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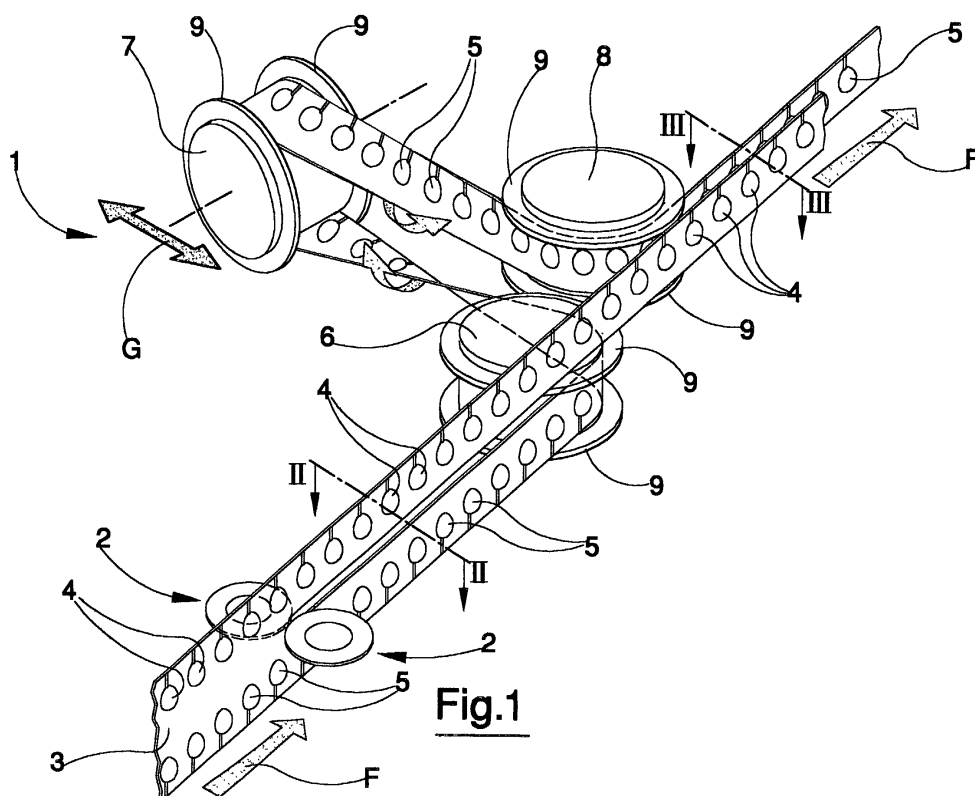
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(54) Process and device for tilting a continuous strip of containers

(57) In the process of the invention a strip of containers (5) made of a heat-formable material is guided through a deviated course in a transversal direction with respect to a main horizontal line of advancement (F), in which the strip of containers undergoes, in sequence, a first rotation of a quarter of a full turn about a vertical-axis first guide (6), a first twist by half a full turn, a second

rotation, by half a full turn, about a second guide (7) having a winding axis which is parallel to the line of advancement (F), returning towards the line of advancement, a second twist by another half a full turn, and finally a third rotation about a vertical-axis third guide (8). With the invention the longitudinal extension of the line of advancement is reduced.



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Description

[0001] Specifically, though not exclusively, the invention is usefully applied in the field of a system for heat-forming, filling and sealing plastic containers made from strips of heat-formable material. The containers can be used for packing various substances (cosmetics, detergents, pharmaceutical or food products, etc.) either in liquid or solid form, either coherent (pastilles, tablets, suppositories) or loose (powder or granules).

[0002] Particular reference is made to a process according to the preamble of the first claim.

[0003] A process of this type is already known, according to which a continuous strip of containers, for reasons connected to the production process, has to be tilted by 180° by means of a twisting of the strip on itself about a rotation axis coinciding with the advancement direction of the strip towards the filling station. As the flexibility of the strip is limited, mainly due to the presence of containers which confer a certain rigidity on the strip, the angle of twist of the strip cannot be too high, so the total 180° turn is developed over a relatively long tract on the line of advancement of the strip itself. This leads to a considerable overall lengthening of the advancement line, with a consequently large machine length.

