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(72) Inventors:
• **KOWALKIEWICZ, Piotr**
87-100 Torun (PL)
• **RANISZEWSKI, Robert**
86-100 Swiecie (PL)
• **SCHWAIGER, Elisabeth**
9431 St. Stefan (AT)

(71) Applicant: **Mondi AG**
1030 Wien (AT)

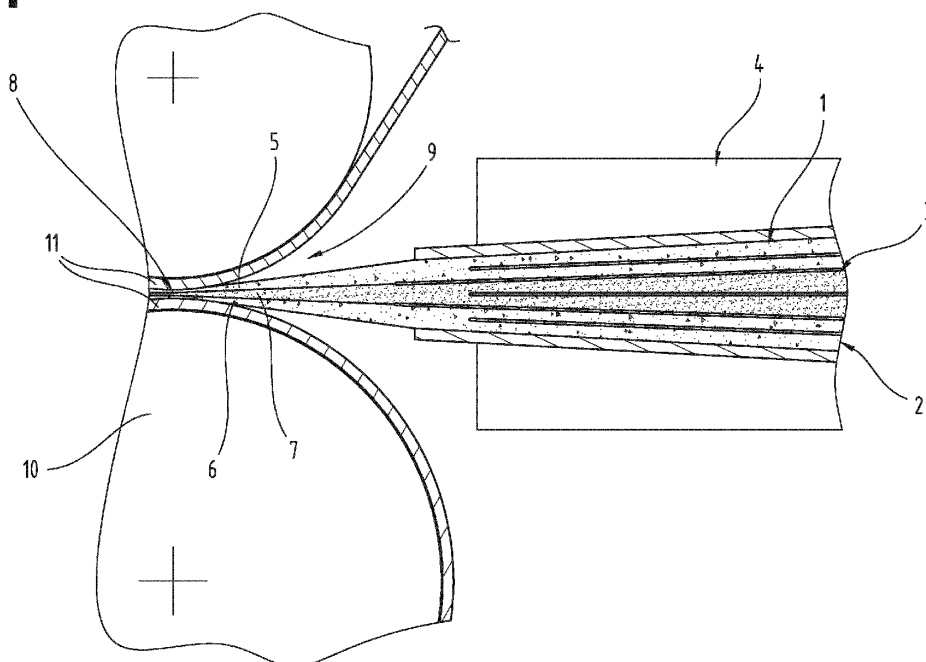
(74) Representative: **Burger, Hannes**
Anwälte Burger & Partner
Rechtsanwalt GmbH
Rosenauerweg 16
4580 Windischgarsten (AT)

(54) **METHOD FOR PRODUCING A MULTI-LAYER PACKAGING PAPER OR BOARD**

(57) The invention pertains to a method for producing a multi-layer packaging paper or board. The method comprises providing a first pulp suspension, a second pulp suspension and an aqueous composition, wherein the first pulp suspension, the second pulp suspension and the aqueous composition are fed to a multi-layer headbox of a paper machine such as to form a multi-layer web,

which multi-layer web is subsequently dried by means of the paper machine. The aqueous composition is provided comprising 92 wt.% to 99,9 wt.% water and 0,1 wt.% to 8 wt.% of one or more water-soluble dye(s). Based on 100 wt.% of aqueous composition, up to 4 wt.% of the maximum 8 wt.% of the one or more water-soluble dye(s) may be replaced by a cellulose fibre material.

Fig.1



Description

[0001] The invention relates to a method for producing a multi-layered packaging paper or board.

[0002] Like many technology industries the paper packaging industry nowadays seeks ways to produce packaging paper and board with more economic reasonable, but also more sustainable methods. One already well-established way to achieve such goal is the re-use of paper material by recycling already used paper or board.

[0003] The use of recycled fibre material recovered from used paper or board is not without problems however, one aspect in this regard involving consumer expectations and acceptance. Consumers in particular tend to relate the optical appearance of paper packages to quality. For example, customers are well accustomed to a brownish colouring of packaging paper and board. Paper packages exhibited such brownish colour from the beginning of paper packaging back in the days on, primarily resulting from the residual lignin present in unbleached paper. Packaging paper with white colour is also commonly used and accepted in paper packaging, especially when a packaging includes printing applications, like logos, text or pictures of the packed goods. Printing coloured, for example brownish packaging paper or board is also possible of course, but with usually lower quality demands.

