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- (71) Applicant: **G. D S.P.A.** [IT/IT]; Via Battindarno, 91, I-40133 Bologna (IT).
- (72) Inventors: **FERRARI, Michele**; Via Settefonti, 32, I-40064 Ozzano Dell'emilia (bo) (IT). **MADERA, Giovanni**; Viale Masini, 40, I-40126 Bologna (IT). **NEGRINI, Stefano**; Via Longarola, 21, I-40012 Calderara Di Reno (bo) (IT).
- (74) Agent: **BIANCIARDI, Ezio**; Via di Corticella, 87, I-40128 Bologna (IT).

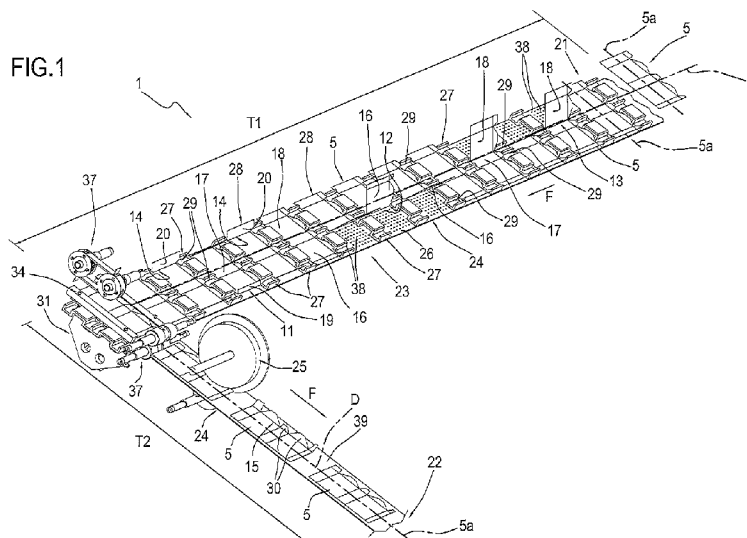
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(54) Title: PACKAGING MACHINE AND METHOD FOR PACKING CIGARETTES.



(57) Abstract: A packaging machine for packing cigarettes in packets (2) comprises a station (21) for feeding an outer wrapper (5) and a station (22) for folding the outer wrapper (5) along respective fold lines (11, 12, 13, 14, 15) around a respective group (3) of cigarettes, thereby making the packet (2); and a device (23) for weakening the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) positioned between the feeding station (21) and the folding station (22); More specifically, the weakening device (23) comprises a rectilinear feed line (24) along which the outer wrappers (5) are conveyed and means (25) for folding each outer wrapper (5) positioned along the feed line (24) and able to weaken the outer wrapper (5) along the feed lines (11, 12, 13, 14, 15) parallel to the feed direction (D).

DESCRIPTION

PACKAGING MACHINE AND METHOD FOR PACKING CIGARETTES

Technical field

This invention relates to a packaging machine and method for packing cigarettes in a packet.

More specifically, this invention addresses a cigarette packet comprising an outer wrapper made of foldable card which houses a group of cigarettes wrapped in an inner wrapper which is generally metallized.

More precisely, the term “foldable card” is used to denote a soft-rigid card, that is, a card which is neither rigid like the card preferably used for hinged-lid packets, nor soft like the card preferably used to make soft packets.

The grammage of the foldable card of this type is in the order of 140-220 gr/m².

Background art

Generally speaking, the soft-rigid foldable card of this type of cigarette packet is wrapped around the side walls and bottom wall of the group of cigarettes, leaving the top of the group uncovered with a rectangular stamp or state revenue stamp placed astride of it.

This foldable card, however, has a disadvantage. Indeed, if it is not weakened along the fold lines before being folded around the respective group, it tends to curve or “bulge out” sideways without adhering to the side walls of the group, and the longitudinal and transversal edges are not perfectly square, with a generally negative effect on the quality of the packet.

To overcome this disadvantage, packaging machine for packing cigarettes

are known which comprise means for weakening the foldable card along the fold lines.

The weakening means comprise rollers and counter-rollers acting in combination to feed and weaken the foldable card along the fold lines.

It has been found, however, that the combined action of the rollers and counter-rollers is unable to weaken or stress-relieve the foldable card enough to prevent the above mentioned quality defects when wrapped around the group of cigarettes.

Aim of the invention

This invention has for an aim to provide a packaging machine and method, for the tobacco machinery industry, for packing cigarettes in a packet, which is free of the above mentioned disadvantages, and as set out in the independent claims 1 and 19.

Brief description of the drawings

The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment and in which:

- Figure 1 is a schematic perspective view of a packaging machine according to this invention for packing cigarettes in packets;
- Figure 2 is a scaled-up schematic perspective view of a detail of the machine of Figure 1, with some parts cut away in order to better illustrate others;
- Figure 3 is a scaled-up schematic front view of a detail of the machine of Figure 1;
- Figure 4 is a schematic perspective view illustrating some steps in the operation of the machine shown in Figure 1;
- Figure 5 is a schematic perspective view of a packet which can be made by the machine according to the invention;

- Figure 6 is a schematic perspective view of a blank from which the outer wrapper of the packet of Figure 5 is made;
- Figure 7 is a schematic perspective view illustrating some alternative steps in the operation of the machine shown in Figure 1.

Detailed description of preferred embodiments of the invention

With reference to Figure 1, the numeral 1 denotes a packaging machine for packing cigarettes in packets 2.

More specifically, the packet 2, illustrated in Figure 5, comprises a group 3 of cigarettes, wrapped in an inner wrapper 4, and an outer wrapper 5, in particular made of foldable thin cardboard, enclosing the group 3 of cigarettes, in particular the inner wrapper 4 of the group 3.

Preferably, the inner wrapper 4 of the group 3 of cigarettes is made of a metallized material.

The packet 2 has a front wall 6, a rear wall 7, a bottom wall 8, a top wall 9 and two flanks 10.

More specifically, the front wall 6, the rear wall 7, the bottom wall 8, and the two flanks 10 are defined by the outer wrapper 5 enclosing the group 3 of cigarettes and the top wall 9 is defined by the top wall of the inner wrapper 4 wrapped around the group 3 of cigarettes.

In other words, the outer wrapper 5 is wrapped all around the group 3 of cigarettes except for the top wall 9 which is defined by the group 3 itself. Thus, the packet 2 does not have a hinged lid.

The outer wrapper 5 is formed from a blank, illustrated in Figure 6, which comprises a plurality of fold lines 11, 12, 13, 14, 15 which delimit a plurality of panels designed to form the respective walls of the packet 2, and which will constitute the longitudinal and transversal edges of the selfsame packet 2.

The outer wrapper 5 has a main axis 5a of extension.

More specifically, the outer wrapper 5 comprises a first, a second, a third and a fourth fold line 11, 12, 13, 14, transversal to the axis 5a, and a fifth fold line 15 parallel to the axis 5a.

More precisely, the first and second fold lines 11, 12 and the fifth fold line 15 define a first panel 16 which will form the front wall 6 of the packet 2.

The second and third fold lines 12, 13 and the fifth fold line 15 define a second panel 17 which will form one of the flanks 10 of the packet 2.

The third and fourth fold lines 13, 14 and the fifth fold line 15 define a third panel 18 which will form the rear wall 7 of the packet 2.

The first and fourth fold lines 11, 14 and the fifth fold line 15 define respective fourth and fifth panels 19, 20 which will form one of the flanks 10 of the packet 2.

From the fifth fold line 15 there extends a plurality of wings or bottom panels which will form the bottom wall 8 of the packet 2.

