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(54) **SELF-CLOSING BOXES**

SELBSTSCHLIESSENDE FALTSCHACHTEL
BOITES A FERMETURE AUTOMATIQUE

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(74) Representative:
**Harman, Michael Godfrey
Holmwood
37 Upper Park Road
Camberley Surrey GU15 2EG (GB)**

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(73) Proprietors:
• **Wollen, Brian Raymond Edward
Camberley, Surrey GU17 7YP (GB)**
• **Wollen, Laura Virginia
Camberley, Surrey GU17 7YP (GB)**

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US-A- 5 098 014

(72) Inventor:
**WOLLEN, Laura, Virginia
Surrey GU17 7YP (GB)**

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Description

[0001] The present invention relates to self-closing boxes, particularly though not necessarily of cardboard.

[0002] Certain snack and other foods cause a considerable amount of nuisance, in entertainment establishments and elsewhere, when they are discarded unfinished, because the remains can easily spill from their containers if they are not put tidily in refuse bins. Popcorn, for example, is a particular problem being light and readily spilt and also sticky with caramel, so that it readily soils carpets, etc in establishments such as cinemas.

[0003] The object of the present invention is to provide a self-closing box which can alleviate such problems.

[0004] According to the invention there is provided a box of thin and resilient material and of generally polyhedral shape, *characterized in that* it has an edge forming a closure line at which two faces constituting the closure faces meet separably such that pressing the vertexes at the ends of that line together splays those faces resiliently apart along that line to allow access to the interior of the box.

[0005] The box may conveniently be assembled from a flat blank of cardboard cut and creased to the appropriate shapes.

[0006] To provide greater initial security for the contents of the box, the two closure faces may initially be secured together by temporary securing means along their closure edges (the edges lying along the closure line). A strip of adhesive tape which can be peeled off can be used; alternatively, the two faces may have extensions which are initially attached together. These extensions may be tied together by a tie through matching holes in them. Alternatively, they may be defined by perforated lines so that they can be torn off the closure faces: in this case, they may be formed from a continuous portion of the card which is folded double to form a tab which protrudes beyond the two closure faces at the closure line, or may be formed separately on the two closure faces and glued together. A further option for certain shapes of the box is a separate cap having the same shape as the top part of the box (ie the part around the closure line) and slightly larger than that part to fit snugly but removably over that part of the box.

[0007] The closure edges of the two closure faces may simply abut at the closure line. To provide a firmer closure of the box, however, the closure faces may have an overlap. For this, the two closure faces both project in the same direction beyond the geometrically straight line between the two vertexes (ends) of the closure line, and come apart from the inside outwardly as the two vertexes are pressed together. This construction results in the two closure faces being distorted into slightly concave forms, with the tension resulting from the concavity tending to hold the closure edges together.

[0008] A variety of shapes may be used for the box.

Conveniently, the box has a flat base with the closure line lying above and parallel to the base.

[0009] One suitable shape is a triangular prism, with one rectangular face forming the base of the box, the other two rectangular faces (side faces) forming the closure faces (so that the edge along which they meet, the edge opposite the base, forms the closure line), and the two triangular faces forming the ends of the box. The two closure faces may have integral extensions to provide matching overlap; alternatively, this shape may be modified by adding a lune-shaped element to the top edge of each of the rectangular side faces to form a pair of closure faces with sliding overlap.

[0010] This shape can be modified by shortening the closure line so that the two closure faces become trapeziform. This allows the boxes to be nested together in a stack partially assembled form with open bases. The stack can be held upside down, a filling poured into the top box in the stack, the base closed up, and the box removed from the stack. Alternatively, the closure line can be extended, so that the two closure faces become trapeziform in the opposite orientation.

[0011] A second suitable shape has a rectangular base with, rising from it, four vertical sides with their top ends being sloped in zig-zag fashion, and closed by two sloping triangular top faces forming the closure faces with the closure line running between the two top-most points of the side faces. The side faces may be trapeziform, or may have their top edges sloped right down to the base so that they are triangular. (Sloping them even further makes the two "top" faces trapeziform and the base hexagonal.)

[0012] The box may be such that it can be stored flat in partially assembled form. The base may be of a construction which assembles automatically when such a partially assembled box is opened out.

[0013] Various boxes embodying the invention will now be described, by way of example, with reference to the drawings, in which:

Fig. 1 shows a cardboard blank for a first box;
Figs. 2A and 2B show the first box in the closed and open states respectively;
Figs. 3A to 3E show variants of the first box;
Fig. 4 shows a further variant of the first box;
Figs. 5 and 5A, 6 and 6A, 7 and 7A, and 8 and 8A show further boxes and blanks therefor.

[0014] Fig. 1 shows a blank of cardboard from which the first box may be made. The cardboard must be stiff but resilient, and capable of being permanently folded along fold lines. (Obviously any thin or sheet-like material with these properties may be used.)

[0015] The box is assembled by creasing and folding the blank along the broken lines; all the folds are made in the same direction. The sides of the box are formed by the two rectangles 17 and 18 and the two triangles 19 and 20; a tab 21 on triangle 20 is glued to the

edge region 22 of rectangle 17 to hold the shape of the box. The base is a rectangle which is assembled by folding together four flaps 10 to 13; flaps 11 and 13 are folded first, and then flaps 10 and 12 are folded together, with the tag forming part of flap 10 being inserted into the slot 14 in flap 12.

[0016] This results in a box of the shape shown in Fig. 2A. In this box, the two rectangular sides 17 and 18 form the closure faces. In the normal, closed, state of the box, as shown in Fig. 2A, the top edges 25A, 25B of these closure faces meet to form a single common closure line 25. If the top corners of the box at the ends of this edge 25 are pressed together manually, as shown by arrows 26 in Fig. 2B, the closure edges 25A, 25B are sprung or splayed apart, as shown by arrows 27, so allowing access to the interior of the box. If the pressure on the corners of the box is relaxed, the stiffness and resilience of the cardboard will return the box to its closed state.

