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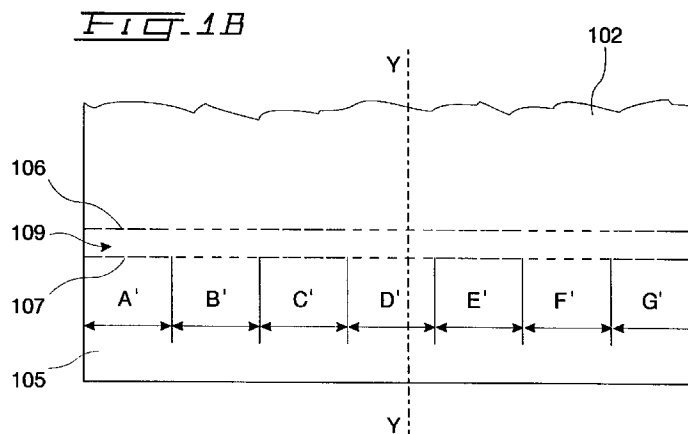
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(54) **Method and apparatus for obtaining a tear strip in packages of heat-shrink fail**

(57) -A method for obtaining at least one opening tear strip in packages of the heat-shrink type using sheets of heat-shrink material provides to manage and vary the degree of weakening along the weakening lines (106, 107) produced on the sheet (102) of heat-shrink material in relation to the product to be packed, wherein provision is made to weaken with greater intensity the sections (A', C', E', G') of the weakening lines (106, 107) intended to undergo a build-up of material during the

heat-shrinking phase, and wherein provision is made to weaken with less intensity the sections (B', D', F') of the weakening lines (106, 107) intended to undergo less build-up of material during the heat-shrinking phase.

-A pack obtained with the said method and an apparatus for implementing the said method.



Description

-The invention relates to a method for obtaining at least one opening tear strip in packages of the heat-shrink type using pieces of sheet of heat-shrink material, a pack obtained in this way and an apparatus for implementing the said method.

-More specifically the invention comes within the specific sector of packaging with pieces of sheet of heat-shrink material, in which the said pieces are first wrapped round the products in the manner of sleeves, and are then heat-shrunk in a hot air oven in order to obtain the adhesion of the said piece close to the product to be packaged.

-Various methods and systems are currently known for facilitating the opening of so-called heat-shrink packages.

-From Italian patent IT-1.001.574 a method is known for obtaining a tear strip delimited by two tearing lines in a pack of heat-shrink material.

-In this patent the strip is obtained by producing on the band of packaging in the process of being supplied towards the packing station at least two perforated weakening lines side by side, disposed transversely with respect to the longitudinal development of the said band.

-If applied for the packaging of groups of containers such as bottles or similar products which have an irregular shape, this method has a number of disadvantages.

-A first disadvantage is due to the fact that the pack obtained has an irregular structural continuity because the tearing lines which delimit the tear strip have undergone modifications during the heat-shrinking which cause, along their development, zones in which an enormous weakening has taken place (tears) and zones where there is no weakening because the perforations have closed.

-A second disadvantage is due to the fact that the pack obtained has a tear strip which has an irregular tear strength along its extent for the same reasons as those stated above.

-These particular disadvantages have not yet been remedied and in relation to the opening of the above-mentioned packs, the prior art has preferred to adopt different alternative methods.

-Briefly, these alternative methods provide to produce a light weakening line on the band in the process of being supplied towards the packaging station and/or towards the piece cutting station and to combine it with one or more tear threads/strips. In this way, after the piece of heat-shrink material has been wrapped and heat-shrunk round the product, the pack has a very strong pre-cut tear line to maintain the structural continuity of the pack, in which the said tear line can be torn solely by pulling the said tear thread/strip since the latter acts as a knife, and it is not possible to tear it by hand because it is too strong and irregular.

-The above-mentioned method has a number of disadvantages.

-A first disadvantage lies in the fact that in order to perform the above-mentioned operations it is necessary to adopt low operating speeds which involve a low productive capacity of the packing machine.

-A second disadvantage lies in the fact that the above-mentioned operations may cause the packing machine to malfunction and/or jam.

-A third disadvantage lies in the fact that the above-mentioned operations require the use of additional apparatus suitable for applying the said tear threads/strips to the band of packaging and, furthermore, the use of additional devices for cutting the said tear threads/strips, as well as the use of additional elements for supporting and unwinding the associated spools, comprising an increase in the cost of the packing machine and the associated maintenance.

-A fourth disadvantage lies in the fact that by applying the said tear threads/strips, the packaging cost increases in a conspicuous manner.

-A fifth disadvantage comprises the fact that by applying the said tear threads/strips, the residual mass of the pack after opening increases and, furthermore, because the said threads/strips comprise a different material from the pack film, the disposal and/or recycling of the said pack waste involves problems.

-The object of the invention is to eliminate the above unfortunate disadvantages.

The invention therefore principally relates to a method for obtaining at least one opening tear strip in packages of the heat-shrink type using sheets of heat-shrink material, wherein provision is made to produce on the said pieces before they are wrapped round the product to be packed at least one pair of weakening lines side by side and intended to determine a tear strip on the heat-shrunk pack, wherein the said method is characterized in that provision is made to manage and vary the degree of weakening along the weakening lines produced on the sheet in relation to the product to be packed, in that provision is made to weaken with greater intensity the sections of the weakening lines intended to undergo a build-up of material during the heat-shrinking phase and in that provision is made to weaken with less intensity the sections of the weakening lines intended to undergo less build-up of material during the heat-shrinking phase.

-The invention also relates to a pack obtained by means of the above-mentioned method which is characterized in that the tear lines which determine the tear strip on the pack are obtained by means of weakening lines which have a differentiated degree of weakening along their extent and are produced on the sheet of wrapping material.

-The invention further relates to an apparatus for implementing the above-mentioned method which is characterized in that it provides: a first pair of dragging rollers, located upstream of the said apparatus, suitable for stretching and dragging downstream a band of heat-shrink material; a second pair of dragging rollers, located at a distance downstream of the said first drag-

ging rollers, suitable for stretching upstream and dragging downstream the band of heat-shrink material; and cutting means located between the first pair of dragging rollers and the second pair of dragging rollers, extending transversely with respect to the direction of feed of the band, equipped with adjustment means to vary the degree of cutting along their extent and suitable for cyclically cutting the band as it slides by.

-The invention, which is characterized by the claims, solves the problem of creating a method for obtaining at least one opening tear strip in packages of the heat-shrink type using pieces of heat-shrink material, of creating a pack of the above-mentioned type equipped with a tear strip to facilitate its opening and of creating an apparatus for implementing the said method.

-The following results are obtained by using a method of this type: the tear strip obtained does not have tear lines having sections with enormous breaks (tears) and sections without breaks; the tear strip does not have an irregular tear strength along its extent; the band of heat-shrink material does not have to be subjected to applications of tear threads/strips; the packing machine does not have to be equipped with apparatus for applying the said tear threads/strips, the packing machine does not have to be equipped with devices for cutting the said tear threads/strips and elements for supporting the associated spools; the pack obtained does not have additions of material; the pack obtained does not have different materials.

-The advantages obtained by means of the invention essentially comprise the fact that the pack obtained maintains a structural continuity, the fact that the tear strip has a constant tear strength over its entire extent, the fact that high operating speeds can be used with consequent increase in the productive capacities of the packing machines, the fact that jams and/or malfunctions due to the above-mentioned application operations are avoided, the fact that the production costs of the packing machine are reduced, the fact that the packaging production costs are reduced, the fact that the mass of the pack waste after unpacking is reduced and, finally, the fact that the disposal and/or recycling operations of the said pack waste are facilitated.

