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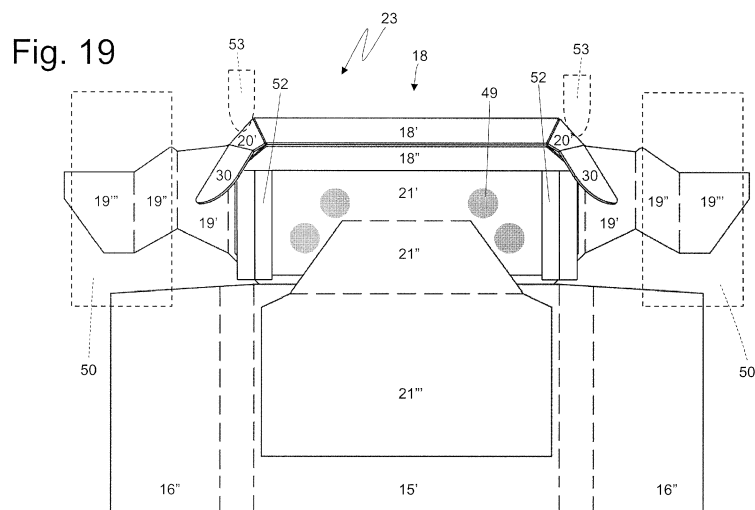
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(54) **WRAPPING METHOD AND UNIT TO FOLD A BLANK DESIGNED TO FORM A CONTAINER, SO AS TO MANUFACTURE A BOX-SHAPED FRONT WALL AND TWO BOX-SHAPED LATERAL WALLS OF A HINGED LID OF THE CONTAINER**

(57) Wrapping method and unit (35) to fold a blank (23) designed to form a container (4) so as to manufacture a box-shaped front wall (18) and two box-shaped lateral walls (19) of a hinged lid (11) of the container (4); the blank (23) has a first panel (17') making up a top wall (17) of the lid (11), a second panel (18') making up an outer part of the box-shaped front wall (18) of the lid (11), a third panel (18'') making up an inner part of the box-shaped front wall (18) of the lid (11), and a fourth panel (21'); the first panel (17') has a pair of lateral ap-

pendages, each of which consists of a first wing (19') making up an outer part of the box-shaped lateral wall (19) of the lid (11), a second wing (19'') making up an inner part of the box-shaped lateral wall (19) of the lid (11), and a third wing (19'''); and the second panel (18') has a pair of fourth wings (20'), which forms two connection walls (20) of the lid (11) and each of which is interposed between the box-shaped front wall (18) of the lid (11) and a lateral box-shaped wall (19) of the lid (11) and is provided with a connecting tab (30).



Description

TECHNICAL FIELD

[0001] The present invention relates to a wrapping method and unit to fold a blank designed to form a container so as to manufacture a box-shaped front wall and two box-shaped lateral walls of a hinged lid of the container.

[0002] In the following description, for brevity, reference will be made to a package of cigarettes with a sliding opening and with a hinged lid, without implying any loss of generality for the present invention.

PRIOR ART

[0003] The rigid packages for cigarettes with a hinged lid are the packages for cigarettes currently most widespread in the market as they are simple to manufacture, are easy and practical to use and offer a good mechanical protection to the cigarettes contained in the inside thereof.

[0004] Besides the aforementioned rigid packages of cigarettes with a hinged lid, rigid packages of cigarettes with a sliding (or slidable) opening have been proposed comprising two containers inserted one inside the other in a separable manner. In other words, a rigid package of cigarettes with a sliding opening comprises an inner container, which is suited to house a group of cigarettes wrapped in a wrapping sheet of metalized paper and is housed inside an outer container so as to be able to slide relative to the outer container itself between a closed configuration, in which the inner container is inserted inside the outer container, and an open configuration, in which the inner container is extracted from the outer container.

[0005] A rigid package of cigarettes with a sliding opening and with a hinged lid (for example as described in patent application EP2325093A1) has also been proposed, in which the outer container is provided with a hinged lid to rotate between a closed position and an open position of an open top end of the outer container. The lid has a connecting tab that at one end is integral with the lid and at the opposite end is integral with the inner container so as to "automatically" operate (that is, without the user having to touch the lid) the rotation of the lid by way of the sliding of the inner container relative to the outer container.

[0006] As described in patent application EP2325093A1, the lid, hinged to the outer container, comprises a top "flat" wall (that is, made up by a single cardboard panel, or by more cardboard panels packaged one on top of the other and therefore internally full) and front and lateral "box-shaped" walls (that is, made up of two cardboard panels spaced apart from one another and therefore internally empty) having a triangular cross section. A possible manufacturing manner of the lid, hinged to the outer container and provided with the "box-

shaped" walls, is provided in patent application EP2621376A1.

[0007] When the package of cigarettes described in patent application EP2325093A1 has bevelled (i.e. when it has an octagonal cross-section) or rounded longitudinal corners, the edges of the front wall are relatively spaced from the edges of the lateral walls and therefore between the front wall and the lateral walls, "holes" are provided that interrupt the continuity (i.e. create a noticeable discontinuity between the lateral walls and the front wall) and are generally not very appreciated by the users since they spoil the aspect of this area of the package making this area of the package seem "incomplete" (among other things this area of the package is the most visible part of the package itself being immediately next to the cigarettes). To solve this drawback, it has been proposed to provide the lid with two connection walls, which are interposed between the front wall and the lateral walls and restore the continuity between the front wall and the lateral walls themselves. In particular, each connection wall has its own connecting tab, which is glued on the inside of a corresponding lateral wall to keep the connection wall itself in the correct position.

[0008] It has been observed that the current known folding methods used to manufacture the box-shaped walls of the hinged lid of the outer container do not allow to achieve high productivity (that is, a high number of packages of cigarettes produced per time unit), in particular if a high quality standard is needed to be maintained. Consequently, the known packing machines used to manufacture the packages of cigarettes with sliding opening and with a hinged lid provided with box-shaped wall are excessively slow and suitable to produce only limited batches for special series.

DESCRIPTION OF THE INVENTION

[0009] The object of the present invention is to provide a wrapping method and unit to fold a blank designed to form a container, so as to manufacture a box-shaped front wall and two box-shaped lateral walls of a hinged lid of the container, which wrapping method and unit are free from the drawbacks described above and, in particular, are simple and inexpensive to manufacture.

[0010] According to the present invention, a wrapping method and unit are provided to fold a flat blank designed to form a container so as to manufacture a box-shaped front wall and two box-shaped lateral walls of a hinged lid of the container, as claimed in the attached claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting embodiment, wherein:

- Figure 1 is a front perspective view of a container manufactured according to the wrapping method of

- the present invention;
- Figure 2 is a schematic view and in cross section of the container of Figure 1;
 - Figure 3 is an enlarged view of a lid of the container of Figure 1;
 - Figure 4 is a plan view of a blank used to manufacture the container of Figure 1;
 - Figure 5 is a view in enlarged scale of a detail of the blank of Figure 4;
 - Figure 6 is a plan view of the partially folded blank of Figure 4;
 - Figure 7 is a view in enlarged scale of a detail of the partially folded blank of Figure 6;
 - Figure 8 is a cross-sectional view along line VIII-VIII of the partially folded blank of Figure 6;
 - Figure 9 is a longitudinal section view along line IX-IX of the partially folded blank of Figure 6;
 - Figure 10 is a schematic and perspective view of a wrapping unit, which performs a preliminary folding of the blank of Figure 4;
 - Figure 11 is a perspective view of the preliminary folding sequence of the blank of Figure 4, performed by the wrapping unit of Figure 10;
 - Figures 12-19 are a series of plan views of a top portion of the blank of Figure 4 during successive folding steps performed by the wrapping unit of Figure 10; and
 - Figure 20 is a plan view of a top portion of the blank of Figure 4 during a folding step performed by an alternative embodiment of the wrapping unit of Figure 10.

PREFERRED EMBODIMENTS OF THE INVENTION

[0012] In figure 1 number 4 denotes, as a whole, a container designed to contain a wrapped group of cigarettes (not illustrated). Preferably, the container 4 constitutes an outer container of a rigid package of cigarettes with a sliding opening by way of translation (linear movement) for example of the type described in patent application EP2325093A1. Consequently, the container 4 is suited to house an inner container in a sliding manner so as to allow the inner container itself to slide relative to the container 4 so as to move with a translation movement between a closed configuration, in which the inner container is fully inserted on the inside of the container 4, and an open configuration, in which the inner container is extracted from the container 4 so as to allow access to a group of wrapped cigarettes housed inside the inner container.

[0013] The container 4 has an open top end 10 and is provided with a lid 11, which is hinged to the container 4 along a hinge 12 to rotate, relative to the container 4 itself, between an open position (illustrated in Figure 1) and a closed position (not illustrated) of the open top end 10 of the container 4. The container 4 is parallelepiped-shaped and has a bottom wall 13 opposite to the top open end 10, a front wall 14 and a rear wall 15 parallel and opposite

to each other, and two lateral walls 16 parallel one to the other and interposed between the walls 14 and 15. Between the walls 14 and 15 and the lateral walls 16 four longitudinal corners are defined having a bevelled shape giving the container 4 an octagonal cross-section (well visible in figure 2).

[0014] As better illustrated in Figure 3, the lid 11 has a top wall 17 which, when the lid is in the closed position, closes the open top end 10 of the container 4, a front wall 18 and two lateral walls 19. The top wall 17 of the lid 11 is "flat" (that is, made up by a single cardboard panel, or by more cardboard panels packed one on top of the other and therefore internally full), whereas the walls 18 and 19 of the lid 11 are "box-shaped" (that is, made up by two cardboard panels spaced apart from one another and therefore internally empty) and have a triangular cross section. The lid 11 has a pair of connection walls 20, which are interposed between the front wall 18 and the lateral walls 19 and restore the continuity between the front wall 18 and the lateral walls 19 themselves.

[0015] When the lid 11 is in the closed position, the walls 18 and 19 of the lid 11 are inserted inside the top open end 10 of the container 4 so that the top wall 17 of the lid 11 is arranged flush with the top edges of the walls 14, 15 and 16 of the container 4.

[0016] According to a preferred embodiment, a rear wall of the inner container is connectable to the top wall 17 of the lid 11 by means of a connecting tab 21 (partly illustrated in Figures 1 and 3) to "automatically" operate (that is, without the user having to touch the lid 11) the rotation of the lid 11 by means of the sliding of the inner container relative to the container 4.

[0017] The container 4 of the package illustrated in Figure 1 is obtained starting from a blank 23 which is illustrated in Figure 4 and comprises, inter alia, a plurality of elements, which are marked, where possible, with accented reference numbers equal to the reference numbers that distinguish the corresponding walls of the container 4.

[0018] With reference to Figure 4, the blank 23 has two pairs of longitudinal pre-weakened folding lines 27 and a plurality of transverse pre-weakened folding lines 28, which define, between the two pairs of longitudinal folding lines 27, a panel 17' making up the top wall 17 of the lid 11, a panel 15' making up the rear wall 15 of the container 4, a panel 13' making up the lower wall 13 of the container 4, and a panel 14' making up the front wall 14 of the container 4.

[0019] To the panel 17' a panel 18' is connected along a transverse folding line 28 and in turn the panel 18' is connected to a panel 18'' along a transverse folding line 28; the two panels 18' and 18'' form the front wall 18 of the lid 11 and in particular form the outer part and the inner part of the front wall 18, respectively. To the panel 18'' and along a transverse folding line 28, the connecting tab 21 is connected, which in turn consists of four panels 21', 21'', 21''' and 21'''' which are separated, one from the other, by respective transverse folding lines 28; the panel

21' of the connecting tab 21 is glued to an inner surface of the top wall 17 of the lid 11 (therefore to an inner surface of the panel 17'), whereas the panel 21'" of the connecting tab 21 is glued to an outer surface of a rear wall of the inner container (after being overlapped and glued to the panel 21''').

[0020] The panel 14' has a pair of lateral wings 16', which make up an outer part of the lateral walls 16, are arranged on opposite sides of the panel 14', and are separated from panel 14' by the longitudinal folding lines 27. The panel 15' has a pair of lateral wings 16'', which are glued to the corresponding wings 16', make up an inner part 16 of the lateral walls, are arranged on opposite sides of panel 15', and are separated from panel 15' by the longitudinal folding lines 27.

[0021] The panel 17' has a pair of lateral appendages, which are arranged on opposite sides of the panel 17', are separated from panel 17' by the transverse folding lines 28, consist of respective wings 19', 19'' and 19''' separated one from the other by the transverse folding lines 28, and form the lateral walls 19 of the lid 11. Each lateral portion of the panel 17' has two wings 19' and 19'' which form the outer part and the inner part of a lateral wall 19, respectively, and a wing 19''' which is glued to an inner surface of the top wall 17 of the lid 11 (therefore to an inner surface of the panel 17') with the interposition of the panel 21' of the connecting tab 21 (i.e. the panel 21' is directly glued to the inner panel 17' and the wings 19'' are glued to the panel 21').

[0022] As better illustrated in Figure 5, the panel 18' has a pair of wings 20', which are arranged on opposite sides of the panel 18', are separated from the panel 18' by two corresponding oblique folding lines 29, and form the connection walls 20. Each wing 20' is provided with its own connecting tab 30, which is separated from the wing 20' by a same oblique folding line 31 and is arranged on the inside of a corresponding lateral wall 19 (which is arranged underneath a wing 19' of the corresponding lateral wall 19) as illustrated in Figure 8. According to an alternative embodiment not illustrated, each connecting tab 30 is arranged on the inside of the front wall 18 (i.e. is arranged underneath the panel 18' of the front wall 18).

[0023] As illustrated in Figure 4, the blank 23 comprises two connecting tabs 32, each of which is hinged to a corresponding wing 16'' and is folded by 90° relative to the corresponding wing 16'' itself so as to be glued on the inside of the panel 13'. The blank 23 comprises a through hole, which is obtained at the centre of the panel 14' (i.e. the centre of the front wall 14 of the container 4 as illustrated in Figure 1) and four reinforcing tabs 33 which are distributed around the through hole and are folded by 180° and glued onto an inner surface of the panel 14'. Finally, the blank comprises a reinforcing tab 34 which is folded by 180° and glued onto an inner surface of the panel 14'.

