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(54) **Blank for a tray having partitions**

(57) Blank for the production of a container divided into compartments, for example for biscuits, chocolates and the like, comprising at least four panels joined by parallel longitudinal fold lines (6-9), which panels (1-5) in the finished container define, successively, a base (1,5), a side (2), a number of transverse partitions and a side (5), of which panels the three panels (2-4) defined by the sides (2,4) and the panel (3) located between them possess a number of parallel transverse cuts (18) which intersect the longitudinal fold lines (7,8) which join said three panels (2-4), and of which panels the intermediate panel (3) possesses a number of transverse fold lines (10,11) running to the longitudinal fold lines

(7,8) delimiting it, and the side panels (2,4) possess oblique fold lines (16) running from the point of intersection of a longitudinal fold line (7,8) with a transverse fold line (10,26,27), such that when the panels (2,4) defined by the sides are folded with respect to the intermediate panel (3), the regions (19,20) of the intermediate panel (3) which in each case are delimited between a transverse fold line (10,26,27), two oblique fold lines (16) and a cut (18) are folded with the formation of transverse partitions which define the compartments (30), characterised in that both ends of each transverse cut (18) intersect an auxiliary cut (17,31-34), the two ends of which adjoin an oblique fold line (16).

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Description

The invention relates to a blank for the production of a container divided into compartments, for example for biscuits, chocolates and the like, comprising at least four panels joined by parallel longitudinal fold lines, which panels in the finished container define, successively, a base, a side, a number of transverse partitions and a side, of which panels the three panels defined by the sides and the panel located between them possess a number of parallel transverse cuts which intersect the longitudinal fold lines which join said three panels, and of which panels the intermediate panel possesses a number of transverse fold lines running to the longitudinal fold lines delimiting it, and the side panels possess oblique fold lines running from the point of intersection of a longitudinal fold line with a transverse fold line, such that when the panels defined by the sides are folded with respect to the intermediate panel, the regions of the intermediate panel which in each case are delimited between a transverse fold line, two oblique fold lines and a cut are folded with the formation of transverse partitions which define the compartments.

A blank of this type is disclosed in US-A 2 690 866. The container produced from said blank has fairly deep cut-outs in the sides, which constitute a weakening in the finished container. At the location of said cut-outs the resistance to sagging is low, as a result of which the container can easily give way under pressure in its longitudinal direction.

A further important point is that said blank has to be made of a relatively rigid material. First of all this is necessary in order to provide the finished container with adequate robustness even at the location of the deep cut-outs. In addition, the way in which the container is produced from said blank gives rise to the need to use a rigid material. In the production procedure a tube is first formed from the blank, after which the transverse partitions are formed by pressing in the relevant regions, during which operation the material has to pleat. In this stage high forces arise which would destroy a blank made of a lightweight material.

The aim of the invention is, therefore, to provide a blank from which a container which is more robust can be produced from a relatively lightweight, inexpensive material. Said aim is achieved in that both ends of each transverse cut intersect an auxiliary cut, the two ends of which adjoin an oblique fold line.

As a consequence of the presence of the auxiliary cuts at both ends of a transverse cut, the cut-outs in the sides of the finished container are much smaller, with the result that said sides are able to offer relatively high resistance to sagging. A further advantage of the blank according to the invention is that no material is lost because the blank is completely rectangular or square.

US-A 2 744 675 also discloses a blank for a container. Said blank is likewise shaped into a tube in a first step, after which the transverse partitions are obtained

by pressing in the associated regions. Said blank has the same disadvantages as the blank according to US-A 2 690 866, which has been described above, although the side walls of the finished container are weakened to a lesser extent in view of the fact that the incisions are fairly shallow. A significant disadvantage, however, is that a large amount of waste material is produced during forming of the blank.

According to the invention, because the blank is completely square, the transverse cuts can have a gabled or arched shape at the location of the intermediate panel, such that the regions on either side of each transverse cut have unequal dimensions, viewed in the direction parallel to the longitudinal fold lines. The largest of said regions, which in the finished container form partitions between adjacent compartments, is of a size such that it reaches virtually or completely to the base of the container. As a result a better separation between the compartments is obtained without this having an adverse effect on the strength of the other parts of the container, in particular of the side walls, as a consequence of cut-outs which are too large.

Both panels defining a side can be joined via a fold line with a panel defining a base. In this embodiment a double base is produced, which provides high strength.

Furthermore, the intermediate panel can have a section defining an end wall beyond each of the two outer transverse fold lines. The container can be robustly closed off at its two longitudinal ends by means of end walls of this type.

Preferably, the two outer transverse fold lines extend over the entire two panels defining a side and the side regions located beyond the two outer transverse fold lines are joined via a longitudinal fold line to an end wall section, which side regions are not joined to a panel defining a base and have an oblique fold line running from the point of intersection between an outer transverse fold line and a longitudinal fold line on one side and the free corner of said side region on the other side. With this embodiment the sides extend to beyond the end walls of the container, which provides a very rigid construction.

In this context, each base has, at both longitudinal ends, a transverse fold line located in the extension of, in each case, an outer transverse fold line, each of which determines an end base section, which end base sections can be accommodated between an end wall section and that region of the intermediate panel which is joined thereto via a transverse fold line. By gluing those sections of sides, base and intermediate panel which are lying against one another at the location of the end wall, a very robust and rigid container is produced.

With the blank according to the invention, the side wall of the container can be made in various shapes. For instance, according to a first possibility, each auxiliary cut can run in the longitudinal direction and intersect the transverse cut at an essentially right angle. The top edge of the sides of the finished container is then

straight.

According to another possibility, each auxiliary cut can comprise two oblique cut halves which intersect one another and the associated transverse cut at a common point of intersection. The top edge of the sides of the container now has triangular sections protruding upwards.

According to another possibility, a lid can be produced, in which case a panel forming the base is joined via a fold line to a lid which is foldable onto the transverse partitions defined by the transverse fold lines.

An embodiment of this type has greater stability and provides better protection for the packed products.

In particular, the lid can comprise a first lid panel joined via a fold line to a panel forming the base, the width of which first lid panel is essentially equal to the distance between the top of the transverse partitions and the base, and a second lid panel joined via a further fold line to the first lid panel.