-Further features and advantages of the invention will emerge in greater detail from the detailed description below of a preferred embodiment thereof, given purely by way of non-exhaustive example and with reference to the accompanying drawings in which:

-Fig. 1 is a perspective view of a particular pack obtained with the invention;

-Fig. 1A is a partial top view in horizontal section along the tear strip of the pack of Fig. 1;

-Fig. 1B is a partial plan view of the piece used for the pack of Fig. 1;

-Fig. 2 is a diagrammatic plan view of the apparatus to which the invention relates, in which provision has been made to remove a number of components in order to illustrate others, so as to show the plane of sliding of the heat-shrink band;

-Fig. 2A is a diagrammatic sectional side view along A-A of Fig. 2 of the apparatus to which the invention relates;

-Fig. 3 is a side view of a first form of tool for cutting;

-Fig. 3A is a diagrammatic sectional view along A-A of Fig. 3;

-Fig. 3B is a top view of the band of heat-shrink material showing a first form of the cuts intended to determine the tear strip obtained with the tool of Figs. 3 and 3A;

-Fig. 4 is a side view of a second form of tool for cutting;

-Fig. 4A is a diagrammatic sectional view along A-A of Fig. 4;

-Fig. 4B is a top view of the band of heat-shrink material showing a second form of the cuts intended to determine the tear strip and obtained with the tool of Figs. 4 and 4A;

-Fig. 5B is a top view of the band of heat-shrink material showing a particular form of the cuts intended to determine the tear strip;

-Fig. 6B is a top view of the band of heat-shrink material showing a further particular form of the cuts intended to determine the tear strip.

-Fig. 7B is a top view of the band of heat-shrink material showing a practical variant of the cuts of Fig. 6B.

-With reference to Fig. 1, this shows a particular heat-shrunk pack 1 obtained by means of the invention.

-This pack 1 provides a heat-shrunk wrapping 2, obtained from a piece 102 (see Fig. 1b) which has been wound longitudinally y-y round a product 3, in this case a group of six bottles 3a-3f, and then, after having disposed the longitudinal terminal ends 4 and 5 under the product 3, it has been heat-shrunk, obtaining the above-mentioned wrapping 2, wherein the latter has a tear strip 9 defined by the tearing lines 6 and 7 described in greater detail below.

-With reference to Fig. 1A also, which in a partial top view shows the pack of Fig. 1 sectioned along a horizontal plane located between the breaking lines 6 and 7, after shrinking, because of the particular shape of the packed product 3, build-ups of heat-shrunk material

form in particular zones of the opening wall of the pack 1.

-More specifically, the thickness of the opening wall of the pack 1 provides a thickness which varies in size along its extent and, with reference to the said Figs. 1 and 1A, substantially and diagrammatically, provides a section A of thick thickness, a section B of thin thickness, a section C of thick thickness, a section D of thin thickness, a section E of thick thickness, a section F of thin thickness and a section G of thick thickness.

-In fact, the variations in thickness between two continuous sections, between sections D and E for example, are not sudden but gradual.

-With reference to Fig. 1B, the piece 102 has a terminal end portion 105 intended to form the portion 5 of the pack 1 and a pair of weakening lines 106 and 107 extending transversely with respect to the said line y-y, intended to form the breaking lines 6 and 7 of the pack 1, between which is determined a strip of material 109, also extending transversely, and intended to form the tear strip 9 of the pack 1.

-The weakening lines 106 and 107 provide segments A', C', E' and G' having a larger degree of weakening and segments B', D' and F' having a smaller degree of weakening.

-This particular differentiation of the degree of weakening may be obtained with various systems, some of which are described in greater detail below, for example by producing consecutive cuts with associated connection bridges in which the segments A', C', E' and G' provide long cuts and short bridges whereas the segments B', D' and F' provide short cuts and long bridges.

-In view of the above, it will be evident that after the heat-shrinking of the piece 102 close to the product 3 to form the heat-shrunk wrapping 2, on the opening wall of the pack 1 there will be the tear strip 9 defined by the breaking lines 6 and 7 which, because of their previous differentiated weakening and because of the localized build-up of material following the heat-shrinking as described above, have a degree of pre-breaking which is substantially constant along their entire extent, so as to produce a pack having a constant and regular structural continuity and a tear strip 9 having mechanical tear strength and longitudinal and transverse tensile strength properties which are substantially regular and constant along its entire extent.

-To summarize, the method described above comprises managing and varying the degree of cutting and/or weakening along the weakening lines 106 and 107 produced on the piece 102 prior to heat-shrinking in relation to the shape of the product to be packed 3a-3f, wherein provision is made to weaken with greater intensity the segments A', C', E' and G' of the weakening lines intended to undergo an increase in thickness further to heat-shrinking and to weaken with less intensity the segments B', D', F' of the weakening lines which do not undergo an increase in thickness further to heat-shrinking, so as to obtain, after heat-shrinking, breaking lines 6 and 7 which have a tensile and tear strength that

is substantially constant along their entire extent.

-With reference to Fig. 4B, which shows a second particular embodiment of the weakening lines, a band 202 of heat-shrink material, which extends longitudinally along a line y-y, is intended to be cut into longitudinal pieces so that they can then be wrapped round the products 3a-3f in the manner described above.

-This band 202 has a pair of weakening lines 206 and 207, intended to form the breaking lines 6 and 7 of the pack 1, wherein the cuts 247a, 247b, 247c, etc. and the bridges 248a, 248b, 248c, etc. of a weakening line 206 are arranged staggered longitudinally with respect to the counter-facing cuts 249a, 249b, 249c etc. and associated bridges 250a, 250b, 250c, etc. of the other weakening line 207, determining a strip 209 intended to constitute the tear strip 9 of the pack 1.

-This embodiment of the weakening lines 206 and 207, after the heat-shrinking of the piece onto the product, comprises the formation of breaking lines 6 and 7 having mechanical tear and separation/tensile strength properties which are different from those of the preceding embodiment and which have particular uses.

-With reference to Fig. 5B, which shows a third particular embodiment of the weakening lines, a band 302 of heat-shrink material which extends longitudinally along a line y-y is intended to be cut into longitudinal pieces so that they can then be wrapped round products 3a-3f in the manner described above.

-This band 302 has a pair of weakening lines 306 and 307 intended to form the breaking lines 6 and 7 of the pack 1, wherein the said weakening lines 306 and 307 are convergent at the centre and divergent at the ends so as to obtain, following heat-shrinking, which comprises an enormous shrinking of the transverse terminal portions of the band 302, see also Fig. 1, a tear strip 9 having a substantially uniform height.

-With reference to Fig. 6B, which illustrates a fourth particular embodiment of the weakening lines, a band 402 of heat-shrink material which extends longitudinally along a line y-y is intended to be cut into longitudinal pieces so that they can then be wrapped round products 3a-3f in the manner described above.

-This band 402 has a pair of weakening lines 406 and 407, intended to form the breaking lines 6 and 7 of the pack 1, wherein the said weakening lines 406 and 407 determine between them a portion of material 409 which extends transversely and is intended to form the tear strip 9 of the pack 1.

-In this particular embodiment the weakening lines 406 and 407 provide a double set of oblique cuts 406a, 406b, etc. and 407a, 407b, etc. disposed in the manner of a fish's backbone with respect to the portion 409, wherein, to vary the degree of weakening, provision is made to vary the length L3, L4 of the cuts and/or to vary the spacing distance D between the successive cuts of each row 406 and 407.

-With reference to all the embodiments of the weakening lines described above, and in particular to Figs. 1, 5B, 6B, the pack 1 has a take-hold tab 75 which is

obtained by making a pair of mirror-image continuous lateral cuts, denoted by 71, 71 in Fig. 5B and 72, 72 in Fig. 6B, in the vicinity of the terminal portion of the weakening lines denoted by 306, 307 in Fig. 5B and by 406, 407 in Fig. 6B, so as to obtain a tab-portion denoted by 73 in Fig. 5B and by 74 in Fig. 6B, between the said weakening lines.

