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(54) STRUCTURAL STRAPPED MULTI-PACK PACKAGING

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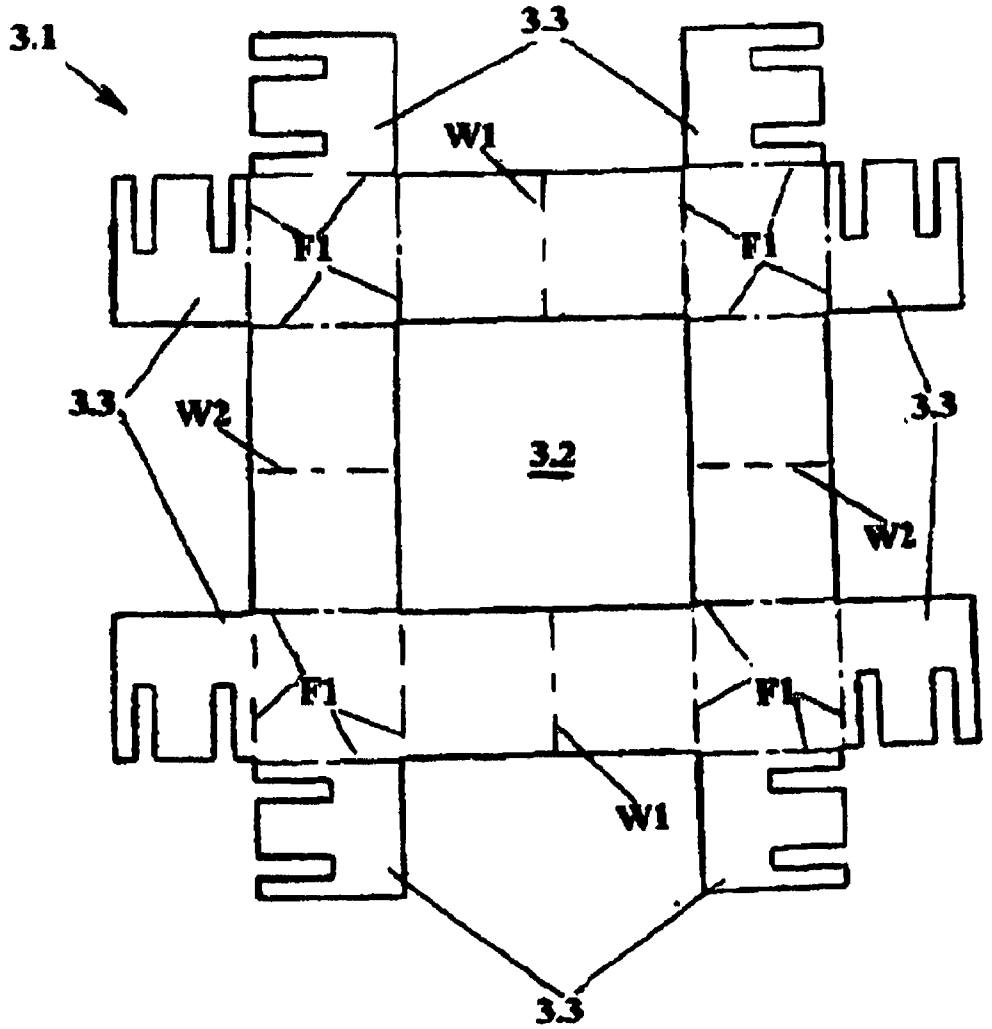
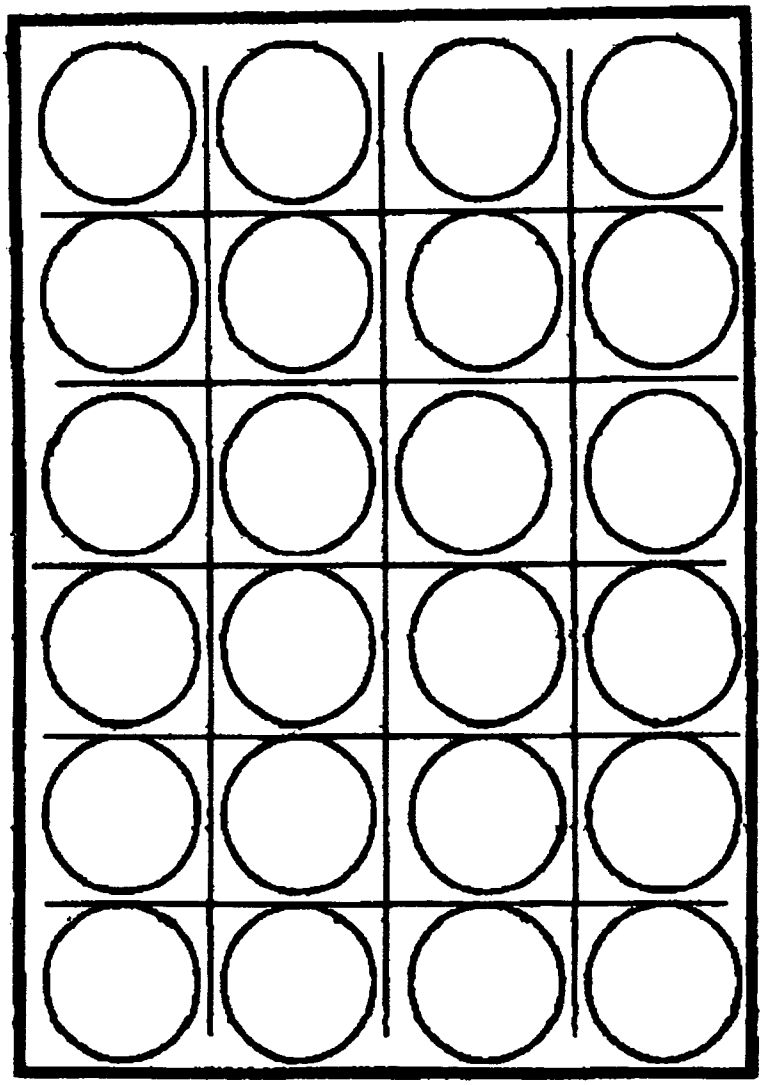
(57) **ABSTRACT**

Packages for multiple goods containers are secured by tensioned straps into integrated, load bearing, stackable units for palletizing, storage and supply-line service. Rigid, semi-rigid and flexible containers, including multi-tiered tubs are accommodated by the system. Cardboard usage is reduced 40 to 50 percent. Die-cut spacers, flaps and occlusions, and dividers separate the containers, giving frictional integration under strapped compression. Cruciform spacers enable reductions in stock gauge. Packages are ventilated, for goods identification and cooling. L-section rolled stock makes simple, strong, ventilated bases and caps. Re-usable plastic trays can form cap and base portions of the package.

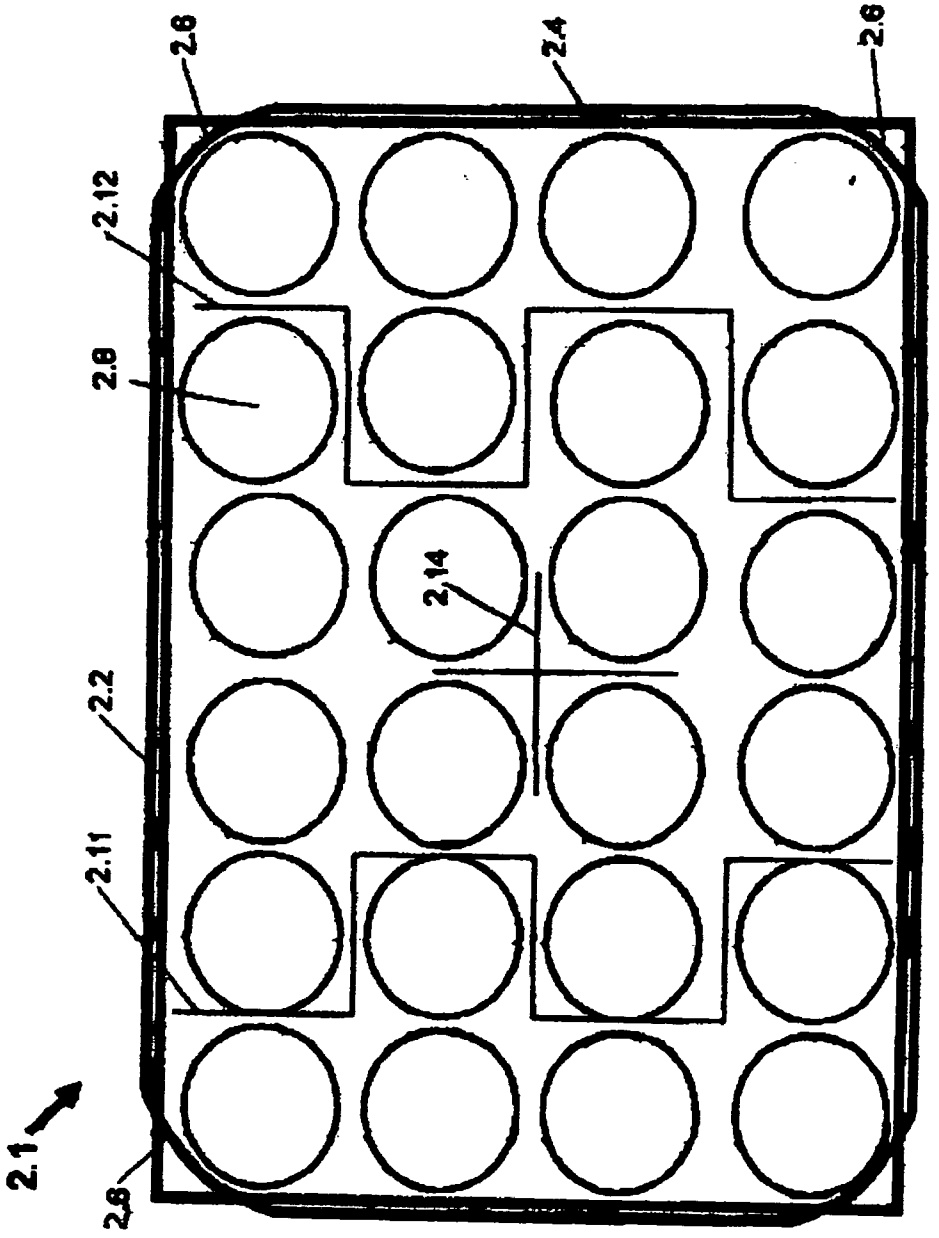




Prior Art

FIG 1

FIG 2



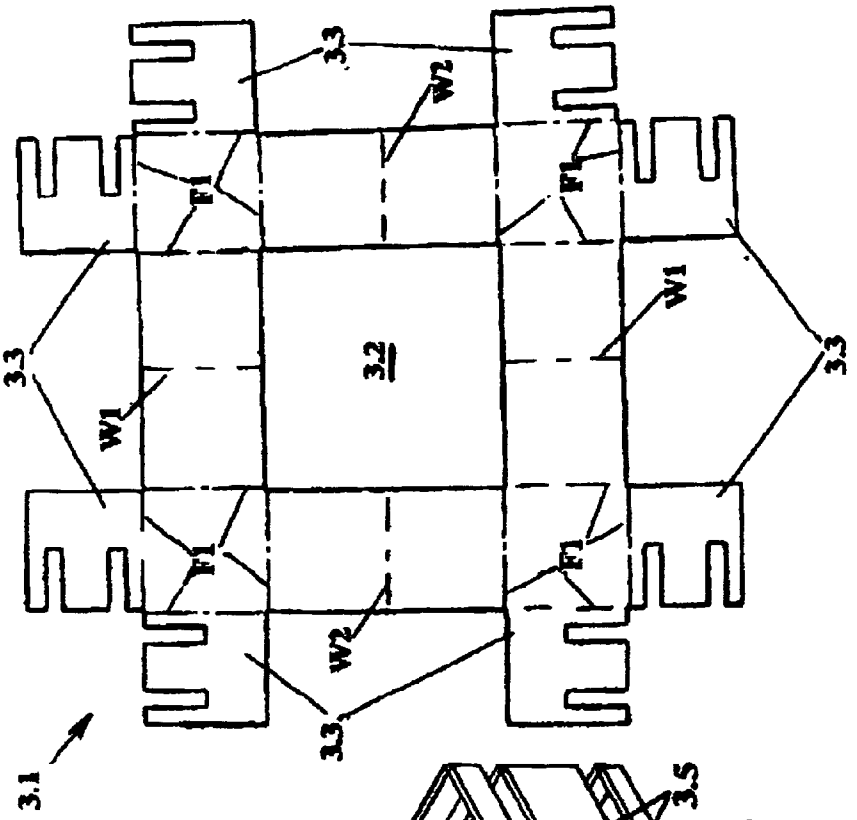


FIG 3A

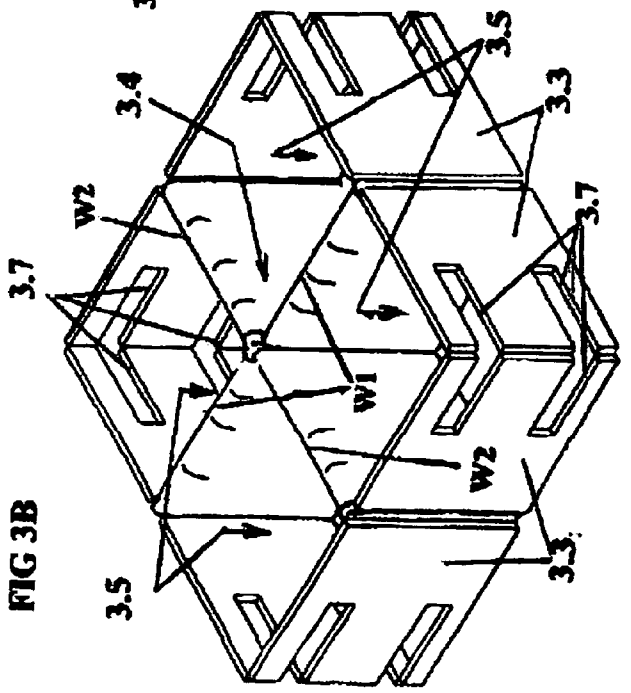


FIG 3B

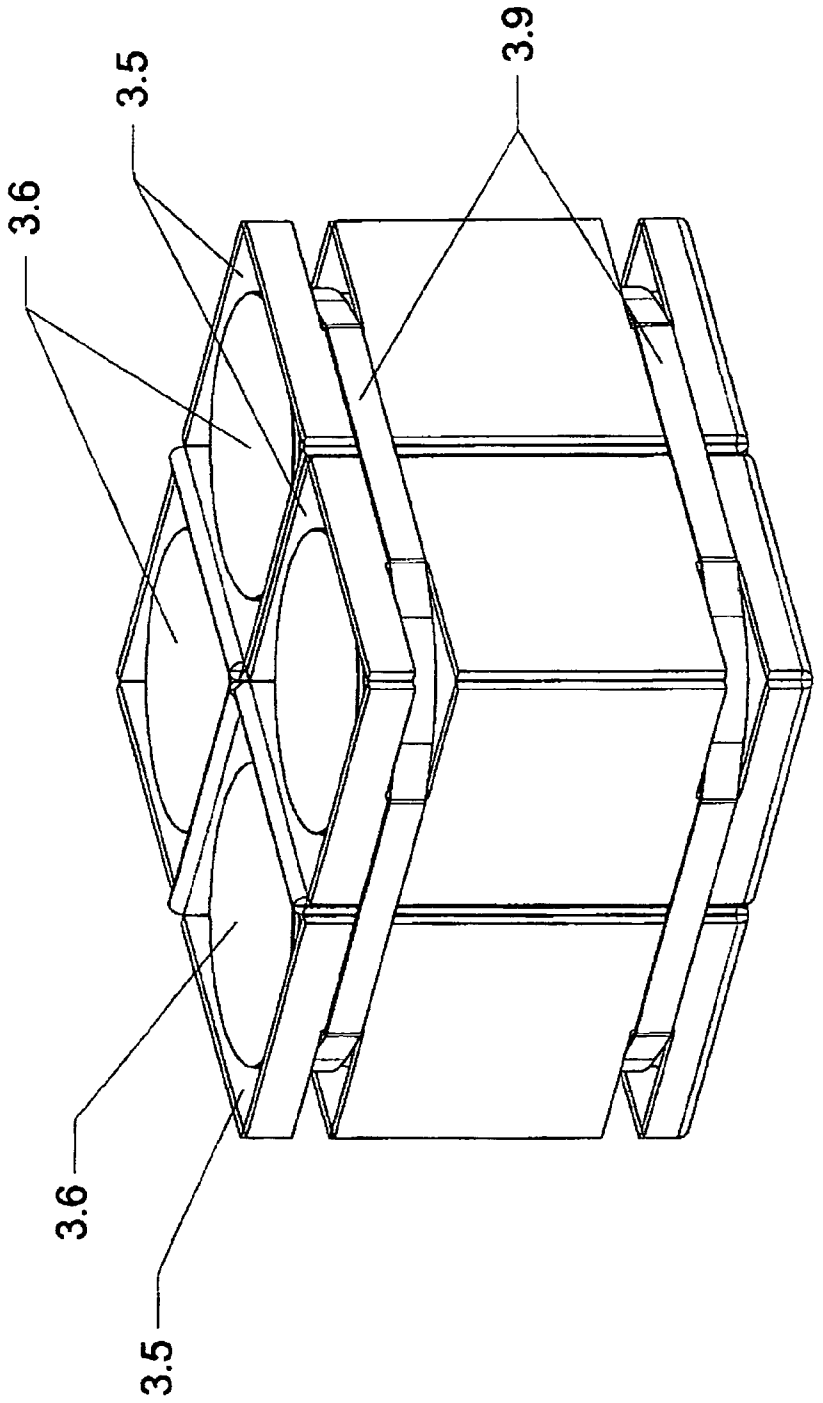


FIG 3C

FIG 4

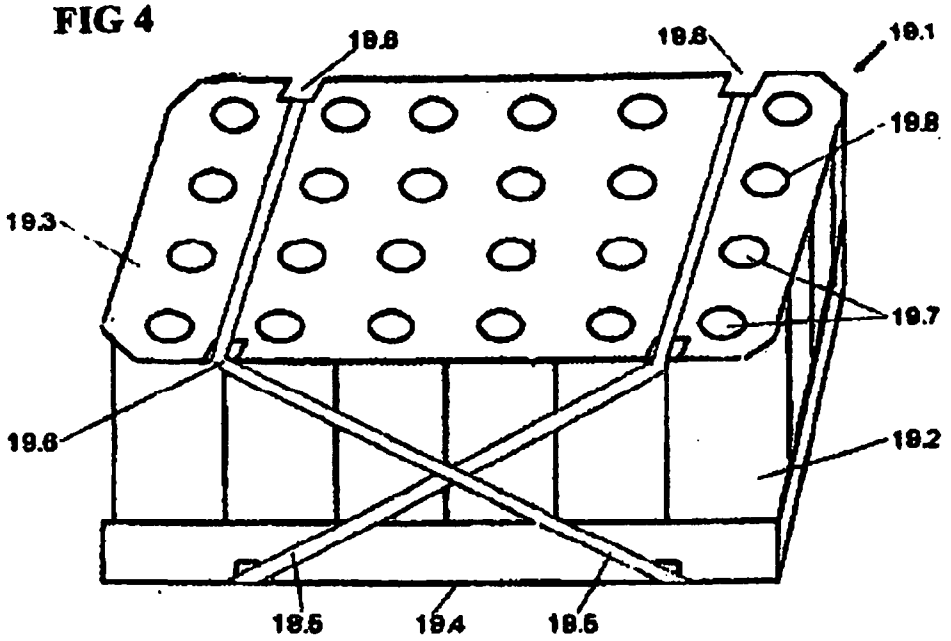
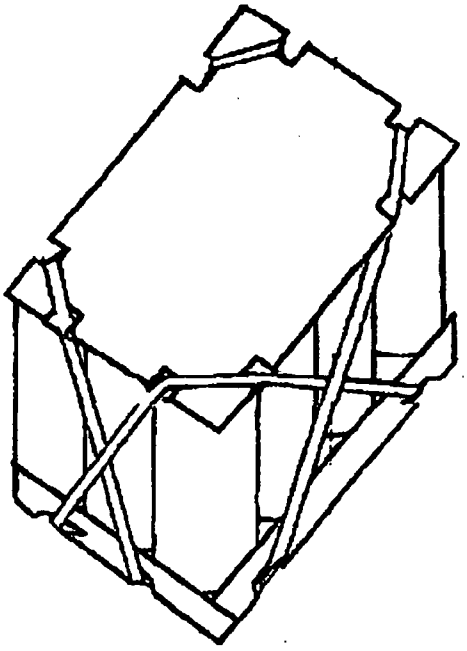