[0004] The main aim of the present invention is to provide a process which enable the container-strip advancement line to be reduced overall.

[0005] An advantage of the invention is that it provides a process which enables the longitudinal development of the advancement line of the container strip to be reduced.

[0006] A further advantage consists in the fact that the process can be realised with constructionally simple and economical means.

[0007] These aims and advantages and more besides are all attained by the present invention, as it is characterised in the appended claims.

[0008] Further characteristics and advantages of the invention will better emerge from the detailed description that follows of a preferred but non-exclusive embodiment of the invention, illustrated purely by way of a non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a perspective view of a tilting device made according to the invention;

figures 2 and 3 are two sections, respectively according to lines II-II and III-III of figure 1;

figure 4 is a detail of the tilting device of figure 1.

[0009] With reference to the above-mentioned figures, 1 denotes in its entirety a device for tilting a continuous strip of containers made of a heat-formable material, formed by means of a coupling of two or more continuous strips of heat-weldable plastic material.

[0010] The device 1 is inserted in a machine for forming, filling and sealing containers made of heat-weldable material. The machine, of known type, comprises:

ing, filling and sealing containers made of heat-weldable material. The machine, of known type, comprises:

a feed line of two facing strips of heat-weldable plastic material;

a welding station in which the strips, oriented with a flat part vertically arranged, are welded at predetermined zones to produce two parallel and opposite lines of cells, each provided with an opening arranged on one of the opposite longitudinal edges of the strips, so that the apertures of the upper line face upwards and the apertures of the lower line face downwards;

a forming station in which a forming fluid under pressure is injected into the cells through the apertures, in order to expand each cell internally of a respective forming cavity so as to form a container.

[0011] The parts of the machine described up to here, arranged upstream of the tilting device, are of known type and are consequently not illustrated. The machine also comprises, downstream of the tilting device 1, a filling station for the containers, followed by a sealing station: both of these stations are of known type and are not illustrated. In the filling station, the containers can be filled with various types of products, for example liquid substances destined or not for solidification, or solid loose substances, in grain or powder form, or objects destined to enter in one piece into the containers, or even objects destined to remain partially outside the containers (for example handles).

[0012] Figure 1 schematically illustrates a cutting device 2 which cuts into half, in a longitudinal direction, a strip 3 of containers arriving from the forming station. The longitudinal cut separates the first, upper line of containers 4, in which the apertures are upwardly-facing, from the second, lower line of containers 5, in which the apertures are downwardly-facing. The first line of containers 4 proceeds, after the cut, following the advancement line normally, which brings it to the filling station, while the second line is tilted by 180° by the tilting device 1 which also aligns the second line with the first line, so that the two lines proceed parallel to one another towards the filling station, both with their apertures facing upwards in order to receive the product which is to be put into the containers.

[0013] Arrows F indicate the advancement direction of the containers 4 and 5 along the advancement line which goes from the forming station to the filling station. The tilting device 1 of the strip of containers 5 comprises three drum guides, respectively 6, 7 and 8, about which the transiting strip winds in sequence. Each drum guide comprises a wheel, freely rotatable about an axis thereof and laterally provided with two opposite borders 9, for laterally containing the strip. The strip winds about each guide with a flat side of the strip oriented parallel to the rotation axis of the guide.

[0014] Figure 4 shows any one of the three guides,

having a lateral surface which in section is conformed complementarily to the container strip. The lateral surface comprises at its centre a concave annular part 10, thanks to which the containers are not subject to deformation, which annular part 10 is predisposed to receive the main body of the containers; the annular part 10 may be in the shape of a continuous gullet or can be a series of recesses arranged circumferentially and equidistant one from another at a distance which is equal to the step of the containers on the strip. The lateral surface of the guides further comprises two annular end surfaces 11 and 12, of unequal diameters, one of which is predisposed to receive the welded part of the strip which does not comprise a container, and the other of which is predisposed to receive the part of the strip comprising the container mouths, which terminate in the apertures. The mouths of the containers can be located in cavities arranged circumferentially on the annular end surface 12 of the guide at reciprocal distances equal to the step of the mouths.

