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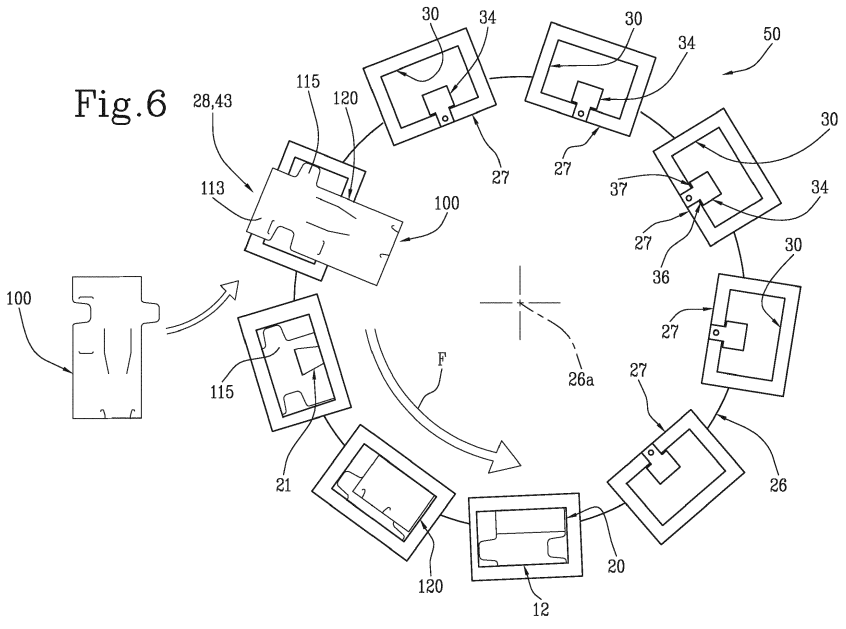
(54) METHOD FOR FOLDING A BLANK OF WRAPPING MATERIAL USED TO MAKE A FRAME FOR A RIGID PACKET FOR SMOKERS' ARTICLES

(57) This invention relates to a method for folding a blank (100) of wrapping material used to make a frame (20) for a rigid packet (1) for smokers' articles; the blank comprising a main panel (115), first and second side panels (113, 120) connected to the main panel by first and second fold lines (111, 112), first and second through slits (125, 126) running along respective portions of the main panel (115) and of the second side panel (120), the slits (125, 126) delimiting the edges of at least one strip (121; 121 a, 121 b) which will form a respective supporting element (21) of the frame (20); the step of drawing the blank is carried out simultaneously with a step of shaping the strip in order to form the respective supporting element by means of at least one shaping member (34) connected to a respective drawing die (27) and extending into the opening (30).

Fig.6



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Description

[0001] This invention relates to a method for folding a blank of wrapping material used to make a frame for a rigid packet for smokers' articles. More specifically, the invention relates to a method for folding a blank of wrapping material used to make a frame for a rigid packet for smokers' articles configured to house a group of cigarettes of reduced size, that is, a group of cigarettes which is smaller in size than the total volume of the space inside the packet. In this description, explicit reference is made to this use without losing in generality.

[0002] Cigarette packets are known which are configured to house groups of cigarettes of reduced size. Inside a packet of this kind there is a frame or filler element designed to occupy the part of the packet interior left free by the group of cigarettes.

[0003] The filler element fills in the gaps inside the packet of cigarettes so that the group of cigarettes in the packet does not "wobble".

[0004] If the group of cigarettes were left free to "wobble" inside the packet of cigarettes, the movements of the group of cigarettes when the packet is handled, not only during production but also during distribution and sale, would subject the cigarettes to mechanical stresses tending to empty the cigarette ends, that is, causing tobacco fibres to fall out of the free ends of the cigarettes.

[0005] Prior art filler elements are in the form of spacers designed to be placed inside the packet of cigarettes to occupy the empty space left by the group of cigarettes.

[0006] The use of these spacers is a source of considerable complications for the construction of the packing machine, which must be provided with manipulating elements to handle the spacers, and of increased cost due to the considerable quantities of wrapping material needed to make the spacers themselves.

[0007] Patent application WO2015/114587 (A1) discloses a twin-pocket ("twin bundle") type of rigid packet for smokers' articles, where a collar inside the packet is made from a paperboard blank having a plurality of panels which must be folded two or more times to make a stabilizing frame designed to occupy the part of the packet interior left free by the group of cigarettes. The frame described therein may, in some embodiments of it, have an at least partly tubular shape (Figures 18-22). That patent application does not, however, offer any indication as to how the stabilizing frame can be made: that is to say, it does not describe a method and a device for folding the panels of the paperboard blank a plurality of times.

[0008] Patent application EP2489501 (A1) discloses a device for forming packaging elements from flat blanks, that is, for forming parts or inserts for finished packages which may be in the form of lidded boxes. The device comprises a drawing die and a fork-shaped punch, with adjustable elements, which pushes the blank through the die opening and opposing elements which at least initially accompany the folding of the side panels of the blank. The insert thus formed is placed on an outfeed conveyor belt. As may be inferred from the accompanying drawings, however, it is a complex device which is not suitable for working at the high speeds required for current cigarette packing machines. Moreover, production of the resulting insert, illustrated in Figure 5b, requires a large quantity of wrapping material.

[0009] To overcome these disadvantages, therefore, the need is felt for a method which is easy and inexpensive to implement and used for folding a blank of wrapping material to make a frame for a rigid packet for smokers' articles.

[0010] The invention is described below with reference to the accompanying drawings, which illustrate non-limiting embodiments of it, and in which:

- Figure 1 is a front perspective view of a rigid cigarette packet made according to this invention, in a closed configuration;
- Figure 2 is a front perspective view of the cigarette packet of Figure 1, in an open configuration;
- Figure 3 is a perspective view of a collar for the cigarette packet of Figure 1;
- Figure 4 is a top view of the collar of Figure 3;
- Figure 5 is a plan view of a blank used to make the collar of Figure 3;
- Figure 6 is top view of a device for folding the blank of Figure 5;
- Figures 7 to 12 are perspective views of a portion of the device of Figure 10 in different operating configurations for folding the blank of Figure 5;
- Figures 13 to 16 are perspective views of some of the steps of folding the blank of Figure 5 to obtain the collar of Figure 3;
- Figure 17 shows a variant of the blank of Figure 4 in a plan view;
- Figure 18 is a top view of an alternative embodiment of the pocket of the device of Figure 6.

[0011] The numeral 1 in Figures 1 and 2 denotes in its entirety a rigid cigarette packet comprising an outer container 2 having the shape of a parallelepiped, and an inner wrapper 3, placed inside the container 2.

[0012] In variants not illustrated, the rigid packet 1 is a packet 1 whose longitudinal edges are rounded or radiused.

[0013] The packet 1 comprises a group 11 of cigarettes enclosed in the inner wrapper 3.

[0014] The packet 1 is configured to house a group 11 of smokers' articles which is smaller in size than the total volume of the space inside the packet 1.

[0015] The outer container 2 has a lid 4 which is joined to the container 2 along a hinge 5 allowing it to rotate relative to the container 2 itself between an open condition and a closed condition and vice versa. When the packet 1 is in the closed condition, as illustrated in Figure 1, the lid 4 gives the outer container 2 the shape of a rectangular parallelepiped having a top wall 6 and a bottom wall 7 which are parallel and opposite to each other,

two large side walls 8 and 9 which are parallel and opposite to each other, defining the front and rear walls of the packet 1, respectively, and two small side walls 10 which are parallel and opposite to each other, defining the respective flanks of the packet 1.

[0016] As illustrated in Figures 2, 3 and 4, the packet 1 comprises a collar 12 which encloses the inner wrapper 3.

[0017] The collar 12 comprises a first and a second side wall 13 and 14, each of which is abutted against, and connected to, a respective flank 10 of the container 2, and a front wall 15 abutted against, and connected to, the front wall 8 of the container 2.

[0018] The collar 12 also comprises an upper edge and a lower edge which have the same profile. More specifically, at the front wall 15 of the collar 12, the upper edge has a U-shaped indentation 15b and the lower edge has a tongue 15a designed to come into contact with the bottom wall 7 of the container 2 of the packet 1 to reinforce the collar 12.