[0017] When the box has been partially assembled by gluing tag 21 to region 22 of side 17, it can be flattened by folding the sides 19 and 20 (together with the base flaps 11 and 13) along storage crease lines 30 and 31. A large number of boxes may then be stored compactly. For this, the base flaps 10 to 13 are left flat, ie not folded away from the planes of their associated sides 17, 19, 18, and 20 respectively. To complete the assembly of the box, the sides 19 and 20 (with their associated base flaps 11 and 13) are flattened out, and the base flaps are then folded together as described above.

[0018] Instead of storing the partially assembled boxes in the completely flat state, they may be given a slight fold along the storage crease lines 30 and 31, and nested in each other to form a stack. This allows them to present a taper and to de-nest without jamming. If the stack is then placed upside down, the top box in the stack can then be filled (eg with popcorn), the base assembled, and the completed and filled box removed from the stack, turned the right way up, and handed to a customer.

[0019] Fig. 3A shows a variant closure face shape for the box of Fig. 1. In this, the closure face 17 has its top edge 25A curved as shown; the other closure face 18 is similar. The closure line of the box therefore becomes curved upwards above the geometrically straight line 25 shown in Fig. 2A, and the top parts of the closure faces 17 and 18 are in matching overlap when the box is closed. The closure faces are forced into a slightly curved shape when the box is closed, with a positive pressure between their overlapping regions near their closure edges. This variant form of the box, like the other variants using the closure face shapes of Figs. 3B to 3E, may also be desirable as having a more distinctive appearance.

[0020] A hole 26 may be provided near the top edge of the face 17, and a corresponding hole in the face 18. A ribbon or string can then be tied through the two holes to form temporary securing means, which can be untied

when access to the box is required.

[0021] Fig. 3B shows a variant which is similar to the Fig. 3A variant. However, the closure face 17 has a straight crease 31 across it, which is folded slightly backwards. The overlapping portions of the closure faces 17 and 18 then lie against each other, but without forcing the main portions of those faces out of flat.

[0022] Fig. 3C shows a variant which is similar to the Fig. 3B variant. However, the closure face 17 has a crease 32 across it which is curved oppositely to the top edge 25A. The main use of this is with the Fig. 4 shape described below.

[0023] Figs. 3D and 3E show further variants of the box of Fig. 1, in which the sides 17 and 18 are trapeziums. This results in the shape of the box being that of a horizontal triangular prism with sloping ends. If the Fig. 3E shape is suitably chosen to match that of the triangular ends, the blank from which the box is made may be straight (ie with the creases between the sides of the box and various flaps forming the base being a straight line).

[0024] Fig. 4 shows a further variant of the box of Fig. 1. In this variant, the closure faces 17 and 18 are of the form shown in Fig. 3C, but the fold 31 is initially made in the same sense as the other folds. The portions 17A and 18A of the faces 17 and 18 are therefore roughly horizontal, forming inwardly facing overlapping lune shapes on those faces. (This also forces the faces 17 and 18 to be slightly curvilinear.) The result is a shape of the "pillow-pack" type, which retains its contents with considerable tenacity; in effect, the lune shapes 17A and 18A in effect form temporary initial closure means. To gain access to the interior of the box, these portions 17A and 18A have to be pulled out to form smooth extensions of the faces 17 and 18. The box thereupon becomes in effect the Fig. 3C type box. (Obviously this variant can be combined with the variants of Figs. 3D or 3E.)

[0025] Fig. 5 shows a second form of box, which is based on a vertical square prism. This box has a base 30 and four vertical sides 31-34, each vertical side being in the form of a rectangle with the top end sloped off to turn it into a trapezium. The box is closed by two sloping triangular faces 35 and 36 at the top; these two faces form the closure faces, and their common edge 37 forms the closure line of the box. This box is assembled from the blank shown in Fig. 5A. All tabs for gluing are shown in Fig. 5A; some are shown, in lightly broken lines, in Fig. 5.

[0026] It will be noted that the closure line 37 of the box is shown in Fig. 5 as having a strip 38 above it. Fig. 5A, which is a blank for this box, shows this strip as a double strip which is joined to the faces 35 and 36 and has a crease line 39 along its centre. When the box is assembled, this strip 38 is folded double along the line 39. Its joins to the faces 35 and 36 are defined by lines of perforation, as shown at 37, which will form the closure edges of the faces 35 and 36. When the box is first

assembled, it is therefore sealed by the strip 38, which forms a temporary seal. To gain access to the box, the strip 38 has to be torn off. The box can then be opened along its closure line 37 by pressing the corners at the ends of this line together, and will close again when this pressure is removed. If the box of Fig. 5 is made without the sealing strip 38, then it can be made from a "straight" blank in which the four main sides 31-34 form a straight band.

[0027] With this shape of box, an alternative temporary initial closure means can be used in the form of a large cap having the same shape as the upper part of the box and fitting snugly over the upper part of the box.

[0028] Fig. 6 shows a box whose shape is a variant of that of Fig. 5, in which the triangular closure faces 35 and 36 extend down to the base 30. As a result, the side faces 31-34 are triangular. (For convenience, the tabs and the temporary sealing strip are omitted in Fig. 6.) The shape of this second box can also be varied in other ways, eg analogously to Figs. 3D and 3E. Fig. 6A shows a blank for this box. This shape can be partially assembled and stored flat with only the base remaining to be assembled for final assembly.

[0029] The shape of Fig. 5 cannot be treated in the same way, because when the three faces 31, 32, and 35 are joined they form a 3-dimensional shape which cannot be flattened. However, for some purposes it may be acceptable to partially assemble the shape of Fig. 5 is a flattenable form, leaving the joins between faces 31 and 32, and between 33 and 34, unmade.

