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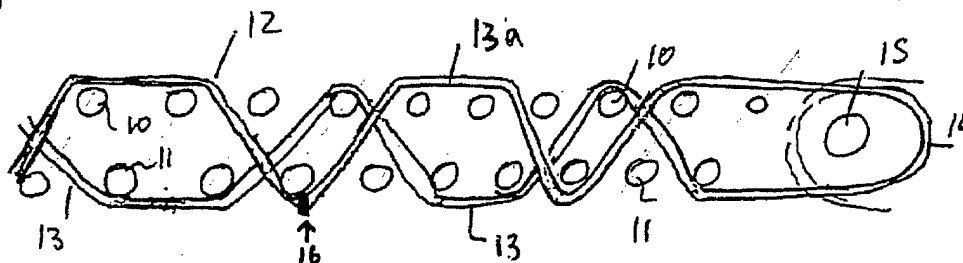
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(54) **Papermachine fabric seaming**

(57) Paper machine clothing woven flat comprising weft yarns (10,11) being interwoven with first and second warp yarns (12,13), wherein for seaming some of the first warp yarns (13) are woven back to form loops (14), wherein at least in the seam zone the warp path of

first warp yarns (13) is symmetrically opposite to the warp path of second warp yarns (12) so that the woven back portion of said first yarns (13) can follow the warp path of said second yarns (12) without being additionally twisted.

Fig. 1



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Description

[0001] This invention relates to dryer fabrics for use in the dryer section of a papermaking machine and in particular to an improvement in the seam area. Paper is conventionally manufactured by conveying a paper furnish, usually consisting of an initial slurry of cellulosic fibres, on a forming fabric or between two forming fabrics in a forming section, the nascent sheet then being passed through a pressing section and ultimately through a drying section of a papermaking machine. In the case of standard tissue paper machines, the paper web is transferred from the press fabric to a Yankee dryer cylinder and then creped.

[0002] Papermachine clothing is essentially employed to carry the paper web through these various stages of the papermaking machine. In the forming section, the fibrous furnish is wet-laid onto a moving forming wire and water is encouraged to drain from it by means of section boxes and foils. The paper web is then transferred to a press fabric that conveys it through the pressing section, where it usually passes through a series of pressure nips formed by rotating cylindrical press rolls. Water is squeezed from the paper web and into the press fabric as the web and fabric pass through the nip together. Press fabrics generally comprise a batt of fibres needed to a base fabric. In the final stage, the paper web is transferred either to a Yankee dryer, in the case of tissue paper manufacture, or to a set of dryer cylinders upon which, aided by the clamping action of the dryer fabric, the majority of the remaining water is evaporated.

[0003] Dryer fabrics are woven flat, where the yarns of the warp in the loom lie in the machine direction of the fabric on the papermachine.

[0004] Dryer fabrics have a range of permeabilities depending upon the particular application. Fabrics with relatively high permeability may have a permeability of around 250 cfm, typically consisting of a single layer of weft yarns with warp yarns woven symmetrically about the median plane of the fabric. In the case of such a fabric there is no problem with seaming.

[0005] Lower permeability fabrics may consist of two (or more) layers of weft yarns with the yarns of the upper (paper side) layer often being of smaller diameter than those in the lower layer. The usual weave pattern of the warp yarns is "face Biased", that is, the upper paper supporting side of the fabric consists of floats over two or more weft yarns, whilst the lower machine side consists of knuckles where warp yarns are woven around only one weft yarn. Further, such fabrics are commonly woven with flattened monofilament warp yarns extending in the machine direction, with width to depth ratios in the order of 2 : 1 to 3 : 1.

