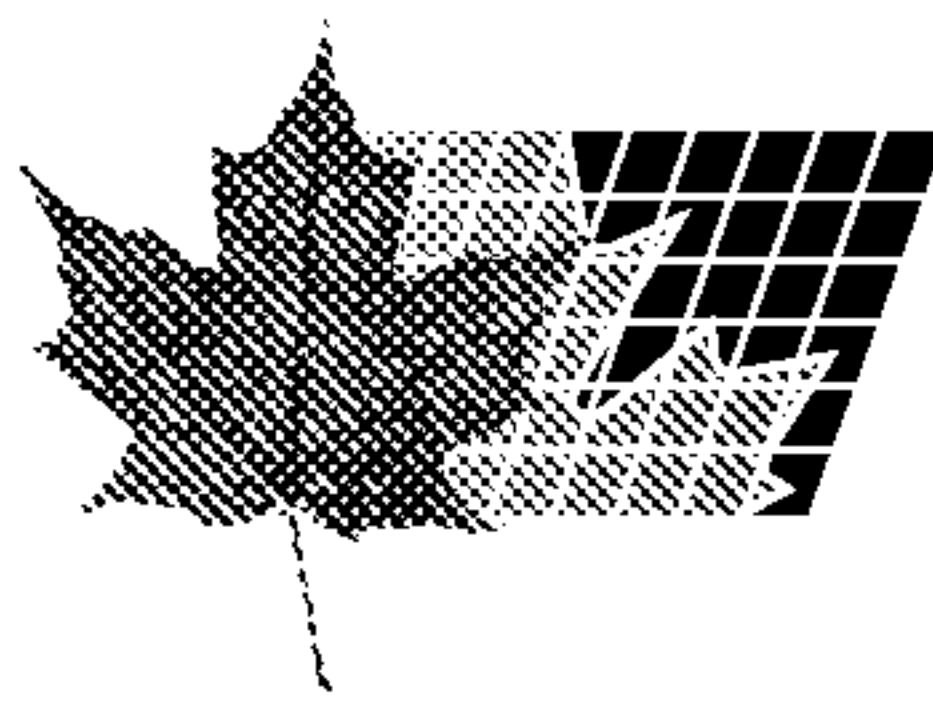




(72) FÄHLING, GERD, DE

(72) KASSELMANN, GERD, DE

(72) ZIMMERMANN, RICHARD, DE

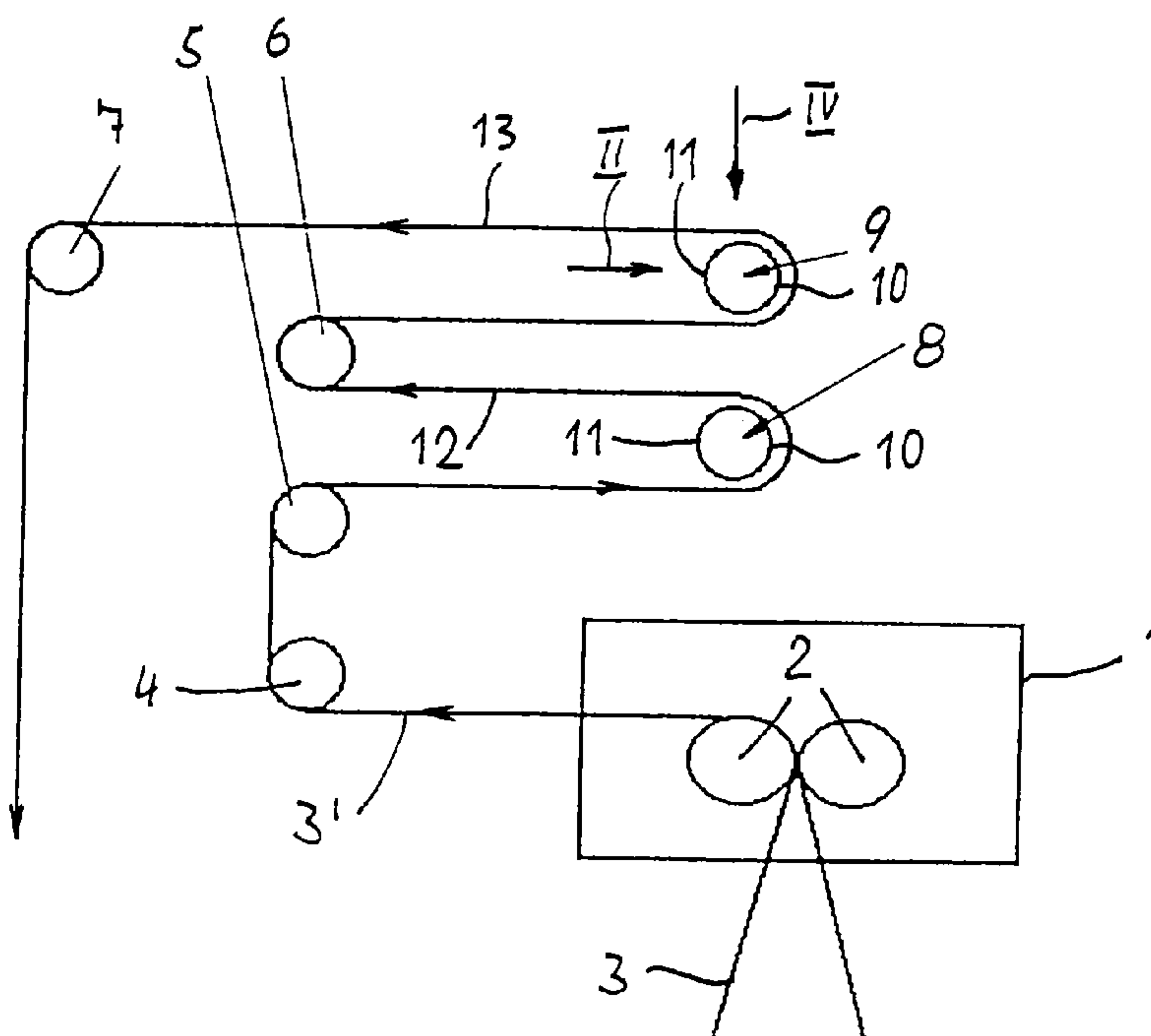
(71) KLAUS REINHOLD MASCHINEN- UND GERATEBAU GMBH, DE

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(54) **DISPOSITIF DE TIRAGE POUR TOILES DE TUBES DE
MEMBRANES DE PLASTIQUE**

(54) **DRAW-OFF DEVICE FOR WEBS OF PLASTIC FOIL TUBING**



(57) A draw-off device for webs of plastic foil tubing produced by an extruder in the blowing process, having a flattening device for the tubing web conveyed with an expanded round cross-section and with at least one pivoted guide roller as well as at least one air turning bar supported so as to be non-rotatable for conveying the flattened tubing web, whereby the air turning bar is provided with an arrangement of air outlet openings in an area of its peripheral surface about which the flattened tubing web is wound during conveyance, characterized therein that the air turning bar exhibits, at a constant outside diameter, a curved course of travel in axial direction and defining a curvature plane with a concave and a convex side of the air turning bar and the air outlet openings are arranged on the concave side of the air turning bar.

Abstract

A draw-off device for webs of plastic foil tubing produced by an extruder in the blowing process, having a flattening device for the tubing web conveyed with an expanded round cross-section and with at least one pivoted guide roller as well as at least one air turning bar supported so as to be non-rotatable for conveying the flattened tubing web, whereby the air turning bar is provided with an arrangement of air outlet openings in an area of its peripheral surface about