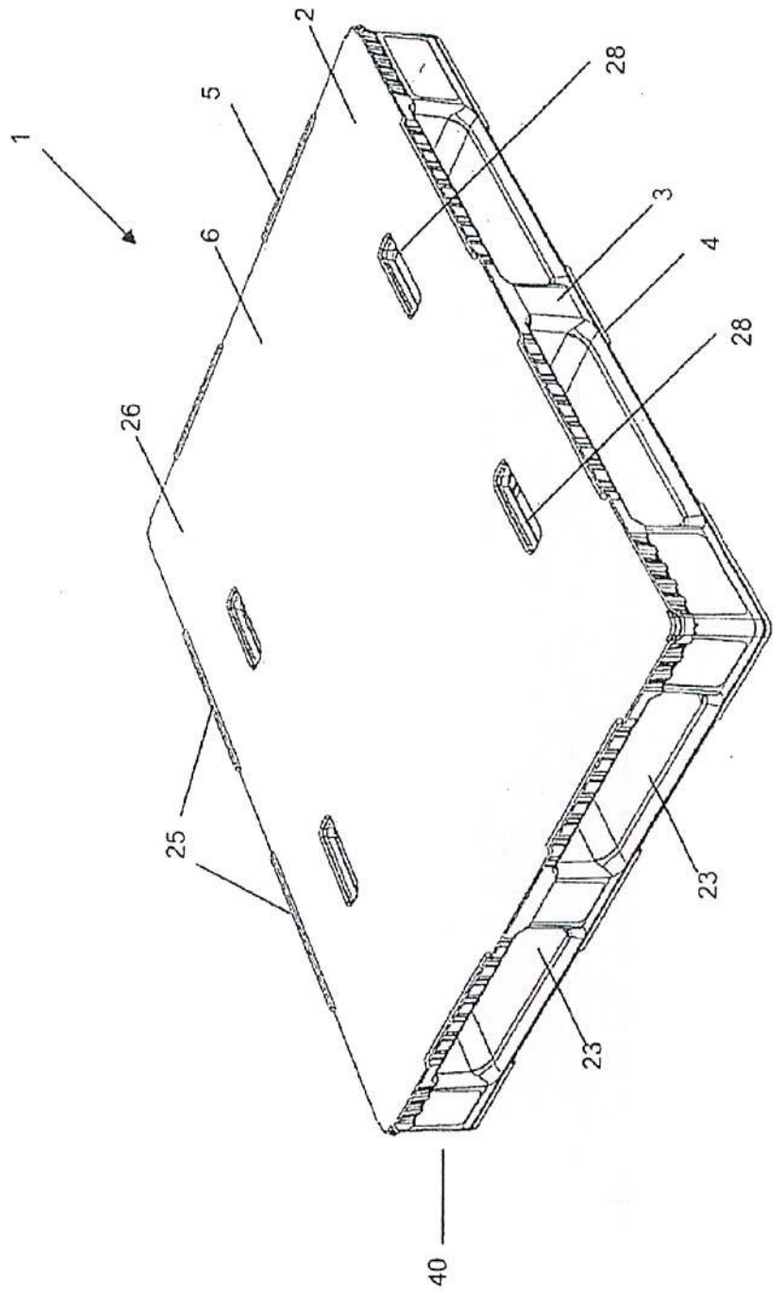


Fig. 1

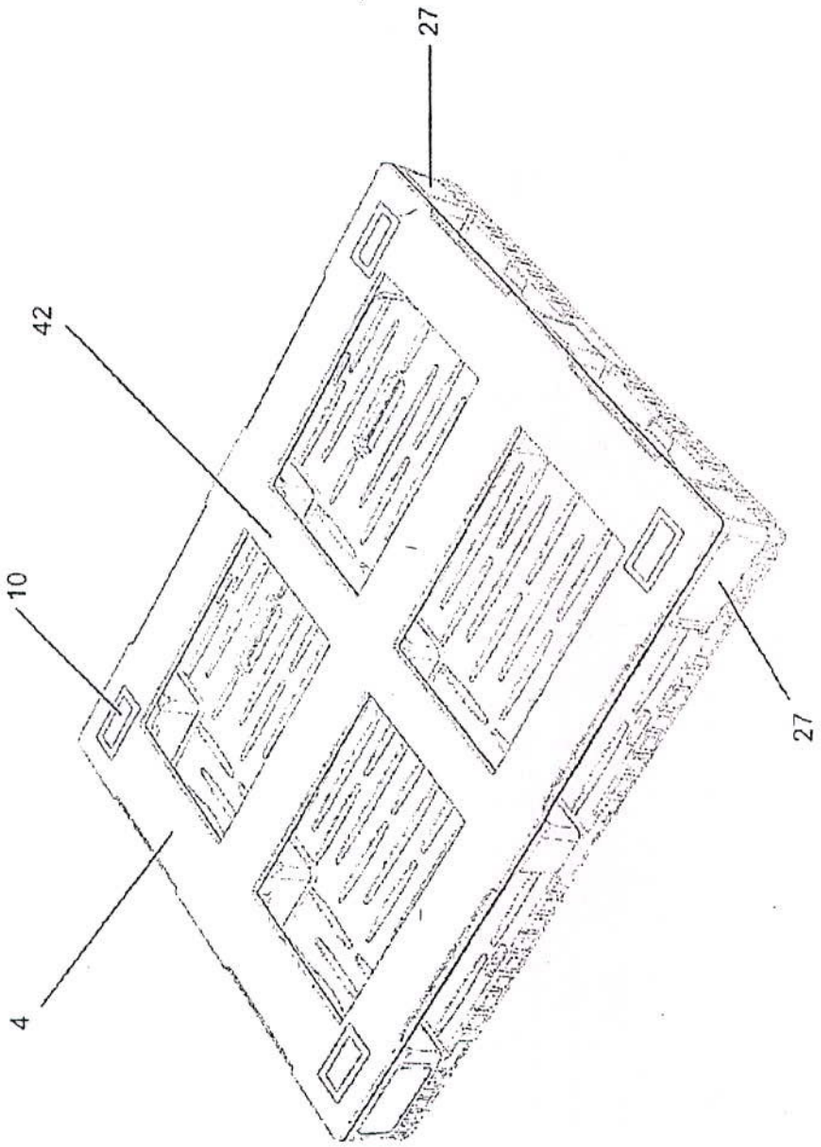


Fig. 2

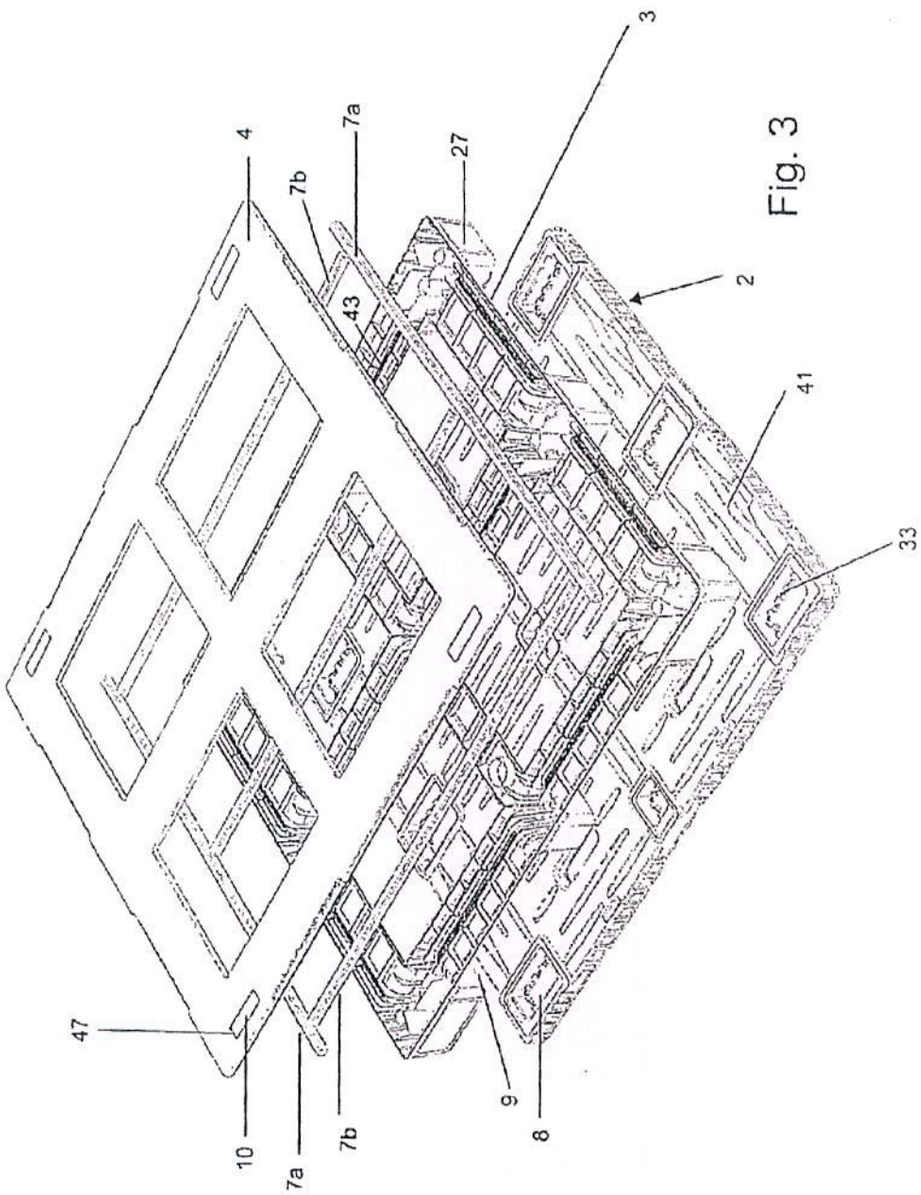


Fig. 3

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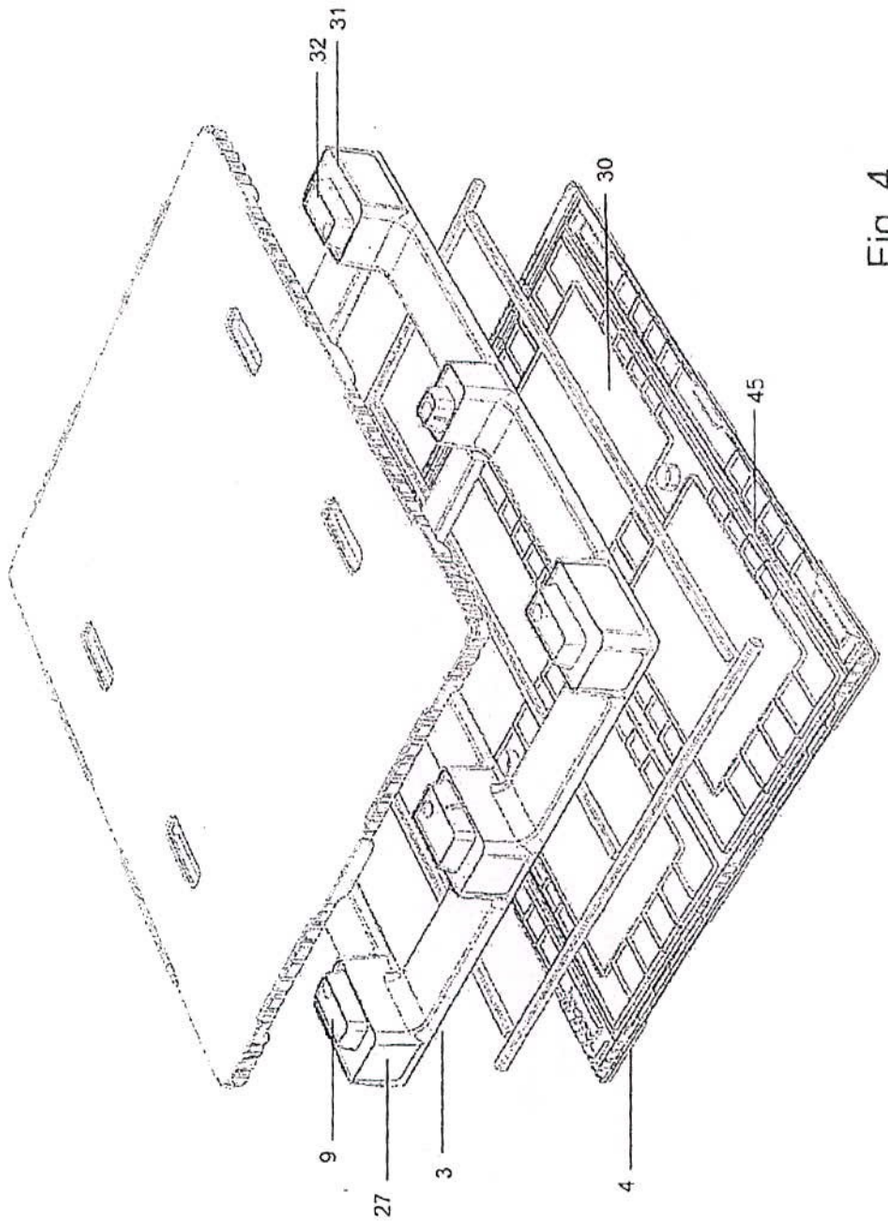


Fig. 4

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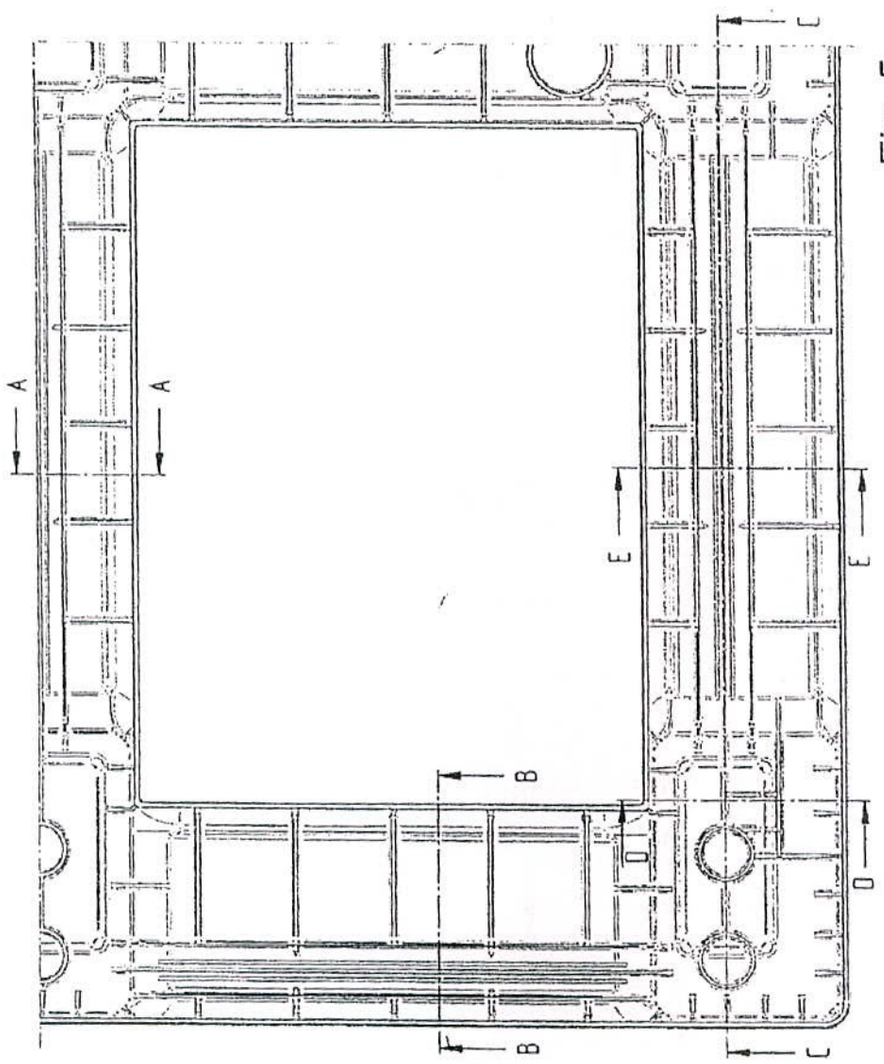


