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(54) **Method and Machine for making a box**

Verfahren und Vorrichtung zur Herstellung einer Schachtel

Procédé et dispositif de fabrication d'une boîte

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Description

[0001] The present invention relates to a method and a machine for making a box.

[0002] Specifically, the present invention is advantageously applied in the field of industrial production of packaging box for the transportation of products. The known boxes usually include a bottom wall, four side walls orthogonal to the bottom wall, four corners, each of which is delimited by two adjacent side walls, and four angular elements, each of which is arranged at each corner.

[0003] US4596542 discloses a mandrel having its face formed to define a negative impression of reinforcing elements to be formed into the walls of a Bliss box. The reinforcing elements may comprise tubular corner posts and/or intermediate hollow ribs or posts. The mandrel is mounted in a machine frame for reciprocation along its axis so that upon full extension of the mandrel it is disposed within a die cavity in which the Bliss body panel is formed around a pair of upstanding end panels.

[0004] Some methods currently used for making the aforesaid boxes include:

- a step in which, starting from a flat blank displaying a central panel which will later define the bottom wall and four side panels which will define the side walls, two first side panels opposing to each other are folded orthogonally to the central panel;
- a step in which two second side panels opposing to each other are folded orthogonally to the central panel; and
- a step in which, with the preformed box, the angular elements are taken to the corners defined between two adjacent side walls, having applied a layer of glue on the angular elements before positioning the same.

[0005] The above-described method displays some drawbacks.

[0006] Specifically, the system which implements the above-mentioned method is quite complex, above all with regards to the extreme accuracy which is required for positioning the angular elements in the preformed box in order to avoid to incorrectly and inefficiently glue the angular elements to the side walls.

[0007] It is worth mentioning that the angular elements serve the function of providing stability to the box to make the boxes stackable one over the other and, therefore, an incorrect and/or ineffective gluing noticeably affects the stability of the box.

[0008] It is the object of the present invention to provide a method and a machine for making a box which allow to at least partially overcome the drawbacks of the known art while being easy and cost-effective to be implemented.

[0009] According to the present invention, a method and a machine for making a box is provided as set forth in Claim 1 and 15.

[0010] The present invention will now be described with reference to the accompanying drawings, which illustrate non-limitative embodiments thereof, in which:

- figure 1 diagrammatically shows a first step of a method in accordance with the present disclosure;
- figure 2 diagrammatically shows a further step of the method in figure 1;
- figure 3 shows a box obtained by means of the method in figure 1;
- figure 4 diagrammatically shows further steps of the method in figure 1;
- figures 5 and 7 diagrammatically show alternative embodiments of the steps in figure 4;
- figure 6 shows a different embodiment of an angular element for the implementation of a method in accordance with the present invention;
- figure 8 diagrammatically shows a step of an alternatively embodiment of the method in accordance with the present invention;
- figures 9, 10 and 11 show details of a machine for implementing a method in accordance with the present invention; and
- figure 12 shows a different embodiment of the box in figure 3.

[0011] With reference to figure 3, numeral 1 indicates as a whole a box including a box body 1a, which in turn displays a bottom wall 2 with a rectangular peripheral profile, two reciprocally opposite side walls 3 laying on reciprocally parallel planes orthogonal to the bottom wall 2, two reciprocally opposite side walls 4 laying on reciprocally parallel planes orthogonal to the bottom wall 2 and to the side walls 3, and four corners 4a, each of which is delimited by a side wall 3 and by a side wall 4.

[0012] The box 1 further includes four angular elements 5 arranged inside the box 1 at the corners 4a. Each side wall 4 displays a corresponding appendix 6 at each longitudinal end thereof, each appendix is folded and glued at least onto the portion closest to the inner face of the adjacent side wall 3. The angular elements 5 are each fixed to the inner face of the corresponding side walls 3 and 4 (specifically, according to the embodiment shown in figure 3, to the inner face of the corresponding side wall 4 and of the corresponding appendix) by hot gluing. According to alternative embodiments, the fastening is obtained by cold gluing or by means of metallic staples (not shown) or other suitable means (not shown) for making the fastening.

[0013] The box 1 or better the elements thereof may be made of plastic material, cardboard, card, plasticized cardboard, polycarbonate or other material. Preferably, the angular elements 5 are made of a material which displays a certain strength to compression, with a force orthogonally applied to its thickness, which is higher than the resistance defined by the material by which the box body 1a is formed. For example, if the box body 1a is

made of corrugated cardboard, the angular elements will be formed by several layers of paper glued onto each other.

[0014] The angular elements 5 display reciprocally orthogonal portions 5a and 5b (figure 1) separated by a folding line 5'; in this case, the angular elements 5 display an "L"-shaped cross section development.

[0015] According to an alternative embodiment, shown in figure 6, the portions 5a and 5b are joined by a central portion 5c, from which they are separated by folding lines 5' and 5"; in this case, the angular elements 5 display a polygonal development. The angular elements 5 shown in figure 11 allow to stabilize the corners 4a in a very effective manner.

[0016] With specific reference to figures 9, 10 and 11, letter M indicates as a whole a machine for making the box 1.

[0017] The machine M includes four storages 10, each containing a plurality of slats 11, four cutting devices 12, each of which is arranged at an outlet of a corresponding storage 10 and is adapted to transversally cut the slats 11 to obtain the angular elements 5, and four feeding devices 13, each feeding the angular elements 5 along a corresponding path P from the cutting device 12 to a machining device 14 arranged at a machining station S. The machining device 14 is adapted to make the box body 1a and to insert the angular elements 5 into the box body 1a itself. The path P is parallel to the folding line of the angular element 5 and is advantageously vertical.

[0018] The machining device 14 displays a forming plate 15 (figure 10), which is adapted to be vertically handled by means of actuating devices (intrinsically known and not shown) and to be coupled with a flat blank 16 and to push the flat blank 16 itself downwards and along a forming channel 17 (figure 11). A plurality of fixed guides 18 adapted to fold the flat blank 16 so as to obtain the box body 1a are arranged inside the forming channel 17.

[0019] Specifically, the flat blank 16 (figures 10 and 11) displays a central panel 2', which will define the bottom wall 2, and two side panels 3', which are opposing to each other and will define the side walls 3, and two second side panels 4', which are opposing to each other, will define the side walls 4 displaying longitudinal end segments 6' which will each define a corresponding appendix 6. The forming plate 15 displays a rectangular shape which is essentially similar to the central panel 2'.

[0020] The machine M further includes four gripping devices 19, each of which is adapted to arrange a corresponding angular element 5 at a corresponding angle of the central panel 2' and is mounted to an angular end of the forming plate 15.

[0021] Each gripping device 19 includes a corresponding gripping head 20, which displays a shape complementary to the shape of the angular element 5, and a corresponding actuator assembly 21, which is adapted to move the corresponding gripping head 19 horizontally and diagonally to the forming plate 15; the gripping head 20 being defined by a body displaying a plurality of nozzles which hold the corresponding angular element 5 on such a body by means of a suction.

[0022] Each feeding device 13 includes a chute 22, along which the angular element 5 is conveyed, in use, by gravity towards a corresponding housing 22". At this point, the angular element 5 is taken by a corresponding gripping head 20.

[0023] Each cutting device 12 includes a corresponding blade 12', the vertical position of which is adjustable so as to be able to vary the desired length of the angular elements 5, and a corresponding blocking unit 12" for preventing the downward movement of the slats 11 while being cut.

[0024] At the outlet of each storage 10, a gripping assembly 10' is arranged for taking the head slat 11 of the storage 10 to a mouth of an essentially vertical channel 22', along which the blade 12' is arranged and at the end of which the blocking device 12" and the chute 22 are arranged. In use, when an angular element 5 has been cut, the blocking unit 12" disengages a lower opening of the channel 22' so as to allow the angular element 5 to enter into the chute 22. After the angular element 5 has exited from the channel 22', the blocking device 12" engages the lower opening of the channel 22' again.

[0025] Figure 4 diagrammatically shows the angular element 5 construction and the path P.

