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(54) **Garniture tongue for a filter making apparatus**

(57) A garniture tongue (6, 7, 8, 9) for a filter making apparatus, comprises a guide surface (60, 61, 70, 80, 90) guiding the filter tow running over the guide surface,

and further comprises means (62, 63, 72, 73, 82, 92) arranged on the guide surface for laterally deflecting the filter tow.

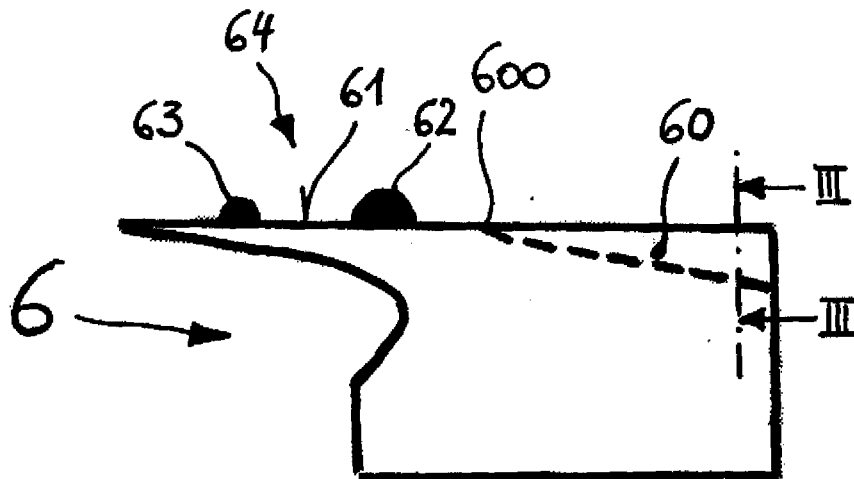


Fig. 2

Description

[0001] The present invention relates to a garniture tongue for a filter making apparatus. Such a filter making apparatus is used for example in the manufacturing of filter elements for smoking articles, such as cigarettes.

[0002] Filter making apparatuses are generally known in the art, for example from the International patent application WO 03/082558. In the production of conventional cigarette filters, the filter tow material, for example cellulose acetate tow, is drawn from a bale and is subsequently transported to the filter making apparatus. Inside the filter making apparatus, in a first step, the tow material is bloomed by a series of rollers running at different speeds, thereby significantly increasing the volume of the tow material. The bloomed filter tow is then converged into a transport jet 3 as shown in Fig. 1. The filter tow material is then fluffed by the injection of compressed air supplied via a suitable arrangement (not shown) to the transport jet 3. After exiting the outlet end of the transport jet 3, the fluffed filter tow material is further converged by the air funnel 4 before entering under a garniture tongue 5. The garniture tongue 5 guides the converging filter tow material exiting from transport jet 3 and air funnel 4 into a standard garniture downstream of outlet end 2 where the filter tow is shaped to rod form having a circular cross section. The resulting continuous rod is then wrapped with a plug wrap and the plug wrap is secured with an overlapping and adhesively bonded seam. Finally, the continuous rod of wrapped filter material is cut into rods of defined length and transported to a cigarette maker.

[0003] While conventional finished filter rods generally have a circular cross section, filter rods and cigarettes with oval cross sections are also known. In order to arrive at the oval shape, the filter rods are typically crushed into the oval shape after they have been produced in a circular form on conventional filter making machinery. This has the disadvantage, that the filter tow material inside the crushed oval filter is not evenly distributed. This decreases the efficiency of the filter. Furthermore, the unevenly distributed fibres inside the crushed oval filter have the tendency to reshape the filter into a circular form. In addition, the crushing has a negative impact on the visual appearance of the filter.

[0004] It would be desirable to provide a filter making apparatus that produces an oval filter with an even distribution of filter tow across the cross section of the filter.

[0005] According to the present invention there is provided a garniture tongue for a filter making apparatus comprising a guide surface capable of guiding filter tow running over the guide surface, and further comprising means arranged on the guide surface for laterally deflecting the filter tow. The laterally deflected filter tow may then be directly formed into an oval or elliptic shape. Preferably, the major axis of the oval cross section of the filter rod generally coincides with the direction of lateral deflection of the filter tow material.

