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Automatic packaging machine for continuously packaging products each wrapped in a single envelope and method for continuously packaging products each wrapped in a single envelope

Automatische Verpackungsmaschine zum kontinuierlichen Verpacken von in einzelnen Umschlägen eingewickelten Produkten und Verfahren zum kontinuierlichen Verpacken von in einzelnen Umschlägen eingewickelten Produkten

Machine de conditionnement automatique et procédé associé pour emballer en continu chaque enveloppée de produits dans une enveloppe unique

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The present invention refers to an automatic packaging machine for continuously packaging products each wrapped in a single envelope.

The present invention also refers to a method for continuously packaging products each wrapped in a single envelope.

There are known automatic packaging machines that operate continuously and that are of the type suitable for producing packages consisting of envelopes, each containing inside it a product of the type, in particular, of a printed product consisting of a sheet, a folded sheet, a fascicle of sheets, an insert or similar. See for instance US-A-5 640 831.

These automatic packaging machines are suitable for producing packages the envelope of which consists of a single front on which two flaps are folded, the flaps being at least partially overlapped, wherein one flap defines the actual back of the envelope and the other defines a closing flap of the envelope itself - known in the jargon as closing "tab" - and wherein, moreover, the envelope can be closed at least one of its two opposite sides.

In these packaging machines the products, which are made to advance one after the other and at distance one from another, are fed on a continuous sheet of paper that is unwound continuously from a reel, is rest-ed on a sliding plane (in practice consisting of a conveyor belt) and is conveyed by it along a conveying direction.

The opposite longitudinal leaves of the continuous sheet of paper, on which the products have been fed, are then folded one upon the other to form the back and the closing flap (closing "tab") of each envelope and thus obtain a tubular, flat and continuous wrapping containing inside it a plurality of products that are arranged in succession one after the other and spaced apart from one another.

The tubular wrapping thus obtained is then cut between two successive products so as to obtain single envelopes, each of which containing a respective product, or pressed at glue strips, which are previously applied onto the continuous sheet of paper at one or both of the transversal sides of each longitudinal portion thereof that defines a corresponding envelope, and then cut between two successive products so as to obtain single envelopes, each of which is closed at one or both sides and contains a respective product.

In these automatic packaging machines of the known type, the continuous sheet of paper is fed at the entrance of the sliding plane simultaneously to the feeding on it of the products to be packaged.

For such a purpose, the continuous sheet of paper is unwound from a reel and fed, by means of a feeding unit with which the packaging machine itself is equipped, along a feeding plane substantially orthogonal to the sliding plane and arranged close to the entrance end of the latter.

In practice, considering that the sliding plane lies horizontally, the continuous sheet of paper is fed from the bottom upwards along a substantially vertical plane close to the entrance end of the sliding plane itself.

While passing from the feeding plane (substan-tially vertical) to the sliding plane (substantially horizon-tal), the continuous sheet of paper undergoes a deviation of about 90°.

During such passage the continuous sheet of paper is creased longitudinally so as to define the folding lines of two longitudinal leaves thereof, which are then folded one upon another on the products already fed onto the sheet itself.

For such a purpose, known packaging machines are equipped with a creasing unit that is arranged close to the entrance end of the sliding plane and that comprises, for each side of the sliding plane, a block provided with an edge that faces the continuous sheet of paper that rises along the feeding plane and that is par-allel to the feeding direction of the sheet itself to impress on the latter a respective longitudinal creasing that de-fines a respective longitudinal leaf.

At each side of the sliding plane a folding bar for folding the corresponding longitudinal leaf is then ar-ranged.

Such folding bars are supported at one end by a bridge-type frame fixed astride of the sliding plane with the interposition of adjusting means for adjusting the spa-tial position thereof.

As the format of the envelope varies, the width of the front and/or the width of the longitudinal leaves that form the two flaps (back and closing flap or "tab") of each envelope and/or the degree of overlapping of the two flaps, as well as the length of the single envelope, vary.

The longitudinal edges of the continuous sheet of paper can be rectilinear and continuous, so that the two flaps that respectively define the back and the closing flap (closing "tab") of each envelope are rectangle shaped.

Alternatively, the longitudinal edge of the con-tinuous sheet of paper that defines the longitudinal leaf that forms the closing flaps (closing "tabs") of the enve-lopues is interrupted by a plurality of transversal notches, each of which forms the profile of one of the two opposite ends of the closing flap (closing "tab") of two successive envelopes. This allows to obtain envelopes that have an appearance similar to that of standard pre-formed enve-lopues.

According to the prior art, such a longitudinal edge of the continuous sheet of paper is profiled by die-cutting by means of a die-cutter that is separate and "off-line" with respect to the packaging machine or by means of a die-cutter that is separate and "in line" with the pack-ag ing machine.

In the first case, the continuous sheet of paper is unwound from the reel to be fed at the entrance of a die-cutter that performs the profile-forming of the longi-tudinal edge thereof that will then define the closing flaps.
Generally, the length of a few mm and can reach values of the order of one or two tens of mm. 

**0029** Such a configuration of the notches 204 is required for the following reasons:

- As stated above, the sheet 201, once already die-cut and profiled, is fed at the entrance of the packaging machine. At the entrance of the packaging machine, the sheet 201, passing from the substantially vertical feeding plane to the substantially horizontal sliding plane, undergoes a deviation of about 90°, during which it is longitudinally creased to define the first crease 202 and the second crease 203. This passage is a very critical point of the packaging machine. At this point, indeed, due to the tensions to which the sheet itself is subjected, the risks of creasing and tearing of the sheet are very high and, on the one hand, do not allow the use of low grammage papers, which would tear very easily, and, on the other hand, force the advancement speed of the sheet itself to be kept low and, therefore, slowing down production. If each notch 204 had a depth such as to reach the second crease 203, such risks and the consequent effects would be further accentuated. Therefore, it becomes necessary to distance the bottom 204c of each notch 204 from the second crease 203 by a non-zero distance $d$.

- Moreover, while the continuous sheet advances along the machine, inevitable slippings or in any case errors in pulling the sheet itself and/or errors in phasing the various processings carried out on it may occur. In particular, the transversal cut that separates the single envelopes is carried out a few metres after the entrance of the continuous sheet in the machine and, in particular, a few metres after the folding of the first leaf and of the second leaf to form the flat tubular wrapping. If the notches 204 were shaped like a "V", it would, therefore, be practically impossible to centre the transversal cut with the vertex of each notch 204. In order, therefore, to mask the phasing error of the transversal cuts with respect to the position of the notches 204 it becomes necessary to distance the first flank 204a and the second flank 204b of each notch by a distance defined by the rectilinear portion 204c of length $l$ and along which the separation line 205 at which the transversal cut that separates two successive envelopes will be defined.

From what has been outlined above it is clear that the known solutions impose a series of constraints and limitations to the design of the envelopes and, in particular, to the design of the profile of their closing flap or "tab" that, on the one hand, do not allow the design of standard type pre-formed envelopes to be exactly copied and, on the other hand, could require the use of a continuous sheet of paper that is oversized in length and/or in width that is reflected in greater material costs.
of the fact that they require the provision of a die-cutting apparatus, be it arranged "off-line" or "in line" with the packaging machine, which can be separate from the latter and that, due to the bulk that it occupies, requires a space that is not always available.

[0032] In the case in which such a die-cutting apparatus is arranged "in line" with the packaging machine, moreover, it could require the preparation of storage units of the sheet of paper that further complicate the structure, the operation and the management of the entire packaging plant.

[0033] The die-cutter, indeed, consists of a drum with a circumference equal to the length of the envelope to be made or to a multiple of such a length that, for envelopes of standard format type C6, C5 and C4, varies between about 165 mm, 230 mm and 350 mm (162 mm, 229 mm and 324 mm, respectively). Envelopes of different format and, in particular, of different length, correspond to drum die-cuts with different format. The high inertia of the rotation of the drum of the die-cutter and the different speed of forward movement that the continuous sheet of paper can have during die-cutting and during processing in the machine can, indeed, require the provision of storage units before and after the die-cutter itself. As the format of the envelope to be made varies and, in particular, as the length of the envelopes varies it is necessary to change the drum of the die-cutter, with complicated and long replacement operations and, therefore, stopping operations of the packaging machine.

[0034] Known solutions, moreover, are expensive to install, maintain and manage, which reflects in a greater unitary cost of the single envelopes produced.

[0035] Yet another drawback of known solutions consists of the fact that the presence in the continuous sheet of paper of transversal notches that are pre-formed in it before it is fed at the entrance of the packaging machine itself further weakens the sheet itself, making its passage from the feeding plane to the sliding plane with a deviation of about 90° particularly critical. Known solutions, therefore, do not allow low grammage papers to be used, which would tear very easily and force the advancement speed of the sheet itself to be kept low and, therefore, forcing production to be slowed down.

[0036] Yet another drawback of known solutions consists of the fact that they require the die-cutting of the continuous sheet of paper to be carried out before it is fed to the packaging machine, which, in particular in the case in which the die-cutting is carried out "off-line", slows down production further, being it necessary to prepare the reels of pre-die-cut sheet before the start of the packaging processing of the envelopes.

[0037] The purpose of the present invention is to make an automatic packaging machine for continuously packaging products, each wrapped in a single envelope, and to propose a method for continuously packaging products, each wrapped in a single envelope, which allow the drawbacks of the prior art to be avoided.

[0038] In this general purpose, a particular purpose of the present invention is to make an automatic packaging machine for continuously packaging products, each wrapped in a single envelope, and to propose a method for continuously packaging products, each wrapped in a single envelope, which allow to obtain envelopes the design of which copies that of standard pre-formed envelopes and to keep low the dimensions of the continuous sheet of paper necessary to make them, with consequent reduction of the material costs.

[0039] Yet another purpose of the present invention is to make an automatic packaging machine for continuously packaging products, each wrapped in a single envelope, and to propose a method for continuously packaging products, each wrapped in a single envelope, which allow to also use low grammage papers and/or to increase the operating packaging speed, with a consequent increase in production and reduction of the material costs.

[0040] Yet another purpose of the present invention is to make an automatic packaging machine for continuously packaging products, each wrapped in a single envelope, which is structurally and constructively simple and the operation of which is flexible and versatile making it easier, in particular, to change format of the envelope to be obtained and reducing the time for processing the single formats and for changing them.

[0041] These purposes according to the present invention are accomplished by making an automatic packaging machine for continuously packaging products, each wrapped in a single envelope, as outlined in claim 1.

[0042] These purposes according to the present invention are accomplished with a method for continuously packaging products, each wrapped in a single envelope, as outlined in claim 16.

[0043] Further characteristics are provided in the dependent claims.

[0044] The characteristics and advantages of an automatic packaging machine for continuously packaging products, each wrapped in a single envelope, and of a method for continuously packaging products, each wrapped in a single envelope, according to the present invention will become clearer from the following description, given as an example and not for limiting purposes, referring to the attached schematic drawings, in which:

figure 1 is a schematic axonometric view of an automatic packaging machine according to the present invention associated with a feeding unit of products to be packaged and with an unwinding unit of the continuous sheet of packaging material from a reel; figure 2 is a schematic axonometric view of the entrance end of the conveyor of the machine of figure 1; figure 3 is a schematic view of a detail of the machine of figure 1 on an enlarged scale and seen axonometrically from above; figure 4 is a schematic view of the sole die-cutting unit of the machine of figure 1; figure 5 is a schematic axonometric view of the die-
With reference to the attached figures, reference numeral 10 wholly indicates an automatic packaging machine according to the present invention;

figures 8 and 9 are schematic axonometric views of a second possible alternative embodiment of the packaging machine according to the present invention associated with a feeding unit of products to be packaged and with a unit for unwinding the continuous sheet of packaging material from a reel;

figure 9 is a schematic axonometric view of a detail of the packaging machine of figure 8;

figures 10 to 12D schematically show the sequence of stages in which the die-cutting step according to the present invention develops, carried out, at least in part, at the same time as the pressing step;

figures 13A and 13B respectively show a portion of the continuous sheet of packaging material after the die-cutting carried out on the packaging machine according to the present invention and a detail thereof on an enlarged scale;

figures 14A and 14B respectively show a reel of a die-cut sheet and a portion of a die-cut sheet according to the prior art;

figure 14C shows a detail of figure 14B on an enlarged scale;

figure 15 schematically and axonometrically shows the entrance end of a third possible alternative embodiment of the packaging machine according to the present invention.

[0045] With reference to the attached figures, reference numeral 10 wholly indicates an automatic packaging machine for continuously packaging products P each wrapped in a single envelope B obtained from a continuous sheet F according to the present invention.