[0024] During the forming of the container 4, the blank 23 is preliminarily folded so as to form the walls 18 and 19 of the lid 11 and to fold the reinforcing tabs 33 and 34

as illustrated in Figure 6; in other words, the forming of the container 4 provides a preliminary folding of the blank 23 during which only the walls 18 and 19 of the lid 11 (together with the folding of the connecting tab 21) and the reinforcing tabs 33 and 34 are folded by passing the blank 23 from the fully extended configuration illustrated in Figure 4 to the partially folded configuration illustrated in Figure 6.

[0025] In the embodiment illustrated in the attached figures, the longitudinal corners of the container 4 are bevelled; according to alternative embodiments not illustrated, the longitudinal corners of the container 4 are rounded or straight.

[0026] As illustrated in Figure 10, a wrapping unit 35 is provided that performs the above-described preliminary folding of the blank 23, i.e. performs the folding of the walls 18 and 19 of lid 11 (together with the folding of the connecting tab 21) and of the reinforcing tabs 33 and 34 by passing the blank 23 from the fully extended configuration illustrated in Figure 4 to the partially folded configuration illustrated in figure 6.

[0027] The wrapping unit 35 comprises a wrapping conveyor 36 provided with a flexible conveyor belt which is wound in a loop around two end pulleys and supports a plurality of suction wrapping pockets 37 each suited to house a corresponding blank 23 for feeding the blank 23 along a wrapping path P which is "U"-shaped and extends between an input station S1 and an output station S2. The input station S1 is arranged along an initial rectilinear section of the wrapping path P and the output station S2 is arranged along a rectilinear end section of the wrapping path P which is connected to the rectilinear initial section by means of a semi-circular intermediate section. At the input station S1, a hopper (not illustrated) is provided, which houses a stack of blanks 23 and cyclically feeds the blanks 23 from a lower outlet mouth towards the wrapping pockets 37 of the wrapping conveyor 36; in particular, each blank 23 arranged at the bottom outlet mouth of the hopper is drawn by a suction gripping head which moves vertically and is laid on an underlying wrapping pocket 37 of the wrapping conveyor 36 which is in holding position in the input station S1 aligned with the bottom outlet mouth.

[0028] To the wrapping conveyor 36 a folding device 38 is coupled, which is arranged along the wrapping path P immediately downstream of the input station S1 and performs a "back and forth" folding of the connecting tabs 30 around the corresponding oblique folding lines 31 so as to weaken the oblique folding lines 31 themselves. In other words, the folding device 38 folds in a first direction and then in the opposite direction each connecting tab 30 around the corresponding oblique folding line 31 not for changing the position of the connecting tab 30 (at the end of the folding, the connecting tab 30 is located exactly at the initial position), but only for weakening (stressing) the folding line 31 (i.e. to reduce the resistance of the wrapping material 31 along the oblique folding line).

[0029] To the wrapping conveyor 36 a glueing device

39 is coupled, which is arranged along the wrapping path P downstream of the folding device 38 and applies glue 40 (illustrated in Figure 12) on the panel 21''' of each blank 23. To the wrapping conveyor 36 a folding device 41 is coupled, which is arranged downstream of the glueing device 39 along the wrapping path P and folds each panel 21''' relative to the corresponding panel 21''' so as to overlap and glue the panels 21''' and 21''' themselves; preferably, the folding device 41 is made-up by a fixed folding profile that causes each panel 21''' to be folded by means of the effect of the feeding movement imposed by the wrapping conveyor 36. To the wrapping conveyor 36 a pressing device 42 is coupled, which is arranged downstream of the folding device 41 along the wrapping path P and presses, with a given force, the panels 21''' and 21''' against one another so as to favour the mutual glueing of the panels 21''' and 21''' themselves.

[0030] To the wrapping conveyor 36 a glueing device 43 is coupled, which is arranged along the wrapping path P downstream of the pressing device 42 and applies glue 44 (illustrated in Figure 14) on the panel 17' of each blank 23. To the wrapping conveyor 36 a folding device 45 is coupled, which is arranged downstream of the glueing device 43 along the wrapping path P and, in each blank 23, simultaneously folds the panel 18' relative to the panel 17' and relative to the panel 18'' and the panel 18'' relative to the panel 18' and relative to the panel 21' so as to form the front wall 18 of the lid 11 by simultaneously lying the panels 21' and 22' on panel 17' (the panel 21' overlaps the glue 44 previously applied) and the panels 21''' and 21''' (overlapped and glued together) on the panel 15'. Preferably, the folding device 45 is made-up by a fixed folding profile which causes, in each blank 23, the panels 18', 18'' and 21' to be folded by means of the feeding movement effect imposed by the wrapping conveyor 36. In other words, in each blank 23, the folding device 45 simultaneously folds the panel 18' relative to the panel 17', the panel 18'' relative to panel 18' and panel 21' relative to the panel 18'' so as to place the panel 21' in contact with the panel 17' (to which is glued by the effect of the glue 44), and, at the same time, to form the box-shaped front wall 18 of the lid 11 by arranging the panel 18' and the panel 18'' inclined one relative to the other.

[0031] To the wrapping conveyor 36 a pressing device 46 is coupled, which is arranged downstream of the folding device 45 along the wrapping path P and presses with a given force the panels 21' and 17' one against the other so as to favour the mutual glueing of the panels 21' and 17' themselves.

[0032] According to a preferred embodiment, the folding device 45 comprises a contrasting body 47 (illustrated schematically in Figures 15 and 17) with a prismatic shape and with a triangular cross section, around which the panels 18' and 18'' are folded so as to form, with more precision, the front wall 18 of the lid 11 as further described in the patent application WO2013011455A1.

[0033] To the wrapping conveyor 36 a glueing device 48 is coupled which is arranged along the wrapping path

P downstream of the pressing device 46 and applies glue 49 (illustrated in Figures 17, 18 and 19) on the panel 21' (which has been previously overlapped on and glued to the panel 17') of each blank 23. To the wrapping conveyor 36 a folding device 50 is coupled which is arranged downstream of the glueing device 48 along the wrapping path P (in particular near the curved part of the wrapping path P) and in each blank 23 simultaneously folds, in each lateral appendage of the panel 17', the wing 19' relative to panel 17', the wing 19'' relative to the wing 19' and the wing 19''' relative to the wing 19'' so as to place the wing 19''' in contact with the panel 21' (over the previously applied glue 49), and, at the same time, to form the box-shaped lateral wall 19 of the lid 11 by arranging the wing 19' and the wing 19'' one relative to the other. Preferably, the folding device 50 consists of movable parts which are supported by two vertical arms, each of which is part of an articulated parallelogram (as illustrated in Figure 10). Obviously, the folding device 50 may be shaped differently.

[0034] To the wrapping conveyor 36 a pressing device 51 is coupled, which is arranged downstream of the folding device 50 along the wrapping path P (in particular at the curved part of the wrapping path P) and presses against each other, with a given force, the wings 19''' and the panel 21' (which has been previously overlapped and glued to the panel 17') so as to favour the glueing of the wings 19''' to the panel 21'. As previously mentioned, the folding device 50 is arranged at an end portion of a straight section of the wrapping path P, whereas the pressing device 51 is arranged along a curvilinear section and is provided with grippers mounted in a rotatable manner that follow each blank 23 along an arc of the curved section. According to a preferred embodiment, the folding device 50 comprises two contrasting bodies 52 (illustrated schematically in Figures 18 and 19) with a prismatic shape and with a triangular cross section and around which the wings 19' and 19'' are folded so as to form, with more precision, the lateral walls 19 of the lid 11 as further described in the patent application WO2013011455A1.

[0035] In the embodiment illustrated in the attached figures, the folding device 50 comprises two pushing elements 53 (illustrated schematically in Figures 18 and 19), each of which pushes on a corresponding wing 20' while the wings 19', 19'' and 19''' are being folded so as to place the corresponding connecting tab 30 on the path of the wing 19', and therefore cause the wing 19' to intercept the connecting tab 30 by arranging the connecting tab 30 underneath the wing 19' itself (and thus inside the corresponding lateral wall 19 of the lid 11). In other words, simultaneously with the forming of the lateral walls 19 of the lid 11 by way of the action of the folding device 50, the pushing elements 53 of the folding device 50 push on the wings 20' to arrange the corresponding connecting tabs 30 under the wing 19' and so that the connecting tabs 30 are embedded inside the lateral walls 19 of the lid 11. Therefore, each connecting tab 30, being arranged

underneath the corresponding wing 19', gets trapped inside a box-shaped lateral wall 19 of the lid 11 between the first wing 19' and the second wing 19". Each pushing element 53 by pushing on the corresponding wing 20' causes the wing 20' to be folded relative to the panel 18' itself and around the corresponding oblique folding line 29, as is evident by comparing the position of the wings 20' and of the connecting tabs 30 in Figure 18 (before being folded) and in Figure 19 (after being folded). Subsequently, each wing 19' by intercepting the corresponding connecting tab 30 causes the tab 30 itself to be folded relative to the wing 20' and around the oblique folding line 31 and also a (small) folding (residual) of the wing 20' relative to the panel 18' and around the oblique folding line 29. In particular, each connecting tab 30 is arranged underneath the wing 19' between the wing 19' itself and the corresponding contrasting body 52; when the corresponding contrasting body 52 is axially withdrawn at the end of folding, each connecting tab 30 becomes "trapped" inside the corresponding lateral wall 19 of the lid 11.

[0036] In the alternative (and perfectly equivalent) embodiment illustrated in Figure 20, the folding device 45 comprises two pushing elements 54 (illustrated schematically in Figure 20), each of which pushes on a corresponding wing 20' while the panels 18', 18" and 21' are being folded so as to place the corresponding connecting tab 30 on the path of the panel 18", and therefore cause the panel 18" to intercept the connecting tab 30 by arranging the connecting tab 30 underneath the panel 18" itself (and therefore inside the front wall 18 of the lid 11). In other words, simultaneously with the forming of the front wall 18 of the lid 11 by way of the action of the folding device 45, the pushing elements 54 of the folding device 45 push on the wings 20' to arrange the corresponding connecting tabs 30 under the panel 18", and therefore cause the connecting tabs 30 to be embedded inside the front wall 18 of the lid 11. Then, each connecting tab 30, being arranged underneath the panel 18', becomes trapped inside the front wall 18 of the box-shaped lid 11 between the panel 18' and the panel 18". Each pushing element 54 by pushing on the corresponding wing 20' causes the wing 20' itself to be folded relative to the panel 18' and around the corresponding oblique folding line 29. Subsequently, the panel 18" by intercepting each connecting tab 30 causes the tab 30 itself to be folded relative to the wing 20' and around the oblique folding line 31 and also a (small) folding (residual) of the wing 20' relative to the panel 18' and around the oblique folding line 29. In particular, each connecting tab 30 is arranged underneath the panel 18" between the panel 18" itself and the contrasting body 47; when the contrasting body 47 is axially withdrawn at the end of the folding, each connecting tab 30 becomes "trapped" inside the front wall 18 of the lid 11.

[0037] In the embodiments described above, each connecting tab 30 is completely free from glue and is simply mechanically fitted inside a corresponding lateral

wall 19 of the lid 11 or inside the front wall 18 of the lid 11.

[0038] As previously mentioned, the folding device 38 weakens in advance (that is, before the pushing elements 53 or 54 are being activated) each oblique folding line 31 by folding back and forth the corresponding connecting tab 30 around the oblique folding line 31 itself; in this way, the connecting tabs 30 have less resistance in following the movement of the corresponding wing 20' or of the panel 18" when they are intercepted by the corresponding wing 20' or by the panel 18" and therefore accomplishing an overall improved insertion of the connecting tabs 30 inside the lateral walls 19 of the lid 11 or the front wall 18 of the lid 11.

[0039] With reference to figures 12-19, the preliminary folding of the blank 23 so as to form the walls 18 and 19 of lid 11 is described.

[0040] As illustrated in Figure 12, the glueing device 39 applies the glue 40 on the panel 21"". Subsequently and as illustrated in Figure 13, the folding device 41 folds the panel 21"" over the panel 21"" to overlap and glue the panels 21"" and 21"" one to the other. At this point and as illustrated in Figure 14, the glueing device 43 applies the glue 44 on the panel 17'. Subsequently and as illustrated in Figures 15 and 16, the folding device 41 folds the panels 21', 18" and 18' so as to lay the panel 21' on the panel 17' (over the glue 44 previously applied) and so as to form the front wall 18 of the lid 11; at this step, the contrasting body 47 is arranged over the panel 17' and at the front wall 18 of the lid 11 by means of an axial movement to provide a contrast against which the panels 18" and 18' are being folded during the forming of the front wall 18 of the lid 11. At this point and as illustrated in figure 17, the contrasting body 47 is axially withdrawn from the front wall 18 of the lid 11 just formed and, more or less simultaneously, the glueing device 48 applies the glue 49 on the panel 21'. Subsequently and as illustrated in Figure 18, the folding device 50 is coupled to the blank 23 to fold the wings 19', 19" and 19"" and thus form the lateral walls 19 of the lid 11; the folding device 50 comprises the pushing elements 53, each of which pushes on a corresponding wing 20' while the wings 19', 19" and 19"" are being folded so as to place the corresponding connecting tab 30 on the path of the wing 19' and so that the wing 19' intercepts the connecting tab 30 by arranging the connecting tab 30 underneath the wing 19' itself (and therefore inside the corresponding lateral wall 19 of the lid 11). By comparing the position of the wings 20' (and thus of the connecting tabs 30 carried by the wings 20') in Figure 18 (before the pushing elements 53 are activated) and in Figure 19 (during or after the pushing elements 53 are activated) it can be seen how the pushing elements 53 push on the wings 20' to place the connecting tabs 30 on the path of the wings 19'.

[0041] In Figure 20 an alternative of the folding device 45 is illustrated, which is provided with the pushing elements 54, each of which pushes against a corresponding wing 20' while the panels 18', 18" and 21' are being folded so as to place the corresponding connecting tab 30 on

the path of the panel 18", and therefore cause the panel 18" to intercept the connecting tab 30, thus placing the connecting tab 30 underneath the panel 18" itself (and therefore inside the front wall 18 of the lid 11).

[0042] The wrapping method and the corresponding wrapping unit 35 described above have numerous advantages.

[0043] In the first place, the wrapping method and the corresponding wrapping unit 35 described above allow to manufacture the containers 4 with high productivity (that is, with a high number of containers 4 produced per time unit) while keeping a high quality standard. This result is also obtained thanks to the fact that the folding of the connecting tabs 30 is not performed by direct action effect of a folding element which contacts the connecting tabs 30 (the action of said folding element would require a long time to not interfere with the folding of the panels 18' and 18" or with the folding of the wings 19' and 19"), but is performed by the movement effect of the panel 18' or of the wings 19'; in this respect it is important to note that the pushing elements 53 or 54 by acting solely on the wings 20' are always external to the trajectory of the panels 18' and 18" or of the wings 19' and 19" and therefore no further movement should be performed to "dodge" the movement of the panels 18' and 18" or of the wings 19' and 19".

