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(54) Titre : Apparatus and method for packaging products.

(57) Abrégé :

An apparatus (10) for packaging products (11), in particular food products, comprises both an inlet transporter (13) provided with one or more transport units (15), which are configured to receive and transport a product (11) and a corresponding wrapping sheet (12), and also a packaging transporter (14) provided with one or more gripping units (16), each able to receive a product (11) and the corresponding wrapping sheet (12) partly wrapped around the product (11) from a corresponding transport unit (15), and configured to form a packaged product (100), wherein said apparatus (10) also comprises both folding means (25, 26, 27, 28) associated with the inlet and packaging transporters (13, 14), and also heating means (40) configured to thermally activate an adhesive substance present on the wrapping sheet (12) in order to stabilize the latter around the product (11).

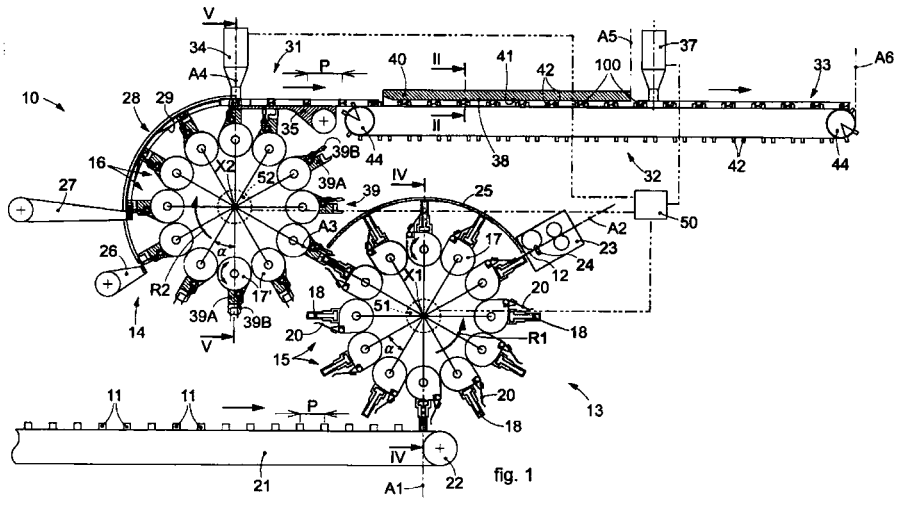

fig. 1

Fig. 1

"APPARATUS AND METHOD FOR PACKAGING PRODUCTS"

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FIELD OF THE INVENTION

The present invention concerns an apparatus and a method for continuously packaging products, in particular small sized products, such as for example food products, preferably in the solid or semi-solid state, typically cubic in shape, or parallelepiped, such as for example stock cubes, chocolates, candy, and other similar products, contained inside a wrapper, which defines a primary package.

The present invention also concerns a machine which comprises the apparatus and uses the method for packaging products as above.

BACKGROUND OF THE INVENTION

In the field of automated packaging of food products, machines and methods are known for packaging the latter inside their respective wrappers. These wrappers, typically made of paper, are fed to known machines in the form of a flat sheet.

These known machines comprise folding members, suitably shaped and configured to make all the folds necessary to shape the wrapper so as to fold it around the product to be packaged.

In some cases, such as for example in the case where the food products to be packaged are stock cubes, the paper of the wrapping has, on the internal side intended to come into contact with the product, an adhesive layer that can be thermally activated to allow the wrapping to adhere to the product.

For this reason, known machines comprise heating members configured to thermally activate the adhesive layer disposed on the sheet of paper.

Examples of machines known in the state of the art for packaging small food products, such as stock cubes or candy, are described in the patent documents EP 3.293.124 A1, US 3.670.475 A, EP 2.894.103 A2 and EP 3.578.468 A1.

One of the technical problems that the designers of food packaging machines have to face and solve is to mechanically handle the products themselves without damaging them. In fact, food products are often in a semi-solid or doughy state, or are obtained by compressing powders, and therefore each of them must be handled with a relatively small force, which does not damage it.

Another technical problem is the high productivity desired to be obtained with

a machine for automatically packaging food products with a low unit economic value, so that the production cost of each individual product is competitive on the market. By way of indication, a target value of this productivity can reach and exceed several thousand products to be packaged per minute.

Another technical problem concerns the handling of small-sized products which, as we said, often have a semi-solid or doughy consistency, at the high speeds necessary to reach the productivity described above, so that in practice these machines are usually very complex and expensive.

Furthermore, if it is necessary to provide the heating elements as above, it is evident that the latter make the machine even more complex and expensive, in particular if they are disposed on moving members, for example on wheels, or carousels, for moving the products, which normally rotate at high speed.

There is therefore a need to perfect and make available an apparatus and a method for packaging products, in particular food products, such as stock cubes, which overcome at least one of the disadvantages of the state of the art.

In particular, one purpose of the present invention is to provide an apparatus and to perfect the corresponding method for automatically packaging products, in particular, but not limited to, food products such as for example stock cubes, chocolates, candy, and other similar products, which, overcoming the disadvantages of the state of the art, are fast and reliable and allow to carry out all the processing steps without damaging the products to be packaged.

Another purpose of the present invention is to provide an apparatus and to perfect the corresponding method for automatically packaging products, in particular, but not limited to, food products such as for example stock cubes, chocolates, candy, and other similar products, which allow to reach high productivity, in the order of a few thousand packaged products every minute, for example able to package up to three thousand, or four thousand, products, for example stock cubes, per minute.

Another purpose of the present invention is to provide an apparatus for automatically packaging products, in particular, but not limited to, food products such as stock cubes, chocolates, candy, and other similar products, able to be integrated into an automated production line of said products.

The Applicant has devised, tested and embodied the present invention to

overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

The present invention is set forth and characterized in the independent claims. The dependent claims describe other characteristics of the present invention or variants to the main inventive idea.

In accordance with the above purposes, an apparatus for packaging products according to the present invention comprises an inlet transporter, comprising a first wheel rotating around a first axis of rotation provided with one or more transport units which are configured to each take and transport one of the products and a respective wrapping sheet, and a packaging transporter comprising a second wheel rotating around a second axis of rotation, parallel to the first axis of rotation, the second wheel being provided with one or more gripping units, each able to receive, from a respective transport unit, one of the products and the respective wrapping sheet at least partly wrapped around the product.

The apparatus also comprises heating means disposed downstream of the packaging transporter and configured to heat an adhesive substance present on the wrapping sheet in order to stabilize the latter around the product to be packaged, thanks to the thermal activation of such substance.

According to one aspect of the present invention, the inlet transporter comprises first folding means configured to carry out at least one fold of the wrapping sheet around the product, and the packaging transporter comprises second folding means configured to carry out the remaining folds of the wrapping sheet around the product and thus complete the wrapping of the wrapping sheet around the product, so as to package each product inside the corresponding wrapper and form a packaged product.

According to one aspect of the present invention, the apparatus comprises linear transport means disposed directly downstream of the packaging transporter and comprising both a pair of transporters opposite and distanced from each other in such a way as to be able to transport the products interposed between them along a segment of linear advance, and also a support member disposed below and between the pair of transporters and configured to support the product from

below.

According to one aspect of the present invention, each gripping unit of the packaging transporter is configured to pass through the pair of transporters while the second wheel rotates around the second axis of rotation, and to simultaneously cooperate with the support member in such a way as to release each product already wrapped by a respective wrapping sheet onto the support member without interruption in motion, so that the pair of transporters consecutively moves the products released by each of the gripping units along the segment of linear advance.

According to one aspect of the present invention, the segment of linear advance is rectilinear.

According to one possible example embodiment, the pair of transporters consists of belt or strip conveyors, closed in a loop around at least one pair of first rollers.

According to another aspect of the present invention, the apparatus comprises a control unit configured to command the pair of transporters at a constant speed which is correlated to the speed of rotation of the first and second wheel, and is such as to keep the products distanced from each other according to a predefined pitch.

According to another aspect of the present invention, the support member comprises a flat, horizontal surface, located centrally under the pair of transporters.

According to another aspect of the present invention, the pair of transporters cooperates with the gripping units of the packaging transporter in a zone disposed in proximity to the highest point of the circumferential trajectory of the second wheel, the second axis of rotation of the second wheel being disposed substantially horizontal.

In accordance with one aspect of the present invention, the heating means comprise at least two walls heated by one or more heating members; the walls form a passage channel and are disposed in such a way as to be brushed against by the packaged products in transit along the passage channel.