[0006] Such a garniture tongue is particularly suitable for the formation of oval filter rods. The means for laterally deflecting the filter tow forces the fibres of the tow aside laterally to flatten and widen the filter tow. Upstream of the means for laterally deflecting the tow, the tow has essentially a circular cross section. Directly downstream of the deflecting means, the tow assumes for a short period two more or less separate streams, each with a more or less circular cross section. Further downstream of the deflecting means, the fibres of the two smaller streams of tow partially regroup such that the area between the two streams of tow is filled again while the two smaller streams of tow expand into the available space. This results in a relatively oval shape of the rejoined filter tow streams, enabling the formation of an oval filter rod having a uniform distribution of filter tow material. Additionally, the uniform distribution of filter tow material in the filter rod will keep the rod in an oval cross sectional shape and will resist the transformation into a circular cross sectional shape. It has been found, that the distribution of the fibres inside an oval filter manufactured with the garniture tongues according to the invention show a significantly improved uniformity in fibre distribution across the oval filter as compared to "crushed" oval filters or oval filters that are simply drawn through an oval orifice instead of a circular orifice. In addition, resistance to draw characteristics and particle retention capacity is likewise improved.

[0007] Throughout the specification, the term "downstream" is used to indicate the position of an element relative to another in a direction that follows the flow of filter tow through the filter making apparatus. Likewise, the term "upstream" is used to indicate the position of an element relative to another in a direction that is opposite of the downstream direction.

[0008] In one embodiment of the garniture tongue according to the invention, the means for laterally deflecting the filter tow comprises at least one protrusion which is arranged on the guide surface. In a further embodiment with two protrusions, a second protrusion is located downstream of the first protrusion. Preferably, the first protrusion has larger outer dimensions than the second protrusion.

[0009] The protrusions are a particularly effective deflecting means. They may have any suitable shape, such as for example spherical, pyramidal, cylindrical, conical, frustoconical, prismatic, polyhedral, egg-shaped or drop shaped. The protrusion or protrusions may reach partly into the stream of tow or up to the centre of the stream of tow, beyond the centre of the stream of tow or may completely split the stream of tow flowing over and past the protrusion or protrusions.

[0010] In a particular preferred embodiment, the shape of the protrusion or protrusions is spherical. The term "spherical" is meant to include any parts of a sphere, in particular semi-spheres or larger or smaller parts of a sphere. This is applicable similarly for the other shapes of the protrusions mentioned above.

[0011] Throughout the specification, the terms "pyramidal, cylindrical, conical, frustoconical, prismatic" are meant to include all kinds of base shapes. Examples for base shapes are triangular, rectangular, pentagonal, hexagonal, octagonal or parts thereof, circular, semi-circular, oval, elliptical, ring shaped, pie slice shaped or parts thereof.

[0012] Throughout the specification, the term "circular" is meant to include any parts of a circle, in particular semi-circle or larger or smaller parts and slices of a circle, comprising at least one rounded edge. This is applicable similarly for the other geometrical shapes mentioned above.

[0013] Preferably, the at least one bead is glued, welded, soldered, riveted, screwed clamped or otherwise permanently or removably attached to the surface of the garniture tongue.

[0014] Preferably, the garniture tongue is removably attached to the filter making apparatus in order to facilitate easy exchange of the garniture tongue.

[0015] Preferably, the at least one protrusion is made of a material that has a hard, smooth surface that shows little abrasion during use. Preferably, the at least one protrusion is made from steel.

[0016] In an alternative embodiment, the flat surface has at least one hole as a seat for the protrusion. For example, the garniture tongue may have a semi-circular hole or cavity into which an essentially spherical bead is inserted such that only a semi-circular protrusion of the bead is in the path of the moving filter tow.

[0017] In a further embodiment of the garniture tongue according to the invention, the guide surface comprises a channel. Preferably, the channel is open on its side facing the filter tow and the means for laterally deflecting the filter tow are arranged in the channel. In case of the afore-mentioned protrusions, preferably, the protrusion are arranged in the channel.

