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(54) PACKING METHOD AND PACKING MACHINE FOR PRODUCING A RIGID PACKET OF CIGARETTES

(57) Packing method and packing machine (22) for producing a rigid packet (1) of cigarettes, which has a soft package (3) formed by folding a sheet (4) of packing material and a rigid container (5; 44) formed by folding a blank (13; 45); the sheet (4) of packing material and the blank (13; 45) are folded into a 'U' all around a group (2) of cigarettes so as to fold in the blank (13; 45) a first panel (15) and a third panel (17) 90° with respect to a second panel (16) and over corresponding parts of the sheet (4) of packing material; the sheet (4) of packing material and the blank (13; 45) are folded together and simultaneously all around the group (2) of cigarettes so as to fold, in the blank (13; 45), two second tabs (19) 90° with respect the second panel (16) together with corresponding parts of the sheet (4) of packing material; the sheet (4) of packing material and the blank (13; 45) are folded together and simultaneously all around the group (2) of cigarettes so as to fold, in the blank (13; 45), two third tabs (20) 90° with respect the third panel (17) and over the second tabs (19) together with corresponding parts of the sheet (4) of packing material; and the sheet (4) of packing material and the blank (13; 45) are folded together and simultaneously all around the group (2) of cigarettes so as to fold, in the blank (13; 45), two first tabs (18) 90° with respect to the first panel (15) and over the third tabs (20) together with corresponding parts of the sheet (4) of packing material.

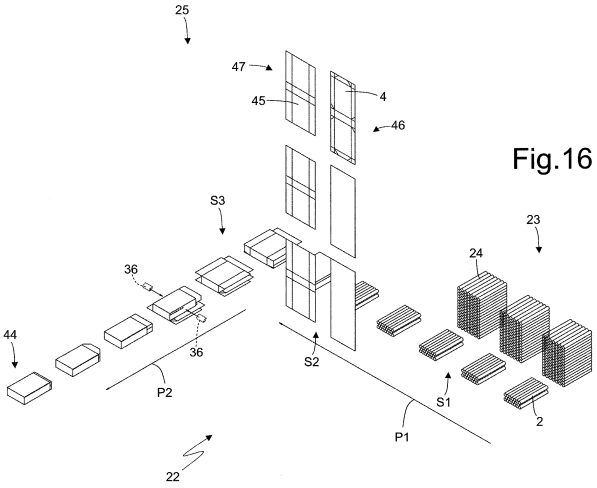

Fig.16

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Description

TECHNICAL FIELD

[0001] The present invention relates to a packing method and to a packing machine for producing a rigid packet of cigarettes.

PRIOR ART

[0002] In patent application WO2013170975-A1 a packet of cigarettes comprising a group of cigarettes enclosed in a soft package is described, an inner rigid type container, inside which the soft package is directly placed, and an outer rigid type container housing the inner container. The outer container comprises a bottom wall and two box-shaped shells, which are symmetrical and arranged mirror-like one with respect to the other and are hinged to the bottom wall about respective hinges to rotate between a closed position wherein the two shells interpenetrate one inside the other completely covering the inner container and the soft package, and an open position wherein the two shells are separated one from the other thus exposing the inner container and the soft package. A box-shaped slideway is provided for allowing the inner container to slide with respect to the outer container, this slideway is located inside the outer container, is glued to the bottom wall of the outer container and houses in a sliding manner the inner container for allowing the inner container itself to slide with respect to the slideway (and therefore with respect to the outer container). In particular, during the opening movement of the two shells of the outer container (i.e. when the two shells move rotating from the closed position to the open position) the inner container carrying the soft package performs a linear translational movement (i.e. slides) with respect to the slideway (and therefore with respect to the outer container) to slide out from the outer container (i.e. leaves it). For this purpose, the inner container comprises two connecting elements, which are arranged on opposite sides of the inner container and connect respective upper edges of the inner container to the corresponding walls of the two shells so that the rotation of the two shells with respect to the bottom wall also involves a translation of the inner container with respect to the bottom wall itself.

[0003] The soft package is formed by folding a sheet of packing material all around the group of cigarettes, the inner container is formed by folding a first rigid blank all around the soft package, the slideway is formed by folding a second rigid blank all around the inner container, and the outer container is formed by folding a third rigid blank all around the inner container and over the slideway. The fact of having to use a soft sheet of packing material and three rigid blanks separated one from the other to produce the packet of cigarettes described above makes the production of the packet of cigarettes itself in a standard packing machine impossible, which is normally structured to handle a maximum of one soft sheet of packing material and two rigid blanks separated one from the other. Therefore, to produce the packet of cigarettes described above it is necessary to use two standard packing machines arranged in series one after the other, obviously doubling the costs and the overall dimensions.

[0004] Patent application GB721757A describes a packing machine which produces a packet of cigarettes wherein a group of cigarettes is wrapped in a soft sheet of packing material which forms an inner package and is wrapped in a rigid blank which forms an outer container; in the packing machine the soft sheet of packing material and the rigid blank are superimposed and glued one to the other beforehand and are subsequently folded together all around the group of cigarettes.

DESCRIPTION OF THE INVENTION

[0005] The object of the present invention is to provide a packing method and a packing machine for producing a rigid packet of cigarettes, wherein said packing method and packing machine are free of the drawbacks described above and are, at the same time, easy and inexpensive to manufacture.

[0006] According to the present invention, a packing method and a packing machine for producing a rigid packet of cigarettes, as claimed in the attached claims are provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention will now be described with reference to the accompanying drawings, which illustrate some examples of non-limiting embodiments, wherein:

- Figure 1 is a perspective view of a rigid packet of cigarettes in a closed configuration;
- Figure 2 is a front perspective view of the packet of cigarettes of Figure 1 in an open configuration;
- Figure 3 is a perspective view of a group of cigarettes contained in the packet of cigarettes of Figure 1;
- Figure 4 is a perspective view of a soft package enclosing the group of cigarettes of Figure 3 and is arranged in the packet of cigarettes of Figure 1;
- Figure 5 is a perspective view of an inner container housing the soft package of Figure 4 and is arranged in the packet of cigarettes of Figure 1;
- Figure 6 is a plan view of a blank used for producing an outer container of the packet of cigarettes of Figure 1;
- Figure 7 is a plan view of a blank used to produce a slideway of the packet of cigarettes of Figure 1;
- Figure 8 is a plan view of a blank used to produce the inner container of the packet of cigarettes in Figure 1;
- Figure 9 is a plan view of a sheet of packing material

used to produce the soft package of the packet of cigarettes of Figure 1;

- Figure 10 is a schematic and perspective view of a packing machine which produces the packet of cigarettes of Figure 1 and is not part of the present invention;
- Figure 11 is a schematic and front view of the packing machine of Figure 10;
- Figure 12 is a perspective view of a simplified alternative of the rigid packet of cigarettes of Figure 1;
- Figure 13 is a plan view of a blank used for producing an outer container of the packet of cigarettes of Figure 12;
- Figure 14 is a schematic and perspective view of a packing machine which produces the packet of cigarettes of Figure 12 and is not part of the present invention;
- Figure 15 is a schematic and perspective view of an alternative packing machine of Figure 14; and
- Figure 16 is a schematic and perspective view of a further alternative packing machine of Figure 14 produced according to the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION

[0008] In Figures 1 and 2, number 1 indicates as a whole a rigid packet of cigarettes.

[0009] The packet 1 of cigarettes illustrated in Figure 1 comprises a group 2 of cigarettes 14 (illustrated in Figure 3) enclosed in a soft package 3 (illustrated in Figure 4) defined by a sheet 4 of packing material made of metalized paper (illustrated in Figure 9) folded all around the group 2 of cigarettes itself. Furthermore, the packet 1 of cigarettes comprises an inner rigid type container 5 (visible in Figures 2 and 5), inside which the soft package 3 is directly placed and an outer rigid type container 6, housing the inner container 5.

[0010] The outer container 6 comprises a bottom wall 7 and two box-shaped shells 8, which are symmetrical and arranged mirror-like one with respect to the other and are hinged to the bottom wall 7 about respective hinges to rotate between a closed position (illustrated in Figure 1) wherein the two shells 8 interpenetrate one inside the other to completely cover the inner container 5 and the soft package 3 (which therefore are completely isolated from the external environment), and an open position (illustrated in Figure 2) wherein the two shells 8 are separated one from the other to expose the inner container and the soft package.

[0011] A box-shaped slideway 9 is provided for allowing the inner container 5 to slide with respect to the outer container 6, which is located inside the outer container 6, is glued to the bottom wall 7 of the outer container and houses in a sliding manner the inner container 5 allowing the inner container 5 itself to slide with respect to the slideway 9 (and therefore with respect to the outer container). In particular, during the opening movement of the two shells 8 of the outer container 6 (i.e. when the two shells 8 are moved by rotating from the closed position to the open position) the inner container 5 carrying the soft package 3 performs a linear translational movement (i.e. slides) with respect to the slideway 9 (and therefore with respect to the outer container 6) to slide outwards from the outer container 6 (i.e. leaves it); obviously, during the closing movement of the two shells 8 of the outer container 6 (that is, when the two shells 8 are moved by rotating from the open position to the closed position) the inner container 5 carrying the soft package performs a linear translation movement in an opposite direction with respect to the slideway 9 (and therefore with respect to the outer container 6) to slide back completely inside the outer container 6. According to a preferred embodiment, the inner container 5 comprises two connecting elements 10, which are arranged on opposite sides of the inner container 5 and connect respective upper edges of the inner container 5 to corresponding walls of the two shells 8 so that the rotation of the two shells 8 with respect to the bottom wall 7 will also involve a translation of the inner container 5 with respect to the bottom wall 7 itself.

[0012] The outer container 6 and the slideway 9 are made by folding one after the other (as better described hereinafter), respectively, a rigid blank 11 (illustrated in Figure 6) and a rigid blank 12 (illustrated in Figure 7) about the 5 inner container. The inner container 5 and the soft package 3 are produced by folding together (as better described hereinafter), respectively, a rigid blank 13 (illustrated in Figure 8) and the sheet 4 of packing material (illustrated schematically in Figure 9) all around the group 2 of cigarettes.

