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(54) **CARDED BLISTER PACK** (52) **U.S. Cl. 206/538; 206/531; 206/534.1**
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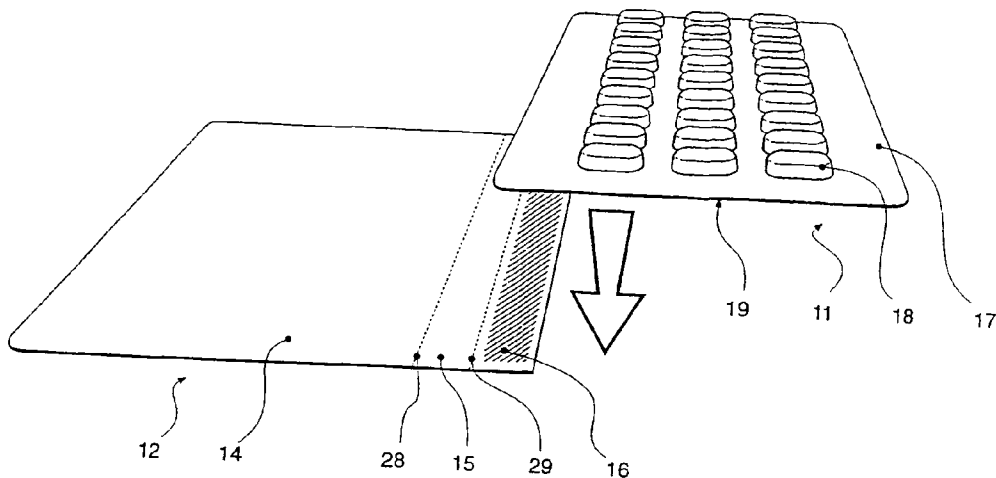
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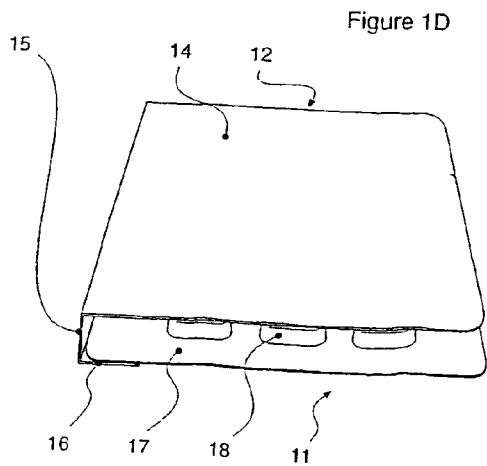
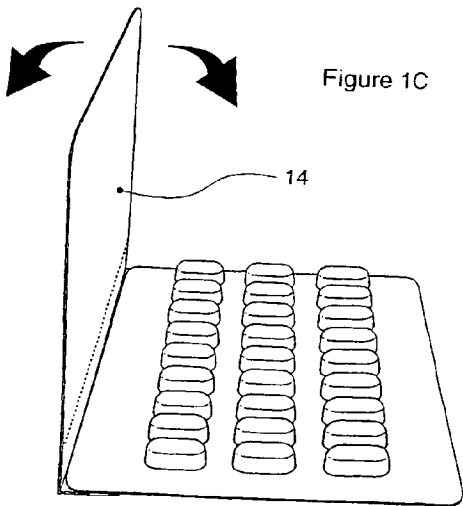
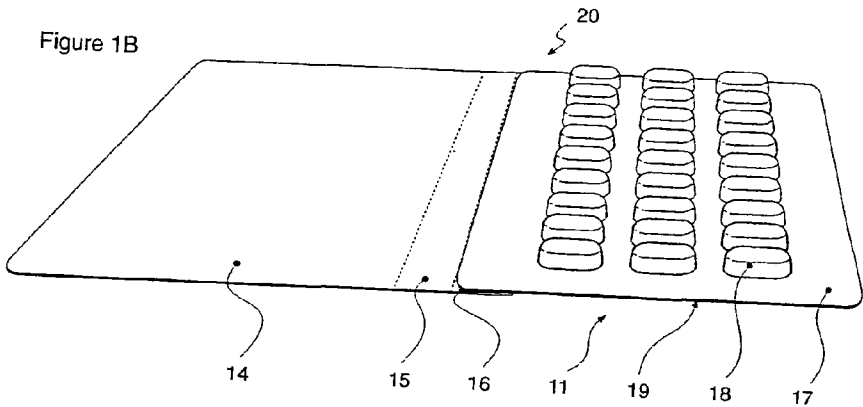
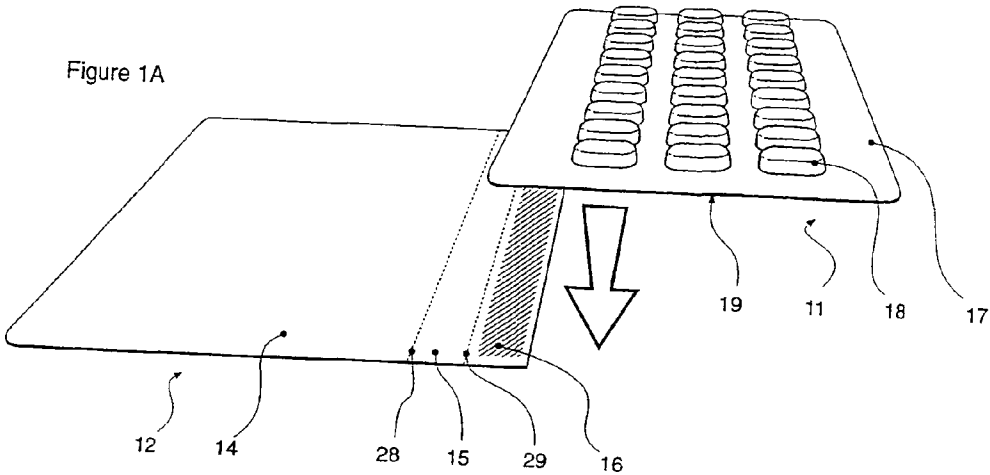
Publication Classification

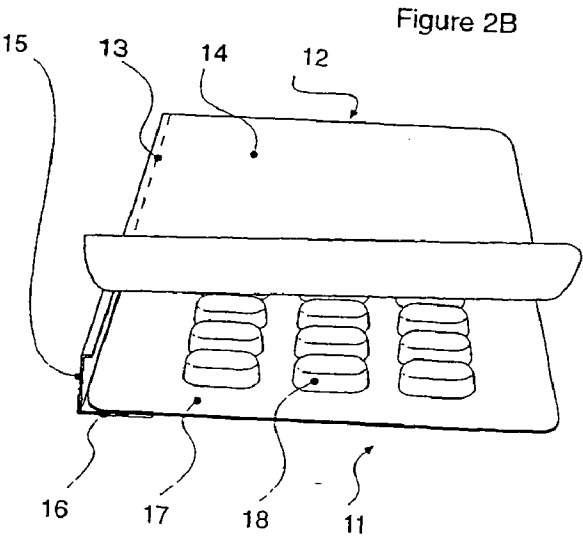
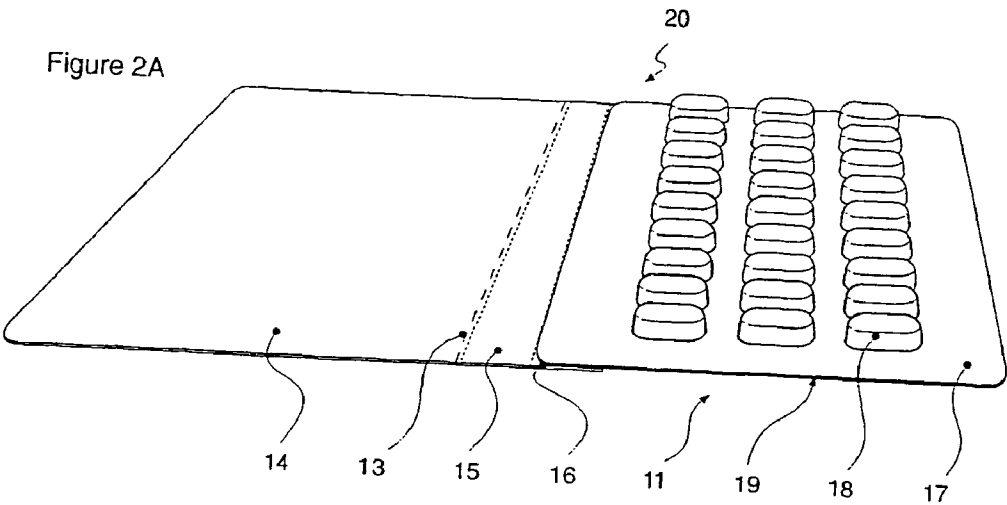
(51) **Int. Cl.⁷ B65D 83/04**

(57) **ABSTRACT**

A blister pack (20) folded wallet has a mounting card (12), with a [hinged] spine segment (15), and an adhesive edge strip (16). Overlaid by a pre-formed blister pack (11), for mutual (edge) entrainment; a dedicated assembly machine entrains mounting cards and blister packs stored in respective magazines. Child resistance is available through cover latching and/or paper reinforced foil laminate (161), with through apertures (166) and perforations (163, 165) for selective localised paper patch (169) removal, over individual blister pockets (168).







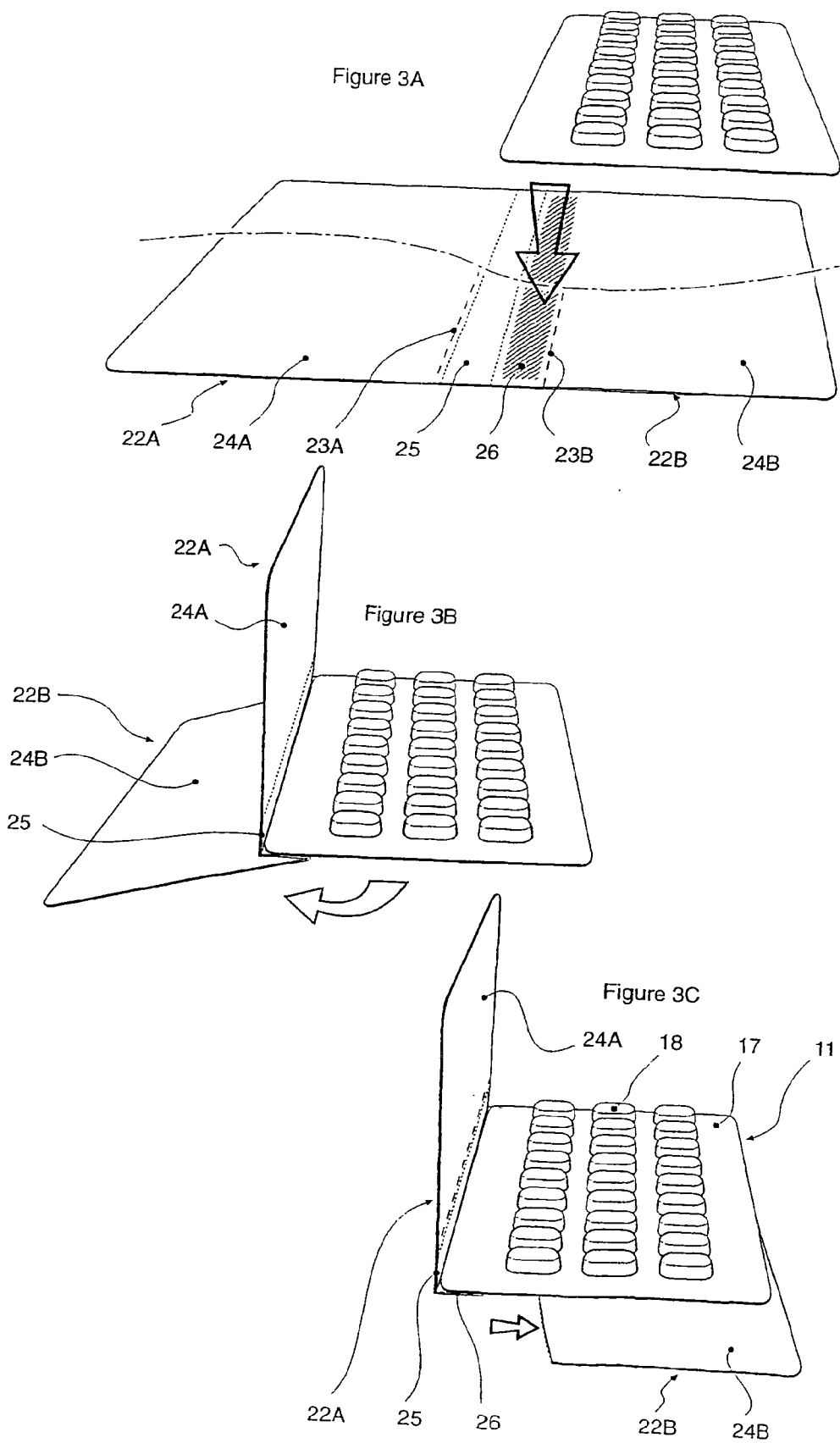


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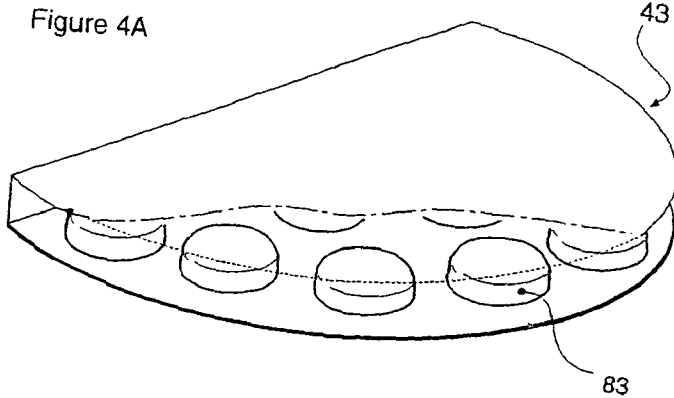


Figure 4B

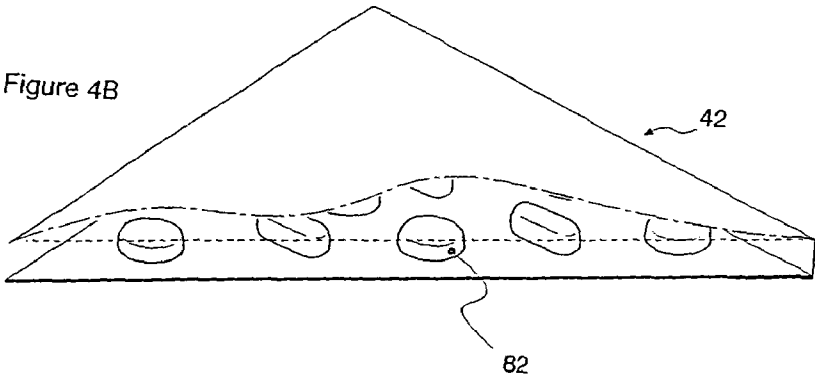


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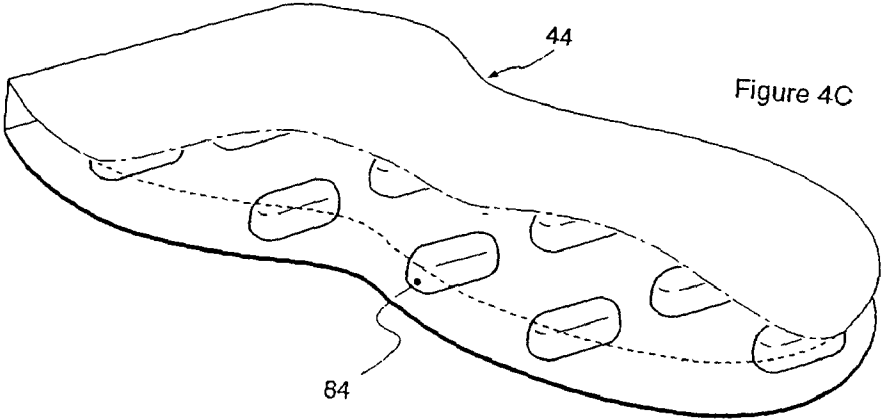


