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(72) Inventors:
• **Spirito, Gilberto**
40133 Bologna (IT)
• **Bertuzzi, Ivanoe**
40033 Casalecchio di Reno (IT)
• **Biondi, Andrea**
40133 Bologna (IT)

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(71) Applicant: **G.D Societa' per Azioni**
40133 Bologna (IT)

(74) Representative: **Jorio, Paolo et al**
Studio Torta S.r.l.
Via Viotti 9
10121 Torino (IT)

(54) **Method and unit for processing the edges of a soft package**

(57) A method of processing the edges (9) of a soft package (5), the method including the steps of folding a soft wrapping (6) about an article (3) to form the soft package (5) having a number of edges (9), each defining the boundary between two adjacent walls (8) of the soft pack-

age (5); and, once the soft wrapping (6) is folded about the article (3), subjecting the soft package (5) to a shaping process to shape the soft wrapping (6) along at least one edge (9) to obtain a sharp edge (9) and to square the soft wrapping (6) along the edge (9).

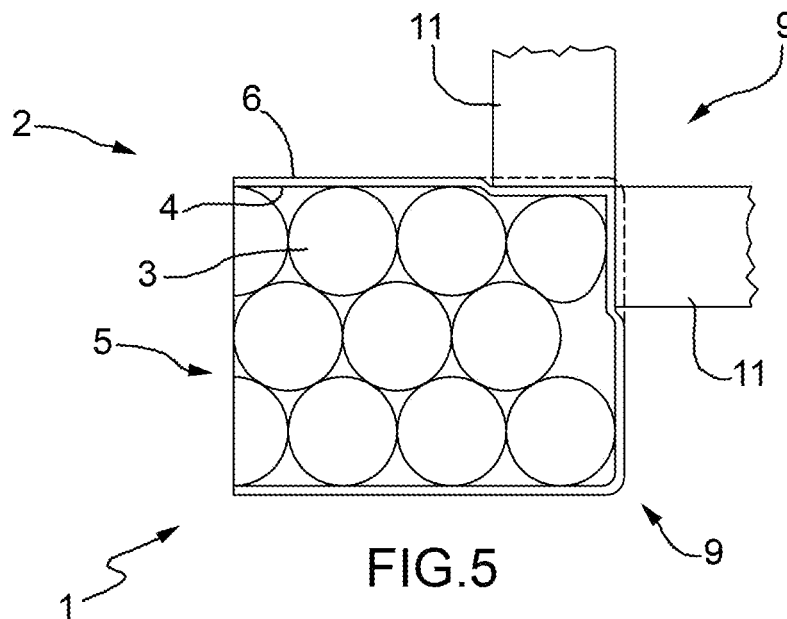


FIG.5

Description

TECHNICAL FIELD

[0001] The present invention relates to a method and unit for processing the edges of a soft package.

[0002] In the following description, reference is made, for the sake of simplicity and purely by way of a non-limiting example, to a soft packet of cigarettes.

BACKGROUND ART

[0003] A soft packet of cigarettes comprises a parallelepiped-shaped inner package comprising a group of cigarettes wrapped in a sheet of soft (i.e. non-rigid) inner wrapping of paper or foil; and an outer package comprising a sheet of soft (i.e. non-rigid) outer wrapping which is wrapped about the inner package to cover five walls of the inner package (i.e. leaving the top wall of the inner package exposed).

[0004] Along the longitudinal edges, the inner package wraps about the end cigarettes in the group, and so tends to assume a rounded shape (i.e. an arc shape, thus forming rounded edges). As a result, when the outer wrapping is wrapped and folded about the inner package, it is impossible to achieve a sharp, precise fold of the outer wrapping along the longitudinal edges. In other words, along the longitudinal edges, the outer wrapping, as opposed to being square and forming sharp edges, is rounded (i.e. arc-shaped, thus forming rounded edges), mainly on account of being folded about an inner package with rounded longitudinal edges.

[0005] A rounded, as opposed to square, outer wrapping along the longitudinal edges is particularly undesirable by producing an overall look of the soft packet of cigarettes that is not very popular with consumers, who tend to opt for soft packets of cigarettes with sharp, well pronounced edges.

[0006] In the manufacture of hard packets of cigarettes, a rigid blank is folded about the inner package to form a rigid outer package; and the flat rigid blank is weakened along the eventual edges of the outer package before being folded about the inner package, so that the rigid outer package has sharp square edges. A soft wrapping, however, cannot be weakened along the eventual edges of the soft outer package before being folded, on account of the soft wrapping, once weakened, no longer being manageable on the packing machine, and on account of the exact position of the edges of the outer package being impossible to determine accurately enough beforehand.

DISCLOSURE OF THE INVENTION

[0007] It is an object of the present invention to provide a method and unit for processing the edges of a soft package, which method and unit are designed to eliminate the aforementioned drawbacks, are cheap and easy

to implement, and, in particular, provide for achieving a soft package with sharp, well pronounced edges.

[0008] According to the present invention, there are provided a method and unit for processing the edges of a soft package, as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a top view in perspective of a soft packet of cigarettes;

Figure 2 shows a bottom view in perspective of the Figure 1 packet of cigarettes;

Figure 3 shows a cross section of the Figure 1 packet of cigarettes;

Figures 4-6 show, schematically, the sequence of operations performed on a longitudinal edge of the Figure 1 packet of cigarettes according to the processing method of the present invention;

Figure 7 shows, schematically, a packing system featuring a processing unit in accordance with the present invention, and by which to perform the Figure 4-6 operation sequence on the longitudinal edges of soft packets of cigarettes;

Figures 8, 9, 10 and 13 show front views of four embodiments of a forming channel of the Figure 7 processing unit;

Figure 11 shows a front view of a housing of the Figure 10 forming channel;

Figure 12 shows a view in perspective of a housing of the Figure 10 forming channel;

Figure 14 shows a front view of a housing of the Figure 13 forming channel;

Figure 15 shows a view in perspective of a housing of the Figure 13 forming channel;

Figures 16 and 17 show schematic front views of two embodiments of a portion of the forming channel of the Figure 7 processing unit;

Figures 18-21 show, schematically, the sequence of operations performed on a longitudinal edge of the Figure 1 packet of cigarettes according to an alternative embodiment of the processing method according to the present invention;

Figure 22 shows a schematic cross section of a further embodiment of a portion of a forming channel by which to perform the Figure 18-21 operation sequence on the longitudinal edges of the Figure 1 soft packet of cigarettes;

Figure 23 shows a front view of a variation of the Figure 7 forming channel.

PREFERRED EMBODIMENTS OF THE INVENTION

[0010] Number 1 in Figures 1-3 indicates as a whole a soft package defined by a substantially parallelepiped-

shaped soft packet of cigarettes with a rectangular cross section.

[0011] Packet 1 of cigarettes comprises a parallelepiped-shaped inner package 2 comprising a group 3 of cigarettes wrapped in a soft (i.e. non-rigid) inner wrapping 4 of foil; and a cup-shaped outer package 5 comprising a soft (i.e. non-rigid) outer wrapping 6 wrapped about inner package 2 to cover five walls of inner package 2 (i.e. leaving a top wall of inner package 2 exposed).

[0012] Outer package 5 is cup-shaped (i.e. open at the top), is in the form of a rectangular parallelepiped, and comprises a bottom wall 7, and four lateral walls 8 divided into two major lateral walls 8, and two minor lateral walls 8. Four longitudinal edges 9 are defined between lateral walls 8, i.e. each longitudinal edge 9 defines the boundary between two adjacent lateral walls 8; and four transverse edges 10 are defined between bottom wall 7 and lateral walls 8, i.e. each transverse edge 10 defines the boundary between a lateral wall 8 and bottom wall 7.

[0013] As shown in Figure 3, along longitudinal edges 9, inner package 2 wraps about the end cigarettes in group 3, and so tends to assume a rounded shape (i.e. an arc shape, thus forming rounded edges). As a result, when outer wrapping 6 is wrapped and folded about inner package 2, it is impossible to achieve a sharp, precise fold of outer wrapping 6 along longitudinal edges 9. In other words, along longitudinal edges 9, outer wrapping 6, as opposed to being square and forming sharp edges, is rounded (i.e. arc-shaped, thus forming rounded edges), mainly on account of being folded about an inner package 2 with rounded longitudinal edges.