FIG 19



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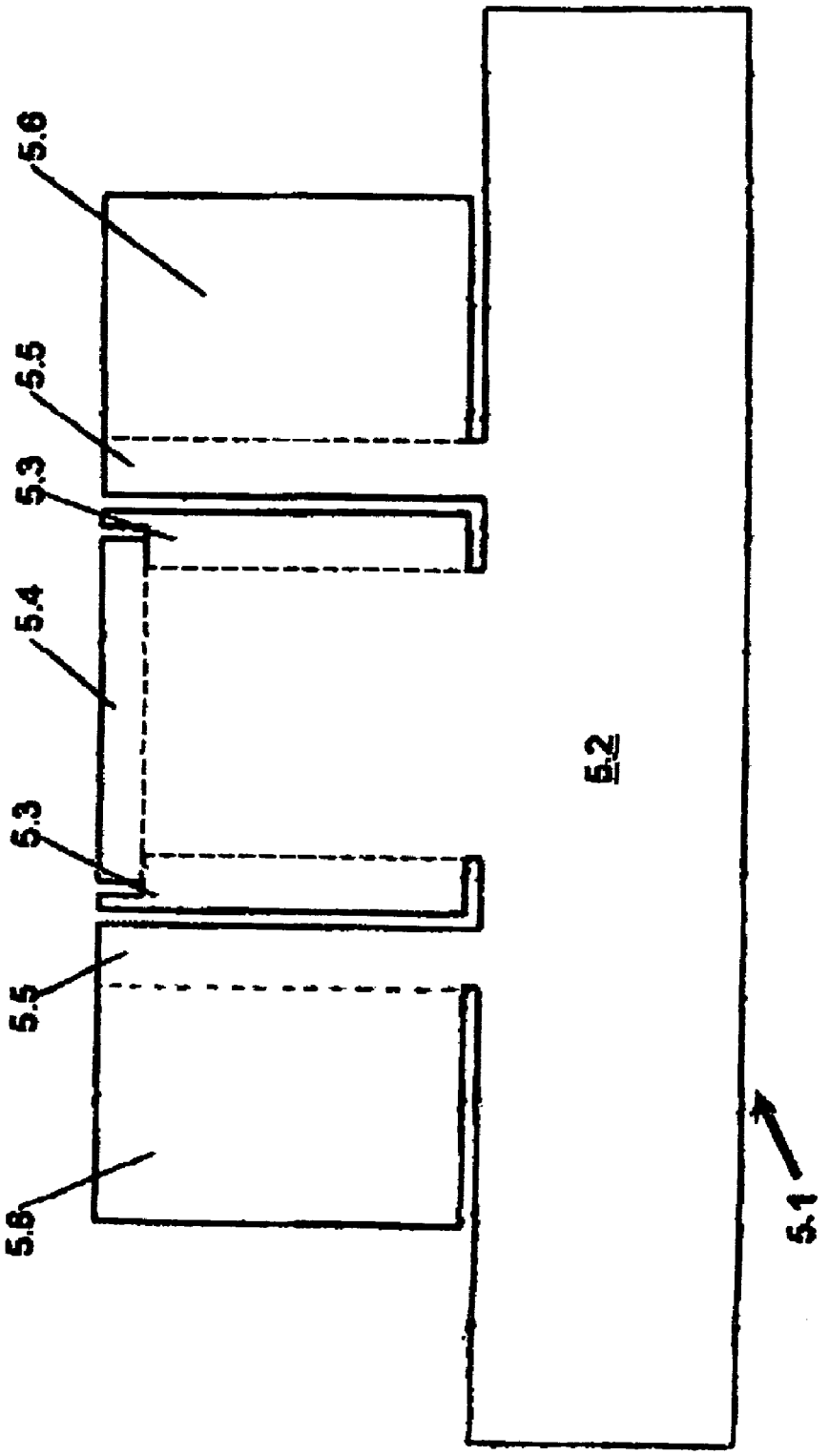


FIG 6A

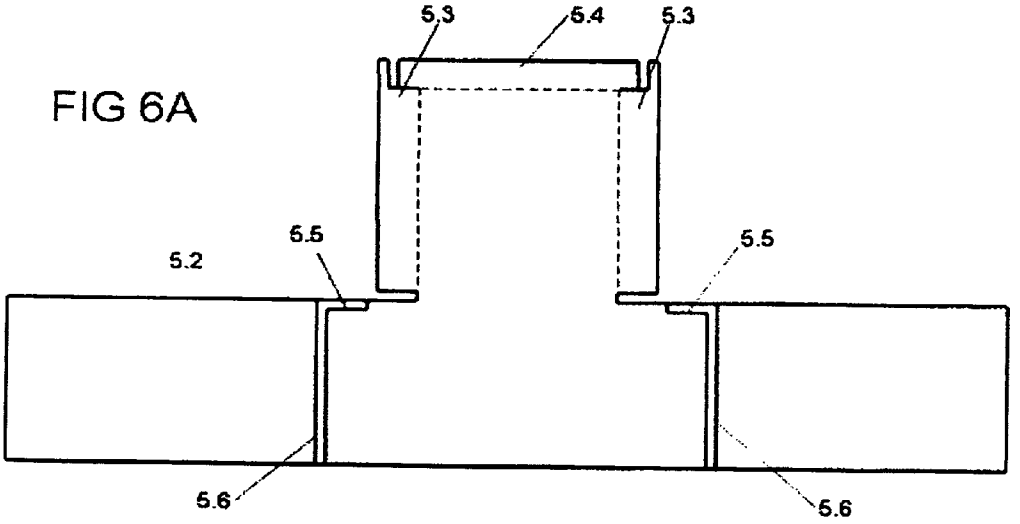
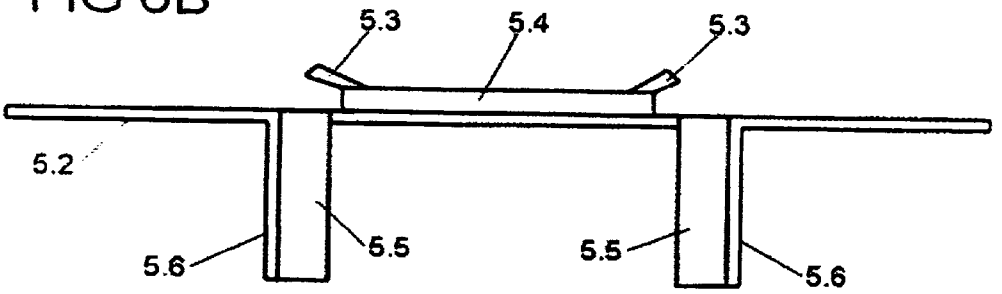


FIG 6B



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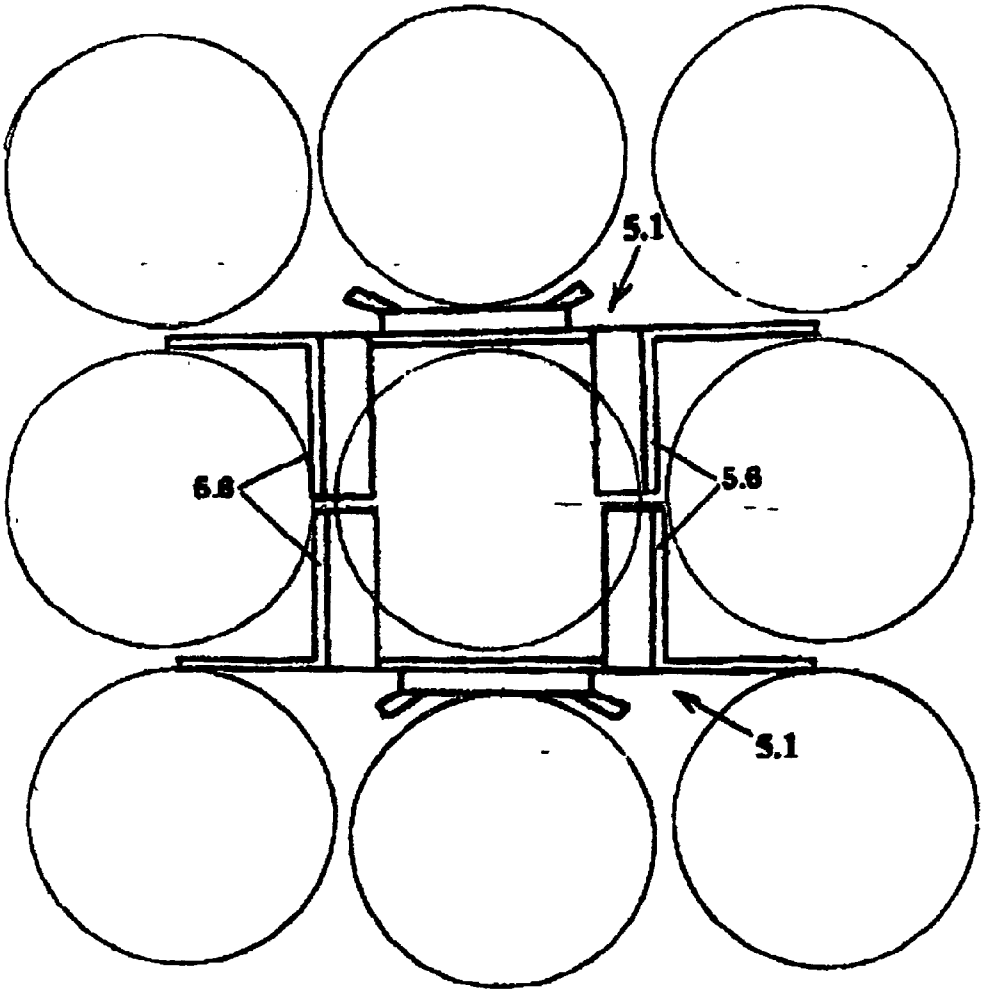

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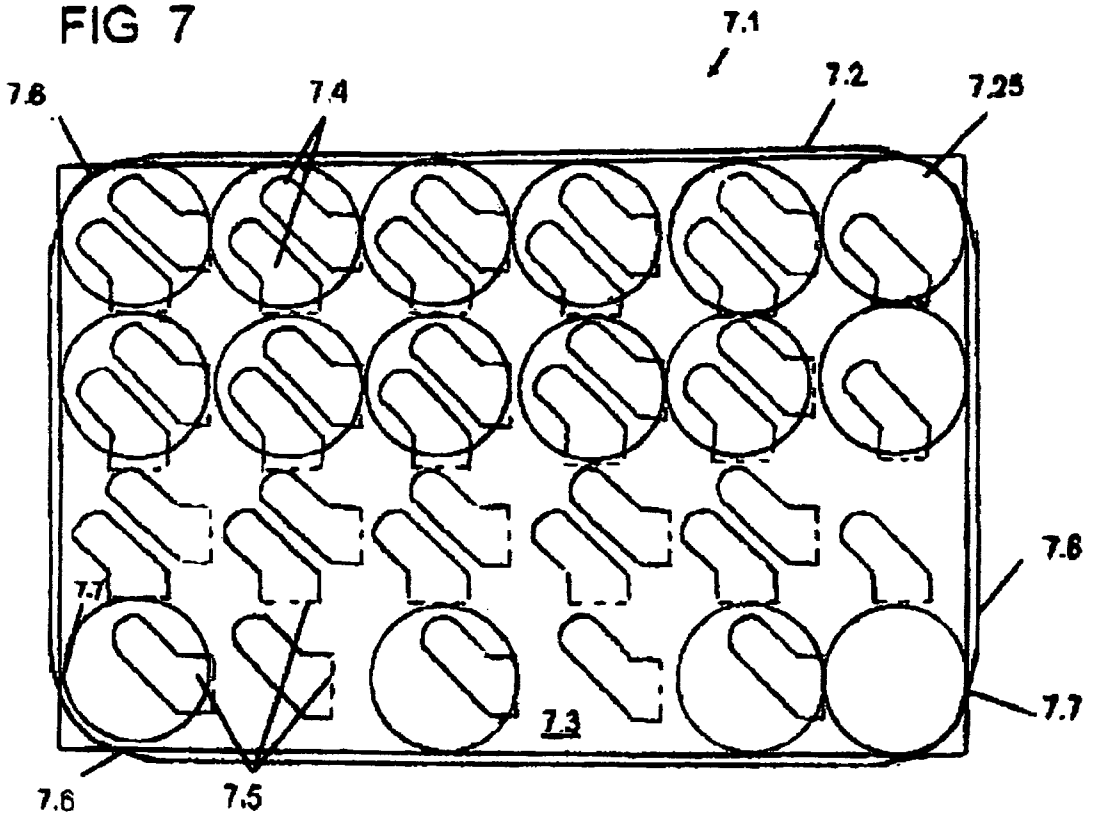
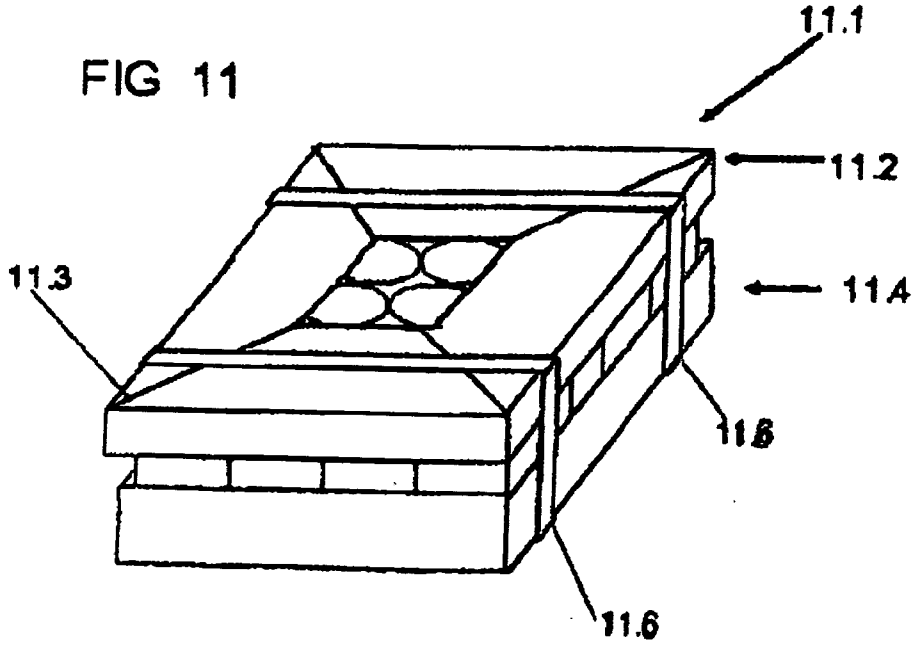


FIG 11



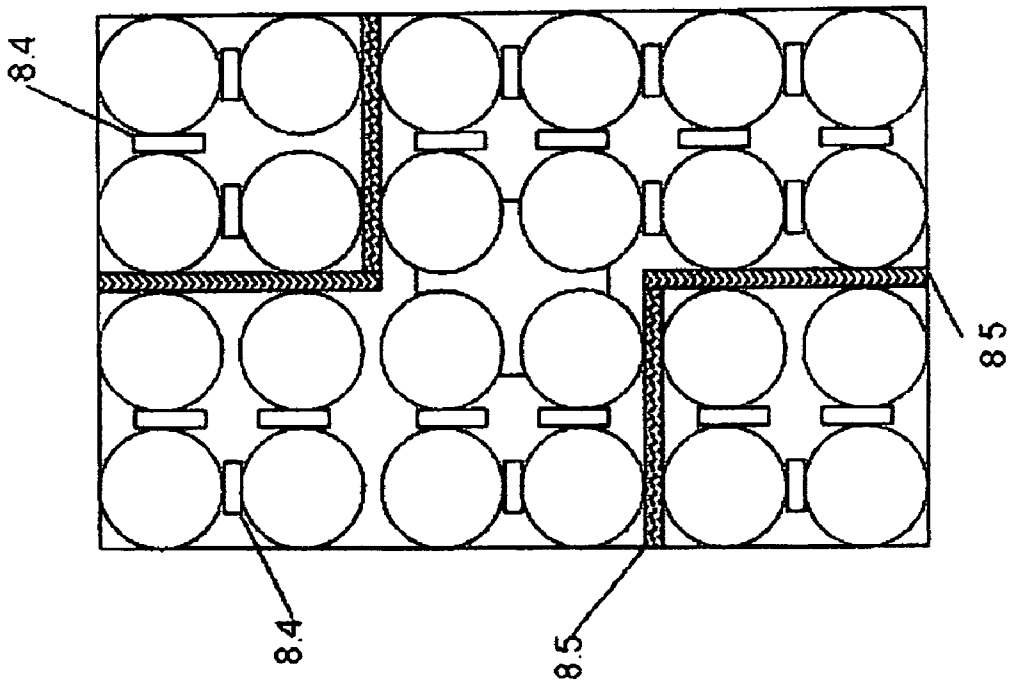


FIG 8B

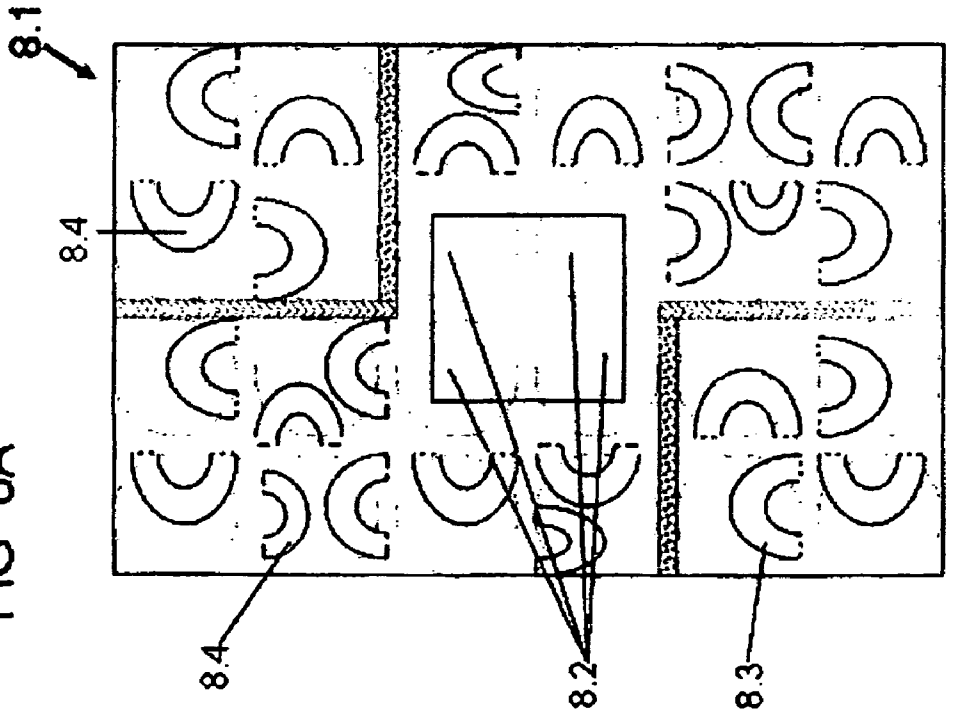


FIG 8A

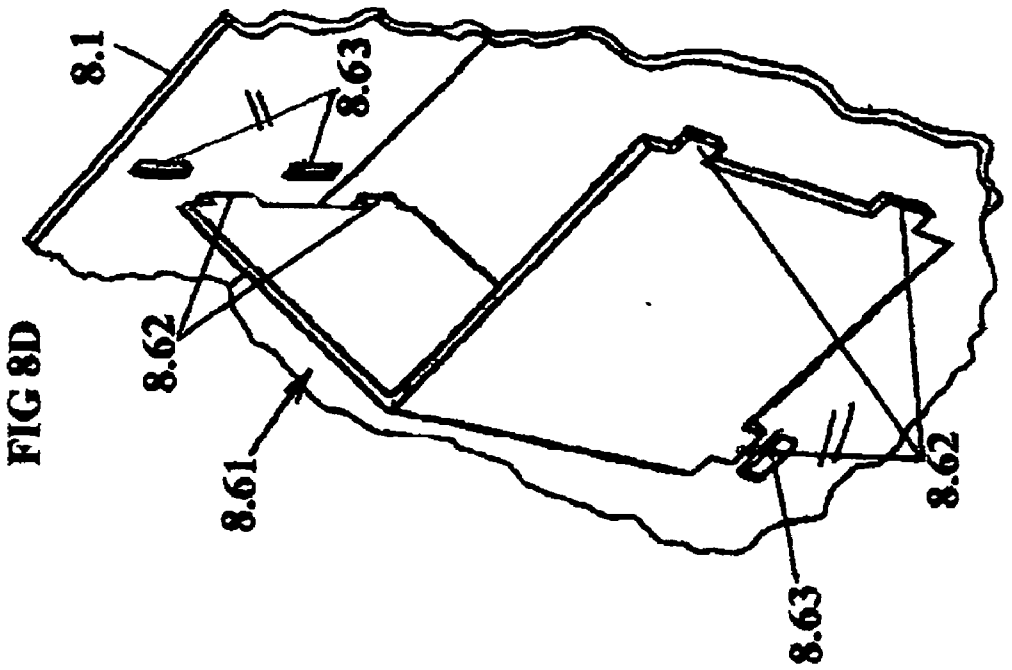


FIG 8D

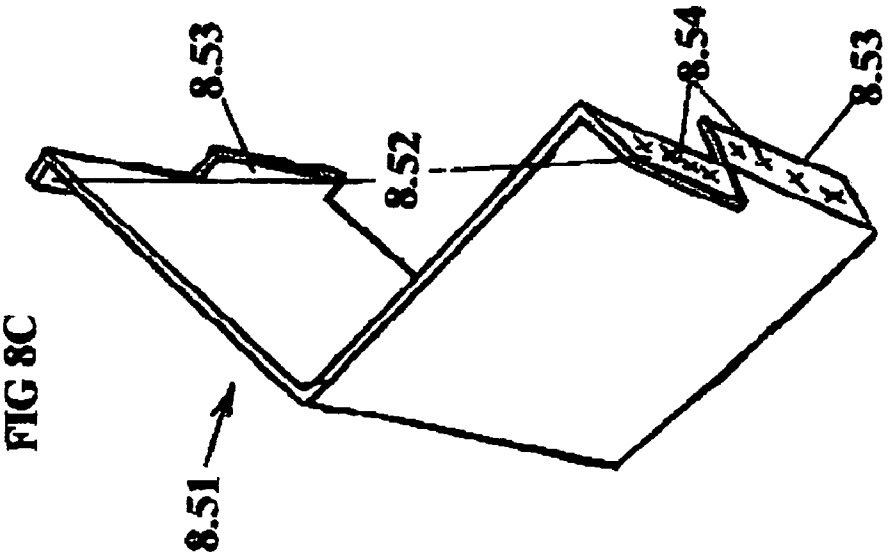


FIG 8C

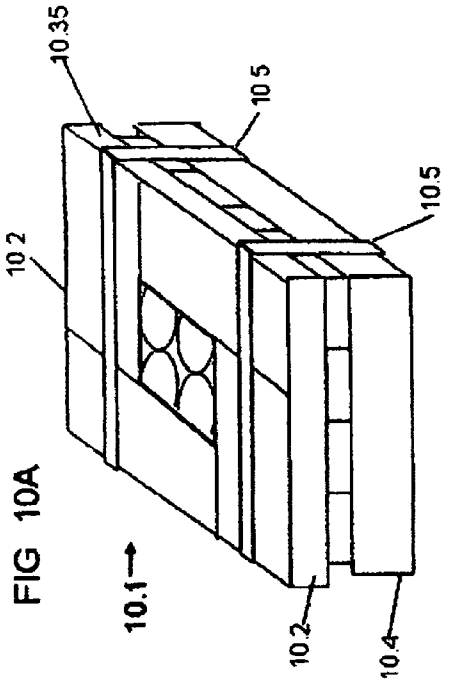
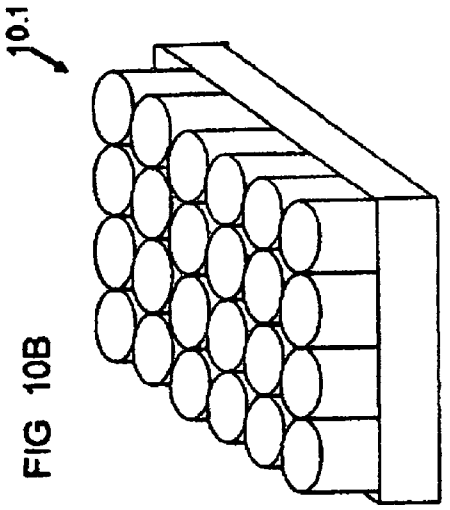