[0044] In addition, the wrapping method and the corresponding wrapping unit 35 allow to establish and maintain in the desired position the connecting tabs 30 without the use of glue (as the connecting tabs 30 become "trapped" inside the lateral walls 19 of the lid 11 or inside the front wall 18 of the lid 11); in this way both a saving in the wrapping process (being able to use one less glueing device), and a saving in the container 4 (which takes less glue) are obtained.

[0045] Finally, the wrapping method and the corresponding wrapping unit 35 described above are relatively simple to implement.

Claims

1. A wrapping method to fold a blank (23) designed to form a container (4), so as to manufacture a box-shaped front wall (18) and two box-shaped lateral walls (19) of a hinged lid (11) of the container (4); wherein the blank (23) has a first panel (17') making up a top wall (17) of the lid (11), a second panel (18') making up an outer part of the box-shaped front wall (18) of the lid (11), a third panel (18") making up an inner part of the box-shaped front wall (18) of the lid (11), and a fourth panel (21'); wherein the first panel (17') has a pair of lateral appendages, which are arranged on opposite sides of the first panel (17'), are separated from the first panel (17') by longitudinal folding lines (27), and each of which is made up of a first wing (19') constituting an outer part of the box-shaped lateral wall (19) of the

lid (11), a second wing (19") constituting an inner part of the box-shaped lateral wall (19) of the lid (11), and a third wing (19'''); wherein the second panel (18') has a pair of fourth wings (20'), which are arranged on opposite sides of the second panel (18'), are separated from the second panel (18') by two corresponding first oblique folding lines (29), and make up two connection walls (20) of the lid (11), each of which is interposed between the box-shaped front wall (18) of the lid (11) and a box-shaped lateral wall (19) of the lid (11); and wherein each fourth wing (20') is provided with a connecting tab (30), which is separated from the fourth wing (20') by a second oblique folding line (31); the wrapping method comprises the steps of:

applying, by means of a first glueing device (43), a first glue (44) between the first panel (17') and the fourth panel (21'); simultaneously folding, by means of a first folding device (45), the second panel (18') relative to the first panel (17'), the third panel (18") relative to the second panel (18') and the fourth panel (21') relative to the third panel (18"), so as to place the fourth panel (21') in contact with the first panel (17') and, at the same time, to form the box-shaped front wall (18) of the lid (11) by arranging the second panel (18') and the third panel (18") in such a way that they are inclined relative to each other;

applying, by means of a second glueing device (48), a second glue (49) between each third wing (19'') and the fourth panel, (21') which overlaps and is glued to the first panel (17'); and

simultaneously folding, by means of a second folding device (50) and in each lateral appendage of the first panel (17'), the first wing (19') relative to the first panel (17'), the second wing (19") relative to the first wing (19') and the third wing (19''') relative to the second wing (19"), so as to bring the third wing (19''') in contact with the fourth panel (21') and, at the same time, to form the box-shaped lateral wall (19) of the lid (11) by arranging the first wing (19') and the second wing (19") in such a way that they are inclined relative to each other;

applying, by means of a second glueing device (48), a second glue (49) between each third wing (19'') and the fourth panel, (21') which overlaps and is glued to the first panel (17'); and

simultaneously folding, by means of a second folding device (50) and in each lateral appendage of the first panel (17'), the first wing (19') relative to the first panel (17'), the second wing (19") relative to the first wing (19') and the third wing (19''') relative to the second wing (19"), so as to bring the third wing (19''') in contact with the fourth panel (21') and, at the same time, to form the box-shaped lateral wall (19) of the lid (11) by arranging the first wing (19') and the second wing (19") in such a way that they are inclined relative to each other;

the wrapping method is **characterized in that** it comprises the further steps of:

pushing, by means of a first pushing element (54), on each fourth wing (20') while the second, third and fourth panel (18', 18" and 21') are being folded, so as to place the corresponding connecting tab (30) on the path of the third panel (18") and therefore cause the third panel (18") to intercept the connecting tab (30), thus placing the connecting tab (30) underneath the third

- panel (18"); or
pushing, by means of a second pushing element (53), on each fourth wing (20') while the first, second and third wing (19', 19", 19''') are being folded, so as to place the corresponding connecting tab (30) on the path of the corresponding first wing (19') and therefore cause the first wing (19') to intercept the connecting tab (30), thus placing the connecting tab (30) underneath the first wing (19').
2. A wrapping method according to claim 1, wherein each connecting tab (30) is completely free from glue.
 3. A wrapping method according to claim 1 or 2, wherein the pushing element (53; 54), by pushing on each fourth wing (20'), causes the fourth wing (20') to be folded relative to the second panel (18') and around the corresponding first oblique folding line (29).
 4. A wrapping method according to claim 1, 2 or 3, wherein:

the third panel (18"), by intercepting each connecting tab (30), causes the connecting tab (30) to be folded relative to the fourth wing (20') and around the corresponding second oblique folding line (31); or

each first wing (19'), by intercepting the corresponding connecting tab (30), causes the connecting tab (30) to be folded relative to the fourth wing (20') and around the corresponding second oblique folding line (31).
 5. A wrapping method according to any of the claims from 1 to 4, wherein:

each connecting tab (30), by being placed underneath the third panel (18"), gets trapped inside the box-shaped front wall (18) of the lid (11) between the second panel (18') and the third panel (18"); or

each connecting tab (30), by being placed underneath the corresponding first wing (19'), gets trapped inside a box-shaped lateral wall (19) of the lid (11) between the first wing (19') and the second wing (19").
 6. A wrapping method according to any of the claims from 1 to 5 and comprising the further step of weakening each second oblique folding line (31) before pushing, by means of the pushing element (53; 54), on the corresponding fourth wing (20').
 7. A wrapping method according to claim 6, wherein each second oblique folding line (31) is weakened by folding the corresponding connecting tab (30) back and forth around the oblique folding line (31).
 8. A wrapping method according to any of the claims from 1 to 7, wherein the blank (23) has a fifth panel (21"), which is connected to the fourth panel (21') along a transverse folding line (28), a sixth panel (21'''), which is connected to the fifth panel (21") along a transverse folding line (28), and a seventh panel (21'''), which is connected to the sixth panel (21''') along a transverse folding line (28); the wrapping method comprises the further steps of:

applying a third glue (40) between the fifth panel (21''') and the seventh panel (21'''); and

folding the sixth panel (21''') relative to the seventh panel (21''') so as to place the sixth panel (21''') on top of the seventh panel (21''') before folding the second panel (18') relative to the first panel (17') and so as to lay the seventh panel (21'''), placed on top of the sixth panel (21'''), upon the third panel (15') when the second panel (18') is folded relative to the first panel (17').
 9. A wrapping method according to any of the claims from 1 to 8 and comprising the further step of keeping the first panel (17') and the fourth panel (21') pressed against each other by means of a first pressing device (46) arranged downstream of the first folding device (45).
 10. A wrapping method according to any of the claims from 1 to 9 and comprising the further step of keeping each third wing (19''') and the corresponding fourth panel (21') pressed against each other by means of a second pressing device (51) arranged downstream of the second folding device (50).
 11. A wrapping method according to any of the claims from 1 to 10, wherein the first folding device (45) comprises a first contrasting body (47) with prismatic shape and with a triangular cross section, around which the second panel (18') and the third panel (18") are folded so as to form the box-shaped front wall (18) of the lid (11).
 12. A wrapping method according to claim 11, wherein each connecting tab (30) is arranged underneath the third panel (18"), between the third panel (18") and the first contrasting body (47).
 13. A wrapping method according to any of the claims from 1 to 11, wherein the second folding device (50) comprises two second contrasting bodies (52) with prismatic shape and with a triangular cross section, around each of which the corresponding first wing (19') and the corresponding second wing (19") are folded so as to form a box-shaped lateral wall (19) of the lid (11).

14. A wrapping method according to claim 11, wherein each connecting tab (30) is arranged underneath the corresponding first wing (19'), between the first wing (19') and the second contrasting body.

15. A wrapping unit (35) to fold a blank (23) designed to form a container (4) so as to manufacture a box-shaped front wall (18) and two box-shaped lateral walls (19) of a hinged lid (11) of the container (4); wherein the blank (23) has a first panel (17') making up a top wall (17) of the lid (11), a second panel (18') making up an outer part of the box-shaped front wall (18) of the lid (11), a third panel (18'') making up an inner part of the box-shaped front wall (18) of the lid (11), and a fourth panel (21'); wherein the first panel (17') has a pair of lateral appendages, which are arranged on opposite sides of the first panel (17'), are separated from the first panel (17') by transverse folding lines (28), and each of which is made up of a first wing (19') constituting an outer part of the box-shaped lateral wall (19) of the lid (11), a second wing (19'') constituting an inner part of the box-shaped lateral wall (19) of the lid (11), and a third wing (19'''); wherein the second panel (18') has a pair of fourth wings (20'), which are arranged on opposite sides of the second panel (18'), are separated from the second panel (18') by two corresponding first oblique folding lines (29), and make up two connection walls (20) of the lid (11), each of which is interposed between the box-shaped front wall (18) of the lid (11) and a box-shaped lateral wall (19) of the lid (11); and wherein each fourth wing (20') is provided with a connecting tab (30), which is separated from the fourth wing (20') by a second oblique folding line (31); the wrapping unit (35) comprises:

a first glueing device (43), which applies a first glue (44) between the first panel (17') and the fourth panel (21');

a first folding device (45), which simultaneously folds the second panel (18') relative to the first panel (17'), the third panel (18'') relative to the second panel (18') and the fourth panel (21') relative to the third panel (18''), so as to place the fourth panel (21') in contact with the first panel (17') and, at the same time, to form the box-shaped front wall (18) of the lid (11) by arranging the second panel (18') and the third panel (18'') in such a way that they are inclined relative to each other;

a second glueing device (48), which applies a second glue (49) between each third wing (19''') and the fourth panel, (21') which overlaps and is glued to the first panel (17'); and

a second folding device (50), which simultaneously folds, in each lateral appendage of the first panel (17'), the first wing (19') relative to the first

panel (17'), the second wing (19'') relative to the first wing (19') and the third wing (19''') relative to the second wing (19''), so as to bring the third wing (19''') in contact with the fourth panel (21') and, at the same time, to form the box-shaped lateral wall (19) of the lid (11) by arranging the first wing (19') and the second wing (19'') in such a way that they are inclined relative to each other;

the wrapping unit (35) is **characterised in that** it comprises:

a first pushing element (54), which pushes on each fourth wing (20') while the second, third and fourth panel (18', 18'' and 21') are being folded, so as to place the corresponding connecting tab (30) on the path of the third panel (18'') and therefore cause the third panel (18'') to intercept the connecting tab (30), thus placing the connecting tab (30) underneath the third panel (18''); or

a second pushing element (53), which pushes on each fourth wing (20') while the first, second and third wing (19', 19'', 19''') are being folded, so as to place the corresponding connecting tab (30) on the path of the corresponding first wing (19') and therefore cause the first wing (19') to intercept the connecting tab (30), thus placing the connecting tab (30) underneath the first wing (19').