[0046] The sheet F is made of packaging material consisting, in particular, of paper, although it should not be excluded the possibility that the sheet F be made of different packaging materials. In the rest of the description, for the sake of simplicity, reference will be made to a continuous sheet F of paper.

[0047] The machine 10 is of the type suitable for producing packages consisting of envelopes B each containing inside it a product P of the type, in particular, of a printed product, whether it consists of a sheet, a folded sheet, a fascicle of sheets, an insert or similar.

[0048] The machine 10, in particular, is of the type suitable for producing packages the envelope B of which consists of a single front B1 and of a back in turn consisting of two flaps B2 and B3 at least partially overlapped and a first flap B2 of which is of greater height and defines the actual back of the envelope B and a second flap B3 of which is of lesser height and defines the closing flap or closing "tab" of the envelope B. The envelope B can be closed at least at one of the opposite sides B4 and B5, as well as longitudinally at the portion of the closing flap or "tab" B3 which is overlapped on the back B2, by means of strips of adhesive or glue applied to the sheet F.

[0049] The machine 10 is of the automatic and continuously operating type.

[0050] The machine 10 comprises a support frame 11 for resting on the ground, said frame being associated with a conveyor 12 defining a conveying plane, indicated by the line PT, for conveying the sheet F along a conveying direction indicated by the line DT.

[0051] The conveyor 12, as will become clearer hereafter, does not necessarily have a uniform and continuous structure and, can consist, for some portions thereof, of conveyor belts 13, 13', 13'' and 14 and, for some other portions thereof, of conveying rollers 15, 16, 17 that are arranged between successive conveyor belts 13' and 13'' and 13 and 14 and that also act as contrast elements of members of corresponding operative units of the machine 10.

[0052] In any case, the conveyor 12 defines a movable conveying plane PT that allows the sheet F to be moved forward along the conveying direction DT in the sense indicated by the arrow A2.

[0053] The conveying plane PT or in any case the conveyor 12 defines an entrance end 12a of the sheet F and an exit end 12b of the packaged envelopes B and each containing a product P and schematically indicated in figures 1, 2 and 8 by respective lines.

[0054] Moreover, the conveying plane PT or in any case the conveyor 12 has two opposite sides parallel to the conveying direction DT.

[0055] The frame 11 supports a feeding unit 18 of the sheet F which is arranged below the conveyor 12.

[0056] The feeding unit 18 receives at the entrance the sheet F unwound from a reel 19 by an unwinding unit 20 associated with the machine 10.

[0057] The feeding unit 18 comprises a plurality of return rollers and deviator rollers generically indicated with 21 that deviate and move forward the sheet F unwound from the reel 19 along a feeding plane indicated by the line PA along a direction of forward movement DA substantially orthogonal to the conveying plane PT and in the sense of feeding indicated by the arrow A1.

[0058] The feeding plane PA extends below the conveying plane PT, is orthogonal or substantially orthogonal to the conveying direction DT and is defined at the entrance end 12a of the conveyor 12 or in any case at the conveying plane PT (figures 1, 2 and 8).

[0059] It should be specified that the feeding plane PA is orthogonal or substantially orthogonal to the conveying direction DT except for an angle that is generally less than 30° and equal, in particular, to 4°-5°. 
It should also be specified that the feeding direction DA is orthogonal or substantially orthogonal to the conveying plane PT except for an angle that is generally less than 30° and equal, in particular, to 4°-5°.

In practice, the conveying plane PT is substantially horizontal and the feeding plane PA is substantially vertical.

While passing from the feeding plane PA to the conveying plane PT, the sheet F is therefore deviated from the bottom upwards by a right angle or substantially a right angle.

The feeding unit 18 can also comprise application devices for applying, on the face of the sheet F that, considering the sheet F resting on the conveying plane PT, faces upwards or in any case opposite to the conveying plane PT itself, strips S', S'' of glue or adhesive at the transversal portions thereof intended to constitute the closures at the sides B4 and/or B5 of each envelope B and, possibly, longitudinal strips S'' of glue along the longitudinal sections of the sheet F intended to form the closing flaps or closing "tabs" B3 of the single envelopes B. These application devices of strips of glue or adhesive are not represented in the attached figures (except for figure 7), since they are of the type known to the person skilled in the art.

Upstream of the entrance end 12a of the conveyor 12 or in any case of the conveying plane PT there is a feeding unit 22 for feeding the products P to be packaged in single envelopes B and which are fed in succession one after the other and at a distance one after another on the sheet F entering the conveying plane PT.

The feeding unit 22 in turn comprises a support frame 23 for resting on the ground and that supports a continuous conveyor of the type, for example, using belts or chains 24 equipped with a plurality of so-called "carriers" 25 that separate and push the single products P one in succession after the other and one spaced from the other along a conveying direction coinciding with the conveying direction DT of the sheet F and in the same sense of forward motion A2.

At the entrance end 12a of the conveyor 12 or in any case of the conveying plane PT there is a creasing unit 26 for die-cutting the sheet F that is designed to define in the sheet F a pair of longitudinal folding creases, each of which defines a respective continuous longitudinal leaf of the sheet F, and to accompany the overturning of these two longitudinal leaves from the feeding plane PA to the conveying plane PT.

In more detail, the creasing unit 26 defines in the sheet F a first longitudinal crease C1, which defines a first continuous longitudinal leaf F1 of the sheet F and that is intended to constitute the back B2 of the envelopes B, and a second longitudinal crease C2, which defines a second continuous longitudinal leaf F2 of the sheet F and that is intended to constitute the closing flap or "tab" B3 of the envelopes B. Between the first longitudinal leaf F1 and the second longitudinal leaf F2 a longitudinal central portion F3 of the sheet F is defined, on which central portion the products P, which are fed by the feeding unit 22 in succession one after another at a distance one from another, are arranged.

The creasing unit 26 comprises for each of the two opposite sides of the conveyor 12 or in any case of the conveying plane PT a respective block 26' provided with a rectilinear edge that faces the feeding plane PA and that is substantially parallel to the feeding direction DA so as to define a longitudinal creasing element of the sheet F for folding a corresponding longitudinal leaf F1, F2 thereof or corresponding parts thereof.

In the attached figures, the creasing elements are only schematically represented in figure 2, being of the type known to the person skilled in the art.

According to a peculiar feature of the present invention, the packaging machine 10 comprises at least one die-cutting unit 27 for die-cutting at least one of the first longitudinal leaf F1, or in any case the longitudinal portion of the sheet F that defines the first longitudinal leaf F1, and the second longitudinal leaf F2, or in any case the longitudinal portion of the sheet F that defines the second longitudinal leaf F2, to die-cut in it the back B2 and/or the profile of the back B2 and the closing flap or "tab" B3 and/or the profile of the closing flap or "tab" B3, respectively, in which such a die-cutting unit 27 is arranged between the entrance end 12a and the exit end 12b of the conveying plane PT to act on the sheet F fed on the conveying plane PT, after such a sheet F has undergone the deviation by 90° to pass from the feeding plane PA to the conveying plane PT.

As will become clearer from the following description, the at least one die-cutting unit 27 can consist of a unit separate and distinct from the remaining operative units arranged along the conveying plane PT to carry out the different processing operations necessary to obtain the single envelopes B or it can be integrated or in any case incorporated in one of such operative units, like for example the pressing unit or the transversal cutting unit described hereafter.

The at least one die-cutting unit 27 is provided for die-cutting, in particular, the outer longitudinal edge, respectively, of the first longitudinal leaf F1 and/or of the second longitudinal leaf F2, i.e. the longitudinal edge of the first longitudinal leaf F1 and/or of the second longitudinal leaf F2 opposite, respectively, to the first longitudinal crease C1 and to the second longitudinal crease C2.

In particular, the at least one die-cutting unit 27 is arranged to die-cut the second longitudinal leaf F2 to define in it the profile of the closing flap or "tab" B3 of the envelopes B, i.e. the profile of the outer longitudinal edge of the second longitudinal leaf F2 opposite to the second longitudinal crease C2 and/or to define in it a plurality of perforations, toothings or incisions for tamper-proofing that, in other words, highlight the fact that the envelope B has been opened.

With reference to the first embodiment represented in figures 1 to 6, the machine 10 comprises a first folding unit 28 for folding the first longitudinal leaf F1 on
the longitudinal central portion F3 of the sheet F so as to at least partially cover the products P present on it and form the back B2 of the envelopes B and thus obtain a continuous wrapping containing the products P, closed along the side defined by the first longitudinal crease C1 and open at the opposite side.

[0075] The first folding unit 28 is arranged downstream, with respect to the sense of forward motion A2 of the sheet F along the conveying direction DT, of the creasing unit 26 and comprises, in a known manner, folding bars 28′ that extend above the conveying plane PT and incident and/or parallel to it.

[0076] The second longitudinal leaf F2, on the other hand, remains laid on the conveying plane PT and, if in the passage from the feeding plane PA to the conveying plane PT it is accompanied by a partial folding, once the conveying plane PT has been reached it would be reopened and laid on it.

[0077] The machine 10 also comprises, in succession one after the other in the sense of forward motion A2 of the sheet F along the conveying direction DT: a pressing unit 29 arranged downstream of the first folding unit 28 and a transversal cutting unit 30 arranged downstream of the pressing unit 29.

[0078] The pressing unit 29 is designed to exert a pressure on the first longitudinal leaf F1 folded over the longitudinal central portion F3 at the transversal strips S′, S″ of adhesive or glue present or in any case applied on the face of the sheet F opposite to the one resting on the conveying plane PT at at least one segment of at least one of the two transversal sides of each longitudinal section of the sheet F that defines a corresponding envelope B, so that each envelope B is closed on one or both of the opposite sides B4 and B5.

[0079] The transversal cutting unit 30 is designed to transversally cut the continuous wrapping obtained by folding at least the first longitudinal leaf F1 on the longitudinal central portion F3 (and possibly by folding the second longitudinal leaf F2 on the first longitudinal leaf F1 that is already folded) between two successive products P so as to obtain a plurality of longitudinal sections of such a continuous wrapping that are separate from one another and each defining a respective envelope B.

[0080] In such an embodiment, the die-cutting unit 27 is arranged between the creasing unit 26 and the transversal cutting unit 30 and, preferably, is arranged downstream, i.e. after, of the first folding unit 28 and upstream, i.e. before, of the pressing unit 29.

[0081] In more detail and with reference to the embodiment represented in figures 1 to 6, the die-cutting unit 27 consists of a separate and independent unit that is arranged between the first folding unit 28 and the pressing unit 29 between two successive portions 13′ and 13″ of the conveyor belt 13. This does not exclude alternative embodiments, in which, for example, the die-cutting unit 27 consists of a separate unit arranged between the pressing unit 29 and the cutting unit 30.

[0082] It should be noted that, in a known manner, the conveyor belt 13, or in any case its portions 13′, 13″, and the conveyor belt 14 each have perforations 130, 140 that are in communication with a suction unit to hold the sheet F, the sections thereof or the envelopes B adhering to the conveyor belts themselves and allow them to be moved forward along the conveying direction DT. For this purpose, moreover, a plurality of pressure rollers 31 is arranged above the conveying plane PT to cooperate with the conveyor belts 13 and 14.

[0083] The die-cutting unit 27 comprises an own shaft 32 that is rotatably supported above the conveying plane PT by means of a pair of supports 33, is arranged with its longitudinal axis parallel to the conveying plane PT and orthogonal to the conveying direction DT and is associated with own motor means 34 controlled by the control unit, not shown.

[0084] A die-cutter 35 is mounted on the shaft 32 in a fixed manner with respect to translation and rotation, which die-cutter consists of a drum sector or segment on the outer side surface of which a die-cutting cutting profile 36 is defined.

[0085] The die-cutter 35 is mounted on the shaft 32 at the longitudinal portion thereof that is arranged above the second longitudinal leaf F2.

[0086] The die-cutting unit 27 also comprises a contrast element for contrasting the die-cutter 35 and which is of the type of a roller 17, a belt or similar, which simultaneously acts as a conveying element.

[0087] The roller 17 is arranged between the portions 13′ and 13″ of the conveyor belt 13 and is made to rotate in the opposite sense to that of the shaft 32 by a transmission unit, not represented.

[0088] The cutting profile 36 is configured to define in the second longitudinal leaf F2 a plurality of transversal notches I, described later on, which define the profile of the closing flap or “tab” B3 of each envelope B. In an alternative embodiment, not shown, the cutting profile 36 is configured to define in the second longitudinal leaf F2 a plurality of perforations or incisions for tamper-proofing.

