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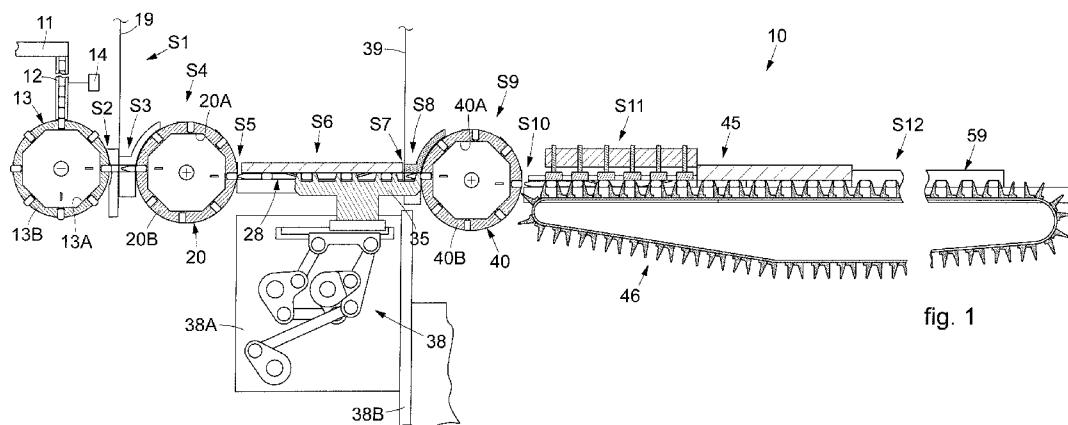


fig. 1

(57) Abstract: The machine (10) for packaging discrete items (100) comprises a feed station (S1) for feeding the discrete items (100) in ordered groups (101), a first feed station (S3) for feeding an internal wrapper (201), a station (S4) for conveying and folding the internal wrapper (201) for conveying the ordered groups (101) and folding the internal wrapper (201) around them, an operating station (S6), a second feed station (S8) for feeding an external wrapper (202), a station (S9) for conveying and folding the external wrapper (202) for conveying the groups (101) and folding the external wrapper (202) around them, a station (S11) for closing and welding the external wrapper (202) and an exit station (S12).

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"MACHINE FOR PACKAGING DISCRETE ITEMS"

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FIELD OF THE INVENTION

5 The present invention concerns a machine for packaging discrete items, in particular with a wrapper which can be either single or double layer. Specifically, the discrete items to be packaged are food items, such as confectionery such as sweets, chewing gum, chocolates, biscuits or other similarly sized foods.

A predefined number of such items is grouped to form a group of items, which is subsequently wrapped with said wrapper, in a single or double layer.

10 BACKGROUND OF THE INVENTION

Pocket-sized packages of chewing gum, generally also called candies, in the form of rigid and compact bars, have long been known. This chewing gum can be marketed in packages in which an ordered group of items is wrapped in a first wrapper, consisting of a sheet of wrapping material, and possibly also by a second
15 wrapper, consisting of a second sheet of wrapping material, which is wrapped around the first wrapper. To firmly close the packaging, the second wrapper is closed by welding, for example by activating a sealing wax previously applied on the internal surface of the second wrapper, or by directly welding the second wrapper, if it is made of heat-sealable material.

20 Packaging machines that carry out the packaging of the chewing gum grouped into ordered groups of items are also known. A first type of known machines is configured to carry out a packaging with a single layer wrapping, while a second type of known machines is configured to carry out a packaging with a double layer wrapping. Each of these types is specifically designed to carry out the packaging
25 with a precise wrapping material for candies with pre-established shape and sizes. Should the wrapping material and/or the shape and size of the candies change, it would be necessary to adopt the necessary design changes on the machines.

The poor flexibility of known machines is a problem, since they are not versatile and are specifically dedicated to exclusively package the packages for which they
30 were designed. Known machines do not allow to pass from a single layer packaging to a double layer one, or vice versa, and they are also constrained to a predetermined size of the discrete items, as well as to their pre-established number in the ordered groups to be packaged.

In addition, known machines are configured to make the wrappers with usually plastic-based wrapping materials, which are therefore not very eco-sustainable. Known machines are therefore not able to carry out the packaging using eco-sustainable materials, that is, of at least partly natural origin, which are recyclable or compostable.

There is therefore the need to perfect a machine for packaging discrete items that can overcome at least one of the disadvantages of the state of the art.

To do this it is necessary to solve the technical problem of providing a machine for packaging discrete items that is flexible, allowing to use different wrapping materials with different types of discrete items.

In particular, one purpose of the present invention is to provide a machine for packaging discrete items which is convertible and capable of performing the packaging of both single layer wrappers and also double layer wrappers, according to requirements.

Another purpose of the present invention is to provide a machine which is more compact in size compared to the machines of the first and second type known in the state of the art.

Another purpose of the present invention is to provide a machine for packaging discrete items which allows to package, with substantially simple and rapid machine set-up operations, packages comprising a number of items which can be selected by the operator, as well as the shape and sizes of each discrete item to be packaged.

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 claim. The dependent claims describe other characteristics of the present invention or variants to the main inventive idea.

In accordance with the above purposes and to resolve the technical problem disclosed above in a new and original way, also achieving considerable advantages compared to the state of the prior art, a machine according to the present invention for packaging discrete items alternatively selected either according to a double

layer wrapping configuration or according to a single layer wrapping configuration, comprises, in succession, a feed station configured to feed the discrete items in ordered groups, conveyor devices of rotating type comprising a plurality of wheels rotatable around respective axes of rotation, each of these
5 wheels having a plurality of peripheral pockets configured to accommodate each at least one of the ordered groups of discrete items, at least a first and a second feed stations configured to feed an internal wrapper and an external wrapper, respectively, first and second folding members configured to fold an internal and external wrapper around each of the ordered groups, respectively.

10 In accordance with one aspect of the present invention, the machine further comprises an operating station arranged downstream of the first feed station and upstream of the second feed station, and having a modifiable set-up which is a function of the selected wrapping configuration, wherein the operating station comprises a first conveying device configured to close the internal wrapper around
15 the ordered groups and to convey the ordered groups at least partly wrapped in the internal wrapper towards the second folding members, which close the external wrapper around the internal wrapper already wrapped around the ordered groups when the machine operates according to the double layer wrapping configuration, and a second conveying device comprising a rotatable wheel of a plurality of
20 wheels which is configured to convey the ordered groups towards the second folding members without any internal wrapper wrapped therearound, so that the second folding members close the external wrapper around the ordered groups, when the machine operates according to the single layer wrapping configuration. The first and second devices are installed in a removable manner in the operating
25 station, one as an alternative to the other.

Doing so achieves at least the advantage of having a machine for packaging discrete items that can be converted between a double layer wrapping configuration and a single layer wrapping configuration. In the double layer wrapping configuration, both the internal and the external wrapper are fed, and the
30 first conveying device is installed in the operating station. In the single layer wrapping configuration, on the other hand, only the external wrapper is fed, and the second conveying device is installed in the operating station.

According to some embodiments, the first feed station feeds a first wrapping

sheet intended to form the internal wrapper, and the second feed station feeds a second wrapping sheet intended to form the external wrapper.

In accordance with some embodiments, the first conveying device comprises an advancing member configured to make the ordered groups of discrete items partly wrapped in the internal wrapper advance, and a drive mechanism for driving the advancing member. The advancing member is configured to be displaced between an active position, in which the advancing member is moved along a channel of the first conveying device, and an inactive position, in which the advancing member is displaced distanced from the channel and moved back towards the first feed station in a cyclical manner.

In accordance with some embodiments, the channel comprises at least a horizontal support configured to restingly receive the ordered groups and allow their sliding when moved by the first conveying device.

In accordance with some embodiments, the advancing member comprises pushing members configured to cooperate with the channel from below, when the machine is operated in the double layer wrapping configuration.

In accordance with some embodiments, the advancing member is configured to be positioned between a raised active position to move the ordered groups, and a lowered resting position to allow the second conveying device to be put in place instead of the first conveying device.

In accordance with some embodiments, the drive mechanism is mounted on a support body which is movable mounted on the machine to be displaced between a working position, in which the drive mechanism can drive the advancing member for moving the ordered groups partly wrapped by the internal wrapper, when the machine is operated according to the double layer wrapping configuration, and a resting position, below the working position, in which the drive mechanism is placed at a certain distance from the second conveying device in order to not interfere with it, when the machine is operated according to the single layer wrapping configuration.

In accordance with some embodiments, the support body is movable mounted, preferably slidingly, on the machine, that is, on a frame thereof.

In accordance with some embodiments, the drive mechanism comprises a first motor configured to move the advancing member according to a horizontal

direction and a second motor configured to move the advancing member according to a vertical direction.

According to some embodiments, the machine comprises a closing and welding station configured to close and weld the external wrapper. The station for closing
5 and welding the external wrapper comprises a plurality of welding members configured to weld the external wrapper. This allows to adjust the intensity of the welding according to the wrapping material used.

Preferably, the plurality of welding members comprises a first series of upper welding members, configured to weld the external wrapper at an upper longitudinal
10 side of the ordered groups, followed by a second series of lateral welding members configured to weld the external wrapper at the ends of the ordered groups.

In accordance with some embodiments, the machine comprises a single linear conveyor for conveying the ordered groups of discreet items, wrapped at least in the external wrapper, through the station for closing and welding the external
15 wrapper and, subsequently, towards the exit station.

Advantageously, the exit station further comprises a pair of lateral conveyors, each located on a respective side with respect to the ordered groups of discreet items wrapped at least in the external wrapper, so as to accompany the newly welded ends of the external wrappers. This allows to safeguard the welds of the
20 ends, preventing them from sliding against a stationary surface while they cool.