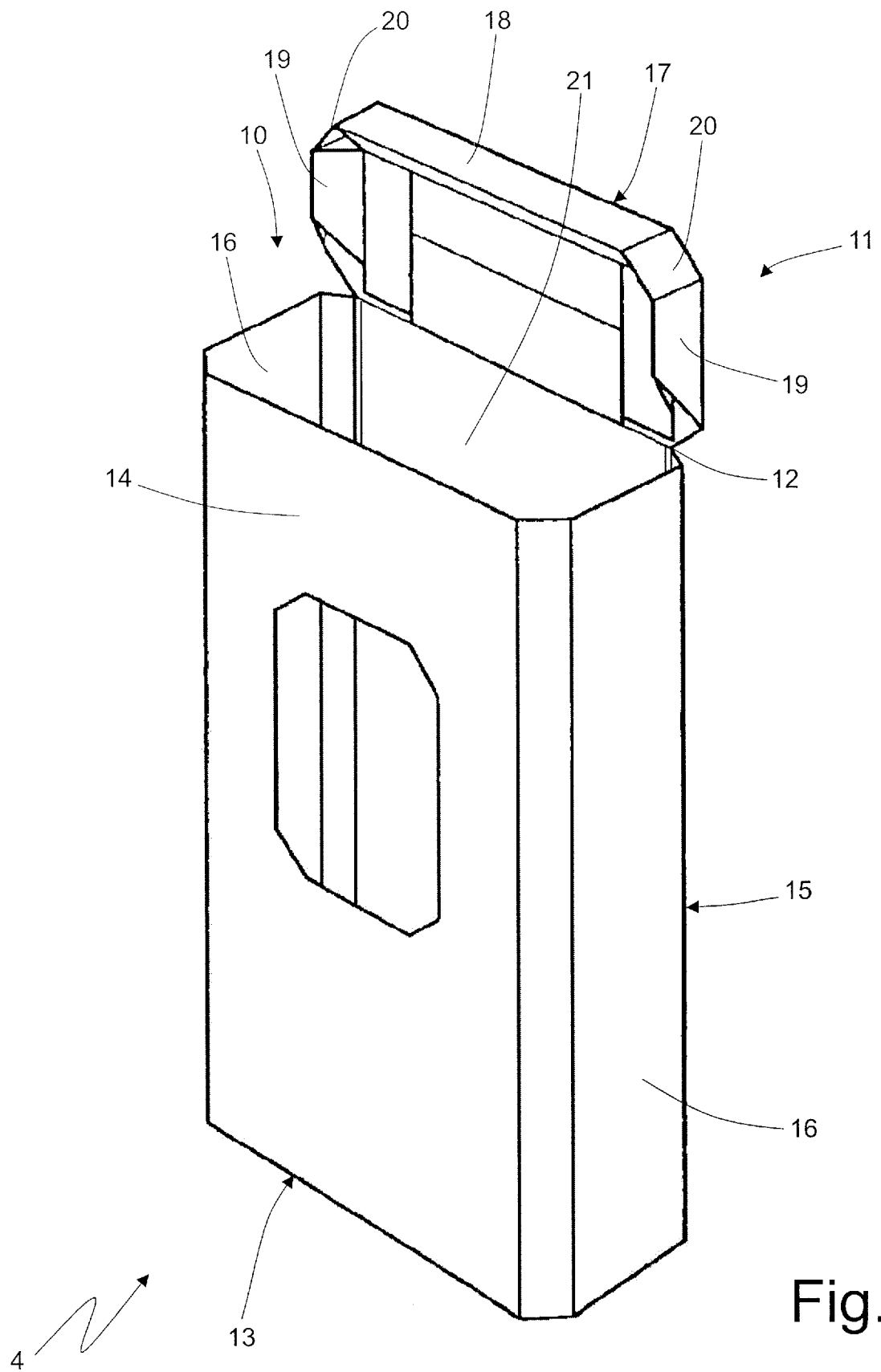


Fig. 1

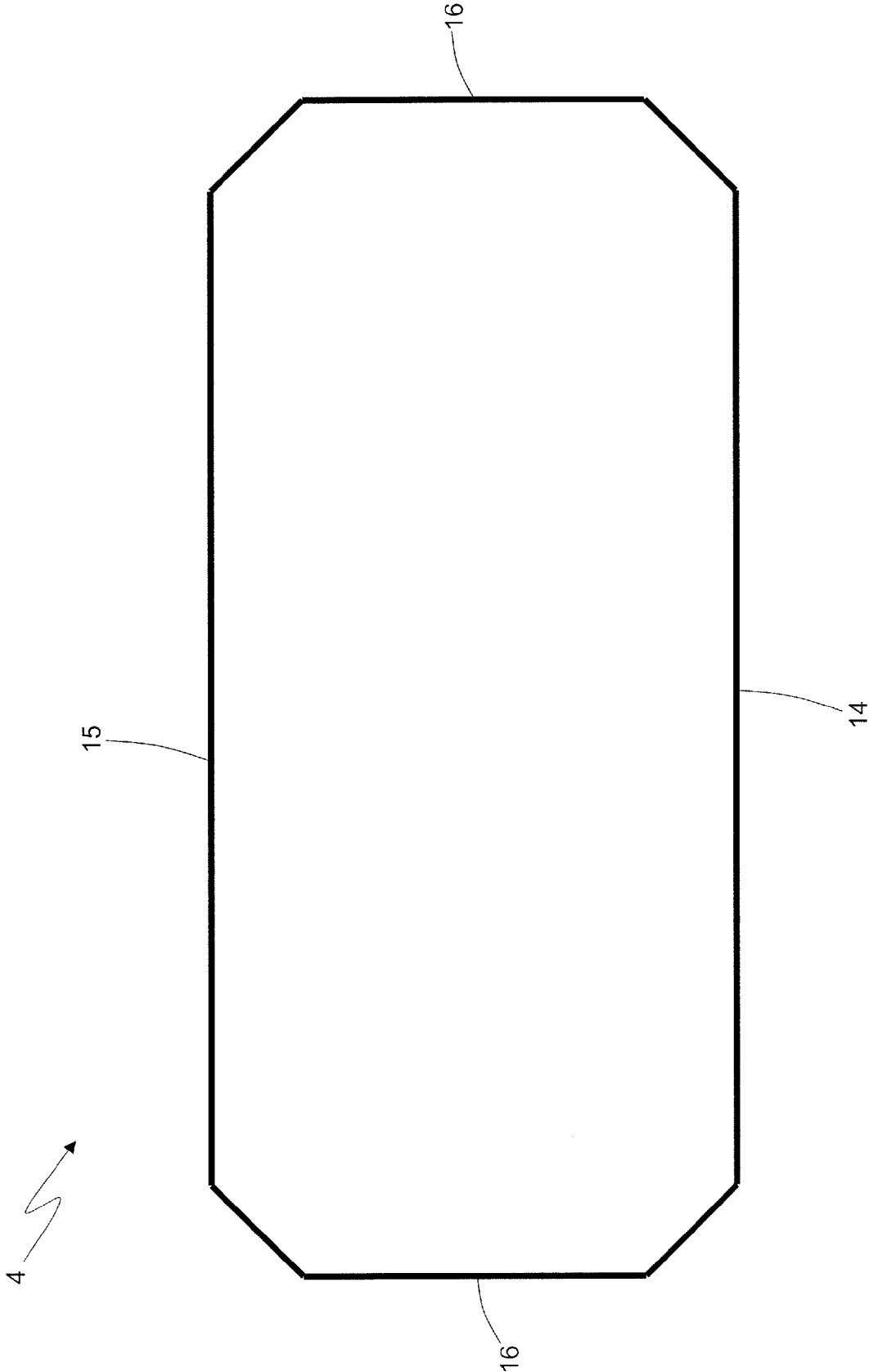
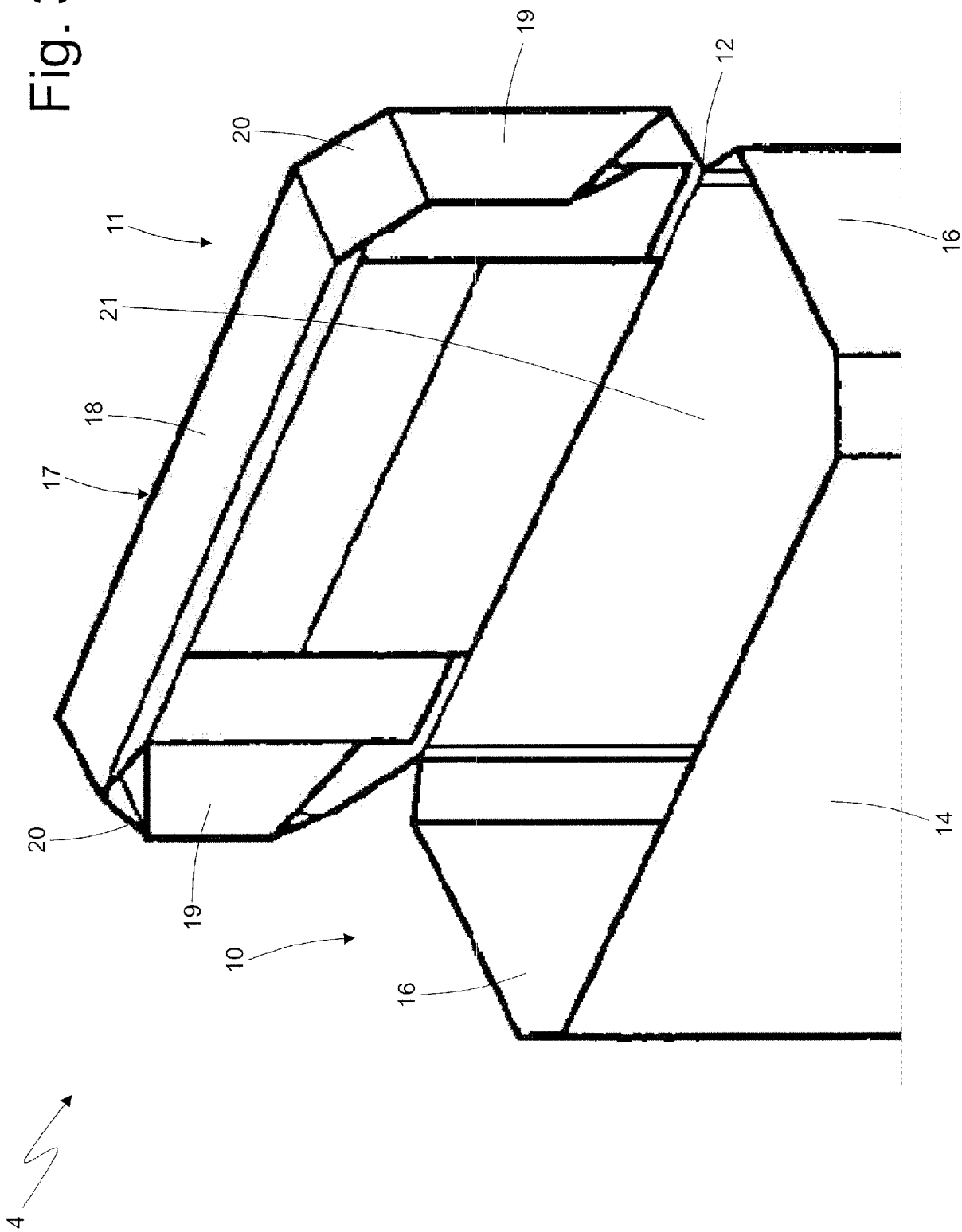


