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(54) **FORMING STATION AND MACHINE FOR PRODUCING POURABLE FOODSTUFF CONTAINERS**

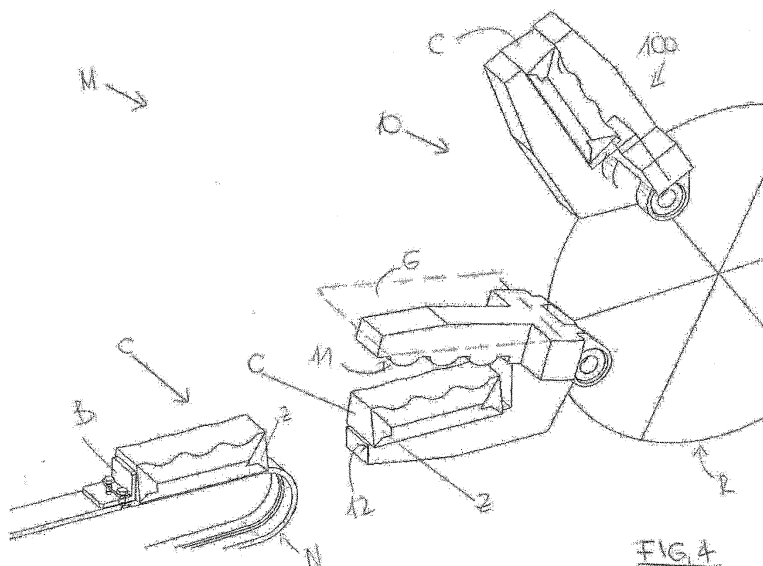
(57) The invention relates to a forming station (1) for producing containers (C) for pourable foodstuff starting from a packaging material tube (T).

The forming station (1) comprises a first forming half-shell (2) and a second forming half-shell (3), both intended for receiving therebetween a portion of the tube (T). The first forming half-shell (2) and the second forming half-shell (3) are hinged with respect to articulation parallel axes (H) in such a way to be movable in order to move closer and away from each other.

Each forming half-shell (2, 3) comprises an abutment

surface (20, 30) to each abut the portion of tube (T).

In particular, the abutment surface (20) of the first forming half-shell (2) comprises a first portion (21) and a second portion (22), which are shaped in such a way that the first portion (21) protrudes with respect to the second portion (22), and that the second portion (22) curves inward with respect to the first portion (21), according to a direction transverse with respect to the lying plane (P) of the abutment surface (20) of the first forming half-shell (2).



Description

[0001] The present invention falls within the technical field of the containers for pourable foodstuff. In particular, the invention relates to a forming station and to a machine for producing pourable foodstuff containers.

[0002] The containers for pourable foodstuff (fruit juices, milk, sauces of various type, etc.) are obtained starting from a continuous band of packaging material formed by a plurality of layers of different materials coupled one to another (generally paper, aluminium and heat-seal plastic material, such as for example polyethylene), that is processed in a dedicated automatic machine.

[0003] An automatic machine intended for making such containers comprises a feeding station, wherein a band of packaging material is fed, and in particular is unwound from a reel.

[0004] The machine can comprise, downstream of the feeding station, a creasing station, wherein crease lines are made on the band. By crease lines those lines are meant that are impressed on the material in order to allow achieving a container having predetermined shape (flat wall parallelepiped) at the end of the respective production. Alternatively, creases can be made on the band before it is fed to the machine.

[0005] The band is then sterilized, for example by passing the same in a tank containing hydrogen peroxide, and then closed at a welding station of the machine, in such a way to form a tube open at an end. The open tube reaches the filling station where it is filled with the foodstuff.

[0006] In order to obtain flat wall parallelepiped containers with a predetermined foodstuff amount in their inside, the tube is carried to a forming station, where the container volume and shape are defined, before being subjected to the final welding.

[0007] In particular, the forming station comprises two forming half-shells hinged at an articulation axis, in such a way to be rotatable to move closer to each other. The packaging material is conveyed between the two forming half-shells. In particular, each forming half-shell comprises a flat abutment wall, for abutting a corresponding tube portion that will constitute the container.

[0008] Thereby, the flat abutment walls contribute to define the flat wall parallelepiped shape of the container and, at the same time, physically limit the volume of the tube (thus of the container) once filled, before the final welding.

[0009] Downstream or at the forming station cutting means are provided for separating the filled and closed containers.

[0010] A folding station can be further provided, at which the shape of the closed and separated containers is optimized.

[0011] In detail, the folding station comprises a transport wheel provided with a plurality of seats adapted to hold and move the closed and filled wrappers. Along the path defined by the folding wheel a warmer device and

at least one folding device can be provided. The warmer device allows warming the wrapper portions to be folded in such a way to bring to temperature the thermoplastic layer of concerned portions.