[0026] In a different embodiment diagrammatically shown in figure 5, the angular elements 5 are fed along a path P displaying vertical segments and horizontal segments. Indeed, along the aforesaid path P a handling device (not shown) is provided, which is adapted to pick and rotate an angular element 5 by 180° and to feed the same to a conveyor system (not shown), which conveys the angular elements 5 firstly along a vertical segment, then along an essentially horizontal segment P' of the path P.

[0027] In a further embodiment diagrammatically shown in figure 7, the angular elements 5 obtained from a same slat 11 by means of appropriate cutting means are shown, exiting from a storage 10 (not shown) in a horizontal direction. Such angular elements 5 are transferred by means of conveying devices (not shown) onto several conveyor belts 23 and, subsequently, by means of further handling devices (not shown) they are taken from the aforesaid belts 23 and transferred to corresponding gripping heads 20.

[0028] The method for producing the box 1 includes:

- a first step in which a flat blank 16 is conveyed along a given path by means of conveying means;
- a second step during which a layer of glue is applied on the longitudinal end areas of the panels 3' and 4';
- a third step during which the gripping heads 20 carry the angular elements 5 at the corners 4a;
- a fourth step in which the first side panels 3' are folded so as to arrange them orthogonally to the central panel 2' and so that the end areas of such panels 3'

displaying the layer of glue press on the portions 5a of the angular elements 5, the latter still carried by the corresponding gripping heads 20;
a fifth step in which the second side panels 4' are folded so as to arrange them orthogonally to the central panel 2' and so that the end areas of such panels 4' displaying the layer of glue press on the portions 5a of the angular elements 5, the latter still carried by the corresponding gripping heads 20; and
a sixth step during which the segments 6' are folded on the outer face of the panels 3' adjacent to the panels 4' so as to glue such segments 6' to the panels 3'.

[0029] It is apparent that the sixth step can be simultaneously carried out with the fifth step. Furthermore, it is worth noting that the layer of glue, except for the segments 6', may be applied onto the aforesaid area of the side panels 3' and 4', on the angular elements 5 or on both such elements.

[0030] In the aforesaid third step, the angular elements 5 may be positioned either orthogonally to the central panel 2', i.e. with both portions 5a and 5b laying on corresponding planes orthogonal to the central panel 2' as shown in figures 1 and 2, or with the portion 5a being parallel to and laying on the panel 3' so as to be directly glued onto the latter and, when folding such a panel 3', to be positioned orthogonally to the central panel 2' as shown in figure 8.

[0031] The step of folding the panels 3' and 4' includes handling the blank 16 inside the channel 17 in which the guides 18 are present, on which the panels 3' and 4' abut according to the sequence shown before, and which cause the folding of such panels 3' and 4'.

[0032] Figure 12 shows a different embodiment of the box 1, which in this case includes a box body 1a, which in turn displays a bottom wall 2 with a triangular peripheral profile, two side walls 3 laying on reciprocally parallel planes orthogonal to the bottom wall 2, and a side wall 4 laying on a plane orthogonal to the bottom wall 2, and three corners 4a, one delimited between two side walls 3 and the other two delimited between the side wall 4 and the adjacent side walls 3. The box 1 further includes three angular elements 5 arranged inside the box 1 at the corners 4a. The side wall 4 displays corresponding appendixes 6 at the longitudinal ends thereof, each of which is folded and glued at least onto the portion closest to the inner face of the adjacent side wall 3. A side wall 3 also displays an appendix 6 folded and glued onto the portion closest to the inner face of the other side wall 3. The box body 1a shown in figure 12 is obtained from a flat blank (not shown) which unlike the blank 16 shown in figures 1 and 2 displays a central panel with a triangular peripheral development which will define the bottom wall 2 and three side panels which will define the side walls 3 and 4. The method for making the box 1 shown in figure 12 is similar to that shown for making the box shown in figure 3, because the only difference between such boxes consist in the peripheral development of the bottom wall 2 and thus the number of angular elements 5 fixed to the box body 1a. Obviously, both the forming plate 15 and the guides 18 installed along the channel 17 will be adapted to the peripheral development of the bottom wall 2 of the box 1 shown in the figure 12.

[0033] The advantages obtained by the implementation of the present invention are apparent from the description above.

[0034] Specifically, a method is obtained which assures the correct and effective fastening of the side walls 3 and 4 to the angular elements 5 without needing an accurate positioning of the angular elements 5 on the bottom wall 2. Furthermore, the aforesaid method allows a high simplification of the system which actuates the method and therefore a considerable reduction of production costs.

Claims

1. A method for making a box (1) including a box body (1a), which displays a bottom wall (2) with a polygonal peripheral profile, at least three side walls (3, 4) essentially orthogonal to said base wall (2), and at least three corners (4a), each of which is delimited by two adjacent side walls (3, 4); and at least one angular element (5), which is arranged inside said box body (1a) at a corresponding corner (4a); the method including:

   a step of folding a flat blank (16) displaying a central panel (2'), which is adapted to define said bottom wall (2), at least one first side panel (4'), which includes at least one corresponding appendix (6), and at least two second side panels (3') adjacent to said first side panel (4'); during the step of folding, the flat blank (16) is folded so as to obtain said box body (1a); the first and the second panels (4' and 3') are folded so as to be essentially orthogonal to said central panel (2') and to define said side walls (3, 4); said appendix (6) being folded so as to define a corner (4a) of an angle of said box body (1a) and at least to partially overlap one of said second panels (3'); and
   a step of fastening, during which said angular element (5) is fixed to said box body (1a);
   the method being **characterized in that** it includes a step of placing, during which said angular element (5) is arranged on said flat blank (16); the step of placing being prior to the step of folding; during the step of placing, said angular element (5) is conveyed crosswise to said flat blank (16).

2. A method for making a box (1) according to claim 1, wherein at least one angular element (5) is arranged

inside said box body (1a) at a corresponding corner (4a) of said box body (1a) and is made of a material which displays a certain strength to compression, with a force orthogonally applied to its thickness, which is higher than the compression resistance of the material of which said box body (1a) is made.

3. A method according to claim 1 or 2, wherein the step of placing is essentially prior to the step of fastening.

4. A method according to any one of the preceding claims, wherein, during the step of placing, said angular element (5) is conveyed orthogonally to the flat blank (16), in particular to said central panel (2').

5. A method according to any one of the preceding claims, wherein the angular element (5) displays at least two portions (5a and 5b) which are reciprocally separated by a folding line (5').

6. A method according to one any of the preceding claims, wherein the angular element (5) displays three portions (5a, 5b and 5c), two side portions (5a and 5b) of which are arranged on opposite sides of a central portion (5c); said side portions (5a and 5b) being separated from said central portion (5c) by corresponding folding lines (5' and 5") which are parallel to each other.

7. A method according to claim 5 or 6, wherein, during the step of placing, said angular element (5) is conveyed parallelly to the folding line thereof.

8. A method according to any one of the preceding claims wherein during the step of placing each gripping element (20) is coupled to a corresponding angular element (5), and arranges the corresponding angular element (5) at each angle of said central panel (2').

9. A method according to claim 8, wherein each angular element (5) is fed to the corresponding gripping element (20) by gravity from a corresponding storage (10) .

10. A method according to claim 9, wherein the angular elements (5) are produced by cutting a slat (11) at the outlet of each storage (10), which is adapted to accommodate a plurality of said slats (11).

11. A method according to claim 8, wherein the angular elements (5) fed to the different angles of said central panel (2') are fed to the applying station from a single storage (10).

12. A method according to claim 11, wherein the angular elements (5) are obtained by cutting a slat (11) horizontally arranged at an outlet of said storage (10).

13. A method according to claim 11 or 12, wherein the angular elements (5) are fed along a path which displays at least one essentially horizontal segment.

14. A method according to any one of the preceding claims, wherein the box (1) includes four angular elements (5) arranged inside the box (1) at the corners (4a) .

15. A machine for making a box (1) including a box body (1a), which displays a bottom wall (2) with a polygonal peripheral profile, at least three side walls (3, 4) essentially orthogonal to said bottom wall (2), and at least three corners (4a), each of which is delimited by two adjacent side walls (3, 4); and at least one angular element (5), which is arranged inside said box body (1a) at a corresponding corner (4a); the machine being **characterized in that** it includes:

at least one storage (10) in which said angular elements (5) are accommodated;
a plurality of gripping heads (20) adapted to transfer said angular elements (5) at said corners (4a); the angular elements (5) being conveyed crosswise to the flat blank (16); and
a machining device (14) for folding a flat blank (16) displaying a central panel (2'), which is adapted to define said bottom wall (2), at least one first side panel (4'), which includes at least one corresponding appendix (6), and at least two second side panels (3') adjacent to said first side panel (4'); said flat blank (16) being folded so as to obtain said box body (1a).

