LAMELLA OF A HEADBOX OF A PAPER, CARDBOARD OR TISSUE MACHINE

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ABSTRACT

Lamella of a headbox through which at least one fibrous suspension flows. The headbox has a machine-width headbox nozzle with a nozzle length and an exit opening, and the headbox nozzle is delimited by an upper nozzle wall and a lower nozzle wall. The lamella, which is structured and arranged to be mounted within the headbox nozzle, includes a lamella body having a downstream lamella end structured and arranged to be positioned downstream, relative to a suspension flow direction, on an opposite end of the lamella body, and the downstream lamella end includes a first surface, a portion coupled to an sloped relative to the first surface, and a second surface, located opposite the first surface, provided with a structure.
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CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a lamella of a headbox of a paper, cardboard or tissue machine. At least one fibrous suspension flows through the headbox, which features a machine-width headbox nozzle having an exit opening. The nozzle has a nozzle length formed by an upper nozzle wall and a lower nozzle wall and a lamella mounted therein.

[0004] 2. Discussion of Background Information

[0005] Such a lamella of a headbox in the form of a multi-layer headbox is known, e.g., from German published patent application DE 44 40 079 A1. The headbox nozzle of the disclosed headbox contains at least one lamella that keeps two neighboring fibrous suspension flows separate from another until the area of an exit opening. The lamella is embodied in a symmetrical way until the area of the exit opening and features at its lamella end a bilateral slope of, e.g., about 2° to 4°, on its upper and lower sides.

[0006] Furthermore, another such lamella of a headbox is known, e.g., from German published patent application DE 43 29 810 A1. The lamella features grooves in its end area which are preferably provided on the upper and lower side of the lamella in various embodiment types and positions or orientations.

[0007] The known lamella forms and structures feature alone or in combination with one another the disadvantage that they lead to unstable flow conditions and thus to oscillation tendencies, i.e., the flows do not always run symmetrically, e.g., when a screen is present at the exit opening, and possible lamella structures cannot be optimally flowed against to avoid turbulence. These difficulties result in a deterioration of the stream quality and thus in defects in the fibrous material web.

SUMMARY OF THE INVENTION

[0008] Therefore, the present invention provides a headbox of the type mentioned at the outset in which the lamella features an improved geometry at its lamella end such that the known disadvantages of the prior art, in particular instabilities in the flow conditions and tendencies to oscillation, are avoided.

[0009] According to the invention, a headbox of the type mentioned at the outset includes a lamella with a lamella length on its downstream lamella end having a slope on a side that faces one of the two nozzle walls and a structure on the opposite side.

[0010] This proposed geometry provides the advantage of the obtainability of stable flow conditions even with unsymmetrical flow channels and the best possible flow against the structured downstream lamella end with regard to avoiding turbulence.

[0011] From flow technology viewpoints it is advantageous if the slope features an angle of slope of about 1.5° to 6°, preferably about 2.5° to 5°, as, consequently, the percentage enlargement of the flow surface does not become too great, thus counteracting the production of separation eddies (turbulences).

[0012] The lamella end features preferably a height of about 0.5 mm to 0.6 mm, preferably 0.5 mm. This height is sufficient to give the lamella end the necessary rigidity for optimal operation of the headbox.

[0013] Furthermore, from material strength viewpoints, the lamella has a predominant lamella thickness of about 2 mm to 6 mm, preferably about 4 mm, since these values have often proved worthwhile in practice in various areas of application.

[0014] In order to be able to influence the fiber orientation in the finished fibrous material web, the upper nozzle wall is provided with a preferably adjustable screen in the area of the exit opening, with the slope of the lamella being directed towards the screen.

[0015] From manufacturing and flow technology viewpoints, it is advantageous if the structure in the lamella features the form of grooves with rectangular and/or wedge shaped and/or parabolic and/or round form with constant and/or variable depth.

[0016] Taking into consideration the latest material developments in the field of polymers, the lamella can be made of at least one high-performance polymer. The high-performance polymer can be in particular a polyphenylene sulfone (PPSU), a polyethersulfone (PES), a polyetherimide (PEI) or a polysulfone (PSU).

[0017] From flow technology viewpoints, the lamella length, in accordance with the instant invention, has a value of at least about 80% of the nozzle length and a flow velocity of the fibrous suspension in the area of the downstream lamella end is in the range of more than about 3 m/s.