[0004] The colour of recycled paper material per se however is basically uncontrollable, at least without taking further measures. For example, due to former printing, degradation and use in general, paper products made of recycled fibre material may exhibit varying optical appearance, wherein a greyish colour is most common with paper products made of untreated, recycled fibre material. Because of this optical appearance, paper products like paper or board packaging products made of purely untreated recycled fibre material, are often deemed unacceptable by consumers.

[0005] Several ways to address this issue have been applied in the past. One way involves chemical treatment of fibre material recovered from used paper products, often including a chemical brightening step for recycled fibre material. Such chemical treatment of recycled fibre material however involves the use of high amounts of treatment chemicals, at least some of those treatment chemicals being considered as ecologically questionable or even harmful. Furthermore, such chemical treatment always involves degradation of the treated fibres, primarily resulting in a shortening of fibre length, thus limiting the number of cycles for reuse of the fibre material. In addition, such chemical treatment of recycled fibres does also negatively effect productions costs.

[0006] Other ways to address the optical appearance issues related to the use of recycled fibre material avoiding extensive chemical treatment involve the use of dyes and/or virgin fibre material in combination with recycled fibre material, wherein a combination of both measures

is quite common. Such products typically are multiply paper products, comprising at least a ply primarily consisting of recycled fibres and a ply primarily comprising virgin fibre material. Both of these plies or layers may contain dyes, for example brownish or white dyes, wherein dying of such base plies requires use of high amounts of dyes to be effective.. Both the use of a virgin fibre material containing ply and dying pertain to optical coverage of an underlying ply consisting essentially of recycled fibre material. Virgin fibre material often must also be used to meet mechanical strength requirements for a packaging paper or board. Using dyes or virgin fibres or a combination of both however involves the use of high amounts of costly materials. Therefore, a need still exists to at least minimize the amounts of virgin fibre material or dyes within such paper applications.

[0007] Multi-ply paper products are basically being produced in two different ways. One method is called multi-ply forming, wherein individual plies are formed separately using several headboxes, (pre)drying these distinct plies and joining them at different levels of water content. Such individual plies may for example be fused in a wet state within a forming section of a paper machine. Separate plies may however also be pressed or glued together in various states of water content.

[0008] An alternative method for producing multi-layered paper products is the so-called multi-layer forming, wherein several stock suspensions of fibre material are brought together in one headbox and one multilayer web is initially formed in a paper machine and dried in multiple successive sections of the paper machine. Such multi-layer method and devices used therefor are for example disclosed in EP 2 784 214 A1.

[0009] The objective of the invention is to address the disadvantages of the prior art methods mentioned above, and to provide a more sustainable and cost-effective, novel method for producing a multi-layered packaging paper or board with no or at least no essential drawbacks regarding consumer acceptance.

[0010] This objective is achieved by a method as defined in the claims.

[0011] The method for producing a multi-layered packaging paper or board comprises the steps

- providing a first pulp suspension comprising 95 wt.% to 99,5 wt.% water and 0,5 wt.% to 5 wt.% of a first fibre material, wherein the first fibre material is provided comprising 50 wt.% to 100 wt.% virgin cellulose material,
- providing a second pulp suspension comprising 95 wt.% to 99,5 wt.% water and 0,5 wt.% to 5 wt.% of a second fibre material, wherein the second fibre material is provided comprising 50 wt.% to 100 wt.% recycled fibre material,
- providing an aqueous composition.

[0012] Further the method comprises

- feeding the first pulp suspension to a multi-layer headbox of a paper machine such as to form a top layer,
- feeding the second pulp suspension to the multi-layer headbox of the paper machine such as to form a bottom layer,
- feeding the aqueous composition to the multi-layer headbox of the paper machine in between the top layer and the bottom layer such as to form an intermediate, aqueous layer,
- forming a multi-layer web comprising the top layer, the intermediate, aqueous layer, and the bottom layer,
- and drying of the multi-layer web by means of the paper machine.

[0013] Thereby the aqueous composition is provided comprising 92 wt.% to 99,9 wt.% water and 0,1 wt.% to 8 wt.% of one or more water-soluble dye(s).

[0014] The first and second pulp suspensions may also be denoted stock suspensions. All solid materials added to the suspensions and the aqueous composition are of course added prior to feeding the corresponding suspensions and the aqueous composition to the multi-layer headbox.