One of the advantages of the blank according to the invention is that it is particularly suitable for high speed production and for shaping of the blank by machine immediately thereafter to produce a container. A method of this type makes the blank suitable for lightweight packaging for, for example, confectionery, biscuits and the like, the relevant machine being installed at the premises of the confectionery manufacturer. The packaging is produced from a stock roll and then filled with the product concerned.

The invention therefore relates to an installation for the production of a container from a blank according to one of the preceding embodiments, comprising:

feed means for feeding a piece of starting material in sheet form,
cutting and pressing means for making cuts and fold lines in the starting material in order to produce the blank, and
die means for folding the panels of the blank which in the finished container form the sides, as well as for folding the regions in the panel located between the sides in order to form the transverse partitions.

In this context it is pointed out that the blanks according to the prior art as described in the abovementioned US-A 2 690 866 and US-A 2 744 675 are not suitable for such completely mechanised processing to produce a container. In these cases the container is formed by hand. Such a procedure is economically not justifiable when packing large numbers of products in a relatively lightweight container, such as is the subject of the invention.

The installation according to the invention comprises an upper die and a lower die which are movable towards and away from one another, which lower die has two upright die sections running in the longitudinal direction, between which a number of transverse upright die sections positioned some distance apart are located,

the number of said transverse die sections being equal to the number of transverse partitions to be formed, and which upper die has a number of transverse pressing punches, which pressing punches overlap the upright die sections of the lower die when the lower die and upper die are in the position in which they are moved towards one another.

By means of the upper die and the lower die it is possible simultaneously to form the transverse partitions and to fold the side walls up. Even in the case of a blank made of lightweight material such as thin corrugated cardboard, it is possible in this way to form a container from the blank without the latter being damaged or pressed flat.

In this context the number of pressing punches is preferably equal to the number of transverse partitions plus one, which pressing punches are located alongside and between the upright transverse die sections when the lower die and upper die are in the position in which they are moved towards one another.

To obtain good functioning of the installation, the die sections running transversely can have a saddle roof-shaped top and their dimension transverse to the saddle roof shape can be virtually identical to the distance between two transverse partitions in the finished container, the upper limit of the transverse die sections preferably being at a higher level than that of the die sections running in the longitudinal direction.

In the case of this latter embodiment, an advantageous operation of the installation can be obtained, comprising the following steps:

feeding a piece of starting material in sheet form, making cuts and fold lines in the starting material to form a blank, placing the blank between the upper die and the lower die, and moving the upper die and the lower die towards one another, wherein, in a first stage, the pressing punches push the blank onto the transverse die sections and the transverse die sections push open the cuts in the blank, and in a second, immediately consecutive stage the die sections running in the longitudinal direction fold the panels forming the sides whilst at the same time the cuts are pushed further open.

By virtue of the saddle shape of the transverse die sections and their relatively high positioning in comparison with the die sections running in the longitudinal direction, the cut lines can be opened such that shaping of the blank into a container can proceed rapidly and without any hitches.

Moreover, the positions of the various die sections can be adjusted in a simple manner, such that blanks of diverse different formats and layouts can be handled by the installation according to the invention.

The invention is explained in more detail below with

the aid of a few illustrative embodiments shown in the figures.

Figure 1 shows a top view of a first blank.

Figure 2 shows a perspective view of a container produced from the first blank.

Figure 3 shows a second blank.

Figure 4 shows a detail of the container produced from the second blank.

Figure 5 shows further blank variants.

Figure 6 shows the side of the container produced from the blank according to Figure 5.

Figure 7 shows a blank for a container with a lid.

Figure 8 shows the container with lid.

Figure 9 shows the dies of the installation according to the invention, partially, in cross-section and in perspective.

Figure 10 shows the various steps in the procedure.

Figure 11 shows a variant of the installation with two lower dies.

The blank shown in Figure 1 comprises five panels, that is to say a first base panel 1, a first side panel 2, a second side panel 4, a panel 3 located between them, and a second base panel 5. Said panels are joined to one another by means of longitudinal fold lines 6, 7, 8, 9.

Furthermore, the blank comprises a number of transverse fold lines 10, 11. The transverse fold lines 11 are located at the extremities of the blank and intersect the longitudinal fold lines in such a way that they are also present in the side panels 2, 4 (transverse fold line sections 12, 13) and the base panels 1, 5 (transverse fold line sections 14, 15). Cuts 23 are provided in the extension of the longitudinal fold lines 6, 9 beyond the transverse fold lines 11.

The side regions which are located between, in each case, a transverse fold line section 12, 13, a longitudinal fold line 7, 8 and a cut 23 each have an oblique fold line 22.

A single oblique fold line 16 adjoins the point of intersection between each longitudinal fold line 7, 8 and each outer transverse fold line 11; two oblique single fold lines 16, which run at opposite angles, adjoin in each case the point of intersection between each longitudinal fold line 7, 8 and every other transverse fold line 10.

A cut 17, which intersects the end of a transverse cut 18 running transversely to the longitudinal fold lines 7, 8, runs, in each case, between the outermost ends of two oblique fold lines 16. In the illustrative embodiment shown, the transverse cut 18 is of gable shape, as a result of which relatively large regions 20 are formed on the one side and relatively small regions 19 are formed on the other side of each cut 18.

When producing a container, as shown in Figure 2, from the blank according to Figure 1, the side panels 2, 4 are first of all folded down around the fold lines 7, 8. During this folding movement, the side regions 21, which are delimited by longitudinal fold line 7 or 8, oblique fold line 16 and longitudinal cut 17, are likewise folded such that they come to lie against the remaining

part of the side panel concerned. At the same time, the regions 19, 20 are folded against one another about their transverse fold line 10.

The finished container is shown in Figure 2. The two base panels 1, 5 are folded on top of one another. The side regions in which the oblique fold lines 22 are located are folded about said fold line 22, as can be seen in Figure 2.

The base flaps 24 located outside the transverse fold line sections 14, 15 likewise overlap one another when the container is in the finished state. At one end of the container said base flaps 24 are inserted between the region 19 folded about the transverse fold line 11 and the region 25; at the other side of the container, said base flaps 24 are located between the region 20 and region 25.