[0030] It is also possible to utilize the techniques of Figs. 3A to 3C with Fig. 5 type boxes. If this is done, the temporary sealing strip can be formed with a straight central crease and curved lines of perforation. Alternatively, it can be formed in another way, eg by gluing together two portions, one attached to each of the closure faces. The technique of Fig. 4 can also be used with boxes of the shapes of Figs. 5 and 6, though that would require the omission of the sealing strip. If desired, a strip of removable adhesive tape can be used to provide a temporary seal for the box.

[0031] For a rectangular box which is stored flat, a technique is known for forming the base by gluing and folding flaps up inside the box in such a way that when the box is opened out, the base flaps are pulled down and automatically interlock in such a manner that a substantially rigid base is automatically formed. This technique can be applied to most of the present boxes.

[0032] However, for some forms of the present box, a slight modification of this technique is required. The box of Fig. 7 (which is a box of the Fig. 1 type as modified by combining Figs. 3B and 3D) is an example. Fig. 7A is a blank for this box. This consists of four faces 41-44, with a flap 45 which has to be glued to the outer end of face 44, plus base parts 46-53. The base parts consist of two main flaps 46 and 50, plus various minor flaps and portions 47-49 and 51-53. The two portions 47 are glued together, and the two portions 51 are glued

together.

[0033] When the box has been partially assembled by the gluings just noted, it can then be stored flat, with 180° bends down the centre lines of the end faces 42 and 44, and with the base flaps all tucked up inside the box. When the assembly of the box is to be completed, it is opened out by pulling the sides 41-44 apart. This pulls the base flap portions down from inside the box. As a result, the lowermost parts of the main flaps 46 and 50 form two tongues which automatically engage with each other (each sliding over the adjacent part of the other flap), to form a firm and secure base.

[0034] Figs. 8 and 8A show a box and a blank therefor of the same general shape as the Fig. 5 box but which is assembled in a different manner. This box has sides 55-58, top closure faces 58 and 59, and a base 60. This box can be stored flat in partially assembled form, with only tongue and groove matching required for completing its assembly.

Claims

1. A box of thin and resilient material and of generally polyhedral shape, *characterized in that* it has an edge forming a closure line (25) at which two faces constituting the closure faces (17, 18) meet separably such that pressing the vertexes at the ends of that line together (at 26) splays those faces resiliently apart along (at 27) that line to allow access to the interior of the box.
2. A box according to claim 1, *characterized in that* it is assembled from a flat blank of cardboard cut and creased to the appropriate shapes.
3. A box according to either previous claim, *characterized by* temporary securing means attached to the closure edges (the edges lying along the closure line) of the two closure faces.
4. A box according to claim 3, *characterized in that* the temporary securing means comprise peelable adhesive tape.
5. A box according to claim 3, *characterized in that* the temporary securing means comprise extensions (38) on the two closure faces (35, 36) which are attached together and are defined by perforated lines (37) so that they can be torn off the closure faces.
6. A box according to claim 3, *characterized in that* the temporary securing means comprise a cap having the same shape as the box in the region of the closure line and fitting removably over that part of the box.
7. A box according to claim 5, *characterized in that* the

extensions are formed from a continuous portion of the blank which is folded double (at 39) to form a tab (38) which protrudes beyond the two closure faces at the closure line.

- 5
8. A box according to claim 5, *characterized in that* the extensions are formed separately on the two closure faces and glued together.
- 10
9. A box according to any previous claim, *characterized in that* the closure faces have either a matching or a sliding overlap.
- 15
10. A box according to any previous claim, *characterized in that* the box has a flat base with the closure line lying above and parallel to the base.
- 20
11. A box according to claim 10, *characterized in that* the box is a triangular prism, with one rectangular face (10-13) forming the base of the box and the other two rectangular faces (side faces) (17, 18) forming the closure faces.
- 25
12. A box according to claims 9 and 11, *characterized in that* the two closure faces have integral extensions to provide overlap.
- 30
13. A box according to claim 12, *characterized by* the extensions are initially folded inwards to overlap and give a "pillow pack" shape.
- 35
14. A box according to claim 10, *characterized in that* the closure faces are trapeziums.
- 40
15. A box according to claim 10, *characterized in that* it has a rectangular base with, rising from it, four vertical sides with their top ends being sloped in zig-zag fashion, and closed by two sloping triangular top faces forming the closure faces.
- 45
16. A box according to claim 15, *characterized in that* the side faces are trapeziums.
- 50
17. A box according to claim 15, *characterized in that* the side faces are triangular.
- 55
18. A stack of boxes according to any previous claim nested in partially assembled form.
- 50
19. A box according to any one of claims 1 to 17, *characterized in that* it can be stored flat in partially assembled form and its base automatically assembles when the partially assembled box is opened out.

Patentansprüche

1. Schachtel aus dünnem und federndem Material

und mit allgemein vielfächiger Form, dadurch gekennzeichnet, daß sie eine Kante hat, die die Verschlusslinie ausmacht (25), aufweist, an der zwei Flächen die die Verschlussflächen ausmachen (17, 18) sich in trennbarer Weise treffen, derart, daß ein Zusammendrücken der Scheitelpunkte an den Enden dieser Linie (bei 26) diese Flächen federnd entlang (bei 27) dieser Linie auseinanderspreizt, um einen Zugang an das Innere der Schachtel zu ermöglichen.