[0014] As shown in Figures 4-6, once outer package 5 is completed, i.e. once outer wrapping 6 is folded about inner package 2, longitudinal edges 9 of outer package 5 are subjected to a forming process (i.e. permanent local deformation of the material fibres) to shape the soft wrapping 6 along longitudinal edges 9 and obtain an outer wrapping 6 with sharp square longitudinal edges 9. In other words, once outer wrapping 6 is folded about inner package 2, outer package 5 is subjected to a forming process to shape outer wrapping 6 along longitudinal edges 9.

[0015] Shaping each longitudinal edge 9 comprises pressing inwards of outer package 5 the portions of walls 8 on either side of longitudinal edge 9, and, at the same time, enclosing the portions of walls 8 on either side of longitudinal edge 9 inside a square forming member 11 negatively reproducing the desired shape of outer wrapping 6 along longitudinal edge 9.

[0016] As shown in Figure 5, by pressing inwards of outer package 5 the portions of walls 8 on either side of longitudinal edge 9, outer wrapping 6 adheres to the inner surface of forming member 11 and assumes a square, sharp-edged shape. Wrapping 6 is thus shaped along the sharp edge, and maintains its square shape (at least partly) when forming member 11 is removed from outer package 5.

[0017] A comparison of Figures 4 and 5 clearly shows

that, without being compressed, outer wrapping 6 could not adhere to the inner surface of forming member 11, on account of outer wrapping 6 not being flexible (i.e. capable of locally increasing in length) and so being unable to change from a rounded to a square shape, which, for a given surface area, would call for a roughly 27% increase in perimeter. Conversely, by reducing the surface area by compression, outer wrapping 6 can temporarily change from a rounded to a square shape (requiring a larger perimeter for a given surface area) and so adhere to the inner surface of forming member 11. In other words, on either side of longitudinal edge 9, outer wrapping 6 (not being flexible) has a constant perimeter, but its surface area is temporarily reduced to allow it to adhere to the inner surface of forming member 11 negatively reproducing, as stated, the desired shape of outer wrapping 6 along longitudinal edge 9.

[0018] As shown in Figure 7, a conveyor 12 transfers packets 1 of cigarettes from a packing machine 13 to a cellophaning machine 14 along a straight path P parallel to longitudinal edges 9. A processing unit 15 for processing longitudinal edges 9 of outer packages 5 of packets 1 of cigarettes, and implementing the forming method described above, is located along conveyor 12, which feeds packets 1 of cigarettes through a forming channel 16 at, for example, substantially constant travelling speed.

[0019] As shown by way of example in Figures 8-10 and 13, conveyor 12 may comprise two parallel, offset, horizontal conveyor belts for receiving packets 1 of cigarettes in between, and having vertical teeth by which to push packets 1 of cigarettes along path P. In other words, the vertical teeth of the two conveyor belts define pockets, each for housing a respective packet 1 of cigarettes.

[0020] As shown in Figures 8-10 and 13, processing unit 15 comprises a forming channel 16, through which packets 1 of cigarettes are fed by conveyor 12, and which gradually gets smaller in cross section along longitudinal edges 9. In other words, as a packet 1 of cigarettes is fed through forming channel 16, the gradual reduction in the cross section of forming channel 16 along longitudinal edges 9 "draws" outer package 5 of packet 1 of cigarettes along longitudinal edges 9 to shape each longitudinal edge 9 as described above.

[0021] As shown in Figures 8, 9, 10 and 13, forming channel 16 comprises four forming members 11 located along the four longitudinal edges 9, and which produce a gradual reduction in the cross section of the channel along longitudinal edges 9.

[0022] In the Figure 8 and 9 embodiments, each forming member 11 comprises two rollers 17 mounted to rotate idly about respective axes 18 of rotation, and which gradually reduce the cross section of the channel at a longitudinal edge 9. The axes 18 of rotation of the two rollers 17 are normally perpendicular and coplanar, and each roller 17 has a lateral surface parallel to its axis 18 of rotation. In a different embodiment, axes 18 of rotation of the two rollers 17 may be offset (i.e. non-coplanar)

and/or slope with respect to each other by an angle of other than but preferably close to 90°. In the Figure 8 and 9 embodiments, the lateral surfaces of the two rollers 17 of each forming member 11 form a "V" (with a pointed tip in Figure 8 and a bevelled tip in Figure 9) negatively reproducing the shape of the corresponding longitudinal edge 9.

[0023] In the Figure 16 embodiment, axes 18 of rotation of the two rollers 17 are parallel, and each roller 17 has a lateral surface sloping 45° with respect to its axis 18 of rotation. In the Figure 16 embodiment, too, the lateral surfaces of the two rollers 17 of each forming member 11 form a "V" (with a pointed tip in the Figure 16 embodiment and a bevelled tip in an embodiment not shown) negatively reproducing the shape of the corresponding longitudinal edge 9.

[0024] It is important to note that the angle of the "V" formed by the two rollers 17 of each forming member 11 may be exactly or close to 90°, and is normally slightly over 90° (e.g. 95-105°).

[0025] In the Figure 23 embodiment, the two rollers 17 of each forming member 11 are coaxial and side by side, and each have a lateral surface sloping roughly 45° with respect to the common axis 18 of rotation. The lateral surfaces of the two rollers 17 slope roughly 45° in opposite directions with respect to the common axis 18 of rotation. In the Figure 23 embodiment, too, the lateral surfaces of the two rollers 17 of each forming member 11 form a "V" (with a pointed tip in the Figure 23 embodiment and a bevelled tip in an embodiment not shown) negatively reproducing the shape of the corresponding longitudinal edge 9. In the Figure 23 embodiment, each forming member 11 comprises two coaxial, side by side rollers 17; in a perfectly equivalent variation, the two coaxial, side by side rollers 17 are replaced by a single roller 17 with a central V-shaped annular groove. In other words, the annular groove produces a single roller 17 with a V-shaped lateral surface negatively reproducing the shape of the corresponding longitudinal edge 9.

[0026] In this embodiment, too, the angle of the "V" formed by the two rollers 17 of each forming member 11 may be exactly or close to 90°, and is normally slightly over 90° (e.g. 95-105°).

[0027] In the Figure 8 and 16 embodiments, the desired shape of outer wrapping 6 along each longitudinal edge 9 calls for forming a square longitudinal edge 9, so the two rollers 17 of each forming member 11 are positioned side by side so skim each other at a given point.

[0028] In the Figure 9 embodiment, the desired shape of outer wrapping 6 along each longitudinal edge 9 calls for forming a bevelled longitudinal edge 9 (i.e. having two sharp edges separated by a portion sloping at an angle of 45°), so the two rollers 17 are positioned apart, and a flat central wall 19 is interposed between and at an angle of 45° to the two rollers 17.

[0029] In the Figure 10-12 embodiments, the desired shape of outer wrapping 6 along each longitudinal edge 9 calls for forming a square longitudinal edge 9, so the

fixed profile 20 comprises two flat perpendicular walls 21.

[0030] In the Figure 13-15 embodiments, the desired shape of outer wrapping 6 along each longitudinal edge 9 calls for forming a bevelled longitudinal edge 9 (i.e. having two sharp edges separated by a portion sloping at an angle of 45°), so the fixed profile 20 has three flat walls 21 comprising a central flat wall 21 at 45° to the two lateral flat walls 21.

[0031] In a different embodiment shown in Figure 17, conveyor 12 feeds packets 1 of cigarettes through forming channel 16 in steps, and each packet 1 of cigarettes is arrested inside forming channel 16. In this case, for each longitudinal edge 9, forming channel 16 comprises two pressure bodies 22 which move between a rest position (shown by the dash line in Figure 17) in which the two pressure bodies 22 are detached from outer package 5, and a work position (shown by the continuous line in Figure 17) in which the two pressure bodies 22 are pressed against outer package 5 at longitudinal edge 9.

[0032] Preferably, the two pressure bodies 22 are hinged about respective axes 23 of rotation, to rotate between the rest and work positions, and the axes 23 of rotation of pressure bodies 22 are parallel to longitudinal edges 9.

[0033] In a different embodiment shown in Figure 22, conveyor 12 feeds packets 1 of cigarettes through forming channel 16 in steps, and each packet 1 of cigarettes is arrested inside forming channel 16. In this case, each forming member 11 is connected to a suction device 24 for drawing outer wrapping 6 outwards of soft package 1. More specifically, forming member 11 is a square body with a suction opening 25 at longitudinal edge 9. Suction opening 25 is preferably wide enough to permit insertion of two flaps of the portion of outer wrapping 6 inside suction opening 25.

