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(54) **DEVICE AND METHOD FOR PROCESSING A CONTINUOUS SEMI-FINISHED PRODUCT OF THE TOBACCO INDUSTRY**

VORRICHTUNG UND VERFAHREN ZUR VERARBEITUNG EINES KONTINUIERLICHEN HALBFERTIGPRODUKTS DER TABAKINDUSTRIE

DISPOSITIF ET PROCÉDÉ DE TRAITEMENT D'UN PRODUIT SEMI-FINI CONTINU DE L'INDUSTRIE DU TABAC

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Description

[0001] This invention relates to a device and a method for processing a continuous semi-finished product of the tobacco industry - in particular, a continuous stream of fibre material (specifically, a stream of filter tow) or a continuous succession of filter segments, for example having different properties, so as to form a succession of composite filters.

[0002] Known in the prior art are devices for processing a continuous stream of filter and disposed in a zone for forming a filter rod: that is to say, a zone where the stream of filter is progressively wrapped in a paper web. These devices are provided with a presser element configured to progressively compress the stream in a direction transverse to the longitudinal axis of the stream so that, when the stream is completely wrapped, its natural springback causes it to eliminate any empty spaces in and to fill the paper tube with a good degree of compression. This also allows optimum control over the final diameter of the paper tube formed, hence of the resulting rod, so as to give it the required diameter size more easily and reliably.

[0003] A device of this kind is described in EP3363303, in the name of this Applicant. The device has a compression finger with a curved transverse cross section and provided with suction holes.

[0004] Document EP2767177 describes a different type of device which uses a train of rollers disposed in sequence along the longitudinal axis of the stream to progressively compact the stream. A further device for pressing segments of multi-segment filters is disclosed in WO2014/199284A1.

[0005] The Applicant has found that prior art devices can be improved to overcome certain disadvantages.

[0006] In particular, a device of the first type, if applied to filter material, may give rise to local heating due to the sliding action between the concave section of the presser element and the outside surface of the filter material, also on account of the increased contact force caused by the pneumatic suction.

[0007] The device of the second type, on the other hand, has moving parts (rollers) which are very sensitive to dust and other waste particles present in the air. In effect, these particles can reach the rolling interfaces (bearings), leading to jamming or unwanted friction preventing the rollers from rolling normally.

[0008] In this context, the basic technical purpose of this invention is to provide a device and a method for processing a continuous semi-finished product of the tobacco industry to overcome the above mentioned disadvantages of the prior art.

[0009] More specifically, the aim of this invention is to provide a device and a method for processing a continuous semi-finished product of the tobacco industry which allow obtaining a high level of reliability and, at the same time, producing a filter rod of optimum quality.

[0010] The technical purpose indicated and the aim specified are substantially achieved by a method for

processing a continuous semi-finished product of the tobacco industry comprising the technical features set out in the appended claim 1 or in one or more of the claims dependent thereon, and by a device for processing a continuous semi-finished product of the tobacco industry comprising the technical features set out in claims 6 and 13 or in one or more of the claims dependent thereon.

[0011] Also an object of this invention is a presser element used in the device according to the invention, as set out in one or more of claims 17-18.

[0012] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it and in which:

- Figure 1 shows a schematic transverse cross section of a processing device according to this invention;
- Figure 2 is an even more schematic representation of the view of Figure 1, intended to highlight geometric aspects;
- Figures 3 and 4 show a component of the device of Figure 1 from two different angles;
- Figure 5 shows a simplified view of the processing device according to this invention in a transverse cross section intended to better illustrate the component of Figures 3 and 4;
- Figure 6 shows a schematic transverse cross section of a different embodiment of a processing device according to this invention.

[0013] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a device for processing a continuous semi-finished product of the tobacco industry according to this invention.

[0014] The expression "continuous semi-finished product of the tobacco industry" (labelled 100 in the accompanying drawings) is used, in the context of this invention, to denote an intermediate product of undefined length, which can, in particular, be likened to a continuous product having a main direction of longitudinal extension and which is made to advance in that direction. More specifically, in the context of a machine for making filters in a cigarette production plant, the semi-finished product 100 may be:

- a continuous stream of filter, (specifically, filter tow) obtained at the exit of a respective machine for processing a continuous strip of filter fed from bales; or
- a continuous succession of cylindrical filter segments, made by a machine known as "combining machine" and where the filters are aligned with their axes of symmetry along a common longitudinal feed direction; these segments, although discrete, are abutted end to end to define a continuous outer structure.

[0015] In particular, the invention applies in substantially the same way to both of the above possibilities, as

well as to other forms of semi-finished product falling within the concept of "continuous semi-finished product".

[0016] As may be seen more clearly in the schematic illustration of Figure 1, the device 1 comprises a supporting base 2 having an open-top guide groove 3 for longitudinally feeding a respective semi-finished product 100; the guide groove 3 has an arcuate or substantially semicircular shape. More specifically, the device 1 may be a single-track device or, in an embodiment not illustrated, it may be configured as a device with multiple tracks (twin-track or multi-track device) for simultaneously processing two or more continuous semi-finished products in parallel through respective guide grooves running alongside each other.

[0017] More in detail, the device 1 is a device for forming a filter rod and configured to continuously wrap the continuous semi-finished product 100 in a paper web 200 by using a supporting belt 300, according to known technology. The belt 300, which initially lies in a horizontal plane, receives the paper web 200 and the continuous semi-finished product and, through specific fixed guides, is progressively wrapped around the semi-finished product so as to wrap the paper web 200 around the semi-finished product 100 as the semi-finished product 100 is fed forward longitudinally. During this operation, the belt 300 thus adopts an initial configuration where it is flat and lies in a horizontal plane and then a configuration in which it is progressively folded into a U shape and closed on itself.

[0018] The device 1 also comprises, for each guide groove 3, a respective presser element 4 facing the guide groove 3 and shaped and/or disposed in such a way as to define a cross section of decreasing size for the passage of the semi-finished product 100 so as to apply a progressive compressive action on at least one angular portion of the semi-finished product 100 as the semi-finished product advances. The compression is applied on an "angular" portion because, as may be seen in Figures 1, 2 and 5, the contact zone between the presser element 4 and the semi-finished product 100 affects only a small perimeter band of the circular cross section of the semi-finished product 100.

[0019] Advantageously, the presser element 4 has a pressing surface 5 facing the guide groove 3 and intended to come into sliding contact with the advancing semi-finished product 100 and to apply the progressive compressive action on the semi-finished product 100. The pressing surface 5 is thus adapted to come into contact with the semi-finished product 100 along a longitudinal contact zone which, in particular, is ideally a contact line identified by the tangency between the tubular surface of the semi-finished product 100 and the flat pressing surface 5 but which, in actual fact, is a contact surface defined by the local deformation caused by the flattening of the compressed zone of the semi-finished product 100.

[0020] More specifically, the pressing surface 5 is oriented convergently with the guide groove 3 in such a way that its distance from the guide groove 3 decreases along

the feed direction of the semi-finished product 100 to create a channel with a cross section of decreasing size for the passage of the semi-finished product 100.