Fig. 2

Fig. 3



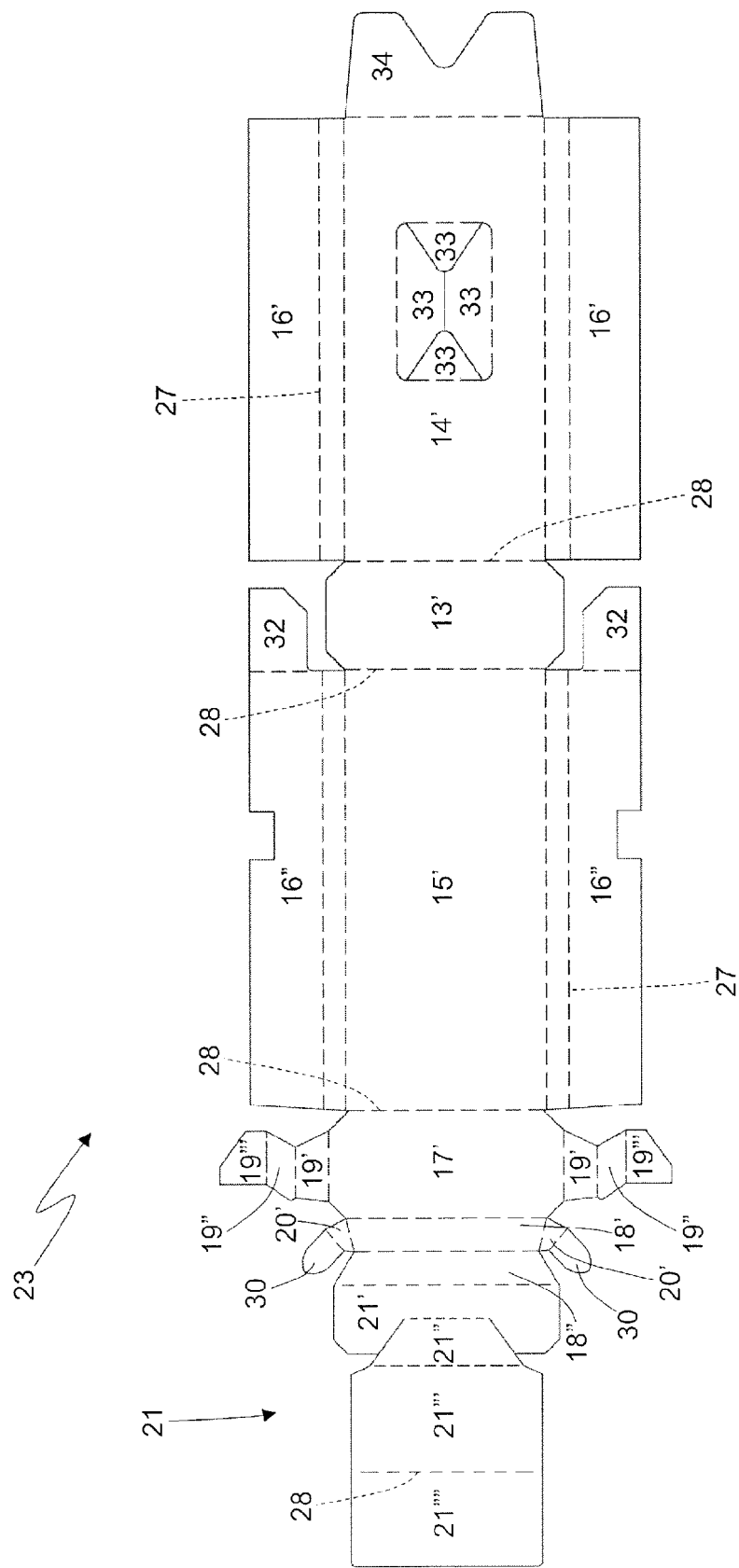


Fig. 4

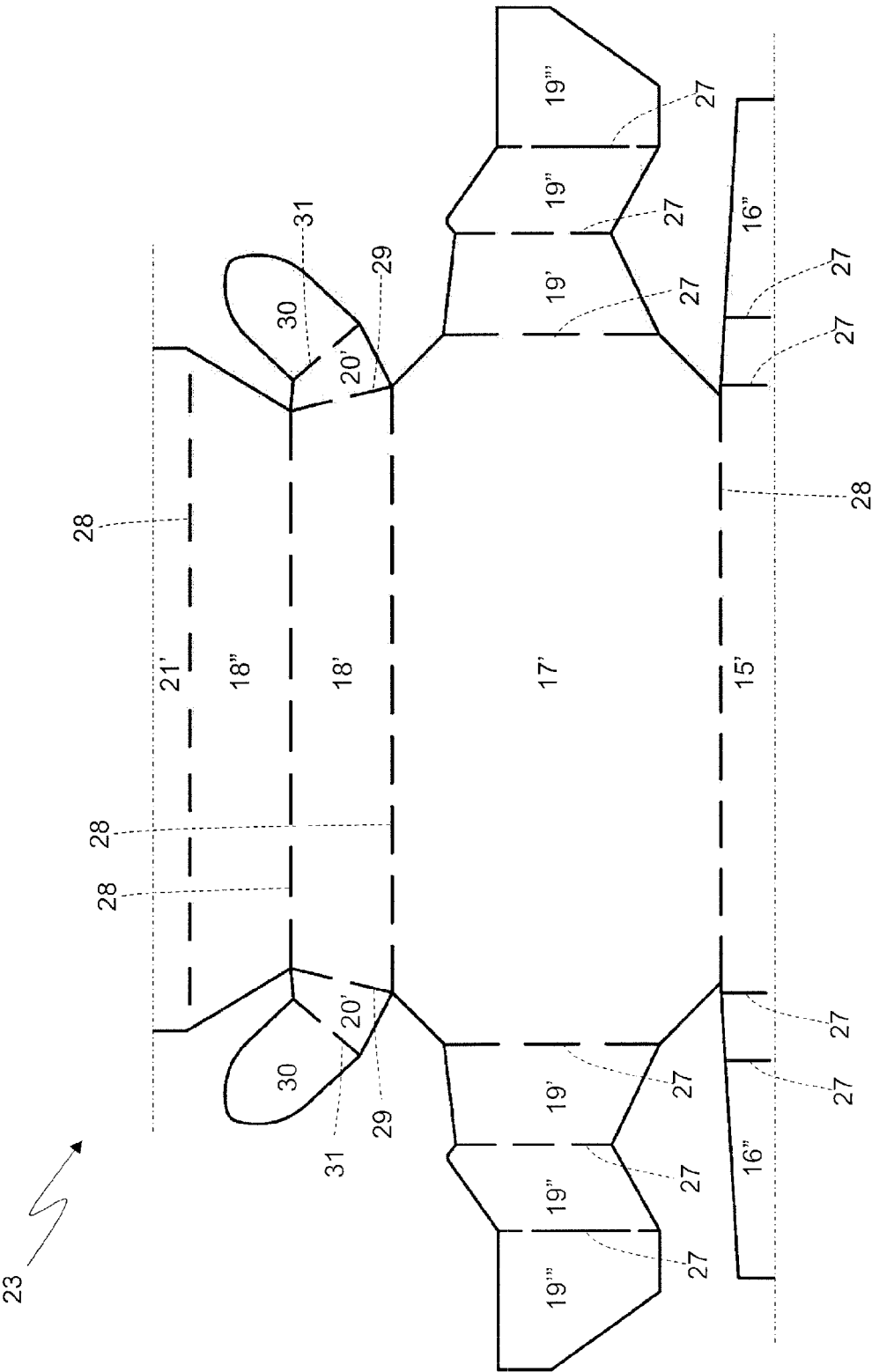


Fig. 5

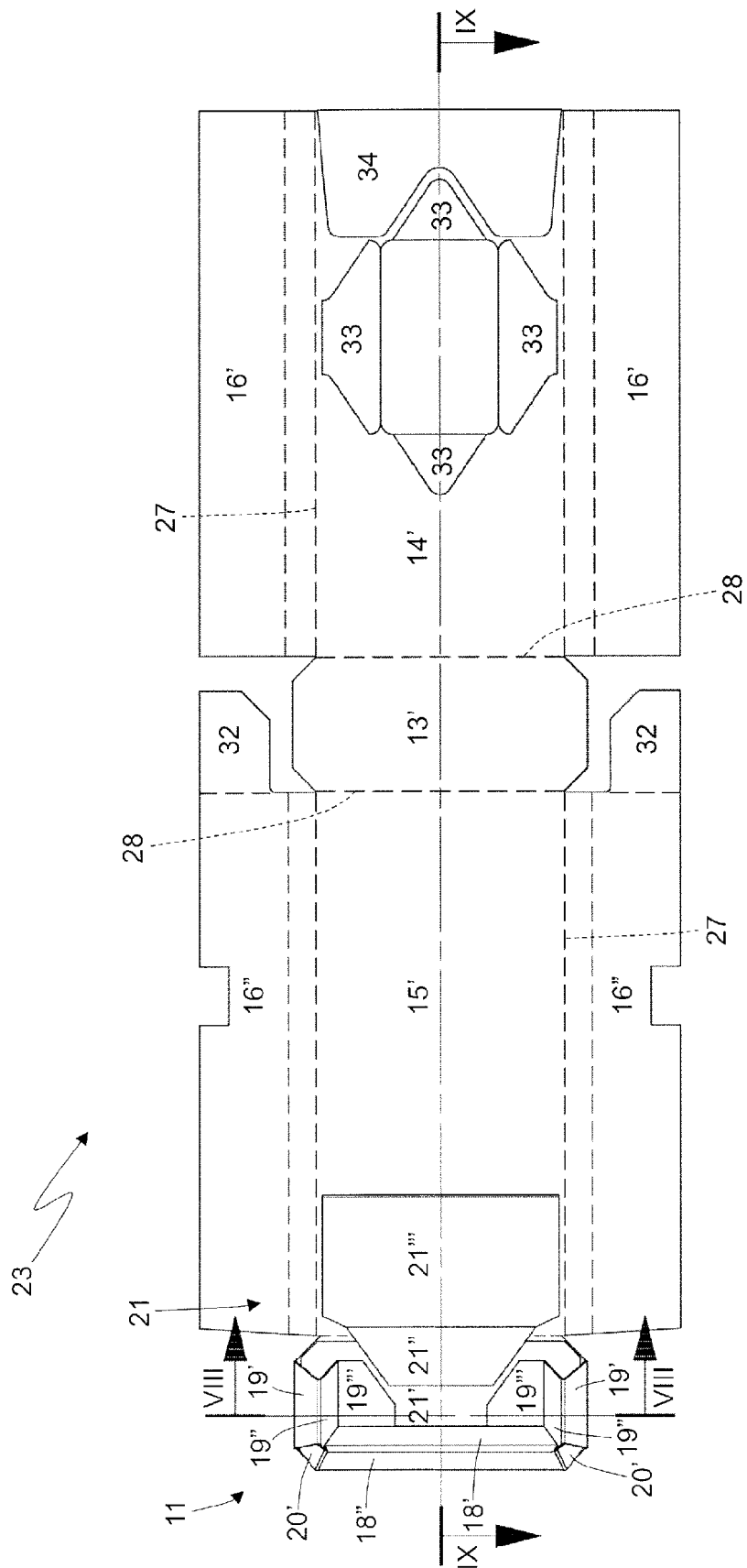


Fig. 6

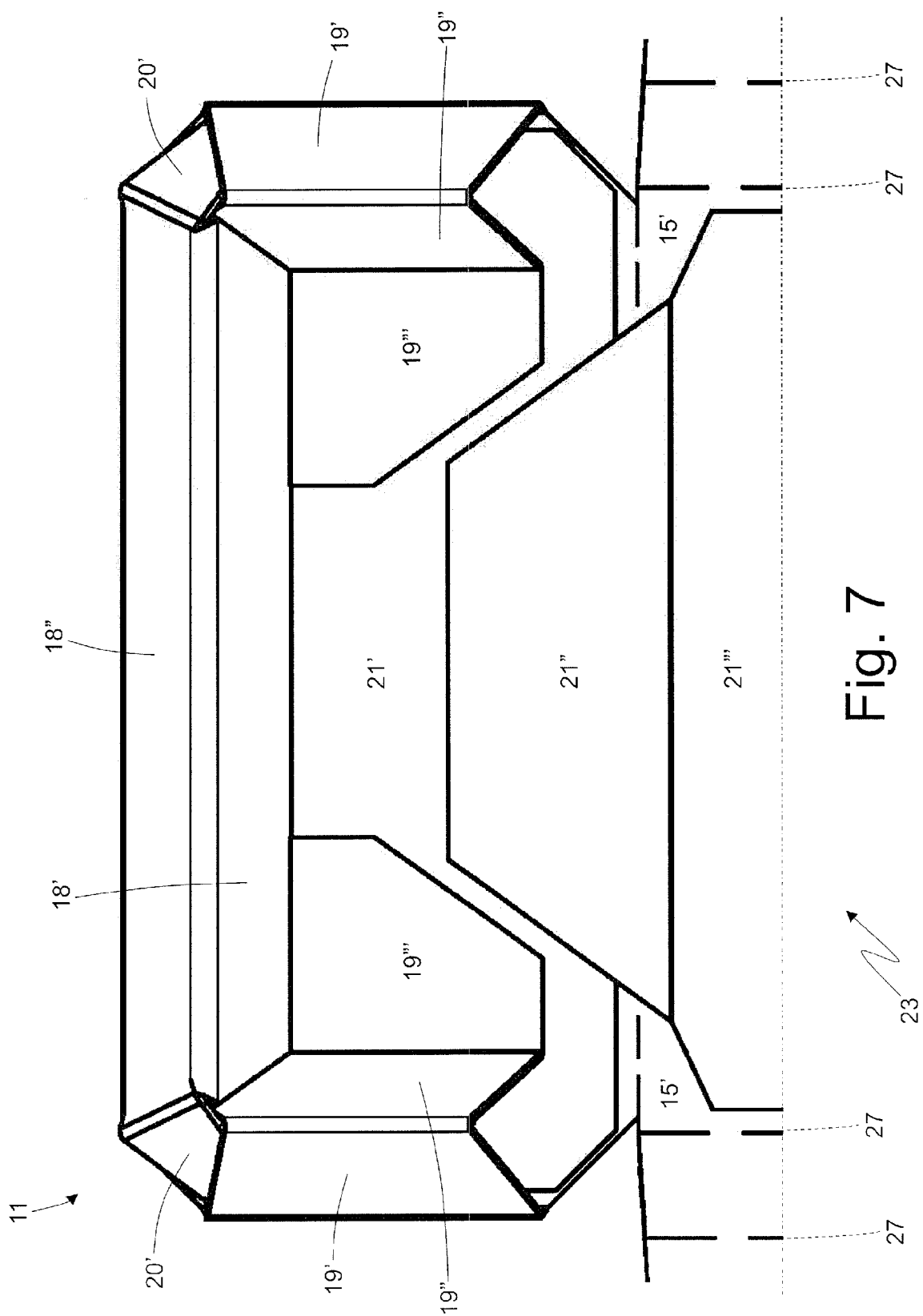


