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(54) **Method of forming a foil tube and forming shoulder**

(57) A method for forming a flat foil web (2) into a foil tube (3), wherein the foil web is led, via a collar (4) surrounding a virtual tube (5), to a gap (12) formed by edges (13,14) of said collar. First and second longitudinal sides (22,23) of the flat foil web are made to overlap by means of said gap. The gap extends helically over the virtual tube. Part (24) of the first longitudinal side (22) of the foil web is led to an outer side of the collar remote from the central axis (15) by means of edges (13,14) bounding

the gap, whilst the second longitudinal side (23) of the foil web is placed into abutment with the first longitudinal side (22) on an inner side of the collar facing towards the central axis. Following that, the part (24) of the first longitudinal side (22) located on the outer side of the collar is gradually moved towards the inner side of the collar, until said part of the first longitudinal side abuts against the second longitudinal side (23).

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Description

[0001] The invention relates to a method for forming a flat foil web into a foil tube, wherein the foil web is led, via a collar surrounding a virtual tube, to a gap formed by edges of said collar, by means of which gap first and second longitudinal sides of the flat foil web are made to overlap.

[0002] The invention further relates to a shoulder for forming a flat foil web into a foil tube, which shoulder is provided with a collar surrounding a virtual tube, leaving open a gap for causing a first and a second longitudinal side of the foil web to overlap each other so as to form a foil tube extending in a direction of transport.

[0003] With such a shoulder and method as known from European patent application EP-A-0 850 836, a flat foil web is moved in a direction of transport and formed into a foil tube by means of the shoulder. With the known shoulder, the gap is formed by two gap edges disposed one above the other, thus forming a gap extending parallel to the direction of transport, the central axis and the circumference of the virtual tube.

[0004] A drawback of the known method and the known shoulder is that the two longitudinal sides move over one another upon forming the foil tube, which is not possible, or only with difficulty, with foil webs made of certain materials or having a certain thickness. For this reason it is practically impossible to form such a foil web into a foil tube by means of the known shoulder.

[0005] The object of the present invention is to provide a method by means of which a foil tube can be made of a foil web in a simple manner.

[0006] This object is accomplished with the method according to the invention in that the gap extends helically over the virtual tube, with part of the first longitudinal side of the foil web being led to an outer side of the collar remote from the central axis by means of edges bounding the gap, whilst the second longitudinal side of the foil web is placed into abutment with the first longitudinal side on an inner side of the collar facing towards the central axis, after which the part of the first longitudinal side located on the outer side of the collar is gradually moved towards the inner side of the collar, until said part of the first longitudinal side abuts against the second longitudinal side.

[0007] Since the gap extends helically over the virtual tube, the first and second longitudinal sides of the foil web are placed into abutment with each other, practically without the longitudinal sides moving over one another. As a result, undesirable movements of the foil web are prevented. Furthermore, the extent to which damage is caused to the foil web upon forming a foil tube is minimised.

[0008] One embodiment of the method according to the invention is characterized in that a first part of the second longitudinal side of the foil web is led to the outer side of the collar remote from the central axis via the gap substantially simultaneously with said part of the first longitudinal side of the foil web being led outwards to an

outer side of the collar remote from the central axis, wherein said first part of the second longitudinal side is moved inwardly substantially simultaneously with the inward movement of said part of the first longitudinal side, said first part of the second longitudinal side being folded double over a second part of the second longitudinal side, so that the double folded second longitudinal side abuts against the first longitudinal side.

[0009] Since the second longitudinal side is folded double, the inner side of the first longitudinal side abuts against the inner side of the second longitudinal side, which is advantageous if the inner side and the outer side of the foil are made of different materials (for example plastic/aluminium). In this way it is easy to form a longitudinal seam.

[0010] Another embodiment of the invention is characterized in that a longitudinal seam is formed on the overlapping longitudinal sides of the foil web.

[0011] The longitudinal seam interconnects the longitudinal sides of the foil tube.

[0012] Yet another embodiment of the invention is characterized in that the foil tube is cylindrical or rectangular.

[0013] Depending on the product eventually to be formed by means of the method, the foil tube may be either cylindrical or rectangular.