FIG 10A



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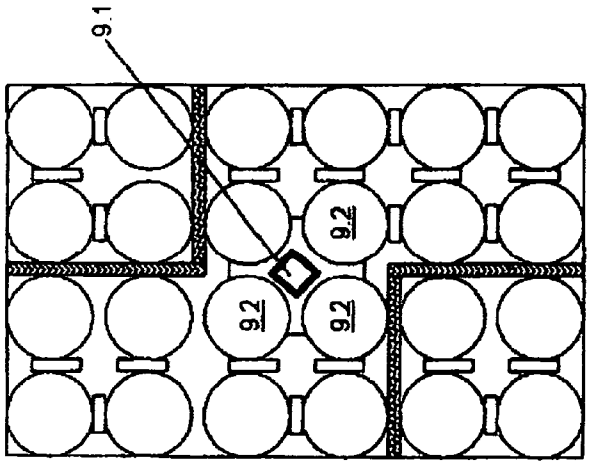
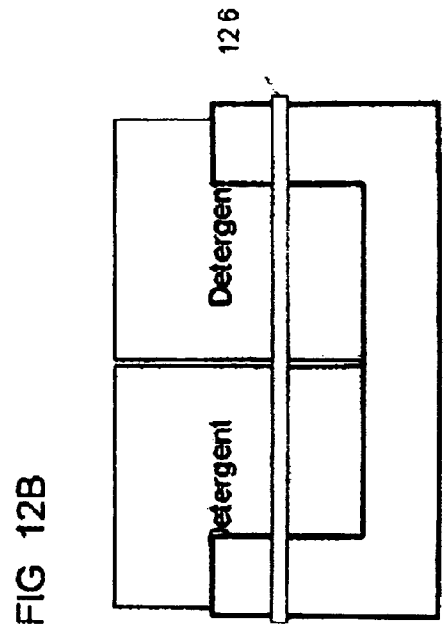


FIG 9

FIG 10C



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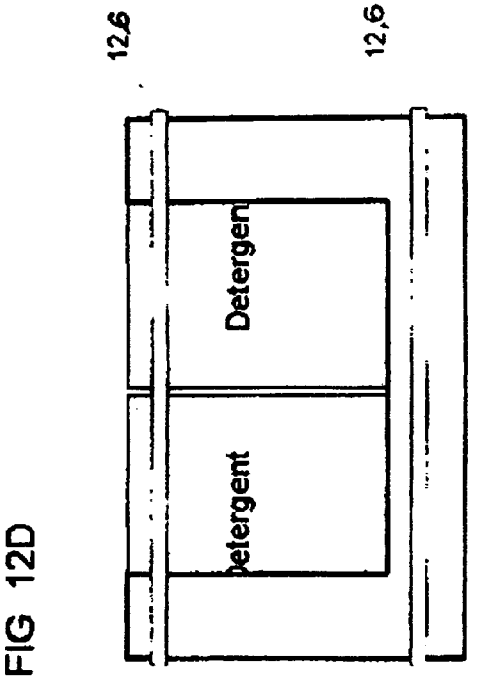

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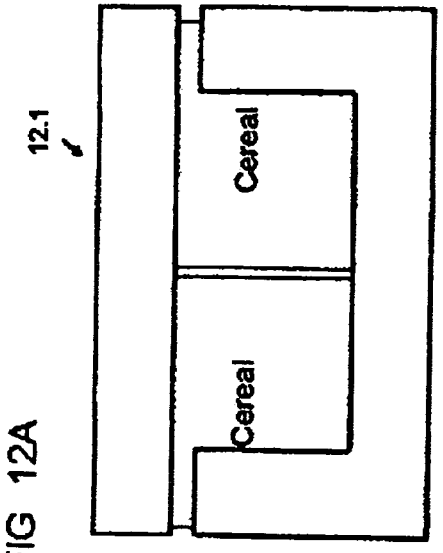

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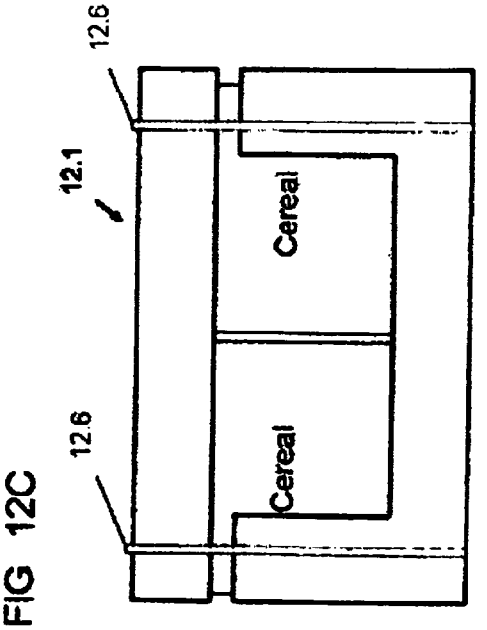
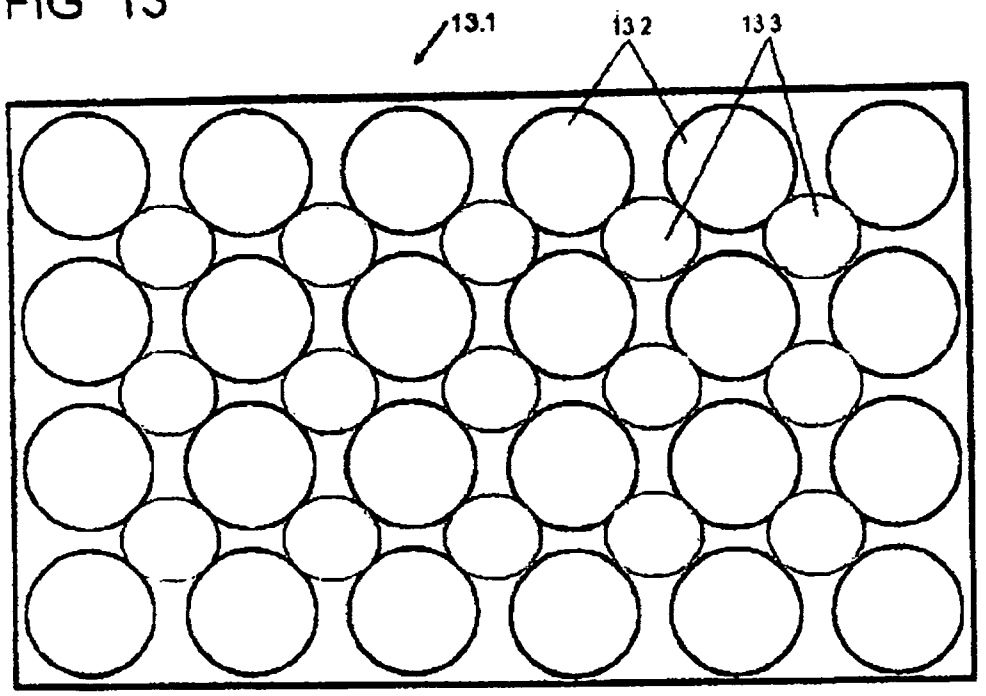


FIG 12C

FIG 13



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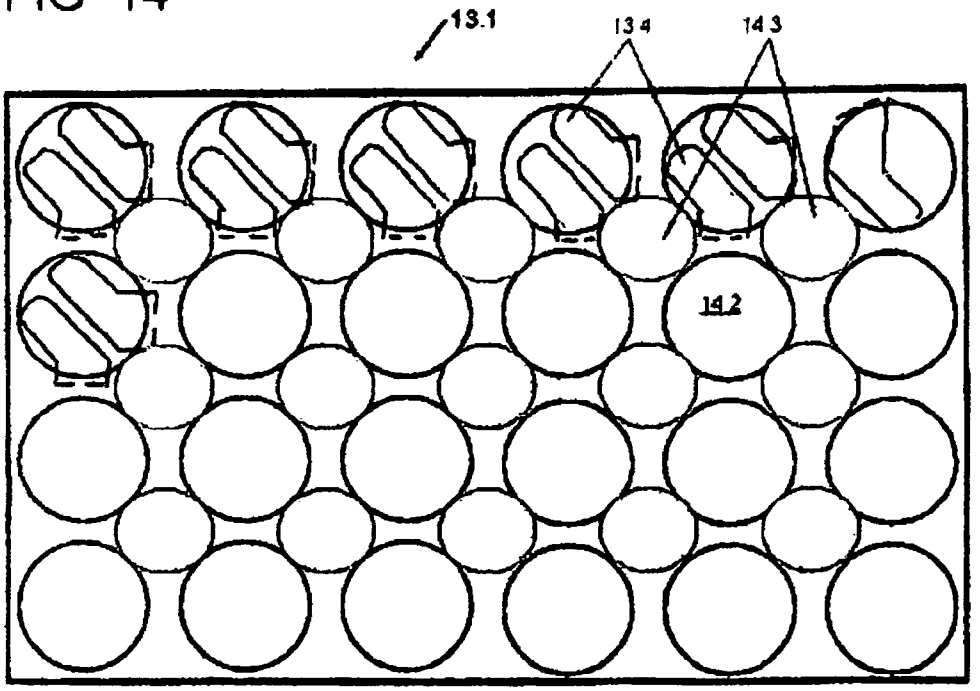

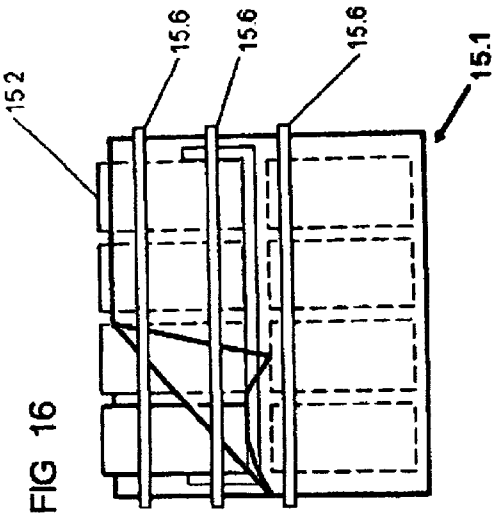

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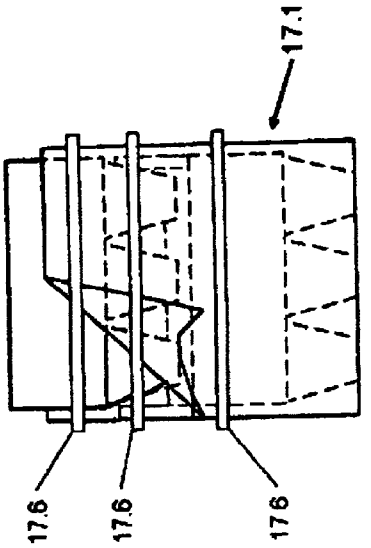

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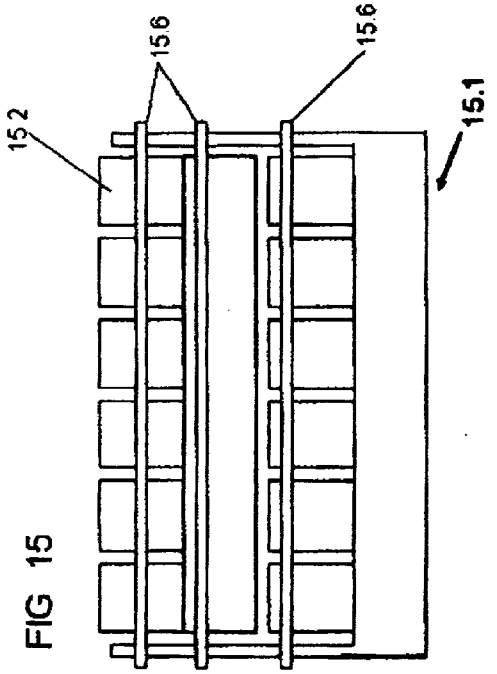

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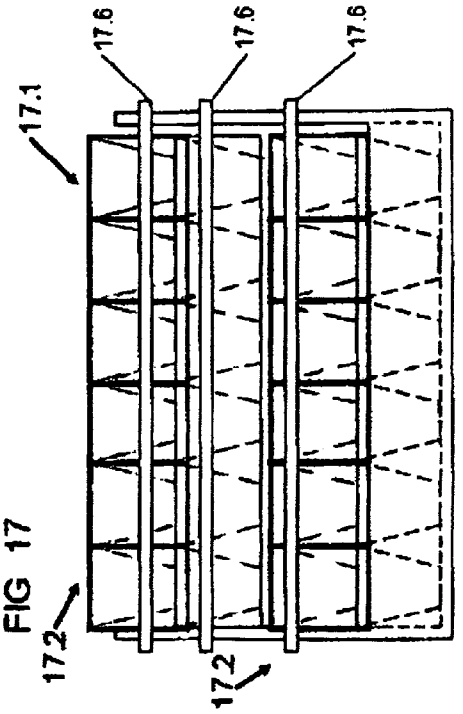
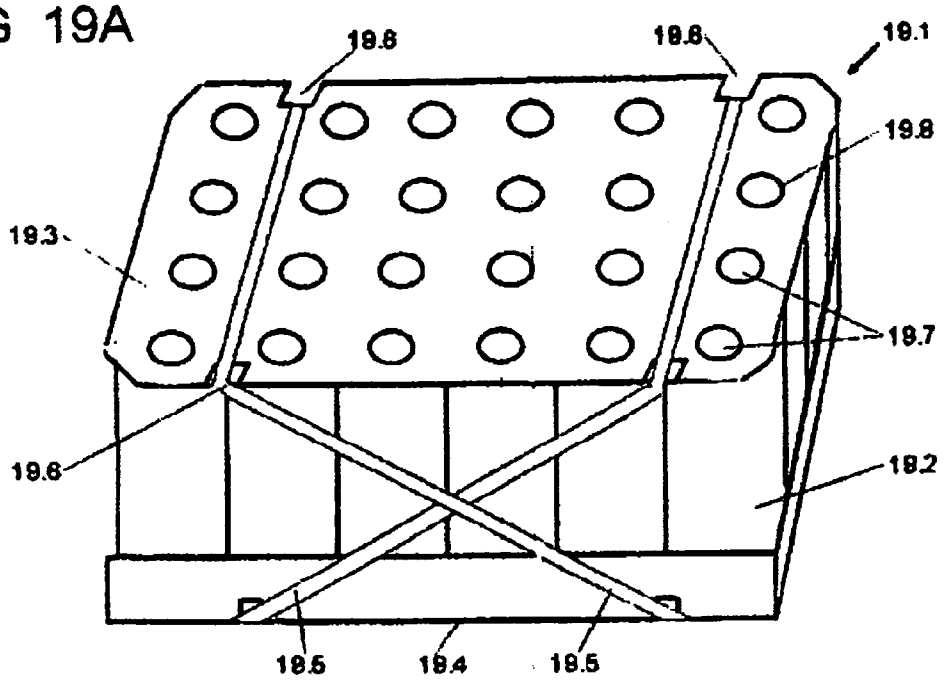


FIG 17

FIG 19A



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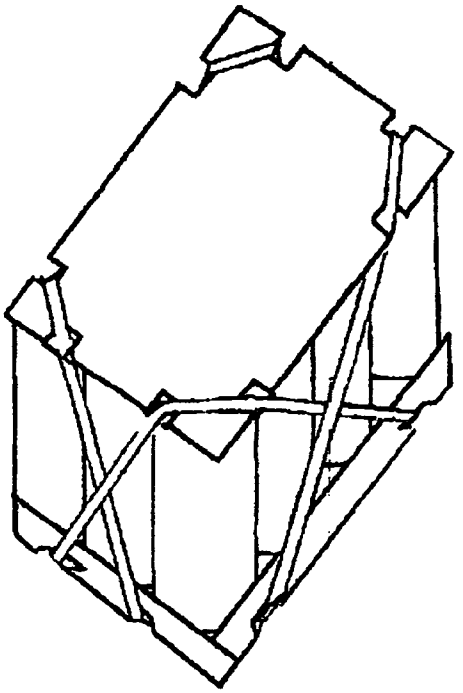

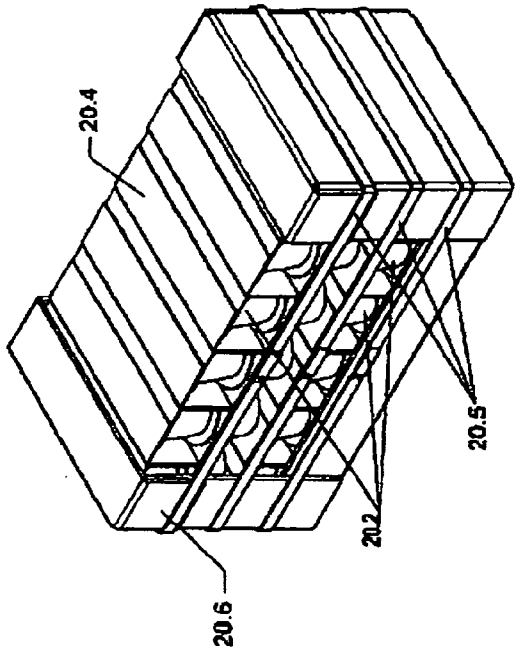

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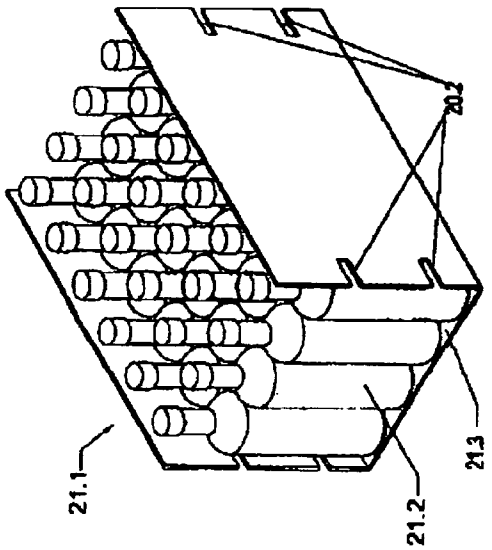

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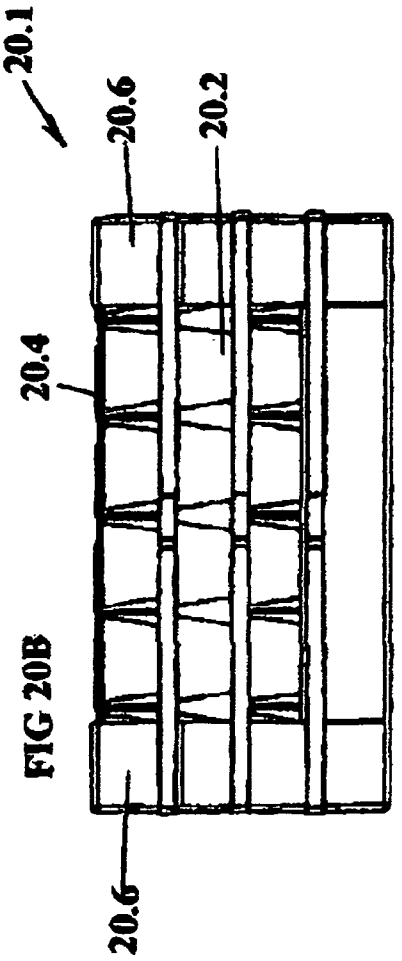