[0021] In order to apply compression on the outside surface of the semi-finished product 100, the presser element 4 is disposed at a position on the device 1 where the paper web is wrapped partly, or into a U shape, around the semi-finished product 100 in such a way that an upper portion of the semi-finished product 100 not yet wrapped in the paper web comes into contact with the pressing surface 5 of the presser element 4.

[0022] In order to optimize the compression process, at least the pressing surface 5 is made of stainless steel or a material having a low friction coefficient: for example, a polymeric material such as PTFE.

[0023] The pressing surface 5 is preferably quadrangular, specifically in the shape of a rectangle or trapezium. In the embodiment illustrated in the accompanying drawings, the pressing surface 5 has the shape of a trapezium of width "I" variable along the feed direction of the semi-finished product 100. The width "I" preferably increases in the feed direction of the semi-finished product 100 so that the semi-finished product 100, as it advances, undergoes progressively increasing compression on its surface.

[0024] Preferably, the pressing surface 5 has a length "L", measured parallel to the guide groove 3, of between 30 mm and 100 mm and/or a width "I", measured perpendicularly to the guide groove 3, of between 2 mm and 10 mm.

[0025] Preferably, also, the pressing surface 5 has rounded zones at the side and/or at the front and/or at the rear.

[0026] As may be seen in particular in Figure 2, the pressing surface 5 is inclined at a pressure angle " α " of between 2° and 60°, preferably between 10° and 50° and still more preferably, between 20° and 30°, relative to a horizontal plane. That means a corresponding (complementary) angle, relative to a vertical plane or longitudinal symmetry of the guide groove 3, of between 30° and 88°, preferably between 40° and 80° and still more preferably, between 60° and 70°.

[0027] In effect, it is assumed that the base 2 defining the guide groove 3 lies in a horizontal plane or, in any case, that the guide groove 3 has a vertical plane of symmetry.

[0028] Further, the pressing surface 5 is laterally de-centred relative to a vertical midplane of the guide groove 3, specifically to the left in the views of Figures 1, 2 and 5. In effect, in this situation, the pressing surface 5 has a longitudinal centre line which is permanently de-centred relative to the vertical midplane of the guide groove 3.

[0029] In an embodiment, the presser element 4 is movable translationally towards and away from the guide groove 3 by means of respective actuating means (not illustrated) for varying the distance between the pressing surface 5 and the guide groove 3.

[0030] In another embodiment, the presser element 4

is adjustable about an adjustment axis, parallel to the guide groove 3 or to a longitudinal centre axis of the pressing surface 5, in order to vary the pressure angle " α ".

[0031] Figures 3-5 illustrate a preferred embodiment of the presser element 4, where the presser element has a bottom portion 6 defining the pressing surface 5 and a top portion 7 rigidly connected to the bottom portion 6 and mounted on a frame (not illustrated) of the device 1 and where the bottom portion 6 and the top portion 7 are made as a monolithic part.

[0032] The monolithic part may be made of metallic material or of another material: for example, an anti-friction material. In an embodiment, the monolithic part may be made of a generic material - for example, steel - and lined, on the underside of it, with an anti-friction material defining the pressing surface 5.

[0033] The top surface 7 may be defined by a rib or mounting plate having its own positioning plane, making with the pressing surface 5 an inclination angle " β " of between 30° and 88° , preferably between 40° and 80° and still more preferably, between 60° and 70° . The inclination angle " β " is the complementary angle of the pressure angle " α " when the mounting plate is oriented vertically.

[0034] Figure 6 illustrates a different embodiment of the device according to the invention, differing from the embodiment illustrated in Figures 1-5 in that the pressing surface 5 has a concave shape, with concavity directed towards the semi-finished product 100 and curvature smaller than that of the semi-finished product 100. In a preferred embodiment, the pressing surface 5 has a transverse cross section in the shape of a circular arc whose radius is larger than the radius of the semi-finished product 100.

[0035] In this embodiment, also, the pressing surface 5 has an axis of revolution (oriented longitudinally along the semi-finished product 100 and preferably parallel or substantially parallel therewith), labelled C2 in Figure 6 and the axis of revolution C2 is disposed eccentrically relative to the position plane of the mounting plate of the upper portion 7 to which the lower portion 6, defining the pressing surface 5, is fixed.

[0036] Considering the device 1 as a whole, in the cross section view of Figure 6, the axis of revolution C2 of the pressing surface 5 is also disposed eccentrically relative to a vertical plane and/or a longitudinal midplane of the guide groove 3, passing, in particular, through the longitudinal axis C1 of the semi-finished product 100.

[0037] In use, the semi-finished product 100 is made to advance along a feed direction inside the guide groove 3 and, as it advances, the semi-finished product 100 is progressively compressed by the presser element 4, disposed above the semi-finished product 100.

[0038] The step of applying a progressive compressive action on the semi-finished product 100 is carried out during a step of wrapping the semi-finished product (100) in a continuous paper web 200, specifically before the

semi-finished product 100 is completely wrapped in the continuous paper web 200, at an instant in which the paper web 200 is wrapped partly, or in a U shape, around the semi-finished product 100 in such a way that a top portion of the semi-finished product 100 not yet wrapped in the paper web 200 comes into contact with the pressing surface 5 of the presser element 4.

[0039] Furthermore, the progressive compressive action is applied on the semi-finished product 100 by disposing the pressing surface 5 in contact with the continuous semi-finished product 100 on a contact zone or line (defined by the tangency between the pressing surface 5 and the semi-finished product 100) which is eccentric relative a longitudinal (vertical) midplane of the guide groove 3: that is to say, laterally (angularly) offset relative to the longitudinal midplane. More specifically, the contact line is angularly offset relative to a longitudinal top line of the semi-finished product 100 (or relative to a vertical plane) by an offset angle " γ " that is ideally equal to the pressure angle " α ".

[0040] This, in the embodiment of Figures 1-5, is accomplished by disposing the pressing surface 5 so it lies in a plane that is inclined at the pressure angle " α " to the vertical plane and/or by laterally offsetting the pressing surface 5 relative to the vertical midplane of the guide groove 3.

[0041] In the embodiment of Figure 6, this is accomplished by disposing the axis of revolution of the pressing surface 5 eccentrically relative to the position plane of the mounting plate and/or relative to a vertical plane and/or a longitudinal midplane of the guide groove 3.

[0042] The step of applying a progressive compressive action on the semi-finished product 100 is preceded by a step of adjusting a mutual distance and/or angle between the pressing surface 5 and the respective guide groove 3.

[0043] This invention achieves the preset aims by overcoming the disadvantages of the prior art.

[0044] Making the presser element (or finger) in the form of a stationary part provided with a flat pressing surface enhances the reliability of the compression process (heating is reduced and there are no moving parts).