The first, second, third, fourth and fifth panels 16, 17, 18, 19, 20 are connected to each other in sequence by respective fold lines 11, 12, 13, 14.

The first, second, third, fourth and fifth panels 16, 17, 18, 19, 20 are each connected to a respective wing or bottom panel 30 by the fifth fold line 15.

The machine 1 comprises a station 21 for feeding the outer wrapper 5 and a station 22, located downstream of the feed station 21, for folding the outer wrapper 5 along the fold lines 11, 12, 13, 14, 15 around a respective group 3 of cigarettes, thereby wrapping the selfsame group 3 of cigarettes to make the finished packet 2.

The machine 1 comprises a device 23 for weakening the outer wrapper 5 along the fold lines 11, 12, 13, 14, 15 and positioned between the feeding station 21 and the folding station 22.

The weakening device 23 comprises a rectilinear feed line 24 along which the outer wrappers 5 are conveyed, fed by the feeding station 21.

The outer wrappers 5 are conveyed along a feed direction D parallel to

the direction of extension of the feed line 24, as indicated by the arrow F in Figure 1.

The rectilinear feed line 24 comprises at least two sections T1, T2, in particular a first and a second section, distinct from each other.

The weakening device 23 comprises transfer means 31 by which the outer wrapper 5 is transferred from the first section T1 to the second section T2. The outer wrapper 5 advances along the first and second sections T1, T2 according to a first configuration and a second configuration, respectively, the second configuration differing from the first configuration relative to the feed direction D.

In other words, the outer wrapper 5 advances along the first section T1 oriented with its main axis 5a of extension at right angles to the feed direction of the first section T1, that is, in the first configuration, and along the second section T2 oriented with its main axis 5a of extension parallel to the feed direction of the second section T2, that is, in the second configuration.

In an alternative variant embodiment not illustrated, the outer wrapper 5 advances along the first section T1 oriented with its main axis 5a of extension parallel to the feed direction of the first section T1 and along the second section T2 oriented with its main axis 5a of extension at right angles to the feed direction of the second section T2.

More precisely, as illustrated in Figures 1, 2 and 4, the rectilinear feed line 24 comprises at least two consecutive sections, namely, the first and the second section T1, T2, at right angles to each other.

In this embodiment, the first and second sections T1, T2 have respective feed directions D at right angles to each other.

The machine 1 comprises means 25 for folding the outer wrapper 5, positioned along the feed line 24 and capable of weakening the outer wrapper 5 along the fold lines 11, 12, 13, 14, 15 parallel to the feed direction D.

The folding means 25 are positioned along the first and the second section T1, T2 to weaken the fold lines 11, 12, 13, 14, 15 parallel to the feed direction D of the first and the second section T1, T2, respectively.

In the embodiment illustrated, along the first section T1 of the feed line 24, the outer wrapper 5 is weakened along the first, second, third and fourth fold lines 11, 12, 13, 14.

Along the second section T2 of the feed line 24, the outer wrapper 5 is weakened along the fifth fold line 15.

The folding means 25 engage respective portions of the panels 16, 17, 18, 19, 20, 30 of each outer wrapper 5 while it advances along the feed line 24.

More specifically, the folding means 25 drive in relative rotation the panels 16, 17, 18, 19, 20, 30 of the outer wrapper 5 along the respective fold lines 11, 12, 13, 14, 15 taking the panels 16, 17, 18, 19, 20, 30 from an initial position to a final position and vice versa taking the panels 16, 17, 18, 19, 20, 30 back to the initial position.

It should be noted that the folding means 25 weaken the outer wrapper 5 along a respective fold line 11, 12, 13, 14, 15 defining the panel 16, 17, 18, 19, 20, 30 engaged by the selfsame folding means 25.

By initial position is meant a position where a respective panel 16, 17, 18, 19, 20, 30 of the outer wrapper 5 lies flat.

By final position is meant the position where a respective panel 16, 17, 18, 19, 20, 30 of the outer wrapper 5 lies when it has reached the maximum folding angle α under the action of the folding means 25.

Advantageously, from the initial position to the final position, the folding means 25 act on the respective panel 16, 17, 18, 19, 20, 30 to rotate it by an angle greater than 90° , in particular and preferably up to 135° , so as to weaken the respective outer wrapper 5 along the fold lines 11, 12, 13, 14, 15.

The folding means 25 are integral with the weakening device 23 and are

relatively fixed with respect to the movement of the feed line 24.

The folding means 25 comprise at least one spiral-shaped profile 25b equipped with a respective opposing or abutment element 25a.

The spiral-shaped profile 25b and the respective opposing element 25a are parts that remain fixed relative to the feed line 24.

In practice, the folding means 25 lift and lower the panels 16, 17, 18, 19, 20, 30 relative to the position where the outer wrapper 5 lies flat.

The folding means 25 act on the respective panels 16, 17, 18, 19, 20, 30 of each outer wrapper 5 when the outer wrapper is being conveyed along the feed line 24.

In other words, the outer wrappers 5 interact with the folding means 25 by interference therewith while they are being conveyed along the feed line 24.

Advantageously, the spiral-shaped profile 25b engages a respective panel 16, 17, 18, 19, 20, 30 of the outer wrapper 5 to rotate it along the fold line 11, 12, 13, 14, 15 until reaching an angle of rotation α of 135° where the panel is at the final position.

The spiral-shaped profile 25b is shaped in such a way as to take the panels 16, 17, 18, 19, 20, 30 back from their final position to their initial position, in particular by rotating them by 135° in the opposite direction of rotation.

Along the first section T1, the feed line 24 comprises a conveyor belt 26 for retaining and transporting the outer wrappers 5.

The conveyor 26 comprises a pair of distinct suction belts, separated by a space, and a plurality of side walls 27, integral with the suction belts, which define respective compartments 28 for positioning and housing respective outer wrappers 5. In particular, two consecutive side walls 27 define a respective compartment 28.

Each outer wrapper 5 is positioned in a respective compartment 28 of the conveyor 26 and held down on the suction belts by suction means 38.

More precisely and preferably, the suction means 38 act on the second panel 17 and on the fourth panel 19 of each outer wrapper 5.

The side walls 27 are positioned in a direction transversal to the feed direction D of the outer wrappers 5. More specifically, each side wall 27 has one or more recesses 29 in which the respective folding means 25 are positioned, as illustrated in Figure 3, while the conveyor 26 advances. More specifically, each side wall 27 has as many recesses 29 as there are fold lines 11, 12, 13, 14 parallel to the feed direction D.

In other words, each recess 29 is designed to house a respective spiral-shaped profile 25b equipped with a respective opposing element 25a while the conveyor 26 advances.

Thus, each recess 29 houses a respective folding means 25 which acts on a respective panel 16, 17, 18, 19, 20 to weaken each outer wrapper 5 along the respective fold line 11, 12, 13, 14 defining the panel itself.

Along the first section T1 of the feed line 24, the folding means 25 comprise fixed spiral-shaped profiles 25b equipped with respective opposing elements 25a having a respective engagement surface shaped to rotate a respective panel 16, 17, 18, 19, 20 along the respective fold line 11, 12, 13, 14 from the initial position to the final position, and vice versa.

In practice, the folding means 25 lift and lower a respective panel 16, 17, 18, 19, 20 relative to the position where the outer wrapper 5 lies flat as the outer wrapper 5 itself, housed in the compartment 28 of the conveyor 26, advances along the direction D.

It should be noted that the moment the folding means 25 engage the second or fourth panel 17, 19 the suction hold-down action of the suction means 38 on the second or fourth panel 17, 19 is interrupted.