[0089] This does not exclude alternative embodiments, wherein the same die-cutter 35 is equipped with more than one cutting profile operating in succession and/or at least in part simultaneously with one another or wherein the packaging machine 10 comprises more than one die-cutting unit 27 each suitable for carrying out different die-cutting on the second longitudinal leaf F2, for example one to carry out a plurality of tamper-proofing perforations in it and one to carry out a plurality of transversal notches I in it defining the profile of the closing flap or “tab” B3 of each envelope. The same die-cutter 35 could also consist of a full drum with diameter substantially equal to the length of the envelopes B to be made, and this, in particular, in the case in which it is wished to make perforations or incisions along the entire length of each closing flap and/or it is wished to rotate the die-cutter always at the same speed of forward motion of the sheet F along the conveying plane PT.

[0090] At an end of the shaft 32 there is a joint 37 with
an air-suction/blowing circuit, not represented since it is of the type easy for the person skilled in the art to understand. The joint 37 is in fluid communication with a hole 38 formed near the cutting profile 36, to hold, during die-cutting, the cutting waste and to release it, after die-cutting, so that it is removed by a removal or discharging unit 39 schematically represented in figure 5.

[0091] Downstream, with respect to the sense of forward motion A2 of the sheet F along the conveying direction DT, of the die-cutting unit 27 a second folding unit 40 is arranged for folding the second longitudinal leaf F2 on the already folded first longitudinal leaf F1, so that the portions thereof that define the closing flaps or "tabs" B3 of each envelope B at least partially overlap on the first longitudinal leaf F1 already folded to define the corresponding back B2.

[0092] In the embodiment represented in figures 1 and 3, the second folding unit 40 is arranged between the die-cutting unit 27 and the pressing unit 29, the sheet F fed at the entrance of the conveying plane PT being already provided with longitudinal strips S'' of glue applied along portions of the second longitudinal leaf F2 corresponding to the closing flaps or "tabs" B3.

[0093] In an alternative embodiment of the packaging machine 10 as represented in figure 7, the sheet F fed on the conveying plane PT lacks the longitudinal strips S'' of glue and downstream, with respect to the sense of forward motion A2 of the sheet F along the conveying direction DT, of the die-cutting unit 27 and upstream of the second folding unit 40 an application unit 41 of the longitudinal strips S'' of glue is arranged. Also in this case the second folding unit 40 and, therefore, the application unit 41 that precedes it, is arranged between the die-cutting unit 27 and the pressing unit 29. However, this does not exclude the possibility that both the application unit 41 and the second folding unit 40 or even just the second folding unit 40 are arranged downstream of the transversal cutting unit 30.

[0094] Again with reference to the embodiments represented in figures 1 to 7, the pressing unit 29 comprises a shaft 42 that is rotatably supported about its longitudinal axis and above the conveying plane PT by a pair of supports 43.

[0095] The shaft 42 extends parallel to the conveying plane PT and perpendicular to the conveying direction DT and it is associated with motor means suitable for making it to rotate. The motor means are of the electric type and are commanded by a control unit, not represented in the attached figures and that controls the operation of the entire machine 10.

[0096] At least one pressing element 44 is mounted on the shaft 42 in a fixed manner with respect to rotation and translation, the pressing element consists of a sector of a cylindrical drum that is coaxial to the shaft 42 itself and that extends for a length substantially equal to that of the longitudinal central portion F3 of the sheet F and at the latter.

[0097] The pressing unit 29 also comprises the roller 15 that is rotatably supported about its longitudinal axis by respective supports and that is arranged below the shaft 42 with its axis parallel to that of the shaft 42, to act simultaneously as conveying element and as contrast element of the pressing element 44.

[0098] The transversal cutting unit 30 in turn comprises a drum 45 that is mounted on a shaft rotatably supported above the conveying plane PT by a pair of respective supports and that is arranged with its longitudinal axis parallel to the conveying plane PT and orthogonal to the conveying direction DT. Motor means make support shaft of the drum 45 rotate. The drum 45 in turn carries one or more cutting blades or elements that are arranged along radial planes thereof to cut the continuous wrapping - which consists of the sheet F with the first longitudinal leaf F1 folded over the longitudinal central portion F3 to cover the products P and the second longitudinal leaf F2 die-cut and folded over the first longitudinal leaf F1 - between two successive products P. In this case the conveying roller 16 acts as contrast element of the cutting elements or blades and is arranged below the drum 45 with its axis parallel to that of the drum 45 itself. The drum 45 and the conveying roller 16 rotate in opposite senses.

[0099] The pressing unit 29 and the transversal cutting unit 30 are not detailed any further, being of the known type.

[0100] The alternative embodiment of the packaging machine 10 represented in figures 8 to 12D, differs from the one represented in figures 1 to 7 in that the die-cutting unit 27, which is designed to die-cut the second longitudinal leaf F2 to die-cut in it the closing flap or "tab" B3 of each envelope B or define its profile, is integrated or in any case incorporated in the pressing unit 29.

[0101] In describing such an alternative embodiment of the packaging machine 10 elements corresponding to those of the packaging machine 10 represented in figures 1 to 7 will be indicated with the same reference numeral possibly indexed.

[0102] In more detail, the die-cutting unit 27 is integrated or in any case incorporated in the pressing unit 29 and comprises a die-cutter 35 consisting of a drum sector or segment mounted coaxially to the shaft 42 of the pressing unit 29 so as to rotate and translate as a unit with it.

[0103] The die-cutter 35 is mounted close to the end of the pressing element 44 facing towards the second longitudinal crease C2.

[0104] The roller 15 extends below the die-cutter 35' to act as contrast element also of the latter.

[0105] In a totally analogous way to the embodiment represented in figures 1 to 6, the die-cutter 35' comprises a cutting profile 36' and the shaft 42 has, at one end, a joint 37' to an air suction/blowing unit that is in fluid communication with an air-suction/blowing circuit, not represented since it is associated with motor means suitable for making it to rotate.

[0106] As can be seen from figures 12A-12D the arc of circumference that defines the die-cutter 35' has a
greater width than the arc of circumference that defines the pressing element 44, such arcs being mutually centred and symmetrically arranged with respect to a radial plane of the shaft 42.

[0107] The shaft 42 of the pressing unit 29, therefore, simultaneously makes both the pressing element 44 and the die-cutter 35 rotate, the intervention times of these on the sheet F overlap and coincide for the angle of rotation of the shaft 42 corresponding to the arc subtended to the arc of circumference that defines the pressing element 44.

[0108] Also in this case, alternative embodiments of the die-cutter 35' as described above with reference to the embodiment of figures 1-7 are not excluded.

[0109] Downstream, with respect to the sense of forward motion A2 of the sheet F along the conveying direction DT, of the cutting unit 30 a second folding unit 40 is arranged for folding the closing flap B3 of each envelope B over the respective back B2.

[0110] In the embodiment represented in figures 8 to 12D, the sheet F fed at the entrance of the conveying plane PT is already provided with longitudinal strips S''' of glue applied along portions of the second longitudinal leaf corresponding to the closing flaps or "tabs" B3.

[0111] In an alternative embodiment of the packaging machine 10, not represented, the sheet F fed on the conveying plane PT lacks the longitudinal strips S''' of glue and downstream, with respect to the sense of forward motion A2 of the sheet F along the conveying direction DT, of the transversal cutting unit 30 and upstream of the second folding unit 40 an application unit 41 is arranged for applying the longitudinal strips S''' of glue. Also in this case, the second folding unit 40 and, therefore, the application unit 41 that precedes it, are arranged downstream of the transversal cutting unit 30.

[0112] In the embodiments represented in the attached figures, the die-cutter 35, 35' is equipped with a cutting profile 36, 36' designed to die-cut in the second longitudinal leaf F2 a plurality of transversal notches I.

[0113] Each notch I comprises a first flank I1 and a second flank I2 that are angled to one another and convergent towards the second longitudinal crease C2 and that define the profile at an end of the closing flap B3 of two consecutive envelopes B.

[0114] As can be noted from figures 13A and 13B, the first flank I1 and the second flank I2 of each transversal notch I intersect in a "V" with the vertex of the "V" substantially at the second longitudinal folding crease C2 of the second longitudinal leaf F2, i.e. in correspondence with it except for processing tolerances.

[0115] With reference to the embodiment of the packaging machine 10 represented in figure 15, at least one auxiliary die-cutting unit 270, which is integrated or in any case incorporated in the feeding unit 18, is provided to die-cut, in the longitudinal central portion F3 or in any case in the portion of the sheet F that defines it, a window FS at each front B1 of each envelope. As an alternative to the window FS, the auxiliary die-cutting unit 270 could define holes of different shape or in any case openings, perforations or other in the longitudinal central portion F3.

[0116] Moreover, the same or other auxiliary die-cutting unit 270 could be provided for die-cutting the first longitudinal leaf F1 or in any case the longitudinal portion of the sheet F that defines it to define in it the profile of the edge that defines the back B2 of each envelope and/or perforations, incisions, toothings, in particular for tamper-proofing.

[0117] Advantageously, the die-cutting unit 270 is arranged to act on the sheet F moving forward along the feeding plane PA and comprises a shaft 271 that is rotatably supported with its axis parallel to the plane PA and orthogonal to the feeding direction DA and that is associated with motor means, not represented, suitable for making it rotate.

[0118] On the shaft 271 a respective die-cutter 272 is mounted, the die-cutter being provided with a drum sector or segment having a cutting profile 273.

[0119] The die-cutting unit 270 also comprises a contrast element for contrasting the die-cutter 272, said contrast element being opposite the shaft 271 and consisting of a roller, a belt or similar.

[0120] It should be specified that the auxiliary die-cutting unit 270 could be applied on a packaging machine 10 as represented in figures 1 to 12D, i.e. wherein a further die-cutting unit 27 is arranged between the entrance end 12a and the exit end 12b of the conveying plane to die-cut the sheet F and, in particular, the second longitudinal leaf F2 thereof, only after it has been fed on the conveying plane PT after the deviation at 90°, as well as on packaging machines of the known type, i.e. in which the sheet F fed is already pre-die-cut.

[0121] In both cases, a possible application unit for applying a transparent film on each window FS could be arranged downstream of the auxiliary die-cutting unit 270 and before the feeding of the products P on the longitudinal central portion F3 of the sheet F.

[0122] The operation of a machine 10 according to the present invention can be immediately understood by a person skilled in the art in light of the attached figures and the description given above.

[0123] With reference to the embodiment represented in figures 1 to 6, the sheet F is unwound from the reel 19 by the unreeling unit 20 that feeds it at the entrance of the feeding unit 18 of the machine 10.

[0124] The feeding unit 18 deviates and feeds the sheet F along the substantially vertical feeding plane PA. Along the path followed by the sheet F while passing through the feeding unit 18 at least one application device is arranged for applying a plurality of strips S', S" of glue or adhesive on the face of the sheet F intended to constitute the inside of each envelope B and on at least one segment of at least one of the two transversal sides of each longitudinal portion of the sheet F that defines a corresponding envelope B.

[0125] Along the path followed by the sheet F while passing through the feeding unit 18, moreover, at least
one further application device is arranged for applying a plurality of strips S'' of glue or adhesive on the face of the sheet F intended to constitute the inside of each envelope B and on the portions of the second longitudinal leaf F2 intended to form the flap or the closing "tab" B3 of each envelope B.

[0126] While passing from the feeding plane PA to the conveying plane PT, the sheet F is creased by the creasing unit 26 that defines in it the longitudinal crease C1 and the second longitudinal crease C2 for respective-ly folding the first longitudinal leaf F1 and the second longitudinal leaf F2.

[0127] At the entrance end 12a of the conveyor 12 or in any case of the conveying plane PT, the feeding unit 22 associated with the machine 10 feeds the products P one in succession of the other and one after another on the longitudinal central portion F3 of the sheet F defined by the first longitudinal leaf F1 and by the second longitudinal leaf F2, so that each product P rests on the longitudinal portion of the sheet F intended to form a respective envelope B and is arranged between the transversal strips S', S'' of glue or adhesive at the opposite sides B4 and B5 of the respective envelope B.

[0128] The first folding unit 28 folds the first longitudinal leaf F1 on the longitudinal central portion F3 so as to cover the products P and obtain a continuous wrapping closed along the first longitudinal crease C1 and open along the opposite side, where the second longitudinal leaf F2 rests on the conveying plane PT.

[0129] The continuous wrapping thus obtained passes through the die-cutting unit 27 that die-cuts the second longitudinal leaf F2 cutting a plurality of transversal notches I in it. During the angle of rotation of the shaft 32 necessary to carry out the die-cutting and for an angle of rotation subsequent to it, the cutting waste is held stuck to the die-cutter 35 by means of a suction action applied through the hole 38. After this, the cutting waste is removed by the removal unit 39 that, for example, sucks it up, while an air jet is blown through the hole 38.