The blank shown in Figures 3 and 4 substantially corresponds to that in Figure 1. Contrary to the blank according to Figure 1, two fold lines 26, 27 in each case are now made between the transverse cuts 18. When producing the container from the blank according to Figure 3, the regions 19 and 20 do not come to lie against one another as a bridge section 28 is located between them, which bridge section is delimited by, in each case, two fold lines 26, 27. With this arrangement the partition between, in each case, two compartments 30 has a greater strength and rigidity.

Although the blanks according to the figures both relate to a container having four compartments, the invention can be employed in the case of a container having different numbers of compartments as well.

The blank (partially) shown in Figure 5 produces a container which has a side as shown in the side view in Figure 6. In this case the respective protrusions 36, 37 and 38 are obtained by the incisions 31, 32, 33 and 34. In addition to a decorative effect, said protrusions also have the effect of increasing the strength of the side.

Figure 7 shows a blank having panels 53, 54 forming a lid. The panel 53, which is joined via a fold line to the panel 1 forming the base, comes to lie against side panel 4, whilst panel 54 comes to lie above the transverse partitions, as shown in Figure 8.

Figure 9 shows, diagrammatically, the upper die 40, consisting of three pressing punches 41, 42, which are mounted on the plate 43 indicated by broken lines.

A lower die 44 is also present, which lower die consists of die sections 45 running in the longitudinal direction and die sections 46, 47 which run in the transverse direction and which, per pair, have a saddle roof-shaped top. Said saddle roof shape has the oblique surfaces 48 and the flat top surfaces 49.

Thin lines indicate the positions at which the pressing punches come into contact with the blank. In Figure 9 the blank is shown in its initially shaped state, which is achieved when the blank 1 is lying on those die sections 45 of the lower die 44 which run in the longitudinal direction and the pressing punches 41, 42 have been moved down over a small distance to between said die

sections 45 running in the longitudinal direction.

As the saddle roof-shaped side of the die pairs 46, 47 running in the transverse direction, and in particular the top surfaces 49 thereof, are at a higher level than the top of die sections 45 running in the longitudinal direction, the regions 19, 20 of the blank are pushed open first of all during this operation, as a result of which the cuts 17, 18 are opened. In the subsequent stage, the panels 2 and 4 are folded up with respect to the panel 3, whilst pushing open of the regions 19, 20 continues. In the final stage, the panels 2, 4 have been bent through 90° with respect to the panel 3, said panels then lying against the inside of the die sections 45 running in the longitudinal direction. The regions 19, 20 are in contact with the vertical surfaces of, respectively, the die sections 46, 47 running in the transverse direction.

The abovementioned procedural steps are shown diagrammatically in Figure 10. First of all the blank according to Figures 7 and 8 is shown, with its various fold and cut lines. The supplementary panel 52, for forming a lid closure, has been added.

In the first procedural step, carried out by means of the upper die 40 and lower die 44, according to Figure 9, the panels 2 and 4 have been folded through 90° with respect to panel 3, the transverse partitions 19, 27 being formed.

In the subsequent procedural step, the panels 5 and 1, which have to form the base of the finished container, are folded onto one another.

The supplementary side wall panel 50 is then folded onto the side wall panel 4, after which the lid panel 51 is folded over the transverse partitions. Finally, the closure panel 52 is folded over as far as side panel 2 and, if desired, fixed with glue. It will be clear that in Figure 10 an upside down container has been obtained.

The variant of the installation shown in Figure 11 comprises two lower dies 44, 53, mounted on a carrier 54, which lower dies define two stations where different operations take place. In the first procedural step of Figure 10, the blank has just been shaped on the first lower die 44 to give the intermediate product with folded sides 2, 4 and transverse partitions 19, 27. The panels 5 and 1, which form the base, are folded on the second lower die, as is shown in procedural step 2 of Figure 10.

The carrier 54 with the lower dies 44, 53 is movable both in the horizontal direction and in the vertical direction (see the arrows). There is a product on both lower dies. The carrier moves the products to the following station; after the products have been formed on lower dies 44, 53, they are moved to the right. The blank on lower die 44 is then shaped to give a container by folding over its base panels. At that point in time the container has become a coherent whole, so that the lower die 44, with carrier, can be moved away downwards out of the finished container. The carrier then moves to the left and then upwards. Lower die 44 comes into position beneath a blank to be processed, which has been fed in in the interim, and beneath the upper die 40 (which is not

shown in Figure 11). Die 53 comes into position inside the finished container and on the following stroke to the right said finished container is discharged.

Claims

- Blank for the production of a container divided into compartments, for example for biscuits, chocolates and the like, comprising at least four panels joined by parallel longitudinal fold lines (6-9), which panels (1-5) in the finished container define, successively, a base (1, 5), a side (2), a number of transverse partitions and a side (5), of which panels the three panels (2-4) defined by the sides (2, 4) and the panel (3) located between them possess a number of parallel transverse cuts (18) which intersect the longitudinal fold lines (7, 8) which join said three panels (2-4), and of which panels the intermediate panel (3) possesses a number of transverse fold lines (10, 11) running to the longitudinal fold lines (7, 8) delimiting it, and the side panels (2, 4) possess oblique fold lines (16) running from the point of intersection of a longitudinal fold line (7, 8) with a transverse fold line (10, 26, 27), such that when the panels (2, 4) defined by the sides are folded with respect to the intermediate panel (3), the regions (19, 20) of the intermediate panel (3) which in each case are delimited between a transverse fold line (10, 26, 27), two oblique fold lines (16) and a cut (18) are folded with the formation of transverse partitions which define the compartments (30), characterised in that both ends of each transverse cut (18) intersect an auxiliary cut (17, 31-34), the two ends of which adjoin an oblique fold line (16).
- Blank according to Claim 1, wherein the transverse cuts (18) have a gabled or arched shape at the location of the intermediate panel (3), such that the regions (19, 20) on either side of each transverse cut (18) have unequal dimensions, viewed in the direction parallel to the longitudinal fold lines (7, 8).
- Blank according to Claim 1 or 2, wherein both panels (2, 4) defining a side are joined via a fold line (6, 9) with a panel (1, 5) defining a base.
- Blank according to Claim 1, 2 or 3, wherein the intermediate panel (3) has a section (25) defining an end wall beyond each of the two outer transverse fold lines (11).
- Blank according to Claim 4, wherein the two outer transverse fold lines (11) extend over the entire two panels (2, 4) defining a side and the side regions (31) located beyond the two outer transverse fold lines (11) are joined via a longitudinal fold line (7, 8) to an end wall section (25), which side regions (31)

are not joined to a panel (1, 5) defining a base and have an oblique fold line (22) running from the point of intersection between an outer transverse fold line (11) and a longitudinal fold line (7, 8) on one side and the free corner of said side region (31) on the other side.