[0014] Another object of the invention is to provide a shoulder that provides an improved guidance for the foil web, thus reducing the risk of damage to the foil web.

[0015] This object is accomplished with the shoulder according to the invention in that the gap extends helically over the virtual tube, at an angle to the direction of transport, in a direction towards the second collar edge, wherein the first longitudinal side of the foil web can be positioned in the gap via the first collar edge, whilst the second longitudinal side of the foil web can be placed into abutment with the first longitudinal side that abuts against the inner side of the tube via the second collar edge near the gap.

[0016] The gap that extends helically over the virtual tube ensures that the longitudinal sides are made to overlap each other, in which position they will hardly move over one another, so that the risk of damage and track formation on the foil web is low.

[0017] One embodiment of the shoulder according to the invention is characterized in that the second gap edge is provided with a transition comprising an obtuse angle near the gap for positioning the second longitudinal side in the gap.

[0018] The second longitudinal side is efficiently moved in the direction of the first longitudinal side of the foil web by means of said obtuse angle and placed into abutment therewith so as to form the foil tube.

[0019] Another embodiment of the shoulder according to the invention is characterized in that the collar edge is provided with a continuous transition near the gap edge for positioning the first longitudinal side in the gap.

[0020] The use of such a transition enables the collar

to position the first foil edge in the gap in a gradual manner, so that the risk of damage to the foil web is practically excluded.

[0021] The invention will now be explained in more detail with reference to the drawing, in which:

Figure 1 is a perspective view of the shoulder according to the invention;

Figure 2 is a front view of the shoulder that is shown in figure 1;

Figures 3a-3c are cross-sectional views of the shoulder that is shown in figure 2, at the positions indicated A, B and C, respectively.

[0022] Like parts are indicated by the same numerals in the various figures.

[0023] Figures 1 and 2 show the shoulder 1 according to the invention, by means of which a foil web 2 can be formed into a foil tube 3.

[0024] The shoulder 1 is provided with a collar 4, which surrounds a virtual cylindrical tube 5. The collar 4 comprises a tubular portion 6 extending around the tube 5 and a first and a second collar edge 7, 8. The collar edges 7, 8 extend from an edge 9 remote from the virtual tube 5, via a foil guide surface 10, towards an edge 11 bounding the tubular portion as well as towards gap edges 13, 14 bounding a gap 12. The gap 12 extends helically over the virtual cylindrical tube 5, at an angle to the central axis 15 of the tube 5, in a direction towards the gap edge 14 of the second collar edge 8 (see figure 2). The gap 12 further extends substantially in radial direction (see figures 3a-3c).

[0025] Seen in a direction of transport parallel to the central axis 15 as indicated by the arrow P1, the gap 12 begins at the transitions 16, 17 between the collar edges 7, 8 and the gap edges 13, 14.

[0026] The transition 16 between the first collar edge 7 and the first gap edge 13 is a continuous transition. The transition 17 between the second collar edge 8 and the second gap edge 14 takes place via a bend, with the second collar edge 8 including an obtuse angle with the second gap edge 14.

[0027] The shoulder 1 is adapted for being placed in a packaging machine (not shown) by means of fasteners such as screws and screwed holes.

[0028] In use, the foil web 2 is guided onto the collar 4 of the shoulder 1 via the guide roller 20, after which the foil web 2 is transported over the foil guide surface 10 of the collar 4 and through the tubular portion 6 in the direction of transport indicated by the arrow P1.

[0029] Now the manner in which the foil tube 3 is provided with a double folded longitudinal side 21 will be described with reference to the figures.