[0045] Also, the inclination of the surface in combination with its flat position plane has the effect of optimizing the result of the compression process, which occurs gradually on a zone of the semi-finished product laterally offset relative to the top and, thanks to the flat shape of the pressing surface, without score marks or other invasive actions on the surface of the semi-finished product. The inclination also has the effect of applying a lateral pushing action on the semi-finished product, opposite to the simultaneous folding action of the inner edge of the paper web being wrapped around it.

[0046] Moreover, the presence of rounded zones at the edges of the pressing surface improves the properties of the finished semi-finished product: in particular, the (convex) curvature on the trailing side prevents dust/glue residues deposited during the preceding formation proc-

ess from accumulating.

Claims

1. A method for processing a continuous semi-finished product (100) of the tobacco industry, specifically a continuous stream of filter or a continuous succession of filter segments, comprising the step of feeding at least one continuous semi-finished product (100) along a feed direction in an open-top guide groove (3) and, as the semi-finished product (100) advances, applying a progressive compressive action on the semi-finished product (100) by means of a presser element (4) which is located above the semi-finished product (100) and which has, on the underside of it, a pressing surface (5) facing the guide groove (3) and intended to come into sliding contact with the advancing semi-finished product (100) and to apply the progressive compressive action on the semi-finished product (100), the pressing surface (5) is stationary and shaped or disposed in such a way as to come into contact with the continuous semi-finished product (100) along a longitudinal contact band or line that is eccentric relative to a longitudinal top line or portion of the semi-finished product (100); **characterized in that** the pressing surface (5) is planar or it has a concave shape, with concavity facing towards the semi-finished product (100), having a cross section in the shape of a circular arc whose radius is greater than the radius of the semi-finished product (100).
2. The method according to claim 1, wherein the longitudinal contact band or line is angularly spaced by an offset angle (γ) of between 2° and 60°, preferably between 10° and 50° and still more preferably, between 20° and 30°, relative to a vertical plane of symmetry of the semi-finished product (100) and/or of the guide groove (3).
3. The method according to claim 1 or 2, wherein the step of applying a progressive compressive action on the semi-finished product (100) is carried out during a step of wrapping the semi-finished product (100) in a continuous paper web (200), specifically before the semi-finished product (100) is completely wrapped in the continuous paper web (200), at an instant in which the paper web (200) is wrapped partly, or in a U shape, around the semi-finished product (100) in such a way that a top portion of the semi-finished product (100) not yet wrapped in the paper web (200) comes into contact with the pressing surface (5) of the presser element (4).
4. The method according to one or more of the preceding claims, wherein the step of applying a progressive compressive action on the semi-finished product (100) is carried out by positioning the pressing surface at a pressure angle (α) of between 2° and 60°, preferably between 10° and 50° and still more preferably, between 20° and 30°, relative to a horizontal plane.
5. The method according to one or more of the preceding claims, wherein the step of applying a progressive compressive action on the semi-finished product (100) is preceded by a step of adjusting a mutual distance and/or angle between the pressing surface (5) and the respective guide groove (3).
6. A device (1) for processing a continuous semi-finished product (100) of the tobacco industry, specifically a continuous stream of filter or a continuous succession of filter segments, comprising a supporting base (2) having at least guide groove (3) for longitudinally feeding a respective continuous semi-finished product (100) and, associated with the at least one guide groove (3), a respective stationary presser element (4) facing the guide groove (3) and shaped and/or disposed in such a way as to define a cross section of decreasing size for the passage of the semi-finished product (100) so as to apply a progressive compressive action on at least a portion of the semi-finished product (100) as the semi-finished product (100) advances, wherein the presser element (4) has a pressing surface (5) facing the guide groove (3) and intended to come into sliding contact with the advancing semi-finished product (100) and to apply the progressive compressive action on the semi-finished product (100), **characterized in that** the pressing surface (5) is stationary, planar and inclined at a pressure angle (α) of between 2° and 60°, preferably between 10° and 50° and still more preferably, between 20° and 30°, relative to a horizontal plane.
7. The device according to claim 6, wherein the pressing surface (5) has a quadrangular shape, preferably rectangular or trapezium shaped, and is provided at the side and/or at the front and/or at the back with rounded edge zones.
8. The device according to claim 6 or 7, wherein the presser element (4) has a bottom portion (6) defining the pressing surface (5) and a top portion (7) rigidly connected to the bottom portion (6) and mounted on a frame of the device (1) and wherein the bottom portion (6) and the top portion (7) are made as a monolithic part.
9. The device according to any one of claims 6 to 8, wherein the shape of the pressing surface (5) has a width (l) that is variable along the feed direction of the semi-finished product (100), the width (l) preferably increasing in the feed direction of the semi-finished product (100).

ished product (100) so that the semi-finished product (100), as it advances, undergoes compression over a progressively increasing extent.

10. The device according to any one of claims 6 to 9, wherein the pressing surface (5) has a length (L), measured parallel to the guide groove (3), of between 30 mm and 100 mm and/or a width (l), measured perpendicularly to the guide groove (3), of between 2 mm and 10 mm.

11. The device according to any one of claims 6 to 10, wherein the presser element (4) is movable translationally towards and away from the guide groove (3) by means of respective actuating means for varying the distance between the pressing surface (5) and the guide groove (3).

12. The device according to one or more of claims 6 to 11, wherein the presser element (4) is adjustable about an adjustment axis, parallel to the guide groove (3) or to a longitudinal centre axis of the pressing surface (5), in order to vary the pressure angle (α).

13. A device (1) for processing a continuous semi-finished product (100) of the tobacco industry, specifically a continuous stream of filter or a continuous succession of filter segments, comprising a supporting base (2) having at least one guide groove (3) for longitudinally feeding a respective continuous semi-finished product (100) and, associated with the at least one guide groove (3), a respective stationary presser element (4) facing the guide groove (3) and shaped and/or disposed in such a way as to define a cross section of decreasing size for the passage of the semi-finished product (100) so as to apply a progressive compressive action on at least a portion of the semi-finished product (100) as the semi-finished product (100) advances, wherein the presser element (4) has a pressing surface (5) facing the guide groove (3) and intended to come into sliding contact with the advancing semi-finished product (100) and to apply the progressive compressive action on the semi-finished product (100), **characterized in that** the pressing surface (5) is stationary, has a concave shape, with concavity facing towards the semi-finished product (100) and having a cross section in the shape of a circular arc, whose radius is greater than the radius of the semi-finished product (100), and disposed in such a way as to come into contact with the continuous semi-finished product (100) along a longitudinal contact band or line that is eccentric relative to a vertical plane and/or a longitudinal midplane of the guide groove (3).

14. The device according to claim 13, wherein the pressing surface has an axis of revolution and wherein the

axis of revolution is disposed at a position that is eccentric relative to a vertical plane and/or a longitudinal midplane of the guide groove (3).

15. The device according to any one of claims 6 to 14, configured as a multi-line device and comprising two or more parallel guide grooves (3) for feeding respective continuous semi-finished products (100) and, for each guide groove (3), a respective presser element (4) facing the respective guide groove (3) and shaped and/or disposed in such a way as to apply a progressive compressive action on at least a portion of the semi-finished product (100).

