(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 725 135 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.04.2014 Bulletin 2014/18

(51) Int Cl.:
D21F 5/00 *(2006.01)* ***E04B 1/00*** *(2006.01)*

(21) Application number: **12190357.9**

(22) Date of filing: **29.10.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Metso Paper Inc.**
00130 Helsinki (FI)

(72) Inventors:
- **Helenius, Kalle**
  21360 Lieto (FI)
- **Virtanen, Janne**
  21380 Aura (FI)
- **Nurmio, Reijo**
  21140 Rymättylä (FI)
- **Mäkimattila, Timo**
  21200 Raisio (FI)
- **Norri, Petri**
  20300 Turku (FI)

(74) Representative: **Mäkelä, Katja**
Turun Patenttitoimisto Oy
P.O. Box 99
20521 Turku (FI)

(54) An insulated hood of a paper machine and a method for constructing an insulated hood of a paper machine

(57) An insulated hood of a paper machine, in which hood at least a wall, a door element or a roof has been constructed by arranging at least a first element (10) and a second element (11) in contact with each other. The elements comprise two essentially parallel planar surfaces (12a, 12b), an insulation material (13) between the surfaces, and watertight edges. The gap between the first and the second surface (12a, 12b) comprising the insulation material (13) is free of frame structures of the hood.

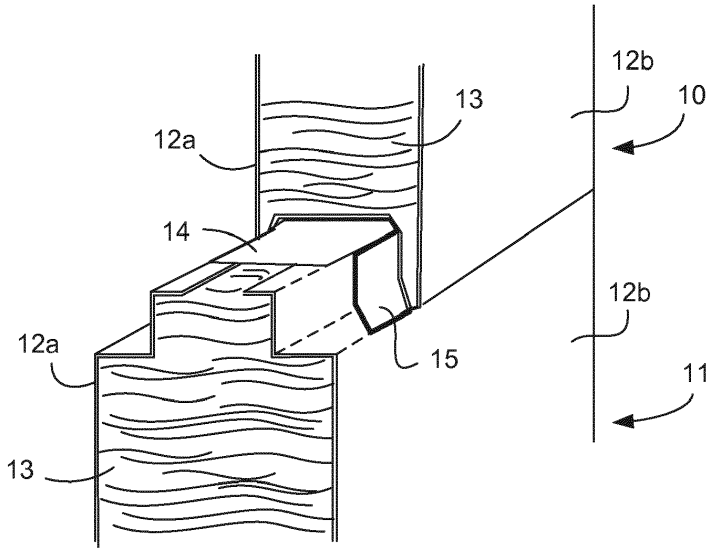

Fig. 1

EP 2 725 135 A1

Description

Field of the invention

[0001] The present invention relates to an insulated hood of a paper or paper board machine and a method for constructing an insulated hood of a paper or paper board machine according to the preambles of the independent claims presented below.

Background of the invention

[0002] Typically, a dryer section of paper or paper board machines has been covered by an insulated hood. The hood has usually been built by arranging a separate insulation material and cover plates to a frame structure of the hood wherein at least a part of the frame structure is between the cover plates of the hood. The building of the hood in this way is time-consuming and laborious.

[0003] Conditions inside the hood of the paper machine are humid and warm. In the insulated hoods, the humid air condensates on the hood structures due to cold insulated surfaces and causes e.g. weakening of the insulating properties of the insulation material. In wet areas of the paper machine, especially in wet end side of the paper machine dryer section, the hood is also protected against water splashes either by separate stainless steel save-alls, or by air heated hollow stainless steel panels instead of normal insulated construction. Both solutions cause trouble in manufacturing, installation, and also might need external equipment like air blowing ducts. Thus, the costs of these constructions for avoiding wetting of the insulation material of the hood are high. Without any protection, water and/or hot and humid air will penetrate into the insulation material of the hood construction and spoil the insulation material.

Description of the Invention

[0004] It is an object of the present invention to reduce or even eliminate the above-mentioned problems appearing in prior art.

[0005] The aim of the present invention is to obtain an entirely novel solution for constructing an insulated hood of a paper or paper board machine.

[0006] It is especially an object of the present invention to provide an element structure which makes possible a watertight and water vapour tight construction of a hood of a paper machine.

[0007] It is another object of the present invention to provide a hood structure, which is quick and easy to build and install.