2. Schachtel nach Anspruch 1, dadurch gekennzeichnet, daß sie aus einem flachen Rohling aus Kartonmaterial zusammengesetzt ist, das auf die passenden Formen geschnitten und gefalzt ist.
3. Schachtel nach einem der vorhergehenden Ansprüche, gekennzeichnet durch vorübergehende Befestigungseinrichtungen, die an den Verschlusskanten (den entlang der Verschlusslinie liegenden Kanten) der beiden Verschlussflächen angerbracht sind.
4. Schachtel nach Anspruch 3, dadurch gekennzeichnet, daß die vorübergehenden Verschlusseinrichtungen ein abziebares Klebeband umfassen.
5. Schachtel nach Anspruch 3, dadurch gekennzeichnet, daß die vorübergehenden Befestigungseinrichtungen Verlängerungen (38) der beiden Verschlussflächen (35,36) umfassen, die aneinander befestigt und durch perforierte Linien (37) umgrenzt sind, so daß die von den Verschlussflächen abreißbar sind.
6. Schachtel nach Anspruch 3, dadurch gekennzeichnet, daß die vorübergehenden Befestigungseinrichtungen eine Kappe mit der gleichen Form wie die Schachtel im Bereich der Verschlusslinie umfassen, die lösbar über diesem Teil der Schachtel aufgesetzt ist.
7. Schachtel nach Anspruch 5, dadurch gekennzeichnet, daß die Verlängerungen aus einem durchgehenden Teil des Rohlings gebildet sind, der doppelt gefaltet ist (bei 39), um eine Lasche (38) zu bilden, die über die beiden Verschlussflächen gefaltet ist (bei 39), um eine Lasche (38) zu bilden, die über die beiden Verschlussflächen an der Verschlusslinie hinaus vorspringt.
8. Schachtel nach Anspruch 5, dadurch gekennzeichnet, daß die Verlängerungen getrennt auf den beiden Verschlussflächen gebildet und miteinander verklebt sind.
9. Schachtel nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Ver-

schlußflächen entweder eine aneinander angepaßte oder eine gleitende Überlappung aufweisen.

10. Schachtel nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Schachtel eine ebene Grundfläche aufweist, wobei die Verschußlinie oberhalb und parallel zu der Grundfläche liegt. 5
11. Schachtel nach Anspruch 10, dadurch gekennzeichnet, daß die Schachtel ein dreiseitiges Prisma ist, wobei eine rechtwinklige Fläche (10-13) die Grundfläche der Schachtel bildet und die beiden anderen rechtwinkligen Flächen (Seitenflächen) (17, 18) die Verschußflächen bilden. 10
12. Schachtel nach Ansprüchen 9 und 11, dadurch gekennzeichnet, daß die beiden Verschußflächen einstückige Verlängerungen aufweisen, um eine Überlappung zu bilden. 20
13. Schachtel nach Anspruch 12, dadurch gekennzeichnet, daß die Verlängerungen anfänglich nach innen gefaltet sind, um sich zu überlappen und eine "Kissenpackungs"-Form zu ergeben. 25
14. Schachtel nach Anspruche 10, dadurch gekennzeichnet, daß die Verschußflächen Trapeze sind.
15. Schachtel nach Anspruch 10, dadurch gekennzeichnet, daß sie eine rechtwinklige Grundfläche mit von dieser aus aufsteigenden vier vertikalen Seiten aufweist, deren obere Enden in Zick-Zack-Weise geneigt sind und die durch zwei geneigte dreieckige obere Flächen verschlossen sind, die die Verschlussflächen bilden. 30 35
16. Schachtel nach Anspruch 15, dadurch gekennzeichnet, daß die Seitenflächen Trapeze sind. 40
17. Schachtel nach Anspruch 15, dadurch gekennzeichnet, daß die Seetenflächen dreieckig sind.
18. Stapel von Schachteln nach einem der vorgehenden Ansprüche, die in teilweise zusammengesetzter Form ineinandergesteckt sind. 45
19. Schachtel nach einem der Ansprüche 1-17, dadurch gekennzeichnet, daß sie in flachem Zustand in teilweise zusammengesetzter Form gespeichert werden kann und daß ihre Grundfläche automatisch zusammengesetzt wird, wenn die teilweise zusammengesetzte Schachtel geöffnet wird. 50

Revendications

1. Une boîte en matériau mince et élastique, et de forme globalement polyédrique, caractérisée en ce

qu'elle comporte un bord qui forme une ligne de fermeture (25) auquel deux faces qui forment des faces de fermeture (17,18) se rejoignent séparément de manière que le pressage ensemble des sommets des extrémités de cette ligne (en 26) évide ces faces de façon élastique en les écartant, sur cette ligne (en 27), pour donner accès à l'intérieur de la boîte.

2. Une boîte selon la revendication 1, caractérisée en ce qu'elle est assemblée à partir d'un flan de carton plat découpé et est déformée pour prendre les formes appropriées. 15
3. Une boîte selon l'une quelconque des revendications précédentes, caractérisée par des moyens de fixation temporaire, attachés aux bords de fermeture (les bords situés sur la ligne de fermeture) des deux faces de fermeture. 20
4. Une boîte selon la revendication 3, caractérisée en ce que les moyens de fixation temporaires sont constitués d'un ruban adhésif pelable. 25
5. Une boîte selon la revendication 3, caractérisée en ce que les moyens de fixation temporaire comprennent des extensions (38) sur les deux faces de fermeture (35,36) qui sont attachées ensemble et sont définies par des lignes perforées (37), de manière qu'elles puissent être rompues par déchirement au niveau des faces de fermeture. 30
6. Une boîte selon la revendication 3, caractérisée en ce que les moyens de fixation temporaire comprennent un capuchon ayant la même forme que la boîte dans la zone de la ligne de fermeture et s'ajustant de façon amovible sur cette partie de la boîte. 35
7. Une boîte selon la revendication 5, caractérisée en ce que les extensions sont formées à partir d'une partie continue du flan qui est pliée deux fois (en 39) pour former une patte (38) faisant saillie au-delà des deux faces de fermeture de la ligne de fermeture. 40
8. Une boîte selon la revendication 5, caractérisée en ce que les extensions sont formées séparément sur deux faces de fermeture et sont collées ensemble. 45
9. Une boîte selon l'une quelconque des revendications précédentes, caractérisée en ce que les faces de fermeture sont soit en coïncidence soit en chevauchement de coulissement. 50
10. Une boîte selon l'une quelconque des revendications précédentes, caractérisée en ce que la boîte a une base plate, la ligne de fermeture étant située au-dessus et parallèlement à la base. 55