[0034] In the Figure 22 embodiment, outer wrapping 6 may also be shaped along longitudinal edges 9 as shown in Figures 18-21. More specifically, shaping outer wrapping 6 along at least one longitudinal edge 9 comprises drawing outwards of longitudinal edge 9 a portion of outer wrapping 6 on either side of longitudinal edge 9; pinching the portion of outer wrapping 6 projecting outwards of longitudinal edge 9, so as to squeeze together the two flaps of the portion and fold the two flaps over 90° (normally close to 180°) about a fold line parallel to longitudinal edge 9; and releasing the portion of outer wrapping 6 projecting from longitudinal edge 9. To draw a portion of outer wrapping 6 outwards of longitudinal edge 9, suction device 24 is used to draw the portion of outer wrapping 6 on either side of longitudinal edge 9 outwards of outer package 5. In this case, too, pressure is applied on packet 1 of cigarettes to enable a portion of outer wrapping 6 on either side of longitudinal edge 9 to be drawn outwards of longitudinal edge 9. This pressure may be produced by drawing the portion of outer wrapping 6 on either side of longitudinal edge 9 outwards, in that this necessarily tensions the whole of wrapping 6 and so presses outer packing 5 inwards.

[0035] In the embodiments described, the forming method is applied to longitudinal edges 9, though the same obviously also applies to transverse edges 10.

[0036] In the embodiments described, reference is made solely to the shaping of outer wrapping 6, though obviously, in a packet 1 of cigarettes comprising an inner package 2 and an outer package 5, the method simultaneously shapes both outer wrapping 6 of outer package 5 and the underlying inner wrapping 4 of inner package 2 (though to a lesser degree).

[0037] In the embodiments described, reference is made to the shaping of a packet 1 of cigarettes with no overwrapping of heat-sealed transparent plastic material (typically cellophane). The shaping method described, however, may also be applied to a packet 1 of cigarettes with an overwrapping of heat-sealed transparent plastic material covering outer package 5. In which case, being much thinner and more elastic than the underlying outer wrapping 6, the overwrapping of transparent plastic material undergoes no permanent deformation and therefore substantially no change in shape.

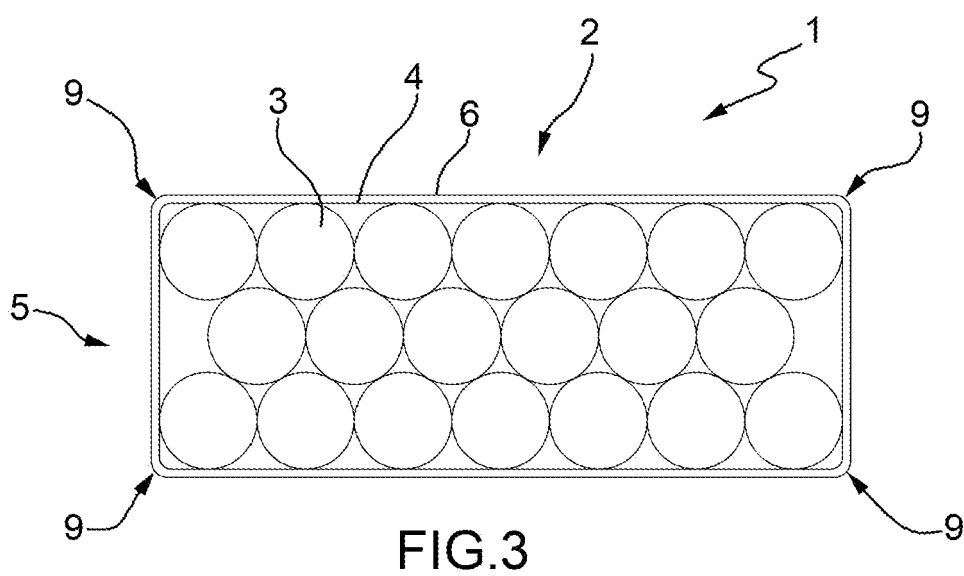
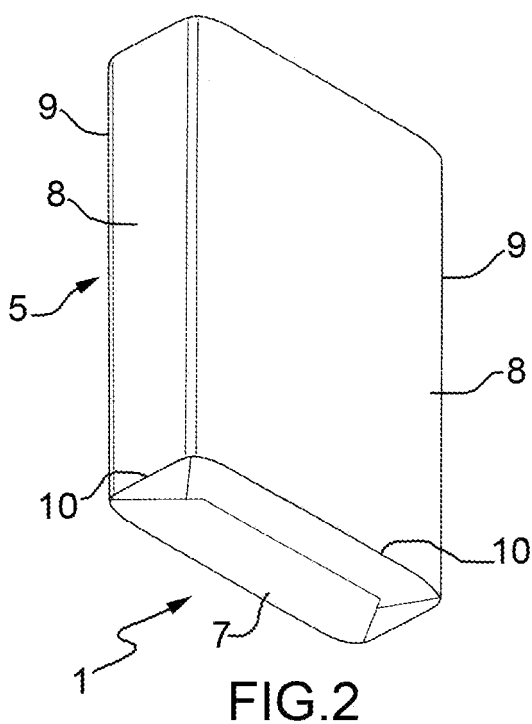
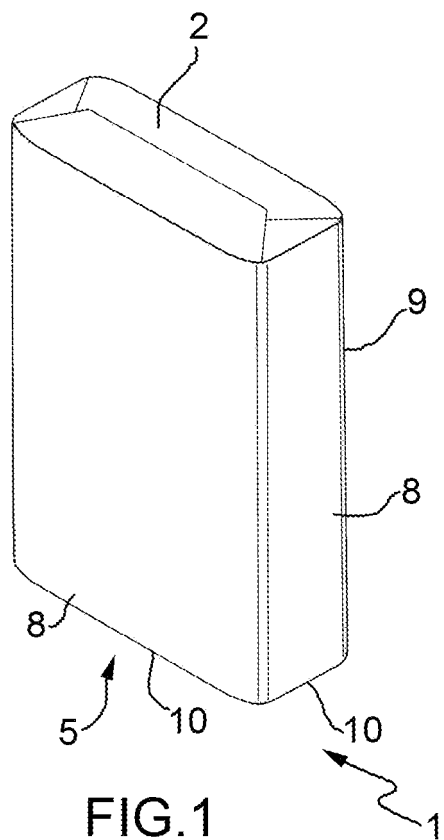
[0038] The method described of processing edges 9 or 10 has numerous advantages : it is cheap and easy to implement, and provides for forming sharp square edges 9 or 10 of outer package 5. It is important to note that the method described of processing edges 9 or 10 is applied to the finished outer package 5 (i.e. after folding outer wrapping 6), which means processing unit 15 can be installed easily even on an existing packing system, with no major alterations to the system required. That is, processing unit 15 need simply be installed along an output conveyor of a packing machine (or cellophaning machine).

