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(54) Title: METHOD OF CONDITIONING A PINTLE FOR SEAMING A PAPERMAKERS PRESS FABRIC

(57) Abstract: A method of conditioning a pintle for seaming a papermakers press fabric, and a pintle conditioned by the method. The method comprises arranging the pintle, comprising at least one monofilament yarn of a preselected length, into a coiled configuration; selecting a sealable container constructed of a substantially moisture impermeable material; inserting the coiled pintle into the sealable container; adding to the sealable container a preselected amount of a desiccant; sealing the container and retaining it in a sealed condition; and removing the coiled pintle from the sealed container for insertion into aligned seamable ends of the fabric to be seamed. The method prevents swelling of the pintle during storage in high humidity environments before insertion into a seam, significantly facilitating insertion and reducing insertion times.



WO 2009/039633 A1

**METHOD OF CONDITIONING A PINTLE FOR SEAMING A PAPERMAKERS
PRESS FABRIC**

Field of the Invention

- 5 This invention relates to pintles used in seaming papermakers press fabrics, and in particular to a method of conditioning such pintles.

Background of the Invention

- 10 During the papermaking process, an aqueous slurry of cellulosic fibers is deposited onto a moving forming fabric in the forming section of the papermaking machine. As the fabric moves along the forming section, a large volume of water is removed, and the fibers form an
- 15 incipient paper web, which is carried into the following section, which is the press section. The web is transferred onto one or more press fabrics, and passes through a series of press nips, for further water removal. After the press section, the paper sheet passes
- 20 to the dryer section for completion of the process.

- In each section, the web or sheet is carried on fabrics which run as endless loops. In the press section, the press fabric typically comprises a base fabric, on which
- 25 batt is affixed, typically by needling. These fabrics may be provided in various types of construction, including endless woven, spirally wound multiaxial and flat woven. Nearly all of these constructions are typically seamed on the papermaking machine; to effect this, they are
- 30 provided with seaming loops at each end, which are brought together on the machine and interdigitated to form a channel, into which a pintle can be inserted, to

lock the loops in position. Typically, the pintle will be provided with a rigid leader, attached to one end of the pintle. The leader can more readily be inserted into the loops, and is used to pull the pintle through the
5 loops.

However, in papermaking, any irregularity in the supporting fabrics can cause corresponding irregularities in the paper sheet, including marking, reducing the
10 quality of the eventual finished sheet. The seaming area of the fabric has typically been a significant source of such adverse effects, due to the difficulty of ensuring uniformity of the fabric at this area. For fabrics which are seamed by the insertion of a pintle into opposing
15 loops at each end of the fabric, such uniformity requires that the pintle be as close in size to the adjacent cross-machine direction yarns as possible, and have the minimum clearance with the insides of the interdigitated loops. It is also common practice to use pintles
20 comprised of two or more monofilaments, as these monofilaments will tend to compress under pressure in a manner similar to the fabric in which they are used, which will reduce any tendency to impart a seam mark on the sheet being conveyed.

25

Press felts and the pintles used in the seaming process are now typically made from polyamide polymers (nylons), generally polyamide-6, in the forms identified as polyamide-6/4, polyamide-6/6, polyamide-6/10, polyamide-
30 6/11, and polyamide-6/12.

However, papermaking machines operate in an environment which has high relative humidity, typically at least 40% and up to at least 75%, the level being particularly high

in the region of the press section. This can have an adverse effect on the polymer yarns used for the press fabrics, and for the pintles, in that the polyamide materials which are preferred for their properties in operation are sensitive to humidity, tending to absorb moisture and swell. Any swelling of the pintle itself has an adverse effect on the ability to insert a pintle of the size which is required for the fabric; however this is further compounded by the fact that the high humidity can also result in swelling of the loops into which the pintle is to be inserted, in that any swelling in the direction of the inner aperture of the loop will result in the reduction in size of that aperture.

Where a press fabric is being replaced on a papermaking machine, any difficulty in inserting the pintle results in increased down time for the machine, with significant adverse economic effects. It is often found necessary for this task to be performed in small incremental stages across the fabric. As the fabrics are typically up to 10 metres wide in the cross-machine direction, this task can be extremely time-consuming.