[0130] The exit from the die-cutting unit 27 the second longitudinal leaf F2 has a plurality of transversal notches I the flanks I1 and I2 of which define the bevel at one of the opposite ends of the closing flaps or "tabs" B3 of two successive envelopes.

[0131] At the exit from the die-cutting unit 27 the second longitudinal leaf F2 thus die-cut is folded by the second folding unit 40 on the continuous wrapping to form the closing flaps or "tabs" B3 of the single envelopes B.

[0132] The continuous tubular wrapping thus obtained then passes through the pressing unit 29, which presses the first longitudinal leaf F1 on the longitudinal central portion F3 at the transversal strips of glue S' and S", and then the transversal cutting unit 30 that cuts the continuous tubular wrapping between two successive products at the separation line LS that is centred with respect to the corresponding pair of transversal strips S', S" of glue and to the vertex of the corresponding notch I, thus obtaining single closed envelopes B.

[0133] The operation of the packaging machine 10 represented in figure 7 is totally analogous to that indicated above, excluding the fact that the longitudinal strips of glue S''' are applied downstream of the die-cutting unit 27 and upstream of the second folding unit 40.

[0134] The operation of the packaging machine 10 represented in figures 8 to 12D differs from that described above in that the continuous wrapping exiting from the first folding unit 28 passes through the pressing unit 29 in which the die-cutting unit 27 is integrated, so that the die-cutting of the second longitudinal leaf F2 is carried out at least in part simultaneously with the pressing of the transversal strips of glue S' and S''.

[0135] As schematically represented in figures 12A to 12D as the tubular wrapping moves forwards in the sense of forward motion A2 along the conveying direction DT, the shaft 42 makes the die-cutter 35 to act on the second longitudinal leaf F2 where it starts to cut the first flank I1 of a transversal notch I.

[0136] After the shaft 42 has completed a rotation by an angle α1 from the start of the intervention of the die-cutter 35 on the second longitudinal leaf F2, the pressing element 44 starts to contact the first longitudinal leaf F1 pressing it on the longitudinal central portion F3 of the sheet F at the transversal strip S' of glue applied at the end of the longitudinal portion of the sheet F that defines the side B5 of an envelope B.

[0137] During a subsequent angle of rotation α2 of the shaft 42 and substantially equal to the angle subtended at the arc of circumference that defines the press element 44, the die-cutter 35' and the pressing element 44 act simultaneously respectively to press the first longitudinal leaf F1 on the longitudinal central portion F3 of the sheet F at the transversal strips S' and S" of glue applied to the adjacent ends of two successive longitudinal portions of the sheet F that define the side B5 and the side B4 of two successive envelopes and to start to notch the second flank I2 of the transversal notch I.

[0138] During a subsequent angle of rotation α3 of the shaft 42, the die-cutter 35' completes the incision of the second flank I2 of the transversal notch I, the pressing element 44 having already ended its pressing action.

[0139] At the exit from the pressing unit 29 having the die-cutting unit 27 integrated there, the second longitudinal leaf F2 has a plurality of transversal notches I, the flanks I1 and I2 of which define the bevel at one of the opposite ends of the closing flaps or "tabs" B3 of two successive envelopes, and the first longitudinal leaf F1 folded on the longitudinal central portion F3 adheres to the latter at the transversal strips of glue S' and S".

[0140] The continuous wrapping thus obtained then passes through the transversal cutting unit 30 that cuts it at the separation line LS between two successive longitudinal sections of the sheet F that define a respective envelope B and that is centred with respect to the corresponding pair of transversal strips S', S" of glue and to the vertex of the corresponding notch I.
defining in the sheet F being fed on the conveying plane PA, wherein the sheet F is fed along the feeding plane PA according to a feeding direction DA orthogonal or substantially orthogonal to the conveying direction DT.

[0147] The method of feeding the sheet F comprises moving the sheet F forward along a feeding plane PA which extends below the conveying plane PT, orthogonal or substantially orthogonal to the conveying direction DT and is defined at the entrance end 12a of the conveying plane PT, wherein the sheet F is fed along the feeding plane PA according to a feeding direction DA orthogonal or substantially orthogonal to the conveying plane PT and is deviated by a right angle or substantially a right angle in the passage from the feeding plane PA to the conveying plane PT.

[0148] In particular, the at least one die-cutting step is carried out after the sheet F has been deviated by about 90° to pass from the feeding plane PA to the conveying plane PT and, even more specifically, after the first longitudinal crease C1 and the second longitudinal crease C2 have been defined in it.

[0149] The at least one die-cutting step, therefore, takes place when the sheet F moves forward along the conveying direction DT.

[0150] The at least one die-cutting step, moreover, is provided, in particular, to die-cut the second longitudinal leaf F2, or in any case the longitudinal portion of the continuous sheet F that defines the second longitudinal leaf F2, to die-cut it in the closing flap B3 and/or the profile of the closing flap B3 of each envelope B.

[0151] Such an at least one die-cutting step is carried out, in particular, to define in the second longitudinal leaf F2 a plurality of transversal notches I as described above and/or a plurality of incisions, toothings, perforations for tamper-proofing aimed at highlighting when the envelopes have been opened.

[0152] There could also be more than one die-cutting step and they could be carried out simultaneously or in succession after one another.

[0153] The method according to the present invention also comprises, after the step of defining in the sheet F the pair of longitudinal folding creases C1 and C2, even in a different succession to one another, at least the operative steps of:
- folding the first longitudinal leaf F1 on the longitudinal central portion F3 of the sheet F so as to at least partially cover the products P, forming the back B2 of the envelopes B and obtaining a continuous wrapping, or folding the portion of the first longitudinal leaf F1 of each longitudinal section of the sheet F that defines a respective envelope B on the respective portion of the longitudinal central portion F3 so as to at least partially cover the respective product P forming the back B2 of the respective envelope B;
- pressing the first longitudinal leaf F1 folded on the longitudinal central portion F3 or the portion of the first longitudinal leaf F1 of each longitudinal section of the sheet F that defines a respective envelope B folded on the respective portion of the longitudinal central portion F3, exerting a pressure on them at least one transversal strip S, S'' of adhesive or glue present or in any case applied on the sheet F or on each longitudinal section of the sheet F that defines a respective envelope B at least one segment of at least one of the two transversal sides of each longitudinal section that defines a corresponding envelope B;
- transversally cutting the continuous wrapping obtained by the folding at least the first longitudinal leaf or in any case the sheet F between two successive products P so as to obtain a plurality of longitudinal sections that are separated from one another and each defining a respective envelope B.

[0154] In the method according to the present invention, the at least one die-cutting step, in particular the at least one die-cutting step of the second longitudinal leaf F2, is carried out after the step of folding the first longitudinal leaf F1 on the longitudinal central portion F3 so as to at least partially cover the products P and obtain a continuous wrapping and before the step of transversally cutting such a continuous wrapping between two successive products P.

[0155] The at least one die-cutting step, in particular the at least one die-cutting step of the second longitudinal leaf F2, is carried out separately from the other operative steps or at least in part simultaneously with one of them.

[0156] For example, the at least one die-cutting step can be carried out separately and distinctly before the pressing step or after the pressing step and before the transversal cutting step.

[0157] Alternatively, the at least one die-cutting step can be carried out at least in part simultaneously with the pressing step or with the transversal cutting step.

[0158] After the at least one die-cutting step of the second longitudinal leaf F2 and after the folding step of the first longitudinal leaf F1 or in any case of the portion of the first longitudinal leaf F1 of each longitudinal section of the sheet F that defines a respective envelope B, there is a step of folding the second longitudinal leaf F2 thus die-cut on the first longitudinal leaf F1 or in any case the portion of the second longitudinal leaf F2 of each longitudinal section of the sheet F defines a respective envelope B on the corresponding portion of the first longitudinal leaf F1 already folded.

[0159] The step of folding the second longitudinal leaf F2 that is already die-cut can, in other words, be carried out before or after the transversal cutting step; if it is carried out before, then the entire die-cut second longitudinal leaf F2 is folded on the first longitudinal leaf F1 that is already folded, whereas if it is carried out after, on the other hand, the single portions thereof corresponding to each longitudinal section of the sheet F are folded on the respective portion of the first longitudinal leaf F1 that is already folded.

[0160] Such a folding step, moreover, can be preceded by a step of applying, on the second longitudinal leaf F2 or on the portion of the second longitudinal leaf F2 of each longitudinal section of the sheet F that defines a respective envelope B, a strip S''' of glue parallel to the conveying direction DT.

[0161] In a possible alternative embodiment of the method according to the present invention, there is a further die-cutting step carried out during the feeding step to die-cut the longitudinal central portion F3 of the sheet F or in any case the longitudinal portion of the sheet F that defines the longitudinal central portion F3 to define a window FS, a hole or other in it, at the front B1 of each envelope B.

[0162] Such a further die-cutting step can also or alternatively be provided to die-cut the first longitudinal leaf F1, or in any case the longitudinal portion of the sheet F that defines it to define in it the profile of the edge that defines the back B2 of each envelope B and/or transversal notches and/or perforations, holes, incisions, toothings or similar, in particular for tamper-proofing. Such a further die-cutting step could also take place in a packaging method that does not provide the at least one die-cutting step for die-cutting the first or the second longitudinal leaf.

[0163] In practice it has been noted how the present invention achieves the predetermined purposes.

[0164] The machine and the method for packaging according to the present invention, indeed, allow to carry out the die-cutting that defines the profile of the free edge of the closing flap of each envelope directly on the machine itself and during the packaging of the products in single envelopes, eliminating the need for dedicated "on line" or "off-line" die-cutting apparatuses and thus eliminating the installation, management and maintenance costs of the latter and the bulk occupied by them.

[0165] The machine and the method for packaging according to the present invention allow to carry out the die-cutting that defines the profile of the free edge of the closing flap of each envelope directly on the machine itself and during the packaging of the products in single envelopes, in particular, after the deviation by about 90° that the continuous sheet of paper undergoes when entering while passing from the feeding plane to the conveying plane. This allows to more safely preserve the
The machine and the method for packaging according to the present invention also allow to obtain profiles of the free edge of the closing flap of the envelopes that copy those of standard pre-formed envelopes and, consequently, to reduce the dimensions of the continuous sheet of paper necessary to package them.

The machine and the method for packaging according to the present invention also allow to carry out the die-cutting that defines the profile of the free edge of the closing flap of each envelope directly on the machine itself and during the packaging of the products in single envelopes and, in particular, during and simultaneously to the pressing for closing one or both of the adjacent transversal sides of two successive envelopes. This allows to reduce the packaging times, with evident advantages in terms of production.

The machine and the method for packaging according to the present invention also allow to easily manage, for the same profile, the change in length of the single envelopes. For this purpose, indeed, it is no longer necessary to replace any processing unit and, in particular, any die-cutter, being sufficient to manage the speed of rotation of the die-cutter outside of each die-cutting operation. The die-cutter itself, moreover, consists of a drum sector and not a full drum, with a consequent reduction of the inertias involved and, therefore, the possibility of being able to make it rotate at a tangential speed equal to that of forward movement of the continuous sheet of paper along the conveying plane, without the need to provide buffers for the storage of the sheet itself upstream and/or downstream of it.

The machine and the method for packaging according to the present invention also allow to carry out the die-cutting that defines the profile of the free edge of the closing flap of each envelope directly on the machine itself and during the packaging of the products in single envelopes and, in particular, just before the operation of cutting and separating the single envelopes. This allows eliminating the phasing errors of the cutting operation with the forward movement of the continuous sheet of paper and, therefore, to centre the cutting at the separation line of two successive longitudinal portions of the sheet itself that each define a respective envelope. Therefore, it is no longer necessary to provide astride of such a same separation line an auxiliary compensation portion of the position errors of the transversal cut with consequent further reduction of the dimensions of the sheet needed to obtain the same number of envelopes with respect to the prior art.

The possible presence of an auxiliary die-cutting unit to form a window in the front of each envelope allows to use the machine to carry out operations that are currently carried out with separate apparatuses.