Preferably, in order to weaken the outer wrapper 5 as it advances along the first section T1 of the feed line 24, the conveyor 26 advances with intermittent motion.

The second section T2 of the feed line 24 comprises a suction conveyor belt 39 which advances with continuous motion.

Advantageously, in order to synchronize the intermittent motion of the first section T1 with the continuous motion of the second section T2, the first section T1 of the feed line 24 lies in a first plane and the second section T2 of the feed line 24 lies in a second plane, different from the first plane. More specifically, the first plane is at a level lower than the second plane. The weakening device 23 comprises lifting means 31 which transfer each outer wrapper 5 from the first section T1 to the second section T2, lifting them from the first to the second plane.

It should be noted that the lifting means 31 constitute the aforementioned transfer means.

The lifting means 31 are located along the conveyor 26 at the end of the first section T1 of the feed line 24.

Preferably, the lifting means 31 comprise a rocker arm 32 which oscillates about its axis 32a, and a retaining element 33, connected to the arm 32, which transports a respective outer wrapper 5 held by it from the first to the second plane.

For this purpose, the retaining element 33 is equipped with a plurality of supports which come into abutment against the outer wrappers 5 passing in the space between and on the outside of the two suction belts, as illustrated in Figure 2 where, for clarity, the pair of suction belts is not shown. The supports may consist of suction gripper heads.

As illustrated in Figure 2, the lifting means 31 are movable, by oscillation of the arm 32, from the first to the second plane, lifting a respective outer wrapper 5, and from the second to the first plane to receive from the conveyor belt 26 the next outer wrapper 5 to be lifted.

In other words, the lifting means 31 are movable from a station 36 for receiving the outer wrappers 5 to be lifted to a station 35 for releasing the outer wrappers 5 which have been lifted.

Advantageously, in order to correctly orient and position the outer wrappers 5 at the second section T2 of the feed line 24, the weakening device 23 comprises a positioner 34 located at the releasing station 35.

The positioner 34 acts in conjunction with the lifting means 31 to orient the outer wrapper 5 in a direction parallel to its main axis 5a of extension.

In effect, since the first and second sections T1 and T2 are at right angles to each other, the outer wrapper 5 advances along the first section T1 oriented with its main axis 5a of extension at right angles to the feed direction of the first section T1 and along the second section T2 oriented with its main axis 5a of extension parallel to the feed direction of the second section T2.

The positioner 34 has two abutment surfaces 34a and 34b facing each other and each of which is designed to come into contact with a respective end edge 40 of a respective outer wrapper 5. More specifically, it comes into contact with the end edges 40 parallel to the main axis 5a of extension of each outer wrapper 5.

Preferably, the abutment surfaces 34a and 34b each have an edge 41 extending in a direction parallel to the feed direction of the second section T2.

Abutment between the end edges 40 of an outer wrapper 5 and the respective edge 41 of the abutment surfaces 34a and 34b guarantees correct positioning of the outer wrapper 5.

It should be noted that to insert an outer wrapper 5 in the positioner 34, the lifting means 31 lift the respective outer wrapper 5 until the end edges 40 engage the respective edge 41 of the abutment surfaces 34a and 34b, flicking elastically past the lower edge of each of the abutment surfaces 34a and 34b themselves.

Once the outer wrapper 5 has been placed in the positioner 34, feed means 37 transfer each outer wrapper 5 from the positioner 34 to the conveyor 39 of the second section T2 of the feed line 24.

The conveyor 39 feeds the outer wrappers 5 continuously along the second stretch T2 of the feed line 24.

As stated above, along the second section T2 of the feed line 24, the outer wrapper 5 is weakened along the fifth fold line 15.

The folding means 25 located along the second section T2 of the feed line 24 comprise a roller and a counter-roller, acting in conjunction, and a fixed spiral-shaped profile, not illustrated, equipped with an abutment element, not illustrated, located downstream of the roller and counter-roller.

More precisely, the roller and counter-roller engage the wings 30 of a respective outer wrapper 5 rotating them along the fifth fold line 15 preferably by up to 90° relative to their initial position.

Next, the fixed spiral-shaped profile, not illustrated, engages the wings 30 further rotating them along the fifth fold line 15, preferably up to 135°, taking them to their final position.

The spiral-shaped profile, not illustrated, is shaped in such a way as to take the wings 30 back from their final position to their initial position, in particular by rotating them by 135° in the opposite direction of rotation.

In practice, the folding means 25 lift and lower the wings 30 relative to the position where the outer wrapper 5 lies flat.

The feed means 37 may comprise a toothed belt driven by two pulleys and two rollers acting in conjunction along a common line of tangency, as illustrated in Figure 1.

Downstream of the folding means 25 located along the second section T2, the outer wrapper 5 is weakened along the fold lines 11, 12, 13, 14, 15 parallel and transversal to its main axis 5a of extension.

On leaving the weakening device 23, the outer wrappers 5 are fed to the folding station 22, where each outer wrapper 5 is folded along the fold lines 11, 12, 13, 14, 15 around a respective group 3 of cigarettes, thus making the packet 2.

In use, the folding means 25 are located along the feed line 24 according to a configuration such as to weaken the outer wrapper 5 according to a predetermined sequence, as illustrated in Figure 4.

Preferably, the sequence illustrated entails first weakening the third fold line 13 by acting on the third panel 18.

Next, the second fold line 12 is weakened by acting on the first panel 16.

At this point, the second and third fold lines 12 and 13 of the second panel 18 by which the latter is connected to the second and fourth panels 17 and 19, respectively, have been weakened.

Next, the first and fourth fold lines 11, 14 are weakened, preferably simultaneously, by acting on the fourth and fifth panels 19, 20.

Lastly, the fifth fold line 15 is weakened by acting on the bottom panels or wings 30.

In the variant embodiment of the machine 1 illustrated in Figure 7, the first and second sections T1, T2 have the same feed direction D.

More specifically, the first and second sections T1 and T2 are aligned.

More specifically, in this variant embodiment, the first and second sections T1, T2 lie in the same plane.

In this variant embodiment, the transfer means 31 are in the form of a turntable which rotates alternately about its axis of rotation 31a.

More specifically, the axis of rotation 31a of the turntable is a vertical axis.

When picked up by the transfer turntable 31 from the first section T1, the outer wrapper 5 is positioned according to a first configuration and when released onto the second section T2, the outer wrapper 5 is positioned according to a second configuration, different from the first configuration relative to the feed direction D.

In this embodiment, when the outer wrapper 5 is positioned according to the first configuration, its main axis 5a of extension is parallel to the feed direction D and when positioned according to the second configuration, its main axis 5a of extension is transversal to the feed direction D.

In this embodiment, considering that the first and second sections T1, T2 have the same feed direction D, the transfer means 31, in particular in the form of a turntable, change the orientation of the outer wrapper 5 from the first to the second configuration.

More specifically, during the passage from the first to the second configuration, the outer wrapper 5 is rotated by the turntable 31 by 90°.

This invention also relates to a packaging method for the tobacco machinery industry, for packing cigarettes in a packet 2.

The method comprises the step of feeding an outer wrapper 5 for a respective group 3 of cigarettes and the step of folding the outer wrapper 5 around a respective group 3 of cigarettes along the fold lines 11, 12, 13, 14, 15 to make the packet 2.

The method comprises a step of weakening the outer wrapper 5 along the fold lines 11, 12, 13, 14, 15 before the step of wrapping the outer wrapper 5 around the group 3 of cigarettes.