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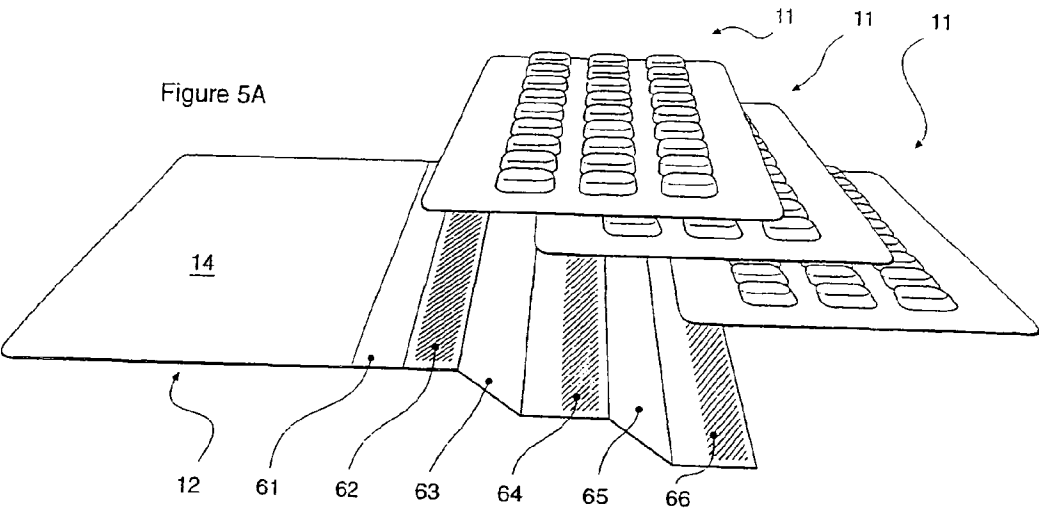


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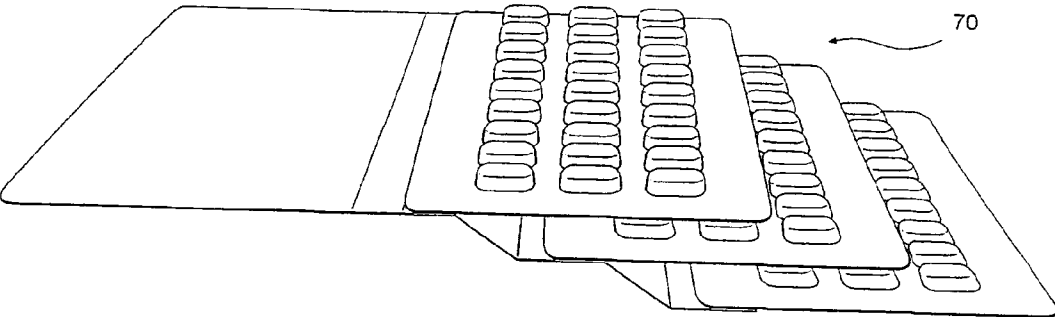


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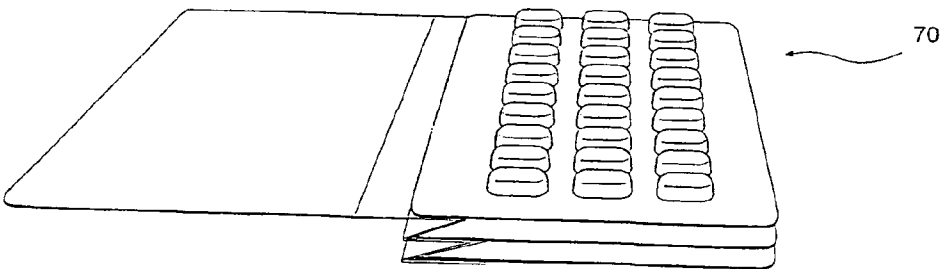


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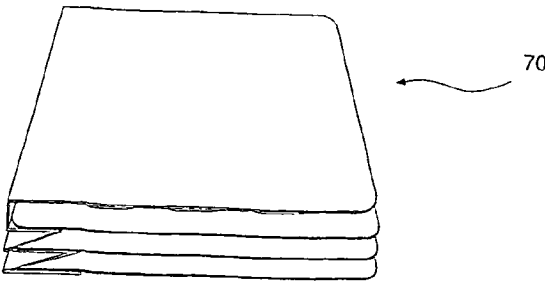


Figure 6A

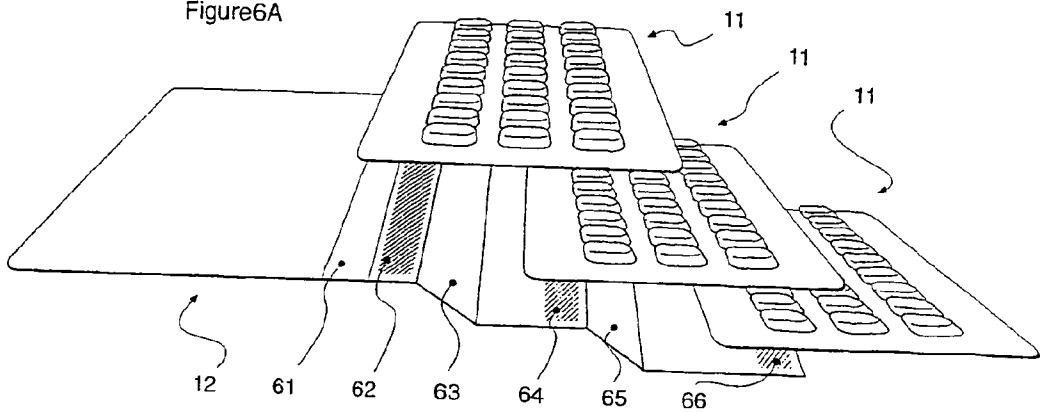


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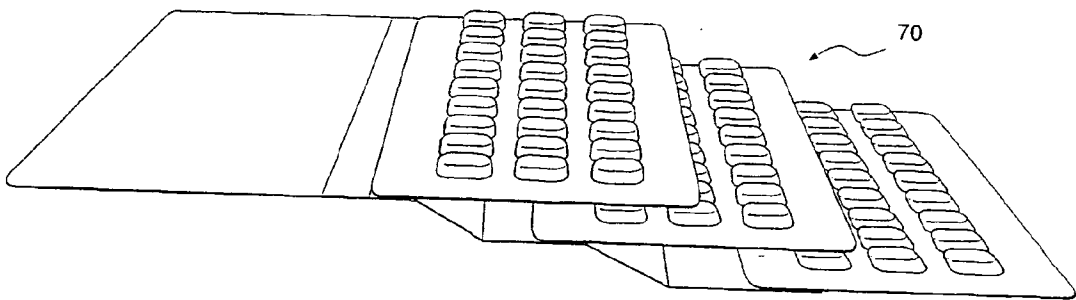


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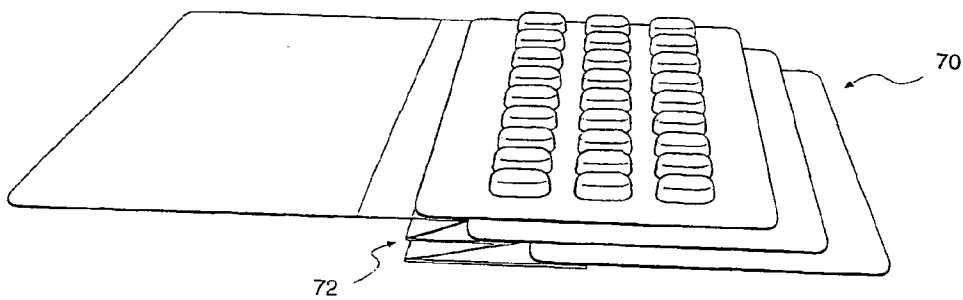
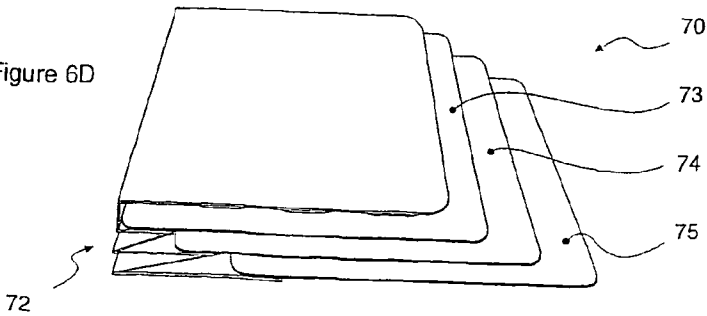
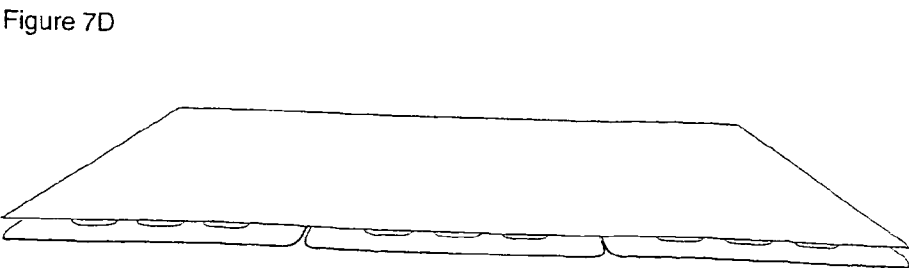
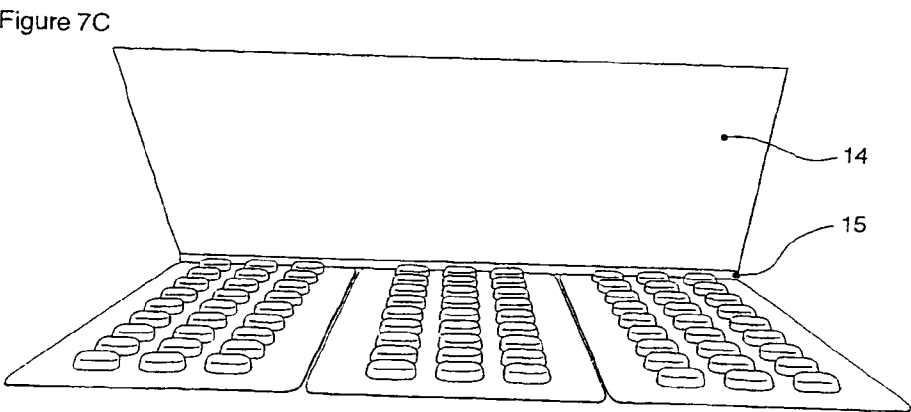
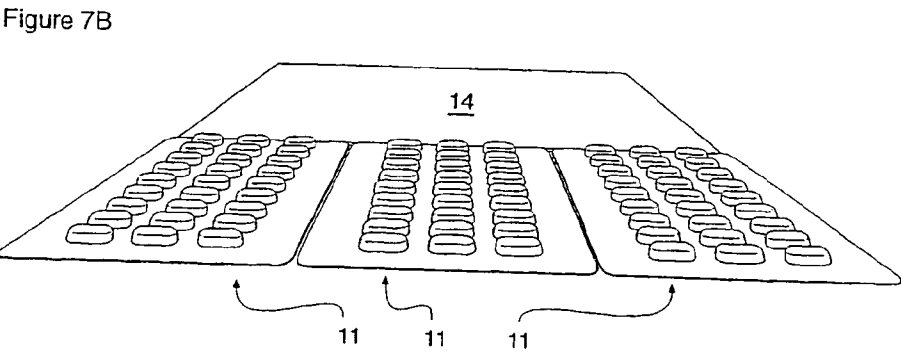
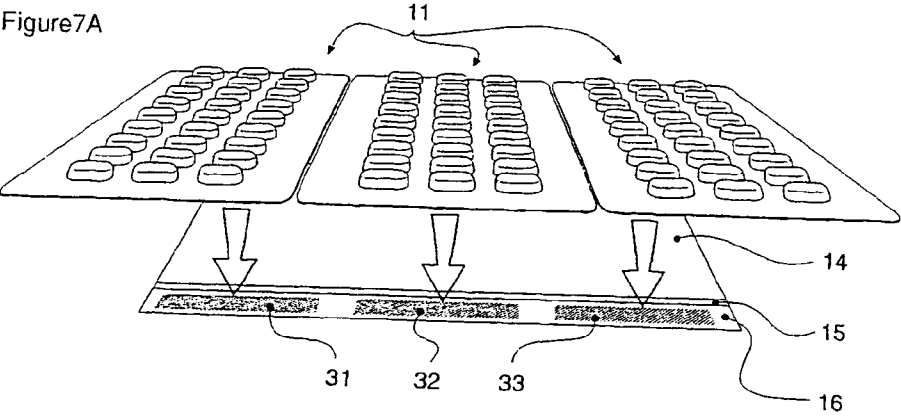