6. Blank according to Claim 4 or 5, wherein each base (1, 5) has, at both longitudinal ends, a transverse fold line (14, 15) located in the extension of, in each case, an outer transverse fold line (11), each of which determines an end base section (24), which end base sections (24) can be accommodated between an end wall section (25) and that region (19 and 20 respectively) of the intermediate panel (3) which is joined thereto via a transverse fold line. 10
7. Blank according to one of the preceding claims, wherein, in each case, a number of pairs of transverse fold lines (26, 27) is provided in the intermediate panel (3), which pairs each enclose a bridge (28) which is joined at both ends via a longitudinal fold line (7, 8) to a panel (2, 4) defining a side. 15
8. Blank according to one of the preceding claims, wherein each auxiliary cut (17) runs in the longitudinal direction and intersects the transverse cut at an essentially right angle. 20
9. Blank according to one of Claims 1-7, wherein each auxiliary cut comprises two oblique cut halves (31) which intersect one another and the associated transverse cut at a common point of intersection (35). 25
10. Blank according to one of Claims 1-7, wherein each auxiliary cut has a cut mid section (33) which runs in the longitudinal direction and intersects the associated transverse cut (17) at an essentially right angle, a cut transverse section (32) adjoining each of the two ends of said cut mid section. 30
11. Blank according to one of Claims 1-7, wherein each auxiliary cut is arc-shaped (34) and intersects the associated transverse cut essentially half way along the length of its arc. 35
12. Blank according to one of the preceding claims, wherein a panel (1, 5) forming the base is joined via a fold line to a lid (53, 54) which is foldable onto the transverse partitions defined by the transverse fold lines (10, 26, 27). 40
13. Blank according to Claim 12, wherein the lid comprises a first lid panel (51) joined via a fold line to a panel (1, 5) forming the base, the width of which first lid panel (51) is essentially equal to the distance between the top of the transverse partitions and the 45

base, and a second lid panel (52) joined via a further fold line to the first lid panel (51).

14. Blank according to Claim 13, wherein the width of the second lid panel (52) is essentially equal to the width of the base. 5
15. Installation for the production of a container from a blank according to one of the preceding claims, comprising:

feed means for feeding a piece of starting material in sheet form,
cutting and pressing means for making cuts and fold lines in the starting material in order to produce the blank, and
die means for folding the panels of the blank which in the finished container form the sides, as well as for folding the regions in the panel located between the sides in order to form the transverse partitions. 10
16. Installation according to Claim 15, wherein the die means comprise an upper die and a lower die which are movable towards and away from one another, which lower die has two upright die sections running in the longitudinal direction, between which a number of transverse upright die sections positioned some distance apart are located, the number of said transverse die sections being equal to the number of transverse partitions to be formed, and which upper die has a number of transverse pressing punches, which pressing punches overlap the upright die sections of the lower die when the lower die and upper die are in the position in which they are moved towards one another. 15
17. Installation according to Claim 16, wherein the number of pressing punches is equal to the number of transverse partitions plus one, which pressing punches are located alongside and between the upright transverse die sections when the lower die and upper die are in the position in which they are moved towards one another. 20
18. Installation according to Claim 16 or 17, wherein the die sections running transversely have a saddle roof-shaped top and their dimension transverse to the saddle roof shape is virtually identical to the distance between two transverse partitions in the finished container. 25
19. Installation according to one of Claims 16 - 18, wherein the upper limit of the transverse die sections is at a higher level than that of the die sections running in the longitudinal direction. 30
20. Installation according to one of Claims 16 - 19,

wherein the lower die is movable in the longitudinal direction for moving, after folding of the side walls and the transverse partitions, to a station provided with means for folding the panels forming the base of the container.

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- 21.** Installation according to Claim 20, wherein the lower die is movable up and down for downward removal of the lower die from the container after formation of the base in the relevant station and for returning and moving upwards into its position beneath the upper die for receiving a subsequent blank.

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- 22.** Installation according to Claim 21, wherein two lower dies are provided, the first of which has an outermost position at the location of the upper die and the other of which has an outermost position at the location of the station for forming the base.

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- 23.** Method for producing a container from a blank according to one of Claims 1 - 11, by means of an installation according to one of Claims 16-22, comprising the following steps:

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feeding a piece of starting material in sheet form,

making cuts and fold lines in the starting material to form a blank,

placing the blank between the upper die and the lower die, and

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moving the upper die and the lower die towards one another, wherein, in a first stage, the pressing punches push the blank onto the transverse die sections and the transverse die sections push open the cuts in the blank, and in a second, immediately consecutive stage the die sections running in the longitudinal direction fold the panels forming the sides whilst at the same time the cuts are pushed further open.

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- 24.** Method according to Claim 23, wherein the lower die, with blank, is moved to a station for folding the panel (panels) forming the base.