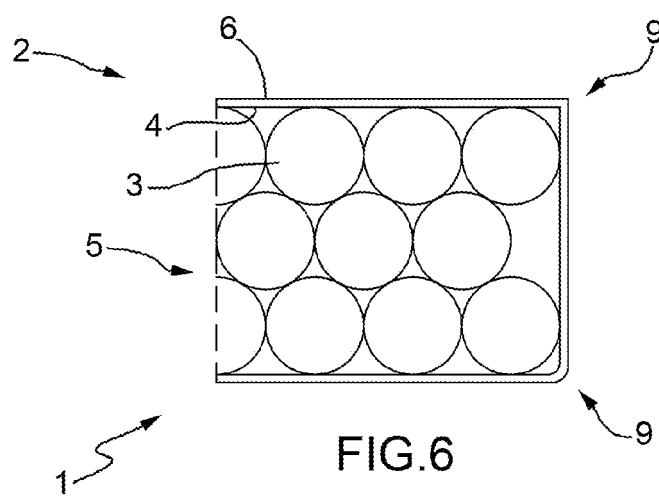
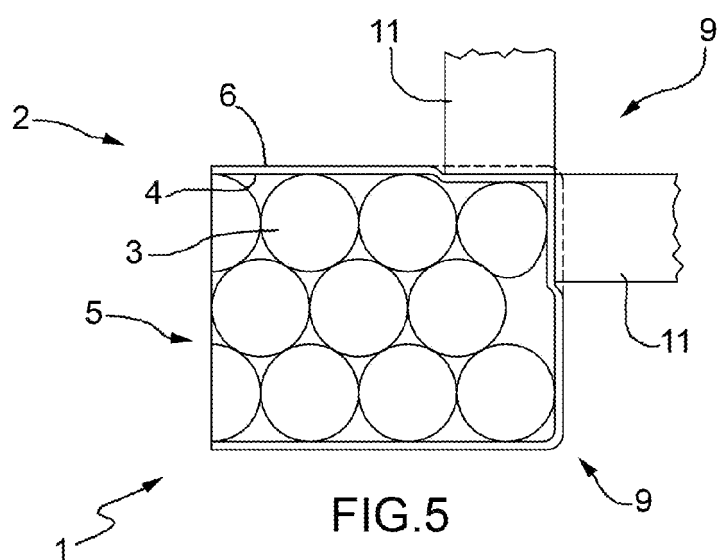
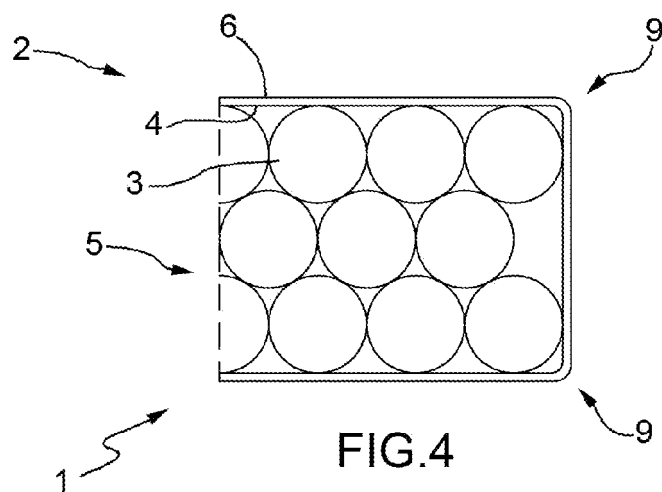
[0039] It is important to note that the method described of processing edges 9 or 10 also applies to any type of soft package other than a packet 1 of cigarettes, e.g. a soft carton of cigarettes.