which the flattened tubing web is wound during conveyance, characterized therein that the air turning bar exhibits, at a constant outside diameter, a curved course of travel in axial direction and defining a curvature plane with a concave and a convex side of the air turning bar and the air outlet openings are arranged on the concave side of the air turning bar.

Klaus Reinhold
Maschinen- und Gerätebau GmbH
Rahestrasse 79a
49525 Lengerich (Westf.)

L/Br 598023

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Draw-Off Device for Webs of Plastic Foil Tubing

The invention concerns a draw-off device for webs of plastic foil tubing produced by an extruder in the blowing process in accordance with the preamble of claim 1.

In draw-off devices of this type that may be reversible for a distribution of thickness tolerances latent in the tubing webs over the entire winding width of the foil winding to be produced, both the guide roller and the air turning bar are usually cylindrical. When operating the draw-off device, compressed air escapes through the air outlet openings of the air turning bar which allows the flattened tubing web being conveyed to float on an air cushion when it is wound about the air turning bar in order to obtain a frictionless leading of the tubing web about the non-rotating turning bar. If the compressed air outlet and thus the air cushion is set too low, the tubing web comes into contact with the air turning bar when being wound about it, as a result of which scratches and similar damage occurs on the tubing web. In tubing webs having strongly adhering surfaces, it can even lead to an adhesion of the tubing web surface in certain areas which can result in an interruption of the production process.

