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(54) **Device and method for heating at least one member of a processing apparatus in a pressing, drying and/or finishing section of a fibrous-web treatment machine**

Vorrichtung und Verfahren zum Beheizen von mindestens einem Element einer
Verarbeitungsvorrichtung in einem Pressen-, Trocknungs- und/oder Veredlungsabschnitt einer
Maschine zur Behandlung einer Faserstoffbahn

Dispositif et procédé pour chauffer au moins un élément d'un appareil de traitement dans une section
de presse, séchage et/ou finition d'une machine de traitement d'une bande de matériau fibreux

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Description

Technical Field

[0001] The present invention relates to a processing apparatus for use in a pressing, drying and/or finishing section of a fibrous-web treatment machine according to the preamble of claim 1, said apparatus comprising a heating device for heating a belt of the processing apparatus.

Description of the prior art

[0002] Generally, heating of a member (e.g. a metal belt) of a processing apparatus in a pressing, drying and/or finishing section of a fibrous-web treatment machine is done by an induction heater, an infrared radiator, a gas burner, or a capacitive heater. Such heating means are shown in WO 2004/106628 A1.

[0003] Heating by means of an induction heater, an infrared radiator, a gas burner or a capacitive heater is generally less efficient than heating means using heat exchange.

[0004] Here, devices and methods for heating members (e.g. rolls, belts, metal belts, cylinders, etc.) of a processing apparatus in a pressing, drying and/or finishing section of a fibrous-web treatment machine by means of steam are generally known (e.g. so-called CondeBelt drying devices/methods provided by the applicant).

[0005] According to this known technology, a heating cycle is provided in which steam generated by a power unit which is arranged in a fibrous web mill (such as paper, tissue or cardboard) is passed to get into contact with a surface of a member to be heated (e.g. a metal belt). At least a part of the steam condenses at said surface of the member to be heated and, thus, a specific amount of heat is transferred to the member so that its temperature rises (the member is heated). The steam condensate is recovered and returned to the power unit. Here, the use of steam is cost-effective because such a steam (low-pressure steam) is available at any fibrous web mill.

[0006] A problem of this technology is that by condensing of steam directly on a process surface (i.e. fibrous-web contacting metal belt or roll surface) impurities (fibres, sticky materials, etc.) are transferred from the process surface to the condensate. Thus, the condensate may become contaminated and acidified causing corrosion and other disadvantages in the steam heating cycle system.

[0007] WO 97/39183 A1 shows a processing apparatus according to the preamble of claim 1 comprising a heating device for heating a belt of the processing apparatus.

[0008] Each of EP 0 349 202 A2, WO 97/39184 A1 and WO 97/39186 A1 shows a processing apparatus comprising a heating device according to the prior art for heating a belt member of the processing apparatus for treating a fibrous web.

Summary of the invention

[0009] It is an object of the present invention to further develop a processing apparatus comprising a heating device for heating a belt of the processing apparatus such that a degree of contamination of a heating medium can be lowered.

[0010] The object of the present invention is achieved by a processing apparatus comprising a heating device having the features of claim 1.

[0011] Further advantageous developments according to the present invention are defined in the dependent claims.

[0012] According to an aspect of the present invention, a processing apparatus comprising a heating device for heating a belt of the processing apparatus in a pressing, drying and/or finishing section of a fibrous-web treatment machine is provided. The device comprises a primary heating cycle in which a primary heating medium is passed, a secondary heating cycle for heating the belt of the processing apparatus in which a secondary heating medium is circulated, and an indirect heat exchanging means for exchanging heat between the primary heating medium and the secondary heating medium, wherein an amount of heat of the primary heating medium passing in the primary heating cycle is transferred to the secondary heating medium circulating in the secondary heating cycle by means of the indirect heat exchanging means so that the belt of the processing apparatus is heatable by the secondary heating medium.

[0013] According to the above, it is ensured that a heating cycle is divided into different cycles. That is, a primary heating cycle in which a primary heating medium is passed and a secondary heating cycle in which a secondary heating medium is passed are provided such that these cycles are structurally separated from each other. Since the cycles are separated from each other, process impurities of a fibrous-web such as fibres, sticky materials, etc. stay (circulate) in the secondary heating medium within the secondary heating cycle and cannot enter the primary heating cycle since the amount of heat of the primary heating medium passing in the primary heating cycle is transferred to the secondary heating medium circulating in the secondary heating cycle by means of the indirect heat exchanging means (i.e. without direct contact of the heating mediums).

[0014] The secondary heating cycle comprises a medium chamber in which the secondary heating medium is in direct contact with the member to be heated. Here, a sealing means may be provided at edges of the medium chamber in order to avoid leakage of the secondary heating medium to surroundings of the secondary heating cycle. Such a sealing means may be a pressure-operated sealing member, i.e. a sealing operating pressure is adjusted in accordance with pressure acting in the medium chamber. Thus, the sealing member is adapted to act in accordance with a pressure of the secondary heating medium in the medium chamber.

[0015] Further, the secondary heating medium in the medium chamber cooperates with the belt to be heated, i.e. directly contacts the belt to be heated. Thus, a predetermined medium pressure is maintained by the pressure in the chamber. Consequently, the structure of the whole device including the medium chamber is simplified because no further means for sealing are required.