[0019] The collar 12 comprises a rear wall 16, which is opposite to the front wall 15 and abutted against and connected to, the rear wall 9 of the container 2, and an intermediate wall, or partition, 17 interposed between the side walls 13 and 14 of the collar 12.

[0020] The intermediate wall 17 is perpendicular to the front and rear walls 15 and 16 of the collar 12 and parallel to the side walls 13 and 14 of the collar 12.

[0021] The intermediate wall 17 divides the space inside the container 2 into a main chamber 18 adapted to receive the group of cigarettes 11 and a secondary chamber 19 occupying the rest of the space inside the container 2.

[0022] The intermediate wall 17, the rear wall 16, the second side wall 14 and at least part of the front wall 15 of the collar 12 define a frame or filler element 20 of the cigarette packet 1.

[0023] The frame 20 has a substantially tubular parallelepiped shape.

[0024] In order to confer greater rigidity to the frame 20, the collar 12 comprises a supporting element 21 for supporting the frame 20.

[0025] The supporting element 21 comprises a first wall 22 which abuts the intermediate wall 17 of the collar 12 and a second wall 23 which abuts the rear wall 16 of the collar 12.

[0026] In a preferred embodiment, the first wall 22 of the supporting element 21 and the intermediate wall 17 of the collar 12 are connected to each other mechanically by a tuck-in joint.

[0027] More specifically, the intermediate wall 17 of the collar 12 has a pair of cuts 24 which extend from the edge of the intermediate wall 17 towards the inside of the wall itself and each of which is configured to receive a portion of the first wall 22 of the supporting element 21. That portion of the first wall 22 remains interposed between the parts of the intermediate wall 17 alongside the respective cut 24, as illustrated in Figure 4.

[0028] In a variant not illustrated, the first wall 22 of the supporting element 21 and the intermediate wall 17 of the collar 12 are coupled to each other by adhesive connecting means, such as, for example, glue points.

[0029] With reference to Figure 5, the numeral 100 denotes in its entirety a blank of wrapping material used to make the collar 12 of the cigarette packet 1 comprising the frame 20.

[0030] The blank 100 is shaped in such a way as to be cuttable, without waste or offcuts, from a continuous web of wrapping material, not illustrated.

[0031] The blank 100 extends mainly along a longitudinal axis of extension L.

[0032] The blank 100 comprises a main panel 115 and a first and a second side panel 113, 120 which are parallel and opposite to each other and connected to the main panel 115 by a first and a second fold line 111, 112, respectively.

[0033] The first and second fold lines 111 and 112 are parallel to each other, in particular at right angles to the longitudinal axis of extension L.

[0034] The main panel 115 of the blank 100 will form the front wall 15 of the collar 12.

[0035] The first side panel 113 of the blank 100 will form the first side wall 13 of the collar 12.

[0036] The second side panel 120 of the blank 100 will form the frame 20 of the packet 1.

[0037] More specifically, the second side panel 120 comprises a first, a second and a third sector 114, 116 and 117 connected to each other in succession by respective fold lines 118 and 119.

[0038] The third and fourth fold lines 118 and 119 are parallel to each other, in particular at right angles to the longitudinal axis of extension L. The first, second, third and fourth fold lines 111, 112, 118 and 119 are parallel to each other, in particular at right angles to the longitudinal axis of extension L.

[0039] The first sector 114 of the second side panel 120 will form the second side wall 14 of the collar 12.

[0040] The second sector 116 of the second side panel 120 will form the rear wall 16 of the collar 12.

[0041] The third sector 117 of the second side panel 120 will form the intermediate wall 17 of the collar 12.

[0042] The third sector 117 of the second side panel 120 is intended to come into contact with the supporting element 21 to define the intermediate wall 17 of the collar 12.

[0043] In a preferred embodiment, the cuts 24 are made in the third sector 117. The cuts 24 are preferably hook-shaped to form a stable tuck-in joint.

[0044] In Figure 5, the curved part of each hook-shaped cut 24 is directed outwards, defining end portions 130 of the zones of the third sector 117 on the outer side of the cuts 24.

[0045] In other words, the end portions 130 adjacent to the cuts 24 are each located on the same side as the respective upper or lower edge of the collar 12.

[0046] In a variant not illustrated, where the connecting

means are adhesive connecting means the third sector 117 does not have the cuts 24 on it.

[0047] The blank 100 comprises an inner strip 121 which will form the supporting element 21 of the frame 20 of the packet 1.

[0048] The blank 100 has a first and a second through slit 125 and 126, each of which delimits the edges of the strip 121.

[0049] At least part of the first slit 125 runs along an inner portion of the main panel 115 and the remaining part along an inner portion of the second side panel 120, in particular along an inner portion of the first sector 114.

[0050] At least part of the second slit 126 runs along an inner portion of the main panel 115 and the remaining part along an inner portion of the second side panel 120, in particular along an inner portion of the first sector 114.

[0051] The first and second slits 125 and 126 comprise respective oblique stretches T1.

[0052] The first, oblique stretches T1 of the first and second slits 125 and 126 extend from the second fold line 112 to the third fold line 118 of the blank 100.

[0053] The first, oblique stretches T1 of the first and second slits 125 and 126 are inclined to the longitudinal axis of extension L.

[0054] More specifically, with reference to the second sector 116 of the second side panel 120, the first, oblique stretches T1 of the first and second slits 125 and 126 extend in convergent directions.

[0055] With reference to the main panel 115, the first, oblique stretches T1 of the first and second slits 125 and 126 extend in divergent directions.

[0056] In other words, the first, oblique stretches T1 of the first and second slits 125 and 126 make an obtuse angle with the second fold line 112 and an acute angle with the third fold line 118.

[0057] The first and second slits 125 and 126 comprise respective second, rectilinear stretches T2.

[0058] The second, rectilinear stretches T2 of the first and second slits 125 and 126 are parallel to the longitudinal axis of extension L of the blank 100.

[0059] The second, rectilinear stretches T2 of the first and second slits 125 and 126 extend along respective portions of the main panel 115.

[0060] The second, rectilinear stretches T2 of the first and second slits 125 and 126 extend from the second fold line 112 to the fifth fold line 127. The blank 100 comprises engagement portions 124 of the second side panel 120, included between the respective oblique stretches T1 and the extension of the respective second, rectilinear stretches T2. In other words, with reference to the first, oblique stretches T1 of the first and second slits 125 and 126, during the step of folding the blank 100, the engagement portions 124 of the first sector 114 are moved into a position which forms an undercut relative to the rectilinear extension of the second stretches T2 of the first and second slits 125 and 126. These engagement portions 124 are substantially triangular in shape (Figure 5).

[0061] Advantageously, the undercut portions 124 define means for engaging the second side panel 120 of the blank 100 during the steps of folding the blank 100 as described below.

[0062] The strip 121 comprises at least a first and a second panel 122 and 123 which will form the first and second walls 22 and 23 of the supporting element 21, respectively.

[0063] The first panel 122 is connected to the main panel 115 by a respective fold line 127, that is, the fifth fold line 127 of the blank 100. The second panel 123 is connected to the second side panel 120 by a respective fold line 128, that is, the sixth fold line 128 of the blank 100.

[0064] More specifically, the sixth fold line 128 of the blank 100 is part of the third fold line 118.

[0065] The first and second panels 122 and 123 of the strip 121 are connected to each other by a shared fold line 129.

[0066] The respective fold lines of the first and second panels 122 and 123 of the strip 121 are parallel to each other, in particular at right angles to the longitudinal axis of extension L.

[0067] The first, oblique stretches T1 of the first and second slits 125 and 126 at least partly delimit the edges of one of either the first or the second panel 122 or 123 of the strip 121.

[0068] In particular, in the embodiment illustrated, the first, oblique stretches T1 at least partly delimit the edges of the second panel 123 of the strip 121.

[0069] The second, rectilinear stretches T2 of the first and second slits 125 and 126 at least partly delimit the edges of the first panel 122 of the strip 121.

[0070] It should be noted that the first, oblique stretches T1 of the first and second slits 125 and 126 might at least partly delimit the edges of the first panel 122 of the strip 121 when the position of the shared fold line 129 of the first and second panels 122 and 123 of the strip 121 varies.