[0015] By way of the method multi-layer packaging papers and boards can be manufactured in more sustainable and cost-effective way as compared to prior art technology. Surprisingly the inventors found, that in comparison to prior art technology as described above, both the amount of virgin fibre material used to form the top layer as well as the overall amount of dye(s) can be lowered without substantial negative effects regarding the optical appearance of the packaging paper or board. In other words, the same good results regarding masking the colour of the recycled fibre material of the bottom layer from shining through to the surface of the top layer can be achieved with substantially lower amounts of costly virgin fibre material and dye(s). Depending on specific requirements on paper or board quality it was found, that by way of the method up to 40 % less virgin fibre material and up to 35 % less dye(s) are sufficient to achieve similar results as with the prior art technologies.

[0016] It is believed that applying the dye(s) in a separate ply or layer leads to a more efficient optical coverage of the recycled fibre material containing bottom layer by the dye(s), since a (chemical) dyeing of fibre material may be omitted or at least reduced. Therefore, the dye(s) introduced by means of the separate, intermediate aqueous layer seem to exhibit a better optical coverage of the bottom ply containing recycled fibre material as compared to the dye(s) applied to dye the fibre material containing base suspensions of the prior art. Thus, the first pulp suspension and second pulp suspension preferably may contain no dyes, respectively the aqueous composition may preferably be the sole material fed to the multi-layer headbox of the paper machine containing dye(s). Because of the comparatively better optical coverage of

the bottom layer/ply that can be achieved by applying the intermediate dye-containing aqueous layer, the amount of virgin fibre material necessary for effectively masking a shine-through of the recycled fibre material from the bottom ply can also be lowered.

[0017] Furthermore, the inventors surprisingly found, that despite the lower amount of virgin fibre material used within the method, the mechanical strength of the resulting packaging papers or boards also is at least comparable to the prior art products. In this context it is believed that the separation of the virgin fibres containing top layer and the recycled fibres containing bottom layer by the intermediate, aqueous layer during drying brings about a better mechanical performance of the finished packaging paper or board. It seems, that this separation prevents or at least impedes a mixing of the virgin and recycled fibre material of the bottom and top layers, leading to a pure top ply/layer containing substantially only virgin fibre material. This relatively pure top layer as produced by the present method basically seems to positively affect the mechanical properties of the overall, finished packaging paper or board, in particular causing enhanced mechanical strength even when applied in much lower amounts as compared to prior art technologies. While products produced with prior art technologies typically require top layer grammages of about 45 g/m², packaging paper or board produced according to the present method merely require grammages of about 30 g/m² to exhibit similar mechanical strength.

[0018] In a preferred embodiment of the method, the aqueous composition may be provided comprising 0,5 wt.% to 2 wt.% of the water-soluble dye(s). Such concentration range for the dye(s) has proven to be particularly convenient, in particular regarding the processing within the paper machine.

[0019] In another embodiment, the aqueous composition may be provided comprising one or more dye(s) exhibiting a brownish colour. In this way, the optical appearance of the multilayer packaging paper or board can be shifted towards a quite familiar appearance associated with paper packaging products, thereby satisfying consumer acceptance.

[0020] Further it may be advantageous, if the aqueous composition is provided comprising at least one anionic or cationic dye. Such anionic or cationic dye tends to ionically adhere to cellulose fibre material, such that a better dye fixation may be achieved.

[0021] It also may be convenient to replace up to 4 wt.% of the maximum 8 wt.%, based on 100 wt.% aqueous composition, of the one or more water-soluble dye(s) of the aqueous composition by a cellulose fibre material. In other words, based on 100 wt.% of the one or more soluble dye(s), it may be convenient to replace up to 50 % of the one or more water-soluble dye(s) of the aqueous composition by a cellulose fibre material. Such cellulose fibre material in the intermediate layer may be convenient for the processing of the multi-layer web within the paper machine and may also be of advantage regarding the

mechanical properties of the finished packaging paper or board product, in particular regarding its mechanical strength. In this context, such cellulose fibre material of the aqueous composition may be provided comprising 60 wt.% to 100 wt.% recycled cellulose fibre material. The cellulose fibre material of the aqueous composition may however also be provided comprising virgin cellulose fibre material. If the aqueous composition is provided comprising cellulose fibre material the term aqueous suspension may be used equally. If the aqueous composition does not contain any cellulose fibre material the term aqueous solution may be used equally.

