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(54) **PLANT AND PROCESS FOR PACKING, BY THERMOFORMING TECHNOLOGY, PRODUCTS IN PACKAGES MADE FROM A FILM OF BIODEGRADABLE NATURAL MATERIAL AND RECYCLABLE MATERIAL HAVING PRE-PRINTED PATTERNS**

VERPACKUNGSANLAGE UND VERFAHREN ZUR VERPACKUNG VON PRODUKTE IN VERPACKUNGEN, MITTELS DER THERMOFORMING-TECHNOLOGIE, VERPACKUNGEN DIE AUS EINEM FILM BIODEGRADABLER NATÜRLICHER MATERIALIEN UND WIEDERVERKAUFBARER MATERIALIEN MIT VORGEDRUCKTEN MUSTERN HERGESTELLT WERDEN

INSTALLATION ET PROCÉDÉ D'EMBALLAGE, PAR TECHNOLOGIE DE THERMOFORMAGE, PRODUITS EN PAQUETS À PARTIR D'UN FILM DE MATIÈRE NATURELLE BIODÉGRADABLE ET DE MATÉRIAU RECYCLABLE À MOTIFS PRÉIMPRIMÉS

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(73) Proprietor: **Coligroup S.p.A.**
25032 Chiari (BS) (IT)

(72) Inventor: **LIBRETTI, Vittorio**
25032 Chiari (BS) (IT)

(74) Representative: **Botti & Ferrari S.p.A.**
Via Cappellini, 11
20124 Milano (IT)

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Description

Field of application

[0001] In its most general aspect, the present invention refers to the packing of products in general, in particular consumer goods such as foodstuffs of pharmaceutical products.

[0002] In particular, the present invention relates to a plant for packing products in packages obtained from a film comprising a "eco-friendly" material such as paper, cardboard or the like having a succession of pre-printed patterns, the plant comprising in series, along a forward direction of said film, optionally a forming station for forming a succession of containers each having a pre-printed pattern from said film, a welding station for closing or sealing with a closing film the containers in which the product to be packed has been previously placed or for closing or sealing with a closing film consecutive portions of said film each having a pre-printed pattern on which a product to be packed has been previously placed, and a cutting station for separating the packages so obtained from the film.

[0003] The present invention also relates to a process for packing products in packages comprising a support or container or tray having a pre-printed pattern, preferably made of paper, cardboard or the like, and a closing film, by using a plant of the above-mentioned type.

Prior art

[0004] As it is well known in this specific technical field, one of the most common processes for packing consumer goods is the one which employs a plant comprising a thermoforming station, a welding station and a cutting station in succession along a horizontal direction. Such a plant is e.g. known from DE 102013015005A1.

[0005] Said plant uses a lower film unrolled by a specific reel, which film which is moved forward in an intermittent way (pitch-by-pitch) in the horizontal direction and is thermoformed in the thermoforming station in order to obtain a succession of containers, for example cup-shaped containers, and an upper film of extendable material, unrolled by specific reel, which is spread out on the containers and is then welded thereto in the welding station. Finally, the cutting station separates the packages so obtained from the lower film.

[0006] The packages of consumer goods, mostly foodstuffs and pharmaceutical products, are made of an upper package material, usually a plastic material, pre-printed with patterns, for example images, containing information and logos which promote and facilitate retail sale, while the lower material of which the containers are formed, which is similar to the upper material, is not pre-printed and the possible images are applied with adhesive labels.

[0007] Since it is a "continuous" high-capacity process, the plant thermoforms and closes more packages at the same time, which packages, before being released, are separated by a cutting process in the above-mentioned cutting station and, are often also pre-etched by a pre-cutting station arranged between the thermoforming station and the welding station in order to facilitate their opening. This station is devised for etching the whole material constituting the package in order to facilitate its opening.

[0008] For this reason, it is necessary to control the position of the pre-printed images to ensure that the same are correctly positioned in the various operations of the process and thus to avoid that they are cut or not correctly centered in the packages.

[0009] Many are the causes which can bring about a variation of the position of the images during the packing process, and for this reason the plants of the above-mentioned type are provided with a system for reading pre-printed references (marks) formed in succession on the lower film according to predefined pitches which are used to position the images in the right position.

[0010] In traditional plants, the upper film (i.e. the closing film) and the lower film are usually made of an (extendable) plastic material such as a plastic material and the images are normally pre-printed on the upper film.

[0011] Thus, the most common system to center the images which is used in traditional plants using elastic films is to brake the lower film stretching it out according to the detection of the reference "mark" of the position of the printed image, by the system of reading until the image brought by the upper film corresponds to the lower container and to the cutting imprint formed in the pre-cutting station.

[0012] However, for ecological reasons and for reducing environmental impact, in recent years there is an increasing need to use packaging materials other than plastic, in particular paper, cardboard or the like, possibly coupled to plastic materials according to modern technologies which allow a simple separation thereof, so as to facilitate their disposal/recycle. Said materials are not elastic (extendable) and are thus scarcely deformable. This characteristic provides the opportunity to print images also on the lower part of the package, a solution which is so far not much used because of the deformation the image undergoes on elastic materials during thermoforming.

[0013] To control the position of the image in the process for packing in forming of rigid materials, currently the most effective known method involves the use of a software by which the forward movement of the lower film having the pre-printed images is adjusted according to the position of the reference "mark" of the position of each of said images detected by a photocell reading.

[0014] Thus, it follows that the pitches of forward movement of the lower film are not performed in the same extent but rather with a size equal to that impressed on the lower film between consecutive references which often have a non-regular (oscillating) position due to the print error and to the slight deformation occurred in the

forming step.

[0015] Normally, the photocell is arranged upstream of the welding station (with respect to the direction of forward movement of the lower film) and close thereto, to ensure that the process of coupling the upper film with the lower container having the image is correctly performed in the desired position.

[0016] However, the pitch variation so obtained creates a non-correspondence between containers and packages which are simultaneously in the forming position and in the cutting position, respectively.

[0017] The error due to the non-correspondence becomes more evident with increasing film thickness, as it occurs in new, more eco-friendly materials which substitute plastic, such as paperboard, cardboard and the like. In fact, said materials with a larger thickness can be used as packing materials only if they are wound on medium-size reels (for example with 800 mm diameter) whose unwinding radius is relatively large (for example variable to a minimum of 80 mm) and this originates image position errors which are significant and higher than 5/10 mm, which are incompatible with the continuous packing process described above, which instead needs higher precision.

[0018] For example, assuming a packing line with 20 pitches of 400 mm, between the forming and the welding station, the maximum tolerance allowed for image fluctuation should be less than 3/ 100 mm between one reference (mark) and the next if the package allows a position error of about 1mm.

[0019] Thus, the solutions known up to now for controlling image position in traditional plants for packing in continuum can not be used with the new packing material currently demanded by the market and in the future possibly required by new regulations.

[0020] The main aim of the present invention is thus to provide a plant and a process for in-continuum packing products in packages comprising a "flat" support (non-formed tray) or a container and a closing film obtained from a film comprising an "eco-friendly" substantially rigid material, such as paper, cardboard or the like, and having a succession of pre-printed patterns which have structural and/or functional characteristics that allow to correctly perform the various packing operations, in particular forming and cutting, so as to overcome the drawbacks mentioned above in relation to the known plants for packing.

[0021] A further aim of the present invention is to provide a plant and a process for packing as above which have a high production capacity.

Summary of the invention

[0022] Said aims are achieved by a plant according to each of the claims 1 and 2.

[0023] In an embodiment of the plant for packing according to the invention, the forming station and the cutting station are both movable along said forward direction and the command and control unit is capable of controlling, through the actuation means, a displacement of the forming station and/or of the cutting station along said forward direction determined by the processing means according to said data in case of wrong positioning of said forming station and/or of said cutting station.

[0024] In an embodiment of the present invention, said first film is a multilayer film comprising a sheet of substantially rigid material and a film of plastic material coupled to the sheet of substantially rigid material and the plant further comprises, upstream of the welding station or the forming station if present:

- a heating station for heating said film of plastic material to a temperature not higher than the softening temperature of said plastic material and thus favor its adhesion on the sheet of substantially rigid material,

- a coupling station for coupling said preheated film of plastic material with said sheet of substantially rigid material, obtaining said multilayer film.

[0025] Said coupling station is calibrated to provide an adequate and homogeneous pressure to the two films in order to obtain an easily separable multilayer film and consequently 100% recyclability of the package.

[0026] In an embodiment of the present invention, the first film comprises a support of substantially rigid material possibly coupled in a separable manner to a film of a plastic material and the plant further comprises a first pre-cutting station arranged upstream of the welding station, in particular between the forming station if present and the welding station, to perform an etching or a separation-facilitating line on the containers or on the consecutive portions of the first film each having a pre-printed pattern in order to facilitate the separation of said film of plastic material possibly coupled to said support of the first film.

[0027] In an embodiment of the present invention, the plant further comprises a second pre-cutting station arranged upstream of the welding station, in particular between the forming station if present and the welding station, to perform a facilitated opening etching on the edge of the containers obtained in the forming station or on the edge of the portions of the first film each having a pre-printed pattern and whereon the product to be packed is placed.

[0028] According to an aspect of the present invention, the first pre-cutting station and/or the second pre-cutting station are movable along said forward direction and in communication with the command and control unit, which is capable of controlling, through the actuation means, a displacement of the first pre-cutting station and/or of the second pre-cutting station along said forward direction determined by the processing means according to said data in case of wrong positioning of said first pre-cutting station and/or of said second pre-cutting station. The

above-mentioned aims are also achieved by a process for packing which uses a plant of the above-mentioned type.

[0029] In an embodiment, the process according to the invention comprises the according to each of the claims 7 and 8.

[0030] In this way, the correct positioning of the cutting station during the above-mentioned step of separating the above-mentioned packages is ensured.

[0031] In an embodiment of the present invention, said first film is a multilayer film comprising a sheet of substantially rigid material and a film of plastic material coupled to the sheet of substantially rigid material and the plant comprises a heating station and a coupling station. In this embodiment, the process can comprise before the moving forward step of said first film with a substantially constant pitch (P) along a forward horizontal direction, the steps of:

- heating, in said heating station, the film of plastic material to a temperature not higher than the softening temperature of the plastic material, and
- coupling, in said coupling station, preferably in a separable manner, the preheated film of plastic material with the sheet of substantially rigid material.

[0032] In an embodiment, the plant of the present invention comprises a first pre-cutting station and the first film comprises a support of substantially rigid material possibly coupled in a separable manner to a film of a plastic material. In said embodiment, the process may further comprise, after the forming step, if provided, and before the closing film application step, the steps of:

- displacing, substantially simultaneously to the pitch-by-pitch forward movement of the first film comprising a layer of substantially rigid material, the first pre-cutting station along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of the first pre-cutting station in case of wrong positioning of the first pre-cutting station, and

- etching the film of plastic material at the containers or at the consecutive portions of the first film each having a pre-printed pattern to facilitate the separation of said film of plastic material from said support of substantially rigid material of the first film.

[0033] In an embodiment, the plant comprises a second pre-cutting station and the process may further comprise, after the forming step if provided, and before the closing film application step, the steps of:

- displacing, substantially simultaneously to the pitch-by-pitch forward movement of the first film comprising a layer of substantially rigid material, the second pre-cutting station along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of the second pre-cutting station in case of wrong positioning of the second pre-cutting station, and

- performing a facilitated opening etching on the edge of the containers or on the edge of the consecutive portions of the first film, each having a pre-printed pattern and whereon the product to be packed is placed through the second pre-cutting station.

[0034] Preferably, the substantially rigid material comprised in the first film or forming the support of the first film consists of paper, cardboard and the like.

[0035] Moreover, the first film comprising a layer of substantially rigid material has a thickness preferably between 300μm and 500μm. Preferably, the material of the second closing film is an extendable and/or stretchable material, in particular a plastic material.

[0036] The characteristics and advantages of the plant and of the process for packing according to the invention will be apparent from the following description of one embodiment thereof, given by way of a non-limiting example with reference to the attached drawings.

Brief description of the drawings

[0037] In the drawings:

- Figure 1 schematically shows a horizontal plant for in-continuum packing according to an embodiment of the invention where the forming stations, the pre-cutting stations, the welding station and the cutting station are highlighted.