In accordance with one aspect of the present invention, in one embodiment, the heating means and the linear transport means cooperate to delimit the passage

channel in such a way that the passage channel is closed on at least three sides.

In accordance with one aspect of the present invention, the linear transport means comprise one or more transport members disposed in succession one after the other along the segment of linear advance and each equipped with respective drive members.

In accordance with one aspect of the present invention, in one embodiment, the heating means comprise heating members disposed in proximity to at least one of the transport members so as to heat the wrapping sheet by means of the heated transport member.

In accordance with one aspect of the present invention, the heating means comprise one or more heating members selected from a group consisting of electrically heated bars which extend parallel to the segment of linear advance, which are provided with one or more heated walls, or conductive elements, or electromagnetic induction coils.

In accordance with one aspect of the present invention, each transport unit of the inlet transporter comprises first retention members and second retention members configured to selectively retain one of the products and one of the wrapping sheets, respectively.

In accordance with one aspect of the present invention, the apparatus also comprises first and second feed means associated with the inlet transporter in order to feed, respectively, the products and the wrapping sheets to the transport units.

In accordance with one aspect of the present invention, the first folding means comprise a contrast member for folding the wrapping sheet on the product in such a way that it is disposed on two adjacent surfaces of the product.

In accordance with one aspect of the present invention, each gripping unit of the packaging transporter comprises third retention members, configured to selectively retain the products and the wrapping sheets partly wrapped thereon. Each of the third retention members is provided with arms, the terminal ends of which are shaped as prongs having a thickness sized so as to pass through a respective hollow space present between the support member and the pair of transporters.

In accordance with one aspect of the present invention, the second folding

means comprise a plurality of folding members associated with the packaging transporter in order to fold, according to a predetermined sequence, respective flaps of the wrapping sheet against corresponding surfaces of each of the products in order to obtain the packaged product, in particular while the gripping units travel along a curvilinear trajectory, such as for example an arc of circumference.

In accordance with one aspect of the present invention, the inlet transporter and the packaging transporter are disposed in such a way that the transfer of each of the products and of the corresponding wrapping sheet from the transport unit to the gripping unit takes place along a directrix of radial transfer oriented along a segment joining the axes of rotation.

In accordance with one aspect of the present invention, the apparatus comprises means for compressing the packaged product, which are disposed downstream of the heating means along the segment of linear advance in order to press the wrapping sheet against each of the products in such a way as to facilitate the adhesion of the corresponding wrapping sheet on the corresponding product, thanks to the presence of the adhesive layer which has been thermally activated.

In accordance with one aspect of the present invention, the linear transport means comprise one or more transport members, disposed in succession one after the other along the segment of linear advance and comprising, for example, closed belts, or strips, or chains, closed in a loop, each driven by respective drive members, and possibly provided with a plurality of drawing elements for the advance of the packaged products.

According to another aspect of the present invention, the first feed means are configured to feed at least two products simultaneously disposed on respective parallel rows; the inlet transporter, the packaging transporter, the second feed means and the linear transport means being configured to simultaneously work, in parallel, the products disposed on two different parallel work paths.

The present invention also concerns a method to continuously package products with wrapping sheets in order to form a packaged product, comprising:

- a step of feeding the products to be packaged to transport units of an inlet transporter by means of first feed means,

- a step of feeding wrapping sheets to the transport units by means of second feed means,

- a step of picking up and transporting the products and the wrapping sheets by means of the inlet transporter comprising a first wheel rotating around a first axis of rotation and provided with one or more of the transport units, which are configured each one to take and transport one of the products and a respective wrapping sheet,

- a step of transferring each of the products and the respective wrapping sheet partly wrapped around the latter from the transport unit to a respective gripping unit of a packaging transporter comprising a second wheel rotating around a second axis of rotation, parallel to the first axis of rotation,

- a step of folding the wrapping sheet around the product, according to a predetermined sequence, by means of first and second folding means associated respectively with the inlet transporter and the packaging transporter in order to form a packaged product, and

- a step of heating an adhesive substance present on the wrapping sheet in order to stabilize the wrapping sheet around the product by means of heating means disposed downstream of the packaging transporter.

According to one aspect of the present invention, the method also comprises a step of making the products advance along a segment of linear advance by means of linear transport means disposed directly downstream of the packaging transporter and comprising both a pair of transporters, opposite and distanced from each other in such a way as to be able to transport the products, and also a support member, disposed below and between the pair of transporters, in such a way that the pair of transporters determines the transport of the products while the products are supported from below by the support member.

According to one aspect of the present invention, before the step of advance, there is provided a step of release of the products, wrapped by respective wrapping sheets, by each gripping unit onto the support member, without interruption in motion. Each gripping unit is configured to pass through the pair of transporters while the second wheel rotates around the second axis of rotation, and to simultaneously cooperate with the support member so that the pair of transporters consecutively moves the products released by each of the gripping

units along the segment of linear advance.

In accordance with one aspect of the present invention, the step of heating the adhesive substance takes place after the folding step, and takes place during a step of advance in which it is provided to make the packaged product advance with continuous motion on a segment of linear advance, along a passage channel comprised in the linear transport means and defined at least by two heated walls comprised in the heating means and disposed in such a way as to be brushed against by the products in transit along the passage channel.

In accordance with one aspect of the present invention, after the step of heating the adhesive substance, there is provided a step of compressing the packaged product, by means of compression means configured to press the wrapping sheet against the corresponding one of the products in order to facilitate their reciprocal adhesion due to the presence of the adhesive substance that has been heated.

In accordance with one aspect of the present invention, the folding step provides to completely fold the wrapping sheet around the product and comprises: firstly carrying out a first fold of the wrapping sheet on the product so that it is disposed on two adjacent surfaces of the product by means of a contrast member comprised in the first folding means, then folding the wrapping sheet on a third surface of the product during the transfer from the inlet transporter to the packaging transporter, and finally carrying out other folds of the wrapping sheet, according to a predetermined sequence, against corresponding surfaces of the product by means of folding members associated with the packaging transporter while the gripping units travel along a curvilinear trajectory, such as for example an arc of circumference.

According to another aspect of the present invention, in one embodiment of the method the step of feeding the products provides to feed the products along two parallel rows, each configured to feed a respective inlet transporter, and the steps of picking up and transporting, transferring, folding, releasing, making advance and heating, allow to work a plurality of products in parallel, which are disposed along a first work path and along a second work path, respectively; each of the paths being fed by a respective one of the rows of products.

It is quite clear that the apparatus and the method according to the present

invention are suitable to package products having various shapes and sizes. Typically, the products to be packaged have a shape that is cubic, or parallelepiped with a rectangular base, with sides approximately one or several centimeters long, according to the standard sizes of food products such as for example stock cubes, chocolates, candy, and other similar products. The person of skill in the art will easily understand that simple structural adaptations are required to adapt the apparatus to the exact shapes and sizes of these elements, the adaptations having no impact on the scope of protection defined by the present invention.

The present invention also concerns a machine for packaging products according to the present invention, typically food products, comprising the apparatus as above and capable of actuating the above method to package such products, in the context of automated processing lines for packaging products.

The apparatus according to the present invention has the advantage of being structurally simpler, and therefore cheaper, than conventional packaging apparatuses of a known type.

In fact, only two transporters are provided, configured as transport wheels, to associate a wrapping sheet with the product and to fold the sheet around the product so as to package the product.

Advantageously, the step of heating the wrapper onto the product takes place after the product and the corresponding wrappers have left the transport wheels. This ensures that the heating members of the heating means are not disposed on moving members, which would entail a significant complication of the apparatus, both from a plant engineering point of view as well as from a structural point of view.

The apparatus according to the present invention, in which the heating members, as stated, are not disposed on the transport wheels, is instead simpler because it does not require neither a complex mechanical design that allows to electrically power high temperature heating members rotatable at high speed around an axis of rotation, nor complex and frequent maintenance operations on such heating members.

Another advantage of the apparatus and of the method according to the present invention is that of allowing very high productivity, even of the order of several

thousand products packaged per minute, with a simple apparatus and an easy to implement method.

