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(54) **METHOD FOR DRYING A SURFACE-TREATED PAPER WEB OR EQUIVALENT IN AN
AFTER-DRYER OF A PAPER MACHINE AND AFTER-DRYER CARRYING OUT THE METHOD IN
A PAPER MACHINE**

VERFAHREN ZUR TROCKNUNG VON OBERFLÄCHENBEHANDELTEM PAPIER IN EINEM
NACHTROCKNER EINER PAPIERMASCHINE UND NACHTROCKNER ZUR AUSFÜHRUNG DES
VERFAHRENS IN EINER PAPIERMASCHINE

PROCEDE DE SECHAGE D'UNE BANDE DE PAPIER OU ANALOGUE, SOUMIS A UN
TRAITEMENT DE SURFACE, DANS UNE POST-SECHERIE ET POST-SECHERIE PERMETTANT
D'APPLIQUER LEDIT PROCEDE DANS UNE MACHINE A PAPIER

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Description

[0001] The invention concerns a method for drying a surface-treated paper web or equivalent in an after-dryer of a paper machine, in which method the paper web is first finished in a finishing section, in which finishing section the paper web is surface-sized or coated by means of a finishing device, after which the paper web is dried.

[0002] The invention also concerns an after-dryer for a paper machine for applying the method in accordance with the present invention to the drying of a surface-treated paper web or equivalent, which after-dryer is placed after the finishing device, by means of which finishing device the paper web is surface-sized or coated.

[0003] As is known from the prior art, in multi-cylinder dryers of paper machines, twin-wire draw and/or single-wire draw is/are employed. In twin-wire draw the groups of drying cylinders comprise two wires, which press the web one from above and the other one from below against heated cylinder faces. Between the rows of drying cylinders, which are usually horizontal rows, the web has free and unsupported draws, which are susceptible of fluttering, which may cause web breaks, in particular so when the web is still relatively moist and, therefore, of low strength. This is why, in recent years, ever increasing use has been made of said single-wire draw, in which each group of drying cylinders includes just one drying wire, on whose support the web runs through the whole group so that the drying wire presses the web on the drying cylinders against the heated cylinder faces, whereas on the reversing cylinders or rolls between the drying cylinders the web remains at the side of the outside curve. Thus, in single-wire draw, the drying cylinders are placed outside the wire loop, and the reversing cylinders or rolls inside said loop.

[0004] In the what is called normal groups with single-wire draw, known from the prior art, the heated drying cylinders are placed in the upper row and the reversing cylinders are placed in the lower row, which rows are, as a rule, horizontal and parallel to one another. On the other hand, in inverted groups with single-wire draw, the reversing cylinders are placed in the upper row and the drying cylinders in the lower row. In the following, when the terms "normal (dryer) group" and "inverted (dryer) group" are used, what is meant is expressly groups with single-wire draw in multi-cylinder dryers, of the sort mentioned above.

[0005] When paper is dried by means of normal groups with single-wire draw from the side of its bottom face and if such asymmetric drying is extended over the entire length of the forward dryer section, the drying takes place so that first the bottom-face side of the paper web is dried and, when the drying makes progress, the drying effect is also extended to the side of the top face of the paper web. Under these circumstances, the dried paper is usually curled and becomes concave, seen from above.

[0006] As is known from the prior art, the tendency of curling of paper is already affected in connection with the web formation, in particular at the sheet formation stage by means of selection of the difference in speed between the slice jet and the wire, and by means of other running parameters. As is known from the prior art, for example, in the case of copying paper, by means of unequalsidedness of drying in the after-dryer a suitable initial curl form is regulated for the sheet in order that the curling of the paper after one-sided or double-sided copying could be optimized. In the case of copying paper, the reactivity of curling, i.e. the extent to which curling occurs per unit of change in moisture content, is affected to a greater extent by means of a multi-layer structure of the paper, which is produced in connection with the web formation in the wet end.

[0007] The most recent technology related to the present invention in high-speed paper machines, in particular in fine-paper machines, has been based on dryer sections in which there is single-wire draw over the major part of the length of the machine, and, in view of controlling the tendency of curling of paper, in practice, an inverted group has also been used in order that the drying could be made sufficiently symmetric in the z-direction.

[0008] In conventional after-dryers in paper machines, in which the web is dried after coating or surface-sizing, a problem has been the swelling of the web arising from the moisture introduced by the coating into the web, which swelling produces "wrinkles" and equivalent problems that deteriorate the runnability in the web. In twin-wire draw, which is used traditionally in an after-dryer, the web flutters between the upper and lower rows, in which connection web breaks tend to occur and, moreover, on the drying cylinders in the lower row, when the web is wrinkled, the drying wire of the lower row has been readily damaged as a result of the wrinkles, the problem consisting of frequent replacements of the lower fabric.

[0009] Further, as is known from the prior art, problems have also been caused by the lowering of the web strength resulting from the coating, in which connection long free draws of the web have been quite problematic.

[0010] From the prior art, solutions are known for an after-dryer for paper to be coated, in particular for fine paper or equivalent, in which dryer there is first an upper cylinder and a lower cylinder and after this one group that employs normal single-wire draw, and after that dryer groups that make use of twin-wire draw. In these applications, it is a problem that, in view of the tendency of curling of paper, the ratio of the upper and lower cylinders is wrong if the curling is supposed to be regulated efficiently. As is known from the prior art, in the after-dryer it has been necessary to keep the temperature of the first cylinders low because of adhering of the web and the size/paste to the cylinder.