[0016] The secondary heating medium directly contacts a surface of the belt to be heated in order to transfer the amount of heat from the secondary heating medium to the belt by condensing of the secondary heating medium along said surface. Since heating occurs at such a process surface of the belt, this provides an effective heat transfer, i.e. heat amount is directly brought to where it is required. That is, since no structural elements are arranged between the belt and the secondary heating medium, heat transfer resistances are avoided, loss of heat is minimized and thermal stresses related to it are reduced. The structure for transferring heat from the secondary heating medium to the belt to be heated is thus simple.

[0017] According to the present invention, the processing apparatus comprises the heating device and the belt to be heated by the heating device, wherein the belt is impervious to fluids, forms an endless loop and guides a fibrous web. For example, in case the low- or medium-pressure primary heating medium is still vaporized after passing through the heat exchanging means, the low- or medium-pressure primary heating medium of the primary heating cycle may be further conveyed (passed) after passing through the heat exchanging means to a further process stage to another member to be heated (e.g. a drying cylinder or the like) where it is finally condensed. Thus, thermal efficiency is further improved.

[0018] The primary heating cycle may be a power unit cycle (i.e. main steam cycle) of a fibrous web mill. Further, the installation size of the secondary heating cycle is small compared to that of the primary heating cycle. Thus, the amount of the secondary heating cycle circulating in the secondary heating cycle can be further reduced.

[0019] For the primary heating medium, it is possible to employ low- or medium-pressure steam (process steam) in a fibrous web mill. This is cost-effective since this kind of medium is basically available at any place in the fibrous web mill and in any amount. In other words, using low- or medium pressure steam is cost-effective because it is available easily and inexpensively in large quantities. The pressure range of the primary heating medium in the primary heating cycle is preferably 5 to 10 bar. Based on this pressure range and a preferred process surface temperature of the member to be heated of 110 to 120 °C, which are determined by corresponding sensors, the pressure rate, temperature rate, and/or circulating property of the secondary heating medium in the secondary heating cycle may be suitably set by means of a heating transfer control unit.

[0020] The constitution of the heat exchanging means may be dimensioned such that there is a temperature

difference as small as possible between surfaces of the primary heating cycle and the secondary heating cycle of the heat exchanging means. Thus, thermal stresses in the construction of heat exchanging means are reduced.

[0021] The heat exchanging means may be a liquid/gas heat exchanger, a liquid/liquid heat exchanger or a gas/gas heat exchanger.

[0022] The belt to be heated can be heated by the condensing secondary heating medium (e.g. water steam) and the primary heating medium (e.g. water and/or steam) remains clean and reusable.

[0023] A device may be provided by means of which a metal belt cycle or roll can be heated by a condensing steam chamber such that recovered condensation medium remains clean and recyclable.

[0024] Preferably, the indirect heat exchanging means is a heat exchanger arranged between the primary heating cycle and the secondary heating cycle. The heat exchanger may be a countercurrent/counterflow heat exchanger or a cocurrent/parallelflow heat exchanger. The primary heating medium (preferably, water steam) of the primary heating cycle may be delivered from a steam power unit of the mill and an amount of heat is transferred to the secondary heating medium of the secondary heating cycle via the heat exchanger. The secondary heating medium (e.g. water) of the secondary heating cycle may then be vaporized in the heat exchanger. Then the vaporized secondary heating medium (e.g. water steam) is conveyed (circulated) to the belt to be heated (e.g. to a process surface of the belt), where it condenses and an amount of heat is transferred to said belt. The condensed secondary heating medium may be recovered and returned within the secondary heating cycle such that it is vaporized again in the heat exchanger. In other words, the secondary heating cycle may be connected to the medium chamber in which the secondary heating medium may condense and heats a surface of the belt to be heated (e.g. inner or outer surface of the belt) with thermal energy released by the condensation of said medium.

[0025] Further, a pump may be arranged in the secondary heating cycle in order to support or force circulation of the secondary heating medium in the secondary heating cycle.

[0026] Preferably, the secondary heating cycle comprises an adjustment means which is adapted to control the pressure amount and/or temperature of the secondary heating medium. The adjustment means may be a pressure adjustment valve by which pressure and/or temperature of the secondary heating medium is controlled. The adjustment means may be connected to the secondary heating cycle, preferably to the medium chamber, and alternatively, the adjustment means may be integrally provided with the secondary heating cycle, preferably with the medium chamber, in order to provide a compact installation space.

[0027] Preferably, the adjustment means is provided in order to control the pressure amount and/or tempera-

ture of the secondary heating medium (for example, chamber pressure, condensation temperature, etc.). Thus, precise and quick adjustment of the temperature of the member to be heated is provided (e.g. according to values of the thermodynamic steam table: e.g. pressure 1 bar → vaporization/condensation temperature 100 °C; 2 bar → 121 °C; 3 bar → 134 °C, and so on). That is, temperature of the steam and, thus, that of the belt to be heated may be controlled based on a pressure control of the adjustment means. Furthermore, the adjustment means may include a regulating valve for adding/discharging of new secondary heating medium, if required.