It has been found that if the pintle yarn or yarns are stored in a significantly less humid environment until as close as possible to the time at which they are to be used, they can be manipulated with dramatically improved ease, reducing the time required to insert them into the seaming loops across the face of the fabric by a factor of at least five (20 minutes vs. 2 hours or more). However, pintles are typically stored in the general vicinity of the papermaking machine. It has been found that, when pintle yarns are stored in a humid environment similar to that found near the press section of a

papermaking machine, the diameter of the pintle can increase by as much as 5%, or more, thereby dramatically increasing the difficulty of pintle insertion and seaming of the fabric.

5

It has now further been found that if pintle yarns are conditioned by being stored in a sealed container with a suitable desiccant, and removed only at the time of insertion into the seaming area of the fabric, they will not suffer the disadvantageous increase in size from ambient humidity before the time of insertion, and will in fact undergo a small but limited reduction in size, which further facilitates their insertion into the fabric. After a period of time in the humid environment of the papermaking machine, the pintles will increase in size; however, the dramatic improvement in insertion time resulting from the effects of the conditioning results in it being possible to complete the insertion of a pintle before any adverse effect can arise from the humidity of the papermaking machine environment.

As discussed further below, the amount of the selected desiccant needed will primarily depend on the physical properties of the storage container used, and the expected length of time during which the pintle will be stored in the container, prior to its intended end use, these factors in turn depending on the moisture vapour transmission rate of the container.

30 Summary and Detailed Description of the Invention

The invention therefore seeks to provide a method of conditioning a pintle for seaming a papermakers press fabric, comprising the steps of

- (i) arranging a pintle comprising at least one monofilament yarn having a preselected length into a coiled configuration;
- (ii) selecting a sealable container constructed of a substantially moisture impermeable material;
- (iii) inserting the coiled pintle into the sealable container;
- (iv) adding to the sealable container a preselected amount of a desiccant;
- (v) sealing the container and retaining it in a sealed condition;
- (vi) removing the coiled pintle from the sealed container at a time at which seamable ends of the fabric are aligned to receive the at least one coiled pintle.

15

Preferably, the pintle includes at least two monofilaments, and more preferably four.

20

Preferably, the monofilaments are comprised of a polyamide polymer, preferably a polyamide-6, most preferably selected from at least one of polyamide-6/4, polyamide-6/6, polyamide-6/10, polyamide-6/11, and polyamide-6/12.

25

Preferably, the pintle is coiled onto a spool, which is most preferably inserted into a casing.

30

Preferably, the pintle further includes a leader for guiding the pintle into the seamable ends of the fabric.

The sealable container can be of any suitable configuration or material which will provide the required impermeability to moisture. Although it is possible to use containers which are completely impermeable, these

tend to have economic disadvantages; it is more economically feasible to use containers, preferably reusable and resealable, made of plastic or metal, which have a sufficiently low level of permeability to moisture
5 for the expected duration of storage in a high humidity environment. In the case of plastics, the permeability is proportionate to the thickness, so that a suitable level of impermeability can be achieved by selection of the appropriate thickness.

10

Currently available plastics for this purpose having a thickness of 0.2mm, and a moisture vapour transmission rate (MVTR) of 1.2 g/100in²/24hr, might be suitable for short term storage, but a lower rate will be necessary in
15 most cases, where the expected storage time in the high humidity environment close to the machine may be from one to several months. Preferably, therefore, the sealable container is a plastic bag having a thickness of at least 0.4mm, and most preferably the bag or other container is
20 sealed by heat sealing.

The desiccant preferably comprises a silica gel, preferably a synthetic amorphous silica gel, and can additionally comprise a high density polyethylene filler.
25 Other desiccants may also be suitable.

Preferably, the amount of desiccant is selected in proportion to the MVTR of the sealable container. As noted above, where the sealable container is a plastic
30 bag, the rate will be determined by the thickness of the plastic.

Although the desiccant will remove any moisture which might be present in the pintle immediately after sealing

of the pintle and desiccant into the container, preferably the pintle will be as dry as possible before being inserted in the sealable container, to remove or minimize the need for such immediate moisture removal.

5

A commercially available desiccant, NatrasorbTM S, a hard, clear porous amorphous form of silica gel available from Multisorb Technologies of 325 Harlem Road, Buffalo, USA, is particularly suitable, and has been found to be

10 effective to preserve complete dryness of a pintle sealed in a plastic container having a thickness of at least 0.4mm, and a MVTR of less than 1.2g/100in²/24hr, and stored for six months in a paper mill environment.