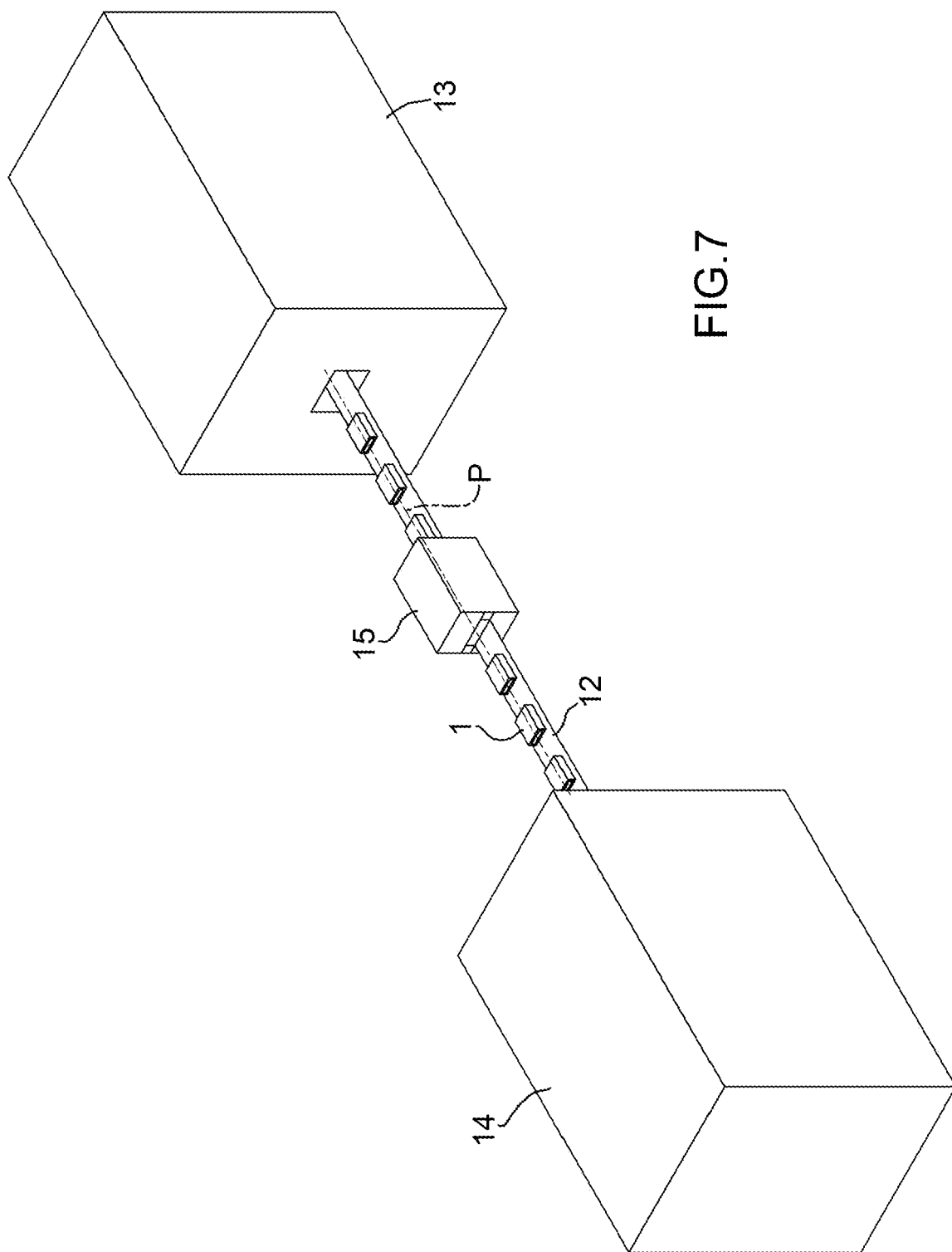
Claims

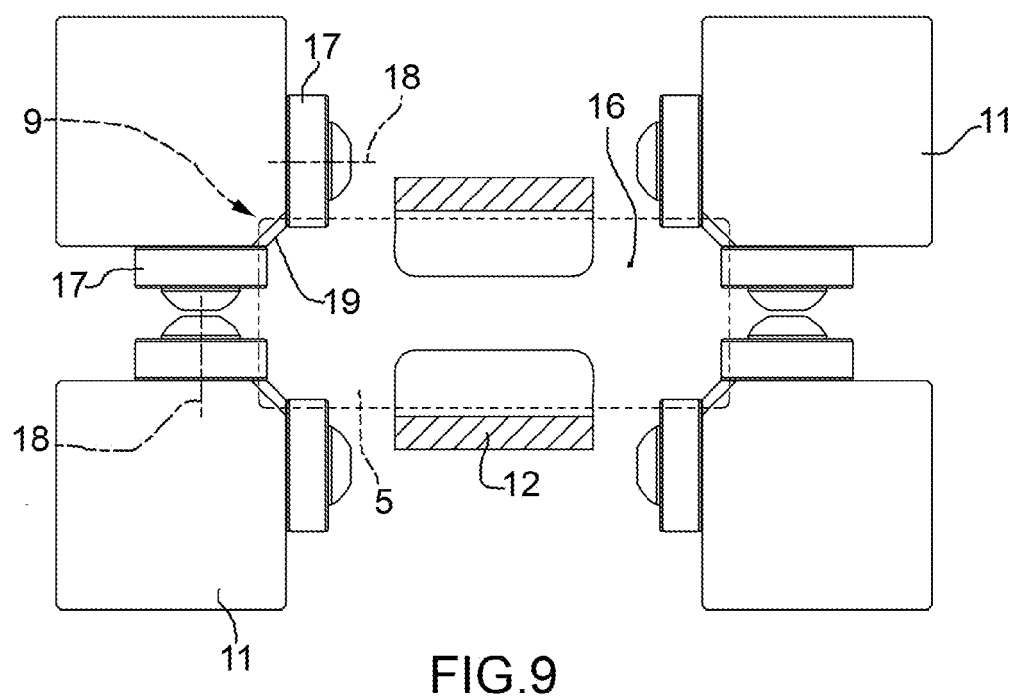
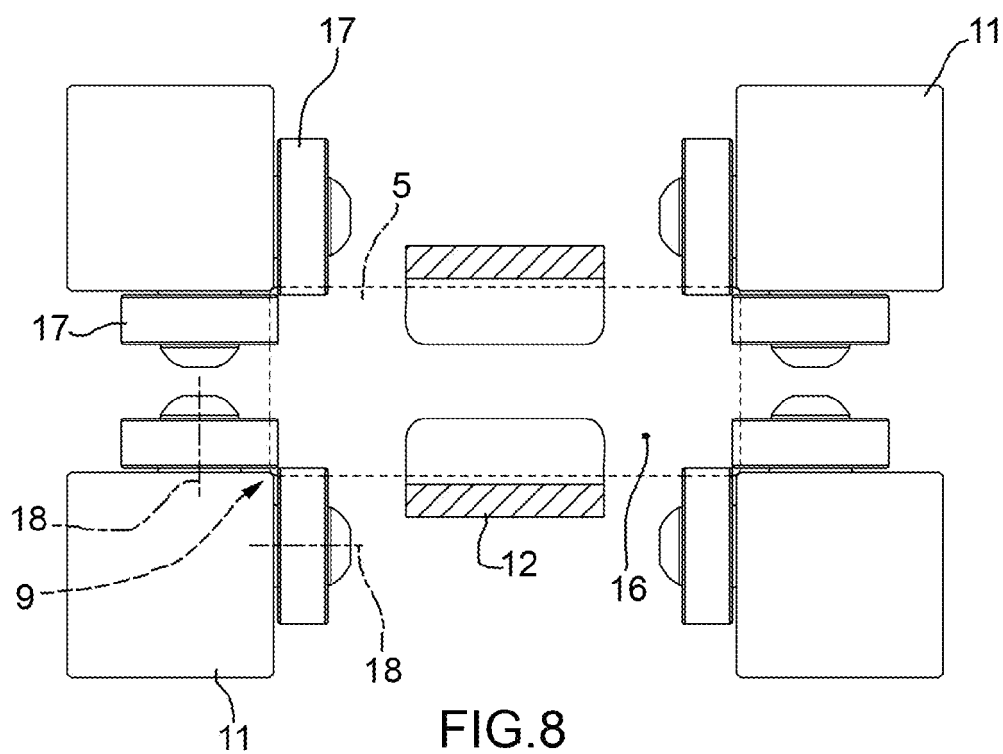
1. A method of processing the edges of a soft package, the method comprising the step of folding a soft wrapping (6) about an article (3) to form the soft package (5) having a number of edges (9), each defining the boundary between two adjacent walls (8) of the soft package (5); and the method being **characterized by** comprising the further step, once the soft wrapping (6) is folded about the article (3), of subjecting the soft package (5) to a shaping process to shape the soft wrapping (6) along at least one edge (9) to obtain a sharp edge (9) and to square the soft wrapping (6) along the edge (9).
2. A method as claimed in Claim 1, wherein the step of shaping the soft wrapping (6) along at least one edge (9) comprises the further steps of:
 - pressing the portions of the walls (8) on either side of the edge (9) inwards of the soft package (5); and
 - simultaneously enclosing the portions of the walls (8) on either side of the edge (9) in a forming member (11) negatively reproducing the desired shape of the soft wrapping (6) along the edge (9).
3. A method as claimed in Claim 1 or 2, wherein the step of shaping the soft wrapping (6) along at least one edge (9) comprises the further step of feeding the soft package (5) in a direction parallel to the edge (9) and through a forming channel (16) that gets gradually smaller in cross section along the edge (9).
4. A method as claimed in Claim 3, wherein the forming channel (16) comprises a fixed profile (20) that produces the gradual reduction in cross section along the edge (9).
5. A method as claimed in Claim 4, wherein the desired shape of the soft wrapping (6) along the edge (9) calls for forming a square edge; and the fixed profile (20) comprises two substantially perpendicular flat walls (21).
6. A method as claimed in Claim 4, wherein the desired shape of the soft wrapping (6) along the edge (9) calls for forming a bevelled edge; and the fixed profile (20) comprises three flat walls (21) comprising a central flat wall (21) at 45° to two lateral flat walls (21).
7. A method as claimed in Claim 3, wherein the forming channel (16) comprises at least one roller (17) mounted to rotate idly about a respective axis (18) of rotation, and which has a V-shaped lateral surface and produces the gradual reduction in cross section along the edge (9).
8. A method as claimed in Claim 7, wherein the roller (17) has a central V-shaped annular groove.
9. A method as claimed in Claim 7, wherein the forming channel (16) comprises two rollers (17) mounted to rotate idly about two respective axes (18) of rotation, and which produce the gradual reduction in cross section along the edge (9).
10. A method as claimed in Claim 9, wherein the axes (18) of rotation of the two rollers (17) are perpendicular, and each roller (17) has a lateral surface parallel to its axis (18) of rotation.
11. A method as claimed in Claim 9, wherein the axes (18) of rotation of the two rollers (17) are parallel, and each roller (17) has a lateral surface sloping with respect to its axis (18) of rotation.