[0022] In general, the first and second suspensions as well as the intermediate, aqueous composition may contain minor amounts of additives commonly applied in paper making, including wet strength agents, strength enhancing agents, starch, agents to introduce barrier functionalities, sizing agents and so on.

[0023] In a further embodiment the virgin cellulose material of the first fibre material may be provided comprising 50 wt.% to 99,9 wt.% virgin cellulose fibres and 0,1 wt.% to 20 wt.% lignin. As known in the art, the amount of virgin cellulose fibres and lignin may be varied by means of the chemical treatment used to prepare the virgin cellulose material, wherein depending on such chemical treatment the virgin cellulose material may contain up to 30 wt.% hemicelluloses. Such virgin cellulose material has proven to be particularly useful for processing of the multi-layer web within the paper machine and for producing multi-layered packaging paper or board with properties that satisfy the requirements of the packaging industry. Furthermore, the first fibre material may also comprise up to 30 wt.% synthetic fibres and/or fibre-like materials.

[0024] In principle, more than two pulp suspensions in addition to the aqueous composition may be fed the headbox to form the multi-layer web within the present method, in particular another pulp suspension may be fed to the multi-layer headbox to adjoin the bottom layer on the side opposite of the aqueous layer. Preferably however, the first pulp suspension, the second pulp suspension and the aqueous composition may be fed to a 3-layer headbox. In this way, the structural requirements for the equipment as well as the operational requirements of the method can be kept as simple as possible, therefore providing a more convenient and less error-prone way of producing multilayer packaging paper or board. In particular, any special requirements on the packaging paper or board can be met by modifying the exact compositions of the first and second suspensions and the intermediate, aqueous composition if needed.

[0025] Regarding the initial processing of the multi-layer web, it may be convenient to form and initially dewater it by means of a gap former of the paper machine. In principle any type of gap former may be used for forming and dewatering the multi-layer web, for example gap formers of roll and blade type or gap formers without blade may be used. Gap formers in general harmonize well with multi-layer headboxes, in particular allowing

high machine speeds and therefore high production rates.

[0026] In another embodiment, the first pulp suspension and the aqueous composition may be fed to the multi-layer headbox in a first pulp suspension to aqueous composition weight-ratio of 4:1 to 2:1, preferably 4:1 to 2,5:1 per time unit. A weight-ratio in the given range has proven to be suited very well for forming and further processing the multi-layer web within the method.

[0027] In a preferred embodiment, it also may be convenient to set a grammage of the top layer or ply in the final dried condition of the multi-layered packaging paper or board to 20 g/m² to 40 g/m². A grammage of the virgin fibre material containing top layer in this range is low compared with prior art technologies, without exhibiting negative effects regarding optical appearance and mechanical properties of the finished packaging paper or board. Thus the packaging paper or board can be produced in a more sustainable and also cost-effective way. In particular, the grammage of the top layer/ply in the final dried condition of the multi-layered packaging paper or board may be set to 25 g/m² to 35 g/m².

[0028] To provide a better understanding, the invention is described in more detail in the following, also with reference to the appended figure.

[0029] This is a highly simplified, schematic drawing illustrating the following:

Fig. 1 A headbox section of a paper machine with a 3-layer headbox in operation, shown in part.

[0030] Introductory, it should be pointed out, that the same parts described in the different embodiments are denoted by the same reference numbers and the same component names and the disclosures made throughout the description can be transposed in terms of meaning to same parts bearing the same reference numbers or same component names. Furthermore, the positions chosen for the purposes of the description, such as top, bottom, side, etc., relate to the drawing specifically being described and can be transposed in terms of meaning to a new position when another position is being described.

[0031] The method pertains to production of multi-layer packaging paper or board using multi-layer headbox technology, wherein by means of a multi-layer headbox multiple layers of feed material are formed and adjoined before subsequent dewatering, pressing and drying of the multiple adjoined layers within a paper machine. Such procedure is schematically depicted in a very simplified way in Fig. 1.

[0032] The method comprises providing a first pulp suspension 1 comprising 95 wt.% to 99,5 wt.% water and 0,5 wt.% to 5 wt.% of a first fibre material. The first fibre material is thereby provided comprising 50 wt.% to 100 wt.% virgin cellulose material. A second pulp suspension 2 is provided comprising 95 wt.% to 99,5 wt.% water and 0,5 wt.% to 5 wt.% of a second fibre material. The second fibre material is thereby provided comprising 50 wt.% to

100 wt.% recycled fibre material. Furthermore an aqueous composition 3 is also provided.