Figure 6D





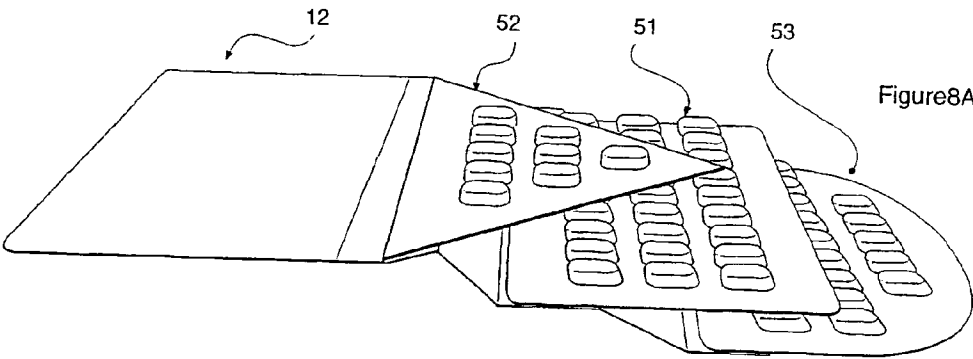


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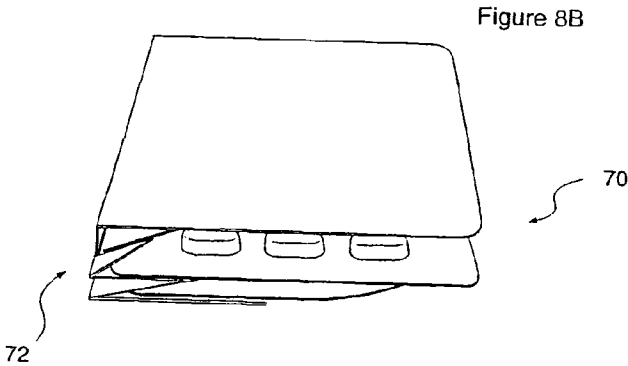
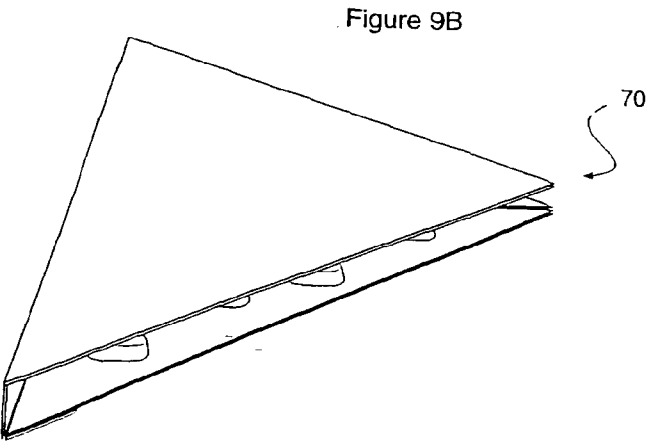
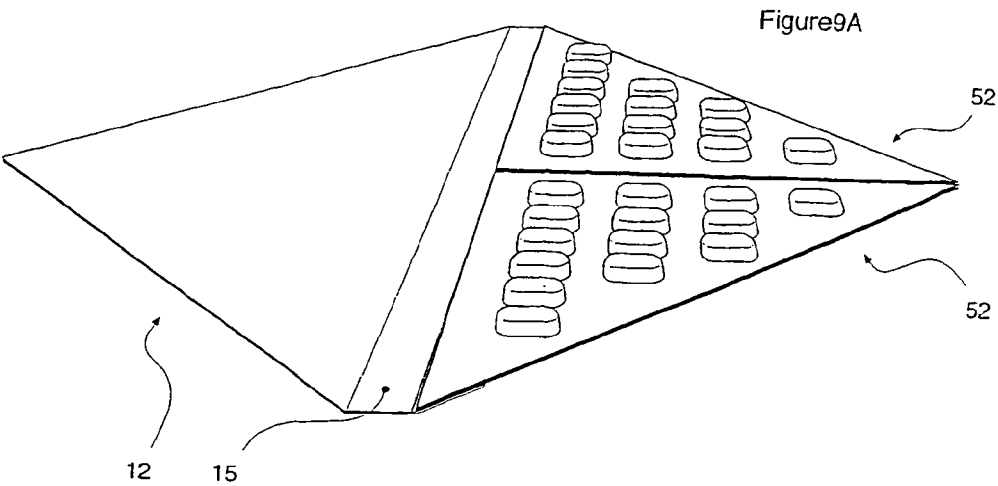
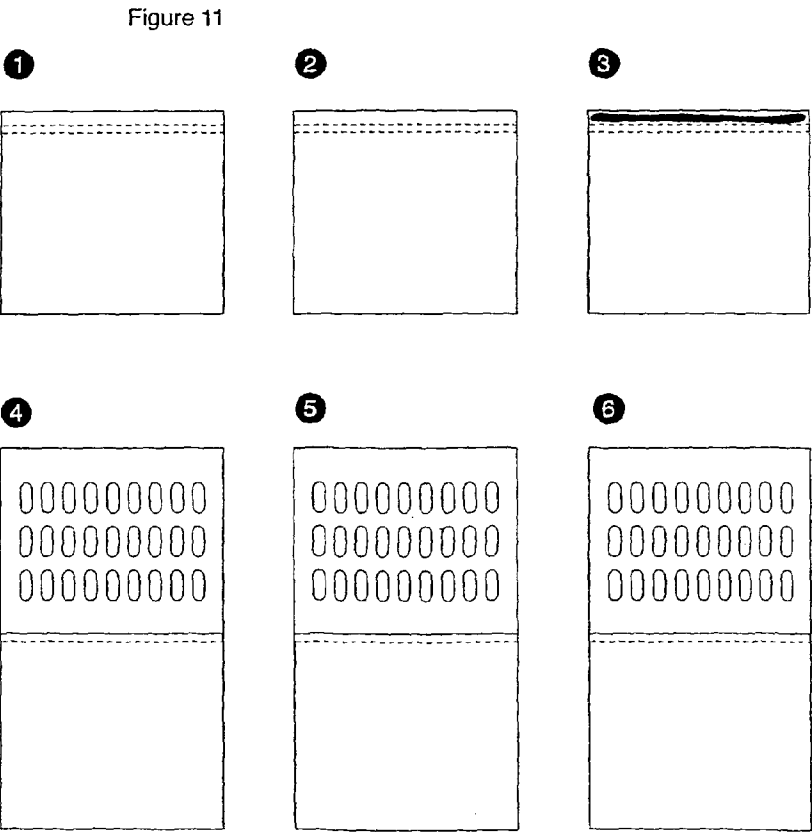
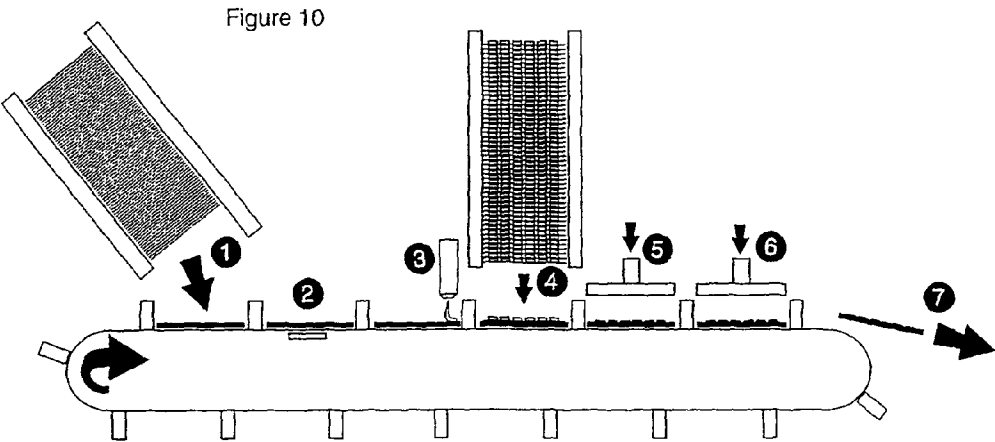
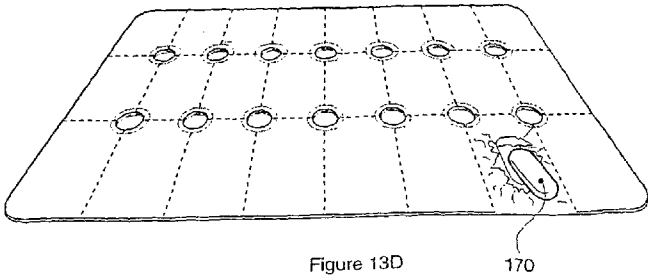
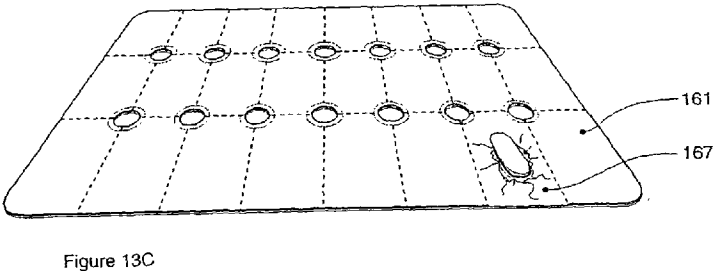
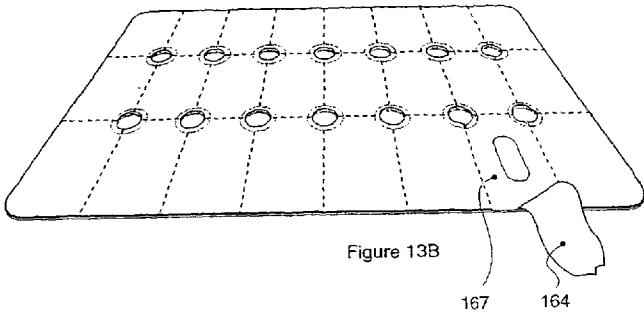
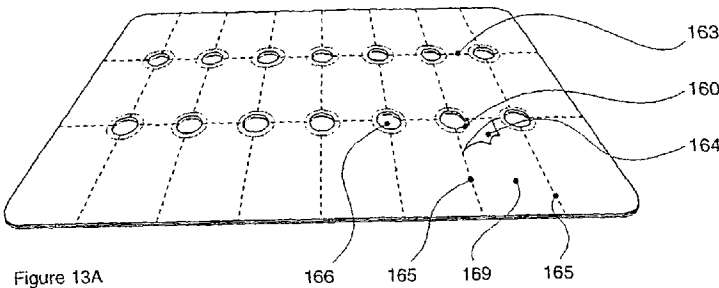


Figure 8B







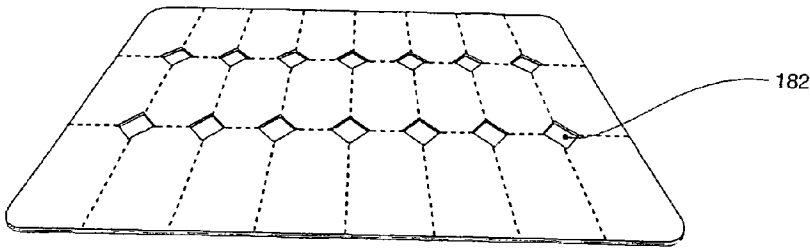


Figure 14A

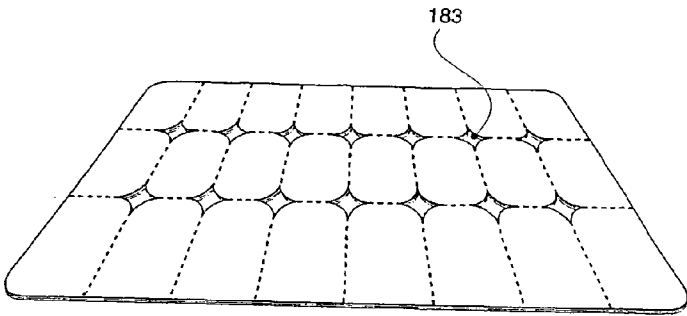


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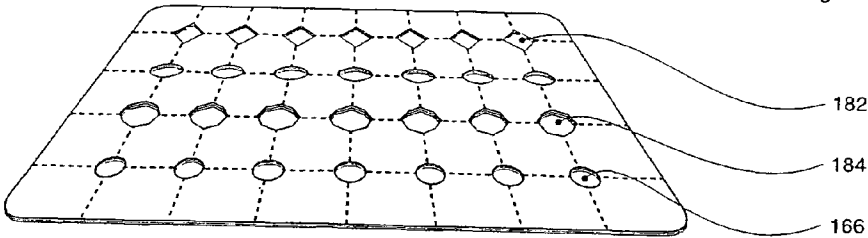


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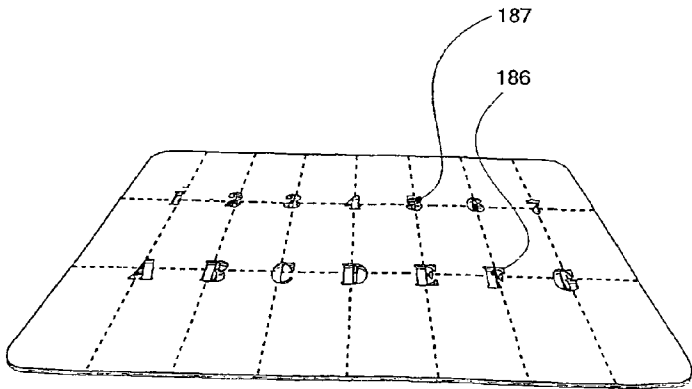
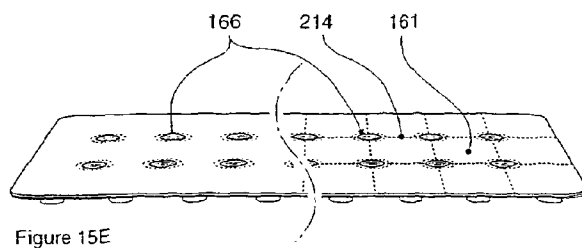
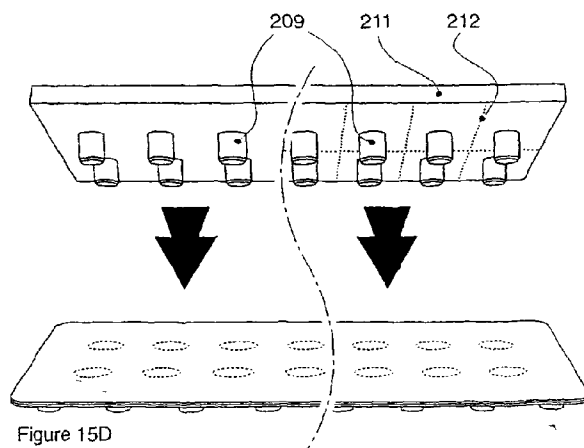
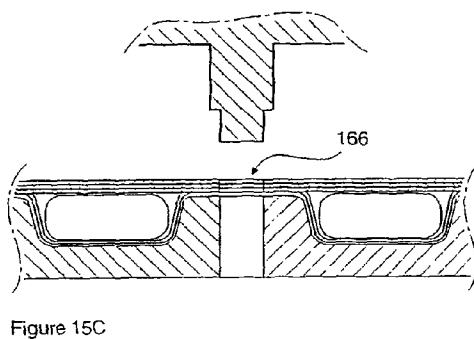
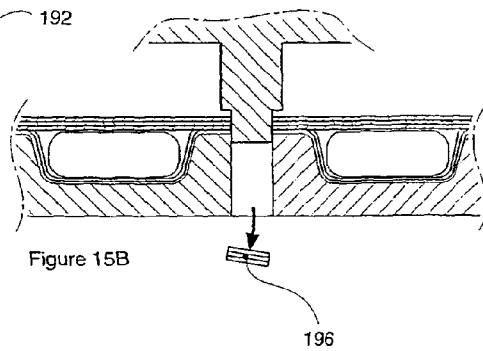
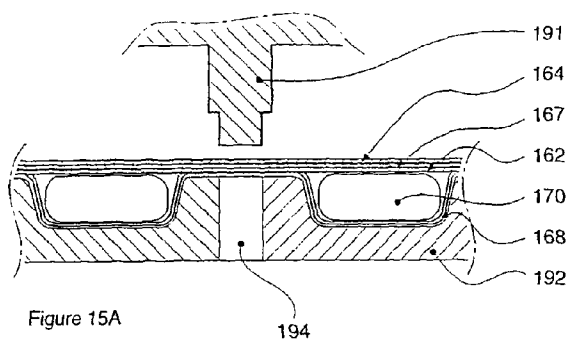
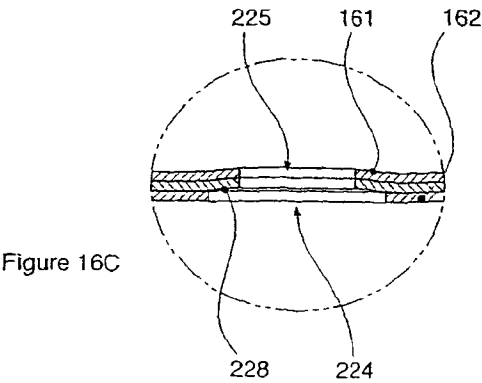
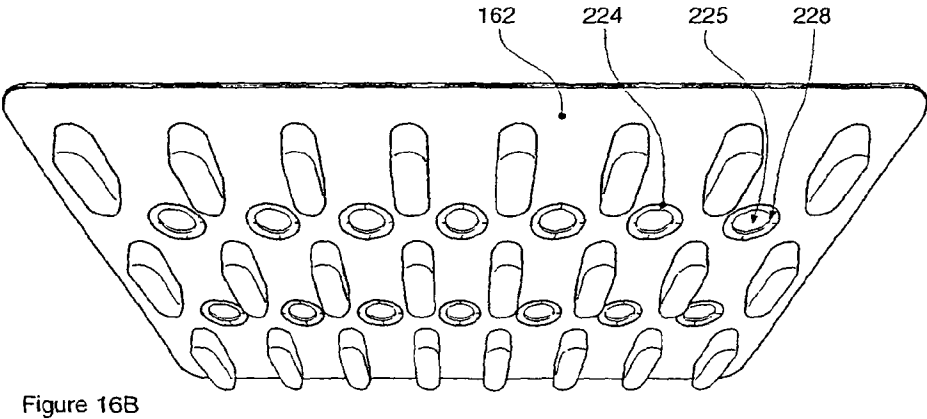
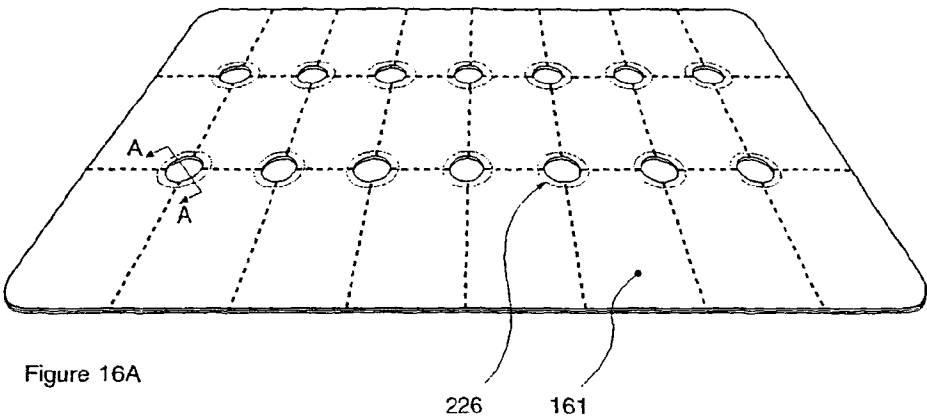