[0011] Groups of the sort mentioned above for finishing of paper to be coated, in particular of fine paper, have

been described, among other things, in the applicant's *FI Patent Application No. 950434* (corresp. EP-A-0 726 353). Thus, the object of the present invention is further development of the solutions suggested in said application so that the tendency of curling of paper can be controlled more efficiently in the after-dryer.

[0012] It is a further object of the invention to provide such a solution for an after-dryer as is suitable for use in particular in dryer sections in which it has not been possible or desirable to control the curling of the paper web in the forward dryer.

[0013] Also, it is an object of the invention to create an arrangement in which there are no long free draws while the web is still moist after the coating.

[0014] It is a further object of the present invention to provide such an after-dryer for a paper machine in which the runnability can be brought to a particularly high level.

[0015] Further, it is an additional object of the invention to provide such an after-dryer for a paper machine in which a what is called ropeless threading can be applied favourably within the entire length of the after-dryer in the machine direction, which for its part contributes to making the constructions simpler and standstills shorter.

[0016] In view of achieving the objectives stated above and those that will come out later, the method in accordance with the invention is mainly characterized in that in the after-dryer the paper web is dried only in a dryer group/groups making use of a normal single-wire draw, and that, in connection with or after the drying, the paper web is treated by means of a device/devices in order to compensate for a tendency of curling of the paper web.

[0017] Further, the after-dryer that makes use of the method of the present invention is mainly characterized in that the after-dryer comprises only a dryer group/dryer groups that apply a normal single-wire draw so as to dry the paper web and a device/devices for compensating for a tendency of curling of the paper web.

[0018] In the arrangement in accordance with the invention, in which the whole after-dryer is formed as a group with single-wire draw or is composed of a group with single-wire draw, the web is supported over the entire length of the dryer section, in which case the runnability is very good. Possible curling of the web is compensated for, for example, by means of steam boxes and/or by means of soft-calendering. The web can also be passed to an upper cylinder directly after the coating, in which case the draw is closed right from the beginning of the after-dryer over the entire length of the after-dryer.

[0019] In the following the invention will be described in more detail with reference to the figures in the accompanying drawing, the invention being, however, in no way supposed to be strictly confined to the details of said illustrations.

[0020] Figure 1 is a schematic illustration of an exemplifying embodiment of an after-dryer, which is composed of a dryer group that applies a normal single-wire draw, and

[0021] Figure 2 is a schematic illustration of an arrangement in which, after the coating, the web is passed directly onto the upper cylinder in the group with single-wire draw over a reversing blow-box or a reversing roll or equivalent, in which case a closed draw is obtained over the entire length.

[0022] In Fig. 1 the coating device is denoted with the reference numeral 10, and the coating device 10 is, for example, a coating device marketed by the applicant with the name SYM-SIZER™, which device comprises two opposite coating rolls 11 and 12, in connection with each of which there are size feed devices so that the paper web W is coated from both sides in the coating nip between the rolls 11 and 12. The direction of progress of the paper web W is denoted with the reference arrow S. After the coating device 10 the web W is passed over the drying cylinder 171 into the dryer group that applies a normal single-wire draw, in which group the reversing rolls/cylinders, fitted inside the drying-wire loop 176 guided by the guide rolls 177, are denoted with the reference numeral 175 and the drying cylinders are denoted with the reference numeral 174. In the dryer group the paper web W to be dried runs from the drying cylinders 174 placed in the upper row RY onto the reversing rolls 175 placed in the lower row RA so that on the drying cylinders 174 the web W is placed against the heated face of the drying cylinder 174, and on the reversing rolls 175 placed in the lower row RA the web W remains at the side of the outside curve on the wire 176. After the dryer group the paper web W is passed over the guide roll 195 to the soft calender 191, which comprises two calender nips N1 and N2. In connection with the soft calender, two steam boxes 192 are also placed, and curling of the paper web W is compensated for by means of the soft-calendering and by means of the steam boxes. Over the guide roll 197 the paper web is passed through the nip device 198 to further processing. Between the calendering nips N1,N2 the web is guided over the guide roll 196.

[0023] In Fig. 1, after the coating device 10, a pre-drying unit 15 is fitted, which does not contact the web W and which can be an infrared dryer or an airborne web dryer or a combination of same, in itself known from the prior art. In the final portion of the after-dryer, a blower unit 201 is fitted, by whose means attempts are made to promote evaporation through the wire, i.e. to equalize the distribution of moisture in the direction of thickness in the paper that departs from the after-dryer. Further, in the arrangement, there may be a steam box 202 in itself known, of the sort described, for example, in the *FI Patent Application No. 906216*, or a moistening device 202, which is also in itself known, by means of which devices 202 the distribution of moisture in the Z-direction of the web is equalized and/or the curling of the web is reduced. All of these additional devices are, of course, not necessarily in use in the same construction.