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fig -1

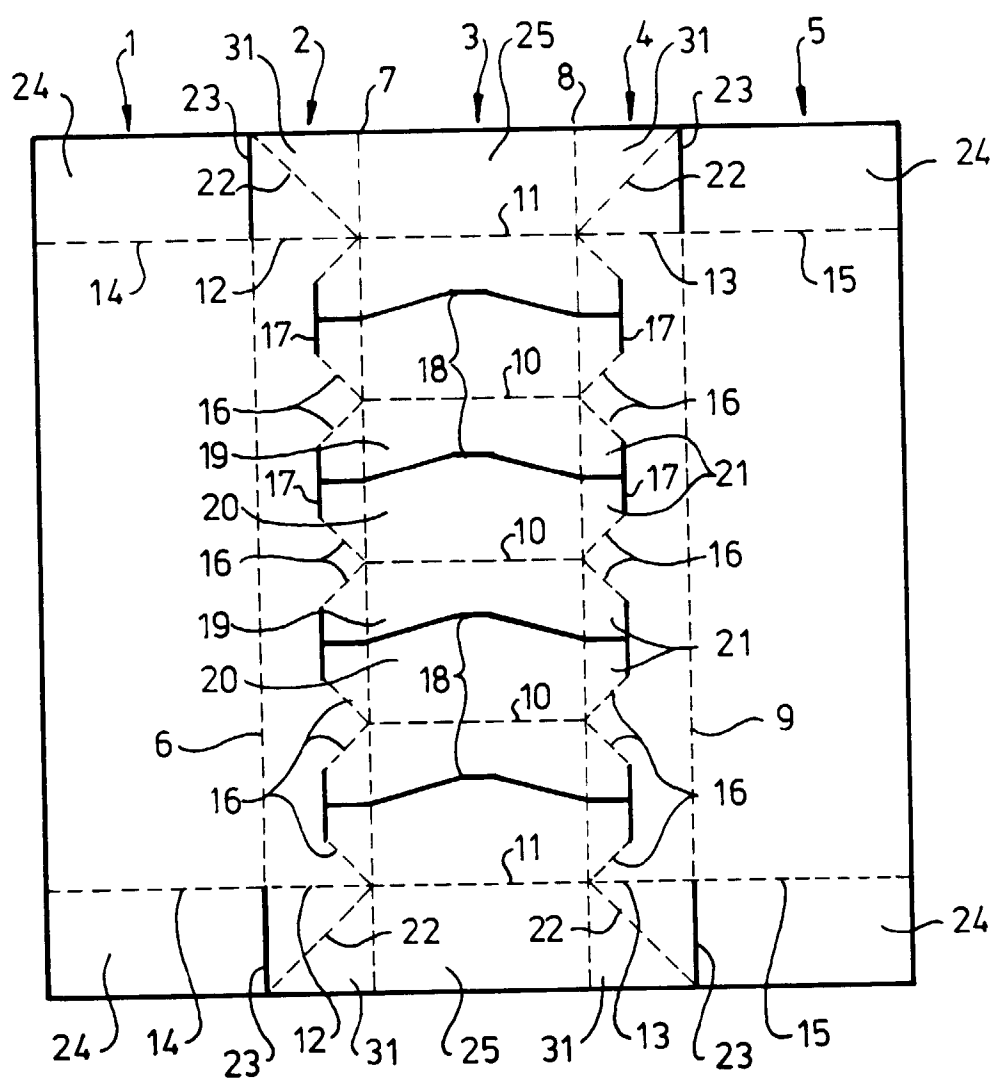


fig - 2

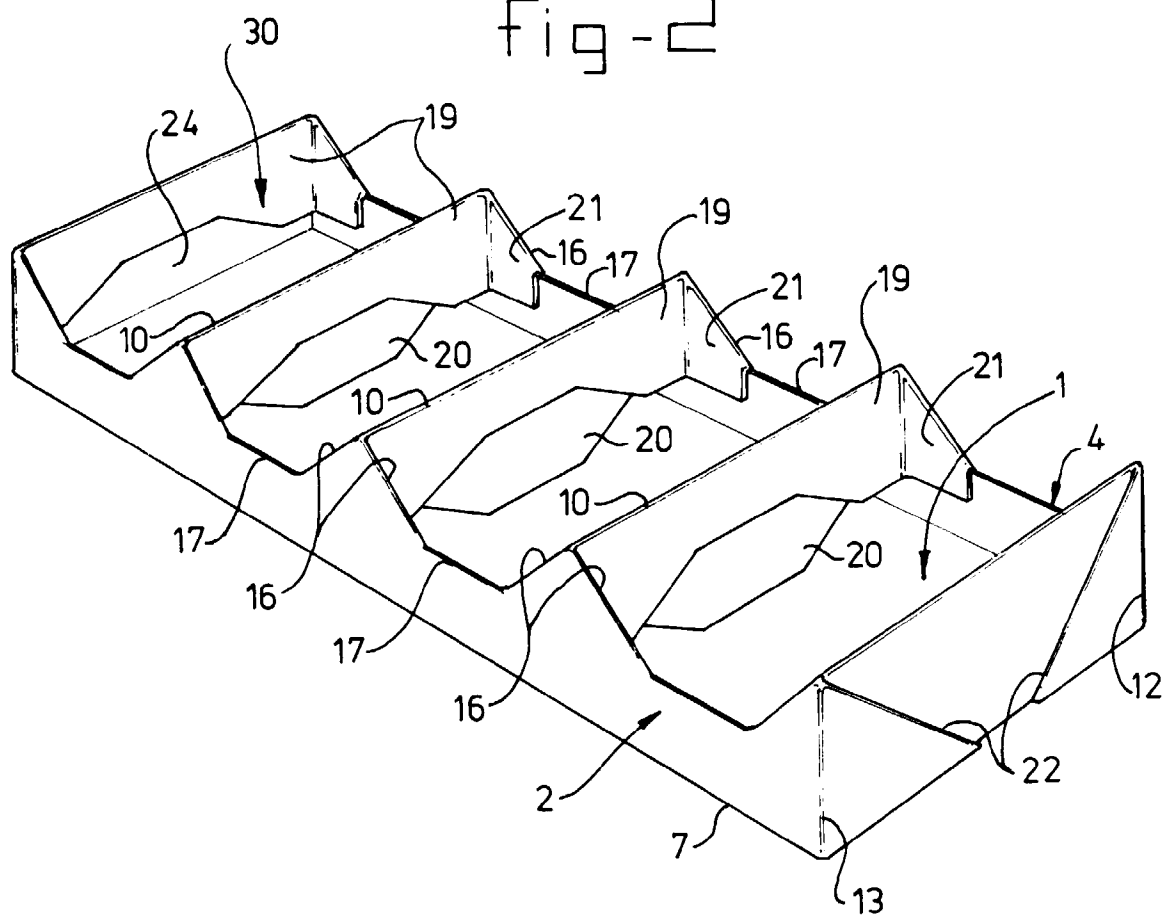