Fig. 7

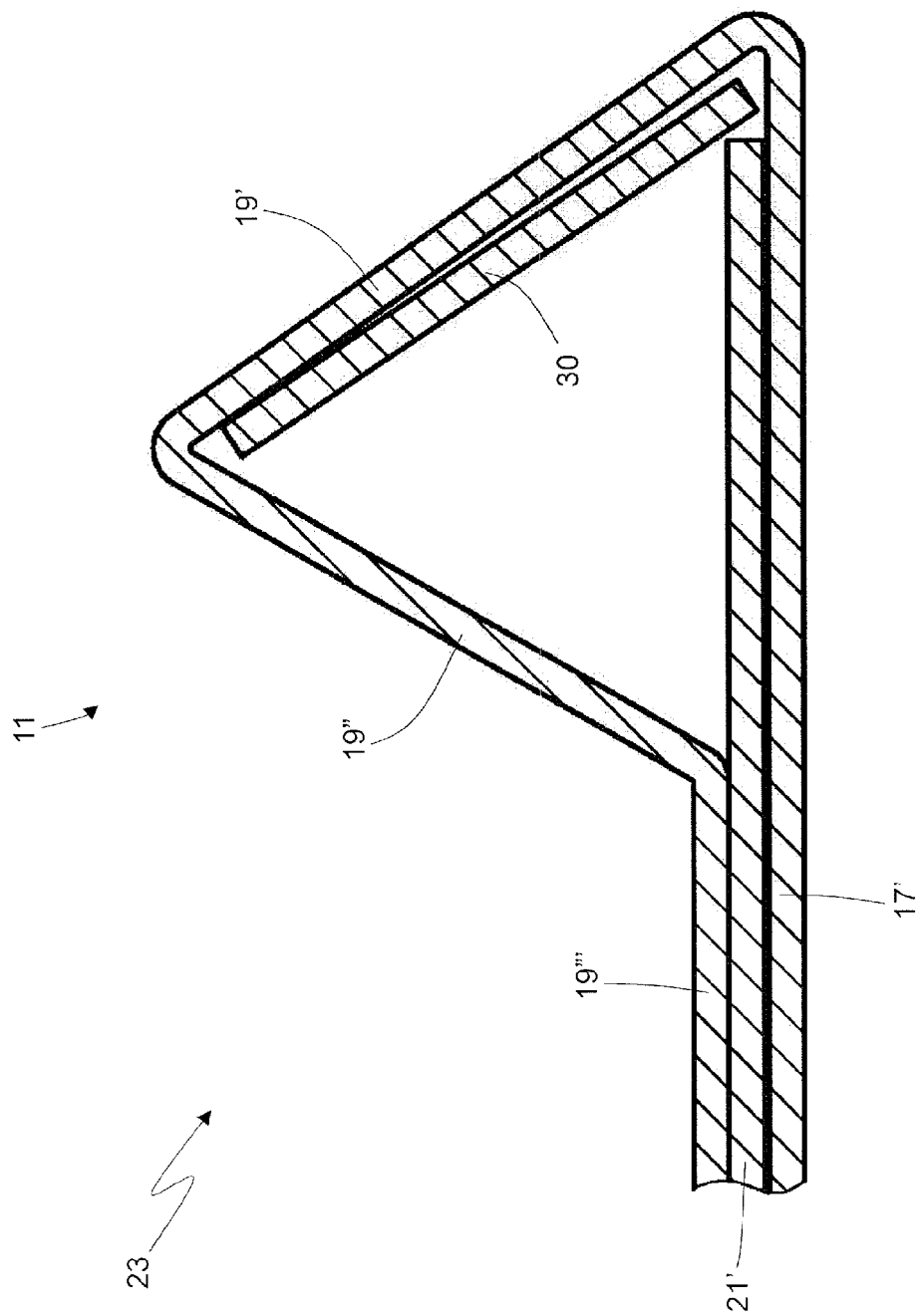


Fig. 8

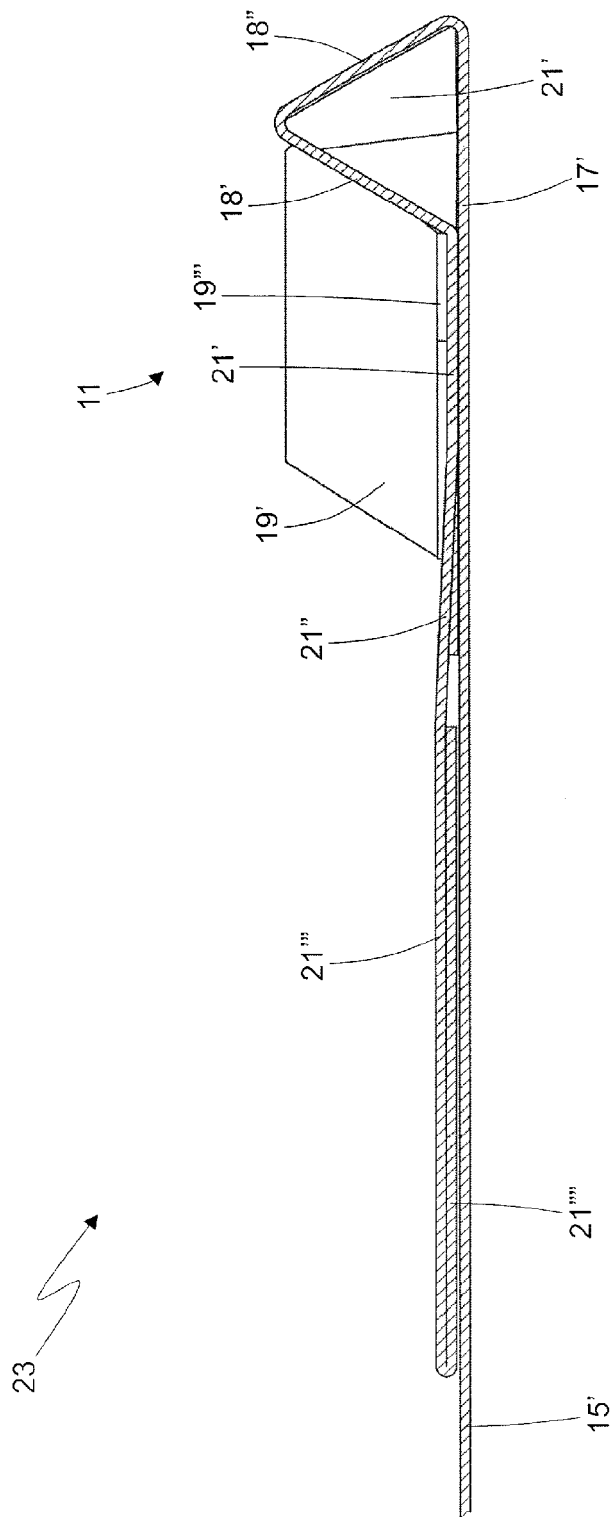


Fig. 9

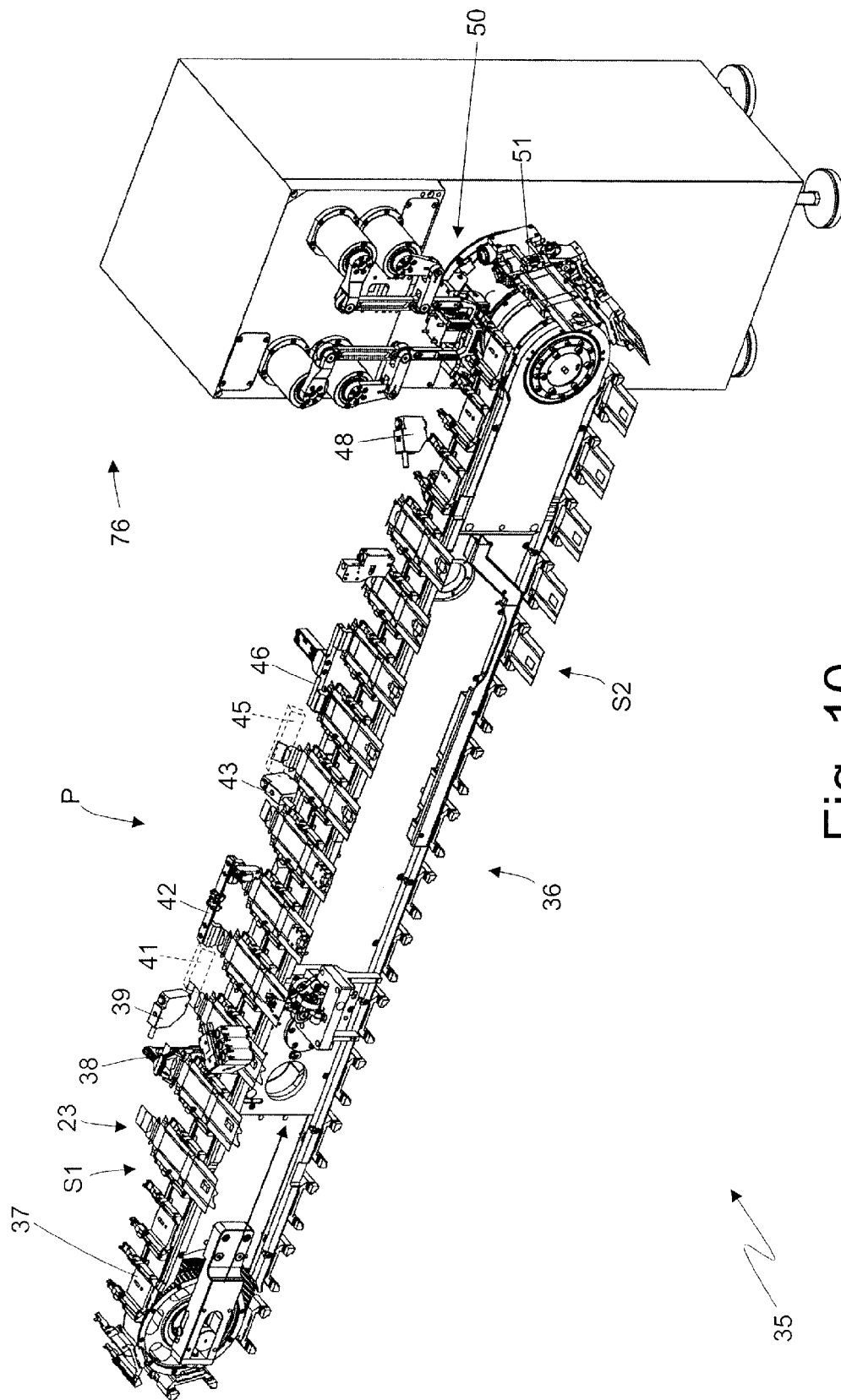


Fig. 10

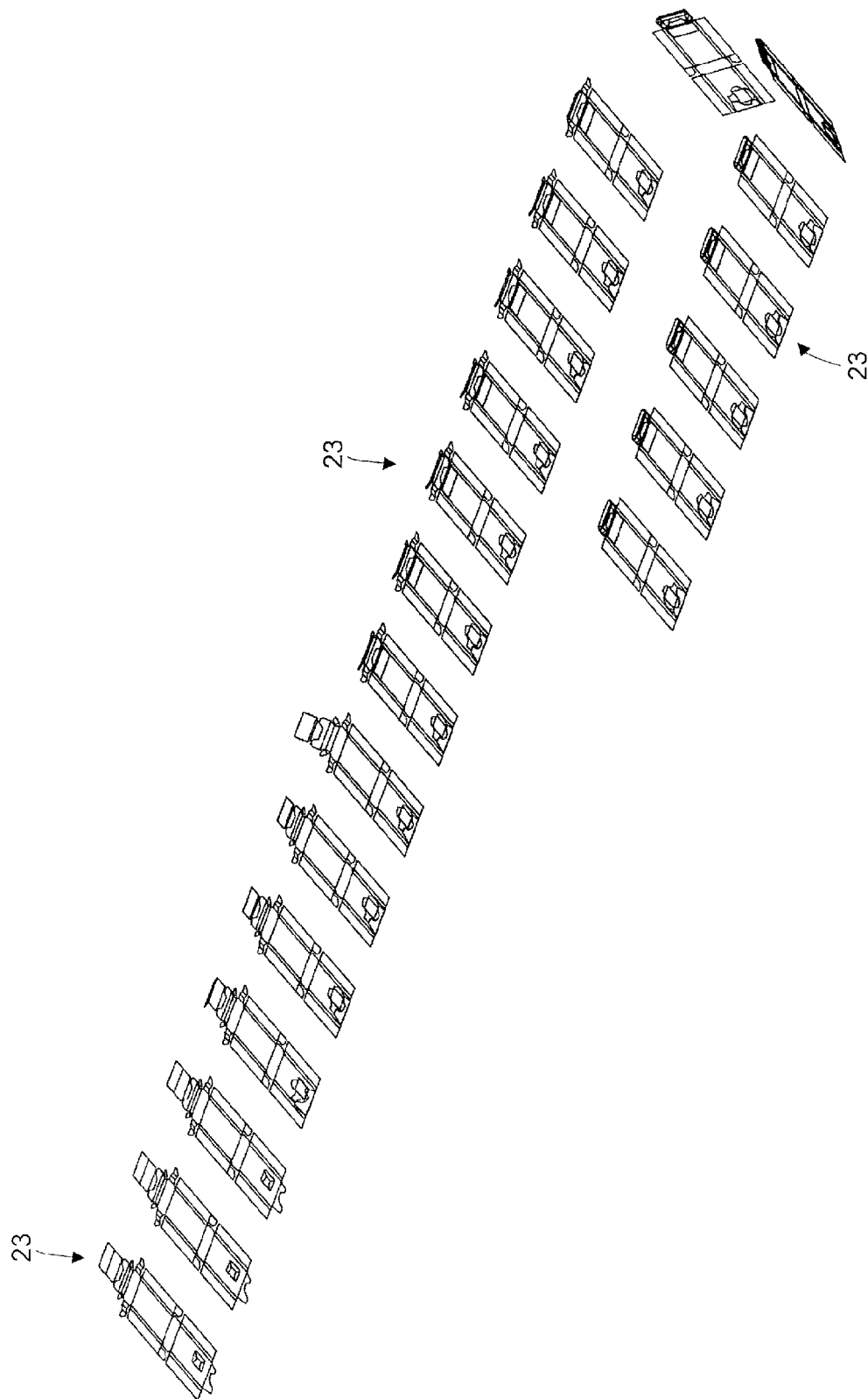