[0024] In relation to curling of the paper web, the applicant has carried out tests with a newsprint machine,

whose dryer section was exclusively provided with single-wire draw and which dryer section was followed by a two-nip soft calender preceded by a steam box. In these reference test run conditions, it was noticed that the web was curled in the direction of the top face - the edges of a sample of a diameter of 100 mm rose 3 centimetres in the direction of the top face. When the running conditions were kept in the other respects unchanged but the bottom face of the web was steam-treated before the latter soft-calender nip, the curling was reduced significantly to the value 1.2 cm. In a second test the dryer section was run normally, in which case the curling was measured as 1.5...2 cm, and when the bottom face of the web was steam-treated in the way mentioned above, the web was no longer curled at all.

[0025] As regards its principal features, the exemplifying embodiment shown in Fig. 2 is similar to the exemplifying embodiment shown in Fig. 1, but in the embodiment of Fig. 2, after the coating device, a reversing blower device 14 is fitted, by whose means the web is turned so that it is passed directly onto the drying cylinder 174 in the upper row. After this, there follow two dryer groups that apply a normal single-wire draw, and between said groups there is a closed draw. The parts in the first dryer group that applies a normal single-wire draw are denoted with the reference denotations corresponding to Fig. 1, and the drying cylinders in the second dryer group are denoted with the reference numeral 182 and the reversing rolls/cylinders with the reference numeral 181. The drying wire 186 in the second dryer group runs guided by the guide rolls 187. After the dryer groups, after the guide roll 184, the dried paper web W is passed, in compliance with what is shown in Fig. 1, to the soft calender 191, in whose connection preferably also steam boxes 192 are fitted, in which case it is possible to control the curling of the web W by means of the steam boxes 193 and by regulating the calendering nips N1,N2 of the soft calender 191 in a suitable way.

[0026] In the arrangement in accordance with the invention, as the reversing rolls/cylinders, particularly favourably are used the suction cylinders marketed by the applicant with the trade mark "VAC-ROLL"™ and provided with no inside suction box, reference being made, with respect to the details of the constructions of said rolls, to the applicant's *FI Patent No. 83, 680 (equivalent US Patents Nos. 5,022,163 and 5,172,491)*.

[0027] Above, the invention has been described just with reference to some preferred exemplifying embodiments of same only, the invention being, however, by no means supposed to be strictly confined to the details of said embodiments.

Claims

1. A method for drying a surface-treated paper web or equivalent in an after-dryer of a paper machine, in which method the paper web (W) is first finished in

a finishing section, in which finishing section the paper web (W) is surface-sized or coated on both sides by means of a finishing device (10), after which the paper web (W) is dried, **characterized in that** in the after-dryer the paper web (W) is dried only in a dryer group/groups making use of a normal single-wire draw, and that, in connection with or after the drying, the paper web (W) is treated by means of a device/devices (192, 191,201,202) in order to compensate for a tendency of curling of the paper web (W).

2. A method as claimed in claim 1, **characterized in that** in the after-dryer the paper web (W) is dried only in a dryer group/groups that make(s) use of a normal single-wire draw, and that, after drying, the paper web (W) is guided past at least one steam box (192) and/or through at least one soft-calender nip (N1;N2) so as to compensate for a tendency of curling of the paper web (W).

3. A method as claimed in claim 1 or 2, **characterized in that** in the after-dryer the paper web is dried only in a dryer group/groups that make(s) use of a normal single-wire draw, and that, after drying, the paper web is guided past at least one blower unit (201), by whose means evaporation through the wire is promoted in view of equalizing the distribution of moisture in the direction of thickness in the web (W) that departs from the after-dryer so as to compensate for a tendency of curling of the paper web (W).

4. A method as claimed in any of the claims 1 to 3, **characterized in that** in the after-dryer the paper web is dried only in a dryer group/groups that make (s) use of a normal single-wire draw, and that the paper web (W) is guided past a steam box and/or a moistening device (202) so as to equalize the distribution of moisture in the Z-direction in the web and/or to reduce the curling of the web (W).

5. A method as claimed in claims 1 to 4, **characterized in that** after the paper-web (W) finishing device (10) the paper web (W) is guided over a drying cylinder (171) into a dryer group/groups that make (s) use of single-wire draw, and that after said dryer group/groups the paper web (W) is guided past a steam box (192), by whose means curling of the paper web (W) is compensated for, into a soft calender (191), in which the paper web (W) is calendered in two successive calendering nips (N1,N2), between which the curling of the paper web (W) is compensated for by means of a steam box (192).

6. A method as claimed in any of the claims 1 to 5, **characterized in that** in the method the paper web (W) is dried in one dryer group that makes use of

single-wire draw (FIG. 1).