[0033] As depicted in Fig. 1, the first pulp suspension 1 is fed to a multi-layer headbox 4 of a paper machine such as to form a top layer 5. The second pulp suspension 2 is fed to the multi-layer headbox 4 of the paper machine such as to form a bottom layer 6. The aqueous composition 3 is fed to the multi-layer headbox 4 of the paper machine in between the top layer 5 and the bottom layer 6 such as to form an intermediate, aqueous layer 7. As can be seen from the schematic drawing in Fig. 1, a multi-layer web 8 is thereby formed by means of the multi-layer headbox 4, which multi-layer web 8 comprises the top layer 5, the intermediate, aqueous layer 7, and the bottom layer 6.

[0034] The denotations of the layers 5, 6 as top layer 5 and bottom layer 6 are in relation to the layer stacking in the finished multi-layer packaging paper or board in its dried condition rather than any orientation or positioning upon processing in the paper machine. Thus, the dried top layer 5 will be the layer forming the visible outside of a paper or board packaging while the bottom layer 6 will form the inside layer of a packaging facing the packed product. Those having ordinary skill in the art will appreciate, that the relative layer orientation pertaining to "up" and "down" directions in the paper machine during processing and drying of the multi-layer web 8 may vary and change, since the multi-layer web 8 may be redirected and guided in different directions multiple times in a common paper machine configuration during processing/drying.

[0035] The method further comprises subsequent drying of the multi-layer web 8 by means of the paper machine. In general any paper machine configuration can be used to dry the multi-layer web 8, wherein conventional paper machine configurations commonly comprise multiple, subsequent dewatering, pressing and drying steps.

[0036] Preferably, the multi-layer web 8 is formed and initially dewatered by means of a gap former 9 of the paper machine. Such gap former 9 is only shown in part in Fig. 1. Usually such gap former 9 comprises at least a forming roll 10 and the paper web, within the present method the multi-layer web 8 is fed into a gap between two fabrics 11 acting as sieves. In principle, any type of gap former 9 can be used for initial dewatering of the multi-layer web 8, such as for example a gap former of roll and blade type. It is possible however to also use bladeless type of gap formers or other types of gap formers known in the art.

[0037] For achieving the desired effects for the production of the multi-layer packaging paper or board, the aqueous composition 3 is provided comprising 92 wt.% to 99,9 wt.% water and 0,1 wt.% to 8 wt.% of one or more water-soluble dye(s). Preferably, the aqueous composition 3 may be provided comprising 0,5 wt.% to 2 wt.% of the water-soluble dye(s). Preferably the first pulp suspension 1 and second pulp suspension 2 may contain

no dyes, respectively the aqueous composition 3 may preferably be the sole material fed to the multi-layer headbox 4 of the paper machine which contains dye(s).

[0038] The aqueous composition 3 may also be provided comprising one or more dye(s) exhibiting a brownish colour. For better dye fixation, the aqueous composition 3 may be provided comprising at least one anionic or cationic dye.

[0039] Based on 100 wt.% aqueous composition 3, up to 4 wt.% of the maximum 8 wt.% of the one or more water-soluble dye(s) of the aqueous composition 3 may be replaced by a cellulose fibre material. In other words, based on 100 wt.% of the one or more soluble dye(s), up to 50 wt.% of the one or more water-soluble dye(s) of the aqueous composition 3 may be replaced by the cellulose fibre material. In this context, such cellulose fibre material of the aqueous composition 3 may be provided comprising 60 wt.% to 100 wt.% recycled cellulose fibre material. The cellulose fibre material of the aqueous composition may however also be provided comprising virgin cellulose fibre material.

[0040] Regarding the virgin cellulose material of the first fibre material provided with the first pulp suspension 1, this virgin cellulose material of the first fibre material may especially be provided comprising 50 wt.% to 99,9 wt.% cellulose fibres and 0,1 wt.% to 20 wt.% lignin. The virgin cellulose material of the first fibre material may also contain up to 30 wt.% hemicelluloses. The first fibre material may comprise up to 30 wt.% synthetic fibres and/or fibre-like materials.

