DEVELOPMENT AND PROCESS FOR TRANSFERRING A MATERIAL WEB

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ABSTRACT
This invention relates to a device for transferring a material web, particularly a web made of paper, board, tissue, or other pulp. In order to transfer the material web and, preferably, a supporting belt from a supporting surface to a subsequent supporting surface, a pick-up box with a pick-up zone to lift the material web off the first supporting surface and a stabilizing box with a stabilizing zone to stabilize the material web are arranged before the subsequent supporting surface. Suction can be applied to the pick-up zone and the stabilizing zone by means of a vacuum source. A further zone to separate the vacuum in the pick-up zone from the vacuum in the stabilizing zone is located between the pick-up zone and the stabilizing zone. This invention also relates to a process for transferring a material web performed with the device according to the invention.
DEVICE AND PROCESS FOR TRANSFERRING A MATERIAL WEB

BACKGROUND

[0001] This invention relates to a device for transferring a material web, particularly a web made of paper, board, tissue, or other pulp. In order to transfer the material web and, preferably, a supporting belt from a first supporting surface, for example a drying cylinder, to a subsequent supporting surface, for example a suction roll, the device has a pick-up box with a pick-up zone to lift the material web off the first supporting surface and a stabilizer box with a stabilizing zone to stabilize the material web before the subsequent supporting surface. A vacuum can be applied to the pick-up zone and stabilizing zone by means of a vacuum source. This invention also relates to a process for transferring a material web performed with the device according to the invention.

[0002] Devices of this kind for web transfer are used in the dryer section of paper machines, for example. These dryer sections usually consist of a number of drying cylinders and suction rolls, each of which are arranged in a row. The web to be dried, supported in a meandering path by an air-permeable supporting belt, runs from a first drying cylinder to a suction roll, round which the web is guided with the aid of vacuum, and on to a further drying cylinder. Here, the web must be transferred in the areas between the drying cylinders and the suction rolls. This transfer takes place using special web transfer devices. Patent application EP 1 788 153 A2, for example, describes a web transfer box with a pick-up zone and a stabilizing zone. In the pick-up zone, the material web and the supporting belt are lifted off the drying cylinder by means of vacuum, and in the stabilizing zone that immediately follows, the material web and supporting belt are stabilized by means of vacuum. The two vacuum in the pick-up zone and the stabilizing zone can be set and adjusted separately in this process, with the vacuum in the pick-up zone generally being higher than in the stabilizing zone in practice.

[0003] As the stabilizing zone immediately adjoins the pick-up zone and the seal between the zones is often inadequate, the level of vacuum during operation in the stabilizing zone is often too high or not at an optimum. Stronger vacuum in the pick-up zone can create a suction effect on the immediately adjoining stabilizing zone. Too strong a vacuum in the stabilizing zone, however, causes too much adherence by suction and deflects the material web and supporting belt. As a result, the supporting belt is subject to greater wear. It can even rub against the web transfer box, which can ruin the belt.

[0004] The problem could be avoided by reducing the vacuum in the pick-up zone and thus attuning it to the vacuum in the stabilizing zone, however this would not permit efficient operation because different levels of vacuum are required in the individual zones, particularly at high machine and production speeds. Due to the ever increasing machine speeds, the web must be detached even faster from the preceding supporting surface in order to prevent any negative effect on the web quality.

SUMMARY

[0005] The problem thus addressed by the present invention is to create a web transfer device and transfer process that allows web transfer without deflecting the material web and the supporting web too much in the transfer area, even at high machine speeds.

[0006] This problem is solved by a device in which the pick-up zone of the pick-up box is limited by sealing mechanisms and the stabilizing zone of the stabilizing box is limited by a seal and the subsequent supporting surface, where a further zone to separate the vacuum in the pick-up zone from the vacuum in the stabilizing zone is located between the pick-up zone and the stabilizing zone, and is limited by a sealing mechanism in the pick-up zone and a seal in the stabilizing zone.

[0007] This arrangement avoids the vacuum in the pick-up zone having a negative effect on the vacuum in the stabilizing zone and the vacuum in the stabilizing zone affecting the vacuum in the pick-up zone.