Fig. 11

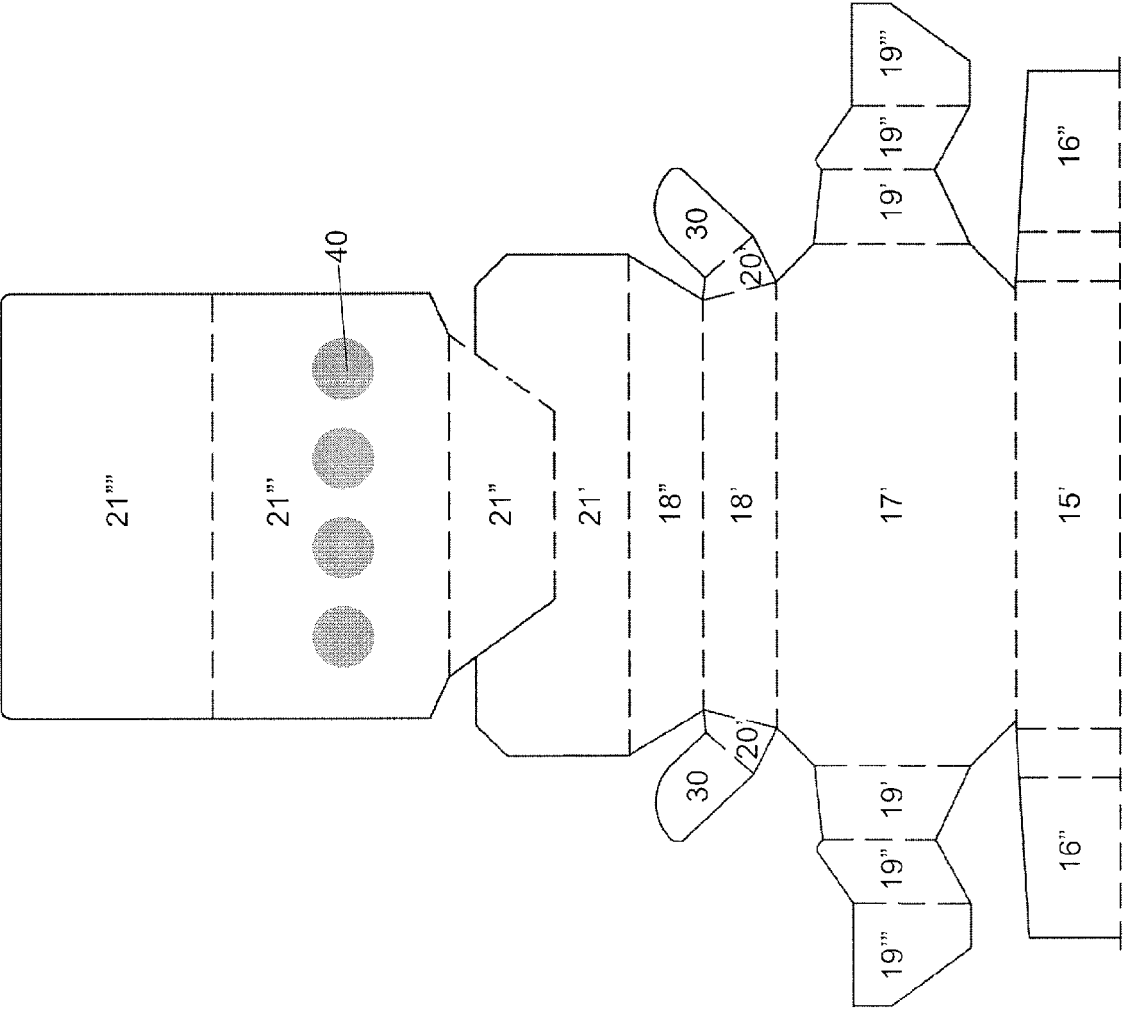


Fig. 12



Fig. 13

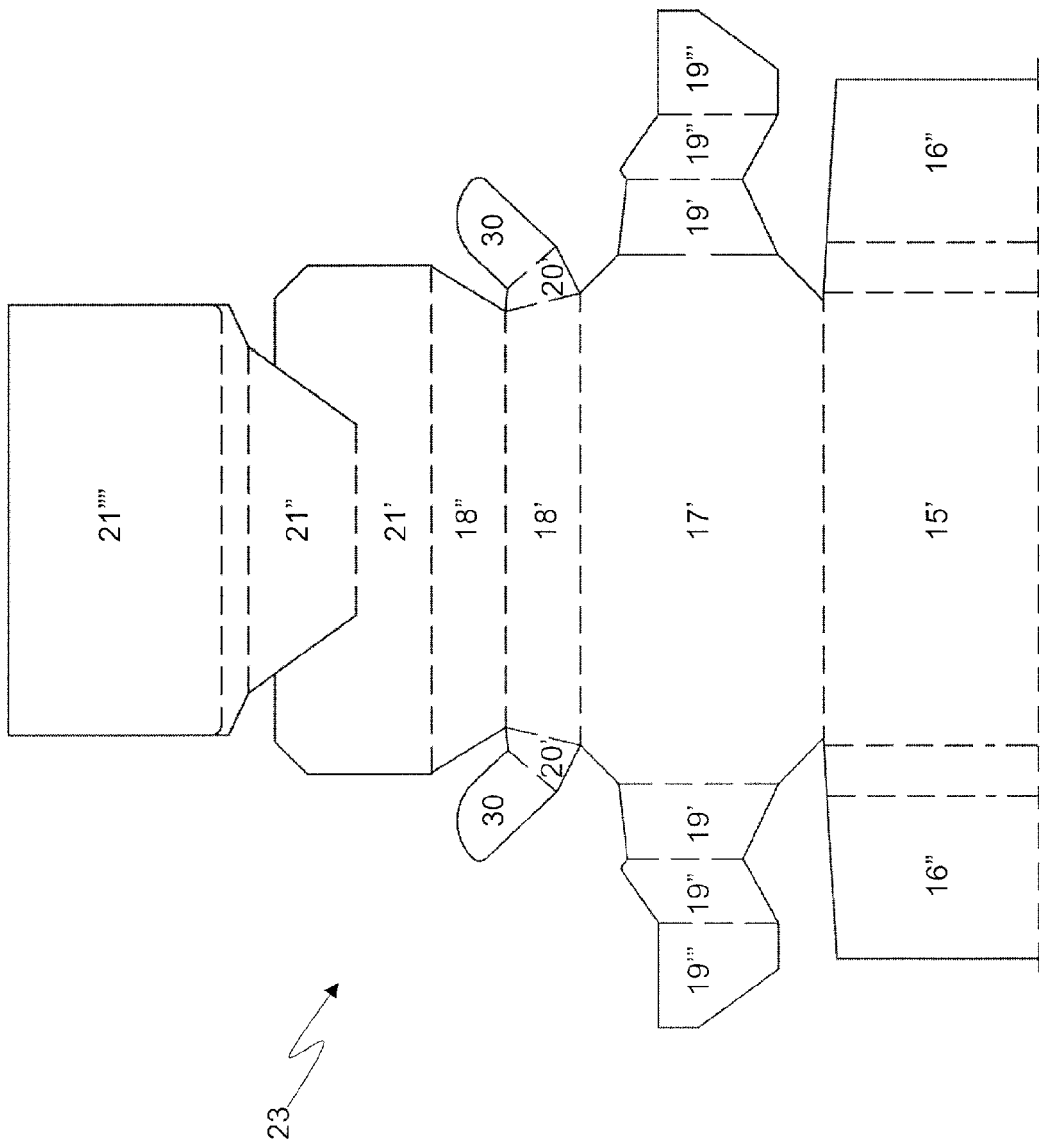


Fig. 14

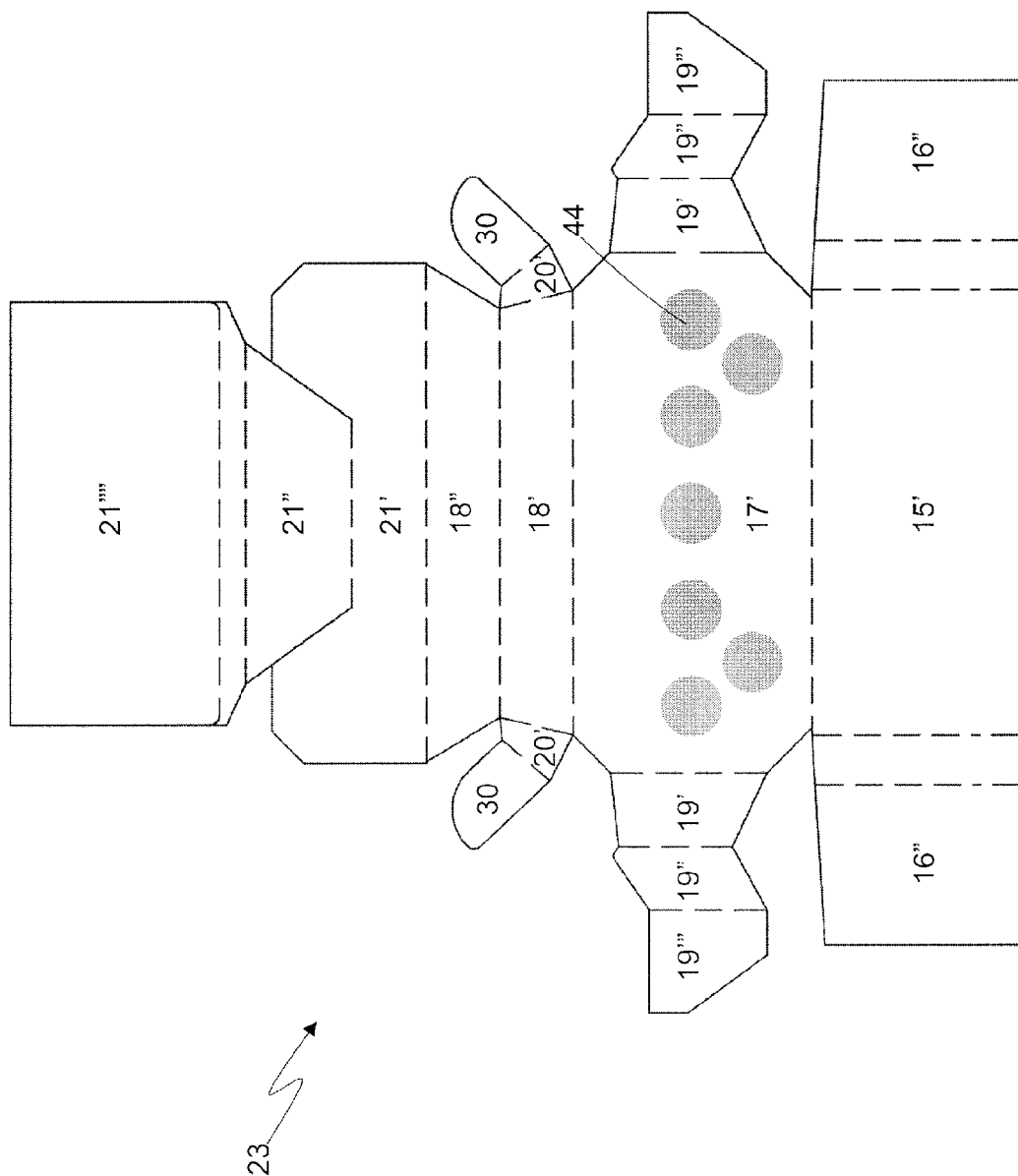
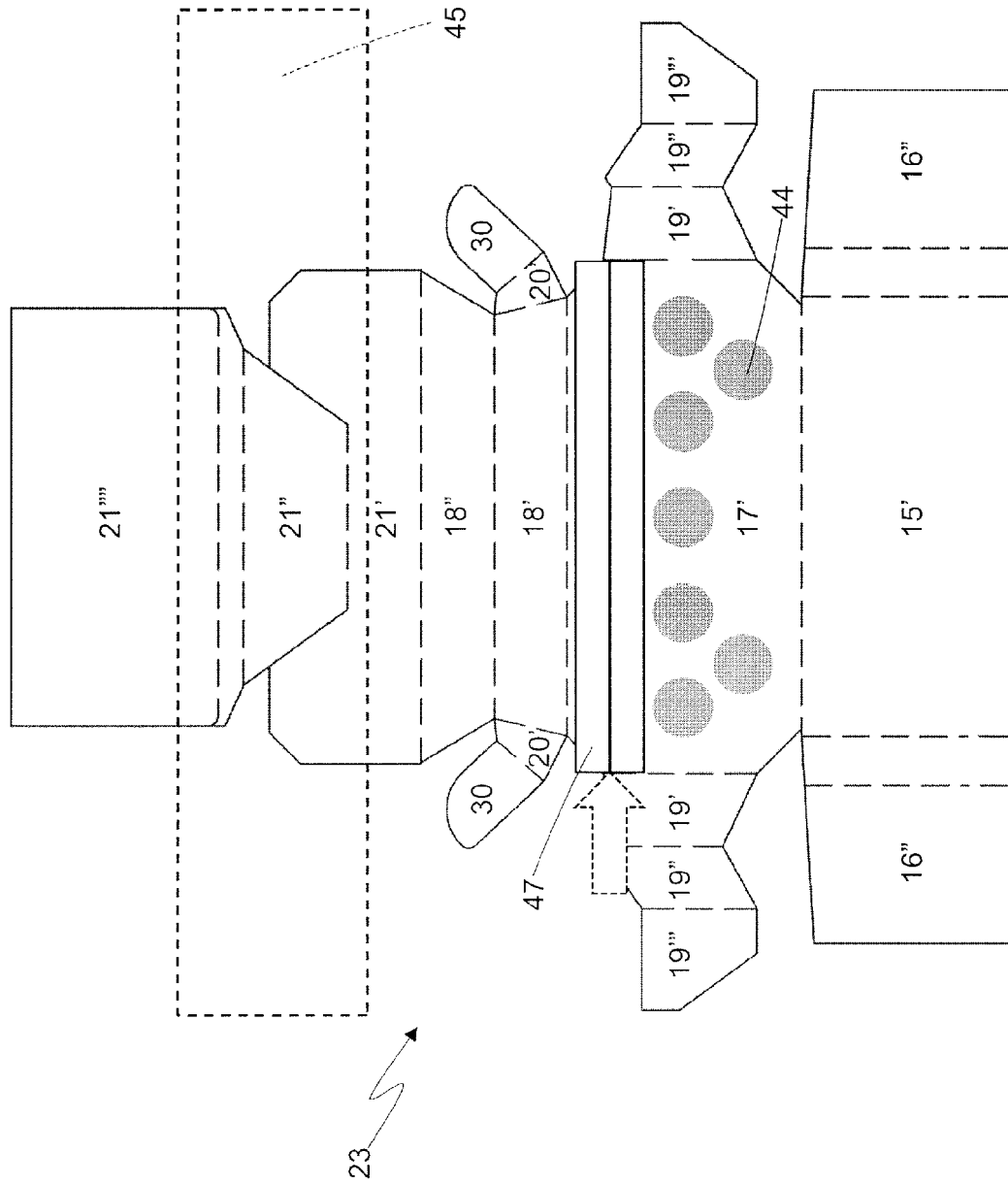