[0013] According to the illustration in Figure 8, the blank 13 comprises two longitudinal fold lines and a plurality of transversal fold lines, defining, between the longitudinal fold lines a panel 15 a major lateral wall 5 of the inner container, a panel 16 defining a bottom wall of the inner container 5, and a panel 17 defining another major lateral wall of the inner container 5. Each panel 15 or 17 is connected to a connecting element 10 along a corresponding transversal fold line. The panel 15 is provided with a pair of tabs 18, which are located on opposite sides of the panel 15, being separated from panel 15 by the two longitudinal fold lines, and define part of the minor lateral walls of the inner container 5 being bent 90° with respect to panel 15 itself. The panel 16 is provided with a pair of tabs 19, which are located on opposite sides of the panel 16, being separated from panel 16 by the two longitudinal fold lines, and are fixed inside the minor lateral walls of the inner container 5 being bent 90° with respect to panel 16 itself. The panel 17 is provided with a pair of tabs 20, which are located on opposite sides of the panel 17, being separated from panel 17 by the two longitudinal fold lines, and define part of the minor lateral walls of the inner container 5 being bent 90° with respect to panel 17 itself. In particular, each tab 18 is overlapped to a tab 20 to form a corresponding minor lateral wall 5 of the inner container; to stabilize the shape of the inner container 5, each tab 18 is glued to the corresponding

tab 20 by means of glue 21.

[0014] Figure 10 illustrates the above described packing machine 22 which produces the packet 1, and then shapes the soft package 3 by folding the sheet 4 of packing material all around the group 2 of cigarettes, forms the inner container 5 by folding the blank 13 all around the sheet 4 of packing material, forms the slideway 9 by folding the blank 12 about the inner container 5, and finally forms the outer container 6 by folding the blank 11 about the inner container 5 and over the slideway 9.

[0015] The packing machine 22 comprises a group-forming unit 23 in which the groups 2 of cigarettes are formed. The group-forming unit 23 comprises four twin hoppers 24, each of which contains a mass of cigarettes and has at the bottom an outlet opening through which a group 2 of cigarettes at a time is extracted axially from the hopper 24 by means of a corresponding pusher provided with alternative motion.

[0016] The packing machine 22 comprises a packing unit 25, in which the soft package 3 is formed by folding the sheet 4 of packing material all around group 2 of cigarettes and the inner container 5 is formed by folding the blank 13 all around the sheet 4 of packing material. The packing unit 25 comprises a packing conveyor 26, which is provided with a plurality of pockets 27, which are fed cyclically along a packing path P1 with an intermittent motion (i.e. with cyclic alternated steps of movements and stops); each pocket 27 of the packing conveyor 26 is suited to contain a group 2 of cigarettes which is received by a corresponding hopper 24 of the group-forming unit 23 at a group-forming station S1. In the embodiment illustrated in the attached figures, the packing conveyor 26 comprises a conveyor belt wound in a loop about respective end pulleys; according to a different and perfectly equivalent embodiment not illustrated, the packing conveyor 26 comprises a drum mounted rotatable about a central axis of rotation.

[0017] The packing unit 25 comprises a feeding device 28 that cyclically feeds, in a feed station S2 and in front of each pocket 27 of the packing conveyor 26, a sheet 4 of a fully extended packing material (i.e. completely devoid of folds) and a fully extended corresponding blank 13 (i.e. completely devoid of folds) overlapping each other. In particular, the feeding device 28 overlaps each sheet 4 of fully extended packing material and a corresponding fully extended blank 13 in a coupling station SA, which is arranged upstream (i.e. at a certain distance) from the feed station S2 (and therefore from the packing conveyor 26); accordingly, the fully extended sheet 4 of packing material and a fully extended corresponding blank 13 are overlapped (widely) before being coupled to the group 2 of cigarettes.

[0018] At the feed station S2, the packing unit 25 comprises a folding device 29, which folds the sheet 4 of packing material and the first blank 13 together and simultaneously into a 'U' all around the group 2 of cigarettes so as to fold the panel 15 and the panel 17 (approximately) 90° with respect to panel 16 and over corresponding parts of sheet 4 of packing material; in particular, the folding device 29 acts directly (that is, with direct contact) upon parts of the blank 13 to fold the blank 13 itself and acts indirectly (that is, without direct contact) upon parts of the sheet 4 of packing material to fold the sheet 4 of packing material itself: in fact, the sheet 4 of packing material is folded by the effect of the corresponding folding of the blank 13 which is overlapping the sheet 4 of packing material itself.

[0019] According to a possible (but not binding) embodiment, each pocket 27 is tubular-shaped, contains inside a group 2 of cigarettes and acts as a folding spindle around which the sheet 4 of packing material and the blank 13 are folded into a 'U'; in other words, the group 2 of cigarettes is located inside the pocket 27 having a tubular shape while the sheet 4 of packing material and the blank 13 are folded externally to the pocket 27.

[0020] The packing unit 25 comprises a packing conveyor 30, which is provided with a plurality of pushers 31, each of which is suited to axially extract a group 2 of cigarettes partially wrapped in the sheet 4 of packing material and the blank 13 from a pocket 27 of the packing conveyor 26 at a transfer station S3, and then feed the group 2 of cigarettes itself along a straight packing path P2.

[0021] It is important to note that in the packing machine 22 illustrated in Figures 10 and 11 the panels 15 and 17 of the blank 45 are folded initially (slightly) less than 90° with respect to the panel 16 in the feed station S2 and the folding thereof is completed up at 90° in the transfer station S3.

[0022] The packing unit 25 comprises a folding device 32, which is located along a packing path P2 immediately downstream from the transfer station S3 and simultaneously folds together the sheet 4 of packing material and the blank 13 all around the corresponding group 2 of cigarettes so as to fold the tabs 19 90° with respect to the panel 16 together with corresponding parts of sheet 4 of packing material; in particular, the folding device 32 acts directly (that is, with direct contact) upon parts of the blank 13 for folding the blank 13 itself and acts indirectly (that is, without direct contact) upon parts of the sheet 4 of packing material for folding the sheet 4 of packing material: in fact, the sheet 4 of packing material folds by effect of the corresponding folding of the blank 13 which is overlapping the sheet 4 of packing material itself.

[0023] The packing unit 25 comprises a folding device 33, which is located along the packing path P2 immediately downstream from the folding device 32 and simultaneously folds together the sheet 4 of packing material and the blank 13 all around the corresponding group 2 of cigarettes so as to fold the tabs 20 90° with respect to panel 17 and over the tabs 19 (previously folded by the folding device 32) together with corresponding parts of sheet 4 of packing material; in particular, the folding device 33 acts directly (that is, with direct contact) upon parts of the blank 13 for folding the blank 13 itself and acts indirectly (that is, without direct contact) upon parts

of the sheet 4 of packing material for folding sheet 4 of packing material itself: in fact, the sheet 4 of packing material is folded by effect of the corresponding folding of the blank 13 which is overlapping the sheet 4 of packing material itself.

[0024] The packing unit 25 comprises a folding device 34, which is located along the packing path P2 immediately downstream from the folding device 33 and folds together and simultaneously the sheet 4 of packing material and the blank 13 about the corresponding group 2 of cigarettes so as to fold the tabs 18 90° with respect to the panel 15 and over the tabs 20 (previously folded by the folding device 33) together with corresponding parts of sheet 4 of packing material; in particular, the folding device 34 acts directly (that is, with direct contact) upon parts of the blank 13 for folding the blank 13 itself and acts indirectly (that is, without direct contact) upon parts of the sheet 4 of packing material for folding sheet 4 of packing material itself: in fact, the sheet 4 of packing material is folded by effect of the corresponding folding of the blank 13 which is superimposed on the sheet 4 of packing material.

[0025] Finally, the packing unit 25 comprises a folding device 35, which is located along packing path P2 immediately downstream from the folding device 34 and folds about the corresponding group 2 of cigarettes an open top end of the sheet 4 of packing material that projects from the inner container 5 to form a top wall of the soft package 3 (illustrated in Figures 4 and 5) .

[0026] In the embodiment described above, the tabs 20 are folded first, and then the tabs 18 are folded over the tabs 20 previously folded; obviously it would be possible to reverse said sequence by folding first the tabs 18 and then successively folding the tabs 20 over the tabs 18 previously folded.

[0027] Between the folding device 33 and the folding device 34 a gumming device 36 is located, which applies glue 21 onto the tabs 18 which after will be immediately folded 90° by the action of the folding device 34 and against the tabs 20 previously folded.

[0028] According to a preferred embodiment, the folding device 29 comprises a single movable folding element which is U-shaped and moves cyclically along a direction perpendicular to the packing path P1. In addition, the folding device 32, the folding device 33, and the folding device 34 are defined by respective rigid bodies in a fixed position along the packing path P2; in other words, the devices 32, 33 and 34 are defined by fixed folding contrasts and/or fixed helical folding and entirely devoid of moving parts. Finally, the folding device 35 comprises four movable folding elements which move perpendicularly to the packing path P2.

[0029] The packing machine 22 comprises a packing unit 37 which is arranged beside and immediately downstream the packing unit 25 and therein the slideway 9 is formed by folding the blank 12 about the inner container 5 and therein the outer container 6 is formed by folding the blank 11 about the inner container 5 and over the slideway 9. The packing unit 27 comprises a packing conveyor 38, which is provided with a plurality of pockets 39, which are cyclically fed along a packing path P3 by an intermittent motion (i.e. with cyclic alternated steps of movements and stops). Each pocket 39 of packing conveyor 38 is suited to contain a blank 12 fed in a feed station S4 (wherein the blank 12 is folded into a 'U' entering into the pocket 39), is suited to contain an inner container 5 which is transferred by the packing conveyor 30 in a transfer station S5 (arranged downstream from the feed station S4), and is suited to contain a blank 11 that is fed in a feed station S6 (located downstream from the transfer station S5). In the embodiment illustrated in the attached figures, the packing conveyor 38 comprises a drum mounted rotatable about a central axis 40 of rotation; according to a different, and perfectly equivalent, not illustrated embodiment, the packing conveyor 38 comprises a conveyor belt wound in a loop about respective end pulleys.

[0030] Along the packing path P3, each blank 12 is completely folded about the inner container 5 to form the slideway 9 and each blank 11 is partially folded about the inner container 5 and over the slideway 9.

[0031] The packing unit 37 comprises a packing conveyor 41, which is provided with a plurality of pockets 42, which are cyclically fed along a packing path P4 with an intermittent motion (i.e. with cyclic alternated steps of movements and stops). Each pocket 42 of packing conveyor 41 is suited to contain an inner container 5 provided with the slideway 9 and coupled to a partially folded blank 11 which are fed together to a transfer station S7 by a pocket 39 of the packing conveyor 38. In a transfer station S8 the completed packets 1 of cigarettes are transferred from the pockets 42 of the packing conveyor 41 to a drying conveyor. In the embodiment illustrated in the attached figures, the packing conveyor 41 comprises a drum mounted rotatable about a central axis 43 of rotation; according to a different, and perfectly equivalent, embodiment not illustrated, the packing conveyor 41 comprises a conveyor belt wound in a loop about respective end pulleys.