Furthermore, advantageously, the apparatus according to the present invention has overall sizes substantially comparable to those of the current packaging machines of the known type, therefore without the simplification of the apparatus having led to a significant increase in overall sizes.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects, characteristics and advantages of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic front view of an apparatus for packaging products according to the embodiments described here, in which some components are shown sectioned according to the section plane with trace I-I of fig. 3;
- fig. 1a is an enlarged detail of fig. 1;
- fig. 2 is a schematic transverse section, along the section plane with trace II-II of fig. 1, which shows an enlarged detail of the apparatus of fig. 1;
- fig. 3 is a schematic plan view of a portion of the apparatus of fig. 1;
- fig. 4 is a schematic, simplified section view of an inlet transporter comprised in the apparatus according to the present invention, taken according to the plane with trace IV-IV of fig. 1;
- fig. 5 is a schematic, simplified section view of a packaging transporter comprised in the apparatus according to the present invention, taken according to the plane with trace V-V of fig. 1;
- fig. 6 is an enlarged detail of fig. 5;
- fig. 7 is a view the same as that of fig. 3, which shows a variant of said portion of the apparatus according to the present invention;
- figs. 8A-8F are schematic front views that show the operating sequence by means of which the wrapping sheet is folded around the product to be packaged by means of folding members comprised in the apparatus according to the present invention;
- fig. 9 is a partial and schematic three-dimensional view of another embodiment of an apparatus for packaging products according to the present invention.

We must clarify that in the present description and in the attached claims the terms horizontal, vertical, lower, upper, high and low, with their declinations, have the sole function of better illustrating the present invention with reference to the drawings and must not be in any way used to limit the scope of the invention itself, or the field of protection defined by the attached claims. For example, by the term horizontal we mean an axis, or a plane, that can be either parallel to the line of the horizon, or inclined, even by several degrees, for example up to 20°, with respect to the latter.

Furthermore, the people of skill in the art will recognize that certain sizes or characteristics in the drawings may have been enlarged, deformed, or shown in an unconventional or non-proportional way in order to provide a version of the present invention that is easier to understand. When sizes and/or values are specified in the following description, the sizes and/or values are provided for illustrative purposes only and must not be construed as limiting the scope of protection of the present invention, unless such sizes and/or values are present in the attached claims.

To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one embodiment can conveniently be incorporated into other embodiments without further clarifications.

DESCRIPTION OF SOME EMBODIMENTS OF THE PRESENT INVENTION

We will now refer in detail to the possible embodiments of the invention, of which one or more examples are shown in the attached drawings, by way of a non-limiting illustration. The phraseology and terminology used here is also for the purposes of providing non-limiting examples.

The embodiments described here with reference to the attached drawings concern an apparatus for packaging products, indicated as a whole with reference number 10.

In the example provided here, the products to be packaged are food products, in particular stock cubes, chocolates, candy, and other similar products, and these are indicated with the reference number 11. These products are packaged inside a wrapper, obtained from a wrapping sheet, which is indicated with the reference number 12.

In the example provided here, the wrapping sheets 12 are made of paper, thin cardboard or similar materials, and have, on the internal layer intended to come into contact with the product 11, an adhesive layer that can be thermally activated (not shown).

As will be explained in greater detail below, the apparatus 10 according to the present invention therefore at entry receives the products 11 and the wrapping sheets 12 for them to be packaged, and at exit returns packaged products, indicated with the reference number 100, in which each product 11 is wrapped in the wrapping sheet 12, folded around it and adhering to the product itself thanks to the thermal activation of the adhesive layer as above.

It is evident that the apparatus 10 according to the present invention can be advantageously used to package also, but not limited to, other types of products of a food nature, such as for example chocolates, as well as non-food products that need to be packaged individually, such as for example objects or components with small sizes and simple shapes.

With reference to fig. 1, the apparatus 10 comprises an inlet transporter 13 and a packaging transporter 14.

In the example provided here, the inlet transporter 13 and the packaging transporter 14 are configured as wheels rotatable, respectively, around a first axis of rotation X1 and a second axis of rotation X2 (fig. 1), parallel to each other.

The inlet transporter 13 comprises a plurality of transport units, indicated as a whole with the reference number 15, which will be described in greater detail below with particular reference to figs. 1 and 4. The transport units 15 are preferably distributed in a uniform manner with respect to the first axis of rotation X1 and they rotate around the latter according to a first sense of rotation R1, which in the example described here is counterclockwise. In the example shown, twelve transport units 15 are provided, angularly distanced from each other by an angle at the center α equal to 30°. The inlet transporter 13 is made to rotate, for example according to the first sense of rotation R1, by a first motor unit 51 of a known type, or one which will be developed in the future, which for simplicity is shown in the drawings with a dashed circle concentric with respect to the first axis of rotation X1. By way of a non-limiting example, the first motor unit 51 can comprise an electric stepper motor, and can optionally be equipped

with a reduction unit.

Each transport unit 15 comprises a support element 17, connected to the frame of the inlet transporter 13 so that they rotate around the first axis of rotation X1. Furthermore, each support element 17 can rotate, for example by a few degrees, but also by greater quantities, around an axis of rotation of its own, indicated in the present description as third axis of rotation X3, and parallel to the first axis of rotation X1.

Each transport unit 15 comprises first retention members 18, organized into pairs, wherein each pair is configured to temporarily and selectively retain a respective product 11. As better visible in fig. 4, each pair of first retention members 18 comprises a first arm 18A and a second arm 18B, each of these arms being pivoted to the support element 17 by means of a respective pin 19. The first and the second arms 18A and 18B are commanded by suitable actuator means, of a known type or one which will be developed in future, not shown, in order to oscillate around the respective pins 19, as indicated by the arrows F1 of fig. 4, so as to alternatively move into a condition of retention, or release, of the product 11, as will be explained in detail below.

Each transport unit 15 also comprises a second retention member 20, configured to receive and retain a respective wrapping sheet 12 pressed against a lateral surface of the product 11. The second retention member 20 is attached to the support element 17 in such a way as to be mobile between an active position, in which it retains a wrapping sheet 12, and an inactive position, in which it does not retain the sheet. The movement of the second retention member 20 is commanded by a dedicated actuator, such as for example a cam mechanism, not shown in the attached drawings.

The apparatus 10 also comprises a first feed member 21, which in the example provided here is configured as a transporter belt closed on pulleys 22 (only one of which is shown in fig. 1) and motorized by means of suitable drive means of a known type and not shown. The first feed member 21 is configured to feed the products 11 toward the inlet transporter 13. More in particular, the first feed member 21 feeds the products 11 disposed in an orderly manner resting on it, distanced from each other by a linear pitch P which corresponds to the angular distance between two transport units 15, equal to the angle at the center α. In this

way, the first feed member 19 feeds the products 11 directly to the transport units 15.

The apparatus 10 also comprises a second feed member 23, which is associated with the inlet transporter 13 in order to feed the wrapping sheets 12 to the latter. In the specific example provided here, the second feed member 23 receives the sheet material, preferably unwound from a reel, which is then cut to format by means of a suitable cutting tool 24 in order to make the wrapping sheets 12. The second feed member 23 is disposed in a position such as to feed the wrapping sheets 12 to the second retention member 20 in a radial direction with respect to the first axis of rotation X1.

The apparatus 10 also comprises a first contrast member 25, operatively associated with the inlet transporter 13, to fold the wrapping sheet 12 on the product 11 in such a way that it is disposed on two adjacent surfaces 11A, 11B of the product itself.

In the example provided here, the first contrast member 25 is configured as an arcuate element which extends around the inlet transporter 13 for an arc of circumference, and it is disposed downstream of the second feed member 23 so that, by advancing in the first sense of rotation R1, each transport unit 15 first receives a wrapping sheet 12 from the second feed member 23 and subsequently meets the first contrast member 25 in order to fold the wrapping sheet 12 in the manner that will be described in greater detail below.

The packaging transporter 14 comprises a plurality of gripping units, indicated as a whole with the reference number 16, which will be described in greater detail below with reference to figs. 1 and 6. The gripping units 16 are preferably distributed in a uniform manner with respect to the second axis of rotation X2 and they rotate around the latter in a second sense of rotation R2, which in the example described here is clockwise. In the example shown, twelve gripping units 16 are provided, angularly distanced from each other by an angle at the center α equal to 30°. The packaging transporter 14 is made to rotate, for example in the second sense of rotation R2, by a second motor unit 52 of a known type, or one which will be developed in the future, which for simplicity is shown in the drawings with a dashed circle concentric with respect to the second axis of rotation X2. By way of a non-limiting example, the second motor unit 52

can comprise an electric stepper motor, and can optionally be equipped with a reduction unit.

Similarly to the transport units 15 described above, each gripping unit 16 comprises a support element 17', connected to the frame of the packaging transporter 14 in such a way as to rotate around the second axis of rotation X2. Furthermore, each support element 17' can rotate, for example by a few degrees, but also by greater quantities, around an axis of rotation of its own, indicated in the present description as fourth axis of rotation X4 (fig. 5) and parallel to the second axis of rotation X2.