Fig. 5

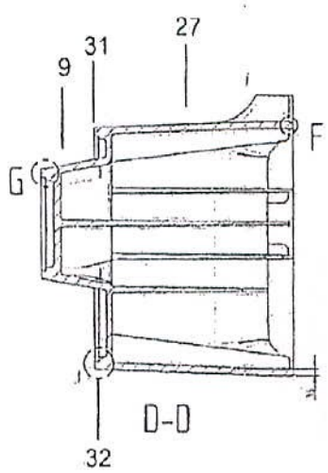
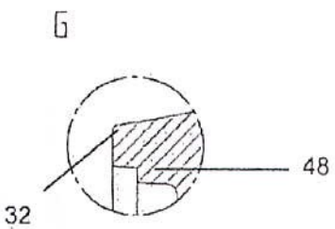


Fig. 6

Fig. 7



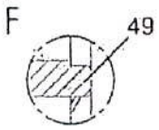


Fig. 8

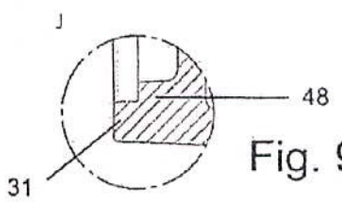


Fig. 9

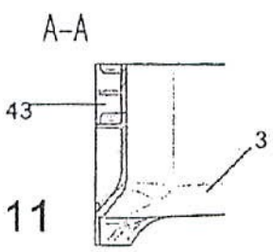


Fig. 11

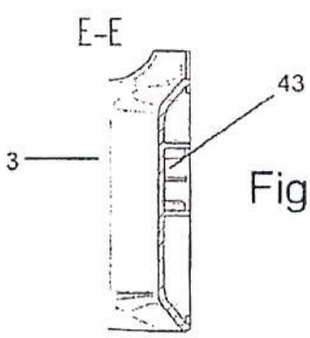


Fig. 10

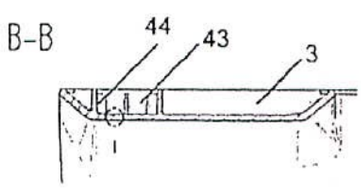


Fig. 12

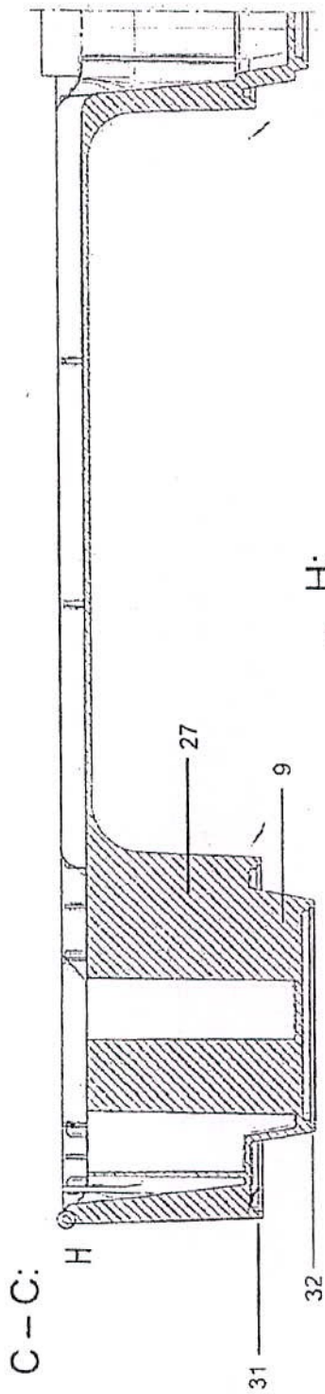


Fig. 13

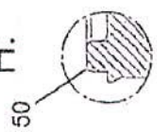


Fig. 14

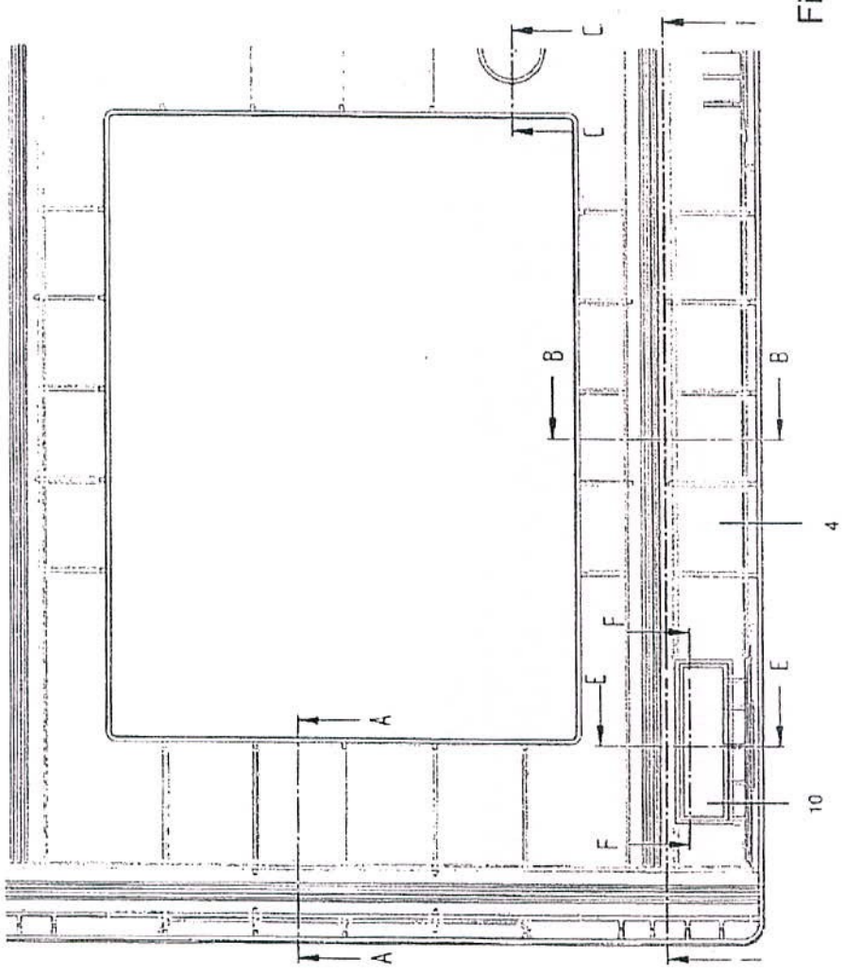


Fig. 15

F-F Fig. 16





Fig. 17



Fig. 19

B-B

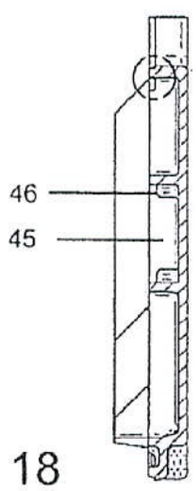


Fig. 18

E-E

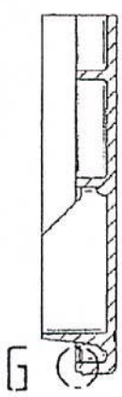


Fig. 20

TRANSPORT PALLET

FIELD OF THE INVENTION

[0001] The present invention relates generally to a pallet for the movement of goods.

BACKGROUND OF THE INVENTION

[0002] For the transport of goods, transport pallets, especially Euro pallets, are well-known, which are traditionally made of wood. Furthermore, pallets manufactured from plastic are also common, which, in addition to having a low weight, have better resistance to aging and are better to clean in comparison to wood. Many well-known pallets, however, have a relatively low torsional rigidity. They therefore cannot be readily subjected to asymmetric heavy loads. This reduces the scope of application.

[0003] Furthermore, the problem arises in the case of plastic pallets that the plastic is flammable such that, in the event of a fire, toxic gases can develop. This, too, leads to a fundamentally undesirable restriction on the pallet's scope of application.

[0004] The object of the present invention is to create a pallet whose scope of application is increased.

SUMMARY OF THE INVENTION

[0005] The pallet described here has an upper section and a frame section, wherein the upper section has a loading part with loading surface and a reinforcement section that have a material-fit connection to each other. The frame section comprises a frame center section and a frame floor section, which likewise have a material-fit connection to one another. Furthermore, the frame center section corresponds to the size of the loading surface and, at least at its corners, has spacers which point toward the upper section and via which the frame center section is connected to the upper section. At their end faces, the spacers have elevations which are inwardly offset in steps. For accommodating these elevations, the reinforcement section has recesses at its lower surface. The frame center section likewise has a material-fit connection to the reinforcement section in the area of the end-face spacers. Alternatively or additionally, the aforementioned connection can be in the area of the elevations. The pallet in accordance with the invention is substantially torsionally stiffer than well-known pallets, because the upper section and the frame section reinforcing it are much better connected to one another. This increases its scope of application such that it is more economically applicable.

[0006] The loading part, the reinforcement section, the frame center section and the frame floor section are preferably made from plastic, especially an elastomer plastic, with a material such as polypropylene or polyethylene suitable for use. Parts made from such a plastic lend themselves readily to material-fit connections. The aforementioned connections between the parts are of a material-fit type effected by a welding method, with hot-plate welding especially suitable. Hot-plate welding is one of those heating element welding methods in which heating elements heat the contact area to be welded until the material in the areas concerned softens, and then the heating elements are removed from the heated area. The components to be welded are then positioned against each other and aligned with each other under compressive force. Material in the area to be welded deforms fluidly and, in flowing, creates the material connection. Preferably, heating is performed not as far as the melting point of the plastic, but only to above the softening point.

[0007] For the purpose of supporting the welding process, at least a first welding rib is molded on to the spacers at the end face, said rib pointing toward the reinforcement section and serving as welding material during welding of the frame center section to the reinforcement section. The first welding rib of the spacer is advantageously closely molded on at a peripheral outside edge of the spacer and points upward and away from the frame center section. The rigidity of the connection is increased by the outer welding rib.

[0008] Further, at least a second welding rib is molded on advantageously at the end face of the elevations, said rib pointing toward the reinforcement section and serving as welding material during welding of the frame center section and the reinforcement section. The first and second welding ribs both have the same alignment, which is parallel to the loading surface. Thus, the welding planes defined by the first and second welding ribs are accordingly parallel to the loading surface. The second welding rib is thereby arranged closer to the loading surface than the first welding rib. Due to this vertical offset, correspondingly offset welding regions are produced, which, through their different positioning, serve to improve retention of the elevations in the recesses. Furthermore, the lateral gap between the elevation and the recess is advantageously dimensioned, such that a part of the material of the second welding rib flows into this area in order to yield a weld at a side that is not the end face of the elevation.

[0009] In a development in the area of the recesses at the reinforcement section, at least a third welding rib for welding the frame center section to the reinforcement section is provided . Advantageously, this third welding rib is multipart. These third welding ribs are either formed as a rib-like elevations, or alternatively as incremental elevations. These third welding ribs are formed such that, during uniting of the reinforcement section and the frame center section, they press against the softened material of the second welding rib, and so flow of the material around the welding ribs is made possible. A good welded joint can be achieved by this flow around the third welding ribs. Advantageously, the material of the recess, too, and thus the third welding rib is heated, with the material able to connect well to the material of the second welding rib and the elevations. A corresponding welding process is provided for welding of the first welding rib to the reinforcement section, as well for the other aforementioned material-fit connections.

[0010] The loading part has advantageously an essentially flat surface at the upper surface and has especially the shape of a flat slab, such that the loading part can be cut out from an extruded flat slab. Since the material becomes thermoplastic during the extrusion process, clearly better values for strength are attainable than is the case for an injection molded material under given comparable material thicknesses. Thus, the loading surface, which corresponds to the surface of the loading part, has good mechanical properties, such that it is not damaged by transport goods that are placed on the loading surface.

[0011] The reinforcement section is arranged underneath the loading part. It is essentially tub-shaped, with the open side of the tub limited by the loading part. The depth of the tub, that is, the distance in the vertical direction, is a few centimeters and the tub floor forms a plane that is parallel to the loading part. At the reinforcement section in the area of the tub floor, a plurality of rib-like elevations are molded on,

which point toward the loading part and are in contact with it. Furthermore, the recesses at an area of the tub floor are molded on such that the vertical ends of the recesses are in contact with the loading part.

[0012] In this regard, the reinforcement section is preferably designed such that it is manufacturable in a thermoforming process. In the thermoforming process, starting from a plastic slab, the three-dimensional structure is created, which substantially effects the stability of the upper section.

[0013] Preferably, the reinforcement section has a material-fit connection at the aforementioned contact areas with the loading part. By means of reinforcement section ribs, connections from the loading part to the reinforcement section at a plurality of points or areas are produced, which provides a three-dimensional structure, which effects high strength for the upper section of the pallet. The reinforcement section ribs, which are located between two recesses, are aligned such that they point in the longitudinal direction from one recess to the next.

[0014] The upper section preferably has a plurality of handle openings. Expediently, the connection from the loading part to the reinforcement section in the area of the handle openings is a material-fit connection. So that workers do not hurt their hands when handling the pallet, it is advantageous if the handle openings arranged in the upper section are rounded.

[0015] At the pallet, preferably an outwardly sealed transponder cavity is provided for accommodating a transponder in the area of the spacers. Furthermore, at an exterior surface of the transponder cavity, the wall thickness of the pallet is at least locally reduced. The transponder cavity is outwardly sealed in order that no harmful environmental influences, such as damp, may penetrate and damage the electronics of the transponder. Further, at an exterior side of the transponder cavity is provided an area of smaller wall thickness, which advantageously corresponds to the lower surface of the pallet, such that, for example, the material there can be removed with a knife in order that an opening may be created through which the transponder can be replaced. A replacement of this kind may be necessary if, due to technical changes, for example, new transponders or altered specifications, a transponder, which was already inserted into the transponder cavity during production of the pallet, can no longer be used. If a transponder is replaced via the window in the frame floor section, the transponder cavity can be sealed by a plastic molding compound in order that the replaced transponder may be protected from environmental influences.

[0016] Preferably, the reinforcement section in the area of its side wall has an impact reinforcement, areas of which at least are formed so as to be corrugated or ribbed. The impact reinforcement advantageously leads, starting from the floor surface of the tub-shaped form of the reinforcement section, upwardly to as far as the edges of the reinforcement section that are in contact with the loading part. The corrugations lie in a plane that is parallel to the loading surface. The shape of the impact reinforcement ensures that the impact strength is increased, a fact which is essential if the pallet experiences jerky lateral loads, for example, during transport or when grabbed by the tines of a fork-lift truck or a lifting truck.

[0017] Furthermore, handle recesses are provided advantageously at the reinforcement section. These are expediently arranged at the reinforcement section in the area of the transport openings, such that they are arranged at a slight distance from the side wall at which the impact reinforcement is molded on. The handle recesses comprise an indentation, which is at least as wide as a human hand.

[0018] Preferably, the reinforcement section has an anti-slipping rim that projects over the upper surface of the loading part and serves to limit slipping of goods present on the loading surface. The bulk of the reinforcement section is underneath the loading part in the vertical direction. However, some bar-like areas of the reinforcement section preferably are molded on such that they terminate above the loading part at the sides. Thus, for example, an interrupted bar which has a uniform height of, for example, 1 cm, can be created at the outside edge of the loading surface. Goods might slip on the loading area due to transport forces, but this slippage is limited by the anti-slipping rim. Advantageous in this regard is that the anti-slipping rim is easily producible, does not require a separate part and also lends itself to better stacking of several pallets. It is advantageous that the anti-slipping rim is formed as a component of the reinforcement section, since as such it is more readily and economically producible, a fact which would not be obtained if it were a component of the loading part, which is preferably manufactured by extrusion.

[0019] For the purpose of easy stacking of several pallets one above the other, corresponding anti-slipping rim recipients are molded on at the frame floor section, in which the anti-slipping rim of a further pallet may be accommodated. This offers advantages in the stacking of several pallets since alignment and immobilization of pallets lying one on top of the other is achieved.

[0020] The pallet has preferably four bar-like carriers in which stiffening profiles are arranged. These carriers form the framework of the frame section. The frame section has preferably four large-area rectangular floor break-throughs. In the bar-like areas, which limit the floor break-throughs, stiffening profiles can preferably be arranged. These recipient areas for the stiffening profiles are located in the area of the contact surface of the frame center section and frame floor section.