7. A method as claimed in any of the claims 1 to 5, **characterized in that** in the method the paper web (W) is dried in two dryer groups that make use of single-wire draw (FIG. 2). 5
8. A method as claimed in any of the claims 1 to 7, **characterized in that** after the finishing device (10) the paper web (W) is passed over a reversing blow device (14) into a dryer group that makes use of single-wire draw. 10
9. A method as claimed in any of the claims 1 to 7, **characterized in that** after the finishing device (10) the paper web (W) is passed over a drying cylinder (171) placed in the lower row (RA) into a dryer group that makes use of single-wire draw. 15
10. A method as claimed in any of the claims 1 to 8, **characterized in that** in the method, after the finishing device (10), the paper web (W) is passed as a closed draw onto the first drying cylinder in the upper row (RY) in a dryer group that makes use of a normal single-wire draw. 20 25
11. A method as claimed in claims 1 to 5, 7 to 10, **characterized in that** in the method the paper web (W) is passed from one dryer group into the other as a closed draw. 30
12. An after-dryer for a paper machine for applying the method as claimed in any of the claims 1 to 11 to the drying of a surface-treated paper web or equivalent, which after-dryer is placed after the finishing device (10), by means of which finishing device (10) the paper web (W) is surface-sized or coated on both sides, **characterized in that** the after-dryer comprises only a dryer group/groups that applies/apply a normal single-wire draw so as to dry the paper web (W) and a device/devices (191, 192, 201, 202) for compensating for a tendency of curling of the paper web (W). 35 40
13. An after-dryer as claimed in claim 12, **characterized in that** after the dryer group/groups that only applies/apply single-wire draw a soft calender (191) and/or steam boxes (192) are fitted so as to compensate for a curling tendency of the paper web. 45 50
14. An after-dryer as claimed in claim 12 or 13, **characterized in that** in the final portion of the after-dryer a blower unit (201) is fitted so as to promote evaporation taking place through the wire and to equalize the distribution of moisture in the direction of thickness in the paper web (W) that departs from the after-dryer so as to compensate for a curling tendency of the paper web. 55
15. An after-dryer as claimed in any of the claims 12 to 14, **characterized in that** in the after-dryer a steam box and/or a moistening device (202) are fitted so as to equalize the distribution of moisture in the Z-direction in the paper web (W) and/or to reduce the curling of the paper web (W).
16. An after-dryer as claimed in any of the claims 12 to 15, **characterized in that** the after-dryer comprises one dryer group that makes use of single-wire draw and that is placed after the finishing device (10).
17. An after-dryer as claimed in any of the claims 12 to 15, **characterized in that** the after-dryer comprises two dryer groups that make use of single-wire draw and that are placed after the finishing device (10).
18. An after-dryer as claimed in any of the claims 12 to 17, **characterized in that** two steam boxes (192) are fitted after the dryer group/groups.
19. An after-dryer as claimed in claim 18, **characterized in that** a steam box (192) is fitted before a calendering nip (N1;N2) of the soft calender (191).
20. An after-dryer as claimed in any of the claims 12 to 19, **characterized in that** after the finishing device (10) a reversing blow device (14) is fitted before the dryer group/dryer groups that make(s) use of single-wire draw.
21. An after-dryer as claimed in any of the claims 12 to 15, 17 to 20, **characterized in that** between the dryer groups in the after-dryer the paper web (W) has a closed draw.

Patentansprüche

1. Verfahren zum Trocknen einer oberflächenbehandelten Papierbahn oder dergleichen bei einem Nachrockner einer Papiermaschine, wobei bei diesem Verfahren die Papierbahn (W) zunächst in einer Finishing-Partie endbehandelt wird, wobei in der Finishing-Partie die Papierbahn (W) an beiden Seiten mittels einer Finishing-Vorrichtung (10) oberflächengeleimt oder beschichtet wird, wobei danach die Papierbahn (W) getrocknet wird, **dadurch gekennzeichnet, dass**
in dem Nachrockner die Papierbahn (W) lediglich bei einer Trocknergruppe / Trocknergruppen getrocknet wird, die einen normalen Einzelsiebzug anwendet / anwenden, und
in Verbindung mit dem oder nach dem Trocknen die Papierbahn (W) mittels einer Vorrichtung / Vorrichtungen (192, 191, 201, 202) behandelt wird, um eine Rollneigung der Papierbahn (W) auszugleichen.