[0008] In order to achieve, among others, the objects presented above, the invention is characterized by what is presented in the characterizing parts of the enclosed independent claims.

[0009] The embodiments and advantages mentioned in this text relate, where applicable, both to the hood and to the method according to the invention, even though it is not always specifically mentioned.

[0010] A typical insulated hood of a paper or paper board machine according to the invention comprises

- a frame structure,
- a roof connected to the frame structure, and
- walls connected to the frame structure, and/or
- at least one door element,

in which hood at least a wall, a door element or the roof has been constructed by arranging at least a first element and a second element in contact with each other so that a long side edge of the first element is in contact with a long side edge of the second element, and which elements comprise

- two essentially parallel surfaces, i.e. a first planar surface and a second planar surface, which surfaces are arranged at a distance from one another,
- an insulation material between the surfaces, whereby the gap between the first and the second surface comprising the insulation material is free of frame structures, and
- watertight edges.

[0011] A typical method for constructing an insulation hood of a paper machine according to the invention comprises

- constructing a frame structure of the hood, the height of which frame structure defines the height of the hood in the vertical direction,
- constructing at least a wall, a door element or a roof of the hood by arranging at least a first element and a second element in contact with each other so that a long side edge of the first element is in contact with a long side edge of the second element, which elements comprise

  - two essentially parallel surfaces, i.e. a first planar surface and a second planar surface, which surfaces are arranged at a distance from one another,
  - an insulation material between the surfaces, whereby the gap between the first and the second surface comprising the insulation material is free of frame structures, and
  - watertight edges,

  and
- fastening the short side edges of the first and the second element to the frame structure of the hood or to the support beam of the door element.

[0012] Some preferred embodiments of the invention will be described in the other claims.

[0013] A watertight paper machine hood according to the invention is based on watertight and water vapour proof prefabricated elements, which are ready for instal-

lation. In the hood construction of the invention the elements are attached together and to the frame structure of the hood. The watertight elements of the invention make possible that the penetration of water and humid air into the insulation material of the elements can effectively be prevented. The term watertight refers to both watertight and water vapour tight structures in this description. A benefit of the invention is to get a completely watertight and water vapour tight surface in the wet area of the paper machine hood without expensive special solutions or equipment. In addition, a modification of the hood construction and so a modification of the protected area can be made easily without extra engineering work. Therefore, by means of the invention the costs of engineering and manufacturing can be remarkably reduced.

[0014] An insulated hood of the invention comprises at least one wall or one door element or the roof which has been constructed from at least a first watertight element and a second watertight element. In a preferred embodiment of the invention all walls and door elements and the roof of the hood are constructed from at least a first and a second watertight element. The first and the second element usually have a rectangular shape, which comprises two parallel planar large surfaces, and a first and a second parallel long side edge, and a first and a second parallel short side edge, which are perpendicular to the long side edges. The length of the long side edge of the element is typically e.g. 1000 to 10000 mm. The length of the short side edge of the element is typically e.g. 800 to 1200 mm.

[0015] The first and second elements are advantageously in contact with each other by means of a tongue-and-groove joint. With the aid of the tongue-and-groove joint an easy installation of the elements is made possible, and at the same time as good a waterproofing ability as possible is ensured. Typically each element has a slot, i.e. a groove, cut all along one long side edge, and a ridge, i.e. a tongue, on the opposite long side edge. Thus two elements can be joined strongly together to form a single flat surface. The tongue-and-groove joint also stiffens the wall or the door element structure. The shape of the grooves and the tongues can vary. The long side edges of the elements can also be bevelled otherwise to fit each other. In an embodiment of the invention the long side edges of the elements are also glued together in addition to the tongue-and-groove joint for ensuring a strong structure. Typically, the elements forming the wall of the hood of the invention have not been glued but the elements have been attached together only by tongue-and-groove joint.

[0016] In an embodiment of the invention the first and the second surface of the element have been manufactured from a steel plate or an Aluminium plate. Typically, the steel or Aluminium plate has also been coated with a corrosion resistive coating in order that the plates withstand better the humid conditions inside the hood. Typically, the insulation material between the large planar surfaces of the element is polyurethane, fire retardant polyurethane or fibre insulation material such as mineral wool comprising inorganic fibres. Mineral wool can be rock wool or glass wool. In an embodiment of the invention the insulation material has been attached, e.g. glued, directly to the first and the second surface of the element. The gap between the first and the second surface comprising the insulation material has no frame structures of the hood.