[0021] These stiffening profiles can be rectangular or square hollow sections made from a metal, especially steel, and serve to increase the torsional rigidity of the pallet. A plastic profile resistant to bending is also conceivable.

[0022] Advantageously, the stiffening profiles are provided in the frame of the frame section described by the external form of the pallet, with one profile provided per edge. A further profile can be provided in one of the edges of the central crosspiece of the frame section, as a result of which therefore four or five stiffening profiles result. The stiffening profiles can be economically inserted as individual parts into the frame sections independently of each other. They can, however, also be welded to one another, which further increases the rigidity.

[0023] The pallet has in an advantageous embodiment a coating of flame-retarding material, which is applied at least on areas of the surface of the loading part, the reinforcement section, the frame center section and/or the frame floor section. Pallets, especially plastic pallets, whose plastic material contains a flame-retarding additive, are well-known. However, incorporation of the flame-retarding material into the plastic causes the disadvantage that physical properties such as hardness and breaking strength are adversely affected. Thus it is advantageous, in contravention to convention, for the flame protection to be applied via a coating.

[0024] The pallet has, as described, a plurality of plastic parts, which have in turn a plurality of ribs. The result is a large overall surface, which can be coated accordingly.

Advantageously, especially those surfaces will be provided with the coating which are exposed to little or no mechanical load. The coating can be applied both to the individual parts before welding and to the finished pallet after welding. The coating works on one hand as a direct protection for the coated plastic material since the material cannot be so easily reached by the fire. On the other, there is an advantage in the fact that, in this manner, the flame-retarding material inhibits the fire overall in the vicinity of the fire. This means that, if, for example, one part of a warehouse with the pallets is on fire, the flame-retarding material causes the fire to be generally inhibited, such that it spreads more slowly and is easier to extinguish. This also applies if interior surfaces are coated, by which is meant the surfaces between the loading part and reinforcement section and between frame center section and the frame lower section. Thus, the pallet is highly suitable in fire-risk areas or for transporting readily flammable materials.

[0025] Further, a flame-retarding material can, for example, be incorporated as a kind of foam, at least in an outwardly sealed space between the loading part and the reinforcement section and between the frame center section and the frame floor section. The aforementioned enclosed space can be between the loading part and the reinforcement section or between the frame center section and the frame floor section. A material with flame-retarding characteristics can be incorporated into both areas before the individual parts of the pallet are welded. If the pallet is in a fire, the plastic material of the pallet melts or burns and the flame-retarding material is released to thus limit burning of the pallet and the fire overall.

[0026] Coatings containing urethane are especially suitable as material for coating the surfaces of the pallet. Also, a foam that contains urethane can be incorporated into an outwardly sealed area of the pallet. Furthermore, the flame protection can also be achieved by means of inorganic flame protection agents, halogenated flame protection agents, such as those based on chromium or bromine, or organophosphorous agents or by means of nitrogen compounds.

[0027] The following drawings show the preferable embodiment, without limiting the inventive idea expressed in the claims. These and other objects, advantages, purposes and features of the present invention will become apparent upon review of the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] FIG. **1** is a three-dimensional view of the pallet in the position of normal use, wherein the loading surface points upward,

[0029] FIG. **2** is a corresponding three-dimensional lower view of the pallet,

[0030] FIG. **3** is a partly exploded view of the pallet, in which the reinforcement piece and loading part are not exploded toward each other,

[0031] FIG. **4** is a rotated view of the exploded view in accordance with FIG. **3**,

[0032] FIG. **5** is a plan view of a quarter of the frame center section, with the lower right corner shown,

[0033] FIG. **6** is a cross-sectional view on the line D-D of FIG. **5** through one of the elevations **9**,

[0034] FIG. **7** is a detailed view of FIG. **6** with the representation of the second welding ribs.

[0035] FIG. **8** is a detailed view of FIG. **6** of the welding ribs for welding of frame center section to the frame floor part,

[0036] FIG. **9** is a detailed view of the FIG. **6** of the first welding ribs,

[0037] FIG. **10** is a cross-sectional view on the line E-E of FIG. **5**,

[0038] FIG. **11** is a cross-sectional view on the line A-A of FIG. **5**,

[0039] FIG. **12** is a cross-sectional view on the line B-B of FIG. **5**,

[0040] FIG. **13** is a cross-sectional view on the line C-C of FIG. **5**,

[0041] FIG. **14** is a detailed view of FIG. **13** of the welding ribs for welding the frame center section to the frame floor section,

[0042] FIG. **15** is a plan view of a quarter of the frame center section, with the lower right corner shown,

[0043] FIG. **16** is a cross-sectional view on the line F-F of FIG. **15**,

[0044] FIG. **17** is a detailed view of FIG. **16**,

[0045] FIG. **18** is a cross-sectional view on the line B-B of FIG. **15**,

[0046] FIG. **19** is a detailed view of detail G of FIG. **20**, and

[0047] FIG. **20** is a cross-sectional view on the line E-E of FIG. **15**.

DETAILED DESCRIPTION OF THE DRAWINGS

[0048] FIG. **1** is a three-dimensional view of a pallet in accordance with the invention **1**, whose loading surface **26** points upward. In the following, it is this definition of the direction which is referred to. The loading surface **26** is an area of the loading part **6**, which, together with the reinforcement section **5**, forms the upper section **2** of the pallet **1**. Underneath the upper section **2** is arranged the frame section **40**, which comprises the frame center section **3** and the frame floor section **4**. The frame section **40** has a rectangular basic structure, which corresponds roughly in size to the loading surface **26**, and in this basic structure are provided four wide, window-like break-throughs, such that the frame section **40** has essentially four external struts and a central crosspiece **42**, as evident in FIG. **2**. Underneath the frame center section **3** is the frame floor section **4**, which is connected to the frame center section **3** and has a platform for the surface. Stiffening profiles **7***a*, **7***b* are accommodated in the area between frame center section **3** and frame floor section **4**.

[0049] Upper section **2** has four handle openings **28**, which are long enough and wide enough for a worker to put in a hand to comfortably lift the unloaded pallet. The alignment of the handle openings **28** in their length corresponds to the longitudinal direction of the rectangular pallet **1**. The handle openings are arranged at the edge of the upper section **2**.

[0050] As is evident from FIG. **3**, the upper section **2** is of uniform thickness, which is created by the distance from the loading part **6** to a parallel arranged base surface of the reinforcement section **5**. At the sides of this base surface are provided essentially perpendicularly arranged edges, which point toward the loading part **6** and are connected to this. Viewed in this way, the reinforcement section **5** has a tub-shaped basic structure, with the open side of the tub limited by the loading part **6**. At the outer peripheral contact area between reinforcement section **5** and the loading part **6** are provided areas upon which the loading part **6** on the reinforcement section **5** rests. In other words, the contact surface here is horizontally aligned such that gravity forces from goods

present on the loading part **6** are transmitted direct via compressive forces to reinforcement section **5**. These areas are arranged at the corners of the pallet and at the center of their sides. On areas located between them are arranged anti-slipping rims **25**, which are a component of the reinforcement section **5**, arranged such that they terminate above the loading area **26**. The contact surface between the reinforcement section **5** and the loading part **6** has a vertical alignment there. The loading surface **26** is limited at each of its sides by two anti-slipping rims **25**.

[0051] In FIG. **3**, it is clear that the reinforcement section **5** comprises a plurality of reinforcement section ribs **41**, which, starting from the base surface of the reinforcement section **5**, point toward to the loading part **6**, have a longitudinal extension and are in contact with the loading part **6**. At the contact areas between the loading part **6** and the reinforcement section **5** is provided a material-fit connection, a fact which means that the material of both parts is welded in these areas. Through the welds, the loading part **6** and the reinforcement section **5** enclose an area, which is designed to be dampproof.

[0052] The view of the lower side of the pallet in FIG. **2** clearly shows the central crosspiece **42** of the frame section **40**. It extends centrally in the frame, which is spanned by the four corners of the pallet **1**. The central crosspiece **42** as well as the lower area of the frame section **40** are formed from the frame center section **3** and the frame floor section **4**. As FIG. **3** shows, in areas between the frame floor section **4** and the frame center section of **3** are arranged two stiffening profiles *7a* and three stiffening profiles *7b*, with two each of the profiles *7a* and *7b* in the outside edges of the framework and a profile *7b* in an axis of the central crosspiece **42**. The stiffening profiles *7a* and *7b* are manufactured from a rectangular steel section. At the lower side at the frame center section **3** are provided center section profile recipients **43**, which are U-shaped. As shown in FIGS. **10**, **11** and **12**, center section profile recipients **43** are roughly the width of the stiffening profiles *7a* or *7b* and half their height. Each of the stiffening profiles *7a* and *7b* is fitted into the profile recipient **43** such that approximately half of the height projects above the center section profile recipient **43** and is accommodated in a profile recipient **45**—see FIG. **18**—of the frame floor section **4**. Furthermore, for the purpose of lateral guidance of the stiffening profiles *7a*, *7b*, ribs **46** are molded on at the frame center section ribs **44** and at the frame floor section, said ribs **46** limiting the lateral mobility of the profiles. Since the ribs **44** deform flexibly when the stiffening profiles *7a* and *7b* are joined to the frame center and floor sections, the stiffening profiles are accommodated without any play and so can easily accommodate twisting of the pallet and thus support the rigidity of the pallet. Additionally, the frame center and floor sections are aligned relative to each other via the stiffening profiles *7a* and *7b* during joining in the production process.

[0053] At the frame center section **3** are molded on nine spacers **27**, which contact its four corners, four centers of its outside edges and the center of its surface. As evident from FIG. **4** or FIG. **6**, provided at the spacers **27** are elevations **9**, which are present at an end face of the spacers and are inwardly offset stepwise. Both the spacers **27** and the elevations **9** are essentially rectangular, with the length and width of the elevations **9** smaller than those of the spacers **27**. FIG. **6** shows that the elevation **9** has a truncated pyramid extension. Reinforcement piece **5** has corresponding recesses **8**, in which the elevations **9** are accommodated. Here, the truncated pyramid shape facilitates joining of the frame center section to the reinforcement section in the manufacturing process, since both parts position themselves relative to each other via the diagonal edge.

[0054] FIG. **4** or **6** shows how first welding ribs **31** are molded on at the spacer **27**, and second welding ribs **32** are molded on at the end of the elevation **9**. Both, the first and second welding ribs, are each molded on at the end-face outside edges of the spacer **27** and the elevations **9**. During welding of frame center section **3** to the upper section **2**, the ribs **31** and **32** are heated to the softening point, then the two parts are joined to each other. During joining, mechanical pressure is exerted on the first and second welding ribs **31** and **32**, such that these ribs deform fluidly, such that this flow creates a material-fit connection between the two parts. This process is supported by third welding ribs **33**, which are shown in FIG. **3**. The third welding ribs **33** are at the base of the recesses **8** and make contact with the second welding ribs **32** during joining. Since the third welding ribs **33**, unlike the second welding ribs **32**, are not formed continually around the periphery, but project from area to area, the material of the second welding ribs **32** can flow around the third welding ribs **33** during joining, whereby the strength of the welded joint can be improved.

[0055] FIG. **5** shows a plan view of the lower right corner of the frame center section **3**, which shows only one of the four windows of the frame center section **3**. In the lower right corner of FIG. **5** is shown a plan view **5** of the spacer **27**, which, in cross-sections along lines D-D, in accordance with FIG. **6**, and C-C, in accordance with FIG. **5**, is shown in detail in both side views.

[0056] FIGS. **7** and **9** show the shape of the welding ribs **32** and **31** in details G and J. At those areas where the ribs at the elevation **9** or the spacer **27** are molded on is provided one each of a material accumulation **48**, which has a larger wall thickness than the corresponding welding rib **31** and **32**. In the welding method, temperature control ensures that primarily the material of the welding ribs is softened. Since, in the area of the material accumulation **48**, the heat supplied is insufficient to soften the material, during welding, this area, and thus also elevations **9** and the spacers **27**, remain undeformed as far as possible and material softening is limited to the welding ribs.

[0057] In FIG. **8**, a fourth welding rib **49** of the frame center section **3** is shown, which serves for welding to the frame floor section **4**. Peripheral fourth welding ribs **49** are each arranged around one of the window-like break-throughs, such that the frame center section **3** and the frame floor section **4** at these welding seams can be connected to each other continuously and thus to be impermeable to damp.

[0058] FIGS. **11** and **12** show the cross-sections along lines A-A and B-B of FIG. **5** with a part of the frame of the frame section **40**, the center section profile recipients **43** and corresponding ribs **44**, which serve the purpose of guidance of the ribs shown. FIG. **13** shows a section through the frame center section **3**, whose detail H in FIG. **14** shows a fourth welding rib **50**. This is arranged peripherally at the outside edge of the frame center section **3** and makes for a dampproof weld to the frame floor section **4** in this area.

[0059] FIG. **15** shows a plan view of the lower right quarter of the frame floor section **4**, and the section in accordance with FIG. **16** with the detail K in accordance with FIG. **17** shows a groove **47**, which is molded on at the lower surface of the frame floor section **4**. This groove **47** is rectangular, as shown in FIG. **3**, and forms an area in which the wall thick-

ness of the frame floor section **4** is reduced. This groove **47** thus delimits in other words a window **10**, behind which extends toward the spacer **27** an inner space as transponder cavity **11**, which is suitable for accommodating a transponder. Before the frame center section **3** is welded to the floor section **4**, a transponder is inserted into this transponder cavity **11**, said transponder being then enclosed by welding so as to be dampproof. Only when, for example, a cut is made with a knife along the groove **47**, is the window **10** opened, such that access to the inserted transponder is made possible. In this way, the transponder can be removed and replaced, for example. Then, plastic, such as a plastic foaming compound, can be used to seal the window again in order that harmful environmental influences may be kept at bay from the transponder. At each of the spacers **27**, which lie at the corners of the pallet, is provided a transponder cavity.

1. A pallet for the movement of goods, comprising:

an upper section having a loading part with a loading surface and a reinforcement section, wherein the loading surface and the reinforcement section have a material-fit connection to each other;

a frame section comprising a frame center section and a frame floor section, wherein the frame center section and the frame floor section are connected to each other;

wherein the frame center section corresponds to the size of the loading surface and, at least at its corners, has spacers, which point to the upper section and have a material-fit connection via the frame section to the upper section, wherein the spacers have end-face elevations inwardly offset stepwise, and the reinforcement section has, at its lower surface, recesses for accommodating the elevations; and

wherein the frame center section has a material-fit connection to the reinforcement section in the area of at least one of the spacers and the end-face elevations.

2. The pallet in accordance with claim **1**, wherein the loading part, the reinforcement section, the frame center section and the frame floor section are formed from plastic.

3. The pallet in accordance with claim **2**, wherein at least a first welding rib is molded to the end faces of the spacers, wherein the at least one welding rib points toward the reinforcement section and serves as welding material during welding of the frame center section to the reinforcement section.

4. The pallet in accordance with claim **2**, wherein at least a second welding rib is molded to the end faces of the elevations, wherein the at least one welding rib points toward the reinforcement section and serves as welding material during welding of the frame center section to the reinforcement section.

5. The pallet in accordance with claim **4**, wherein at least a third welding rib is provided at the reinforcement section in the area of the recesses for welding the frame center section to the reinforcement section.

6. The pallet in accordance with claim **5**, wherein the third welding rib is comprised of multiple parts.

7. The pallet in accordance with claim **2**, wherein the reinforcement section is adapted to be produced in a thermoforming process.

8. The pallet in accordance with claim **2**, wherein the upper surface of the loading part is planar.

9. The pallet in accordance with claim **2**, wherein the reinforcement section is tub-shaped and includes a tub floor, wherein the open side of the reinforcement section is limited by the loading part, wherein, in the area of the tub floor, a plurality of rib-like elevations is formed, said plurality of rib-like elevations being in contact with the loading part.

10. The pallet in accordance with claim **1**, wherein the upper section has a plurality of handle openings.

11. The pallet in accordance with claim **10**, wherein the loading part and the reinforcement section have a material-fit connection in the area of the handle openings.

12. The pallet in accordance with claim **2**, wherein an outwardly sealed transponder cavity is provided at the pallet in the area of the spacers for accommodating a transponder, wherein at an exterior surface of the transponder cavity, the wall thickness is reduced at least from area to area.