[0071] The position of the shared fold line 129 depends on the size of the frame 20 because it determines the extension of the first and second panels 122 and 123 of the strip 121, with reference to the longitudinal axis L of the blank 100.

[0072] The variant of the blank 100 of Figure 17 differs from the blank 100 of Figure 4 in that, with reference to the second sector 116 of the second side panel 120, the first, oblique stretches T1 of the first and second slits 125 and 126 extend in divergent directions.

[0073] With reference to the main panel 115, the first, oblique stretches T1 of the first and second slits 125 and 126 extend in convergent directions.

[0074] In other words, the first, oblique stretches T1 of the first and second slits 125 and 126 make an acute angle with the second fold line 112 and an obtuse angle with the third fold line 118.

[0075] In Figure 17, the curved part of each hook-shaped cut 24 is directed inwards, defining end portions 130 of the zones of the third sector 117 on the inner side of the cuts 24.

[0076] In other words, the end portions 130 adjacent to the cuts 24 are directed towards the longitudinal axis L of the collar 12.

[0077] The variant of the blank 100 of Figure 17 comprises two strips 121 a, 121b, each of which will form a respective supporting element 21 of the frame 20 of the packet 1.

[0078] Each strip 121 a, 121 b comprises a respective first and second panel 122a, 122b and 123a, 123b.

[0079] The first panels 122a, 122b of the strips 121 a, 121 b are connected to the main panel 115 by respective fold lines 127a, 127b.

[0080] The second panels 123a, 123b of the strips 121 a, 121b are connected to the second side panel 120 by respective fold lines 128a, 128b, that is, the sixth fold lines 128a, 128b of the blank 100. More specifically, the sixth fold lines 128a, 128b of the blank 100 are part of the third fold line 118.

[0081] The first and second panels 122a, 122b and 123a, 123b of each strip 121 a, 121b are connected to each other by a respective shared fold 129a, 129b.

[0082] The respective fold lines of the first and second panels 122a, 122b and 123a, 123b of the strips 121 a, 121 b are parallel to each other, in particular at right angles to the longitudinal axis of extension L.

[0083] In this variant, one strip 121 a is at least partly delimited by a portion of the outer edge of the blank 100 and by the first slit 125.

[0084] The other strip 121b is at least partly delimited by a portion of the outer edge of the blank 100 and by the second slit 126.

[0085] Advantageously, during the step of folding the blank 100 in this variant, in particular of folding the strips 121 a, 121 b, the first, oblique stretches T1 of the first and second slits 125, 126 define respective portions 124 of the first sector 114 of the second side panel 120 which form undercuts relative to the second, rectilinear stretches T2 of the first and second slits 125, 126. The portions 124 are substantially triangular in shape.

[0086] The folding of the blank 100 to give it the shape of a collar 12 comprising the frame 20 is performed by a device 50 for folding blanks 100 of wrapping material, illustrated schematically in Figure 6. The device 50 comprises a conveyor 26 which, by way of example, may consist of a conveyor wheel rotatable stepwise or continuously about a vertical axis 26a in a direction indicated by the arrow F in Figure 6.

[0087] The conveyor 26 supports a plurality of folding dies 27, in particular located at equal angular intervals from each other.

[0088] The blank 100 is fed in an initially flat configuration, preferably horizontal and preferably after having cut it off from a continuous web of wrapping material (not illustrated).

[0089] The feeding of each blank 100 is carried out at a placing station 28 traversed in succession by the folding dies 27 carried by the conveyor 26.

[0090] Each drawing die 27 is provided with a respective through opening 30. The shape of the through opening 30 of the drawing die 27 is such as to fold the blank 100 as it passes through the opening 30.

[0091] In the variant where the first panel 122 of the strip 121 is joined to the third sector 117 of the second side panel 120 by adhesive connecting means, applicator means, not illustrated, are provided upstream of the placing station 28 for applying the adhesive substance.

[0092] In the variant where the first panel 114 of the strip 121 is joined to the third sector 117 of the second side panel 113 by adhesive connecting means, applicator means, not illustrated, are provided upstream of the placing station 28 for applying the adhesive substance.

[0093] The adhesive applicator means not illustrated apply the adhesive connecting means to one or more portions of the third sector 117 of the second side panel 113 which are intended to come into contact with the first panel 114 of the strip 121.

[0094] The device 50 comprises a folding station 43, where at least part of the blank 100 is folded as it is moved through the opening 30 of the drawing die 27.

[0095] In the preferred embodiment, the folding station 43 corresponds to the placing station 28.

[0096] Alternatively, the folding station 43 is located downstream of the placing station 28, with reference to the direction indicated by the arrow F.

[0097] The device 50 comprises engagement means 31 for engaging a blank 100 and movable linearly through the opening 30 of the die 27, in particular with vertical motion from the bottom up and vice versa. More specifically, the engagement means 31 comprise a pusher 32 and a counterpusher 33 between which a respective blank 100 is interposed, as illustrated in Figures 7 and 8.

[0098] The pusher 32 and the counterpusher 33 engage a respective face of the main panel 115 of the blank 100 between them.

[0099] In this embodiment, the opening 30 of the die 27 is rectangular in shape and just larger in size than the main panel 115.

[0100] That way, the passage of the blank 100 into the opening 30 of the die 27 causes folding at least of the first and second side panels 113 and 120 about the first and second fold lines 111 and 112, as illustrated in Figure 9.

[0101] In order to fold the blank 100, the pusher 32 and the counterpusher 33 perform a stroke C, in particular downwards, through the opening 30 of the die 27.

[0102] The stroke C is substantially equal to the extension of the panel 122 of the strip 121, with reference to the longitudinal axis of extension L of the blank 100, when the distance between the fifth fold line 127 and the shared fold line 129 is substantially equal to the distance between the second fold line 112 and the third fold line 118. Advantageously, each die 27 comprises at least one respective shaping member 34 for shaping the strip 121 and configured to engage the strip 121 in such a way as to fold it to obtain the supporting element 21.

[0103] The shaping member 34 is connected to the die

27 in such a way as to extend into the through opening 30, defining the cross section of the opening 30 of the die 27 through which the blank 100 is made to pass.

[0104] In other words, the shaping member 34 is an element which obstructs the passage of the strip 121 through the opening 30 of the die 27.

[0105] The shaping member 34 comprises a sliding surface 35 for the blank 100 configured to at least partly contact the first panel 122 of the strip 121 and to rotate it relative to the main panel 115 of the blank 100 about the respective fold line 127, that is, the fifth fold line 127, thus folding the first panel 122.

[0106] More specifically, the first panel 122 of the strip 121 is rotated through an angle of 90° about the respective fold line 127.

[0107] The rotation of first panel 122 of the strip 121 about the respective fold line 127, that is, the fifth fold line 127, causes rotation of the second panel 123 of the strip 121 relative to the first panel 122 about the respective fold line 129, that is, the shared fold line 129, and causes rotation of the second panel 123 of the strip 121 relative to the second sector 116 of the second side panel 120 along the respective fold line 128, that is, the sixth fold line 128, thus folding the second panel 123.

[0108] More specifically, the second panel 123 of the strip 121 is rotated through an angle of 90° about the respective fold lines 128 and 129.

[0109] The rotation of the first and second panels 122 and 123 of the strip 121 about the respective fold lines 127, 128 and 129 occurs while the blank 100 travels the length of the stroke C in the opening 30 of the die 27.

[0110] After being rotated, the first and second panels 122 and 123 of the strip 121 are disposed at right angles to each other, as illustrated in Figure 10.

[0111] The shaping member 34 comprises a first and a second contact surface 38 and 39 intended to come into contact with the first and the second panel 122 and 123 of the strip 121; respectively.

[0112] More specifically, the mutual position of the first and second contact surfaces 38 and 39 determines the shape of the supporting element 21 of the frame 20 formed by folding the first and second panels 122 and 123 of the strip 121.

[0113] In this embodiment, the first and second contact surfaces 38 and 39 are disposed at a 90° angle to each other.

[0114] Once the blank 100 has travelled the length of the stroke C in the die 27, the first and second panels 122 and 123 of the strip 121 are placed round the shaping member 34 in such a way as to abut the first and second contact surfaces 38 and 39, respectively.

