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(54) **High density press fabric**

(57) A press fabric (14) for use in a papermaking machine, includes a base fabric (22) and a layer (16) of fine fibers combined with a polymer reinforcement. The layer (16) is associated with the base fabric. The layer (16) is no more than 125 grams/m^2. The press fabric (14) is precompacted to a density greater than 750 kg/m^3.

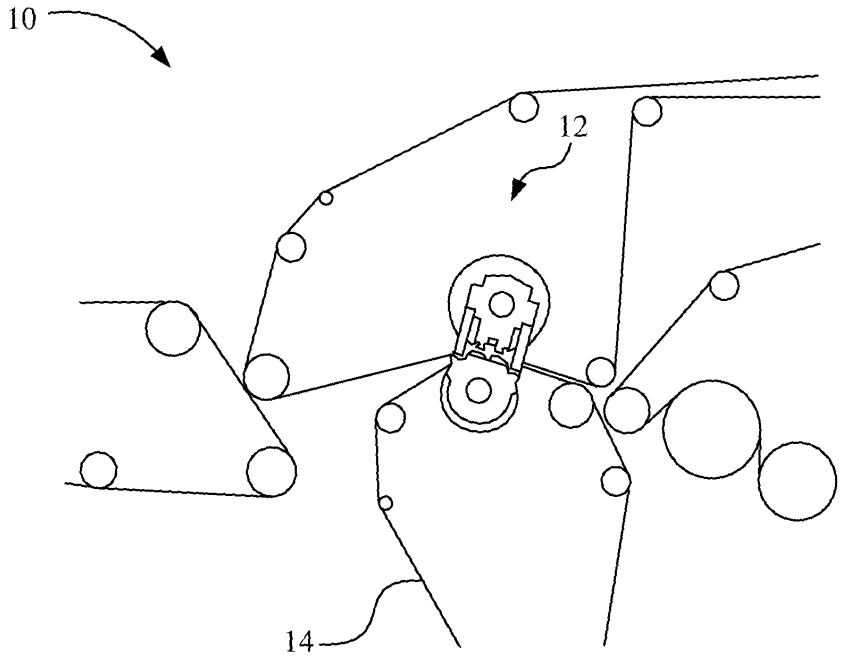

Fig. 1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a papermaking machine, and, more particularly, to a press fabric utilized by a papermaking machine.

2. Description of the Related Art

[0002] In the art of papermaking multiple steps occur from the introduction of a pulp slurry to the production of a finished paper product. The initial introduction of the slurry is that portion of a papermaking machine known as the wet end. Here, the slurry, or fiber suspension, is initially dewatered when the slurry is introduced onto a moving forming fabric, in the forming section of the papermaking machine. Varying amounts of water is removed from the slurry through the forming fabric, resulting in the formation of a fibrous web on the surface of the forming fabric.

[0003] The forming fabric addresses the dewatering of the slurry and also sheet formation, which contributes to the sheet quality as the web forms on the forming fabric. The roll of the forming fabric also includes the conveyance of the fibrous web to the press section of the papermaking machine.

[0004] The web is conveyed to a press section where the web encounters at least one press fabric either directly or adjacent to a fabric carrying the web. The press fabric is utilized with a shoe press or a roll press and the press fabric may exert a pressing force upon the web to further reduce the moisture content of the web.

[0005] The current state of the art press fabrics start with a high volume, which is gradually reduced down to an acceptable value after 8 to 48 hours by a procedure known as running in the fabric. The running in of the fabric results in lost production time and/or at the very least non-optimal dewatering efficiency of the papermaking machine. This running in sequence and non-optimal nip dewatering resulting therefrom leads to a condition of increased contamination of the press fabric mainly in the surface batt structure, which leads to an increased flow resistance.

[0006] What is needed in the art is a press fabric structure that allows immediate startup for more efficient use of the papermaking machine.

SUMMARY OF THE INVENTION

[0007] The present invention provides a press fabric for use in a papermaking machine that does not require a run-in before use.

[0008] The invention in one form is directed to a press fabric for use in a papermaking machine, the press fabric including a base fabric and a layer of fine fibers combined with a polymer reinforcement. The layer being associated with the base fabric. The layer being no more than 125 grams/m^2. The press fabric being pre-compacted to a density greater than 750 kg/m^3.

[0009] An advantage of the present invention is that it significantly reduces the time needed for the running in time of the fabric.

[0010] Another advantage of the present invention is that it reduces initial contamination of the press fabric.