[0032] In Figure 12 a simplified alternative of the rigid packet 1 of cigarettes is illustrated, as the packet 1 of cigarettes illustrated in Figure 12 is devoid of both the slideway 9, and the external container 6. In particular, the packet 1 of cigarettes illustrated in Figure 12 comprises a soft package 3 completely identical to the soft package 3 of the packet 1 of cigarettes illustrated in Figures 1 and 2 and comprises a rigid type container 44 which is similar to the inner container 5 of the packet 1 of cigarettes illustrated in Figures 1 and 2. The container 44 differs from the inner container 5 due to the absence of the connecting elements 10 and for a greater height (i.e. longitudinal dimension) of its side walls; in fact, in the inner container 5 the side walls have a height (i.e. longitudinal dimension) which is roughly half the height (i.e. longitudinal dimension) of the soft package 3, while in the container 44 the side walls have a height (i.e. a

longitudinal dimension) that is approximately equal (in fact slightly less) to the height (i.e. to the longitudinal dimension) of the soft package 3.

[0033] The container 44 is formed by folding a blank 45 (illustrated in Figure 13) that is similar to the blank 13 illustrated in Figure 8; accordingly, for a detailed description of the blank 45 illustrated in Figure 13, please refer completely to the previous description of the blank 13 illustrated in Figure 8.

[0034] Figure 14 illustrates a packing machine 22 which produces the packet 1 illustrated in Figure 12, and thereafter forms the soft package 3 by folding the sheet 4 of packing material all around group 2 of cigarettes and forms the container 44 by folding the blank 45 all around the sheet 4 of packing material. The packing machine 22 illustrated in Figure 14 is quite similar to the packing machine 22 illustrated in Figures 10 and 11; accordingly, for a detailed description of the packing machine 22 illustrated in Figure 14, reference is made completely to the previous description of the packing machine 22 illustrated in Figures 10 and 11.

[0035] Figure 15 shows a further packing machine 22 which produces the packet 1 illustrated in Figure 12, and thereafter forms the soft package 3 by folding the sheet 4 of packing material all around the group 2 of cigarettes and forms the container 44 by folding the blank 45 all around the sheet 4 of packing material. The packing machine 22 illustrated in Figure 15 is similar to the packing machine 22 illustrated in Figure 14 from which it differs by the horizontal positioning (instead of vertical) of the packing path P1 and by the fact that the panels 15 and 17 of the blank 45 are immediately folded 90° with respect to panel 16 when the blank 45 together with the sheet 4 of packing material are coupled to the group 2 of cigarettes in the feed station S2 (in the packing machine 22 illustrated in Figure 14, as well as in the packing machine 22 illustrated in Figures 10 and 11, the panels 15 and 17 of the blank 45 are folded initially a little less than 90° with respect to the panel 16 in the feed station S2 and their folding is completed up to 90° in the transfer station S3).

[0036] In figure 16 a further packing machine 22 is illustrated which is implemented according to the present invention, produces the packet 1 illustrated in Figure 12, and thereafter forms the soft package 3 by folding the sheet 4 of packing material all around group 2 of cigarettes and forms the container 44 by folding the blank 45 all around the sheet 4 of packing material. The packing machine 22 illustrated in Figure 16 is similar to packing machine 22 illustrated in Figure 15 from which it differs only in the fact that in the feed station S2 the sheet 4 of packing material and the blank 45 are fed separately to the packing conveyor 26. In particular, a feeding device 46 feeds the sheet 4 of packing material that is folded into a 'U' all around the group 2 of cigarettes to a pocket 27 of the conveyor 26; subsequently, a feeding device 47 feeds the blank 45 that is folded into a 'U' all around the group 2 of cigarettes and over the sheet 4 of packing material previously folded into a 'U' to a pocket 27 of the packing conveyor 26. Subsequently (i.e. downstream from the feed station S2), the blank 45 is always folded together and simultaneously with the sheet 4 of packing material as previously described.

[0037] The embodiment illustrated in Figure 16 is particularly advantageous, since feeding the sheet 4 of packing material and the blank 45 separately allows to more precisely control the positioning of the sheet 4 of packing material and the blank 45 with respect to the group 2 of cigarettes. In other words, when the sheet 4 of packing material and the blank 45 are previously overlapped (as illustrated in Figures 14 and 15) it is difficult to ensure that the sheet 4 of packing material and the blank 45 will not perform undesired relative movements with respect to each other that could create a bad positioning of the sheet 4 of packing material and/or of the blank 45 with respect to the group 2 of cigarettes; instead, by feeding separately the sheet 4 of packing material and the blank 45 it is possible to precisely control the position of both always ensuring a correct positioning of both with respect to the group 2 of cigarettes. I.e. when the sheet 4 of packing material and the blank 45 are previously superimposed it is complex to control the correct position of both, as the overlapping thereof prevents a complete control of the position of the individual elements. Even the application of glue between the sheet 4 of packing material and the blank 45 is not conclusive, since the glue does not have sufficient time to dry ensuring the freezing of the position of the sheet 4 of packing material with respect to the blank 45.

[0038] It is important to note that the alternatives of the packing machine 22 illustrated in Figures 15 and 16 may be applied, *mutatis mutandis,* also to the packing machine 22 illustrated in Figures 10 and 11 for producing the packet 1 of cigarettes illustrated in Figures 1 and 2.

[0039] It is important to observe that the sheet 4 of packing material is longer (i.e. more longitudinally extended) and narrower (i.e. less transversely extended) with respect to the blanks 13 and 45. The sheet 4 of packing material is longer (i.e. more longitudinally extended) with respect to the blanks 13 and 45 to be suitable for producing the upper wall of the soft package 3 (the container 5 and 44 is instead devoid of top wall). In addition, the sheet 4 of packing material is narrower (i.e. less transversely extended) with respect to the blanks 13 and 45 to be suitable to apply glue 21 which connects one to the other the tabs 18 and 20 of the blanks 13 and 45 by means of the gumming device 36 (Figures 14 and 15).

[0040] The packing machine 22 described above has numerous advantages.

[0041] First, the packing machine 22 described above is structurally analogous to a standard packing machine, i.e. the packing machine 22 described above is obtainable with a few simple modifications starting from a standard packing machine.

[0042] Moreover, the packing machine 22 described

above is also suitable to operate rapidly (i.e. with a high hourly productivity) while ensuring a high production quality.

[0043] Finally, it is important to note that the packing machine 22 described above may be used indifferently to produce the packet 1 illustrated in Figures 1 and 2 or the packet 1 illustrated in Figure 12; simply to produce the packet 1 illustrated in Figures 1 and 2 the packing conveyors 38 and 41 are also actively used, while for producing the packet 1 illustrated in Figure 12, the packing conveyors 38 and 41 are not actively used (they can be indifferently bypassed or may be used passively as conveyor means).

Claims

1. A packing method for producing a rigid packet (1) of cigarettes, comprising a soft package (3) formed by folding a sheet (4) of packing material and a first rigid container (5; 44) formed by folding a first blank (13; 45);
wherein the first blank (13; 45) comprises a first panel (15) defining a major lateral wall of the first container (5; 44), a second panel (16) defining a bottom wall of the first container (5; 44), and a third panel (17) defining another major lateral wall of the first container (5; 44); and
wherein the first panel (15) has two first tabs (18) defining part of the minor lateral walls of the first container (5; 44), the second panel (16) has two second tabs (19), and the third panel (17) has two third tabs (20) defining the rest of the minor lateral walls of the first container (5; 44);
the packing method comprising the steps of:

forming a group (2) of cigarettes (14) by means of a group-forming unit (23);
folding the sheet (4) of packing material and the first blank (13; 45) into a 'U' all around the group (2) of cigarettes by means of a first folding device (29), so as to fold the first panel (15) and the third panel (17) 90° with respect to the second panel (16) and over corresponding parts of the sheet (4) of packing material;
folding the sheet (4) of packing material and the first blank (13; 45) together and simultaneously all around the group (2) of cigarettes by means of a third folding device (33), so as to fold the second tabs (19) 90° with respect to the second panel (16), together with corresponding parts of the sheet (4) of packing material;
folding the sheet (4) of packing material and the first blank (13; 45) together and simultaneously all around the group (2) of cigarettes by means of a third folding device (33), of cigarettes so as to fold the third tabs (20) 90° with respect to the third panel (17) and over the second tabs (19), together with corresponding parts of the sheet (4) of packing material; and
folding the sheet (4) of packing material and the first blank (13; 45) together and simultaneously all around the group (2) of cigarettes by means of a fourth folding device (34), so as to fold the first tabs (18) 90° with respect to the first panel (15) and over the third tabs (20) together with corresponding parts of the sheet (4) of packing material;
the packing method is **characterized by** comprising the further steps of:

initially folding only the sheet (4) of packing material into a 'U' all around the group (2) of cigarettes; and
subsequently folding the first blank (13; 45) into a 'U' all around the group (2) of cigarettes and over the sheet (4) of packing material previously folded into a 'U'.

2. The packing method according to Claim 1 and comprising the further step of folding, by means of a fifth folding device (35), an open top end of the sheet (4) of packing material projecting from the rigid first container (5; 44), to form a top wall of the soft package (3).

3. The packing method according to Claim 1 or 2 and comprising the further steps of:

feeding the group (2) of cigarettes along a first packing path (P1) by means of a first packing conveyor (26) having a first pocket (27); and
folding the sheet (4) of packing material and the first blank (13; 45), by means of the first folding device (29), into a 'U' all around the group (2) of cigarettes along the first packing path (P1) and while the group (2) of cigarettes is housed in the first pocket (27).

4. The packing method according to Claim 3, wherein the first pocket (27) is tubular-shaped, contains the group (2) of cigarettes inside and acts as a folding spindle around which the sheet (4) of packing material and the first blank (13; 45) are folded into a 'U'.

5. The packing method according to Claim 3 or 4 and comprising the further steps of:

transferring the group (2) of cigarettes, partly wrapped in the sheet (4) of packing material and in the first blank (13; 45), from the first pocket (27) of the first packing conveyor (26) to a second packing conveyor (30) at a first transfer station (S3);
feeding the group (2) of cigarettes together with the sheet (4) of packing material and the first

blank (13; 45) along a second packing path (P2) by means of a second packing conveyor (30); and
folding the sheet (4) of packing material and the first blank (13; 45) completely all around the group (2) of cigarettes along the second packing path (P2).