[0115] Generally speaking, the shaping member 34 is configured in such a way as to reproduce in negative form the shape of the supporting element 21.

[0116] Advantageously, while the blank 100 is being drawn, the shaping member 34 allows simultaneously folding the second side panel 120 along the second fold line 112 and the first and second panels 122 and 123 of the strip 121 about the respective fold lines 127, 128 and 129 to obtain the supporting element 21.

[0117] As illustrated in Figure 6, each die 27 comprises a single shaping member 34.

[0118] The shaping member 34 has a first and a second slot 36 and 37 for insertion of respective portions of the blank 100 adjacent to the first and the second slit 125 and 126, in particular of the undercut portions 124 of the first sector 114 of the second side panel 120 (Figures 5 and 10).

[0119] The first and the second insertion slots 36 and 37 define means for retaining the portions of the blank adjacent to the first and the second slit 125, 126, in particular the undercut portions 124 of the first sector 114 of the second side panel 120.

[0120] In the variant illustrated in Figure 18, the shaping member 34 of the die 27 comprises a first and a second element 34a and 34b, each of which is designed to engage a respective strip 121 a, 121b of the blank 100.

[0121] The first and second elements 34a and 34b each have a respective insertion slot 36 and 37 for insertion of the undercut portions 124 of the first sector 114 of the second side panel 120.

[0122] The first and second elements 34a and 34b of a respective die 27 are positioned to face each other on the same side of the die 27. Advantageously, the first, oblique stretches T1 of the first and second slots 125 and 126 allow the portions of the blank 100 to be inserted into the first and second slots 36 and 37 of the shaping member 34. While the blank 100 travels the length of the stroke C in the opening 30 of the die 27, the portions of the blank 100 adjacent to the first and second slits 125 and 126 are inserted into the first and second insertion slots 36 and 37 until the second panel 123 of the strip 121 abuts the contact surface 39 of the shaping member 34. Advantageously, during the subsequent steps of folding the second side panel 120, the shaping member 34 abuts the portions of the blank 100 engaged in the first and second insertion slots 36 and 37, thereby preventing further rotation of the second side panel 120 about the second fold line 112.

[0123] In other words, the shaping member 34 keeps the second side panel 120 folded at an angle of 90° to the main panel 115 of the blank 100 along the second fold line 112.

[0124] Once the blank 100 has been drawn, the pusher 32 is lifted out of the opening 30 of the die 27 and the conveyor 26 is started and rotated one step in the direction indicated by the arrow F.

[0125] The consequent movement of the drawing die 27, partly housing the blank 100 considered above brings part of the second side panel 120 into contact with a fixed folder 40 located downstream of the folding station 43 with reference to the direction of rotation indicated by the arrow F. Preferably, the fixed folder 40 has a helical profile - see Figure 11.

[0126] Engagement of the second side panel 120 by the fixed folder 40 causes the second sector 116 of the

second side panel 120 to rotate by 90° about the respective fold line 118, that is, the third fold line 118.

[0127] That way, the second sector 116 of the second side panel 120 is brought into contact with the second panel 123 of the strip 121, advantageously held in position by the shaping member 34.

[0128] A movable folding element 41, located downstream of the fixed folder 40 with reference to the direction of rotation indicated by the arrow F, engages the third sector 117 of the second side panel 120 to rotate by 90° about the respective fold line 119, that is, the fourth fold line 119, as illustrated in Figure 12.

[0129] That way, the third sector 117 of the second side panel 120 is brought into contact with the first panel 122 of the strip 121.

[0130] In the variant where the third sector 117 of the second side panel 120 and the first panel 122 of the strip 121 are connected to each other mechanically by a tuck-in joint, the movable folding element 41 comprises a first and a second pushing element 41 a and 41 b adapted to press respecting portions of the third sector 117 adjacent to the cuts 24 in such a way as to tuck respective end portions 130 in behind the first panel 122 of the strip 121.

[0131] The first and second pushing elements 41 a and 41 b position the end portions 130 on the side of the first panel 122 opposite the side of the first panel 122 which comes into contact with the third sector 117.

[0132] In a variant not illustrated, the movable folding element 41 comprises a single pushing element to make the mechanical tuck-in connection between the third sector 117 of the second side panel 120 and the first panel 122a, 122b of the strips 121 a, 121 b of the blank 100 of the collar 12 according to the variant of Figure 17.

[0133] At this point, the blank 100 is fully folded into the shape shown in Figure 3 and can be removed, in a manner not illustrated, from the conveyor 26 and used to make up a packet of cigarettes.

[0134] This invention also relates to a method for folding a blank 100 of wrapping material used to make a frame 20 for a rigid packet 1 of cigarettes, as illustrated schematically in Figures 13 to 16.

[0135] The method comprises a step of feeding the blank 100 in a flat, preferably horizontal configuration, as shown in Figure 13.

[0136] The method comprises a step of drawing the blank 100 during which at least one between the first and the second side panel 113, 120 of the blank 100 is folded along the respective fold line 111, 112, that is, the first and the second fold line 111 and 112, relative to the main panel 115.

[0137] In this embodiment, during the step of drawing the blank 100, the first and the second side panel 113, 120 of the blank 100 are folded along the respective fold lines 111, 112, that is, the first and the second fold line 111 and 112, relative to the main panel 115.

[0138] Advantageously, the step of drawing the blank 100 is carried out simultaneously with a step of shaping the strip 121, during which the first and second panels 122 and 123 are folded along the respective fold lines 127, 128, 129 relative to the panel 115, as shown in Figure 14.

[0139] The step of shaping the strip 121 comprises a step of rotating the first panel 122 of the strip 121, in particular through an angle of 90°, relative to the main panel 115 about the respective fold line 127, that is, the fifth fold line 127.

[0140] The step of shaping the strip 121 comprises a step of rotating the first panel 122 of the strip 121, in particular through an angle of 90°, relative to the second panel 123 of the strip 121 about the shared fold line 129.

[0141] The step of shaping the strip 121 comprises a step of rotating the second panel 123 of the strip 121, in particular through an angle of 90°, relative to the second sector 116 of the second side panel 120 about the respective fold line 128, that is, the sixth fold line 128. More specifically, the step of rotating the second panel 123 of the strip 121 about the respective fold line 128, that, the sixth fold line 128, is carried out in response to the step of rotating the first panel 122 of the strip 121 about the respective fold line 127, that is, the fifth fold line 127.

[0142] The step of shaping the strip 121 comprises a step of rotating the second side panel 120, in particular through an angle of 90° about the second fold line 112, in response to the step of rotating the first panel 122 of the strip 121 about the respective fold line 127, that is, the fifth fold line 127.

[0143] The shaping step comprises a step of engaging respective portions 124 of the second side panel 120 in order keep part of the second side panel 120, in particular the first sector 114 thereof, in the folded configuration along the second fold line 112 during the subsequent steps of folding the blank 100.

[0144] The method comprises a step of rotating the second sector 116 of the second side panel 120, in particular through an angle of 90°, relative to the first sector 114 of the second side panel 120 about the respective fold line 118, that is, the third fold line 118, in such a way as to bring the second sector 116 of the second side panel 120 and the second panel 123 of the strip 121 into contact with each other, as shown in Figure 15.

[0145] The method comprises a step of rotating the third sector 117 of the second side panel 120, in particular through an angle of 90°, relative to the second sector 116 of the second side panel 120 about the respective fold line 119, that is, the fourth fold line 119, in such a way as to bring the third sector 117 of the second side panel 120 and the first panel 122 of the strip 121 into contact with each other to complete the frame 20, as shown in Figure 16.