[0018] Furthermore, the lamella according to the invention can be formed in a headbox with sectioned consistency control (dilution water technology). This embodiment of the headbox provides the possibility of optionally controlling the through-put, the consistency and, thus, the basis weight and the fiber orientation. Moreover, this control can be provided in the presence of optimal lamellae.

[0019] In order to take into account the present and future production requirements with regard to production volume and the like, the lamella can be mounted in a headbox designed for a stream velocity of more than about 1,500 m/s, preferably more than about 1,800 m/s.

[0020] The lamella can also be mounted in a headbox developed as a multi-layer headbox, with the lamella essentially featuring the aforementioned characteristics, being developed as an intermediate lamella.

[0021] It is contemplated that the instant invention can be used not only in the given combination, but also in other combinations or alone, without going beyond the scope of the invention.
[0022] The present invention is directed to a lamella of a headbox through which at least one fibrous suspension flows. The headbox has a machine-width headbox nozzle with a nozzle length and an exit opening, and the headbox nozzle is delimited by an upper nozzle wall and a lower nozzle wall. The lamella, which is structured and arranged to be mounted within the headbox nozzle, includes a lamella body having a downstream lamella end structured and arranged to be positioned downstream, relative to a suspension flow direction, of an opposite end of the lamella body, and the downstream lamella end includes a first surface, a portion coupled to an sloped relative to the first surface, and a second surface, located opposite the first surface, provided with a structure.

[0023] According to a feature of the present invention, the lamella can be structured and arranged to be mounted within the headbox nozzle supplying a suspension for forming paper, cardboard or tissue machine.

[0024] In accordance with another feature of the invention, the first surface may be structured and arranged to be positioned to face one of the nozzle walls.

[0025] The sloped portion can be oriented at an angle of between about 1.5° to 6° to the first surface. Further, the angle can be between about 2.5° to 5°.

[0026] Moreover, the downstream lamella end may have a height of between about 4.4 mm and 0.6 mm, and preferably about 0.5 mm. The height can be determined from a distance between an end of the sloped portion and the second surface.

[0027] The lamella may have a predominant lamella thickness of between about 2 mm and 6 mm. Still further, the predominant thickness can be about 4 mm.

[0028] The lamella may be located within the headbox nozzle and the upper nozzle wall in the area of the exit opening can be coupled to an adjustable screen. The sloped portion may be positioned toward the adjustable screen.

[0029] The structure can include grooves having at least one of (A) at least one of essentially rectangular, wedge-shaped, parabolic, and essentially round structure, and (B) varying depth.

[0030] The lamella may be composed of at least one high-performance polymer. The high-performance polymer can include at least one of a polyphenylene sulfone (PPSU), a polyethersulfone (PES), a polyetherimide (PEI) or a polysulfone (PSU).

[0031] According to another feature of the present invention, the lamella may have a length that is at least about 80% of the nozzle length.

[0032] A flow velocity of the fibrous suspension in the area of the downstream Lamella end can be within a range of more than about 5 m/s.

[0033] The lamella may be structured and arranged to be mounted in a headbox with sectioned consistency control.

[0034] Moreover, the lamella may be structured and arranged to be mounted in a headbox designed for a stream velocity of more than about 1,500 m/s, and preferably the stream velocity can be more than about 1,800 m/s.

[0035] According to still another feature of the instant invention, the lamella can be structured and arranged to be mounted in a multi-layer headbox. Further, the lamella may be structured and arranged to be an intermediate lamella.

[0036] The present invention is directed to a headbox for supplying at least one fibrous suspension flows. The headbox includes a headbox nozzle having an exit opening, the headbox nozzle and the exit opening being delimited by an upper nozzle wall and a lower nozzle wall, and a lamella mounted within the headbox nozzle having a downstream lamella end structured and arranged to be positioned downstream, relative to a suspension flow direction, of an opposite end of the lamella body. The downstream lamella end includes a first surface, a portion coupled to and sloped relative to the first surface, and a second surface, located opposite the first surface, provided with a structure.

[0037] In accordance with a feature of the invention, an adjustable screen can be coupled to the upper nozzle wall. The sloped portion may be positioned toward the adjustable screen.