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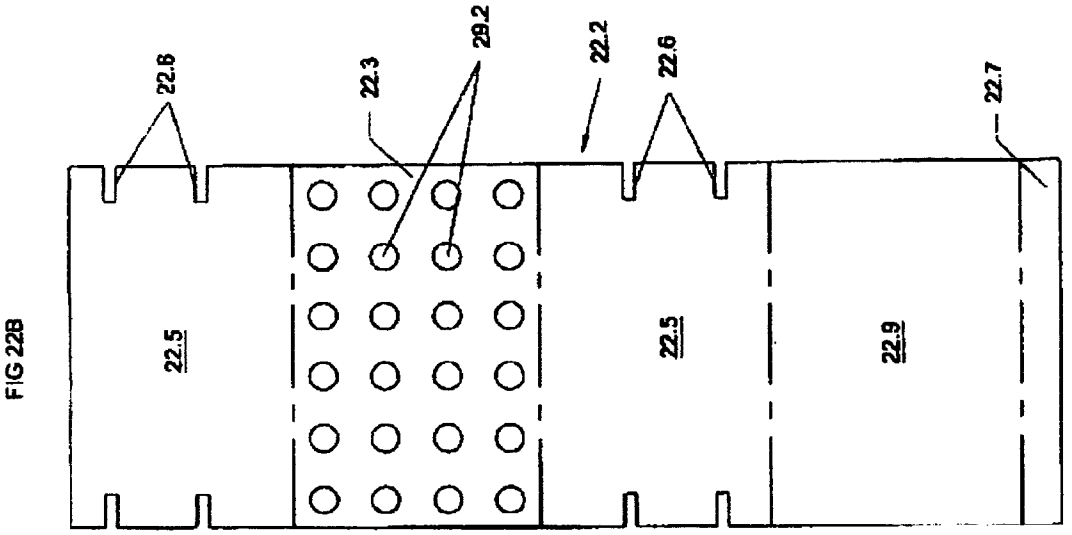

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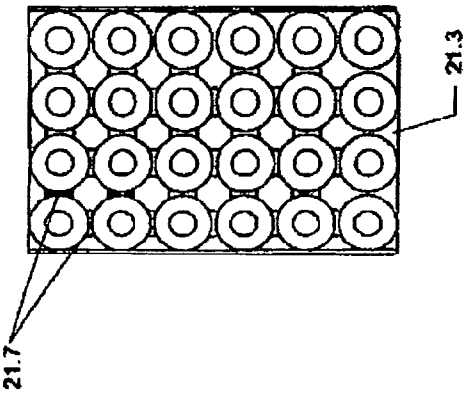
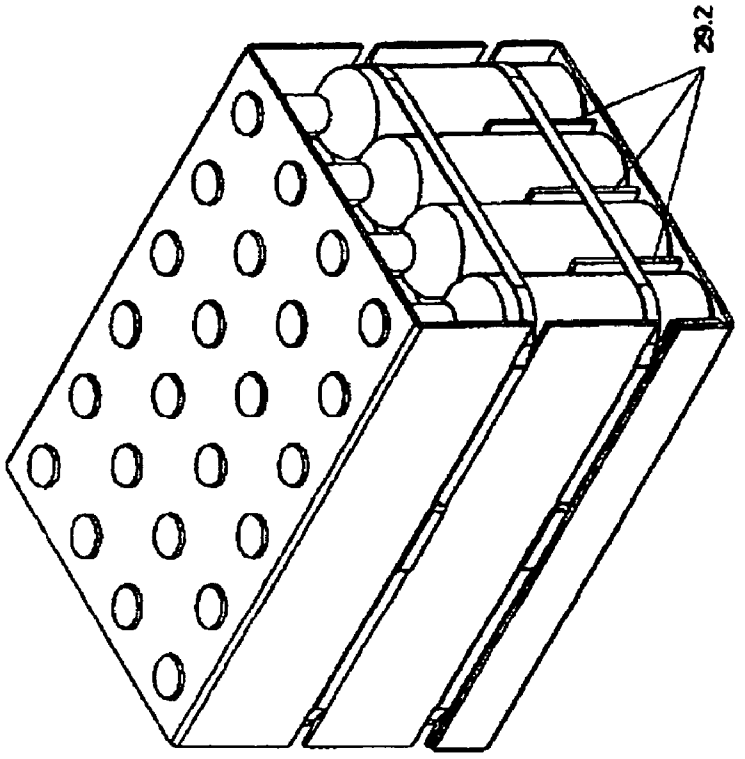


FIG 21B

FIG 22C



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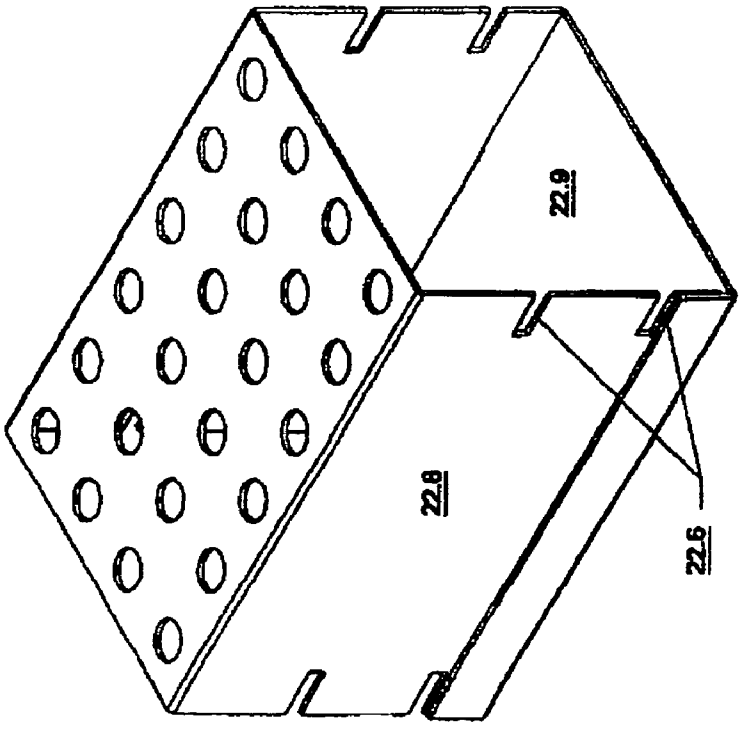

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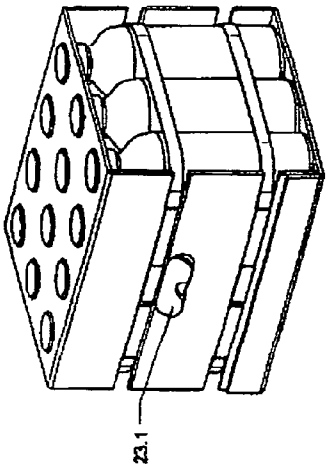

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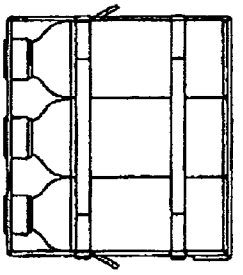

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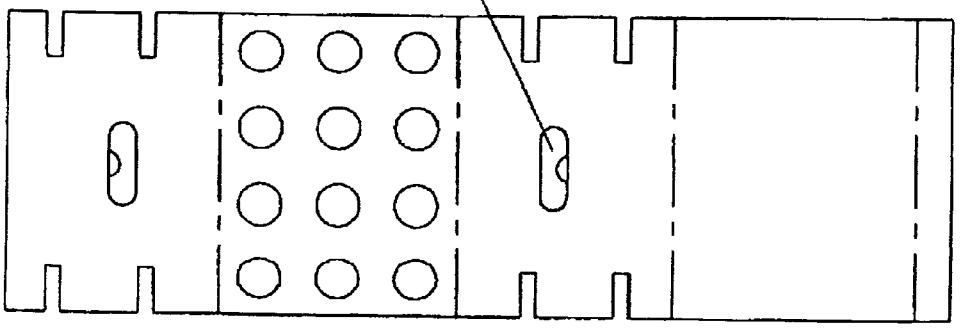


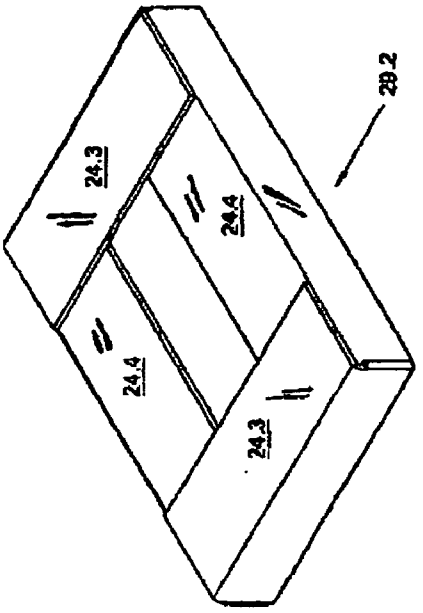
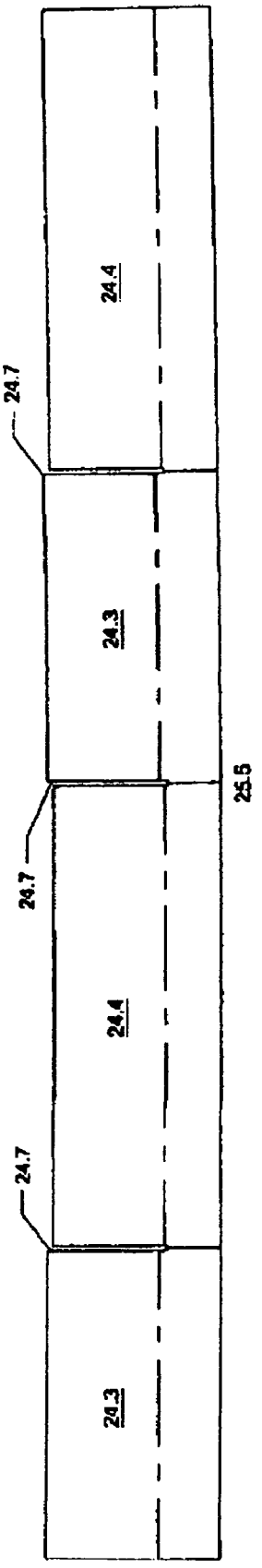


FIG 24A



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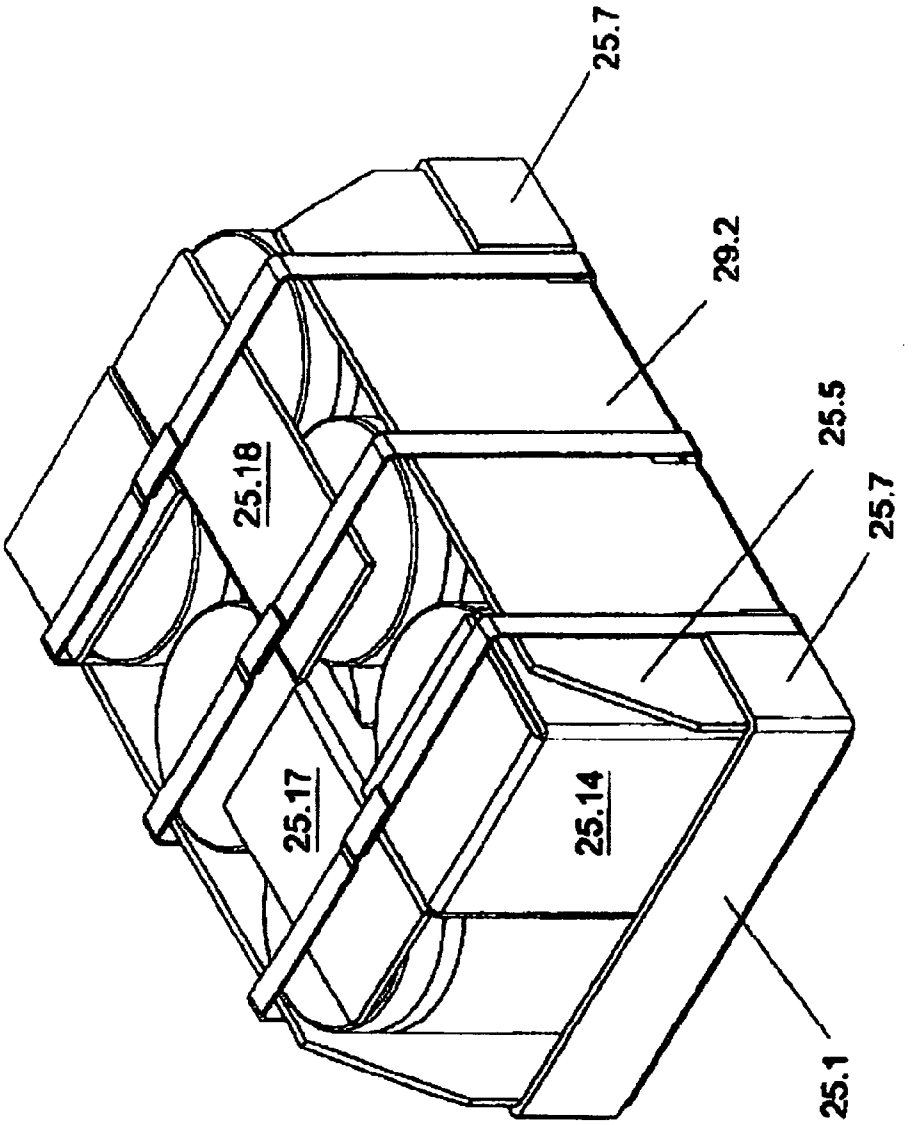
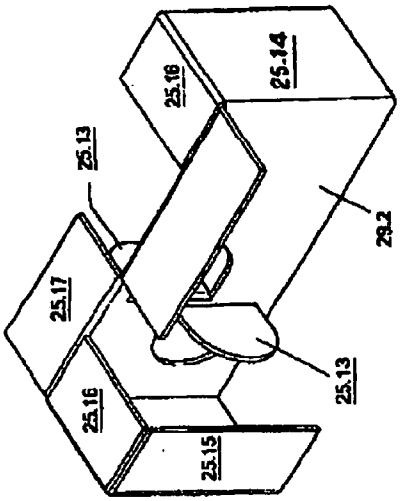


FIG 25A

FIG 25B



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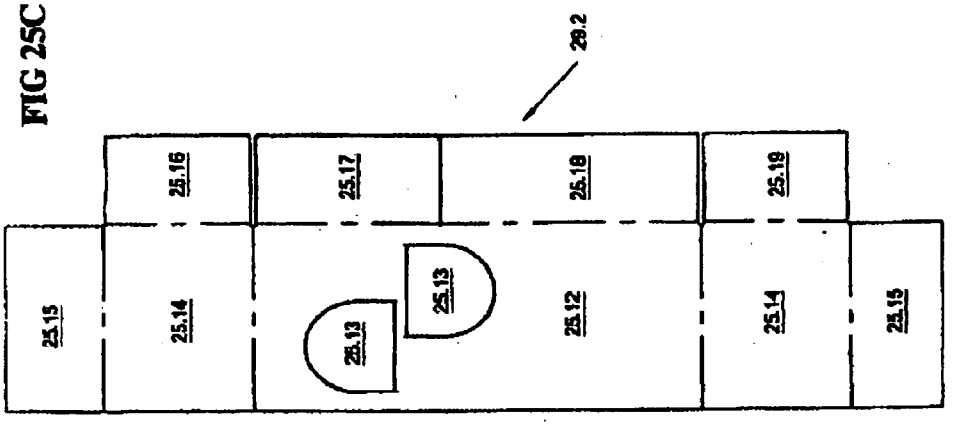


FIG 25D

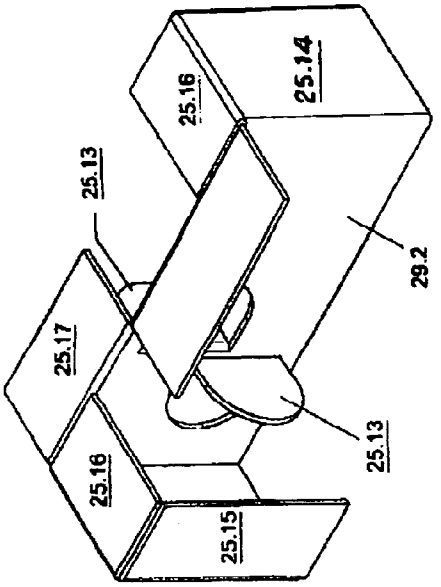
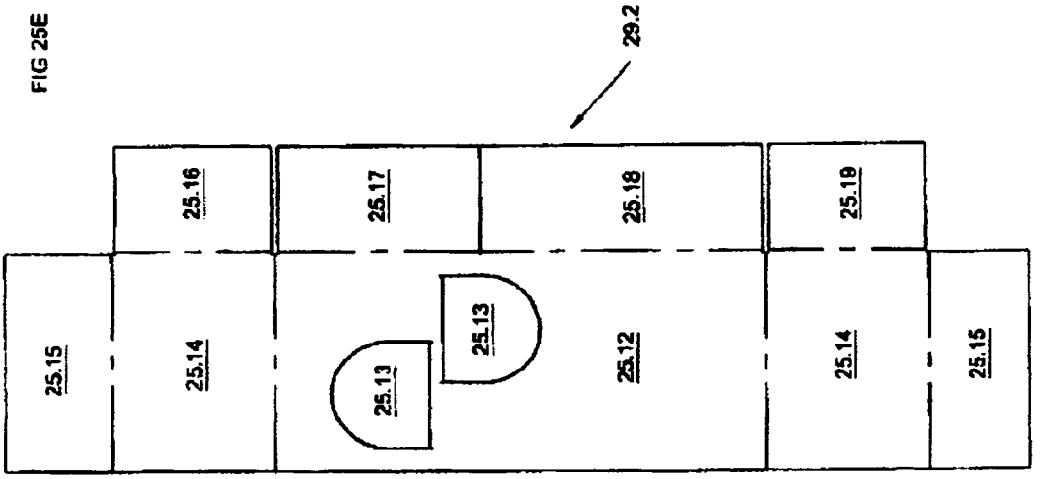