2. Verfahren gemäß Anspruch 1,
dadurch gekennzeichnet, dass
bei dem Nachtrockner die Papierbahn (W) lediglich in einer Trocknergruppe / Trocknergruppen getrocknet wird, der / die einen normalen Einzelsiebzug anwendet (anwenden) und
nach dem Trocknen die Papierbahn (W) hinter zumindest einen Dampfkasten (192) und / oder durch zumindest einen Weichkalendrierspalt (N1; N2) geführt wird, um so eine Rollneigung der Papierbahn (W) auszugleichen.
3. Verfahren gemäß Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
bei dem Nachtrockner die Papierbahn lediglich in einer Trocknergruppe / Trocknergruppen getrocknet wird, die einen normalen Einzelsiebzug anwendet (anwenden), und
nach dem Trocknen die Papierbahn hinter zumindest eine Gebläseeinheit (201) geführt wird, durch die ein Verdampfen durch das Sieb im Hinblick auf das Ausgleichen der Verteilung der Feuchtigkeit in der Richtung der Dicke in der Bahn (W) unterstützt wird, die von dem Nachtrockner weggeht, um so eine Rollneigung der Papierbahn (W) auszugleichen.
4. Verfahren gemäß einem der Ansprüche 1 bis 3,
dadurch gekennzeichnet, dass
bei dem Nachtrockner die Papierbahn lediglich in einer Trocknergruppe / in Trocknergruppen getrocknet wird, die einen normalen Einzelsiebzug anwendet (anwenden), und
die Papierbahn (W) hinter einen Dampfkasten und / oder eine Befeuchtungsvorrichtung (202) geführt wird, um so die Verteilung der Feuchtigkeit in der Richtung Z in der Bahn auszugleichen und / oder das Rollen der Bahn (W) zu vermindern.
5. Verfahren gemäß einem der Ansprüche 1 bis 4,
dadurch gekennzeichnet, dass
nach der Vorrichtung (10) zum Endbearbeiten der Papierbahn (W) die Papierbahn (W) über einen Trocknungszyylinder (171) in eine Trocknergruppe / in Trocknergruppen geführt wird, die einen Einzelsiebzug anwendet (anwenden), und
nach der Trocknergruppe / den Trocknergruppen die Papierbahn (W) hinter einen Dampfkasten (192), durch den das Rollen der Papierbahn (W) ausgeglichen wird, in einen Weichkalandar (191) geführt wird, bei dem die Papierbahn (W) in zwei aufeinanderfolgenden Kalendrierspalten (N1, N2) kalendriert wird, zwischen denen das Rollen der Papierbahn (W) mittels eines Dampfkastens (192) ausgeglichen wird.
6. Verfahren gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
bei dem Verfahren die Papierbahn (W) in einer Trocknergruppe getrocknet wird, die einen Einzelsiebzug anwendet (Fig. 1).
7. Verfahren gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
bei dem Verfahren die Papierbahn (W) in zwei Trocknergruppen getrocknet wird, die einen Einzelsiebzug anwenden (Fig. 2).
8. Verfahren gemäß einem der Ansprüche 1 bis 7,
dadurch gekennzeichnet, dass
nach der Finishing-Vorrichtung (10) die Papierbahn (W) über eine Umkehrgebläsevorrichtung (14) in eine Trocknergruppe tritt, die einen Einzelsiebzug anwendet.
9. Verfahren gemäß einem der Ansprüche 1 bis 7,
dadurch gekennzeichnet, dass
nach der Finishing-Vorrichtung (10) die Papierbahn (W) über einen Trocknungszyylinder (171), der in der unteren Reihe (RA) angeordnet ist, in eine Trocknergruppe tritt, die einen Einzelsiebzug anwendet.
10. Verfahren gemäß einem der Ansprüche 1 bis 8,
dadurch gekennzeichnet, dass
bei dem Verfahren nach der Finishing-Vorrichtung (10) die Papierbahn (W) als ein geschlossener Zug zu dem ersten Trocknungszyylinder in der oberen Reihe (RY) in einer Trocknergruppe tritt, die einen normalen Einzelsiebzug anwendet.
11. Verfahren gemäß einem der Ansprüche 1 bis 5, 7 bis 10,
dadurch gekennzeichnet, dass
bei diesem Verfahren die Papierbahn (W) von einer Trocknergruppe zu der anderen als ein geschlossener Zug tritt.
12. Nachtrockner für eine Papiermaschine zum Anwenden des Verfahrens gemäß einem der Ansprüche 1 bis 11 zum Trocknen einer oberflächenbehandelten Papierbahn oder dergleichen, wobei der Nachtrockner nach der Finishing-Vorrichtung (10) angeordnet ist, wobei durch die Finishing-Vorrichtung (10) die Papierbahn (W) an beiden Seiten oberflächengeleimt oder beschichtet wird,
dadurch gekennzeichnet, dass
der Nachtrockner lediglich eine Trocknergruppe / Trocknergruppen, die einen normalen Einzelsiebzug anwendet / anwenden, um so die Papierbahn (W) zu trocknen, und eine Vorrichtung / Vorrichtungen (191, 192, 201, 202) zum Ausgleichen einer Rollneigung der Papierbahn (W) aufweist.
13. Nachtrockner gemäß Anspruch 12,
dadurch gekennzeichnet, dass

nach der Trocknergruppe / den Trocknergruppen, die lediglich einen Einzelsiebzug anwendet / anwenden, ein Weichkalanders (191) und / oder Dampfkästen (192) sitzt / sitzen, um so eine Rollneigung der Papierbahn auszugleichen.

14. Nachrockner gemäß Anspruch 12 oder 13,
dadurch gekennzeichnet, dass

bei dem Endabschnitt des Nachrockners eine Gebläseeinheit (201) sitzt, um so ein durch das Sieb hindurch stattfindendes Verdampfen zu unterstützen und die Verteilung der Feuchtigkeit in der Richtung der Dicke in der Papierbahn (W) auszugleichen, die von dem Nachrockner weggeht, um so eine Rollneigung der Papierbahn auszugleichen.

15. Nachrockner gemäß einem der Ansprüche 12 bis 14,

dadurch gekennzeichnet, dass

bei dem Nachrockner ein Dampfkasten und / oder eine Befeuchtungsvorrichtung (202) sitzt / sitzen, um so die Verteilung der Feuchtigkeit in der Richtung Z in der Papierbahn (W) auszugleichen und / oder das Rollen der Papierbahn (W) zu verringern.

16. Nachrockner gemäß einem der Ansprüche 12 bis 15,

dadurch gekennzeichnet, dass

der Nachrockner eine Trocknergruppe aufweist, die einen Einzelsiebzug anwendet und die nach der Finishing-Vorrichtung (10) angeordnet ist.

17. Nachrockner gemäß einem der Ansprüche 12 bis 15,

dadurch gekennzeichnet, dass

der Nachrockner zwei Trocknergruppen aufweist, die einen Einzelsiebzug anwenden und die nach der Finishing-Vorrichtung (10) angeordnet sind.

18. Nachrockner gemäß einem der Ansprüche 12 bis 17,

dadurch gekennzeichnet, dass

zwei Dampfkästen (192) nach der Trocknergruppe / den Trocknergruppen eingesetzt sind.