Figure 14D





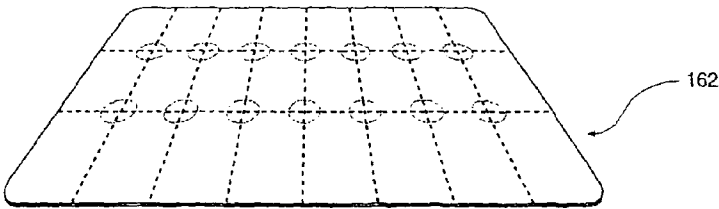


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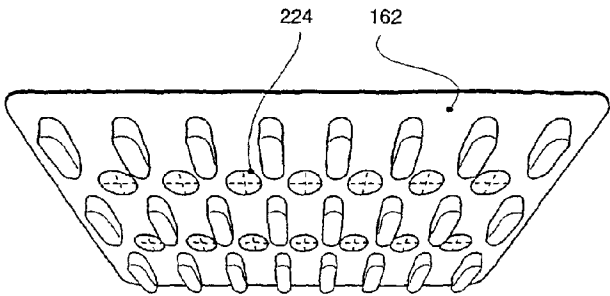


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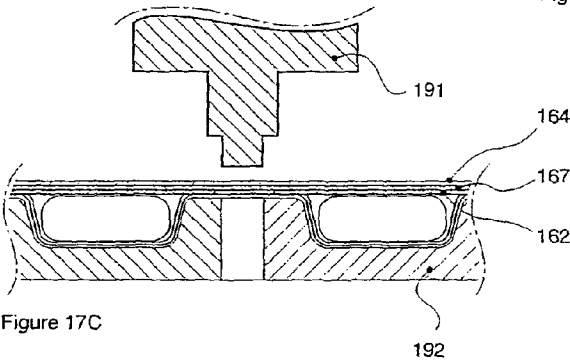


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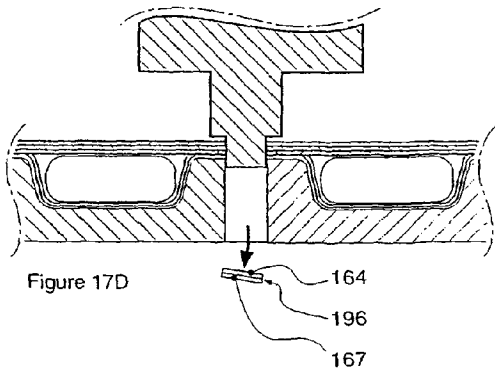


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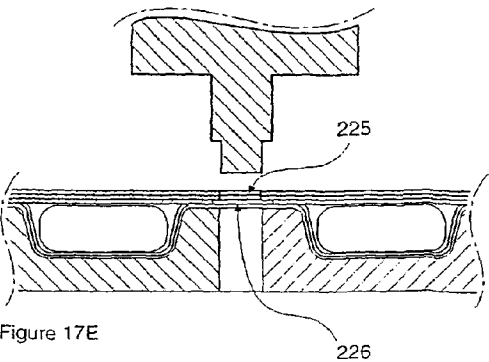


Figure 17E

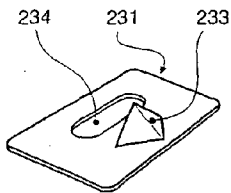


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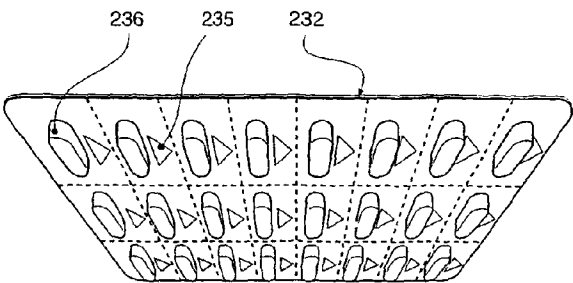


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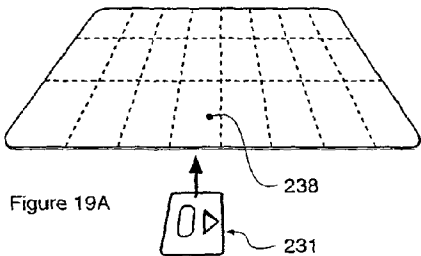


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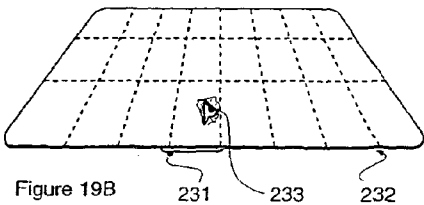


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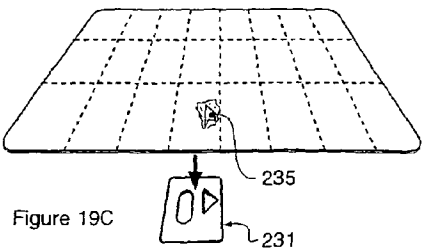


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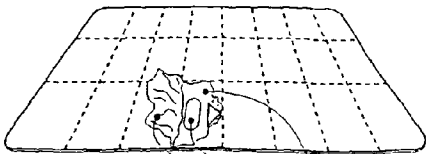


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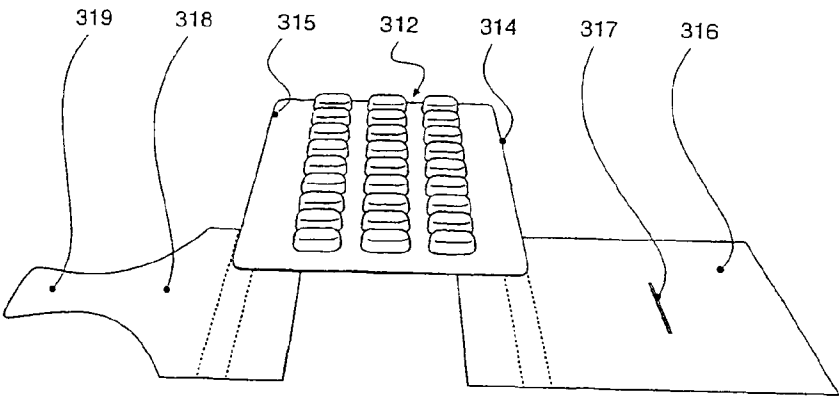


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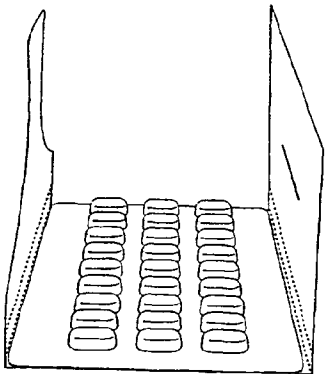


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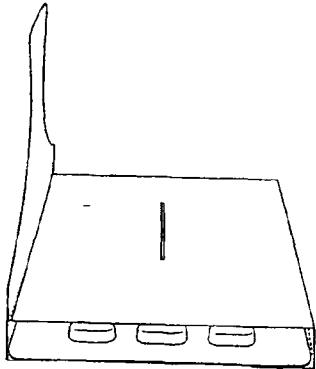


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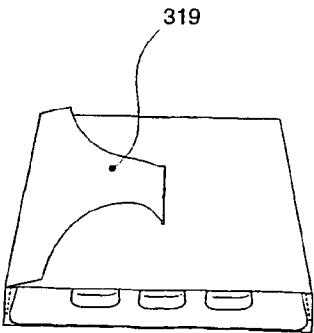


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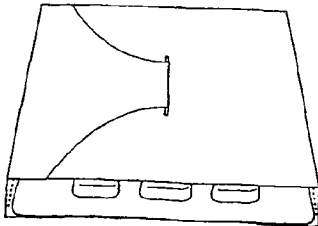


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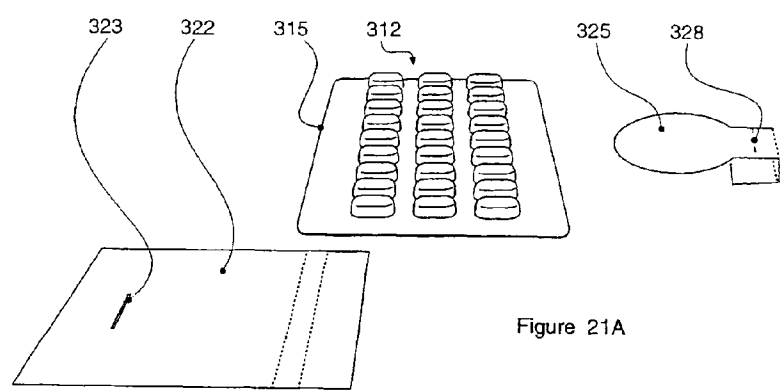


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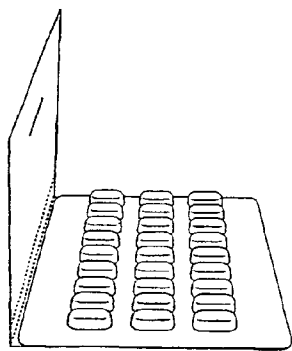


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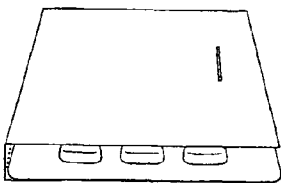


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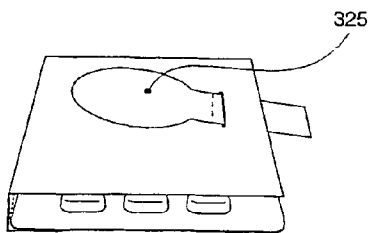


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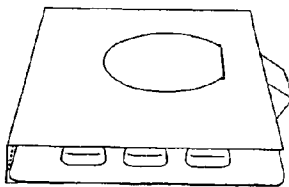


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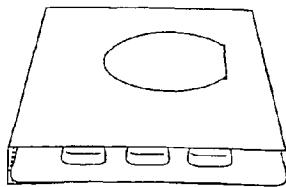


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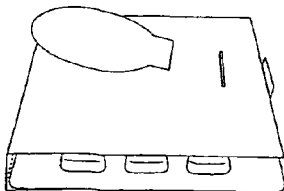


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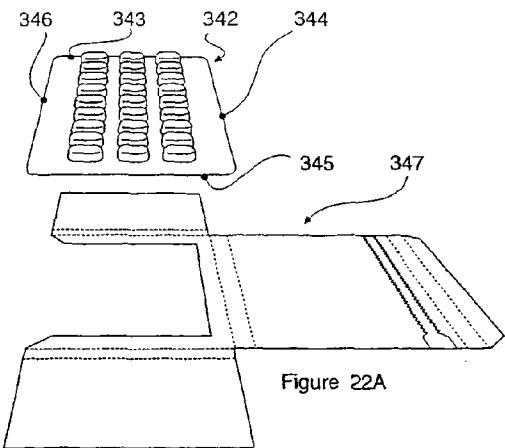


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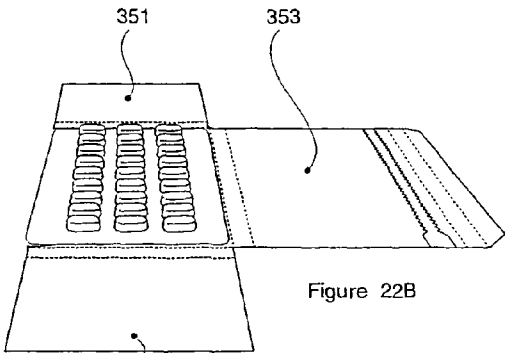


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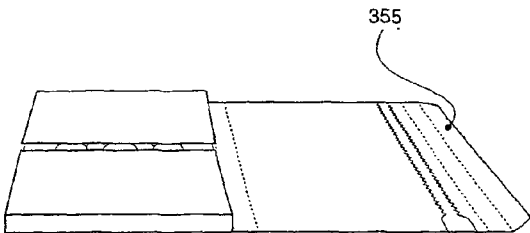


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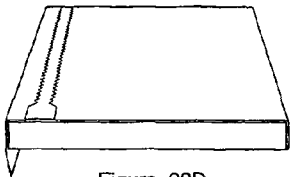


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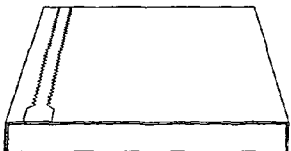


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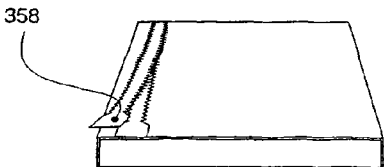


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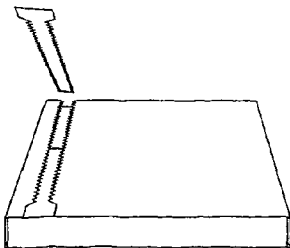


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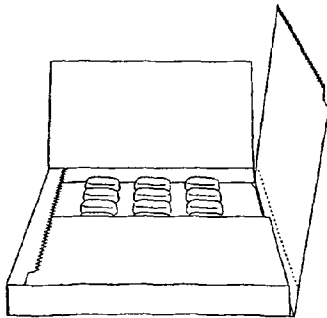


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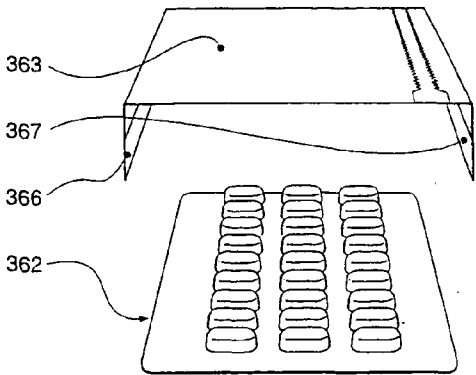


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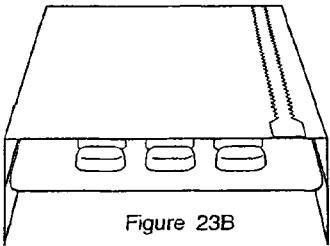


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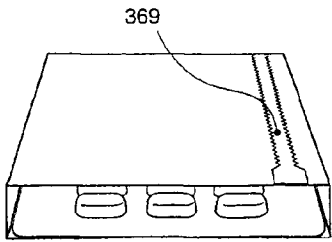


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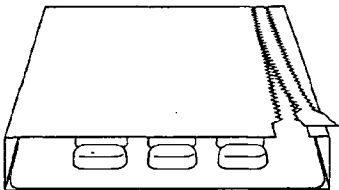


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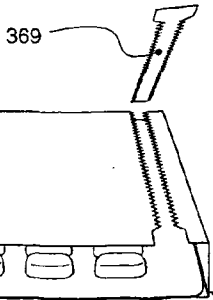


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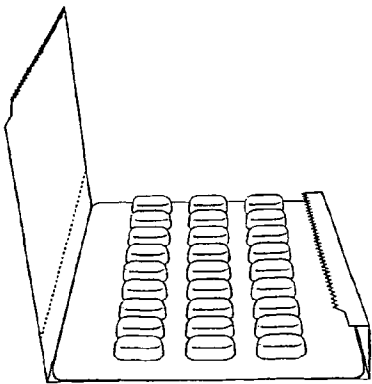


Figure 23F

CARDED BLISTER PACK

[0001] This invention relates to so-called 'blister packs' (or simply 'blisters') and is particularly, but not exclusively, concerned with blister pack mounting, capture or entrainment in, with, upon, or in relation to other elements or structures—say for ease and security of transport and/or storage.