[0008] Thus, the pressures in the pick-up zone and in the stabilizing zone can be set to the optimum levels so that the web can be lifted off the supporting surface as close as possible to the tangent point in the pick-up zone and lowest possible wearing forces act on the supporting belt in the stabilizing zone.

[0009] The pick-up box is preferably separated from the stabilizing box. By separating the two boxes, it is much easier to install them in the dryer section of a paper machine. It is easier to position these two boxes in relation to the drying cylinder because each box can be adjusted separately. In addition, this makes maintenance of the boxes easier, and there is no need to replace the entire web transfer device in the event of a fault.

[0010] It is advantageous if the take-off box or the stabilizing box has at least one sealing mechanism that is swivel-mounted. With this swivel-mounted sealing mechanism it is easy to change a supporting belt.

[0011] It makes sense for the pick-up box or the stabilizing box to have at least one sealing mechanism with several sealing lips, where at least one plane between the sealing lips is connected to a vacuum source. The seal is crucial in maintaining a certain vacuum level. If strong vacuums are required, a conventional seal is often ineffective. Thus, in order to achieve a suitable result, the air inside the labyrinth chambers or between the sealing lips is often extracted by suction. Thus, an additional vacuum can be maintained and applied in the chambers.

[0012] The invention also relates to a corresponding process for transfer of a material web, where the material web runs through an additional zone between the pick-up zone and the stabilizing zone where the prevailing pressure is higher than the vacuum in the pick-up zone and the vacuum in the stabilizing zone.

[0013] The vacuum in the pick-up zone and the stabilizing zone do not affect one another here and allow optimum pressure settings for gentle web transfer, also at high machine speeds.

[0014] In a favorable embodiment of the process the vacuum in the pick-up zone is set at a higher level than the vacuum in the stabilizing zone. This ensures that the material web can be picked up easily, also at high machine speeds.

[0015] In an advantageous embodiment of the process, suction is applied in at least one sealing mechanism delimiting the pick-up zone or the stabilizing zone. Since suction is applied to the seal itself, in the space between the individual sealing lips, an even better sealing effect is achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The present disclosure may be better understood and its numerous objects and advantages will become apparent to those skilled in the art by reference to the accompanying drawings in which:

[0017] FIG. 1 is a schematic side view of a web transfer device according to the invention;

[0018] FIG. 2 is an enlarged section of the schematic side view in FIG. 1;
FIG. 3 is a detail of the pick-up box with a swivel-mounted sealing mechanism; and

FIG. 4 is a schematic detail of the pick-up box with a sealing mechanism to which suction is applied.

DETAILED DESCRIPTION

The web transfer device according to the invention is shown in FIG. 1. It comprises a pick-up box 5 and a stabilizing box 7. During operation, the material web 1, coming from the right, is supported on a supporting belt 2 and guided over a first supporting surface 3, which is a rotating and heated drying cylinder in the present example. Then the material web 1 and the supporting belt 2 are lifted off the first supporting surface 3 by the pick-up box 5 in the pick-up zone 6. For this purpose, a vacuum is applied to the pick-up box 5, causing the material web 1 and the supporting belt 2 to be lifted off the first supporting surface 3 by suction in the area of the pick-up zone 6. The pick-up zone 6 is sealed off by means of sealing mechanisms 10 and 10' that run across the machine running direction. The pick-up zone is adjoined by a further zone 9, which is open to the atmosphere in the present example and thus has atmospheric pressure. It is also conceivable that the pressure in this further zone 9 can be controlled, for example by means of a gate damper. This further zone 9 is adjoined by the stabilizing zone 8 of the stabilizing box 7. In this stabilizing zone 8, the material web 1 and the supporting belt 2 are stabilized by means of vacuum. The stabilizing zone 8 is separated from the further zone 9 by a seal 14. The stabilizing zone 8 is adjoined by the subsequent supporting surface 4, which in the present example is a suction roll. The vacuum applied to the suction roll ensures that the material web 1 and the supporting belt 2 are deflected properly around the suction roll. The suction roll can be connected directly to the stabilizing box 7, which results in the air from the stabilizing box 7 being extracted by means of the suction roll. After the suction roll, the material web 1 and the supporting belt 2 run over a further drying cylinder. The direction of rotation of the two drying cylinders and of the suction roll is indicated by the arrows.