[0011] Yet another advantage of the present invention is that it allows the use of a fine surface batt structure that yields improved paper surface quality and higher dryness.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention will be better understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a schematicized side view of a papermaking machine using an embodiment of the press fabric of the present invention;

Fig. 2 is a schematicized cross-sectional view of one embodiment of the press fabric utilized in the papermaking machine of Fig. 1;

Fig. 3 is a schematicized cross-sectional view of another embodiment of the press fabric utilized in the papermaking machine of Fig. 1; and

Fig. 4 is a schematicized cross-sectional view of yet another embodiment of the press fabric utilized in the papermaking machine of Fig. 1.

[0013] Corresponding reference characters indicate corresponding parts throughout the several views. The exemplifications set out herein illustrate embodiments of the invention, in one form, and such exemplifications are not to be construed as limiting the scope of the invention in any manner.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Referring now to the drawings, and more particularly to Fig. 1, there is shown a papermaking machine 10 having a press section 12 that utilizes a press fabric 14. Not all of papermaking machine 10 is illustrated with papermaking machine 10 having a forming section and a drying section in addition to press section 12.

[0015] Now, additionally referring to Fig. 2, there is shown one embodiment of press fabric 14 having a fine layer 16, a batt layer 18, a non-woven component 20, a base fabric 22 and a batt layer 24. Fine layer 16 is a thin layer of fine fabric fibers combined with a polymer reinforcement. Fine layer 16 is so thin that it is no more than

125 g/m^2. The polymer reinforcement may be made of polyamide or polyurethane. The fine fibers are finer than 3.1 dtex for a shoe press application used in a press section 12 or finer than 6.7 dtex for roll presses used in a press section 12. Base fabric 22 has a low lateral and transversal Intrinsic Flow Resistance (IFR) of below 120 [10^{10} meters^{-2}] at 8 MPa pressure. The IFR can be understood to be a flow resistance calculated per flow length, flow area, hydraulic pressure gradient and adjusted for water viscosity. Using a measure of the intrinsic flow resistance enables a comparison of the flow resistances in different directions of a fabric and courses between felts at different imposed test conditions.

[0016] Base fabric 22 is preferably woven from single monofilaments only, with machine direction yarns not courser than 0.30 mm. Further, base fabric 22 is preferably woven in only one layer. Adjacent to base fabric 22 is non-woven component 20, which may be a Vector nonwoven component. Non-woven component 20 helps provide a mark-free impression on the paper web and provides a void volume in press fabric 14.

[0017] No fibers courser than 11 dtex are included in press fabric 14, except for in non-woven component layer 20. Fine layer 16, batt layer 18, non-woven component 20, base fabric 22 and batt layer 24 are needled and pre-compacted to a high density of at least 750 kg/m^3. Advantageously the pre-compacting of press fabric 14 allows for the use of a thin layer of fine fibers, which are not contaminated during a running in sequence of prior art press fabrics. Press section 12 may utilized more than one press fabric 14. The pre-compaction of press fabric 14 allows for constant and retained properties of press fabric 14 throughout the life of press fabric 14. The constant properties allow a lower initial void volume, which offers immediate nip dewatering and conditioning and also allows the finer fiber layer 16 structure to be used.

[0018] Now, additionally referring to Fig. 3, there is shown another embodiment of press fabric 14 including similar features as those shown in Fig. 2. A fine layer 16 is adjacent a batt layer 18 that is next to the non-woven component 20 that is adjacent to an elastomeric Spectra membrane 26 that is in contact with base fabric 22 next to a batt layer 24. The similar numbered layers in this embodiment have the same properties as those described previously. Elastomeric Spectra membrane 26 may be added for vibration sensitive uses. Once the fabric described in this embodiment is needled it is then pre-compacted to a high density of at least 850 kg/m^3.

[0019] Now, additionally referring to Fig. 4, there is yet another embodiment of press fabric 14 of the present invention. Again, many of the layers are similar to those described above, which retain the same reference numbers in this example. The layers in order are a fine layer 16, a batt layer 18, a single layer component 28, an elastomeric Spectra membrane 26, a base fabric 22 and a batt layer 24. Single layer component 28, may be a machine direction yarn 28 that runs adjacent to elastomeric Spectra membrane 26. The layers described in this embodiment are needled and pre-compacted to a high density of at least 850 kg/m^3. Again, it is this pre-compaction of this particular set of layers that leads to significantly reduced or no running in time for the fabric. This advantageously reduces downtime for papermaking machine 10. Further, since the characteristics of press fabric 14 are substantially fixed by the layers being pre-compacted, the paper produced utilizing a press fabric 14 provides paper of a constant quality. Additionally, higher dryness of the web, as it leaves press section 12, is experienced due to the fabric not being subjected to contamination during a running in process.