[0038] According to another feature of the instant invention, the nozzle may have a nozzle length and the lamella can have a length that is at least about 80% of the nozzle length.

[0039] Further, a flow velocity of the fibrous suspension in the area of the downstream lamella end can be within a range of more than about 5 m/s.

[0040] Moreover, the headbox can be structured and arranged for sectioned consistency control.

[0041] The headbox can be designed for a stream velocity of more than about 1,500 m/s, and preferably the stream velocity can be more than about 1,800 m/s.

[0042] According to still another feature, the headbox may include in a multi-layer headbox. The lamella can be structured and arranged to be an intermediate lamella.

[0043] Moreover, the lamella may be fixedly mounted in the headbox nozzle.

[0044] Further still, the lamella can be pivotably mounted in the headbox nozzle.

[0045] The present invention is directed to a lamella for a headbox in a fibrous material web production machine. The lamella includes a lamella body having a first and second surface and a mountable end and a downstream end remote from the mountable end. The downstream end includes a sloped surface obliquely oriented with respect to and coupled to the first surface and a structure provided at least one of in and on the second surface.

[0046] According to a feature of the instant invention, the sloped surface can be obliquely oriented relative to the first surface at an angle of between about 1.5° to 6° to the first surface. Further, the structure can include grooves having at least one of (A) at least one of essentially rectangular, wedge-shaped, parabolic, and essentially round structure, and (B) varying depth.

[0047] In accordance with still yet another feature of the present invention, the downstream lamella end can have a height, determined from a distance between an end of the sloped portion and the second surface, of between about 0.4 mm and 0.6 mm.

[0048] Other exemplary embodiments and advantages of the present invention may be ascertained by reviewing the present disclosure and the accompanying drawing.
BRIEF DESCRIPTION OF THE DRAWINGS

[0049] The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

[0050] FIG. 1 schematically illustrates a longitudinal section of a headbox with two lamellae according to the invention;

[0051] FIG. 2 schematically illustrates an area view of a multi-layer headbox with a lamella according to the invention;

[0052] FIG. 3a schematically illustrates a longitudinal section of a downstream lamella end of a lamella according to the invention; and

[0053] FIG. 3b schematically illustrates plan views of structural end areas of lamellae according to the invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0054] The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

[0055] FIG. 1 shows a headbox 1 in schematic longitudinal section. This headbox 1 comprises a feed device 2 for a fibrous suspension 3 in headbox 1. Feed device 2 is embodied or formed as a lateral distribution pipe 4. However, it is also contemplated that, in another embodiment, feed device 2 can also include a central distributor with fixed hoses. Headbox 1 further comprises a machine-width device to produce microturbulences (i.e., a “turbulence producer”) 5, upstream from which a machine-width antechamber 6 in flow direction S (arrow) of fibrous suspension 3 is located. As is generally known, turbulence producer 5 includes a plurality of turbulence pipes 5.2 of differing forms arranged in rows and columns next to and above one another. A machine-width headbox nozzle 7 arranged to distribute fibrous suspension 3 between two wires (i.e., lower wire 8.1 and upper wire 8.2) of a twin wire former (gap former) 9, which is not shown in detail, is located after turbulence producer 5 in flow direction S (arrow) of fibrous suspension 3. However, it is contemplated that, in a further embodiment, fibrous suspension 3 can also be distributed to only one wire of a fourdriner wire former or a hybrid former. In FIG. 1, headbox nozzle 7 has a nozzle length L2 and is delimited on an initial or inlet side by turbulence producer 5, on an outer or outlet side by exit opening 7.1, laterally by an upper nozzle wall 13.1 and a lower nozzle wall 13.2, and on two sides by parts which are not shown. Two machine-width lamellae 10.1 and 10.2 are mounted in headbox nozzle 7 of headbox 1, with lower lamella 10.1 being flexibly attached and the upper lamella being rigidly attached to turbulence producer 5.

[0056] According to the invention, both lamellae 10.1 and 10.2 have a respective lamella length L4 and, on their respective downstream lamella ends 11.1 and 11.2, sloped portions 12.11 and 12.12 are provided on the lamella surface arranged to face upper nozzle wall 13.2 and respective structures 12.21 and 12.22 are provided in or on the opposite surface, which faces lower nozzle wall 13.1. Respective lamella length L4 preferably has a value of at least about 80% of nozzle length L4, and flow velocities Vn (arrow) of fibrous suspensions 3, 3.1, and 3.2 in the area of both lamella ends 11.1 and 11.2 are in the range of more than about 5 m/s.