11. Une boîte selon la revendication 10, caractérisée en ce que la boîte est un prisme triangulaire, une face rectangulaire (10,13) formant la base de la boîte et les deux autres faces rectangulaire (faces latérales) (17, 18) formant les faces de fermeture. 5
12. Une boîte selon les revendications 9 et 11, caractérisée en ce que les deux faces de fermeture ont des extensions réalisées d'une seule pièce, pour produire un chevauchement. 10
13. Une boîte selon la revendication 12, caractérisée par le fait que les extensions sont initialement pliées vers l'intérieur afin de produire un chevauchement et de donner une forme en "paquet en polochon". 15
14. Une boîte selon la revendication 10, caractérisée en ce que les faces de fermeture sont des trapèzes. 20
15. Une boîte selon la revendication 10, caractérisée en ce qu'elle a une base rectangulaire avec, montant à partir d'elle, quatre côtés verticaux, ayant leurs extrémités supérieures inclinées en zig-zag et fermées par deux faces supérieures triangulaires inclinées formant les faces de fermeture. 25
16. Une boîte selon la revendication 15, caractérisée en ce que les faces latérales sont des trapèzes. 30
17. Une boîte selon la revendication 15, caractérisée en ce que les faces latérales sont triangulaires.
18. Une pile de boîtes selon l'une quelconque des revendications précédentes, emboîtées sous une forme partiellement assemblée. 35
19. Une boîte selon l'une quelconque des revendications 1 à 17, caractérisée en ce qu'elle peut être stockée à plat, sous une forme partiellement assemblée, et sa base s'assemblant automatiquement lorsque la boîte partiellement assemblée est ouverte par découpe. 40