FIG 25E



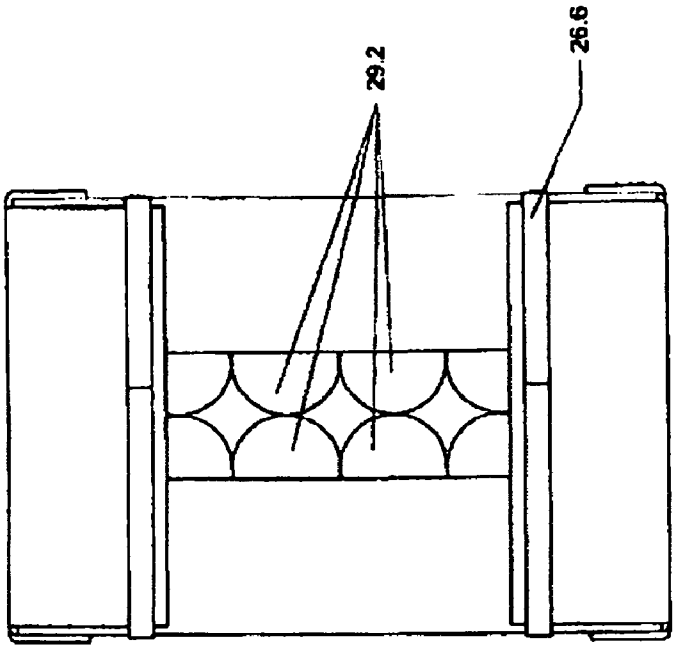


FIG 26B

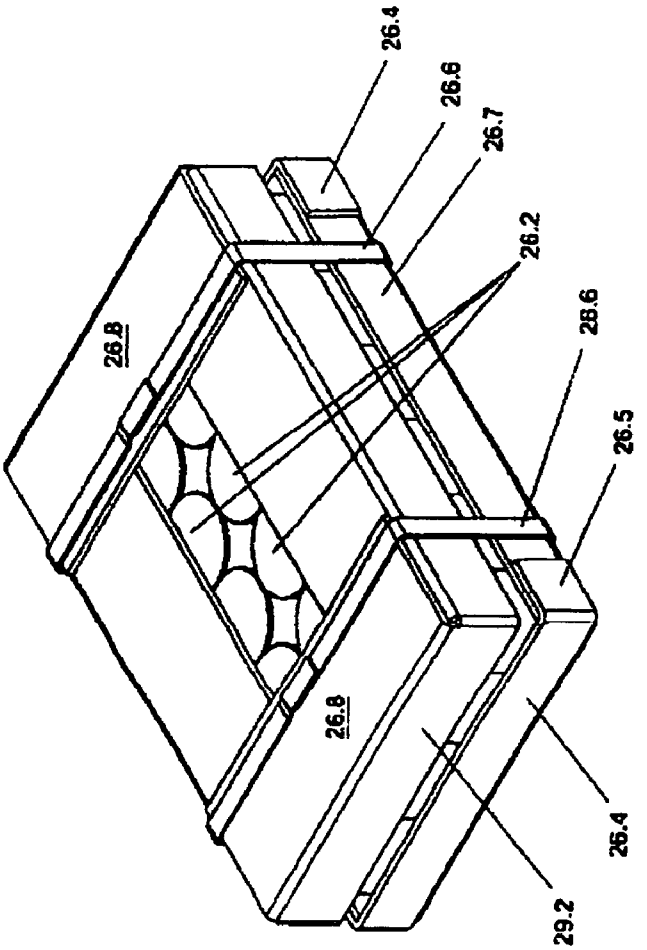


FIG 26A

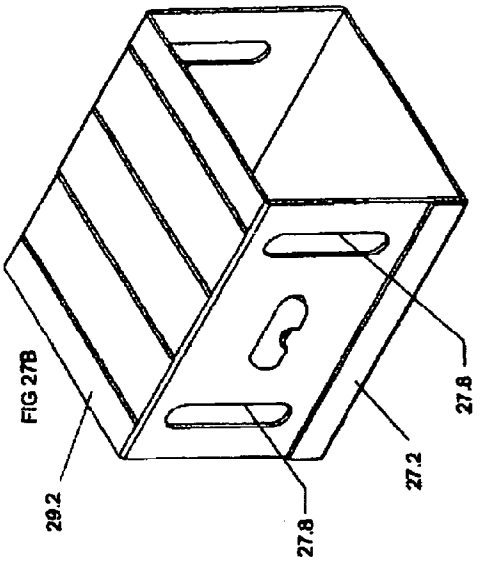


FIG 27B

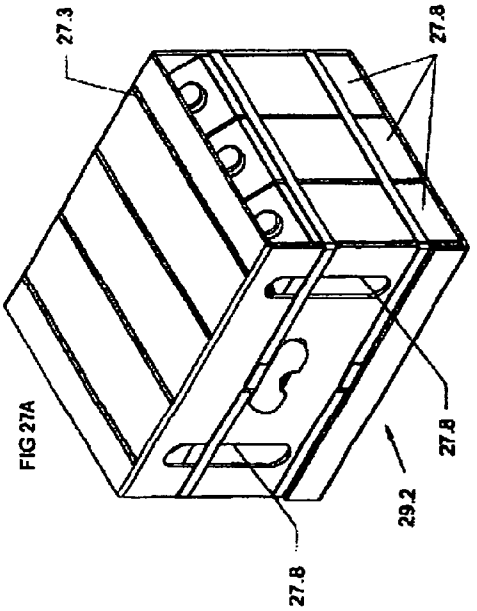


FIG 27A

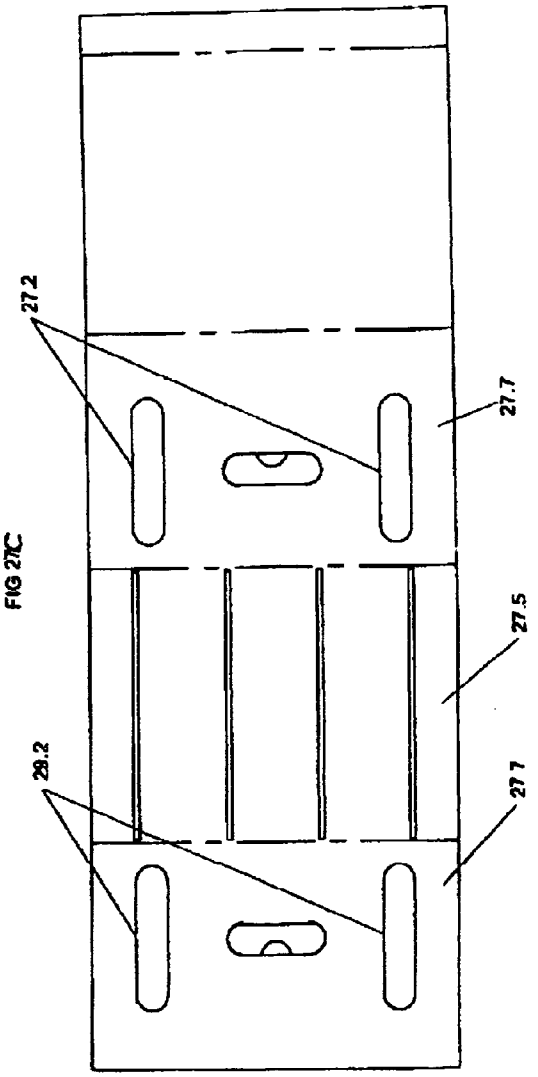


FIG 27C

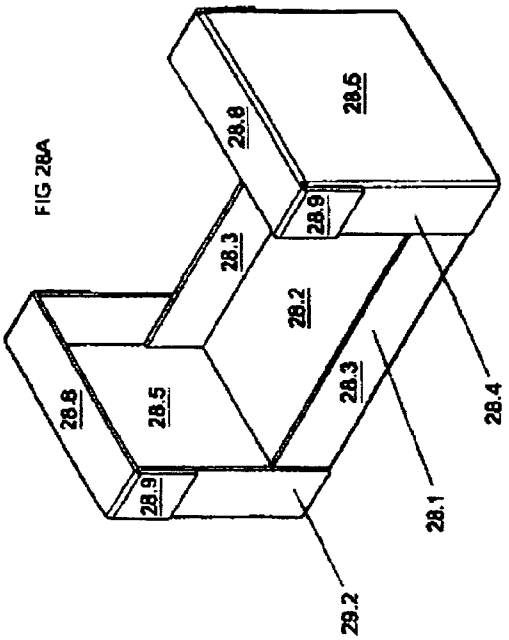


FIG 28A

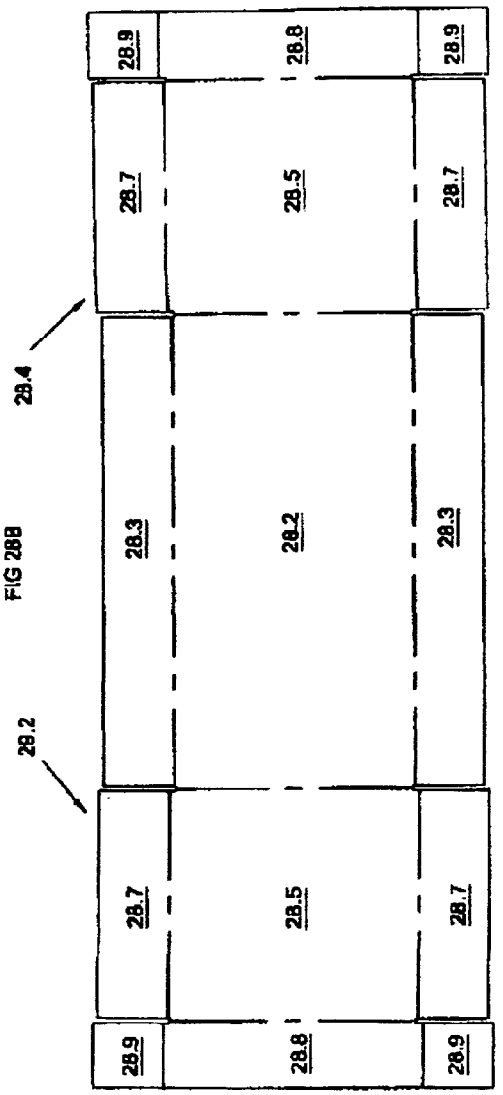


FIG 28B

FIG 29A

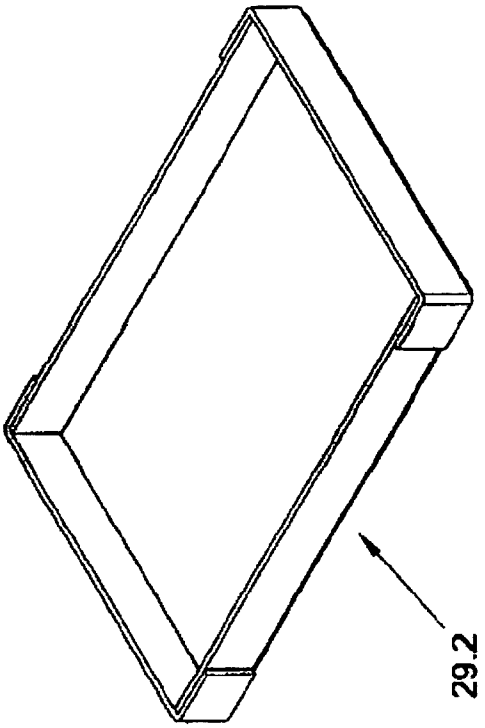


FIG 29B

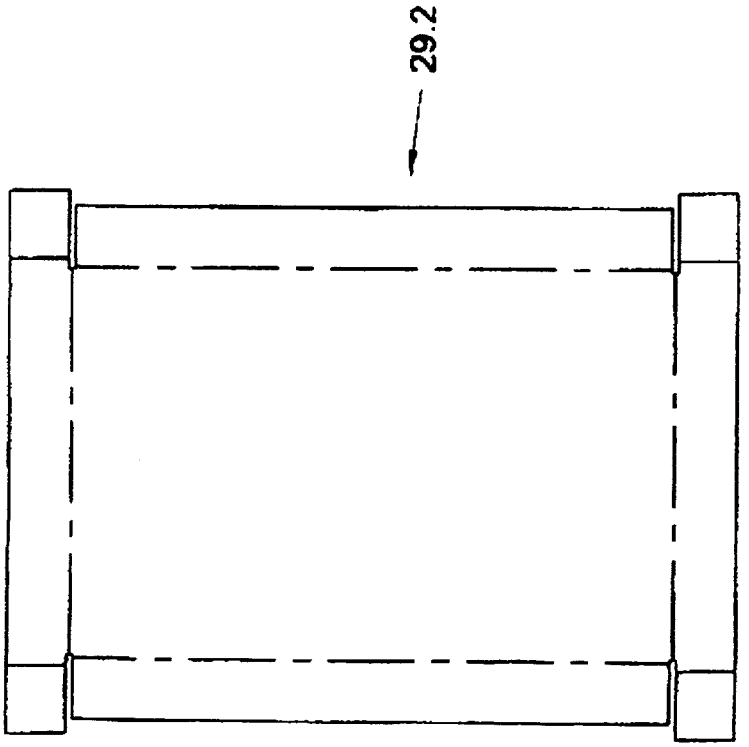


FIG 30A

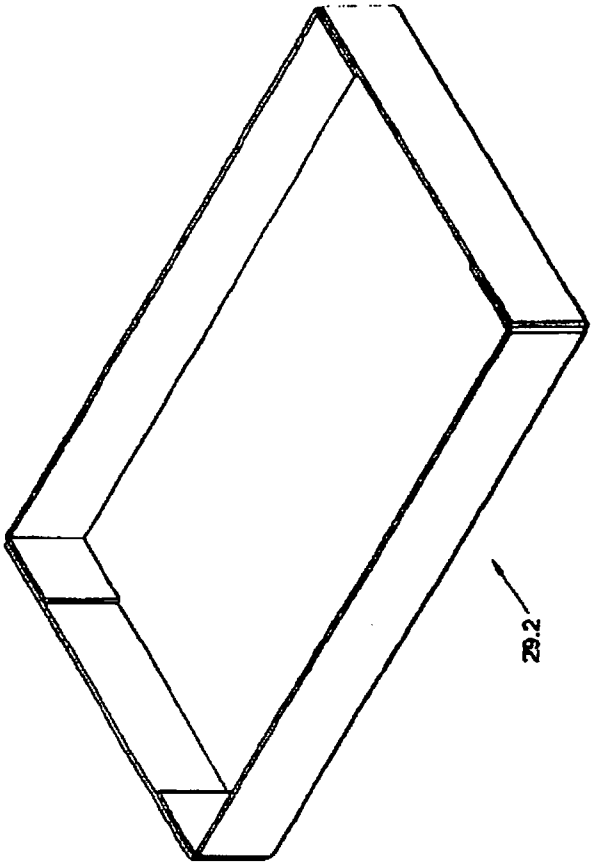
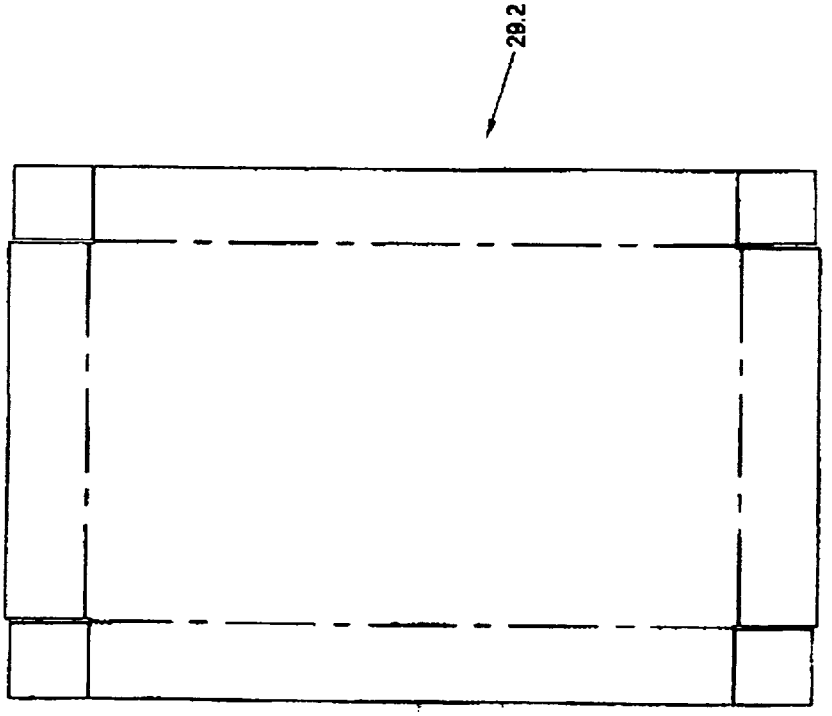