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For this reason, attempts are being made to work with as strong an air cushion as possible on the turning bar or bars, so that scratches on the foil surface and production interruptions due to the adhesion of the tubing web on an air turning bar are avoided. However, this has shown that, when there is a strong air cushion on the back of the air turning bar, i.e. in direction of travel of the foil behind the air nozzle area about which the tubing web is wound, the flattened tubing web greatly inflates after leaving the zenith of the air turning bar, with the result that the lateral folding edges of the flattened tubing web move a little closer to one another. If the tubing web is then wound on a subsequent cylindrical guide roller with its lateral folding edges moved closer to one another and consequently correspondingly narrowed down, then a folding of the tubing web results in its middle area during the flat contact winding of the guide roller, as a result of which the quality of the tubing web produced is again negatively affected. Moreover, large leakages of the compressed air occur as a result of a great expansion of the tubing web on the back of the air turning bar which can only be compensated with difficulty since an increased compressed air discharge in the area of the winding of the air turning bar may result in an uneven travel of the tubing web with negative effects on the production process.

Furthermore, draw-off devices have already become known in which the guide rollers and/or the air turning bars have a varying diameter over its length to produce a concave or convex surface or peripheral area of the guide roller and/or the air turning bar. Although this shape of the peripheral area counteracts an adhesion of the tubing web in the winding area by the air cushion applied, a convex or concave curved cross-sectional profile is impressed on the tubing web on the

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back of a correspondingly formed air turning bar which, in turn, again results in the lateral folding edges of the flattened tubing web coming close to one another, with the danger that a folding occurs in the middle area of the foil when conveyed. Moreover, a considerable leakage flow of the compressed air results on the back of the air turning bar in the middle or side areas of the air turning bar, depending on whether it is provided with a concave or convex peripheral surface.

The object of the invention is to create a draw-off device of the conventional type in which, while maintaining a sufficiently strong air cushion to prevent an adhesion of the flattened tubing web to the air turning bar in its winding area, high compressed air losses are avoided by a leakage flow behind the air turning bar and the occurrence of an undesirable formation of folds in the middle area of the tubing web during further conveyance.

This object is solved according to the invention by an embodiment of the device in accordance with claim 1. As a result of the fact that, in this embodiment, the air outlet openings of the air turning bar are arranged on its concave side, i.e. the side facing the chord of an imaginary associated segment, the space required to apply a sufficiently large air cushion is created which prevents the adhesion of the flattened tubing web when being wound about the air turning bar, even with a sticky surface finish. At the same time, the continuously constant outside diameter of the air turning bar ensures that the tubing web travels evenly over the convex side of the air turning bar at the zenith of the air turning bar, so that an inflation of the tubing web on the back of the air turning bar is counteracted by compressed air

carried along from the winding area in association with an inward deformation of the peripheral area of the turning bar. This also eliminates the cause for an undesirable fold formation in the middle area of the tubing web when being conveyed further, so that the prerequisites for a trouble-free production of blown films, even those with strongly adhering surfaces, are provided.

Generally, the curvature plane of the air turning bar is arranged parallel to a conveyance plane of the flattened tubing web preset by a guide roller arranged upstream. In a draw-off device usually used which takes up the tubing web conveyed upward at right angles from the extruder, this means a horizontal arrangement of the guide roller or rollers and, accordingly, a horizontal arrangement of the air turning bar or bars for the conveyance of the flattened tubing web through the draw-off device via its horizontal conveyance route sections.

An adjustable support of the air turning bar or bars is thereby advantageous in such a way that its curvature plane can be adjusted from a flattened tubing web to the conveyance plane parallel or generally horizontal basic position into a position inclined thereto at an angle of about 10 to 20°. As a result of this, the air cushion can be regulated and the travel of the tubing web optimized.

The height of the arc of the curve offered by the air turning bar, i.e. the distance measurement between the apex of the curve and the chord of an imaginary associated arc section, depends on the length of the air turning bar which, in turn, depends on the maximum width of the tubing webs produced. The height of the arc is thereby only a few millimeters and in the

range of about 1 to 10 mm.

To prevent compressed air losses and troublesome influences on the conveyance behaviour of the tubing web in the winding area of the air guide roller, air outlet openings not required in the winding area of the air turning bar outside of the conveyance area can be sealed, e.g. by a screening device placed inside the air turning bar, when conveying narrower tubing webs which fall below the length of the turning bars designed for a maximum tubing width.