According to some embodiments, at least one of either a station for conveying and folding the internal wrapper or a station for conveying and folding the external wrapper is equipped with a damper member configured to accompany the insertion of the ordered groups of discreet items and of the corresponding wrapper, if
25 present, inside a respective seating.

Advantageously, the at least one of either the station for conveying and folding the internal wrapper or the station for conveying and folding the external wrapper comprises one of the conveyor devices of rotating type equipped with the seatings for receiving the ordered groups of discreet items, and which comprises the damper
30 member able to be displaced between a retracted position, in which it is completely contained within the overall size of the conveying device, and an extended position, in which at least one end thereof protrudes from one of the seatings, so that it is the first to come into contact with the ordered groups of discreet items.

More precisely, each of either the station for conveying and folding the internal wrapper or the station for conveying and folding the external wrapper comprises a respective wheel comprising a body with a central cavity and an external wall with a circular section in which a plurality of seatings are created, which are configured to receive the ordered groups of discrete items. Each seating comprises a bottom equipped with a longitudinal slot. The damper member is located inside the central cavity and has a plate-shaped body configured to pass through the longitudinal slot of the bottom of the seatings.

Advantageously, each damper member is able to be displaced between a retracted position, in which it is completely contained in the central cavity, and an extended position, in which at least one end thereof protrudes from the longitudinal slot and is positioned inside the corresponding seating.

DESCRIPTION OF THE DRAWINGS

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

- fig. 1 is a partial and schematic longitudinal section view of a machine for packaging discrete items according to the present invention, in a first operating configuration;
- figs. 2a and 2b are three-dimensional views of packaged discrete items, each in a respective variant;
- figs. 3, 4 and 6 are detailed and enlarged longitudinal section views showing different operating stations of the machine of fig. 1;
- fig. 5 is a schematic three-dimensional section view of a device comprised in the operating station shown in fig. 4;
- figs. 7 and 8 are three-dimensional views, on an enlarged scale, of other details of the machine of fig. 1, fig. 8 also being partly sectional;
- fig. 9 schematically shows the operating flow of a group of discrete items to be packaged by means of the machine in the first operating configuration of fig. 1;
- fig. 10 is a partial and schematic longitudinal section view of some operating stations of the machine of fig. 1, in which the machine is arranged in a second operating configuration; and
- fig. 11 schematically shows the operating flow of a group of discrete items to be

packaged by means of the machine arranged in the second operating configuration visible in fig. 10.

We must clarify that the phraseology and terminology used in the present description, as well as the figures in the attached drawings also in relation as to
5 how described, have the sole function of better illustrating and explaining the present invention, their purpose being to provide a non-limiting example of the invention itself, since the scope of protection is defined by the claims.

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

DESCRIPTION OF AN EMBODIMENT OF THE PRESENT INVENTION

With reference to the drawings, a machine 10 according to the present invention is configured to package ordered groups 101 of discrete items 100, such as
15 confectionary such as sweets, chewing gum, chocolates, biscuits or foods in general, wherein each group comprises a predetermined number of discrete items, for example ten items.

In the description that follows, the discrete items 100 are preferably chewing gum in the form of a substantially rectangular candy, of a known type. Obviously,
20 the nature of the packaged discrete items can also be different, for example even products belonging to sectors other than the food sector, and does not constitute a limitation of the scope of protection of the present invention.

Each ordered group 101 of items 100 therefore has an elongated shape in which a plurality of longitudinal sides 102 extend between two opposite ends 103. In the
25 specific example shown, in which the items have a rectangular shape, four longitudinal sides 102 are provided, that is, one for each perimeter side of the items (fig. 2a and 2b).

As will be described in greater detail below, the machine 10 allows to package these discrete items 100 according to two different packaging configurations: with
30 a double layer wrapping or with a single layer wrapping.

In the case of double layer wrapping, an internal wrapper 201 is provided directly in contact with the group 101 of discrete items 100, and in an external wrapper 202 that wraps around the internal wrapper 201 (fig. 2a). Each of the

wrappers 201, 202 consists of a respective sheet of a suitable wrapping material cut to size. The material of these wrappers can comprise cellulosic based materials, such as paper, plastic materials, materials suitable to define a barrier effect to protect the products from moisture, such as foil or metallized paper for example.

- 5 The sheet is folded in a known manner around the group 101 of discrete items 100, so as to keep the discrete items 100 belonging to the same group 101 grouped together in a stable manner.

In the case of single layer wrapping, on the other hand, a single wrapper is provided, wrapped directly in contact with the group 101 of discrete items 100 and
10 consisting of the external wrapper 202, also made of a suitable wrapping material, such as those listed above for example.

With reference to figs. 1 and from 3 to 8, these show an operating configuration of the machine 10 which allows to obtain a package like the one shown in fig. 2a, in which there is a double layer wrapping.

- 15 The machine 10 comprises a feed station S1 equipped with a vibrating reorderer 11 in which the discrete items 100 are fed in bulk, and from which they automatically fall by gravity into a channeling device 12. In one possible embodiment, the channeling device 12 comprises a plurality of channels, not shown and preferably arranged parallel and adjacent to each other, which are
20 configured to lead the discrete items 100 from the feed station S1 towards the next processing station.

An ordered group of discrete items 100 forms within each channel. At the exit of the channeling device 12, a respective item exits from each channel. By virtue of the arrangement of the channels, all the items exiting from the channels are
25 arranged in order and side by side to form the group 101. In the example given here, in which each group 101 comprises ten items 100, the channeling device comprises the same number of channels. The group 101 is oriented so as to extend along a longitudinal axis, which is substantially horizontal.

- In the example described here, there is provided at least one control device 14
30 associated with the channeling device 12 and configured to control the discrete items 100 during their descent in order to detect, for example, any clogging or the absence of the items or their possible damage. The control device 14 is advantageously of the optical type and comprises, for example, a video camera.

The machine 10 comprises a first transfer station S2, comprising a conveyor wheel 13.

In the first transfer station S2, the group 101 enters the conveyor wheel 13 (figs. 1 and 3) for conveying the items 100, which has an axis of rotation R1 substantially parallel to the longitudinal axis of the group 101.

The conveyor wheel 13 for conveying the items 100 comprises a plurality of pockets 15, angularly distributed along the circumference of the wheel 13 and open towards the outside. Each pocket 15 acts as a seating and is configured to receive a respective group 101 so as to ensure that it keeps its orderly arrangement in the absence of any element that constrains it together, given that in this operating position of the machine 10 the group 101 is formed only by a plurality of items side by side, without any wrapper wrapping them together. For this purpose, the internal sizes of each pocket 15 substantially correspond to the external sizes of a group 101, as formed at the exit of the channeling device 12.

We must clarify that the pockets 15 are rectangular in shape and oriented with a longitudinal axis substantially parallel to the axis of rotation R1 of the wheel 13, so that the groups 101 are also oriented parallel to this axis.

In the example shown, the wheel 13 has eight pockets 15 distanced from each other by an angle of 45°. The wheel 13 is connected to a respective motor member (not shown for simplicity), preferably of the brushless type, and configured to drive the wheel with a stepwise alternating motion with a unidirectional direction of rotation, for example in a counterclockwise direction. In this case, the motor member makes the wheel rotate by an angle of 45° with each step.

A reject zone 16 is provided, located for example below the wheel 13, although other positions are possible.

The wheel 13 comprises two pusher members 17, 18 configured to push the groups 101 out of the pockets 15. To allow the passage of these pusher members 17, 18, the bottom wall of the pockets 15 comprises at least one passage hole for the pushers, not shown.

A first pusher member 17 is arranged at the reject zone 16 (fig. 3) so as to push the group 101 out of the respective pocket 15 in the event that the control device 14 has detected that this group does not comply with quality standards. The second pusher member 18 is configured to push the group 101 out of the respective pocket

15 at an exit station from the conveyor wheel 13, towards the next processing station (fig. 3).

Each pusher member 17, 18 is shaped in such a way that it can interact with all the items 100 of the group 101 to prevent any isolated items from accidentally
5 remaining inside the pockets.

Each pusher member 17, 18 is movable between a resting position, in which the pusher member 17, 18 is entirely contained in a compartment inside the wheel (fig. 3), and a pushing position, in which at least an end portion of the pusher member 17, 18 exits into the pocket 15 to push out the items 100.

10 The machine 10 comprises a first feed station S3, at which a sheet 19 of wrapping material is fed, intended to form the internal wrapper 201 of the packaging with double layer wrapping. The sheet 19 of wrapping material is preferably fed along a vertical plane, parallel to the orientation of the channeling device 12, by a corresponding reel (not shown), for example located above the first
15 wrapper feeding station S3. The sheet 19 arrives at the first wrapper feeding station S3 in such a way as to intersect the path of the group 101 pushed by the second pusher member 18, so that the group 101 hits against the sheet. The latter is preferably pre-cut so as to automatically detach from the reel thanks to the force of the impact of the group 101 advancing against the sheet.

20 Immediately downstream of the first feed station S3 there is provided a conveying and folding station S4 comprising a wheel 20 rotatable around an axis of rotation R2 which is parallel to the axis of rotation R1 of the wheel 13.

The wheel 20 is configured to convey the group 101 together with the sheet 19 associated therewith in the wrapper feeding station S3, and at the same time to
25 carry out a predetermined sequence of folds of the sheet 19 in order to define the wrapping of the internal wrapper 201 around the group 101.

The wheel 20 comprises a plurality of pockets 21, for example eight pockets in the example shown, which are configured as seatings angularly distributed around its circumference and oriented parallel to its axis of rotation R2 (figs. 1, 3 and 4).
30 The conveying and folding wheel 20 is driven with an alternating motion with a unidirectional step, in a clockwise direction.

The wheel 20 comprises a damper member 22 configured to accompany, in a controlled manner, the entry of the assembly formed by the group 101 and by the

corresponding sheet 19 into the pockets 21 of the wheel 20.