6. The packing method according to Claim 5, wherein the second packing path (P2) is straight.

7. The packing method according to Claim 6, wherein the second folding device (32), the third folding device (33), and the fourth folding device (34) are defined by respective rigid bodies in fixed position along the packing path (P2).

8. The packing method according to one of Claims 1 to 7, wherein:

the rigid packet (1) of cigarettes comprises second container (6) formed by folding a second blank (11) and which internally houses the first container (5; 44) in a sliding manner; and
the further step of folding the second blank (11) all around the first container (5; 44) after completely folding the sheet (4) of packing material and the first blank (13; 45) all around the group (2) of cigarettes is provided.

9. The packing method according to claim 8, wherein:

the rigid packet (1) of cigarettes comprises a box-shaped slideway (9) which is formed by folding a third blank (12), is located inside the second container (6), is glued to a bottom wall (7) of the second container (6) and houses the first container (5; 44) in a sliding manner;
the further step is provided for folding the third blank (12) about the first container (5; 44) after completely folding the sheet (4) of packing material and the first blank (13; 45) all around the group (2) of cigarettes.

10. The packing method according to Claim 9, wherein:

the third blank (12) is folded about the first container (5; 44) after completely folding the sheet (4) of packing material and the first blank (13; 45) all around the group (2) of cigarettes, and before folding the second blank (11); and
the second blank (11) is folded all around the slideway (9) after completely folding the third blank (12).

11. The packing method according to Claim 10 and comprising the further steps of:

transferring the first container (5; 44), housing the soft package (3), from second packing conveyor (30) to a second pocket (39) of a third packing conveyor (38);
feeding the first container (5; 44) housing the soft package (3) along a third path (P3) of packing material by means of the third packing conveyor (38) for folding the third blank (12) about the first container (5; 44) at a second transfer station (S5);
transferring the first container (5; 44) housing the soft package (3) and enclosed in the slideway (9) from the second pocket (39) of the third packing conveyor (38) to a third pocket (41) of a fourth packing conveyor (41) at a third transfer station (S7);
feeding the first container (5; 44) housing the soft package (3) and enclosed in the slideway (9), along a fourth packing path (P4) by means of the fourth packing conveyor (41), to fold the second blank (11) about the first container (5; 44) and over the slideway (9).

12. A packing machine (22) for producing a rigid packet (1) of cigarettes comprising a soft package (3) formed by folding a sheet (4) of packing material and a first rigid container (5; 44) formed by folding a first blank (13; 45);
wherein the first blank (13; 45) comprises a first panel (15) defining a major lateral wall of the first container (5; 44); a second panel (16) defining a bottom wall of the first container (5; 44), and a third panel (17) defining another major lateral wall of the first container (5; 44); and
wherein the first panel (15) has two first tabs (18) forming part of the minor lateral walls of the first container (5; 44), the second panel (16) has two second tabs (19), and the third panel (17) has two third tabs (20) forming the rest of the minor lateral walls of the first container (5; 44);
the packing machine (22) comprising:

a group-forming unit (23) for forming a group (2) of cigarettes;
a first folding device (29) for folding the sheet (4) of packing material and the first blank (13; 45) into a 'U' all around the group (2) of cigarettes, so as to fold the first panel (15) and the third panel (17) 90° with respect to the second panel (16) and over corresponding parts of the sheet (4) of packing material;
a second folding device (32) for folding the sheet (4) of packing material and the first blank (13; 45) together and simultaneously all around the group (2) of cigarettes, so as to fold the second tabs (19) 90° with respect to the second panel (16) together with corresponding parts of the sheet (4) of packing material;

a third folding device (33) for folding the sheet (4) of packing material and the first blank (13; 45) together and simultaneously all around the group (2) of cigarettes so as to fold the third tabs (20) 90° with respect to the third panel (17) and over the second tabs (19) together with corresponding parts of the sheet (4) of packing material; and

a fourth folding device (34) for folding the sheet (4) of packing material and the first blank (13; 45) together and simultaneously all around the group (2) of cigarettes so as to fold the first tabs (18) 90° with respect to the first panel (15) and over the third tabs (20) together with corresponding parts of the sheet (4) of packing material;

the packing machine (22) is **characterized in that** the first folding device (29) initially folds only the sheet (4) of packing material into a 'U' all around the group (2) of cigarettes, and subsequently folds

the first blank (13; 45) into a 'U' all around the group (2) of cigarettes and over the sheet (4) of packing material previously folded into a 'U'.