[0041] The first and second pulp suspensions 1, 2 as well as the aqueous composition 3 may also be provided with minor amounts of further ingredients, for example additives commonly applied in paper making, such as wet strength agents, strength enhancing agents, starch, agents to introduce barrier functionalities, sizing agents and so on. It will be appreciated by those having ordinary skill in the, that the providing of first and second pulp suspensions 1, 2 as well as the aqueous composition 3 of course includes respective mixing of water with all ingredients desired for the individual layers 5, 6, 7 prior to feeding the suspensions 1, 2 and composition 3 to the multi-layer headbox 4.

[0042] In principle, one or more additional pulp suspension(s) in addition to the first and second pulp suspensions 1, 2 may be fed to a correspondingly configured multi-layer headbox 4 to form a multi-layer web 8 with more than the three layers shown in the exemplary embodiment depicted in Fig. 1. In particular, another pulp suspension may be fed to the multi-layer headbox 4 to adjoin the bottom layer 6 on the side opposite of the aqueous layer 7. Preferably however, the first pulp suspension 1, the second pulp suspension 2 and the aqueous composition 3 may be fed to a 3-layer headbox as depicted in the exemplary embodiment shown in Fig. 1. Requirements regarding properties of the packaging paper or board to be produced at least in most cases can be met by modifying the exact compositions of the first and sec-

ond suspensions 1, 2 and the aqueous composition 3 if needed, for example by adding small amounts of suited additives as already mentioned above.

[0043] In dependence of the demands and desired properties of the multi-layered packaging paper or board and also dependent on the initial fibre material and dye contents of the suspensions 1, 2 and the aqueous composition 3 respectively, the multi-layer headbox 4 can be operated with varying slice openings and volumetric slice flows for the individual suspensions 1, 2 and the aqueous composition 3. A person having ordinary skill in the art in this context can choose and set the individual slice parameters of the multi-layer headbox 4 for production of packaging paper or board with desired properties, hereby also taking into account specific paper machine configurations. Preferably the feed slice speed (in m/s) is at least roughly the same for all suspensions and the aqueous composition fed to the multi-layer headbox, although the multi-layer headbox may also be operated with individual jet speeds at least slightly varying with respect to each other.

[0044] Regarding volumetric slice flow, it may be convenient to feed the first pulp suspension 1 and the aqueous composition 3 to the multi-layer headbox 4 in a first pulp suspension 1 to aqueous composition 3 weight-ratio of 4:1 to 2:1, preferably 4:1 to 2,5:1 per time unit. In particular when using a gap former as initial forming and dewatering device, a typical volumetric slice flow of the aqueous composition 3 at the corresponding slice opening of the multi-layer headbox 4 for the aqueous composition 3 may for example be selected within a range of 15 l/s*m to 70 l/s*m. A volumetric slice flow for the first pulp suspension 1 may be selected accordingly. The unit l/s*m hereby designates litres per second and per meter width of the paper machine, wherein the latter at least roughly corresponds to meter width of the multi-layer web 8 formed and dried within the paper machine. For the above considerations, the first pulp suspension 1 and the aqueous composition 3 may be considered having the same density in good approximation.

[0045] Actual slice flows for all suspensions 1, 2 and the aqueous composition 3 of course have to be selected/adapted considering the corresponding respective slice openings for the suspensions and the aqueous composition, as well as the initial water content of the pulp suspensions 1, 2 and the aqueous composition 3. Typical slice openings for first pulp suspension 1 may for example be selected in a range from 2 mm to 7 mm, a slice opening for the aqueous composition 3 may for example be set to 1 mm to 4 mm. A final, total slice opening for both the first and second pulp suspensions 1, 2 as well as the aqueous composition 3 thus may for example be set to 4 mm to 15 mm.

[0046] Regarding the top layer 5 containing the virgin fibre material, it may be convenient to set a grammage of the top layer in its final dried condition of the multi-layered packaging paper or board to 20 g/m² to 40 g/m², preferably to 25 g/m² to 35 g/m².

[0047] The slice flow and slice opening for the second pulp suspension 2 of course may be varied widely, in particular dependent on the desired volumetric flow of the second pulp suspension 2, which primarily and preferably is used to set the desired total grammage of the finished multi-layered packaging paper or board, since this second pulp suspension 2 basically contains the recycled fibre material. As is known per se, the grammage of the bottom layer 6 in its final, dried condition can thereby be set by varying related process parameters, for example the initial recycled fibre material content of the second pulp suspension 2, the slice opening and volumetric slice flow of the multi-layer headbox 4 selected for the second pulp suspension 2, as well as the subsequent dewatering, pressing and drying conditions in the paper machine used.