19. Nachrockner gemäß Anspruch 18,

dadurch gekennzeichnet, dass

ein Dampfkasten (192) vor einem Kalendrier-spalt (N1; N2) des Weichkalanders (191) sitzt.

20. Nachrockner gemäß einem der Ansprüche 12 bis 19,

dadurch gekennzeichnet, dass

nach der Finishing-Vorrichtung (10) eine Umkehrgebläsevorrichtung (14) vor der Trocknergruppe

pe / den Trocknergruppen sitzt, die den Einzelsiebzug anwendet (anwenden).

21. Nachrockner gemäß einem der Ansprüche 12 bis 15, 17 bis 20

dadurch gekennzeichnet, dass

zwischen den Trocknergruppen bei dem Nachrockner die Papierbahn (W) einen geschlossenen Zug hat.

Revendications

1. Procédé pour le séchage d'une bande continue de papier ou analogue traitée en surface dans une post-sécherie d'une machine à papier, procédé dans lequel la bande continue de papier (W) est d'abord finie dans une section de finition, section de finition dans laquelle la bande continue de papier (W) est collée en surface ou revêtue des deux côtés au moyen d'un dispositif de finition (10), après quoi la bande continue de papier (W) est séchée, **caractérisé en ce que** dans la post-sécherie la bande continue de papier (W) est séchée uniquement dans un/des groupe/groupe de sécherie faisant usage d'une circulation mono- toile normale et **en ce que**, en liaison avec ou après le séchage, la bande continue de papier (W) est traitée au moyen d'un dispositif/de dispositifs (192,191,201,202) afin de compenser une tendance à la crispation de la bande continue de papier (W).
2. Procédé selon la revendication 1, **caractérisé en ce que** dans la post- sécherie, la bande continue de papier (W) est séchée uniquement dans un groupe/des groupes de sécherie faisant usage d'une circulation mono- toile normale et **en ce que**, après le séchage, la bande continue de papier (W) est guidée devant au moins une boîte de vapeur (192) et/ ou à travers au moins une emprise de calandrage doux (N1:N2) de façon à compenser la tendance à la crispation de la bande continue de papier (W).
3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** dans la post- sécherie, la bande continue de papier est séchée uniquement dans un groupe/ des groupes de sécherie faisant usage d'une circulation mono- toile normale et **en ce que**, après séchage, la bande continue de papier est guidée devant au moins une unité de soufflage (201) au moyen de laquelle l'évaporation est facilitée à travers la toile en vue d'égaliser la répartition de l'humidité dans la direction de l'épaisseur dans la bande continue (W) qui quitte la post-sécherie afin de compenser la tendance à la crispation de la bande continue de papier (W).
4. Procédé selon l'une quelconque des revendications

- 1 à 3, **caractérisé en ce que** dans la post - sécherie, la bande continue de papier est séchée uniquement dans un groupe/des groupes de sécherie faisant usage d'une circulation mono - toile normale, et **en ce que** la bande continue de papier (W) est guidée devant une boîte de vapeur et/ou un dispositif d'humidification (202) de façon à égaliser la répartition d'humidité dans la direction Z dans la bande continue et/ou pour réduire la crispation de la bande continue (W).
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5. Procédé selon les revendications 1 à 4, **caractérisé en ce qu'**après le dispositif de finition (10) de la bande continue de papier (W), la bande continue de papier (W) est guidée par le biais d'un cylindre de séchage (171) dans un groupe/des groupes de sécherie faisant usage d'une circulation mono - toile, et **en ce qu'**après ledit groupe/lesdits groupes de sécherie la bande continue de papier (W) est guidée devant une boîte de vapeur (192), au moyen de laquelle est compensée la crispation de la bande continue de papier (W), dans une calandre douce (191) dans laquelle la bande continue de papier (W) est calandree dans deux emprises de calandrage successives (N1,N2), entre lesquelles la crispation de la bande continue de papier (W) est compensée au moyen d'une boîte de vapeur (192).
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6. Procédé selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** dans le procédé la bande continue de papier (W) est séchée dans un groupe de sécherie qui fait usage de la circulation mono- toile (Figure 1).
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7. Procédé selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** dans le procédé la bande continue de papier (W) est séchée dans deux groupes de sécherie qui font usage de la circulation mono- toile (Figure 2).
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8. Procédé selon l'une quelconque des revendications 1 à 7, **caractérisé en ce qu'**après le dispositif de finition (10) la bande continue de papier (W) est amenée par un dispositif de soufflage par inversion (14) dans un groupe de sécherie qui fait usage de la circulation mono- toile.
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9. Procédé selon l'une quelconque des revendications 1 à 7, **caractérisé en ce qu'**après le dispositif de finition (10) la bande continue de papier (W) est amenée par un cylindre de séchage (171) placé dans la rangée inférieure (RA) jusque dans un groupe de sécherie qui fait usage de la circulation mono - toile.
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10. Procédé selon l'une quelconque des revendications 1 à 8, **caractérisé en ce que** dans le procédé, après le dispositif de finition (10), la bande continue de papier (W) est amenée par une circulation fermée sur le premier cylindre de séchage dans la rangée supérieure (RY) dans un groupe de sécherie qui fait usage d'une circulation mono - toile normale.
11. Procédé selon les revendications 1 à 5, 7 à 10, **caractérisé en ce que** dans le procédé la bande continue de papier (W) est amenée depuis un groupe de sécherie jusque dans l'autre groupe en circulation fermée.
12. Post-sécherie pour une machine à papier pour l'application du procédé tel que défini dans l'une quelconque des revendications 1 à 11 au séchage d'une bande continue de papier ou analogue traitée en surface, laquelle post-sécherie est placée après le dispositif de finition (10), au moyen duquel dispositif de finition (10) la bande continue de papier (W) est collée en surface ou revêtue des deux côtés, **caractérisée en ce que** la post-sécherie comprend seulement un (des) groupe(s) de sécherie qui fait (font) usage d'une circulation mono - toile normale de façon à sécher la bande continue de papier (W) et un (des) dispositif(s) (191,192,201,202) pour compenser une tendance à la crispation de la bande continue de papier (W).
13. Post-sécherie selon la revendication 12, **caractérisée en ce qu'**après le(s) groupe(s) de sécherie qui ne fait (font) usage que de la circulation mono - toile, uu calandrage doux (191) et/ou des boîtes à vapeur (192) est (sont) équipés pour compenser une tendance à la crispation de la bande continue de papier.
14. Post-sécherie selon la revendication 12 ou 13, **caractérisée en ce que** dans la portion finale de la post-sécherie est prévue une unité de soufflage (201) afin de faciliter l'évaporation se produisant à travers la toile et pour égaliser la répartition de l'humidité dans la direction de l'épaisseur de la bande continue de papier (W) qui sort de la post-sécherie afin de compenser une tendance à la crispation de la bande continue de papier.
15. Post-sécherie selon l'une quelconque des revendications 12 à 14, **caractérisée en ce que** dans la post-sécherie sont prévus une boîte de vapeur et/ou un dispositif d'humidification (202) afin d'égaliser la répartition de l'humidité dans la direction Z de la bande continue de papier (W) et/ou pour réduire la crispation de la bande continue de papier (W).
16. Post-sécherie selon l'une quelconque des revendications 12 à 15, **caractérisée en ce que** la post-sécherie comprend un groupe de sécherie qui fait usage de la circulation mono - toile et qui est placé après le dispositif de finition (10).