-With reference to Fig. 7B, which shows a fifth particular form of the weakening lines illustrated in Fig. 6B, a band 502 of heat-shrink material extends longitudinally along a line y-y and is intended to be cut into longitudinal pieces so that they can then be wrapped round the products 3a-3f in the manner described above.

-This band 502 has a pair of weakening lines 506 and 507, intended to form the breaking lines 6 and 7 of the pack 1, wherein the said weakening lines 506 and 507 are separated centrally by a total cut line 574a determining two tear strips 509, 509 extending from the centre outwards.

-The separation line 547a is associated with a pair of further cut lines 572, 572 so as to determine two tabs 574, 574 which, following heat-shrinking, will form on the pack obtained two central take-hold tabs for pulling the respective tear strips 509, 509.

-With reference to Figs. 2, 2A, 3 and 3A, these show a perforation apparatus 20 intended to implement the method described above.

-This perforation apparatus 20 is arranged upstream of a cutting station 21 intended to cut pieces 23 from a band 22 of heat-shrink material being fed according to the arrow F, so as then to feed them by means of a conveyor 24 into the wrapping station of the packing machine, as described and illustrated in Italian patent No. 1.246.637 (corresponding to US patent 5.203.144) for example.

-From upstream to downstream with respect to the direction F of feed of the heat-shrink band 22, see in particular Fig. 2A, the perforation apparatus 20 initially provides a first pair of dragging rollers 25 and 26, counter-rotating, wherein the roller 25 provides a rotating shaft 27 on which four rubberized wheels 28a, 28b, 28c, 28d are close-fitted, and the roller 26 provides a rotating shaft 29 on which four corresponding rubberized wheels 30, only the wheel 30c being visible in Fig. 2A, are close-fitted, which wheels are arranged vertically above the wheels 28a, 28b, 28c, 28d and are suitable for cooperating therewith for the feed of the band 22.

-Between the said pair of rollers 26 and 27 is arranged a first sliding plate 31, extending longitudinally beneath the plane of sliding of the band 22, which plate has slots 32a, 32b, 32c and 32d in which the said rubberized wheels 28a, 28b, 28c, 28d, the tops of which project from them at the top, are inserted.

-Downstream of the above-mentioned elements is arranged a cutting tool 33, rotating about an axis x, which comprises a shaft 34 which carries a pair of perforating blades 35 and 36, each of which provides a profile with teeth 51 and 52 arranged aligned, only the row of teeth 52a, 52b, 52c, 52d, 52e, 52f, 52g and 52h of

which being visible in Fig. 3A.

-Between the said two perforating blades 35 and 36 are carried a set of adjustment blocks 37, denoted respectively by 37a, 37b, 37c, 37d, 37e, 37f and 37g, which are adjustably movable radially with respect to the shaft 34 by means of a set of screws 38a, 38b, 38c, 38d, 38e, 38f, 38g having their free ends opposite to the heads rotoidally engaged in the said blocks 37a, 37b etc. and their shanks coupling in a screwable manner inside and through the said shaft 34.

-Downstream of the cutting tool 33 is arranged a second pair of dragging rollers 39 and 40, wherein the roller 39 provides a rotating shaft 41 on which four rubberized wheels 42a, 42b, 42c, 42d are close-fitted, and the roller 40 provides a rotating shaft 43 on which four corresponding rubberized wheels 44, only the wheel 44c being visible in Fig. 2A, are close-fitted, which wheels are arranged vertically above the wheels 42a, 42b, 42c, 42d and are suitable for cooperating therewith for the feed of the band 22.

-Between the said pair of rollers 39 and 40 is arranged a second sliding plate 45, extending longitudinally beneath the plane of sliding of the band 22, which plate has slots 46a, 46b, 46c and 46d in which the said rubberized wheels 42a, 42b, 42c, 42d, the tops of which project from them at the top, are inserted.

-The apparatus 20 described above is also equipped with mechanical and/or electrical and/or electronic and control means to synchronize and control the operation of the said apparatus 20, which are not described or illustrated here because they do not come within the inventive concept of the invention and because they are well-known and may have various configurations.

-With reference to the above structural description, the operation of the apparatus 20 provides, during the feed of the band 22 towards the cutting station 21, the cyclical rotation of the perforation assembly 33 in such a way that the tips 51 and 52 of the perforating blades 35 and 36 interfere with the said band 22 which, being stretched between the pair of rollers 25-26 and 39-40, is inserted in the teeth 51 and 52 of the said blades 35 and 36 until it meets the radially external surfaces of the blocks 37, see Fig. 2A.

-With reference to Figs. 3, 3A and 3B also, it is evident that by varying the radial position of the individual blocks 37 with respect to the teeth 51 and 52 it is possible to obtain cuts 47e and 47f having different lengths L1 and L2 and, consequently, connecting bridges 48e and 48f having a different width P1 and P2.

-In this way it is possible to obtain weakening lines 106 and 107 having a differentiated degree of weakening along their extent as required in order to implement the method described above.

-With reference to Fig. 4 and 4A, these show a particular configuration of the cutting blades of the perforator assembly 33. In this configuration a pair of perforating blades 235 and 236, equipped with respective perforator teeth 251 and 252 (followed by letter a, b,

c, etc. in Fig. 4A) are arranged in such a way that the teeth 251 of the blade 235 are staggered with respect to the teeth 252 of the other blade 236 whilst a set of adjustment blocks 237a, 237b, 237c, etc. is arranged between the said blades 235 and 236 in the manner and for the reasons described above for the first embodiment.

-With this configuration, see Fig. 4B, it is possible to obtain on the band 202 weakening lines 206 and 207 in which the cuts 247a, 247b, etc. produced by the perforating teeth 252a, 252b, etc. are staggered with respect to the cuts 249a, 249b, 249c, etc. produced by the teeth 251a, 251b, 251c, etc.

-With reference to the above description and illustration, it will be easy for a person skilled in the art to produce blades having different profiles or developments such as to be able to produce the weakening lines shown in Figs. 5B, 6B and 7B in which the rotating cutting tool will be equipped with equivalent adjustment blocks intended to limit and determine the penetration path of the band with respect to the teeth, determining weakening lines with a differentiated degree of weakening along their extent.

-The above description is particularly indicated for packaging with heat-shrink material under heat, but the inventive concepts of the said invention are equally applicable to packaging with heat-shrink material at low temperature.

-The description of the method for obtaining at least one opening tear strip in packages of the heat-shrink type using pieces of heat-shrink material, the pack obtained, and the apparatus for implementing the said method are given purely by way of non-exhaustive example and it is therefore evident that all those modifications or variants suggested by practice or their use or application may be introduced to them and still remain within the scope of the claims which follow.

Claims

1. Method for obtaining at least one opening tear strip in packages of the heat-shrink type using pieces of sheet of heat-shrink material, wherein provision is made to produce on the said pieces before they are wrapped round the product to be packed at least one pair of weakening lines side by side and intended to determine a tear strip on the heat-shrunk pack, characterized in that provision is made to manage and vary the degree of weakening along the weakening lines (106, 107) produced on the sheet (102) of heat-shrink material in relation to the product (3a-3f) to be packed, in that provision is made to weaken with greater intensity the sections (A', C', E', G') of the weakening lines (106, 107) intended to undergo a build-up of material during the heat-shrinking phase and in that provision is made to weaken with less intensity the sections (B', D', F') of the weakening lines intended to undergo less build-up of material during the heat-shrinking

phase.