[0048] The embodiments illustrated as examples represent possible variants and it should be pointed out at this stage that the invention is not specifically limited to the variants specifically illustrated, and instead the individual variants may be used in different combinations with one another and these possible variations lie within the reach of the person skilled in this technical field given the disclosed technical teaching.

[0049] The protective scope is defined by the claims. However, reference may be made to the description and drawings with a view to interpreting the claims. Individual features or combinations of features from the different examples of embodiments described and illustrated may also be construed as independent embodiments of the solutions proposed by the invention. The objective underlying the individual solutions proposed by the invention may be found in the description.

[0050] For the sake of good order, finally, it should be pointed out that, in order to provide a clearer understanding of the structure, elements are illustrated to a certain extent out of scale and/or on an enlarged scale and/or on a reduced scale.

List of Reference Numbers

[0051]

- | | |
|----|---------------------|
| 1 | Pulp suspension |
| 2 | Pulp suspension |
| 3 | Aqueous composition |
| 4 | Multi-layer headbox |
| 5 | Top layer |
| 6 | Bottom layer |
| 7 | Intermediate layer |
| 8 | Multi-layer web |
| 9 | Gap former |
| 10 | Forming roll |
| 11 | Fabric |

Claims

1. Method for producing a multi-layer packaging paper or board, comprising

- providing a first pulp suspension (1) comprising 95 wt.% to 99,5 wt.% water and 0,5 wt.% to 5 wt.% of a first fibre material, wherein the first fibre material is provided comprising 50 wt.% to 100 wt.% virgin cellulose material,
 - providing a second pulp suspension (2) comprising 95 wt.% to 99,5 wt.% water and 0,5 wt.% to 5 wt.% of a second fibre material, wherein the second fibre material is provided comprising 50 wt.% to 100 wt.% recycled fibre material,
 - providing an aqueous composition (3),
 - feeding the first pulp suspension (1) to a multi-layer headbox (4) of a paper machine such as to form a top layer (5),
 - feeding the second pulp suspension (2) to the multi-layer headbox (4) of the paper machine such as to form a bottom layer (6),
 - feeding the aqueous composition (3) to the multi-layer headbox (4) of the paper machine in between the top layer (5) and the bottom layer (6) such as to form an intermediate, aqueous layer (7),
 - forming a multi-layer web (8) comprising the top layer (5), the intermediate, aqueous layer (7), and the bottom layer (6),
 - drying of the multi-layer web (8) by means of the paper machine,

characterized in that,

the aqueous composition (3) is provided comprising 92 wt.% to 99,9 wt.% water and 0,1 wt.% to 8 wt.% of one or more water-soluble dye(s).

2. Method according to claim 1, **characterized in that** the aqueous composition (3) is provided comprising 0,5 wt.% to 2 wt.% of the water-soluble dye(s).

3. Method according to claim 1 or 2, **characterized in that** the aqueous composition (3) is provided comprising one or more dye(s) exhibiting a brownish colour.

4. Method according to any one of the preceding claims, **characterized in that** the aqueous composition (3) is provided comprising at least one anionic or cationic dye.

5. Method according to any one of the preceding claims, **characterized in that**, based on 100 wt.% of aqueous composition (3), up to 4 wt.% of the 8 wt.% of the one or more water-soluble dye(s) of the aqueous composition (3) is replaced by a cellulose fibre material.

6. Method according to claim 5, **characterized in that** the cellulose fibre material of the aqueous composition (3) is provided comprising 60 wt.% to 100 wt.% recycled cellulose fibre material.