[0012] The folding device allows, instead, forming the container walls according to the weakening lines provided on the packaging material band and/or folding the corner warmed portions (the so called "ears" or "fins") in order to allow them to adhere to the container body.

[0013] However, there is the need of making containers with shape differing from the flat wall parallelepiped one.

[0014] In fact, the afore said shape of the containers obtained with known machines firstly results in practical drawbacks: such as a not optimal container grip (low ergonomics) mostly when they are placed side by side, for example on a shelf, or close to a wall.

[0015] In addition, when two or more containers are placed side by side one another, the reduced air circulation among the same can cause condensation forming, mostly under humid environmental conditions.

[0016] The forming stations being in known machines, such as the afore described one, do not allow obtaining containers having shape different from the flat wall parallelepiped one.

[0017] Object of the present invention is to overcome the afore described drawback.

[0018] Such an object is achieved by a forming station and a machine for producing pourable foodstuff containers according to the attached claims.

[0019] Advantageously, the forming station and the machine according to the invention allow making pourable foodstuff containers having a shape different from the flat wall parallelepiped shape of known art containers. This way, therefore, pourable foodstuff containers can be made specially ergonomic, i.e. easy to be gripped also in case they are placed side by side or close to a wall.

[0020] Furthermore, pourable foodstuff containers can be made by the invention that prevent condensation to be formed among the same, if they are placed for example side by side one to another.

[0021] Further advantages of the invention will be apparent in the following discussion, by the aid of the accompanying figures, in which:

- figure 1 is a perspective view of a forming station for producing pourable foodstuff containers according to the present invention;
- figure 2 is a partial view of a forming station for producing pourable foodstuff containers according to the present invention;
- figure 3 is a perspective view of a machine for producing pourable foodstuff containers according to the present invention;
- figure 4 is an enlarged view of a particular of figure 3;
- figure 5 is a magnification of a detail of figure 4;
- figure 6 is a perspective view of a container that can be obtained by the invention.

[0022] With reference to the accompanying figures 1, 2, a forming station for producing containers C for pourable foodstuff starting from a tube of packaging material according to the present invention, has been denoted with the reference 1.

[0023] The containers C for pourable foodstuff (fruit juices, milk, sauces of various type, etc.) are obtained starting from a continuous band of packaging material (not shown), consisting of a plurality of layers of different materials coupled one to another (generally paper, aluminium and heat-seal plastic material, such as for example polyethylene), that is closed in order to form a tube.

[0024] Generally, such containers C are defined by an upper wall W1 and a lower wall W2 opposed each other, by a front wall W3 and a rear wall W4 opposed each other, and by two side walls W5, W6 (see for example figure 6).

[0025] The forming station 1 according to the invention comprises: a first forming half-shell 2 and a second forming half-shell 3 opposed each other along an abutment direction and prearranged for receiving therebetween a portion of the tube intended for originating a pourable foodstuff container C (see in particular figure 1). The first forming half-shell 2 and the second forming half-shell 3 are hinged with respect to articulation parallel axes H (preferably coincident), in such a way to be movable in order to move closer and away from each other. Preferably, the articulation axes H are perpendicular to the abutment direction.

[0026] Each forming half-shell 2, 3 comprises an abutment surface 20, 30 to each abut the tube portion filled with the pourable foodstuff.

[0027] In particular, the abutment surface 20 of the first forming half-shell 2 comprises a first portion 21 and a second portion 22 both shaped in such a way that the first portion 21 protrudes with respect to the second portion 22, and that the second portion 22 curves inward with respect to the first portion 21, according to a transverse direction with respect to the lying plane P of the abutment surface 20 of the first forming half-shell 2 (the lying plane P has been partially shown in figure 2).

[0028] In other words, the first portion 21 of the abutment surface 20 of the first forming half-shell 2 protrudes towards the abutment surface 30 of the second forming half-shell 3, i.e. towards the tube portion, once interposed between the first forming half-shell 2 and the second forming half-shell 3.

[0029] As known, in general, the first forming half-shell 2 and the second forming half-shell 3 abut (by the respective abutment surfaces 20, 30) the tube portion being filled and, in particular, each abut a tube portion intended for originating a wall of the container C. The first forming half-shell 2 and the second forming half-shell 3 constitute, therefore, also a physical limit to the volume of the container C, in addition to impart an established shape to the container C itself.