Each transport unit 15 comprises third retention members 39, organized into pairs, wherein each pair is configured to temporarily and selectively retain a respective product 11 and the corresponding wrapping sheet 12 partly wrapped on it. Each pair of third retention members 39 comprises a fixed arm 39A, attached to the support element 17', and a mobile arm 39B, pivoted to the support element 17' by means of a respective pin 19', as better visible in the enlargement of fig. 1a.

The movement of the mobile arm 39B is commanded by suitable actuator means, for example comprising a cam mechanism, in order to oscillate around the respective pins 19', as indicated by the arrow F2 in fig. 1a, so as to alternatively move into a condition of retention, or release, of the product to be packaged, or already packaged, as will be explained in detail below.

The fixed arm 39A and the mobile arm 39B have a configuration suitable to allow the correct interaction with the means for transporting the packaged products 100, which make the product advance after it has left the packaging transporter 14, as will be described below. In particular, the ends of the arms 39A, 39B are configured as jaws capable of stably retaining first one of the products 11, together with the corresponding wrapping sheet 12, and then the packaged product 100.

The apparatus 10 also comprises at least a first folding member 26, a second folding member 27 and a second contrast member 28, which are associated with the packaging transporter 14 in order to fold the wrapping sheet 12 around the product 11, as will be explained in detail below with particular reference to the folding sequence shown in figs. 8A-8F. We must clarify that the folding

members 26, 27 can be of a type known per se, or of any type whatsoever that will be developed in the future, and they will not be described in detail here since their specific conformation is beyond the scope of protection of the present invention.

The second contrast member 28 is configured as an arcuate element which extends around the packaging transporter 14 for an arc of circumference. The second contrast member 28 is preferably disposed downstream of the first folding member 26, and it extends for at least one segment in which the folding of the wrapping sheet 12 is completed, even downstream of the second folding member 27.

In the example provided here, the second contrast member 28 comprises a pair of shaped lateral walls 29 which project from opposite sides of a wall with an arch-shaped base, in order to each one intercept a flap protruding laterally from the wrapping sheet 12 and press the flap against a respective wall of the product 11, as will be explained in greater detail below.

The apparatus 10 also comprises one or more linear transport members or means, generally indicated as a whole with the reference number 30, and configured to transport the packaged products 100 along a segment of linear advance L. In the example provided here, the apparatus 10 comprises, disposed in sequence one after the other, a first transport member 31, a second transport member 32 and a third transport member 33.

The linear transport means 30 comprise a passage channel 38 for the packaged products 100 which extends parallel to the segment of linear advance L through the transport members 31, 32 and 33.

Preferably, the passage channel 38 is closed on at least three sides in order to effectively contain the packaged product 100 during its advance along the segment of linear advance L, and at the same time limit thermal dispersions so that the greatest possible amount of heat is transferred to the packaged products 100 in transit.

In the example provided here, the first transport member 31 comprises a pair of transporter belts 31A and 31B, each one closed in a loop around a pair of first rollers 43, and configured to retain the packaged product 100 in correspondence with opposite lateral walls thereof. Each transporter belt 31A and 31B is provided

with a respective drive member, for example a motor or gearmotor of the type known in the state of the art, which in the attached drawings is indicated with the reference number 34, disposed above the first rollers 43 which are disposed furthest to the left in fig. 3.

The apparatus 10 also comprises a support member 35 (figs. 1, 5 and 6), disposed below the transporter belts 31A, 31B to prevent accidental falls of the packaged product 100 while it is being transported by the first transport member 31.

The second transport member 32 is configured as a belt or strip conveyor, closed in a loop on a pair of second rollers 44. At least one of the second rollers 44 is motorized by means of a respective drive member 46, for example a motor or a gearmotor of a type known in the state of the art, not shown. The second transport member 32 comprises a plurality of drawing elements 42 which are configured to delimit the packaged product 100 at least at the front and rear, with reference to its direction of advance along the segment of linear advance L.

In the example provided here, the third transport member 33 is configured in a completely similar way to the first transport member 31 previously described. The third transport member 33 comprises a pair of transporter belts 33A and 33B, each one closed in a loop around a pair of third rollers 45 and configured to retain the packaged product 100 in correspondence with opposite lateral walls thereof. Each transporter belt 33A and 33B is provided with a respective drive member, for example a motor or gearmotor of a type known in the state of the art, which in the attached drawings is indicated with the reference number 37, disposed above the third rollers 45 which are disposed furthest to the left in fig. 3.

In the example described, the conveyor which constitutes the second transport member 32 extends below the third transport member 33. This is preferable because, in this way, this conveyor performs the function of the support member 35, since it prevents accidental falls of the packaged product 100 while it is being transported by the third transport member 33.

As will be evident from the description of the operation of the apparatus 10, the transporter belts 33A, 33B of the third transport member 33 are configured as compression means able to press the wrapping sheet 12 against the product 11 in order to facilitate its adhesion thereto.

The apparatus 10 also comprises heating members 40 which are configured as heating means suitable to thermally activate the layer of adhesive substance present on the wrapping sheet 12 in order to make the latter adhere to the product 11.

The heating members 40 are disposed along at least one portion of the segment of linear advance L of the packaged products 100.

The heating members 40 can be configured in various ways, either known in the state of the art or which will be developed in the future, providing they are suitable to transfer to the wrapping sheet a quantity of heat sufficient to thermally activate the layer of adhesive substance, without damaging the products to be packaged. By way of a non-limiting example, the heating members 40 can comprise electrically heated bars, or conductive elements of various shapes and sizes, or electromagnetic induction coils, etc.

According to the embodiment shown with reference to figs. 1-3, the heating members 40 are configured as a heated bar, with a C-shaped cross-section (fig. 2), and extending longitudinally parallel to the segment of linear advance L of the packaged products 100. In this example, the heating members 40 comprise at least two heated walls 41, more preferably three heated walls 41, disposed adjacent to as many walls of the packaged product 100 in order to heat them and activate the adhesive layer present on the wrapping sheet 12.

In correspondence with the first transport member 31, the passage channel 38 is delimited laterally by the transporter belts 31A, 31B and at the bottom by the support member 35; in correspondence with the second transport member 32, it is delimited at the bottom by the conveyor and at the top and laterally by the heated walls 41 of the heating member 40; and in correspondence with the third transport member 33, it is delimited laterally by the transporter belts 33A, 33B and at the bottom by the conveyor, that is, by the second transport member 32.

With reference to the embodiment as per the variant that can be seen in fig. 7, the heating members 40 are associated with the first transport member 31. Specifically, there can be provided a heating member 40 associated with each transporter belt 31A, 31B so as to heat them and, through them, the wrapping sheet 12. It should be noted that this embodiment provides a shorter segment of linear advance L of the packaged products 100, and therefore a smaller overall

size of the apparatus 10. This is due to the fact that the first and third transport members 31, 33 are reciprocally adjacent, with the conveyor of the second transport member 32 disposed below them.

In another embodiment, not shown, the heating members 40 can be disposed both above the second transport member, as shown in figs. 1-3, and also associated with the transporter belts 31A, 31B of the first transport member 31.

With reference to figs. 8A-8F, we will briefly describe the sequence of the folding operations to fold the wrapping sheet 12 around the product 11, and thus obtain the packaged product 100. Since the product 11 has, by way of example, a cubic shape, hereafter we will refer to the six surfaces or faces of the product 11, referred to hereafter as first surface 11A, second surface 11B, and so on.

When the second retention member 20 receives a wrapping sheet 12, it keeps it pressed against a first surface 11A of the product 11. Subsequently, the wrapping sheet 12 is forced, by the first contrast member 25, to fold against a second surface 11B of the product 11 (fig. 8A), adjacent to the first surface 11A. When the product 11 and the corresponding wrapping sheet 12 are released from the transport unit 15 of the inlet transporter 13 to a corresponding gripping unit 16 of the packaging transporter 14, the product 11 moves according to a directrix of radial transfer oriented along a segment joining the first and the second axes of rotation X1, X2.

During the displacement along this directrix of transfer, the wrapping sheet 12 is forced by the third retention members 39 to fold against a third surface 11C of the product 11 (fig. 8B). In this configuration, the flaps of the sheet that are disposed on the second and on the third surface 11B and 11C protrude beyond the sizes of such surfaces, as can be seen in the section of fig. 5 (bottom part). A protruding part of such flaps is folded on the fourth surface 11D by the first folding member 26 (fig. 8C), while the laterally protruding parts of the flaps are partly folded on the fifth surface 11E and on the sixth surface (not shown in the drawings) by the second folding member 27 (fig. 8D). Finally, the shaped lateral walls 29 of the second contrast member 28 complete the folding of the flaps on the fifth surface 11E and on the sixth surface, so as to fold, against such surfaces of the product 11, first one wing (fig. 8E) and then the other (fig. 8F) which had formed during the previous folding operations, and thus obtain the packaged

product 100.