Advantageously, the method comprises a step of feeding the outer wrapper 5 along a rectilinear feed path during the step of weakening the outer wrapper 5.

The step of feeding the outer wrapper 5 comprises a step of feeding the outer wrapper 5 along at least two sections T1, T2, in particular a first and a second section, distinct from each other.

During the step of feeding along the first and second sections T1, T2, the outer wrapper 5 advances according to a first configuration and a second configuration, respectively, the second configuration differing from the first configuration relative to the feed direction D.

More specifically, as it advances during the step of feeding along the first section T1, the outer wrapper 5 is oriented with its main axis 5a of extension at right angles to the feed direction and as it advances during the step of feeding along the second section T2 the outer wrapper 5 is oriented with its main axis 5a of extension parallel to the feed direction of

the second section T2, or vice versa.

The method comprises a step of transferring the outer wrapper 5 from the first section T1 to the second section T2.

More specifically, the step of weakening the outer wrapper 5 along the fold lines 11, 12, 13, 14, 15 comprises a step of rotating the panels 16, 17, 18, 19, 20, 30 along the respective fold lines 11, 12, 13, 14, 15.

The step of weakening the outer wrapper 5 along the fold lines 11, 12, 13, 14, 15 comprises a step of rotating the respective panel 16, 17, 18, 19, 20, 30 according to an angle of rotation α greater than 90° , in particular up to 135° .

More specifically, the step of weakening the outer wrapper 5 occurs along the fold lines 11, 12, 13, 14, 15 positioned parallel to the feed direction D of the wrapper 5.

As illustrated in Figures 1, 2 and 4, the step of feeding the outer wrapper 5 occurs along two or more feed sections T1, T2, one section being at right angles to the next.

In other words, the step of feeding the outer wrapper 5 occurs along the first and second sections T1, T2 which have respective feed directions D at right angles to each other.

To pass from the first section T1 to the second section T2, the method comprises a step of raising the outer wrapper 5 at the point where the feed direction changes between the first and the second section T1, T2.

In the variant embodiment illustrated in Figure 7, the step of feeding the outer wrapper 5 is performed along the first and second sections T1, T2 having the same feed direction D.

To pass from the first section T1 to the second section T2, the method comprises a step of rotating each outer wrapper 5 during the step of transferring the outer wrapper 5 from the first section T1 to the second section T2. More specifically, during the step of rotating each outer wrapper 5, the latter is rotated by 90° during the passage from the first to

the second configuration.

In both embodiments, the outer wrapper 5 is conveyed along the first section T1 of the feed line 24 with intermittent motion and along the second section T2 with continuous motion.

This invention overcomes the disadvantages of the prior art in that the force applied to the outer wrapper 5 when it leaves the weakening device 23 to wrap and fold it around the group 3 of cigarettes is relatively low compared to the prior art.

That is because, advantageously, along a rectilinear feed path 24, it is possible to weaken the fold lines 11, 12, 13, 14, 15 by relatively rotating the respective panels 17, 18, 19, 20, 30 by more than 90° and at least up to 135° relative to the plane in which the outer wrapper 5 itself lies.

Moreover, once the packet 2 has been made, the outer wrapper 5 wrapped around the group 3 of cigarettes has longitudinal and transversal edges which are perfectly square and without sideways curves or “bulges” since the outer wrapper 5 adheres to the group 3.

CLAIMS

1. A packaging machine for packing cigarettes in packets (2), the packet (2) comprising an outer wrapper (5) made of foldable thin cardboard enclosing a group (3) of cigarettes; the outer wrapper (5) comprising a plurality of fold lines (11, 12, 13, 14, 15) forming a plurality of panels (16, 17, 18, 19, 20, 30) each of which is designed to form a respective wall (6, 7, 8, 10) of the packet (2); the machine (1) comprising a station (21) for feeding the outer wrapper (5) and a station (22) for folding the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) around the respective group (3) of cigarettes, thereby making the packet (2); and a device (23) for weakening the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) positioned between the feeding station (21) and the folding station (22); the machine (1) being characterized in that the weakening device (23) comprises a rectilinear feed line (24) along which the outer wrappers (5) are conveyed, fed by the feeding station (21), along a feed direction (D) parallel to the direction of extension of the feed line (24) and means (25) for folding each outer wrapper (5), positioned along the selfsame feed line (24) and capable of weakening the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) parallel to the feed direction (D).

2. The machine according to claim 1, characterized in that the rectilinear feed line (24) comprises at least two sections (T1, T2), in particular a first and a second section, distinct from each other; the outer wrapper (5) advancing along the first and second sections (T1, T2) according to a first configuration and a second configuration, respectively, the second configuration differing from the first configuration relative to the feed direction (D).

3. The machine according to claim 2, characterized in that the folding means (25) are positioned along the first and the second section (T1, T2) for weakening the fold lines (11, 12, 13, 14, 15) parallel to the feed direction (D) of the first and the second section (T1, T2), respectively.
4. The machine according to claim 2 or 3, characterized in that the weakening device (23) comprises transfer means (31) by which the outer wrapper (5) is transferred from the first section (T1) to the second section (T2).
5. The machine according to any one of claims 2 to 4, characterized in that the outer wrapper (5) advances along the first section (T1) oriented with its main axis (5a) of extension at right angles to the feed direction of the first section (T1) and along the second section (T2) oriented with its main axis (5a) of extension parallel to the feed direction of the second section (T2), or vice versa.
6. The machine according to any one of claims 1 to 5, characterized in that the folding means (25) drive in relative rotation the panels (16, 17, 18, 19, 20, 30) of a respective outer wrapper (5) along the respective fold lines (11, 12, 13, 14, 15) taking the panels (16, 17, 18, 19, 20, 30) from an initial position to a final position and vice versa.
7. The machine according to claim 6, characterized in that the folding means (25) rotate a respective panel (16, 17, 18, 19, 20, 30) by an angle of rotation (α) greater than 90°, preferably up to 135°.
8. The machine according to any one of claims 1 to 7, characterized in that the folding means (25) are integral with the weakening device (23) and are relatively fixed with respect to the movement of the feed line (24); the folding means (25) acting on the respective panels (16, 17, 18, 19, 20, 30) of each outer wrapper (5) when the outer wrappers (5) are being conveyed along the feed line (24).
9. The machine according to any one of claims 2 to 8, characterized in that the feed line (24) comprises at least along the first section (T1) a

conveyor belt (26) for retaining and transporting the outer wrappers (5); the conveyor belt (26) having a plurality of side walls (27) defining respective compartments (28) for positioning and housing respective outer wrappers (5).

10. The machine according to claim 9, characterized in that the side walls (27) are positioned in a direction transversal to the feed direction (D) of the outer wrappers (5).

11. The machine according to claim 9 or 10, characterized in that each side wall (27) has one or more recesses (29) in which the folding means (25) are positioned when the outer wrappers (5) are being conveyed.

12. The machine according to any one of claims 2 to 11, characterized in that the outer wrapper (5) is conveyed along the first section (T1) of the feed line (24) with intermittent motion and along the second section (T2) with continuous motion.

13. The machine according to any one of claims 1 to 12, characterized in that the folding means (25) comprise at least one spiral-shaped profile (25b) equipped with a respective opposing element (25a).

14. The machine according to any one of claims 2 to 13, characterized in that the first and second sections (T1, T2) have respective feed directions (D) at right angles to each other.

15. The machine according to any one of claims 2 to 13, characterized in that the first and second sections (T1, T2) have the same feed direction (D).