16. A machine according to claim 15, **characterized in that** said storage (10) includes a plurality of slats (11) and **characterized in that** it includes, between said storage (10) and said gripping heads (20), a cutting device (12) of a slat (11) so as to define said angular element (5).

17. A machine according to claim 15 and/or 16 **characterized in that** said machining device (14) includes a forming plate (15) coupled to said flat blank (16) for pressing the latter along a channel (17) within which a plurality of fixed guide (18) is arranged, which guides are adapted to fold said flat blank (16) so as to obtain said box body (1a).

18. A machine according to any one of claims 15 to 17, wherein the box (1) includes four angular elements (5) arranged inside the box (1) at the corners (4a).

Patentansprüche

1. Verfahren zur Herstellung einer Schachtel (1) mit einem Schachtelkörper (1a), der aufweist: eine Bo-

denwand (2) mit einem polygonalen Umfangsprofil, mindestens drei Seitenwände (3, 4), die im Wesentlichen senkrecht zur Basiswand (2) sind, und mindestens drei Ecken (4a), von denen jede durch zwei benachbarte Seitenwände (3, 4) begrenzt ist; und mindestens einem Winkelelement (5), das innerhalb des Schachtelkörpers (1a) an einer entsprechenden Ecke (4a) angeordnet ist; wobei das Verfahren aufweist:

einen Schritt des Falzens eines Flachzuschnitts (16) mit einem Mittelflachteil (2'), das geeignet ist, die Bodenwand (2) zu bilden, mindestens einem ersten Seitenflachteil (4'), das mindestens einen entsprechenden Ansatz (6) aufweist, und mindestens zwei zweiten Seitenflachteilen (3') benachbart zum ersten Seitenflachteil (4'); wobei im Schritt des Falzens der Flachzuschnitt (16) so gefalzt wird, dass der Schachtelkörper (1a) erhalten wird; die ersten und zweiten Seitenflachteile (4' und 3') so gefalzt werden, dass sie im Wesentlichen senkrecht zum Mittelflachteil (2') sind und die Seitenwände (3, 4) bilden; wobei der Ansatz (6) so gefalzt wird, dass er eine Ecke (4a) eines Winkels des Schachtelkörpers (1a) bildet und eines der zweiten Flachteile (3') mindestens teilweise überlappt; und
einen Schritt des Befestigens, in dem das Winkelelement (5) am Schachtelkörper (1a) befestigt wird;
wobei das Verfahren **dadurch gekennzeichnet ist, dass** es einen Schritt des Platzierens aufweist, in dem das Winkelelement (5) auf dem Flachzuschnitt (16) angeordnet wird; der Schritt des Platzierens vor dem Schritt des Falzens erfolgt; wobei im Schritt des Platzierens das Winkelelement (5) quer zum Flachzuschnitt (16) überführt wird.

2. Verfahren zur Herstellung einer Schachtel (1) nach Anspruch 1, wobei mindestens ein Winkelelement (5) innerhalb des Schachtelkörpers (1a) an einer entsprechenden Ecke (4a) des Schachtelkörpers (1a) angeordnet wird und aus einem Material hergestellt ist, das eine bestimmte Druckfestigkeit bei einer senkrecht zu seiner Dicke ausgeübten Kraft aufweist, die höher als der Druckwiderstand des Materials ist, aus dem der Schachtelkörper (1a) hergestellt ist.

3. Verfahren nach Anspruch 1 oder 2, wobei der Schritt des Platzierens im Wesentlichen vor dem Schritt des Befestigens erfolgt.

4. Verfahren nach einem der vorstehenden Ansprüche, wobei im Schritt des Platzierens das Winkelelement (5) senkrecht zum Flachzuschnitt (16), insbesondere zum Mittelflachteil (2') überführt wird.

5. Verfahren nach einem der vorstehenden Ansprüche, wobei das Winkelelement (5) mindestens zwei Abschnitte (5a und 5b) aufweist, die durch eine Falzlinie (5') gegenseitig getrennt sind.

6. Verfahren nach einem der vorstehenden Ansprüche, wobei das Winkelelement (5) drei Abschnitte (5a, 5b und 5c) aufweist, von denen zwei Seitenabschnitte (5a und 5b) auf Gegenseiten eines Mittelabschnitts (5c) angeordnet sind; wobei die Seitenabschnitte (5a und 5b) vom Mittelabschnitt (5c) durch entsprechende Falzlinien (5' und 5") getrennt sind, die parallel zueinander sind.

7. Verfahren nach Anspruch 5 oder 6, wobei im Schritt des Platzierens das Winkelelement (5) parallel zu seiner Falzlinie überführt wird.

8. Verfahren nach einem der vorstehenden Ansprüche, wobei im Schritt des Platzierens jedes Greifelement (20) mit einem entsprechenden Winkelelement (5) gekoppelt wird und das entsprechende Winkelelement (5) an jedem Winkel des Mittelflachteils (2') anordnet.

9. Verfahren nach Anspruch 8, wobei jedes Winkelelement (5) dem entsprechenden Greifelement (20) aus einem entsprechenden Lager (10) durch Schwerkraft zugeführt wird.

10. Verfahren nach Anspruch 9, wobei die Winkelelemente (5) durch Schneiden eines Streifens (11) am Auslass jedes Speichers (10) hergestellt werden, der geeignet ist, mehrere der Streifen (11) aufzunehmen.

11. Verfahren nach Anspruch 8, wobei die Winkelelemente (5), die den unterschiedlichen Winkeln des Mittelflachteils (2') zugeführt werden, der Auftragsstation aus einem einzelnen Lager (10) zugeführt werden.

12. Verfahren nach Anspruch 11, wobei die Winkelelemente (5) durch Schneiden eines Streifens (11) erhalten werden, der an einem Auslass des Lagers (10) waagerecht angeordnet ist.

13. Verfahren nach Anspruch 11 oder 12, wobei die Winkelelemente (5) entlang eines Wegs zugeführt werden, der mindestens ein im Wesentlichen waagerechtes Segment aufweist.

14. Verfahren nach einem der vorstehenden Ansprüche, wobei die Schachtel (1) vier Winkelelemente (5) aufweist, die innerhalb der Schachtel (1) an den Ecken (4a) angeordnet sind.

15. Maschine zum Herstellen einer Schachtel (1) mit ei-

nem Schachtelkörper (1a), der aufweist: eine Bodenwand (2) mit einem polygonalen Umfangsprofil, mindestens drei Seitenwände (3, 4), die im Wesentlichen senkrecht zur Bodenwand (2) sind, und mindestens drei Ecken (4a), von denen jede durch zwei benachbarte Seitenwände (3, 4) begrenzt ist; und mindestens einem Winkelelement (5), das innerhalb des Schachtelkörpers (1a) an einer entsprechenden Ecke (4a) angeordnet ist; wobei die Maschine **dadurch gekennzeichnet ist, dass** sie aufweist:

mindestens ein Lager (10), in dem die Winkelelemente (5) aufgenommen sind; mehrere Greifköpfe (20), die geeignet sind, die Winkelelemente (5) an den Ecken (4a) zu transportieren; wobei die Winkelelemente zum Flachzuschnitt (16) quer überführt werden; und
eine Bearbeitungsvorrichtung (14) zum Falzen eines Flachzuschnitts (16) mit einem Mittelflachteil (2'), das geeignet ist, die Bodenwand (2) zu bilden, mindestens einem ersten Seitenflachteil (4'), das mindestens einen entsprechenden Ansatz (6) aufweist, und mindestens zwei zweiten Seitenflachteilen (3') benachbart zum ersten Seitenflachteil (4'); wobei der Flachzuschnitt (16) gefalzt wird, um den Schachtelkörper (1a) zu erhalten.