[0057] Furthermore, upper nozzle wall 13.2 is provided with a preferably adjustable screen 7.2 in the area of exit opening 7.1, and respective sloped portions 12.11 and 12.12 are directed toward screen 7.2.

[0058] Lamellae 10.1 and 10.2 are made of at least one high-performance polymer, which includes, e.g., a polyethylene sulfone (PPSU), a polyethersulfone (PES), a polyetherimide (PEI) and/or a polysulfone (PSU).

[0059] In order to take into account the present and future production requirements regarding production volume and the like, lamellae 10.1 and 10.2 of headbox 1 are designed from hydraulic and flow technology viewpoints for a stream velocity Vn (arrow) of more than about 1,500 m/s, preferably of more than about 1,800 m/s.

[0060] The schematic perspective view of FIG. 2 shows a headbox embodied or formed as a multi-layered headbox 1.1 having feeding devices 2.1, 2.2, which are only schematically shown, for introducing different fibrous stock suspensions 3.1, 3.2. Nozzle 7 is limited in a known fashion by two flow guidance walls 13.1, 13.2 over the width of the machine. These walls are each connected to a central, stationary separation wall 14 by a known turbulence generator 5.1.1. A separating lamella 16 is pivotally mounted on the distributing end of separating wall 14 by a joint 15. Alternatively, separating lamella 16 may also be mounted in a stationary manner relative to separating wall 14.

[0061] According to the invention, the plurality of intermediate lamellae 16.1 are embodied or formed as lamellae 10.1, 10.2 according to the invention.

[0062] According to the invention, multi-layered headbox 1.1 is embodied or formed as a headbox having a sectional fibrous suspension density control (dilution water technology) as disclosed in German publication DE 40 19 593 A1, U.S. Pat. No. 5,707,495, and U.S. Pat. No. 5,885,420 of the Applicant, the disclosures of which are expressly incorporated by reference herein in their entireties. An initial fibrous stock suspension flow having a high consistency Qs travels via a crosswise distribution pipe 4 through a number of sectional feeding pipes 17-17n branching off therefrom to turbulence generator 5. Modified from FIG. 2, a volume flow control may be provided in each of the sectional feeding pipes 17-17n. In order to embody a sectional stock density control the second fibrous stock suspension flow, having a lower consistency Qs, e.g., backwater-1, is guided via a crosswise distribution pipe 4.1 and sectional feeding pipes 18-18n into the sectional feeding pipes 17-17n. Each sectional feeding pipe 18-18n has a control valve 19-19n.
in order to feed a controlled sectional fibrous stock suspension flow $Q_{11}$ to each of the corresponding merging or mixing points $20, 20n$ in which it is merged or mixed with the sectional fibrous stock suspension flow $Q_{11}$. A third fibrous stock suspension flow having a medium or high consistency $Q_{11,2}$ arrives at the turbulence generator 5.1 via a crosswise distribution pipe 4.2 and via a number of sectional feeding pipes 21, 21n branching off therefrom. Thus, in this embodiment of the multi-layered headbox 1.1, the possibility is created of allowing the sectional control of the throughput, the stock density, and thus the basis weight and the orientation of the fibers, in the presence of an optimal separation lamella 16.

[0063] Headbox 1 shown in FIG. 1 may naturally also be embodied or formed as a headbox having sectioned stock density control (dilution water technology) according to the above-mentioned embodiments.

[0064] FIG. 3e shows a schematic longitudinal section of downstream lamella end 11.1 of lamella 10.1 in accordance with the features of the present invention.

[0065] According to the invention, sloped portion 12.11 features an angle of slope $e_{11}$ within a range of about 1.5° to 6°, and preferably between about 2.5° to 5°. Moreover, lamella end 11.1 features a height $H$ from an end of the sloped portion to the bottom side 10.1 of between about 0.4 mm to 0.6 mm, and preferably about 0.5 mm. Lamella 10.1 has a predominant lamella thickness D of between about 2 to 6 mm, and preferably about 4 mm.