Fig. 15



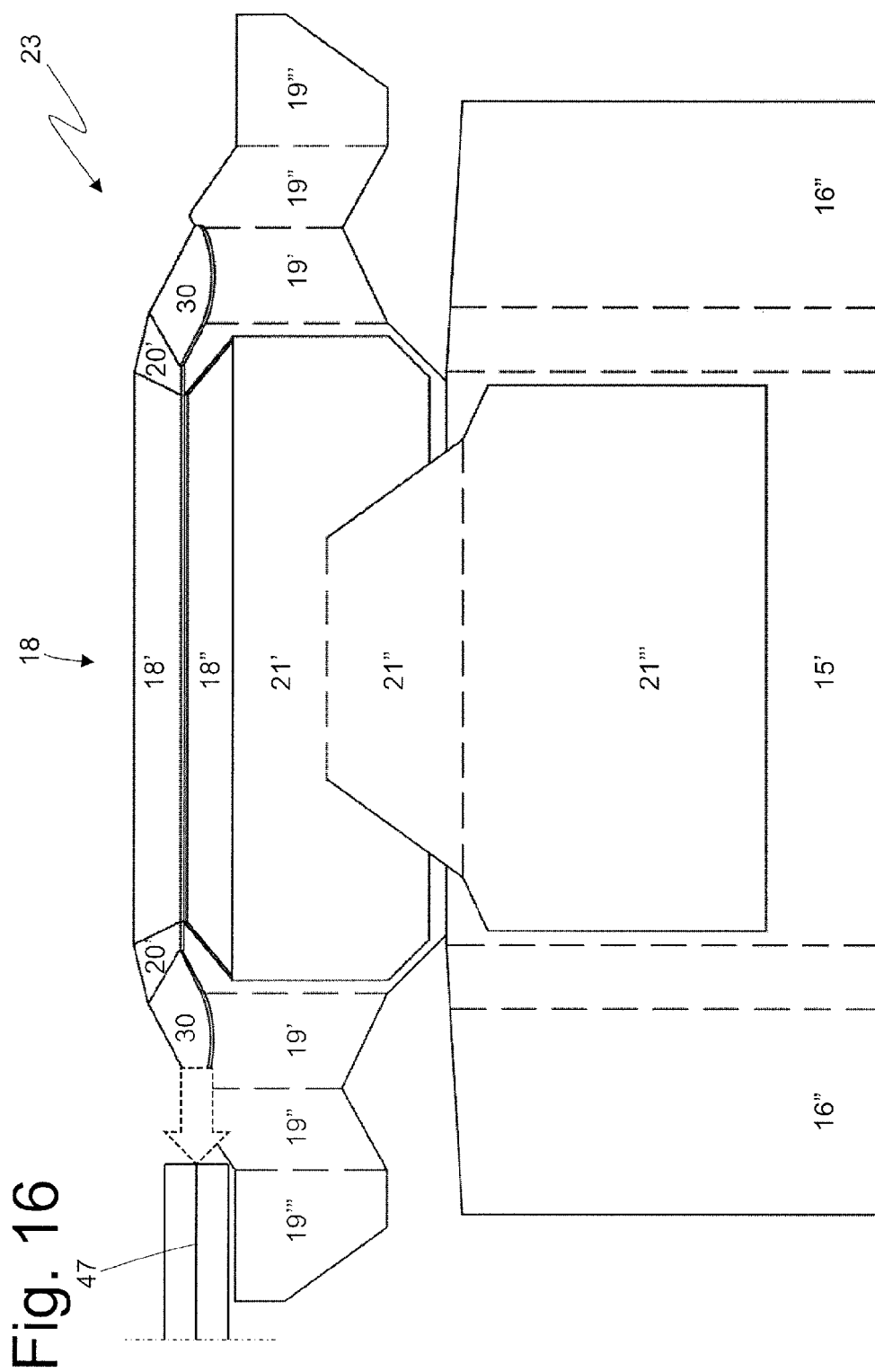
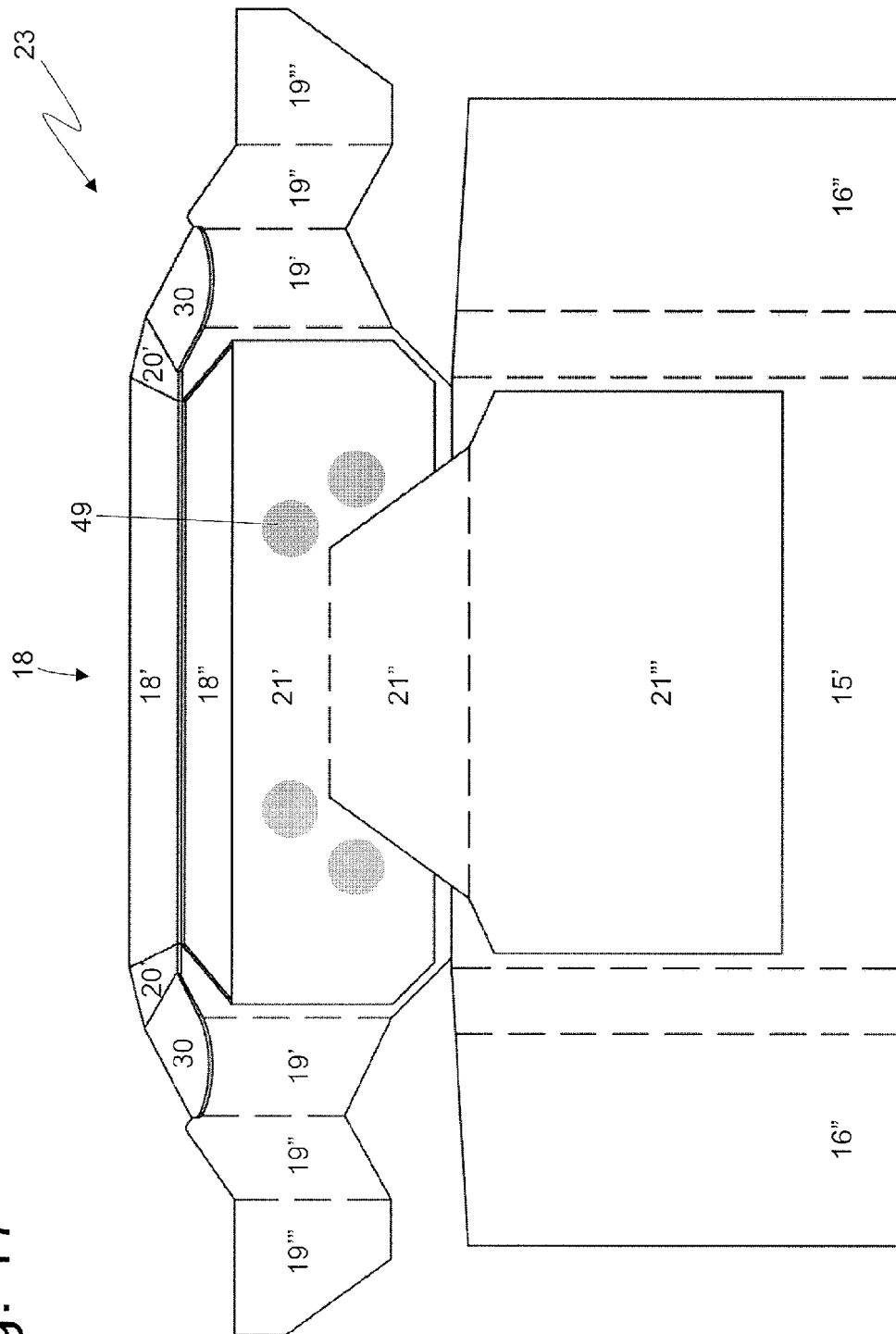
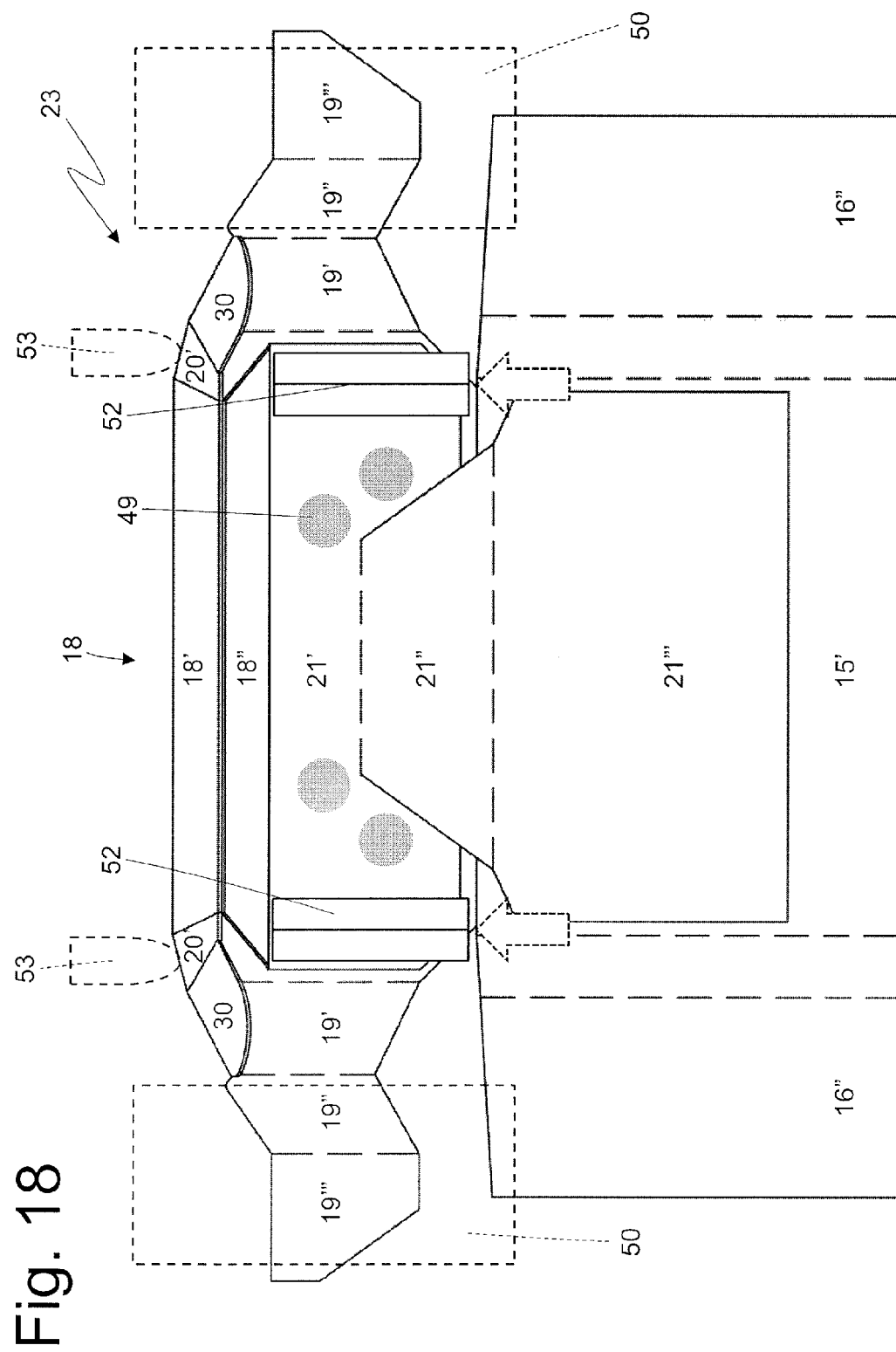


Fig. 17





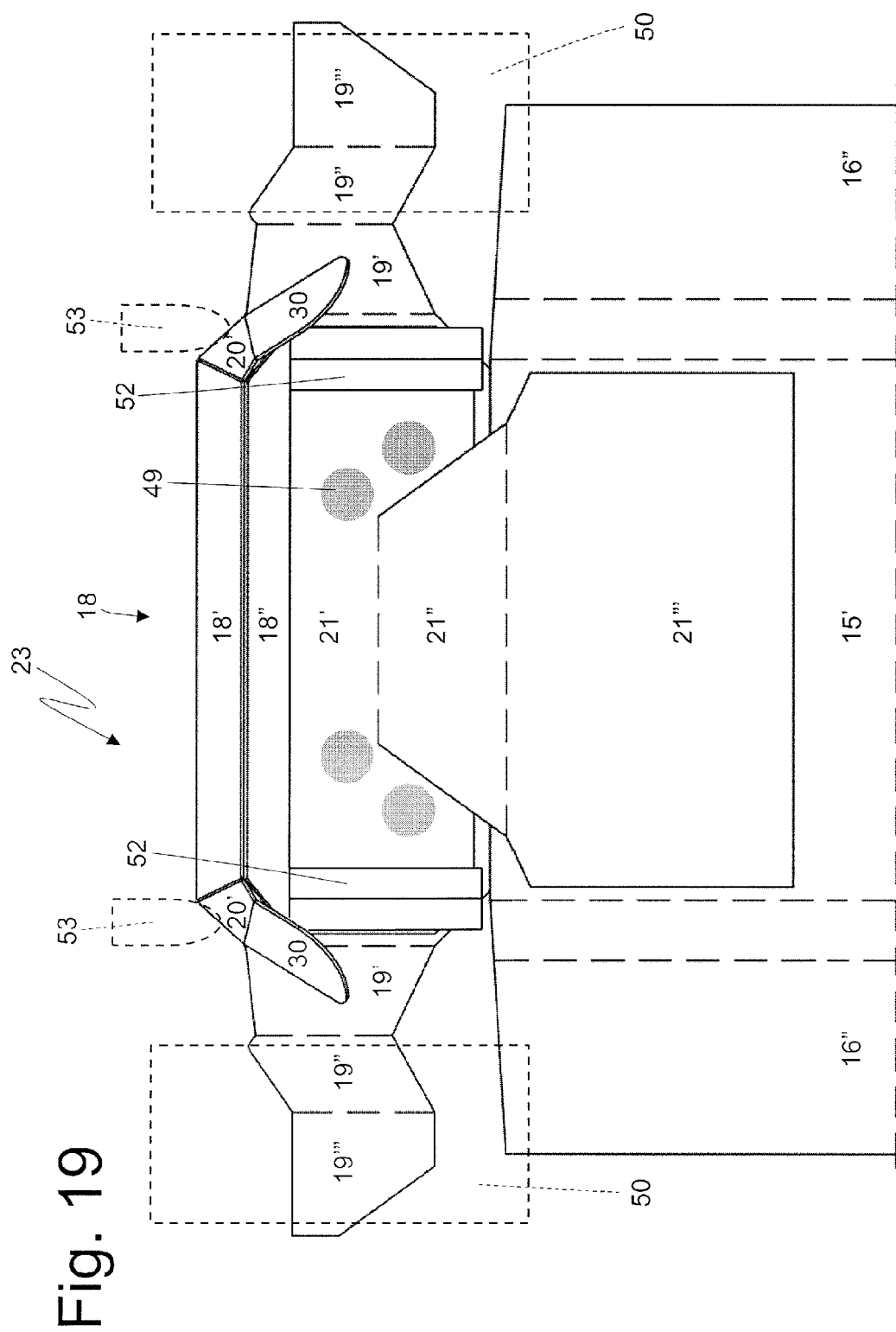
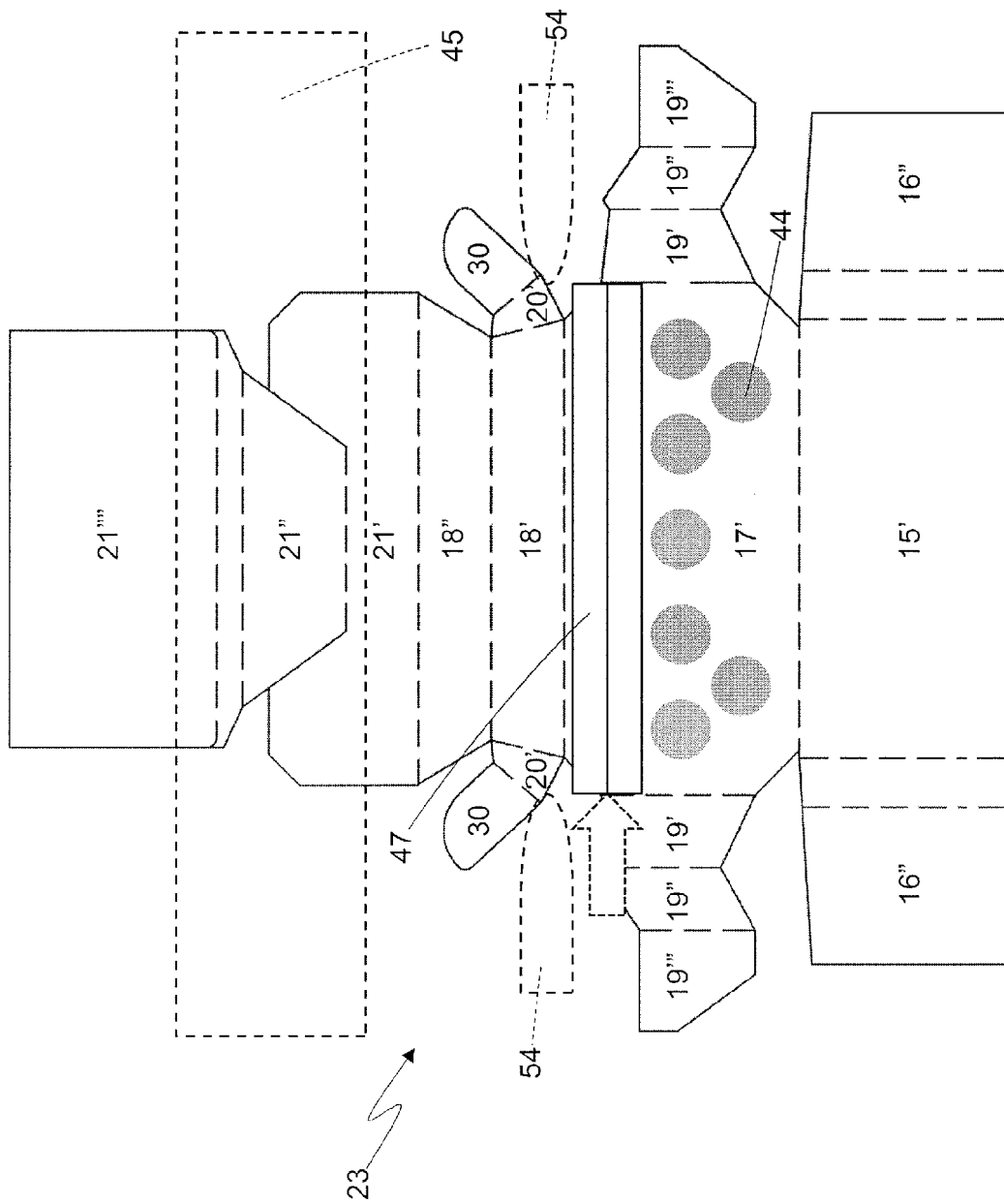


Fig. 20





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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 November 2016	Examiner Grondin, David
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