[0017] Typically, a thickness of an insulation material layer of the element is 40 to 120 mm. In the case of polyurethane or fire retardant polyurethane, the thickness of the insulation layer is typically about 50 mm. Typically, the thickness of a mineral wool layer of the element is about 80 mm.

[0018] In a typical embodiment of the invention, the element is a so-called sandwich element, which has been manufactured so that the edges of the element are open, i.e. the insulation material between the surface plates is not covered by the surface plates in the edges of the element. In an embodiment of the invention, the element has been manufactured so that the insulation material is covered at least partly by the surface plates on the long side edges of the element, i.e. the surface plates of the element have been partly bent over the long side edges and then the insulation material is visible at least partly on the edges of the element. So, in this case the edges of the element have to be waterproofed in order for preventing water or humid air from penetrating into the insulation material of the element and spoiling the insulation material if e.g. a non-waterproof insulation material such as fibre insulation material has been used. The waterproofing can be carried out by arranging a sealant and/or a water resistive tape over at least the visible insulation material on the edges of the element. Especially if mineral wool or other fibre insulation material has been used as an insulation material, a separate sealant and/or water resistive tape has been arranged over the edges of the element. In a preferred embodiment of the invention, both long side edges and short side edges of the element have been waterproofed by using a sealant and/or a water resistive tape irrespective of the insulation material.

[0019] The sealant arranged to the edges of the element can be any sealant suitable for waterproofing, for example polyurethane mass. In another embodiment of the invention the waterproofed edges of the element comprise a water resistive tape, such as an Aluminium foil tape or the like.

[0020] According to an embodiment of the invention a seam between the long side edges of the first and the second element also comprises a separate sealing, which is arranged at least to one edge of the tongue-and-groove joint. The sealing is attached, e.g. glued, to the edge of the element so that it remains inside the joint between the elements. Preferably, the sealing is a silicone sealing such as a silicone tape or the like, which is arranged at least to the seams inside the hood. Thus, the watertightness and water vapour tightness of the wall

constructed from the elements can be ensured inside the hood, i.e. on the walls against the paper machine. On another side of the joint, i.e. to the seam against outside of the hood, a separate sealing is not typically arranged in order that possible humidity inside the element can exit from the element.

[0021] In an embodiment of the invention at least one planar surface of the element has been coated with a water resistive coating for ensuring watertightness of the element. A suitable water resistive coating is e.g. a polyurethane-based coating or the like. In an embodiment of the invention, the water resistive coating is applied on the surface of the element so that it covers substantially the entire planar surface of the element. In addition, the seams between the elements can also be sealed with a water resistive coating during the assembly work. Thus, also the seams between the elements are sealed for preventing water and water vapour from entering into the insulation material of the element. Especially, the elements in the area of the wet end side of the paper machine dryer section can be covered with the water resistive coating.

[0022] In a preferred embodiment of the invention for ensuring water tightness of the hood, a wall of the hood has been constructed from a first element and a second element, the edges of which elements has been covered a separate sealant and/or water resistive tape. In addition, the seam between the first and the second element comprises a separate silicone sealing, which is arranged at least to one edge of the tongue-and-groove joint. The wall surface constructed from the element has also been coated with a water resistive coating inside the hood.

[0023] In an embodiment of the invention, the element comprises a window, a door, a hatch or a through hole for an air duct, a drive axle or any other component included in the paper machine. In a preferred embodiment of the invention, a ready-made window module has been arranged to the element wherein the seams around the module are easy to seal for ensuring waterproofing. Also, other through holes are arranged to the elements as ready-made modules. The ready-made modules can be glued to the element and so separate fastenings are not needed.

[0024] An embodiment of the invention comprises a frame structure of the hood, which has been arranged around the paper machine so that the frame structure is not supported by the paper machine but it forms an own self-supporting construction. The frame structure according to said embodiment of the invention holds up only the structures of the hood, and so the frame structure can also be manufactured from more lightweight beams. The light-weight frame structure according to the invention reduces also costs of the manufacturing of the frame structure.