2. Method according to Claim 1, characterized in that for each weakening line (106 or 107) provision is made to produce cuts (47e, 47f) intercalated with connecting bridges (48e, 48f) both extending consecutively along the development of the weakening line (106 or 107), and in that provision is made to vary the width of the cuts (L1, L2) and of the bridges (P1, P2) to vary the degree of intensity of the weakening along the sections of the said weakening line (106 or 107).
3. Method according to Claim 2, characterized in that provision is made to arrange the cuts (247a, 247b, etc.) and the bridges (248a, 248b, etc.) of a first weakening line (206) of the said pair of weakening lines (206, 207) in a staggered position with respect to the cuts (249a, 249b, etc.) and bridges (250a, 250b, etc.) of the said second weakening line (207).
4. Method according to Claim 1, characterized in that provision is made to arrange the said pair of weakening lines (306, 307) divergent in the vicinity of their terminal portions.
5. Method according to Claim 1, characterized in that weakening lines (406, 407) are provided which comprise a double set of oblique cuts (406a, 406b, etc. and 407a, 407b, etc.) arranged in the manner of a fish's backbone with respect to a portion (409) intended to form, after heat-shrinking, the tear strip (9) of the pack (1).
6. Method according to Claim 5, characterized in that provision is made to vary the width (L3, L4) of the said cuts to vary the intensity of the degree of weakening along each weakening line (406, 407).
7. Method according to Claim 5 or 6, characterized in that provision is made to vary the distance (D) between the cuts of each row (406, 407) to vary the intensity of the degree of weakening.
8. Method according to one of the preceding Claims, characterized in that provision is made to produce at least two continuous lateral cuts (71, 71; 72, 72) in the vicinity of the terminal portion of the weakening lines (306, 307; 406, 407) so as to obtain an end tab (73; 74) intended to form, after heat-shrinking, a take-hold tab (75) to tear the tear strip (9).
9. Method according to one of the preceding Claims, characterized in that provision is made to produce a cut (574a, 572, 572) at a median point with respect to the extent of the weakening lines (506, 507) so as to determine two tear strips (509, 509) tearing from the centre outwards and equipped with respective take-hold tabs (574, 574).

10. Pack obtained by means of the method of one of the preceding Claims, characterized in that the tearing lines (7 and 8) which determine the tear strip (9) on the pack (1) are obtained by means of weakening lines (106, 107) which have a differentiated degree of weakening along their extent and are produced on the sheet of wrapping material (102). 5
11. Pack according to Claim 10, characterized in that at least one take-hold tab (75; 574, 574) is provided for taking hold of an end of the tear strip (9). 10
12. Apparatus (20) for implementing the method of one of the preceding Claims characterized in that it provides: 15
- a first pair of dragging rollers (25, 26), located upstream of the said apparatus (20), suitable for stretching and dragging downstream a band (22) of heat-shrink material; 20
 - a second pair of dragging rollers (39, 40), located at a distance downstream of the said first dragging rollers (25, 26), suitable for stretching upstream and dragging downstream the band (22) of heat-shrink material; 25
 - cutting means (33) located between the first pair of dragging rollers (25, 26) and the second pair of rollers (39, 40), extending transversely with respect to the direction of feed (F) of the band (22), equipped with adjustment means (37, 38) to vary the degree of cutting along their extent and suitable for cyclically cutting the band (22) as it slides by. 30
13. Apparatus according to Claim 12, characterized in that the said cutting means (33) provide a cutter assembly (34, 35, 36, 37, 38) rotating with respect to an axis (x) extending transversely with respect to the direction of feed (F) of the band (22); in that the said cutter assembly (34, 35, 36, 37, 38) has a pair of perforation blades (35, 36) extending parallel to the said axis (x) of rotation and equipped with a multiplicity of pointed teeth (51, 52) facing radially outwards with respect to the said axis of rotation (x); in that the said adjustment means (37, 38) provide a multiplicity of companion blocks (37) arranged in succession along the extent of the said blades (35, 36), each of which block is adjustably movable radially with respect to the said axis of rotation (x); and in that during the revolution of the said rotating cutter assembly (34, 35, 36, 37, 38) the said teeth (51, 52) act on the band (22) which meets the radially external surface of the said companion blocks (37). 35 40 45 50 55
14. Apparatus according to Claim 12 or 13, characterized in that provision is further made for a first plane (31) of sliding of the band (22), located substantially at a tangent with respect to the dragging point of the said first pair of dragging rollers (25, 26), extending downstream of the feed path of the band (22) and terminating shortly before the operating region of the cutting means (33); and in that provision is further made for a second plane (45) of sliding of the band 22, located substantially at a tangent with respect to the dragging point of the said second pair of dragging rollers (39, 40), extending upstream of the feed path of the band (22) and terminating shortly before the operating region of the cutting means (33). 15
15. Method, pack and apparatus according to the preceding Claims and substantially as described and illustrated in the accompanying drawings and for the purposes described above.