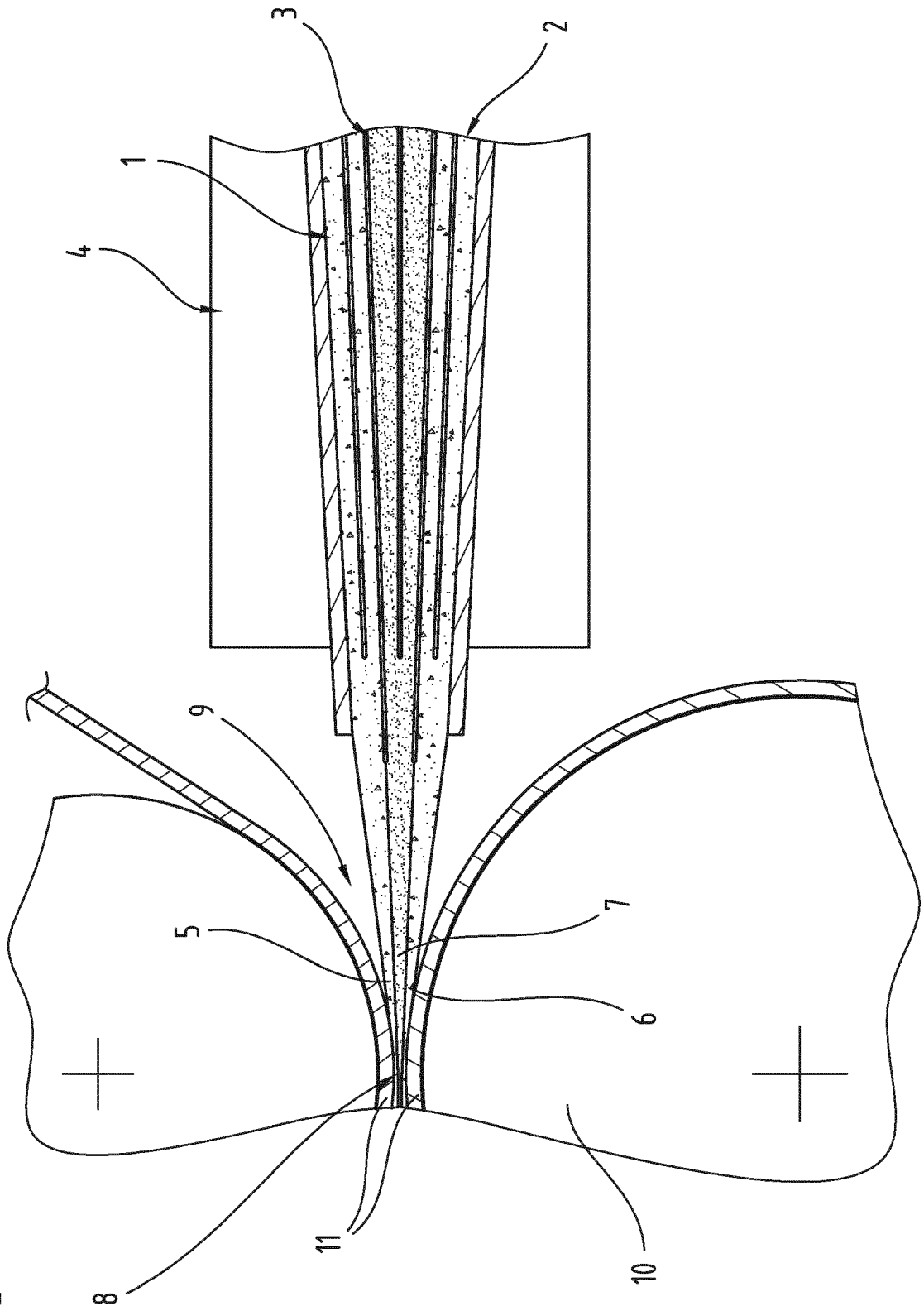
7. Method according to any one of the preceding claims, **characterized in that** the virgin cellulose material of the first fibre material is provided comprising 50 wt.% to 99,9 wt.% cellulose fibres and 0,1 wt.% to 20 wt.% lignin.

8. Method according to any one of the preceding claims, **characterized in that** the first pulp suspension (1), the intermediate, aqueous composition (3) and the second pulp suspension (2) are fed to a 3-layer headbox.

9. Method according to any one of the preceding claims, **characterized in that** the multi-layer web (8) is formed and initially dewatered by means of a gap former (9) of the paper machine.

10. Method according to any one of the preceding claims, **characterized in that** the first pulp suspension (1) and the aqueous composition (3) are fed to the multi-layer headbox (4) in a first pulp suspension (1) to aqueous composition (3) weight-ratio of 4:1 to 2:1 per time unit.

11. Method according to any one of the preceding claims, **characterized in that** a grammage of the top layer in the final dried condition of the multi-layered packaging paper or board is set to 20 g/m² to 40 g/m².



THE



EUROPEAN SEARCH REPORT

Application Number

EP 21 21 6080

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