Claims

1. A method for folding a blank (100) of wrapping material used to make a frame (20) for a rigid packet

(1) for smokers' articles;
the blank (100) comprising a main panel (115) and a first and a second side panel (113, 120) which are parallel and opposite to each other and connected to the main panel (115) by a first and a second fold line (111, 112), respectively;
the method comprises a step of feeding the blank (100) in a flat configuration and a step of drawing the blank (100) during which the blank (100) is moved through an opening (30) of a respective drawing die (27) to fold at least one between the first and the second side panel (113, 120) along the respective fold line (111, 112) relative to the main panel (115);
the method entails using a blank (100) which has a first and a second through slit (125, 126) running along respective portions of the main panel (115) and of the second side panel (120), the slits (125, 126) delimiting the edges of at least one strip (121; 121 a, 121b) which will form a respective supporting element (21) of the frame (20);
the method is **characterized in that** the step of drawing the blank (100) is carried out simultaneously with a step of shaping at least one strip (121; 121 a, 121 b) in order to form the respective supporting element (21) by using at least one shaping member (34) which is connected to the respective drawing die (27) and which extends into the opening (30) to define the cross section through which the blank (100) is passed; the shaping member (34) comprises a first and a second contact surface (38, 39) intended to come into contact with, respectively, the first and the second panel (122, 123; 122a, 122b, 123a, 123b) of the strip (121; 121 a, 121b); the mutual position of the first and second contact surfaces (38, 39) determines the shape of the supporting element (21) of the frame (20).

2. The method according to claim 1, **characterized in that** the first and the second panel (122, 123; 122a, 122b, 123a, 123b) of the strip (121; 121 a, 121 b) of the blank (100) are connected respectively to the main panel (115) and to the second side panel (120) by means of respective fold lines (127, 128; 127a, 127b, 128a, 128b) and **in that** the step of shaping the strip (121; 121 a, 121b) comprises a step of rotating the first panel (122; 122a, 122b) of the strip (121; 121 a, 121 b) relative to the main panel (115) and the second panel (123; 123a, 123b) of the strip (121; 121 a, 121 b) relative to the second side panel (120) about the respective fold lines (127, 128; 127a, 127b, 128a, 128b), in particular through an angle of 90°.

3. The method according to claim 2, **characterized in that** it entails using a blank (100) where the first and the second panel (122, 123; 122a, 122b, 123a, 123b) of the strip (121; 121 a, 121b) are connected to each other by a shared fold line (129, 129a, 129b) and **in that** the step of shaping the strip (121; 121a, 121b) comprises a step of rotating the first panel (122; 122a, 122b) of the strip (121; 121 a, 121 b) relative to the second panel (123, 123a, 123b) of the strip (121; 121 a, 121 b) about the shared fold line (129; 129a, 129b), in particular through an angle of 90°.

4. The method according to any one of claims 1 to 3, **characterized in that** the shaping step comprises a step of engaging portions (124) of the second side panel (120) in order keep part of the second side panel (120) in the folded configuration during the subsequent steps of folding the blank (100) to complete the frame (20) of the packet (1).

5. The method according to claim 4, **characterized in that** it entails using a blank (100) where the first and the second slit (125, 126) comprise respective first, oblique stretches (T1) and second, rectilinear stretches (T2) relative to the longitudinal extension of the blank (100); the engagement portions (124) of the second side panel (120) are included between the respective oblique stretches (T1) and the extension of the respective second, rectilinear stretches (T2); during the step of folding the blank (100), the engagement portions (124) of the first sector (114) being moved into a position which forms an undercut relative to the rectilinear extension of the second stretches (T2) of the first and second slits (125, 126).

6. The method according to claim 5, **characterized in that** it entails using a blank (100) where the first, oblique stretches (T1) of the first and second slits (125, 126) extend between two fold lines (112, 118) of the blank, delimiting a first sector (114) of the second side panel (120).

7. The method according to claim 5 or 6, **characterized in that** it entails using a blank (100) where the first, oblique stretches (T1) of the first and second slits (125, 126) extend between the second fold line (112) of the second side panel, away from the main panel (115) in a converging or diverging direction.

8. The method according to any one of claims 1 to 7, **characterized in that** it entails using a blank (100) where the second side panel (120) comprises a first, a second and a third sector (114, 116, 117) connected to each other in succession by respective fold lines (118, 119); and **in that** it comprises a step of rotating the second sector (116) relative to the first sector (114) of the second side panel (120) about the respective fold line (118), in particular through an angle of 90°, to bring the second sector (116) of the second side panel (120) and the second side panel (123, 123a, 123b) of the strip (121, 121 a, 121 b) into contact with each other.

9. The method according to claim 8, **characterized in that** comprises a step of rotating the third sector (117) of the second side panel (120) relative to the second sector (116) of the second side panel (120) about the respective fold line (119), in particular through an angle of 90°, to bring the third sector (117) of the second side panel (120) and the first side panel (122; 122a, 122b) of the strip (121; 121 a, 121 b) into contact with each other.

10. The method according to claim 4 or 5, **characterized in that** the shaping member (34) has a first and a second slot (36, 37) for insertion of respective portions of the blank (100) adjacent to the first and the second slit (125, 126), in particular of the engagement portions (124) of the second side panel (120), during the drawing step; the first and the second insertion slots (36, 37) define means for retaining the engagement portions (124) of the blank (100).

11. A device for folding a blank (100) of wrapping material used to make a frame (20) for a rigid packet (1) for smokers' articles, the frame (20) comprising a main panel (115) and a first and a second side panel (113, 120) connected to the main panel (115) by a first and a second fold line (111, 112), respectively; the blank (100) has a first and a second through slit (125, 126) running along respective portions of the main panel (115) and of the second side panel (120), the slits (125, 126) delimiting the edges of at least one strip (121; 121 a, 121b) which will form a respective supporting element (21) of the frame (20);
the device comprises a conveyor (26), which supports a plurality of drawing dies (27), and a folding station (43) where at least part of the blank (100) is folded as it is moved through the opening (30) of the drawing die (27); **characterized in that** each drawing die (27) comprises at least one respective shaping member (34) for shaping the strip (121; 121 a, 121 b) and configured to engage the strip (121; 121 a, 121 b) in such a way as to fold it to obtain the supporting element (21); the shaping member (34) being an element which obstructs the passage of the strip (121; 121 a, 121 b) through the opening (30) of the drawing die (27).

12. The device according to claim 11, **characterized in that** the shaping member (34) has a first and a second slot (36, 37) for the passage of respective portions of the blank (100) adjacent to the first and the second slit (125, 126); the first and the second through slots (36, 37) define means for retaining the portions of the blank (100) adjacent to the first and the second slit (125, 126), in particular the engagement portions (124) of the second side panel (120).