15 Other suitable desiccants include those based on Montmorillonite clay, or calcium oxide, or other commercially available desiccants.

The invention further seeks to provide a pintle
20 conditioned by the method of the invention.

Pintles presently in use are generally comprised of from 1 - 4 or more monofilaments. The monofilaments are usually made from a species of polyamide, such as
25 polyamide 6/6 or polyamide 6/10 so as to be as similar as possible to the press felt into which they are incorporated. In a pintle comprised of 4 monofilaments, each monofilament will have a diameter of from about 0.015in to about 0.020 in. These monofilaments are held
30 together at one end by a swedge or ferrule, to which is attached a metal wire leader. The purpose of the leader is to provide a stiff material which can be pushed

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through the seaming loops of the press felt. The pintle is usually sized so as to closely match the size of the seaming loops. A pintle is of appropriate size when it requires from about 4 to 7 lb of force per 100 ft. to
5 pull it through the seaming loops. A pintle of originally appropriate size but which has become swollen by hydration during conventional storage can require up to 9 to 10 lb of force per 100 ft.

10 Paper mills generally schedule down time or idle time to service various machine components and to change certain fabrics due to a degradation in their properties. Modern press sections may contains from 2 to 6 press felts or more, and it is very common to change at least
15 one these fabrics during a scheduled maintenance interruption. It will normally take from about 1 to 3 hours or longer to change a press felt and, if the press felt seam joins easily, from 10 to about 30 minutes to seam a new felt with a pintle and leader.

20

In a paper machine trial, three press felts were scheduled for installation in the press section of a paper machine. In all instances, the press felt was of the same design and roughly the same dimensions, and each
25 felt had been manufactured to similar specifications. The seams in all cases were as similar as possible, allowing for manufacturing irregularities. The press felts were brought to the paper machine several hours prior to their installation so that they were exposed to
30 the high humidity conditions proximate the press section. In two of the three cases, the pintles were not sealed in a container with a desiccant prior to installation, while in the third case the pintle was conditioned as described in the claims.

The press felts that were seamed using the pintles that had not been treated in the manner described were difficult to seam, requiring several hours each to join
5 successfully. In both cases, the pintle had to be "stitched out" of the seam and then brought back in again in order to complete the join. In the third instance, where the pintle had been stored in a sealed container with desiccant packs, the pintle inserted easily into and
10 across the seam, closing it easily.

Since that trial, numerous installations of pintles conditioned according to the invention have been equally and consistently successful, in each case with consistent
15 reduction in installation times and required pull force, which has been particularly advantageous in cases of felts having a high width, for example exceeding 200 in. (508cm.).

Claims

1. A method of conditioning a pintle for seaming a papermakers press fabric, comprising the steps of
- 5 (i) arranging a pintle comprising at least one monofilament yarn having a preselected length into a coiled configuration;
- (ii) selecting a sealable container constructed of a substantially moisture impermeable material;
- 10 (iii) inserting the coiled pintle into the sealable container;
- (iv) adding to the sealable container a preselected amount of a desiccant;
- (v) sealing the container and retaining it in a sealed
- 15 condition;
- (vi) removing the coiled pintle from the sealed container at a time at which seamable ends of the fabric are aligned to receive the at least one coiled pintle.
- 20 2. A method according to Claim 1, wherein the pintle includes at least two monofilaments.
3. A method according to Claim 2, wherein the pintle includes four monofilaments.
- 25 4. A method according to any one of Claims 1 to 3, wherein the at least one monofilament comprises a polyamide polymer.
- 30 5. A method according to Claim 4, wherein the polyamide is a polyamide-6.
6. A method according to Claim 5, wherein the polyamide-6 is selected from at least one of polyamide-6/4,

polyamide-6/6, polyamide-6/10, polyamide-6/11, and
polyamide-6/12.

7. A method according to Claim 1, wherein step (i)
5 includes coiling the pintle onto a spool.

8. A method according to Claim 7, wherein step (i)
includes insertion of the spool into a casing.

10 9. A method according to Claim 1, wherein the pintle
further includes a leader for guiding the pintle into the
seamable ends of the fabric.

10. A method according to Claim 1, wherein step (ii)
15 comprises selecting a plastic bag.

11. A method according to Claim 10, wherein the plastic
bag has a thickness of at least 0.4mm.

20 12. A method according to Claim 10, wherein step (v)
comprises heat sealing the sealable container.