13. The pallet in accordance with claim **2**, wherein the reinforcement section has an impact reinforcement in the area of a side wall of the reinforcement section, wherein said reinforcement section is formed to be corrugated or rib-like at least from area to area.

14. The pallet in accordance with claim **2**, wherein handle recesses are provided at the reinforcement section.

15. The pallet in accordance with claim **2**, wherein the reinforcement section comprises at least one anti-slipping rim for limiting slipping of goods present on the loading surface, said rim projecting over the upper side of the loading part.

16. The pallet in accordance with claim **15**, wherein at least one anti-slipping rim recess is formed in the frame foor section, wherein a further pallet may be received in the recess during stacking of the anti-slipping rim.

17. The pallet in accordance with claim **1**, wherein the pallet comprises at least four stiffening profiles made of metal.

18. The pallet in accordance with claim **1**, wherein the frame section has at least four bar-like carriers, wherein stiffening profiles are arranged in the bar-like carriers.

19. The pallet in accordance with claim **1**, whewrein a coating of a flame-retarding material is applied at least on areas of the surface of the loading part, the reinforcement section and the at leastone of the frame center section and the frame floor section.

20. The pallet in accordance with claim **19**, wherein a flame-retarding material is incorporated in at least one outwardly sealed area between the loading part and the reinforcement section and between the frame center section and the frame floor section.

21. The pallet in accordance with claim **2**, wherein the reinforcement section is producible in a thermoforming process.

22. The pallet in accordance with claim **2**, wherein the upper surface of the loading part is planar.

23. The pallet in accordance with claim **2**, wherein the reinforcement section is tub-shaped and includes a tub floor, wherein the open side of the reinforce nent section is limited by the loading part, wherein a plurality of rib-like elevations is formed in the area of the tub floor, said plurality of rib-like elevations being in contact with the loading part.

24. The pallet in accordance with claim **3**, wherein the reinforcement section is producible in a thermoforming process.

25. The pallet in accordance with claim **3**, wherein the upper surface of the loading part is planar.

26. The pallet in accordance with claim **3**, wherein the reinforcement section is tub-shaped and includes a tub floor, wherein the open side of the reinforcement section is limited

by the loading part, wherein, in the area of the tub floor, a plurality of rib-like elevations is formed, said plurality of rib-like elevations being in contact with the loading part.

27. The pallet in accordance with claim 4, wherein the reinforcement section is adapted to be produced in a thermoforming process.

28. The pallet in accordance with claim 4, wherein the upper surface of the loading part is planar.

29. The pallet in accordance with claim 4, wherein the reinforcement section is tub-shaped and includes a tub floor, wherein the open side of the reinforcement section is limited by the loading part, wherein, in the area of the tub floor, a plurality of rib-like elevations is formed, said plurality of rib-like elevations being in contact with the loading part.

* * * * *

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(12) **United States Patent**
Smorgan et al.

(10) **Patent No.: US 6,508,182 B1**
(45) **Date of Patent: Jan. 21, 2003**

(54) **PLASTICS PALLETS AND MOULDING APPARATUS FOR PRODUCING PLASTICS PALLETS AND OTHER PLASTIC ARTICLES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(52) **U.S. Cl.** **108/57.28**; 108/57.25
(58) **Field of Search** 108/57.28, 57.25, 108/56.1, 53.1, 51.3; 425/527

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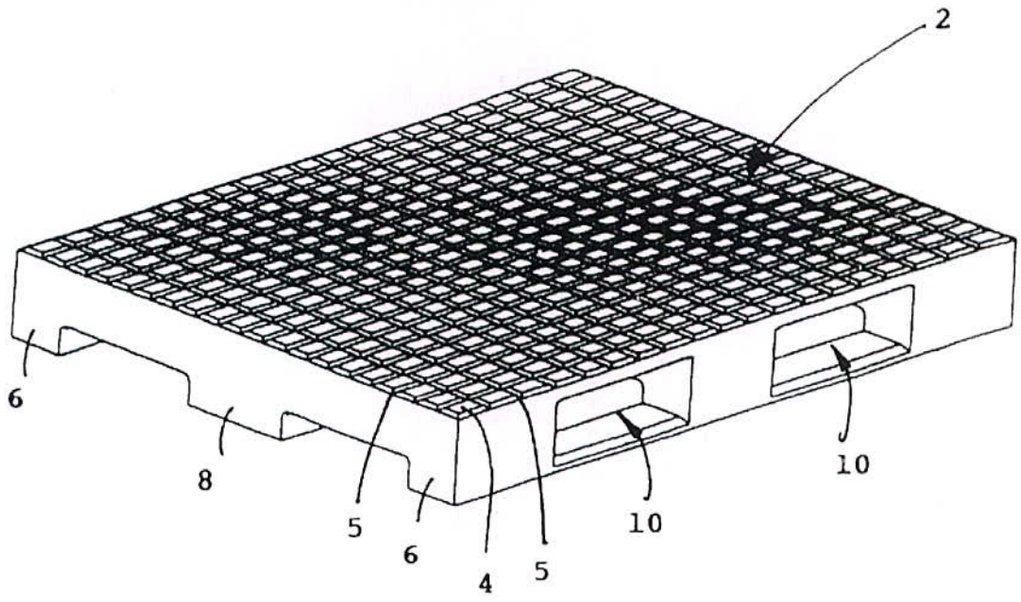
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(57) **ABSTRACT**

A pallet of moulded construction comprising a load-carrying surface supported by underlying support structure configured to permit the insertion of the tines of the fork-lift, the load-carrying surface being reinforced at its underside by a cellular reinforcing structure comprising cells the axes of which extend perpendicularly to the load-carrying surface.

9 Claims, 5 Drawing Sheets



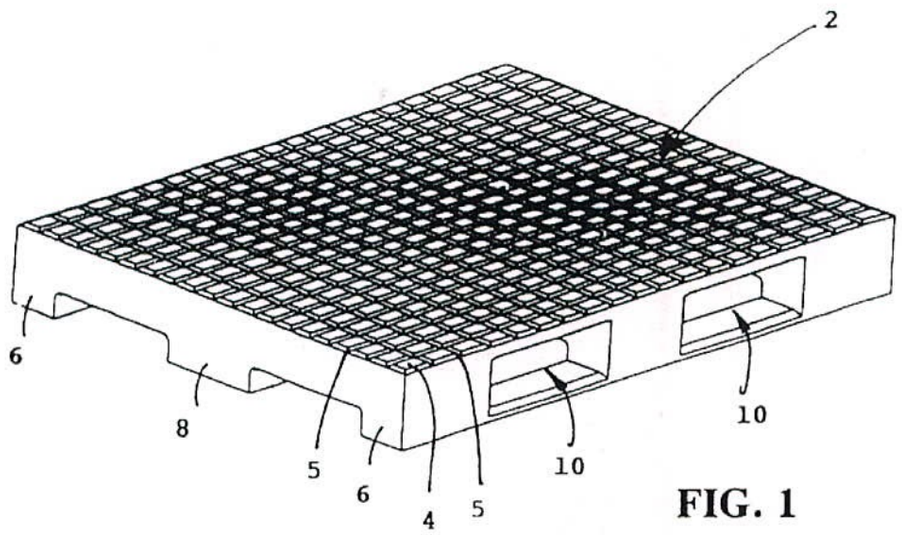


FIG. 1

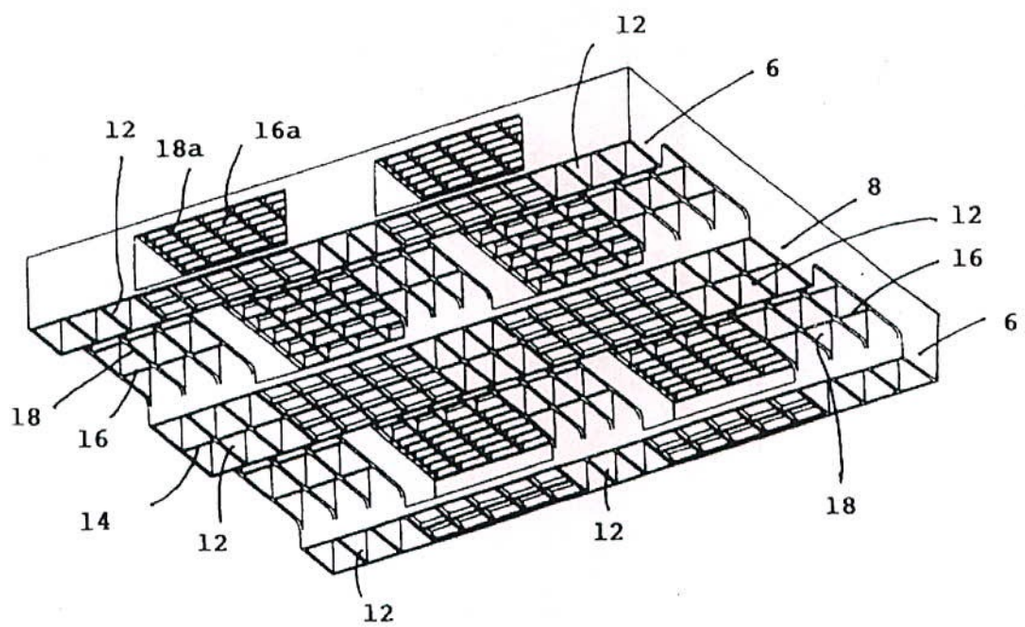


FIG. 2

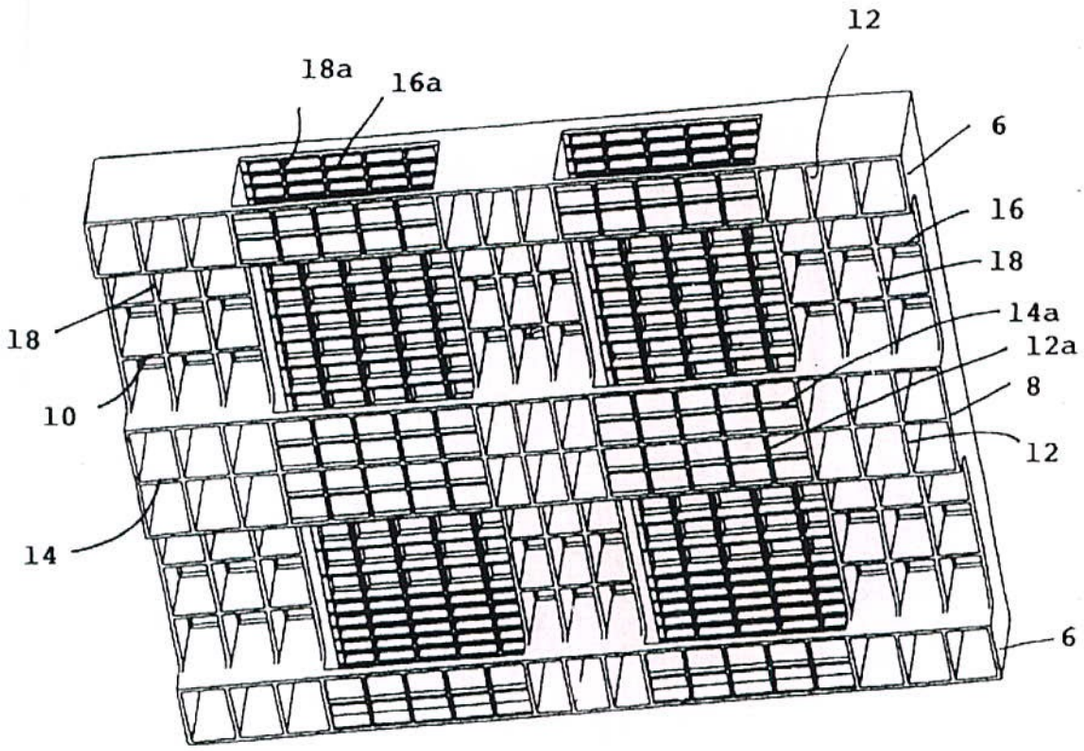


FIG. 3



FIG. 4

FIG 5

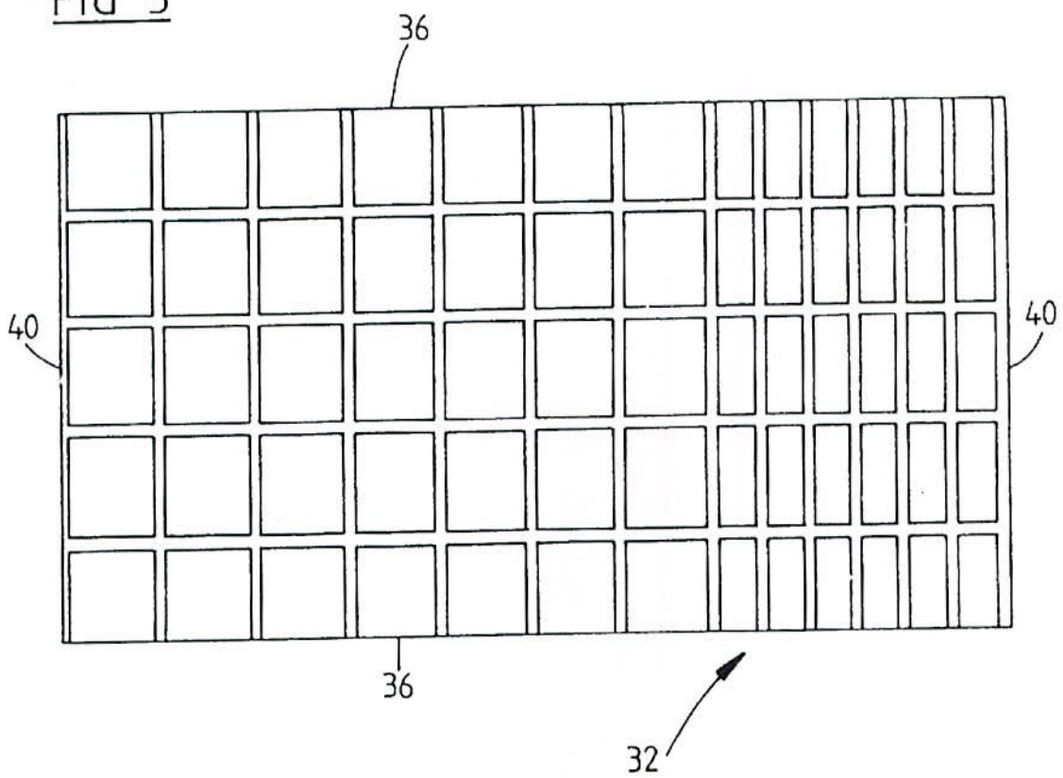


FIG 6

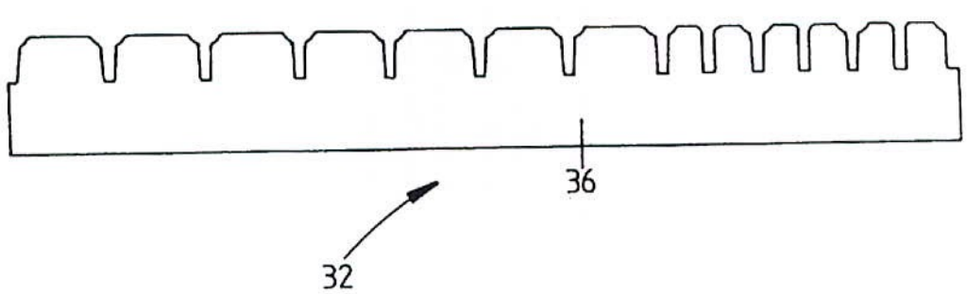


FIG 7

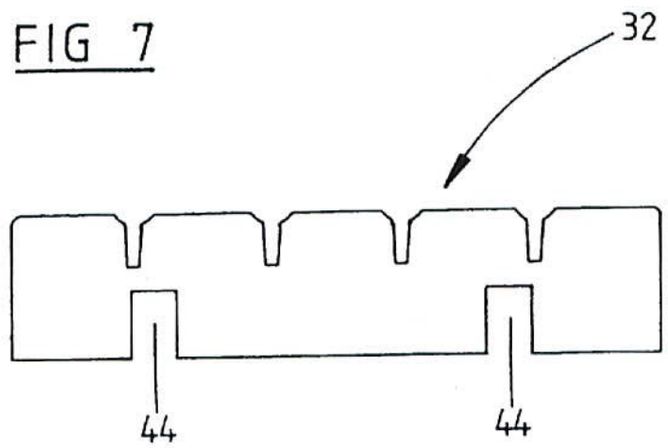
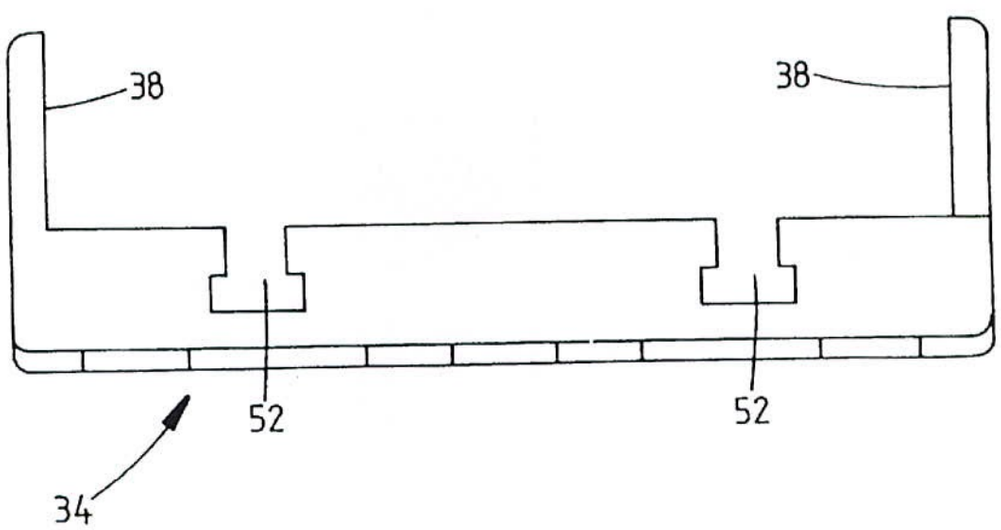