16. Maschine nach Anspruch 15, **dadurch gekennzeichnet, dass** das Lager (10) mehrere Streifen (11) aufweist, und **dadurch gekennzeichnet, dass** es zwischen dem Lager (10) und den Greifköpfen (20) eine Schneidvorrichtung (12) eines Streifens (11) aufweist, um das Winkelelement (5) zu bilden.

17. Maschine nach Anspruch 15 und/oder 16, **dadurch gekennzeichnet, dass** die Bearbeitungsvorrichtung (14) eine mit dem Flachzuschnitt (16) gekoppelte Formgebungsplatte (15) zu dessen Pressen entlang eines Kanals (17) aufweist, in dem mehrere feste Führungen (18) angeordnet sind, wobei die Führungen geeignet sind, den Flachzuschnitt (16) so zu falzen, dass der Schachtelkörper (1a) erhalten wird.

18. Maschine nach einem der Ansprüche 15 bis 17, wobei die Schachtel (1) vier Winkelelemente (5) aufweist, die innerhalb der Schachtel (1) an den Ecken (4a) angeordnet sind.

Revendications

1. Procédé de fabrication d'une boîte (1) incluant un corps de boîte (1a), qui présente une paroi (2) de dessous avec un profil périphérique polygonal, au moins trois parois de côté (3, 4) essentiellement orthogonales à ladite paroi (2) de base, et au moins trois coins (4a), dont chacun est délimité par deux parois de côté (3, 4) adjacentes ; et au moins un élément angulaire (5), qui est agencé à l'intérieur dudit corps de boîte (1a) au niveau d'un coin (4a) correspondant ; le procédé incluant :

une étape de pliage d'une découpe plate (16) présentant un panneau central (2'), qui est adapté pour définir ladite paroi (2) de dessous, au moins un premier panneau de côté (4'), qui inclut au moins un appendice (6) correspondant, et au moins deux seconds panneaux de côté (3') adjacents audit premier panneau de côté (4') ;
pendant l'étape de pliage, la découpe plate (16) est pliée de façon à obtenir ledit corps de boîte (1a) ; les premier et second panneaux (4' et 3') sont pliés de façon à être essentiellement orthogonaux audit panneau central (2') et à définir lesdites parois de côté (3, 4) ;
ledit appendice (6) étant plié de façon à définir un coin (4a) d'un angle dudit corps de boîte (1a) et à chevaucher au moins partiellement l'un desdits seconds panneaux (3') ; et
une étape d'assujettissement, pendant laquelle ledit élément angulaire (5) est fixé audit corps de boîte (1a) ;
le procédé étant **caractérisé en ce qu'**il inclut une étape de placement, pendant laquelle ledit élément angulaire (5) est agencé sur ladite découpe plate (16) ; l'étape de placement étant antérieure à l'étape de pliage ; pendant l'étape de placement, ledit élément angulaire (5) est acheminé de travers vers ladite découpe plate (16).

2. Procédé de fabrication d'une boîte (1) selon la revendication 1, dans lequel au moins un élément angulaire (5) est agencé à l'intérieur dudit corps de boîte (1a) au niveau d'un coin (4a) correspondant dudit corps de boîte (1a) et est constitué d'un matériau qui présente une certaine résistance à la compression, avec une force appliquée orthogonalement à son épaisseur, qui est supérieure à la résistance à la compression du matériau dont est constitué ledit corps de boîte (1a).

3. Procédé selon la revendication 1 ou 2, dans lequel l'étape de placement est essentiellement antérieure à l'étape d'assujettissement.

4. Procédé selon l'une quelconque des revendications précédentes, dans lequel, pendant l'étape de placement, ledit élément angulaire (5) est acheminé orthogonalement à la découpe plate (16), en particulier audit panneau central (2').

5. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'élément angulaire (5) présente au moins deux portions (5a et 5b) qui sont

réciproquement séparées par une ligne de pliage (5').

6. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'élément angulaire (5) présente trois portions (5a, 5b et 5c), dont deux portions de côté (5a et 5b) sont agencées sur des côtés opposés d'une portion centrale (5c) ; lesdites portions de côté (5a et 5b) étant séparées de ladite portion centrale (5c) par des lignes de pliage (5' et 5") correspondantes qui sont parallèles l'une à l'autre.

7. Procédé selon la revendication 5 ou 6, dans lequel, pendant l'étape de placement, ledit élément angulaire (5) est acheminé parallèlement à sa ligne de pliage.

8. Procédé selon l'une quelconque des revendications précédentes, dans lequel pendant l'étape de placement chaque élément de préhension (20) est couplé à un élément angulaire (5) correspondant, et agence l'élément angulaire (5) correspondant au niveau de chaque angle dudit panneau central (2').

9. Procédé selon la revendication 8, dans lequel chaque élément angulaire (5) est fourni à l'élément de préhension (20) correspondant par gravité depuis un stockage (10) correspondant.

10. Procédé selon la revendication 9, dans lequel les éléments angulaires (5) sont produits en coupant une lamelle (11) au niveau de la sortie de chaque stockage (10), qui est adapté pour accueillir une pluralité desdites lamelles (11).

11. Procédé selon la revendication 8, dans lequel les éléments angulaires (5) fournis aux angles différents dudit panneau central (2') sont fournis à la station d'application depuis un stockage (10) unique.

12. Procédé selon la revendication 11, dans lequel les éléments angulaires (5) sont obtenus en coupant une lamelle (11) agencée à l'horizontale au niveau d'une sortie dudit stockage (10).

13. Procédé selon la revendication 11 ou 12, dans lequel les éléments angulaires (5) sont fournis le long d'un trajet qui présente au moins un segment essentiellement horizontal.

14. Procédé selon l'une quelconque des revendications précédentes, dans lequel la boîte (1) inclut quatre éléments angulaires (5) agencés à l'intérieur de la boîte (1) au niveau des coins (4a).

15. Machine de fabrication d'une boîte (1) incluant un corps de boîte (1a), qui présente une paroi (2) de dessous avec un profil périphérique polygonal, au moins trois parois de côté (3, 4) essentiellement orthogonales à ladite paroi (2) de dessous, et au moins trois coins (4a), dont chacun est délimité par deux parois de côté (3, 4) adjacentes ; et au moins un élément angulaire (5), qui est agencé à l'intérieur dudit corps de boîte (1a) au niveau d'un coin (4a) correspondant ; la machine étant **caractérisée en ce qu'**elle inclut :

au moins un stockage (10) dans lequel lesdits éléments angulaires (5) sont accueillis ;
une pluralité de têtes de préhension (20) adaptées pour transférer lesdits éléments angulaires (5) au niveau desdits coins (4a) ; les éléments angulaires (5) étant acheminés de travers vers la découpe plate (16) ; et
un dispositif d'usinage (14) pour plier une découpe plate (16) présentant un panneau central (2'), qui est adapté pour définir ladite paroi (2) de dessous, au moins un premier panneau de côté (4'), qui inclut au moins un appendice (6) correspondant, et au moins deux seconds panneaux de côté (3') adjacents audit premier panneau de côté (4') ; ladite découpe plate (16) étant pliée de façon à obtenir ledit corps de boîte (1a).

16. Machine selon la revendication 15, **caractérisée en ce que** ledit stockage (10) inclut une pluralité de lamelles (11) et **caractérisée en ce qu'**elle inclut, entre ledit stockage (10) et lesdites têtes de préhension (20), un dispositif de coupe (12) d'une lamelle (11) de façon à définir ledit élément angulaire (5).

17. Machine selon la revendication 15 et/ou 16, **caractérisée en ce que** ledit dispositif d'usinage (14) inclut une plaque de formation (15) accouplée à ladite découpe plate (16) pour presser cette dernière le long d'un canal (17) au sein duquel une pluralité de guides fixes (18) sont agencés, lesquels guides sont adaptés pour plier ladite découpe plate (16) de façon à obtenir ledit corps de boîte (1a).

18. Machine selon l'une quelconque des revendications 15 à 17, dans laquelle la boîte (1) inclut quatre éléments angulaires (5) agencés à l'intérieur de ladite boîte (1) au niveau des coins (4a).