[0028] Preferably, the heating device comprises cleaning means which are in contact with the belt in order to clean a surface of the belt which is in direct contact with the secondary heating medium. The cleaning means serve to clean/remove condensed secondary heating medium (i.e. condensate film layer) and, if existing, impurities in the secondary heating medium from said surface. The cleaning means may be formed of at least one elastic blade, doctor blade, scraper unit, or the like. The cleaning means may be arranged within the medium chamber. The cleaning means may be inclined with respect to the surface extending direction of the surface of the belt which is in direct contact with the secondary heating medium.

[0029] According to the preferred constitutions mentioned above, it is ensured that the belt (especially, the surface which is in direct contact with the secondary heating medium) is dry and free of impurities after being heated by the secondary heating medium.

[0030] Preferably, the primary heating cycle and/or the secondary heating cycle are closed cycles. Preferably, the secondary heating cycle comprises filter means for filtering the secondary heating medium.

[0031] Preferably, elements forming the secondary heating cycle are manufactured of corrosion-resistant and/or acid-resistant material, and/or elements forming the primary heating cycle are manufactured of steel-based materials. Since the secondary heating medium in the secondary heating cycle is in contact with the belt to be heated, some impurities of the secondary heating medium are unavoidable for this cycle. Thus, the secondary heating cycle is designed (e.g. manufactured of corrosion-resistant and/or acid-resistant material) such that it endures contaminated and/or acidic medium. Since the primary and secondary cycles are separated from each other, the elements of the primary heating cycle may be manufactured from common steel-based materials. Thus, manufacturing costs of the structure of the heating device are optimized.

[0032] Preferably, water is used as the primary heating medium and as the secondary heating medium. Alternatively, water with additives, oil, air, or gas may be used as said heating medium.

Brief Description of the Drawings

[0033] The present invention is described in more detail below with reference to a embodiment illustrated in the accompanying drawings, to which the present invention is not exclusively confined. In the drawings,

Fig. 1 schematically shows a processing apparatus having a heating device according to an embodiment of the present invention;

Fig. 2 schematically shows a further processing apparatus having a heating device which does not fall within the scope of the appended claims; and

Fig. 3 schematically shows a modification of the further processing apparatus according to Fig. 2 which does not fall within the scope of the appended claims.

Description of the preferred embodiment

[0034] Initially, the reference signs used in the figures depict the following members in a processing apparatus used in a pressing, drying and/or finishing section of a fibrous-web treatment machine:

- 10 member to be heated (belt)
- 20 primary heating cycle
- 22 heat exchanging part of primary heating cycle
- 30 secondary heating cycle
- 32 medium chamber
- 34 adjustment means (pressure adjustment valve)
- 40 heat exchanger
- 50 drying cylinder
- 60 pressing roll
- 70 guiding roll
- W fibrous web

[0035] Fig. 1 schematically shows a processing apparatus having a heating device according to the embodiment of the present invention along the machine-direction of the apparatus. The processing apparatus is used in a pressing, drying and/or finishing section of a fibrous-web treatment machine.

[0036] According to Fig. 1, the member to be heated 10 is formed by the belt 10 which is impervious to fluids, forms an endless loop and guides the fibrous web W. A moving direction of the belt 10 is indicated by an arrow and corresponds to counter-clockwise direction. A moving direction of the web W is indicated by another arrow in the figure and is guided along and between a surface of the pressing roll 60 and a surface of the belt 10. The belt 10 is guided by means of three guiding rolls 70. The guidance of the belt 10 may be constituted by at least two guiding rolls 70 and is further not delimited to three guiding rolls. That is, four, five or even more guiding rolls may be used for guiding the belt 10 in an endless loop.

[0037] Furthermore, the processing apparatus accord-

ing to the embodiment comprises two heating devices according to the present invention. However, at least one heating device may be sufficient to heat the belt 10. In the following, since the constitution of the heating devices is basically the same, one of the heating devices shown in Fig. 1 is described in further detail.

[0038] The heating device for heating the belt 10 comprises the primary heating cycle 20 in which a primary heating medium is passed, the secondary heating cycle 30 for heating the belt 10 of the processing apparatus in which a secondary heating medium is circulated, the medium chamber 32 as a part of the secondary heating cycle 30, and the heat exchanger 40 arranged between the first heating cycle 20 and the secondary heating cycle 30 and acting as an indirect heat exchanging means for exchanging heat between the primary heating medium and the secondary heating medium.

[0039] Here, the secondary heating cycle 30 is formed by the medium chamber 32 and pipings connecting the medium chamber 32 and the heat exchanger 40 and passing through the heat exchanger 40.

[0040] In the medium chamber 32, the secondary heating medium is in direct contact with the belt 10. Sealing means (not shown) are provided at edges of the medium chamber 32 in order to avoid leakage of the secondary heating medium to surroundings of the secondary heating cycle 30.

[0041] The sealing means may be a pressure-operated sealing member, i.e. a sealing operating pressure is adjusted in accordance with pressure acting in the medium chamber 32. Thus, the sealing member is adapted to act in accordance with a pressure of the secondary heating medium in the medium chamber 32.

[0042] Thus, the secondary heating cycle 30 comprising the medium chamber 32 forms a closed loop. The primary heating cycle 20 may be formed as a closed loop or an open loop.