16. A machine for making filters in a cigarette production plant, comprising a unit for forming a continuous semi-finished product (100), specifically a continuous stream of filter or a continuous succession of filter segments and, downstream of the unit for forming a continuous semi-finished product (100), a device (1) according to one or more of claims 6 to 15, wherein the device is a device for forming at least one filter rod and configured to continuously wrap the continuous semi-finished product (100) in a paper web (200), the presser element (4) being disposed on the device (1) at a position where the paper web (200) is wrapped partly, or in a U shape, around the semi-finished product (100) in such a way that a top portion of the semi-finished product (100) not yet wrapped in the paper web (200) comes into contact with the pressing surface (5) of the presser element (4).

17. A presser element (4) for processing a continuous semi-finished product of the tobacco industry, specifically a continuous stream of filter or a continuous succession of filter segments, comprising:

- a bottom portion (6) having on the underside of it a stationary pressing surface (5) which is planar and intended to come into sliding contact with the advancing semi-finished product (100) and to apply a progressive compressive action on the semi-finished product (100) as the semi-finished product (100) advances; and
- a top portion (7) rigidly connected to the bottom portion (6) and mounted on a supporting frame;

characterized in that the top portion (7) is at least partly defined by a mounting plate having a main position plane and **in that** the pressing surface (5) is inclined, relative to the main position plane of the mounting plate, at an inclination angle (β) of between 30° and 88°, preferably between 40° and 80° and still more preferably, between 60° and 70°.

18. The presser element according to claim 17, wherein the bottom portion (6) and the top portion (7) are

made as a monolithic part.

Patentansprüche

1. Verfahren zur Verarbeitung eines kontinuierlichen Halbfertigprodukts (100) der Tabakindustrie, insbesondere eines kontinuierlichen Filterstroms oder einer kontinuierlichen Abfolge von Filtersegmenten, umfassend den Schritt zum Zuführen von mindestens einem kontinuierlichen Halbfertigprodukt (100) entlang einer Zuführungsrichtung in einer oberseitig offenen Führungsnut (3) und während des Vorschubs des Halbfertigprodukts (100) Ausüben einer progressiven Kompressionswirkung auf das Halbfertigprodukt (100) mittels eines Presselements (4), das sich über dem Halbfertigprodukt (100) befindet und das auf seiner Unterseite eine Pressoberfläche (5) aufweist, die der Führungsnut (3) zugewandt und dazu bestimmt ist, mit dem vorgeschobenen Halbfertigprodukt (100) in Schiebekontakt zu kommen und eine progressive Kompressionswirkung auf das Halbfertigprodukt (100) auszuüben, wobei die Pressoberfläche (5) stationär und so ausgeformt oder angeordnet ist, dass sie mit dem kontinuierlichen Halbfertigprodukt (100) entlang eines Längskontaktbands oder einer Längskontaktlinie in Kontakt kommt, das/die relativ zu einer oberseitigen Längsline oder einem oberseitigen Längsabschnitt des Halbfertigprodukts (100) exzentrisch ist, **dadurch gekennzeichnet, dass** die Pressoberfläche (5) ebenflächig ist oder eine gewölbte Form mit einem Hohlraum aufweist, der dem Halbfertigprodukt (100) hinführend zugewandt ist, aufweisend einen Querschnitt in der Form eines Kreisbogens, dessen Radius größer ist als der Radius des Halbfertigprodukts (100).
2. Verfahren nach Anspruch 1, wobei das Längskontaktband oder die Längskontaktlinie winkelig um einen Versatzwinkel (γ) zwischen 2° und 60° , vorzugsweise zwischen 10° und 50° und noch bevorzugter zwischen 20° und 30° , relativ zu einer vertikalen Symmetrieebene des Halbfertigprodukts (100) und/oder der Führungsnut (3) beabstandet ist.
3. Verfahren nach Anspruch 1 oder 2, wobei der Schritt zum Ausüben einer progressiven Kompressionswirkung auf das Halbfertigprodukt (100) während eines Schritts zum Einwickeln des Halbfertigprodukts (100) in eine kontinuierliche Papierbahn (200) durchgeführt wird, insbesondere bevor das Halbfertigprodukt (100) vollständig in der kontinuierlichen Papierbahn (200) eingewickelt ist, zu einem Zeitpunkt, an dem die Papierbahn (200) teilweise oder in einer U-Form rund um das Halbfertigprodukt (100) gewickelt ist, sodass ein oberseitiger Abschnitt des Halbfertigprodukts (100), der noch nicht in der Papierbahn

(200) eingewickelt ist, mit der Pressoberfläche (5) des Presselements (4) in Kontakt kommt.

4. Verfahren nach einem oder mehreren der vorhergehenden Ansprüche, wobei der Schritt zum Ausüben einer progressiven Kompressionswirkung auf das Halbfertigprodukt (100) durch Positionieren der Pressoberfläche an einem Presswinkel (α) zwischen 2° und 60° , vorzugsweise zwischen 10° und 50° und noch bevorzugter zwischen 20° und 30° , relativ zur horizontalen Ebene durchgeführt wird.
5. Verfahren nach einem oder mehreren der vorhergehenden Ansprüche, wobei vor dem Schritt zum Ausüben einer progressiven Kompressionswirkung auf das Halbfertigprodukt (100) ein Schritt zum Justieren eines gegenseitigen Abstands und/oder Winkels zwischen der Pressoberfläche (5) und der jeweiligen Führungsnut (3) durchgeführt wird.
6. Vorrichtung (1) zur Verarbeitung eines kontinuierlichen Halbfertigprodukts (100) der Tabakindustrie, insbesondere eines kontinuierlichen Filterstroms oder einer kontinuierlichen Abfolge von Filtersegmenten, umfassend eine Trägerbasis (2), aufweisend mindestens eine Führungsnut (3) zum längsseitigen Zuführen eines jeweiligen kontinuierlichen Halbfertigprodukts (100) und assoziiert mit der mindestens einen Führungsnut (3) ein jeweiliges stationäres Presselement (4), das der Führungsnut (3) zugewandt und so ausgeformt und/oder angeordnet ist, dass ein Querschnitt abnehmender Größe für den Durchgang des Halbfertigprodukts (100) definiert wird, sodass eine progressive Kompressionswirkung auf mindestens einen Abschnitt des Halbfertigprodukts (100) ausgeübt wird, während das Halbfertigprodukt (100) vorgeschoben wird, wobei das Presselement (4) eine Pressoberfläche (5) aufweist, die der Führungsnut (3) zugewandt und dazu bestimmt ist, in Schiebekontakt mit dem vorgeschobenen Halbfertigprodukt (100) zu kommen und auf das Halbfertigprodukt (100) eine progressive Kompressionswirkung auszuüben, **dadurch gekennzeichnet, dass** die Pressoberfläche (5) stationär, ebenflächig und an einem Presswinkel (α) zwischen 2° und 60° , vorzugsweise zwischen 10° und 50° und noch bevorzugter zwischen 20° und 30° , relativ zur horizontalen Ebene angeordnet ist.
7. Vorrichtung nach Anspruch 6, wobei die Pressoberfläche (5) eine viereckige Form, die vorzugsweise rechteckig oder trapezförmig ausgeformt ist, aufweist und an der Seite und/oder an der Vorderseite und/oder an der Rückseite mit abgerundeten Kanten versehen ist.
8. Vorrichtung nach Anspruch 6 oder 7, wobei das Presselement (4) einen unterseitigen Abschnitt (6)

aufweist, der eine Pressoberfläche (5) definiert, und einen oberseitigen Abschnitt (7), der steif mit dem unterseitigen Abschnitt (6) verbunden und auf einem Rahmen der Vorrichtung (1) montiert ist, und wobei der unterseitige Abschnitt (6) und der oberseitige Abschnitt (7) als monolithisches Teil ausgebildet sind.