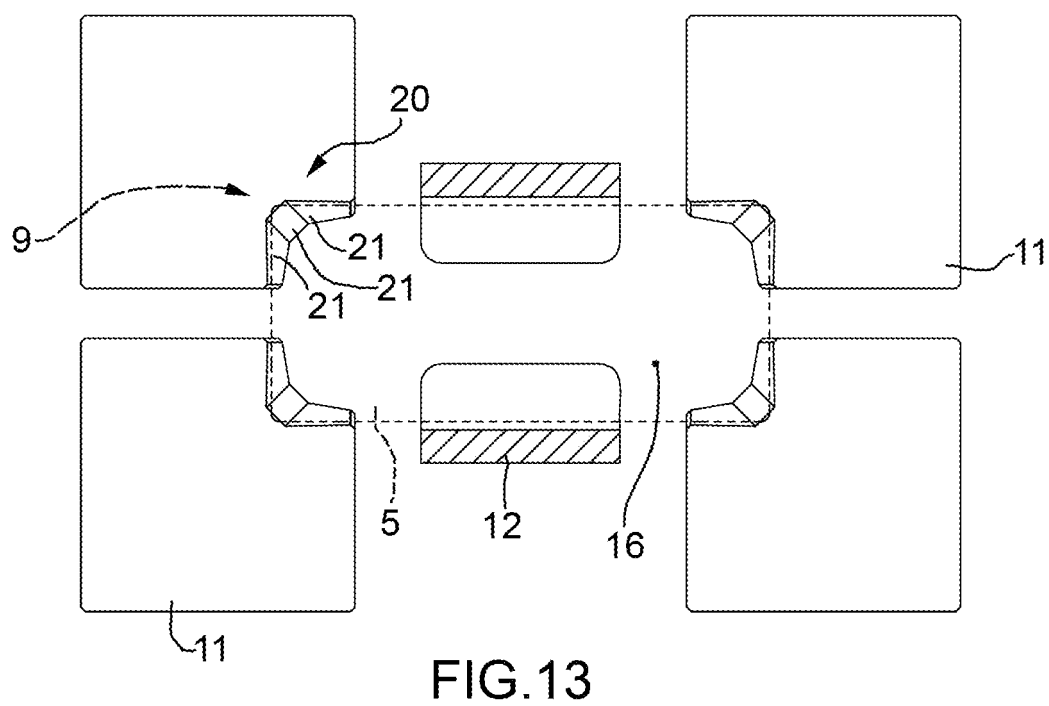
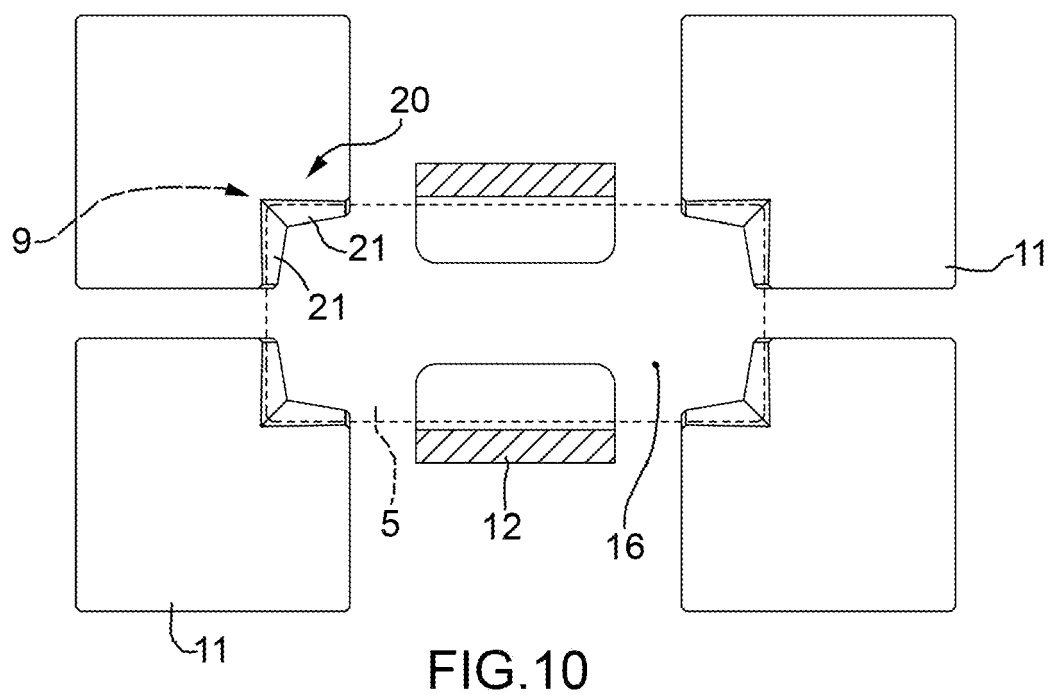
12. A method as claimed in any one of Claims 9 to 11, wherein the desired shape of the soft wrapping (6) along the edge (9) calls for forming a square edge; and the two rollers (17) are positioned side by side to skim each other at a given point.
13. A method as claimed in any one of Claims 9 to 11, wherein the desired shape of the soft wrapping (6) along the edge (9) calls for forming a bevelled edge; the two rollers (17) are positioned apart; and a flat wall (19) is interposed between the two rollers (17), and at an angle of 45° with respect to the two rollers (17).
14. A method as claimed in Claim 2, wherein the soft package (5) is stopped inside the forming channel (16); and the forming channel (16) comprises two pressure bodies (22) movable between a rest position, in which the two pressure bodies (22) are detached from the soft package (5), and a work position, in which the two pressure bodies (22) are pressed against the soft package (5), at the edge (9).
15. A method as claimed in Claim 14, wherein the two pressure bodies (22) are hinged about respective axes (23) of rotation parallel to the edge (9), to rotate between the rest position and the work position.
16. A method as claimed in Claim 2, wherein the soft package (5) is stopped inside the forming channel (16); and the forming channel (16) comprises a forming member (11) connected to a suction device (24) for drawing the soft wrapping (6) outwards of the soft package (5).
17. A method as claimed in Claim 16, wherein the forming member (11) is a square body comprising, at the edge (9), a suction opening (25) through which suction is applied; the suction opening (25) being wide enough to permit insertion of two flaps of a portion of soft wrapping (6) inside the suction opening (25).
18. A method as claimed in Claim 1, wherein the step of shaping the soft wrapping (6) along at least one edge (9) comprises the further steps of:
- drawing outwards of the edge (9) a portion of soft wrapping (6) on either side of the edge (9); pinching the portion of soft wrapping (6) projecting outwards of the edge (9), so as to squeeze together the two flaps of the portion and fold the two flaps over 90° about a fold line parallel to the edge (9); and releasing the portion of soft wrapping (6) projecting from the edge (9).
19. A method as claimed in Claim 18, wherein the two flaps of the portion of soft wrapping (6) projecting from the edge (9) are folded towards each other substantially 180° about a fold line parallel to the edge (9).
20. A method as claimed in Claim 18 or 19, and comprising the further step of drawing a portion of soft wrapping (6) on either side of the edge (9) outwards of the soft package (5) to draw a portion of soft wrapping (6) outwards of the edge (9).
21. A method as claimed in Claim 20, wherein the portion of soft wrapping (6) on either side of the edge (9) is drawn outwards of the soft package (5) by a suction device (24); and the suction device (24) is connected to a square forming member (11) having, at the fold line, a suction opening (25) through which suction is applied.
22. A method of processing the edges of a soft package having a number of edges (9), each defining the boundary between two adjacent walls (8) of the soft package (5); the method being **characterized by** comprising the steps of:
- pressing inwards of the soft package (5) the portions of the walls (8) on either side of at least one edge (9); and simultaneously enclosing the portions of the wall (8) on either side of the edge (9) in a forming member (11) negatively reproducing the desired shape of the soft wrapping (6) along the edge (9).
23. A unit for processing the edges of a soft package formed by folding a soft wrapping (6) about an article (3) and having a number of edges (9), each defining the boundary between two adjacent walls (8) of the soft package (5); the unit (15) being **characterized by** subjecting the soft package (5), once the soft wrapping (6) is folded about the article (3), to a shaping process to shape the soft wrapping (6) along at least one edge (9) to obtain a sharp edge (9) and to square the soft wrapping (6) along the edge (9).