17. Post-sécherie selon l'une quelconque des revendications 12 à 15, **caractérisée en ce que** la post-sécherie comprend deux groupes de sécherie qui font usage de la circulation mono - toile et qui sont placés après le dispositif de finition (10). 5
18. Post-sécherie selon l'une quelconque des revendications 12 à 17, **caractérisée en ce que** deux boîtes de vapeur (192) sont prévues après le(s) groupe(s) de sécherie. 10
19. Post-sécherie selon la revendication 18, **caractérisée en ce qu'**une boîte de vapeur (192) est prévue avant une emprise de calandrage (N1;N2) de la calandre douce (191). 15
20. Post-sécherie selon l'une quelconque des revendications 12 à 19, **caractérisée en ce qu'**après le dispositif de finition (10) un dispositif de soufflage par inversion (14) est prévu avant le(s) groupe(s) de sécherie qui fait (font) usage de la circulation mono - toile. 20
21. Post-sécherie selon l'une quelconque des revendications 12 à 15, 17 à 20, **caractérisée en ce qu'**entre les groupes de sécherie dans la post-sécherie, la bande continue de papier (W) présente une circulation fermée. 25

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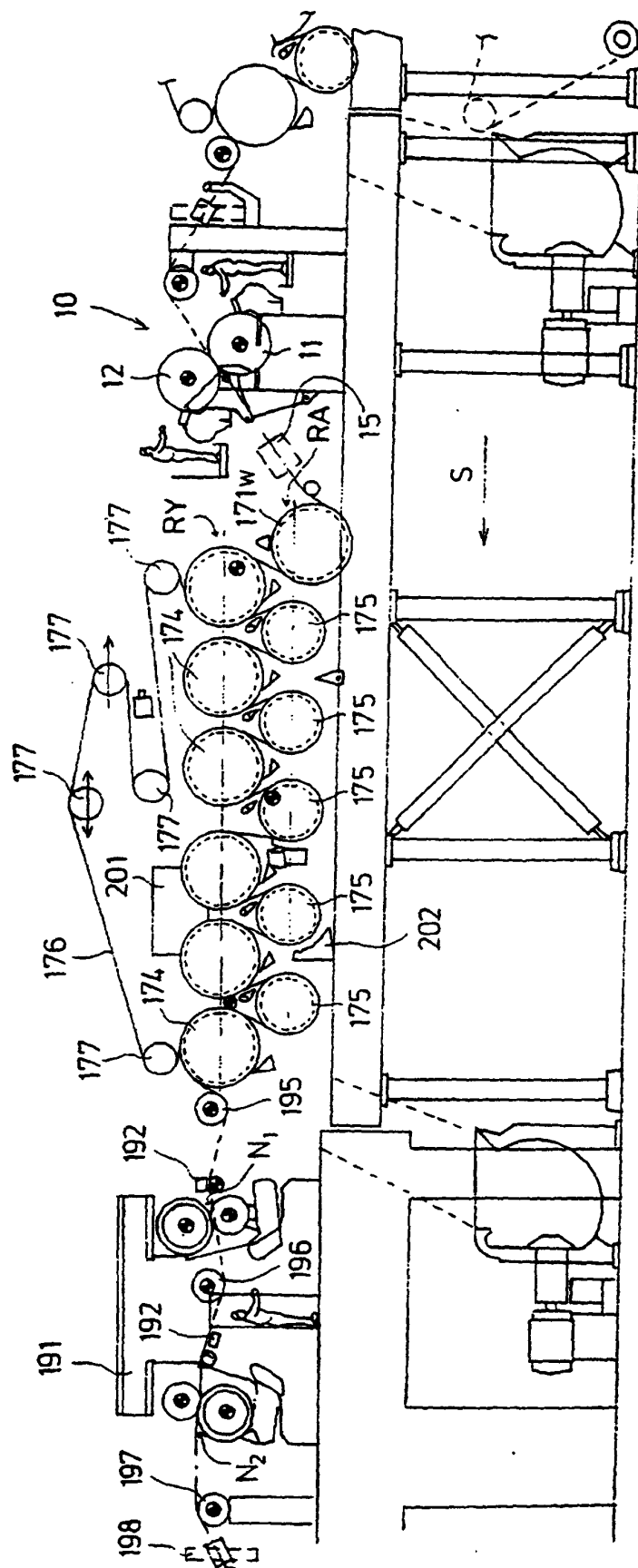