[0002] Some aspects of the invention are concerned with tamper-resistant, in particular child-resistant, and/or tamper evident (blister) pack features.

[0003] Terminology

[0004] The term 'blister pack' is used herein to embrace a pre-formed or pre-configured packaging sheet or layer, for example configured as a shallow tray, pre-profiled with multiple localised compartments or pockets.

[0005] The individual compartment profile conveniently complements that of the intended contents, to ensure a snug relative interfit.

[0006] The pocket wall affords some resistance to impact, but is typically deformable to allow contents displacement and ejection, and modest cushioning action.

[0007] The term 'child-resistant' signals certain measures to impede 'unauthorised' pack opening or access to children, as particularly vulnerable, 'innocent', irresponsible or uneducated consumers—such as might otherwise arise by casual or curious handling, as encountered in child play.

[0008] Such provision represents a precautionary or deterrent measure, rather than necessarily an absolute defence.

BACKGROUND

[0009] Blister pack pre-formation is commonly by moulding a thin sheet synthetic plastics or laminate material into a multi-pocket or compartment tray.

[0010] This may be undertaken continually on-line followed by pack fill and closure.

[0011] Pockets are commonly disposed in a rectangular grid array.

[0012] An individual pocket is generally intended to contain a single item.

[0013] Pocket contents may be accessed at random, or, in certain instances, in a prescribed sequence.

[0014] A peripheral upstand rim, ledge or ridge may be incorporated, to help stiffen the overall tray profile.

[0015] Pharmaceutical

[0016] For pharmaceutical use, blister packs are pre-formed (typically moulded, resiliently deformable, synthetic plastics—eg PVC (polyvinyl chloride) or aluminum laminates (polyamide/aluminum/PVC)—shells, with a pre-configured array of multiple discrete pockets (or blisters), of bespoke contour for respective individual product items, typically a powder or granulated base, in tablet or capsule form.

[0017] Tableted or encapsulated product is captured or restrained within the pockets, by a releasable, removable or

frangible backing layer, typically of metal (eg aluminum foil), metallized plastics foil, or a laminated paper and foil combination.

[0018] In a laminated paper and foil combination, the paper is (adhesive) bonded in a laminated, multi-ply, overlay to the foil, as a (prisable, or 'lift-off') release layer.

[0019] As such, the paper is intended to protect the underlying foil while the paper is in situ,

[0020] To that end, the paper is bonded to the foil, and is not otherwise secured to the blister pack itself.

[0021] In practice, the foil is fused, by heat welding (such as by a heated profiled platen), to the blister, except for certain localised areas, say at the edges, which serve as a backing paper lift-off point for 'prise 'n-peel' paper separation and removal from the foil.

[0022] The paper overlay effectively obscures the foil—and so impedes localised or 'piecemeal' foil and blister separation, as described later.

[0023] Generally, the paper constitutes a tamper-resistant, and in particular child-resistant, quasi-'impenetrable' layer, to casual blister pack contents discharge—say through inquisitive handling and experimentation.

[0024] Once the paper overlay is prised apart and peeled back from the foil underlay, over a selected tablet or capsule pocket or recess in the blister pack, foil puncture is allowed.

[0025] To assist localised peeling of the protective paper backing layer, it is known to apply a matrix or grid of perforations, say, upon pack fabrication and assembly.

[0026] Thus local removal of a paper backing cover portion overlying a particular pocket and local exposure of foil overlying that pocket, allows contents (such as a tablet or capsule) displacement and ultimate ejection—upon foil tearing or rupture—by depressing the relevant resiliently deformable blister pocket walls.

[0027] Given their construction, blister packs, and particularly the intentionally frangible (and so fragile) backing foil layer, are vulnerable to inadvertent (impact or abrasion) contact damage and consequent unintentional pack rupture and attendant product fracture, fragmentation, or displacement and loss.

[0028] Thus folding, creasing or crushing, such as may arise by carrying a foil-backed blister in the pocket, can lead to contents contamination, displacement and loss altogether.

[0029] Similarly, casual handling by a naturally inquisitive child can enable accidental contents access—and the risk of hazardous consumption.

[0030] One aspect of the invention addresses this vulnerability by the provision of a supplementary protective element—specifically a card, which also allows a large print surface area for (multi-lingual) pack directions and information.

[0031] For pharmaceutical packaging, this element may also have an ancillary role in clinical trials—as described later.

[0032] Paper Backing

[0033] The frailty of foil alone has lead to paper-foil laminates, in which the foil is effectively afforded a protective backing layer of more robust and essentially inherently non-tearable paper.

[0034] Mutually-bonded, paper-foil laminates are generally prefabricated, before application to packaging machinery.

[0035] Wallet Card

[0036] Paper protective foil backing aside, another protective counter-measure, is to mount blister packs in juxtaposition with another element, in particular within a carded 'wallet' effectively a protective envelope, pocket, pouch, wrap or shroud.

[0037] The wallet also provides space for the addition of detailed text information and patient instructions, to meet regulatory requirements and promote patient compliance.

[0038] Such a wallet is convenient for personal storage in garment pockets, handbags, purses or wallets.

[0039] Known such wallet card structures envelope the blister pack, with card leaves on opposite sides.

[0040] The card wallet can be configured to allow product discharge without removing the blister pack.

[0041] To this end, one card leaf may incorporate an array of apertures corresponding to that of the blisters, to allow their contents locally to penetrate the card.

[0042] In one known card sandwich configuration, a blister pack entrained between opposed cards may feature corresponding aligned sets of apertures in both cards, one accommodating the blisters, the other for product discharge.

[0043] A further protective hinged fly leaf card completes the wallet to inhibit inadvertent contact discharge.

[0044] The card may literally be of cardboard—ie (relatively thick and stiff) paper (pulp and fibre) product—or other substitute materials, including synthetic plastics and multi-layer composites.

[0045] In a particular—albeit elaborate—walleting method, WO 00/501,511 (Covance), ultrasonic welding is employed to edge bond a polymer coated card to a blister pack, to prescribed constraints—namely, a seam width of ≤ 8 mm, located ≥ 12 mm from the nearest medicament, and an ultrasound exposure time of ≤ 2 seconds.

[0046] Pharmaceutical Dispensing

[0047] Blister packaging for dispensing pharmaceutical products is generally favoured over loose product, or bottled tablets or capsules, in prescription dispensing, for certainty in quantity dispensed, security of storage and convenience of consumption—hence improved prospect of compliance.

[0048] Generally, packaging should be comprehensible and accessible to the elderly, frail and infirm—who may be defeated by certain child-resistant features.

[0049] Clinical Trials

[0050] It is known to adopt bespoke blister packs for so-called 'clinical trials'—a research technique prior to product launch, where (comparative and absolute) product

performance and dosage regimes are evaluated in a strictly regulated scheme, over a designated patient study group, for an assessment of efficacy, side effects and safety.

[0051] Sometimes a pharmaceutical is substituted by a non-active product, or so-called 'placebo'.

[0052] Information & Instructions

[0053] Information and instructions are commonly printed upon the blister pack—for example a daily dosage and compliance regime.

[0054] For clinical trials, some provision for return of completed information, by the patient and/or investigator/clinician may also be desirable to facilitate evaluation.

[0055] Pack contents layout reflects the strict discipline of sequential consumption dictated by the trial sponsor.

[0056] Colour and/or shape encoding of tablet or capsule contents may also be adopted albeit at the risk of unduly complicating the patient task in compliance with the trial sponsor's intentions.

[0057] Printed indicia on the card—and, according to some aspects of the invention, optionally also on the foil or paper-backed foil backing layer—to convey intended contents use, is also envisaged.

[0058] Production

[0059] Machines dedicated to blister pack production are capable of high speed operation and are of sophisticated construction.

[0060] Accordingly, their use is only justifiable economically for long production runs of consistent pack format—that is without frequent interruption for re-setting.

[0061] However, subsequent blister and card handling, relative orientation and assembly steps for packaging, pack mounting, or wallet pack assembly and insertion, are generally more elaborate and cumbersome—and so much slower to effect.

[0062] Thus blister pack carding may prove either incompatible, or slow blister pack production, possibly to uneconomic levels, for short runs, such as may be dictated by clinical trial studies.

[0063] Some aspects of the present invention are concerned to achieve a carded blister pack capable of high speed assembly, and the attendant machines and processes.

STATEMENT OF INVENTION

[0064] According to one aspect of the invention,

[0065] a mounting card

[0066] and blister pack,

[0067] are [mutually] edge entrained—

[0068] such as by adhesive bonding.

[0069] Bonding

[0070] Mutual edge bonding is conveniently alongside one or more spine folds in the card, to facilitate folding over the card, as a cover hinged about that bonding edge.

[0071] Bonding may be undertaken by applying a (thin) strip of adhesive alongside one edge of the cover card and affixing a corresponding edge of the blister pack.

[0072] Adhesive curing or setting can be through various processes, including 'airless' contact, hot melt or chemical interaction or admixture.

[0073] In the case of twin, chemically interactive, components, such as epoxy resins, one component may be applied as an edge strip to the blister pack and the other component to the cover card.

[0074] Thus, for example, a blister pack may be bonded at one edge to a corresponding opposed edge of a mounting card.

[0075] Mounting card may be cardboard and/or plastics, including (say, varnish) coated card, or multiple layer card and plastic (thin) film laminates.

[0076] Mounting card may be translucent (plastics) or opaque.

[0077] A practical problem arises with securing a cover flap to a foil backed, and in particular paper-foil laminate backed, blister pack.

[0078] Thus, whilst a sufficient adhesive bond may be formed between cover and foil, the necessary local 'relief', or peelable edge exposure, would be obstructed at the spine joint between cover and blister.

[0079] As the cover is envisaged as suitable for an otherwise conventional blister pack—allowing assembly on conventional packaging machinery—minimal blister pack structural adaption would be desirable for cover mounting according to the invention.

[0080] Thus, in one approach, a paper-backed foil layer is stopped short of the marginal edge of the blister, to leave an exposed spine mounting strip.

[0081] The paper-backed foil edge would thus remain exposed alongside, rather than overlaid by, the inboard cover edge—allowing local edge prising and peeling back for selective blister pack contents discharge.

[0082] Removal of a paper backing layer in its entirety would expose the entire underlying foil and thus the contents of any or all blister pockets to random access and discharge, upon foil rupture.

[0083] Local paper backing layer removal is difficult to control, without supplementary provision, such as pre-perforation around individual pockets.

[0084] However, access to pockets away from the pack edge requires an initial free prise 'n-peel' edge.

SUPPLEMENTAL STATEMENT OF INVENTION

[0085] According to another aspect of the invention,

- [0086] a paper foil backed blister pack
- [0087] incorporates one or more access apertures,
- [0088] through the paper foil and blister,
- [0089] generally at the corners of individual blisters,

[0090] to afford edge 'prise 'n-peel' access,

[0091] to local patches of paper backing.

[0092] In practice, around the aperture marginal periphery the underlying foil would not be heat welded or fused to the blister.

[0093] This separation creates continuous access edges for local foil, and attendant localised prise 'n-peel' of a patch of paper backing, over a selected blister pocket

[0094] Peeling for patch removal is in a direction appropriate to the particular underlying pocket to be exposed.

[0095] Such apertures could be profiled, for example, as pointer triangles or arrows, to direct such paper and foil peeling.

[0096] Initially, the un-fused foil and bonded paper backing are prised together away from the blister, until a point is reached where the foil to blister pack fusion commences, whereupon continued foil peeling is impeded, but paper backing peeling can be continued, allowing the paper to separate from the foil.

[0097] In practice, by sub-division of the backing layer into a mutually entrained patch matrix by a pre-perforation grid, such paper backing removal is as a local 'patch', over a selected or target underlying blister pocket.

[0098] In addition, or as an alternative, to paper backed foil, further child resistant or tamper evident features may be incorporated, to provide a visible indication that a pack has been interfered with.

[0099] To that end, the same protective or barrier seals or locking/latching tabs which inhibit child access could—upon breakage—provide an irreversible sign of pack opening.

SUPPLEMENTAL STATEMENT OF INVENTION

[0100] According to another aspect of the invention,

- [0101] a blister pack and
- [0102] cover card (or cover wrap)
- [0103] are variously entrained,
- [0104] through single or multiple edge bonding,
- [0105] to form a closed package,
- [0106] which once closed and sealed,
- [0107] can only be opened by (visibly) breaking the [tab] seal.

[0108] In practice, a single tab seal could be used for an entire pack.

[0109] Alternatively, individual portions of a pack could be separately closed, by respective discrete or severable cover portions and attendant tab seals.

[0110] Moreover, the closure covers could be contrived as interactive or interdependent—so that, say, access to covers must follow a prescribed sequence.

[0111] This could be achieved with partial cover overlay or interfit, or wholesale internesting or multi-layered covers or wraps; vis wraps configured within wraps—to allow phased access and contents discharge for consumption.

[0112] Production

SUPPLEMENTAL STATEMENT OF INVENTION

[0113] A machine for assembly of carded blister packs,**[0114]** comprises**[0115]** a mounting card storage magazine,**[0116]** and a blister pack storage magazine;**[0117]** a conveyor for transferring mounting cards,**[0118]** discharged individually in succession**[0119]** from the mounting card storage magazine,**[0120]** through an intervening adhesive application station,**[0121]** into juxtaposition with individual blister packs, discharged individually in succession,**[0122]** from the blister pack storage magazine.**[0123]** In mass production, a stack of mutually-aligned mounting cards may be stored in a magazine, ready for sequential discharge and individual presentation to a designated blister pack.**[0124]** Presentation requires mutual alignment of card and blister pack, together with marginal edge overlap.**[0125]** Prior to contact, a layer of ('airless', contact, hot melt or chemically cured) adhesive is applied to either, or both, card and blister—whereupon the corresponding card and blister edges are pressed and held together.**[0126]** Alternatively, mounting card and blister pack may be solvent bonded, welded or fused, along marginal edge overlap.**[0127]** A flat platen or rotary (squeeze) roller, individually or in mutual opposition, may be used, with local pressure application, by virtue of the surface profile.**[0128]** In a folding station, the card is turned to overlie, or underlie, the blister pack—forming a book jacket, with one panel of card and the other of blister pack.**[0129]** Folding may be prefaced by preliminary creasing, or scoring, about a fold line, locally to weaken the material and pre-dispose it to 'clean' folding, that is without wrinkles or creases.**[0130]** In practice, the fold line can lie within the card, and (just at or) beyond the blister pack margins—leaving the blister itself intact.**[0131]** The card thickness is chosen to provide sufficient residual mechanical robustness upon folding.**[0132]** A score or perforation line may be incorporated—again most conveniently in the card itself—to facilitate detachment of the card from the blister.**[0133]** In a particular construction, a (discharge) conveyor carries the carded blister assembly away from the jointing or joint bonding station, to an optional folding area and thence to a collating station.**[0134]** At a collating station, the carded blisters are discharged and stacked in succession, ready for transit and storage.**[0135]** The cards—and indeed the blister packs—may be pre-printed before assembly, or printed at a printing station as an integrated step in the assembly sequence.**[0136]** Assembly integrated printing may be of additional information, such as a batch code and date identifier, upon an otherwise pre-printed card and/or blister pack.**[0137]** One carded blister pack variant is configured as a book jacket, with a central (mounting) spine, overlaid with adhesive, for attachment to an edge of a (preformed or pre-fabricated) blister pack, and card panels disposed as opposed leaves about the spine, with folds or creases, to allow mutual over-folding.**[0138]** In such a configuration, either or both panels or leaves may be severed from a residual spine by a pre-formed perforation or score line.**[0139]** For ease of mechanised assembly, one panel may be out-turned and folded back upon itself, about a spine edge, to underlie the other, and present the spine and a locally overlaid adhesive layer for blister pack mounting.**[0140]** So presented, the folded double card or book jacket thus equates to the single card mounting configuration.**[0141]** The out-turned panel is return folded back about the spine to underlie the blister pack once mounted.**[0142]** Multiple—similar or disparate—blister packs may be mounted upon a common spine.**[0143]** Moreover, multiple spines may be employed.**[0144]** An example would be mutually concertina-folded spines, with respective blister pack mounting strips.**[0145]** Spines may be stacked overlying and/or mutually staggered or laterally offset for ease of folding and access.