Fig.1

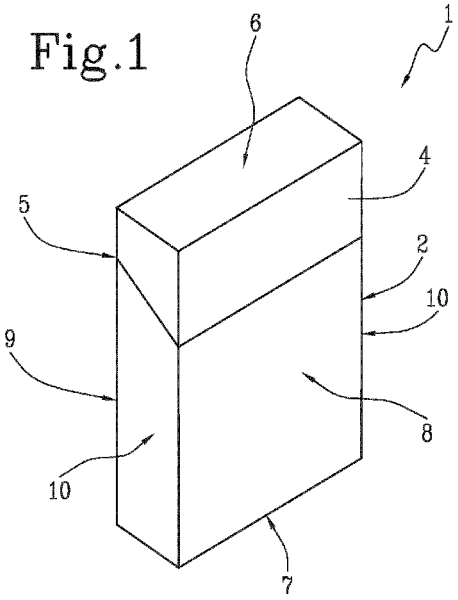


Fig.2

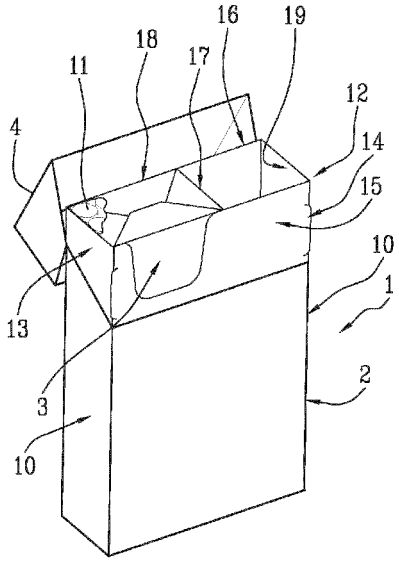


Fig.3

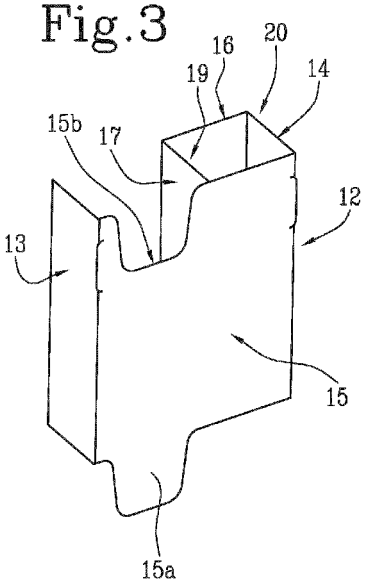


Fig.4

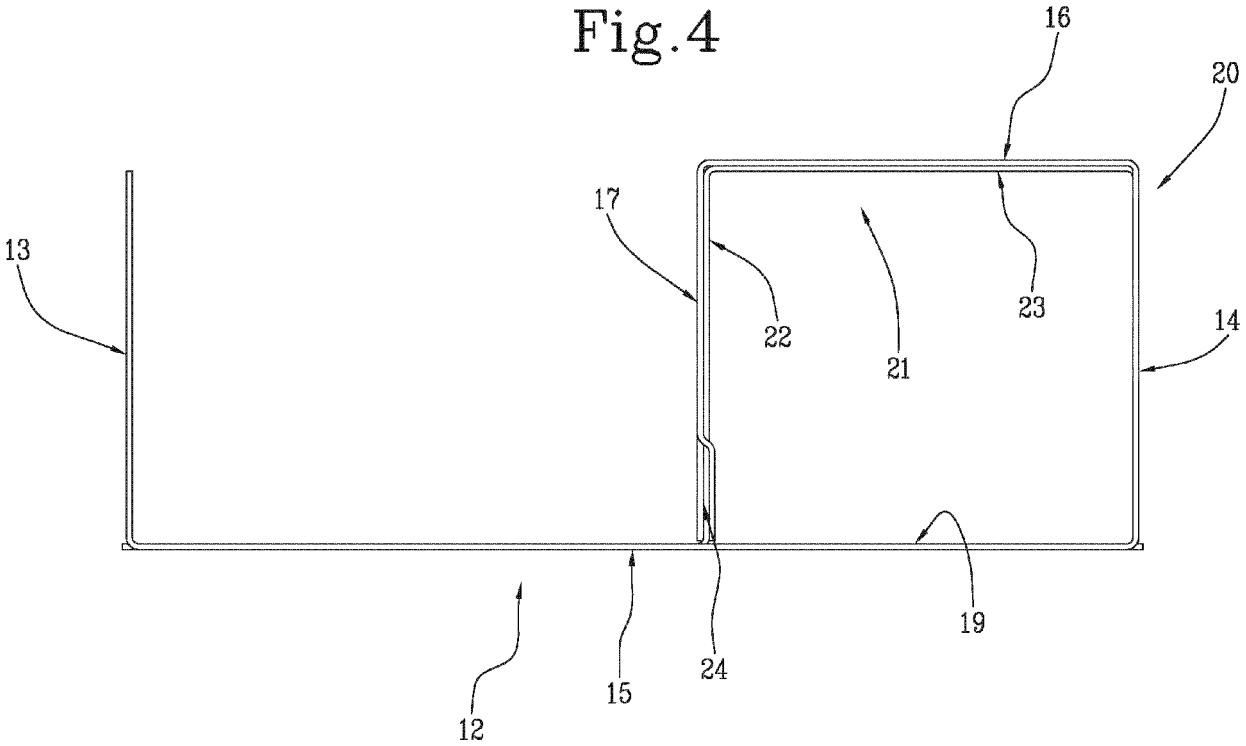
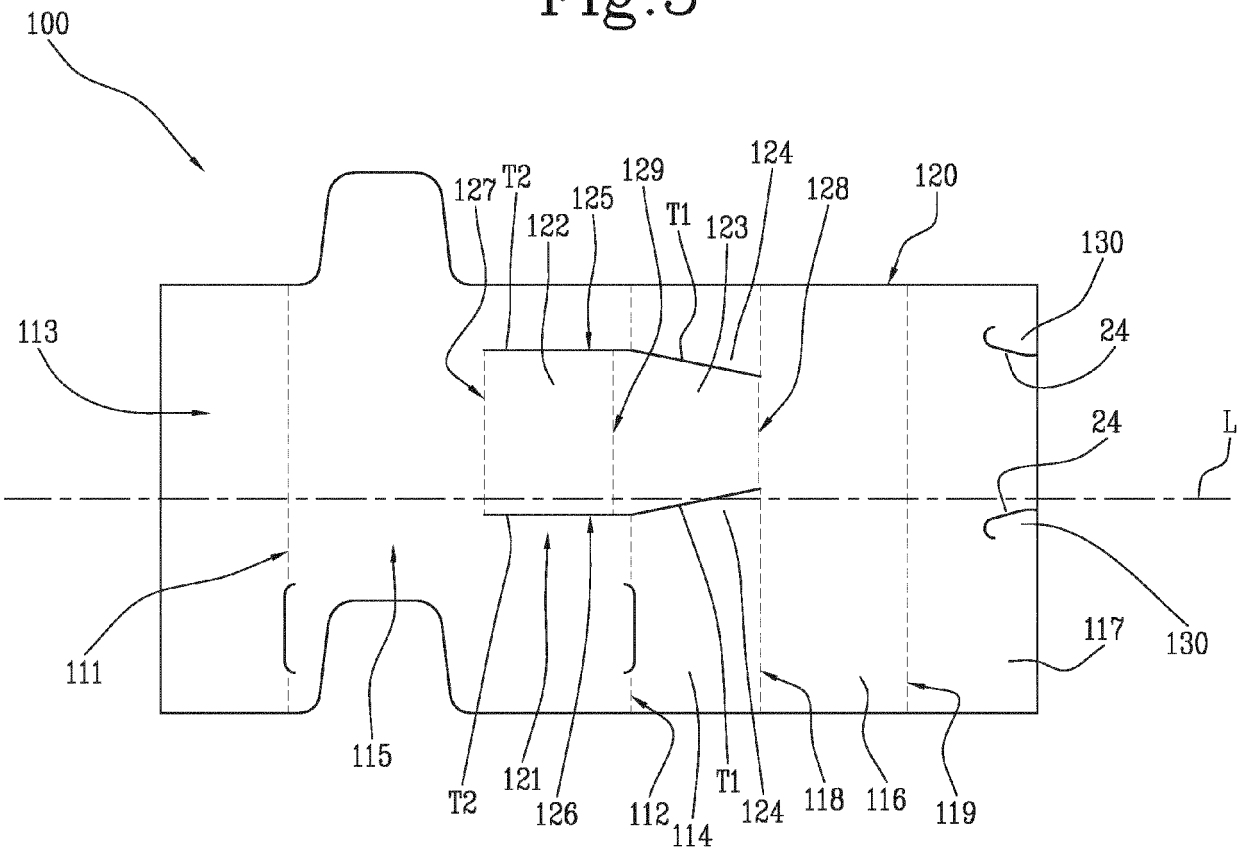