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FIG 1

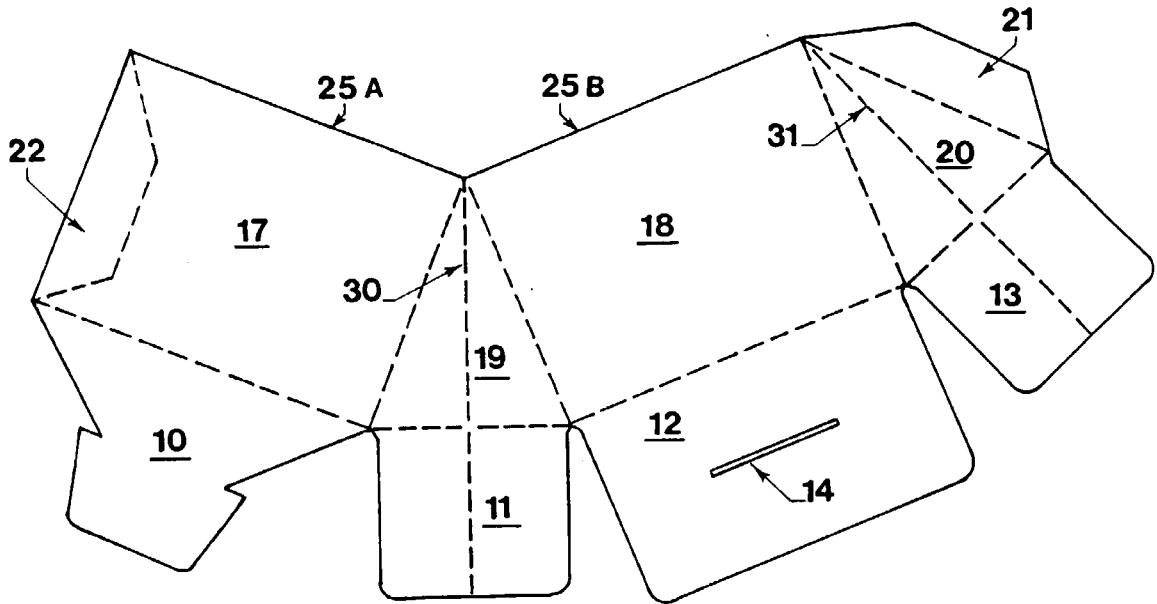


FIG 2 A

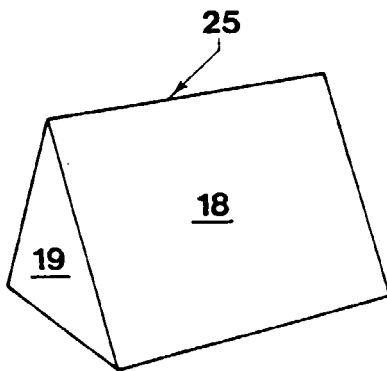
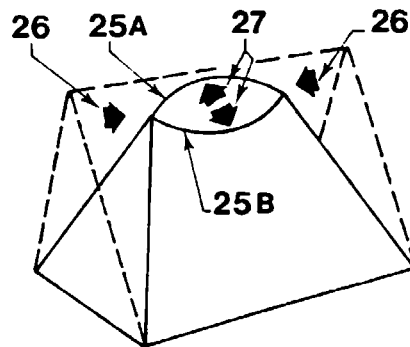
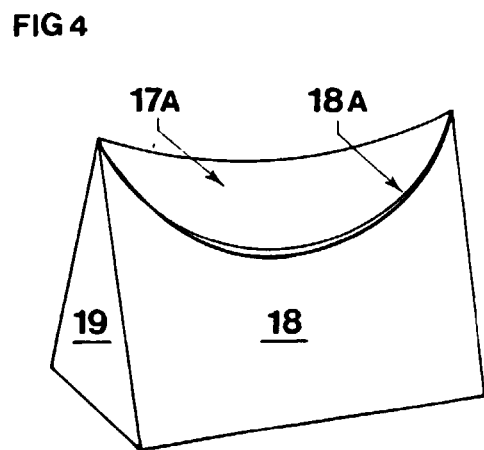
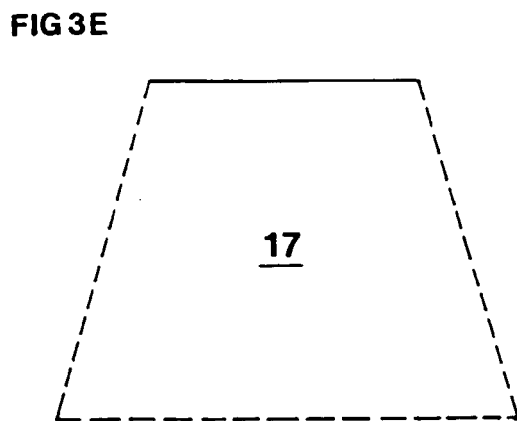