16. The machine according to any one of claims 2 to 15, characterized in that the first section (T1) of the feed line (24) lies in a first plane and the second section (T2) of the feed line (24) lies in a second plane, different from the first plane.

17. The machine according to claim 16, characterized in that the first plane is at a level lower than the second plane.

18. The machine according to any one of claims 2 to 15, characterized in that the first section (T1) and the second section (T2) lie in the same plane.

19. A packaging method for packing cigarettes in a packet (2), the packet (2) comprising an outer wrapper (5) made of foldable thin cardboard enclosing a group (3) of cigarettes; the outer wrapper (5) comprising a plurality of fold lines (11, 12, 13, 14, 15) forming a plurality of panels (16, 17, 18, 19, 20, 30) each of which is designed to form a respective wall (6, 7, 8, 10) of the packet (2); the method comprising the step of feeding a respective outer wrapper (5) for each group (3) of cigarettes having the fold lines (11, 12, 13, 14, 15) and the step of folding the outer wrapper (5) around a respective group (3) of cigarettes along the fold lines (11, 12, 13, 14, 15) for wrapping the group (3) of cigarettes; the method comprising a step of weakening the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) before the step of wrapping the outer wrapper (5) around the group (3) of cigarettes; the method being characterized in that it comprises a step of feeding the outer wrapper (5) along a rectilinear feed path during the step of weakening the outer wrapper (5).

20. The method according to claim 19, characterized in that the step of feeding the outer wrapper (5) comprises a step of feeding the outer wrapper (5) along at least two sections (T1, T2), in particular a first and a second section, distinct from each other; during the step of feeding along the first and second sections (T1, T2), the outer wrapper (5) advancing according to a first configuration and a second configuration, respectively, the second configuration differing from the first configuration relative to the feed direction (D).

21. The method according to claim 20, characterized in that as it advances during the step of feeding along the first section (T1) the outer wrapper (5) is oriented with its main axis (5a) of extension at right angles

to the feed direction and as it advances during the step of feeding along the second section (T2) the outer wrapper (5) is oriented with its main axis (5a) of extension parallel to the feed direction of the second section (T2), or vice versa.

22. The method according to claim 20 or 21, characterized in that it comprises a step of transferring the outer wrapper (5) from the first section (T1) to the second section (T2).

23. The method according to any one of claims 19 to 22, characterized in that the step of weakening the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) comprises a step of rotating the panels (16, 17, 18, 19, 20, 30) of the outer wrapper (5) along the respective fold lines (11, 12, 13, 14, 15).

24. The method according to any one of claims 19 to 23, characterized in that the step of weakening the outer wrapper (5) along the fold lines (11, 12, 13, 14, 15) comprises a step of rotating a respective panel (16, 17, 18, 19, 20, 30) according to an angle of rotation (α) greater than 90° , in particular up to 135° .

25. The method according to any one of claims 19 to 24, characterized in that the step of weakening the outer wrapper (5) occurs along the fold lines (11, 12, 13, 14, 15) positioned parallel to the feed direction (D) of the wrapper.

26. The method according to any one of claims 20 to 25, characterized in that the step of feeding the outer wrapper (5) occurs along the first and second sections (T1, T2) which have respective feed directions (D) at right angles to each other.

27. The method according to any one of claims 20 to 25, characterized in that the step of feeding the outer wrapper (5) occurs along the first and second sections (T1, T2) which have the same feed direction (D).

28. The method according to any one of claims 20 to 27, characterized in that it comprises a step of raising each outer wrapper (5) at the point

where the feed direction changes between the first and the second section (T1, T2).

29. The method according to any one of claims 20 to 27, characterized in that it comprises a step of rotating each outer wrapper (5) during the step of transferring the outer wrapper (5) from the first to the second section (T1, T2).

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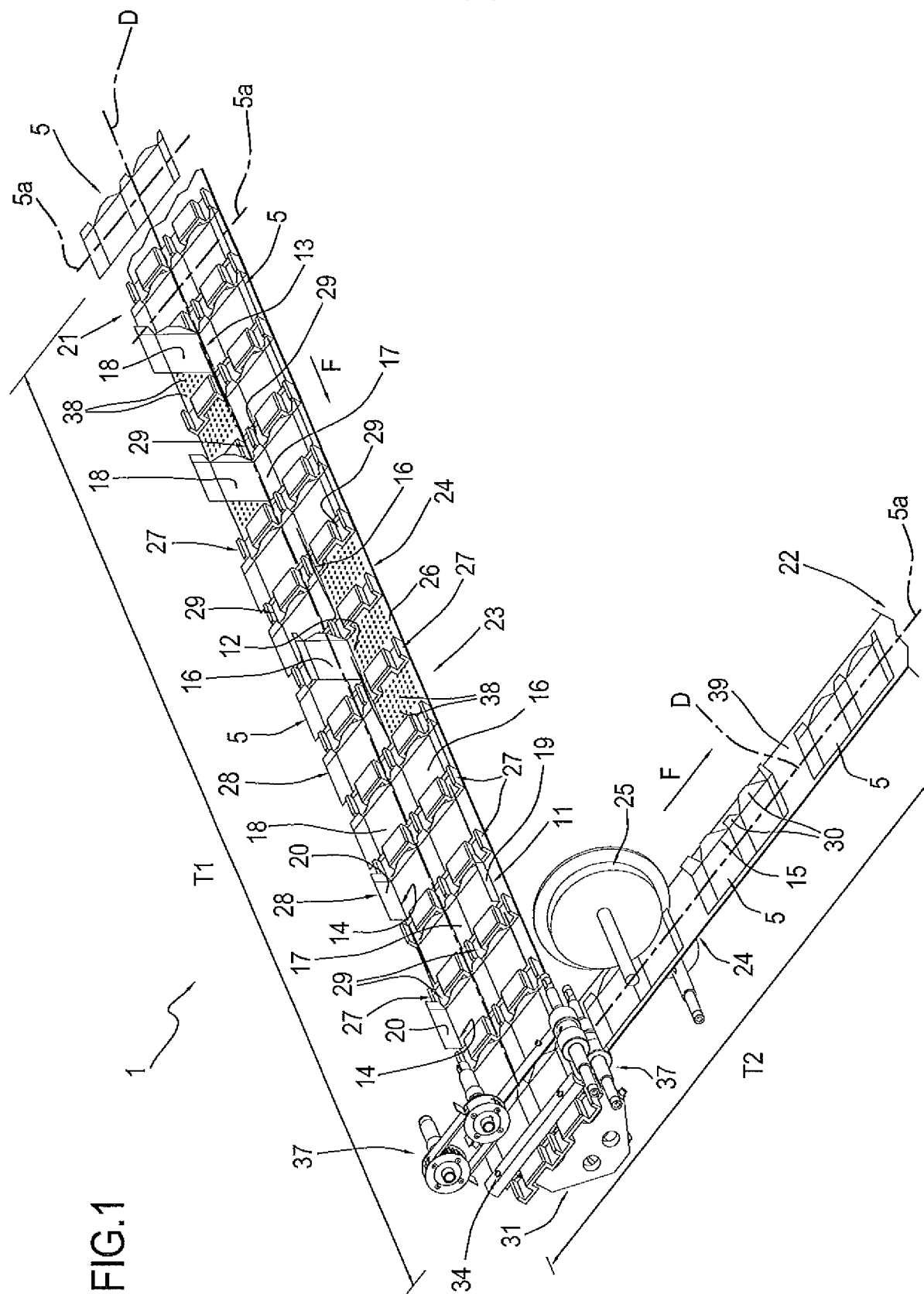
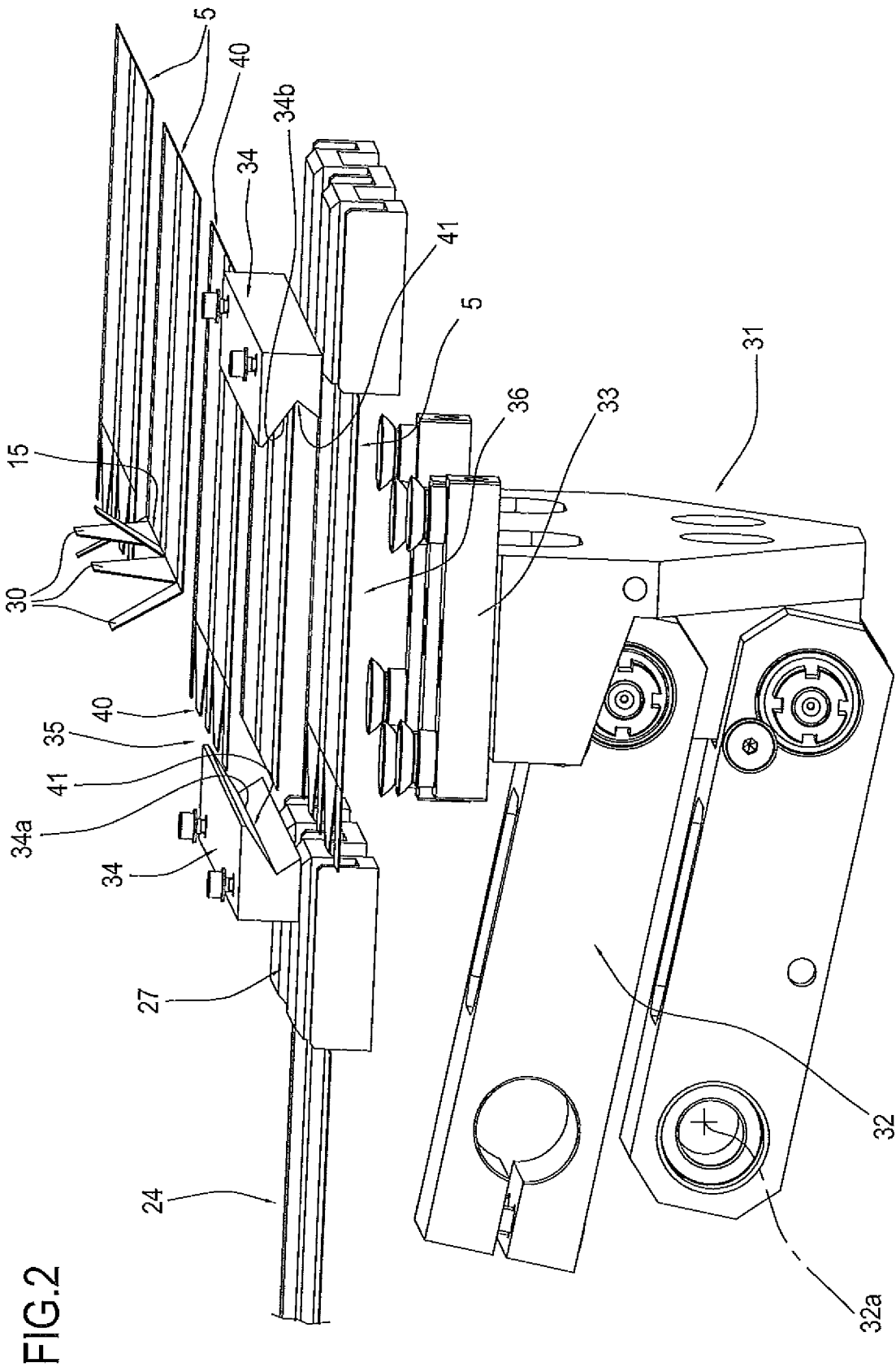