fig - 3

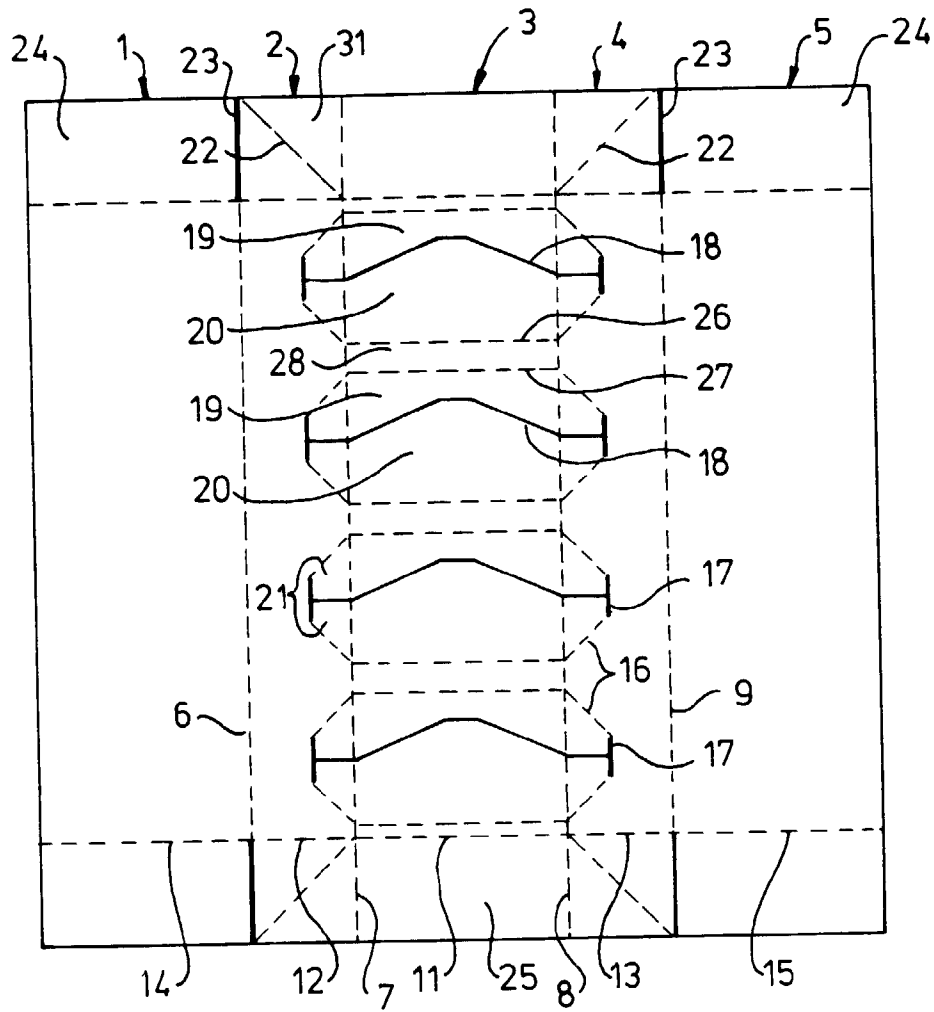


fig - 4

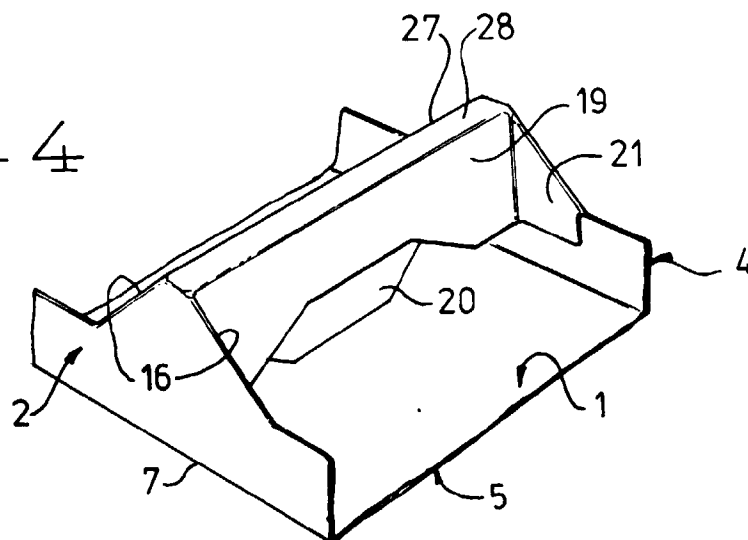


fig-5

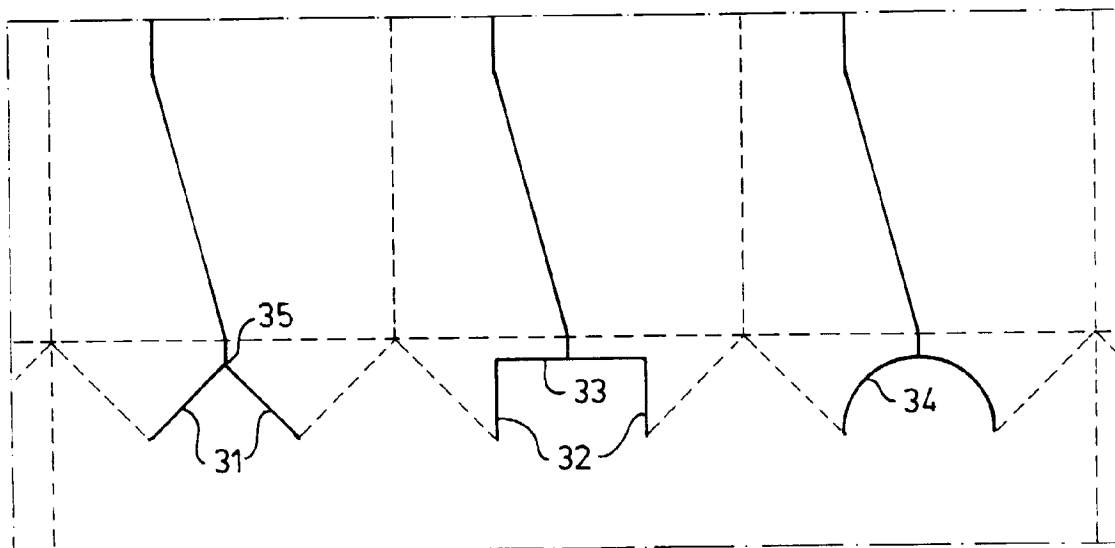