[0030] Therefore, advantageously, the container C that will be formed will not have parallelepiped shape with

flat surfaces as in the known art (wherein both the forming half-shells had flat abutment surfaces), but will have at least one wall with a protrusion and a recess instead. A non-limiting example of a container C that can be obtained by the forming station 1 according to the invention is shown in figure 6, wherein the front wall W3 has three protrusions.

[0031] Clearly the tube (not shown), from which the container C is originated, will have suitable crease lines (i.e. lines impressed on the packaging material and denoted with S in figure 6 in which the container C is shown) adapted to aid the operation of the first forming half-shell 2.

[0032] Clearly, the first portion 21 can take up an area of the abutment surface 20 having extent varying according to needs, i.e. according to the shape of the container C to be obtained. In the same way, the first portion 21 can be more extended, less extended, or have equal extent with respect to the second portion 22 of the abutment surface 20.

[0033] According to a preferred embodiment of the invention, the first portion 21 can have an arched profile, convex with respect to the lying plane P and to the second portion 22. Such a specification gives the so-obtained container C an improved appearance with respect to known type containers. In fact, by considering for example figure 6, the front wall W3 of the container C is shaped in such a way to have concave and convex portions following one another (with respect to the longitudinal development axis Y of the container).

[0034] Alternatively, the first portion 21 and the second portion 22 of the abutment surface 20 of the first forming half-shell 2 each has a profile defined by broken lines.

[0035] According to the preferred embodiment, the abutment surface 20 of the first forming half-shell 2 further comprises a third portion 23 shaped in such a way to protrude with respect to the second portion 22, according to the transverse direction with respect to the lying plane P of the abutment surface 20 (see figure 2). In detail, the second portion 22 is interposed between the first portion 21 and the third portion 23, along a development axis L of the abutment surface 20 (the axis L is shown in figure 2).

[0036] With such an embodiment, for example, a container C such as that of figure 6 can be obtained.

[0037] Clearly, more than two portions can be provided as protruding with respect to said lying plane P.

[0038] For example, the abutment surface 30 of the second forming half-shell 3 can be flat.

[0039] Alternatively, according to a variation not shown, the abutment surface of the second forming half-shell can have the same characteristics described for the abutment surface of the first forming half-shell (i.e. can have at least one protrusion and at least one recess). In other words, also the abutment surface of the second forming half-shell can comprise a first portion and a second portion, both shaped in such a way that the first portion protrudes with respect to the second portion and the

second portion curves inward with respect to the first portion, according to a transverse direction with respect to the lying plane of the abutment surface of the second forming half-shell. In this case, the profile of the abutment surface of the second forming half-shell is not necessarily the same as the profile of the abutment surface of the first forming half-shell.

[0040] According to an embodiment of the invention, the forming station 1 further comprises a first folding element 6 and a second folding element 7, which are bilaterally placed (i.e. placed at opposite sides) with respect to the first forming half-shell 2 and the second forming half-shell 3 and under them. Each folding element 6, 7 is rotatable around a respective articulation axis, in order to allow the folding of portions (for example the corners Z) of the container C.

[0041] Preferably, the articulation axis of the first folding element 6 and the articulation axis of the second folding element 7 are oblique with respect to said articulation axes H of the first forming half-shell 2 and second forming half-shell 3. With reference to the container C of figure 6 and to figure 2, the articulation axis of the first folding element 6 and the articulation axis of the second folding element 7 are parallel to the edges joining, at the upper wall W1, the front wall W3 with the rear wall W4.

[0042] Advantageously, this specification allows obtaining the typology of container C of figure 6, i.e. a container with upper wall W1 and lower wall W2 both trapezoidal. In fact, the first folding element 6 and the second folding element 7, in such a way tilted, allow perfectly abutting against the walls of the container C of figure 6.

[0043] The invention further relates to a machine M (only partially shown) for producing pourable foodstuff containers C, comprising a forming station 1 according to one of the afore described embodiments; welding means (not shown) to weld the formed and filled tube in corresponding closed and filled wrappers; cutting means (not shown), for separating the wrappers and locate the containers C filled and formed in the forming station 1.

[0044] The machine M further comprises a conveying and definition unit 10 arranged downstream of the cutting means, comprising at least one containing and definition device 100 movable along a conveying path. The containing and definition device 100 comprises at least one first containment wall 11 and a second containment wall 12, for receiving and holding therebetween a container C filled and formed in the forming station 1 (see figure 3). Each containment wall 11, 12 comprises a containment surface 110, 120 in order to abut a corresponding wall (for example the front wall W3 and the rear wall W4) of the container C.

[0045] In particular, the containment surface 110 of the first containment wall 11 comprising a first portion 111 and a second portion 112 both shaped in such a way that the first portion 111 protrudes with respect to the second portion 112, and that the second portion 112 curves inward with respect to the first portion 111, according to a transverse direction with respect to the lying plane G (for

the sake of clarity only partially depicted in figure 4) of the containment surface 110 of the first containment wall 11.