[0018] In an alternative embodiment of the garniture tongue according to the invention, the means for laterally deflecting the filter tow comprise a protrusion being arranged in the channel and extending longitudinally in the direction of movement of the filter tow. In a particular embodiment, this protrusion may have a circular shape when viewed in cross-section. In another embodiment of the garniture tongue according to the invention, the protrusion may have a gull-wing shape when viewed in cross-section. While the afore-mentioned two embodiments of the protrusion are advantageous, other cross-sectional shapes of the protrusion are conceivable as well. Preferably, the extension of the protrusion into the channel diminishes in a downstream direction.

[0019] In still a further embodiment of the garniture tongue according to the invention, the garniture tongue may comprise a tip having a flat guide surface. Preferably, the means for laterally deflecting the filter tow like the above-mentioned protrusions are arranged on the flat surface of the tip. This is a particularly advantageous embodiment of the garniture tongue according to the in-

vention, especially when two such protrusions are provided one after the other in a downstream direction on the flat surface of the tip with the first protrusion having larger outer dimensions or volume than the second downstream protrusion.

[0020] The invention is further described, by way of example only, with reference to the accompanying drawings, in which:

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- Fig. 1 shows a detail of an embodiment of a filter making apparatus according to the prior art,
 - Fig. 2 shows a side view of a first embodiment of a garniture tongue according to the invention,
 - Fig. 3 shows a partial section along line III-III of the embodiment of the garniture tongue shown in Fig. 2,
 - Fig. 4 shows a side view partially broken away of a second embodiment of the garniture tongue according to the invention,
 - Fig. 5 shows a side view partially broken away of a third embodiment of the garniture tongue according to the invention,
 - Fig. 6 shows a partial section along lines VI-VI of the embodiment of the garniture tongue shown in Fig. 5, and
 - Fig. 7 shows the channel of a fourth embodiment of the garniture tongue according to the invention in a view similar to that of Fig. 6.

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[0021] Fig. 2 and Fig. 3 show a first embodiment of a tongue 6 according to the invention. An inclined channel 60 is indicated in dashed lines in Fig. 2. The inclined channel 60 converges in the downstream direction towards its end 600. The channel 60 is open on one side. Adjacent to the end 600 of the channel 60 the garniture tongue 6 has a flat surface 61 at its tip 64. On the tip 64 of the flat surface 61 two protrusions in the form of semi-spherical beads 62, 63 are arranged. The outer dimension or volume of the first bead 62 is larger than that of the second downstream bead 63. The direction of flow of the filter tow in the embodiment shown is from left to right. Inside the filter making apparatus, the garniture tongue 6 may be arranged upside down such that the flat surface 61 of the garniture tongue 6 faces downwards rather than upwards as shown. This has no influence on the functioning of the garniture tongue 6 according to the invention. The same is true for the further embodiments of the garniture tongues 7, 8, 9 shown in Fig. 4 to Fig. 7

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[0022] In use, the filter tow material runs through the channel 60 and the fibres of the filter tow material are converged and compressed towards the garniture tongue's end 600 due to the geometry of the channel 60. After exiting the channel 60 and running partly over the flat surface 61, the fibres of the filter tow material are deflected laterally by the beads 62, 63. While semi-circular beads 62, 63 are shown in this embodiment by way of example, the beads 62, 63 may have any other suitable shape. The deflected fibres of the filter tow material re-

group downstream of the beads 62, 63. This allows the formation of an oval filter rod during further process steps. The oval filter rod may then be cut into individual oval filters of a desired length, typically a multiple of the final filter length of a cigarette filter.

[0023] A second embodiment of the garniture tongue according to the invention is shown in Fig. 4. In this second embodiment of the garniture tongue 7, the channel 70 is again converging towards its end 700. However, the garniture tongue 7 has no flat upper surface over which the filter tow material runs. Instead, the beads 72, 73 are arranged inside the channel 70.

[0024] In use, the filter tow material runs through the channel 70 and is converged and compressed towards the garniture tongue end 700 due to the geometry of the channel 70. Upon reaching the beads 72, 73, the fibres are deflected laterally.

[0025] A third embodiment of the tongue according to the invention is shown in Fig. 5 and Fig. 6. The garniture tongue 8 has no discrete beads arranged in the channel 80. Instead, a continuous protuberance 82 as protrusion extends longitudinally along the channel 80. The protuberance 82 has a circular shape when viewed in cross-section, in particular it is semi-circular as shown in Fig. 6. However, the protuberance 82 may have any other suitable cross-sectional shape.