Further details and advantageous embodiments of the invention can be found in the following description of the object of the invention in association with the drawings in which an example of an embodiment of a draw-off device according to the invention is schematically illustrated, showing:

- Fig. 1 a side view of a reversing draw-off device for tubing webs made of plastic foil and produced by a blowing foil extruder,
- Fig. 2 a side view of an air turning bar according to the invention, shown enlarged vis-à-vis Fig. 1,
- Fig. 3 a front view of the air turning bar according to Fig. 2 and
- Fig. 4 a top view onto the air turning bar according to Figs. 2 and 3.

A reversing draw-off device for webs of plastic foil tubing by an extruder in the blowing process is illustrated purely

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schematically in Fig. 1 having only those parts required to understand the invention. The draw-off device comprises a flattening device 1 having a pair of squeeze rolls 2 for the tubing web 3 conveyed with an expanded round cross-section from the blowhead of an extruder (not shown), said tubing web 3 being flattened between the squeeze rolls 2 and then conveyed as a flat web 3' through a reversing system of pivoted guide rollers 4, 5, 6 and 7 and air turning bars 8 and 9 supported so as to be non-rotating for the distribution of the thickness tolerances and then to a winding device in direction of the arrows.

The guide rollers 5 to 7 are formed by straight cylinders, i.e. they exhibit a continuously constant outside diameter. The air turning bars 8 and 9 have, in turn, a continuously constant outside diameter over their entire length, however, they have a curved course of travel defining a curvature plane 14 in axial direction. As a result, each air turning bar 8, 9, has a concave side 10 and a convex side 11, as shown in an exaggerated manner in Figs. 2 to 4 for the air turning bar 9. The arrangement of air outlet openings of the air turning bars 8, 9 is thereby found on the concave side 10 of the air turning bar 8, 9 in an area of its peripheral surface of about 180°, which is surrounded by the flattened tubing web 3' when conveyed through the draw-off device.

It can be seen in Fig. 4, which corresponds to a top view in direction of arrow IV in Fig. 1, that a sufficiently strong air cushion can be formed on the concave side 10 of the air turning bar 9 which prevents the adhesion of the tubing web 3' wound about the air turning bar in this area. It can be seen in Fig. 2, which corresponds to a side view of the air turning bar 9 in direction of arrow II in Fig. 1, that the tubing web

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3' runs off absolutely straight and horizontally to the air turning bar 9 in the area of the zenith of said air turning bar 9. The same is true for the air turning bar 8.

The guide rollers 4 to 7 and the air turning bars 8, 9 all have a horizontal alignment in the draw-off device. Accordingly, the curvature plane of the air turning bars 8, 9 lies in a horizontal plane. The straight run of the tubing web 3' from the air turning bars 8 and 9 prevents the tubing web 3' conveyed in direction of the arrow behind the air turning bars 8 and 9 on a horizontal section 12 or 13 in each case from expanding and thus also a fold formation in their middle area during the flat winding of the respectively adjacent cylindrical guide roller 6 or 7.

Claims:

1. A draw-off device for webs of plastic foil tubing produced by an extruder in the blowing process, having a flattening device for the tubing web conveyed with an expanded round cross-section and with at least one pivoted guide roller as well as at least one air turning bar supported so as to be non-rotatable for conveying the flattened tubing web, whereby the air turning bar is provided with an arrangement of air outlet openings in an area of its peripheral surface about which the flattened tubing web is wound during conveyance, **characterized therein** that the air turning bar (8, 9) exhibits, at a constant outside diameter, a curved course of travel in axial direction and defining a curvature plane (14) with a concave and a convex side (10, 11) of the air turning bar (8, 9) and the air outlet openings are arranged on the concave side (10) of the air turning bar (8, 9).
2. Device according to claim 1, characterized therein that the curvature plane (14) of the air turning bar (8, 9) is arranged parallel to a conveyance plane of the flattened tubing web (3') preset by an upstream guide roller (5, 6).
3. Device according to claim 1 or 2, characterized therein that the air turning bar (8, 9) is supported so as to be adjustable in such a way that its curvature plane (14) can be adjusted from a basic position parallel to the conveyance plane of the flattened tubing web (3') into a position inclined thereto.

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4. Device according to any one of the claims 1 to 3, characterized therein that the height of the arc of the curve provided by the air turning bar (8, 9) is about 1 to 10 mm.
5. Device according to one of the claims 1 to 4, characterized therein that, for conveying narrow tubing webs (3'), the air outlet openings of the air turning bar (8, 9) not required can be sealed.