[0020] While this invention has been described with respect to at least one embodiment, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

Claims

1. A press fabric for use in a papermaking machine, the press fabric comprising:

   a base fabric; and
   a layer of fine fibers combined with a polymer reinforcement, said layer being associated with said base fabric, said layer being no more than 125 g/m^2, the press fabric being pre-compacted to a density greater than 750 kg/m^3.

2. The press fabric of claim 1, wherein said fibers are finer than 3.1 dtex for a shoe press application.

3. The press fabric of claim 1, wherein said fibers are finer than 6.7 dtex for a roll press application.

4. The press fabric of claim 1, wherein said base fabric has a lateral and transversal intrinsic flow resistance of less than 120 * 10^{10}/m^2 at 8 MPa pressure.

5. The press fabric of claim 4, wherein said base fabric is woven from single strand monofilaments.

6. The press fabric of claim 5, wherein said base fabric has machine direction yarns not coarser than 0.30 mm.

7. The press fabric of claim 6, wherein said base fabric is woven in one layer.

8. The press fabric of claim 7, further comprising a nonwoven component positioned between said layer

and said base fabric.

9. The press fabric of claim 8, wherein said non-woven component is a Vector component.

10. The press fabric of claim 8, wherein the fabric is needled.

11. The press fabric of claim 1, wherein the fabric is needled and pre-compacted to a density greater than 850 kg/m^3.

12. The press fabric of claim 11, wherein said polymer includes one of polyamide and polyurethane.

13. A papermaking machine using a press fabric, the press fabric comprising:

a base fabric; and
a layer of fine fibers combined with a polymer reinforcement, said layer being associated with said base fabric, said layer being no more than 125 g/m^2.

14. The papermaking machine of claim 13, wherein said fibers are finer than 3.1 dtex for a shoe press application.

15. The papermaking machine of claim 13, wherein said fibers are finer than 6.7 dtex for a roll press application.

16. The papermaking machine of claim 13, wherein said base fabric has a lateral and transversal intrinsic flow resistance of less than 120 * 10^{10}/m^2 at 8 MPa pressure.

17. The papermaking machine of claim 16, wherein said base fabric is woven from single strand monofilaments.

18. The papermaking machine of claim 17, wherein said base fabric has machine direction yarns not coarser than 0.30 mm.

19. The papermaking machine of claim 18, wherein said base fabric is woven in one layer.

20. The papermaking machine of claim 19, further comprising a non-woven component positioned between said layer and said base fabric.

21. The papermaking machine of claim 20, wherein said non-woven component is a Vector component.

22. The papermaking machine of claim 20, wherein the fabric is needled and pre-compacted to a density greater than 750 kg/m^3.

23. The papermaking machine of claim 13, wherein the fabric is needled and pre-compacted to a density greater than 850 kg/m^3.