For this purpose, the damper member 22 is substantially aligned with the second pusher member 18. The damper member 22 is movable between an active position, in which its end that comes into contact with the sheet 19 is located inside the pocket 21, at the position of entry of the group 101 and of the sheet 19 associated therewith into the wheel 20, and an inactive position, in which the damper member 22 is outside the pockets 21, in a compartment inside the wheel 20.

When the damper member 22 is in the active position, it cooperates with the second pusher member 18 which is pushing a group 101 of items 100. The second pusher member 18 and the damper member 22 are displaced together, in particular towards the right in figs. 1 and 3, striking the assembly formed by the group 101 and the sheet 19, one at the front and one at the rear, so as to accompany and cushion its entry into the wheel 20, thus preventing the items 100 from hitting the walls of the pocket 21. The damper member 22 advantageously also allow to keep the sheet 19 positioned against the group 101 during the insertion in the pocket 21.

The wheel 20 also comprises a third pusher member 23 configured to push the items 100 out of the pockets 21 when the latter reach the position of exit towards the next processing station.

The wheel 20 is provided with first folding members 24 for folding the sheet 19 around the group 101 so as to form the internal wrapper 201. The first folding members comprise a fixed element, located upstream of the wheel 20, at the first transfer station 27. The first folding members 24 in turn comprise a folding channel 25 delimited by an upper wall 26 and two lateral walls 27, with respect to the direction of transfer of the items 100. These upper 26 and lateral walls 27 allow to automatically carry out a first fold of the wrapping sheet 19 along a longitudinal side 102 of the ordered group 101 of items 100 and at its ends 103.

The first folding members 24 have a lower wall which, in addition to sustaining the items 100, performs another fold along a second longitudinal side 102 of the group 101, opposite to the longitudinal side 102 at which the first fold of the sheet 19 is made. Alternatively, these last two folds can be performed while the group 101 of items 100 is inserted in the pocket 21. This results in the sheet 19 being folded substantially in a C-shape on three longitudinal sides 102 of the group 101.

The upper wall 26 of the first folding members 24 also comprises a rear edge

26A positioned flush with the wheel 20 and coaxial therewith, so as to cause a second fold of the sheet 19 of wrapping material along a second longitudinal side 102 of the group 101 of items 100, when the wheel 20 is rotated clockwise.

5 A second transfer station S5 is provided downstream of the internal wrapper conveying and folding station S4, in which the third pusher member 23 pushes a group 101, partly wrapped in the sheet 19 of wrapping material, out of a pocket 21 towards the next processing station (figs. 1 and 3), which is configured as an operating station S6, which will be described in detail below.

10 In this double layer wrapping operating configuration, the operating station S6 comprises a first conveying device 28 (fig. 4), configured to convey the group 101 partly wrapped in the sheet 19 of wrapping material, which has been partly folded thereon by the first folding members 24 associated with the wheel 20, and to simultaneously complete the folds of the same sheet 19 so as to close the internal wrapper 201 around the group 101.

15 The first conveying device 28 is removably mounted on the machine 10, in the operating station S6. The first conveying device 28 comprises a rectilinear channel 29 inside which the group 101 is made to advance stepwise (fig. 5). The channel 29 is delimited at the upper part by a series of abutment bars 30, laterally by two lateral walls 31 and at the lower part by a lower wall 32, which defines a horizontal support for the items 100, the lower wall 32 being provided with one or more longitudinal slits 33 extending for the entire length of the channel 29 (fig. 5).

20 As the group 101 and the sheet 19 wrapped around it advance inside the channel 29, folding means forming part of the first folding members 24 operate additional folds of the sheet 19 to finish the formation of the internal wrapper 201. These folding means can be associated with the lateral walls 31 and operate at the upper part, for example being configured as the upper bars 30 or other folding member (such as continuous bars).

Specifically, in the example shown, the lateral walls 31 are each equipped, as folding means, with two inclined slots 34A, 34B which act as folding means to perform the last folds of the sheet 19 at the ends 103 of the group 101 of items 100 (fig. 4). These slots 34A, 34B are of a known type and are therefore not described further.

30 The first conveying device 28 comprises an advancing member 35, for example

configured as a comb member, arranged below the channel 29 for advancing the groups 101 stepwise therein.

5 The comb member 35 comprises one or more rows 36 of teeth, arranged in such a way as to pass through the longitudinal slits 33 of the lower wall 32 and thus enter the channel 29 in order to be able to push the groups 101 forwards. Each row 36 comprises a plurality of teeth 37 so as to be able to push the groups 101 for the entire length of the channel 29.

10 The stepwise advance of the groups 101 along the entire channel 29 is achieved thanks to a cyclical drive of the advancing member 35. More precisely, the comb member is raised so that its teeth 37 enter the channel 29 vertically (fig. 5), then it is made to advance forwards in order to push a group 101 inside the channel 29, then it is lowered so as to no longer interfere with the groups 101 arranged in the channel 29, and finally it is moved backwards to its starting position. This movement cycle is then repeated to operate the advance of the groups 101 in
15 succession along the channel 29.

To move the advancing member 35, the first conveying device 28 comprises a drive mechanism 38, of a known type (figs. 1 and 10). The drive mechanism 38 is mounted on a support body 38A which is slidingly mounted vertically on a guide 38b attached on a frame of the machine 10. In this way, the advancing member 35,
20 together with the drive mechanism 38, can be displaced between a raised position (fig. 1), in which the teeth 37 of the advancing member 35 can be inserted in the channel 29, and a lowered position (fig. 10).

In some variants, not shown, connection members, for example mechanical, can be provided interposed between the drive mechanism 38 and the advancing
25 member 35, whereby only the latter is displaced between the raised position and the lowered position, while the drive mechanism 38 remains fixed.

The advancing member 35, in turn, is displaceable, in a known manner, between an active position, in which it is raised and interacts with the ordered groups 101 in transit along the channel 29 (as visible in fig. 4), and an inactive position, in
30 which it remains outside the channel 29, in particular below it, and therefore cannot interact with the groups 101 in the channel 29. In this way, the advancing member 35 can be displaced along the channel 29 while it is in the active position, in order to make the ordered groups 101 advance, and is then displaced backwards when it

is in the inactive position, so as to avoid moving the ordered groups 101 backwards.

The machine 10 comprises a third transfer station S7 in which the groups 101 are transferred from the first conveying device 28 towards a wheel 40 for conveying groups and folding the wrapper.

5 In correspondence with this transfer, a second wrapper feeding station S8 is provided, in which a second sheet 39 of wrapping material is fed which, in the version described here, acts as external wrapper 202. Similarly to what disclosed for the first wrapper feeding station S3, the second sheet 39 is fed along a vertical plane that is substantially parallel to the plane along which the sheet 19 is fed. This
10 second sheet 39 is unwrapped by a corresponding reel, not shown, located above the second wrapper feeding station S8, and it is pre-cut to size, remaining connected to the rest of the reel by means of one or more attachment points configured to tear when the groups 101 hit the second sheet 39. As explained above in the context of the first wrapper feeding station S3, the force exerted by the
15 groups 101 that are advancing against the second sheet 39 is such as to determine the tearing of the attachment points and therefore the detachment of the sheet itself, which remains associated with the group 101 in transit, which is already wrapped by the internal wrapper 201.

After the second wrapper feeding station S8, the machine 10 comprises a station
20 S9 for conveying and folding the external wrapper, which comprises the group 101 conveying and wrapper folding wheel 40, completely similar to the conveying and folding wheel 20, with the difference that, from an operational point of view, it conveys the groups 101 of items 100 already wrapped in the internal wrapper 201.

The group conveying and wrapper folding wheel 40 is rotatable around an axis
25 of rotation R3 parallel to the axes of rotation R1, R2 of the previously described wheels 13, 20 and comprises a plurality of pockets 41, eight in the example shown, configured as seatings suitable for housing each a group 101 of items 100 completely wrapped in the internal wrapper 201 and partly wrapped by the second sheet 39 intended to define the external wrapper 202.

30 The wheel 40 also comprises second folding members 42 located between it and the second wrapper feeding station S8, and which are identical in structure and operation to the previously described first folding members 24. The wheel 40 further comprises a second damper member 43 and a fourth pusher member 44,

identical to the damper member 22 and the third pusher member 23, respectively, both in terms of structure and operation, and also in terms of their relative position with respect to the wheel 40.

It can therefore be deduced that the second damper member 43 is configured to
5 accompany the entry of the group 101 of items 100 into the pocket 41 at the third transfer station S7, in cooperation with the advancing member 35 which - in addition to making the groups advance along the channel 29 - is also configured to transfer the groups 101 through the third transfer station S7 to the inside of the pockets 41.

10 The fourth pusher member 44 is configured to push the group 101, partly wrapped in the second sheet 39, towards a fourth transfer station S10, located substantially in a position diametrically opposite the third transfer station S7, with respect to the wheel 40. We must clarify that, similarly to what described for the internal wrapper conveying and folding wheel 20, at exit from the group conveying
15 and wrapper folding wheel 40, the wrapper is folded substantially around four longitudinal sides 102 of the group 101, and is also folded at the ends 103 at only the rear side of the group 101, with respect to the direction of feed. The fold of the rear side of the end 103 occurs during the transit of the group 101 from the wheel 40 to the following station.

20 After the fourth transfer station S10 there is provided a station S11 for closing and welding the external wrapper 202, comprising a device 45 for closing and welding the external wrapper 202. Finally, after the closing and welding station S11, there is provided an exit station S12 of the packaged groups 101 (figs. 7 and 8).

25 The ordered groups 101 of items 100 are fed through the closing and welding station S11 to the exit station S12 by means of a conveyor 46 comprising, for example, two endless belts 47 located parallel to each other, on each of which there are mounted a plurality of first attachment elements 48, each provided with a first tooth 49, and a plurality of second attachment elements 50, each provided with a
30 respective second tooth 51 (figs. 1, 6, 7 and 8).