FIG. 1

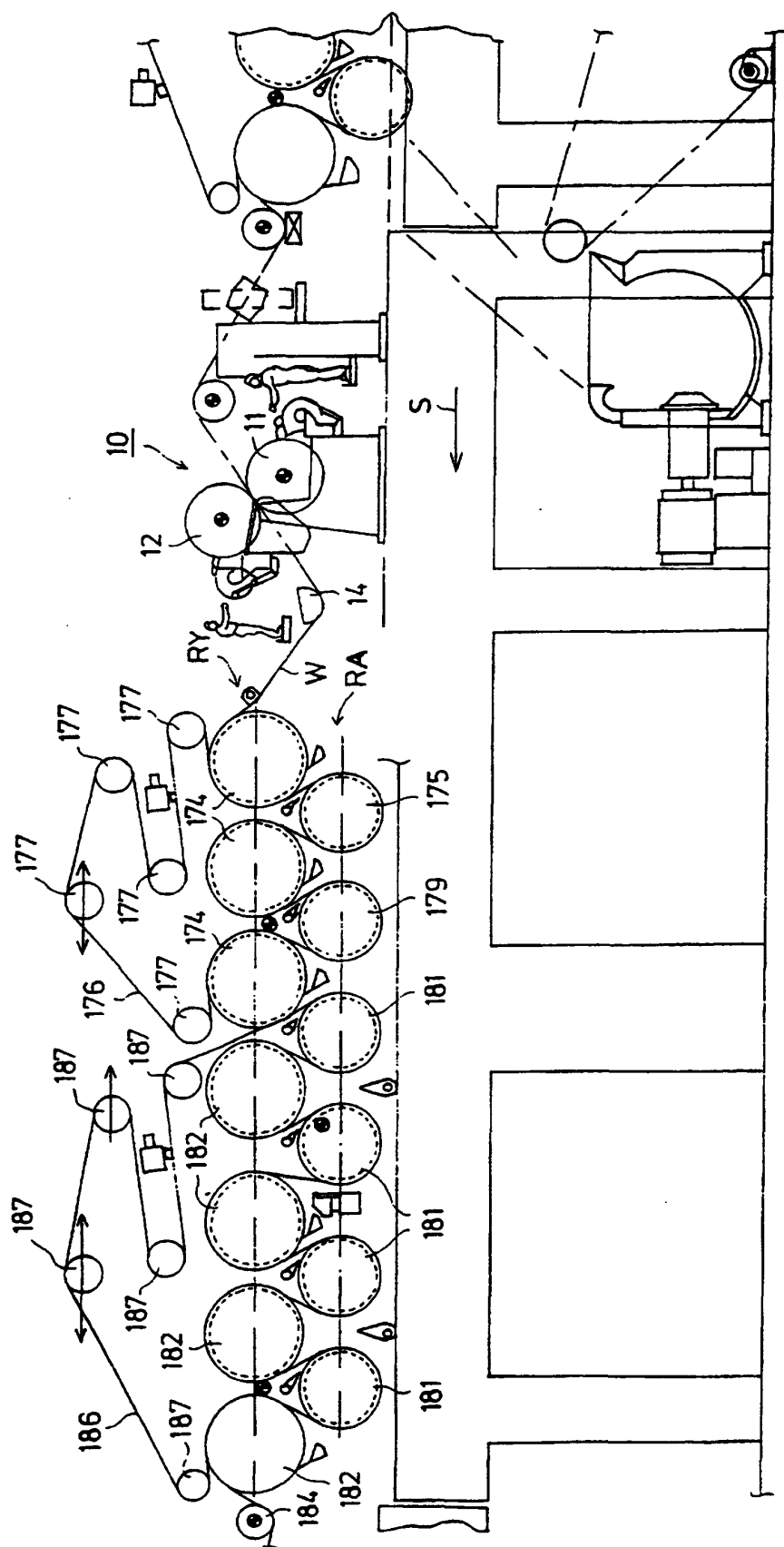


FIG. 2