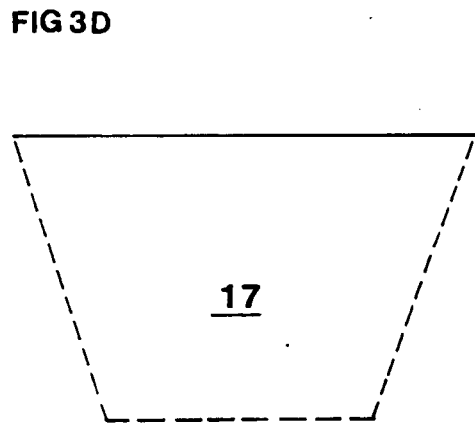
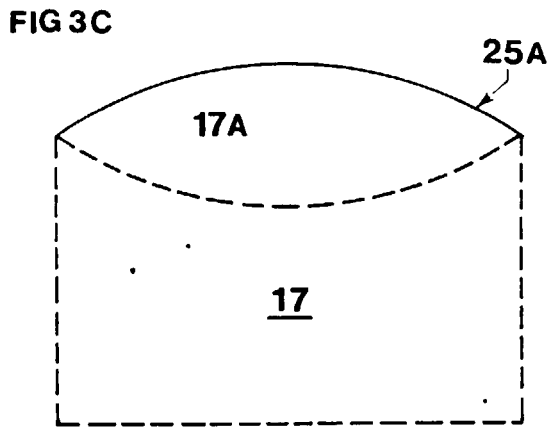
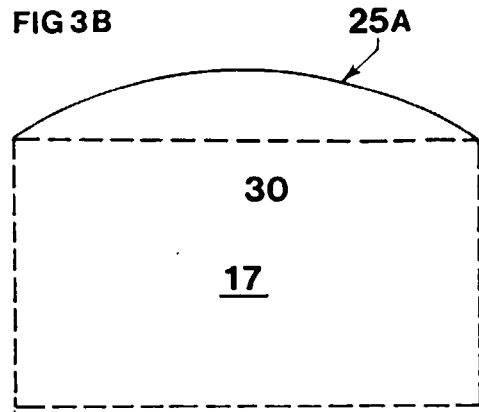
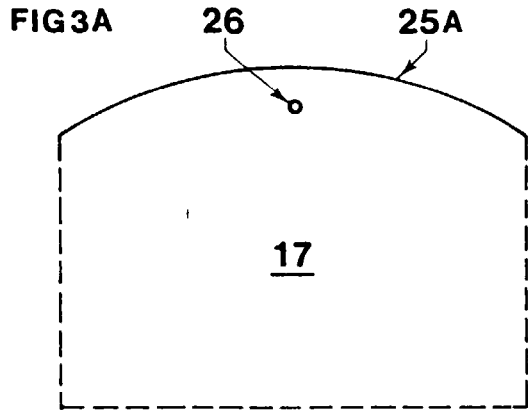
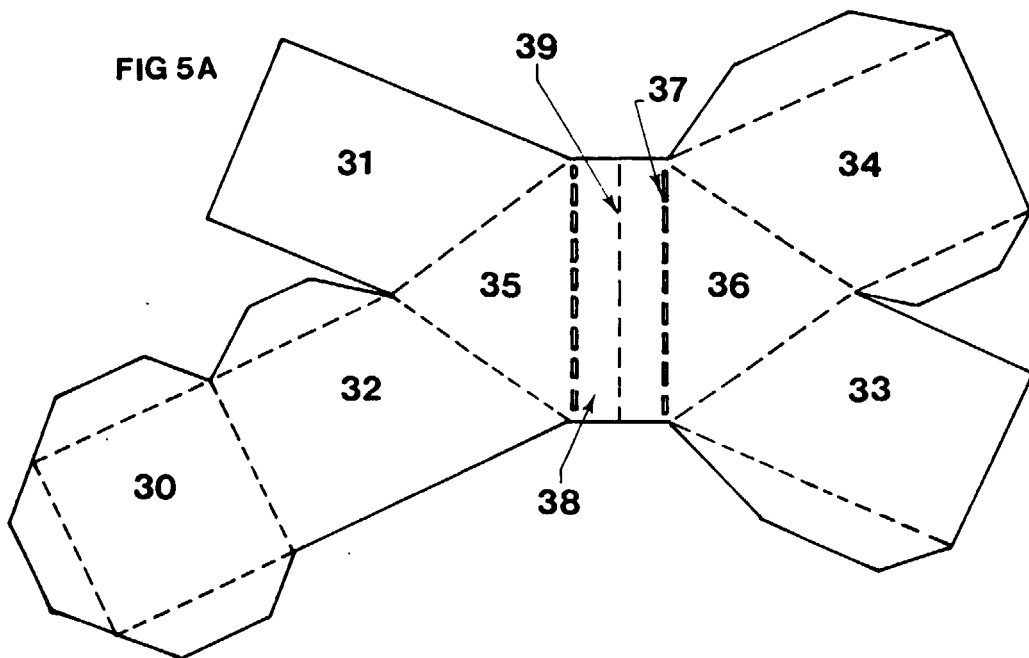
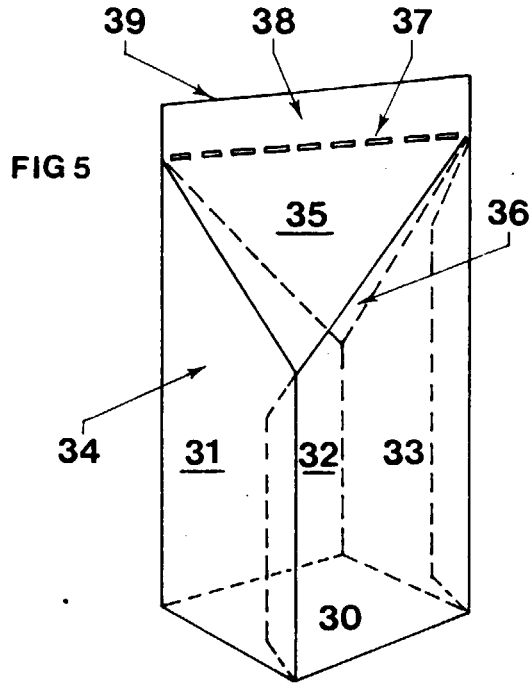