On a same endless belt 47, the first and second abutment elements are alternated in succession. The first teeth 49 have a substantially triangular shape with a front edge 49A substantially perpendicular to the direction of advance A of the ordered

groups 101 of items and configured to push a group 101 of items 100, and a rear edge 49B.

The second teeth 51 have shape and sizes similar to those of the first teeth 49.

5 A second tooth 51 followed by a first tooth 49 form between them a space with two edges parallel to each other (figs. 1 and 6), inside which an ordered group 101 of items 100 is placed. The first teeth 49 act as pushing teeth, while the second teeth 51 act as contrasting teeth, to stop the travel of the groups 101 pushed by the fourth pusher member 44, when they leave the wheel 40 to enter the station S11 for closing and welding the external wrapper 202, where they are received by the
10 conveyor 46.

The closing and welding device 45 comprises a tunnel 52 which, for a first segment 52A, is delimited at the upper part by an initial upper wall 53, which also acts as a folding member to perform a fold of the second sheet 39 on the last longitudinal side 102 of the group 101, and subsequently by a plurality of upper
15 welding members 54 arranged in succession and configured to weld the second sheet 39 in order to close the external wrapper 202 on the longitudinal side 102 of the groups 101 which is oriented upwards, this longitudinal side containing the end flap of the second sheet 39.

The upper welding members 54 are arranged at the longitudinal positions in
20 which the groups 101 stop with each advancing step, so that the welding is performed in several repeated phases, for a short time, on the external wrapper 202 while the group 101 is temporarily stationary between one advancing step and the next. The upper welding members 54, which are in a raised position during the movement of the groups 101, are lowered into contact with the same temporarily
25 stationary groups 101 below.

As an alternative to this mode with alternating motion, the conveyor 46 can be driven with continuous motion, determining a non-stop movement of the groups 101 to be welded. In this alternative mode, the upper welding members 54 are always kept in a lowered position, so that the groups 101, when they are displaced
30 along the first segment 52A of the tunnel 52, remain in contact with them, thus allowing to perform the upper welding.

The same first segment 52A of the tunnel 52 is delimited laterally by two lateral walls 55, each provided with slots similar to the slots 34A, 34B in the channel 29

of the first conveying device 28, which form further folding means comprised in the second folding members 42 for folding the last flaps of the sheet 39 at the ends 103 of the group 101 of items 100, similarly to what described for the slots 34A, 34B of the channel 29 of the first conveying device 28.

5 Subsequently, the tunnel 52 comprises a second segment 52B, consecutive to the first, delimited at the upper part by an upper wall (not visible in the drawings) and laterally by a series of lateral welding members 57, configured to weld the sheet 39 at the ends 103 of the groups 101 of items 100, closing the external wrapper 202 (figs. 7 and 8).

10 We must clarify that the number of upper welding members 54 and lateral welding members 57, or more generally the longitudinal extension covered by such welding members, gives the machine greater flexibility, in terms of potential materials to be used as wrapping, in particular as external wrapper 202, as will be seen below. In fact, the greater the number of upper 54 and/or lateral 57 welding
15 members, or their longitudinal extension, the greater the probability of being able to weld sheets of materials that are also difficult to weld. This allows a wide variety of materials to be used for the external wrapper 202.

In the example shown in the drawings, the closing and welding device 45 comprises six upper welding members 54 and at least two pairs of lateral welding
20 members 57, the latter having a longitudinal extension substantially corresponding to the longitudinal extension covered by the six upper welding members 54.

In both segments 52A, 52B, the tunnel 52 is delimited at the lower part by a lower wall 58 on which the groups 101 are made to slide by the conveyor 46, wherein the lower wall 58 is interposed between the two endless belts 47, below
25 them, so as to allow the teeth 49, 51 to enter the tunnel 52 (figs. 7 and 8).

The exit station S12 comprises a pair of lateral conveyors 59 driven with alternating motion so as to accompany the packaged groups 101 to the exit from the machine 10 (figs. 7 and 8). Substantially, these lateral conveyors 59 allow to have lateral walls that are displaced with the packaged groups 101, preventing the
30 welds at the ends 103 of the groups 101, just performed and not yet cooled, from being dragged against a fixed wall. This allows the newly made welds to be protected from external stresses and ensures that they consolidate optimally while the groups 101 advance towards the exit.

The operation of the machine 10 for packaging discrete items 100 described heretofore, in its operating configuration for making a double layer wrapping, comprises the following steps.

The operating flow of the ordered groups 101 of items 100 is shown in fig. 9.

5 The ordered groups 101 of items 100 are formed in the feed station S1, in particular at the exit of the channeling device 12, on the left in fig. 9. Here, the formed groups 101 fall into the wheel 13, which rotates stepwise in a counterclockwise direction. During the descent along the channeling device 12, the number and conformity of the items 100 are checked by means of the control
10 device 14.

With each step, the wheel 13 rotates by 45° , so that there is always a pocket 15 thereof aligned with the channeling device 12.

After having travelled 180° , the group 101 is located at the reject zone 16, where it is possibly expelled from the wheel 13 by means of the first pusher member 17,
15 if the group 101 comprises a defective or missing item.

The compliant groups 101 travel a further 90° in a counterclockwise direction until they are in front of the first transfer station S2, in which they are pushed out of the wheel 13 by the second pusher member 18. The extension of the second pusher member 18 is such that it pushes the group 101 through the first wrapper
20 feeding station S3, in which the sheet 19 is fed, until it is introduced in a pocket 21 of the wheel 20, in the station S4 for conveying and folding the internal wrapper 201.

While the group 101 is inserted in the pocket 21, the first damper member 22 is extended so that it is the first to come into contact with the group 101 and the sheet
25 19, and it retracts so as to accompany the travel of the group 101 all the way to the bottom of the pocket 21.

During the travel between the first wrapper feeding station S3 and the pocket 21, the group 101 and the sheet 19 meet the first folding members that operate a double fold of the sheet 19 along two opposite longitudinal sides 102 (oriented
30 upwards and downwards) and, at the same time, a fold of a first flap at the ends 103. The first sheet 19 is then wrapped in a C-shape on three longitudinal sides 102 of the group 101 when it is inserted in the pocket 21, before the wheel 20 starts to rotate in a clockwise direction. This configuration is visible in position P1 in fig.

9.

Then the wheel 20 is driven to complete a first step of 45° , which causes a second fold of the sheet 19 on the fourth longitudinal side 102 of the group 101 (position P2).

5 When the group 101 has completed an angle of 180° starting from position P1, it is located in front of the second transfer station S5, in which it is pushed by the third pusher member 23. This push causes the transfer of the group 101 into the first conveying device 28, located in the operating station S6 (position P3).
10 Entering the first conveying device 28, the sheet 19 is folded further, so as to fold its last part onto the first longitudinal side 102 of the group 101, and thus conclude the longitudinal wrapping.

Then the group 101 is made to advance by a first step along the channel 29, which causes a fold of a front flap in each of the ends 103 of the group 101 (position P4).

15 The second step completed by the group 101 in the channel 29 causes the fold of the upper flap of the two ends 103, by means of the first slot 34A (position P5), while the third step (immediately following the second step) causes the fold of the lower flap at the two ends 103, by means of the second slot 34B (position P6). At this point, the internal wrapper 201 is completely folded and closed around the
20 group 101, which is located at the end of the channel 29 facing the third transfer station S7 and the second wrapper feeding station S8.

The group 101 is then pushed by the last tooth 37 of the advancing member 35 through the second sheet 39, fed into the second wrapper feeding station S8, and passes through the second folding members 42 to then reach a pocket 41 of the
25 wheel 40, in the corresponding station S9 for conveying and folding the external wrapper 202.

In this position, indicated with reference P7, the second sheet 39 has undergone the same folds as the first sheet 19 in position P1, and it is folded in a C-shape on three longitudinal sides 102 of the group 101. The wheel 40 is made to rotate by a
30 first step of 45° , which causes the fold of the second sheet 39 on the fourth longitudinal side 102 of the group 101 (position P9) similarly to what described for the first sheet 19 in position P2.

The group 101 completes a 180° path from position P7 and reaches the fourth

transfer station S10, through which it is pushed by the fourth pusher member 44 into the tunnel 52 of the device 45 for closing and welding the external wrapper 202, in the closing and welding station S11. Entering this closing and welding device 45, the second sheet 39 is automatically folded once again onto the first
5 longitudinal side 102 of the group 101, completing the longitudinal wrapping (position P9).

The three successive advances by one step allow to subsequently perform the fold of the front flap, of the lower flap and of the upper flap of the ends 103 of the group 101, by means of the lateral walls 55 of the tunnel 52 and the corresponding
10 slots, respectively. During this last segment, the second sheet 39 is welded on the upper side by the upper welding members 54.

In the following steps (not shown in fig. 9) the external wrapper 202 is welded at the ends 103 of the groups 101, which then enter the exit station 12 where they are accompanied by the lateral conveyors 59 to the exit of the machine 10.

15 In accordance with the present invention, the machine 10 can be easily converted between an operating configuration for producing a packaging with double layer wrapping, in which both the internal wrapper 201 and also the external wrapper 202 are present (fig. 2a), and an operating configuration for producing a packaging with single layer wrapping, in which the only wrapper present is the
20 external wrapper 202, formed starting from the sheet 39 (fig. 2b). The operating configuration of the machine 10 for producing a packaging is shown in fig. 10, while the operating flow followed by the groups 101 of items in this embodiment is shown schematically in fig. 11.