fig-6

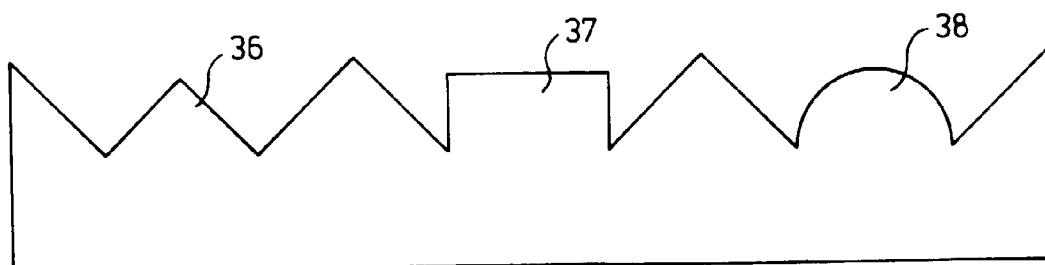


fig - 7

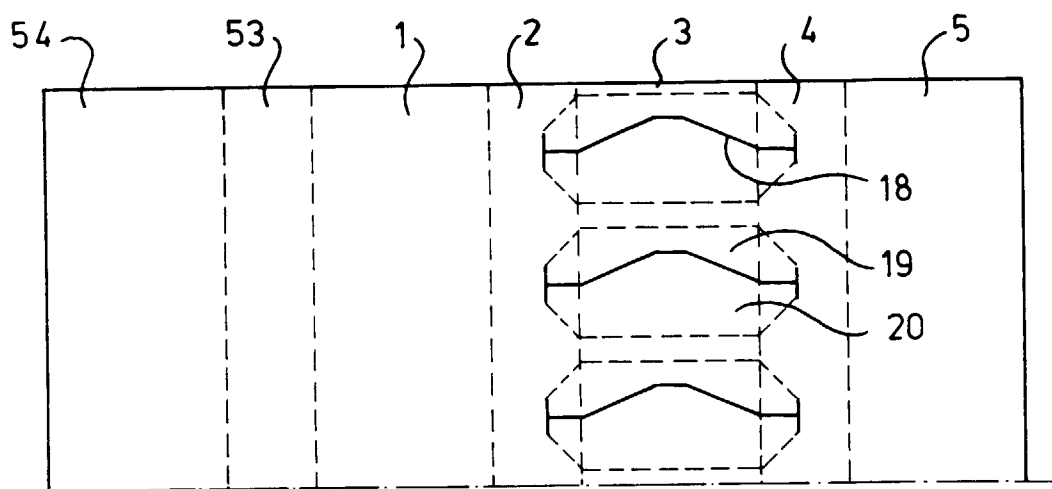
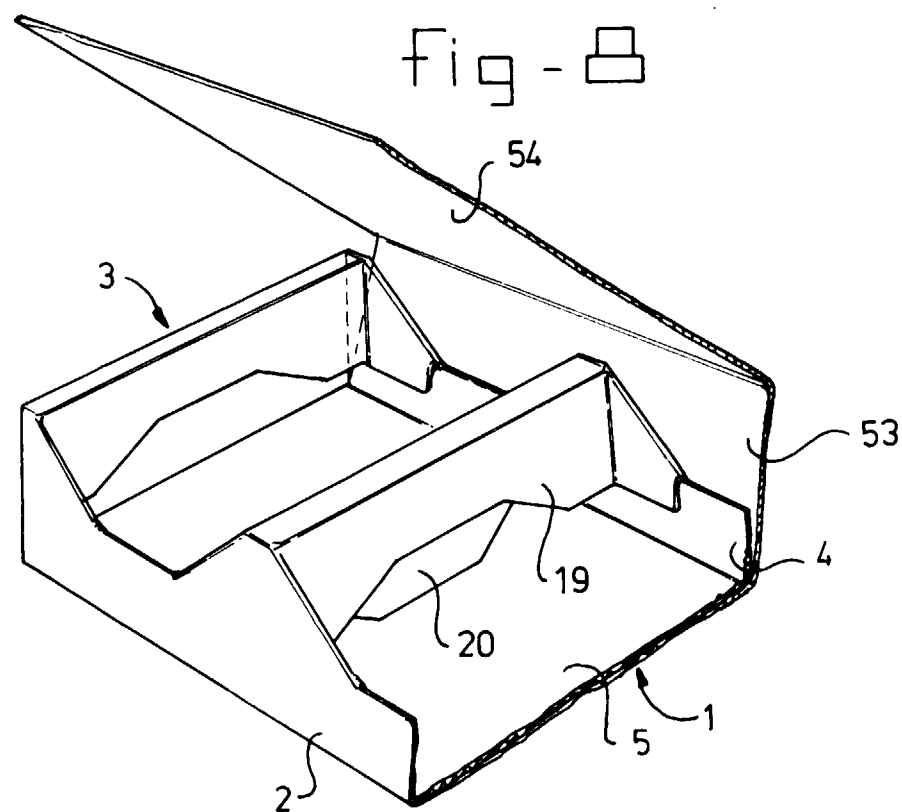