FIG 8



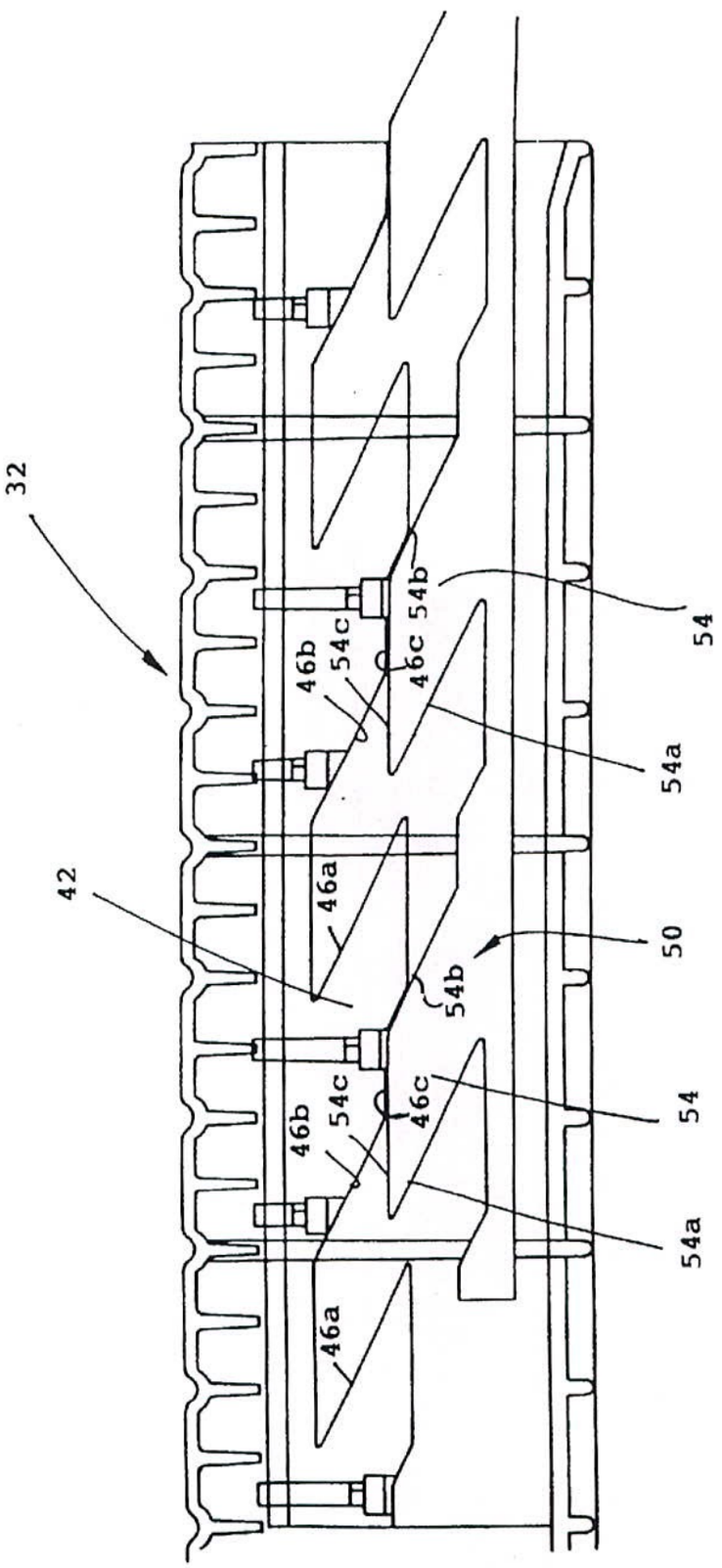


FIG. 9

PLASTICS PALLETS AND MOULDING APPARATUS FOR PRODUCING PLASTICS PALLETS AND OTHER PLASTIC ARTICLES

The present invention relates to pallets and more particularly to pallets of moulded plastics construction, and to moulding apparatus for producing such pallets and other plastics articles.

The present applicants and their successors in business have devised a range of plastics pallets of one-piece moulded plastics construction formed by an injection moulding technique using either wholly or partially post-consumer recycled plastics. While these pallets are effective in use, the applicants have determined that it would be of advantage to construct a pallet of lighter weight whilst achieving similar strength characteristics to those of their earlier pallets.

More particularly there is disclosed in International Patent Application No. PCT/AU97/00382, the disclosure of which is hereby incorporated by reference, a load-carrying pallet moulded in one piece in a suitable plastics, for example post-consumer recycled plastics. International Patent Application PCT/AU95/00690 also discloses a load-carrying pallet formed as a one-piece plasties moulding. We are now proposing to produce a pallet of the type disclosed in the aforesaid applications but using less plastics material. This will be achieved by using thinner sections for the load carrying platform, the beams beneath the platform, and the ground-engaging struts at the underside of the pallet. However in order to achieve adequate rigidity of the overall structure we are proposing to reinforce the load-carrying platform by moulding a multiplicity of intersecting webs into the underside of the load carrying platform whereby the ribs intersect to define a cellular structure with the cells distributed throughout the exposed parts of the underside or at least in those parts subject to maximum loading. For example, the cellular structure may be of honeycomb form or alternatively the cells may be of rectangular or diamond shape. In each case, the axis of each individual cell will extend perpendicularly to the plane of the load carrying surface and each cell will be open at its underside.

According to one aspect of the present invention, there is provided a pallet of moulded construction comprising a load-carrying surface supported by underlying support structure configured to permit the insertion of the tines of the fork-lift, the load-carrying surface being reinforced at its underside by a cellular reinforcing structure comprising g cells the axes of which extend perpendicularly to the load-carrying surface.

Advantageously, the underlying support structure comprises a series of parallel beams of hollow construction comprising opposed side walls, the beams being internally reinforced by webs defining a cellular structure extending to the underside of the load-carrying platform, and the axes of the cells of the reinforcing structure within the beams being substantially perpendicular to the load-carrying platform.

Advantageously, the beams have transverse apertures to permit insertion of the tines of a fork-lift laterally to the beams, and the cellular reinforcement of the load-carrying platform in the zone of the platform adjacent the lateral apertures in the beams has a smaller cell size than that in other zones of the load-carrying platform.

Advantageously, the entire pallet is constructed in a single moulding operation and the mould incorporates a retractable core for forming the cellular reinforcement at the underside of the platform in the zones thereof adjacent the lateral apertures in the beams.

Advantageously, the cellular reinforcing structure in the beams extends to the underside of the beams, and the load-carrying platform is configured to define a pattern of upstanding projections and lands around the projections whereby when two like pallets are arranged in stacked relationship, the lower edges of the reinforcing cells of the beams of the upper pallet will engage with the lands on in the load-carrying platform of the lower pallet whereby to prevent slippage between the two pallets.

According to another aspect of the present invention there is provided an injection mould having a retractable mould core structure, said mould core structure comprising a retractable core configured to form cellular or other reinforcing structure at an inner surface of an article being moulded, and means for retracting said core in a direction substantially at right angles to said surface, said retracting means comprising at least one driving member mounted for reciprocatory movement in a direction at right angles to the direction of retraction, and means linking said driving member and core to translate said movement of the driving member into the required. movement of the core.

In a preferred embodiment of the invention the linkage provided between the core and the driving member is provided by one or more cooperating cams and cam tracks.

Advantageously, the driving member comprises a strip having a series of driving cams, said strip cooperating with a corresponding strip carried by the core and providing a series of cam tracks which cooperate with the respective cams such that movement of the driving strip in one direction causes retraction of the core and movement in the opposite direction causes extension of the core into an operative position for moulding. Preferably there are two or more such driving strips arranged in parallel relation and each cooperating with a respective strip carried by the core.

Preferably, the or each driving strip is driven by a fluid cylinder.

Advantageously, the cams and cam tracks cooperate when the core is in its operative moulding position to lock the core in that position against the pressure of the material being moulded.

The present invention also provides a method of injection moulding plastics articles using a retractable core structure as defined above.

The present invention also provides a moulded plastics article when produced by use of a mould incorporating a retractable core structure as defined above.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. **1** is a perspective view of a pallet in accordance with a preferred embodiment of the invention;

FIG. **2** is an underneath perspective view of the pallet;

FIG. **3** is an underneath perspective view from a more oblique angle in order to better illustrate the underlying cellular reinforcing structure;

FIG. **4** is a schematic section through two such pallets arranged in stacked relationship in order to illustrate the relationship between the lower edges of the reinforcing cells of the upper pallet and the load-carrying platform of the lower pallet;

FIG. **5** is a plan view of a retractable mould core for use in the production of the pallet;

FIG. **6** is a side view of the core;

FIG. **7** is an end view of the core;

FIG. **8** is an end view of the core guide; and

FIG. **9** is a schematic section showing the core and its cooperation with driven and driving cam strips respectively carried by the core and core guide.

There is shown in the accompanying drawings a pallet of one-piece construction formed by injection moulding. The

pallet may be formed wholly from post-consumer recycled plastics, a mixture of post-consumer recycled plastics and other plastics, or virgin plastics material. The pallet comprises a load-carrying platform **2** provided with multiplicity of upstanding projections **4** distributed over its entire surface, the projections **4** being separated by a grid-like pattern of longitudinal and transverse lands **5**. As shown the projections **4** are of rectangular shape with a substantially planar upper surface. The projections act to prevent slippage of goods carried on the pallet while permitting the load-carrying surface easily to be cleaned, for example by hosing or steam cleaning. The projections **4** also provide a strengthening function for the platform **2** and a stacking function as will be described.

The load-carrying platform **2** is supported by an underlying support structure consisting of a series of parallel beams comprising two outer beams **6** defining opposed outer side walls of the pallet and a central beam **8**. The beams **6,8** are spaced to define an access for the tines of a fork-lift truck from either of the two open ends of the pallet. The beams **6** defining the outer side walls of the pallet are also apertured at **10** to permit entry of the fork-lift tines from either of the two opposed sides thereby providing so-called four-way entry for the tines. The central beam **8** is also apertured in alignment with the apertures **10** in the outer beams **6** to permit passage of the fork-lift tines across the underside of the platform.

In order to provide a rigid structure of relatively light weight, each of the beams **6,8** is of hollow construction consisting of parallel side walls reinforced internally by webs **12** which extend from the base o f the beam **6** or **8** to the underside of the platform **2** at right angles thereto, except in those sections of the beams **6,8** provided with the apertures for entry of the fork-lift tines. In the case of the two outer beams **6**, the webs **12** extend transversely between the longitudinal walls of the beams, whereas for the central beam **8** which is of greater width than the outer beams **6**, there is also a central longitudinal reinforcing web **14**. The web reinforcement not only reinforces the beams **6,8** but also reinforces the platform **2** whereby the platform **2** can also be of reduced thickness.

In addition to reinforcement by the beams **6,8** and the webs **12,14** within the beams **6,8**, the load-carrying platform **2** is reinforced by a series of longitudinal and transverse webs **16,18** in the zones between the outer beams **6** and central beams, the webs **16,18** being perpendicular to the plane of the platform and extending respectively parallel to, and at right angles to, the axis of the beams **6,8**. It will be noted that the web reinforcement of the platform **2** is, in the zones of the lateral apertures for the fork-lift tines in the outer and central beams, of reduced depth and in these zones in order to achieve effective reinforcement the longitudinal and transverse reinforcing webs **16***a*,**18***a* are more closely spaced than elsewhere at the underside of the platform. For similar reasons, the parts of each of the outer and central beams **6,8** beneath the apertures for passage of the fork-lift tines have longitudinal and transverse reinforcing webs **14***a*, **12***a* of closer spacing than ill the remainder of the beams.

With a reinforcing structure as described above, the wall thickness of the pallet can be thinner than in the earlier pallets discussed at the outset, resulting in a substantial weight saving but without sacrificing strength and rigidity of the pallet.

It will be noted that the reinforcing webs **12,14** which extend to the underside of the beams **6,8** define a structure consisting of open cells of rectangular form, the axes of which are at right angles to the platform **2**. The boundary walls of these cells correspond to the rectangular pattern of lands **5** defined around the upstanding projections **4** (or groups of the projections **4**) on the load-carrying platform **2** whereby when two such pallets are located in stacked relationship, the end edges of the reinforcing cells at the underside of the upper pallet will engage with the lands **5** of the load-carrying platform of the lower pallet in order to prevent slippage between the two pallets. This is illustrated schematically in FIG. **4**.

As discussed above, the entire pallet is constructed in one-piece in a single injection moulding operation. In order to form the cellular reinforcing structure at the underside of the load-carrying platforms in the zones of the lateral apertures in the beams **6,8**, the mould incorporates retractable cores in these zones. The preferred form of these cores will now be described with reference to FIGS. **5** to **9**.

FIGS. **5** to **7** show a core or insert **32** for moulding a cellular structure at the underside of a section of the load-carrying platform **2** of the pallet described above. In the particular form shown, the core **32** produces a structure with rectangular cells, the size of the various cells changing throughout the structure in accordance with the structural requirements of the load-carrying platform. The core **32** is mounted within the mould in a core guide **34** (FIG. **8**) of channel-like structure for movement in a direction at right angles to the plane of the load-carrying surface to permit retraction of the core **32** after moulding. The opposed sides **36** of the core **32** are in sliding contact with the sidewalls **38** of the guide **34** and the opposed ends **40** of the core **32** are in sliding contact with the adjacent surface of the mould, a close fit being provided to prevent seepage of incoming plastics material around the sides and ends **36**, **40** of the core **32** and into the core guide **34**.

Two or more parallel cam strips **42** are attached to the underside of the core **32** and project into the interior of the core guide **34**, preferably each strip **42** being located within a respective longitudinal slot **44** at the underside of the core **32**. Each cam strip **42** is shaped to provide a plurality of cam tracks **46***a*, **46***b* which are inclined to the axis of movement of the core **32**. Each of the cam strips **42**, which constitutes a driven cam strip, cooperates with a respective driving cam strip **50** which is mounted for sliding movement in a direction at right angles to the axis of movement of the core **32** in a groove **52** provided in the base of the core guide **34**. Each driving cam strip **50** has a series of driving cams **54** having driving cam surfaces **54***a*, **54***b* which are shaped for cooperation with the respective cam tracks **46***a*, **46***b* of the adjacent driven cam strip **42**. The driving cam strips **54** are coupled for co-joint movement to a fluid actuated cylinder.