All the components of the machine 10 common to the two operating
25 configurations are indicated by the same reference numbers. In the following, for brevity, only the differences of the machine 10 set-up in the single layer operating configuration compared to the double layer operating configuration described above will be highlighted, without again repeating the description of all the structural and functional characteristics of the machine common to the two
30 configurations.

In the single layer operating configuration, in the operating station S6, the function of the first conveying device 28 is performed by a second conveying device 60, for example configured as a wheel rotatable around an axis of rotation

R4 thereof, parallel to the axes of rotation R1, R2, R3 of the other wheels 13, 20, 40.

The wheel of the second conveying device 60, which is interposed between the second transfer station S5 and the third transfer station S7, has a similar structure
5 to the other wheels since it comprises a plurality of pockets 61 distributed angularly. The wheel of the second conveying device 60 is driven with a unidirectional alternating movement, in this case in a clockwise direction.

The wheel of the second conveying device 60 shown here comprises sixteen pockets 61 and has a larger diameter than the other wheels of the machine. With
10 each drive thereof, the wheel of the second conveying device 60 travels an angle substantially equal to 22.5° . Obviously, the number of pockets can vary based on requirements, which will affect the angle traveled with each angular step.

The pockets 61 are similar to the pockets of the other wheels, that is, they are configured as seatings open towards the outside of the wheel of the second
15 conveying device 60 and comprise an open bottom to allow the passage of a pushing member.

Due to the overall dimensions of the wheel of the second conveying device 60, the advancing member 35 and the corresponding drive mechanism 38 are lowered into an inactive position, so as to allow the insertion of the second conveying
20 device 60 (fig. 10). During the operation of this version with the second conveying device 60, the advancing member 35 and its drive mechanism 38 are not used and therefore remain stationary.

The wheel of the second conveying device 60 comprises a third damper member 62, similar to the other damper members 22, 43, oriented towards the second
25 transfer station S5 so as to accompany the entry of the ordered groups 101 of items 100 into the pockets 61, in a manner similar to that already described previously with reference to the other wheels 20, 40. The wheel also comprises a fifth pusher member 63 oriented towards the third transfer station S7 so as to push the items 100 out of the pockets 61, through the third transfer station S7 and the second
30 wrapper feeding station S8, up to the wheel 40.

The third damper member 62 and the fifth pusher member 63 are movable in a substantially radial direction of the wheel, actuated by respective actuator members, of a type known in the art.

We must therefore clarify that in order to move from the double layer wrapping operating configuration, in which a double layer packaging is created, to the single layer wrapping operating configuration, it is sufficient to replace the first conveying device 28 with the second conveying device 60 and to lower the advancing member 35 and the corresponding drive mechanism 38.

The operating flow of the groups 101 in this operating configuration of the machine 10, shown in fig. 11, provides that the sheet 19 of wrapping material is not fed in the first wrapper feeding station S3 because in this configuration the internal wrapper 201 is absent.

Unlike the double layer wrapping operating configuration, in this single layer wrapping operating configuration the group 101 of items formed at the exit of the channeling device 12 advances without being wrapped by any sheet until the third transfer station S7 and the second wrapper feeding station S8, where the sheet 39 of wrapping material is fed, which is intended to define the only wrapper wrapped around the items, corresponding to the external wrapper 202 mentioned above when describing the double layer configuration.

The sheet 39 is then folded, closed and welded following the steps previously described for the external wrapper 202, these subsequent steps being identical to those of the double wrapping packaging version, with the only difference that in this case only the single wrapper is directly in contact with the items 100, while in the first operating configuration the external wrapper 202 is wrapped on the internal wrapper 201, which in turn is wrapped around the items 100.

It is clear that modifications and/or additions of parts may be made to the machine 10 as described heretofore, without thereby departing from the field and scope of the present invention, as defined by the claims.

It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art will be able to achieve other equivalent forms of machine for packaging discrete items, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

For example, the person of skill in the art will easily understand the structural adaptations to be made to the machine if there is a change in the size of the discrete items 100 to be packaged, and/or in the number of items to be inserted in each

group and/or in the type of wrapping material used.

In the following claims, the sole purpose of the references in brackets is to facilitate their reading and they must not be considered as restrictive factors with regard to the field of protection defined by the claims.

CLAIMS

1. Machine (10) for packaging discrete items (100) alternatively selected either according to a double layer wrapping configuration or according to a single layer wrapping configuration, wherein said machine comprises, in succession:
- 5 - a feed station (S1) configured to feed said discrete items (100) in ordered groups (101),
- conveyor devices of rotating type comprising a plurality of wheels (13, 20, 40, 60) rotatable around respective axes of rotation (R1, R2, R3, R4), each of said wheels having a plurality of peripheral seatings (15, 21, 41, 61) configured to
- 10 accommodate each at least one of said ordered groups (101) of said discrete items (100),
- at least a first (S3) and a second (S8) feed stations configured to feed respectively an internal (201) and an external (202) wrapper,
- first (24) and second (42) folding members configured to fold said internal (201)
- 15 and external (202) wrappers around each of said ordered groups (101), respectively,
- characterized by** further comprising an operating station (S6) arranged downstream of said first feed station (S3) and upstream of said second feed station (S8), said operating station (S6) having a modifiable set-up, which is a function of
- 20 the selected wrapping configuration, wherein said operating station (S6) comprises a first conveying device (28) configured to close said internal wrapper (201) around said ordered groups (101) and to convey said ordered groups (101) at least partly wrapped in the internal wrapper (201) towards said second folding members (42), which close said external wrapper (202) around the internal wrapper (201)
- 25 which is wrapped around said ordered groups (101) when said machine operates according to said double layer wrapping configuration, and a second conveying device (60) comprising a rotatable wheel (60) of said plurality of wheels (13, 20, 40, 60) which is configured to convey said ordered groups (101) towards said second folding members (42) without any internal wrapper wrapped therearound,
- 30 so that said second folding members (42) close said external wrapper (202) around said ordered groups (101), when said machine operates according to said single layer wrapping configuration, wherein said first (28) and second (60) conveying devices are installed in a removable manner in said operating station (S6), one as

an alternative to the other.

2. Machine (10) as in claim 1, **characterized in that** said first conveying device (28) comprises an advancing member (35) configured to move said ordered groups (101) partly wrapped in said internal wrapper (201), and a drive mechanism (38) for driving said advancing member (35).

3. Machine (10) as in claim 2, **characterized in that** said advancing member (35) is configured to be displaced between an active position, in which the advancing member (35) is moved along a channel (29) of said first conveying device (28), and an inactive position, in which the advancing member (35) is displaced distanced from said channel (29) and moved back towards the first feed station (S3) in a cyclical manner.

4. Machine as in claim 3, **characterized in that** said channel (29) comprises at least a horizontal support (32) configured to restingly receive said ordered groups (101) and allowing their sliding when moved by said first conveying device (28).

5. Machine (10) as in claim 3 or 4, **characterized in that** said advancing member (35) comprises pushing members (37) configured to cooperate with said channel (29) from below, when the machine is operated in said double layer wrapping configuration.

6. Machine (10) as in any claim from 2 to 5, **characterized in that** said advancing member (35) is configured to be positioned between a raised active position to move said ordered groups (101), and a lowered resting position to allow said second conveying device (60) to be put in place instead of said first conveying device (28).

7. Machine (10) as in any claim from 2 to 6, **characterized in that** said drive mechanism (38) is mounted on a support body (38A) which is movable mounted on said machine (10) to be displaced between a working position, in which the drive mechanism (38) can drive the advancing member (35) for moving the ordered groups (101) partly wrapped by the internal wrapper (201), when the machine is operated according to the double layer wrapping configuration, and a resting position, below said working position, in which the drive mechanism (38) is placed at a certain distance from the second conveying device (60) in order to not interfere with it, when the machine is operated according to the single layer wrapping configuration.

8. Machine as in claim 7, **characterized in that** said support body (38A) is slidably mounted on a guide (38B) attached to a frame of said machine (10).

9. Machine as in any claim from 2 to 8, **characterized in that** said drive mechanism (38) comprises a first motor configured to move the advancing member (35) according to a horizontal direction and a second motor configured to move the advancing member (35) according to a vertical direction.

10. Machine (10) as in any claim hereinbefore, **characterized by** further comprising a closing and welding station (S11) configured to close and weld the external wrapper (202).

11. Machine (10) as in claim 10, **characterized in that** said closing and welding station (S11) comprises a plurality of welding members (54, 57) configured to weld said external wrapper (202).

12. Machine (10) as in claim 11, **characterized in that** it comprises a single linear conveyor (46) for conveying said ordered groups (101), wrapped at least in said external wrapper (202), through said closing and welding station (S11) and subsequently toward an exit station (S12).

13. Machine (10) as in claim 12, **characterized in that** said exit station (S12) comprises a pair of lateral conveyors (59) each located on a respective side with respect to said ordered groups (101) wrapped at least in said external wrapper (202).

14. Machine (10) as in any claim hereinbefore, **characterized in that** at least one of either a station (S4) for conveying and folding the internal wrapper (201) or a station (S9) for conveying and folding the external wrapper (202) is equipped with a damper member (22, 43) configured to accompany the insertion of said ordered groups (101) and of the corresponding wrapper (201, 202), if present, inside a respective seating (21, 41).

15. Machine (10) as in claim 14, **characterized in that** said at least one of either said station (S4) for conveying and folding the internal wrapper (201) or said station (S9) for conveying and folding the external wrapper (202) comprises one of said conveyor devices of rotating type (20, 40) equipped with said seatings (21, 41), and which comprises said damper member (22, 43) able to be displaced between a retracted position, in which said damper member (22, 43) is completely contained inside said conveyor device (20, 40), and an extended position, in which

at least one end of said damper member (22, 43) protrudes from one of said seatings (21, 41).