[0046] Preferably, the first portion 111 and the second portion 112 of the first containment wall 11 have the same profile of the first portion 21 and of the second portion 22, respectively, of the abutment surface 20 of the first forming half-shell 2.

[0047] In this way, advantageously, the conveying and definition unit 10 optimizes the final shape of the container C, as it will be more evident in the following of the present discussion.

[0048] According to an alternative, the profile of the first portion and second portion of the first containment wall could not be the same as the profile of the first portion and second portion of the abutment surface of the first forming half-shell.

[0049] According to the preferred embodiment shown (similarly to what mentioned for the first forming half-shell 2), the containment surface 110 of the first containment wall 11 can further comprise a third portion 113 shaped in such a way to protrude with respect to the second portion 112, according to a transverse direction (preferably perpendicular) with respect to the lying plane G of the containment surface 110 (see for example figure 5). In detail, the second portion 112 is interposed between the first portion 111 and the third portion 113, along a development axis of the containment surface 110.

[0050] With reference to the accompanying figures 3-5, the conveying and definition unit 10 comprises a wheel R (only schematically depicted) rotatable around its central axis and comprising a plurality of containing and definition devices 100 rotated by the wheel R along said conveying path (that is, therefore, circular).

[0051] Along the afore said conveying path one or more stations are provided, for example, being part of the machine M according to the invention, at which stations the container C undergoes final operations.

[0052] In this regard, at the conveying and definition unit 10 the machine M can comprise, for example, at least one warmer device (not shown) for warming the corners Z (or other parts) of a container C during the respective transport along the conveying path. Furthermore, handling means (not shown) can be provided, so that the warmed corners Z are in contact with a wall W2, W5, W6 of the corresponding container C.

[0053] This way, the container C keeps the respective formed shape as afore described during the mentioned final operations.

[0054] In particular, each containing and definition device 100 comprises two jaws hinged one another that serve as seat for receiving and holding a container C inserted in its inside (see for example figs. 4, 5).

[0055] With reference to figures 3 and 4, the machine M can further comprise: conveying means N for conveying the containers C exiting from the forming station 1 towards the conveying and definition unit 10; and inserting means (for example a pusher, not shown), for allowing

the insertion of each container C carried by the conveying means between the first containment wall 11 and the second containment wall 12 of a containing and definition device 100.

[0056] For example, as previously anticipated, the abutment surface 30 of the second forming half-shell 3 can be flat, in such a way to define a flat wall in the container C (the rear wall W4 of the container C of figure 6). Similarly, the containment surface 120 of the second containment wall 12 is flat, in such a way to define said flat wall W4 of the container C (i.e. in such a way to keep the conformation).

[0057] With reference to figures 3 and 4, the conveying means N comprise a conveying belt N (for example a closed-loop wound belt). For example, on the conveying belt N there can be abutments B so that each about a container C during the respective conveying on the belt N.

[0058] Preferably, the forming station 1 is prearranged in such a way that the containers C exiting from the same are received on the conveying belt N with their flat wall W4.

[0059] This way, advantageously, the formed shape of the container C is not deformed during the transport on the belt N. This drawback would occur, instead, if the container C would be transported with the respective wall W3 provided with protrusions resting on the belt N.

[0060] The machine M can further comprise, upstream of the forming station 1: a feeding unit (not shown) to feed the packaging material band along a first advancement direction; a band sterilizing unit (not shown); a longitudinal sealing unit (not shown) to seal the sterilized band and adapted to form a continuous tube of packaging material. For example, said band sterilizing units and sealing units longitudinally sealing the band are arranged consecutively along the first advancement direction of the band of packaging material.

[0061] Preferably, the forming station 1 is prearranged in such a way that the containers C exiting from the same have a second advancement direction different from the first advancement direction (for example opposite to the first advancement direction).

[0062] Such a specification allows the container C to be conveyed and exiting from the forming station 1 on the conveying belt N with the respective flat wall (for example the rear wall W4) resting on the latter. Therefore, the container C is transported in horizontal position on the conveying belt.

[0063] Alternatively, according to a solution not shown, the containers exiting from the forming station are transported on the conveying belt with the respective upper wall or lower wall resting on the conveying belt itself (i.e. in vertical position with respect to the conveying belt).

[0064] The forming station 1 and the machine M according to the invention allow obtaining containers C with at least one wall having protrusions and recesses, thus having a different shape different with respect to the parallelepiped containers with flat walls of known art, as well as, possibly, having an upper wall W3 and lower wall W2

both trapezoidal.