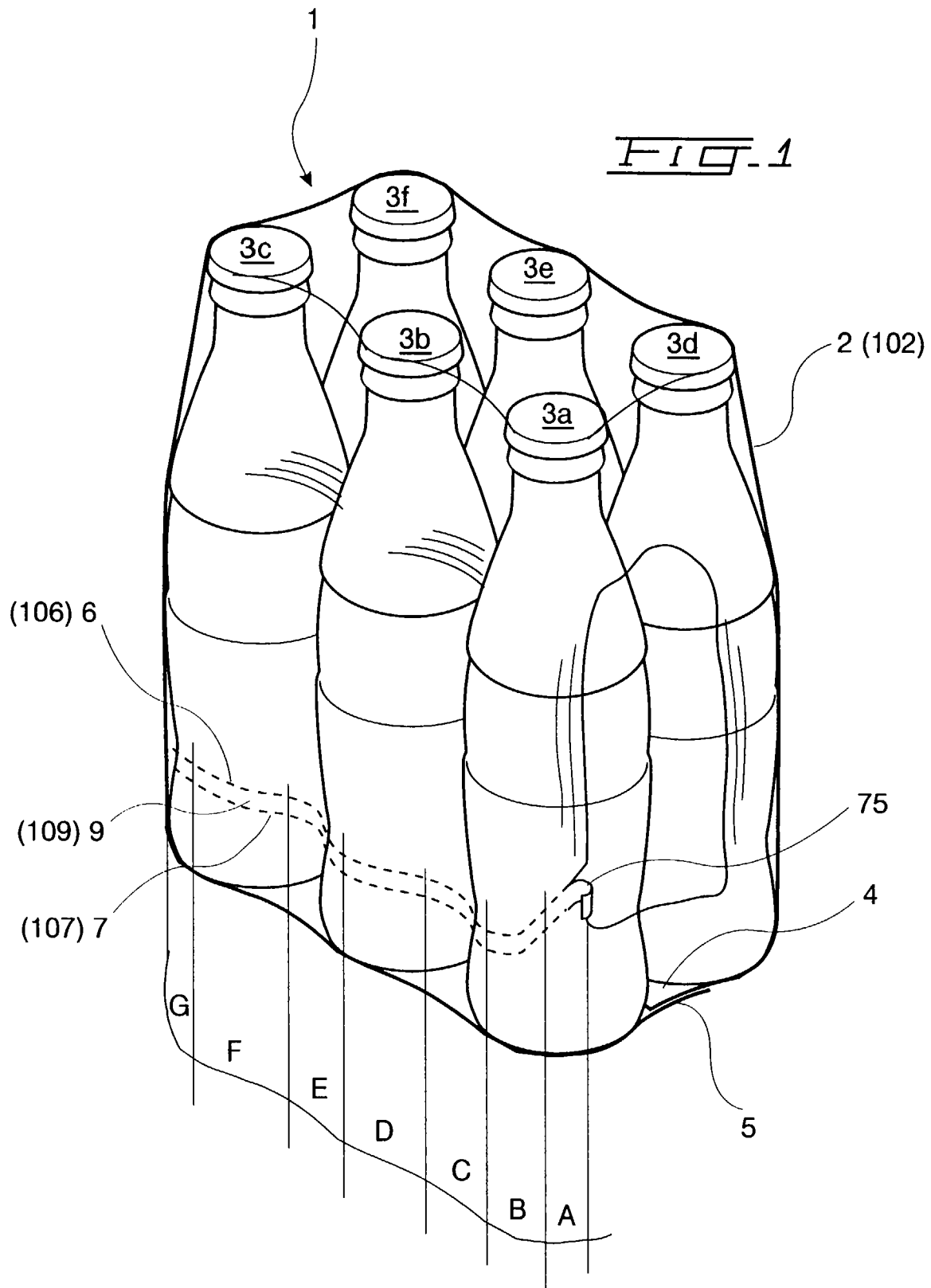


FIG. 1B

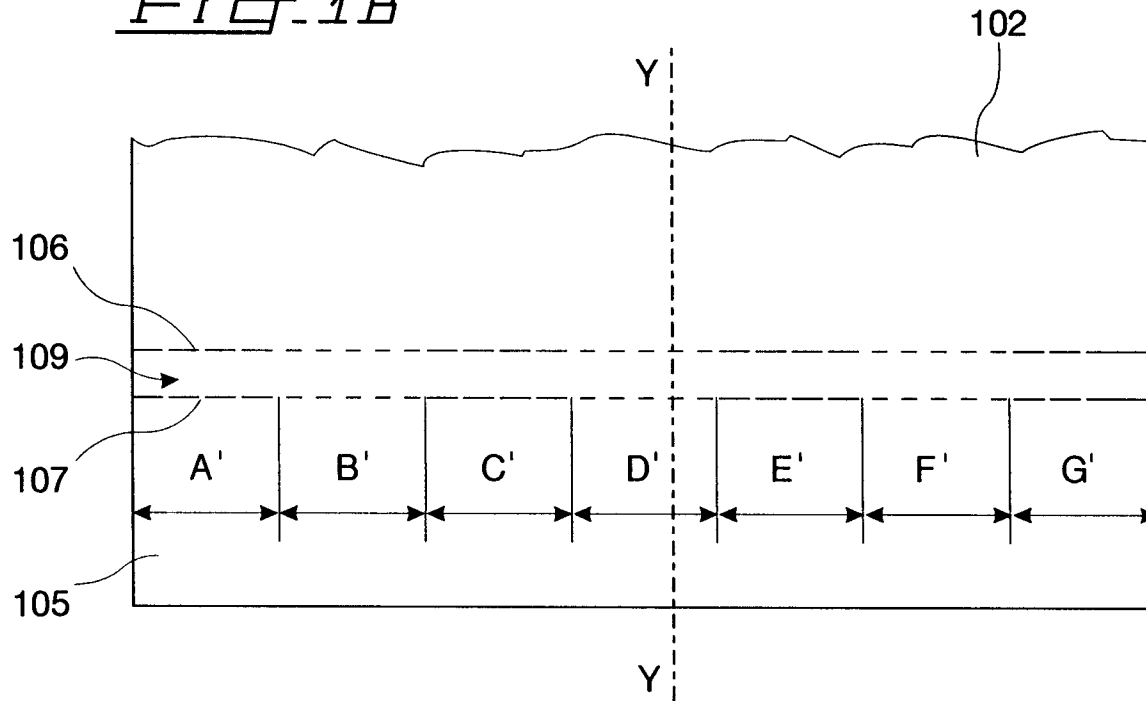
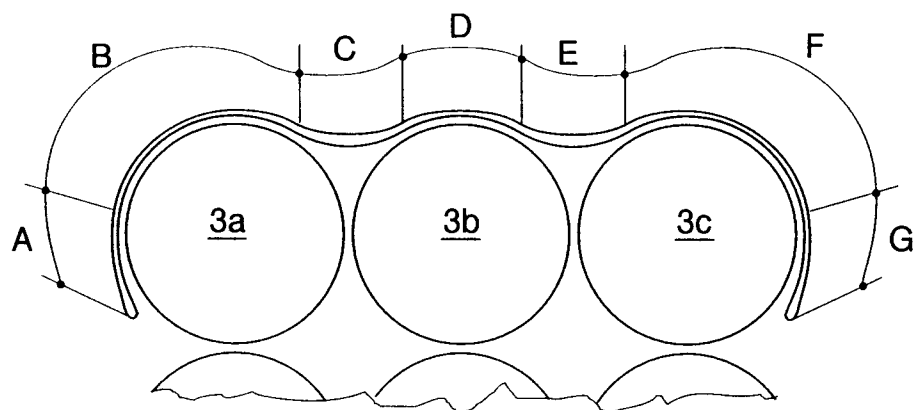