[0025] The frame structure of the hood can be a conventional steel or Aluminium frame structure comprising vertical and horizontal beams. The height of the frame structure defines the height of the hood in the vertical direction. The elements can be arranged to the wall structure so that the long side edges of the element are substantially vertical or horizontal direction in the height direction of the hood. In a preferred embodiment of the invention, the short side edges of the elements of the wall construction have been fastened to the frame structure of the hood, i.e. to the vertical and/or horizontal frame beams depending on the direction of the short side edges of the elements. Thus, the spacing of the frame beams needs not to be corresponded with the spacing of the elements in both vertical and horizontal direction. The elements are typically attached to the frame structure for example with mechanical attaching means. Thus, the elements have no fastenings in the main area of the large surfaces, since the elements are fastened to each other only with the tongue-and-groove joint, and only the short side edges of the elements have been mechanically fastened to the frame structure. This makes the construction of the walls much easier than previously.

[0026] The door element of the hood according to the invention has been typically manufactured from the same elements as the walls of the hood, but in a preferred embodiment of the invention the elements for the door element comprise polyurethane or fire retardant polyurethane as an insulation material. Polyurethane provides a strong structure which is applicable in the door element. In a preferred embodiment of the invention, the long side edges of the first and the second elements have been glued to each other for constructing a strong and self-supporting door element. In an embodiment of the invention, the short side edges of the first and the second element have been fastened to a support beam of the door. The door element can also comprise a window, which is installed to the door element by using a ready-made module for ensuring water-tightness.

[0027] When the roof of the hood around the wet end of the paper machine has been constructed from the elements according to the invention and the surface of the elements against the paper machine has been coated with a separate water resistive coating, separate stainless steel save-alls are not needed.

[0028] To prevent condensation inside the hood due to a cold insulated surface, the inside of this hood area can be equipped with hot air blowing, e.g. through the hood frame beams. This will keep the air relative humidity low enough to prevent condensation on the element or the hood frame surface.

[0029] The area to be protected with the hood of the invention is a free choice. In some cases more area that is protected is needed, in other cases less. According to an embodiment of the invention, at least the hood area in contact with splash water is designed with insulated elements of the invention.

Detailed description of the drawings

[0030] Fig. 1 shows as an example a seam between a first and a second element according to one embodiment

of the invention. The structure of Figure 1 comprises waterproof elements, a first element 10 and a second element 11, which are arranged in contact with each other at their long side edges. The elements are in contact with each other by means of a tongue-and-groove joint. The first element 10 and the second element 11 comprise planar large surfaces 12a, 12b and an insulation material 13 between the large surfaces. The long side edge of the element comprises a water resistive tape 14, which has been arranged over the visible insulation material 13 on the edge of the element. A seam between the long side edges of the first element 10 and the second element 11 also comprises a separate sealing 15, which is arranged to one edge of the tongue-and-groove joint.

[0031] Many variations of the present invention will suggest themselves to those skilled in the art in light of the above detailed description. Such obvious variations are within the full intended scope of the appended claims.

Claims

1. An insulated hood of a paper machine, which hood comprises

   - a frame structure,
   - a roof connected to the frame structure, and
   - walls connected to the frame structure, and/or
   - at least one door element,

   characterized in that at least a wall, a door element or the roof has been constructed by arranging at least a first element (10) and a second element (11) in contact with each other so that a long side edge of the first element is in contact with a long side edge of the second element, and which elements (10, 11) comprise
   - two essentially parallel surfaces (12a, 12b), i. e. a first planar surface and a second planar surface, which surfaces are arranged at a distance from one another,
   - an insulation material (13) between the surfaces, whereby the gap between the first and the second surface comprising the insulation material is free of frame structures, and
   - watertight edges.

2. The hood according to claim 1, **characterized in that** the long side edges of the first and the second element are in contact with each other by means of a tongue-and-groove joint.

3. The hood according to claim 1 or 2, **characterized in that** the first and the second surface (12a, 12b) of the element have been manufactured from a steel plate or an Aluminium plate.

4. The hood according to any of the preceding claims, **characterized in that** the insulation material (13) is polyurethane, fire retardant polyurethane or fibre insulation material such as mineral wool.

5. The hood according to any of the preceding claims, **characterized in that** the edges of the element comprise a sealant and/or a water resistive tape (14), which has been arranged at least over the visible insulation material (13) on the edges of the element.

6. The hood according to any of the preceding claims, **characterized in that** a seam between the long side edges of the first and the second element comprises a sealing (15), which is arranged at least to one edge of the tongue-and-groove joint.