With reference to fig. 9, another embodiment of an apparatus for forming packaged products 100 according to the present invention is shown. This embodiment, in which the apparatus is indicated with the reference number 10', allows to achieve even higher productivity, for example substantially double, compared to that obtainable with the apparatus 10 previously described. The apparatus 10' is similar to the apparatus 10 previously described, comprising the first and second feed members 21, 23, the inlet and packaging transporters 13, 14, the linear transport means 30 and the heating members 40.

Unlike the apparatus 10, the apparatus 10' shown in fig. 9 provides a first and a second work path P1, P2, which are substantially parallel to each other. Therefore, this embodiment provides to simultaneously work two rows of products 11, fed in parallel rows by respective first feed members 21, thus allowing to double the productivity of the apparatus.

A possible operating mode of the apparatus 10, 10' according to the present invention is briefly described below, which is reflected in the method to package the products 11 which is also the subject of the present invention.

The products 11 are fed along the first feed member 21 to the inlet transporter 13. The transport unit 15 picks up a respective product 11 in correspondence with the radial position of pick-up A1 (fig. 1). In this position, it is provided that the first retention members 18 move into the condition of retention, in which the first arm 18A and the second arm 18B close in on the product 11.

The transport unit 15 continues its rotation around the first axis of rotation X1 up to the radial position of feed of the wrapping sheet A2. In this position, the second retention member 20 moves into its active position in order to retain the wrapping sheet 12 received from the second feed member 23.

Continuing its rotation around the first axis of rotation X1, the transport unit 15 reaches the radial position of transfer A3 (fig. 1), in which it releases the product 11 and the wrapping sheet 12 partly wound on it to a respective gripping unit 16 of the packaging transporter 14. It should be noted that during the rotation between the radial position of feed of the wrapping sheet A2 and the radial position of transfer A3, the first contrast member 25 folds the wrapping sheet 12 against a second surface 11B of the product 11, as previously explained with

particular reference to fig. 8A.

In the radial position of transfer A3, the first and second arms 18A, 18B of the first retention members 18 move to the position of release, while the mobile arm 39B moves into the condition of retention in which, in cooperation with the fixed arm 39A, it retains the product 11 and the wrapping sheet 12. Please note that during the radial transfer between the transport unit 15 and the gripping unit 16 the wrapping sheet 12 is folded against a third surface 11C of the product 11, as previously explained with particular reference to fig. 8B.

In the transfer of the product 11 and the wrapping sheet 12 between the inlet transporter 13 and the packaging transporter 14, other transfer members, of a known type and not shown, may intervene, which assist the retention members in order to guarantee a correct transfer of the products between one transporter and the other.

Continuing the rotation around the second axis of rotation X2, the gripping units 16 arrive in the radial position of end-of-packaging A4 (figs. 1, 5 and 6), in which the wrapping sheet 12 has been completely folded around the product 11 so as to obtain the packaged product 100. This radial position of end-of-packaging A4 is substantially disposed in a zone disposed in proximity to the highest point of the trajectory of the packaging transporter 14. Please note that during the rotation between the radial position of transfer A3 and the radial position of end-of-packaging A4, the first folding member 26, the second folding member 27 and the second contrast member 28 complete the folds of the wrapping sheet on the fourth, fifth and sixth surfaces of the product 11, as previously explained with particular reference to the figs. from 8C to 8F.

In the radial position of end-of-packaging A4, the mobile arm 39B moves into its position of release so that the third retention members 39 can release the packaged product 100 to the first transport member 31, that is, to the transporter belts 31A, 31B. In order to do this, the packaged product 100 is disposed resting on the support member 35, which supports it from below, and it is simultaneously retained laterally by the transporter belts 31A, 31B. Please note that the terminal ends of the arms 39A, 39B are shaped as thin prongs, the thickness of which is suitably sized to allow the arms 39A, 39B to pass through the hollow space 48 present between the support member 35 and the transporter belts 31A, 31B, as

clearly visible in the enlargement of fig. 6.

As stated, each transport unit 15 and each gripping unit 16 can rotate around an axis of rotation of its own, that is, around the third axis of rotation X3 for the transport units 15 and the fourth axis of rotation X4 for the gripping units 16. Suitable actuation means, of a known type and not shown, are provided to command such rotations around the respective axes. In particular, it is provided to make the transport units 15 and the gripping units 16 suitably rotate, typically by a few degrees, in correspondence with the radial positions A1, A2, A3 and A4. The person of skill in the art will easily understand that such rotations around the axes X3 and X4 constitute an additional degree of freedom for the units 15 and 16, which allows them to move into the correct position so that their retention means effectively retain or release the product 11, the wrapping sheet 12 first and the packaged product 100 after.

After the packaged product 100 has been released to the linear transport means 30, it advances in the passage channel 38 along the segment of linear advance L. Along this segment, it is possible to define a linear position of end-of-heating A5 and a linear position of end-of-compression A6.

In the linear segment that extends between the radial position of end-of-packaging A4 and the linear position of end-of-heating A5, the heating members 40 heat the wrapping sheet 12 so as to thermally activate the layer of adhesive substance disposed on its internal side in contact with the product 11, in order to stabilize the wrapping sheet 12 around the product 11.

This can take place either while the packaged product is transported by the second transport member 32, by means of the heated walls 41, in the embodiment described with reference to figs. 1-3, or by means of heating members 40 associated with the transporter belts 31A, 31B, as previously described with reference to the variant of fig. 7. Alternatively, the heating can be provided in correspondence with both the first and also the second transport member 31, 32, according to one embodiment described above, but not shown in the attached drawings.

In the linear segment that extends between the linear position of end-of-heating A5 and the linear position of end-of-compression A6, the compression means, which in the example described here are configured as the transporter

belts 33A, 33B, press the wrapping sheet 12 against the product 11, for example at least against the fifth surface 11E and the sixth surface thereof. This facilitates the stabilization of the wrapping sheet 12 around the product 11, thanks to the action of the layer of adhesive substance that was previously thermally activated by means of the heating members 40. The compression means should be disposed adjacent to the heating means, immediately downstream thereof, since their action is all the more effective the less the wrapping sheet 12 has cooled down, which happens gradually once this is no longer subjected to the action of the heating members 40. It will be quite clear to the person of skill in the sector that, in addition or as an alternative to the transporter belts 33A, 33B, the compression means can comprise suitable members, of a type known in the state of the art or which will be developed in the future, able to carry out the action of compression described above.

The apparatus 10 operates in a continuous cycle, a mode which guarantees to achieve high productivity. For this purpose, a programmable control unit is provided, schematized in fig. 1 with the block indicated by the reference number 50, which commands the operation of all the actuation means and members described above in order to move the members in movement, in particular the transporters 13, 14 and the linear transport means 30, with a continuous movement.

To this end, the programmable control unit 50 is operationally connected at least to the drive members 34, 37 and 46, and to the first and second motor units 51, 52.

Adjusting the speed of rotation of the transporters 13, 14 and the speed of the linear transport means 30 by means of the programmable control unit 50 allows to modify the productivity of the apparatus 10. For example, the speed of the pair of transporter belts 31A, 31B can be commanded by the programmable control unit 50 in order to keep the products 11 wrapped by a respective wrapping sheet 12 distanced from each other according to a predefined pitch P during their displacement along the segment of linear advance L. It can be observed that this pitch P can, preferably, be approximately equal to the linear pitch P with which the products 11 are fed to the inlet transporter 13 by the first feed member 21.

It is clear that modifications and/or additions of parts or steps may be made to

the apparatus 10, 10' and to the method as described heretofore, without departing from the field and scope of the present invention as defined by the claims. In the following claims, the sole purpose of the references in brackets is to facilitate reading and they must not be considered as restrictive factors with regard to the field of protection claimed in the specific claims.