FIG 30B



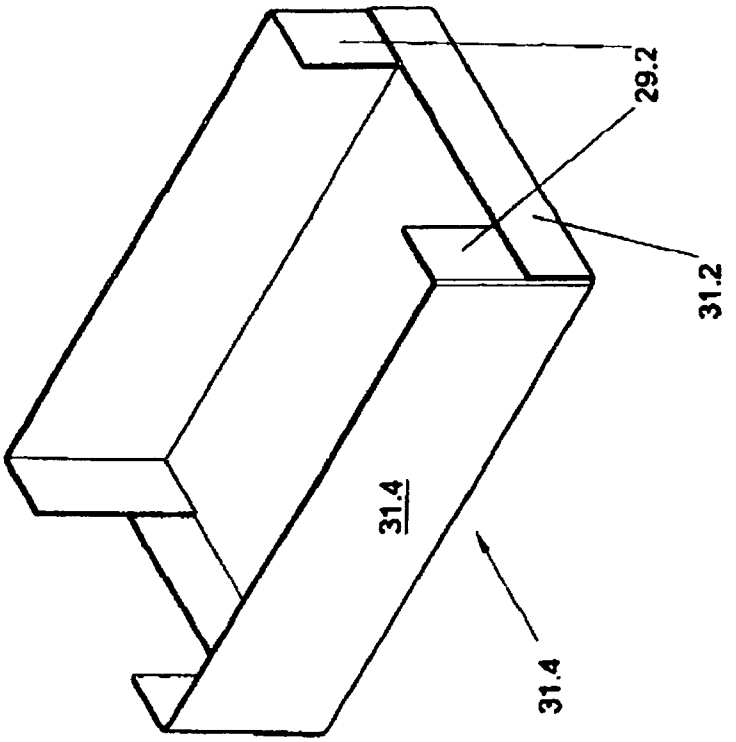


FIG 31A

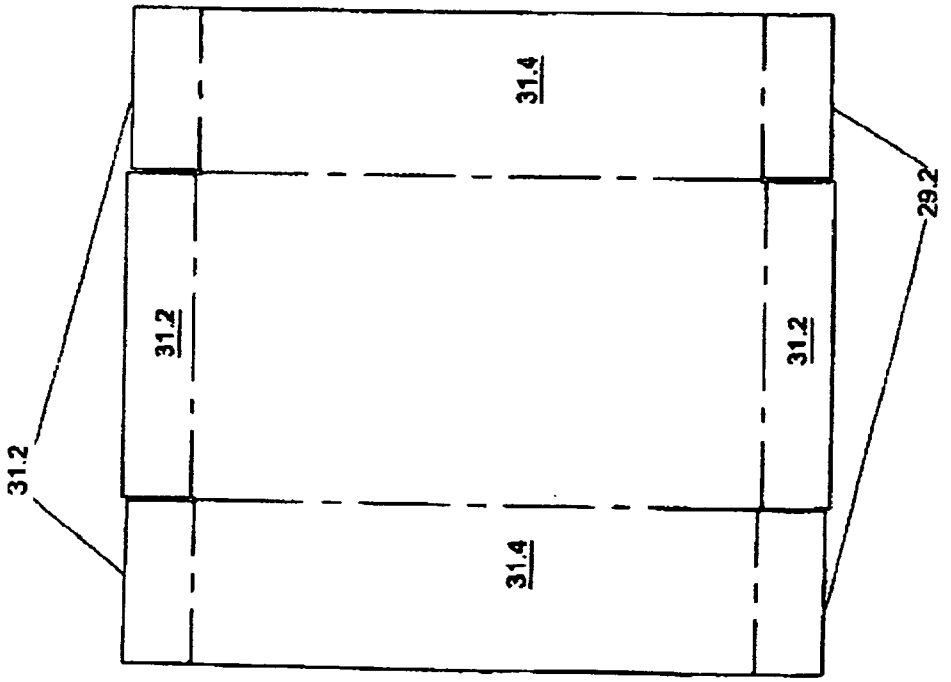


FIG 31B

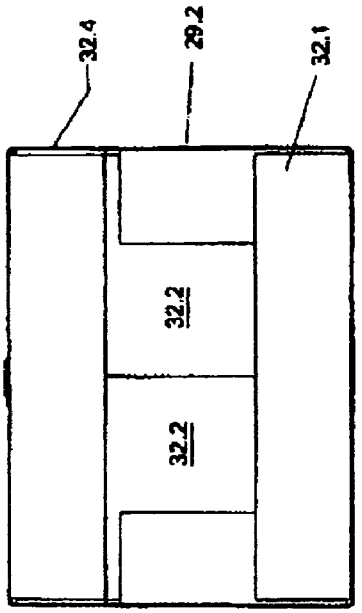


FIG 32B

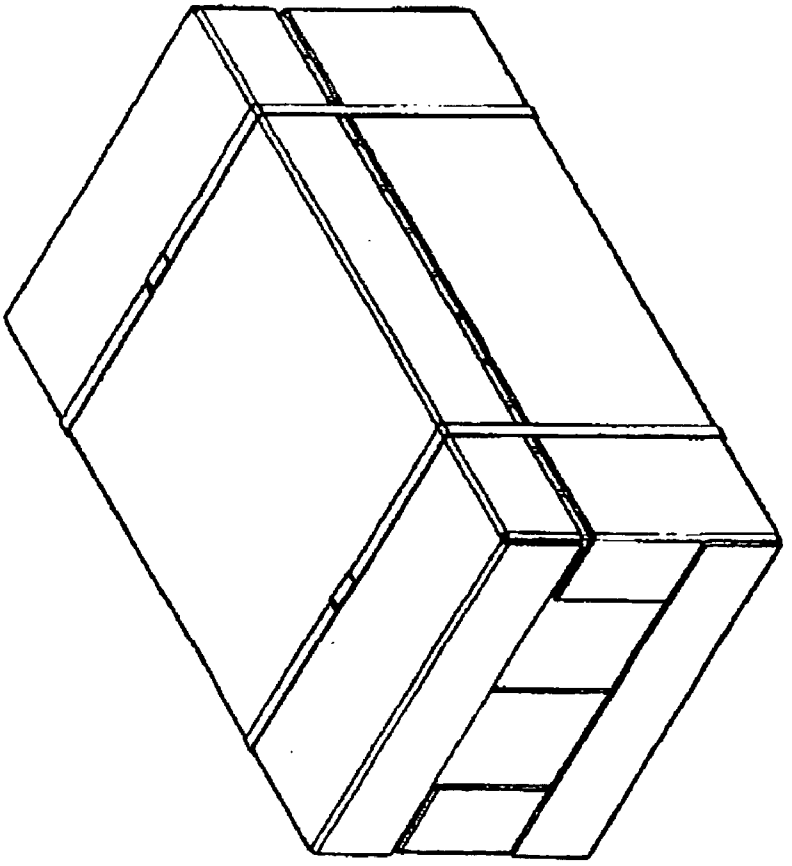


FIG 32A

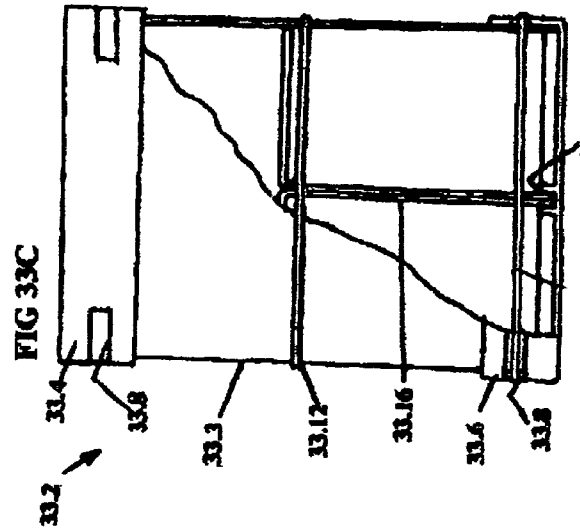


FIG 33C

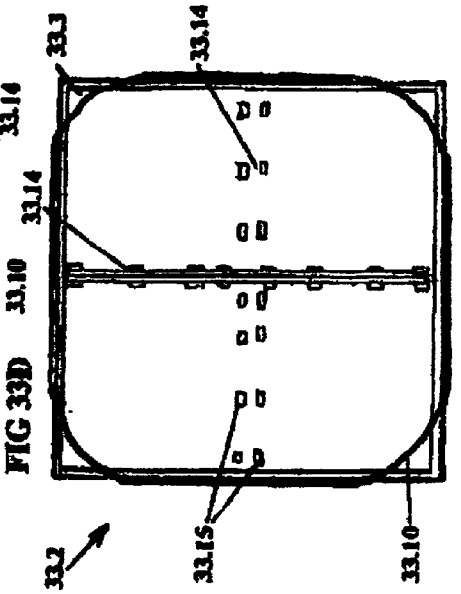


FIG 33D

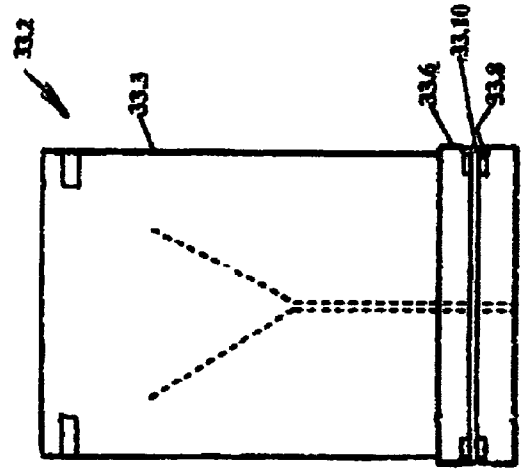


FIG 33A

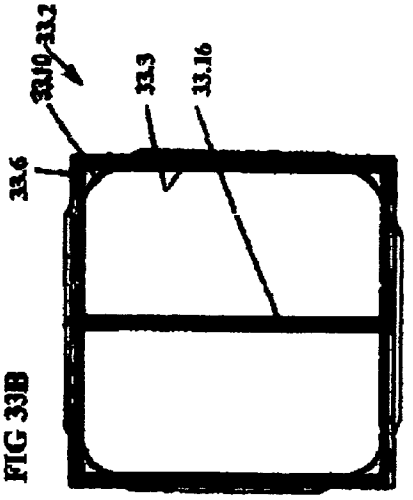


FIG 33B

FIG 34

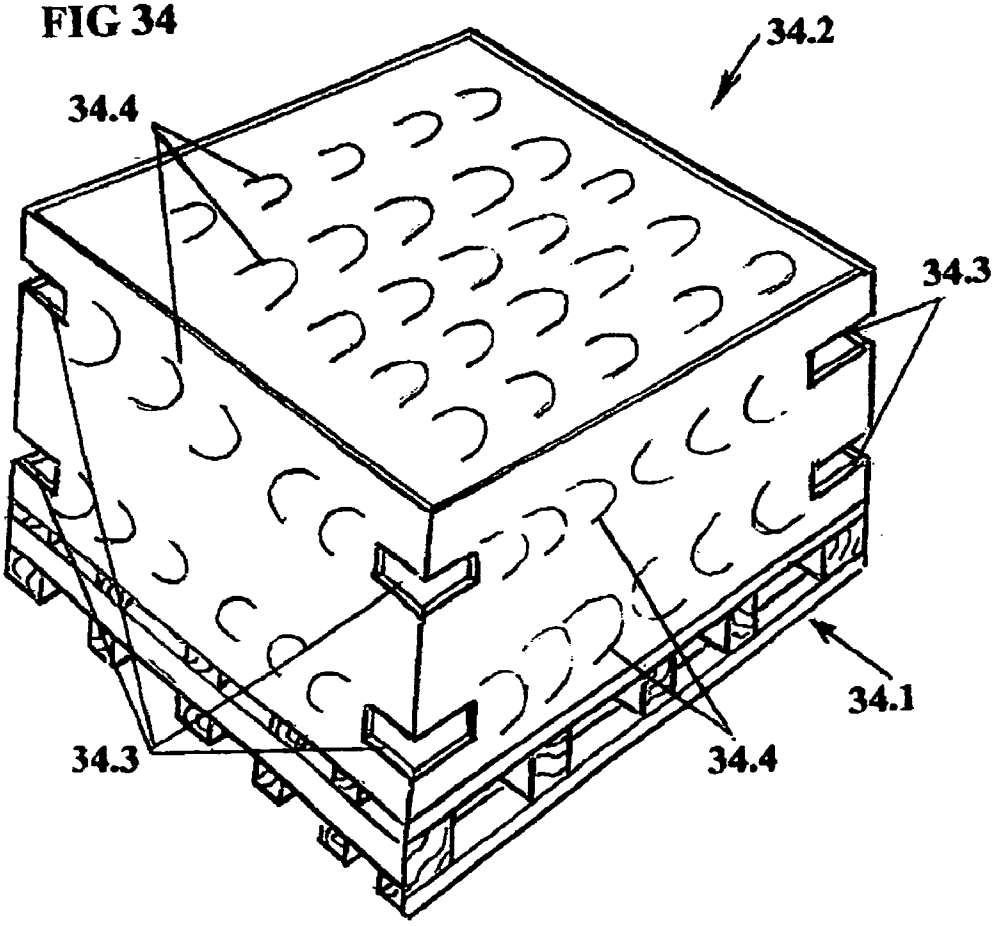
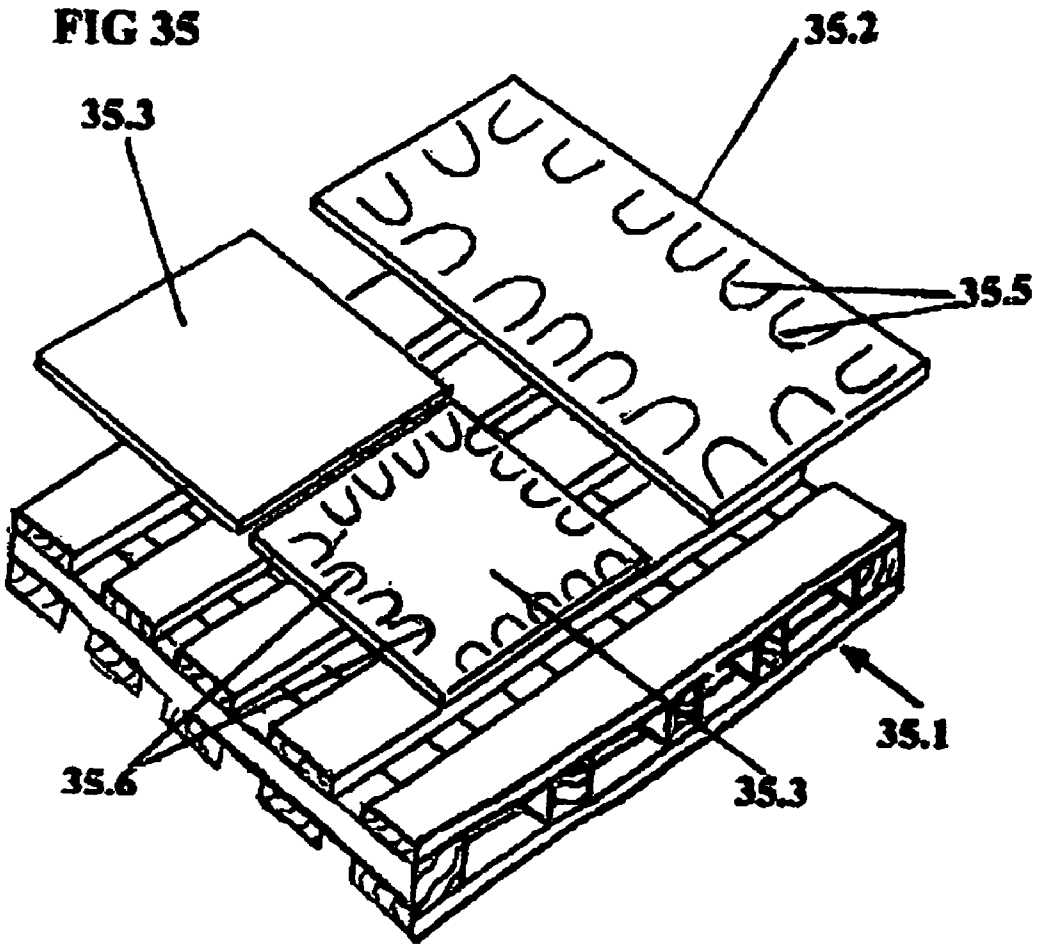


FIG 35



STRUCTURAL STRAPPED MULTI-PACK PACKAGING

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-in-Part of application Ser. No. 11/082,984, filed Mar. 18, 2005.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable (N/A)

REFERENCE TO A SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM

[0003] (N/A)

COMPACT DISC APPENDIX

[0004] (N/A)

BACKGROUND OF THE INVENTION

[0005] 1. This invention is directed to strap-reinforced packaging, including cardboard packaging with separation of wares, and integration of contents to the package container, to form structural units suited to multi-layer palletizing, transportation, storage and shelf display purposes, with significant economic and ecological benefits.

[0006] 2. Cardboard packaging is extensively used for the transportation and display of goods. Current packaging practice does not follow structural engineering principles of integrating all the elements of a package contents with those of the packaging, per se. Thus the available, intrinsic strengths of the package contents are not utilized with that of the package per se to provide a robust integrated package unit.

[0007] This failure to optimize package strength is then reflected in potential failure of individual packages in a multi-tiered palletized load, with consequent damage to the integrity of the whole pallet load, under the stresses resulting from the static and dynamic forces of transportation.

[0008] Current packaging practice relies in large measure on the structural strength and rigidity of the exterior carton per se for pallet load stability, thus requiring a cardboard box structure of undue strength and rigidity, with correspondingly high cardboard and glue content. The profligate use of materials to construct such monocoque packaging for multi-layer palletizing, transportation and storage is a little-recognized but important factor that contributes significantly to the generation of greenhouse gases and global warming, and to the denuding of forests.

[0009] The current modes of packaging frequently permit relative movement and fretting between adjacent containers within a package, which translates, under transit conditions, into goods containers damaged from mutual impact with containers within the package. Such internal movement of containers within a package can include sliding and tilting, and can result in skewing of the package, which renders it unstable, thus destroying the stability and integrity of the pallet load, with consequent further damage to packages and their contents.

[0010] The prior use of strapping has been generally ineffective, and raises problems of pallet-load-bearing stability, having been used primarily in a bundling role, with a failure to recognize its potential contribution as an integrated load bearing structural component. Earlier theoretical packaging work resulted in undependable packages in the load-bearing sense with unpredictable failures. These shortcomings are particularly disadvantageous in the supply/distribution service, where the primary focus is on palletized handling and transportation, so that commercial application in the supply chain was not achieved.

BRIEF SUMMARY OF THE INVENTION

[0011] The present invention provides an array of transit package assemblies of significantly reduced materiel content, being based upon the principle of combining the structure of the package goods content with the structure of the package per se, using a tensioned binding member or members, such as a strap or straps to compress the package and its content of goods containers into an integrated, stable, monolithic structural load-bearing unit. It will be understood that in order to meet the needs of industry, packages require to be suited for loading onto pallets, and to be able to withstand the rigors of long term transit and potential mishandling. In this context, more than simple load-bearing capability is required, as transverse dynamic (i.e. skewing) loading during transit may be an inescapable reality, so that resistance to skewing loads may be an essential characteristic of the subject packages, which are referred to as "substantially rigid", to encompass the requisite anti-skewing capability. In some embodiments separation between individual containers within the package is provided by the provision of divider media, by flaps, cut-outs or die-cut package wall protrusions, which divider media is sandwiched by the tensioned binding member or members, serving as a frictional linking element to further integrate the package and its contents into a stable unitary structural load-bearing, substantially rigid unit that can be arranged in layers upon pallets. Such pallet loads may consist of a single, uniform product, or may consist of mixed, multi-product pallets, for convenient shipping and distribution in the supply chain.

[0012] The palleted goods also lend themselves to storage, and the individual packages greatly facilitate handling, de-packaging and display assembly.

[0013] The use of reduced areas of packaging materials, and of discontinuous package surfaces is particularly helpful in affording improved package ventilation, in the changing of packaged product temperature, by heating or by cooling, with concomitant savings in plant and operating costs

[0014] Further advantages of the present system are: the provision of pallet loads of enhanced stability; improved capability for palletizing with a mixture of goods packages; faster shelf transfer due to reduced de-packaging requirements; reduction in materiel return shipment or discard; facilitated package breakdown, due to reduced joints and use of low-tension glue, with improved return handling and transportation; and enhanced re-use of packaging. The rising costs of packaging, in both materials and labour costs for packaging production and for the handling of packaged goods, together with the adverse impact upon the environment from extreme levels of corrugate production presently

required, all combine to make commercial application of the present invention both feasible and highly desirable.

[0015] Thus, there is provided a package construct having a right cylindrical outer wall structure; a plurality of goods in individual containers in tightly packed relation, substantially filling at least the lower portion of the outer wall structure; and tensioned strapping means wrapped about the wall structure in compressing relation with the wall structure and the plurality of containers, to provide a monolithic, substantially rigid unitary structural unit well-suited for stacking in self-supporting multi-layers, including palletization for storage and shipping. A monolithic transit package of the present invention, which may contain rigid, semi-rigid and flexible containers and combinations thereof, can be handled as a structural unit, in the manner of a traditional rigid box.

[0016] In most instances the individual containers within a package are substantially identical. In the subject package construct, the containers may consist of first and second containers; having the second containers arranged in interposed cushioning relation with the first containers, or vice versa, with a rigid container stabilizing a plurality of flexible containers. The subject system may be considered to comprise a plurality of individual packaged containers which constitute the primary load-bearing structure or backbone of the system, having a secondary structure of necessary support and appended elements, and a tertiary structure of less essential elements.

[0017] Where auxiliary outer flaps are inserted as part of a protective cushion for the contents of a subject embodiment, such flaps serve also to cushion and protect adjoining packages. In one embodiment of the aforesaid package construct, where the substantially identical containers are of frangible material, at least some of the containers may have a protective layer over at least a portion of their outer surface, in cushioning relation with the adjoining containers, to prevent fretting damage, and to limit differential movement between the containers under transportation stress conditions.

[0018] The packaging also serves favourably for display purposes as individual package constructs by the simple expedient, in many instances, of removing the strapping from the de-palletized package. They also lend themselves to pallet, multiple construct displays. The pallet displays include a single, pallet-size container incorporating the principles and physical integers of the present invention, to provide a belted, rigid construction.

[0019] The surfaces of the packaging lend themselves to printed advertising, and for purposes of pallet-contents determination in warehouses and storerooms.

[0020] In some instances, the corrugate (sheet good) portion of the package may have different messages placed on the inside and outside planes. This is of particular marketing value in that products such as soda may be marked with the specific soda flavor branding and the inner unseen can be branded with "Company name Variety Pack". This allows a down stream operation to mix soda flavors in case and re-mark by simply unpacking, turning the corrugate (sheet good) the other way, and then repacking using the original packaging materials.

[0021] The strapping per se may also be used to carry advertising and product identification. The provision of wares separators in accordance with the present invention extends to include drop-in structural cardboard, and a wide range of other spacers, listed below; interposed D-cut protrusions of container walls and flaps; interposed occlusions such as holes and cut-outs; the inclusion of associated secondary products, sandwiched in compressive, cushioning relation between the primary wares; and the provision of protective coatings upon the walls of the wares per se; with at least one binding strap, oriented horizontally, vertically and/or diagonally to draw package and contents together in integrated, compressed and bound relation as a stable monolithic structural unit. In some instances the spacers may rely upon frictional interconnection with the goods containers, under the compressive forces provided by the strap, while in other instances, the spacers may be glued into place, or secured to the container walls by protruding tabs inserted into surface and/or penetrating recesses in the container board.

[0022] In addition to the above interposed separators, immobilization of goods by spot-gluing of the goods to portions of the protective package surface may serve as a pseudo or virtual partition.

[0023] Strapping may be applied horizontally, vertically, in combination of vertical and horizontal, and/or diagonally.

[0024] The use of crossed diagonal strapping prevents skewing of the package, under load conditions. Crossed diagonal strapping also prevents skewing of flexible-walled goods containers, such as bottled water or soft-drinks, unpressurized or pressurized, gas-filled containers such as snack-foods and chips. In this circumstance, the flexible, adherent walls of the goods containers serve as separators for the actual product.

[0025] In addition to stabilizing the integrated package, use of interposed protrusions/coatings also limit or prevent mutual working and fretting between the goods containers during prolonged transit and handling.

[0026] The extended list of inserted partition material includes paper and plastic corrugate, hot melt and other adhesives, expanded and non-expanded plastics, labels and sleeves, carpet/rubber/fabric, preform egg-carton style material, plastic ring carriers such as Hi-Cone® brand and semi structural and structural wood/cellulose/oil-based product.

[0027] The subject system is readily used with a wide range of products, including cans, bottles jars, cartons, bags tubes and other containers both rigid, semi-rigid and flexible.

[0028] The present invention thus provides a stable packaging system that is scalable from very small to very large products, and is capable of withstanding dynamic forces, comprising the steps of providing a board package to receive a predetermined number of containers in regularly arranged array at least partially enclosed by the package walls, to substantially occupy the package; providing spacer means interposed between the containers to substantially preclude direct contact between the containers, and applying a belt in tensioned relation about the package, to compress the package walls, the enclosed containers and the spacing means into mutually immobilized relation, to form a stable, monolithic load bearing structure suitable for palletization, transportation, storage and display at all points of the supply chain.

[0029] The system provides the further steps of arranging a plurality of the aforesaid packages upon a pallet in a plurality of layers, and encompassing the pallet and packages in plastic wrap, to form a stable, transportable load of goods.

[0030] In the aforesaid system, the goods of one set of packages arranged on the pallet may differ from the goods of another set of packages arranged on that pallet.

[0031] The present system also lends itself to pallet displays. These displays include a range of packages, from a full-pallet package construct to fractional-pallet packages, incorporating the principles and physical integers of the present invention, and providing strapped, rigid package constructs.

[0032] As an example, a cardboard ("board") slip-sheet such as a quarter-pallet or half-pallet size, is provided with D-cut upwardly extending protrusions that position and engage the bottom edges and adjoining sides of the individual goods containers. A top-sheet or a cap serves to contain the goods containers, which may be engaged by way of apertures or D-cuts in the top sheet. With the requisite number of such packages filling the surface of the pallet, further like layers may then be loaded. A succeeding, overlying layer may be re-oriented at rightangles to the underlying layer for purposes of interlock and maximum stability. The requisite tension component may then be provided to the pallet load by way of stretched plasti-wrap enclosing the pallet load, and compressing the respective D-cuts or other spacer media into frictional stabilizing relation with the enclosed goods containers, to form a rigid structure.

[0033] The system further provides the steps of selecting the aforesaid spacer means from pre-cut independent spacers inserted within the package, glued and/or tab immobilized inserted spacers, and from dye-cut local projections extending into the package from the interior surfaces of the package.

[0034] The system may further include the steps of forming occlusions in the surfaces of the package to receive portions of the containers in entered relation with the occlusions. The system may further include the steps of providing with a first set of containers a set of second containers; locating the second containers in interposed sandwiched relation between pluralities of the first containers within the package, wherein the step of applying the tensioned belt about the package compresses the first and the second containers into immobilized mutually stabilizing and/or cushioning relation.

[0035] Economically and ergonomically, the reduction in materials, and the simplification in handling for wares packaged in accordance with the present invention significantly reduces overall merchandizing costs to the extent of enabling the profitable sale of low-cost wares that would otherwise be prohibitively costly to package, where the costs formerly associated with packaging and unpackaging-to-display the wares might equal the per se price of the wares. The cost of disposing of waste packaging is also reduced. Containers that are initially filled with high temperature contents that must be cooled before shipping, require electricity, fluorocarbon coolants and refrigeration facilities large enough to receive in-process goods. Reduced corrugate packaging systems facilitate air circulation and minimize insulating properties of cartons. This in turn allows faster heat transfer and a faster cycle time for the product temperature change step, with consequent cost savings in plant and in operational costs.

[0036] The simplified packaging of the present invention protects the package contents against damage due to impact with adjoining package units and/or the application of external forces; it stabilizes product content against mutual slipping, sliding and impact, and the packaging and its contents form structural, load bearing units, which can function in a support role to overlying layers of packages in multi-tier pallet loads.

[0037] The integrated, load-bearing packages also lend themselves to mixed-product palletizing. The drop-in partitions used as protective surfaces may also provide illustrative, printable surfaces

[0038] The use of a tensioned strap or straps serves to trap and compress the intervening spacer members, such as D-cut and flap portions of the package wall, and floating and fixed spacers, into compressive relation with adjoining product container surfaces. This stabilized contact induces high frictional forces between the compressed surfaces, such that the spacer members are effectively anchored at both ends, so as to serve as effective bracing struts between package wall or divider and the product container per se. These high frictional forces also oppose skewing tendencies.

[0039] In a subject pack, containing a number of such stabilized product containers, the package becomes a structural unit with enhanced stability and load bearing and load sharing capability. In many instances, such as semi-rigid and rigid products per se, the product and the package cardboard serve as rigid components, compressed together and integrated by the elastic tensile forces of the strapping into a substantially rigid package unit.