- Figure 2 shows a schematic perspective view of the forming station of the plant of Figure 1,

- Figure 3 shows a schematic perspective view of the cutting station of the plant of Figure 1,

- Figure 4 shows an operative scheme of the plant for packing according to the invention,

- Figure 5 schematically shows a horizontal plant for in-continuum packing according to another embodiment of the invention,

- Figure 6 shows an enlarged view of the plant of Figure 5.

Detailed description

[0038] With reference to the figures 1-4, a plant and a process for packing according to an embodiment of the present invention are described below.

[0039] It should be noted that the figures show schematic views and are not drawn to scale but are instead drawn so as to emphasize the main characteristics of the invention. Further, in the figures, the different components are showed in a schematic way, their shape being variable depending on the desired application.

[0040] The plant for in-continuum packing is referred as a whole with the reference numeral 1 and comprises one forming station 2, one pre-cutting area 3, one station 4 for loading the product to be packed, one welding station 5 and one cutting station 6 arranged in series along a horizontal direction.

[0041] The plant comprises a lower reel-holder 7 which contains a reel of a first film 8 comprising a layer of substantially rigid material, such as for example paper, cardboard or the like, having a plurality of pre-printed patterns in the direction of the length of the first film according to a pre-fixed pitch detectable by reference marks, which are also pre-printed along the first film 8 between the pre-printed patterns.

[0042] In the present description, the term "first film comprising a layer of substantially rigid material" refers to any monolayer or multilayer film consisting of or comprising a material other than plastic in the form of a sheet or film, having a texture and a thickness suitable for producing containers for the packing of the product of interest and substantially not or little extensible and/or stretchable. Preferably, said film consists of a natural or "eco-friendly" material (biodegradable and/or recyclable) or of a support (multilayer film) consisting of a natural or "eco-friendly" material coupled with a film of plastic material whose separation from the support is predetermined and facilitated. Said "eco-friendly" material has a lesser environmental impact because it is mostly made of a biodegradable material which it is easy to dispose of in the recycling system compared to plastic materials. In particular, said material is selected from paper, cardboard and the like and is being introduced in the market with the characteristics required by the recycling disposal system.

[0043] Moreover, in the present invention, "pre-printed pattern" refers to any graphic composition comprising drawings, symbols, writing and/or images which is impressed on the first film of substantially rigid material (or on the layer of rigid material of the first film) by per se conventional printing processes. Normally, the pre-printed patterns contain information such as personalized (i.e. referring to the product to be packed) images, writing, logos, composition, expiration date etc..

[0044] Plant 1 further comprises handling means for moving the first film 8 comprising a layer of substantially rigid material unwound by the reel-holder 7 along the horizontal direction according to a predefined pitch P of forward movement to the forming station 2 and, from this, to the subsequent above-mentioned stations of plant 1.

[0045] Said handling means may comprise for example a plurality of rollers or other handling means arranged along the horizontal direction of plant 1 which are in contact with the first film on the upper and/or the lower side.

[0046] Advantageously, the predefined pitch P of forward movement may be measured in continuum (pitch-by-pitch measurement) during the forward movement of the first film 8 comprising a layer of substantially rigid material by per se conventional means.

[0047] In the forming station 2, the first film 8 is bent in a conventional manner, for example by applying pressure and possibly heat, in a position corresponding to an area which is longitudinally delimited by consecutive reference marks and has impressed a pre-printed pattern so as to form a succession of containers 9 each having a corresponding pre-printed pattern and attached to the first film 8 comprising a layer of substantially rigid material.

[0048] The pre-cutting area 3 comprises a first pre-cutting station 3a followed by a second pre-cutting station 3b along the forward direction of the first film 8.

[0049] The first pre-cutting station 3a receives the containers 9 coming from the forming station 2 and has per se conventional means capable of performing an etching or a separation-facilitating line on the containers 9 to facilitate the separation of the film of plastic material possibly coupled to the support of natural of "eco-friendly" material of the first film 8 after the use of containers 9 for a proper disposal of the above-mentioned materials.

[0050] In embodiments of the plant according to the invention, the forming station 2 may be omitted or made non-functioning, in particular when the package is made as a sealed, substantially "flat" support free of lower forming.

[0051] In embodiments of the plant according to the invention, the first pre-cutting station 3a may be omitted or made non-functioning, in particular when the first film 8 consists only of natural or "eco-friendly" material as defined in the present invention without coupling with a film of plastic material.

[0052] The second pre-cutting station 3b receives the containers 9 coming from the forming station 2 (or from the pre-cutting station 3a) and has per se conventional means capable of performing an etching or a weakening line on the edge of the containers 9 which is intended for facilitated opening of the resulting package by a consumer/user.

[0053] The second pre-cutting station 3b may also be omitted or made non-functioning (inactive) in some embodiments of the present invention.

[0054] The welding station 5 receives the containers 9 coming from the pre-cutting area 3, and in said containers the product to be packed was loaded in the loading station 4 (manually or by per se conventional automatic loaders), and is assigned for closing containers 9.

[0055] In this regard, plant 1 comprises an upper reel-holder 10 for a second closing film 11 associated to the welding station 5 and per se conventional handling means to move the second closing film 11 so as to spread it out on each container 9 entering the welding station.

[0056] The second film 11 is preferably made of an

extendable and/or stretchable material, such as in particular a plastic material.

[0057] In the welding station 5, the second film 11 spread out on the container 9 is welded to the same by conventional welding means, for example by heat-sealing with an adhesive of a welding layer of the second closing film facing the containers 9, thus obtaining a succession of packages 12 still attached to the first film 8 comprising a layer of substantially rigid material.

[0058] In the cutting station 6, the packages 12 coming from the welding station 5 are separated in a conventional manner, for example by die-cutting, and then released from the plant for subsequent operations for example storage and/or transport in/to the destination site.

[0059] In accordance with an aspect of the present invention, the forming station 2 and the cutting station 6 are movable back and forth along the forward direction of the first film 8 comprising a layer of substantially rigid material so as to take the correct position for each operation of forming and cutting, respectively, in the manner that will be better illustrated below.

[0060] In particular, as illustrated in Figure 2, the forming station 2 has a forming group 13 which is slidingly mounted, through its lower portion 14, on a frame 15 along opposite longitudinal guides 16 which are substantially cylindrical. The lower portion 14 of the forming group 13 is in friction engagement with opposite driving belts 17 that are operatively connected to respective motors 18 which, in turn, are in electric communication with a command and control unit (not shown) of the plant 1.

[0061] More in particular, the forming group 13, when driven by the belts 17, can slide back and forth on the guides 16 along the forward direction of the first film 8 by a stretch A delimited by two limit stops 19 on the frame 15. The actual magnitude of the displacement of the forming group 13 in the same sense of forward movement of the first film 8 or in the opposite sense, is determined by the input signal received by the motors 18 from the command and control unit in the manner which will be better described below.

[0062] Similarly, as illustrated in Figure 3, the cutting station 6 has a cutting group 20 which is slidingly mounted, through its lower portion 21, on a frame 22 along opposite longitudinal guides 23 which are substantially cylindrical. The lower portion 21 of the cutting group 21 is in friction engagement with opposite driving belts 24 that are operatively connected to respective motors 25 which, in turn, are in electric communication with a command and control unit (not shown) of the plant 1.

[0063] More in particular, the cutting group 20, when driven by the belts 24, can slide back and forth on the guides 23 along the forward direction of the first film 8 by a stretch B delimited by two limit stops 26 on the frame 22. The actual magnitude of the displacement of the cutting group 20 in the same sense of forward movement of the first film 8 or in the opposite sense, is determined by the input signal received by the motors 25 from the command and control unit in the manner which will be described below.

[0064] In accordance with the present invention, also the first pre-cutting station 3a and/or the second pre-cutting station 3b may be provided with structural and/or functional characteristics equivalent to those described above in order to be made movable back and forth along the forward direction of the first film 8 comprising a layer of substantially rigid material so as to take the correct position for each pre-cutting operation.

[0065] As mentioned above, it is necessary to control the position of the pre-printed patterns on the first film 8 comprising a layer of substantially rigid material to compensate possible errors of pitch-by-pitch forward movement of the first film 8 and consequently errors of position of the pre-printed patterns so that the operations of packing, in particular forming, cutting and possibly pre-cutting are all correctly performed.

[0066] In this regard, instead of varying the pitch of forward movement of the film comprising a layer of substantially rigid material having the pre-printed patterns according to the actual position of said pre-printed patterns, as it occurs in the known plants for packing, which allows to obtain a substantial alignment in one of the manufacturing stations (normally the welding station) but often a substantial non-correspondence of the pre-printed patterns in the other manufacturing stations, instead, the present invention proposes to "chase" the actual position of the pre-printed patterns on the first film 8 comprising a layer of substantially rigid material which is moved forward with a constant pitch P by an appropriate movement of the forming station 2 and/or of the cutting station 6 and possibly also of the first pre-cutting station 3a and/or of the second pre-cutting station 3b, if provided.

[0067] In this way, the manufacturing stations of the plant for packing, with particular reference to the forming station 2, to the cutting station 6 and to the pre-cutting stations 3a, 3b, if provided, are advantageously positioned in a substantially "centered" way with respect to each pre-printed pattern entering each of said stations, thereby ensuring that the manufacturing operations are correctly performed regardless of the error of forward movement of the pre-printed patterns which is due to both the variation of the diameter of the reel of the first film 8 which is being unwound, and to the normal tolerances of the position of the printed image.

[0068] More in detail, for this purpose, the plant 1 comprises means for detecting the position of at least one pre-printed pattern passing in a pre-fixed area along the forward direction during each pitch-by-pitch forward movement of said first film 8 comprising a layer of substantially rigid material, said detection means being in communication with the command and control unit of the machine.

[0069] Said detection means may be for example a photocell 27 or similar means and the position of the at least one pre-printed pattern passing in said area as a result of the pitch-by-pitch movement of the first film 8 may be determined indirectly from the detection (reading)

of the reference marks printed on the first film 8 between consecutive pre-printed patterns.

[0070] Advantageously, the means for detecting the position of the at least one pre-printed pattern, for example the photocell 27, are arranged along the forward direction of the first film 8 comprising a layer of substantially rigid material immediately upstream of the welding station 5 (or in other words close to the welding station 5).

[0071] In this way, it is ensured that the process of coupling the closing film to the containers 9 coming from the forming station 2 and from the pre-cutting stations 3a, 3b is correctly performed in the desired position, positioning the closing film 11 always in the correct point.

[0072] Moreover, the control unit is structured so as to process position data of the pre-printed patterns transmitted by the detection means and position data of the forming station 2 and/or of the cutting station 6 and possibly of the pre-cutting stations 3a, 3b during each forward movement of the first film 8, and to control, in case of errors of positioning of one or more of said stations, a calculated displacement of one or more of said stations along said forward direction according to the processed data, so as to compensate for each error of positioning and ensure the correct positioning of said stations with respect to each pre-printed pattern entering them and thus ensure that the packing operations are correctly performed.

[0073] The processing of position data can be performed by the command and control unit by per se conventional processing means, for example by a software provided with suitable positioning algorithms.

[0074] The command and control unit also comprises actuation means to control the displacement calculated by the software for each of the movable stations. For example, if the software identifies an error of positioning of the forming station 2 during the pitch-by-pitch forward movement of the first film 8 according to the position data received from the detection means, the actuation means control substantially simultaneously the drive of motors 18 so as to determine a longitudinal displacement of the forming group 13 of a "correction" stretch calculated by the software so as to ensure "centering" (or in other words the correct alignment) of the forming group 13 with respect to the pre-printed pattern entering the forming station and, consequently, to ensure that the next forming cycle is correctly performed.

[0075] Similarly, if the software identifies an error of positioning of the cutting station 6 during the pitch-by-pitch forward movement of the first film 8 according to the position data received from the detection means, the actuation means control substantially simultaneously the drive of motors 25 so as to determine a longitudinal displacement of the cutting group 20 of a "correction" stretch calculated by the software so as to ensure "centering" (or in other words the correct alignment) of the cutting group 20 with respect to the package 12 entering the cutting station and, consequently, to ensure that the next cycle of cutting the packages 12 is correctly performed.

[0076] Figures 5-6 show a plant for in-continuum packing according to another embodiment of the invention, which is indicated as a whole with the reference number 50.