[0043] The heat exchanger 40 is arranged (interposed) between the primary heating cycle 20 and the secondary heating cycle 30. The heat exchanger 40 may be a countercurrent/counterflow heat exchanger or a cocurrent/parallelflow heat exchanger. The circulation direction of the secondary heating medium is the counterclockwise direction (see arrows referring to the secondary heating cycle 30 in Fig. 1). In the heat exchanger, an amount of heat of the primary heating medium passing in the primary heating cycle 20 is transferred to the secondary heating medium circulating in the secondary heating cycle 30 by means of the indirect heat exchanging means.

[0044] The primary heating medium (preferably water steam) of the primary heating cycle 20 is delivered from a steam power unit of the fibrous-web mill (not shown) so that the amount of heat is transferred to the secondary heating medium of the secondary heating cycle 30 via the heat exchanger 40.

[0045] The secondary heating medium (e.g. water) of the secondary heating cycle 30 is vaporized in a conduit

portion of the secondary heating cycle 30, which portion is arranged in the heat exchanger 40. Then the vaporized secondary heating medium (e.g. water steam) is conveyed (circulated) to the medium chamber and then gets into contact with the belt 10, where it condenses and amount of heat is transferred to said belt.

[0046] The heating device further comprises cleaning means (not shown) which are arranged within the medium chamber 32 and are in contact with the belt 10 in order to clean the surface of the belt 10 which is in direct contact with the secondary heating medium. The cleaning means serve to clean/remove condensed secondary heating medium (i.e. condensate film layer) and, if existing, impurities in the secondary heating medium from said surface. The cleaning means may be formed of at least one elastic blade, doctor blade, scraper unit or the like. The cleaning means may be inclined with respect to the surface extending direction of the surface of the belt 10 (or with respect to the belt moving direction), which is in direct contact with the secondary heating medium.

[0047] Thus, the condensed secondary heating medium is recovered in the medium chamber 32 and returned (circulated) within the secondary heating cycle 30 such that it may be vaporized again in the heat exchanger 30.

[0048] Fig. 2 schematically shows a processing apparatus having a heating device, which apparatus does not fall within the scope of the appended claims.

[0049] According to Fig. 2, instead of a separate heat exchanger as shown in the embodiment of Fig. 1, the indirect heat exchanging means is formed as a part 22 of the primary heating cycle, which part 22 is arranged within the medium chamber 32. Here, the medium chamber 32 forms the secondary heating cycle 30 as such.

[0050] In other words, the part 22 (e.g. conduit) of the primary heating cycle 20 which forms the indirect heat exchanging means is integrated in the medium chamber 32.

[0051] The part 22 of the primary heating cycle 20 is formed as a conduit part fluid-tightly sealed at entrance and outlet portions (not shown) in the medium chamber 32. Here, the conduit part of the primary heating cycle 20 is arranged in a liquid medium space (lower space) of the medium chamber 32 in which liquid secondary heating medium is contained so that the secondary heating medium vaporize due to the heat exchange by means of the conduit part of the primary heating cycle 20.

[0052] Then, the vaporous secondary heating medium is circulated to the belt 10 (to the upper space in the chamber), where it condenses and transfers heat to said belt 10. Thus, the condensed secondary heating medium will be recirculated to the liquid medium space of the medium chamber 32.

[0053] Thus, circulation and recirculation of the secondary heating medium is performed in the medium chamber 32 as such. In this case, the vaporized secondary heating medium rises up (in a vaporous (upper) medium space of the medium chamber 32) and condenses at a process surface of the belt 10, condensates and

drops due to gravity to the liquid medium space of the medium chamber 32 so that the heating medium is returned. Here, the liquid medium space is arranged at a lower position in vertical direction than that of the vaporous medium space.

[0054] Further, additionally or alternatively, heating of the secondary heating medium can also be performed from the upper medium space of the medium chamber 32 as indicated by the (upper) pipings of the primary heating cycle 20 as schematically shown in the upper part of the medium chamber (see Fig. 2).

[0055] According to Fig. 2, the secondary heating cycle 30 comprises the adjustment means 34 which is adapted to control pressure amount and/or temperature of the secondary heating medium. The adjustment means 34 is a pressure adjustment valve 34 by which pressure and/or temperature of the secondary heating medium is controlled. The adjustment means 34 may be connected to the secondary heating cycle 30, preferably to the medium chamber 32. Alternatively, the adjustment means 34 may be integrally provided with the secondary heating cycle 30, preferably with the medium chamber 32. The adjustment means 34 may include a regulating valve (not shown) for adding/discharging of new secondary heating medium in the medium chamber 32 if required.

[0056] Fig. 3 schematically shows a modification of the processing apparatus shown in Fig. 2, which apparatus does not fall within the scope of the appended claims.

[0057] Here, for example, in case the low- or medium-pressure primary heating medium is still vaporized after passing through the heat exchanging means 22, the low- or medium-pressure primary heating medium of the primary heating cycle is further conveyed (passed) after passing through the heat exchanging means 22 to a further process stage to another member to be heated (e.g. the drying cylinder 50 or the like) where it is finally condensed.

[0058] Thus, thermal efficiency of the processing apparatus having a heating device is further improved.