9. Vorrichtung nach einem der Ansprüche 6 bis 8, wobei die Form der Pressoberfläche (5) eine Breite (l) aufweist, die entlang der Zuführungsrichtung des Halbfertigprodukts (100) variabel ist, wobei sich die Breite (l) vorzugsweise in der Zuführungsrichtung des Halbfertigprodukts (100) erhöht, sodass das Halbfertigprodukt (100) während seines Vorschubs der Kompression über ein sich progressiv erhöhendes Ausmaß unterzogen wird.
10. Vorrichtung nach einem der Ansprüche 6 bis 9, wobei die Pressoberfläche (5) eine Länge (L), parallel gemessen zur Führungsnut (3), zwischen 30 mm und 100 mm und/oder eine Breite (l), rechtwinkelig gemessen zur Führungsnut (3), zwischen 2 mm und 10 mm aufweist.
11. Vorrichtung nach einem der Ansprüche 6 bis 10, wobei das Presselement (4) translatorisch hinführend zur Führungsnut (3) und wegführend von dieser mittels jeweiliger Betätigungsmittel zum Variieren des Abstands zwischen der Pressoberfläche (5) und der Führungsnut (3) bewegbar ist.
12. Vorrichtung nach einem oder mehreren der Ansprüche 6 bis 11, wobei das Presselement (4) um eine Justierachse parallel zur Führungsnut (3) oder einer mittigen Längsachse der Pressoberfläche (5) justierbar ist, um den Druckwinkel (a) zu variieren.
13. Vorrichtung (1) zur Verarbeitung eines kontinuierlichen Halbfertigprodukts (100) der Tabakindustrie, insbesondere eines kontinuierlichen Filterstroms oder einer kontinuierlichen Abfolge von Filtersegmenten, umfassend eine Trägerbasis (2), aufweisend mindestens eine Führungsnut (3) zum längsseitigen Zuführen eines jeweiligen kontinuierlichen Halbfertigprodukts (100) und assoziiert mit der mindestens einen Führungsnut (3) ein jeweiliges stationäres Presselement (4), das der Führungsnut (3) zugewandt und so ausgeformt und/oder angeordnet ist, dass ein Querschnitt abnehmender Größe für den Durchgang des Halbfertigprodukts (100) definiert wird, sodass eine progressive Kompressionswirkung auf mindestens einen Abschnitt des Halbfertigprodukts (100) ausgeübt wird, während das Halbfertigprodukt (100) vorgeschoben wird, wobei das Presselement (4) eine Pressoberfläche (5) aufweist, die der Führungsnut (3) zugewandt und dazu bestimmt ist, in Schiebekontakt mit dem vorgeschobenen Halbfertigprodukt (100) zu kommen und auf

das Halbfertigprodukt (100) eine progressive Kompressionswirkung auszuüben, **dadurch gekennzeichnet, dass** die Pressoberfläche (5) stationär ist, eine gewölbte Form mit einem Hohlraum aufweist, der dem Halbfertigprodukt (100) hinführend zugewandt ist, und aufweisend einen Querschnitt in der Form eines Kreisbogens, dessen Radius größer ist als der Radius des Halbfertigprodukts (100), und so angeordnet, dass sie mit dem kontinuierlichen Halbfertigprodukt (100) entlang eines Längskontaktbands oder einer Längskontaktlinie, die relativ zu einer vertikalen Ebene und/oder einer Längsmittellebene der Führungsnut (3) exzentrisch ist, in Kontakt kommt.

14. Vorrichtung nach Anspruch 13, wobei die Pressoberfläche eine Umdrehungsachse aufweist und wobei die Umdrehungsachse an einer Position angeordnet ist, die relativ zu einer vertikalen Ebene und/oder einer Längsmittellebene der Führungsnut (3) exzentrisch ist.
15. Vorrichtung nach einem der Ansprüche 6 bis 14, ausgelegt als Mehrlinienvorrichtung und umfassend zwei oder mehr parallele Führungsnuten (3) zum Zuführen jeweiliger kontinuierlicher Halbfertigprodukte (100) und für eine jede Führungsnut (3) ein jeweiliges Presselement (4), das der jeweiligen Führungsnut (3) zugewandt und so ausgeformt und/oder angeordnet ist, dass es eine progressive Kompressionswirkung auf mindestens einen Abschnitt des Halbfertigprodukts (100) ausübt.
16. Maschine zur Herstellung von Filtern in einer Zigarettenherstellungsanlage, umfassend eine Einheit zum Formen eines kontinuierlichen Halbfertigprodukts (100), insbesondere eines kontinuierlichen Filterstroms oder einer kontinuierlichen Abfolge von Filtersegmenten, und stromabwärts der Einheit zum Formen eines kontinuierlichen Halbfertigprodukts (100) eine Vorrichtung (1) nach einem oder mehreren der Ansprüche 6 bis 15, wobei die Vorrichtung eine Vorrichtung zum Formen von mindestens einem Filterstab und ausgelegt ist, um das kontinuierliche Halbfertigprodukt (100) kontinuierlich in eine Papierbahn (200) einzuwickeln, wobei das Presselement (4) auf der Vorrichtung (1) an einer Position angeordnet ist, in der die Papierbahn (200) teilweise oder in einer U-Form rund um das Halbfertigprodukt (100) gewickelt wird, sodass ein oberseitiger Abschnitt des Halbfertigprodukts (100), der noch nicht in der Papierbahn (200) eingewickelt ist, mit der Pressoberfläche (5) des Presselements (4) in Kontakt kommt.
17. Presselement (4) zum Bearbeiten eines kontinuierlichen Halbfertigprodukts der Tabakindustrie, insbesondere eines kontinuierlichen Filterstroms oder ei-

ner kontinuierlichen Abfolge von Filtersegmenten, umfassend:

- einen unterseitigen Abschnitt (6), aufweisend auf der Unterseite eine stationäre Pressoberfläche (5), die ebenflächig und dazu bestimmt ist, in Schiebekontakt mit dem vorgeschobenen Halbfertigprodukt (100) zu kommen und auf das Halbfertigprodukt (100) eine progressive Kompressionswirkung auszuüben, während das Halbfertigprodukt (100) vorgeschoben wird, und
- einen oberseitigen Abschnitt (7), der steif mit dem unterseitigen Abschnitt (6) verbunden und auf einem Trägerrahmen montiert ist,

dadurch gekennzeichnet, dass der oberseitige Abschnitt (7) zumindest teilweise durch eine Montageplatte definiert ist, aufweisend eine Hauptpositionsebene, und dadurch, dass die Pressoberfläche (5) relativ zur Hauptpositionsebene der Montageplatte an einem Neigungswinkel (13) zwischen 30° und 88°, vorzugsweise zwischen 40° und 80° und noch bevorzugter zwischen 60° und 70°, geneigt ist.