Claims

1. A forming station (1) for producing pourable foodstuff containers (C) starting from a packaging material tube, comprising:

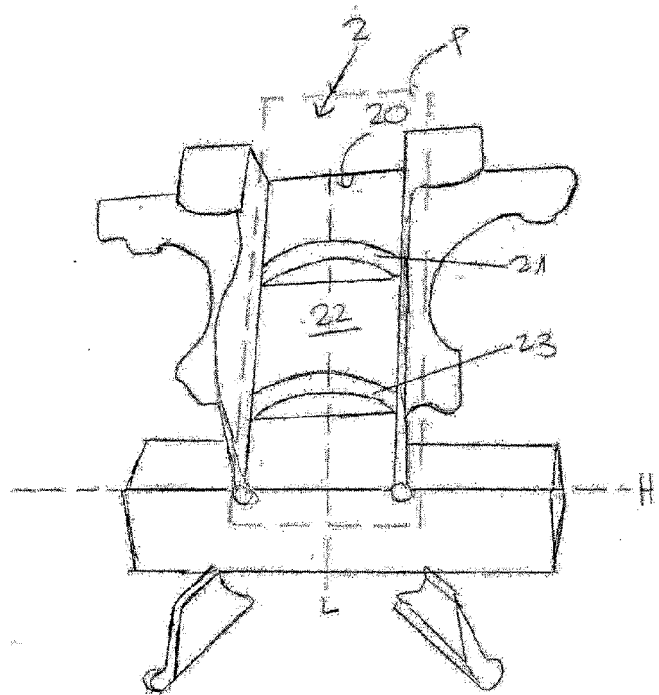
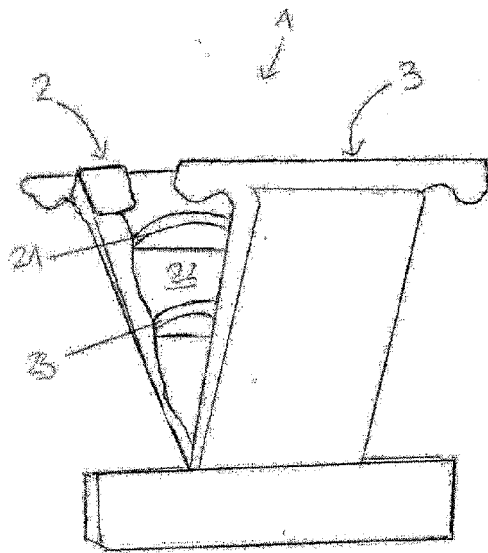
a first forming half-shell (2) and a second forming half-shell (3), opposed each other along an abutment direction and predisposed for receiving between them a portion of the tube destined to originate a pourable foodstuff container (C); the first forming half-shell (2) and the second forming half-shell (3) being hinged with respect to articulation parallel axes (H), in such a way the first forming half-shell (2) and the second forming half-shell (3) are movable in order to be close each other and to be far each other; each forming half-shell (2, 3) comprising an abutment surface (20, 30), to abut the portion of tube, filled with the pourable foodstuff;

characterized in that:

the abutment surface (20) of the first forming half-shell (2) comprises a first portion (21) and a second portion (22), shaped in such a way that the first portion (21) protrudes with respect to the second portion (22), and that the second portion (22) curves inward with respect to the first portion (21), according to a transverse direction with respect to the lying plane (P) of the abutment surface (20) of the first forming half-shell (2).

2. Forming station (1) according to claim 1, in which the abutment surface (20) of the first forming half-shell (2) further comprises a third portion (23) shaped in such a way that it curves inward with respect to the first portion (21), according to the transverse direction with respect to the lying plane (P) of the abutment surface (20) of the first forming half-shell (2); the first portion (21) being interposed between the second portion (22) and the third portion (23), along a development axis (L) of the abutment surface (20) of the first forming half-shell (2).
3. Forming station (1) according to anyone of the preceding claims, further comprising a first folding element (6) and a second folding element (7), bilaterally placed with respect to the first forming half-shell (2) and the second forming half-shell (3) and under the first forming half-shell (2) and the second forming half-shell (3); each folding element (6, 7) being hinged with respect to an axis that is oblique with respect to said articulation axes (H) of the first forming half-shell (2) and the second forming half-shell