FIG.1



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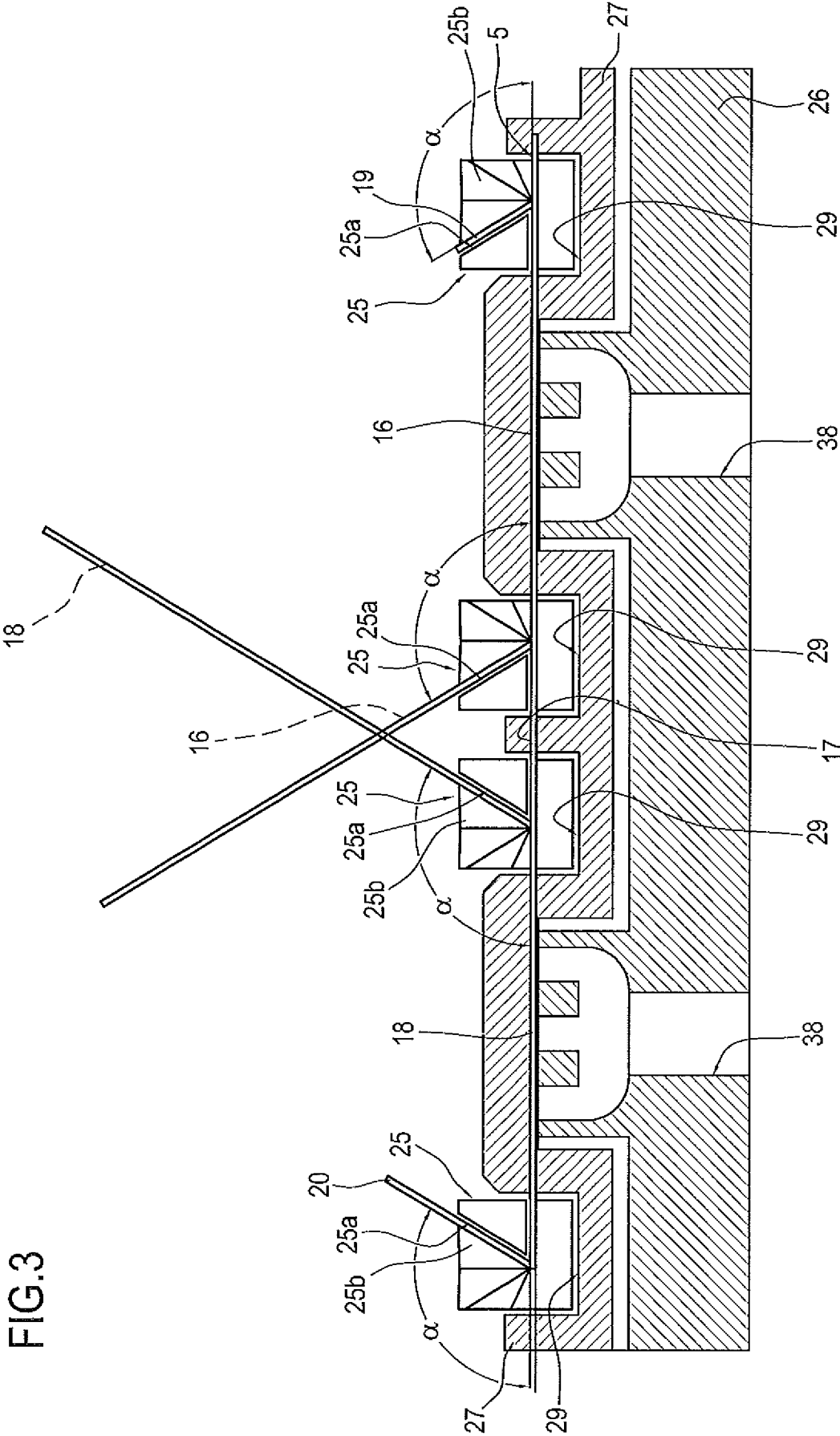