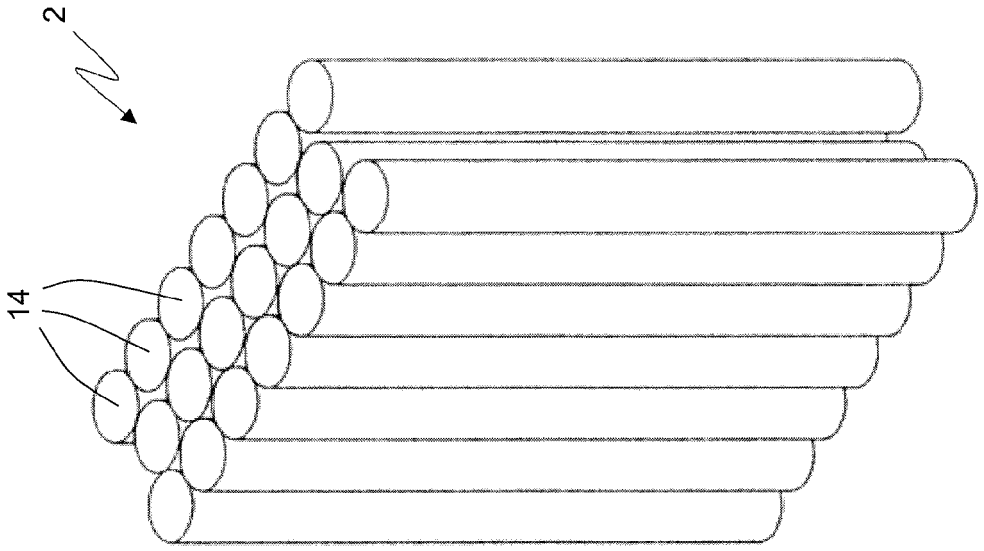

Fig.3

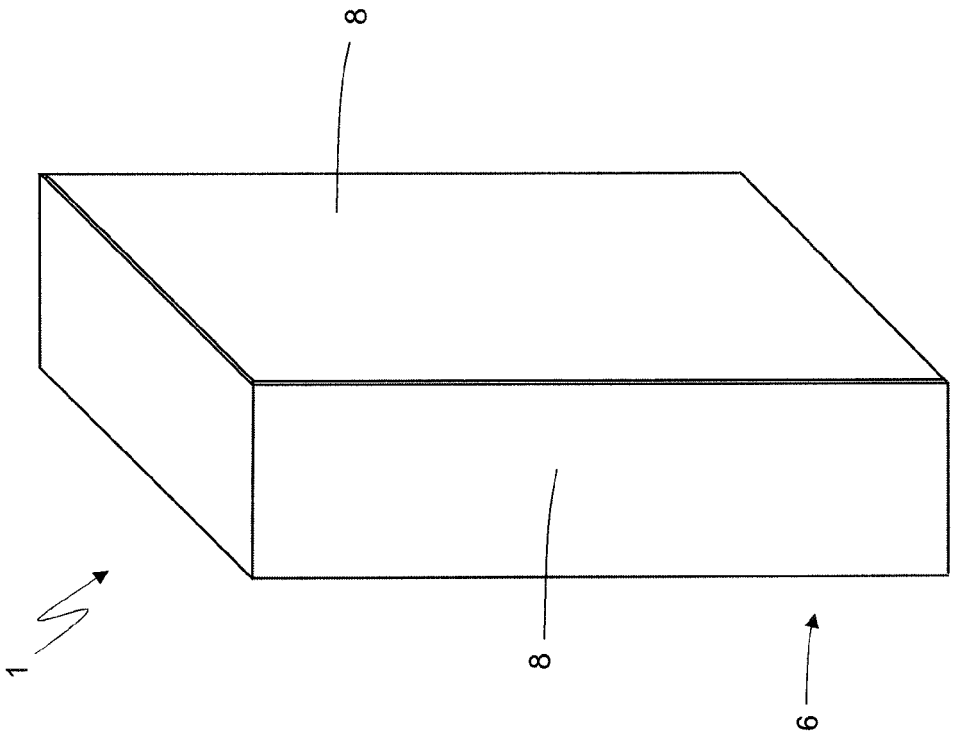

Fig.1

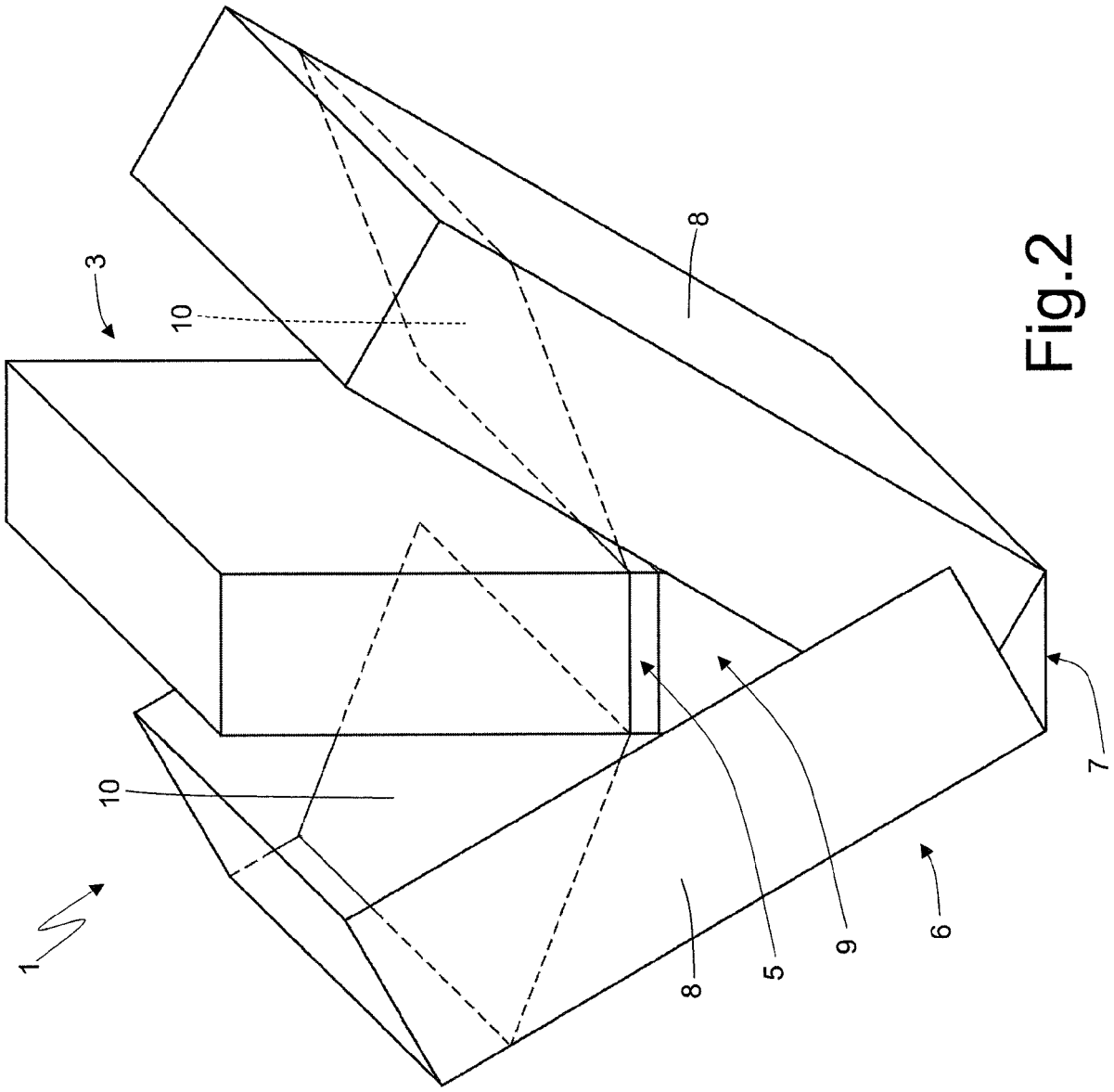

Fig.2

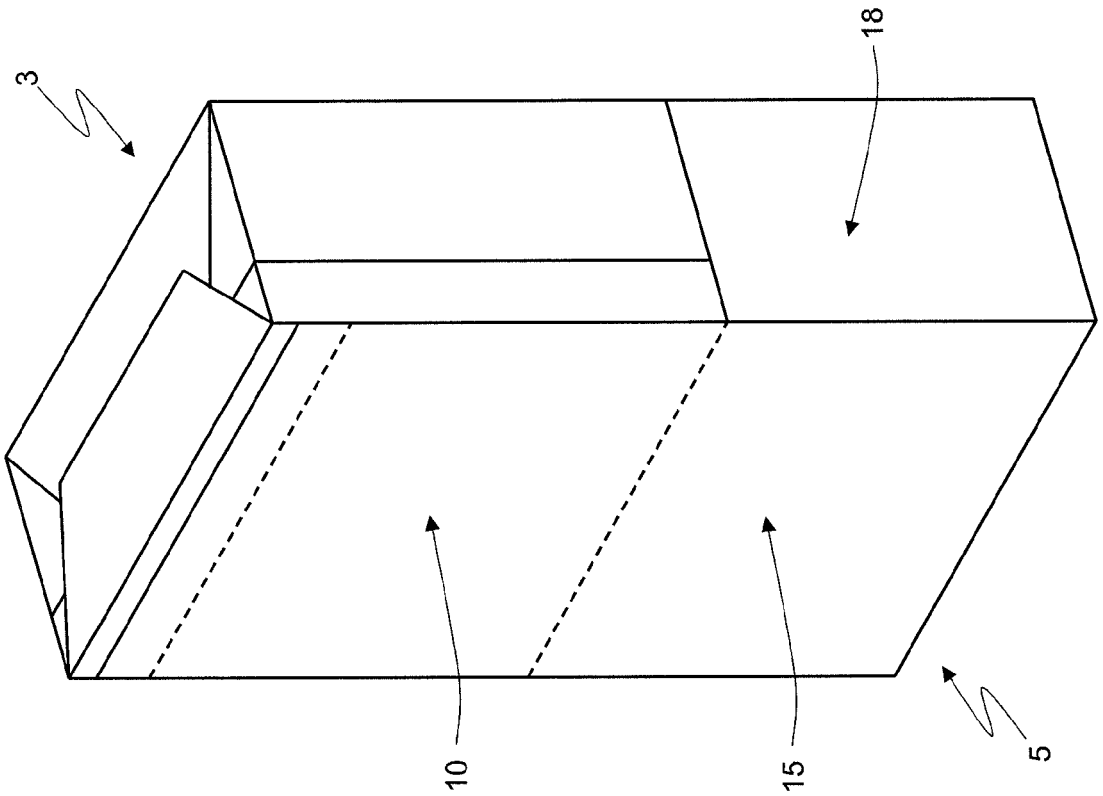

Fig.5

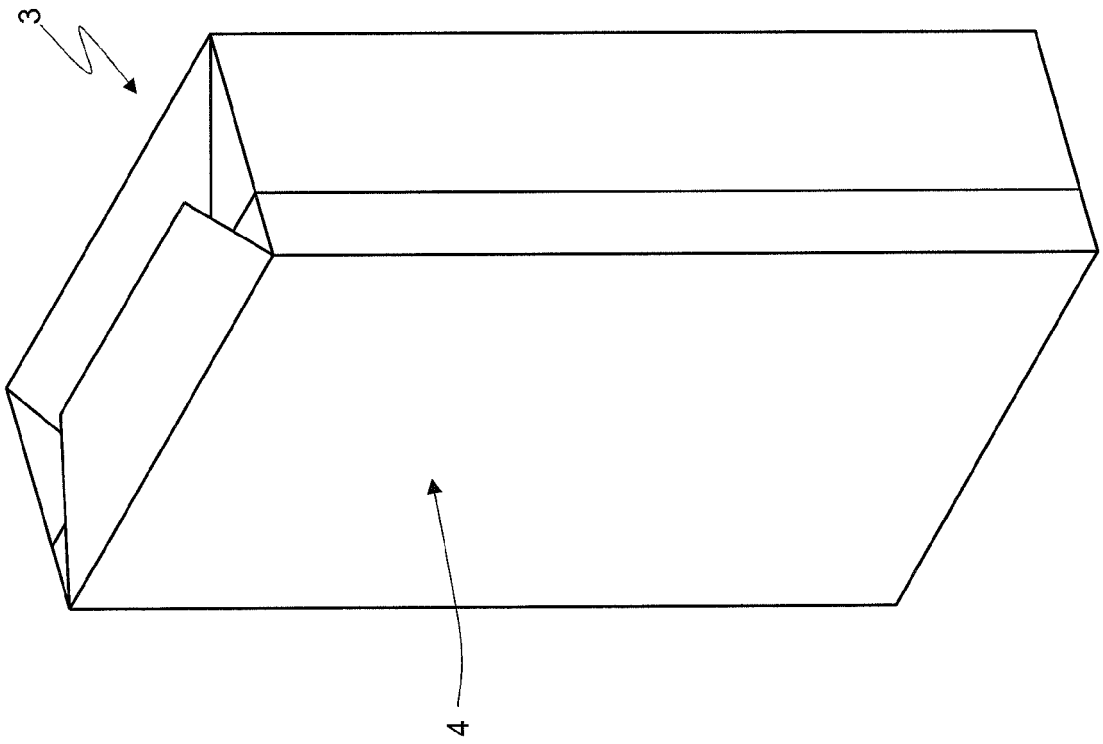

Fig.4