13. A method according to any one of Claims 1 to 12,
wherein step (iv) comprises providing a desiccant
25 selected from a silica gel, Montmorillonite clay and
calcium oxide.

14. A method according to Claim 13, wherein the desiccant
comprises a silica gel.

30 15. A method according to Claim 14, wherein the silica
gel comprises a synthetic amorphous silica gel.

16. A method according to Claim 15, wherein the silica gel further comprises a high density polyethylene filler.

17. A method according to any one of Claims 1 to 16,
5 wherein step (iv) includes selecting the amount of desiccant in proportion to the thickness of the sealable container.

18. A pintle conditioned by the method of any one of
10 Claims 1 to 17.

**AMENDED CLAIMS received by the International Bureau on 06
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Claims

1. A method of conditioning a pintle for seaming a
papermakers press fabric, comprising removal of moisture
5 from the pintle to minimize outer dimensions of the
pintle by the steps of
(i) arranging the pintle comprising at least one
monofilament yarn having a preselected length into a
coiled configuration;
10 (ii) selecting a sealable container constructed of a
substantially moisture impermeable material;
(iii) inserting the coiled pintle into the sealable
container;
(iv) adding to the sealable container a preselected
15 amount of a desiccant;
(v) sealing the container and retaining it in a sealed
condition for removal from the sealed container at a time
at which seamable ends of the fabric are aligned to
receive the coiled pintle.
20
2. A method according to Claim 1, wherein the pintle
includes at least two monofilaments.
3. A method according to Claim 2, wherein the pintle
25 includes four monofilaments.
4. A method according to any one of Claims 1 to 3,
wherein the at least one monofilament comprises a
polyamide polymer.
30
5. A method according to Claim 4, wherein the polyamide
is a polyamide-6.

6. A method according to Claim 5, wherein the polyamide-6 is selected from at least one of polyamide-6/4, polyamide-6/6, polyamide-6/10, polyamide-6/11, and polyamide-6/12.
- 5 7. A method according to Claim 1, wherein step (i) includes coiling the pintle onto a spool.
8. A method according to Claim 7, wherein step (i)
10 includes insertion of the spool into a casing.
9. A method according to Claim 1, wherein the pintle further includes a leader for guiding the pintle into the seamable ends of the fabric.
- 15 10. A method according to Claim 1, wherein step (ii) comprises selecting a plastic bag.
11. A method according to Claim 10, wherein the plastic
20 bag has a thickness of at least 0.4mm.
12. A method according to Claim 10, wherein step (v) comprises heat sealing the sealable container.
- 25 13. A method according to any one of Claims 1 to 12, wherein step (iv) comprises providing a desiccant selected from a silica gel, Montmorillonite clay and calcium oxide.
- 30 14. A method according to Claim 13, wherein the desiccant comprises a silica gel.
15. A method according to Claim 14, wherein the silica gel comprises a synthetic amorphous silica gel.

16. A method according to Claim 15, wherein the silica gel further comprises a high density polyethylene filler.
- 5 17. A method according to any one of Claims 1 to 16, wherein step (iv) includes selecting the amount of desiccant in proportion to the thickness of the sealable container.
- 10 18. A pintle conditioned by the method of any one of Claims 1 to 17.

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER IPC: D21F 7/10 (2006.01) , C09F 9/00 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(2008.04): B65D, B65D 85/04, B65D 81/26, D21F ECLA: B65D 81/26F Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used) Questel-Orbit(QPAT), USPTO (Keywords: pintle, wire, dessicant, yarn, monofilament, stor+ , pack+ , sorb+ , sea+ , method, conditionn+ , bag, spool)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP2000262198 A (MASAYOSHI, Y.) 26 September 2000 (26-09-2000)	1 to 14, 17
Y	*Abstract; paragraphs 0006, 0008, 0009, 0014, 0015; claims 1, 2; figures 1 , 6*	15, 16
Y	US5364455 A (KOMARNENI, S. et al.) 15 November 1994 (15-11-1994) *Abstract*	15, 16
X	EP1683912 A1(PATEL, S et al.) 26 July 2006 (26-07-2006) *Abstract*	18
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents :	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
"A" document defining the general state of the art which is not considered to be of particular relevance		
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"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
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US 5364455A	15-11-1994	None	
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