CLAIMS

1. Apparatus (10; 10') for continuously packaging products (11), in particular food products, comprising:

- an inlet transporter (13) comprising a first wheel rotating around a first axis of rotation (X1), said first wheel being provided with one or more transport units (15) which are configured to each take and transport one of said products (11) and a corresponding wrapping sheet (12), said inlet transporter (13) comprising first folding means (25) configured to make at least one fold of said wrapping sheet (12) around the product (11);

- first feed means (21) configured to feed said products (11) to said transport units (15) of said inlet transporter (13);

- second feed means (23) configured to feed said wrapping sheets (12) to said transport units (15) of said inlet transporter (13);

- a packaging transporter (14) comprising a second wheel rotating around a second axis of rotation (X2), parallel to the first axis of rotation (X1), said second wheel being provided with one or more gripping units (16), each able to receive, from a respective one of said one or more transport units (15), each of said products (11) and the corresponding wrapping sheet (12) at least partly wrapped around the latter, said packaging transporter (14) comprising second folding means (26, 27, 28) configured to complete the wrapping of the wrapping sheets (12) around the product (11);

- heating means (40) configured to heat an adhesive substance present on said wrapping sheet (12) in order to stabilize the wrapping sheet (12) around said product (11), said heating means (40) being disposed downstream of said packaging transporter (14),

said apparatus being **characterized in that** it also comprises linear transport means (30) disposed directly downstream of said packaging transporter (14) and comprising both a pair of transporters (31A, 31B) opposite distanced from each other in such a way as to be able to transport said products (11) interposed between them along a segment of linear advance (L), and also a support member (35), disposed below and between said pair of transporters (31A, 31B) and configured to support said product (11) from below, **and in that** each gripping unit (16) is configured to pass through said pair of transporters (31A, 31B) while

said second wheel rotates around said second axis of rotation (X2) and to simultaneously cooperate with said support member (35) in such a way as to release each product (11) already wrapped by a respective wrapping sheet (12) on said support member (35) without interruption in motion, so that said pair of transporters (31A, 31B) consecutively moves the products (11) released by each of said gripping units (16) along said segment of linear advance (L).

2. Apparatus (10; 10') as in claim 1, **characterized in that** said segment of linear advance (L) is rectilinear.

3. Apparatus (10; 10') as in claim 1 or 2, **characterized in that** said pair of transporters (31A, 31B) consists of belt or strip conveyors, closed in a loop.

4. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** it comprises a control unit (50) configured to command said pair of transporters (31A, 31B) at a constant speed, which is correlated to the speed of rotation of said first and said second wheels and is such as to keep the products (11) distanced from each other according to a predefined pitch (P).

5. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** said support member (35) comprises a flat, horizontal surface, located centrally under said pair of transporters (31A, 31B).

6. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** said pair of transporters (31A, 31B) cooperates with the gripping units (16) of said packaging transporter (14) in a zone disposed in proximity to the highest point of the circumferential trajectory of the second wheel, said second axis of rotation (X2) being disposed substantially horizontal.

7. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** each transport unit (15) of said inlet transporter (13) comprises first retention members (18) and second retention members (20) configured respectively to selectively retain one of said products (11) and one of said wrapping sheets (12), **and in that** said first folding means comprise a contrast member (25) for folding the wrapping sheet (12) on the product (11) so that it is disposed in contact on two adjacent surfaces (11A, 11B) of said product (11).

8. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** each of said gripping units (16) of the packaging transporter (14) comprises third retention members (39), configured to selectively retain said products (11) and

said wrapping sheets (12) partly wrapped around them, each of said third retention members (39) being provided with arms (39A, 39B), the terminal ends of which are shaped as prongs having a thickness sized so as to pass through a respective hollow space (48) present between the support member (35) and the pair of transporters (31A, 31B).

9. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** said inlet transporter (13) and said packaging transporter (14) are disposed in such a way that the transfer of each of said products (11) and of the corresponding wrapping sheet (12) from said transport unit (15) to said gripping unit (16) takes place along a directrix of radial transfer oriented along the segment joining said axes of rotation (X1, X2).

10. Apparatus (10') as in any claim hereinbefore, **characterized in that** said first feed means (21) are configured to feed at least two products simultaneously disposed on respective parallel rows, said inlet transporter (13), said packaging transporter (14), said second feed means (23) and said linear transport means (30) being configured to simultaneously work, in parallel, the products (11) disposed on two different parallel work paths (P1, P2).

11. Apparatus (10; 10') as in any claim hereinbefore, **characterized in that** said heating means (40) comprise at least two heated walls (41) forming a passage channel (38) and disposed in such a way as to be brushed against during the passage of the products (11) along said passage channel (38).

12. Method to continuously package products (11), in particular food products, comprising:

- a step of feeding the products (11) to be packaged to transport units (15) of an inlet transporter (13) by means of first feed means (21),
- a step of feeding wrapping sheets (12) to said transport units (15) by means of second feed means (23),
- a step of picking up and transporting said products (11) and said wrapping sheets (12) by means of said inlet transporter (13) comprising a first wheel rotating around a first axis of rotation (X1) and provided with one or more of said transport units (15), which are configured to each take and transport one of said products (11) and a respective wrapping sheet (12),
- a step of transferring each of said products (11) and the corresponding wrapping

sheet (12) partly wrapped around the latter from said transport unit (15) to a respective gripping unit (16) of a packaging transporter (14) comprising a second wheel rotating around a second axis of rotation (X2), parallel to the first axis of rotation (X1),

- a step of folding the wrapping sheet (12) around said product (11), according to a predetermined sequence, by means of first and second folding means (25, 26, 27, 28) associated respectively with said inlet transporter (13) and with said packaging transporter (14) in order to form a packaged product (100),

- a step of heating an adhesive substance present on said wrapping sheet (12) in order to stabilize the wrapping sheet (12) around said product (11) by means of heating means (40) disposed downstream of said packaging transporter (14),

wherein said method is **characterized in that** it also comprises a step of making said products (11) advance along a segment of linear advance (L) by means of linear transport means (30) disposed directly downstream of said packaging transporter (14) and comprising both a pair of transporters (31A, 31B) opposite and distanced from each other in such a way as to be able to transport said products (11), and also a support member (35) disposed below and between said pair of transporters (31A, 31B) so that said pair of transporters (31A, 31B) determines the transport of said products (11) while the products (11) are supported from below by said support member (35), **and in that** before said step of advance, there is provided a step of release of said products (11) wrapped by respective wrapping sheets (12) by each gripping unit (16) onto said support member (35), without interruption in motion, wherein each gripping unit (16) is configured to pass through said pair of transporters (31A, 31B) while said second wheel rotates around said second axis of rotation (X2), and to simultaneously cooperate with said support member (35) so that said pair of transporters (31A, 31B) consecutively moves the products (11) released by each of said gripping units (16) along said segment of linear advance (L).

13. Method as in claim 12, **characterized in that** said folding step provides to completely fold the wrapping sheet (12) around the product (11), wherein said folding step comprises: firstly carrying out a first fold of the wrapping sheet (12) on the product (11) so that it is disposed on two adjacent surfaces (11A, 11B) of said product (11) by means of a contrast member (25) comprised in said first

folding means, then folding the wrapping sheet (12) on a third surface (11C) of the product (11) during the transfer from said inlet transporter (13) to said packaging transporter (14), and finally carrying out the remaining folds, according to a predetermined sequence, of said wrapping sheet (12) against corresponding surfaces (11D, 11E) of the product (11) by means of folding members (26, 27, 28) comprised in said second folding means, while said gripping units (16) travel along a curvilinear trajectory, such as an arc of circumference.

14. Method as in claim 12 or 13, **characterized in that** the step of heating said adhesive substance takes place after said folding step, **and in that** the heating step takes place during a step of advance in which it is provided to make said packaged product (100) advance with continuous motion on a segment of linear advance (L), along a passage channel (38) comprised in said linear transport means (30) and defined at least by two heated walls (41) comprised in said heating means (40) and disposed in such a way so as to be brushed against by the products (11) in transit along said passage channel (38).

15. Method as in any claim from 12 to 14, **characterized in that** said step of feeding said products (11) provides to feed the products (11) along two parallel rows, each configured to feed a respective inlet transporter (13), **and in that** said steps of picking up and transporting, transferring, folding, releasing, making advance and heating, allow to work a plurality of products (11) in parallel, which are disposed along a first work path (P1) and along a second work path (P2), respectively, each of said paths being fed by a respective one of said rows of products (11).

16. Packaging machine for packaging products (11), in particular food products, inside a wrapper formed by a wrapping sheet (12) folded around each of said products (11) in such a way as to form packaged products (100), wherein said packaging machine is **characterized in that** it comprises an apparatus (10; 10') as in any claim from 1 to 11.