FIG. 1A



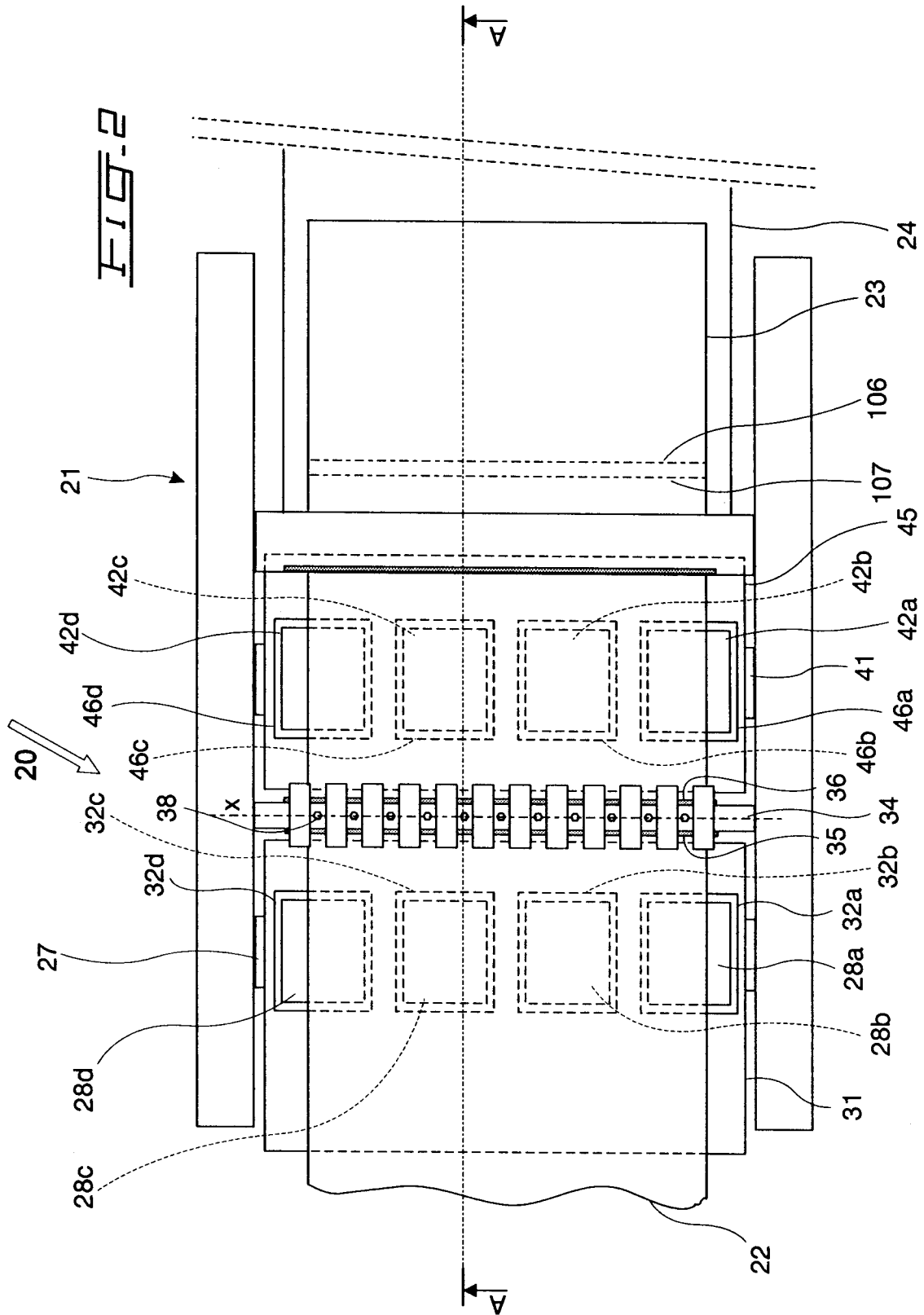
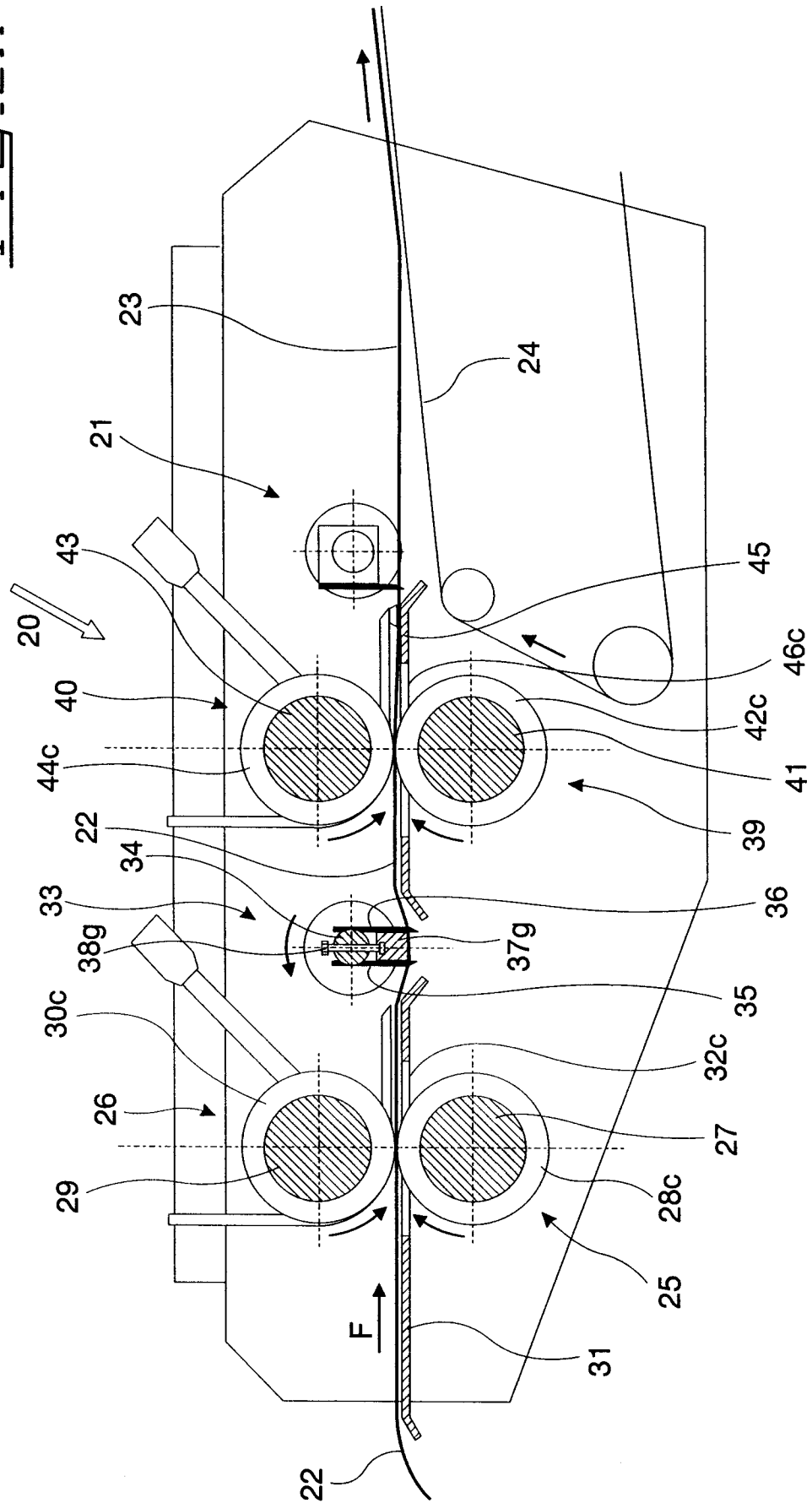


FIG. 2A



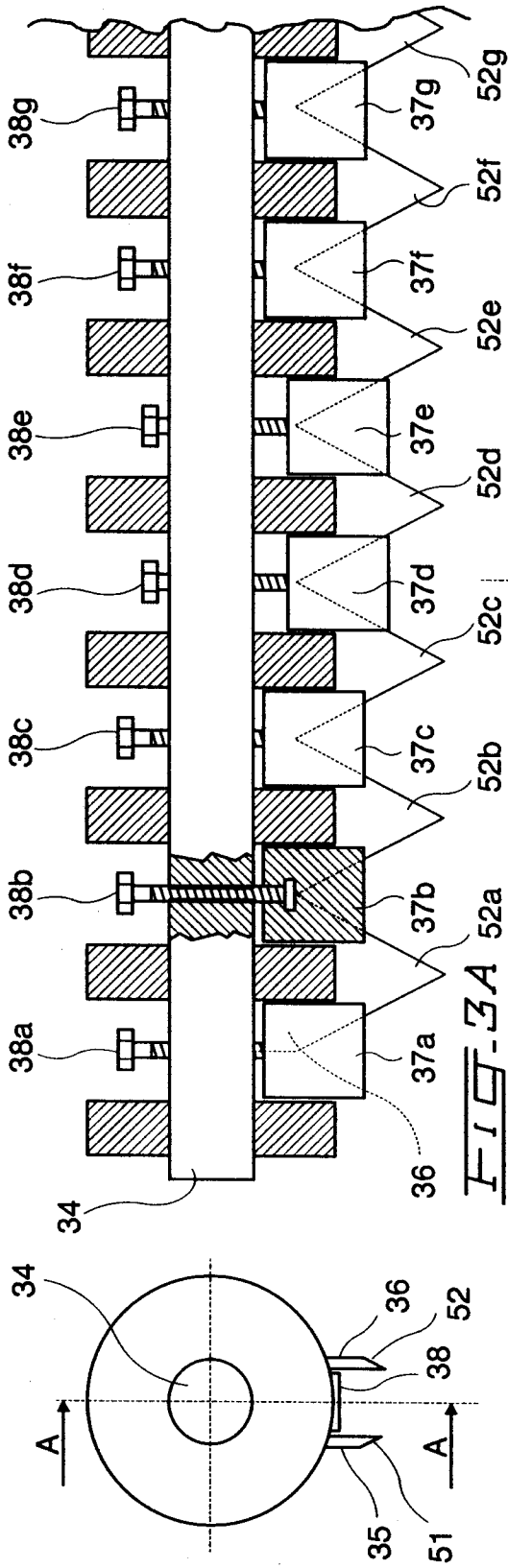
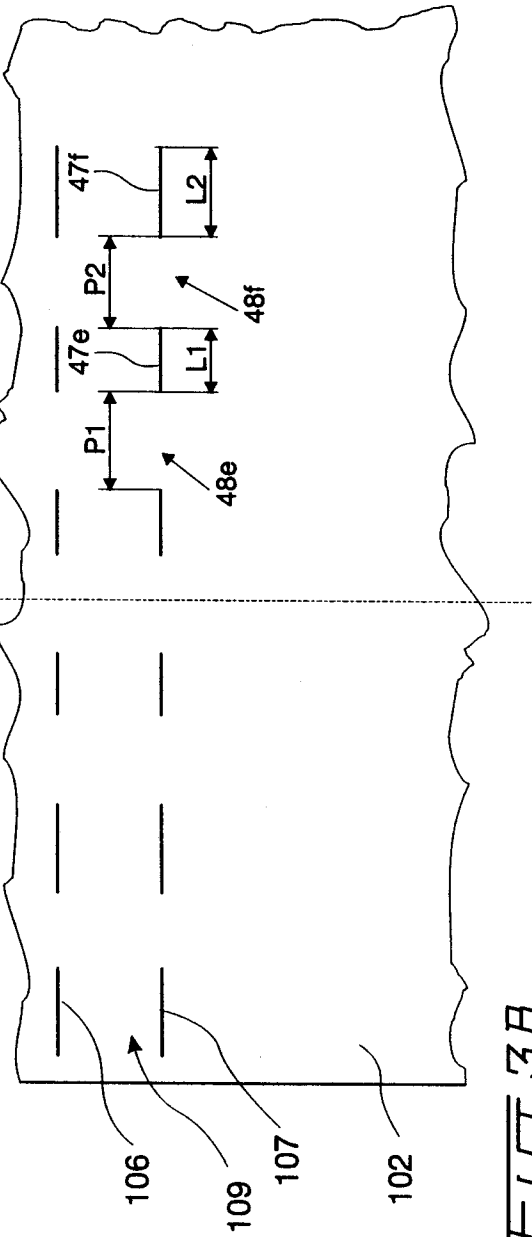