[0077] To the elements of the packaging plant 50 which are structurally and/or functionally equivalent to corresponding elements of the packaging plant 1 described above will be attributed the same reference number of the latter and will not be described further for conciseness.

[0078] The packaging plant 50 comprises a forming station 2, a pre-cutting area 3, a loading station 4 for the product to be packaged, a welding station 5 and a cutting station 6 which are completely equivalent structurally and functionally to those previously described in relation to the plant 1 of Figures 1-4.

[0079] The plant 50 is structured to implement the packaging steps described above from a multilayer film 8 obtained by coupling "in situ" a sheet of substantially rigid material 8a with a film of plastic material 8b, instead of using a similar already preformed multilayer film from an external procurement, for example from a supplier.

[0080] Therefore, the plant 50 further comprises, upstream of the welding station 5 and of the forming station 2 if present, a heating station 82 for the film of plastic material 8b followed, along the forward direction, by a coupling station 81 of the film of plastic material 8b with the sheet of substantially rigid material 8a, and means for feeding the film of plastic material 8b and the sheet of substantially rigid material 8a into the heating station 82 and, from this, into the coupling station 81.

[0081] In more detail, the plant 50 comprises a first reel-holder 7a which contains a reel of a sheet of substantially rigid material 8a, such as for example paper, cardboard or the like, having a succession of pre-printed patterns in the direction of the length of this sheet according to a pre-fixed pitch detectable by reference marks, which are also pre-printed along the first sheet between the pre-printed patterns, and a second reel-holder 7b which contains a reel of a film of plastic material 8b to be coupled to the sheet of material substantially rigid 8a.

[0082] The sheet of substantially rigid material 8a and the film of plastic material 8b, unwound from the respective reels 7a-b, are passed together through rollers 83 and from these feeding into the heating station 82 where the film of plastic material 8b is heated to a temperature not higher than the softening temperature of said plastic material and thus favor its adhesion on the sheet of substantially rigid material 8a in the subsequent coupling station 81.

[0083] At the exit from the heating station 82, the sheet of substantially rigid material 8a and the film of plastic material 8b are fed into the coupling station 81 where they are passed through heated rollers and coupled by lamination between said rollers, thus obtaining the multilayer film 8 which is then fed into the subsequent packaging stations described above.

[0084] Advantageously, the lamination of the sheet of substantially rigid material 8a with the film of plastic material 8b in the coupling station 81 can be carried out at a temperature and pressure suitable for obtaining a sufficiently stable coupling and at the same time allowing a relatively easy separation between the sheet of substantially rigid material 8a and the film of plastic material 8b after opening the package that comprises them by the consumer so as to facilitate their disposal/ recycling according to modern technologies.

[0085] Temperatures and pressures suitable for this purpose can be identified by the person skilled in the art according to the characteristics of the used materials.

[0086] Advantageously, the realization of said multilayer film 8 by means of in-line coupling allows the choice of materials for making a package on the basis of the specific production needs of the user to obtain, for example, an improvement in the performance of the packaging process and/or an increase in the shelf life of the packaged product.

[0087] Moreover, advantageously, the use of a first multilayer film 8 of the type described allows to reduce the thickness of the layer of substantially rigid material used, for example paper, cardboard, and the like, thus leading to a greater precision of the packaging process by way of reduction of the pitch variation of forward movement thanks to the smaller unwinding radius of the reel for the same producible packages.

[0088] Alternatively, with the same pitch variation of forward movement accepted in the packaging operations, the use of a first multilayer film 8 of the type described advantageously allows the use of larger reels with consequent reduction in the procurement costs of packaging materials and the number of production stops for the replacement of the exhausted reel.

[0089] In the light of the above, the present invention achieves the predetermined aims and has numerous advantages compared to the known plants for packing.

[0090] In fact, thanks to the use of means for detecting the position of the pre-printed patterns along the forward direction during the pitch-by-pitch movement of the film of rigid material having said patterns and to the introduction of movable operative stations along said direction together with a command and control unit containing a software with position algorithms capable of determining and controlling the displacement of one or more of said stations according to the detected position of said pre-printed patterns, it is possible to ensure that said stations, with particular reference to the forming station and to the cutting station, take the correct position in each operative cycle in synchrony with the pitch-by-pitch forward movement of the film of substantially rigid material.

[0091] Thus, the plant and the process according to the invention advantageously allow to correctly perform in continuum the packing of products in packages having a pre-printed pattern also when said packages are obtained from a substantially rigid material having a succession of pre-printed patterns such as "eco-friendly" materials that substitute plastic, which are currently demanded by the market and in the future required by new regulations, such as paper, cardboard and the like, possibly coupled with easy-to-separate plastic materials to facilitate their correct disposal.

[0092] In the light of the above, the plant and the process according to the invention advantageously have also a high production capacity.

[0093] Moreover, the plant and the process according to the invention allow to efficiently use materials intended for the thermoforming process made of material derived from paper, cardboard and the like possibly coupled with an isolating protective film which can be easily separated to the advantage of a lower environmental impact and a resulting energy saving.

[0094] In this regard, it should be advantageously noted that the plant and the process according to the invention provide also a station dedicated for etching only the plastic coating (protective film) if present, as well as the absence of the forming step for making a flat tray containing a sealed protruding product.

[0095] Obviously, a person skilled in the art can make many modifications and variants to the plant and to the process for packing described above, for the purpose of satisfying specific and particular requirements, all comprised in the scope of protection of the invention as defined by the following claims.

Claims

1. Plant (1) for packing products in packages, each package comprising a substantially flat support of a substantially rigid material and having a pre-printed pattern, a product placed on said support and a closing film that covers said product and is preferably seal-joined to said support, the plant comprising:

   - means for pitch-by-pitch moving a first film (8) comprising a layer of substantially rigid material having a succession of pre-printed patterns according to a pitch (P) that is substantially constant along a forward direction,
   - a welding station (5) for applying a second closing film (11) on consecutive portions of said first film (8) each having a pre-printed pattern and whereon a product to be packaged was placed, thus obtaining a succession of said packages,
   - a cutting station (6) for separating said packages, said welding station (5) and said cutting station (6) being arranged in series along said forward direction, said cutting station (6) being movable along said forward direction
   - means (27) for detecting the position of at least one pre-printed pattern passing in a pre-fixed area along the forward direction during each movement of said first film (8) comprising a layer of substantially rigid material, and

- a command and control unit in communication with said detection means (27) and with said cutting station (6), said command and control unit comprising means for processing position data of at least one pre-printed pattern transmitted by the detection means (27) and position data of said cutting station (6) during each movement of said first film (8) comprising a layer of substantially rigid material, and actuation means for controlling, substantially simultaneously with the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material, a displacement of said cutting station (6) along said forward direction of a magnitude determined by the processing means according to said data in case of a wrong positioning of said cutting station (6),

the plant (1) being **characterized in that**

said first film (8) comprises a support of substantially rigid material coupled in a separable manner to a film of a plastic material and the plant further comprises a first pre-cutting station (3a) arranged upstream of the welding station (5) to perform an etching or a separation-facilitating line on said consecutive portions of the first film (8) each having a pre-printed pattern in order to facilitate the separation of said film of plastic material coupled to said support of the first film (8), said command and control unit being capable of controlling, through the actuation means, a displacement of the first pre-cutting station (3a) along said forward direction determined by the processing means according to said data in case of wrong positioning of said first pre-cutting station (3a),

and/or being **characterized in that**

the plant (1) further comprises a second pre-cutting station (3b) arranged upstream of the welding station (5) to perform a facilitated opening etching on the edges of the consecutive portions of the first film (8) each having a pre-printed pattern and whereon the product to be packed is placed, said pre-cutting station (3b) being movable along said forward direction and in communication with the command and control unit, said command and control unit being capable of controlling, through the actuation means, a displacement of the second pre-cutting station (3b) along said forward direction determined by the processing means according to said data in case of wrong positioning of said second pre-cutting station (3b).

2. Plant (1) for packing products in packages, each comprising a container of a substantially rigid material and having a pre-printed pattern, a product placed in said container and a closing film preferably seal-joined to said container, the plant comprising:

- a forming station (2) for obtaining a succession of containers (9) each having a pre-printed pattern from a first film (8) comprising a layer of substantially rigid material having a succession of pre-printed patterns with pre-fixed pitch,
- a welding station (5) for applying a second closing film (11) on each of said containers (9) after having placed thereinto the product to be packed, thus obtaining a succession of said packages (12),
- a cutting station (6) for separating said packages,
- means for pitch-by-pitch moving said first film (8) comprising a layer of substantially rigid material having a succession of pre-printed patterns according to a substantially constant pitch (P) along a forward direction, said forming station (2), said welding station (5) and said cutting station (6) being arranged in series along said forward direction, said forming station (2) and/or said cutting station (6) being movable along said forward direction,
- means (27) for detecting the position of at least one pre-printed pattern passing in a pre-fixed area along a forward direction during each movement of said first film (8) comprising a layer of substantially rigid material,
- a command and control unit in communication with said detection means (27) and with said forming station (2) and/or said cutting station (6), said command and control unit comprising means for processing position data of at least one pre-printed pattern transmitted by the detection means (27) and position data of said forming station (2) and/or of said cutting station (6) during each movement of said first film (8) comprising a layer of substantially rigid material, and actuation means for controlling, substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material, a displacement of said forming station (2) and/or said cutting station (6) along said forward direction of a magnitude determined by the processing means according to said data in case of wrong positioning of said forming station (2) and/or said cutting station (6),

the plant (1) being **characterized in that**

said first film (8) comprises a support of substantially rigid material, coupled in a separable manner to a film of a plastic material and the plant further comprises a first pre-cutting station (3a) arranged between the forming station (2) and the welding station (5), to perform an etching or a separation-facilitating line on said containers (9) in order to facilitate the separation of said film of plastic material possibly coupled to said support of the first film (8), said command and

control unit being capable of controlling, through the actuation means, a displacement of the first pre-cutting station (3a) along said forward direction determined by the processing means according to said data in case of wrong positioning of said first pre-cutting station (3a),
and/or being **characterized in that**
the plant (1) further comprises a second pre-cutting station (3b) arranged between the forming station (2) and the welding station (5) to perform a facilitated opening etching on the edges of the containers (9) obtained in the forming station (2), said pre-cutting station (3b) being movable along said forward direction and in communication with the command and control unit, said command and control unit being capable of controlling, through the actuation means, a displacement of the second pre-cutting station (3b) along said forward direction determined by the processing means according to said data in case of wrong positioning of said second pre-cutting station (3b).

3. Plant (1) according to claim 2, wherein said forming station (2) and said cutting station (6) are both movable along said forward direction and the command and control unit is capable of controlling, through the actuation means, a displacement of the forming station (2) and/or of the cutting station (6) along said forward direction determined by the processing means according to said data in case of wrong positioning of said forming station (2) and/or of said cutting station (6).

4. Plant (1) according to any one of the previous claims, wherein said first film (8) is a multilayer film comprising a sheet of substantially rigid material (8a) and a film of plastic material (8b) coupled to the sheet of substantially rigid material (8a) and the plant further comprises, upstream of the welding station (5) or the forming station (2) if present:

- a heating station (82) for heating said film of plastic material (8b) to a temperature not higher than the softening temperature of said plastic material and thus favor its adhesion on the sheet of substantially rigid material (8a),
- a coupling station (81) for coupling, preferably in a separable manner, said preheated film of plastic material (8b) with said sheet of substantially rigid material (8a), obtaining said multilayer film (8), and
- means (83) for feeding the sheet of substantially rigid material (8a) and the film of plastic material (8b) to said heating station (82) and, from this, to said coupling station (81).

5. Plant (1) according to any one of the previous claims, wherein said detection means comprise a photocell (27) arranged upstream of said welding station (5) and close thereto, said photocell (27) being capable of detecting pre-printed reference marks on said first film (8) comprising a layer of substantially rigid material between consecutive pre-printed patterns.

6. Plant (1) according to any one of the previous claims, wherein said forming station (2), if present, and said cutting station (6) have a forming group (13) and a cutting group (20) slidingly mounted on a respective frame (15; 22), respectively, along opposite longitudinal guides (16; 23) and in friction engagement with respective opposite driving belts (17; 24) that are operatively connected to respective motors (18; 25) in electric communication with said command and control unit.