Claims

1. Automatic packaging machine (10) for continuously packaging products (P) each wrapped in a single envelope (B), comprising:

   - a conveyor (12) that defines a conveying plane (PT) for conveying a continuous sheet (F) of packaging material, in particular paper, along a conveying direction (DT), said conveying plane (PT) comprising an entrance end (12a) of said continuous sheet (F) and an exit end of a plurality of envelopes, each containing one of said products (P), wherein said entrance end (12a) of said conveyor can be associated with a feeding unit of a plurality of products (P) in succession one after another and at a distance one from another on the continuous sheet (F) fed on said conveying plane (PT),
   - a feeding unit (18) for feeding said continuous sheet (F) on said conveying plane (PT) and that feeds said continuous sheet (F) along a feeding plane (PA) that extends below said conveying plane (PT), is orthogonal or substantially orthogonal to said conveying direction (DT) and is defined at said entrance end (12a) of said conveying plane (PT), wherein said continuous sheet (F) is fed along said feeding plane (PA) according to a feeding direction (DA) orthogonal or substantially orthogonal to said conveying plane (PT) and is deviated by a right angle or substantially a right angle in the passage from said feeding plane (PA) to said conveying plane (PT),
   - a creasing unit (26) of said continuous sheet (F) to define a pair of longitudinal creases (C1, C2) in it for respectively folding a first longitudinal leaf (F1) that defines the back (B2) of said envelopes (B) and a second longitudinal leaf (F2) that defines the closing flap (B3) of said envelopes (B), wherein said first longitudinal leaf (F1) and said second longitudinal leaf (F2) define a longitudinal central portion (F3) of said continuous sheet that defines the front (B1) of each of
Packaging machine (10) according to claim 1 or 2, characterised in that it comprises:
- at least one die-cutting unit (27) for die-cutting at least one of said first longitudinal leaf (F1), or in any case the longitudinal portion of said continuous sheet that defines said first longitudinal leaf, and said second longitudinal leaf (F2), or in any case the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, to die-cut in it the back (B2) and/or the profile of the back (B2) and the closing flap (B3) and/or the profile of the closing flap (B3) of each of said envelopes (B), respectively, wherein said die-cutting unit (27) is arranged between said entrance end and said exit end of said conveying plane (PT) to act on said continuous sheet (F) fed on said conveying plane (PT).

Packaging machine (10) according to one or more operative units and arranged between said entrance end and said exit end of said conveying plane (PT).

Packaging machine (10) according to claim 1, characterised in that said at least one die-cutting unit (27) is designed to die-cut said second longitudinal leaf (F2), or in any case the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, to die-cut in it said closing flap of each of said envelopes and/or define in it the profile of said closing flap of each of said envelopes (B).

Packaging machine (10) according to claim 1 or 2, characterised in that said creasing unit (26) is arranged at said entrance end (12a) of said conveying plane (PT) and in that said at least one die-cutting unit (27) is arranged downstream, with respect to the sense of forward motion (A2) of said conveying direction (DT), of said creasing unit (26) to act on said continuous sheet (F) fed on said conveying plane (PT).

Packaging machine (10) according to one or more of the previous claims, characterised in that it comprises, downstream, with respect to the sense of forward motion (A2) of said conveying direction (DT), of said creasing unit (26) and also in a different succession, at least the following operative units:
- a first folding unit (28) for folding said first longitudinal leaf (F1) on said longitudinal central portion (F3) of said continuous sheet so as to at least partially cover said products (P), forming the back (B2) of said envelopes (B) and obtaining a continuous wrapping, or for folding the portion of said first longitudinal leaf (F1) of each longitudinal section of said continuous sheet (F) so as to at least partially cover the respective product (P) forming the back (B2) of the respective envelope, - a pressing unit (29) for exerting a pressure on said first longitudinal leaf (F1) folded on said longitudinal central portion (F3) or in any case on the portion of said first longitudinal leaf (F1) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) folded on the respective portion of said longitudinal central portion (F3) at at least one transversal strip (S, S') of adhesive or glue present or in any case applied on said continuous sheet (F) or on each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) at at least one segment of at least one of the two transversal sides of each said longitudinal section that defines a corresponding envelope (B), - a transversal cutting unit (30) for the transversal cutting of said continuous wrapping or in any case of said continuous sheet (F) between two successive products (P) so as to obtain a plurality of longitudinal sections of said continuous wrapping or of continuous sheet (F) that are separate from each other and each defining a respective envelope (B).

Packaging machine (10) according to claim 4, characterised in that said at least one die-cutting unit (27) is a separate and distinct unit from each of said operative units and arranged between said entrance end (12a) and said exit end (12b) of said conveying plane (PT).

Packaging machine (10) according to claim 5, characterised in that said at least one die-cutting unit is arranged upstream, with respect to the sense of forward motion (A2) of said continuous sheet (F) along said conveying direction (DT), with respect to said cutting unit (30).

Packaging machine (10) according to one or more of the previous claims, characterised in that said at least one die-cutting unit (27) comprises a drum-type or drum sector or segment-type die-cutter (35, 35') that is rotatably supported above said conveying plane (PT) with its own longitudinal axis parallel to said conveying plane and transversal to said conveying direction (DT) and that is associative with motor means for making it rotate and a contrast element (17, 15) of said die-cutter arranged with its contrast surface substantially at the level of said conveying plane (PT).

Packaging machine (10) according to claim 4, characterised in that said at least one die-cutting unit (27) is integrated or in any case incorporated in said
pressing unit (29) or in said transversal cutting unit (30).

9. Packaging machine (10) according to claim 8, characterised in that said at least one die-cutting unit (27) is integrated or in any case incorporated in said pressing unit (29) and in that said pressing unit (29) comprises a shaft (42) that is rotatably supported above said conveying plane (PT) with its longitudinal axis parallel to said conveying plane (PT) and transversal to said conveying direction (DT) and that is associative with motor means for making it rotate about its own axis and a pressing element (44) that is mounted on said shaft (42), wherein said at least one die-cutting unit (27) is integrated in said feeding unit and is designed to die-cut, in said first longitudinal leaf (F1) or in any case in the longitudinal portion of said continuous sheet that defines said first longitudinal leaf and/or in said second longitudinal leaf (F2) or in any case in the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, a plurality of perforations, incisions, toothings or similar, in particular for tamper-proofing.

10. Packaging machine (10) according to one or more of claims 4 to 9, characterised in that it comprises a second folding unit (40) arranged downstream, with respect to the sense of forward motion (A2) of said continuous sheet (F) along said conveying direction (DT), of said first folding unit (28) and of said at least one die-cutting unit (27) for folding said second longitudinal leaf (F2) on said first longitudinal leaf (F1) that has already been folded or for folding the portion of said second longitudinal leaf (F2) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) on the corresponding portion of said first longitudinal leaf (F1) that has already been folded.

11. Packaging machine (10) according to one or more of claims 4 to 10, characterised in that it comprises a glue application unit (41) arranged downstream, with respect to the sense of forward motion (A2) of said continuous sheet (F) along said conveying direction (DT), of said at least one die-cutting unit (27) for applying at least one strip (S'') of glue parallel to said conveying direction (DT) on said second longitudinal leaf (F2) or on the portion of said second longitudinal leaf (F2) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) on the corresponding portion of said first longitudinal leaf (F1) that has already been folded.

12. Packaging machine (10) according to claim 2 and to one or more of claims 3 to 11, characterised in that said at least one die-cutting unit (27) is designed to die-cut, in said second longitudinal leaf (F2) or in any case in the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, a plurality of transversal notches (I), each of which comprises a first flank (I1) and a second flank (I2) that are angled to one another and convergent towards the respective longitudinal folding crease (C2) and that define the profile at an end of the closing flap (B3) of two consecutive envelopes (B).

13. Packaging machine (10) according to claim 12, characterised in that said first flank (I1) and said second flank (I2) of each of said transversal notches (I) intersect one another in a "V" with the vertex of the "V" substantially at said longitudinal folding crease (C2) of said second longitudinal leaf (F2).

14. Packaging machine (10) according to one or more of the previous claims, characterised in that said at least one auxiliary die-cutting unit (270) that is integrated in said feeding unit and is designed to die-cut at least one of said first longitudinal leaf (F1), or in any case the longitudinal portion of said continuous sheet that defines said first longitudinal leaf (F1), and said longitudinal central portion (F3) of said continuous sheet (F), or in any case the longitudinal portion of said continuous sheet (F) that defines said longitudinal central portion (F3), to respectively define in it the profile of the edge that defines the back (B2) of each of said envelopes (B) and a window (FS) at the front of each of said envelopes (B) and/or perforations, holes, incisions, toothings or similar, in particular for tamper-proofing.

15. Packaging machine (10) according to one or more of the previous claims, characterised in that it comprises at least one auxiliary die-cutting unit (270) that is integrated in said feeding unit and is designed to die-cut at least one of said first longitudinal leaf (F1), or in any case the longitudinal portion of said continuous sheet that defines said first longitudinal leaf (F1), and said longitudinal central portion (F3) of said continuous sheet (F), or in any case the longitudinal portion of said continuous sheet (F) that defines said longitudinal central portion (F3), to respectively define in it the profile of the edge that defines the back (B2) of each of said envelopes (B) and a window (FS) at the front of each of said envelopes (B) and/or perforations, holes, incisions, toothings or similar, in particular for tamper-proofing.

16. Method for continuously packaging products (P), each wrapped in a single envelope (B), comprising the steps of:

- feeding a continuous sheet (F) of packaging material, in particular paper, on a conveying plane (PT), wherein said conveying plane (PT) is movable to transport said continuous sheet (F) along a conveying direction (DT) in a sense of forward motion (A2) between an entrance end (12a) of said continuous sheet (F) and an exit end (12b) of a plurality of envelopes each containing a respective product (P), wherein said feeding comprises making said continuous sheet (F) advance along a feeding plane (PA) that extends below said conveying plane (PT), is orthogonal or substantially orthogonal to said conveying direction (DT) and is defined at said entrance end (12a) of said continuous sheet (F) and is fed along said feeding plane (PA) according to a feeding direction (DA) orthogonal or substantial-
Packaging method according to one or more of claims 16 to 18, also comprising, after said step of defining in said continuous sheet (F) a plurality of longitudinal creases (C1, C2) for folding a respective longitudinal leaf (F1, F2), a first longitudinal leaf (F1) that defines the back (B2) of said envelopes (B) and a second longitudinal leaf (F2) that defines the closing flap (B3) of said envelopes (B), respectively, wherein said first longitudinal leaf (F1) and said second longitudinal leaf (F2) define a longitudinal central portion (F3) of said continuous sheet that defines the front of said envelopes and on which said products (P) are fed arranged in succession one after another and at a distance from one another; characterised in that after said feeding of said continuous sheet (F) on said conveying plane (PT) and before the exit of said envelopes (B) from said exit end of said conveying plane (PT) there is at least one step of:

- die-cutting at least one of said first longitudinal leaf (F1), or in any case the longitudinal portion of said continuous sheet that defines said first longitudinal leaf, and said second longitudinal leaf (F2), or in any case the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, to respectively die-cut in it the back (B2) and/or the profile of the back (B2) and the closing flap (B3) and/or the profile of the closing flap (B3) of each of said envelopes (B).

17. Packaging method according to claim 16, wherein said at least one die-cutting step is provided for die-cutting said second longitudinal leaf (F2), or in any case the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, to die-cut in it the closing flap (B3) and/or the profile of the closing flap (B3) of each of said envelopes (B).

18. Packaging method according to claim 16 or 17, wherein said at least one die-cutting step follows said step of defining in said continuous sheet (F) said pair of longitudinal folding creases (C1, C2).

19. Packaging method according to one or more of claims 16 to 18, also comprising, after said step of defining in said continuous sheet (F) said pair of longitudinal folding creases (C1, C2), also in a different succession to one another, at least the operative steps of:

- folding said first longitudinal leaf (F1) on said longitudinal central portion (F3) of said continuous sheet so as to at least partially cover said products (P), forming the back (B2) of said envelopes (B) and obtaining a continuous wrapping, or folding the portion of said first longitudinal leaf (F1) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) on the respective portion of said longitudinal central portion (F3) so as to at least partially cover the respective product (P) forming the back (B2) of the respective envelope,
- pressing said first longitudinal leaf (F1) folded on said longitudinal central portion (F3) or the portion of said first longitudinal leaf (F1) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) folded on the respective portion of said longitudinal central portion (F3), exerting a pressure at at least one transversal strip (S', S") of adhesive or glue present or in any case applied on said continuous sheet (F) or on each longitudinal section of said continuous sheet (F) that defines a respective envelope (B) at at least one segment of at least one of the two transversal sides of each said longitudinal section that defines a corresponding envelope (B),
- transversally cutting said continuous wrapping or said continuous sheet (F) between two successive products (P) so as to obtain a plurality of longitudinal sections of said continuous wrapping or of said continuous sheet that are separate from one another and each defining a respective envelope (B).

20. Packaging method according to claim 19, wherein said at least one die-cutting step takes place at least in part simultaneously with said pressing step or with said transversal cutting step.

21. Packaging method according to claim 19, wherein said at least one die-cutting step is separate and distinct from each of said operative steps and preferably takes place before said pressing step and/or before said transversal cutting step.