[0015] The first guide 6 is located close to the advancement line F of the strip having a winding axis perpendicular to the advancement line and arranged vertically. The first guide 6 causes the strip to deviate by about 90° (in the case of figure 1, towards the left) with respect to the normal line of advancement F.

[0016] The second guide 7, which is situated by the side of and at a certain distance from the line of advancement F, exhibits a winding axis which is parallel to the line of advancement F. The strip, in passing from the first guide 6 to the second guide 7, is twisted on itself (in the illustrated embodiment by about 90°) so that the containers pass from a vertical configuration, with the apertures facing downwards, to a horizontal configuration, with the apertures facing forwards. The strip exits from the second guide 7 in an opposite direction with respect to the entrance direction, after having rotated by 180° about the axis of the drum, with the containers horizontal and the apertures facing forwards.

[0017] The third guide 8, which is located in proximity of the line of advancement F, slightly more forwards than the first guide 6, exhibits a winding axis which is perpendicular to the line of advancement. The third guide 8, which is very close to the first guide 6, is situated slightly higher and to the left of the first guide 6, so that the strip of containers 5 exiting from the third guide 8 comes to be side-by-side, parallel and at the same height as the other strip of containers 4 which proceeds normally along the line of advancement F, with the same orientation as before. As it passes from the second guide 7 to the third guide 8 the strip of containers 5 twists on itself (by about 90° in the present embodiment) so that the containers are brought from the horizontal position to a vertical configuration, with the apertures facing upwards. The strip of containers 5 enters the third guide 8 in a more-or-less perpendicular direction to the line of advancement F and when the strip exits from the third guide 8, after winding by about a quarter of a full turn

around the vertical axis of the drum, comes to be on the line of advancement F, paired with the other strip.

[0018] The position of the second guide 7 can be adjusted in at least one direction G transversal to the line of advancement F, so that the timing of the two paired lines of containers 4 and 5 can be adjusted on exit from the tilting device.

[0019] The winding axes of the first guide 6 and the third guide 8 are parallel to each other and parallel to the lie (in this case vertical) of the flat part of the strip transiting along the main line of advancement F. The winding axis of the second guide 7 is perpendicular to the axes of the other two guides 6 and 8.

[0020] During operation, in a first stage, in which the device 11 is readied, the first tract of the strip of containers 5 is manually wound onto the three guides 6, 7 and 8, rotating and twisting the strip in the above-described way. Then, once the strip has been engaged on the drawing means (of known type and not illustrated), which cause the strip to advance (generally in step-motion), the device is ready to function automatically.

[0021] In a further embodiment, not illustrated, the winding guides, which in the illustrated embodiment comprise freely-rotatable drums or pulleys, can be constituted by fixed cylindrical elements. It is however preferable that at least the second guide 7 comprises a rotatable element 7. Further, at least one of the wheels or pulleys (preferably the second) can be a drive pulley and be provided, on its surface, with means for drawing the strip, such as for example cogs (which could be conformed similarly to the containers), or an external high-friction surface, or both solutions together.

[0022] The change in orientation of the strip of containers 5 is made when the strip is in a transversally deviated path with respect to the main line of advancement F. The space occupied in a longitudinal direction (according to the main axis of advancement of the strip towards the filling station) in order to carry out the twisting operation is reduced to a minimum, indeed is practically eliminated. Even the space occupied in a transversal direction is relatively small. With this solution the forming and filling of the containers 4 and 5 occupies a relatively contained space, especially lengthwise.

[0023] In the present embodiment described, a strip of containers is tilted starting from a configuration in which the flat part of the strip is vertically arranged. The tilting device can however be applied in cases where the starting configuration is different, for example with the flat part horizontally arranged.

[0024] The tilting device can also be used with strips of containers made from one film only of heat-formable plastic material (of known type). In this case the containers are open trays, open on one side with the openings arranged on the flat side of the strip and turned the same way, and not, as in the previously-illustrated case, arranged on the edge of the strip and turned on opposite sides. In this case too, the machine can comprise a heat-forming station in which, on the same strip of plastic ma-

terial, two paired and symmetrical lines of containers are formed; after forming one of the two lines is tilted by 180° and superimposed on the other line. To favour tilting it is preferable first to make a longitudinal cut between the two lines.