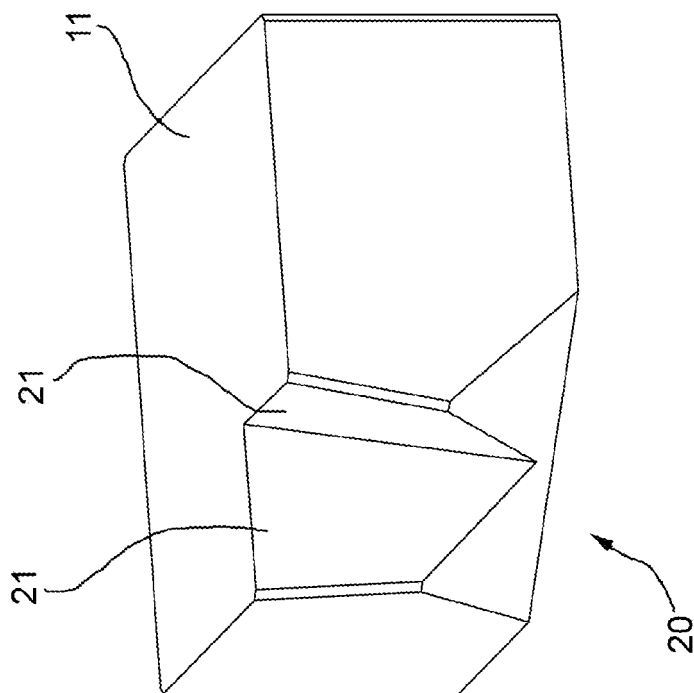


FIG.12

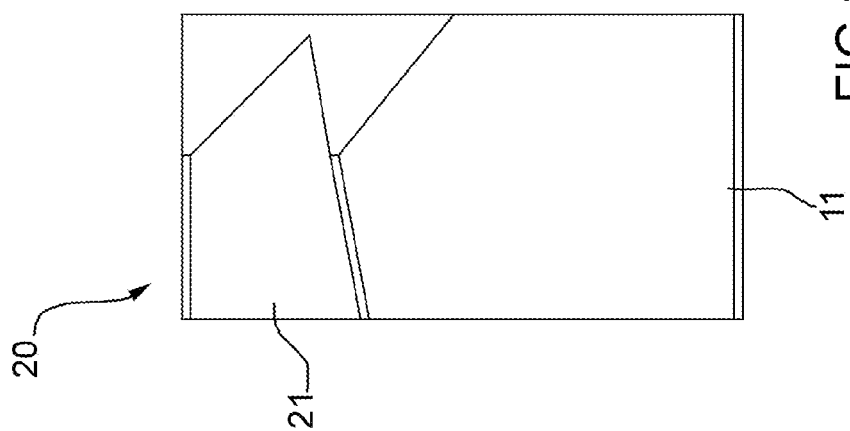


FIG.11

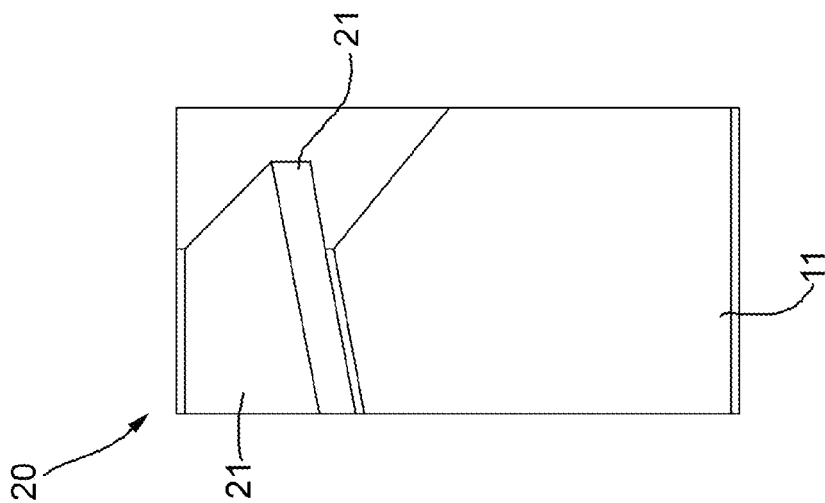


FIG. 14

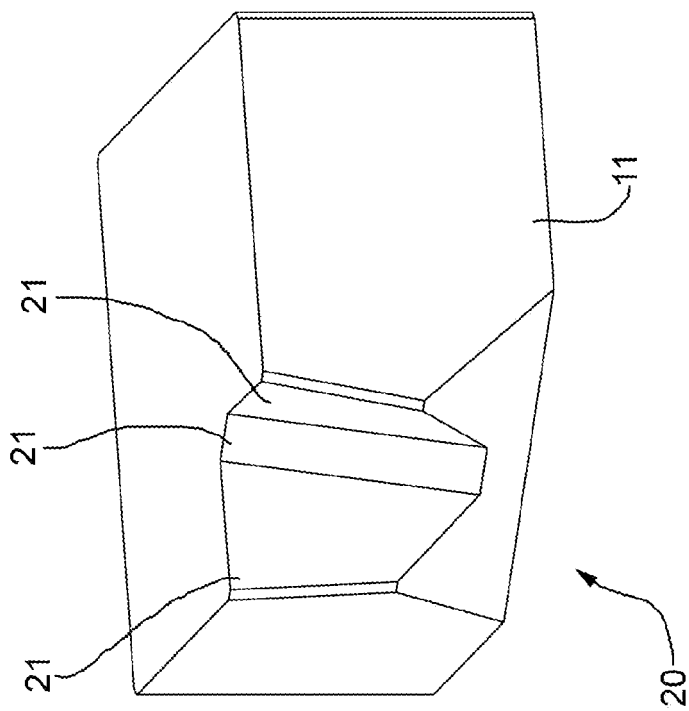
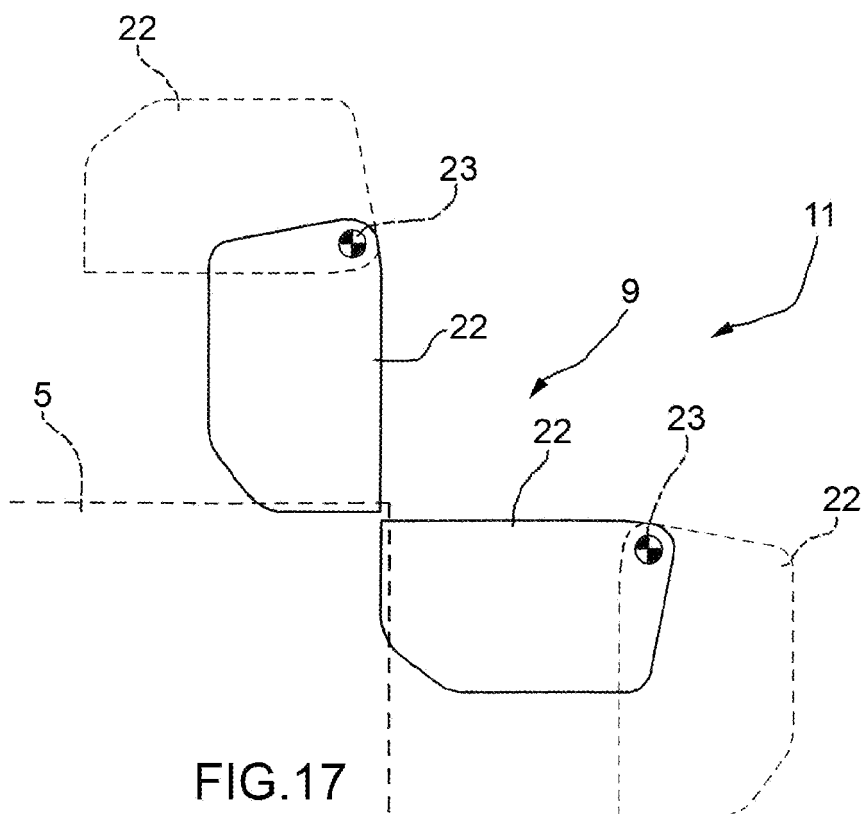
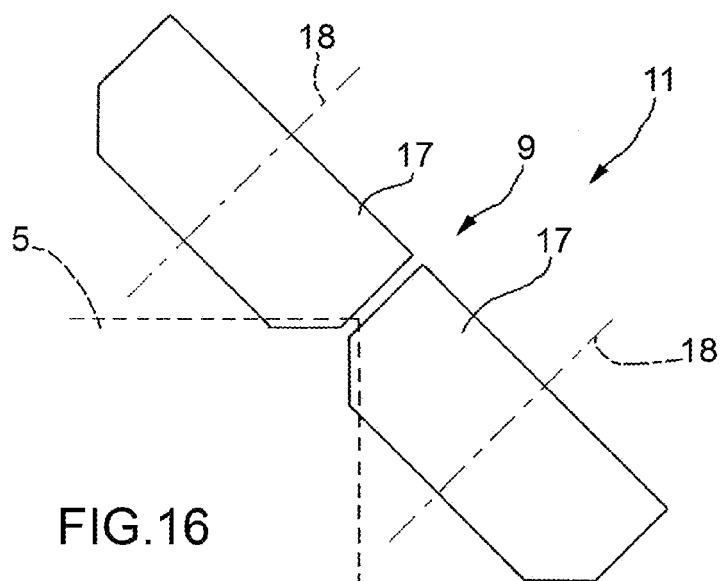
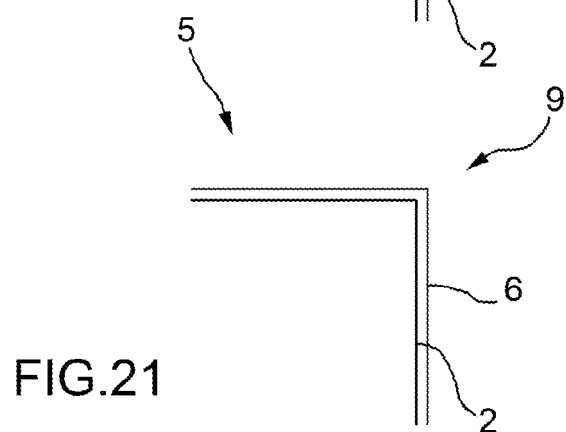
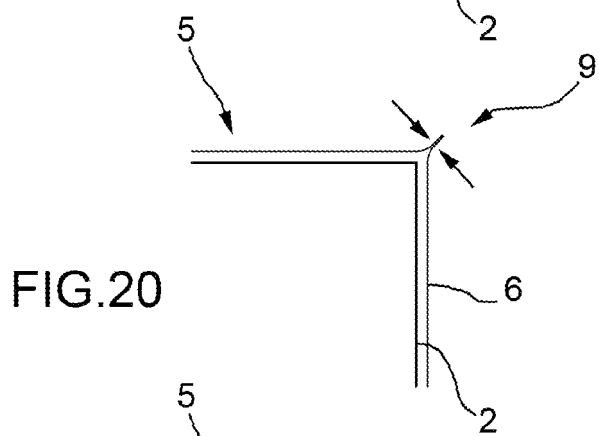
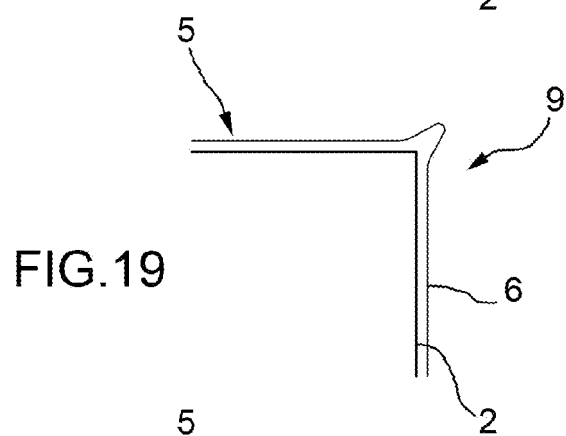
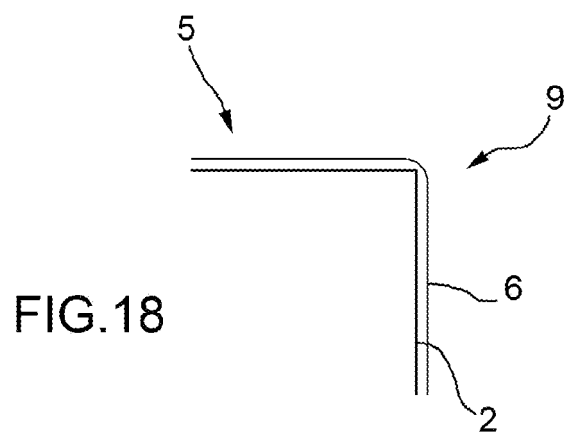