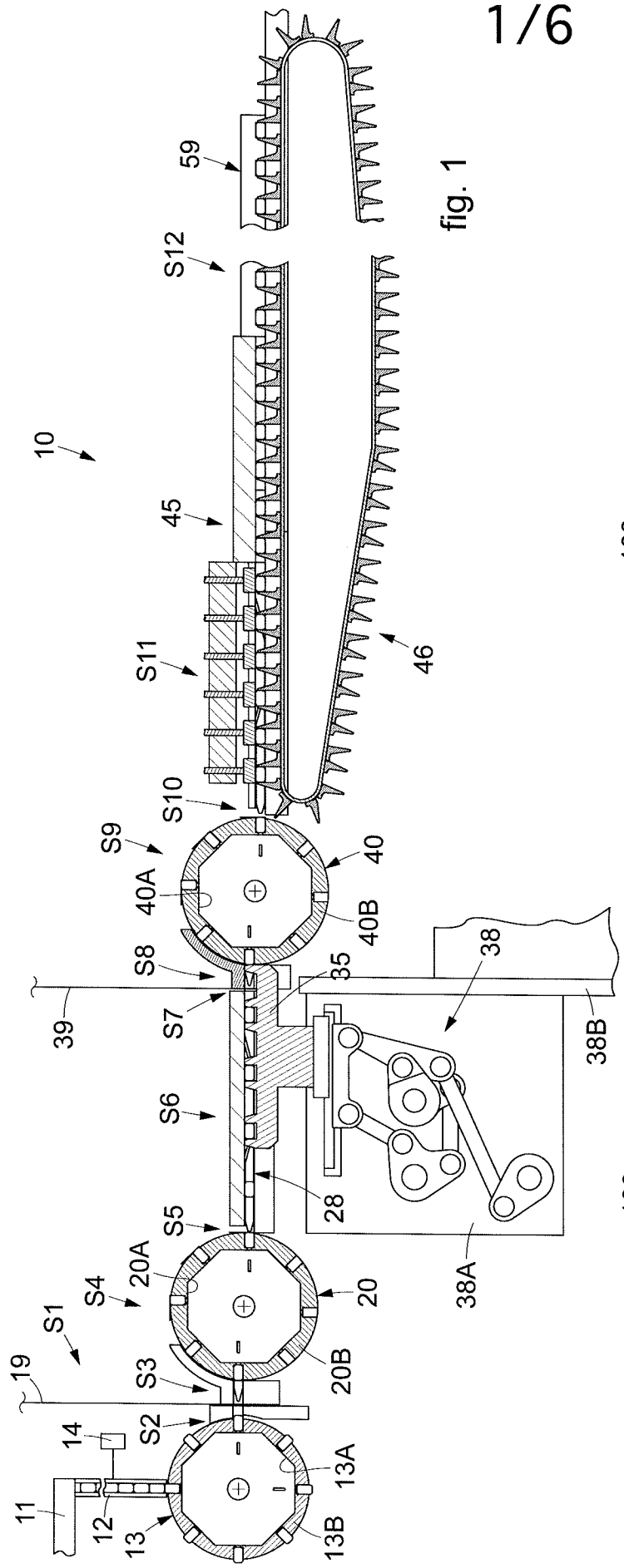


fig. 1

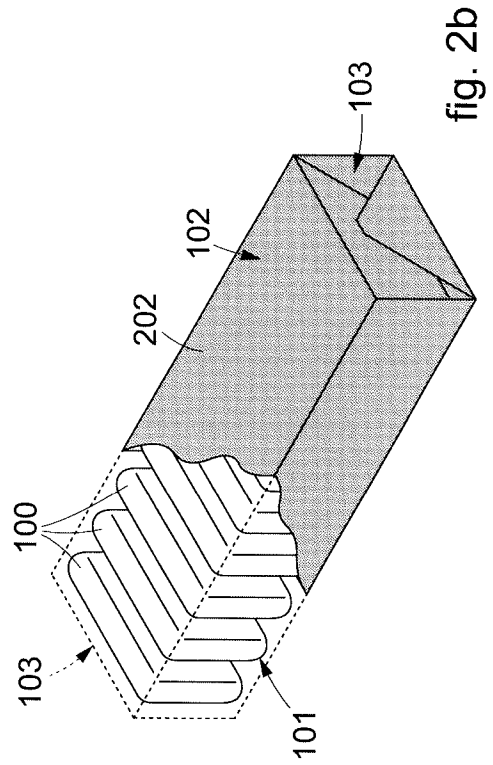


fig. 2b

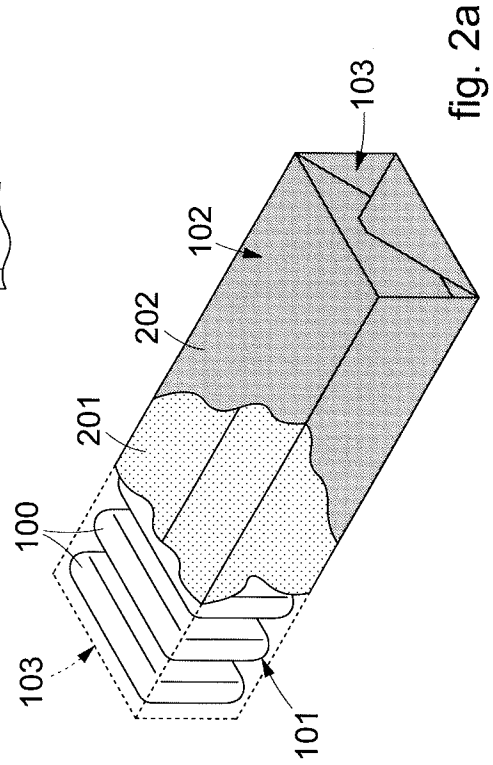


fig. 2a

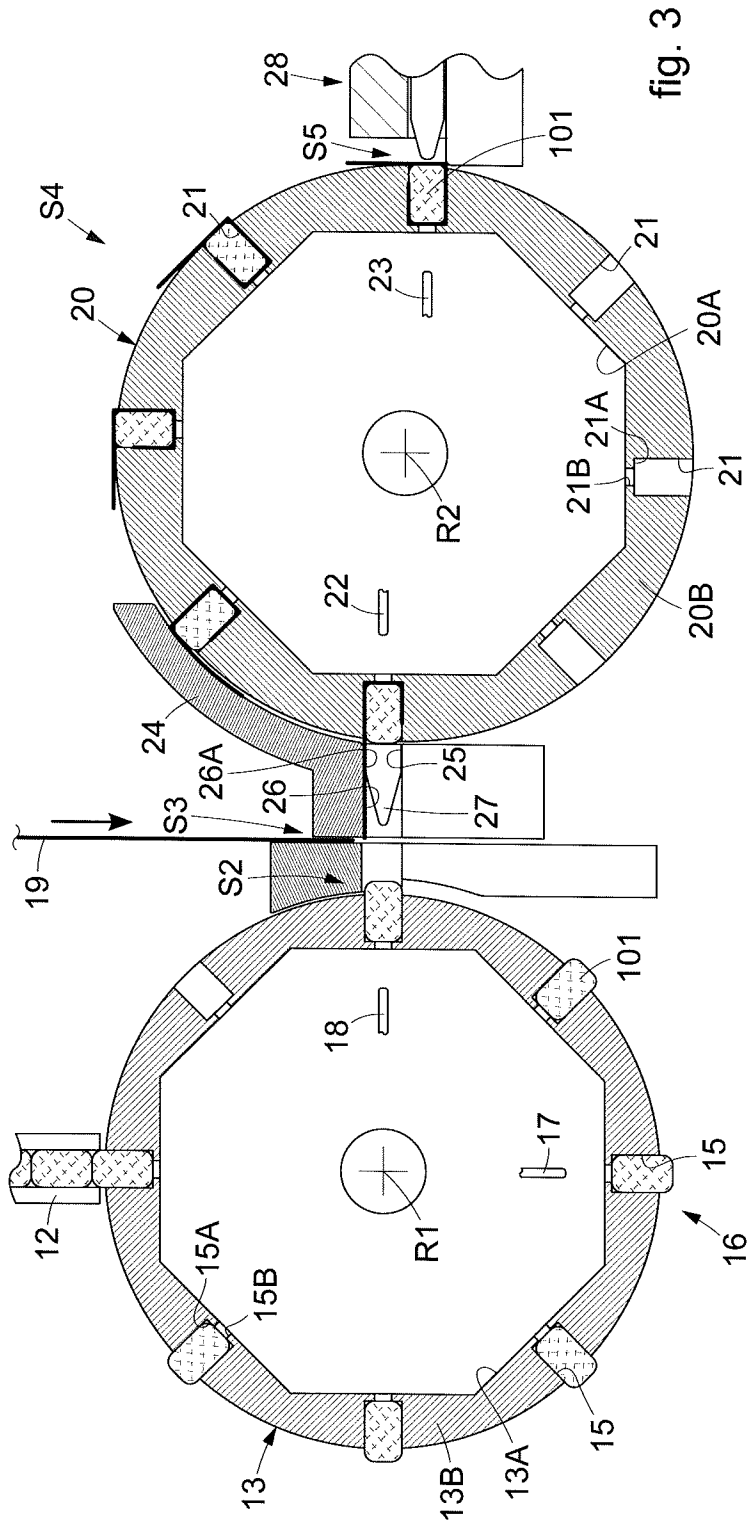


fig. 3