[0030] The foil web 2 has a first longitudinal side 22 and a second longitudinal side 23 (figure 3a). At the transitions 16, 17, a first part 24 of the first longitudinal side 22 of the foil web 2 is led to an outer side of the gap edge 13 remote from the central axis 15 by means of the gap

edges 13, 14. Substantially simultaneously therewith, a first part 25 of the second longitudinal side 23 of the foil web 2 is led to the outer side of the collar 4 remote from the central axis 15 by means of the gap edge 14 (figure 3a). After the foil 1 web 2 has been transported further in the direction of transport P1, from the position indicated A-A to the position indicated B-B, the first part 24 of the first longitudinal side 22 has been partially moved, together with the first part 25 of the second longitudinal side 23, through the gap extending at an angle to the central axis, towards the central axis 15 (figure 3b). The two longitudinal sides 22, 23 are placed into abutment with each other as a result of the shape and the helical path of the gap edges 13, 14, in which position they do not shift relative to each other. Using the helical gap edges 13, 14, the first part 25 of the second longitudinal side 23 is folded double about a fold line 26. Said double folded second longitudinal side 23 is placed into abutment with the first longitudinal side 22.

[0031] It is important to realise that the overlapping longitudinal sides 22, 23 do not shift relative to each other. The second longitudinal side 23, which has been folded double, will come to abut against the first longitudinal side 22, to be true, but the fold line 26 of the second longitudinal side 23 will hardly move, if at all, relative to the first longitudinal side during further movement of the foil web 2 in the direction of transport P1.

[0032] Upon further movement of the foil web 2 in the direction of transport P1, from the position indicated B-B to the position indicated C-C, both the first part 24 of the first longitudinal side 22 and the first part 25 of the second longitudinal side 23 are moved to a position within the collar 4 (figure 3c). The foil web 2 has thus been formed into a foil tube 3 comprising a double folded longitudinal side 23.

[0033] A longitudinal seam may be formed on the overlapping longitudinal sides 22, 23.

[0034] Instead of guiding the second longitudinal side 23 to the outer side of the collar 4, it is also possible to guide the second longitudinal side 23 directly to the second longitudinal side 22. The moment the second longitudinal side 23 overlaps the first longitudinal side 22, the first part 24 of the first longitudinal side 22 will move in inward direction, without overlapping parts 24, 25 of the first and the second longitudinal side 22, 23 moving over one another. The foil tube 3 that has been formed in this manner does not comprise a double folded longitudinal side.

Claims

1. A method for forming a flat foil web into a foil tube, wherein the foil web is led, via a collar surrounding a virtual tube, to a gap formed by edges of said collar, by means of which gap first and second longitudinal sides of the flat foil web are made to overlap, **characterized in that** the gap extends helically over the

virtual tube, with part of the first longitudinal side of the foil web being led to an outer side of the collar remote from the central axis by means of edges bounding the gap, whilst the second longitudinal side of the foil web is placed into abutment with the first longitudinal side on an inner side of the collar facing towards the central axis, after which the part of the first longitudinal side located on the outer side of the collar is gradually moved towards the inner side of the collar, until said part of the first longitudinal side abuts against the second longitudinal side.

in that the collar edge is provided with a continuous transition near the gap edge for positioning the first longitudinal side in the gap.

2. A method according to claim 1, **characterized in that** a first part of the second longitudinal side of the foil web is led to the outer side of the collar remote from the central axis via the gap substantially simultaneously with said part of the first longitudinal side of the foil web being led outwards to an outer side of the collar remote from the central axis, wherein said first part of the second longitudinal side is moved inwardly substantially simultaneously with the inward movement of said part of the first longitudinal side, said first part of the second longitudinal side being folded double over a second part of the second longitudinal side, so that the double folded second longitudinal side abuts against the first longitudinal side.
3. A method according to claim 1 or 2, **characterized in that** a longitudinal seam is formed on the overlapping longitudinal sides of the foil web.
4. A method according to any one of the claims 1-3, **characterized in that** said foil tube is cylindrical or rectangular.
5. A shoulder for forming a flat foil web into a foil tube, which shoulder is provided with a collar surrounding a virtual tube, leaving open a gap for causing a first and a second longitudinal side of the foil web to overlap each other so as to form a foil tube extending in a direction of transport, **characterized in that** the gap extends helically over the virtual tube, at an angle to the direction of transport, in a direction towards the second collar edge, wherein the first longitudinal side of the foil web can be positioned in the gap via the first collar edge, whilst the second longitudinal side of the foil web can be placed into abutment with the first longitudinal side that abuts against the inner side of the tube via the second collar edge near the gap.
6. A shoulder according to claim 5, **characterized in that** the second gap edge is provided with a transition comprising an obtuse angle near the gap for positioning the second longitudinal side in the gap.
7. A shoulder according to claim 5 or 6, **characterized**