FIG. **9** illustrates the position of the driving cam strips **54** in the extended, operative position of the core **32** at which moulding takes place. In this configuration an upper locking surface **54***c* of each driving cam **54** engages a corresponding surface **46***c* at the underside of the corresponding cam track, these surfaces extending at right angles to the direction of displacement of the core **32**, to lock the core **32** in its operative position.

In order to retract the core **32** after moulding to facilitate ejection of the moulded product, the fluid cylinder is actuated to displace the driving cam strips **50** towards the left as viewed in FIG. **9** whereby the inclined driving cam surfaces **54***a* of the driving cams **54** engage the correspondingly inclined cam tracks **46***a* of the driven cam strips **42** and thereby cause the core **32** to be retracted out of engagement with the moulded cellular structure. The inclined cam surfaces and cam tracks enable substantial displacement to be achieved even although the available space for retraction is

relatively restricted. To reset the core **32** in preparation for a subsequent moulding, the driving cam strips **50** are displaced in the opposite direction (to the right as shown in FIG. **9**) by actuation of the fluid cylinder whereby the inclined driving cam surfaces **54***b* of the driving cams **54** engage the correspondingly inclined cam tracks **46***b* of the driven cam strips and cause extension of the core **32** towards its operative position. Towards the end of the displacement of the driving cams **54**, the upper locking surfaces **54***c* of the driving cams **54** move into engagement with the surfaces **46***c* of the cam tracks to thereby hold the core **32** in its operative positions as previously described.

Although the core structure has been particularly described with reference to the production of reinforcing structure of cell-like form at the under side of the load-carrying platform of the pallet, the core may be configured to provide other reinforcing structure, for example, a series of parallel ribs or webs.

It is to be understood that the core structure described herein is also applicable to the manufacture of articles other than pallets.

The embodiment has been described by way of example and modifications are possible within the scope of the invention.

Throughout this specification and claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers or steps but not the exclusion of any other integer or group of integers.

What is claimed is:

1. A pallet of unitary construction comprising:

a load-carrying platform having a first side and a second side;

said first side comprising a closed surface having a plurality of upstanding projections distributed over the entirety of said surface and lying in substantially the same plane, said projections being separated by a grid-like pattern of longitudinal and transverse lands for preventing slippage of articles carried on said surface;

said second side comprising an understructure, a plurality of longitudinal beams, and a plurality of lateral connectors, each of said understructure, said longitudinal beams and said lateral connectors comprising a plurality of hollow, open cells, said plurality of cells having at least two different cross-sectional sizes;

said understructure defining a first plane;

said plurality of longitudinal beams comprising two outer longitudinal beams and a central longitudinal beam, each said longitudinal beam extending across said second side in a longitudinal direction and defining a second plane, said longitudinal beams operable to engage said lands so as to enable a plurality of said pallets to be stacked one on top of another in an interlocking manner;

said plurality of lateral connectors extending between said central longitudinal beam and either of said outer longitudinal beams and defining a third plane.

2. A pallet of unitary construction comprising:

a load-carrying platform having a first side and a second side;

said first side comprising a closed surface having a plurality of upstanding projections distributed over the entirety of said surface and lying in substantially the same plane;

said second side comprising an understructure, a plurality of longitudinal beams, and a plurality of lateral connectors;

said understructure comprising a plurality of hollow, open cells defining a first plane;

said plurality of longitudinal beams comprising two outer longitudinal beams and a central longitudinal beam, each said longitudinal beam extending across said second side and comprising a plurality of hollow, open cells defining a second plane;

said plurality of lateral connectors comprising a plurality of hollow, open cells defining a third plane, each said lateral connector extending between said central longitudinal beam and one of said outer longitudinal beams.

3. The pallet of claim **2**, wherein said projections are separated by a grid-like pattern of longitudinal and transverse lands for preventing slippage of articles carried on said surface.

4. The pallet of claim **3**, wherein said plurality of projections comprise at least one projection having a first area and one projection having a second area.

5. The pallet of claim **3**, wherein said longitudinal beams engage said lands so as to enable a plurality of said pallets to be stacked one on top of another in an interlocking manner.

6. The pallet of claim **2**, wherein said lateral connectors are offset to receive the tines of a forklift.

7. The pallet of claim **2**, wherein said third plane is offset from said first plane so as to form an aperture capable of receiving the tines of a fork-lift.

8. The pallet of claim **2**, wherein said lateral connectors are located at a central region and each end region of each said longitudinal beam.

9. A pallet of unitary construction comprising:

a load-carrying platform having a first side and a second side;

said first side comprising a closed surface having a plurality of upstanding projections distributed over the entirety of said surface and lying in substantially the same plane;

said second side comprising an understructure, a plurality of longitudinal beams, and a plurality of lateral connectors;

said understructure comprising a first plurality of hollow, open cells defining a first plane, said first plurality of cells comprising cells of a first cross-sectional size and cells of a second cross-sectional size;

said plurality of longitudinal beams comprising a second plurality of cells defining a second plane, said second plurality of cells comprising cells of a third cross-sectional size and cells of a fourth cross-sectional size;

said plurality of lateral connectors comprising a third plurality of hollow, open cells defining a third plane, said third plurality of cells comprising cells of a fifth cross-sectional size and cells of a sixth cross-sectional size;

and wherein said third plane lies intermediate said first plane and said second plane.

* * * * *

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(54) **PALLET ASSEMBLY**

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(21) Appl. No.: **11/491,835**

(22) Filed: **Jul. 24, 2006**

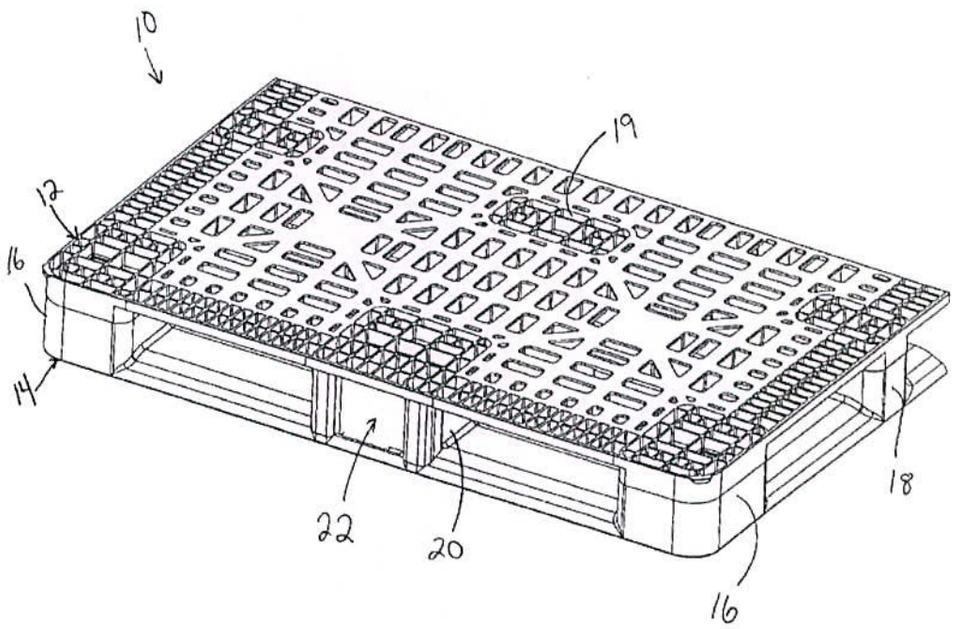
Publication Classification

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B65D 19/16 (2006.01)

(52) **U.S. Cl.** **108/56.1**

(57) **ABSTRACT**

A pallet assembly includes an upper deck and a plurality of supports extending downward from the upper deck. A cap is secured in front of at least one of the supports to protect the support. The cap may be formed of a material different from the support, such as a higher density, tougher or harder material without increasing the cost of the materials for the supports and deck.



Iso

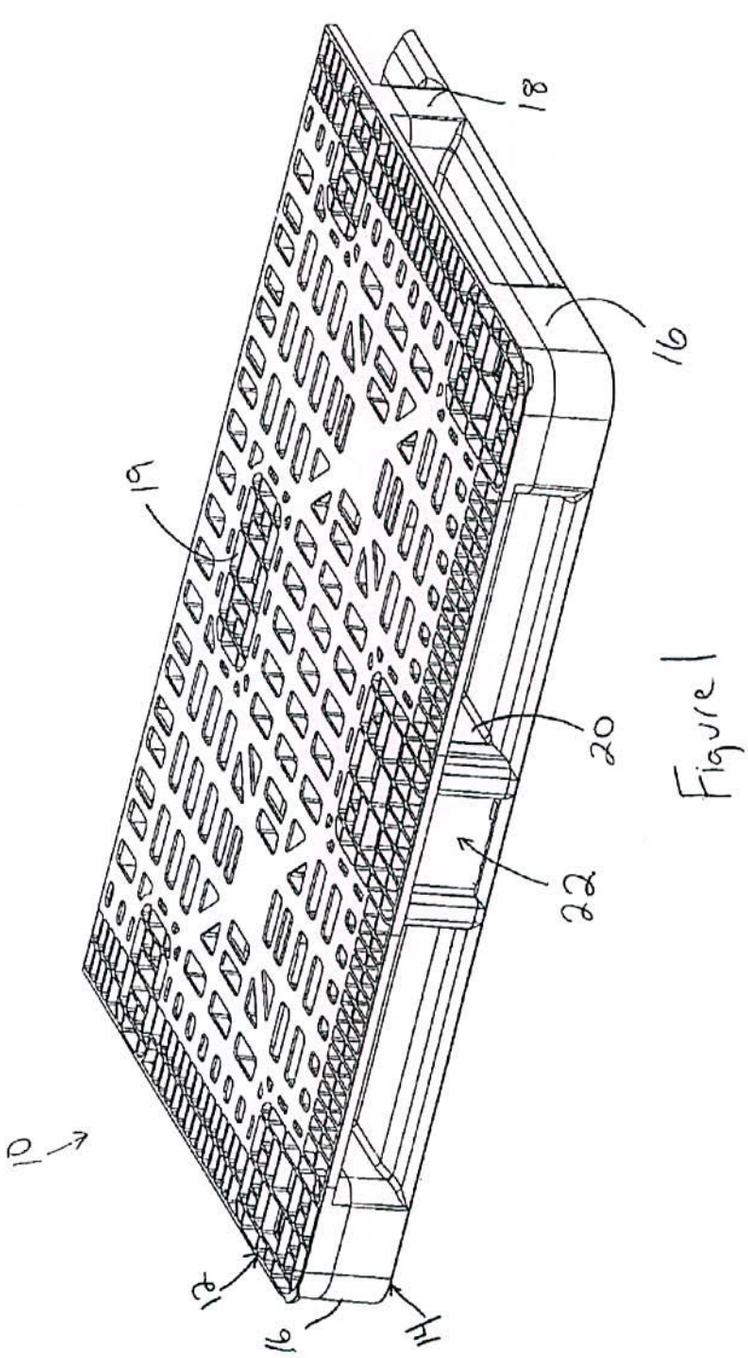


Figure 1

ISO

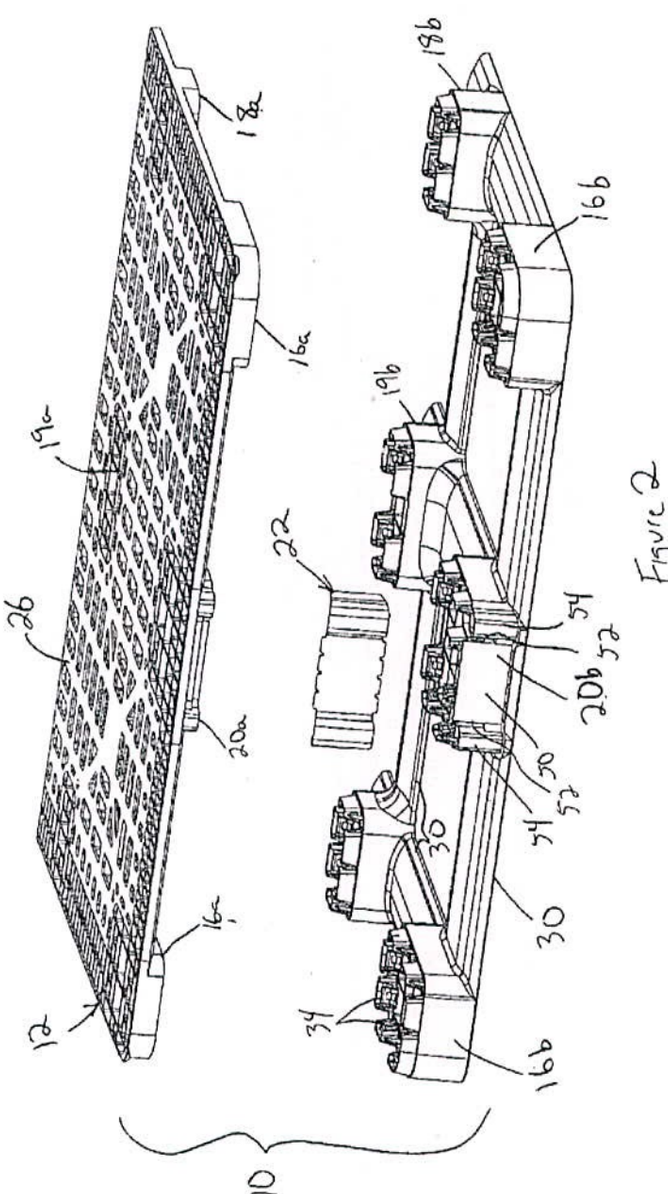
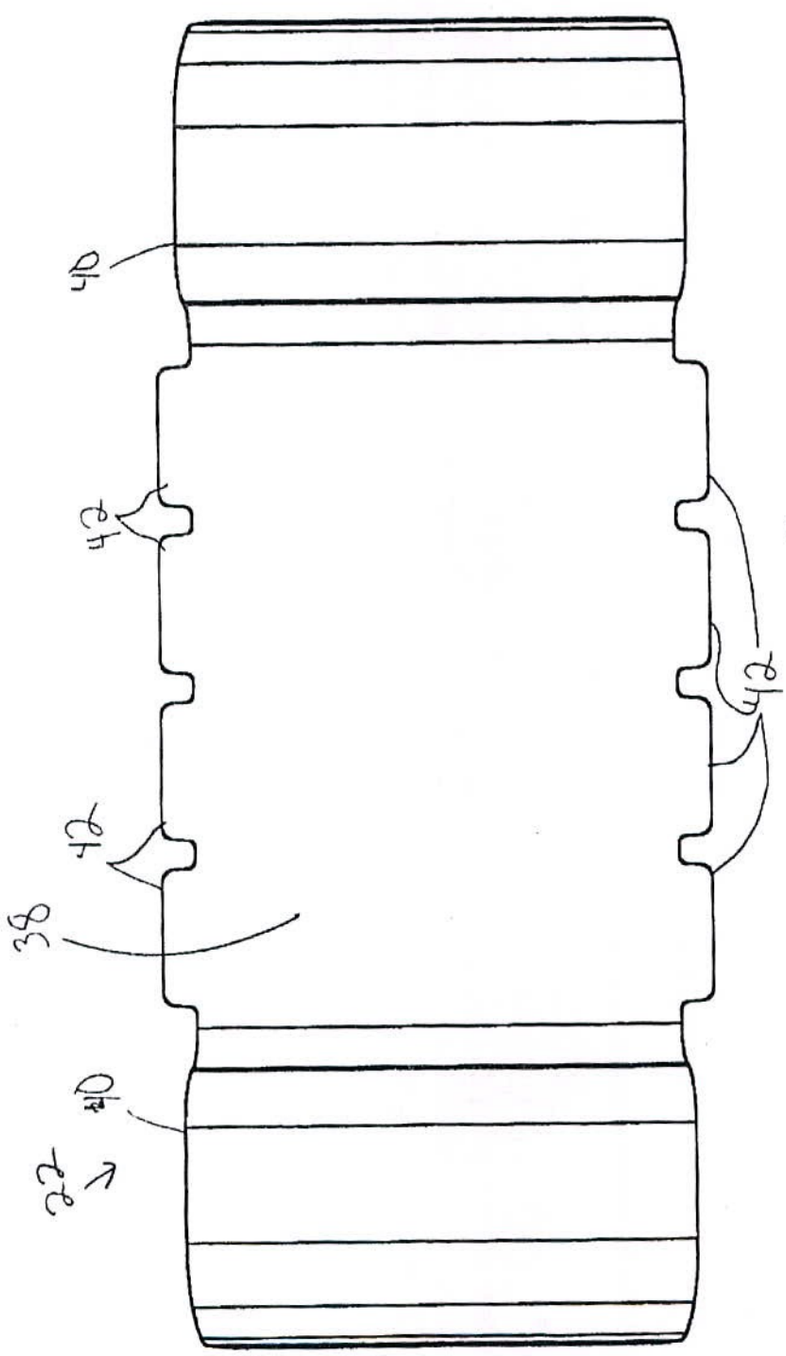