7. Process for packing products in packages having pre-printed patterns comprising:

- providing a plant (1) according to claim 1 or claims 4 to 6 to the extent that they do not depend on claims 2 and 3,
- moving forward a first film (8) comprising a layer of substantially rigid material and having a succession of pre-printed patterns with a pitch (P) that is substantially constant along a forward horizontal direction,
- placing a product to be packed on each of consecutive portions of said first film (8) each having a pre-printed pattern,
- applying, preferably in a seal-manner, a second closing film (11) on each consecutive portion of said first film (8) having a pre-printed pattern in a welding station (5), thus obtaining a succession of packages, each comprising a substantially flat support made of a portion of said first film (8) having a pre-printed pattern, a product placed on said support and a closing film (11) that covers said product and is preferably seal-joined to said support,
- separating said packages from the first film of the substantially rigid material in a cutting station (6),
- detecting the position of at least one pre-printed pattern in a pre-fixed area along the forward direction during each pitch-by-pitch movement of said first film (8) comprising a layer of substantially rigid material, and
- moving substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material said cutting station (6) along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of said cutting station (6) in case of wrong posi-

tioning of said cutting station (6),

the process being **characterized in that** it further comprises before the closing film (11) application step, the steps of:

- displacing, substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material, said first pre-cutting station (3a) along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of said first pre-cutting station (3a) in case of wrong positioning of said first pre-cutting station (3a), and
- etching said film of plastic material at said consecutive portions of the first film (8) each having a pre-printed pattern to facilitate the separation of said film of plastic material from said support of substantially rigid material of the first film (8), and/or
- displacing, substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material, said second pre-cutting station (3b) along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of said second pre-cutting station (3b) in case of wrong positioning of said second pre-cutting station (3b), and
- performing a facilitated opening etching on the edge of the consecutive portions of the first film (8), each having a pre-printed pattern and whereon the product to be packed is placed through said second pre-cutting station (3b).

8. Process for packing products in packages having pre-printed patterns comprising:

- providing a plant (1) according to any one of claims 2 to 6,
- forming in a forming station (2) a succession of containers (9) each having a pre-printed pattern from a first film (8) comprising a layer of substantially rigid material having a succession of pre-printed patterns while said first film (8) is moved forward with a pitch (P) that is substantially constant along a forward horizontal direction,
- placing a product to be packed in each container (9),
- applying, preferably in a seal manner, a second closing film (11) on each container (9) in a welding station (5), thus obtaining a succession of packages (12) each comprising a container (9) of a substantially rigid material and having a pre-printed pattern, a product placed in said container and a closing film (11) preferably seal-joined to said container (9),
- separating said packages (12) from said first film (8) comprising a layer of substantially rigid material in a cutting station (6),
- detecting the position of at least one pre-printed pattern in a pre-fixed area along the forward direction during each pitch-by-pitch movement of said first film (8) comprising a layer of substantially rigid material,
- displacing substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material said forming station (2) and/or said cutting station (6) along said forward direction by a stretch calculated by processing means according to the position detected of said at least one printed pattern and to the position of said forming station (2) and/or of said cutting station (6) in case of wrong positioning of said forming station (2) and/or said cutting station (6),

the process further comprising, after the forming step and before the closing film (11) application step, the steps of:

- displacing, substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material, said first pre-cutting station (3a) along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of said first pre-cutting station (3a) in case of wrong positioning of said first pre-cutting station (3a), and
- etching said film of plastic material at said containers (9) to facilitate the separation of said film of plastic material from said support of substantially rigid material of the first film (8),
and/or
- displacing, substantially simultaneously to the pitch-by-pitch forward movement of said first film (8) comprising a layer of substantially rigid material, said second pre-cutting station (3b) along said forward direction by a stretch calculated by processing means according to the detected position of said at least one printed pattern and to the position of said second pre-cutting station (3b) in case of wrong positioning of said second pre-cutting station (3b), and
- performing a facilitated opening etching on the edge of the containers (9) through said second pre-cutting station (3b).

9. Process according to claim 7 or 8, wherein said first film (8) is a multilayer film comprising a sheet of sub-

stantially rigid material (8a) and a film of plastic material (8b) coupled to the sheet of substantially rigid material (8a) and the process further comprises, before the moving forward step of said first film (8) with a substantially constant pitch (P) along a forward horizontal direction, the steps of:

- heating, in said heating station (82), the film of plastic material (8b) to a temperature not higher than the softening temperature of the plastic material (8b), and
- coupling, in said coupling station (81), preferably in a separable manner, the sheet of substantially rigid material (8a) and the film of plastic material (8b).

10. Process according to any one of claims 7 to 9, wherein said first film (8) has pre-printed reference marks between consecutive pre-printed patterns and said detection step of the position of at least one pre-printed pattern is performed indirectly by detecting the position of said reference marks.

11. Process according to any one of the previous claims 7 to 10, wherein the substantially rigid material comprised in the first film (8) or forming the support of the first film (8) is selected among paper, cardboard and the like and said closing film (11) is made of a plastic material.

Patentansprüche

1. Anlage (1) zum Verpacken von Produkten in Verpackungen, wobei jede Verpackung einen im Wesentlichen flachen Träger aus einem im Wesentlichen steifen Material aufweist und ein vorgedrucktes Muster, ein auf dem Träger platziertes Produkt und eine Verschlussfolie hat, die das Produkt bedeckt und mit dem Träger vorzugsweise dichtend verbunden ist, wobei die Anlage Folgendes aufweist:

- Mittel zum schrittweisen Bewegen einer ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, die eine Abfolge von vorgedruckten Mustern entsprechend einem Schritt (P) hat, der im Wesentlichen konstant entlang einer Vorwärtsrichtung ist,
- eine Schweißstation (5) zum Aufbringen einer zweiten Verschlussfolie (11) auf aufeinanderfolgende Teile der ersten Folie (8), wobei jeder ein vorgedrucktes Muster hat und worauf ein zu verpackendes Produkt platziert wurde, um somit eine Abfolge der Verpackungen zu erhalten,
- eine Schneidestation (6) zum Abtrennen der Verpackungen, wobei die Schweißstation (5) und die Schneidestation (6) der Reihe nach entlang der Vorwärtsrichtung angeordnet sind, wobei die Schneidestation (6) entlang der Vorwärtsrichtung beweglich ist
- Mittel (27) zum Erfassen der Position von mindestens einem vorgedruckten Muster, das sich in einem zuvor festgelegten Bereich entlang der Vorwärtsrichtung während jeder Bewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, bewegt, und
- eine Befehls- und Steuerungseinheit, die mit den Erfassungsmitteln (27) und mit der Schneidestation (6) in Verbindung steht, wobei die Befehls- und Steuerungseinheit Mittel zum Verarbeiten von Positionsdaten von mindestens einem vorgedruckten Muster, die von den Erfassungsmitteln (27) übertragen werden, und Positionsdaten der Schneidestation (6) während jeder Bewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, und Betätigungsmittel zum Steuern, im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, einer Verlagerung der Schneidestation (6) entlang der Vorwärtsrichtung von einer Größe, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der Schneidestation (6) bestimmt wird, aufweist,

wobei die Anlage (1) **dadurch gekennzeichnet ist, dass**

die erste Folie (8) einen Träger aus einem im Wesentlichen steifen Material, der mit einer Folie aus einem Kunststoffmaterial auf eine trennbare Art und Weise verbunden ist, aufweist, und die Anlage außerdem eine erste Vorschneidestation (3a) aufweist, die der Schweißstation (5) vorgelagert ist, um eine Ätz- oder Trennungserleichterungslinie auf den aufeinanderfolgenden Teilen der ersten Folie (8) auszuführen, wobei jeder ein vorgedrucktes Muster hat, um die Trennung der Kunststofffolie, die mit dem Träger der ersten Folie (8) verbunden ist, zu erleichtern, wobei die Befehls- und Steuerungseinheit in der Lage ist, durch die Betätigungsmittel eine Verlagerung der ersten Vorschneidestation (3a) entlang der Vorwärtsrichtung zu steuern, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der ersten Vorschneidestation (3a) bestimmt wird,

und/oder **dadurch gekennzeichnet ist, dass**

die Anlage (1) außerdem eine zweite Vorschneidestation (3b) aufweist, die der Schweißstation (5) vorgelagert ist, um ein erleichtertes Öffnungsätzen an den Kanten der aufeinanderfolgenden Teile der ersten Folie (8) auszuführen, wobei jeder ein vorgedrucktes Muster hat und

worauf das zu verpackende Produkt platziert ist, wobei die Vorschneidestation (3b) entlang der Vorwärtsrichtung beweglich und mit der Befehls- und Steuerungseinheit in Verbindung ist, wobei die Befehls-und Steuerungseinheit in der Lage ist, durch die Betätigungsmittel eine Verlagerung der zweiten Vorschneidestation (3b) entlang der Vorwärtsrichtung zu steuern, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der zweiten Vorschneidestation (3b) bestimmt wird.

2. Anlage (1) zum Verpacken von Produkten in Verpackungen, wobei jede einen Behälter aus einem im Wesentlichen steifen Material aufweist und ein vorgedrucktes Muster, ein in dem Behälter platziertes Produkt und eine Verschlussfolie hat, die mit dem Träger vorzugsweise dichtend verbunden ist, wobei die Anlage Folgendes aufweist:

- eine Formungsstation (2) zum Erzeugen einer Abfolge von Behältern (9), wobei jeder ein vorgedrucktes Muster von einer ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, die eine Abfolge von vorgedruckten Mustern mit einem vorher festgelegten Schritt hat,
- eine Schweißstation (5) zum Aufbringen einer zweiten Verschlussfolie (11) auf jeden der Behälter (9), nachdem das zu verpackende Produkt darin platziert wurde, um somit eine Abfolge von Verpackungen (12) zu erhalten,
- eine Schneidestation (6) zum Abtrennen der Verpackungen,
- Mittel zum schrittweisen Bewegen der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, die eine Abfolge von vorgedruckten Mustern entsprechend einem im Wesentlichen konstanten Schritt (P) entlang einer Vorwärtsrichtung hat, wobei die Formungsstation (2), die Schweißstation (5) und die Schneidestation (6) der Reihe nach entlang der Vorwärtsrichtung angeordnet sind, wobei die Formungsstation (2) und/oder die Schneidestation (6) entlang der Vorwärtsrichtung beweglich sind bzw. ist,
- Mittel (27) zum Erfassen der Position von mindestens einem vorgedruckten Muster, das sich in einem zuvor festgelegten Bereich entlang der Vorwärtsrichtung während jeder Bewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, bewegt,
- eine Befehls- und Steuerungseinheit, die mit den Erfassungsmitteln (27) und mit der Formungsstation (2) und/oder mit der Schneidestation (6) in Verbindung steht, wobei die Befehls- und Steuerungseinheit Mittel zum Verarbeiten von Positionsdaten von mindestens einem vorgedruckten Muster, die von den Erfassungsmitteln (27) übertragen werden, und Positionsdaten der Formungsstation (2) und/oder der Schneidestation (6) während jeder Bewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, und Betätigungsmittel zum Steuern, im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, einer Verlagerung der Formungsstation (2) und/oder der Schneidestation (6) entlang der Vorwärtsrichtung von einer Größe, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der Formungsstation (2) und/oder der Schneidestation (6) bestimmt wird, aufweist,

wobei die Anlage (1) **dadurch gekennzeichnet ist, dass**

die erste Folie (8) einen Träger aus einem im Wesentlichen steifen Material, der mit einer Folie aus einem Kunststoffmaterial auf eine trennbare Art und Weise verbunden ist, aufweist, und die Anlage außerdem eine zwischen der Formungsstation (2) und der Schweißstation (5) angeordnete erste Vorschneidestation (3a) aufweist, um eine Ätz- oder Trennungserleichterungslinie auf den Behältern (9) auszuführen, um die Trennung der Kunststofffolie, die eventuell mit dem Träger der ersten Folie (8) verbunden ist, zu erleichtern, wobei die Befehls- und Steuerungseinheit in der Lage ist, durch die Betätigungsmittel eine Verlagerung der ersten Vorschneidestation (3a) entlang der Vorwärtsrichtung zu steuern, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der ersten Vorschneidestation (3a) bestimmt wird,

und/oder **dadurch gekennzeichnet ist, dass**

die Anlage (1) außerdem eine zwischen der Formungsstation (2) und der Schweißstation (5) angeordnete zweite Vorschneidestation (3b) aufweist, um ein erleichtertes Öffnungsätzen an den Kanten der in der Formungsstation (2) erzeugten Behälter (9) auszuführen, wobei die Vorschneidestation (3b) entlang der Vorwärtsrichtung beweglich und mit der Befehls- und Steuerungseinheit in Verbindung ist, wobei die Befehls-und Steuerungseinheit in der Lage ist, durch die Betätigungsmittel eine Verlagerung der zweiten Vorschneidestation (3b) entlang der Vorwärtsrichtung zu steuern, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der zweiten Vorschneidestation (3b) bestimmt wird.