24. The papermaking machine of claim 23, wherein said polymer includes one of polyamide and polyurethane.

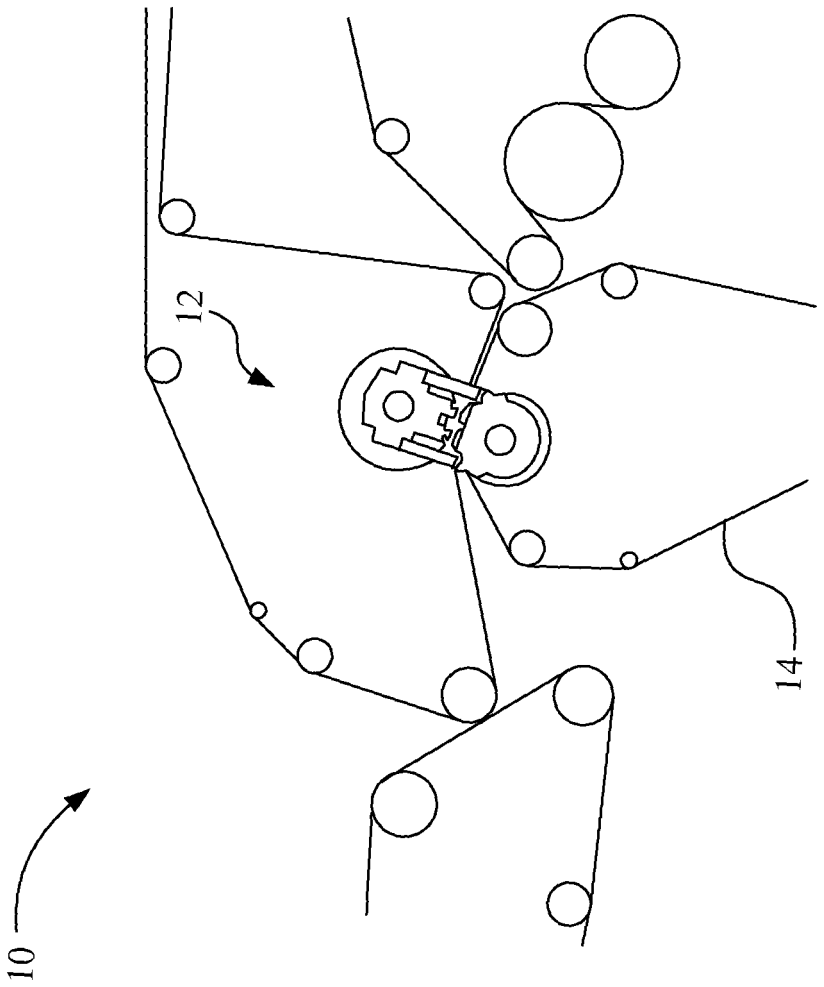

Fig. 1

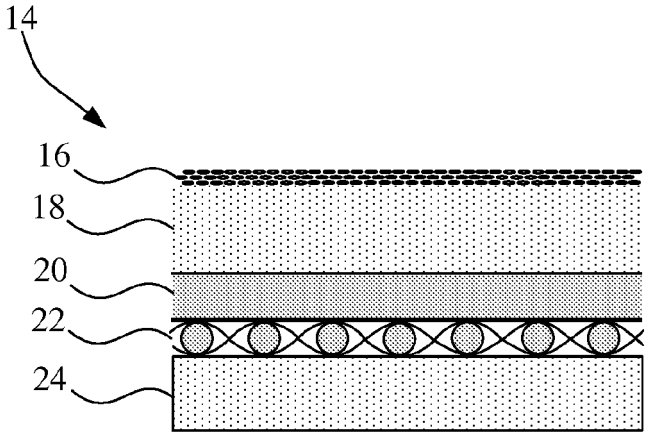

Fig. 2

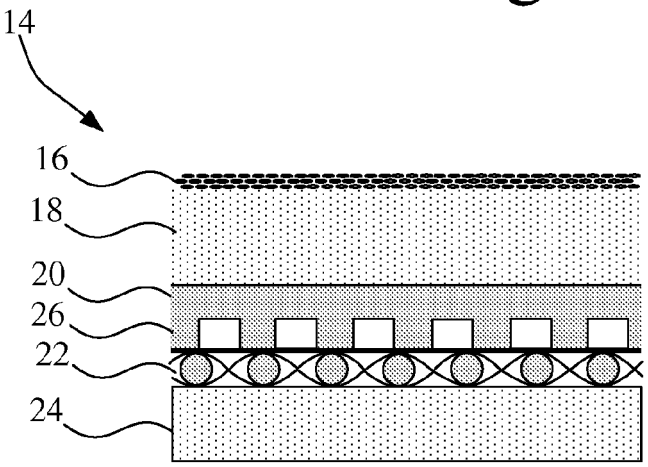

Fig. 3

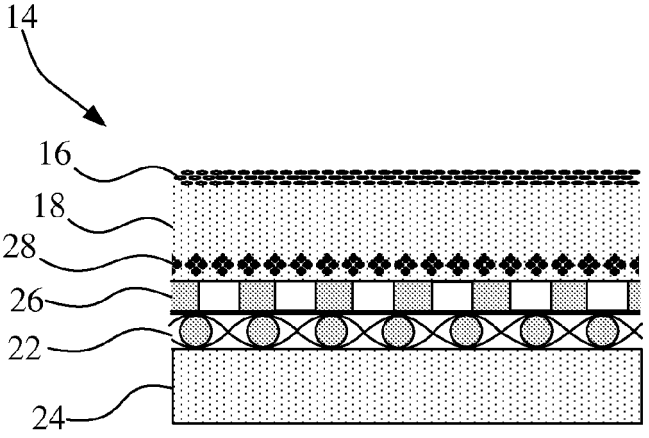

Fig. 4