[0040] The positioning of a strap or straps is controlled by the location of the strap recess cut-outs, which may also form associated flaps by which the strap engages the adjoining goods container. Strap location can serve to secure non-glued package components; also, for the strap to serve as a handle by which handle load stresses are distributed across the package. Advantage can also be taken by aligning a strap with a feature of the contained goods, such as the upper seal facing of a thermoformed pudding cup, in a multi-tiered arrangement of such cups.

[0041] The subject package constructs achieve corners of strength and integrity that provide the idealized 'sweet-zones', localized surfaces that are highly resistant to deformation and buckling under compressive strapping loads.

[0042] The use of strapping possessing significant elasticity facilitates both manual and machine deconstruction/reconstruction of the subject 'reduced format transit packages', by hand or by machine, using the same package components, while assuring maintenance of the requisite compressive forces to sustain package integrity.

[0043] A wide range of strapping may be used, both elastic and inelastic, including polypropylene, paper, nylon, metal, wire,heat and chemically shrinkable, and friction-welded pealable strapping, while the use is contemplated of a settable elastic strapping which assumes its tension attribute

when set with a physical process such as under UV light or by an innocuous chemical treatment. Use of a magnetic strapping akin to the 3M Plastiform (T.M.) Magnetic strip (U.S. Pat. No. 5,178,048) is also contemplated.

[0044] The use of shrink strapping wrapping (or an equivalent) is contemplated, to enhance the packaging, both in application and in performance.

[0045] In many instances package detailing may selectively position the corner recesses which determine the strapping location, to enhance the cooperation between the strap and the goods containers, for improved utilization of the packaging. It may also position the strapping for use as a handle so as to apply handle load stresses beneficially across the package.

[0046] In the case of a previously unstable shrink-wrapped package such as soft drinks or bottled water, formerly subject to tilting of the bottles with consequent skewing of the package and leading to package disintegration under transit conditions, the application of strapping in diagonal, cross-over format can transform the package into a stable, integrated pallet loadable, structural unit.

[0047] In the case of a 'mixed pack', which contains first containers of a first product intermixed with second containers of a second product, which second containers serve as dividers for the assembled first containers, the compressing strap serves to secure the respective containers in mutually compressed, stabilized relation. The respective containers might be glass bottles intermixed with plastic bottles, or cartons intermixed with bags.

[0048] One such combination might be bottles of tequila having smaller bottles of margherita mix interspaced with and serving as 'packers', to assure the effective 'tight-pack' effect when the strap/straps are applied and tensioned, to integrate the whole package.

[0049] Certain goods, such as those packed in flexible sealed plastic, plastic laminate, or laminate foil bags or laminate foils containing a gas charge utilize the walls of the plastic containers per se as the goods divider, being transformed into shippable structural package units by the application of elastic strapping of predetermined stiffness in relation to bag strength and degree of pressurization. Under these conditions the friction between adjoining bag walls serves as a stabilizing factor. Spacers may also be provided, to increase the load-bearing capability of the strapped package.

[0050] One drop-in cruciform separator for use in a package, in accordance with the invention, may consist of two rectangles of corrugated board, each having a mid-width slot extending parallel with the flutes of the board for half its length. One board is reversed and turned at rightangles, and the slots slid over each other, to interdigitate the boards, and establish the load-bearing cruciform.

[0051] Alternatively, the two unslotted boards may be formed at rightangles along their midline, and glued back-to-back to form the cruciform section, again with the flutes extending lengthwise, the height of the cruciform.

[0052] The cruciform height may be selected to coincide with the top of the package, so as to form a strong, load bearing prop, in supporting relation with a superimposed stack of packages. The four, laterally extending arms are of sufficent lateral extent to be sandwiched between adjacent containers, serving to separate and cushion them. The application of a strap or straps in package-compressing relation traps and compresses the respective containers onto the four arms with high frictional forces, to stabilize the cruciform. The vertical orientation of the flutes enables the cruciform arms to readily conform to both the initial and the 'strapped' location of the respective containers, and to exert high friction/tensile stabilization forces on those containers, when the package is strapped. Thus the load-bearing upper end of the cruciform is container-reinforced and friction stabilized, making it extremely stiff, so that it can sustain surprisingly heavy loads, while also providing its separator function to the adjoined goods containers within the package. The high frictional forces thus developed by the cruciform spacer, under the persistent tension of the strap/straps also serve to mutually stabilize the containers lengthwise, to counter any skewing tendencies engendered from loading applied externally against the package.

[0053] Such spacers are of particular value in stiffening packages containing goods such as snack foods, potato chips etc, packaged in plastic bags and generally filled with pressurized gas.

[0054] The securing strap/straps of the present combination package may utilize a variety of strap features to optimize the use of these packages, both in packing and unpacking, or in repackaging.

[0055] 1) The use of a self-adherent strap with the characteristic of low shear strength, high tensile strength permits tool-less, manual release of straps;

[0056] 2) Strap ends or full straps, of adhesive tape

[0057] 3) The provision of notched/tearable plastic strapping;

[0058] 4) Pealable, friction-welded strap

[0059] 5) Strapping with interlocking tabbed ends that are separable by transverse sliding disengagement.

[0060] 6) Knotted strapping or line having a Pull-Release free end.

[0061] 7) Strapping of paper, or adhesive paper tape;

[0062] 8) Elastic banding of tape or rubber with a high coefficient of elasticity and good "memory".

[0063] 9) Strapping may be utilized so that any disruption to the transit package is readily apparent, while replication of the strapping outside the originating facility is difficult. This provides a degree of protection against tampering with and/or counterfeiting of the product.

[0064] Further strapping alternatives include the use of strap made of woven fabric, rope/twine. A PVA (polyvinyl-alcohol) strap may be used, having the capability to dissolve in water, thereby greatly reducing the problems of strap disposal.

[0065] In some very specialized instances the use of PVA strapping may be combined with substantially solvable corrugated (i.e. water disintegrable), so that the whole of the packaging can be disposed-of by flushing away.

[0066] The use of strapping that forms an integral part of this packaging also presents an opportunity for additional labeling or display advertisement.

[0067] The cardboard primarily used in carrying out the invention is corrugated paperboard, wherein the inherent stiffness and compressive strength of the "board" in the direction normal to the corrugations is utilized where feasible to enhance the strength and rigidity of the ultimate pack. Such corrugate also has the property of laying flat when unpackaged, for facilitated return and re-use, or recycling. Alternatively, other materials such as moulded or fabricated members such as trays or support sheets may be used functionally to also serve the purposes normally envisioned for cardboard. This approach may be especially practical where direct re-use is economically feasible, such as with bread delivery, where the delivery system tray is always ireturned to the manufacturing location. One such embodiment includes the provision of a moulded plastic shallow tray similar to commercial store-use bread trays, to serve as the top and/or bottom cover portion of a package. The tray corners are slotted, to receive a strap that can engage the package walls, and serve to compress the package contents. The tray may include notches and local fittings for cardboard divider inserts. A pair of these upstanding dividers may be bent at about their mid-point, in back-to-back mutually bracing relation to serve as an intermediate shelf within the package. Tabbed ends of the shelf halves may engage slots that penetrate the adjoining wall face. This tray/cover embodiment affords extremely high load bearing capacity, which may be enhanced by the provision of a mid-height "stiffening" strap about the package, to control bulging of its walls. The cardboard body of the package may include wall slots to locate partitions and tray inserts. Partition means are selected from a wide range, including paper and plastic corrugate, hot melt and other adhesive, expanded and non-expanded carpet/rubber/fabric etc, preform egg-carton style material, and wood cellulose/oil-based semi-structural and structural products, plastic wraps and/or binders such as plastic ring carriers, sleeves, straps, and films and labels

[0068] A further, major advantage of the subject packaging system is the facilitation of product handling from pallet to shelf, wherein the removal of the strap or straps then enables the package contents to be bulk-transferred to the shelf in the carton or carton portion, in a readily viewable and hand-accessible condition, without further unpackaging, for significant manpower reduction. This obviates the current practice of carton slashing with a box cutter. The use of low-tensile, high shear glues between surfaces of the board package provides additional integration and stability to the package, while facilitating recycling by enabling the ready reduction of glued corner pieces to their original planar (blank) form.

[0069] These low-tensile, high-shear glues may also be used to adhere the ends of some goods containers to planar top and/or bottom sheets, thereby serving in effect as virtual partitioning. Thus, the present system provides structural package units that readily integrate into stable pallet loads. These pallet loads retain their stability over long haulage transit times, when vibration and transmitted road forces would normally cause noticeable disruption to the package contents. In addition to enabling faster stocking of shelves, the subject packages also facilitate pallet accessibility for product identification and removal.

[0070] The individual packages are inherently strong, and the built-in load-sharing characteristic lends resistance to impacts, drops and mishandling, as well as in-transit forces.

[0071] Environmentally, packaging in accordance with the present invention leads to significant and measurable reduction in the mass of cardboard required per unit of goods shipped, and the elimination of one ton of cardboard production has been equated to a one ton reduction of carbon dioxide emissions, so that significant ecological benefits clearly accrue from this invention.

[0072] Reduction of cardboard content by as much as 40% to 50% is anticipated, together with the provision of stronger, integrated packages, using the present packaging system.

[0073] The predictable structural reliability of packages constructed in accordance with the present invention permit their widespread adoption into current supply chains. In making a practical evaluation of the usefulness of the present invention, the following applies: packaging of glassware with the subject system can eliminate up to 65% of the material previously required; for goods in plastic containers 40 to 50% material elimination can be achieved. Concerning cost savings to retailers, waste removal savings in accordance with the above elimination figures are achievable; significant savings in labour costs accrue from reduced container handling, and adoption of pallet displays, due to the substitution of strap-cutting and package cover and spacer removal, versus package slashing, as presently practiced. Ecologically, the accepted industrial figure for waste generation is six tons of waste per ton of discard, so that the factor of six should legitimately be applicable to the foregoing board reduction percentages. Every ton of cardboard packaging eliminated from the system represents a saving of 65,000 litres of process water. Also, the reduction in paper requirements (for the production of board) correspondingly reduces the carcinogenic by-products that are the (apparently) unavoidable accompaniments to paper production.

[0074] Validating in-part the foregoing figures: a case of 500 ml jars of jam previously required 7.5 square feet of board (cardboard). Packaged in accordance with the present invention, the same jars require 3.25 square feet of board. The use of one million such cases generates over 3,000,000 sq ft of material savings (plus a 50% reduction in the chip board partition material used within the cases).

[0075] At a retail location a detailer would formerly have to slash the case and place product individually on the shelf. With the subject packaging, the entire tray (with straps off and partition removed) is placed on the shelf. Time required to do this is a fraction of the time formerly required in case-cutting and then handling the contents of the full case. While the following embodiments illustrate regular, side-by-side rows of goods containers, it will be understood that benefits of the present invention may well be obtained for other, less 'regimental' container arrangements, including so-called 'nested' or off-set, staggered rows of containers.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0076] Certain embodiments of the present invention are described by way of illustration, without limitation thereto other than as set forth in the claims hereof, it being evident

that a person skilled in the art may readily evolve alternative embodiments, in light of the present disclosure and the accompanying drawings, wherein:

[0077] FIG. **1** is a Prior Art illustration showing a plan view of a typical, traditional drop-in divider, for separating container-packed goods;

[0078] FIG. **2** is a plan view of a goods container including a set of drop-in dividers in accordance with the present invention;

[0079] FIG. **3**A is a plan view of a die-cut W-fold package blank in accordance with the present invention;

[0080] FIG. **3**B is a perspective view of the FIG. **3**A blank in a folded condition;

[0081] FIG. **3**C is a perspective view of the FIG. **3** package

[0082] FIG. **4** is a perspective view of a diagonally cross-strapped package;

[0083] FIG. **5** is a plan view of a flat divider blank of the present invention;

[0084] FIG. **6**A shows the FIG. **5** blank in a folded condition;

[0085] FIG. **6**B is an edge view of the FIG. **6**A folded blank;

[0086] FIG. **6**C is a plan view showing the use of a pair of the FIGS. **6**A and **6**B spacers;

[0087] FIG. **7** is a plan view of a bottom sheet having a series of incised D-cut separators;

[0088] FIG. **8**A is a plan view of a package with a transparent cover having non-deployed D-cuts;

[0089] FIG. **8**B is a plan view of a loaded package, showing particulars of D-cut and overlap dividers;

[0090] FIG. **9** is a view similar to FIG. **8**B, showing a center divider;

[0091] FIG. **10**A is a perspective view of a loaded and strapped package formed of L-form rolled stock;

[0092] FIG. **10**B shows the FIG. **10** embodiment, prior to application of cover and straps;

[0093] FIG. **10**C is a cross section of L-form rolled stock

[0094] FIG. **11** is a view similar to FIG. **10**A of a second embodiment formed of L-form stock;

[0095] FIG. **12**A is a side view of an unstrapped carton of packages of cereal;

[0096] FIG. **12**B is side view of the FIG. **12**A carton in a second, uncovered, strapped embodiment;

[0097] FIG. **12**C is a side view of the FIG. **12**A carton in a first strapped embodiment;

[0098] FIG. **12**D is a side view similar to FIG. **12**B of another, double-strapped embodiment;

[0099] FIG. **13** is a plan view of a subject package loaded with goods, including 'secondary packers' interspersed between the goods;

[0100] FIG. **14** shows an example of D-cuts for the FIG. **13** embodiment;

[0101] FIG. **15** is a front elevation of a strapped double layer package;

[0102] FIG. **16** is an end view of the FIG. **15** package;

[0103] FIG. **17** is a front elevation of a doubled, double-layer strapped package;

[0104] FIG. **18** is an end elevation of the FIG. **17** package;

[0105] FIG. **19**A is a perspective view of a strapped package embodiment with top and bottom sheets;

[0106] FIG. **19**B is a perspective view of a second strapping embodiment with top and bottom sheets

[0107] FIG. **20**A is a perspective view of a subject multi-layer package containing tubbed goods;

[0108] FIG. **20**B is a front elevation of the FIG. **20**A embodiment;

[0109] FIG. **21**A is a perspective view of a bottle-loaded, U-sleeve carton, prior to strapping;

[0110] FIG. **21**B is a plan view of the FIG. **21**A embodiment, at a reduced scale;

[0111] FIG. **22**A is a perspective view of an assembled, empty sleeve carton;

[0112] FIG. **22**B shows the die-cut blank of the FIG. **22**A embodiment;

[0113] FIG. **22**C is a perspective view of a loaded, glued and strapped FIG. **22**A embodiment;

[0114] FIG. **23**A is an elevational end view of a further embodiment of loaded sleeve carton;

[0115] FIG. **23**B is a perspective view of the FIG. **23**A embodiment;

[0116] FIG. **23**C shows the die-cut blank of the FIG. **23**A/**23**B embodiment;

[0117] FIG. **24**A is a perspective view of an assembled one-piece cap top;

[0118] FIG. **24**B shows the die-cut blank of the FIG. **24**A embodiment;

[0119] FIG. **25**A is a perspective view of a loaded basket form of package, with a drop-in spacer;

[0120] FIG. **25**B is a perspective view of the basic basket of FIG. **25**A

[0121] FIG. **25**C shows the die-cut blank of the FIG. **25**B basket embodiment;

[0122] FIG. **25**D is a perspective view of the formed spacer portion of FIG. **25**A;

[0123] FIG. **25**E shows the die-cut blank of the FIG. **25**A/**25**D spacer embodiment;

[0124] FIG. **26**A is a perspective view of a strapped package with separate base and cap;

[0125] FIG. **26**B is a bottom view of the FIG. **26**A embodiment;

[0126] FIG. **27**A is a perspective view of a strapped package embodiment with external spacers;

[0127] FIG. 27B is a perspective view of the sleeve assembly of the FIG. 27A embodiment; and,

[0128] FIG. 27C shows the die-cut blank of the FIGS. 27A/27B embodiment.

[0129] FIG. 28A is a perspective view of an enclosed end package;

[0130] FIG. 28B is a plan view of the blank of the FIG. 28A embodiment;

[0131] FIG. 29A is a perspective view of a first embodiment of a package glued cap/base;

[0132] FIG. 29B is a plan view of the blank of the FIG. 29A embodiment;

[0133] FIG. 30A is a perspective view of a second embodiment of a package glued cap/base;

[0134] FIG. 30B is a plan view of the blank of the FIG. 30A embodiment;

[0135] FIG. 31A is a perspective view of a high-side/low-end glued base for a package;

[0136] FIG. 31B is a plan view of the blank of the FIG. 31A embodiment;

[0137] FIG. 32A is a perspective view of a strapped package with separate cap, and dividers;

[0138] FIG. 32B is an end elevation of the FIG. 32A embodiment;

[0139] FIG. 33A is an elevational view of a strapped package having a plastic bottom tray, prior to application of a plastic cap;

[0140] FIG. 33B is a plan view of the FIG. 33A embodiment;

[0141] FIG. 33C is a partially sectioned side view of the FIG. 33A embodiment, with a cap;

[0142] FIG. 33D is a view similar to FIG. 33B, showing an alternative tray arrangement;

[0143] FIG. 34 is a front perspective view of a pallet display package in accordance with the present invention; and,

[0144] FIG. 35 is an exploded perspective view of a pallet and slip-sheet embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0145] FIG. 1 shows the traditional approach used in separating goods, such as glass jars or bottles that are susceptible both to impact forces and also to fretting frictional contact. The dividers are sets of upper and lower straight strips that are slotted through half their width at their intersection points, so that they can be interdigitated to form a stable divider pack which fits loosely into the carton, before it is filled with goods.

[0146] Turning to FIG. 2, a package 2.1 in accordance with the present invention, shown somewhat diagrammatically, has upstanding package walls 2.2, 2.4 that are notched at their corners, permitting an encircling strap-or straps 2.6 to compress the walls 2.2, 2.4 against the goods 2.8. The strap 2.6 also engages the goods 2.8, to further hold them against movement. Convoluted dividers 2.11, 2.12 and a cruciform central divider 2.14 provide separation of the surfaces of the goods, without impeding their displacement into mutual frictional engagement, with D-cut separators (see below) which project inwardly from the package walls and other surfaces, to engage the container bases and to separate the containers. Under the compressive forces provided by the strap or straps, the dividers and separators are compressed between adjacent container surfaces into high-friction integrating means, to integrate the package into a unitary structural unit.

[0147] Referring to FIGS. 3A, 3B and 3C, FIG. 3A shows a W-fold blank 3.1, having a central recess 3.2.

[0148] The blank 3.1 is illustrated as being essentially square, and having pairs of foldable side portions 3.3 at each corner. It will be understood that a substantially unlimited range of arrangements of W-fold blanks can be readily fabricated from sheet stock and made up into containers and spacers, with differing sizes and variations in relative proportions. A series of eight fold lines, lines F1 enable the side portions 3.3 to be turned up (or down if required), at rightangles to the plane of the blank 3.1; and a series of fold lines W1, W2 enable the panels bordering the recess 3.2 to be doubled-up, (see FIG. 3B), thereby forming a double-walled cruciform 3.4 possessing great vertical crush strength; this enables a reduction in gauge of the board, for many applications. Turning up the side portions 3.3 then forms four square compartments 3.5 (FIG. 3C) into which goods containers 3.6 are loaded. The adjoined edges of side portions 3.3 each have belt recesses 3.7 which are brought into alignment, by which peripheral, tensioned belts 3.9 are located. While illustrated as a four-compartment blank, it will be readily understood that multiples of similar blanks can be cut, to make pluralities of cruciform separator units, with stiff, double-thickness walls coupling the units. When the upper edge of the central cruciform spacer is coincident with, or rises above the containers, the great load-bearing strength of the spacer can come into play.

[0149] FIG. 4 shows a rectangular right-cylindrical package 4.1, shown with fold-over end-flaps 4.2, and secured by diagonal cross-over straps 4.3. The straps 4.3 are located by corner recesses 4.4, and serve also to secure the end-flaps 4.2. The cross-over of straps 4.3 adds tremendous anti-skewing strength to the package 4.1. It will be understood that in many instances the straps 4.3 may also be crossed-over on the package ends.

[0150] Turning to FIGS. 5, 6A, 6B and 6C, a blank 5.1 has four major panel portions 5.2, 5.4, and 5.6, 5.6, with fold lines shown dotted. By folding panels 5.6 up, normal to panel 5.2, and then folding the major portion of panels 5.6 to extend laterally across panel 5.2, and with the side panel portions of panel 5.4 folded at about 45 degrees (away) from panel 5.2, a divider 6.1 (FIGS. 6A and 6B) is obtained, which may be paired, back-to-back, as shown in FIG. 6C. The apparent spacings between the cylindrical containers of goods and the members of the dividers 5.1 is taken up in the application of tensioned straps, in accordance with the present invention.

[0151] A singular aspect of the subject system, as brought out in the FIGS. 3, 5 and 6A and 6B illustrations, is the provision of high columnar load-bearing strength that is achieved by the vertical flutes of an upwardly projecting

portion of a corrugated packing piece when sandwiched and pinned by the containers of a package, when strapped into a unitary package.

[0152] Turning to FIG. 7, a container 7.1 with side walls 7.2 is used with cylindrical shaped goods 7.25. The bottom sheet 7.3 has a series of D-cuts 7.4, many being illustrated in phantom, and all of them shown in their initial, undeformed, as-cut condition.

[0153] The form of D-cut 7.4 shown is illustrated with a broken base line 7.5, which is the uncut pivot line about which the D-cut 7.4 is pivoted upwardly, out of the plane of the sheet 7.3.