[0066] In another design, structured lamella end 11.1 may be embodied or formed with a grooved structure 22 that is essentially rectangular and/or wedge-shaped and/or parabolic and/or essentially round with constant and/or varying depth.

[0067] FIG. 3b shows three schematic and exemplary plan views according to elevation arrow E depicted in FIG. 3a on structured lamella ends 11.1 of lamellae 10.1 according to the invention.

[0068] It is clearly shown that structured lamella ends 11.1 of lamellae 10.1 according to the invention can feature a plurality of grooves 22 with rectangular (A) and/or wedge-shaped (B) and/or parabolic (C) and/or round form with constant and/or varying depth.

[0069] Further combinations regarding the design of the structured end areas are known to the applicant from German published patent application DE 43 29 810 A1 and U.S. Pat. No. 5,639,352, the disclosures of which are expressly incorporated by reference herein in their entirety.

[0070] In summary, it should be noted that the invention provides a headbox of the type mentioned at the outset, the lamella of which features an improved geometry at its lamella end, so that the known disadvantages of the prior art are avoided, in particular instabilities in the flow conditions and oscillation tendencies.

[0071] It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

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What is claimed:

1. A lamella of a headbox through which at least one fibrous suspension flows, the headbox having a machine-width headbox nozzle with a nozzle length and an exit opening, and the headbox nozzle being delimited by an upper nozzle wall and a lower nozzle wall, said lamella, which is structured and arranged to be mounted within the headbox nozzle, comprising:

a lamella body having a downstream lamella end structured and arranged to be positioned downstream, relative to a suspension flow direction, of an opposite end of said lamella body; and
said downstream lamella end comprising a first surface, a portion coupled to an sloped relative to said first surface, and a second surface, located opposite said first surface, provided with a structure.

2. The lamella in accordance with claim 1, wherein the lamella is structured and arranged to be mounted within the headbox nozzle supplying a suspension for forming paper, cardboard or tissue machine.

3. The lamella in accordance with claim 1, wherein said first surface is structured and arranged to be positioned to face one of the nozzle walls.

4. The lamella in accordance with claim 1, wherein said sloped portion is oriented at an angle of between about 1.5° to 6° to said first surface.

5. The lamella in accordance with claim 4, wherein said angle is between about 2.5° to 5°.

6. The lamella in accordance with claim 1, wherein said downstream lamella end has a height of between about 0.4 mm and 0.6 mm.

7. The lamella in accordance with claim 6, wherein the height is about 0.5 mm.

8. The lamella in accordance with claim 6, wherein said height is determined from a distance between an end of said sloped portion and said second surface.

9. The lamella in accordance with claim 1, wherein said lamella has a predominant lamella thickness of between about 2 mm and 6 mm.

10. The lamella in accordance with claim 9, wherein said predominant thickness is about 4 mm.

11. The lamella in accordance with claim 1 in combination with the headbox, wherein said lamella is located within the headbox nozzle and the upper nozzle wall in the area of the exit opening is coupled to an adjustable screen, and wherein said sloped portion is positioned toward the adjustable screen.

12. The lamella in accordance with claim 1, wherein said structure comprises grooves having at least one of:

   (A) at least one of essentially rectangular, wedge-shaped, parabolic, and essentially round structure,

   (B) varying depth.

13. The lamella in accordance with claim 1, wherein said lamella is composed of at least one high-performance polymer.

14. The lamella in accordance with claim 13, wherein said high-performance polymer comprises at least one of a polyphenylene sulfone (PPSU), a polyethersulfone (PES), a polyetherimide (PEI) or a polysulfone (PSU).

15. The lamella in accordance with claim 1, wherein said lamella has a length that is at least about 80% of the nozzle length.

16. The lamella in accordance with claim 1 in combination with the headbox, wherein a flow velocity of the fibrous suspension in the area of said downstream lamella end is within a range of more than about 5 m/s.

17. The lamella in accordance with claim 1, wherein said lamella is structured and arranged to be mounted in a headbox with sectioned consistency control.

18. The lamella in accordance with claim 1, wherein said lamella is structured and arranged to be mounted in a headbox designed for a stream velocity of more than about 1,500 m/s.