7. The hood according to any of the preceding claims, **characterized in that** at least one planar surface (12a, 12b) of the element has been coated with a water resistive coating.

8. The hood according to any of the preceding claims, **characterized in that** the element comprises a window, a door, a hatch or a through hole for an air duct or any other component included in the paper machine.

9. The hood according to any of the preceding claims, **characterized in that** the frame structure of the hood has been arranged around the paper machine, and it is not supported by the paper machine.

10. The hood according to any of the preceding claims, **characterized in that** short side edges of the elements have been fastened to the frame structure.

11. A method for constructing an insulation hood of a paper machine, in which method

    - constructing a frame structure of the hood,
    - constructing at least a wall, a door element or a roof of the hood by arranging at least a first element (10) and a second element (11) in contact with each other so that a long side edge of the first element is in contact with a long side edge of the second element, which elements comprise

      - two essentially parallel surfaces (12a, 12b), i.e. a first planar surface and a second planar surface, which surfaces are arranged at a distance from one another,
      - an insulation material (13) between the surfaces, wherein the gap between the first and the second surface comprising the insulation material is free of frame structures, and
      - watertight edges,

and

- fastening the short side edges of the first and the second element (10, 11) to the frame structure of the hood or to the support beam of the door.

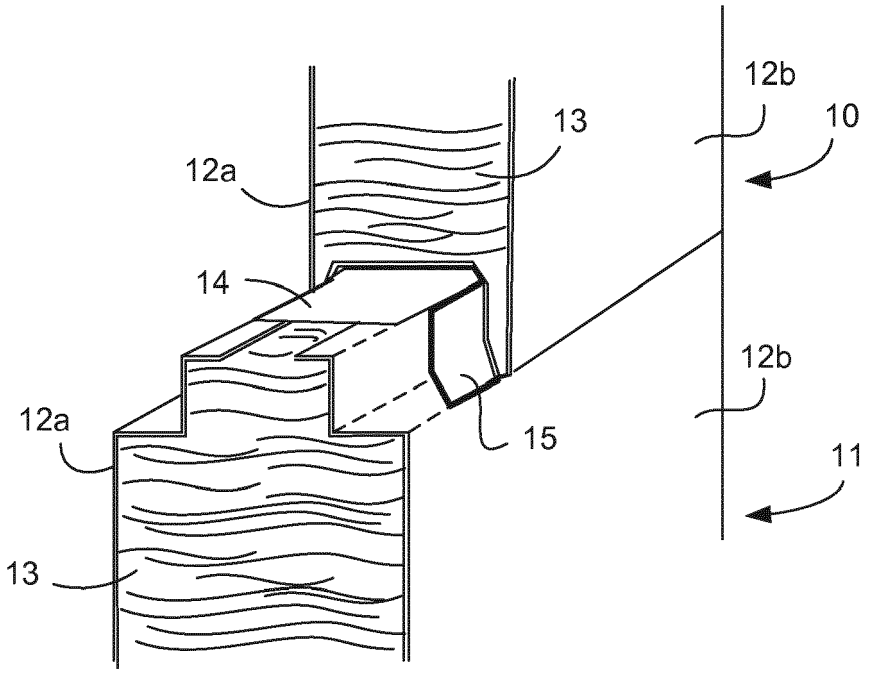

Fig. 1

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 19 0357

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2005 029621 A1 (WIESSNER GMBH [DE]; HEPPER RONALD [DE]) 4 January 2007 (2007-01-04) * paragraphs [0049] - [0062] * * figures *	1-7,10, 11	INV. D21F5/00 E04B1/00
X	EP 2 189 569 A2 (VOITH PATENT GMBH [DE]) 26 May 2010 (2010-05-26) * paragraphs [0015] - [0031] * * figures *	1,2,4-7, 10,11	
A	DE 20 2011 106241 U1 (VOITH PATENT GMBH [DE]) 7 November 2011 (2011-11-07) * the whole document *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			D21F E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 March 2013	Pregetter, Mario

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 19 0357

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-03-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102005029621 A1	04-01-2007	NONE	
EP 2189569 A2	26-05-2010	DE 102008043989 A1	27-05-2010
		EP 2189569 A2	26-05-2010
DE 202011106241 U1	07-11-2011	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82