[0154] The D-cuts 7.4 have their base lines 7.5 located and oriented to be tangential to the cylindrical goods 7.2, such that, when bent upwardly normal to the plane of bottom sheet 7.3, the inclined, upwardly projecting portion of the D-cut 7.4 has a 'wrapping' component of its length, to provide an extended contact area with the surfaces of adjoining goods 7.2, between which it is sandwiched. The portion of the D-cut 7.4 adjacent the base line 7.5 abuts and locates the base of the adjoining container 7.2.

[0155] The application of a tensioned band 7.6 about the walls 7.2, and across corner flaps 7.7 draws the goods 7.2 into tightly nested, mutually bracing relation, having the respective D-cuts 7.4 in sandwiched, compressed relation with the sides of the goods 7.2, to afford a series of high frictional sandwiched links between the respective individual goods 7.2, while tying the package bottom 7.3 to the base of the goods 7.2.

[0156] The band 7.6 holds the corner flaps 7.7 (when retained) in tightly compressed, high friction engagement with the adjoined surface of 'corner' goods 7.2, thereby locking the whole compressed assembly of goods 7.2 and D-cuts 7.4 in unitary integrated relation with the sides 7.2 and bottom 7.3 of container 7.1, so as to form a structural, load-bearing package.

[0157] Turning to FIG. 8A, the illustrated D-cuts 8.4 are of semi-horseshoe form, being formed in the transparent lid 8.3 of a package 8.1, and illustrated in their as-cut, undeformed condition. Each D-cut 8.4 has a pair of spaced-apart, uncut straight base-lines, about which the D-cut 8.4 pivots, for insertion between mutually neighbouring goods 8.2. Additional dividers such as those illustrated in FIGS. 6A, 6B and 6C may be placed so as to extend upwardly from the bottom sheet of the package 8.1, or inserted downwardly, to provide the desired separation of the goods containers. 8.2. Concerning the central four containers 8.2, while sheer impact loads will be substantially dispersed by the adjoining outboard containers, a support/divider in a form such as a cardboard tube may be inserted centrally to contact and cushion these four containers (see FIG. 9).

[0158] Turning to FIG. 8B, the lid of container 8.1 is removed, showing the detail of the bottom sheet D-cuts 8.4 in their up-turned position, and with overlap dividers 8.5 in position.

[0159] In FIG. 8C a modified divider embodiment 8.51 has end flaps 8.52 and 8.53 for gluing attachment to the adjoining wall portion of the container 8.1 of FIG. 8A. The outer X'd surfaces 8.54 are the gluing surfaces.

[0160] In FIG. 8D the modified divider embodiment 8.61 has projecting insert tab ends 8.62 which are inserted into recesses 8.63 that are die-cut into the surfaces of container 8.1.

[0161] It will be understood that these attachment modes may be applied to other separators and dividers of the present invention.

[0162] FIG. 9 shows a center divider 9.1 inserted between the four central containers 9.2. The divider 9.1 may be held in place by way of semi-tack adhesive, or by laterally extending cut flares, which engage the wares sufficiently to hold the divider 9.1 in place, until compression is applied by banding of the package.

[0163] Turning to FIG. 10A, the package 10.1 has a top cover 10.2 and bottom cover 10.4 that are formed from L-section rolled corrugated stock. By transversely cutting the broader web (horizontal face) portion 10.1, and leaving the narrower (vertical) flange portion 10.3 uncut, the bending of the flange 10.3 so as to form a corner brings two adjoining (but now separated) web portions of the cover into mutual overlapping relation. They may be spot-glued.

[0164] A pair of straps 10.5 overlie the overlapped web portions that form the corner, in securing relation therewith.

[0165] The long leg (web 9.1) of the L-section may be sized, for example, to a width of about 130% of the diameter of a wares container, so as to provide a sufficient degree of overlap of the four central goods containers to safely retain them in the package 9.1.

[0166] This cover embodiment has the advantage that no material is removed, and the overlapped corners provide enhanced integrity to the package.

[0167] FIG. 10B shows the package 10.1 prior to the application of the top cover and securing straps.

[0168] It will be understood that standard bottom trays may also be prepared in this format.

[0169] FIG. 11 shows a package 11.1 having a top cover 11.2 and bottom cover 11.4 that are formed from L-section rolled corrugated stock. At the corners, the broader web portion 11.1 has a triangle cut-out with the 90 degree apex angle abutting the flange portion 11.3, such that by bending the flange 11.3 at rightangles to form the package corner, the cut edges of the web are brought together. While a symmetrical 45/45 degree orientation of the cuts gives a 45 degree joint, it will be understood that other orientations may be selected.

[0170] Straps 11.5 are illustrated to overlie the non-glued corner joints in binding relation.

[0171] In FIG. 12A, the package 12.1 is of rolled corrugated stock, for use with a pair of straps which provide the requisite internal compression to frictionally integrate the respective package integers into a unitary, substantially monolithic load-bearing structure.

[0172] FIG. 12B shows a coverless strapped package, best suited for "strong-boxed" goods such as laundry detergent, where the goods container is unusually rigid, such that the strength of the container is combined with that of the package, and the whole combination is integrated into a structure by the application of the tensioned strap 12.6.

[0173] FIG. **12**C shows a covered two-piece strapped package, illustrated with cereal boxes as the contents as in FIG. **12**A, secured by tensioned straps **12.6**, and showing use of the packaging so as to disclose its contents and for advertisement purposes.

[0174] In the majority of applications the deeper lower portion of the package will form the on-shelf container. However, in some instances, the shallower 'cap' portion may be used, by inverting the package and removing the deeper package portion. In such instances, the on-shelf labeling may be included, inverted, on the cap portion of the package.

[0175] The straps **12.6** may be of significant assistance in handling the packages.

[0176] Referring to FIG. **13**, a package **13.1** is shown, having bottled goods **13.2** interspaced with secondary (smaller) goods **13.3**, referred to above as possibly being tequila **13.2**, interspaced by bottles of marguerite mix **13.3**.

[0177] FIG. **14** shows a typical arrangement of a portion of the D-cuts **13.4** (shown in phantom), prior to upward displacement between the goods containers, for the four bottles **14.2** surrounding an interspersed X-centered bottle **14.3**.

[0178] The integrating straps have been omitted for purposes of clarity

[0179] FIGS. **15** through **18** illustrate the application of the subject invention to multi-level packaging, where drop-in open packages are secured in integrated packaged relation by the use of multiple straps, which are located into slotted corner recesses that provide wall tab portions which overlap against the walls of the goods packages. The straps trap the wall tab portions in engaging relation against the corners of the drop-in goods packages.

[0180] FIG. **15** illustrates a package **15.1**, showing the use of three lateral straps **15.6** with cylindrical goods containers **15.2**. The package **15.1** includes light-weight end panels.

[0181] FIG. **16** shows a portion of the package end panel peeled back.

[0182] FIG. **17** shows a package **17.1** which contains two double-layer conical containers **17.2**, secured by way of three straps **17.6**.

[0183] FIG. **18** illustrates the flexible nature of the end panel wrapper of the container **17.1**. The packages **15.1**, **17.1** give unusual visibility to the manufacturers marking upon the containers of his goods. The straps **15.6**, **17.6** also afford highly visible linear areas for the insertion of advertising for the contained goods.

[0184] The open nature of the package greatly assists in the chilling process normally required.

[0185] Referring to FIG. **19**A, a package **19.1** containing jars **19.2** or the like has a top sheet **19.3**, a bottom sheet **19.4**, the top sheet being secured by cross-over straps **19.5** that are located in strap cut-outs **19.6**. The tops **19.7** of jars **19.2** are held within cut-outs **19.8** in sheet **19.3**. The bottoms of the jars **19.2** may be glued to the top surface of the bottom sheet **19.4** by way of a low-tensile, high-shear glue (not shown).

[0186] FIG. **19**B shows another cross-strapping embodiment, wherein the straps also cross over at the ends of the package, for additional stabilization and retention of the goods containers.

[0187] FIGS. **20**A, **20**B show a multi-pack package **20.1** containing four layers of tubs **20.2**, contained within a closed end package **20.3** in accordance with the present invention (see FIG. **32**). Transverse dividers **20.4** having a modified-Z section separate and enclose the rows of tubs **20.2**, alternate ones of the dividers **20.4** being reversed to overlap an adjoining divider, to which it is spot-glued with high-shear, low-tensile glue. Straps **20.5** overlie the outer ends of the dividers **20.4**, and bind the four end-flaps **20.6** of package **20.1**. The end flaps **20.6** may also be spot-glued

[0188] FIG. **21**A shows a loaded sleeve **21.1** filled with goods **21.2**, prior to the application of peripheral strapping through the strap cut-outs **21.6**.

[0189] FIG. **21**B shows D-cuts **21.7**, akin to those of FIG. **7**, which are displaced upwardly from the bottom portion **21.3** of sleeve **21.1** into an upwardly deployed, interposed, cushioning relation between adjacent ones of the goods **21.2**.

[0190] FIG. **22**A shows an empty sleeve **22.1** in its final, closed form, without a showing of goods containers or securing straps.

[0191] Referring to the blank **22.2** of sleeve **22.1**, shown in FIG. **22**B, the top panel portion **22.3** has a series of apertures **22.4** to receive the caps of the goods (see FIG. **22**C). The side panel portions **22.5** have strap cut-outs **22.6** at their edges. An edge gluing panel **22.7**, which forms a part of bottom panel **22.9** overlaps the opposed side panel **22.5**, to which it is spot-glued, after loading of the goods containers and installation of the straps of the assembly. In use, as shown in FIG. **22**C, the goods containers (illustrated as bottles) are loaded on the bottom panel **22.9**, having dividers **22.11** inserted between the rows of bottles. The sides **22.5** and top **22.3** are folded over, with the apertures **22.4** engaging the caps of the bottles, and the panel **22.7** glued to the adjoining side **22.5**. Two straps are then applied about the cut-outs **22.6**, in tensioned, securing relation with the package.

[0192] FIGS. **23**A, **23**B and **23**C are similar to the foregoing FIG. **22**, with the addition of carrying handle cut-outs **23.1**. When the contents are plastic containers there is usually no need for dividers between the rows of containers.

[0193] Referring to FIGS. **24**A and **24**B, the construct **24.1** fills the role of both base and cover of a package, being illustrated and referred to herein as a 'cover'. The blank **24.2** is roll-formed to an L-section, being jogged by the thickness of the stock to offset the end-panel portions **24.3** so as to overly the side-panel portions **24.4**, when assembled. The skirt **24.5** bends readily at the respective lines of the cut-outs **24.7**, to form the corners of the construct **24.1**, as the corrugations extend laterally across the blank **24.2**.

[0194] In FIG. **25**A a basket embodiment **25.1** is shown in a loaded and strapped condition.

[0195] Referring also to FIGS. **25**B and **25**C, the basket **25.1**, formed from blank **25.2**, has side portions **25.3**, a bottom **25.4**, ends **25.5**, and four corner flaps **25.7**. Six vestigial strap slots **25.6** scarcely appear in FIG. **25**A.

[0196] Referring to the drop-in divider of FIGS. **25**D and **25**E, the substantially rectangular blank **25.11** has a spine panel portion **25.12** with two D-cut flaps **25.13**; two end panel portions **25.14**; and two fold-back panels **25.15**. As a possible assist to the reader, the selected names relate to the

role played by the erected blank **25.11** when inserted as a protective divider into the loaded basket embodiment **25.1** (see FIG. **25**A).

[**0197**] Flap-over cover panels **25.16**, **25.17**, **25.18** and **25.19** complete the divider, which is dropped into place prior to the application of the straps in FIG. **25**A.

[**0198**] FIG. **26**A shows a package **26.1** containing goods containers **26.2**. The package **26.1** consists of top portion **26.3** and bottom portion **26.4**. The package bottom portion **26.4** has skirt flap portions **26.5** that are spot-glued to the skirt side portions **26.7** by way of high-shear, low-tensile glue Straps **26.6** hold flaps **26.8** and the top and bottom package portions **26.3**, **26.4** in secured relation.

[**0199**] For shelf display purposes, removal of the straps **26.6** enables the removal of the package top portion **26.3**, and the bottom **26.4** is self sustaining, for use on the shelf, and for ready access to the goods containers **26.2**.

[**0200**] In FIG. **27**A a loaded package **27.1** has containers **27.2** with the well-known ridged tops **27.3** of juice and milk containers. Referring also to FIGS. **27**B and **27**C, the package **27.4** has a substantially fully slotted top panel **27.5**, to receive the ridged tops **27.3** in inserted relation therethrough, such that the combined top/ridges (**27.5**/**27.3**) together form an external separator, and a strong, load-bearing surface. The side panels **27.7** include cooling slots **27.8** to facilitate the required cooling step of the process.

[**0201**] Turning to FIGS. **28**A and **28**B, this enclosed-end package **28.1** has a bottom panel **28.2**, with shallow side panels **28.3**, and end assemblies **28.4** which consist of end panels **28.5**, folded side panels **28.7** and hood panels **28.8** with side flaps **28.9**. The side panels **28.7** are off-set from and can overlie the side panels **28.3**, to which they can be spot-glued if required. The side flaps **28.9** are off-set from side panels **28.7**, so as to overlie them on assembly, and to which they are usually spot-glued.

[**0202**] FIGS. **29**A & B and **30**A & B show the assemblies **29.1**, **30.1** and blanks **29.2** and **30.2** respectively for use as both bases and caps of packages, with appropriate use of strapping (see FIG. **32**A for example). The overlapping end flaps are usually spot-glued with high shear, low tensile glue. These figures should be self-explanatory to one skilled in the art of packaging. FIG. **31**A shows a high-sided package bottom **31.1** having end panels **31.2** that are glued to the flaps **31.3** of side panels **31.4**. FIG. **31**B shows the blank with its numbered panels. FIGS. **32**A and **32**B show a container **32.1** of packaged carton goods **32.2**. The bottom container portion **32.3** is similar to that of FIG. **31**A; and the top portion **32.4** is similar to that of FIG. **30**A. This construct provides strong, collapse-resistant corners for the package.

[**0203**] Turning to FIGS. **33**A, **33**B and **33**C, a package **33.2**, having cardboard walls **33.3**, has a cap **33.4** and bottom tray **33.6** which are identical plastic mouldings. The cap/tray **33.4**/**33.6** has corner slots **33.8** into which straps **33.10** are fitted, so as to engage and compress the walls **33.3**. The walls **33.3** will generally be correspondingly slotted, to enable the straps **33.10** to engage the goods containers in compressing relation within the package **33.2**.

[**0204**] A strap **33.10** has been omitted from the cap **33.4** for purposes of clarity. An intermediate strap **33.12** located at the waist of the package **33.2** serves as a belt to limit bulging of the walls **33.3** under heavy top loads that may be applied.

[**0205**] The cap/tray, **33.4**/**33.6** is illustrated as having four transverse channels **33.14**, into which pairs of cardboard spacers **3.16** can be inserted. The right hand spacer **33.16** is illustrated as being bent at its mid-point, to form a shelf, having outer end tabs (not shown) engaging slots (not shown) in the wall **33.3**.

[**0206**] The walls **33.15** that form the channels **33.14** may be continuous or discontinuous, by way of a series of aligned tabs, in accordance with the end use to be made of the cap/tray **33.4**/**33.6**. In FIG. **33**D the discontinuous tabs forming the channel walls **33.15** extend in both directions, enabling the package **33.2** to be 'quartered' in a variety of ways, including spacers that are in cruciform relation (see above).

[**0207**] In FIG. **33**A, the spacers **33.16** are shown in dotted lines, being divergent at their upper halves, as if being turned down to the "shelf" position, shown in FIG. **33**C. In FIG. **33**B the spacers **33.16** are shown in their erect condition.

[**0208**] In FIG. **34** a standard pallet **34.1** has a cardboard package **34.2** mounted thereon, as a transportation and display unit. Corner slots **34.3** serve to position the tensioning straps (not shown), by which the pallet and its contents are compressed. The surfaces of the package **34.2** may contain a pattern of D-cut spacer/dividers **34.4**, illustrated in their initial, undeformed condition.

[**0209**] Referring to FIG. **35**, a standard pallet **35.1** is illustrated with one 'half-pallet' slip-sheet **35.2**, and two 'quarter-pallet' slip sheets **35.3**. The three slip sheets **35.2**, **35.3** would all have D-cut protrusions **35.5**, illustrated in their non-deployed, as-cut condition. One slip-sheet **35.3** is illustrated in an uncut condition in order to emphasize the customizing aspect of usage, where a slip-sheet will be D-cut in accordance with the shape, size and nature of the goods containers being transported. It will be understood that the illustrated D-cuts are purely representational as to size, location and attitude.

[**0210**] A succeeding layer, possibly comprising a like arrangement of slip-sheets may well be oriented at right-angles to the underlying layer, and with the relative positions of the quarter-pallet and half-pallet sheets also reversed, to optimize pallet-load stability.

1. A composite package containing a plurality of substantially identical containers of goods, for transportation, storage and display, said package having a lower portion to receive said goods containers in assembled, mutually organized relation thereon; and tensioned strapping means securing said package in engaged integrated relation with said goods to form a stable load-bearing structural unit for stacking in a plurality of self-supporting layers.

2. The composite package as set forth in claim 1, said package having a pattern of predetermined surface portions displaced therefrom, to provide contact between said package and individual ones of said containers, in pre-positioned, secured relation.

3. The composite package as set forth in claim 2, wherein said displaced surface portions comprise a plurality of

die-cut tabs projecting inwardly of said package into interposed sandwiched relation between adjacent ones of said goods containers.

4. The composite package as set forth in claim 1, having an upwardly projecting spacer of corrugated board in sandwiched, pinned relation between said goods containers, wherein the vertically extending flutes of said spacer provide high columnar load bearing strength to said package.

5. The composite package as set forth in claim 2, said board structure further including a cap structure engaging the tops of at least some of said containers.

6. The composite structure as claimed in claim 1, wherein said board structure is a sleeve of substantially U-cross section; the edges of said sleeve having recesses to receive said strapping means in entered relation therein.

7. The composite structure as claimed in claim 1, wherein said package is an open-ended enclosure sleeve wrapped in enclosing relation about said containers, including an overlapped joint portion, said strapping means comprising at least one strap encircling the ends of said enclosure in tensioned, retaining relation with said containers.

8. The composite structure as set forth in claim 7, said enclosure sleeve including a plurality of occlusions in mutually spaced relation to receive respective portions of said containers in entered, immobilized relation therein.

9. The composite structure as set forth in claim 1, having frictional linking means engaging the contents of said package, wherein said strapping means effect sandwiching compression of said package contents and said linking means into mutually engaged, substantially immobilized relation.

10. The composite structure of claim 9, wherein said frictional linking means comprise spacer means selected from the group consisting of paper and plastic corrugate, adhesives, labels and sleeves, expanded and non-expanded carpet/rubber/fabric, pre-form egg-carton style material, plastic ring carriers, semi structural and structural wood/cellulose/oil-based product, and interposed secondary product.

11. The composite package of claim 9, wherein said frictional linking means consists of a spacer of cardboard having a plurality of adjoined panel portions in mutually folded relation, with upwardly extending interior fluted portions to form stiff, up-standing cruciform partition members.

12. The composite package as set forth in claim 11, wherein said cruciform partition members comprise double thickness cardboard.

13. The composite package as set forth in claim 1, said package consisting of an upper and a lower package portion, at least one said portion comprising L-section rolled corrugated stock, said L-section consisting of an elongated leg portion having a juncture with a foot portion extending at right-angles from said leg portion; wherein foot portions of the L are formed to serve as side portions of a said package portion, with corresponding leg portions of the L-section cut to said juncture to conform with the package portion formed side-portions.

14. The composite package as set forth in claim 1, wherein said uniform containers each have flexible walls, and contain particulate contents; said strapping means consisting of at least two encompassing straps.

15. The composite package as set forth in claim 14, wherein said strapping means includes at least two encompassing straps, wherein said straps are arranged in mutual cross-over relation.

16. The composite package as set forth in claim 15, said flexible wall containers containing a complementary filling of pressurized gas.

17. The package as set forth in claim 5, including a bottom end tray portion and a top end cover portion; at least one of said end portions being a plastic tray having a substantially planar surface portion, and enclosing wall portions, wherein said enclosing wall portions have slotted corners, to receive an encircling strap in predetermined positioned relation about said tray.

18. A packaging system comprising the steps of providing a board package to receive a predetermined number of containers in regularly arranged array, at least partially enclosed by the walls of said package, to substantially occupy the package; providing spacer means interposed between said containers, to substantially preclude direct contact between the containers, and applying a belt in tensioned relation about said package, to compress said package walls, said enclosed containers and said spacing means into frictionally linked, mutually immobilized relation, to form a stable, substantially stiff load bearing package structure.

19. The system as set forth in claim 18, including the steps of selecting said spacer means from the group consisting of paper and plastic corrugate, adhesives, expanded and non-expanded carpet/rubber/fabric, preform egg-carton style material, plastic ring carriers, semi structural and structural wood/cellulose/oil-based product, and interposed secondary product, and inserting said spacer means in sandwiched relation between said containers, and tensioning said strapping means in compressive relation with said package and package contents, to immobilize said package and said contents into a unitary, load bearing unit.

20. The system as set forth in claim 18, wherein a plurality of said packages with containers of a first set of goods are packed in close array on a pallet, to form at least one layer of said packages; further including the step of arranging a plurality of said packages holding a second set of goods as a further layer of packages upon said at least one layer of packages on said pallet.

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