[0025] The tilting device and process can be applied on a machine which forms strips of containers composed of a single line of containers.

[0026] A machine, for example a forming, filling and sealing machine, can comprise one or even a plurality of tilting devices, should it be necessary to tilt the strip of containers once, twice or more times in a same machine.

Claims

1. A process for tilting a continuous strip of containers made of a heat-formable material, in which at least a first continuous strip of containers (5) arranged one behind another is fed along a line of advancement (F) towards at least one filling station, before which filling station an orientation of the first strip of containers is changed, **characterised in that** the first strip of containers is guided to follow a deviated path which comprises first a deviation in a transversal direction with respect to the line of advancement (F) and then a return towards the line; an orientation of the first strip of containers being changed while undergoing the deviation.
2. The process of claim 1, **characterised in that**: the first strip of containers (5) is formed with the flat part vertically oriented; the line of advancement (F) of the strip is horizontal; and the containers of first strip of containers (5) each exhibit a downwardly-turned aperture and are tilted by 180° in order to present the aperture facing upwards.
3. The process of claim 1 or 2, **characterised in that** during the deviated path the first strip of containers (5) is guided to make a half turn, about an axis which is parallel and side-by-side to the line of advancement (F), in which the flat part of the first strip is oriented parallel to the axis.
4. The process of any one of the preceding claims, **characterised in that** the first strip of containers (5), when following the deviated path, performs the following: a complete rotation about a first axis which is perpendicular to the line of advancement (F) and parallel to the flat part of the first strip; a first twist about itself, a second rotation about a second axis which is parallel and side-by-side to the line of advancement (F), a second twist about itself, and a third rotation about a third axis parallel and close to the first axis.

5. The process of any one of the preceding claims, **characterised in that** before tilting the first strip of containers (5) is solidly fixed, coplanar and facing oppositely to a second strip of containers (4) formed together with the first strip in a same continuous strip of plastic material; the containers of the second strip of containers (4) having apertures facing in an opposite direction to the apertures of the containers of the first strip of containers (5); before tilting the first strip, the two strips are separated by cutting at a midway line parallel to the first and second strips of containers; after tilting, the first strip of containers (5) being brought into a side-by-side position parallel to the second strip of containers (4), both strips advancing together towards the filling station.

6. A device for tilting a continuous strip of containers made of heat-formable material, in which the containers (5) are arranged in a line, one behind another, and the strip of containers (5) is advanced along a predetermined line of advancement (F), **characterised in that** it comprises three winding guides (6, 7 and 8) about which the transiting strip winds in sequence; the strip winds about each guide with a flat part of the strip oriented parallel to an axis of the guide; a first guide (6) of the three guides being located in proximity of the line of advancement (F) of the strip with a winding axis which is perpendicular to the line of advancement (F); a second guide (7) of the three guides being located by a side of and distant from the line of advancement (F), with a winding axis which is parallel to the line of advancement (F); a third guide (8) of the three guides being located in proximity of the line of advancement (F), slightly forward of the first guide (6), with a winding axis which is perpendicular to the line of advancement (F).
7. The device of claim 6, **characterised in that** at least one of the winding guides comprises a drum which is freely rotatable about an axis thereof.
8. The device of claim 6 or 7, **characterised in that** a position of the second guide of the three guides is adjustable at least in a transversal direction (G) to the line of advancement (F).
9. The device of any one of the claims from 6 to 8, **characterised in that** each winding guide comprises two opposite borders (9) for laterally containing the first strip of containers (5).
10. A machine for forming and filling containers made of a heat-formable material, comprising:
 - a line for feeding at least one strip of film made of a heat-formable plastic material;
 - a heat-forming station in which at least one strip

of containers (5) is formed;
a tilting device for tilting the at least one strip of
containers (5) made according to any one of the
preceding claims;
a filling station for the containers (5).