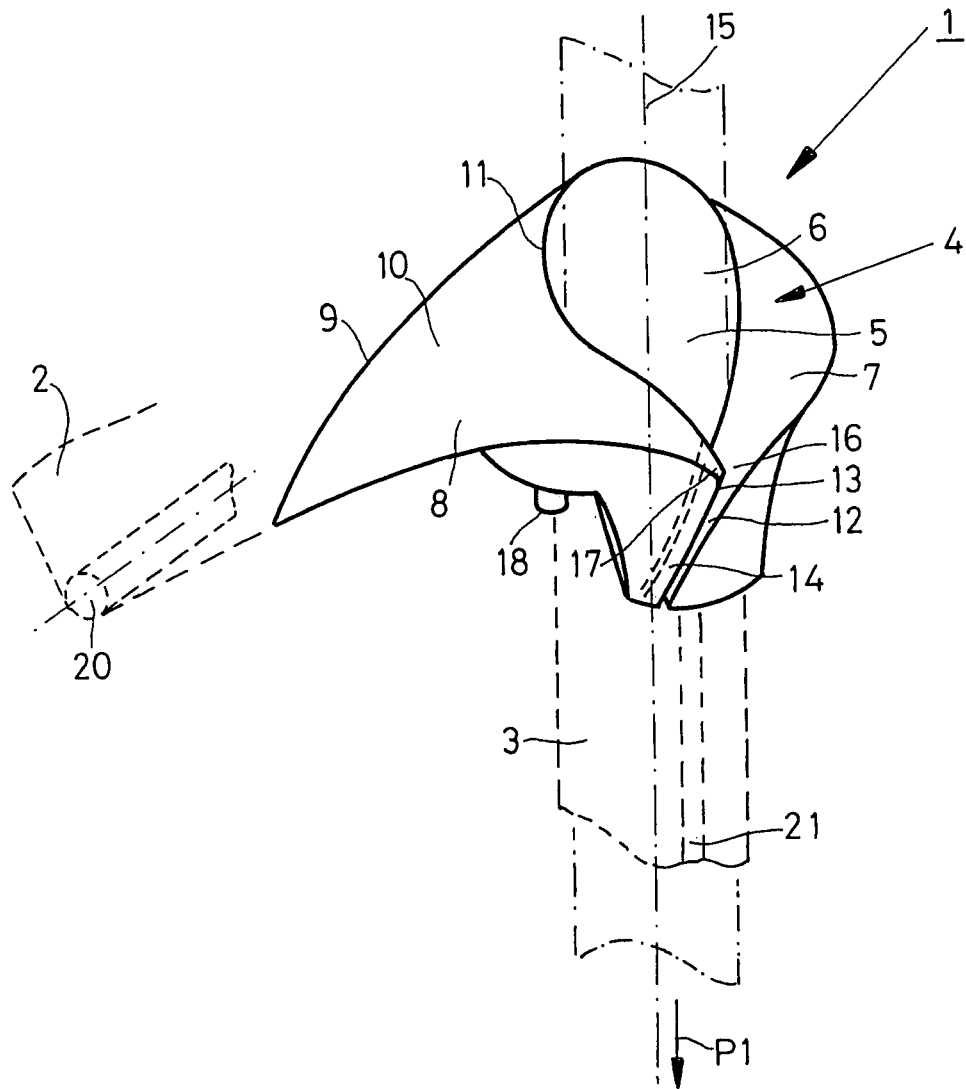


FIG. 1

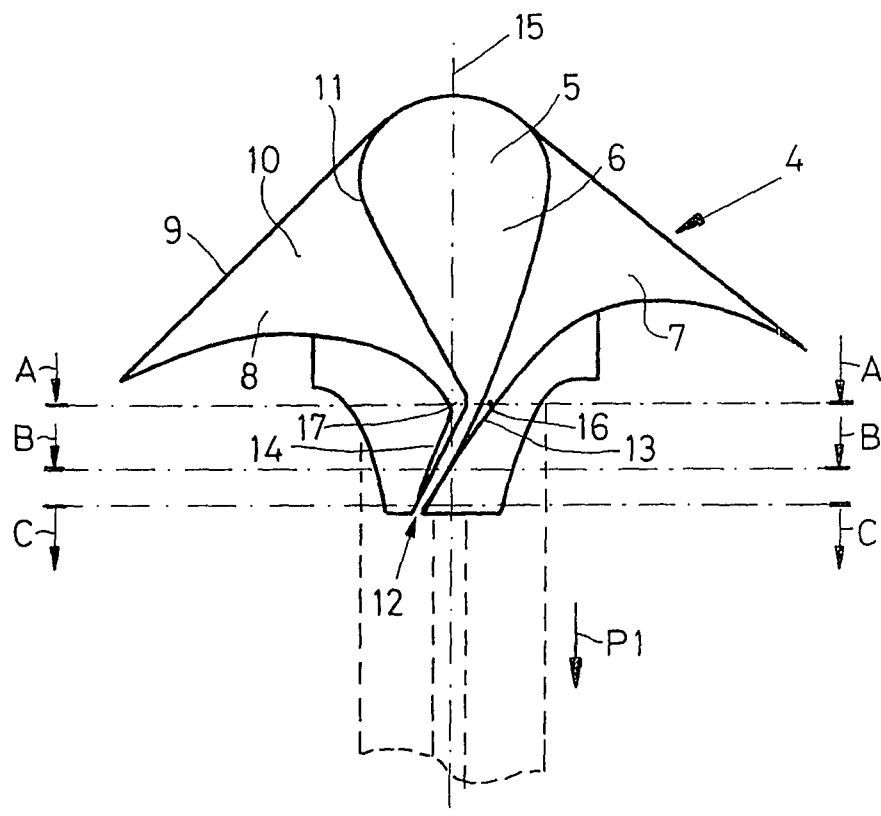


FIG. 2

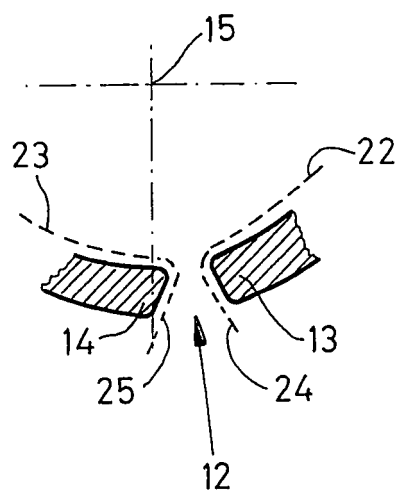


FIG. 3a (A-A)

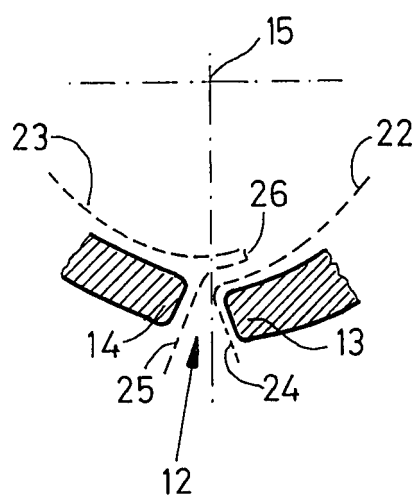


FIG. 3b (B-B)

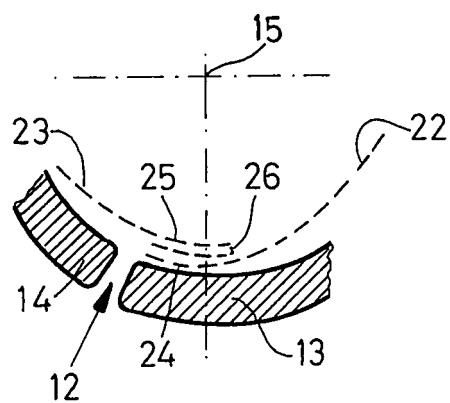


FIG. 3c (C-C)



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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6789

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Place of search The Hague		Date of completion of the search 7 December 2005	Examiner Grentzius, W
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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