FIG. 2 shows an enlarged section of the schematic side view of FIG. 1, where the reference numerals used in all figures refer to the same items as in FIG. 1. The further zone 9, located between the pick-up zone 6 and the stabilizing zone 8, is clearly visible here. The further zone 9 is open to the atmosphere in this figure. The pick-up zone 6 is sealed off at the top and bottom by sealing mechanisms 10 and 10'. The sealing mechanisms 10 and 10' here consist of individual, blade-like sealing lips 11, which can also form a labyrinth seal. These sealing lips 11 and the seal 14 can be made of silicone, Teflon, or another synthatic material.

The pick-up box 5 with swivel-mounted sealing mechanisms 10 and 10' is shown in FIG. 3. The sealing mechanisms 10 and 10' can be swung out of the sealing position by means of an articulated joint 15 and 15'. This swing movement can be effected upwards, for example, and/or downwards. The dot-dash lines here show the sealing mechanisms 10 and 10' swung into position upwards. By mounting the sealing mechanism 10 suitably at the pick-up box 5, it is, of course, possible to swing it into position downwards (not shown). This swing movement of the sealing mechanism 10, 10' facilitates maintenance work and changing of the supporting belt 2. In addition, the sealing mechanism 10 can yield if the paper wraps right round the cylinder and thus prevents damage to the sealing lips 11 and the supporting belt 2. The sealing mechanism 10, 10' can also be pre-stressed in the sealing position by means of a spring. If the sealing mechanism 10, 10' moves out of the sealing position, it is returned to the original sealing position by the pre-stressing mechanism.

FIG. 4 shows a pick-up box 5 with a sealing mechanism 10 to which suction is applied. Here, the suction is applied to the space 12 between the sealing lips 11. The air in this space 12 is sucked into the pick-up box 5 in flow direction 13. During operation, the suction applied to the sealing device 10 provides an improved sealing effect towards the atmosphere and towards the adjoining zone 9, respectively.

The embodiments in the drawings only show one preferred embodiment of the invention. The invention also relates to other embodiments in which, for example, the sealing mechanism 10, 10', which is swivel-mounted or to which suction is applied, is mounted on the stabilizing box 7.

It will be appreciated that various of the above-described and other features and functions, or alternatives thereof, may be desirably combined into many other different systems or applications. Also that various presently unforeseen or unanticipated alternatives, modifications, variations or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

What is claimed is:

1. A device for transferring a material web from a first supporting surface to a subsequent supporting surface, the device comprising:

   a pick-up box having a pick-up zone adapted to lift the material web off the first supporting surface, the pick-up zone being connected to a vacuum source and being limited by first and second sealing mechanisms;

   a stabilizer box disposed proximate to the subsequent supporting surface, the stabilizer box having a stabilizing zone connected to a vacuum source and being limited by a seal and the subsequent supporting surface;

   a further zone disposed intermediate the pick-up zone and the stabilizing zone to separate the vacuum in the pick-up zone from the vacuum in the stabilizing zone, the further zone being limited by the second sealing mechanism of the pick-up zone and the seal of the stabilizing zone.

2. The device of claim 1, wherein the pick-up box is disposed at a distance from the stabilizing box.

3. The device of claim 1, wherein at least one of the sealing mechanisms is swivel-mounted.

4. The device of claim 1, wherein at least one of the sealing mechanisms has a plurality of lips, at least two of the sealing lips defining a space therebetween, the space being connected to a vacuum source.

5. A process for transferring a material web from a first supporting surface to a subsequent supporting surface, the process comprising:

   lifting the material web off the first supporting surface in a pick-up zone using vacuum;

   stabilizing the material web before the subsequent supporting surface in a stabilizing zone using vacuum;

   running the material web through an additional zone disposed intermediate the pick-up zone and the stabilizing zone, the additional zone having a pressure that is higher than the vacuum in the pick-up zone and the vacuum in the stabilizing zone.

6. The process of claim 5, wherein the vacuum in the pick-up zone is set at a higher level than the vacuum in the stabilizing zone.

7. The process of claim 5, further comprising applying a suction in at least one sealing mechanism delimiting the pick-up zone or the stabilizing zone.