22. Packaging method according to one or more of claims 19 to 21, comprising, after said at least one die-cutting step and after said step of folding said first longitudinal leaf (F1) or the portion of said first longitudinal leaf (F1) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B), a step of folding said second longitudinal leaf (F2) on said first longitudinal leaf (F1) that has already been folded or the portion of said second longitudinal leaf (F2) of each longitudinal section of
Method according to one or more of claims 16 to 26, 27.

23. Method according to one or more of claims 19 to 22, also comprising, after said at least one die-cutting step, a step of applying, on said second longitudinal leaf (F2) or on the portion of said second longitudinal leaf (F2) of each longitudinal section of said continuous sheet (F) that defines a respective envelope (B), a strip (S") of glue parallel to said conveying direction (DT).

24. Method according to one or more of claims 18 to 23, wherein said die-cutting step consists of die-cutting, in said second longitudinal leaf (F2) or in any case in the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, a plurality of transversal notches (I), each of which comprises a first flank (I1) and a second flank (I2) that are angled to one another and convergent towards the respective longitudinal folding crease (C2) and that define the profile of an end of the closing flap (B3) of two consecutive envelopes (B).

25. Method according to claim 24, wherein said first flank (I1) and said second flank (I2) of each of said transversal notches (I) intersect in a "V" with the vertex of the "V" substantially at the longitudinal folding crease (C2) of said second longitudinal leaf (F2).

26. Method according to one or more of claims 16 to 25, wherein said die-cutting step consists of die-cutting, in said first longitudinal leaf (F1) or in any case in the longitudinal portion of said continuous sheet that defines said first longitudinal leaf and/or in said second longitudinal leaf (F2) or in any case in the longitudinal portion of said continuous sheet that defines said second longitudinal leaf, a plurality of perforations, incisions, toothings or similar, in particular for tamper-proofing.

27. Method according to one or more of claims 16 to 26, also comprising at least one further die-cutting step carried out during said feeding step to die-cut at least one of said first longitudinal leaf (F1), or in any case the longitudinal portion of said continuous sheet that defines said first longitudinal leaf (F1), and said longitudinal central portion (F3) of said continuous sheet (F), or in any case the longitudinal portion of said continuous sheet (F) that defines said longitudinal central portion (F3), to respectively define in it the profile of the edge that defines the back (B2) of each of said envelopes (B) and a window (FS) at the front of each of said envelopes (B) and/or perforations, holes, incisions, toothings or similar, in particular for tamper-proofing.

Patentansprüche

1. Automatische Verpackungsmaschine (10) zum kontinuierlichen Verpacken von Produkten (P), die jeweils in einem einzelnen Umschlag (B) eingeschlagen sind, umfassend:

- einen Förderer (12), der eine Förderebene (PT) zum Fördern einer Endlosbahn (F) von Verpackungsmaterial, insbesondere Papier, entlang einer Förderrichtung (DT) definiert, wobei diese Förderebene (PT) ein Eintrittsende (12a) für die Endlosbahn (F) und ein Austrittsseite für eine Vielzahl von Umschlägen, die jeweils eines der Produkte (P) enthalten, umfasst, wobei das Eintrittsende (12a) des Förderers mit einer Einheit zum Zuführen einer Vielzahl von einem nach dem anderen aufeinanderfolgenden und von einander beabstandeten Produkten (P) auf die Endlosbahn (F), die auf die Förderebene (PT) zugeführt wird, verbunden werden kann,

- eine Zuführeinheit (18) zum Zuführen der Endlosbahn (F) auf die Förderebene (PT) und die Endlosbahn (F) entlang einer Zuführungsebene (PA) zu führen, die sich unterhalb der Förderebene (PT) erstreckt, orthogonal oder im Wesentlichen orthogonal zur Förderrichtung (DT) ist und am Eintrittsende (12a) der Förderebene (PT) definiert ist, wobei diese Endlosbahn (F) entlang der Zuführungsebene (PA) als einer Zuführungsebene (DA) zugeführt wird, die orthogonal oder im Wesentlichen orthogonal zur Förderebene (PT) ist und beim Übergang von der Zuführungsebene (PA) zur Förderebene (PT) um einen rechten Winkel oder einen im Wesentlichen rechtwinkligen Winkel abgelenkt ist,

- eine Rilleinheit (26) für die Endlosbahn (F), um ein Paar von Längsrillen (C1, C2) in ihr zum Falten eines ersten longitudinalen Blatts (F1), das die Rückseite (B2) der Umschläge (B) definiert, beziehungsweise eines zweiten longitudinalen Blatts (F2), das die Verschlusskappe (B3) der Umschläge (B) definiert, zu definieren, wobei das erste longitudinale Blatt (F1) und das zweite longitudinal Blatt (F2) einen longitudinalen Mittelabschnitt (F3) der Endlosbahn definiert, der die Vorderseite (B1) von jedem dieser Umschläge (B) definiert und auf den die Produkte (P) eines nach dem anderen aufeinanderfolgenden und von einander beabstandeten angeordnet zugeführt werden, wobei diese Verpackungsmaschine (10) dadurch gekennzeichnet ist, dass sie Folgendes umfasst:

- mindestens eine Stanzeinheit (27) zum Stanzen von mindestens einem von den ersten longitudinalen Blatt (F1) oder jedenfalls dem longitudinalen Abschnitt der Endlosbahn, der das
1. Verpackungsmaschine (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** die mindestens eine Stanzeinheit (27) gestaltet ist, um das zweite longitudinale Blatt (F2) oder jedenfalls den longitudinalen Abschnitt der Endlosbahn, der das zweite longitudinale Blatt definiert, um in es bzw. ihn die Rückseite (B2) und/oder die Kontur der Rückseite (B2) beziehungsweise die Verschlussklappe (B3) und/oder die Kontur der Verschlussklappe (B3) von jedem der Umschläge (B) zu stanzen, wobei diese Stanzeinheit (27) zwischen dem Eintrittsende und dem Austrittsende der Förderebene (PT) angeordnet ist, um auf die auf die Förderebene (PT) zugeführte Endlosbahn (F) einzuwirken.

2. Verpackungsmaschine (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** die mindestens eine Stanzeinheit (27) gestaltet ist, um das zweite longitudinale Blatt (F2) oder jedenfalls den longitudinalen Abschnitt der Endlosbahn, der das zweite longitudinale Blatt definiert, zu stanzen, um in es bzw. ihn die Verschlussklappe von jedem der Umschläge zu stanzen und/oder in ihm die Kontur der Verschlussklappe von jedem der Umschläge (B) zu definieren.

3. Verpackungsmaschine (10) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Rilleinheit (26) am Eintrittsende (12a) der Förderebene (PT) angeordnet ist, und dadurch, dass die mindestens eine Stanzeinheit (27), bezogen auf die Richtung der Vorwärtsbewegung (A2) der Endlosbahn (F) entlang der Förderrichtung (DT), stromabwärts der Rilleinheit (26) angeordnet ist, um auf die auf die Förderebene (PT) zugeführte Endlosbahn (F) einzuwirken.

4. Verpackungsmaschine (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie, bezogen auf die Richtung der Vorwärtsbewegung (A2) der Endlosbahn (F) entlang der Förderrichtung (DT), stromabwärts der Rilleinheit (26) und auch in einer unterschiedlichen Reihenfolge mindestens die folgenden Wirkeinheiten umfasst:

- eine erste Falteinheit (28) zum Falten des ersten longitudinalen Blatts (F1) auf den longitudinalen Mittelabschnitt (F3) der Endlosbahn, um die Produkte (P) zumindest teilweise zu bedecken, wodurch die Rückseite (B2) der Umschläge (B) ausgebildet wird und eine durchgehende Umhüllung erhalten wird, oder zum Falten des Abschnitts des ersten longitudinalen Blatts (F1) von jedem Längsabschnitt der Endlosbahn (F), der einen jeweiligen Umschlag (B) definiert, auf den entsprechenden Abschnitt des longitudinalen Mittelabschnitts (F3), um das entsprechende Produkt (P) zumindest teilweise zu bedecken, wodurch die Rückseite (B2) des jeweiligen Um- schlags ausgebildet wird.

- eine Andrückeinheit (29) zum Ausüben eines Drucks auf das erste longitudinale Blatt (F1), das auf den longitudinalen Mittelabschnitt (F3) gefaltet ist, oder jedenfalls auf den Abschnitt des ersten longitudinalen Blatts (F1) von jedem Längsabschnitt der Endlosbahn (F), der einen jeweiligen Umschlag (B) definiert, der auf den entsprechenden Abschnitt des longitudinalen Mittelabschnitts (F3) gefaltet ist, bei mindestens einem Querstreifen (S, S') von Klebstoff oder Leim, der auf der Endlosbahn (F) oder auf jedem Längsabschnitt der Endlosbahn (F), der einen jeweiligen Umschlag (B) definiert, bei mindestens einem Segment von mindestens einem der zwei Querseiten von jedem Längsabschnitt, der einen entsprechenden Umschlag (B) definiert, vorhanden ist oder jedenfalls auf sie bzw. ihn aufgebracht ist,

- eine Querschneideeinheit (30) zum Schneiden in Querrichtung der durchgehenden Umhüllung oder jedenfalls der Endlosbahn (F) zwischen zwei aufeinanderfolgenden Produkten (P), um eine Vielzahl von Längsabschnitten der durchgehenden Umhüllung oder der Endlosbahn (F) zu erhalten, die voneinander getrennt sind und jeweils einen entsprechenden Umschlag (B) definieren.

5. Verpackungsmaschine (10) nach Anspruch 4, **dadurch gekennzeichnet, dass** die mindestens eine Stanzeinheit (27) eine separate und von jeder der Wirkeinheiten getrennte Einheit und zwischen dem Eintrittsende (12a) und dem Austrittsende (12b) der Förderebene (PT) angeordnet ist.

6. Verpackungsmaschine (10) nach Anspruch 5, **dadurch gekennzeichnet, dass** die mindestens eine Stanzeinheit, bezogen auf die Richtung der Vorwärtsbewegung (A2) der Endlosbahn (F) entlang der Förderrichtung (DT), stromaufwärts der Rilleinheit (26) und in Querrichtung der durchgehenden Umhüllung oder jedenfalls auf die entsprechenden Abschnitte der durchgehenden Umhüllung oder der Endlosbahn (F) gegeben ist, oder jedenfalls auf die entsprechenden Abschnitte der durchgehenden Umhüllung oder der Endlosbahn (F) zu erhalten, die voneinander getrennt sind und jeweils einen entsprechenden Umschlag (B) definieren.

7. Verpackungsmaschine (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die mindestens eine Stanzeinheit (27) eine trommelartige oder Trommelsektor- oder segmentartige Stanzvorrichtung (35, 35'), die über die Förderebene (PT) mit ihrer Längsachse parallel zur Förderebene und quer zur Förderrichtung (DT) drehbar gelagert ist und die mit Motormitteln verbunden werden kann, um sie drehen zu lassen, und ein Gegenelement (17, 15) für die Stanzvorrichtung umfasst, das mit seiner Gegenfläche im We sentlichen auf der Höhe der Förderebene (PT) angeordnet ist.

8. Verpackungsmaschine (10) nach Anspruch 4, **dadurch gekennzeichnet, dass** die mindestens eine
9. Verpackungsmaschine (10) nach Anspruch 8, **dadurch gekennzeichnet, dass** die mindestens eine Stanzeinheit (27) in die Andrückeinheit (29) integriert oder jedenfalls eingebaut ist.