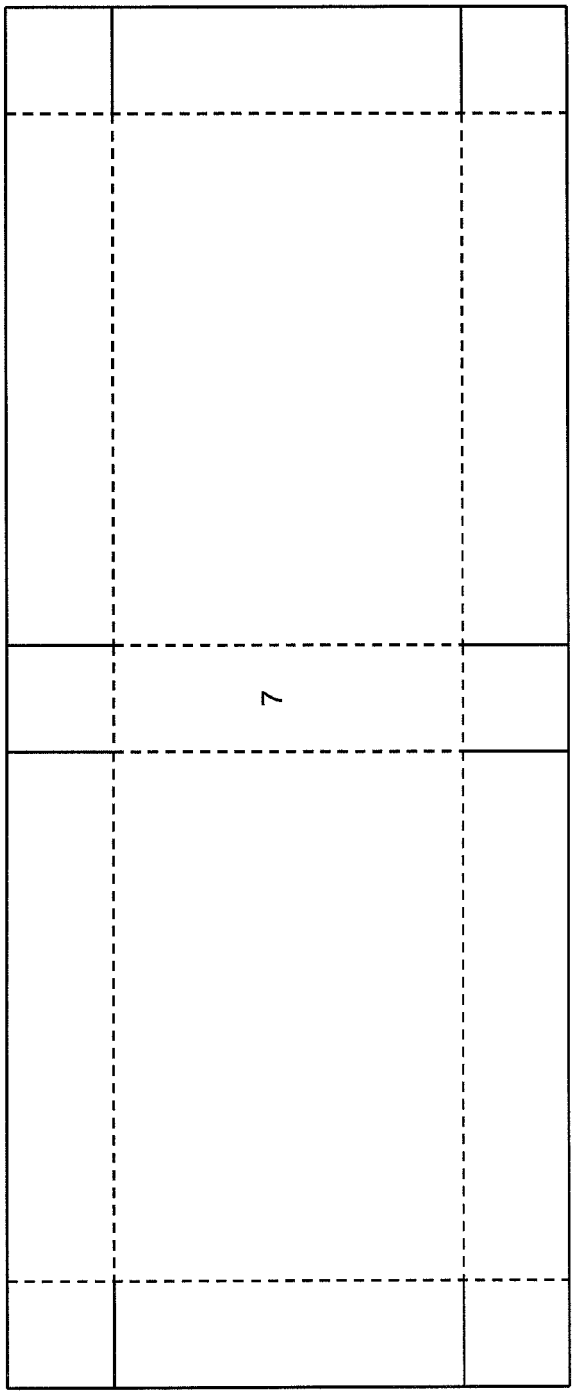

Fig.6

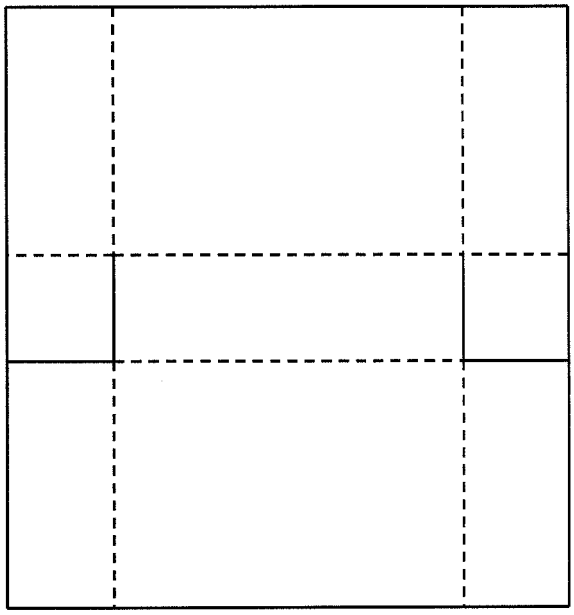

Fig.7

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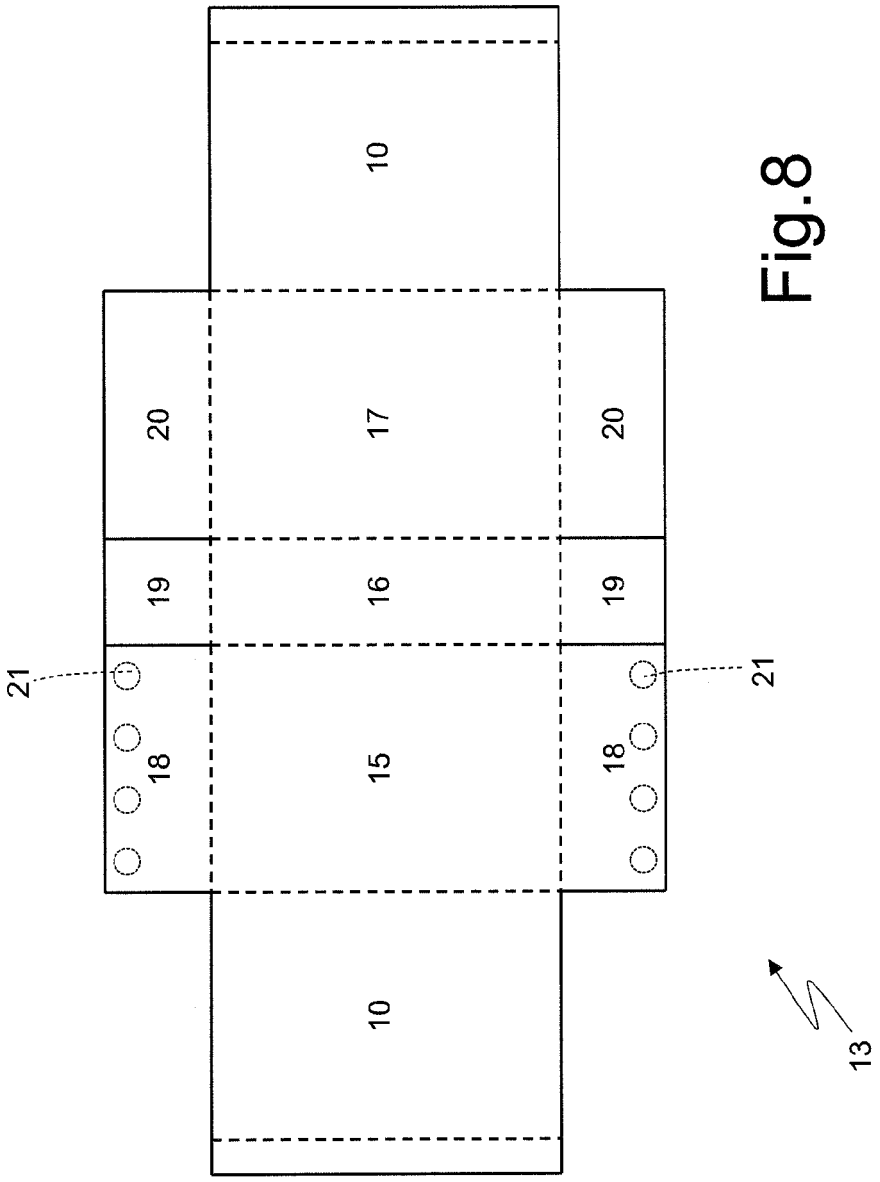


Fig.8

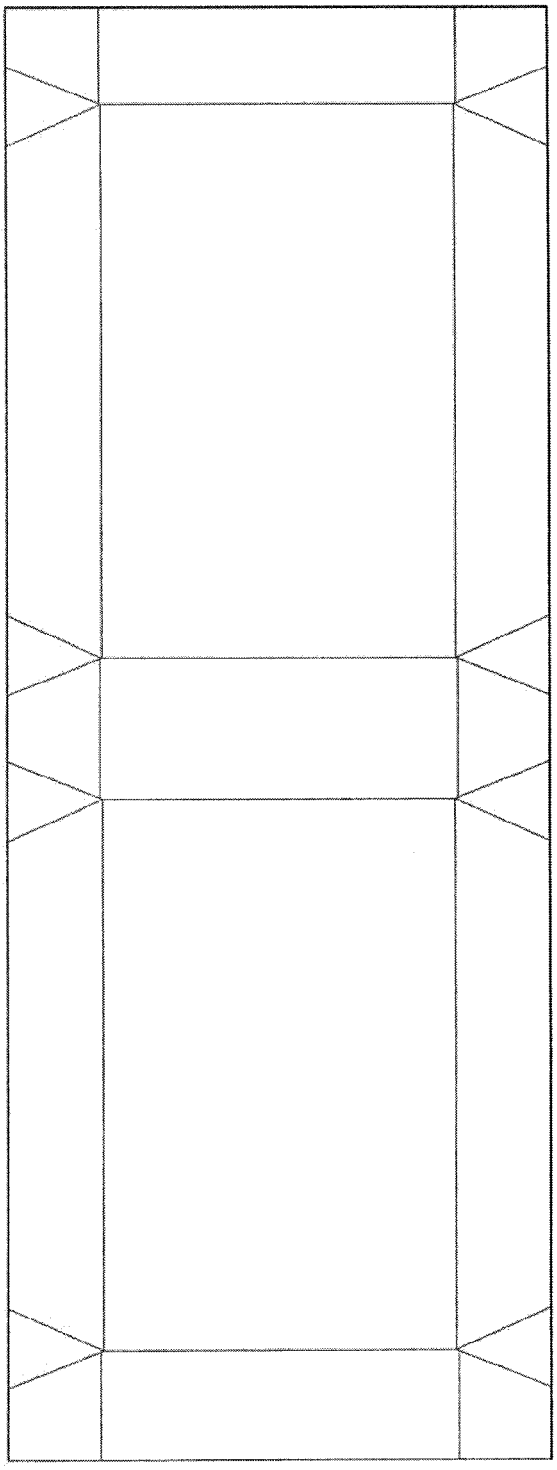
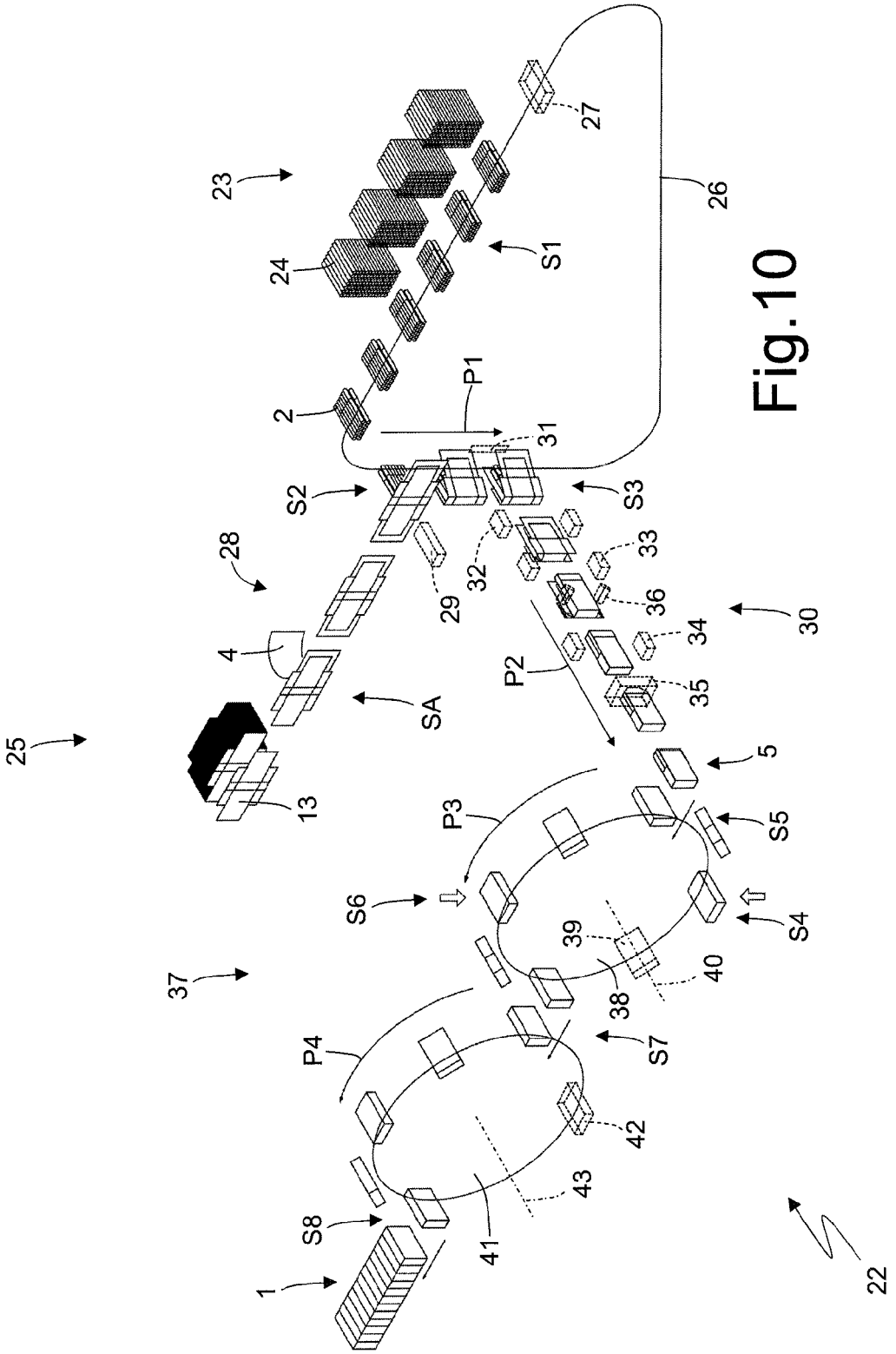