EMBODIMENTS

[0146] There now follows a description of some particular embodiments of the invention, by way of example only, with reference to the accompanying diagrammatic and schematic drawings, in which:**[0147]** Cover Card Variants**[0148]** **FIGS. 1A through 1D** show successive assembly, folding over and closing together stages for a carded blister pack;**[0149]** More specifically:**[0150]** **FIG. 1A** shows juxtaposition of a discrete card element and a blister pack to be entrained thereby, with marginal corresponding edge overlap;**[0151]** **FIG. 1B** shows an assembled card and blister pack, with marginal overlapped edges mutually bonded;**[0152]** **FIG. 1C** shows an initial stage of card element folding, about a crease line, alongside a (adhesively) bonded spine portion;**[0153]** **FIG. 1D** shows closure of the card element to overlie the blister pack, as a book, book cover (leaf) or book jacket configuration;**[0154]** **FIGS. 2A and 2B** show a variant of **FIGS. 1A through 1D** with severable card element through a perforation line;

[0155] More specifically:

[0156] FIG. 2A shows an assembled card and blister pack with marginal overlapped edges mutually bonded, with optional perforation to allow separation of cover and panel element;

[0157] FIG. 2B shows closure of card element to overlie the blister pack, and initial stages of cover card removal by severance along perforations;

[0158] FIGS. 3A through 3C show successive stages in assembly of a variant carded blister construction to that of FIGS. 1A through 2B;

[0159] More specifically:

[0160] FIG. 3A shows juxtaposed fragmentary views of a double-panelled card (in the form of a book jacket) and a blister pack, with an edge overlapped upon a central spine strip, with optional perforations to allow severance of panelled card elements;

[0161] FIG. 3B shows an assembled, open, double card packet) and blister pack, with panel element underlying blister pack folded back, along a spine edge, to allow ejection of blister pack contents;

[0162] FIG. 3C shows an assembled double card (jacket) and blister pack, with one panelled element severed along a spine edge and separated;

[0163] FIGS. 4A through 4C show variant configurations of carded blister pack to those of FIGS. 1A through 3B;

[0164] More specifically:

[0165] FIG. 4A shows a semicircular carded blister pack profile;

[0166] FIG. 4B shows a triangular carded blister pack profile, with differently profiled blisters, disposed in a pattern array; and

[0167] FIG. 4C shows a waisted, curvilinear carded blister pack (dumbbell) profile;

[0168] FIGS. 5A through 5D show successive assembly stages of a multiple-spine, carded blister variant, in which stacked, mutually-overlapping spine folds are entrained to respective individual blister packs;

[0169] More specifically:

[0170] FIG. 5A shows a multiple-spine mounting card, with spine segments (presenting attendant adhesive strips) spread apart and juxtaposed with respective multiple individual blister packs;

[0171] FIG. 5B shows the multiple-spine mounting card of FIG. 5A with blister packs located upon respective individual spine segments;

[0172] FIG. 5C shows concertina-folding, into a mutually-overlapping stack, of the (splayed) spine segments of FIGS. 5A and 5B;

[0173] FIG. 5D shows full closure of the single card mounted multiple blister pack assembly, following the steps of FIGS. 5A through 5C;

[0174] FIGS. 6A through 6D show corresponding assembly and closure stages, for a multiple-spine, carded blister variant of FIGS. 5A through 5D, in which successive spine

folds are somewhat staggered, or mutually-offset laterally, to provide staggered exposed blister leaves—for ease of selection and access upon closure;

[0175] More specifically:

[0176] FIG. 6A shows a multiple-spine mounting card with differential width spine segments (presenting attendant adhesive strips), juxtaposed with multiple individual blister packs;

[0177] FIG. 6B shows the multiple-spine mounting card of FIG. 6A with blister packs disposed (in situ), in laterally staggered or mutually offset relative positions, upon respective individual spine segments;

[0178] FIG. 6C shows concertina-folding, into a mutually part-overlapping, progressively marginally offset, stack of the spine segments of FIGS. 6A and 6B;

[0179] FIG. 6D shows full closure of the single card mounted multiple blister pack assembly following the steps of FIGS. 6A through 6C, with successive stacked blister packs marginally laterally offset, to present exposed outer edges, in the manner of a card index file.

[0180] FIGS. 7A through 7D show successive assembly and closure stages for a single spine, single card, multiple blister pack variant, in which multiple individual blister packs—in this example of generally similar rectangular form—are mounted in tandem, juxtaposed upon respective adhesive pads, spread (evenly) along a common spine;

[0181] More specifically:

[0182] FIG. 7A shows an initial stage in juxtaposition of multiple individual blister packs upon respective adhesive mounting pads;

[0183] FIG. 7B shows the multiple blister packs of FIG. 7A overlaid upon the common card spine; the blister packs could be mounted simultaneously under one press tool (not shown) or successively, by relative displacement of the assembly and/or tool;

[0184] FIG. 7C shows the common (multiple blister pack) mounting card folded about the common spine;

[0185] FIG. 7D shows conclusion of card folding of FIG. 7C to form a common cover for multiple blister packs;

[0186] FIGS. 8A and 8B show a variant configuration of a multiple-spine carded blister pack of FIGS. 5A through 5C, employing disparate blister pack configurations.

[0187] More specifically:

[0188] FIG. 8A shows a multiple-spine mounting card, with disparate blister packs—triangular, rectangular, and semi-circular—located upon respective individual spine segments;

[0189] FIG. 8B shows concertina folding, into a mutually overlapping stack, of the (splayed) spine segments and closure of the common card cover of FIG. 8A;

[0190] FIGS. 9A and 9B show a variant configuration of a single spine, single card, multiple blister pack of FIGS. 7A through 7D;

[0191] More specifically:

[0192] FIG. 9A shows multiple triangular blister packs mounted upon a common spine of triangular card;

[0193] FIG. 9B shows closure of the common triangular cover card over multiple, entrained, triangular blister packs.

[0194] FIG. 10 shows a part-sectioned, part cut-away, side elevation of a bespoke machine for assembly of carded blister packs according to FIGS. 1A through 9B;

[0195] FIGS. 11(1) through 11(6) show successive stages, designated (1) through (6) respectively in FIG. 10, in assembly of a single blister pack upon a mounting card, such as by using the machine of FIG. 10;

[0196] More specifically:

[0197] FIG. 11(1) shows a mounting card initially deposited upon a conveyor from an overhead stacked storage magazine;

[0198] FIG. 11(2) shows the mounting card of FIG. 11(1) placed on the conveyor, its presence is confirmed, and then transferred along the conveyor;

[0199] FIG. 11(3) shows deposition of a strip of adhesive, from a discharge gun, upon the spine of the mounting cards of FIGS. 11(1) and 11(2);

[0200] FIG. 11(4) shows deposition of a blister pack, discharged from an overhead stacked storage magazine, upon the mounting card with adhesive coated spine achieved in FIG. 11(3);

[0201] FIG. 11(5) shows a compression platen, or press compaction, of the adhesive bonded blister pack and mounting card of FIG. 11(4);

[0202] FIG. 11(6) shows optional further compression and/or spine folding for the card mounted blister of FIG. 11(5), prior to card blister discharge (7) FIG. 10;

[0203] Paper-Backed Foil Variants

[0204] FIGS. 12A through 12E—of which FIGS. 12A and 12B are 3-D perspective views and FIGS. 12C through 12E are local enlarged cross-sections—show a paper foil backed blister pack, with edge spine bonded folded cover card, incorporating through apertures and perforations, for selective prising and peeling ('prise 'n-peel') of local paper patches over individual blisters or blister pockets;

[0205] More specifically:

[0206] FIG. 12A shows juxtaposed fragmentary views of one (under) side of a paper foil backing layer, with alternative modes of edge spine attachment for a cover card, itself folded back upon itself somewhat, for ease of illustration; and

[0207] FIG. 12B shows an opposite side blister tray, which the cover is intended to overlay when closed, but with the cover card omitted, again for ease of illustration;

[0208] FIGS. 12C and 12D detail, on an enlarged scale, the alternative modes of cover card edge spine attachment depicted to opposite sides of FIG. 12A;

[0209] Thus FIG. 12C depicts cover card attachment, by an adhesive bonding strip direct to the paper backing layer,

[0210] FIG. 12D depicts cover card attachment, by an adhesive bonding strip, direct to the blister pack itself, with the paper backed foil marginally inset from the blister pack edge, to accommodate the spine joint;

[0211] FIG. 12E depicts, on a still further enlarged scale, a marginal peripheral (prise 'n-peel) rim, formed around each of the apertures through the back assembly, by terminating the (heat) weld fusion between foil and blister locally around the aperture;

[0212] FIGS. 13A through 13D are 3-D perspective views, corresponding to FIG. 12A, of the blister and cover card of FIGS. 12A through 12E, depicted in successive stages of selective contents access.

[0213] Access is through targeted localised protective 'patch' prise 'n-peel, initially of the paper backing, and then rupture of the underlying foil.

[0214] Foil penetration is by distortion of a selected individual pocket, to displace the pocket (tablet or capsule) contents through the foil and eject it altogether from the blister,

[0215] More specifically.

[0216] FIG. 13A shows local paper patch prise 'n-peel from an aperture at a corner of an underlying blister pocket;

[0217] FIG. 13B shows a continuation of the FIG. 13A step, with wholesale patch peeling back for separation and removal, to expose the underlying foil over a target blister pocket;

[0218] FIG. 13C shows exposed foil tearing and rupture by deformation of the target blister pocket walls;

[0219] FIG. 13D shows displacement and discharge of the target blister pocket (tablet or capsule) contents;

[0220] FIGS. 14A through 14D depict 3-D perspective views, corresponding to FIG. 12A and FIGS. 13A through 13D of bespoke through aperture edge profile or bounding contour treatment, to facilitate location, orientation and prising apart of protective paper backing from underlying foil;

[0221] More specifically,

[0222] FIG. 14A depicts a diamond shaped apertures;

[0223] FIG. 14B depicts star-shaped apertures—with a curved edge leaf inviting diagonal prise 'n-peel of a patch of paper backing;

[0224] FIG. 14C depicts a 'mix 'n match' combination of diverse aperture shapes, in a distinctive pattern, to assist blister pocket identification;

[0225] FIG. 14D is a refinement of FIG. 14C with even more elaborate aperture profiling to enable visual and/or machine readable encoding and user direction, such as blister access for consumption sequence;

[0226] FIGS. 15A through 15E depict stages in aperture, formation, by (multiple) punch and die cutting, in this instance from the blister underside, corresponding to a typical orientation of the blister pack in pack assembly machinery; FIGS. 15D and E are 3-D perspective views, as in FIGS. 12A and 12B.

[0227] That said, tool and pack orientation may be varied according to packaging machine configuration.

[0228] More specifically:

[0229] **FIG. 15A** depicts a mutually-aligned punch tool—[albeit for ease of illustration showing only an individual one of multiple pin heads mounted upon a common platen]—complementary die bed and intervening paper foil backed blister, disposed at the corner of adjoining blister pockets;

[0230] **FIG. 15B** shows die penetration of the blister pack and paper foil backing, with waste cut-out portion displacement and discharge through the die aperture; in practice a complete set of cut-out apertures can be punched simultaneously, in a single tool stroke;

[0231] **FIG. 15C** shows die punch retraction, to allow punched blister removal from the tool path(s), say by indexed conveyor output progression to a subsequent process stage, and substitution by a fresh unpunched blister pack;

[0232] In practice, such aperture punching could be undertaken simultaneously, or sequentially, with that for perforation (tear-off) lines, as described later.

[0233] **FIG. 15D** depicts a punch tool with multiple pin heads aligned for multiple aperture formation in a paper foil backed blister pack, optional smaller pin heads allow the addition of perforations, typically only in the paper and foil layer.

[0234] **FIG. 15E** shows a blister pack with cut out apertures between blister pockets, and optional perforation of the paper foil backing layer.

[0235] **FIGS. 16A through 16C** depict differential shape and/or size blister and paper foil backing layer aperture profiles, to create a (segmented) edge 'reveal' around each blister aperture; that is the paper foil is inset marginally within the aperture, to allow prise 'n-peel purchase with a user's finger (nail);

[0236] **FIGS. 16A and 16B** are 3-D perspective views from opposite sides, as in **FIGS. 12A and 12B**; and

[0237] **FIG. 16C** is a localised sectional view, on an enlarged scale, through an individual aperture and immediately surrounding blister pack;

[0238] More specifically,

[0239] **FIG. 16A** shows a paper foil side, with an array of apertures of one shape and size—somewhat smaller than corresponding aligned apertures in the blister itself.

[0240] The blister holes may be integrally moulded upon blister formation, or punched before contents fill and application of paper foil backing layer;

[0241] **FIG. 16B** shows the opposite blister side to **FIG. 16A**, revealing a marginal edge protrusion of paper foil within the blister apertures;

[0242] **FIG. 16C** shows an enlarged scrap or fragmentary section A-A differential aligned apertures in paper foil and blister, to create a paper foil 'overhang', as a marginal starting edge for paper prise 'n-peel.

[0243] **FIGS. 17A through 17E** show die punching for the dual aperture configurations of **FIGS. 16A through 16C**; of these **FIGS. 17A and 17B** are 3-D perspective views of opposite sides of a blister (any cover card being omitted for ease of illustration) and **FIGS. 17C through 17E** are enlarged local sectional views of blister and paper foil backing penetration with a (multi-head) die punch tool;

[0244] More specifically,

[0245] **FIG. 17A** shows a paper foil layer overlaying a pre-punched blister;

[0246] **FIG. 17B** shows a pre-punched blister, with apertures covered on one side by an unpunctured, continuous, paper foil layer;

[0247] **FIG. 17C** shows a stepped-profile die punch tool aligned over a pre-punched blister aperture, ready to penetrate the paper foil backing;

[0248] **FIG. 17D** shows punching action, with interfit of an individual punch tool and complementary die aperture, with displacement of paper foil waste disc;

[0249] **FIG. 17E** shows punch tool retraction, leaving mutually aligned apertures of different span respectively in the paper foil and blister pack layers;

[0250] **FIGS. 18A and 18B** show an alternative approach for selective blister pack individual contents removal, using a bespoke tool;

[0251] More specifically,

[0252] **FIG. 18A** shows a 'discharge' tool or key, with a cutter enabling local penetration of paper reinforced foil;

[0253] **FIG. 18B** shows a bespoke, complementary profiled side to the blister pack configured for selective interaction and interfit with the key of **FIG. 18A**; the blister profile incorporates a juxtaposed blister pocket, for an individual tablet or capsule and a through aperture, to receive a (paper) foil cutter blade upstand upon the key;

[0254] **FIGS. 19A through 19D** show successive steps in using the tool to access the contents of the blister pack of **FIGS. 18A and 18B**;

[0255] More specifically,

[0256] **FIG. 19A** shows an initial step of mutual alignment of a blister pack with an individual blister pocket contents discharge tool or key, configured as a recessed, indented or scalloped plate, whose recess profile corresponds to that of an individual blister pocket, with a knife cutter upstand, for location in the corresponding profile local aperture in the blister, for local foil (and optionally also reinforcement backing paper) penetration;

[0257] **FIG. 19B** shows the discharge tool pressed against an individual blister pocket, so that the cutter penetrates the (paper) foil overlayer;

[0258] **FIG. 19C** shows key removal;

[0259] **FIG. 19D** shows tearing and/or peeling back of the punctured (paper) foil, to expose an individual blister pocket contents; the key could also be used to deform or distort, the pocket wall itself, by say, crushing or reverse, in-turn folding, say, upon tool reversal or through adoption of a shallower tool recess;

[0260] Child Resistant Covers

[0261] **FIGS. 20A through 23F** show variant child-resistant and/or tamper-evident pack configurations, with cover card edge bonding of **FIGS. 1A through 3B**.