- (3), in order to allow the folding of the corners (Z) of the container (C).
4. A machine (M) for producing pourable foodstuff containers (C), comprising:
- a forming station (1) according to anyone of the preceding claims;
 - cutting means, for separating the containers (C) filled and formed in the forming station (1);
 - a conveying and definition unit (10), placed downstream with respect to the cutting means, comprising at least a containing and definition device (100) that is movable along a conveying path and that comprises at least one first containment wall (11) and one second containment wall (12), for receiving and holding between them a container (C) filled and formed in the forming station (1); each containment wall (11, 12) comprises a containment surface (110, 120), that abuts a corresponding wall (W3, W4) of the container (C);
 - the containment surface (110) of the first containment wall (11) comprising a first portion (111) and a second portion (112), shaped in such a way that the first portion (111) protrudes with respect to the second portion (112), and that the second portion (112) curves inward with respect to the first portion (111), according to a transverse direction with respect to the lying plane (G) of the containment surface (110) of the first containment wall (11).
5. The machine (M) according to the preceding claim, in which the first portion (111) and the second portion (112) of the first containment wall (11) respectively have the same profile of the first portion (21) and of the second portion (22) of the abutment surface (20) of the first forming half-shell (2).
6. The machine (M) according to anyone of the claims 4 or 5, in which the conveying and definition unit (10) comprises a wheel rotatable around its central axis and comprises a plurality of containing and definition devices (100), carried in rotation by the wheel along said conveying path.
7. The machine (M) according to anyone of the preceding claims from 4 to 6, comprising at least a warmer device, at the conveying and definition unit (10), for warming the corners (Z) of a container (C) during its transport along the conveying path; and handling means, for bringing the warmed corners (Z) of the container (C) in contact with a wall (W2, W5, W6) of the container (C).
8. The machine (M) according to the preceding claim, further comprising conveying means (N) for conveying the containers exiting from the forming station towards the conveying and definition unit (10); and inserting means, for allowing the insertion of each container (C) carried by the conveying means (N) between the first containment wall (11) and the second containment wall (12) of the containing and definition device (100).
9. The machine (M) according to the preceding claim, in which: the abutment surface (30) of the second forming half-shell (3) is flat, in such a way to form a flat wall (W4) of the container (C); and the containment surface (120) of the second containment wall (12) is flat, in order to define said flat wall (W4) of the container (C); and the conveying means (5) comprise a conveying belt (N); in which the forming station (1) is predisposed in such a way that the containers (C) exiting from the forming station (1) itself are received on the conveying belt (N) with their flat wall (W4) resting on the conveying belt (N).
10. The machine (M) according to the preceding claim, further comprising, upstream with respect to the forming station (1): a band feeding unit along a first advancement direction; a band sterilizing unit, a longitudinal welding unit of the sterilized band for forming a continuous packaging material tube; said band sterilizing unit and longitudinal welding unit being consecutive along the first advancement direction; the forming station (1) being predisposed in such a way that the containers (C) exiting from the forming station (1) itself have a second advancement direction, different from the first advancement direction.