Iso Exploded
18a
19a
16a
26
20a
12
16c
10
22
19b
16b
54
52
20b
50
30
34
16b

Figure 2



Front View

Figure 3

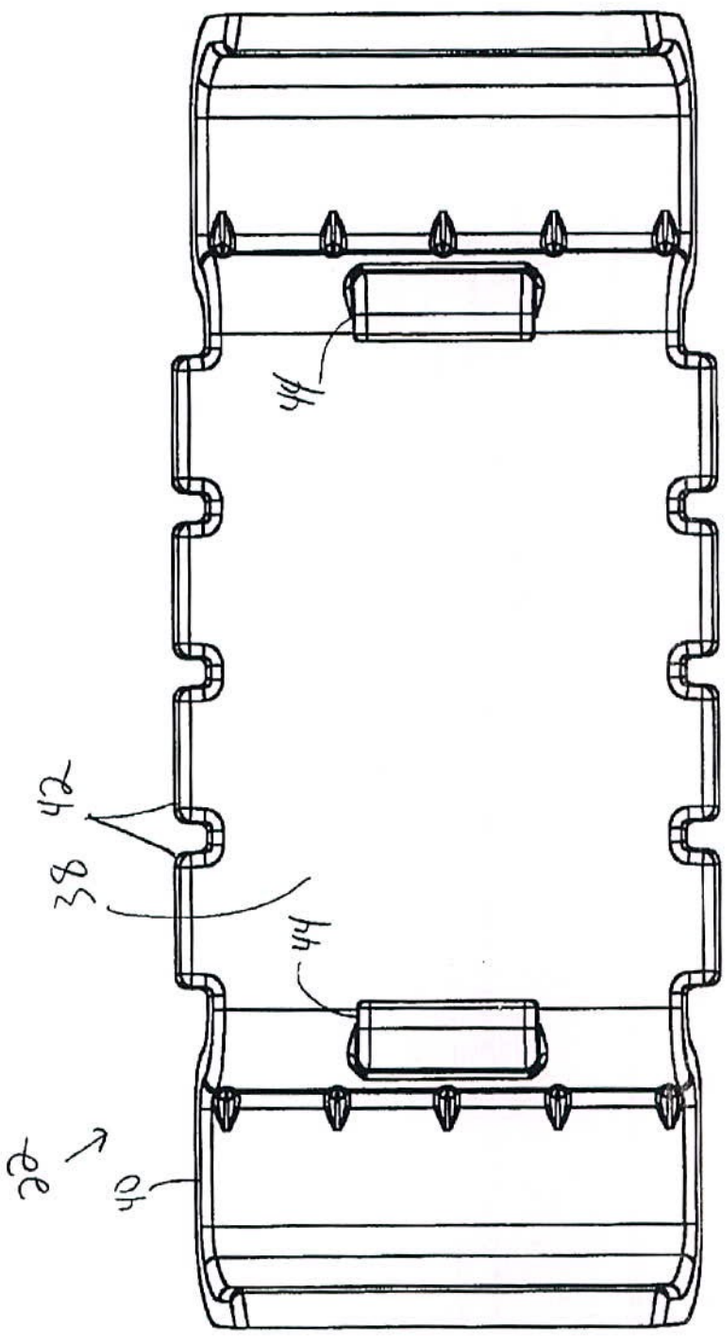


Figure 4

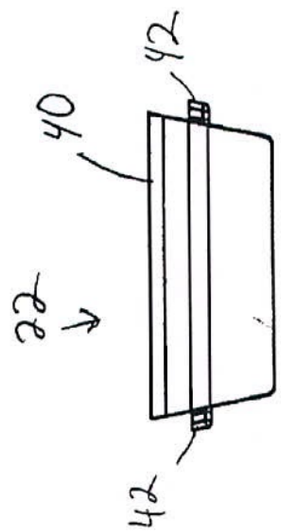


Figure 6

Side View

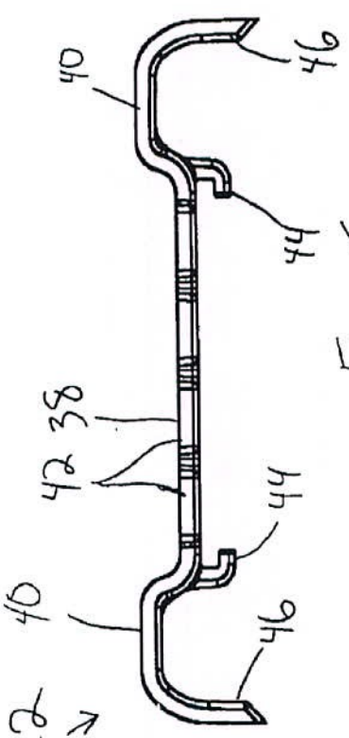
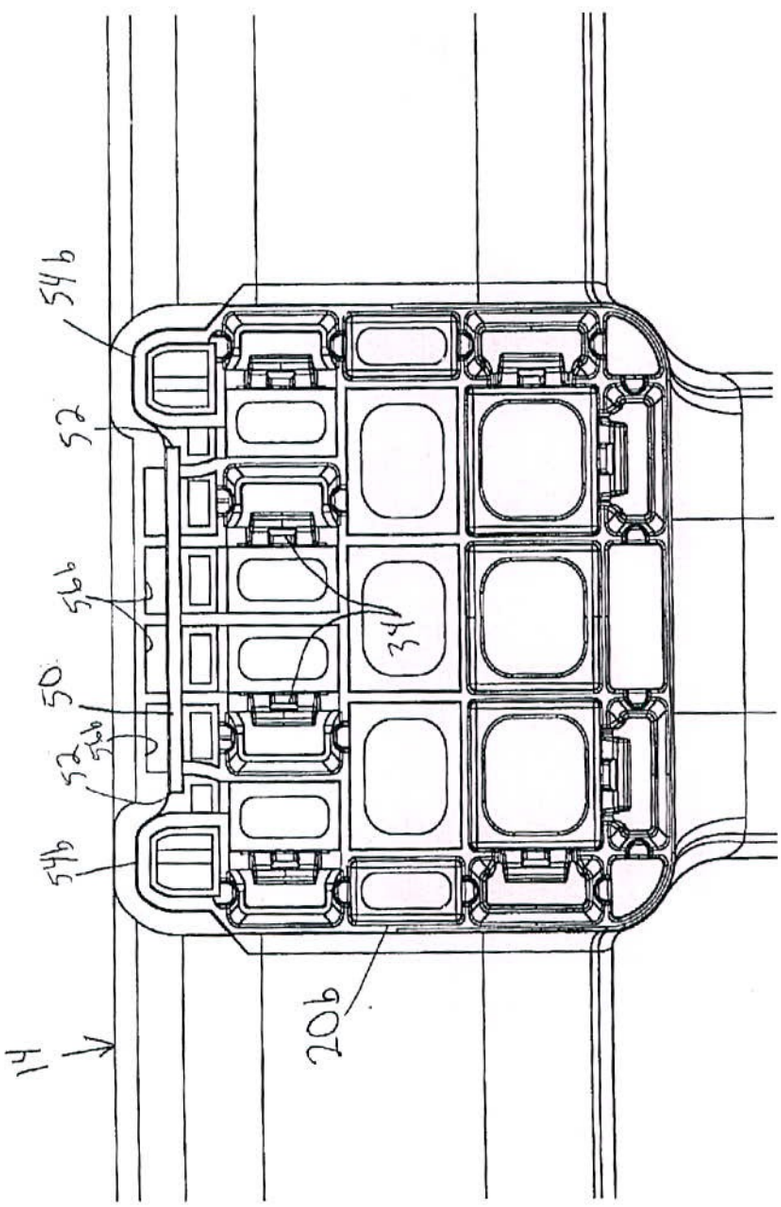


Figure 5

Top View

100



View from top
Top deck not shown
Target cap removed for clarity

Figure 7

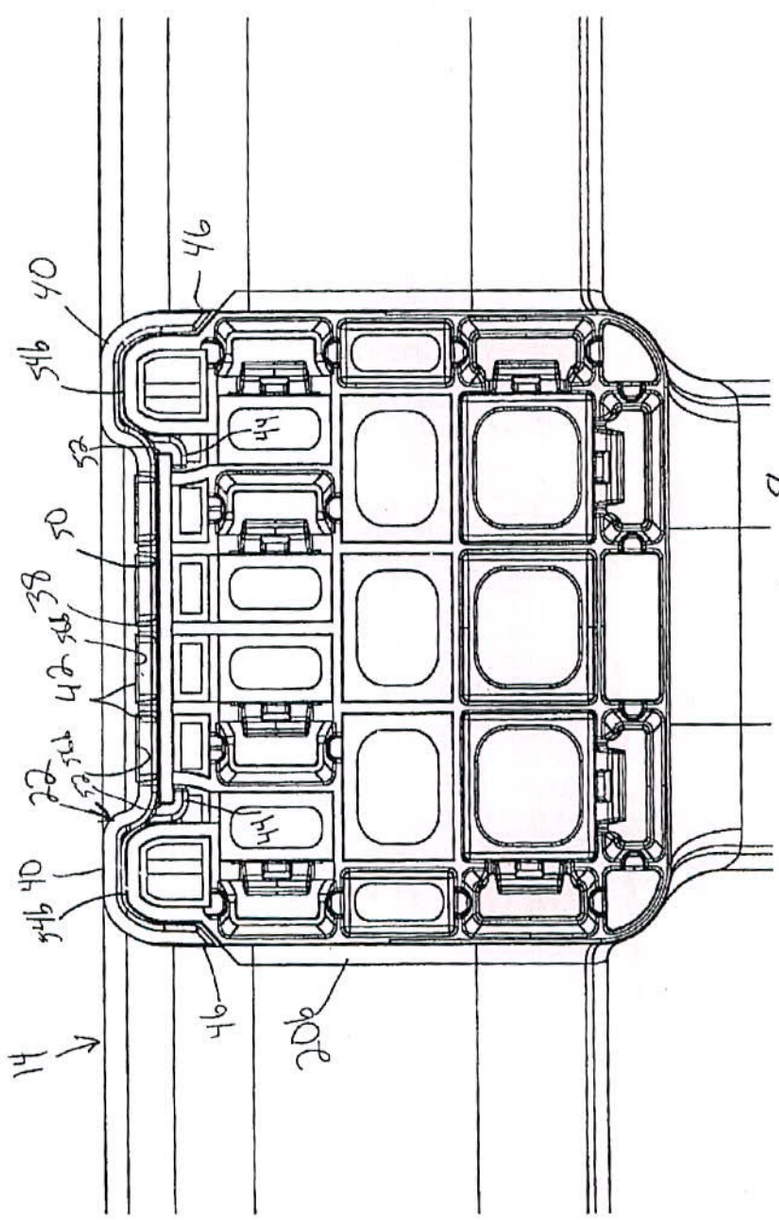

View from top
Top deck not shown
14
46
40
54b
44
58
50
38
42
54a
22
44
40
54b
46
20b