FIG.3

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FIG.4

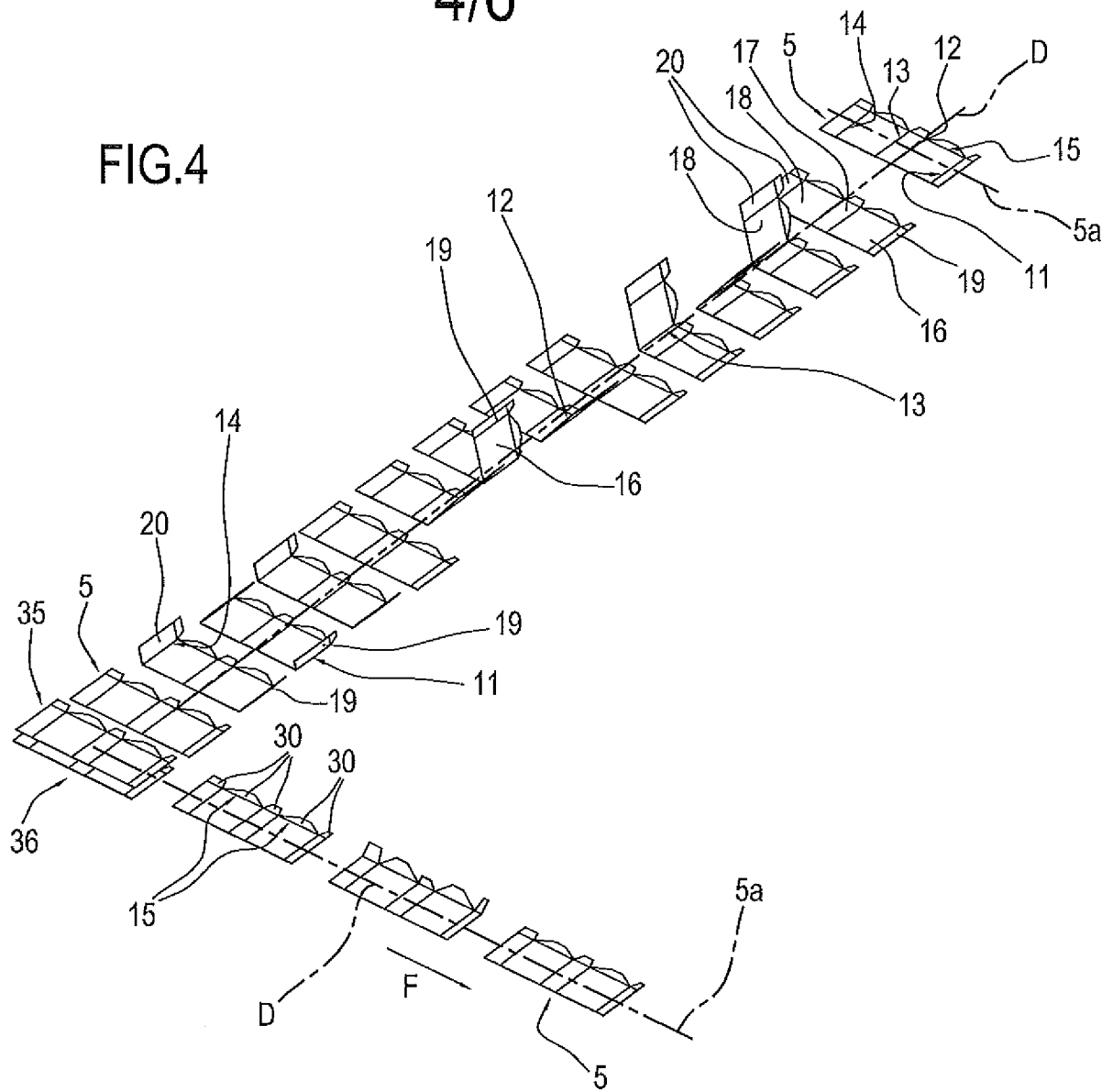


FIG.5

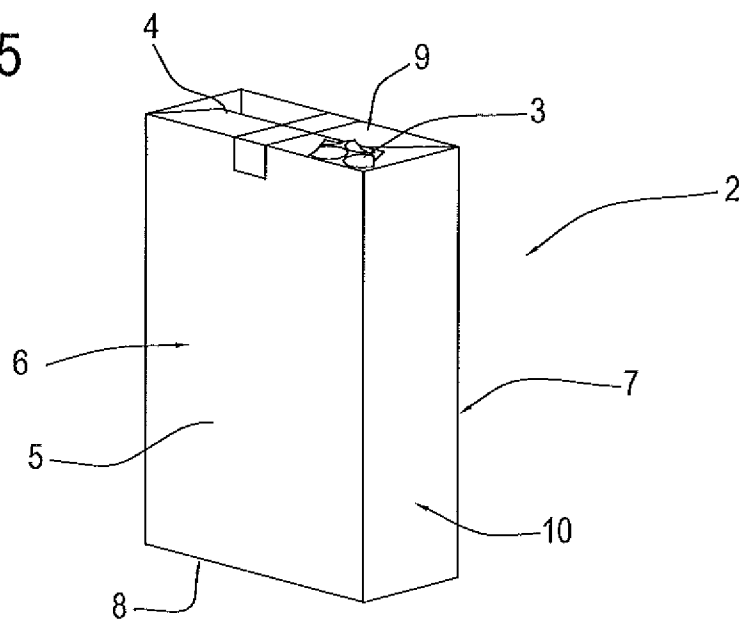
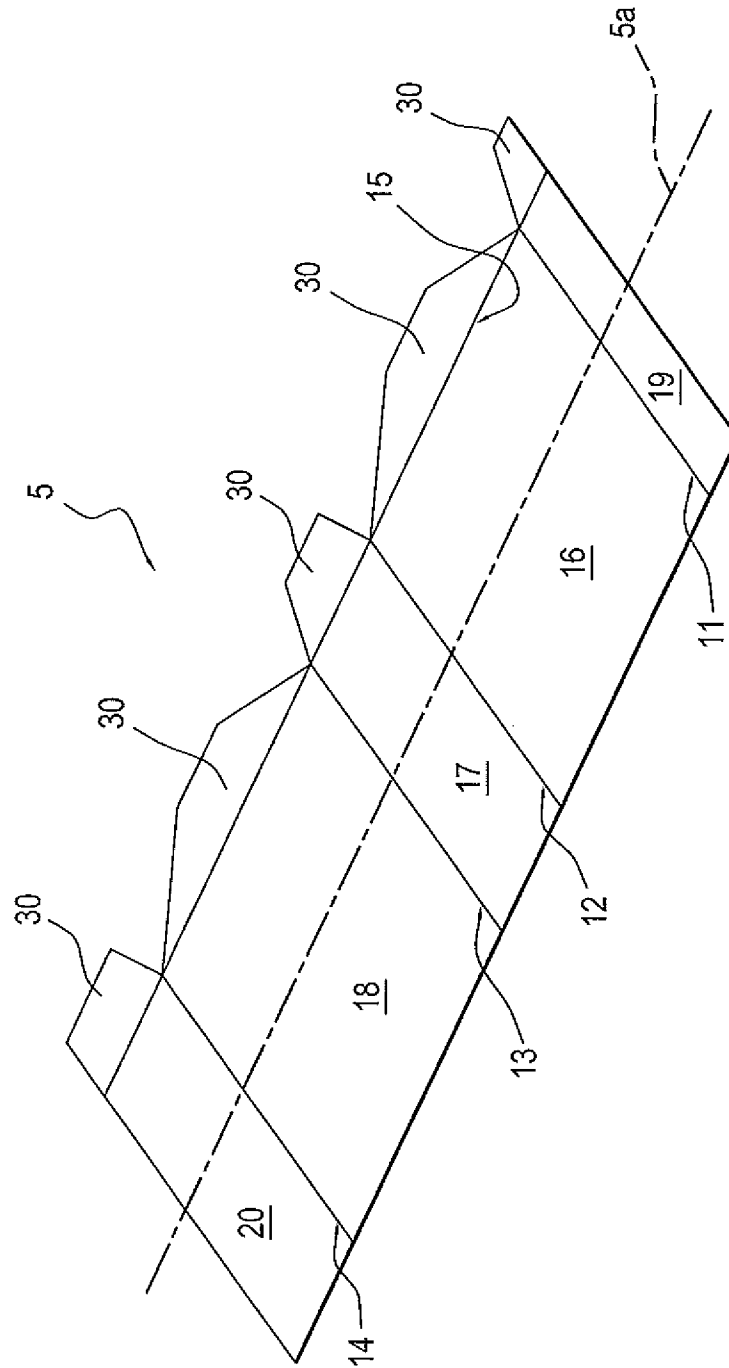
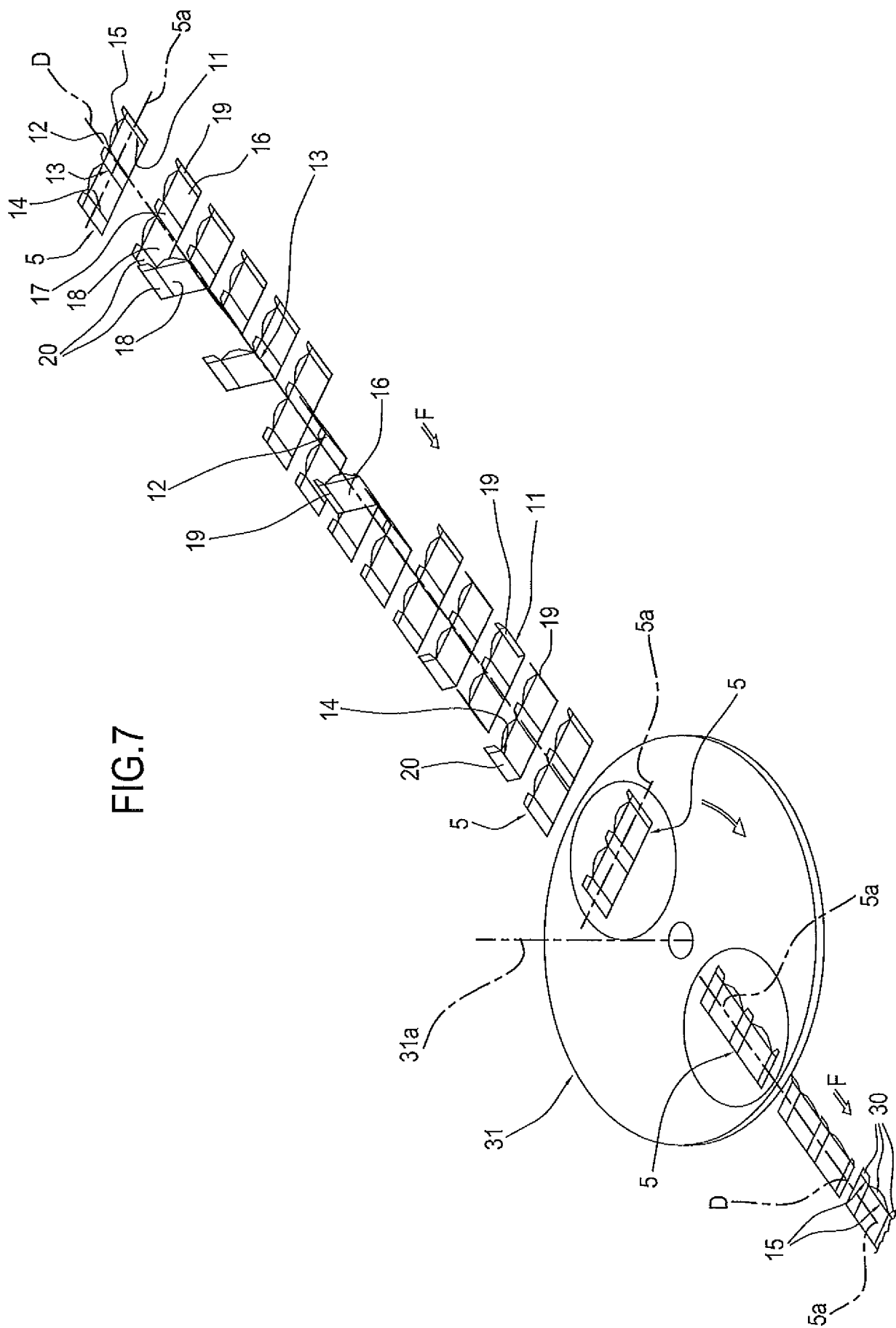


FIG. 6



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FIG.7



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/063505

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B19/22 B65B43/24 B65B41/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65B B31B B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 293 431 A1 (GD SPA [IT]) 19 March 2003 (2003-03-19)	1,6,8, 19,23,25
Y	figures 1-3, 7 paragraphs [0002] - [0003], [0029] - [0036]	7,20-22, 24,26-29
Y	----- US 3 021 768 A (OSKAR GRAULIG ET AL) 20 February 1962 (1962-02-20) figures 1a, 3a, 3b, 4 column 3, lines 1-4, 44-49 ----- -/-	7,9-11, 13,24



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

5 November 2014

Date of mailing of the international search report

13/11/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 800 677 A (JONES C ET AL) 2 April 1974 (1974-04-02)	1-6,8, 12,14, 16,17