Fig.5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127
T2
125
129
124
128
120
122
T1
123
130
113
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111
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112
114
T1
124
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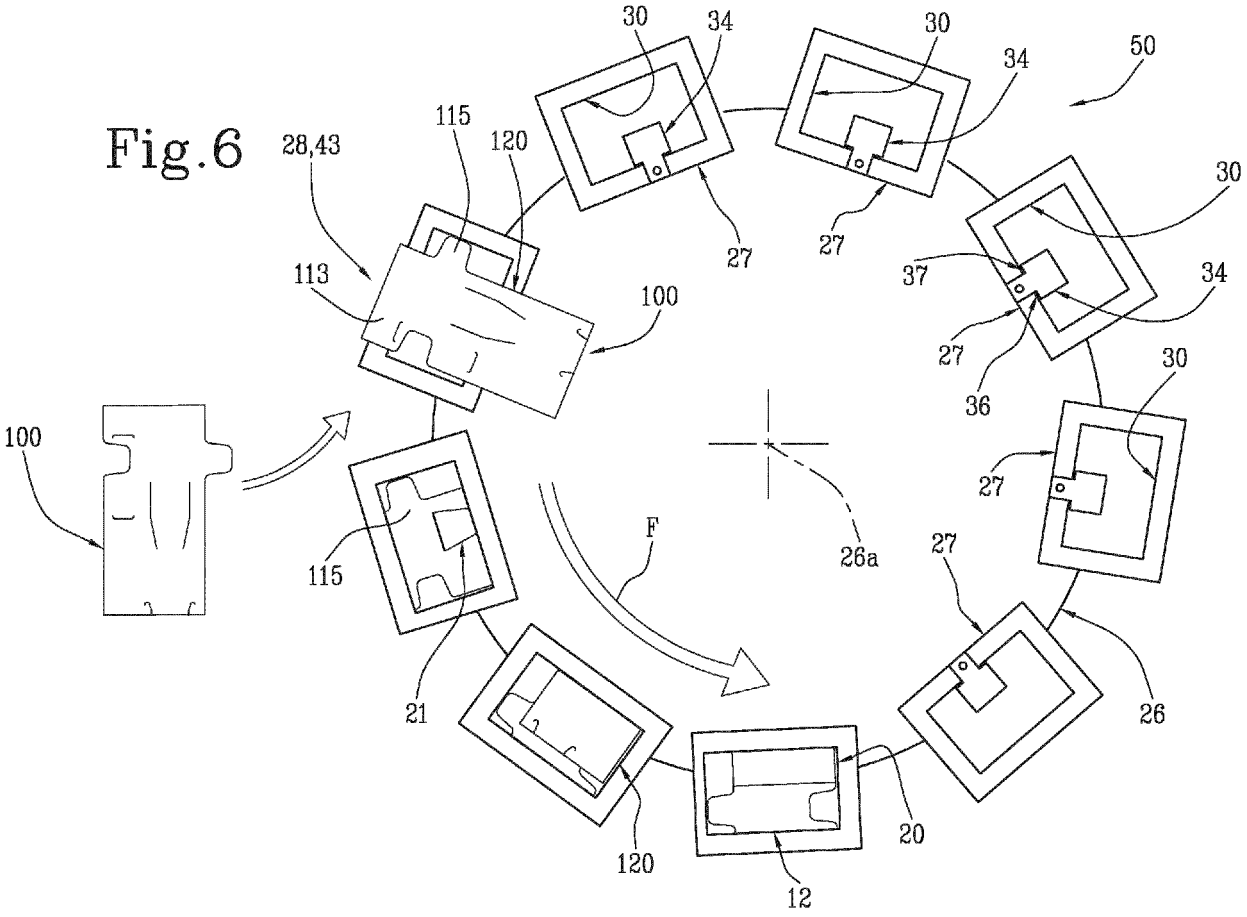
116
119

Fig.6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26a
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26
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120
12