18. Presselement nach Anspruch 17, wobei der unterseitige Abschnitt (6) und der oberseitige Abschnitt (7) als monolithisches Teil ausgebildet sind.

Revendications

1. Procédé de traitement d'un produit semi-fini continu (100) de l'industrie du tabac, en particulier un flux continu de filtre ou une succession continue de segments de filtre, comprenant l'étape consistant à alimenter au moins un produit semi-fini continu (100) le long d'une direction d'alimentation dans une rainure de guidage à sommet ouvert (3) et, au fur et à mesure que le produit semi-fini (100) avance, à appliquer une action de compression progressive sur le produit semi-fini (100) au moyen d'un élément presseur (4) qui est situé au-dessus du produit semi-fini (100) et qui comporte, sur sa face inférieure, une surface de pression (5) faisant face à la rainure de guidage (3) et destinée à se mettre en contact coulissant avec le produit semi-fini (100) qui avance et à appliquer l'action de compression progressive sur le produit semi-fini (100), la surface de pression (5) est stationnaire et façonnée ou disposée de manière à se mettre en contact avec le produit semi-fini continu (100) le long d'une bande ou ligne de contact longitudinale étant excentrée par rapport à une ligne ou partie supérieure longitudinale du produit semi-fini (100) ; **caractérisé en ce que** la surface de pression (5) est plane ou a une forme concave, la concavité étant orientée vers le produit semi-fini (100), ayant une section transversale en forme d'arc de cercle dont le rayon est supérieur au rayon du produit

semi-fini (100).

2. Procédé selon la revendication 1, dans lequel la bande ou ligne de contact longitudinale est angulairement espacée d'un angle de décalage (γ) compris entre 2 et 60°, de préférence entre 10 et 50° et encore plus préférentiellement entre 20 et 30°, par rapport à un plan vertical de symétrie du produit semi-fini (100) et/ou de la rainure de guidage (3).
3. Procédé selon la revendication 1 ou 2, dans lequel l'étape consistant à appliquer une action de compression progressive sur le produit semi-fini (100) est effectuée au cours d'une étape consistant à envelopper le produit semi-fini (100) dans une bande de papier continue (200), en particulier avant que le produit semi-fini (100) ne soit complètement enveloppé dans la bande de papier continue (200), à un moment où la bande de papier (200) est enveloppée partiellement, ou en forme de « U », autour du produit semi-fini (100) de telle sorte qu'une partie supérieure du produit semi-fini (100) pas encore enveloppée dans la bande de papier (200) se met en contact avec la surface de pression (5) de l'élément presseur (4).
4. Procédé selon une ou plusieurs des revendications précédentes, dans lequel l'étape consistant à appliquer une action de compression progressive sur le produit semi-fini (100) est réalisée en positionnant la surface de pression à un angle de pression (α) compris entre 2 et 60°, de préférence entre 10 et 50° et encore plus préférentiellement, entre 20 et 30°, par rapport à un plan horizontal.
5. Procédé selon une ou plusieurs des revendications précédentes, dans lequel l'étape consistant à appliquer une action de compression progressive sur le produit semi-fini (100) est précédée d'une étape consistant à régler une distance et/ou un angle mutuel(le) entre la surface de pression (5) et la rainure de guidage (3) respective.
6. Dispositif (1) de traitement d'un produit semi-fini continu (100) de l'industrie du tabac, en particulier un flux continu de filtre ou une succession continue de segments de filtre, comprenant une base de support (2) comportant au moins une rainure de guidage (3) pour alimenter longitudinalement un produit semi-fini continu (100) respectif et, associé à l'au moins une rainure de guidage (3), un élément presseur stationnaire (4) respectif faisant face à la rainure de guidage (3) et façonné et/ou disposé de manière à définir une section transversale de taille décroissante pour le passage du produit semi-fini (100) afin d'appliquer une action de compression progressive sur au moins une partie du produit semi-fini (100) au fur et à mesure que le produit semi-fini (100) avance,