FIG-3



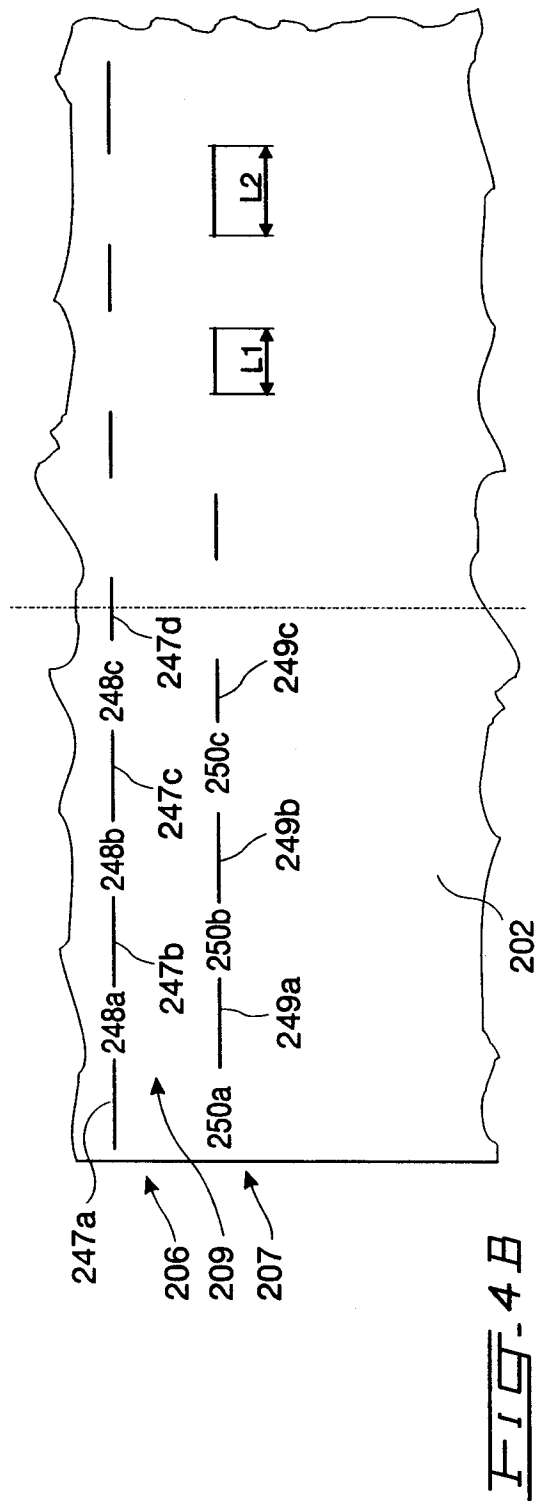
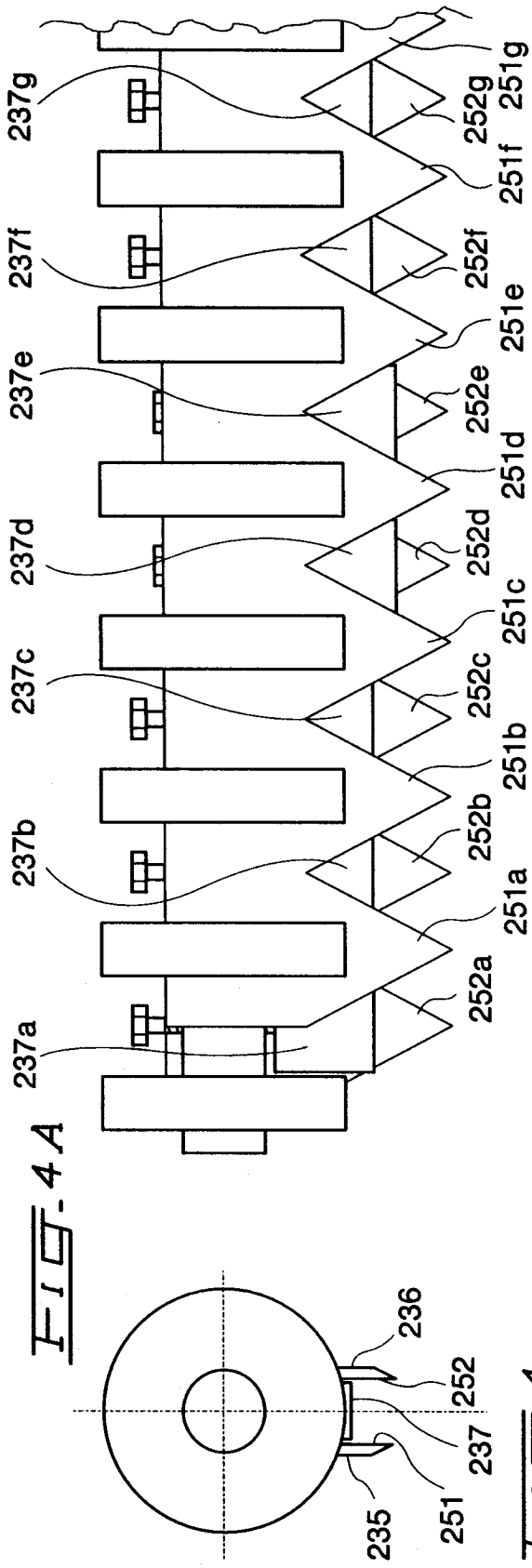