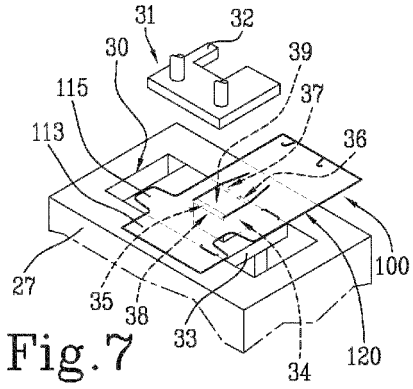


Fig.7

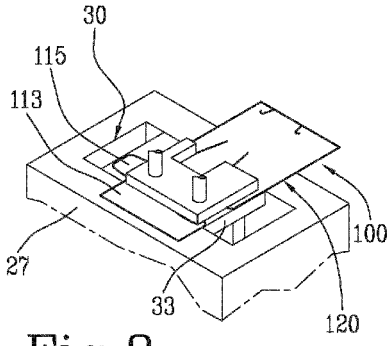


Fig.8

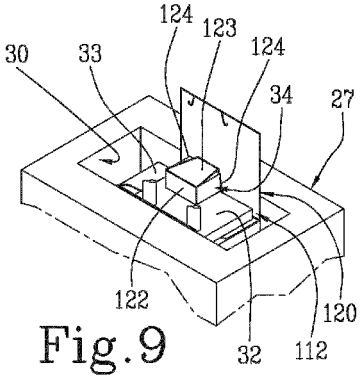


Fig.9

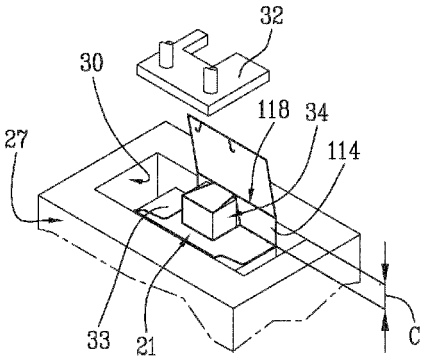


Fig.10

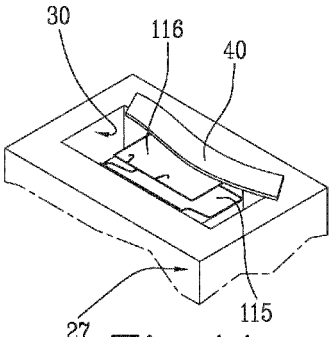


Fig.11

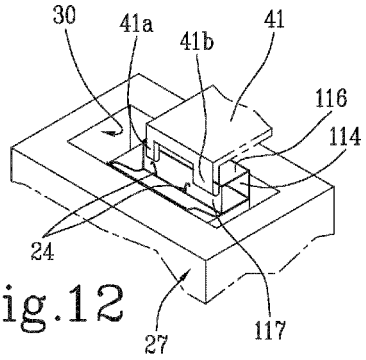


Fig.12

Fig.13

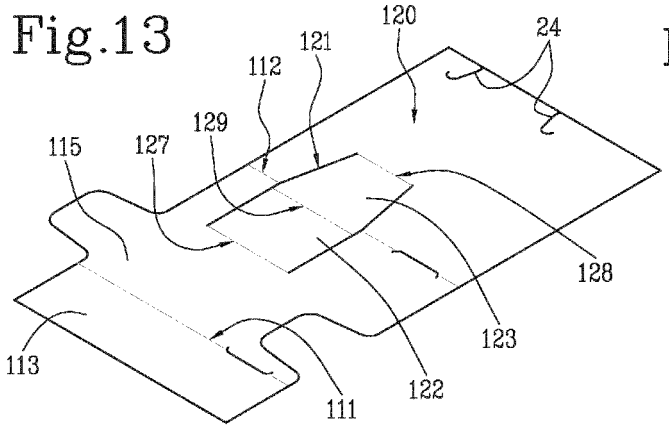


Fig.14

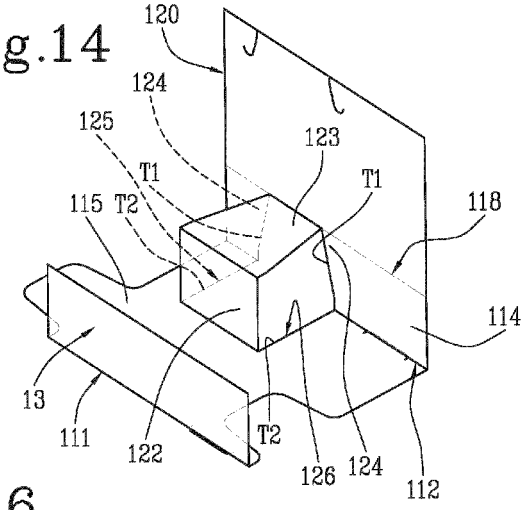


Fig.15

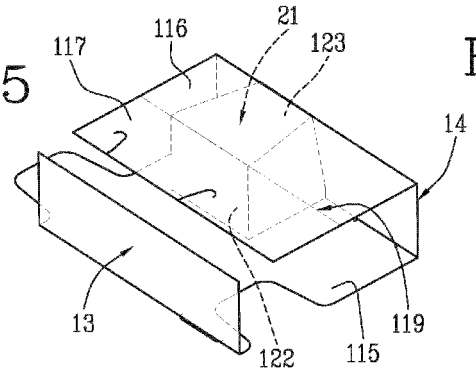


Fig.16

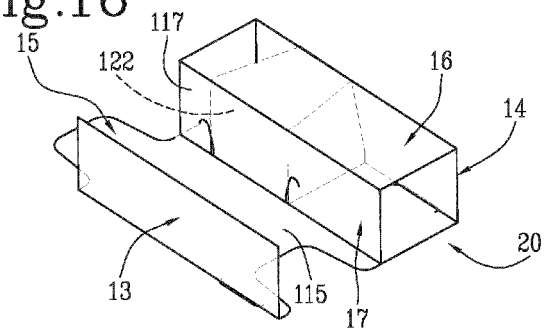
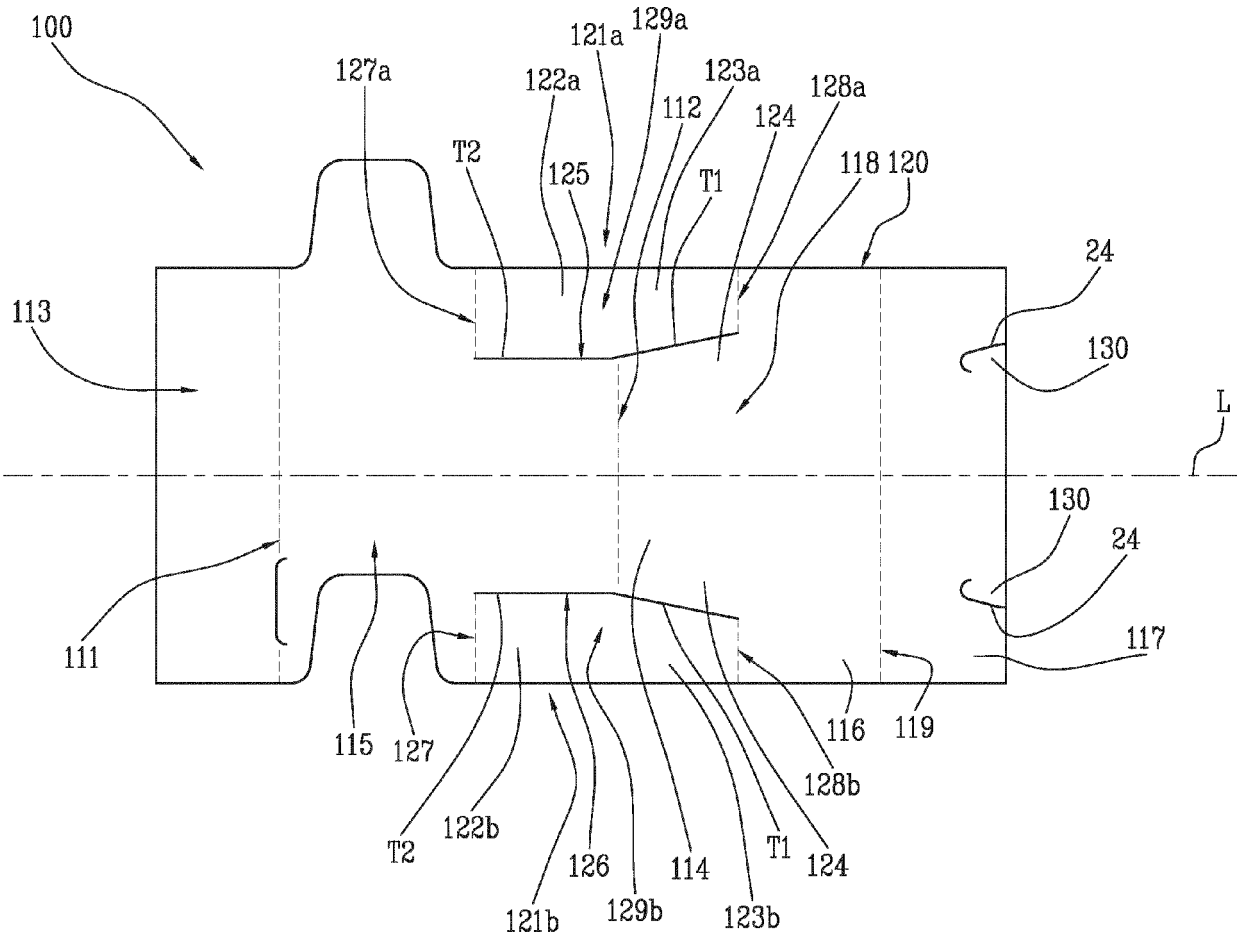


Fig.17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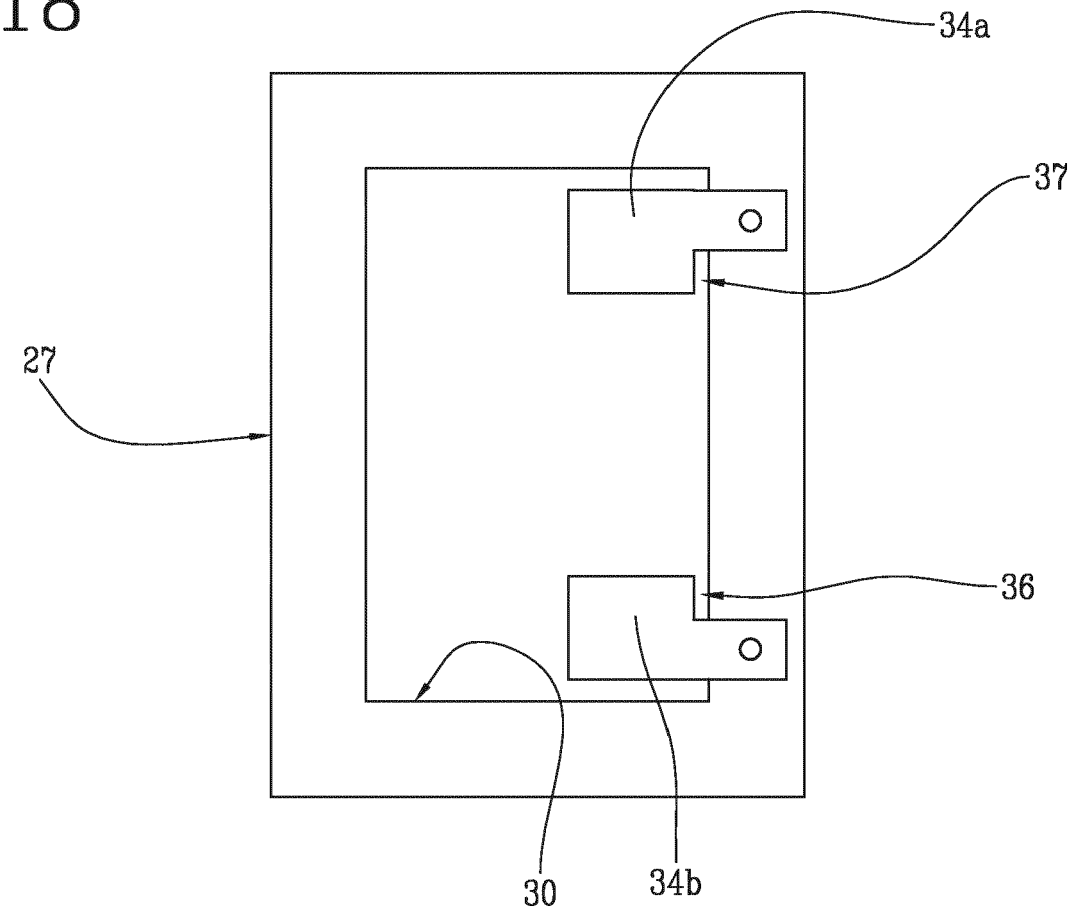
123b

Fig.18



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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 2614

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2015/114587 A1 (GD SPA [IT]) 6 August 2015 (2015-08-06) * page 16, line 20 - page 17, line 19; figures 39-41 *	1-10	INV. B31B50/44 B65D5/50 B65D85/10
A	EP 2 489 501 A1 (SCHUT SYSTEMS B V [NL]) 22 August 2012 (2012-08-22) * paragraph [0022] - paragraph [0039]; figures 1-5 *	11,12	
A	US 4 308 708 A (FOCKE HEINZ) 5 January 1982 (1982-01-05) * figures 1-5 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			B31B B65D B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 April 2017	Sundqvist, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 16 20 2614

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 16 20 2614

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

   Method and device.

1.1. claims: 1-10

   Method.

1.2. claims: 11, 12

   Device.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 20 2614

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07-04-2017

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2015114587 A1 **[0007]**
- EP 2489501 A1 **[0008]**