Fig.9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S1
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P1
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S2
S3
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SA
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S8
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Fig.10

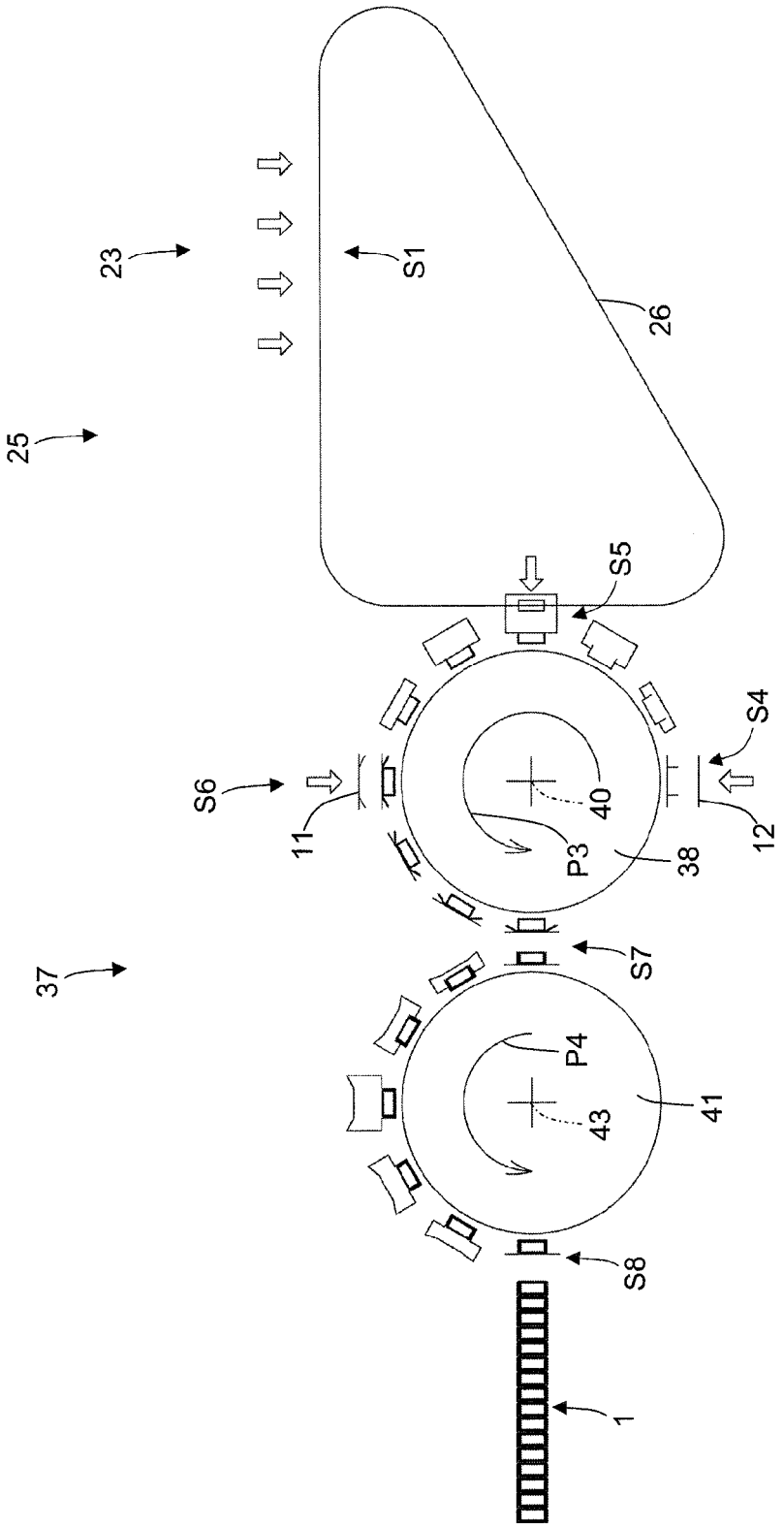


Fig.11

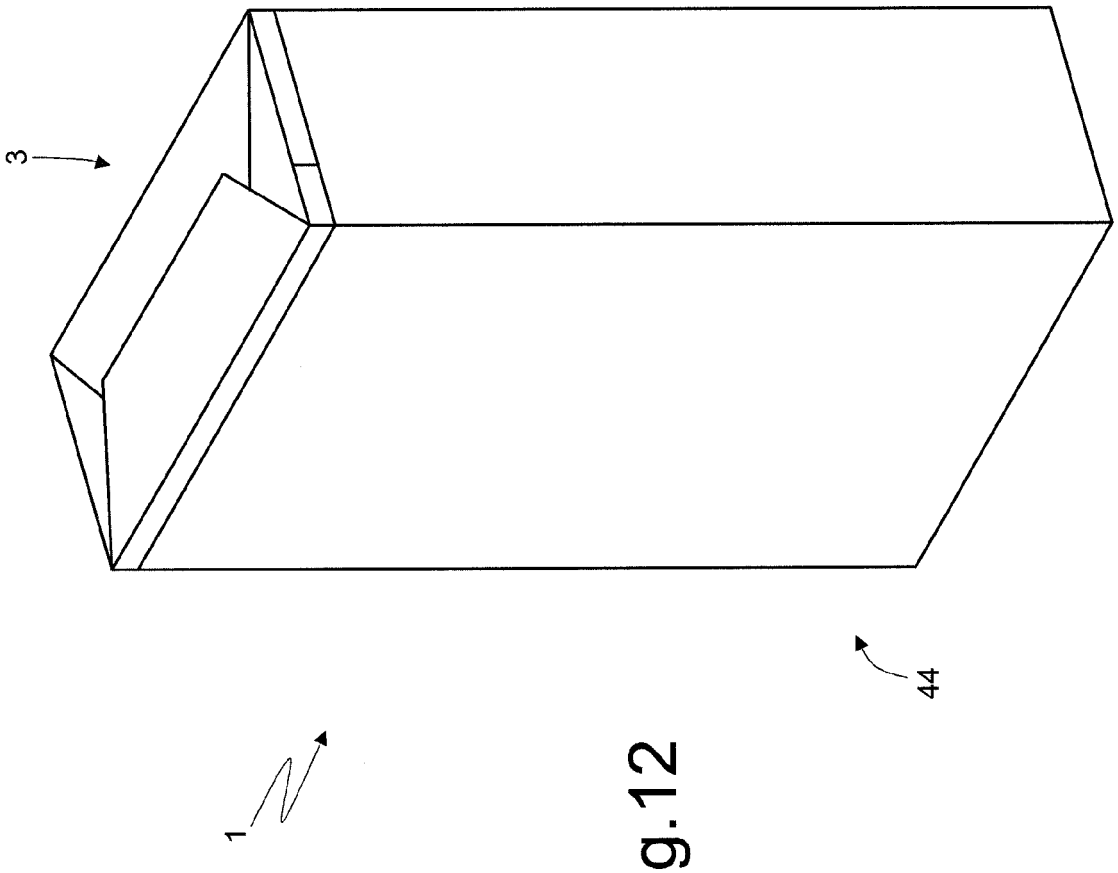


Fig.12

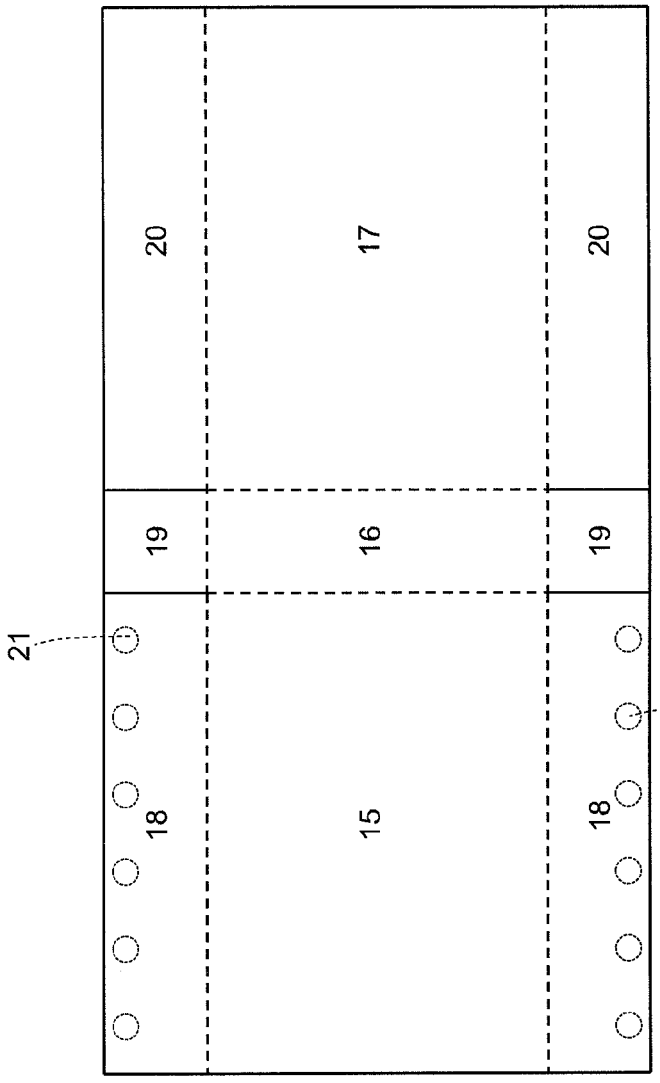


Fig.13

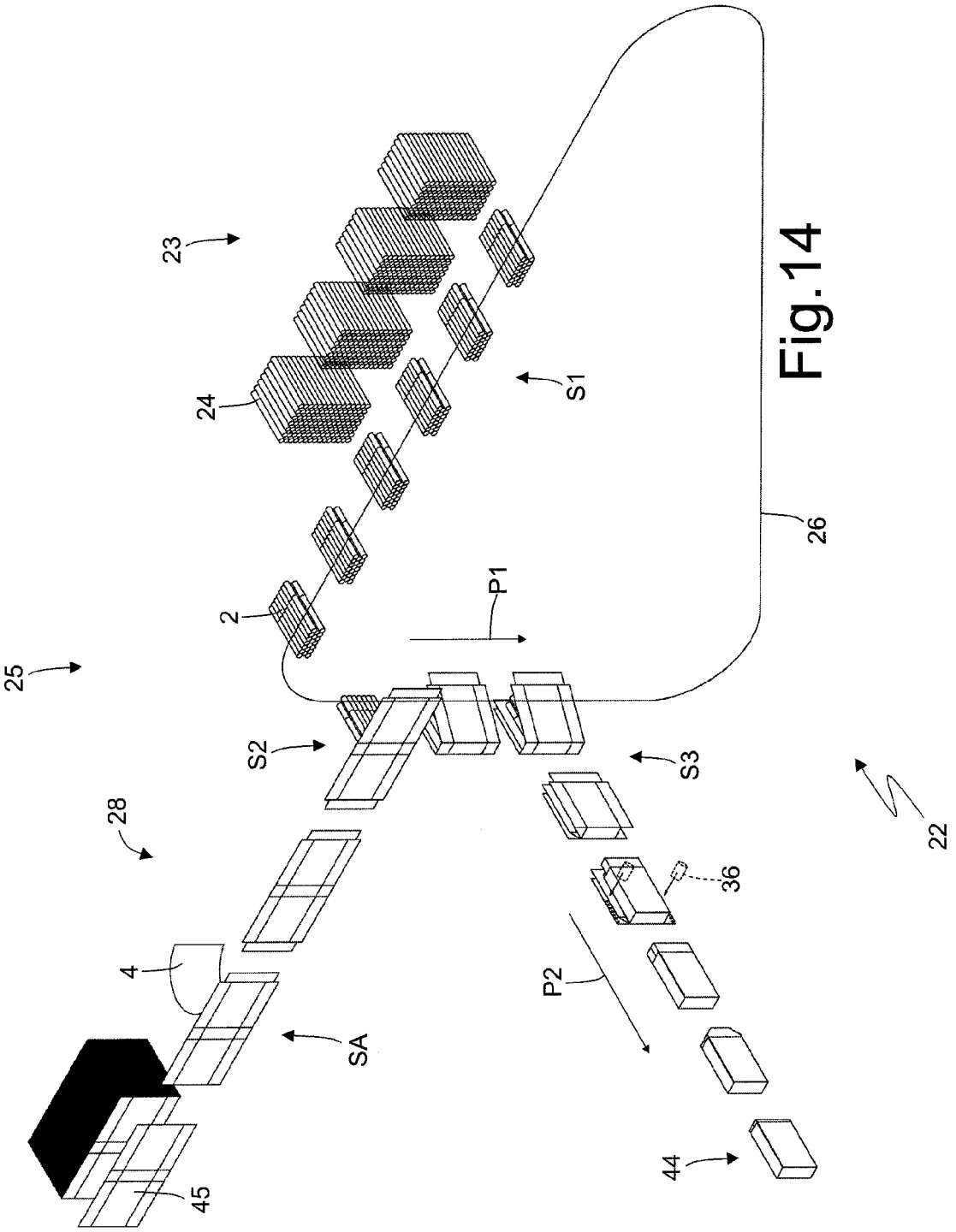