FIG. 15





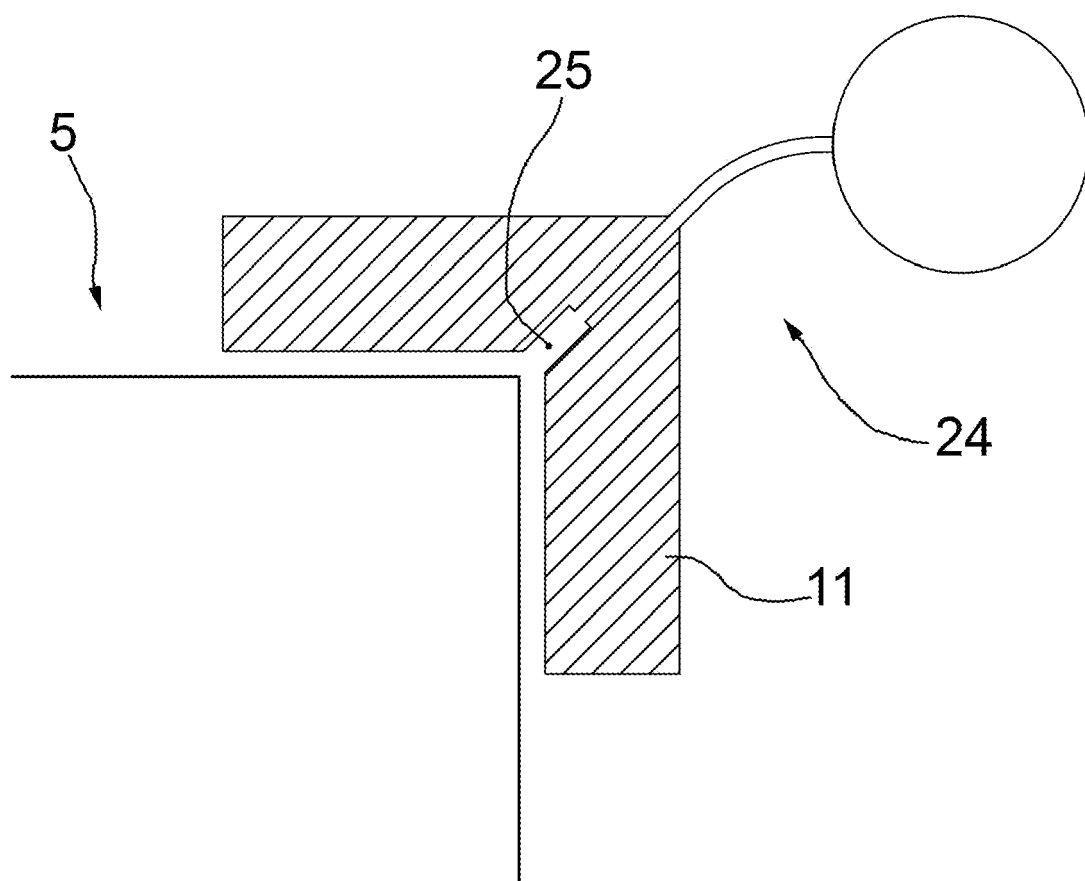


FIG.22

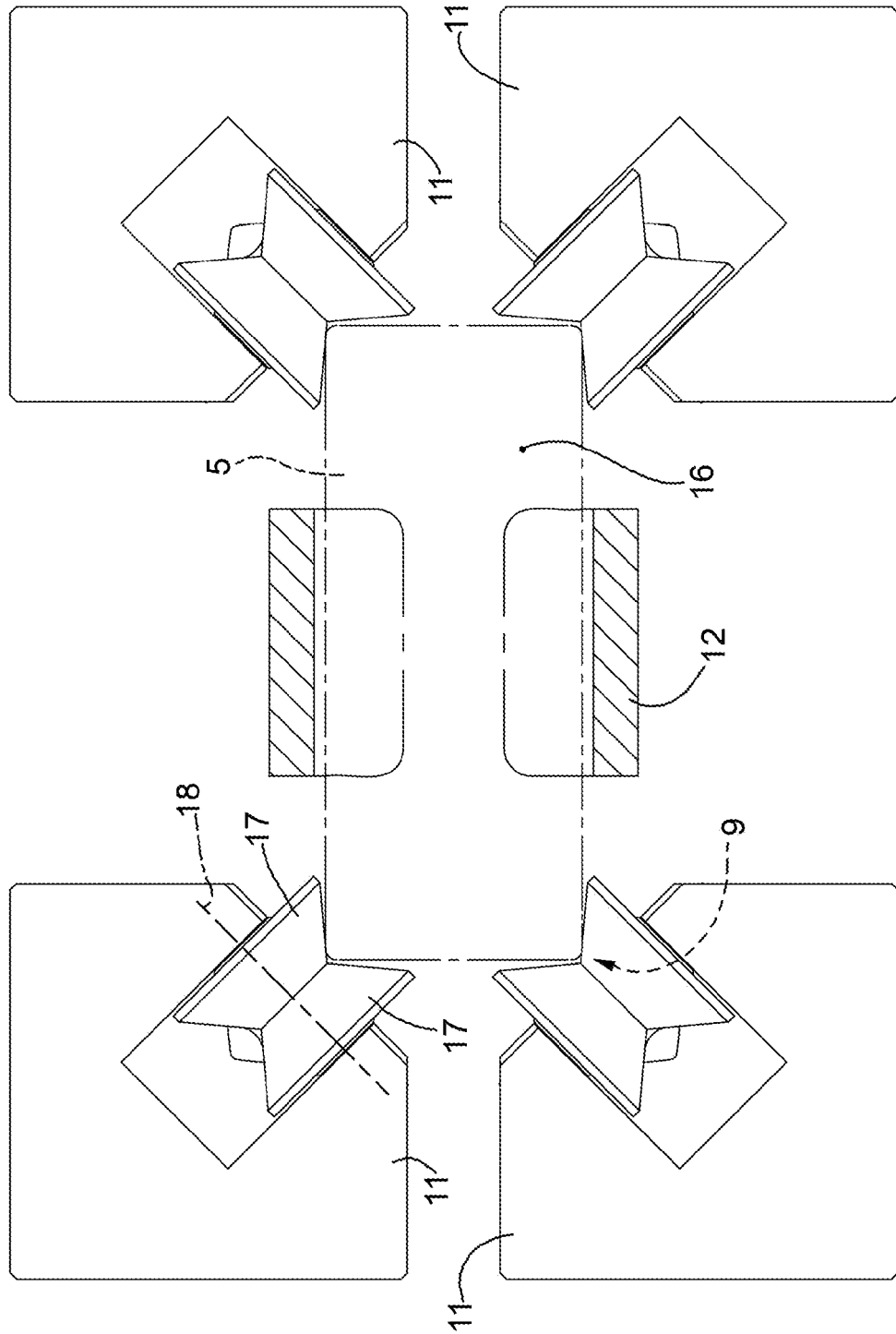


FIG. 23



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 9937

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Place of search Munich		Date of completion of the search 19 February 2009	Examiner Schelle, Joseph
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			

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