3. Anlage (1) nach Anspruch 2, bei der beide, die For-

mungsstation (2) und die Schneidestation (6), entlang der Vorwärtsrichtung beweglich sind, und die Befehls-und Steuerungseinheit in der Lage ist, durch die Betätigungsmittel eine Verlagerung der Formungsstation (2) und/oder der Schneidestation (6) entlang der Vorwärtsrichtung zu steuern, die von den Verarbeitungsmitteln entsprechend dieser Daten im Falle einer falschen Positionierung der Formungsstation (2) und/oder der Schneidestation (6) bestimmt wird.

4. Anlage (1) nach einem der vorhergehenden Ansprüche, bei der die erste Folie (8) eine Mehrschichtfolie ist, die einen Bogen aus einem im Wesentlichen steifen Material (8a) und eine Folie aus Kunststoff (8b), die mit dem Bogen aus einem im Wesentlichen steifen Material (8a) verbunden ist, aufweist, und die Anlage außerdem, vor der Schweißstation (5) oder der Formungsstation (2), falls vorhanden, Folgendes aufweist:

- eine Heizstation (82) zum Erhitzen der Kunststofffolie (8b) auf eine Temperatur, die nicht höher als die Erweichungstemperatur der Kunststofffolie ist, und um somit ihre Adhäsion an dem Bogen aus einem im Wesentlichen steifen Material (8a) zu begünstigen,
- eine Verbindungsstation (81) zum Verbinden, vorzugsweise auf eine trennbare Art und Weise, der vorerhitzten Kunststofffolie (8b) mit dem Bogen aus einem im Wesentlichen steifen Material (8a), wobei die Mehrschichtfolie (8) erhalten wird, und
- Mittel (83) zum Fördern des Bogens aus einem im Wesentlichen steifen Material (8a) und der Kunststofffolie (8b) zu der Heizstation (82) und von dieser, zu der Verbindungsstation (81).

5. Anlage (1) nach einem der vorhergehenden Ansprüche, bei der die Erfassungsmittel eine Photozelle (27) aufweisen, die vor und nahe an der Schweißstation (5) angeordnet ist, wobei die Photozelle (27) in der Lage ist, vorgedruckte Referenzmarkierungen auf der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, zwischen aufeinanderfolgenden vorgedruckten Mustern zu erfassen.

6. Anlage (1) nach einem der vorhergehenden Ansprüche, bei der die Formungsstation (2), falls vorhanden, und die Schneidestation (6) eine Formungsgruppe (13) und eine Schneidegruppe (20) haben, die jeweils gleitend auf einem jeweiligen Rahmen (15; 22) auf entgegengesetzten Längsführungen (16; 23) und in Reibungseingriff mit jeweiligen entgegengesetzten Treibriemen (17; 24) gelagert sind, die mit jeweiligen Motoren (18; 25) wirkmäßig verbunden sind, die in elektrischer Verbindung mit der Befehls- und Steuerungseinheit sind.

7. Verfahren zum Verpacken von Produkten in Verpackungen, die vorgedruckte Muster haben, mit:

- Bereitstellen einer Anlage (1) nach Anspruch 1 oder den Ansprüchen 4 bis 6 insoweit als sie nicht von den Ansprüchen 2 und 3 abhängig sind,
- Vorwärtsbewegen einer ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist und eine Abfolge von vorgedruckten Mustern mit einem Schritt (P) hat, der im Wesentlichen konstant in einer horizontalen Vorwärtsrichtung ist,
- Platzieren eines zu verpackenden Produktes auf jeden Teil von mehreren aufeinanderfolgenden Teilen der ersten Folie (8), die jeweils ein vorgedrucktes Muster haben,
- Aufbringen, vorzugsweise in einer dichtungsbildenden Weise, einer zweiten Verschlussfolie (11) auf jeden aufeinanderfolgenden Teil der ersten Folie (8), der ein vorgedrucktes Muster hat, in einer Schweißstation (5), um somit eine Abfolge von Verpackungen zu erhalten, wobei jede einen im Wesentlichen flachen Träger, der aus einem Teil der ersten Folie (8), der ein vorgedrucktes Muster hat, hergestellt ist, ein Produkt, das auf dem Träger platziert ist, und eine Verschlussfolie (11) aufweist, die das Produkt bedeckt und vorzugsweise mit dem Träger dichtend verbunden ist,
- Trennen der Verpackungen von der ersten Folie aus einem im Wesentlichen steifen Material in einer Schneidestation (6),
- Erfassen der Position von mindestens einem vorgedruckten Muster in einem zuvor festgelegten Bereich entlang der Vorwärtsrichtung während jeder schrittweisen Bewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, und
- Bewegen der Schneidestation (6) im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der eine Schicht aus einem im Wesentlichen steifen Material aufweisenden ersten Folie (8) entlang der Vorwärtsrichtung um eine Strecke, die von Verarbeitungsmitteln gemäß der erfassten Position des mindestens einen gedruckten Musters und der Position der Schneidestation (6) im Falle einer falschen Positionierung der Schneidestation (6) berechnet wird,

wobei das Verfahren **dadurch gekennzeichnet ist, dass** es vor dem die Verschlussfolie (11) aufbringenden Schritt außerdem die folgenden Schritte aufweist:

- Verlagern der ersten Vorschneidestation (3a) im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der eine Schicht aus einem im Wesentlichen steifen Material aufweisenden ersten Folie (8) entlang der Vorwärtsrichtung um eine Strecke, die von Verarbeitungsmitteln gemäß der erfassten Position des mindestens einen gedruckten Musters und der Position der ersten Vorschneidestation (3a) im Falle einer falschen Positionierung der ersten Vorschneidestation (3a) berechnet wird, und
- Ätzen der Folie aus Kunststoff an den aufeinanderfolgenden Teilen der ersten Folie (8), wobei jeder ein vorgedrucktes Muster hat, um die Trennung der Folie aus Kunststoff von dem Träger des im Wesentlichen steifen Materials der ersten Folie (8) zu erleichtern,
und/oder
- Verlagern der zweiten Vorschneidestation (3b) im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der eine Schicht aus einem im Wesentlichen steifen Material aufweisenden ersten Folie (8) entlang der Vorwärtsrichtung um eine Strecke, die von Verarbeitungsmitteln gemäß der erfassten Position des mindestens einen Musters und der Position der zweiten Vorschneidestation (3b) im Falle einer falschen Positionierung der zweiten Vorschneidestation (3b) berechnet wird, und
- Durchführen einer erleichterten Öffnungsätzung an der Kante der aufeinanderfolgenden Teile der ersten Folie (8), wobei jeder ein vorgedrucktes Muster hat und worauf das zu verpackende Produkt platziert ist, durch die zweite Vorschneidestation (3b).

8. Verfahren zum Verpacken von Produkten in Verpackungen, die vorgedruckte Muster haben, mit:

- Bereitstellen einer Anlage (1) nach einem der Ansprüche 2 bis 6,
- in einer Formungsstation (2) Formen einer Abfolge von Behältern (9), wobei jeder ein vorgedrucktes Muster hat, aus einer ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist, die eine Abfolge von vorgedruckten Mustern hat, während die erste Folie (8) in einem Schritt (P) vorwärts bewegt wird, der im Wesentlichen konstant in einer horizontalen Vorwärtsrichtung ist,
- Platzieren eines zu verpackenden Produktes in jeden Behälter (9),
- Aufbringen, vorzugsweise in einer dichtungsbildenden Weise, einer zweiten Verschlussfolie (11) auf jeden Behälter (9) in einer Schweißstation (5), um somit eine Abfolge von Verpackungen (12) zu erhalten, wobei jede einen Behälter (9) aus einem im Wesentlichen steifen Material aufweist und ein vorgedrucktes Muster, ein Produkt, das in dem Behälter platziert ist und eine Verschlussfolie (11) hat, die vorzugsweise mit dem Behälter dichtend verbunden ist,
- Trennen der Verpackungen (12) von der ersten Folie (8), die ein im Wesentlichen steifes Material aufweist, in einer Schneidestation (6),
- Erfassen der Position von mindestens einem vorgedruckten Muster in einem zuvor festgelegten Bereich entlang der Vorwärtsrichtung während jeder schrittweisen Bewegung der ersten Folie (8), die eine Schicht aus einem im Wesentlichen steifen Material aufweist,
- Bewegen der Formungsstation (2) und/oder der Schneidestation (6) im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der eine Schicht aus einem im Wesentlichen steifen Material aufweisenden ersten Folie (8) entlang der Vorwärtsrichtung um eine Strecke, die von Verarbeitungsmitteln gemäß der erfassten Position des mindestens einen gedruckten Musters und der Position der Formungsstation (2) und/oder der Schneidestation (6) im Falle einer falschen Positionierung der Formungsstation (2) und/oder der Schneidestation (6) berechnet wird,

wobei das Verfahren nach dem Formungsschritt und vor dem die Verschlussfolie (11) aufbringenden Schritt außerdem die Schritte aufweist:

- Verlagern der ersten Vorschneidestation (3a) im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der eine Schicht aus einem im Wesentlichen steifen Material aufweisenden ersten Folie (8) entlang der Vorwärtsrichtung um eine Strecke, die von Verarbeitungsmitteln gemäß der erfassten Position des mindestens einen gedruckten Musters und der Position der ersten Vorschneidestation (3a) im Falle einer falschen Positionierung der ersten Vorschneidestation (3a) berechnet wird, und
- Ätzen der Folie aus Kunststoff an den Behältern (9), um die Trennung der Folie aus Kunststoff von dem Träger des im Wesentlichen steifen Materials der ersten Folie (8) zu erleichtern, und/oder
- Verlagern der zweiten Vorschneidestation (3b) im Wesentlichen gleichzeitig mit der schrittweisen Vorwärtsbewegung der eine Schicht aus einem im Wesentlichen steifen Material aufweisenden ersten Folie (8) entlang der Vorwärtsrichtung um eine Strecke, die von Verarbeitungsmitteln gemäß der erfassten Position des mindestens einen Musters und der Position der zweiten Vorschneidestation (3b) im Falle einer falschen Positionierung der zweiten Vorschneidestation (3b) berechnet wird, und

- Durchführen einer erleichterten Öffnungsätzung an der Kante der Behälter (9) durch die zweite Vorschneidestation (3b).

9. Verfahren nach Anspruch 7 oder 8, bei dem die erste Folie (8) eine Mehrschichtfolie ist, die einen Bogen aus einem im Wesentlichen steifen Material (8a) und eine Folie aus Kunststoff (8b), die mit dem Bogen aus einem im Wesentlichen steifen Material (8a) verbunden ist, und wobei das Verfahren vor dem Vorwärtsbewegungsschritt der ersten Folie (8) mit einem im Wesentlichen konstanten Schritt (P) in einer horizontalen Vorwärtsrichtung außerdem die folgenden Schritte aufweist:

- in der Heizstation (82) Erhitzen der Folie aus Kunststoff (8b) auf eine Temperatur, die nicht höher als die Erweichungstemperatur des Kunststoffmaterials (8b) ist, und
- in der Verbindungsstation (81) Verbinden, vorzugsweise auf eine trennbare Weise, des Bogens aus einem im Wesentlichen steifen Materials (8a) mit der Folie aus Kunststoff (8b).

10. Verfahren nach einem der vorhergehenden Ansprüche 7 bis 9, bei dem die erste Folie (8) vorgedruckte Referenzmarkierungen zwischen aufeinanderfolgenden vorgedruckten Mustern hat und der Erfassungsschritt der Position von mindestens einem vorgedruckten Muster indirekt durch Erfassen der Position der Referenzmarkierungen ausgeführt wird.