Fig.14

Fig.15

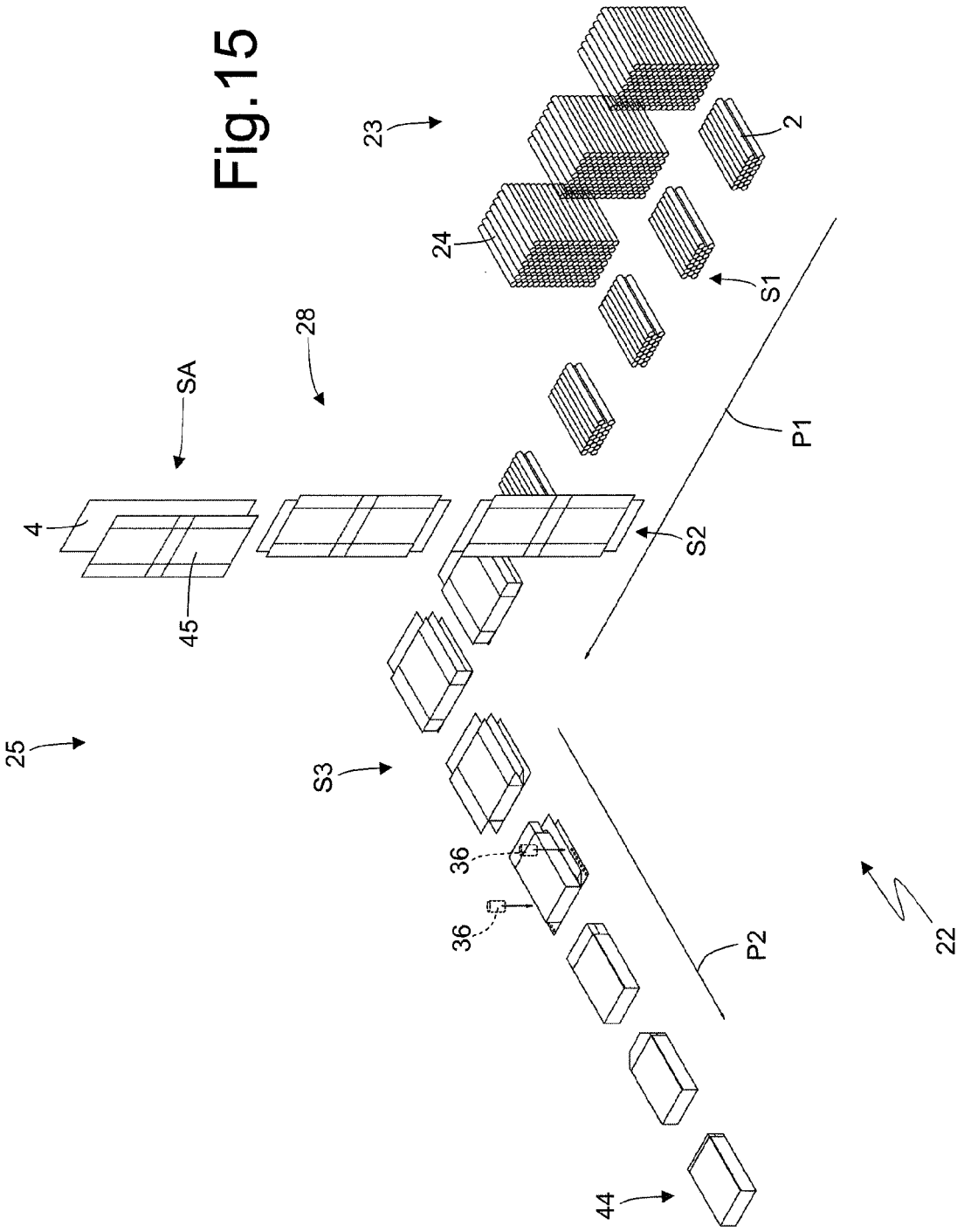
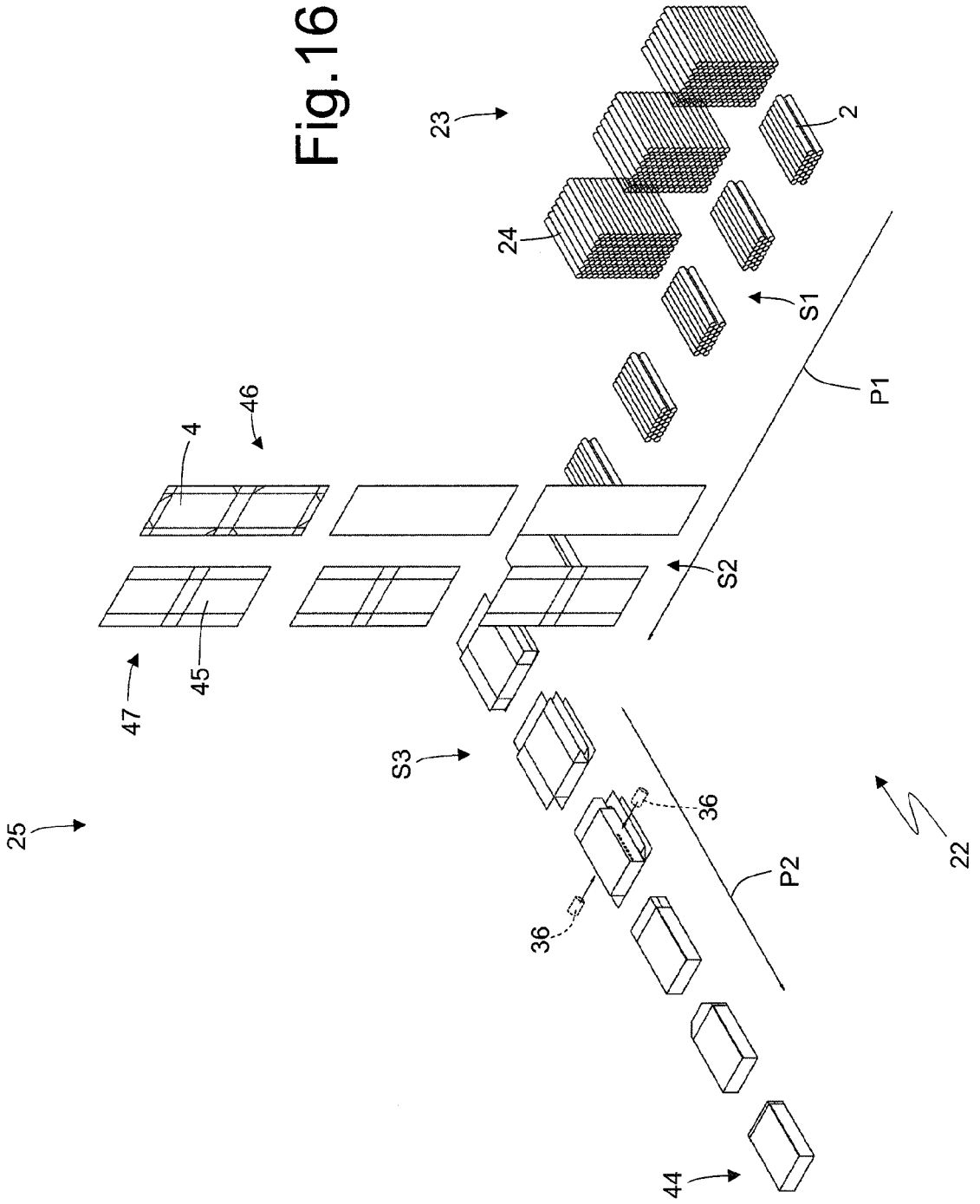


Fig.16



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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 4739

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Y,D	WO 2013/170975 A1 (PHILIP MORRIS PROD [CH]) 21 November 2013 (2013-11-21) * figure 2 * * page 21, lines 14-26 *	8-11	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 November 2015	Schmitt, Michel

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