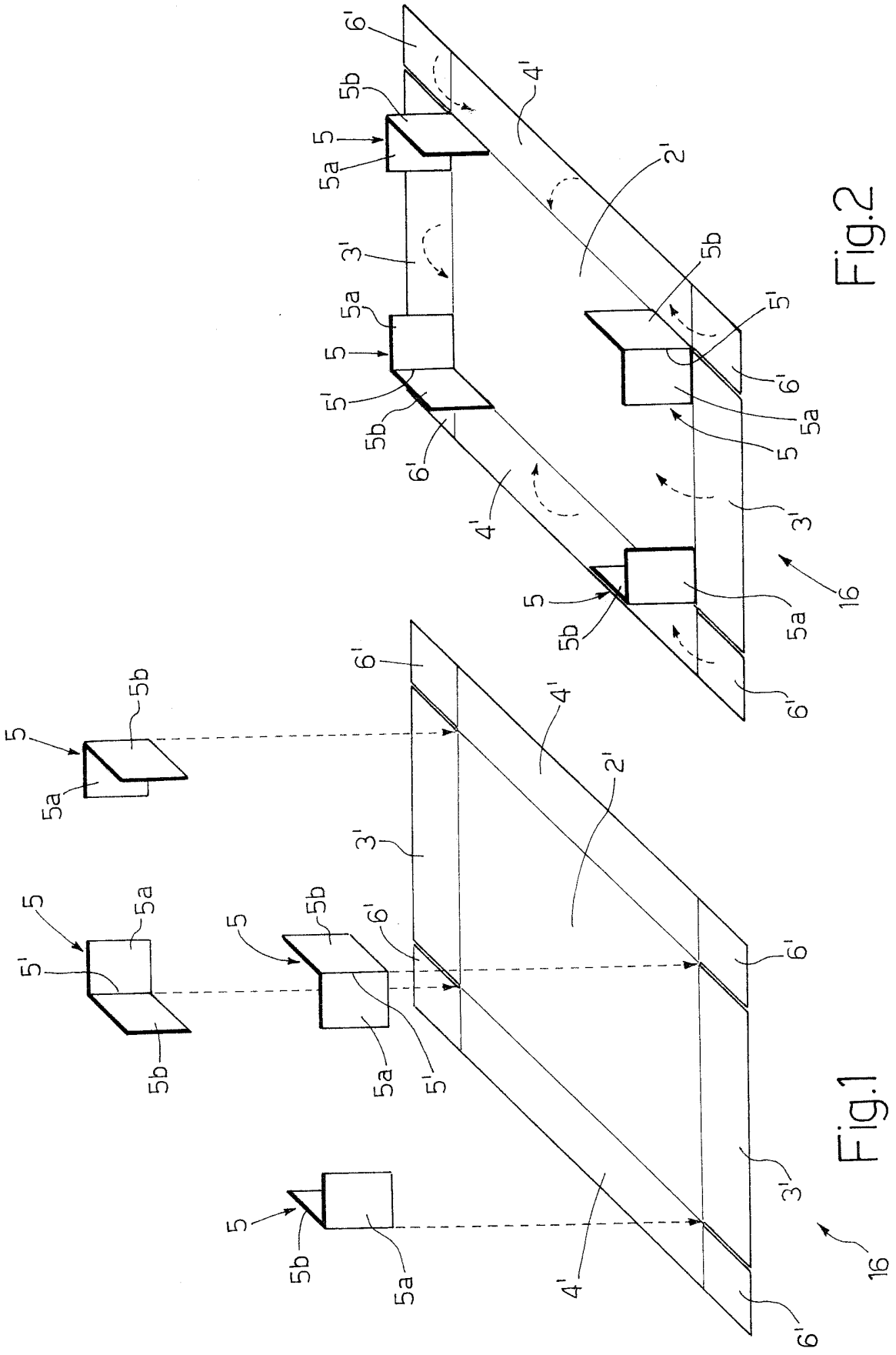


Fig.2

Fig.1

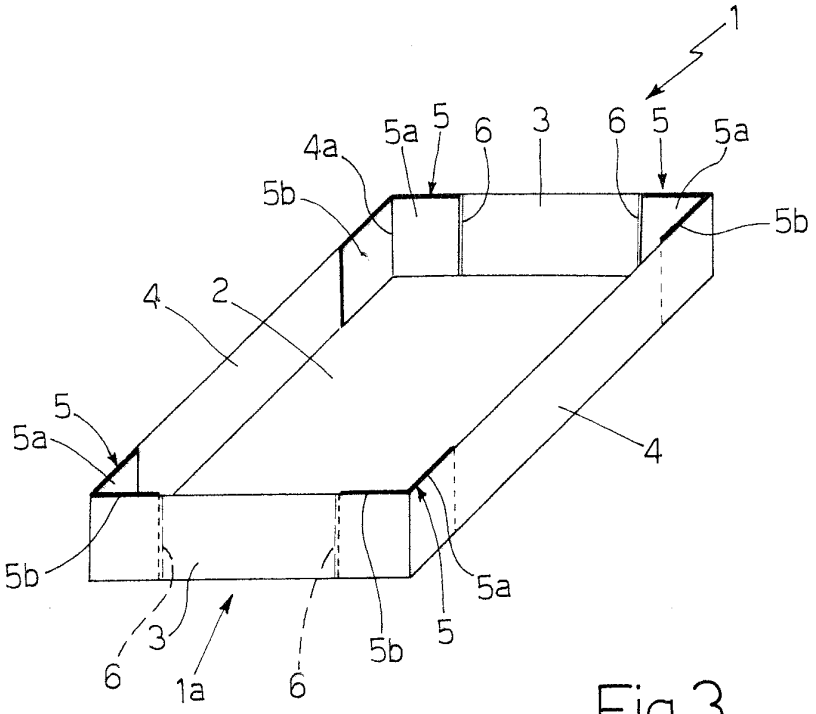


Fig.3

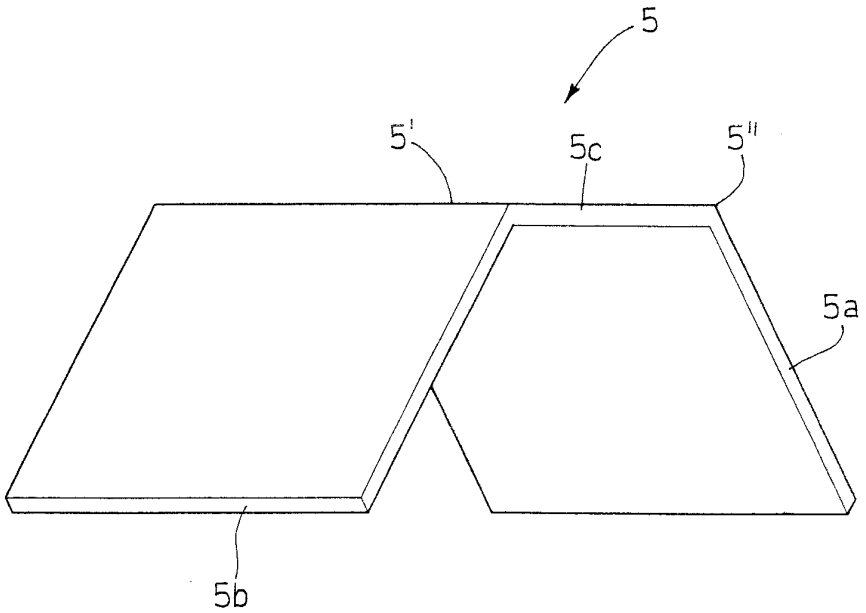