11. Verfahren nach einem der vorhergehenden Ansprüche 7 bis 10, bei dem das im Wesentlichen steife Material, das in der ersten Folie (8) enthalten ist oder den Träger der ersten Folie (8) bildet, unter Papier, Karton und dgl. ausgewählt ist, und die Verschlussfolie (11) aus einem Kunststoffmaterial hergestellt ist.

Revendications

1. Installation (1) destinée à emballer des produits dans des emballages, chaque emballage comportant un support sensiblement plat constitué d'un matériau sensiblement rigide et ayant un motif pré-imprimé, un produit placé sur ledit support et un film de fermeture qui recouvre ledit produit et est de préférence scellé audit support, l'installation comportant :

- des moyens pour déplacer pas à pas un premier film (8) comportant une couche de matériau sensiblement rigide ayant une succession de motifs pré-imprimés en fonction d'un pas (P) qui est sensiblement constant le long d'une direction vers l'avant,
- une station de soudage (5) pour appliquer un second film de fermeture (11) sur des parties consécutives dudit premier film (8) ayant chacune un motif pré-imprimé et sur lesquelles un produit à emballer a été placé, en obtenant ainsi une succession desdits emballages,
- une station de coupe (6) pour séparer lesdits emballages, ladite station de soudage (5) et ladite station de coupe (6) étant agencées en série le long de ladite direction vers l'avant, ladite station de coupe (6) étant mobile le long de ladite direction vers l'avant,
- des moyens (27) pour détecter la position d'au moins un motif pré-imprimé passant dans une zone pré-fixée le long de la direction vers l'avant pendant chaque mouvement dudit premier film (8) comportant une couche de matériau sensiblement rigide, et
- une unité de commande et de contrôle en communication avec lesdits moyens de détection (27) et avec ladite station de coupe (6), ladite unité de commande et de contrôle comportant des moyens pour traiter des données de position d'au moins un motif pré-imprimé transmises par les moyens de détection (27) et des données de position de ladite station de coupe (6) pendant chaque mouvement dudit premier film (8) comportant une couche de matériau sensiblement rigide, et des moyens d'actionnement pour contrôler, de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, un déplacement de ladite station de coupe (6) le long de ladite direction vers l'avant d'une grandeur déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite station de coupe (6),

l'installation (1) étant **caractérisée en ce que** ledit premier film (8) comporte un support constitué d'un matériau sensiblement rigide couplé d'une manière séparable à un film constitué d'une matière plastique et l'installation comporte en outre une première station de pré-découpe (3a) agencée en amont de la station de soudage (5) pour effectuer une gravure ou une ligne facilitant la séparation sur lesdites parties consécutives du premier film (8), chacune ayant un motif pré-imprimé afin de faciliter la séparation dudit film de matière plastique couplé audit support du premier film (8), ladite unité de commande et de contrôle étant capable de contrôler, par l'intermédiaire des moyens d'actionnement, un déplacement de la première station de pré-découpe (3a) le long de ladite direction vers l'avant déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite première station de pré-découpe (3a),

et/ou étant **caractérisée en ce que**
l'installation (1) comporte en outre une seconde station de pré-découpe (3b) agencée en amont de la station de soudage (5) pour effectuer une gravure d'ouverture facilitée sur les bords des parties consécutives du premier film (8), chacune ayant un motif pré-imprimé et sur lesquelles le produit à emballer est placé, ladite station de pré-découpe (3b) étant mobile le long de ladite direction vers l'avant et en communication avec l'unité de commande et de contrôle, ladite unité de commande et de contrôle étant capable de contrôler, par l'intermédiaire des moyens d'actionnement, un déplacement de la seconde station de pré-découpe (3b) le long de ladite direction vers l'avant déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite seconde station de pré-découpe (3b).

2. Installation (1) pour emballer des produits dans des emballages, chacun comportant un contenant en un matériau sensiblement rigide et ayant un motif pré-imprimé, un produit placé dans ledit contenant et un film de fermeture de préférence scellé audit contenant, l'installation comportant :

- une station de formage (2) pour obtenir une succession de contenants (9) ayant chacun un motif pré-imprimé à partir d'un premier film (8) comportant une couche de matériau sensiblement rigide ayant une succession de motifs pré-imprimés avec un pas préfixé,
- une station de soudage (5) pour appliquer un second film de fermeture (11) sur chacun desdits contenants (9) après avoir placé dans celui-ci le produit à emballer, en obtenant ainsi une succession desdits emballages (12),
- une station de coupe (6) pour séparer lesdits emballages,
- des moyens pour déplacer pas à pas ledit premier film (8) comportant une couche de matériau sensiblement rigide ayant une succession de motifs pré-imprimés en fonction d'un pas sensiblement constant (P) le long d'une direction vers l'avant, ladite station de formage (2), ladite station de soudage (5) et ladite station de coupe (6) étant agencées en série le long de ladite direction vers l'avant, ladite station de formage (2) et/ou ladite station de coupe (6) étant mobiles le long de ladite direction vers l'avant,
- des moyens (27) pour détecter la position d'au moins un motif pré-imprimé passant dans une zone pré-fixée le long d'une direction vers l'avant pendant chaque mouvement dudit premier film (8) comportant une couche de matériau sensiblement rigide,
- une unité de commande et de contrôle en communication avec lesdits moyens de détection (27) et avec ladite station de formage (2) et/ou ladite station de coupe (6), ladite unité de commande et de contrôle comportant des moyens pour traiter des données de position d'au moins un motif pré-imprimé transmises par les moyens de détection (27) et des données de position de ladite station de formage (2) et/ou de ladite station de coupe (6) pendant chaque mouvement dudit premier film (8) comportant une couche de matériau sensiblement rigide, et des moyens d'actionnement pour contrôler, de manière sensiblement simultanée, au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, un déplacement de ladite station de formage (2) et/ou de ladite station de coupe (6) le long de ladite direction vers l'avant d'une grandeur déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite station de formage (2) et/ou de ladite station de coupe (6),

l'installation (1) étant **caractérisée en ce que**

- ledit premier film (8) comporte un support constitué d'un matériau sensiblement rigide, couplé d'une manière séparable à un film constitué d'une matière plastique et l'installation comporte en outre une première station de pré-découpe (3a) agencée entre la station de formage (2) et la station de soudage (5), pour effectuer une gravure ou une ligne facilitant la séparation sur lesdits contenants (9) afin de faciliter la séparation dudit film de matière plastique éventuellement couplé audit support du premier film (8), ladite unité de commande et de contrôle étant capable de contrôler, par l'intermédiaire des moyens d'actionnement, un déplacement de la première station de pré-découpe (3a) le long de ladite direction vers l'avant déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite première station de pré-découpe (3a),

et/ou étant **caractérisée en ce que**

- l'installation (1) comporte en outre une seconde station de pré-découpe (3b) agencée entre la station de formage (2) et la station de soudage (5) pour effectuer une gravure d'ouverture facilitée sur les bords des contenants (9) obtenus dans la station de formage (2), ladite station de pré-découpe (3b) étant mobile le long de ladite direction vers l'avant et en communication avec l'unité de commande et de contrôle, ladite unité de

commande et de contrôle étant capable de contrôler, par l'intermédiaire des moyens d'actionnement, un déplacement de la seconde station de pré-découpe (3b) le long de ladite direction vers l'avant déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite seconde station de pré-découpe (3b).

3. Installation (1) selon la revendication 2, dans laquelle ladite station de formage (2) et ladite station de coupe (6) sont toutes deux mobiles le long de ladite direction vers l'avant et l'unité de commande et de contrôle est capable de contrôler, par l'intermédiaire des moyens d'actionnement, un déplacement de la station de formage (2) et/ou de la station de coupe (6) le long de ladite direction vers l'avant déterminée par les moyens de traitement en fonction desdites données en cas de mauvais positionnement de ladite station de formage (2) et/ou de ladite station de coupe (6).

4. Installation (1) selon l'une quelconque des revendications précédentes, dans laquelle ledit premier film (8) est un film multicouche comportant une feuille de matériau sensiblement rigide (8a) et un film de matière plastique (8b) couplé à la feuille de matériau sensiblement rigide (8a) et l'installation comporte en outre, en amont de la station de soudage (5) ou de la station de formage (2) si elle est présente :

- une station de chauffage (82) pour chauffer ledit film de matière plastique (8b) jusqu'à une température non supérieure à la température de ramollissement de ladite matière plastique et favoriser ainsi son adhérence sur la feuille de matériau sensiblement rigide (8a),
- une station de couplage (81) pour coupler, de préférence de manière séparable, ledit film de matière plastique préchauffé (8b) avec ladite feuille de matériau sensiblement rigide (8a), en obtenant ledit film multicouche (8), et
- des moyens (83) pour acheminer la feuille de matériau sensiblement rigide (8a) et le film de matière plastique (8b) jusqu'à ladite station de chauffage (82) et, de là, jusqu'à ladite station de couplage (81).

5. Installation (1) selon l'une quelconque des revendications précédentes, dans laquelle lesdits moyens de détection comportent une cellule photoélectrique (27) agencée en amont de ladite station de soudage (5) et près de celui-ci, ladite cellule photoélectrique (27) étant capable de détecter des marques de référence pré-imprimées sur ledit premier film (8) comportant une couche de matériau sensiblement rigide entre des motifs pré-imprimés consécutifs.

6. Installation (1) selon l'une quelconque des revendications précédentes, dans laquelle ladite station de formage (2), si elle est présente, et ladite station de coupe (6) ont un groupe de formage (13) et un groupe de coupe (20) montés de manière coulissante sur un bâti (15 ; 22) respectif, respectivement, le long de guides longitudinaux opposés (16 ; 23) et en prise par friction avec des courroies d'entraînement opposées (17 ; 24) respectives qui sont reliées de manière opérationnelle à des moteurs (18 ; 25) respectifs en communication électrique avec ladite unité de commande et de contrôle.

7. Procédé pour emballer des produits dans des emballages ayant des motifs pré-imprimés, comportant de :

- fournir une installation (1) selon la revendication 1 ou les revendications 4 à 6 dans la mesure où elles ne dépendent pas des revendications 2 et 3,
- déplacer vers l'avant un premier film (8) comportant une couche de matériau sensiblement rigide et ayant une succession de motifs pré-imprimés avec un pas (P) qui est sensiblement constant le long d'une direction vers l'avant horizontale,
- placer un produit à emballer sur chacune des parties consécutives dudit premier film (8) ayant chacune un motif pré-imprimé,
- appliquer, de préférence de manière étanche, un second film de fermeture (11) sur chaque partie consécutive dudit premier film (8) ayant un motif pré-imprimé dans une station de soudage (5), en obtenant ainsi une succession d'emballages, chacun comportant un support sensiblement plat constitué d'une partie dudit premier film (8) ayant un motif pré-imprimé, un produit placé sur ledit support et un film de fermeture (11) qui recouvre ledit produit et est de préférence scellé audit support,
- séparer lesdits emballages du premier film en matériau sensiblement rigide dans une station de coupe (6),
- détecter la position d'au moins un motif pré-imprimé dans une zone pré-fixée le long de la direction vers l'avant pendant chaque mouvement pas à pas dudit premier film (8) comportant une couche de matériau sensiblement rigide, et
- déplacer, de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, ladite station de coupe (6) le long de ladite direction vers l'avant par un étirage calculé par des moyens de traitement en fonction de la position détectée dudit au moins un motif imprimé et de la position de ladite station de coupe (6) en cas de mauvais position-

nement de ladite station de coupe (6),

le procédé étant **caractérisé en ce qu'**il comporte en outre, avant l'étape d'application du film de fermeture (11), les étapes consistant à :

- déplacer de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, ladite première station de pré-découpe (3a) le long de ladite direction vers l'avant par un étirage calculé par des moyens de traitement en fonction de la position détectée dudit au moins un motif imprimé et de la position de ladite première station de pré-découpe (3a) en cas de mauvais positionnement de ladite première station de pré-découpe (3a), et
- graver ledit film de matière plastique sur lesdites parties consécutives du premier film (8) ayant chacune un motif pré-imprimé pour faciliter la séparation dudit film de matière plastique dudit support de matériau sensiblement rigide du premier film (8),

et/ou

- déplacer, de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, ladite seconde station de pré-découpe (3b) le long de ladite direction vers l'avant par un étirage calculé par des moyens de traitement en fonction de la position détectée dudit au moins un motif imprimé et de la position de ladite seconde station de pré-découpe (3b) en cas de mauvais positionnement de ladite seconde station de pré-découpe (3b), et
- réaliser une gravure d'ouverture facilitée sur le bord des parties consécutives du premier film (8), chacune ayant un motif pré-imprimé et sur lesquelles le produit à emballer est placé à travers ladite seconde station de pré-découpe (3b).