[0026] In use, the filter tow material is converged due to the converging geometry of channel 80, and at the same time the fibres of the filter tow material are laterally deflected by the protuberance 82. The deflected fibres regroup downstream of the channel 80.

[0027] Fig. 7 shows the channel 90 of a fourth embodiment of the garniture tongue 9 according to the invention. In this embodiment, the protuberance 92 has a gull-wing shape. As the filter tow material runs through channel 90, it is converged due to the converging geometry of channel 90, and at the same time the fibres of the filter tow material are deflected laterally by the gull-wing shaped protuberance 92. The deflected fibres regroup downstream of the channel 90.

Claims

1. Garniture tongue (6, 7, 8, 9) for a filter making apparatus, comprising a guide surface (60, 61, 70, 80, 90) capable of guiding filter tow running over the guide surface, and further comprising means (62, 63, 72, 73, 82, 92) arranged on the guide surface for laterally deflecting the filter tow.
2. Garniture tongue according to claim 1, wherein the means for laterally deflecting the filter tow comprises at least one protrusion (62, 63, 72, 73) which is arranged on the guide surface (61, 70).
3. Garniture tongue according to claim 2, comprising at least a first protrusion (62, 72) and a second pro-

trusion (63, 73), wherein the second protrusion (63, 73) is arranged downstream of the first protrusion (62, 72).

4. Garniture tongue according to claim 3, wherein the first protrusion (62, 72) has a larger outer dimension than the second protrusion (63, 73).
5. Garniture tongue according to one of the claims 2 to 4, wherein the shape of the protrusion or protrusions (62, 63, 72, 73) is spherical.
6. Garniture tongue according to any one of the preceding claims, wherein the guide surface comprises a channel (70, 80, 90), and wherein the means (72, 73, 82, 92) for laterally deflecting the filter tow are arranged in the channel.
7. Garniture tongue according to claim 6, wherein the means (62, 63, 72, 73, 82, 92) for laterally deflecting the filter tow comprise a protrusion (82, 92) being arranged in the channel (80, 90) and extending longitudinally in the direction of movement of the filter tow.
8. Garniture tongue according to claim 6, wherein the protrusion (82) has a circular shape in cross-section.
9. Garniture tongue according to claim 6, wherein the protrusion (92) has a gull-wing shape in cross-section.
10. Garniture tongue according to any one of claims 1 to 9, further comprising a tip (64) having a flat guide surface (61), with the means (62, 63) for laterally deflecting the filter tow being arranged on the flat surface (61) of the tip (64).
11. Filter making apparatus comprising a garniture tongue according to any one of the preceding claims.
12. A method of making a filter rod having a oval cross section comprising:

running filter tow over a guide surface (60, 61, 70, 80, 90); and
laterally deflecting the filter tow using a protrusion (62, 63, 72, 73, 82, 92) arranged on the guide surface.