[0262] Although not detailed, the paper foil backing—with access aperture variants of **FIGS. 12A through 19D** herein—can be incorporated, as a supplementary feature.

[0263] **FIGS. 20A through 20E** show successive assembly stages for a blister pack and a cover card bonded to one longitudinal edge and a closure flap, with latching tab, bonded to the opposite side;

[0264] More specifically:

[0265] **FIG. 20A** shows preliminary juxtaposition of a blister pack and a rectangular cover card element, with closure slot, to one side and discrete second card element, with locking tab seal, to be entrained thereby through tab insertion into the slot, with residual marginal edge overlap;

[0266] **FIG. 20B** shows an assembled card and blister pack, with opposite marginal edges respectively bonded to cover card elements;

[0267] **FIG. 20C** shows the card and blister pack assembly of **FIG. 20B**, with the rectangular card folded, about a crease line, alongside an adhesively bonded spine portion, to overlie the blister;

[0268] **FIG. 20D** shows the card and blister pack assembly of **FIG. 20C** with the locking tab folded over and partially inserted into the slot in the rectangular cover card element;

[0269] **FIG. 20E** shows the card and blister pack assembly of **FIG. 20D** fully closed;

[0270] The re-entrant or waisted profile of the locking tab nose, in relation to the slot profile, means that it cannot be readily withdrawn from, once fully inserted into, the slot—without tab severance, such as by tearing off the nose.

[0271] **FIGS. 21A through 21G** show a variant locking tab seal configuration of **FIGS. 20A through 20E**, using a single edge bonded folded cover card and a discrete floating locking tab—also entrained by edge bonding at the opposite side of the blister to the cover card;

[0272] More specifically,

[0273] **FIG. 21A** shows juxtaposed blister pack, cover card and locking tab seal;

[0274] **FIG. 21B** shows initial inter-assembly of cover card and blister pack;

[0275] **FIG. 21C** shows folding over of the assembled cover card and blister pack of **FIG. 21B**;

[0276] **FIG. 21D** shows fitment of the tab seal in the assembly of **FIG. 21C**;

[0277] **FIG. 21E** shows tab sealing;

[0278] **FIG. 21F** shows the sealed pack;

[0279] **FIG. 21G** shows tab seal fracture and removal, to allow cover card opening and pack access

[0280] **FIGS. 22A through 22H** show a variant triple panel element (vis opposed side and lid) cover card configuration, allowing four sided blister attachment;

[0281] More specifically,

[0282] **FIG. 22A** shows juxta-posed triple-panel element cover card and blister pack, with provision for adhesive edge bonding of each panel along a respective spine fold, and corresponding blister edge;

[0283] **FIG. 22B** shows the constituents of **FIG. 22A** in a bonded, open-pack, assembly;

[0284] **FIG. 22C** shows initial in-folding of side panel elements of the assembly of **FIG. 22B**;

[0285] **FIG. 22D** shows over folding of the lid cover panel and depending lip of the folded assembly of **FIG. 22C**;

[0286] **FIG. 22E** shows closure lip in-turn and bonded edge sealing of the assembly of

[0287] **FIG. 22D**—to achieve an overall pack closure seal;

[0288] **FIG. 22F** shows partial tear-off seal tab removal of the pack of **FIG. 22E**;

[0289] **FIG. 22G** shows pack unsealing, by wholesale tab severance and removal, to allow opening and contents access of the pack of **FIG. 22F**;

[0290] **FIG. 22H** shows pack opening, by lid and side panel unfolding of the unsealed pack of **FIG. 22G**;

[0291] **FIGS. 23A through 23F** show a blister pack and cover card with twin opposed side leaves and respective edge spine sealing, to achieve a cover sleeve configuration;

[0292] More specifically,

[0293] **FIG. 23A** shows juxtaposed cover sleeve and blister pack;

[0294] **FIG. 23B** shows initial positioning for opposed edge sealing of the juxtaposed elements of **FIG. 23A**;

[0295] **FIG. 23C** shows cover sleeve opposed edge in-turn and sealing, by adhesive spine bonding, closure of the assembly of **FIG. 23B**;

[0296] **FIG. 23D** shows initial tear-off (face cover) seal tab removal of the cover sleeve and blister assembly of **FIG. 23C**;

[0297] **FIG. 23E** shows tab seal separation and removal to allow opening of the unsealed assembly of **FIG. 23E**;

[0298] **FIG. 23F** shows sleeve face cover opening, by folding about one entrained side edge, of the assembly of **FIG. 23E**, for contents access.

[0299] Referring to the drawings—in particular **FIGS. 1A through 2B**—a carded, or card mounted, (single) blister pack assembly **20** comprises a mutually-entrained card element **12** and pre-formed (and pre-filled and sealed) individual blister pack **11**.

[0300] The blister pack element **11** comprises a plastics sheet **17**, with an array of pre-formed discrete pockets or compartments **18**, backed by a frangible layer of metal foil **19**.

[0301] The card element 12 comprises a panel 14, a (double) hinged spine segment 15 and an adhesive (peripheral) edge mounting strip 16.

[0302] A crease or fold line 29 separates or sub-divides the mounting strip 16 from the spine segment 15.

[0303] Similarly, a crease or fold line 28 separates or sub-divides the spine segment 15 from the panel 14.

[0304] An optional perforation line 13 is marginally inset from the crease 28.

[0305] The panel 14 and spine segment 15 can be separated by a relative tearing action along this perforation line 13.

[0306] Crease or fold lines 28, 29 may themselves be perforated to allow removal of panel 14.

[0307] A corresponding double card(ed) 22A, 22B, blister pack variant, as shown in FIGS. 3A through 3C, includes two removable card panels 24A, 24B.

[0308] Access to blister 18 contents may be achieved by folding back panel 24B, underlying blister pack 17.

[0309] Alternatively, panels 24A, 24B can be severed along respective perforation lines 23A and 23B, offset marginally from a (double) hinged intervening spine 25, and adhesive strip 26.

[0310] The mounting strip 16 can be regarded as an entrained (rear) binding or peripheral edge portion of an overall mounting spine.

[0311] The hinged spine segment 15 performs a (upstand) spacer role in the final assembly of card and blister pack, as shown in FIG. 1D.

[0312] Mutual entrainment of card element 12 and blister pack 11 is through respective marginal edge overlap, by the width of the mounting strip 16.

[0313] Adhesive or bonding agent—such as hot melt glue—is applied over a prescribed portion of the mounting strip 16 as a mounting pad.

[0314] A continuous line of adhesive, and/or multiple discrete pads (not shown), may be employed.

[0315] The adhesive 16 may be a tacky, contact, multi-component (eg two-part epoxy) or impact (airless setting) type, or hot melt—requiring heat application to activate and cooling to harden.

[0316] Adhesive, or bonding agent, is conveniently applied to the card 12, but may instead, or additionally, be applied to the blister pack 11 itself.

[0317] In this case, the card element 12 is of cardboard (ie a paper, or pulped fibre type of product), of a thickness or gauge and constitution sufficient to impart a desired stiffness, for a role of protective cover.

[0318] However, synthetic plastics sheet material may supplement, reinforce or substitute for cardboard.

[0319] Composite, fibre-reinforced or laminated constructions may be used.

[0320] The cardboard may be (surface) coated or sealed, for example by varnish coating or laminated film covering (not shown), for moisture resistance.

[0321] Single-Spine, Multiple Blister Pack

[0322] FIGS. 1A through 4C show single-spine, single carded blister pack configurations.

[0323] In particular, FIGS. 4A through 4C show disparate blister pack contours, in particular, triangular 42, semi-circular 43 and dumb-bell 44, embodying disparate individual blister forms 82, 83, 84 respectively.

[0324] For a single-spine, multiple blister pack variant, the mounting strip 16 length of a single (common) mounting card 14 could be sub-divided into mounting portions 31, 32, 33 as shown in FIGS. 7A through 7D.

[0325] These spine mounting portions could in turn be allocated to different individual blister packs 11.

[0326] The packs 11 themselves could be correspondingly smaller in span, or incorporate small-span protruding mounting tabs.

[0327] Again, disparate individual pack profiles and/or blister forms could be employed, as with FIGS. 4A through 4C.

[0328] FIGS. 7A through 7D and 9A, 9B show variant such blister pack combinations upon a common spine.

[0329] Multiple Spine

[0330] The assembly sequences of FIGS. 5A through 5D, 6A through 6D, and 8A, 8B, show variant multiple-spine, (single or common) carded blister assemblies.

[0331] A single mounting card 12 is concertina—folded at one side into multiple spine segments 61, 63, 65—alternating with intervening adhesive mounting strips 62, 64, 66.

[0332] One (or more) blister packs 11 is allocated to each spine segment 61, 63, 65, or rather the attendant juxtaposed adhesive mounting strip 62, 64, 66.

[0333] In an initial mounting configuration—reflected in FIGS. 5A and 5B—card and spine segments 61, 63, 65 are laid flat, or slightly stepped and mutually offset laterally.

[0334] The mounting strips 62, 64, 66 are thus presented somewhat spread apart, ready for mounting respective blister packs 11.

[0335] Upon blister pack 11 mounting, the spine segments and intervening mounting strips 61 through 66 are concertina-folded into a stacked overlying array, as reflected in FIG. 5A.

[0336] Folding over the (face/cover) card panel 14 to overlie the stack, as represented in FIG. 5D, completes the assembly 70.

[0337] In this way, a multiple (independent) leaf book array of blister packs 11 can be achieved, as reflected in FIGS. 5C and 5D.

[0338] A slight spine segment 'splay' accommodates the depth of each individual blister pack 11, without straining the spine or distorting the stack.

[0339] FIGS. 8A, 8B show disparate profile blister packs 51, 52, 53 mounted upon respective spine segments.

[0340] Thus blister pack 51 has a rectangular profile, as with the blister packs 11 of FIGS. 1A through 3B and 5A through 7D.

[0341] On the other hand, blister pack **52** has a triangular profile, apex outward, as with the blister packs of **FIGS. 4B and 9A, 9B**.

[0342] Further blister pack **53** has a concave curved outer edge profile, as with the semicircular blister pack of **FIG. 4A**.

[0343] The blister packs **51** through **53** can thus readily be differentiated (indeed by touch alone)—for ease of identification when different products are presented.

[0344] As with **FIGS. 4A through 4C**, or indeed any of the variants depicted, different product shapes and sizes, conveniently representing different ingredient products, may be presented upon the same of different blister packs.

[0345] Staggered Stack

[0346] For ease of access to individual blister pack (leaves) in a multiple carded stack, they could be staggered, or marginally offset laterally, as depicted in **FIGS. 6A through 6D**, by adopting a progressively varied spine segment width or depth.

[0347] This preserves a common master binding edge **72** when the overall pack assembly **70** is closed, yet allows the opposite free edges **73, 74, 75** of the blister pack leaves to protrude differentially, in the manner of a card index—as reflected in **FIG. 6D**.

[0348] Diverse permutations and combinations of segmented spine mounting, concertina spine segment folding, and pack outline contour variations could be employed although not illustrated.

[0349] As evoked in **FIG. 10**, yet another aspect of the invention addresses a bespoke or dedicated (cartoner, or cartoning) machine, for assembling mounting cards and blister packs.

[0350] In practice, it is envisaged that cards and blister packs would be produced (prefabricated) elsewhere and loaded, cartridge-fashion into stacked storage magazines from which the machine incrementally draws off stock.

[0351] Magazine contents may be drawn from the stack top or bottom (as illustrated).

[0352] The cards could be pre-creased, pre-scored or folded, and pre-perforated, or some of these features could be introduced as machine stages, prior to and/or after assembly with a blister pack.

[0353] Similarly, post-assembly, the card cover may be left flat, or folded to overlie the entrained blister pack, by an additional machine stage, prior to discharge.

[0354] A printing station (not shown) may be employed, to add local date/time, content and batch code, as part of a production audit trail.

[0355] Space is left on the card and/or blister pack (aside from any generalised pre-printing) for such local data printing.

[0356] The card blister assembly may be discharged to a separate (cartoner) packing stage—for insertion into a final overall wrap or carton, along with a Patient Information Leaflet (PIL).

[0357] Assembly of mounting card and blister is a matter of precise incremental indexing, (linear) alignment, layer deposition, juxtaposition and closing of elements.

[0358] As such, assembly may be undertaken reliably and consistently at high speed, but in short batch runs.

[0359] The attendant production economics are suitable for bespoke carded blister packs as required for low-volume clinical trials.

[0360] Similar assembly principles may be adopted for the multiple (similar or disparate) blister packs upon a common spine, or single or multiple (similar or disparate) blister packs upon stacked spine variants, addressed **FIGS. 1A through 9B**.

[0361] For ease of access and assembly, pack installation can be undertaken with multiple individual spine segments pulled apart and laid flat.

[0362] Effectively, a repeat of single blister pack single card mounting step is undertaken for each spine and each blister pack location.

[0363] The more complex corrugated spine fold configuration is adopted after assembly.

[0364] Child Resistant

[0365] Tamper and in particular child resistant features may be embodied into a blister pack, as required by local regulation, in various formats.

[0366] One format—of **FIGS. 12A through 19D**—uses an adaptation of a (relatively robust) protective paper backing overlay to a (relatively frail) foil underlay.

[0367] Paper backed foil, or simply paper foil, is known per se, but some packing adaptation is required for its use with a cover card according to the invention.

[0368] Another format—of **FIGS. 20A through 23F**—uses mechanical (latching) coupling of a card cover overlay—such as with a locking tab seal.

[0369] Aspects of both formats may be combined—for example in a paper foil backed blister with a card cover and optional cover latching.

[0370] Tamper Evident

[0371] The child resistant features may be adapted or combined with tamper evident features—to provide a visible indication that a pack has been interfered with.

[0372] To that end, the same protective or barrier seals or locking/latching tabs which inhibit child access could—upon breakage—provide an irreversible sign of pack opening.

[0373] Paper Backed Foil

[0374] **FIGS. 12A through 14D** depict the use of paper (reinforcement) backed foil to impart child-resistance.

[0375] More particularly, a laminated (dual layer) paper-backed foil **161**, integrates a frangible foil with a paper reinforcement overlay, impeding foil rupture or tearing, until separated (by say peeling back) from the foil.

[0376] The paper reinforcement layer **164** is (adhesive) bonded to the foil layer **167**, which is itself heat welded to the blister pack **162**.

[0377] Peel back and separation of the paper 164, over a prescribed local area, designated a 'patch' 169, reveals foil 167 'closing' a blister pocket 168.

[0378] Local edge 'prise 'n-peel' access to the foil 167 and thus the paper 164, is afforded by series of apertures 166 (penetrating) through the combined pack thickness.

[0379] These apertures 166 could be die cut, such as by a profiled (press) platen tool, as shown in FIGS. 15A through 15E.

[0380] The foil 167 is not bonded to the blister pack 162 either at or adjacent the immediate periphery of the apertures 166.

[0381] These marginal 'free' foil regions creates a formative 'prise 'n-peel (back)' rim 160, as a starting point for local backing sheet removal.

[0382] The apertures 166 are located at, or rather adjacent, the junction of juxtaposed blister pockets 168, and are disposed in a complementary rectangular matrix array.

[0383] The apertures 166 thus give some indication of the underlying blister pocket 168 layout.

[0384] The apertures 166 may be generally circular in form, to afford uniform peripheral edge access and admit peel-back 'departure' of the paper 164 from the foil 167 in any direction.

[0385] Alternatively, the apertures 166 may be shaped, say, as diamond profiles 182, star shapes 183, octagonal shapes 184, or more elaborately as letters 186 or numbers 187 to help orientate a user to one or more particular directions, such as rows or columns.

[0386] Lines of backing layer perforations, are disposed in a regular rectangular grid array of rows 163 and columns 165, representing the boundaries of the underlying blister pockets 168, and define localised 'patches' 169, of paper backed foil 161, juxtaposed over individual pockets 168.