FIG 2 B







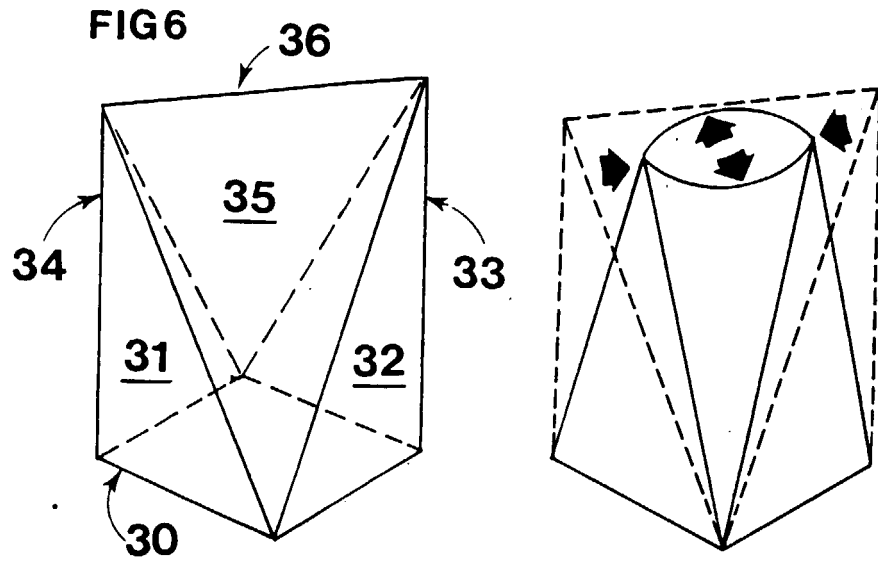


FIG 6 A

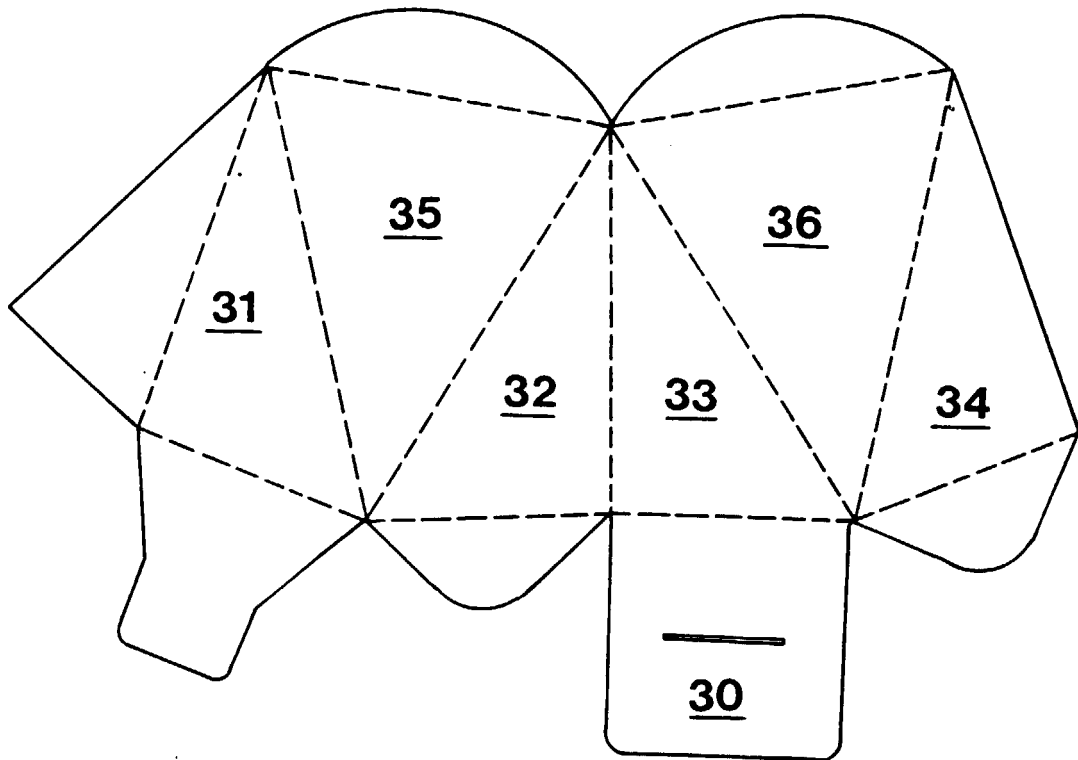


FIG 7

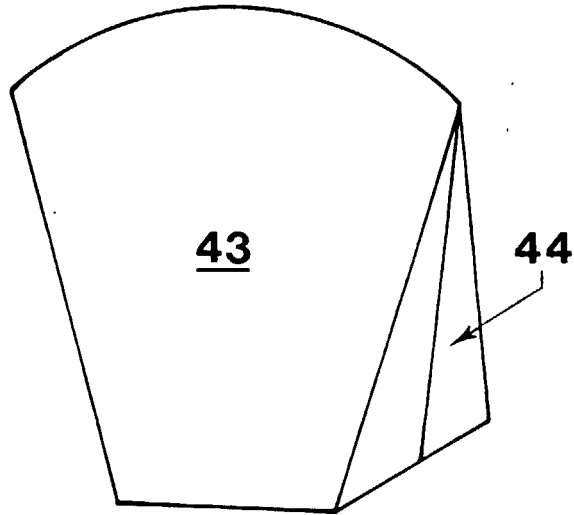
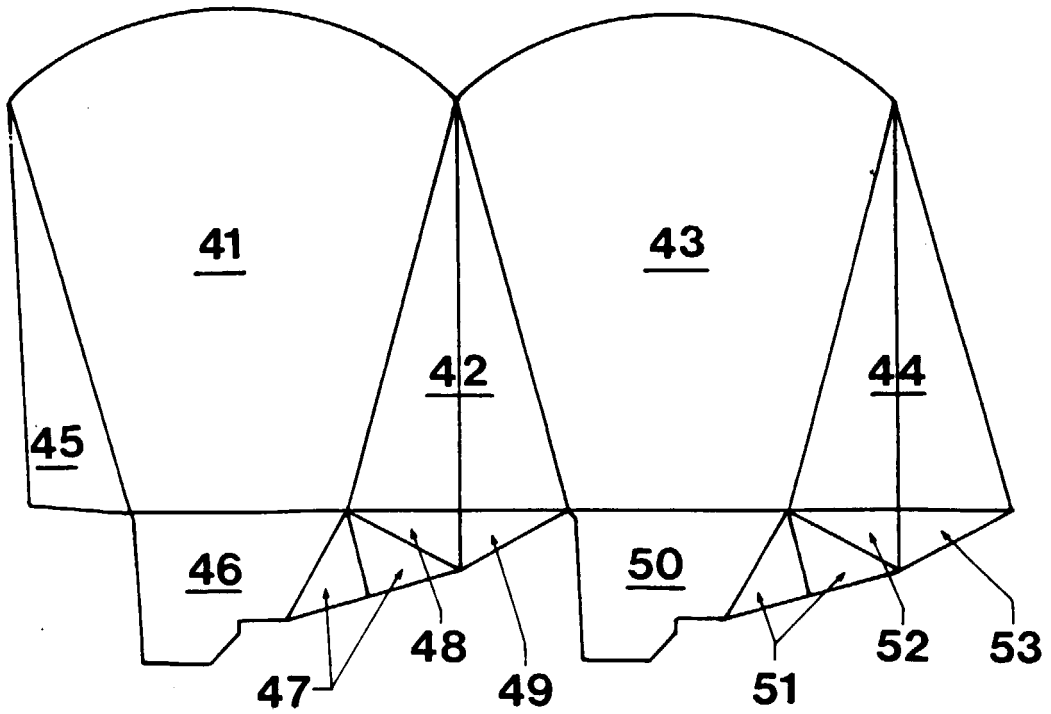


FIG 7A



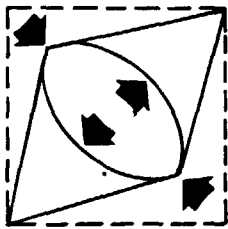
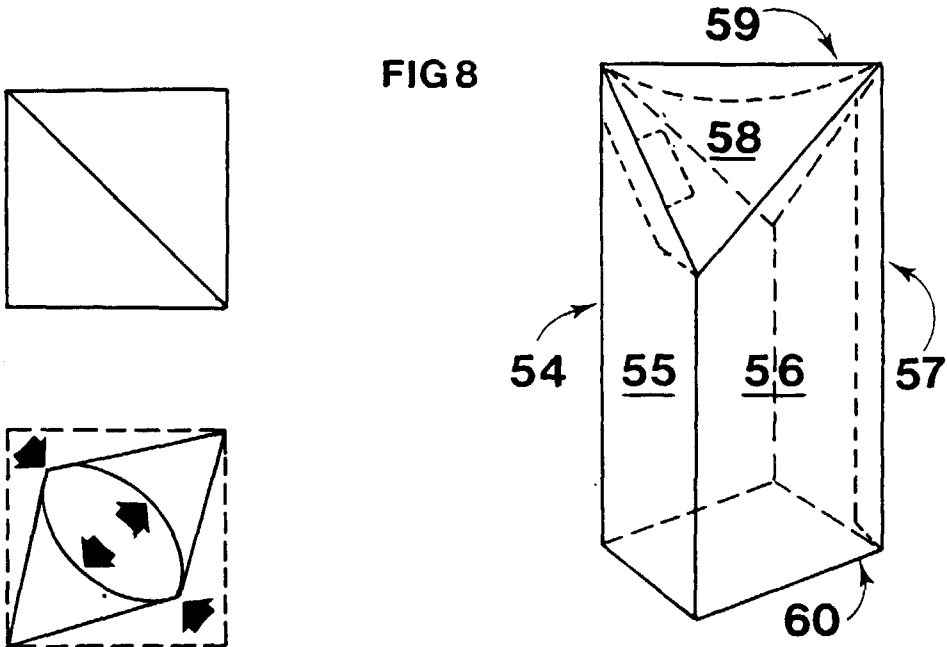


FIG 8A