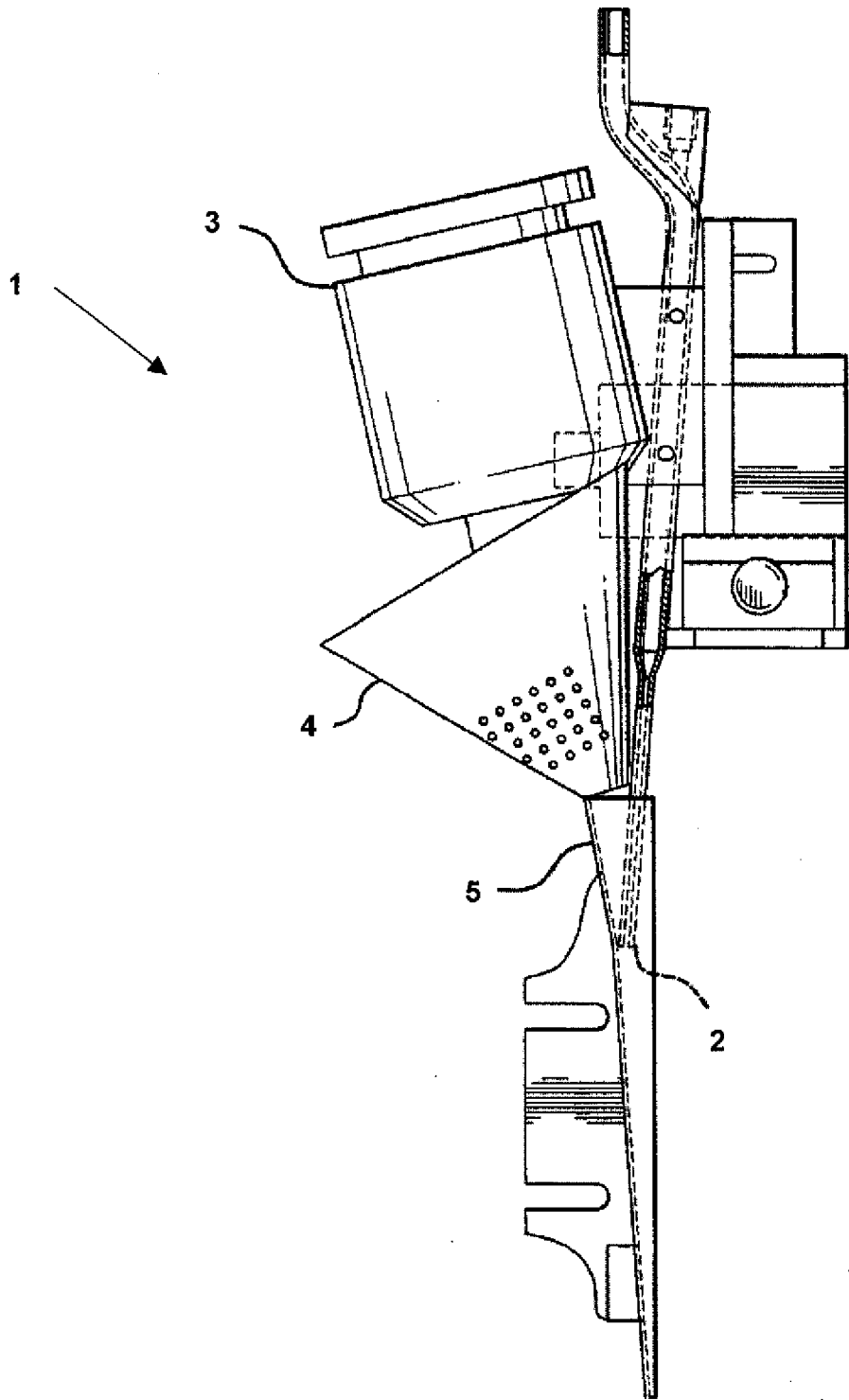


Fig. 1

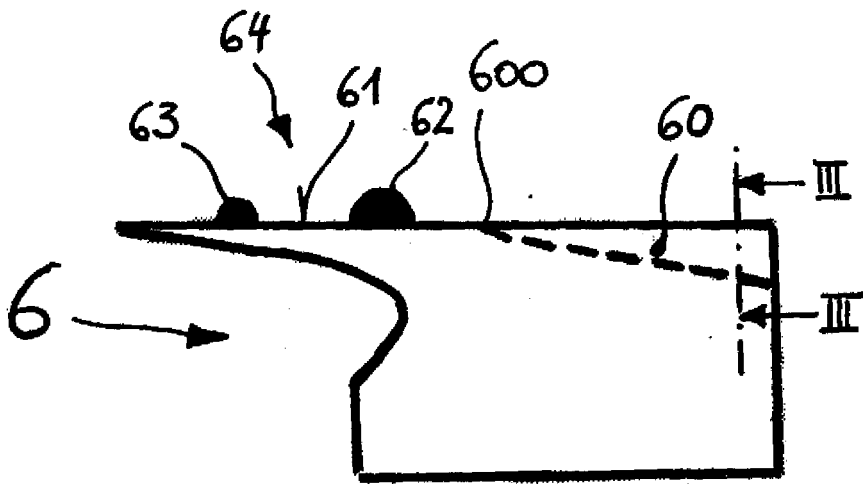


Fig. 2

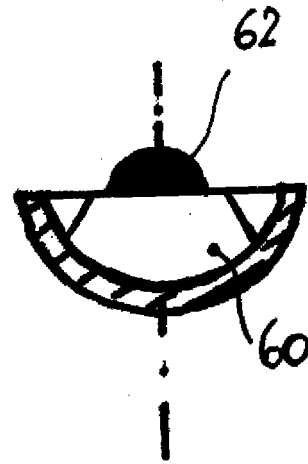


Fig. 3

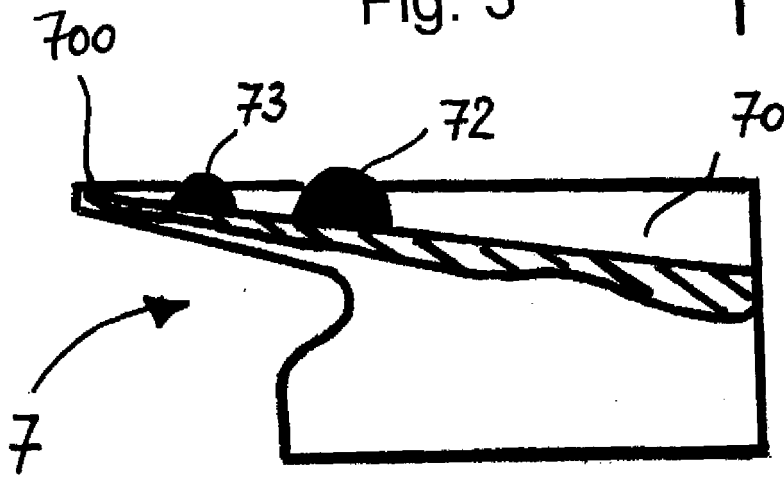
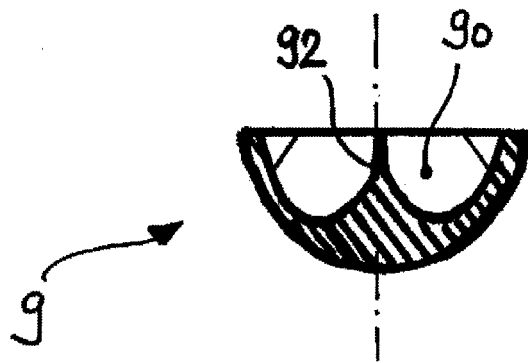
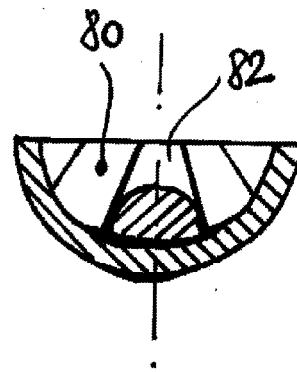