[0059] For the primary heating medium, it is possible to employ low- or medium-pressure steam (process steam) in a fibrous web mill. This is cost-effective since this kind of medium is basically available at any place in the fibrous web mill and in any amount. The pressure range of the primary heating medium in the primary heating cycle is preferably 5 to 10 bar. Based on this pressure range and a preferred process surface temperature of the member to be heated of 110 to 120 °C, which are determined by corresponding sensors, the pressure rate, temperature rate, and/or circulating property of the secondary heating medium in the secondary heating cycle may be suitably set by means of a heating transfer control unit.

[0060] The heating mediums (i.e. primary and secondary heating mediums) used in the above embodiment and comparative examples are normally water and steam, respectively. Alternatively, water with additives, oil or air or even other gases may be used as the heating

mediums.

[0061] The belt as shown above is made of metal. Alternatively, the belt can be made of synthetics or ceramic materials. Also, various different combinations of at least two of the above materials may be used for the belt constitution.

[0062] The preceding description of the present invention is merely exemplary, and is not intended to limit its scope in any way. Various details of the present invention may vary and differ from the exemplary details described above within the scope of the invention as defined in the appended claims.

15 Claims

1. A processing apparatus for use in a pressing, drying and/or finishing section of a fibrous-web treatment machine, said apparatus comprising guiding rolls (70), a belt (10) and a heating device for heating the belt (10), wherein the belt (10) is impervious to fluids, forms an endless loop, is guided by the guiding rolls (70) and guides a fibrous web (W) to be treated, the heating device comprising
a primary heating cycle (20) in which a primary heating medium is passed,
a secondary heating cycle (30) for heating the belt (10) of the processing apparatus in which a secondary heating medium is circulated, the secondary heating cycle (30) comprising a medium chamber (32) in which the secondary heating medium is in direct contact with the belt (10) to be heated, and an indirect heat exchanging means (40) for exchanging heat between the primary heating medium and the secondary heating medium, wherein
an amount of heat of the primary heating medium passing in the primary heating cycle (20) is transferred to the secondary heating medium circulating in the secondary heating cycle (30) by means of the indirect heat exchanging means (40) so that the belt (10) of the processing apparatus is heatable by the secondary heating medium,
characterized in that
the processing apparatus further comprises a pressing roll (60), the web (W) being guided along and between a surface of the pressing roll (60) and a surface of the belt (10), and
the medium chamber (32) is disposed along a portion of the belt (10) in which the belt is supported by the pressing roll (60) or by one of the guiding rolls (70), the belt (10) being disposed between the pressing or guiding roll (60, 70) and the medium chamber (32).
2. The processing apparatus according to claim 1, wherein the indirect heat exchanging means (40) is a heat exchanger (40) arranged between the primary heating cycle (20) and the secondary heating cycle (30).

3. The processing apparatus according to any of the preceding claims, wherein the secondary heating cycle (30) comprises an adjustment means (34) which is adapted to control pressure amount and/or temperature of the secondary heating medium. 5
4. The processing apparatus according to claim 3, wherein the adjustment means is a pressure adjustment valve by which pressure and/or temperature of the secondary heating medium is controlled. 10
5. The processing apparatus according to claim 3 or 4, wherein the adjustment means is connected to the secondary heating cycle (30), preferably to the medium chamber (32), or the adjustment means is integrally provided with the secondary heating cycle (30), preferably with the medium chamber (32). 15
6. The processing apparatus according to any of the preceding claims, further comprising cleaning means which are in contact with the belt (10) in order to clean a surface of the belt (10) which is in direct contact with the secondary heating medium. 20
7. The processing apparatus according to any of the preceding claims, wherein the primary heating cycle (20) and/or the secondary heating cycle (30) are closed cycles. 25
8. The processing apparatus according to any of the preceding claims, wherein the secondary heating cycle (20) comprises filter means for filtering the secondary heating medium. 30
9. The processing apparatus according to any of the preceding claims, wherein elements (30, 32) forming the secondary heating cycle (30) are manufactured of corrosion-resistant and/or acid-resistant material, and/or elements forming the primary heating cycle (20) are manufactured of steel-based materials. 35
10. The processing apparatus according to any of the preceding claims, wherein water is used as the primary heating medium and as the secondary heating medium. 40

Patentansprüche

1. Prozessgerät zur Verwendung in einer Pressen-, Trocken- und/oder Veredelungspartie einer Faserstoffbahnbearbeitungsmaschine, wobei das Gerät Führungswalzen (70), ein Band (10) und eine Heizvorrichtung zum Heizen des Bands (10) aufweist, wobei das Band (10) fluiddicht ist, eine endlose Schleife ausbildet, durch die Führungswalzen (70) 55

geführt wird und eine zu bearbeitende Faserstoffbahn (W) führt, wobei die Heizvorrichtung Folgendes aufweist:

einen primären Heizkreislauf (20), in dem ein primäres Heizmedium strömt, einen sekundären Heizkreislauf (30) zum Heizen des Bands (10) des Prozessgeräts, in dem ein sekundäres Heizmedium zirkuliert, wobei der sekundäre Heizkreislauf (30) eine Mediumkammer (32) aufweist, in der das sekundäre Heizmedium direkt mit dem zu heizenden Band (10) in Kontakt ist, und eine indirekte Wärmetauscheinrichtung (40) zum Tauschen von Wärme zwischen dem primären Heizmedium und dem sekundären Heizmedium, wobei eine Wärmemenge des primären Heizmediums, das in dem primären Heizkreislauf (20) strömt, zu dem sekundären Heizmedium, das in dem sekundären Heizkreislauf (30) zirkuliert, mittels der indirekten Wärmetauscheinrichtung (40) übertragen wird, so dass das Band (10) des Prozessgeräts durch das sekundäre Heizmedium beheizbar ist, **dadurch gekennzeichnet, dass** das Prozessgerät des Weiteren eine Presswalze (60) aufweist, wobei die Bahn (W) entlang und zwischen einer Oberfläche der Presswalze (60) und einer Oberfläche des Bands (10) geführt wird, und die Mediumkammer (32) entlang eines Abschnitts des Bands (10) angeordnet ist, in dem das Band durch die Presswalze (60) oder durch eine der Führungswalzen (70) gestützt ist, wobei das Band (10) zwischen der Press- oder Führungswalze (60, 70) und der Mediumkammer (32) angeordnet ist.

2. Prozessgerät nach Anspruch 1, wobei die indirekte Wärmetauscheinrichtung (40) ein Wärmetauscher (40) ist, der zwischen dem primären Heizkreislauf (20) und dem sekundären Heizkreislauf (30) angeordnet ist.
3. Prozessgerät nach einem der vorangegangenen Ansprüche, wobei der sekundäre Heizkreislauf (30) eine Einstelleinrichtung (34) aufweist, die angepasst ist, um ein Druckausmaß und/oder eine Temperatur des sekundären Heizmediums zu steuern.
4. Prozessgerät nach Anspruch 3, wobei die Einstelleinrichtung ein Druckeinstellventil ist, durch das ein Druck und/oder eine Temperatur des sekundären Heizmediums gesteuert wird.
5. Prozessgerät nach Anspruch 3 oder 4, wobei die Einstelleinrichtung an den sekundären Heiz-

kreislauf (30) bevorzugt an die Mediumkammer (32), angeschlossen ist, oder die Einstelleinrichtung einstückig mit dem sekundären Heizkreislauf (30), bevorzugt mit der Mediumkammer (32), vorgesehen ist.

6. Prozessgerät nach einem der vorangegangenen Ansprüche, das des Weiteren eine Reinigungseinrichtung aufweist, die mit dem Band (10) in Kontakt ist, um eine Oberfläche des Bands (10) zu reinigen, die mit dem sekundären Heizmedium direkt in Kontakt ist.
7. Prozessgerät nach einem der vorangegangenen Ansprüche, wobei der primäre Heizkreislauf (20) und/oder der sekundäre Heizkreislauf (30) geschlossene Kreisläufe sind.
8. Prozessgerät nach einem der vorangegangenen Ansprüche, wobei der sekundäre Heizkreislauf (20) eine Filtereinrichtung zum Filtern des sekundären Heizmediums aufweist.
9. Prozessgerät nach einem der vorangegangenen Ansprüche, wobei Elemente (30, 32), die den sekundären Heizkreislauf (30) ausbilden, aus einem korrosionsbeständigen und/oder säurebeständigen Material hergestellt sind, und/oder Elemente, die den primären Heizkreislauf (20) ausbilden, aus auf Stahl basierenden Materialien hergestellt sind.
10. Prozessgerät nach einem der vorangegangenen Ansprüche, wobei Wasser als das primäre Heizmedium und als das sekundäre Heizmedium verwendet wird.

Revendications

1. Appareil de traitement pour une utilisation dans une section de pressage, de séchage et/ou de finition d'une machine de traitement de bande fibreuse, ledit appareil comprenant des rouleaux de guidage (70), une courroie (10) et un dispositif de chauffage pour le chauffage de la courroie (10), dans lequel la courroie (10) est imperméable aux fluides, forme une boucle sans fin, est guidée par les rouleaux de guidage (70) et guide une bande fibreuse (W) à traiter, le dispositif de chauffage comprenant un cycle de chauffage primaire (20) dans lequel un milieu chauffant primaire passe, un cycle de chauffage secondaire (30) pour chauffer la courroie (10) de l'appareil de traitement dans lequel un milieu chauffant secondaire circule, le cycle de chauffage secondaire (30) comprenant une chambre pour milieu (32) dans laquelle le milieu chauffant secondaire est en contact direct avec la courroie (10) à chauffer, et un moyen d'échange de chaleur indirect (40) pour

échanger de la chaleur entre le milieu chauffant primaire et le milieu chauffant secondaire, dans lequel une quantité de chaleur du milieu chauffant primaire passant dans le cycle de chauffage primaire (20) est transférée au milieu chauffant secondaire circulant dans le cycle de chauffage secondaire (30) à travers le moyen d'échange de chaleur indirect (40) de sorte que la courroie (10) de l'appareil de traitement puisse être chauffée par le milieu chauffant secondaire,

caractérisé en ce que

l'appareil de traitement comprend en outre un rouleau presseur (60), la bande (W) étant guidée le long d'une surface du rouleau presseur (60) et d'une surface de la courroie (10) et entre celles-ci, et la chambre pour milieu (32) est disposée le long d'une partie de la courroie (10) dans laquelle la courroie est soutenue par le rouleau presseur (60) ou par l'un des rouleaux de guidage (70), la courroie (10) étant disposée entre le rouleau presseur ou de guidage (60, 70) et la chambre pour milieu (32).