fig - 8



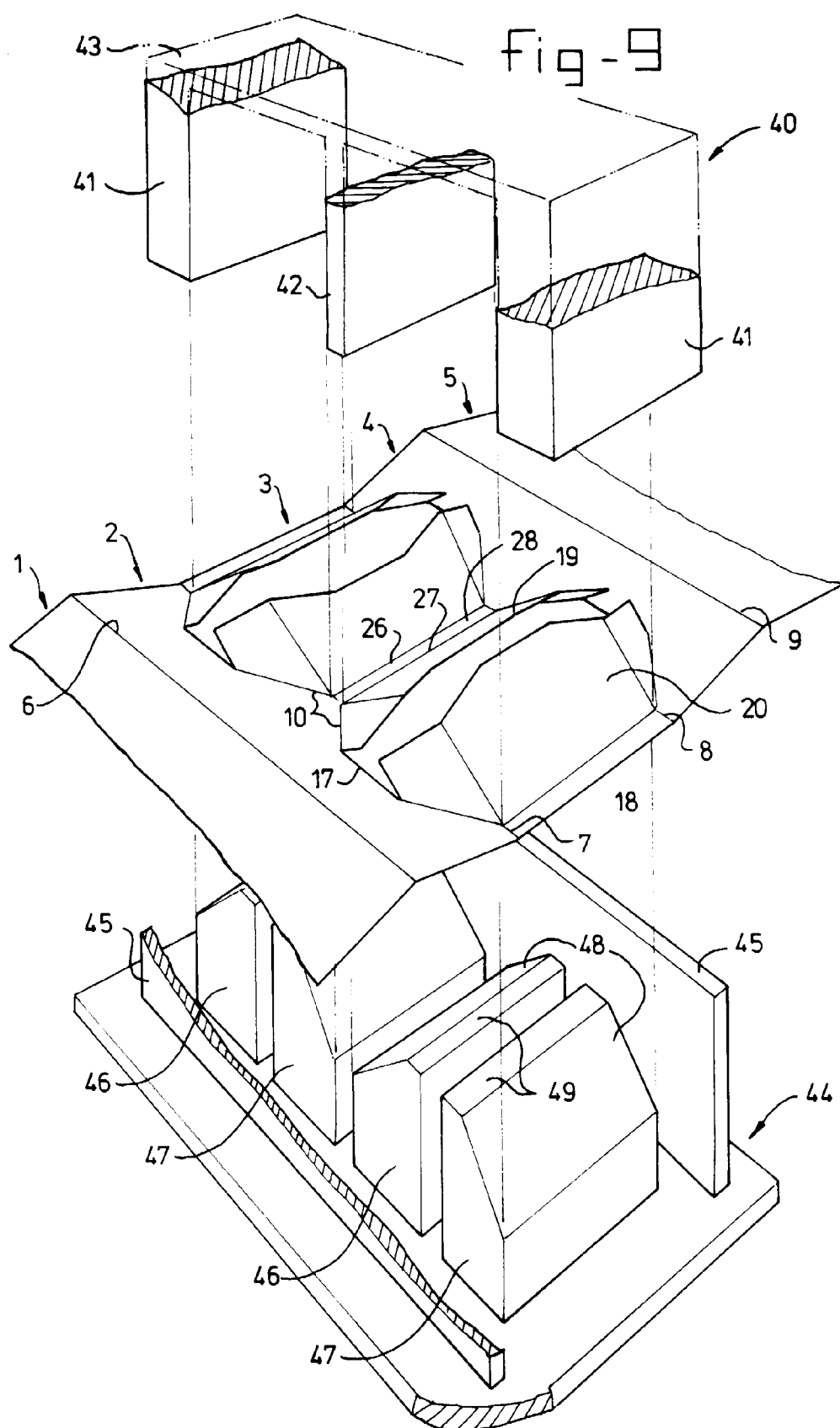


Fig-10

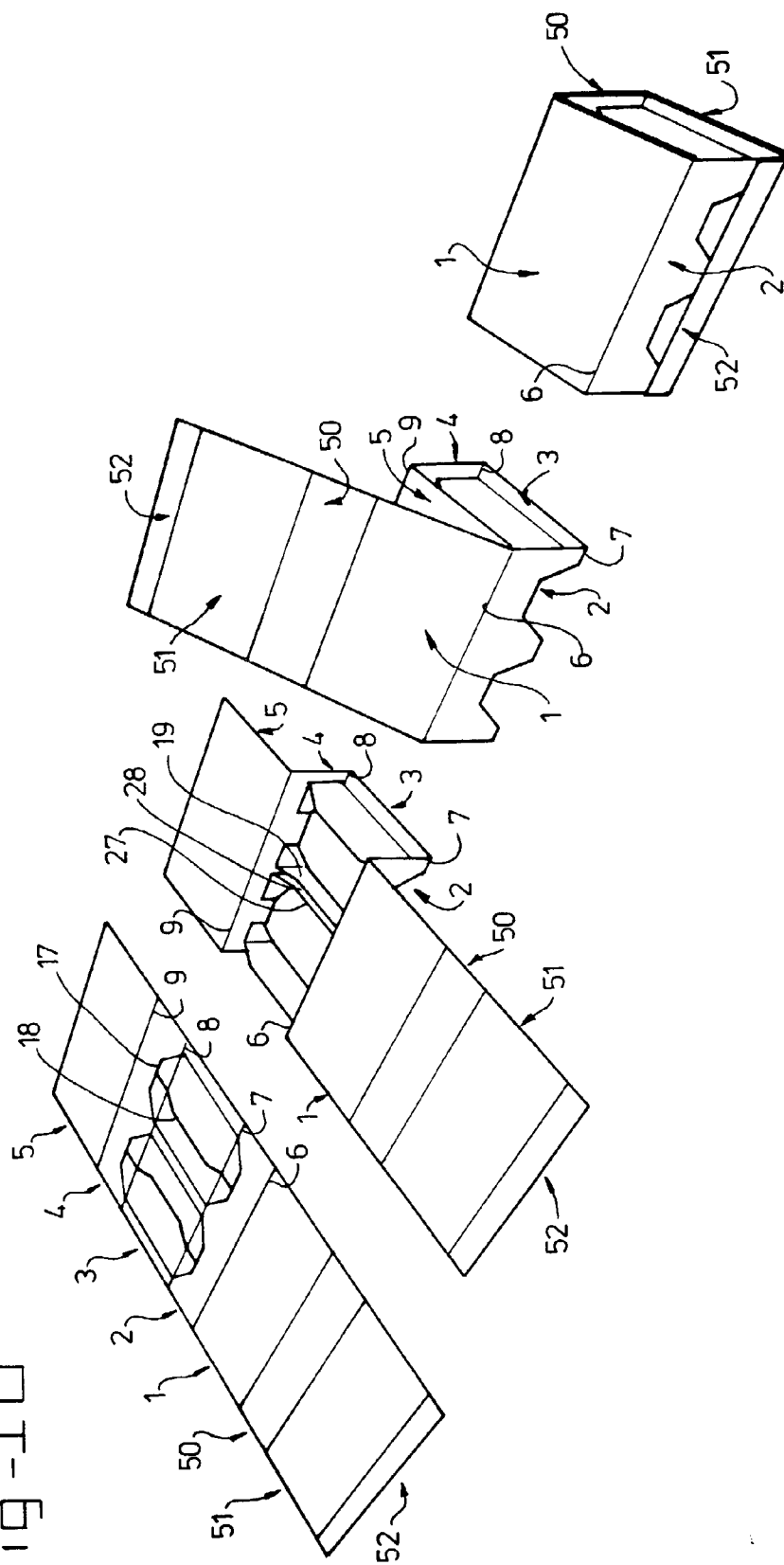


fig-11