- dans lequel l'élément presseur (4) comporte une surface de pression (5) faisant face à la rainure de guidage (3) et destinée à se mettre en contact coulissant avec le produit semi-fini (100) avançant et à appliquer l'action de compression progressive sur le produit semi-fini (100), **caractérisé en ce que** la surface de pression (5) est stationnaire, plane et inclinée à un angle de pression (α) compris entre 2 et 60°, de préférence entre 10 et 50° et encore plus préférentiellement, entre 20 et 30°, par rapport à un plan horizontal.
7. Dispositif selon la revendication 6, dans lequel la surface de pression (5) a une forme quadrangulaire, de préférence rectangulaire ou trapézoïdale, et est pourvue sur le côté et/ou à l'avant et/ou à l'arrière de zones à bords arrondis.
 8. Dispositif selon la revendication 6 ou 7, dans lequel l'élément presseur (4) comporte une partie inférieure (6) définissant la surface de pression (5) et une partie supérieure (7) rigidement reliée à la partie inférieure (6) et montée sur un cadre du dispositif (1) et dans lequel la partie inférieure (6) et la partie supérieure (7) sont réalisées comme une pièce monolithique.
 9. Dispositif selon l'une quelconque des revendications 6 à 8, dans lequel la forme de la surface de pression (5) a une largeur (l) qui est variable le long de la direction d'alimentation du produit semi-fini (100), la largeur (l) augmentant de préférence dans la direction d'alimentation du produit semi-fini (100) de sorte que le produit semi-fini (100), au fur et à mesure qu'il avance, subit une compression sur une étendue progressivement croissante.
 10. Dispositif selon l'une quelconque des revendications 6 à 9, dans lequel la surface de pression (5) a une longueur (L), mesurée parallèlement à la rainure de guidage (3), comprise entre 30 et 100 mm et/ou une largeur (l), mesurée perpendiculairement à la rainure de guidage (3), comprise entre 2 et 10 mm.
 11. Dispositif selon l'une quelconque des revendications 6 à 10, dans lequel l'élément presseur (4) est mobile en translation en se rapprochant et en s'éloignant de la rainure de guidage (3) au moyen de moyens d'actionnement respectifs pour faire varier la distance entre la surface de pression (5) et la rainure de guidage (3).
 12. Dispositif selon une ou plusieurs des revendications 6 à 11, dans lequel l'élément presseur (4) est réglable autour d'un axe de réglage, parallèle à la rainure de guidage (3) ou à un axe central longitudinal de la surface de pression (5), afin de faire varier l'angle de pression (α).
 13. Dispositif (1) de traitement d'un produit semi-fini continu (100) de l'industrie du tabac, en particulier un flux continu de filtre ou une succession continue de segments de filtre, comprenant une base de support (2) comportant au moins une rainure de guidage (3) pour alimenter longitudinalement un produit semi-fini continu (100) respectif et, associé à l'au moins une rainure de guidage (3), un élément presseur stationnaire (4) faisant face à la rainure de guidage (3) et façonné et/ou disposé de manière à définir une section transversale de taille décroissante pour le passage du produit semi-fini (100) afin d'appliquer une action de compression progressive sur au moins une partie du produit semi-fini (100) au fur et à mesure que le produit semi-fini (100) avance, dans lequel l'élément presseur (4) comporte une surface de pression (5) faisant face à la rainure de guidage (3) et destinée à se mettre en contact coulissant avec le produit semi-fini (100) qui avance et à appliquer l'action de compression progressive sur le produit semi-fini (100), **caractérisé en ce que** la surface de pression (5) est stationnaire, a une forme concave, avec une concavité orientée vers le produit semi-fini (100) et ayant une section transversale en forme d'arc de cercle, dont le rayon est supérieur au rayon du produit semi-fini (100), et disposée de manière à se mettre en contact avec le produit semi-fini continu (100) le long d'une bande ou ligne de contact longitudinale excentrée par rapport à un plan vertical et/ou à un plan médian longitudinal de la rainure de guidage (3).
 14. Dispositif selon la revendication 13, dans lequel la surface de pression comporte un axe de révolution et dans lequel l'axe de révolution est disposé en correspondance d'une position étant excentrée par rapport à un plan vertical et/ou un plan médian longitudinal de la rainure de guidage (3).
 15. Dispositif selon l'une quelconque des revendications 6 à 14, configuré comme un dispositif multiligne et comprenant deux ou plusieurs rainures de guidage parallèles (3) pour alimenter des produits semi-finis continus (100) respectifs et, pour chaque rainure de guidage (3), un élément presseur (4) respectif faisant face à la rainure de guidage (3) respective et façonné et/ou disposé de manière à appliquer une action de compression progressive sur au moins une partie du produit semi-fini (100).
 16. Machine de fabrication de filtres dans une installation de production de cigarettes, comprenant une unité de formation d'un produit semi-fini continu (100), en particulier un flux continu de filtre ou une succession continue de segments de filtre et, en aval de l'unité de formation d'un produit semi-fini continu (100), un dispositif (1) selon une ou plusieurs des revendications 6 à 15, dans laquelle le dispositif est un dispo-

sitif de formation d'au moins un bâtonnet-filtre et configuré pour envelopper en continu le produit semi-fini continu (100) dans une bande de papier (200), l'élément presseur (4) étant disposé sur le dispositif (1) en correspondance d'une position où la bande de papier (200) est enveloppée partiellement, ou en forme de « U », autour du produit semi-fini (100) de telle sorte qu'une partie supérieure du produit semi-fini (100) pas encore enveloppée dans la bande de papier (200) se met en contact avec la surface de pression (5) de l'élément presseur (4). 5 10

17. Élément presseur (4) de traitement d'un produit semi-fini continu de l'industrie du tabac, en particulier un flux continu de filtre ou une succession continue de segments de filtre, comprenant : 15

- une partie inférieure (6) comportant sur sa face inférieure une surface de pression stationnaire (5) étant planaire et destinée à se mettre en contact coulissant avec le produit semi-fini (100) avançant et à appliquer une action de compression progressive sur le produit semi-fini (100) au fur et à mesure que le produit semi-fini (100) avance ; et 20 25
- une partie supérieure (7) rigidement reliée à la partie inférieure (6) et montée sur un cadre de support ;

caractérisé en ce que la partie supérieure (7) est au moins partiellement définie par une plaque de montage ayant un plan de position principal et **en ce que** la surface de pression (5) est inclinée, par rapport au plan de position principal de la plaque de montage, à un angle d'inclinaison (β) compris entre 30 et 88°, de préférence entre 40 et 80° et encore plus préférablement, entre 60 et 70°. 30 35 40

18. Élément presseur selon la revendication 17, dans lequel la partie inférieure (6) et la partie supérieure (7) sont réalisées comme une pièce monolithique. 45 50 55

Fig.1

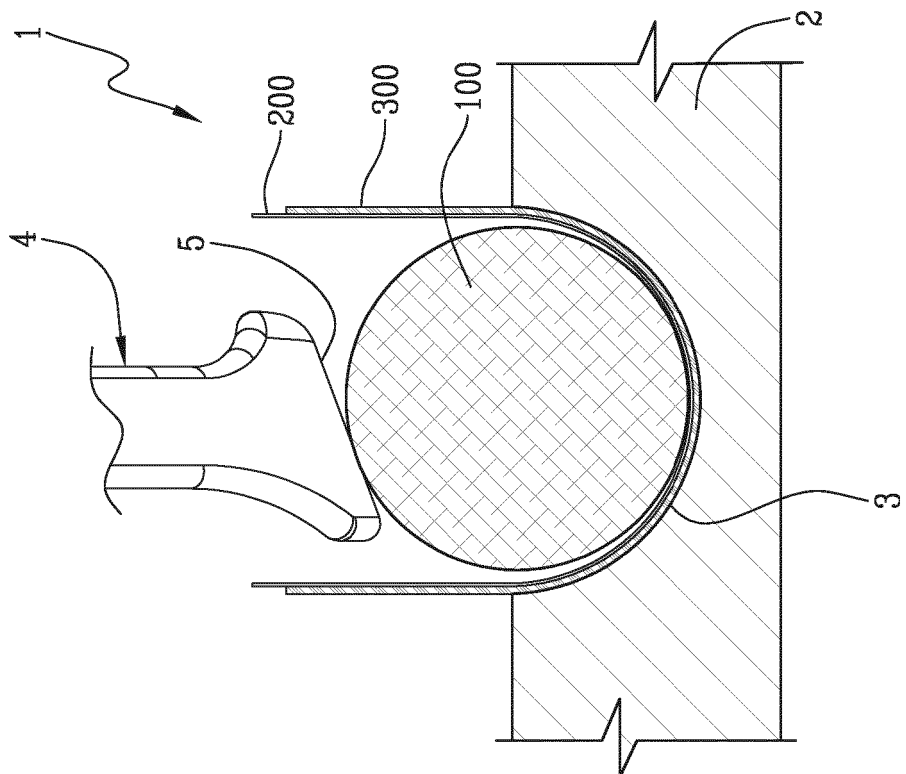
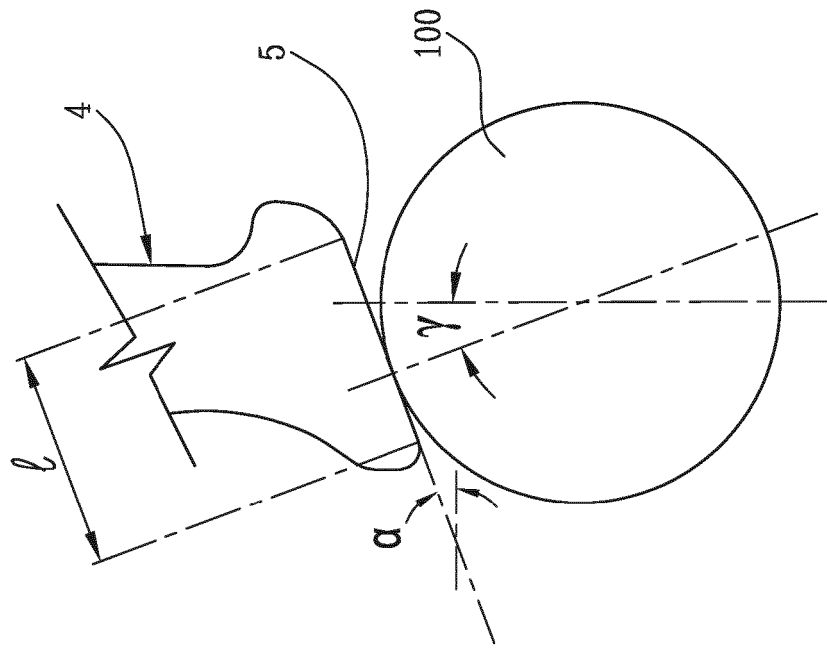