8. Procédé pour emballer des produits dans des emballages ayant des motifs pré-imprimés, comportant de :

- fournir une installation (1) selon l'une quelconque des revendications 2 à 6,
- former, dans une station de formage (2), une succession de contenants (9) ayant chacun un motif pré-imprimé à partir d'un premier film (8) comportant une couche de matériau sensiblement rigide ayant une succession de motifs pré-imprimés alors que ledit premier film (8) est déplacé vers l'avant avec un pas (P) qui est sensiblement constant le long d'une direction vers l'avant horizontale,
- placer un produit à emballer dans chaque contenant (9),
- appliquer, de préférence de manière étanche, un second film de fermeture (11) sur chaque contenant (9) dans une station de soudage (5), en obtenant ainsi une succession d'emballages (12) comportant chacun un contenant (9) constitué d'un matériau sensiblement rigide et ayant un motif pré-imprimé, un produit placé dans ledit contenant et un film de fermeture (11) de préférence scellé audit contenant (9),
- séparer lesdits emballages (12) dudit premier film (8) comportant une couche de matériau sensiblement rigide dans une station de coupe (6),
- détecter la position d'au moins un motif pré-imprimé dans une zone pré-fixée le long de la direction vers l'avant pendant chaque mouvement pas à pas dudit premier film (8) comportant une couche de matériau sensiblement rigide, et
- déplacer, de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, ladite station de formage (2) et/ou ladite station de coupe (6) le long de ladite direction vers l'avant par un étirage calculé par des moyens de traitement en fonction de la position détectée dudit au moins un motif imprimé et de la position de ladite station de formage (2) et/ou de ladite station de coupe (6) en cas de mauvais positionnement de ladite station de formage (2) et/ou de ladite station de coupe (6),

le procédé comportant en outre, après l'étape de formage et avant l'étape d'application du film de fermeture (11), les étapes consistant à :

- déplacer, de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, ladite première station de pré-découpe (3a) le long de ladite direction vers l'avant par un étirage calculé par des moyens de traitement en fonction de la position détectée dudit au moins un motif imprimé et de la position de ladite première station de pré-découpe (3a) en cas de mauvais positionnement de ladite première station de pré-découpe (3a), et
- graver ledit film de matière plastique sur lesdits contenants (9) pour faciliter la séparation dudit film de matière plastique dudit support de matériau sensiblement rigide du premier film (8),

et/ou

- déplacer, de manière sensiblement simultanée au mouvement pas à pas vers l'avant dudit premier film (8) comportant une couche de matériau sensiblement rigide, ladite seconde station de pré-découpe (3b) le long de ladite direction vers l'avant par un étirage calculé par des moyens de traitement en fonction de la position détectée dudit au moins un motif imprimé et de la position

de ladite seconde station de pré-découpe (3b) en cas de mauvais positionnement de ladite seconde station de pré-découpe (3b), et
- réaliser une gravure d'ouverture facilitée sur le bord des contenants (9) à travers ladite seconde station de pré-découpe (3b).

9. Procédé selon la revendication 7 ou 8, dans lequel ledit premier film (8) est un film multicouche comportant une feuille de matériau sensiblement rigide (8a) et un film de matière plastique (8b) couplé à la feuille de matériau sensiblement rigide (8a) et le procédé comporte en outre, avant l'étape de déplacement vers l'avant dudit premier film (8) avec un pas (P) sensiblement constant le long d'une direction vers l'avant horizontale, les étapes consistant à :

- chauffer, dans ladite station de chauffage (82), le film de matière plastique (8b) jusqu'à une température non supérieure à la température de ramollissement de la matière plastique (8b), et
- coupler, dans ladite station de couplage (81), de préférence de manière séparable, la feuille de matériau sensiblement rigide (8a) et le film de matière plastique (8b).

10. Procédé selon l'une quelconque des revendications 7 à 9, dans lequel ledit premier film (8) a des marques de référence pré-imprimées entre des motifs pré-imprimés consécutifs et ladite étape de détection de la position d'au moins un motif pré-imprimé est effectuée indirectement en détectant la position desdites marques de référence.

11. Procédé selon l'une quelconque des revendications 7 à 10 précédentes, dans lequel le matériau sensiblement rigide compris dans le premier film (8) ou formant le support du premier film (8) est choisi parmi du papier, du carton et analogue, et ledit film de fermeture (11) est constitué d'une matière plastique.