Fig.6

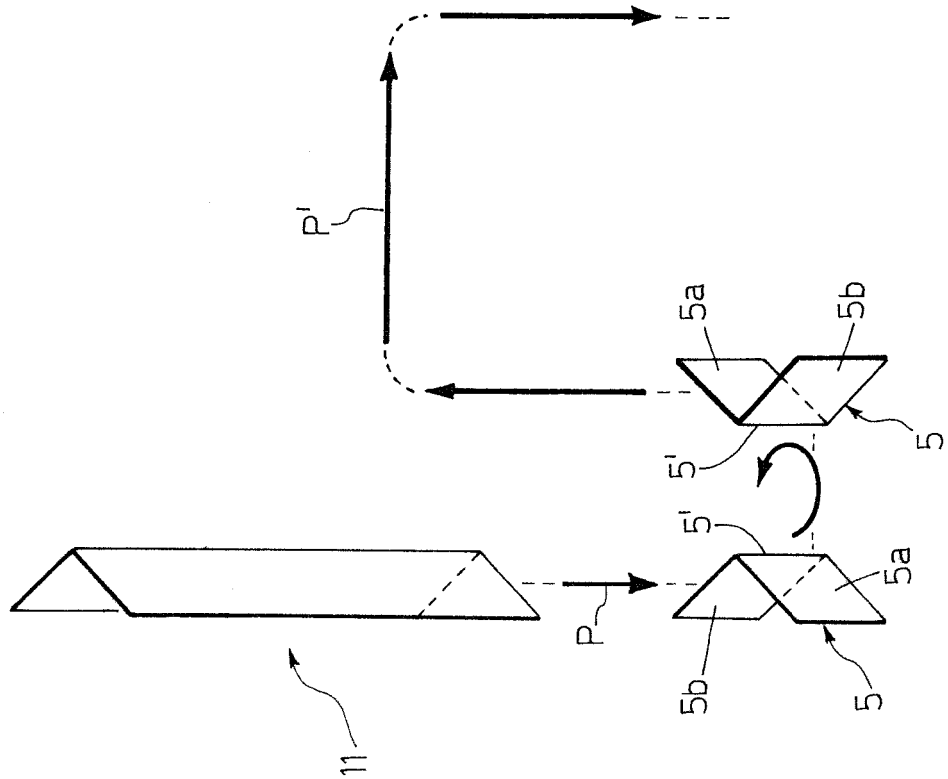


Fig.5

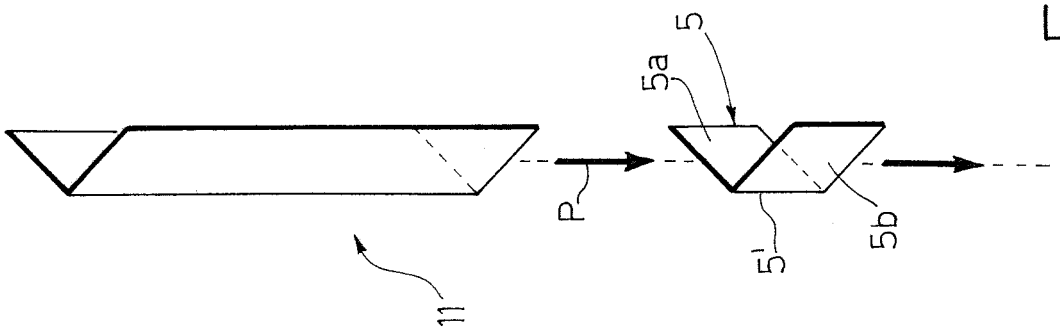


Fig.4

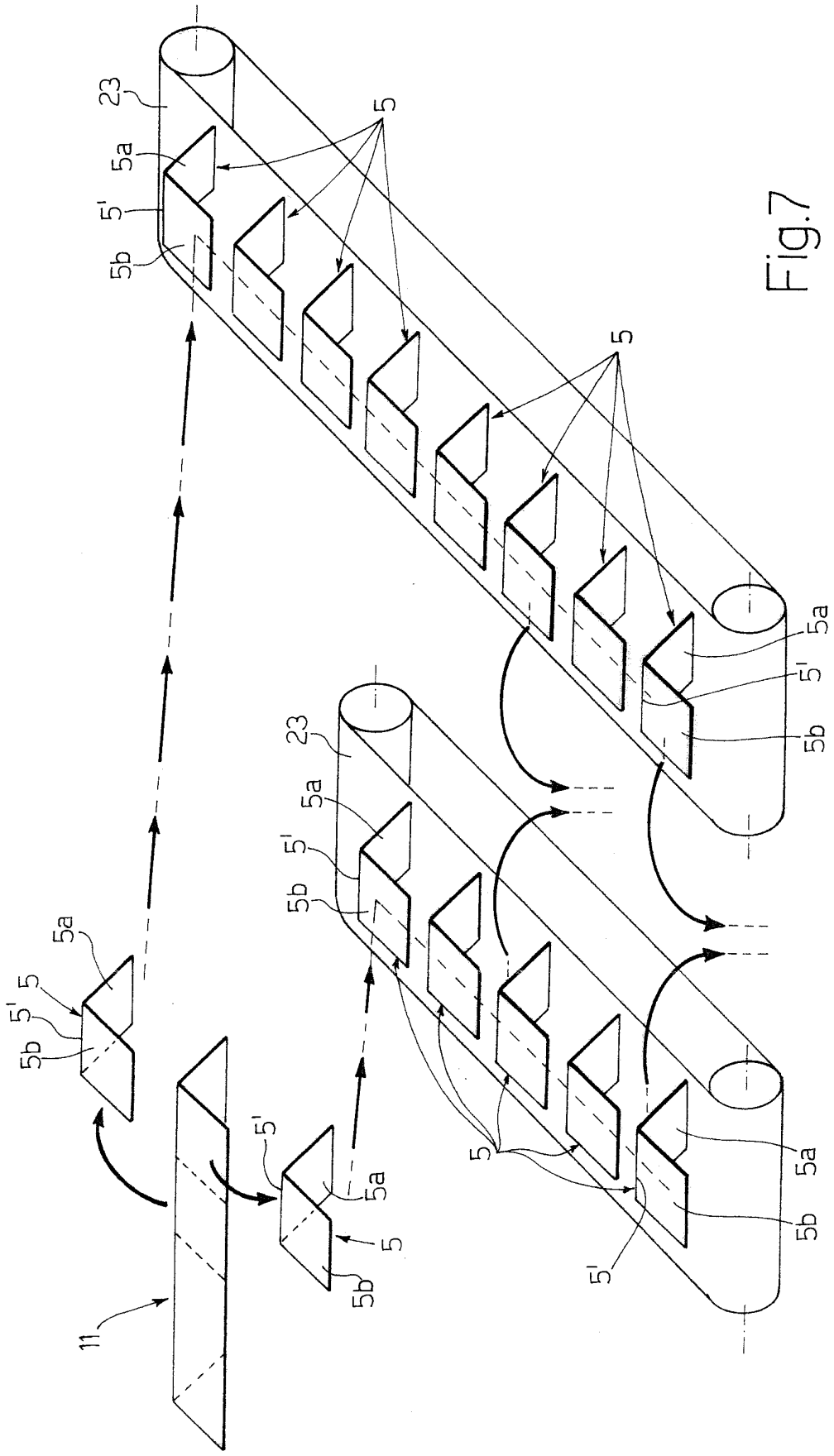