Fig.2



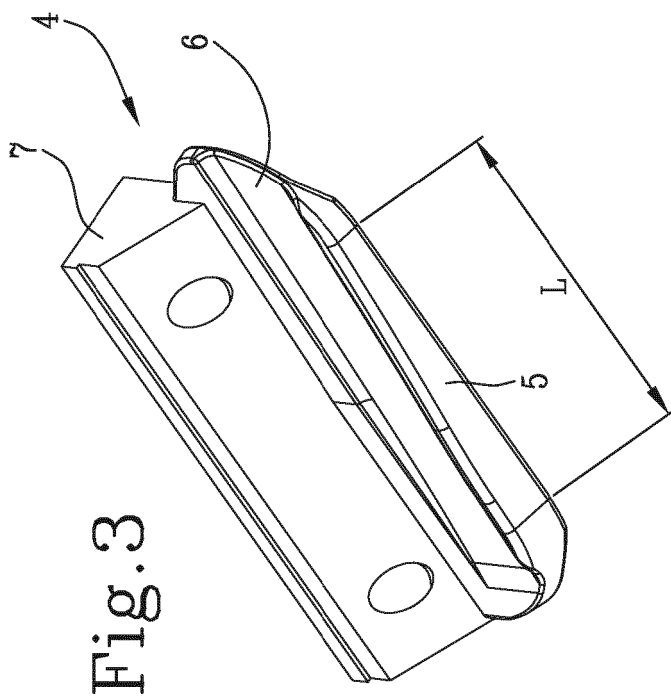
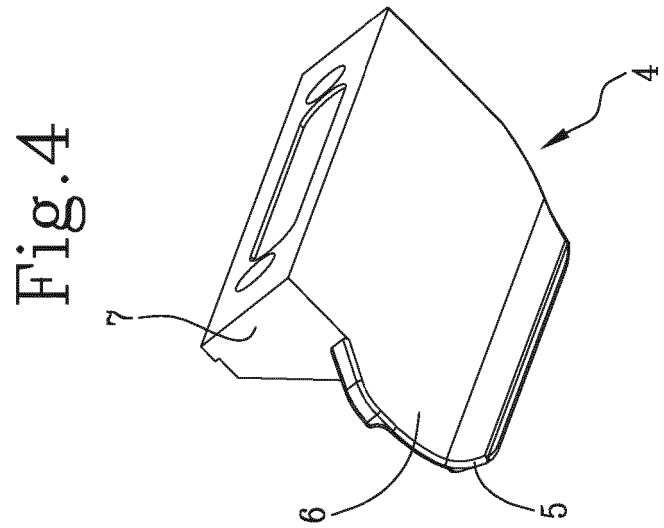
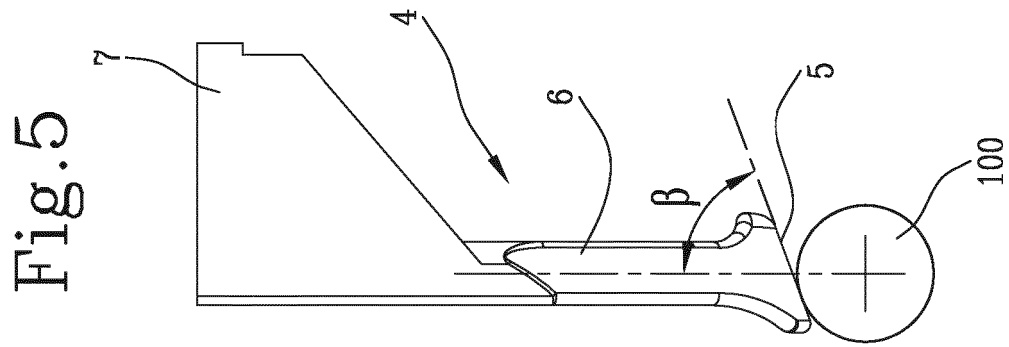
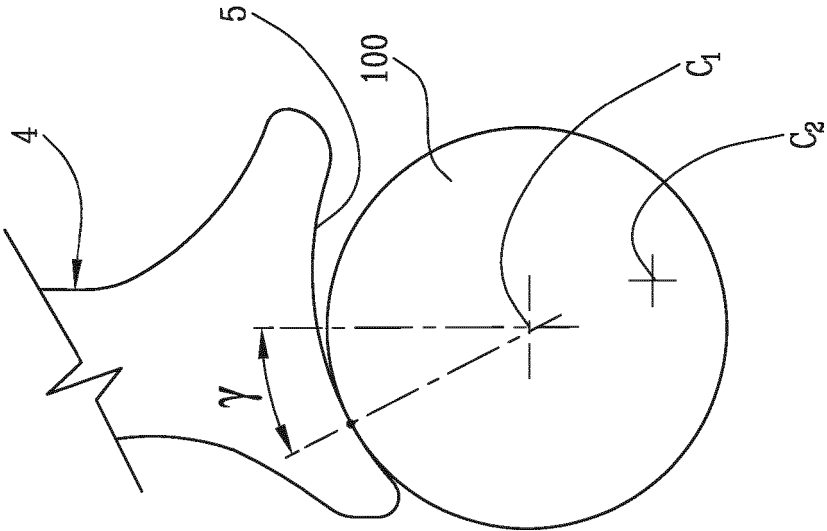


Fig.6



REFERENCES CITED IN THE DESCRIPTION

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