19. The lamella in accordance with claim 18, wherein the stream velocity is more than about 1,800 m/s.

20. The lamella in accordance with claim 1, wherein said lamella is structured and arranged to be mounted in a multi-layer headbox.

21. The lamella in accordance with claim 20, wherein said lamella is structured and arranged to be an intermediate lamella.

22. A headbox for supplying at least one fibrous suspension flows, comprising:

   a headbox nozzle having an exit opening, said headbox nozzle and said exit opening being delimited by an upper nozzle wall and a lower nozzle wall;

   a lamella mounted within said headbox nozzle having a downstream lamella end structured and arranged to be positioned downstream, relative to a suspension flow direction, of an opposite end of said lamella body and said downstream lamella end comprising a first surface, a portion coupled to and sloped relative to said first surface, and a second surface, located opposite said first surface, provided with a structure.

23. The headbox in accordance with claim 22, wherein said first surface is structured and arranged to be positioned to face one of the nozzle walls.

24. The headbox in accordance with claim 22, wherein said sloped portion is oriented at an angle of between about 1.5° to 6° to said first surface.

25. The headbox in accordance with claim 24, wherein said angle is between about 2.5° to 5°.

26. The headbox in accordance with claim 22, wherein said downstream lamella end has a height of between about 0.4 mm and 0.6 mm.

27. The headbox in accordance with claim 26, wherein the height is about 0.5 mm.

28. The headbox in accordance with claim 26, wherein said height is determined from a distance between an end of said sloped portion and said second surface.

29. The headbox in accordance with claim 22, wherein said lamella has a predominant lamella thickness of between about 2 mm and 6 mm.

30. The headbox in accordance with claim 29, wherein said predominant thickness is about 4 mm.

31. The headbox in accordance with claim 22, further comprising an adjustable screen coupled to said upper nozzle wall,

   wherein said sloped portion is positioned toward the adjustable screen.

32. The headbox in accordance with claim 22, wherein said structure comprises grooves having at least one of:

   (A) at least one of essentially rectangular, wedge-shaped, parabolic, and essentially round structure,

   (B) varying depth.

33. The headbox in accordance with claim 22, wherein said lamella is composed of at least one high-performance polymer.

34. The headbox in accordance with claim 33, wherein said high-performance polymer comprises at least one of a polyphenylene sulfone (PPSU), a polyethersulfone (PES), a polyetherimide (PEI) or a polysulfone (PSU).

35. The headbox in accordance with claim 22, wherein said nozzle has a nozzle length and said lamella has a length that is at least about 80% of said nozzle length.
36. The headbox in accordance with claim 22, wherein a flow velocity of the fibrous suspension in the area of said downstream lamella end is within a range of more than about 5 m/s.

37. The headbox in accordance with claim 22, wherein said headbox is structured and arranged for sectional consistency control.

38. The headbox in accordance with claim 22, wherein said headbox designed for a stream velocity of more than about 1,500 m/s.

39. The headbox in accordance with claim 38, wherein the stream velocity is more than about 1,800 m/s.

40. The headbox in accordance with claim 22, wherein said headbox comprises in a multi-layer headbox.

41. The headbox in accordance with claim 40, wherein said lamella is structured and arranged to be an intermediate lamella.

42. The headbox in accordance with claim 22, wherein said lamella is fixedly mounted in said headbox nozzle.

43. The headbox in accordance with claim 22, wherein said lamella is pivotably mounted in said headbox nozzle.

44. A lamella for a headbox in a fibrous material web production machine, comprising:

   a lamella body having a first and second surface and a mountable end and a downstream end remote from said mountable end;

   said downstream end comprising a sloped surface obliquely oriented with respect to and coupled to said first surface and a structure provided at least one of in and on said second surface.

45. The lamella in accordance with claim 44, wherein said sloped surface is obliquely oriented relative to said first surface at an angle of between about 1.5° to 6° to said first surface.

46. The lamella in accordance with claim 45, wherein said structure comprises grooves having at least one of:

   (A) at least one of essentially rectangular, wedge-shaped, parabolic, and essentially round structure,

   (B) varying depth.

47. The lamella in accordance with claim 44, wherein said downstream lamella end has a height, determined from a distance between an end of said sloped portion and said second surface, of between about 0.4 mm and 0.6 mm.