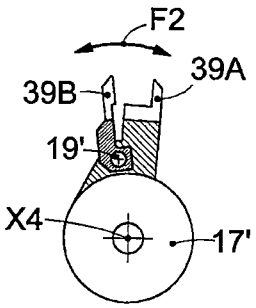

fig. 1A

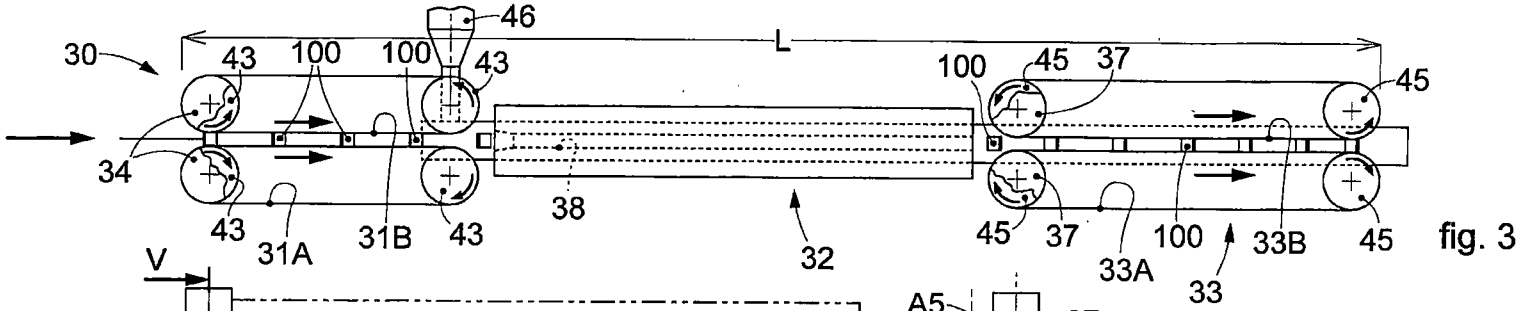

fig. 3

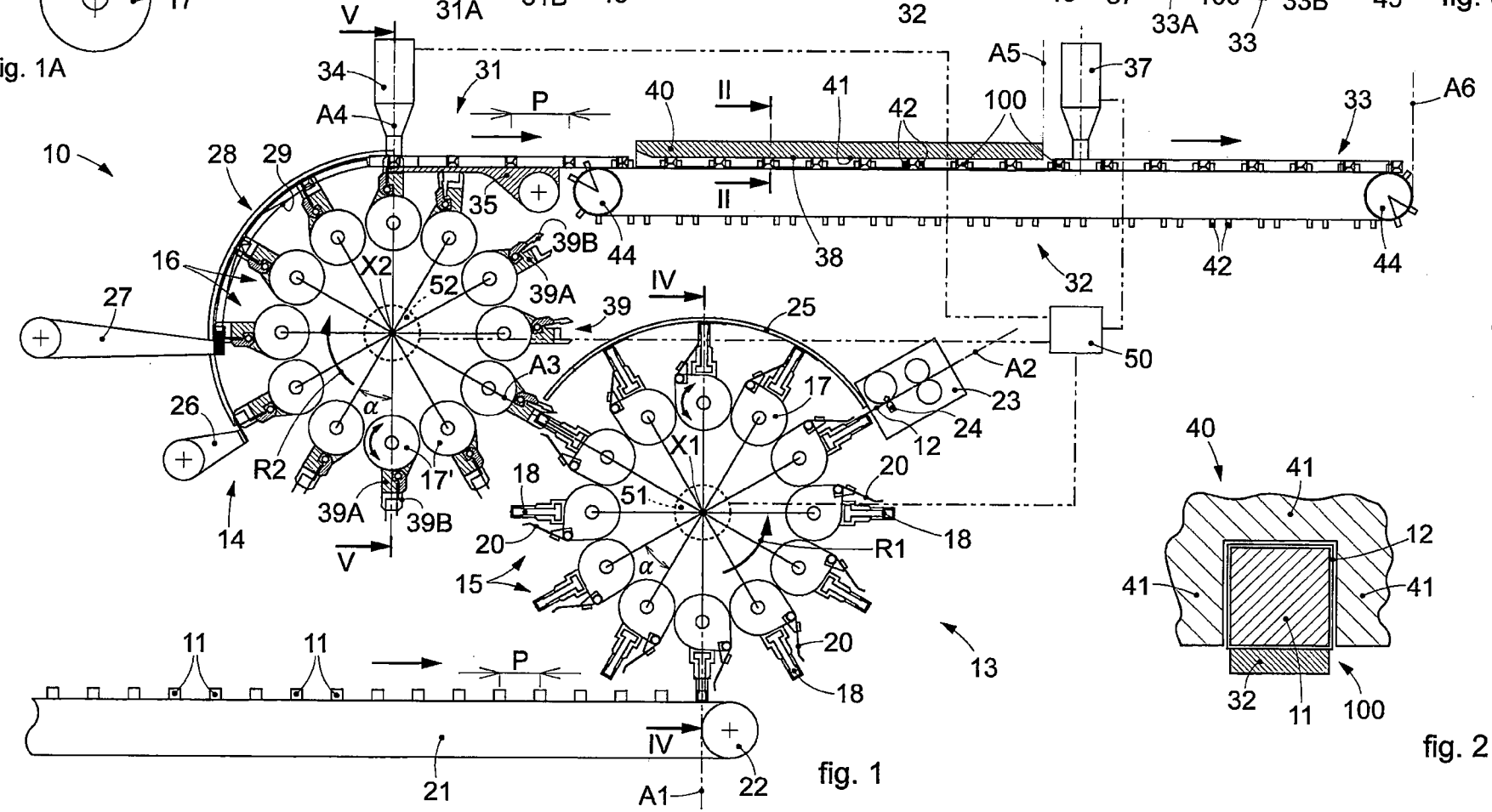

fig. 1

fig. 2

1/3

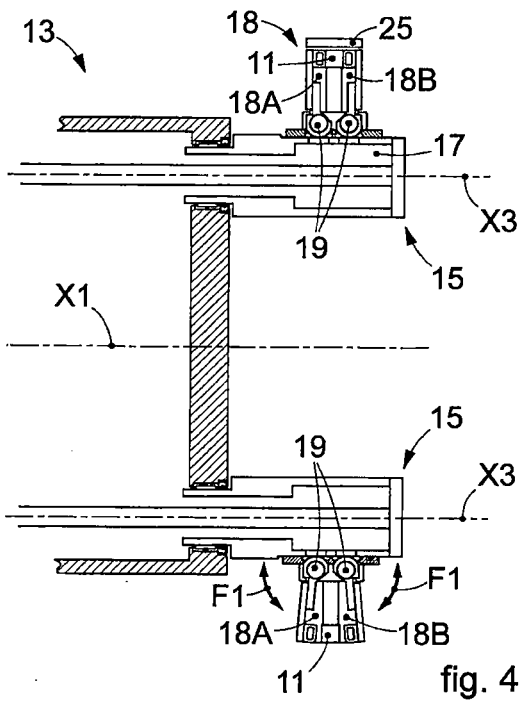

fig. 4

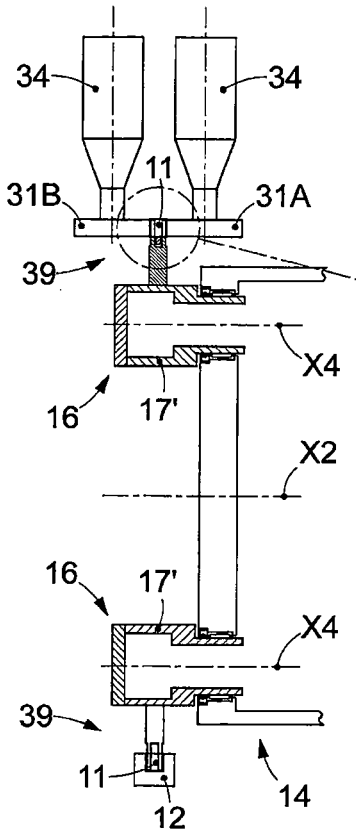

fig. 5

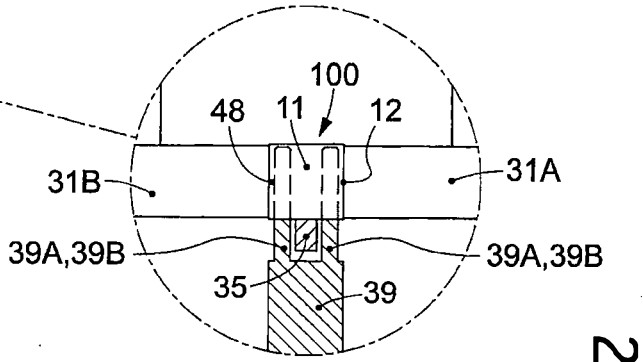

fig. 6

2/3

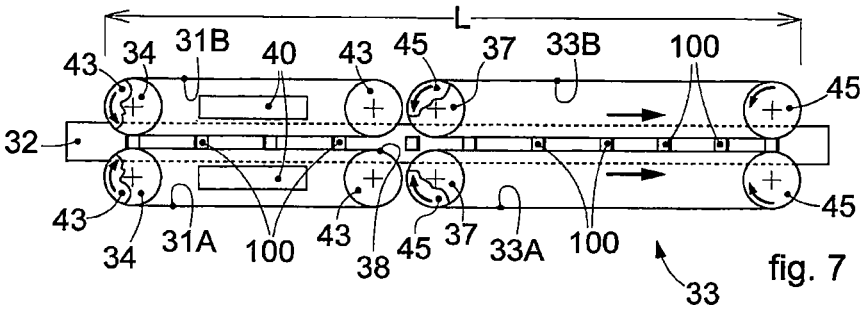

fig. 7

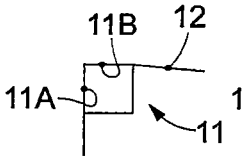

fig. 8a

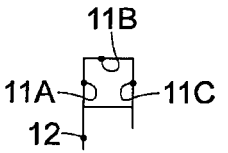

fig. 8b

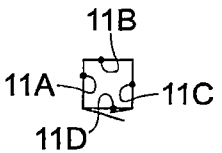

fig. 8c

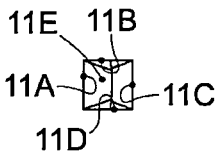

fig. 8d

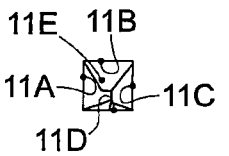

fig. 8e

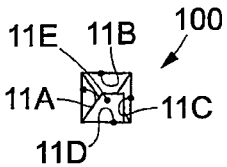

fig. 8f

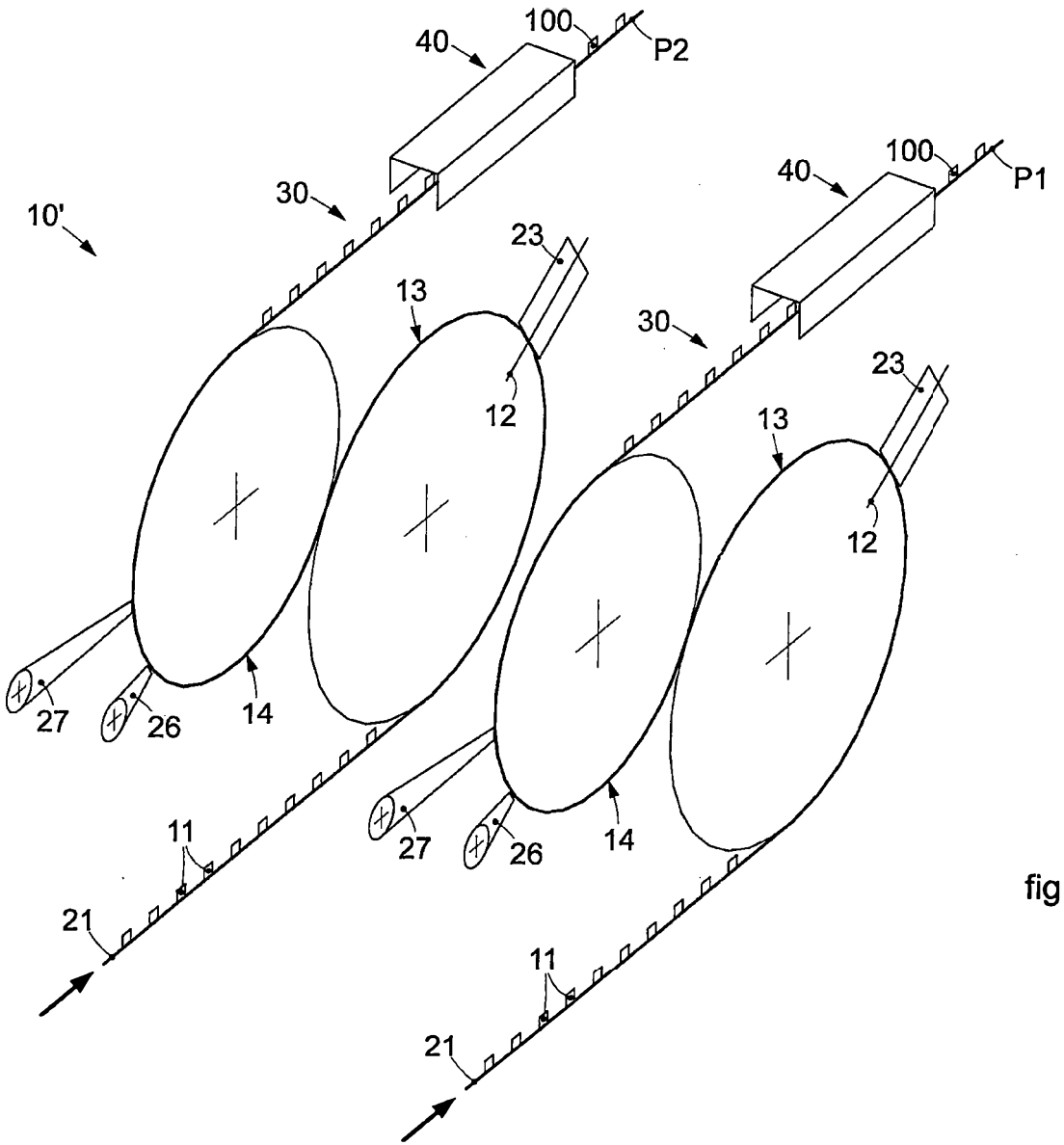
40
100
P2
30
10'
23
13
12
40
100
P1
30
23
13
12
27
26
14
11
21
27
26
14
11
21

fig. 9

Figure accompanying abstract

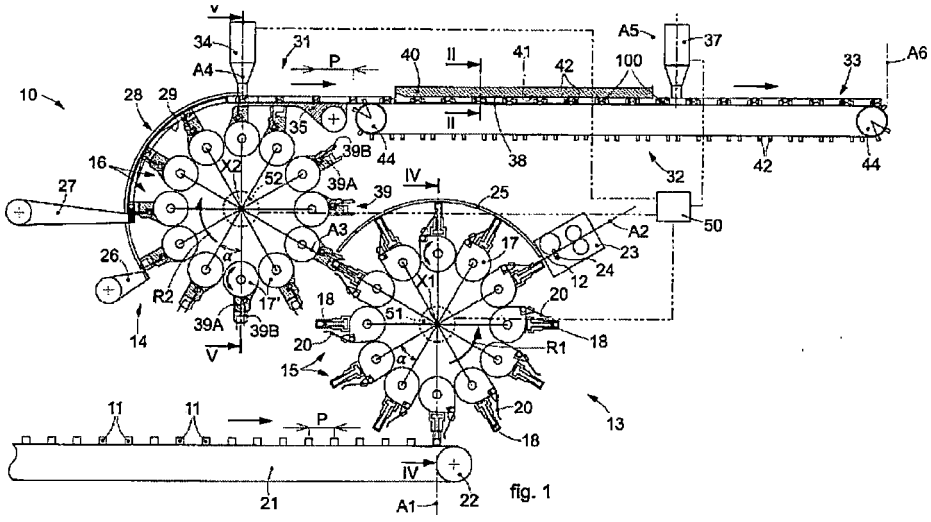

fig. 1

ABSTRACT

An apparatus (10) for packaging products (11), in particular food products, comprises both an inlet transporter (13) provided with one or more transport units (15), which are configured to receive and transport a product (11) and a corresponding wrapping sheet (12), and also a packaging transporter (14) provided with one or more gripping units (16), each able to receive a product (11) and the corresponding wrapping sheet (12) partly wrapped around the product (11) from a corresponding transport unit (15), and configured to form a packaged product (100), wherein said apparatus (10) also comprises both folding means (25, 26, 27, 28) associated with the inlet and packaging transporters (13, 14), and also heating means (40) configured to thermally activate an adhesive substance present on the wrapping sheet (12) in order to stabilize the latter around the product (11).