[0387] The perforations 163, 165 extend through at least a paper backing layer 164, if not also the underlying foil 167, of the paper foil laminate or sandwich 161.

[0388] As shown in FIGS. 15D and 15E, perforations 163, 165 may be produced by a punch tool 211, such as a needle profile platen or rotary needle, upon pack assembly.

[0389] Local patches 169 of backing layer 161, bordered by successive perforation rows 163 and columns 165 and intervening corner apertures 166, overly blister pockets 168.

[0390] An individual blister pocket 168 can thus be identified and its respective paper foil overlay 161 located and peeled back from one of the bordering corner apertures 166.

[0391] Cover Sheet

[0392] FIGS. 12A, 12C and 12D show two alternative approaches to paper foil edge access at a cover spine.

[0393] In one approach, a cover sheet 171, with a folded mounting strip 172, could be (adhesive) bonded at 177, direct to the foil itself, or the paper backing.

[0394] A line of perforations 173 is introduced alongside and marginally inset from the mounting strip bond 177.

[0395] The perforations are interrupted by spaced apertures 176 at the blister row or column boundaries.

[0396] These apertures 176 could be semi-circular in profile, for edge 'prise 'n-peel' separation of the paper backing 164 from the underlying foil 167, in a direction away from the mounting strip 172.

[0397] In another approach, the paper foil 161 stops short of the blister pack 162 peripheral edge, to allow direct bonding 179 of a cover mounting strip 172 to the blister itself.

[0398] In this case, at the paper foil edge 174 adjacent the mounting strip joint, an underlying foil 167 edge reveal 175 is created by leaving short of the edge heat fusion to the underlying blister 162.

[0399] This would be a starting line for edge prise 'n-peel of the overlying paper (reinforcement) layer 164.

[0400] Localised removal of protective paper backing 164 from an individual 'patch' 169, defined by perforations 163, 165, permits selective access to blister pocket 168 contents.

[0401] In practice, the paper layer 164 may be prised 'n-peeled starting at the rim 160 of aperture 166 to expose the underlying foil layer 167.

[0402] Subsequent pressure applied to the selected individual blister pocket 168, causes rupture of the foil layer 167 and ejection of the tablet/capsule contents 170.

[0403] In a particular example, apertures 166 in the blister pack 162 and paper foil layer 161, are formed simultaneously using a punch cutter 191 and die 192.

[0404] The punch cutter 191 penetrates, and cuts, the paper 164, foil, 167 and blister pack 162, to locate in a die aperture 194, cut-out portions 196 are discarded.

[0405] Multiple apertures may be simultaneously punched using a punch tool comprising a plate 211, with multiple cutters 209.

[0406] In addition, pins 212 may be located on the punch cutter plate 211, to make perforations 214—typically only through the paper and foil layer 161.

[0407] An alternative aperture profile 226, as depicted in FIGS. 16A through 16C, is configured such that the aperture 224, in the blister pack 162, is somewhat larger in diameter than the aperture 225 in the paper backed foil 161.

[0408] As a result, an edge 'reveal' 228 is created, where the paper backed foil 161 is inset marginally within the blister pack aperture 224, and can thus be accessed for prise 'n-peel removal of the paper layer.

[0409] Apertures 224 in the blister pack may be pre-made, say, at the vacuum moulding stage, whilst apertures 225 in the paper backed foil 161, are made after heat sealing of the foil to the blister pack.

[0410] FIGS. 17C through 17E depict use of a punch tool 191 and die 192 to make apertures 225.

[0411] Blister contents removal may be further assisted by the use of a bespoke tool, such as illustrated in FIGS. 18A through 19D.

[0412] A bespoke 'discharge' tool or key 231 is profiled for complementary interfit with blister pack 232—aperture

234 locates over a blister pocket **236**, thereby aligning cutter blade **233** with aperture **235** in the blister pack, such that paper backed foil **238** is penetrated.

[0413] Following removal of 'discharge' tool, the pierced paper layer **237** can be peeled off the foil layer **239**, allowing blister pocket contents **240** to be discharged upon rupture of the foil layer **239**.

[0414] Referring now to the mechanical tear-off tab seal sequence of FIGS. **20A** through **20E**, **21A** through **21G**, **22A** through **22G** and **23A** through **23F**, a blister pack and overall cover card, or cover wrap, are variously entrained, through single or multiple edge bonding, to form a closed package.

[0415] Once closed and sealed, the pack can only be opened by breaking the tab seal.

[0416] Whilst a single tab seal is depicted for an entire pack, in principle, individual portions of the pack could be separately closed, by respective discrete or severable cover portions and attendant tab seals.

[0417] Moreover, the closure covers could be contrived as interactive or interdependent—so that, say, access to covers must follow a prescribed sequence.

[0418] This could be achieved with partial cover overlay or interfit, or wholesale interesting or multi-layered covers or wraps; vis wraps configured within wraps—to allow phased access and contents discharge for consumption.

[0419] In particular, FIGS. **20A** through **20E** depict a blister pack **312**, bonded along longitudinal edge **314** to a rectangular cover card element **316**, with closure slot **317**—and along longitudinal edge **315** to card element **318** with locking tab **319**.

[0420] Upon pack closure, locking tab **319** is located in slot **317**.

[0421] In an alternative approach, a single card element **322**, with slot **323**, is bonded along one longitudinal edge **315** of a blister pack **312**.

[0422] The card element **322** is folded over the blister pack and held closed by a discrete locking tab **325**, located through slot **323** and bonded to the underside of blister pack **312**—as depicted in FIGS. **21A** through **21F**.

[0423] To access the blister pack, the locking tab is severed, along severance line **328**.

[0424] For further protection, a card cover which enshrouds the blister pack top, and is sealed along on all four sides, is envisaged.

[0425] More specifically, a blister pack **342** is bonded on three edges **343**, **344**, **345** to a triple panel element **347**. Panel elements **351**, **352** and finally **353** are folded to overlie the blister pack.

[0426] Depending lip panel **355** is folded around blister pack edge **346** and bonded to its underside—thereby sealing the pack closed.

[0427] The sealed pack is accessed by the removal of tear-off seal tab **358**.

[0428] In a simpler construction, a single element cover sleeve **363**, with depending lips **366** and **367** is located over

blister pack **362**. Depending lips **366** and **367** are folded and bonded to the underside of the blister back.

[0429] Again, blister pack access requires removal of tear-off seal tab **369**.

[0430] Component List

- [0431] 11 blister pack
- [0432] 12 mounting card
- [0433] 13 perforation/severance line
- [0434] 14 panel
- [0435] 15 spine
- [0436] 16 mounting/adhesive strip
- [0437] 17 plastics sheet
- [0438] 18 blister compartment
- [0439] 19 (metal) foil backing layer
- [0440] 20 card mounted (single) blister pack assembly
- [0441] 22A mounting card
- [0442] 22B mounting card
- [0443] 23A severance line
- [0444] 23B severance line
- [0445] 24A panel
- [0446] 24B panel
- [0447] 25 spine
- [0448] 26 adhesive strip
- [0449] 28 fold line
- [0450] 29 fold line
- [0451] 31 mounting portion
- [0452] 32 mounting portion
- [0453] 33 mounting portion
- [0454] 42 triangular carded blister pack assembly
- [0455] 43 semi-circular carded blister pack assembly
- [0456] 44 dumbbell carded blister pack assembly
- [0457] 51 rectangular blister pack
- [0458] 52 triangular blister pack
- [0459] 53 semi-circular blister pack
- [0460] 61 spine
- [0461] 62 adhesive strip
- [0462] 63 spine
- [0463] 64 adhesive strip
- [0464] 65 spine
- [0465] 66 adhesive strip
- [0466] 70 card mounted (multiple) blister pack assembly
- [0467] 72 master binding edge
- [0468] 73 protruding blister pack edge

[0469] 74 protruding blister pack edge
 [0470] 75 protruding blister pack edge
 [0471] 82 individual blister form
 [0472] 83 individual blister form
 [0473] 84 individual blister form
 [0474] 160 rim
 [0475] 161 paper backed foil
 [0476] 162 blister pack
 [0477] 163 perforation rows
 [0478] 164 paper reinforced layer
 [0479] 165 perforation columns
 [0480] 166 aperture
 [0481] 167 foil layer
 [0482] 168 blister pocket
 [0483] 169 patch
 [0484] 170 tablet/capsule
 [0485] 171 cover sheet
 [0486] 172 mounting strip
 [0487] 173 perforations
 [0488] 174 paper foil edge
 [0489] 175 edge 'reveal'
 [0490] 176 apertures
 [0491] 177 mounting point
 [0492] 179 mounting point
 [0493] 182 diamond aperture
 [0494] 183 star shaped aperture
 [0495] 184 octagonal aperture
 [0496] 186 letter profiled aperture
 [0497] 187 numeral profiled aperture
 [0498] 191 punch
 [0499] 192 die
 [0500] 194 die aperture
 [0501] 196 cut-out
 [0502] 209 cutter
 [0503] 211 punch cutter plate
 [0504] 212 pins
 [0505] 214 perforations
 [0506] 224 blister pack aperture
 [0507] 225 paper foil layer aperture
 [0508] 226 aperture
 [0509] 228 edge 'reveal'
 [0510] 231 'discharge' tool/key
 [0511] 232 blister pack

[0512] 233 cutter blade
 [0513] 234 aperture
 [0514] 235 aperture
 [0515] 236 blister pocket
 [0516] 237 paper layer
 [0517] 238 paper backed foil layer
 [0518] 239 foil layer
 [0519] 240 blister pocket contents
 [0520] 312 blister pack
 [0521] 314 edge
 [0522] 315 edge
 [0523] 316 card element
 [0524] 317 slot
 [0525] 318 card element
 [0526] 319 locking tab
 [0527] 322 card element
 [0528] 323 slot
 [0529] 325 locking tab
 [0530] 328 severance line
 [0531] 342 blister pack
 [0532] 343 edge
 [0533] 344 edge
 [0534] 345 edge
 [0535] 346 edge
 [0536] 347 triple panel element
 [0537] 351 panel
 [0538] 352 panel
 [0539] 353 panel
 [0540] 355 depending lip panel
 [0541] 358 tear off seal tab
 [0542] 362 blister pack
 [0543] 363 single element cover sleeve
 [0544] 366 depending lip
 [0545] 367 depending lip
 [0546] 369 tear off tab seal

1. A carded blister pack, comprising a mutually entrained blister pack, of multiple blister pockets, and mounting card; with a common edge bonding joint, defining a fold spine, about which the card can fold, to overlie the blister pack, as a hinged cover;
 a foil rupture layer over the blister pockets; a paper backing surmounting the foil;
 prise 'n-peel access to blister pocket margins, for local removal of paper backing, to a foil rupture layer, over individual pockets.

2. {adhesive edge strip} A carded blister pack, as claimed in claim 1, bonded by an adhesive edge strip, upon either one, or both, card and blister.

3. {adhesive bonding} A carded blister pack, as claimed in claim 1, bonded with adhesive, selected from the group comprising (a) and/or (b) and/or (c), where

(a) (airless) contact,

(b) twin chemically interactive component curing,

(c) hot melt.

4. {hinged spine} A carded blister pack, as claimed in claim 1, comprising a mounting card, with a hinged spine, and an adhesive portion, overlaid by a pre-formed blister pack, configured to allow a card leaf or panel to fold over, upon the blister pack, as a [hinged] protective cover.

5. {spine crease} A carded blister pack, as claimed in claim 1, including a crease or fold line, between spine (segment) and adhesive portion, to facilitate card over-turn about the spine, to overlie the blister pack.

6. {localised weakening} A carded blister pack, as claimed in claim 1, including, in the card body, a localised weakening, perforation or severance line, adjacent the spine, to facilitate mutual severance and separation, of card and blister.

7. {book jacket} A carded blister pack, as claimed in claim 1, with a mounting card configured as a jacket, having mutually hinged panels or leafs, disposed about an intervening spine, at opposite sides of the blister pack.

8. {multiple spines} A carded blister pack, as claimed in claim 1, incorporating multiple spines, or spine segments.

9. {concertina folded spines} A carded blister pack, as claimed in claim 1, incorporating a concertina-folded, multiple spine, or segmented spine.

10. {staggered spines} A carded blister pack, as claimed in claim 1, with staggered, or mutually-offset, multiple spine, or spine segment, folds.

11. {multiple blisters upon common spine} A carded blister pack, as claimed in claim 1, with multiple blister packs, as leaves upon a common spine.

12. {differential blisters upon common spine} A carded blister pack, as claimed in claim 1, with differential blister packs, as leaves upon a common single spine, or multiple spines.

13. {paper backed foil} A carded blister pack, as claimed in claim 1, including a paper backed foil, blister backing layer.

14. {perforated paper backing} A carded blister pack, as claimed in claim 1, including a paper-backed foil blister backing layer, with perforations, aligned with the margins of blisters, to facilitate identification, and local separation from the foil, of a paper backing layer portion, over a designated blister pocket.

15. {cover portions} A carded blister pack, as claimed in claim 1, with cover portions along opposite edges, and a mechanical interlock or latch, such as a slot and inter-fitting profiled tab, operative therebetween, once cover portions are folded to overlie the blister; a local, tear-of, tab upon one cover portion, allowing mutual release of cover portions.

16. {tear-off severance tab} A carded blister pack, as claimed in claim 1, with mutual entrainment of card and blister, along opposite edges, with a tear-off severance tab, allowing release of one edge, creating a hinged cover, about the edge still entrained.

17. {tear-off edge tab & residual cover} A carded blister pack, as claimed in claim 1, with mutual entrainment of card and blister, along four successive side edges, featuring a tear-off release tab, juxtaposed with one edge, to allow part-separation of a card edge, and creation of a residual hinged cover, upon end closure flaps, about residual opposite edges.

18. {carded blister pack assembly machine} A machine for assembly of carded blister packs, as claimed in claim 1, with a mounting card storage magazine, and a blister pack storage magazine, a conveyor for transferring mounting cards, discharged individually in succession from the mounting card storage magazine, through an intervening adhesive application station, into juxtaposition with individual blister packs, discharged individually in succession, from the blister pack storage magazine.

19. {free paper edge} A carded blister pack, comprising a mutually entrained blister pack, of multiple blister pockets, and a mounting card;

with a common edge bonding joint, defining a fold spine, about which the card can fold, to overlie the blister pack, as a hinged cover;

a foil rupture layer, disposed over the blister pack;

a paper backing, surmounting the foil over blister pockets, to inhibit foil rupture;

locally free paper backing edge, at or adjacent blister pocket margins,

for local prise 'n-peel removal of paper backing, to expose an underlying foil rupture layer, over individual pockets,

allowing foil rupture and access to pocket contents.

20. {exposed detached paper edge} A carded blister pack, comprising a mutually entrained blister pack of multiple blister pockets, and a mounting card;

with a common edge bonding joint, defining a fold spine, about which the card can fold, to overlie the blister pack, as a hinged cover;

a foil rupture layer over the blister pack, a paper backing attached to the foil upon blister pockets,

an array of perforations and/or cuts, through the paper overlay, separating and bounding individual blister pockets;

an accessible edge to a region of paper (locally) detached from the foil underlay,

for local prise 'n-peel removal of paper backing, to a foil rupture layer, over individual pockets,

and access to pocket contents, by local foil rupture.

21. {exposed paper edge & slit} A carded blister pack, comprising a mutually entrained blister pack of multiple blister pockets, and a mounting card;

with a common edge bonding joint, defining a fold spine, about which the card can fold, to overlie the blister pack, as a hinged cover;

a foil rupture layer over the blister pack, a paper backing overlying and attached to the foil upon blister pockets;

perforations and/or cuts through the paper overlay, to differentiate and bound individual blister pockets;
a region of local detachment of paper from foil underlay,
a slit in the detached paper, to create a free paper access edge, at a selected blister pocket margin, in turn to

allow edge prise 'n-peel removal of local paper overlay, and underlying foil rupture, for access to contents of a selected pocket.

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