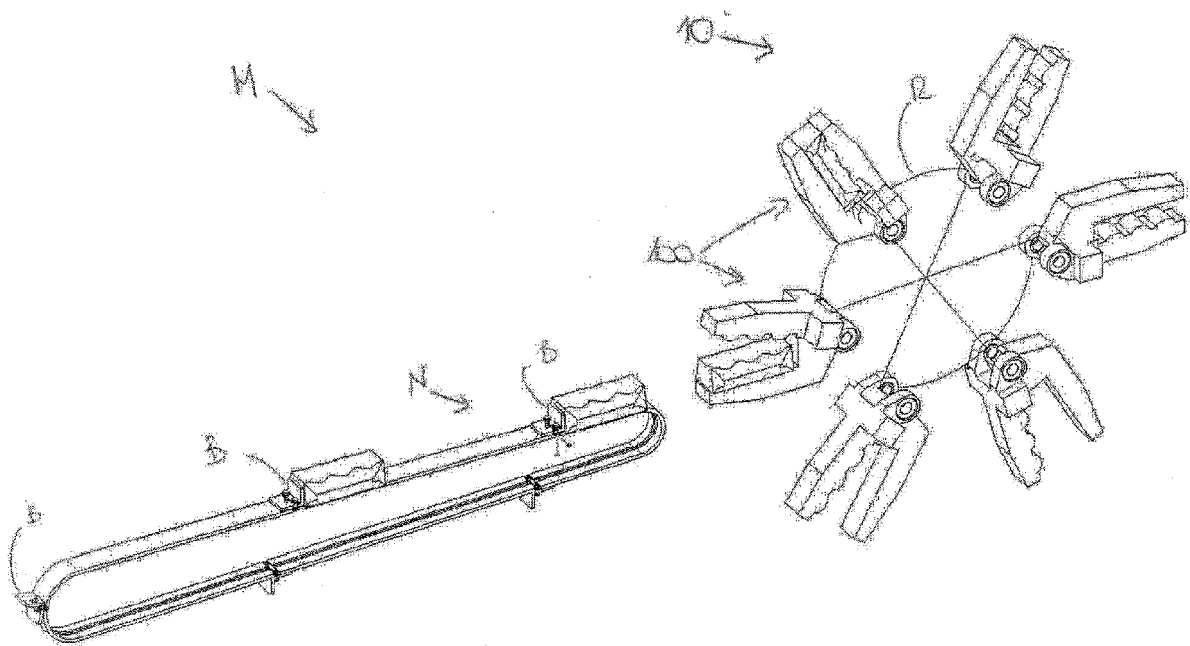
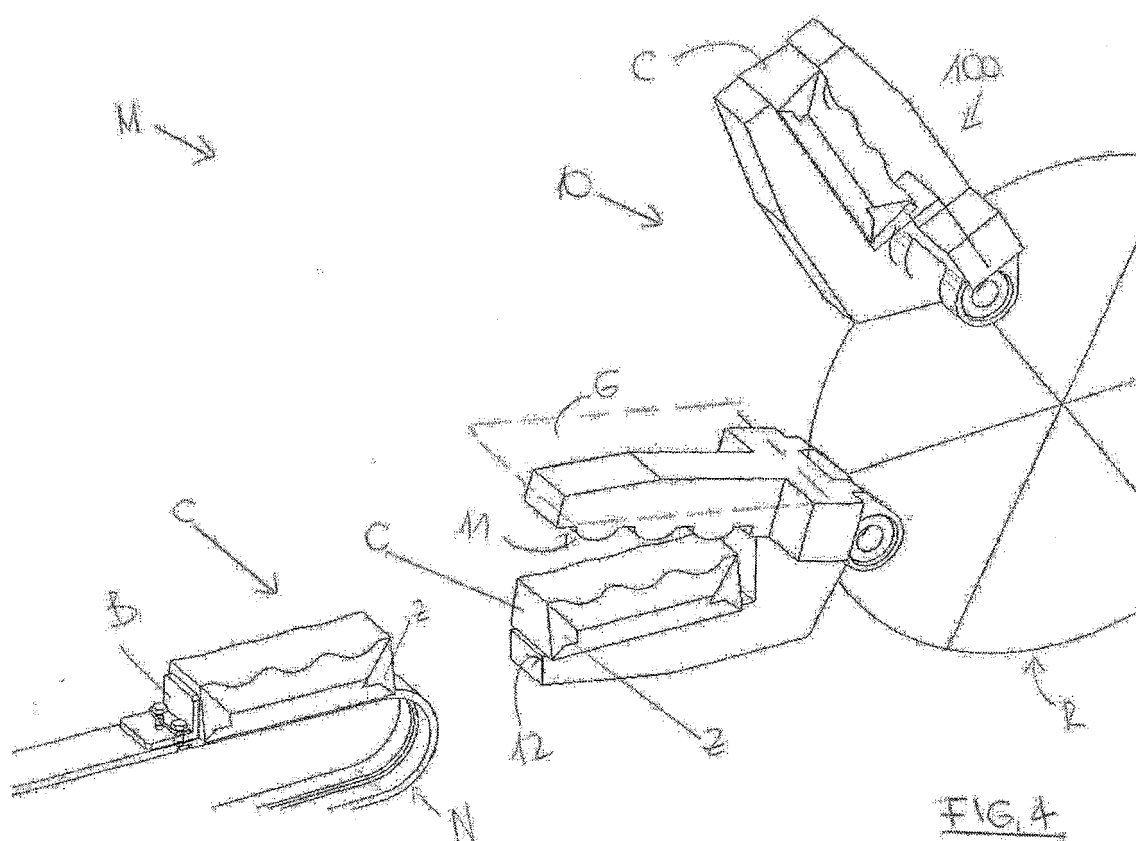