2. Appareil de traitement selon la revendication 1, dans lequel le moyen d'échange de chaleur indirect (40) est un échangeur de chaleur (40) agencé entre le cycle de chauffage primaire (20) et le cycle de chauffage secondaire (30).
3. Appareil de traitement selon l'une des revendications précédentes, dans lequel le cycle de chauffage secondaire (30) comprend un moyen de réglage (34) qui est adapté pour commander la quantité de pression et/ou la température du milieu chauffant secondaire.
4. Appareil de traitement selon la revendication 3, dans lequel le moyen de réglage est une soupape de réglage de pression par laquelle la pression et/ou la température du milieu chauffant secondaire est commandée.
5. Appareil de traitement selon la revendication 3 ou 4, dans lequel le moyen de réglage est relié au cycle de chauffage secondaire (30), de préférence à la chambre pour milieu (32), ou le moyen de réglage est prévu d'un seul tenant avec le cycle de chauffage secondaire (30), de préférence avec la chambre pour milieu (32).
6. Appareil de traitement selon l'une des revendications précédentes, comprenant en outre des moyens de nettoyage qui sont en contact avec la courroie (10) afin de nettoyer une surface de la courroie (10) qui est en contact direct avec le milieu chauffant secondaire.
7. Appareil de traitement selon l'une des revendications précédentes, dans lequel le cycle de chauffage

primaire (20) et/ou le cycle de chauffage secondaire (30) sont des cycles fermés.

8. Appareil de traitement selon l'une des revendications précédentes, dans lequel le cycle de chauffage secondaire (20) comprend un moyen de filtration pour la filtration du milieu chauffant secondaire. 5
9. Appareil de traitement selon l'une quelconque des revendications précédentes, dans lequel des éléments (30, 32) formant le cycle de chauffage secondaire (30) sont fabriqués d'un matériau résistant à la corrosion et/ou résistant aux acides, et/ou des éléments formant le cycle de chauffage primaire (20) sont fabriqués de matériaux à base d'acier. 10 15
10. Appareil de traitement selon l'une des revendications précédentes, dans lequel l'eau est utilisée en tant que milieu chauffant primaire et en tant que milieu chauffant secondaire. 20

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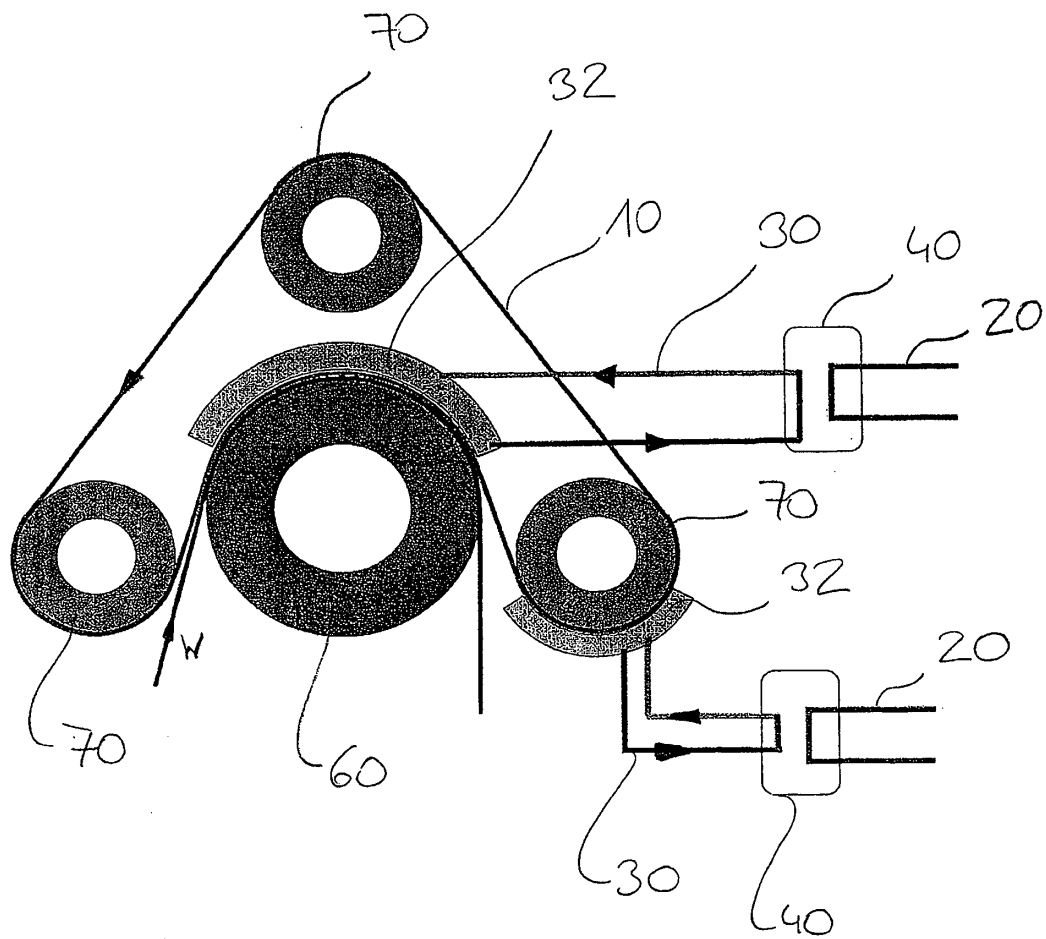