Fig.7

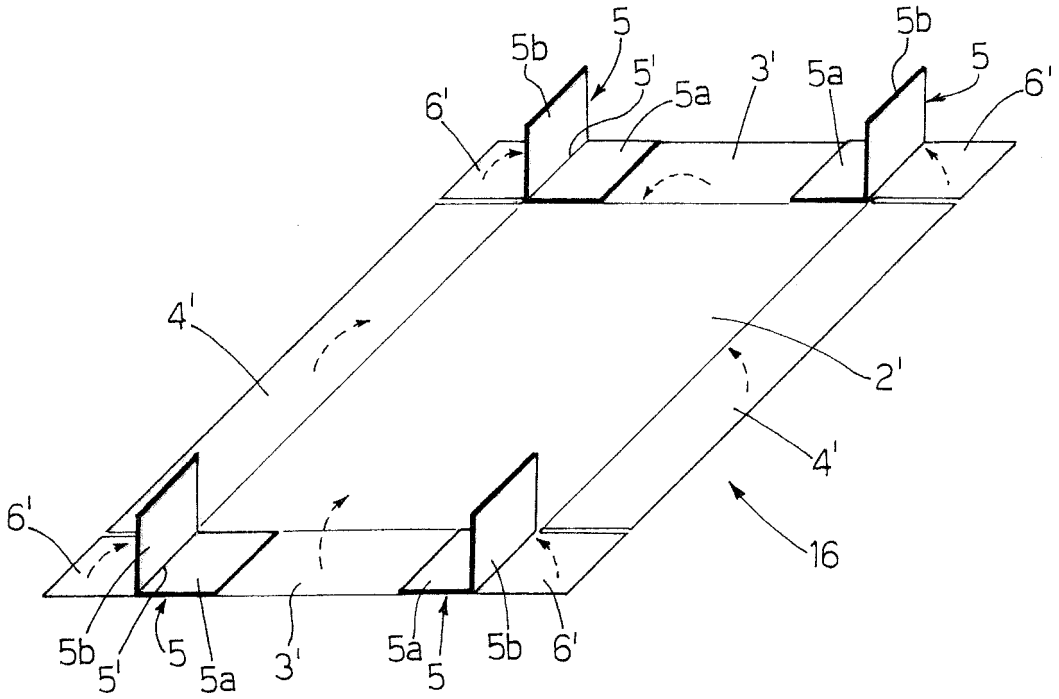


Fig.8

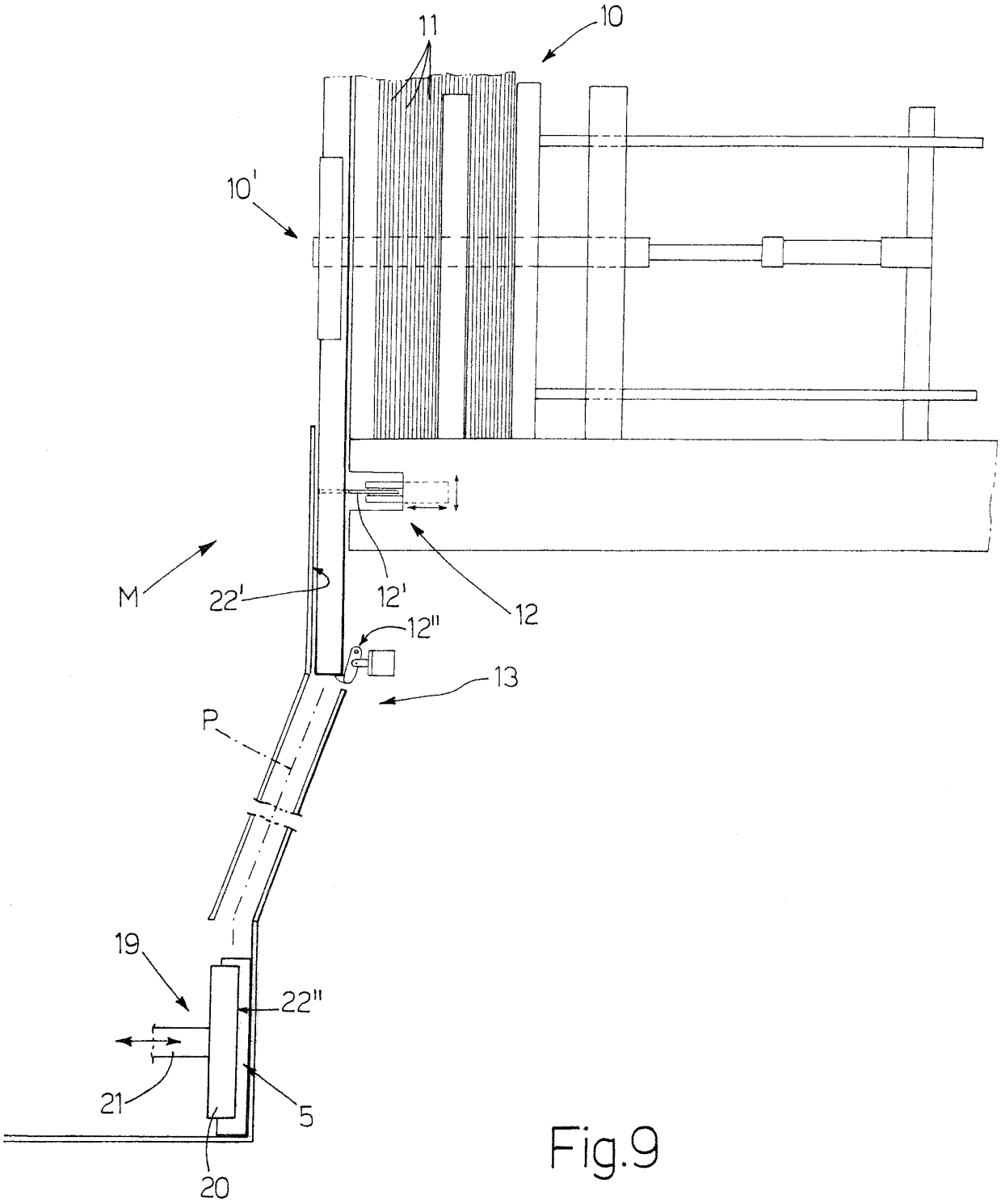
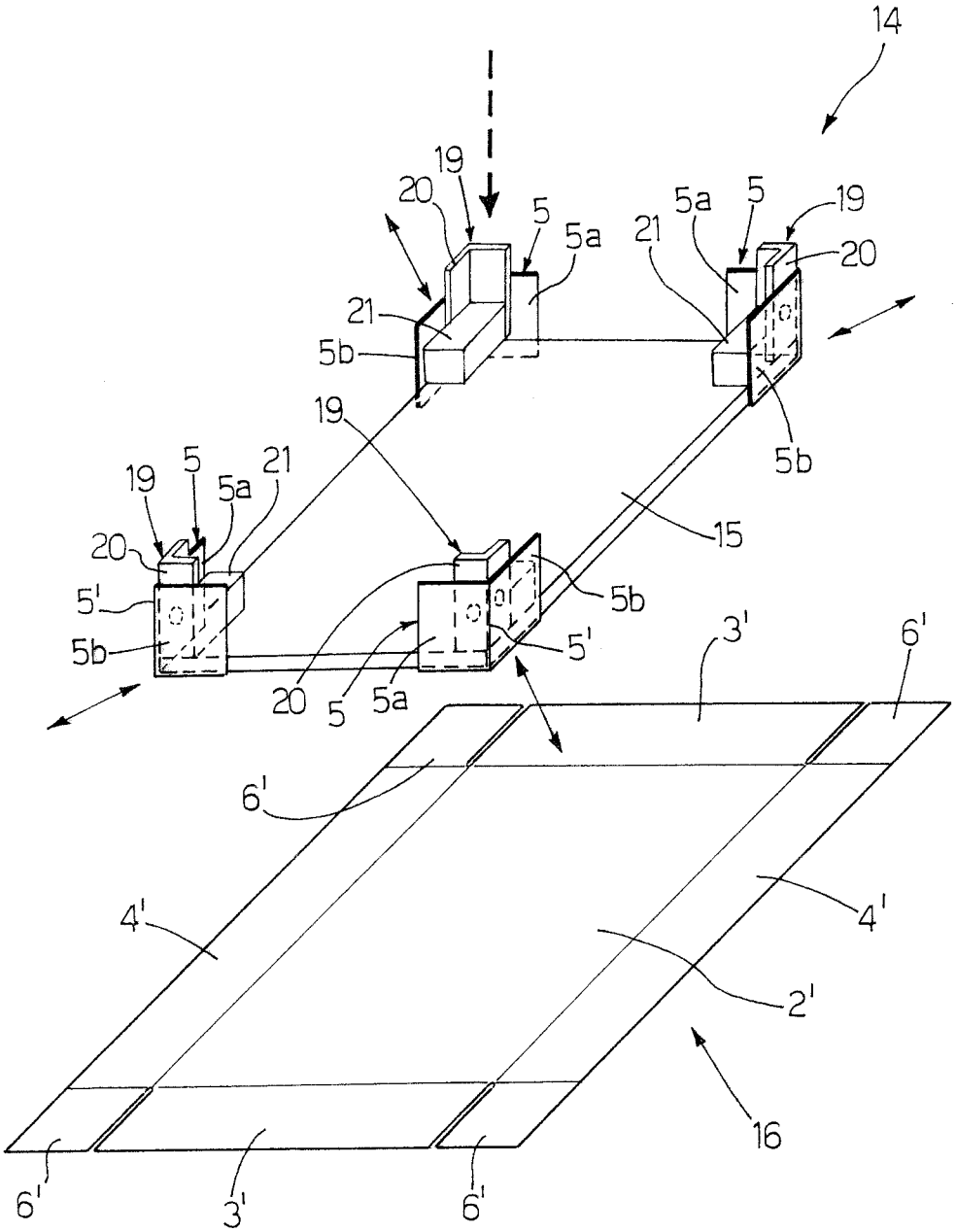