FIG. 5B

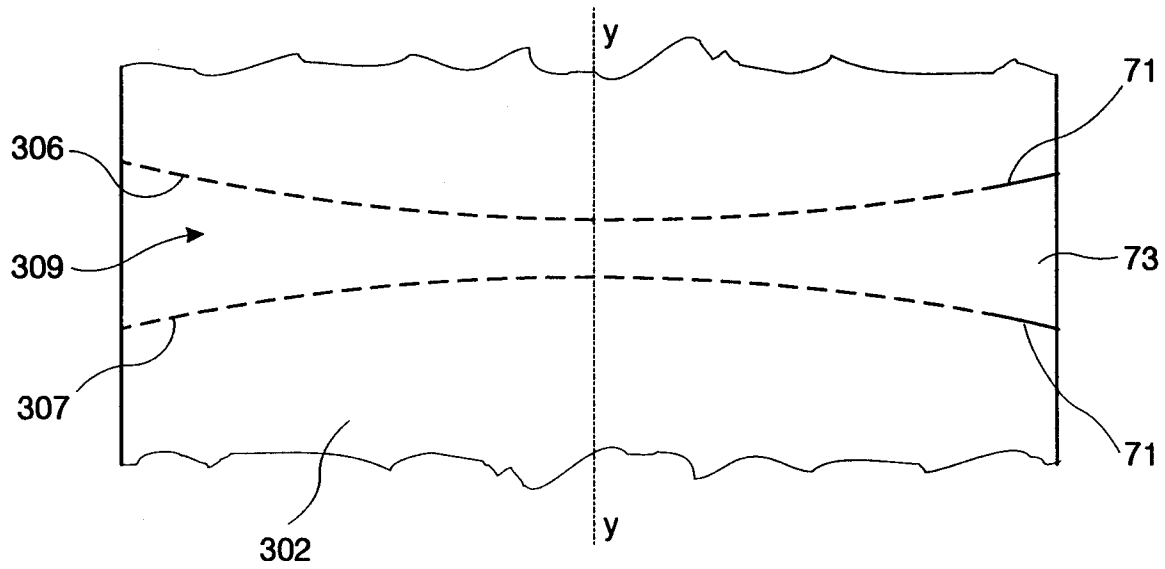


FIG. 6B

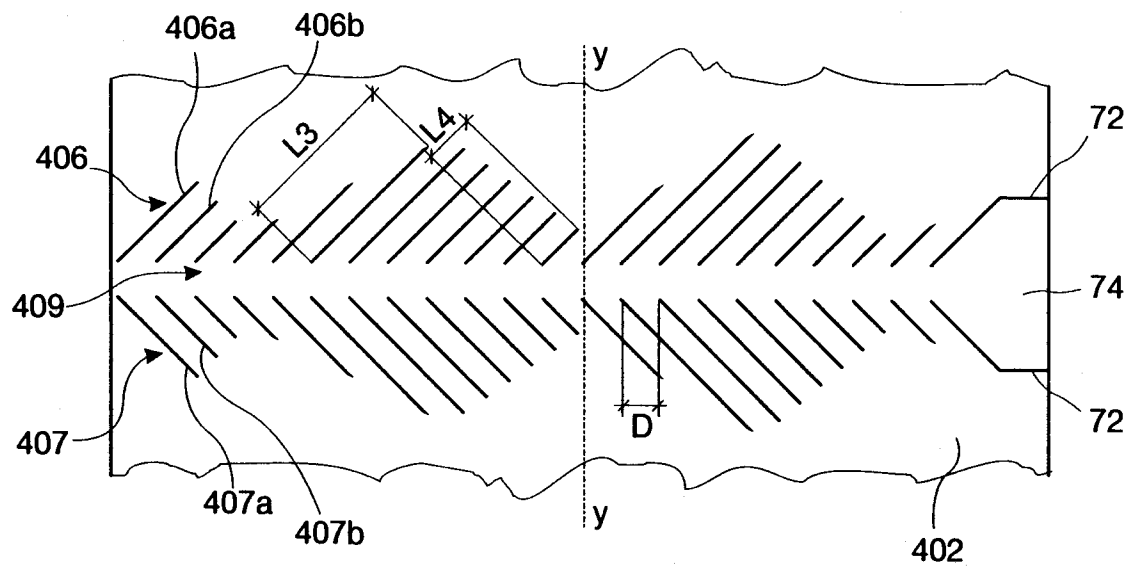
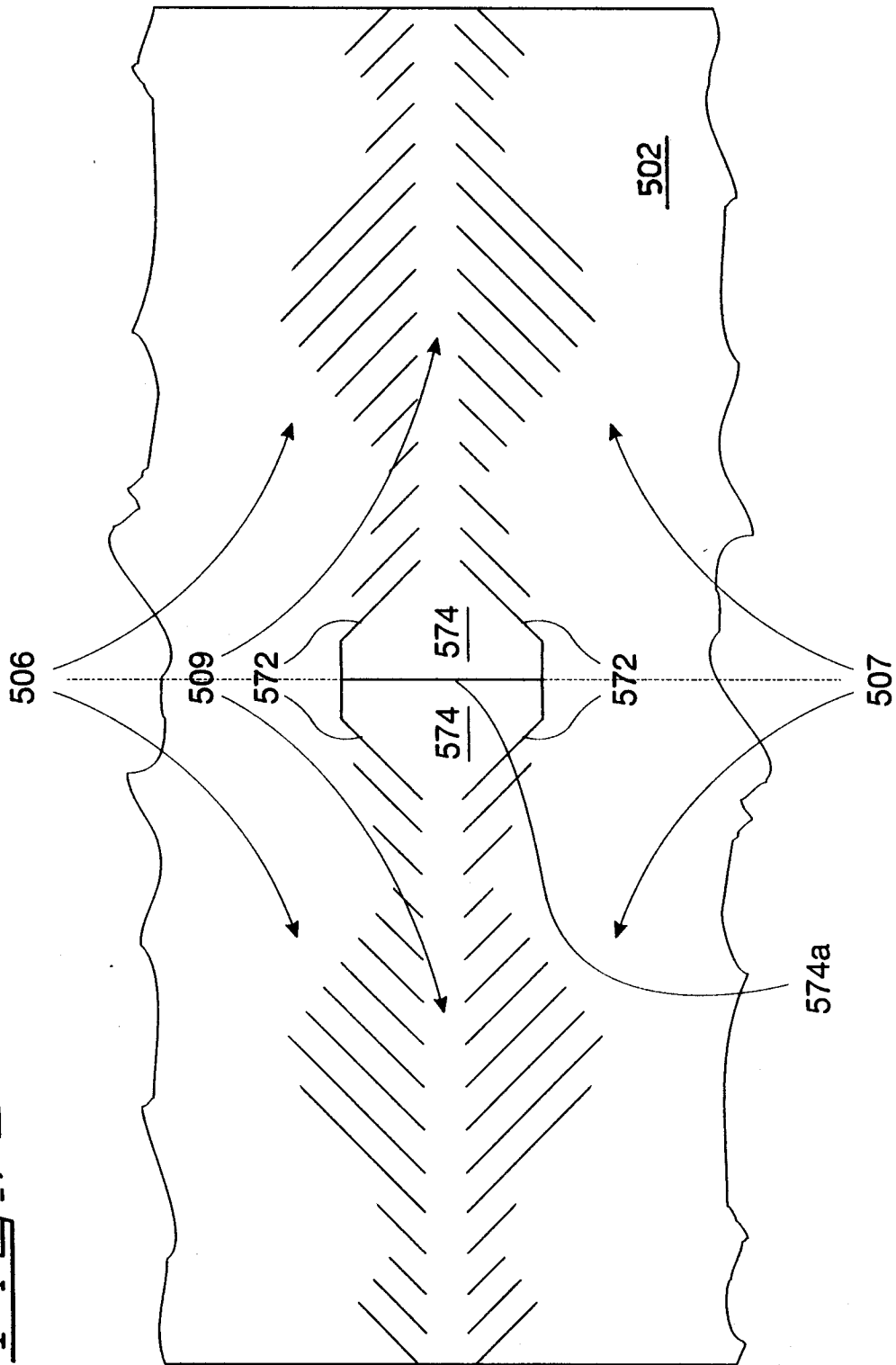


FIG. 7B





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 10 0650

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 4 586 312 A (J. LIMOUSIN) * column 4, line 57 - column 6, line 61; figures *	1,10,12	B65B61/02
A	DE 20 16 039 A (E.I. DU PONT DE NEMOURS) * page 5, line 14 - page 6, line 19; figures *	1,10,12	
A	EP 0 406 136 A (L. MARION) * column 3, line 26 - column 4, line 37; figures *	1,10,12	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 May 1997	Examiner Jagusiak, A
CATEGORY OF CITED DOCUMENTS		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	
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