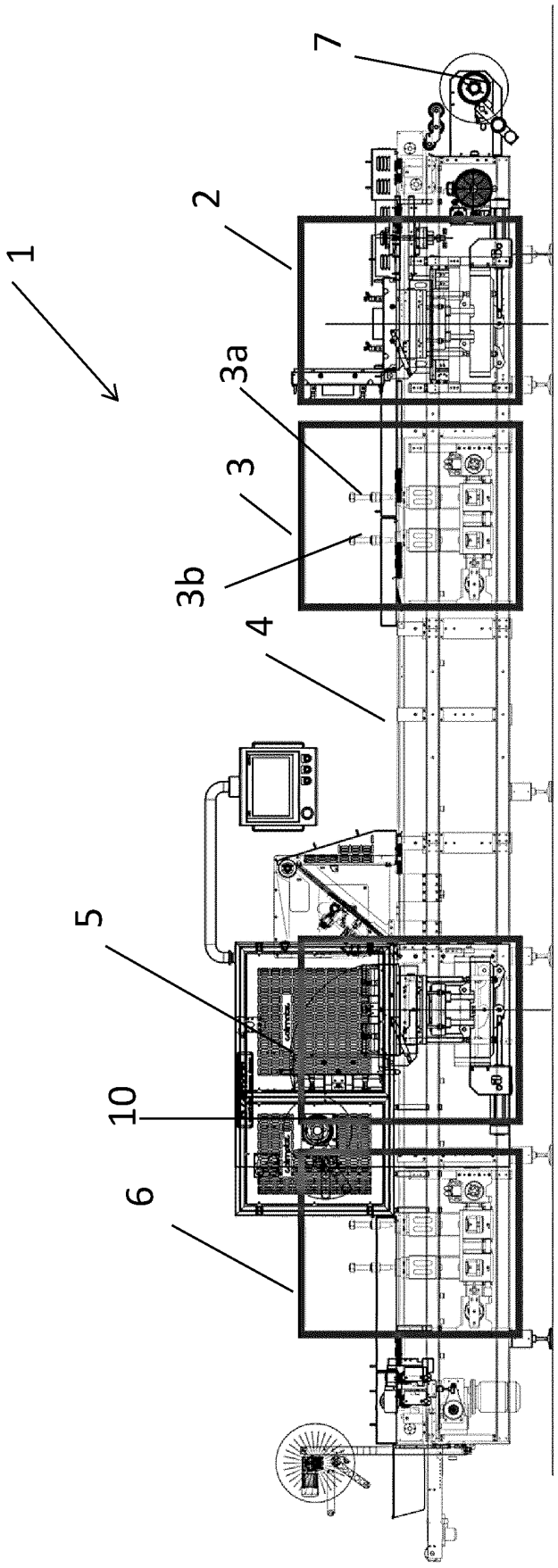

Fig. 1

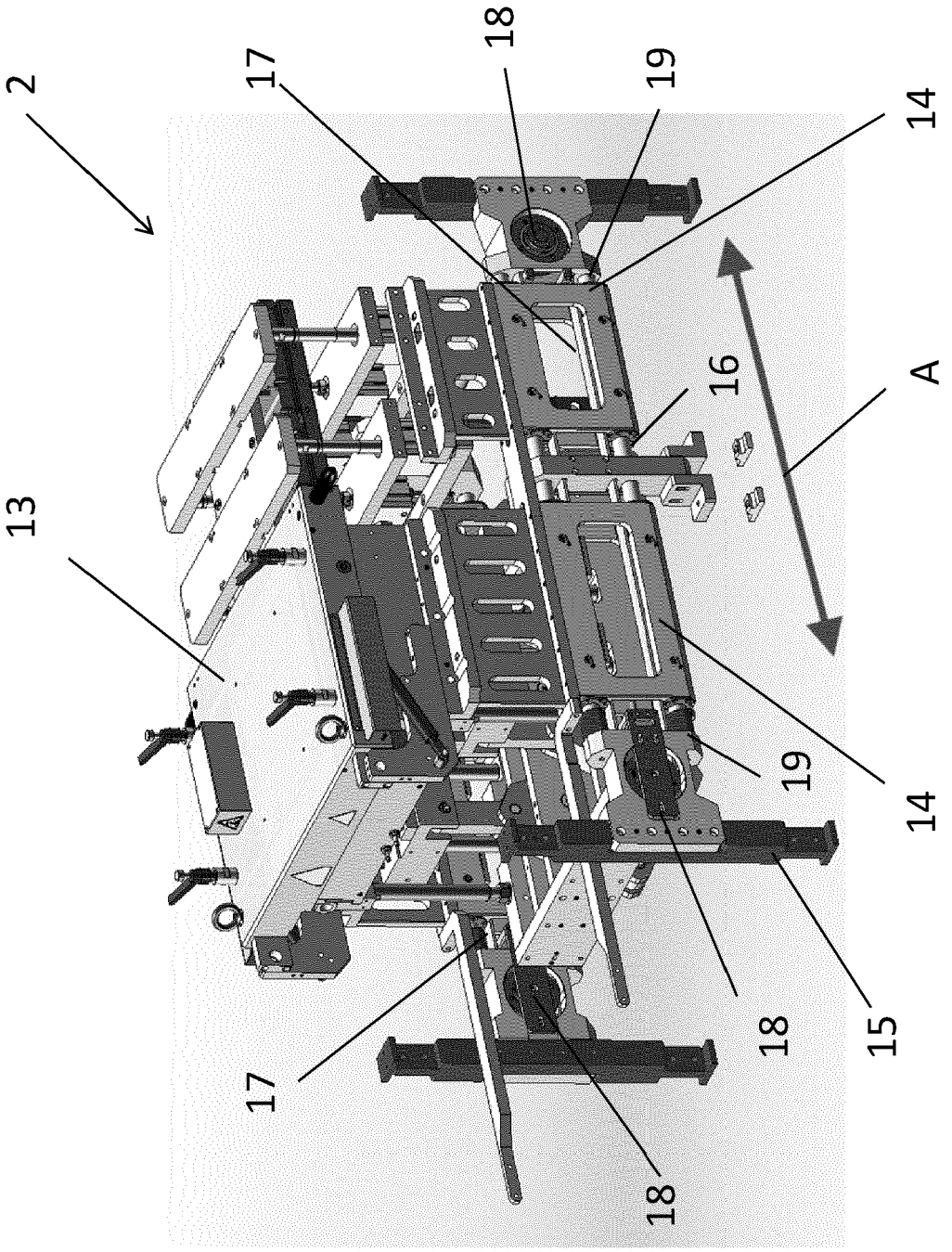

Fig. 2

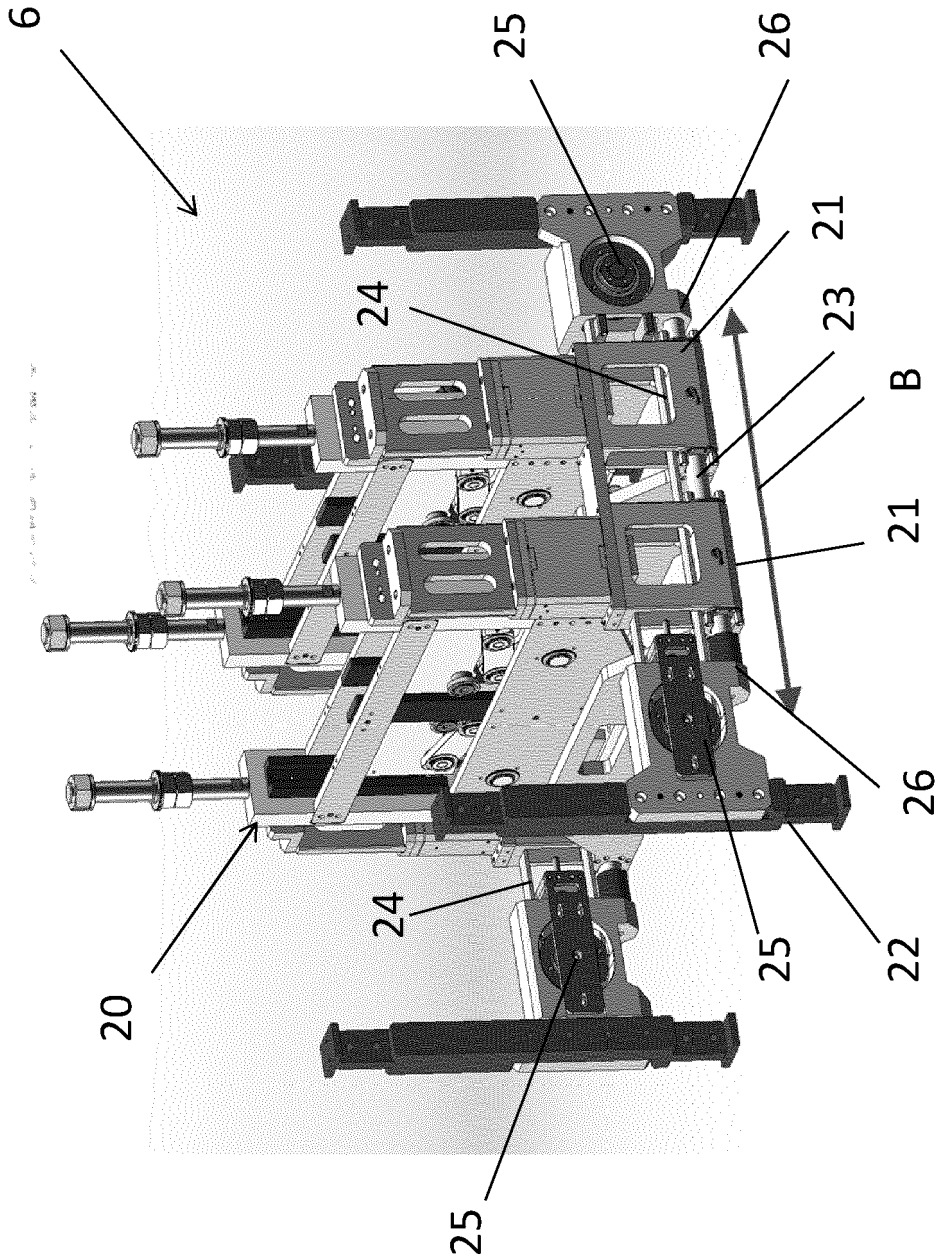

Fig. 3

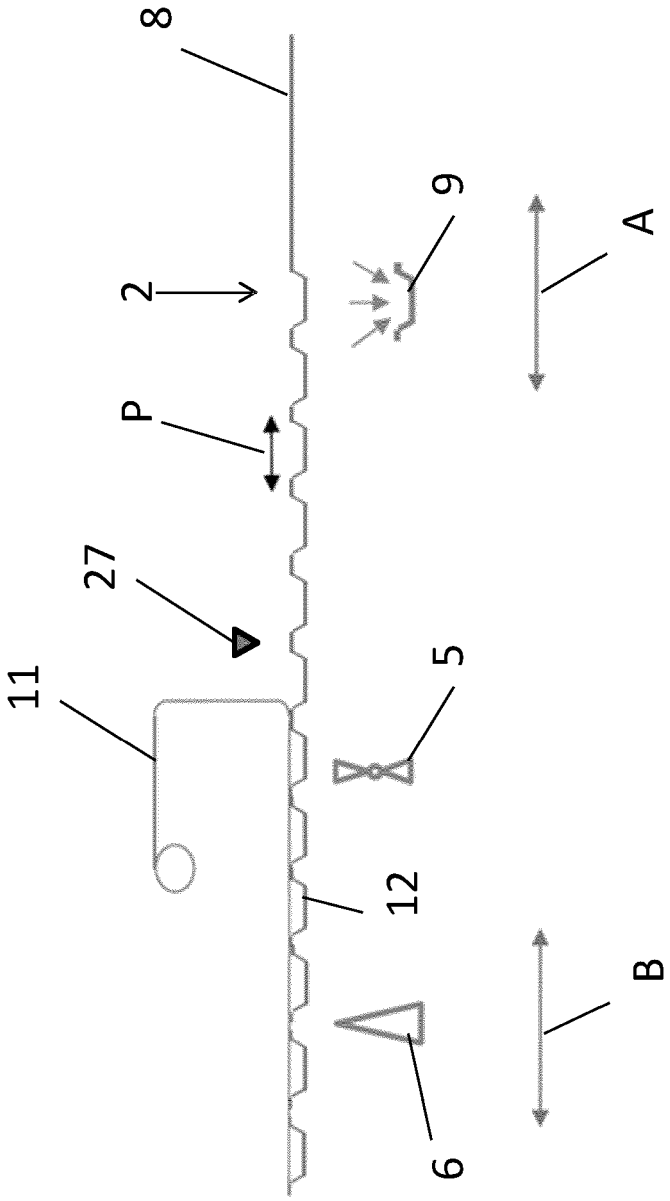

Fig. 4

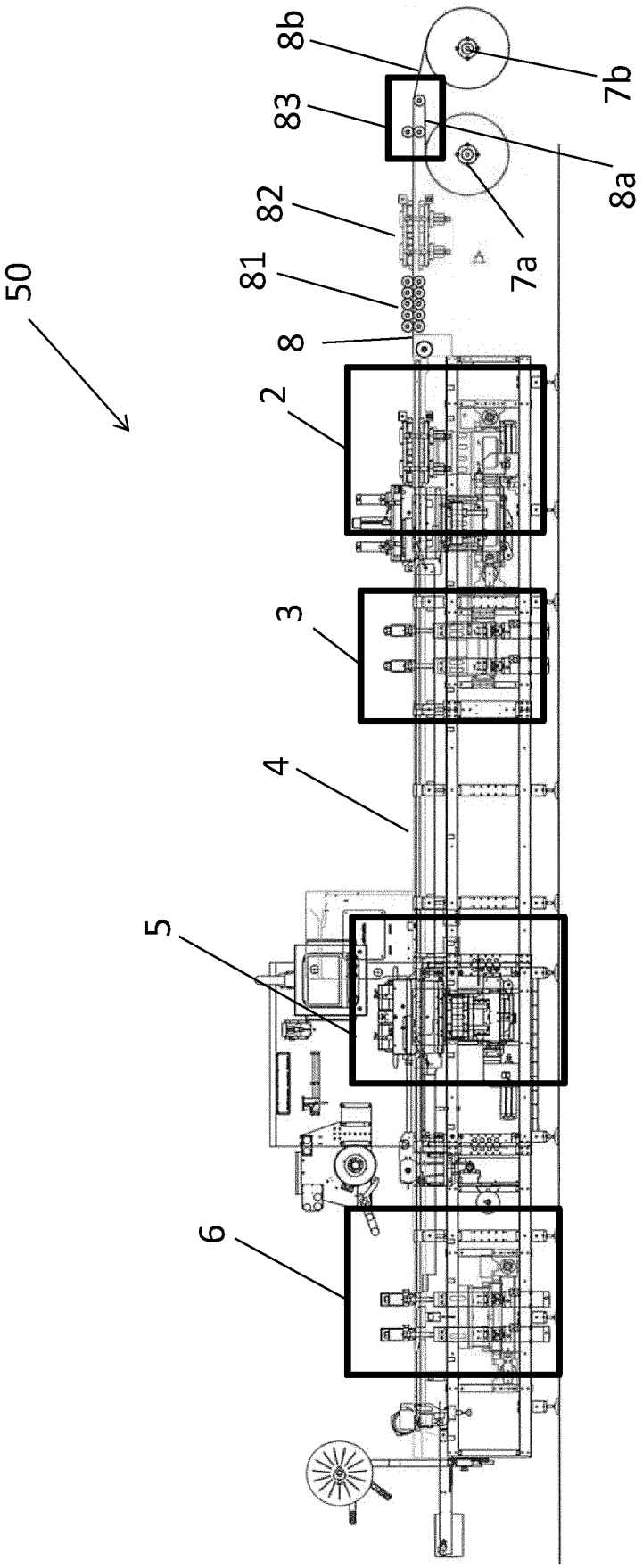

Fig.5

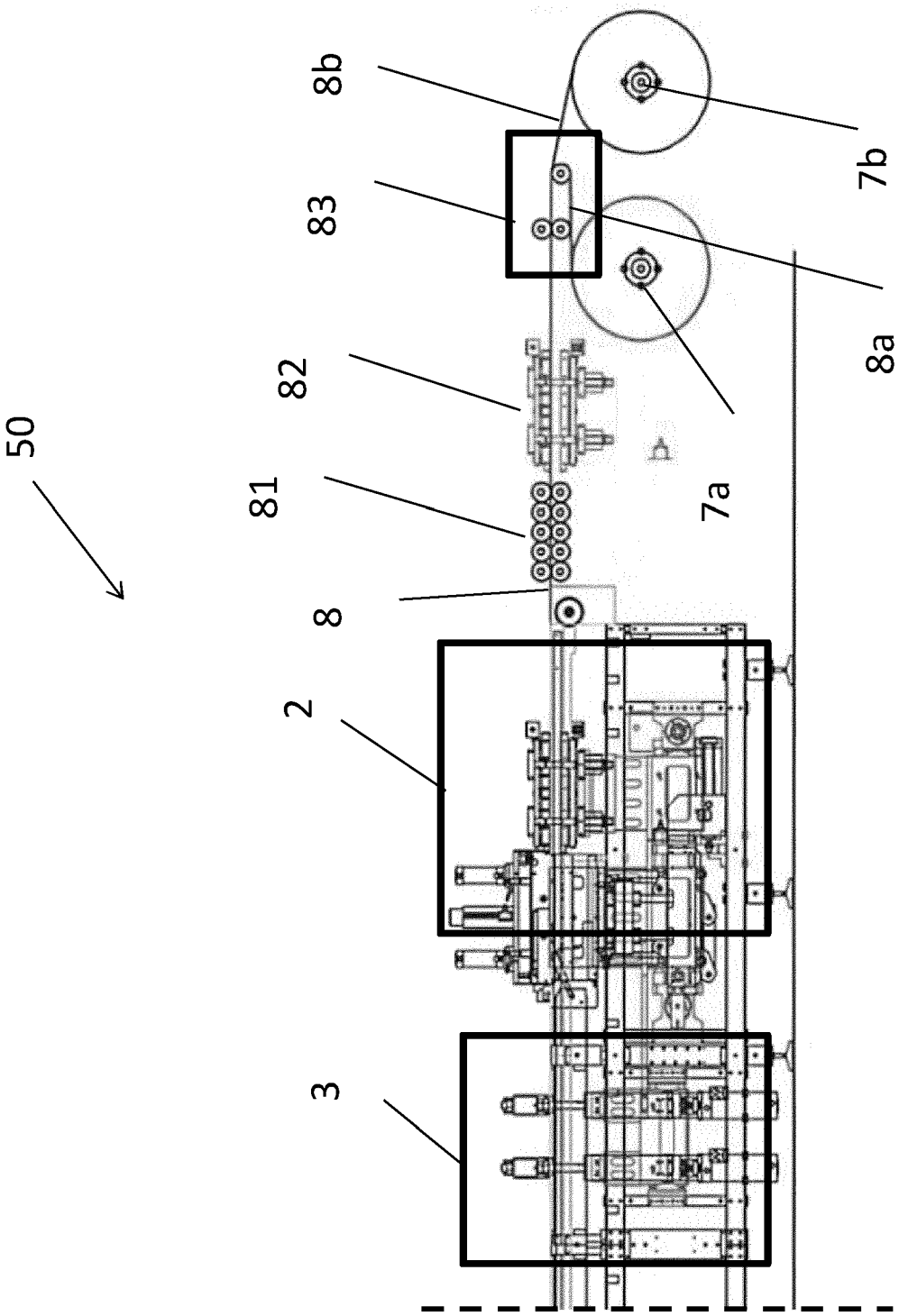

Fig.6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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