Fig.9


14
19
20
5
5a
21
5b
19
5
5a
21
20
5b
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15
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5'
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16
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Fig.10

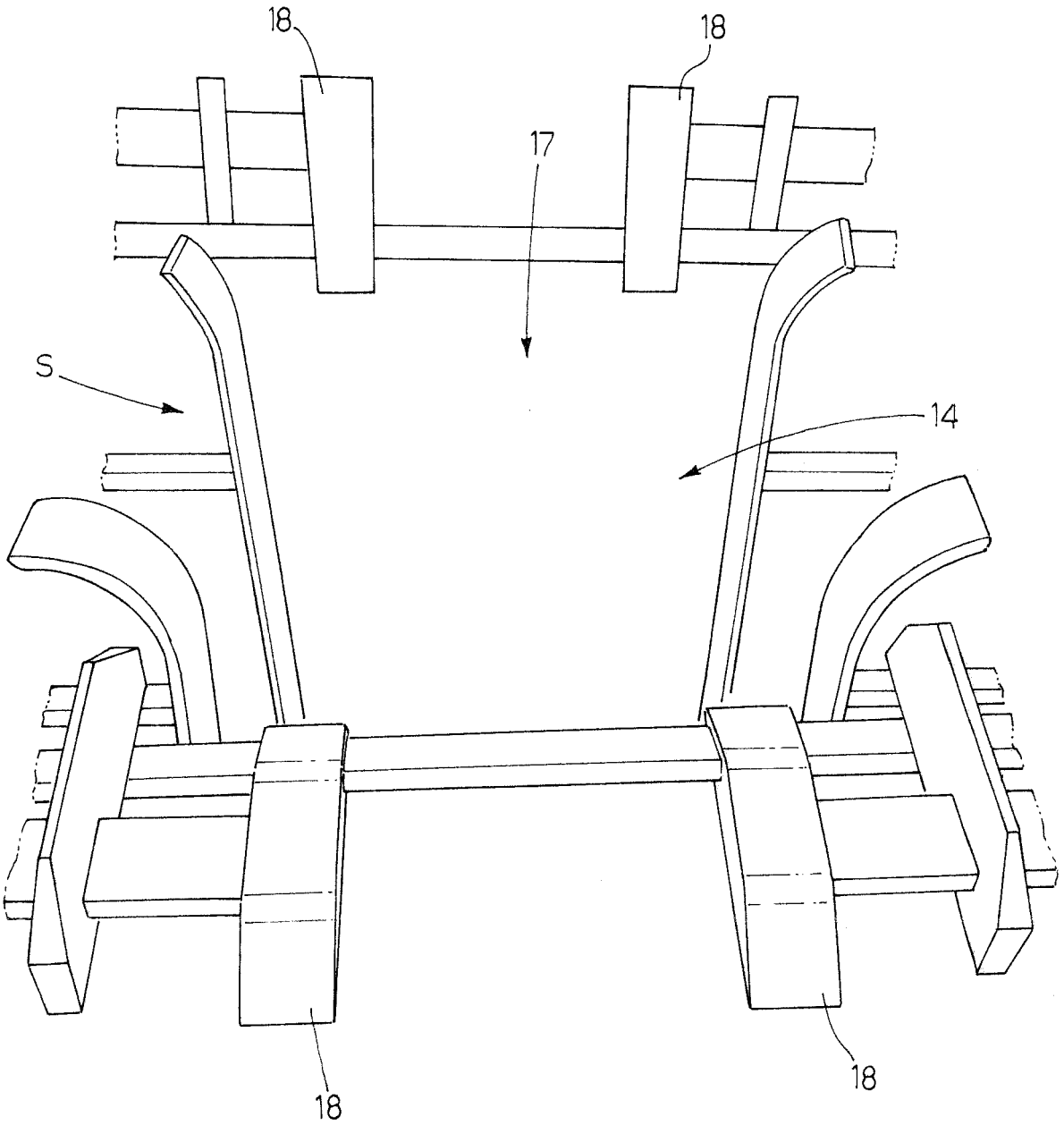

Fig.11

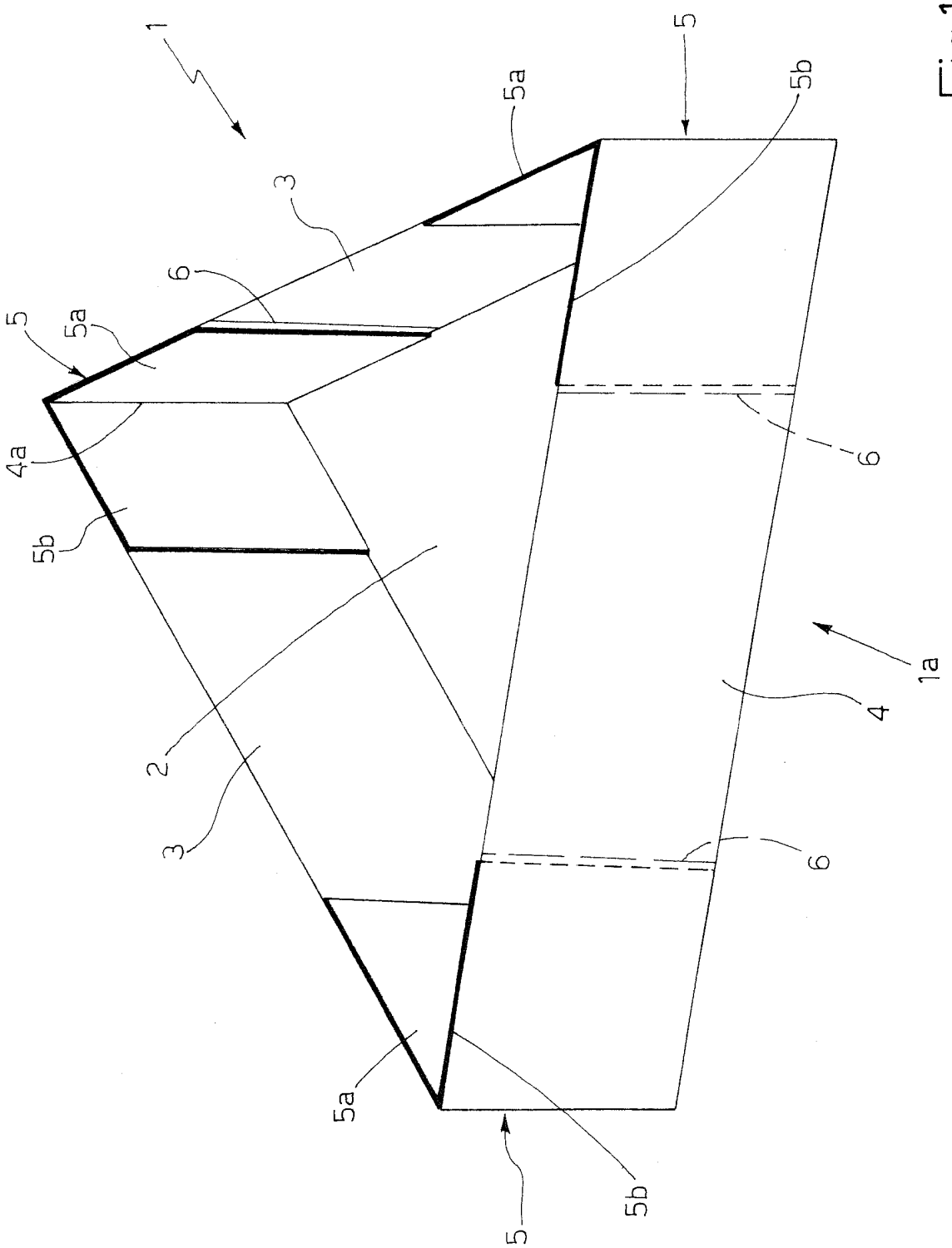

Fig.12

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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