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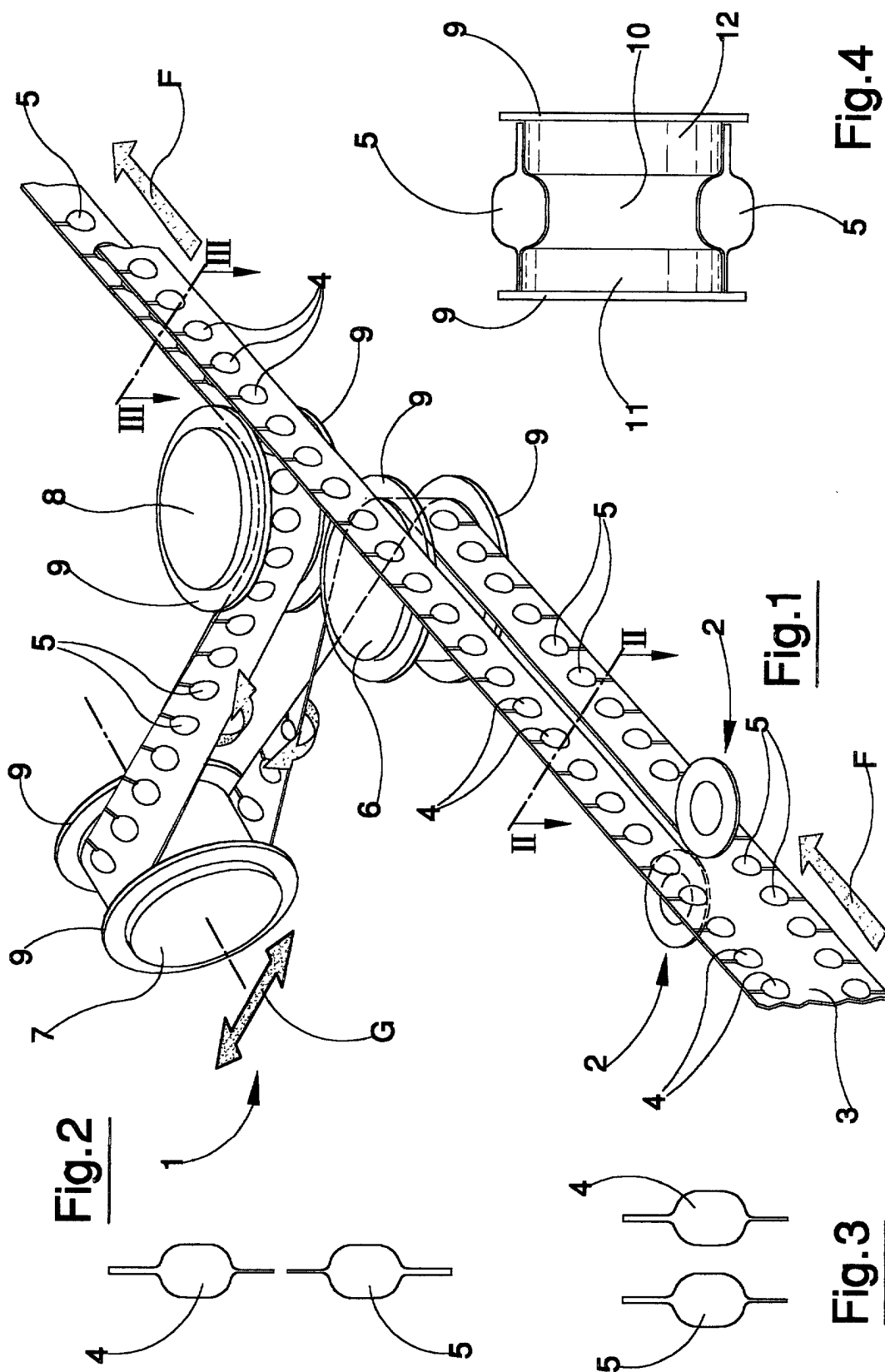
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EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0771

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The present search report has been drawn up for all claims			
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<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P/MC01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 00 83 0771

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