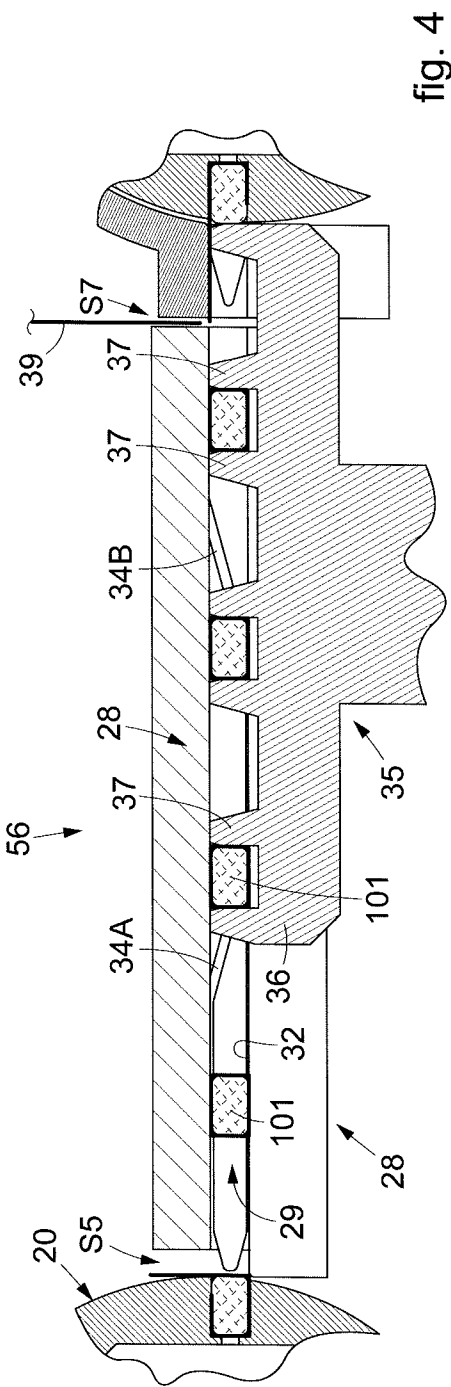


fig. 4

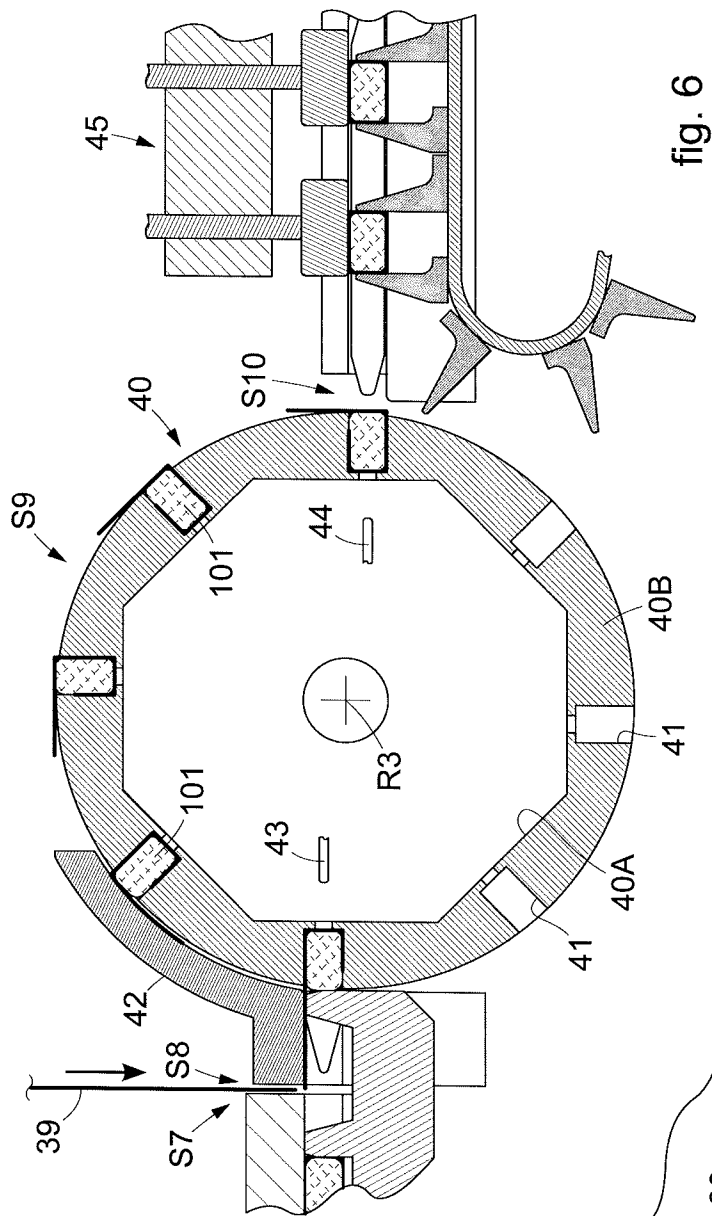


fig. 5

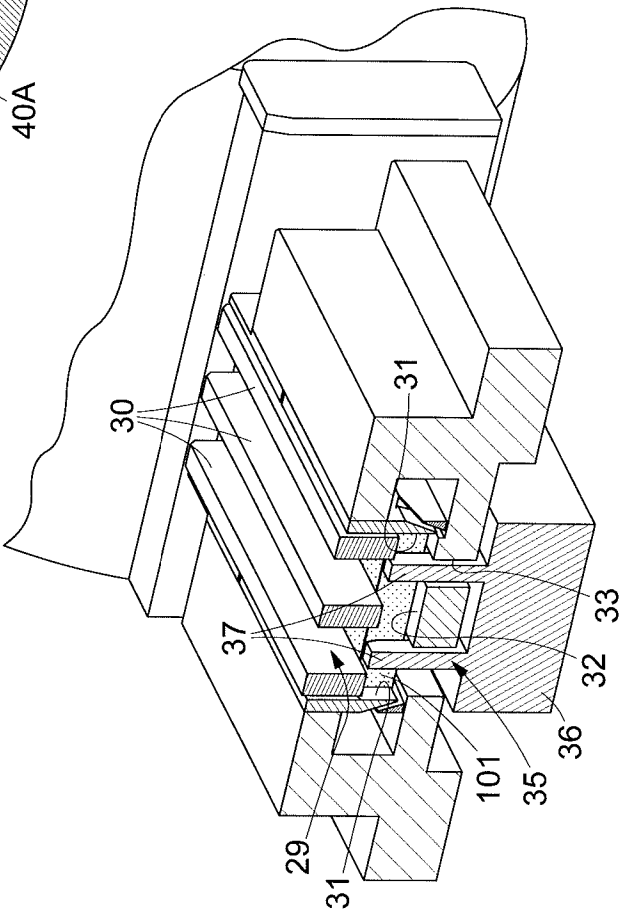
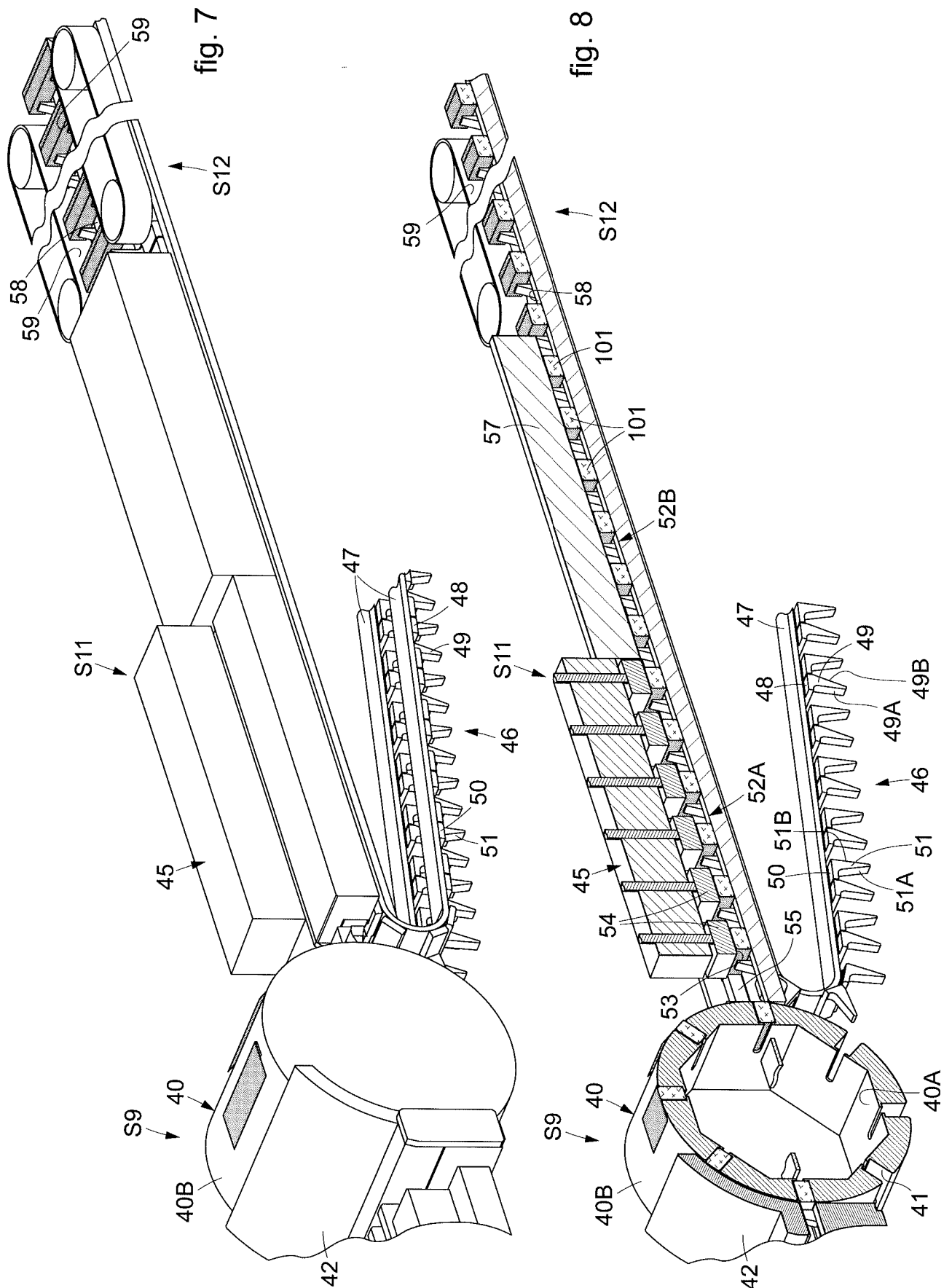
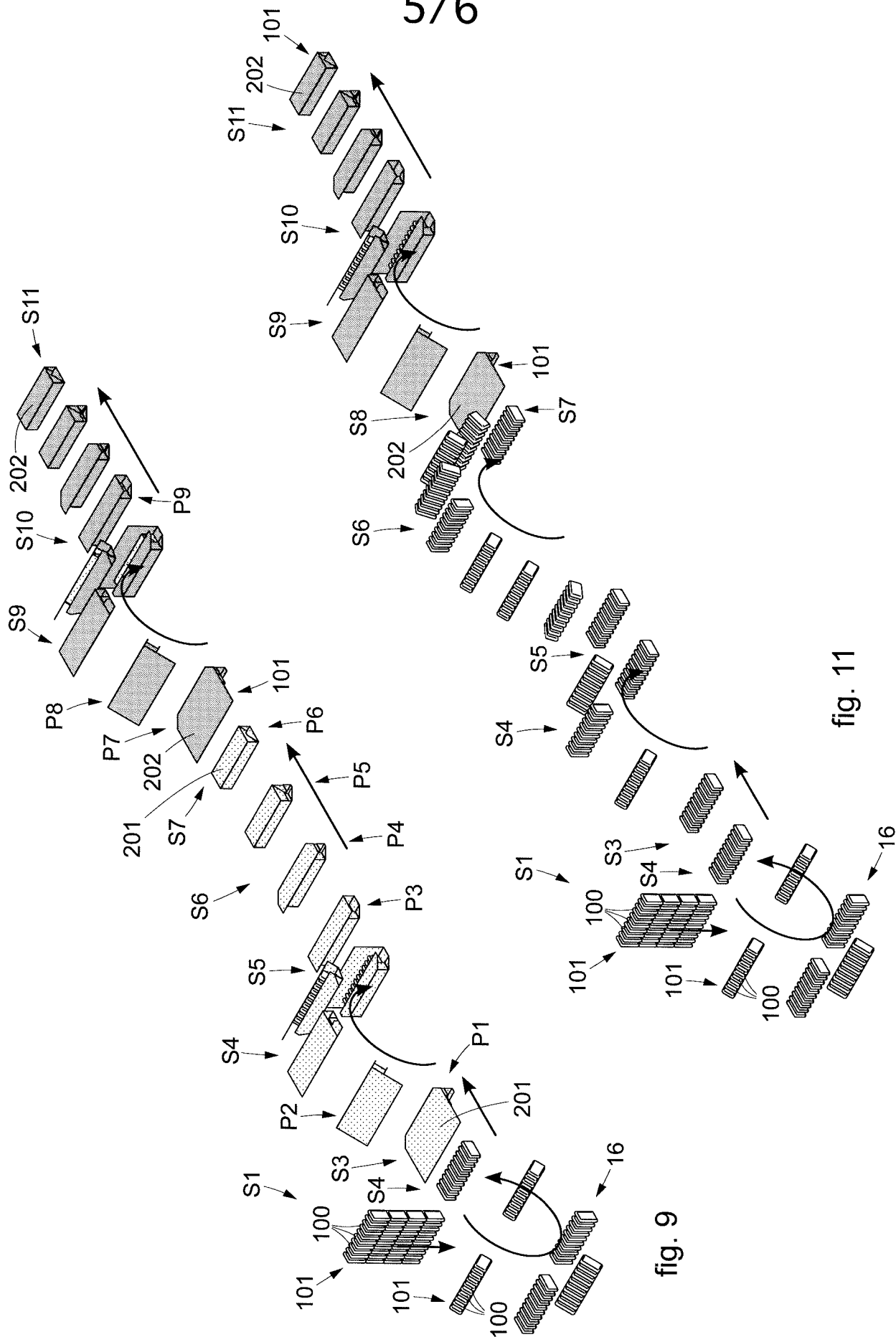