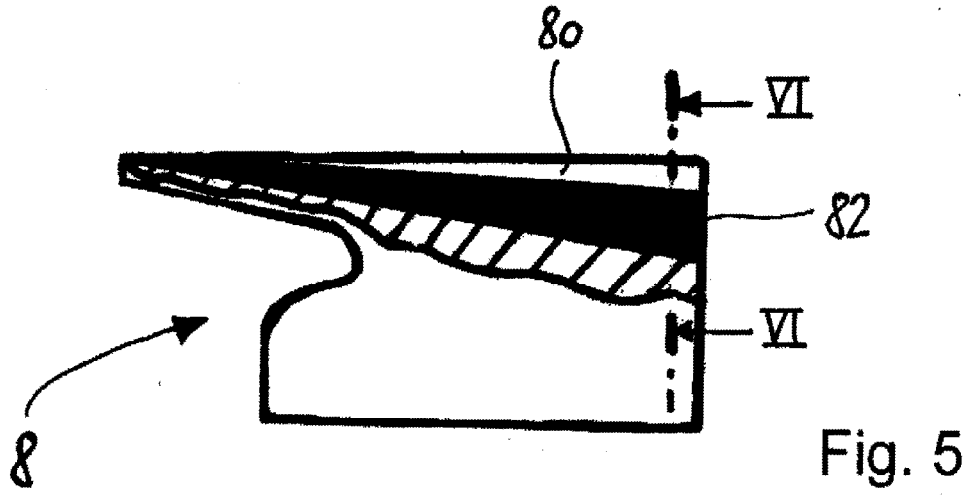


Fig. 4





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Application Number
EP 08 16 0363

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ANNEX TO THE EUROPEAN SEARCH REPORT
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