FIG. 3



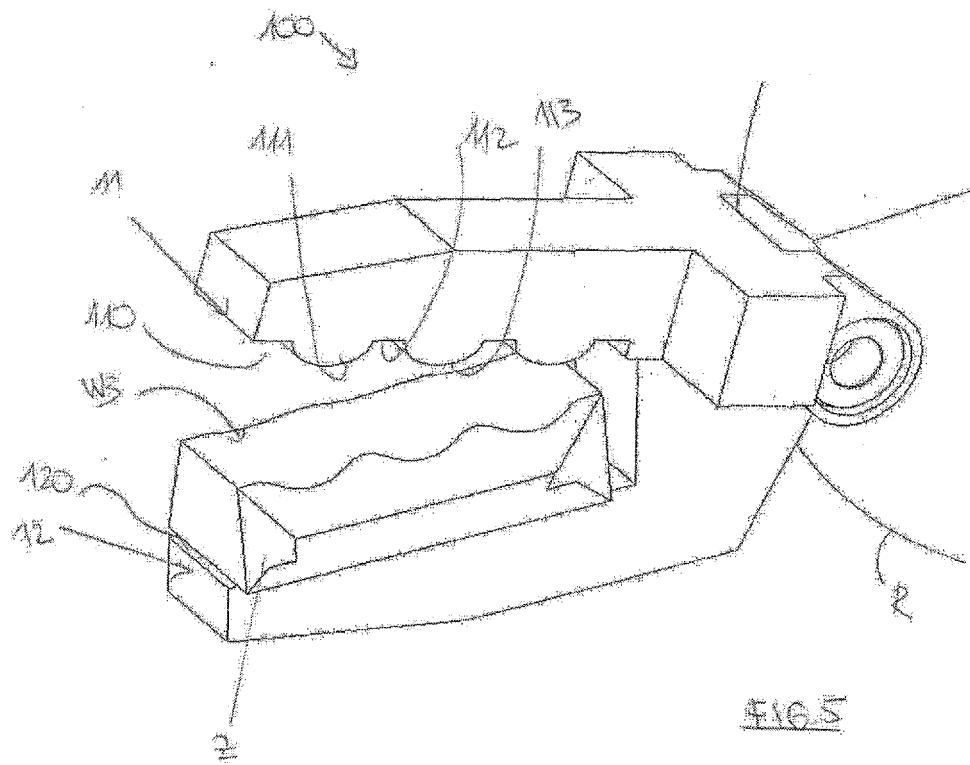


FIG. 5

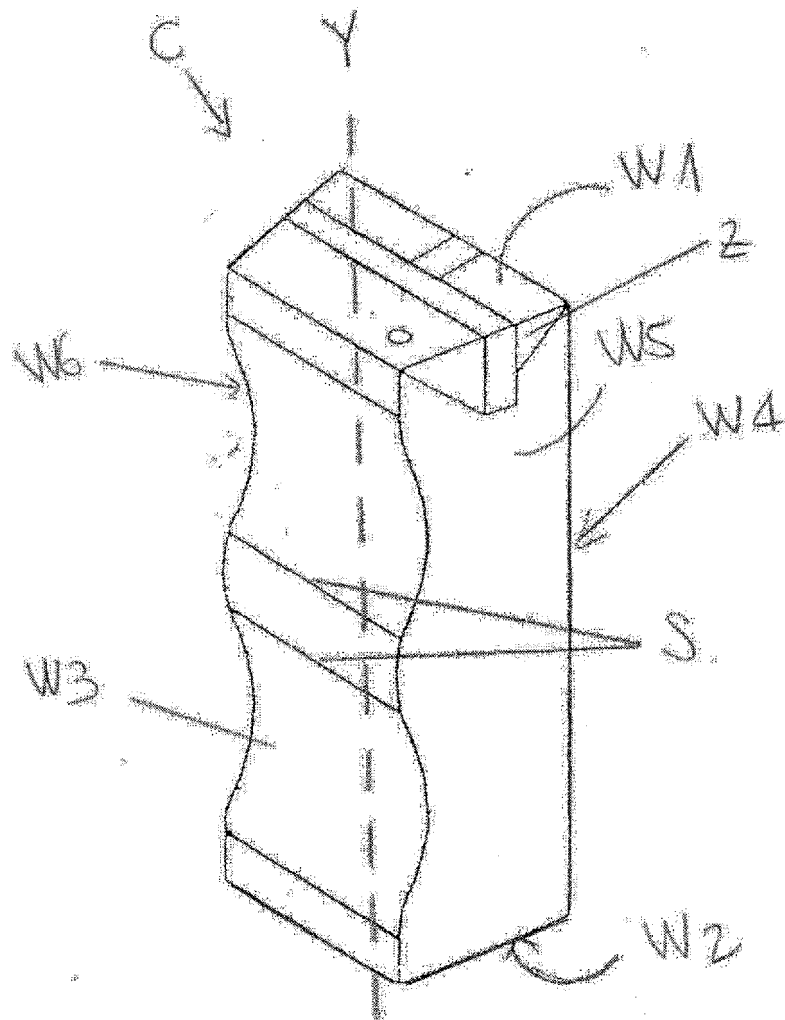


FIG. 6



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 17 7417

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EPO FORM 1503 03.82 (P04C01)

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	* abstract; figures 1-5 *		
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
Place of search		Date of completion of the search	Examiner
Munich		17 August 2017	Cardoso, Victor
CATEGORY OF CITED DOCUMENTS 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 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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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