10. **Verpackungsmaschine (10) nach Anspruch 2 und**

11. **Verpackungsmaschine (10) nach einem oder meh-**

12. **Verpackungsmaschine (10) nach Anspruch 2 und**

13. **Verpackungsmaschine (10) nach Anspruch 12, **

14. **Verpackungsmaschine (10) nach einem oder meh-**

15. **Verpackungsmaschine (10) nach einem oder meh-**

16. **Verfahren zum kontinuierlichen Verpacken von Pro-**
wärtsbewegungsrichtung (A2) zwischen einem Eintrittsende (12a) für die Endlosbahn (F) und einem Austrittsende (12b) für eine Vielzahl von Umschlägen, die jeweils ein entsprechendes Produkt (P) enthalten, zu befördern, wobei dieses Zuführen das Veranlassen der Vorwärtsbewegung der Endlosbahn (F) entlang einer Zuführebe (PA) umfasst, die sich unterhalb der Förderebene (PT) erstreckt, orthogonal oder im Wesentlichen orthogonal zur Förderrichtung (DT) ist und am Eintrittsende (12a) der Förderebene (PT) definiert ist, wobei diese Endlosbahn (F) entlang der Zuführkante (PA) gemäß einer Zuführungrichtung (DA) zugeführt wird, die orthogonal oder im Wesentlichen orthogonal zur Förderebene (PT) ist und beim Übergang von der Zuführkante (PA) zur Förderkante (PT) um einen rechten Winkel oder einen im Wesentlichen rechten Winkel abgelenkt ist;
- Zuführen auf die sich entlang der Förderrichtung (DT) bewegende Endlosbahn (F) einer Vielzahl von Produkten (P), die eines nach dem anderen aufeinanderfolgend und voneinander beabsichtigt angeordnet sind;
- Definieren in der auf die Förderkante (PT) zugeführten oder sich entlang der Förderrichtung (DT) vorwärts bewegenden Endlosbahn (F) eines Paars von Längsrichtungen (C1, C2) zum Falten eines jeweiligen longitudinalen Blatts (F1, F2), eines ersten longitudinalen Blatts (F1), das die Rückseite (B2) der Umschläge (B) definiert, beziehungsweise eines zweiten longitudinalen Blatts (F2), das die Verschlusskappe (B3) der Umschläge (B) definiert, wobei das erste longitudinale Blatt (F1) und das zweite longitudinale Blatt (F2) einen longitudinalen Mittelschnitt (F3) der Endlosbahn definieren, der die Vorderseite der Umschläge definiert und auf den die Produkte (P) eines nach dem anderen aufeinanderfolgend und voneinander beabsichtigt angeordnet zugeführt werden; dadurch gekennzeichnet, dass nach dem Zuführen der Endlosbahn (F) auf die Förderkante (PT) und vor dem Austritt der Umschläge (B) aus dem Austrittsende der Förderkante (PT) mindestens einer der folgenden Schritte vorgesehen ist:
- Stanzen von mindestens einem von dem ersten longitudinalen Blatt (F1) oder jedenfalls dem Längsschnitt der Endlosbahn, der das erste longitudinale Blatt definiert, und dem zweiten longitudinalen Blatt (F2) oder jedenfalls dem longitudinalen Abschnitt der Endlosbahn, der das zweite longitudinale Blatt definiert, um in es bzw. ihn die Rückseite (B2) und/oder die Kontur der Rückseite (B2) beziehungsweise die Verschlusskappe (B3) und/oder die Kontur der Verschlusskappe (B3) von jedem der Umschläge (B) zu stanzen.
und jeweils einen entsprechenden Umschlag (B) definieren.

20. Verpackungsverfahren nach Anspruch 19, wobei der mindestens eine Stanzschritt zumindest teilweise gleichzeitig mit dem Andrückschritt oder mit dem Querschneideschritt erfolgt.


22. Verpackungsverfahren nach einem oder mehreren der Ansprüche von 19 bis 21, das nach dem mindestens einen Stanzschritt und nach dem Schritt des Falten des ersten longitudinalen Blatts (F1) oder des Abschnitts des ersten longitudinalen Blattes (F1) von jedem Längsabschnitt der Endlosbahn (F), der einen jeweiligen Umschlag (B) definiert, einen Schritt des Falten des zweiten longitudinalen Blatts (F2) auf das erste longitudinale Blatt (F1), das schon gefaltet wurde, oder des Abschnitts des zweiten longitudinalen Blattes (F2) von jedem Längsabschnitt der Endlosbahn (F), der einen jeweiligen Umschlag (B) definiert, auf den entsprechenden Abschnitt des ersten longitudinalen Blattes (F1), das schon gefaltet wurde, umfasst.

23. Verfahren nach einem oder mehreren der Ansprüche von 19 bis 22, das ferner nach dem mindestens einen Stanzschritt einen Schritt des Aufbringens auf das zweite longitudinale Blatt (F2) oder auf den Abschnitt des zweiten longitudinalen Blattes (F2) von jedem Längsabschnitt der Endlosbahn (F), der einen jeweiligen Umschlag (B) definiert, einer Vielzahl von Perforationen, Löcher, Einschnitten, Verzahnungen oder dergleichen, insbesondere für die Originalitätssicherung, besteht.

24. Verfahren nach einem oder mehreren der Ansprüche von 19 bis 23, wobei der Stanzschritt im Stanzen in das erste longitudinale Blatt (F1) oder jedenfalls in den Längsabschnitt der Endlosbahn, der das erste longitudinale Blatt definiert, und/oder in das zweite longitudinale Blatt (F2) oder jedenfalls in den Längsabschnitt der Endlosbahn, der das zweite longitudinale Blatt definiert, einer Vielzahl von Perforationen, Einschnitten, Verzahnungen oder dergleichen, insbesondere für die Originalitätssicherung, besteht.

25. Verfahren nach Anspruch 24, wobei die erste Flanke (11) und die zweite Flanke (12) von jedem der Quereinschnitte (i) einander in einem "V" schneiden, wo- bei sich der Scheitel des "V" im Wesentlichen an der Längsfaltrille (C2) des zweiten longitudinalen Blatts (F2) befindet.

26. Verfahren nach einem oder mehreren der Ansprüche von 16 bis 25, wobei der Stanzschritt im Stanzen in das erste longitudinale Blatt (F1) oder jedenfalls in den Längsabschnitt der Endlosbahn, der das erste longitudinale Blatt definiert, und/oder in das zweite longitudinale Blatt (F2) oder jedenfalls in den Längsabschnitt der Endlosbahn, der das zweite longitudinale Blatt definiert, einer Vielzahl von Perforationen, Einschnitten, Verzahnungen oder dergleichen, insbesondere für die Originalitätssicherung, besteht.

27. Verfahren nach einem oder mehreren der Ansprüche von 16 bis 26, das ferner mindestens einen weiteren Stanzschritt umfasst, der während des Zuführschritts ausgeführt wird, um mindestens eines von dem ersten longitudinalen Blattes (F1) oder jedenfalls dem Längsabschnitt der Endlosbahn der das erste longitudinale Blatt (F1) definiert, und dem longitudinalen Mittelabschnitt (F3) der Endlosbahn (F) oder jedenfalls dem Längsabschnitt der Endlosbahn (F), der den longitudinalen Mittelabschnitt (F3) definiert, zu stanzen, um in ihm jeweils die Kontur des Rands, der die Rückseite (B2) von jedem der Umschläge (B) definiert, und ein Fenster (FS) auf der Vorderseite von jedem der Umschläge (B) und/oder Perforationen, Löcher, Einschnitte, Verzahnungen oder dergleichen, insbesondere für die Originalitätssicherung, zu definieren.

Revendications

1. Machine de conditionnement automatique (10) pour emballer en continu des produits (P) enveloppés chacun dans une enveloppe individuelle (B), comprenant :

- un convoyeur (12) qui définit un plan de transport (PT) pour transporter une feuille continue (F) de matériau d’emballage, en particulier du papier, suivant une direction de transport (DT), le dit plan de transport (PT) comprenant une extrémité d’entrée (12a) de la feuille continue (F) et une extrémité de sortie d’une pluralité d’emballages, contenant chacun un desdits produits (P), dans laquelle ladite extrémité d’entrée (12a) dudit convoyeur peut être associée à une unité d’alimentation d’une pluralité de produits (P) en succession l’un après l’autre et à une distance l’un de l’autre sur la feuille continue (F) alimentée sur ledit plan de transport (PT),

- une unité de d’alimentation (18) pour alimenter ladite feuille continue (F) sur ledit plan de transport (PT) qui alimente ladite feuille continue (F) le long d’un plan d’alimentation (PA) qui s’étend au-dessous dudit plan de transport (PT), est orthogonal ou sensiblement orthogonal à la direction de transport (DT) et est défini au
niveau de ladite extrémité d’entrée (12a) dudit plan de transport (PT), dans laquelle ladite feuille continue (F) est alimentée le long dudit plan d’alimentation (PA) suivant une direction d’alimentation (DA) orthogonale ou sensiblement orthogonale audit plan de transport (PT) et qui est déviée à angle droit ou à un angle sensiblement droit dans le passage dudit plan d’alimentation (PA) audit plan de transport (PT),

- une unité de rainurage (26) de ladite feuille continue (F) pour définir une paire de rainures longitudinales (C1, C2) dans celle-ci pour plier respectivement un premier feuillet longitudinal (F1) qui définit la partie arrière (B2) desdites enveloppes (B) et un deuxième feuillet longitudinal (F2) qui définit le volet de fermeture (B3) desdites enveloppes (B), dans lequel ledit premier feuillet longitudinal (F1) et ledit deuxième feuillet longitudinal (F2) définissent une portion centrale longitudinale (F3) de ladite feuille continue qui définit la partie avant (B1) de chacune desdites enveloppes (B) et sur laquelle lesdits produits (P) sont alimentés agencés en succession l’un après l’autre et à une distance l’un de l’autre, dans laquelle ladite machine de conditionnement (10) est caractérisée en ce que

- au moins une unité de découpage (27) pour découper au moins un dudit premier feuillet longitudinal (F1), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit premier feuillet longitudinal, et dudit deuxième feuillet longitudinal (F2), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit deuxième feuillet longitudinal, pour découper dans celui-ci la partie arrière (B2) et/ou le profil de la partie arrière (B2) et le volet de fermeture (B3) et/ou le profil du volet de fermeture (B3) de chacune desdites enveloppes (B), respectivement, dans laquelle ladite feuille continue (F) est alimentée le long dudit plan de transport (PT) pour agir sur ladite feuille continue (F) alimentée sur ledit plan de transport (PT).

2. Machine de conditionnement (10) selon la revendication 1, caractérisée en ce que ladite au moins une unité de découpage (27) est conçue pour découper ledit deuxième feuillet longitudinal (F2), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit deuxième feuillet longitudinal, pour découper dans celui-ci le profil dudit volet de fermeture de chacune desdites enveloppes (B).

3. Machine de conditionnement (10) selon la revendication 1 ou 2, caractérisée en ce que ladite unité de rainurage (26) est agencée au niveau de ladite extrémité d’entrée (12a) dudit plan de transport (PT) et en ce que ladite au moins une unité de découpage (27) est agencée en aval, par rapport au sens de déplacement en avant (A2) de ladite feuille continue (F) suivant ladite direction de transport (DT), de ladite unité de rainurage (26) pour agir sur ladite feuille continue (F) alimentée sur ledit plan de transport (PT).

4. Machine de conditionnement (10) selon une ou plusieurs des revendications précédentes, caractérisée en ce qu’elle comprend, en aval, par rapport au sens de déplacement en avant (A2) de ladite feuille continue (F) suivant ladite direction de transport (DT), de ladite unité de rainurage (26) et également dans une succession différente, au moins les unités fonctionnelles suivantes :

- une première unité de pliage (28) pour plier ledit premier feuillet longitudinal (F1) sur ladite portion centrale longitudinale (F3) de ladite feuille continue de manière à couvrir au moins partiellement lesdits produits (P), en formant la partie arrière (B2) desdites enveloppes (B) et en obtenant un enveloppement continu, ou pour plier la portion dudit premier feuillet longitudinal (F1) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B) sur la portion respective de ladite portion centrale longitudinale (F3) de manière à couvrir au moins partiellement le produit respectif (P) en formant la partie arrière (B2) de l’enveloppe respective,

- une unité de pressage (29) pour exercer une pression sur ledit premier feuillet longitudinal (F1) plié sur ladite portion centrale longitudinale (F3) ou en tout cas sur la portion dudit premier feuillet longitudinal (F1) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B) piée sur ladite portion respective de ladite portion centrale longitudinale (F3) au niveau d’au moins une bande transversale (S’, S’”) d’adhésif ou de colle présente ou en tout cas appliquée sur ladite feuille continue (F) ou sur chaque section longitudinale de ladite feuille continue (F) qui définit une dite enveloppe respective (B) au niveau d’au moins un segment d’au moins un des deux côtés transversaux de chaque dite section longitudinale qui définit une enveloppe correspondante (B),

- une unité de coupe transversale (30) pour la coupe transversale dudit enveloppement continu ou en tout cas de ladite feuille continue (F) entre deux produits consécutifs (P) de manière à obtenir une pluralité de sections longitudinales dudit emballage continu ou de feuille continue.
5. Machine de conditionnement (10) selon la revendication 4, **caractérisée en ce que** ladite au moins une unité de découpage (27) est une unité séparée et distincte de chacune desdites unités fonctionnelles et agencée entre ladite extrémité d’entrée (12a) et ladite extrémité de sortie (12b) dudit plan de transport (PT).

6. Machine de conditionnement (10) selon la revendication 5, **caractérisée en ce que** ladite au moins une unité de découpage est agencée en amont, par rapport au sens du déplacement en avant (A2) de ladite feuille continue (F) suivant ladite direction de transport (DT), par rapport à ladite unité de coupe (30).