Y	figures 5, 32 column 5, lines 40-60 column 8, lines 10-15, 59-68 column 9, lines 54-59 column 10, lines 33-62 -----	7,9-11, 13, 20-22, 26,28
X	GB 2 172 259 A (ACMA SPA) 17 September 1986 (1986-09-17)	1-6,8, 12,15,18
Y	figures 1, 3a, 3b, 4, 5 page 1, line 89 - page 2, line 4 page 2, lines 99-106 page 3, lines 84-97 -----	7,9-11, 13, 20-22, 27,29

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/063505

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1293431	A1	19-03-2003	AT 332841 T 15-08-2006
		CN 1408616 A 09-04-2003	
		DE 60213049 T2 11-01-2007	
		EP 1293431 A1 19-03-2003	
		IT B020010553 A1 14-03-2003	
		JP 4047677 B2 13-02-2008	
		JP 2003104317 A 09-04-2003	
		US 2003093977 A1 22-05-2003	

US 3021768	A	20-02-1962	NONE

US 3800677	A	02-04-1974	NONE

GB 2172259	A	17-09-1986	BR 8601266 A 02-12-1986
		CA 1263849 A1 12-12-1989	
		DE 3608250 A1 18-09-1986	
		FR 2578807 A1 19-09-1986	
		GB 2172259 A 17-09-1986	
		IN 165996 A1 24-02-1990	
		IT 1202138 B 02-02-1989	
		JP H0629073 B2 20-04-1994	
		JP S61273321 A 03-12-1986	
		US 4650450 A 17-03-1987	