Figure 8

102

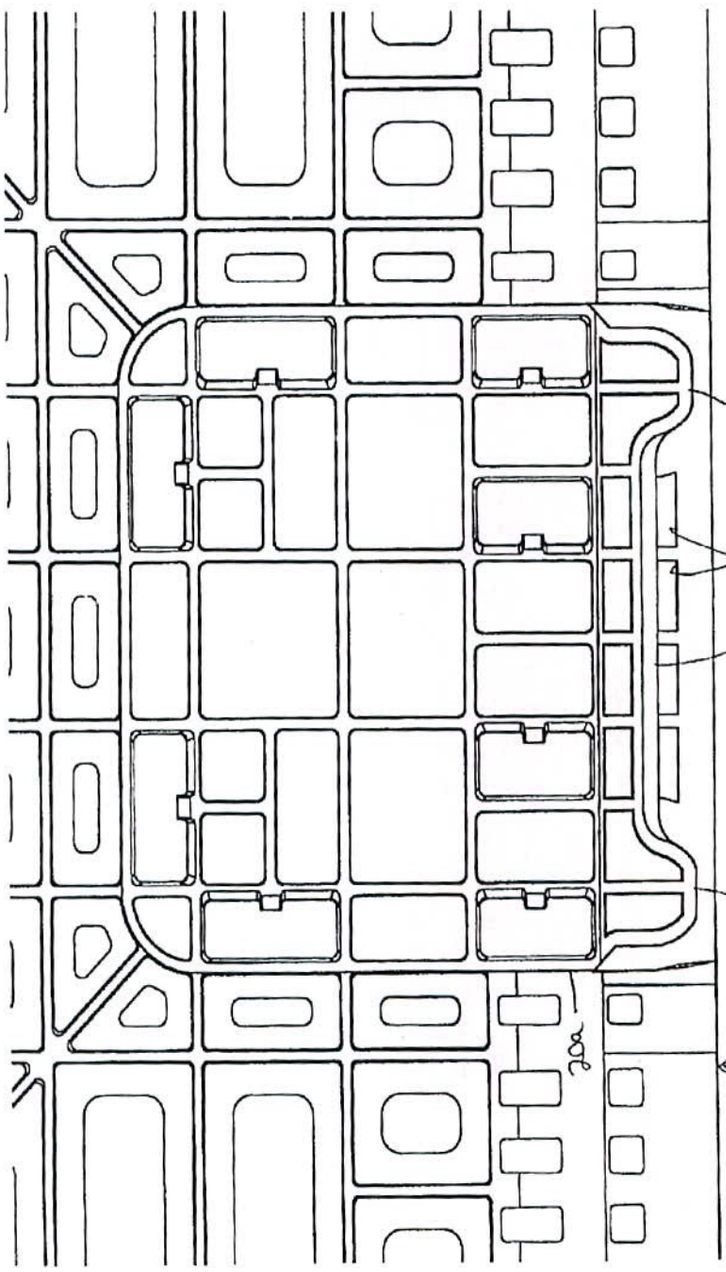


Figure 9

102

103

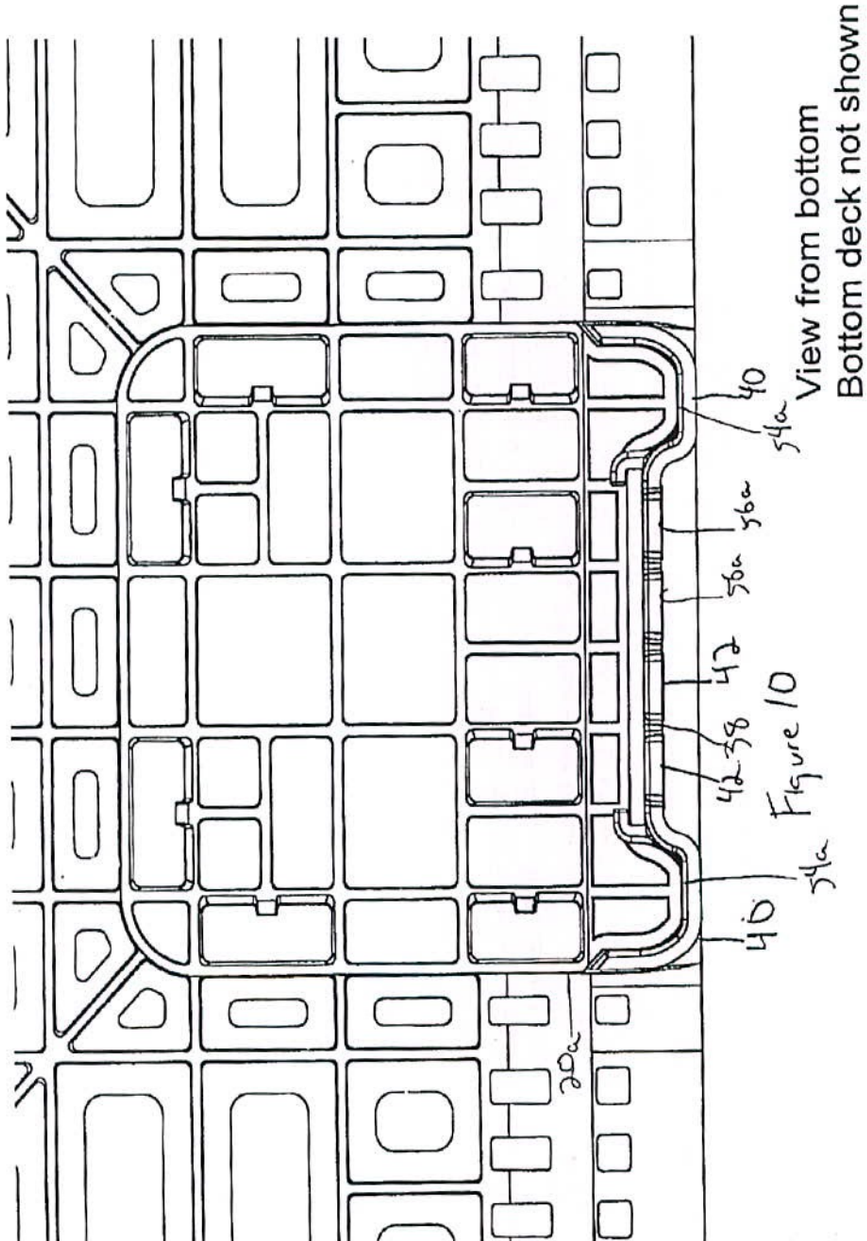


Figure 10

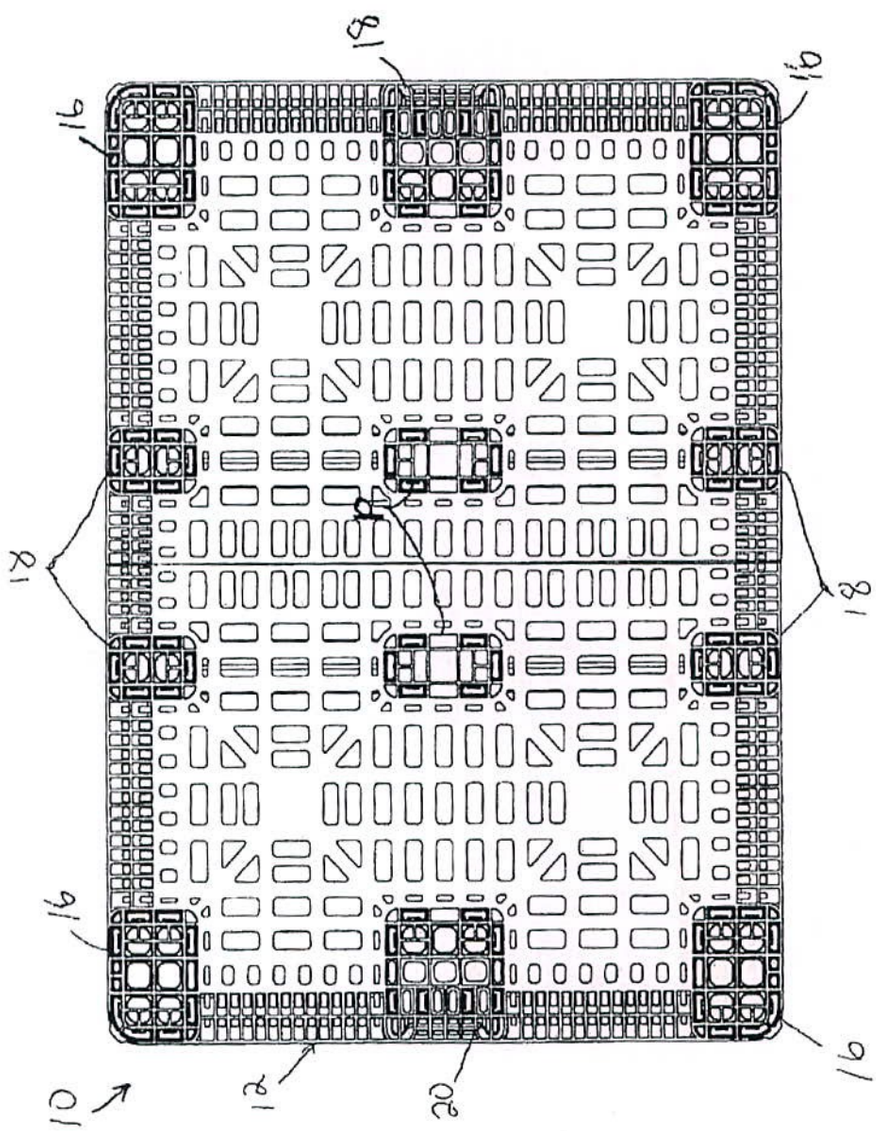


Figure 11

PALLET ASSEMBLY

BACKGROUND OF THE INVENTION

[0001] This invention relates generally to a pallet assembly.

[0002] Pallets are often used to store and transport goods. Pallets maintain the goods at a distance above the floor such that they can readily be lifted and moved by a forklift. Plastic pallets are lighter and more durable than wooden pallets.

[0003] Some pallets comprise upper and lower decks separated by a plurality of columns that maintain the space between the upper and lower decks. Other pallets include only an upper deck supported by a plurality of columns. In either case, forklift operators sometimes move the loaded and stacked pallets by pushing on one of columns with one of the fork tines of the forklift. This may eventually damage the outer wall of the column. The damage is usually cosmetic, not structural; however, the appearance of the damaged column may lead some to believe that the structure of the pallet has been compromised and that the pallet needs to be replaced prematurely.

SUMMARY OF THE INVENTION

[0004] The present invention provides a pallet assembly including an upper deck and a plurality of supports extending downward from the upper deck. A cap is secured in front of at least one of the supports to protect the support. The cap may be formed of a material different from the support, such as a higher density, tougher or harder material, without increasing the cost of the materials for the supports and deck. Optionally, whether or not made of tougher material, the cap can be replaceable if damaged.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Other advantages of the present invention can be understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0006] FIG. **1** is a perspective view of half of a pallet according to one embodiment of the present invention.

[0007] FIG. **2** is an exploded view of the half of the pallet of FIG. **1**.

[0008] FIG. **3** is a front view of the cap of FIG. **2**.

[0009] FIG. **4** is a rear view of the cap.

[0010] FIG. **5** is a top view of the cap.

[0011] FIG. **6** is a side view of the cap.

[0012] FIG. **7** is a top view of the center, end column portion of the bottom deck of FIG. **1**.

[0013] FIG. **8** is a top view of the center, end column portion of the bottom deck and the cap.

[0014] FIG. **9** is a bottom view of the center, end column portion of the top deck.

[0015] FIG. **10** is a bottom view of the center, end column portion of the top deck and the cap.

[0016] FIG. **11** is a top view of the pallet of FIG. **1**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] A half perspective view of an example pallet **10** constructed according to the present invention is shown in FIG. **1**. Although only half is shown for simplicity, it is understood that the other half would be similar. The pallet **10** includes an upper deck **12** spaced above a lower deck **14** by a plurality of supports or columns including corner columns **16**, side columns **18**, a center column **19** and end columns **20**. The upper deck **12** and the lower deck **14** in this example are each a single, integrally formed part, such as by injection molding polypropylene or other suitable material. Other methods such as rotomolding or thermoforming may also be used.

[0018] A column cap **22** is separately formed of a higher density material, such as a higher density polymer such as a high molecular weight high density polyethylene, such that it is stiffer and tougher than the end column **20** (i.e. than the upper deck **12** and lower deck **14**), which may be polypropylene or polyethylene. The column cap **22** may be injection molded (if polymer) or formed according to any suitable process. In the example shown, the column cap **22** is fitted in front of only the end column **20** (and the opposite end column **20**, not shown), as this is the column most often impacted by the tines of the forklift; however, additional column caps **22** could be fitted over any or all of the remaining columns as well.

[0019] FIG. **2** is an exploded view of the pallet **10** of FIG. **1**. The upper deck **12** includes a plurality of integrally molded upper column portions **16***a*, **18***a*, **19***a*, **20***a* that together with integrally molded lower column portions **16***b*, **18***b*, **19***b* **20***b*, form the corner columns **16**, side columns **18**, center column **19** and end columns **20**, respectively. The lower deck **14**, as shown in this example, may include a plurality of runners **30** that interconnect the plurality of lower column portions **16***b*, **18***b*, **19***b*, **20***b*. The end column lower portion **20***b* includes a front wall **50** having gaps **52** on either side of the front wall **50** between the front wall **50** and each of a pair of pillars **54** that protrude outward relative to the front wall **50**. The lower column portions **16***b*, **18***b*, **19***b*, **20***b* each include snap-fit connectors **34** for securing to complementary connectors on the corresponding upper column portions. Numerous other known ways of connecting the upper and lower decks **12**, **14** can be used, such as heat staking, vibration welding, etc.

[0020] FIG. **3** is a front view of the column cap **22** of FIG. **2**. The column cap **22** includes a generally flat front panel **38** and curved side walls **40**. A plurality of teeth or tabs **42** project from the upper edge and from the lower edge of the front panel **38**.

[0021] FIG. **4** is a rear view of the column cap **22**. A pair of integrally-molded hooks **44** project rearward and then inward from outer edges of the front panel **38**. As shown in FIG. **5**, the hooks **44** open inward toward one another. The curved side walls **40** project forward of the front panel **38** and open rearward.

[0022] As shown in FIG. **6**, the tabs **42** protrude upward and downward further than the curved side walls **40**. Also, the curved side walls **40** taper inward as they extend away from the front panel **38**.

[0023] FIG. **7** is a top view of the end lower column portion **20***b* of the lower deck **14** (with the column cap **22** removed). The end lower column portion **20***b* includes a plurality of apertures **56***b* in front of the front wall **50** and between the pillars **54**.

[0024] As shown in FIG. **8**, to assemble the column cap **22** to the end lower column portion **20***b*, the front panel **38** of the column cap **22** is slid down in front of the front wall **50** of the end lower column portion **20***b*. The curved side walls **40** fit around the pillars **54**. The hooks **44** of the column cap **22** are slid down through the gaps **52** to interlock with the

front wall **50** to retain the column cap **22** to the end lower column portion **20***b*. The tabs **42** of the column cap **22** are received in the apertures **56***b* in front of the front wall **50** in the end lower column portion **20***b* to further interlock the column cap **22** with the end lower column portion **20***b*.

[0025] FIG. **9** is a bottom view of the end upper column portion **20***a* of the top deck **12**, with the column cap **22** removed. The upper column portion **20***a* also includes a short rib forming a pair of spaced apart pillars **54***a* (much shorter than the pillars **54***b* on the lower column portion **20***b*) and a front portion **51**. A plurality of spaced-apart apertures **56***a* are formed in front of the front portion **51**. As shown in FIG. **10**, the curved side walls **40** of the column cap **22** fit around the pillars **54***a* and the tabs **42** interlock with the apertures **56***a* to retain the column cap **22**. When the upper deck **12** is assembled to the lower deck **14** (FIG. **8**), the tabs **42** are so received in the apertures **56***a*.

[0026] FIG. **11** is a top view of the entire assembled pallet **10**. As shown, the pallet **10** includes a similar opposite end column **20**, which would also have a column cap **22**.

[0027] In use, a forklift operator could push the pallet **10** across the floor by placing a tine of the fork against the column cap **22** of the end column **20**. The tougher higher-density material of the column cap **22** prevents damage to the end column **20** without unnecessarily increasing the cost of materials for the entire pallet **10** or column **20**. In the event that the column cap **22** does receive damage, it can easily be replaced.

[0028] In accordance with the provisions of the patent statutes and jurisprudence, exemplary configurations described above are considered to represent a preferred embodiment of the invention. However, it should be noted that the invention can be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope. Alphanumeric identifiers for steps in method claims are for ease of reference in dependent claims and do not signify a required sequence unless otherwise stated.

What is claimed is:

1. A pallet assembly comprising:

an upper deck;

a plurality of supports extending downward from the upper deck, the plurality of supports including a first support; and

a cap secured in front of the first support, the cap including a front panel facing outward of the pallet.

2. The pallet assembly of claim **1** wherein the cap interlocks with at least one of the first support and the upper deck.

3. The pallet assembly of claim **1** wherein the cap is formed of a polymer material.

4. The pallet assembly of claim **3** wherein the cap made of a different material from the first support.

5. The pallet assembly of claim **4** wherein the cap material has a higher density than the material of the first support.

6. The pallet assembly of claim **1** wherein the first support includes a front wall facing outward of the pallet, the support panel positioned in front of the front wall.

7. The pallet assembly of claim **6** further including a pair of curved side walls on either side of the front panel.

8. The pallet assembly of claim **1** wherein the front panel includes a plurality of tabs protruding upward into apertures in the upper deck.

9. The pallet assembly of claim **1** further including a lower deck, the plurality of supports extending from the upper deck to the lower deck, the cap interlocking with the lower deck and the upper deck.

10. The pallet assembly of claim **9** wherein the plurality of supports are integrally molded with the lower deck.

11. The pallet assembly of claim **10** wherein the first support includes a front wall facing outward of the pallet, the front panel positioned in front of the front wall, the front panel slidably interlocking with the front wall.

12. The pallet assembly of claim **1** wherein the plurality of supports includes a pair of corner supports, the first support between the pair of corner supports.

13. A pallet support cap comprising:

a front panel;

a pair of side walls extending rearward from outer edges of the front panel; and

interlocking members projecting from at least one of the front panel and the side walls.

14. The pallet support cap of claim **13** wherein the front panel is generally disposed in a plane, the interlocking members include a first plurality of tabs projecting from the front panel in a first direction in the plane.

15. The pallet support cap of claim **14** wherein the interlocking members further include a second plurality of tabs projecting from the front panel in a second direction opposite the first direction in the plane.

16. The pallet support cap of claim **15** wherein the interlocking members further include a pair of hooks projecting rearward from the support cap.

17. The pallet support cap of claim **16** wherein the side walls project forward of the plane of the front panel and open rearward.

18. The pallet support cap of claim **17** wherein the side walls taper vertically from the front panel to a rearward edge.

19. A pallet assembly comprising:

an upper deck;

a plurality of plastic columns extending downward from the upper deck, the plurality of columns including a plurality of corner columns and an end column between two of the plurality of corner columns; and

a cap secured in front of the end column, the cap including a front panel facing outward of the pallet, the front panel made of a material different from the end column.

20. The pallet assembly of claim **19** wherein the cap interlocks with at least one of the first support and the upper deck.

21. The pallet assembly of claim **19** wherein the cap is formed of a polymer.

22. The pallet assembly of claim **19** wherein the material of the cap has a higher density than material forming the end column.

23. The pallet assembly of claim **19** wherein the front panel includes a plurality of tabs protruding upward into apertures in the upper deck.

24. The pallet assembly of claim **19** further including a lower deck, the plurality of columns extending from the upper deck to the lower deck, the cap interlocking with the lower deck and the upper deck.

25. The pallet assembly of claim **19** wherein the end column includes a front wall facing outward of the pallet, the front panel positioned in front of the front wall, the front panel slidably interlocking with the front wall.

26. A method for assembling a pallet including the steps of:

a) molding a plurality of columns;

b) molding a first deck;

c) molding a second deck;

d) sliding a cap over one of the plurality of columns; and

e) securing together the first deck, second deck, plurality of columns and cap.

27. The method of claim **26** wherein said plurality of columns are integrally molded with the first deck.

28. The method of claim **27** wherein the cap is slidably and interlockingly inserted onto the one column in a direction toward the first deck in said step d).

29. The method of claim **28** wherein said step d) is performed before at least part of said step e).

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