7. Machine de conditionnement (10) selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite au moins une unité de découpage (27) comprend une découpeuse de type segment ou secteur de tambour ou de type tambour (35, 35') qui est supportée en rotation au-dessus dudit arbre (42), dans laquelle ladite unité de pressage (29) comprend

8. Machine de conditionnement (10) selon la revendication 7, **caractérisée en ce que** ladite au moins une unité de découpage (27) est conçue pour découper, dans ledit presseur (44) avec son propre axe longitudinal parallèle audit plan de transport et transversal à ladite direction de transport et qui est associable à des moyens moteurs pour la faire tourner et un élément d’opposition (17, 15) de ladite découpeuse agencé avec sa surface d’opposition sensiblement au niveau dudit plan de transport (PT).

9. Machine de conditionnement (10) selon la revendication 8, **caractérisée en ce que** ladite au moins une unité de découpage (27) est intégrée ou en tout cas incorporée dans ladite unité de pressage (29) ou dans ladite unité de coupe transversale (30).

10. Machine de conditionnement (10) selon une ou plusieurs des revendications 4 à 9, **caractérisée en ce que** elle comprend une deuxième unité de pliage (40) agencée en aval, par rapport au sens de déplacement en avant (A2) de ladite feuille continue (F) suivant ladite direction de transport (DT), de ladite première unité de pliage (28) et de ladite au moins une unité de découpage (27) pour plier ledit deuxième feuillet longitudinal (F2) sur ledit premier feuillet longitudinal (F1) qui a déjà été plié ou pour plier la portion dudit deuxième feuillet longitudinal (F2) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B) sur la portion correspondante dudit premier feuillet longitudinal (F1) qui a déjà été plié.

11. Machine de conditionnement (10) selon une ou plusieurs des revendications 4 à 10, **caractérisée en ce que** elle comprend une unité d’application de colle (41) agencée en aval, par rapport au sens de déplacement en avant (A2) de ladite feuille continue (F) suivant ladite direction de transport (DT), de ladite au moins une unité de découpage (27) pour appliquer au moins une bande (S") de colle parallèle à ladite direction de transport (DT) sur ledit deuxième feuillet longitudinal (F2) ou sur la portion dudit deuxième feuillet longitudinal de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective.

12. Machine de conditionnement (10) selon la revendication 2 et une ou plusieurs des revendications 3 à 11, **caractérisée en ce que** ladite au moins une unité de découpage (27) est conçue pour découper, dans ledit deuxième feuillet longitudinal (F2) ou en tout cas dans la portion longitudinale de ladite feuille continue qui définit ledit deuxième feuillet longitudinal, une pluralité d’encoches transversales (I), chacune desquelles comprend un premier flanc (11) et un deuxième flanc (12) qui sont inclinés l’un par rapport à l’autre et convergents vers la rainure de pliage longitudinale respective (C2) et qui définissent le profil à une extrémité du volet de fermeture (B3) de deux enveloppes consécutives (B).

13. Machine de conditionnement (10) selon la revendication 12, **caractérisée en ce que** ledit premier flanc (11) et ledit deuxième flanc (12) de chacune desdites encoches transversales (I) se croisent en formant un « V » avec le sommet du « V » sensiblement au niveau de ladite rainure de pliage longitudinale (C2) dudit deuxième feuillet longitudinal (F2).

14. Machine de conditionnement (10) selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite au moins une unité de découpe (27) est conçue pour découper, dans ledit premier feuillet longitudinal (F1), ou en tout cas dans la portion longitudinale de ladite feuille continue qui dé-
16. Procédé pour emballer en continu des produits (P), enveloppés chacun dans une enveloppe individuelle en particulier pour une protection contre la fraude.

15. Machine de conditionnement (10) selon une ou plusieurs des revendications précédentes, caractérisée en ce qu'elle comprend au moins une unité de découpage auxiliaire (270) qui est intégrée dans ladite unité d'alimentation et est conçue pour découper au moins un dudit premier feuillet longitudinal (F1), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit premier feuillet longitudinal (F1), et ladite portion centrale longitudinale (F3) de ladite feuille continue (F), ou en tout cas la portion longitudinale de ladite feuille continue (F) qui définit ladite portion centrale longitudinale (F3), pour définir respectivement dedans le profil du bord qui définit la partie arrière (B2) de chacune desdites enveloppes (B) et une fenêtre (FS) au niveau de la partie avant de chacune desdites enveloppes (B) et/ou des perforations, trous, incisions, dentures ou similaires, en particulier pour une protection contre la fraude.

16. Procédé pour emballer en continu des produits (P), enveloppés chacun dans une enveloppe individuelle (B), comprenant les étapes suivantes :

- l'alimentation d'une feuille continue (F) de matériaux d'emballage, en particulier du papier, sur un plan de transport (PT), dans lequel ledit plan de transport (PT) est mobile pour transporter ladite feuille continue (F) suivant une direction de transport (DT), dans un sens de déplacement en avant (A2) entre une extrémité d'entrée (12a) de ladite feuille continue (F) et une extrémité de sortie (12b) d'une pluralité d'enveloppes, contenant chacun un produit respectif (P), dans laquelle ladite alimentation comprend le fait de faire avancer ladite feuille continue (F) le long d'un plan d'alimentation (PA) qui s'étend au-dessous dudit plan de transport (PT), est orthogonal ou sensiblement orthogonal à ladite direction de transport (DT) et est défini au niveau de ladite extrémité d'entrée (12a) dudit plan de transport (PT), dans lequel ladite feuille continue (F) est alimentée le long dudit plan d'alimentation (PA) suivant une direction d'alimentation (DA) orthogonale au plan de transport (PT) et est déviée à angle droit ou à un angle sensiblement droit dans le passage dudit plan d'alimentation (PA) audit plan de transport (PT) ;

- l'alimentation sur ladite feuille continue (F) se déplaçant en avant suivant ladite direction de transport (DT) d'une pluralité de produits (P) agencés en succession l'un après l'autre et à une distance l'un de l'autre ;

- la définition dans ladite feuille continue (F) qui est alimentée sur ledit plan de transport (PT) ou se déplaçant en avant suivant ladite direction de transport (DT) d'une paire de rainures longitudinales (C1, C2) pour plier un feuillet longitudinal respectif (F1, F2), respectivement un premier feuillet longitudinal (F1) qui définit la partie arrière (B2) desdites enveloppes (B) et un deuxième feuillet longitudinal (F2) qui définit le volet de fermeture (B3) desdites enveloppes (B), dans lequel ledit premier feuillet longitudinal (F1) et ledit deuxième feuillet longitudinal (F2) définissent une portion centrale longitudinale (F3) de ladite feuille continue qui définit la partie avant desdites enveloppes et sur laquelle lesdits produits (P) sont alimentés agencés en succession l'un après l'autre et à une distance l'un de l'autre ;

17. Procédé de conditionnement selon la revendication 16, dans lequel ladite alimentation comprend le fait de faire avancer ladite feuille continue (F) de manière à convoyer ledit deuxième feuillet longitudinal (F2), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit deuxième feuillet longitudinal, pour découper dans celui-ci respectivement la partie arrière (B2) et/ou le profil de la partie arrière (B2) et le volet de fermeture (B3) et/ou le profil du volet de fermeture (B3) de chacune desdites enveloppes (B).

18. Procédé de conditionnement selon la revendication 16 ou 17, dans lequel ladite alimentation suit ladite étape de découpage dans ladite feuille continue (F) de ladite paire de rainures de pliage longitudinales (C1, C2).

19. Procédé de conditionnement selon une ou plusieurs des revendications 16 à 18, comprenant également,
Procédé de conditionnement selon la revendication 21.

- le pliage dudit premier feuillet longitudinal (F1) sur ladite portion centrale longitudinale (F3) de ladite feuille continue de manière à couvrir au moins partiellement lesdits produits (P), en formant la partie arrière (B2) desdites enveloppes (B) et en obtenant un enveloppement continu, ou pour plier la portion dudit premier feuillet longitudinal (F1) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B) sur la portion respective de ladite portion centrale longitudinale (F3) de manière à couvrir au moins partiellement le produit respectif (P) en formant la partie arrière (B2) de l’enveloppe respective,
- le pressage dudit premier feuillet longitudinal (F1) plié sur ladite portion centrale longitudinale (F3) ou la portion dudit premier feuillet longitudinal (F1) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B) pliée sur la portion respective de ladite portion centrale longitudinale (F3), en exerçant une pression au niveau d’au moins une bande transversale (S', S") d’adhésif ou de colle présente ou en tout cas appliquée sur ladite feuille continue (F) ou sur chaque section longitudinale de ladite feuille continue (F) qui définit une dite enveloppe respective (B) au niveau d’au moins un segment d’au moins un des deux côtés transversaux de chaque dite section longitudinale qui définit une enveloppe correspondante (B),
- la coupe transversale dudit enveloppement continu ou de ladite feuille continue (F) entre deux produits consécutifs (P) de manière à obtenir une pluralité de sections longitudinales du dit enveloppement continu ou de ladite feuille continue qui sont séparées l’une de l’autre et définissant chacune une enveloppe respective (B).

20. Procédé de conditionnement selon la revendication 19, dans lequel ladite au moins une étape de découpage a lieu au moins en partie simultanément avec ladite étape de pressage ou avec ladite étape de coupe transversale.

21. Procédé de conditionnement selon la revendication 19, dans lequel ladite au moins une étape de découpage est séparée et distincte de chacune desdites étapes fonctionnelles et a lieu de préférence avant ladite étape de pressage et/ou avant ladite étape de coupe transversale.

22. Procédé de conditionnement selon une ou plusieurs des revendications 19 à 21, comprenant, après ladite au moins une étape de découpage et après ladite étape de pliage dudit premier feuillet longitudinal (F1) ou de la portion dudit premier feuillet longitudinal (F1) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B), une étape de pliage dudit deuxième feuillet longitudinal (F2) sur ledit premier feuillet longitudinal (F1) qui a déjà été plié ou de la portion dudit deuxième feuillet longitudinal (F2) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B) sur la portion correspondante dudit premier feuillet longitudinal (F1) qui a déjà été pliée.

23. Procédé selon une ou plusieurs des revendications 19 à 22, comprenant également, après ladite au moins une étape de découpage, une étape d’application, sur ledit deuxième feuillet longitudinal (F2) ou sur la portion dudit deuxième feuillet longitudinal (F2) de chaque section longitudinale de ladite feuille continue (F) qui définit une enveloppe respective (B), d’une bande (S") de colle parallèle à ladite direction de transport (DT).

24. Procédé selon une ou plusieurs des revendications 18 à 23, dans lequel ladite étape de découpage comprend le découpage, dans ledit deuxième feuillet longitudinal (F2) ou en tout cas dans la portion longitudinale de ladite feuille continue qui définit ledit deuxième feuillet longitudinal, une pluralité d’encoches transversales (I), chacune desquelles comprend un premier flanc (I1) et un deuxième flanc (I2) qui sont inclinés l’un par rapport à l’autre et convergents vers la rainure de pliage longitudinale respective (C2) et qui définissent le profil à une extrémité du volet de fermeture (B3) de deux enveloppes consécutives (B).

25. Procédé selon la revendication 24, dans lequel ledit premier flanc (I1) et ledit deuxième flanc (I2) de chacune desdites encoches transversales (I) se croisent en formant un « V » avec le sommet du « V » sensiblement au niveau de la rainure de pliage longitudinale (C2) dudit deuxième feuillet longitudinal (F2).

26. Procédé selon une ou plusieurs des revendications 16 à 25, dans lequel ladite étape de découpage comprend le découpage, dans ledit premier feuillet longitudinal (F1), ou en tout cas dans la portion longitudinale de ladite feuille continue qui définit ledit premier feuillet longitudinal et/ou dans ledit deuxième feuillet longitudinal (F2), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit deuxième feuillet longitudinal, une pluralité de perforations, incisions, dentures ou similaires, en particulier pour une protection contre la fraude.
27. Procédé selon une ou plusieurs des revendications 16 à 26, comprenant également au moins une autre étape de découpage exécutée durant ladite étape d’alimentation pour découper au moins un dudit premier feuillet longitudinal (F1), ou en tout cas la portion longitudinale de ladite feuille continue qui définit ledit premier feuillet longitudinal (F1), et ladite portion centrale longitudinale (F3) de ladite feuille continue (F), ou en tout cas la portion longitudinale de ladite feuille continue (F) qui définit ladite portion centrale longitudinale (F3), pour définir respectivement dans le profil du bord qui définit la partie arrière (B2) de chacune desdites enveloppes (B) et une fenêtre (FS) au niveau de la partie avant de chacune desdites enveloppes (B) et/ou des perforations, trous, incisions, dentures ou similaires, en particulier pour une protection contre la fraude.
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description