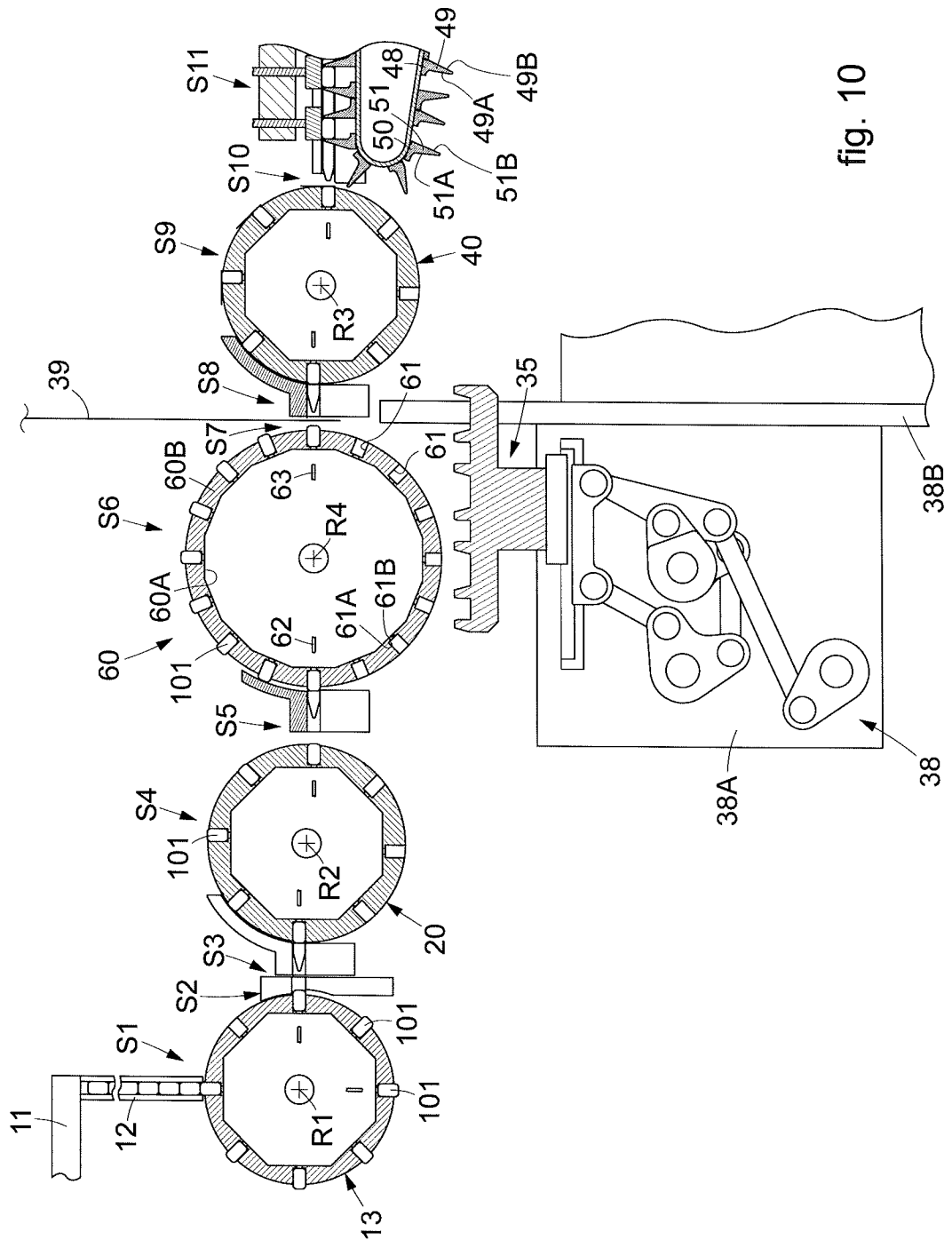
fig. 6

4/6





6/6



INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2024/050115

A. CLASSIFICATION OF SUBJECT MATTER					
INV.	B65B11/10	B65B11/22	B65B11/28	B65B11/58	B65B19/22
	B65B25/00	B65B35/44	B65B49/12	B65B49/14	B65B59/04
	B65B11/42				
According to International Patent Classification (IPC) or to both national classification and IPC					
B. FIELDS SEARCHED					
Minimum documentation searched (classification system followed by classification symbols) B65B					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data					
C. DOCUMENTS CONSIDERED TO BE RELEVANT					
Category*	Citation of document, with indication, where appropriate, of the relevant passages				Relevant to claim No.
A	WO 03/082675 A1 (CARLE & MONTANARI SPA [IT]; FRABETTI FABIO [IT] ET AL.) 9 October 2003 (2003-10-09) the whole document -----				1 - 15
A	GB 1 486 469 A (GD SPA) 21 September 1977 (1977-09-21) the whole document -----				1
A	CN 88 102 751 A (SAPAL SOCIETE ANONYME) 30 November 1988 (1988-11-30) the whole document -----				1
A	EP 0 619 231 B1 (SASIB TOBACCO SPA [IT]) 17 June 1998 (1998-06-17) the whole document -----				1
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.					
* Special categories of cited documents :					
"A" document defining the general state of the art which is not considered to be of particular relevance			"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention		
"E" earlier application or patent but published on or after the international filing date			"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone		
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)			"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art		
"O" document referring to an oral disclosure, use, exhibition or other means			"&" document member of the same patent family		
"P" document published prior to the international filing date but later than the priority date claimed					
Date of the actual completion of the international search 20 September 2024			Date of mailing of the international search report 08/10/2024		
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016			Authorized officer Ungureanu, Mirela		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2024/050115

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