FIG. 1

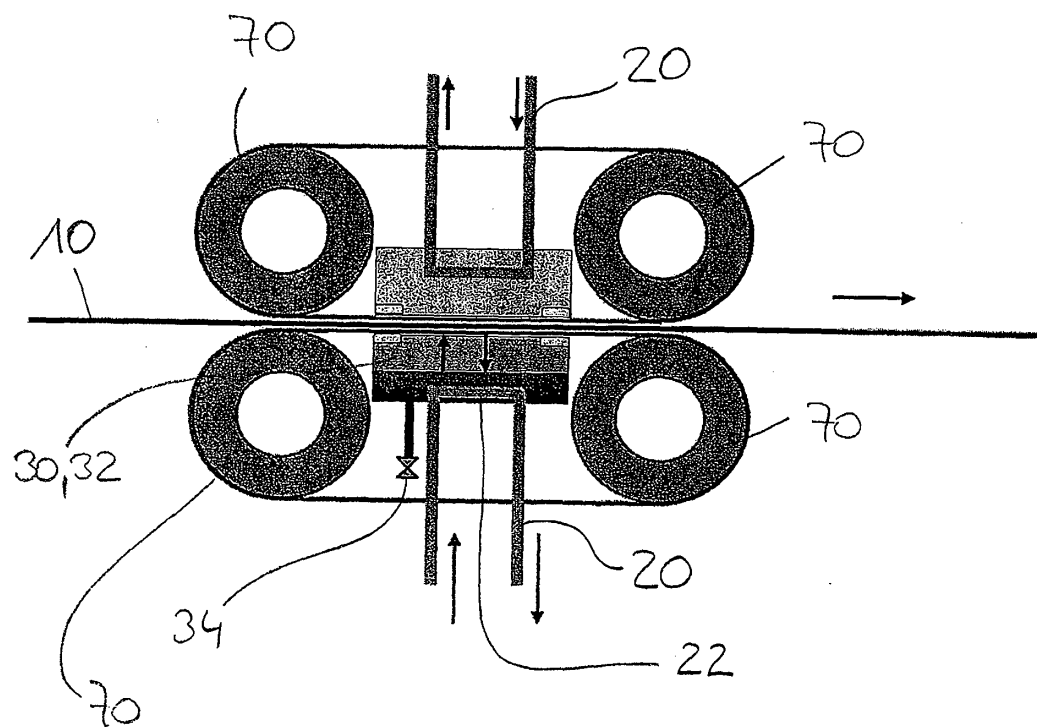


FIG. 2

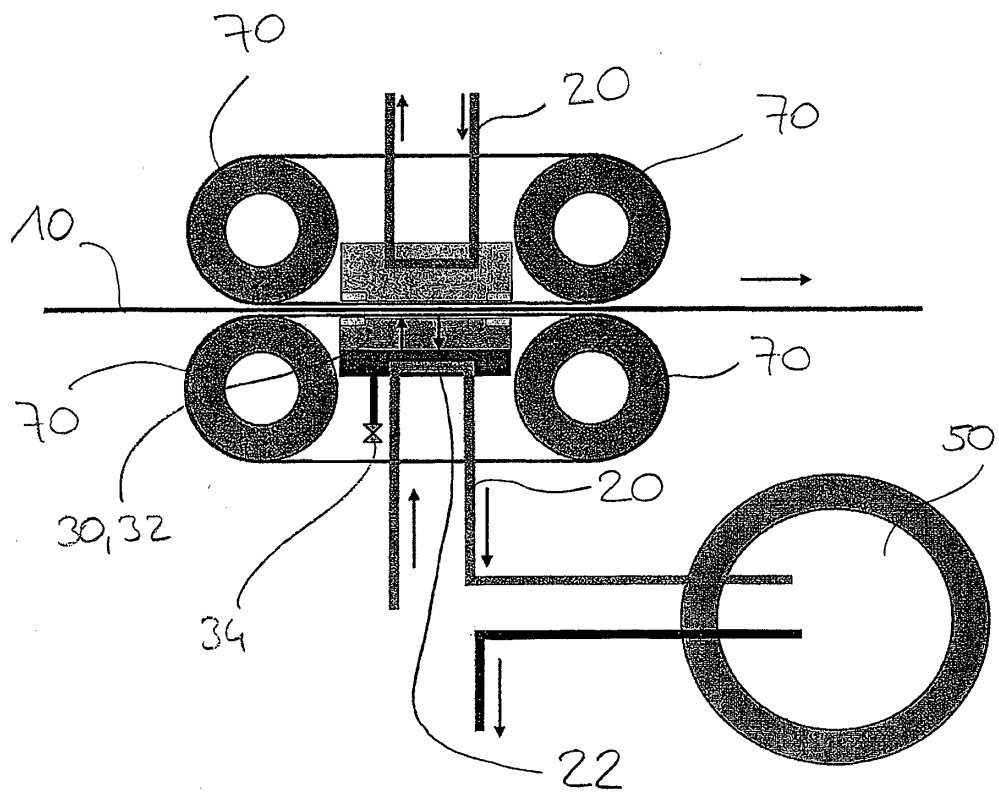


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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