[0006] When it comes to seaming of these fabrics a problem arises from the use of flat yarns in an asymmetric weave pattern. The fabric is first of all woven flat to its full length. A number of weft threads, say over about

30mm of the fabric length, are removed from each end of the fabric, leaving a fringe of warp (machine direction) yarns exposed. Alternate warp yarns are bent back to form a series of aligned loops and the remainder form binders. All ends are then rewoven back into the fabric. In order to avoid double warp paths in the seam zone, half of the warp yarns coming from the body of the fabric are cut short before reaching this seam zone, so leaving empty warp paths for the weaving back of the loop and binder yarn ends into the fabric. The returning warp yarns meet the incoming, conventionally staggered, short warps, so forming overall a continuous warp path. The seam is completed by intermeshing the loops formed at the opposite ends of the fabric and inserting a pintle yarn.

[0007] Where there is a face bias, before the loop and binder forming warp yarns are removed back into the fabric, it is first necessary to twist the warp yarn order to get the crimp to fall into alignment with the weave pattern. In the case of the warp yarns forming the seam loops, this twist takes up loop space, particularly with flat yarns having an appreciable aspect ratio, and this impedes insertion of the pintle yarn. To compensate for this, the loop has to be made larger. Furthermore, the twist is also liable to cause marking of the paper web. An object of the invention is to provide a solution to the disadvantages caused by having to rotate the yarn in the seam and in particular the dimensional and marking problems arising from the presence of the twist.

[0008] According to the invention, the necessity for imparting a twist to warp yarns in the seaming loop is eliminated by providing face and back warp paths which are symmetrically opposite.

[0009] "Symmetrically opposite" means that the weave paths are reversed with respect to a central plane of the fabric, so that the paperside floats are the same as the machine side floats, although they are staggered because of the offset weft yarn arrangement.

[0010] The symmetrically opposite yarn paths extend throughout the full length of the fabric and not only the end regions. In this pattern, the warp yarn paths are provided in pairs, with one path exhibiting a face bias to the paper side, i.e. with two, three or more yarn floats on the paper side of the fabric and knuckles on the machine side of the fabric. The next adjacent warp yarn path exhibits a face bias to the machine side, with identical length floats on the machine side as the first described path has on the paper side, and with the floats and knuckles on the two yarn paths coinciding positionally as closely as possible with reference to any stagger between upper and lower weft yarns. A percentage of the yarns in the second path will often be cut short (on the non-paper side) before reaching the seam zone, to allow the yarn in the adjacent first path to be formed into a seaming loop or a binder yarn, and the free end woven back in the empty second path for a sufficient distance to form a complete warp path, as well as to anchor the yarn against the high longitudinal tension arising in the

seam.

[0011] The weave is completed in known manner by displacing adjacent yarn path pairs by one or more weft yarns to produce a complete weave in the usual way.

[0012] Some preferred embodiments of papermachine fabric according to the invention will now be described by way of example with reference to the accompanying drawings, wherein: -

Fig. 1 is a weave path diagram showing the seam end of a papermachine fabric according to the invention;

Fig. 2 is a diagram showing the pattern of floats and knuckles of warp yarns over weft yarns from the paper facing side of the fabric of Fig. 1;

Fig. 3 is a diagram similar to Fig. 2 showing the pattern of floats and knuckles of the warp yarns under the weft yarns from the machine side of the fabric of Fig. 1.

[0013] As shown in Fig. 1, a first papermachine fabric according to the invention comprises two layers of weft yarns 10, 11 extending in the cross-machine direction, and staggered with respect to each other.

[0014] The weave path of typical second warp yarn 12 and first warp yarn 13 are shown extending in the machine direction. Second warp yarn 12 terminates short of the seam area of the fabric on the machine side of the fabric at 16 and a woven back end portion 13a of the first warp yarn 13, continues the yarn path of yarn 12. The weave is an 8 end repeat, yarns 12 and 13a between them weaving in an over five, under three pattern in each repeat group, forming the paperside floats. The first yarn 13, before it is woven back as 13a, is extended from the edge of the fabric to form a seaming loop 14 (shown with a pintle yarn 15 in place). As can be seen seaming loop 14 is formed by a former float in the warp path of said first yarn 13, therefore having original no twist incorporated before the formation of said loop 14. The woven back end portion 13a of the first warp yarn 13 is an extension of the seaming loop and is woven back into the fabric sufficiently to anchor the yarn against machine direction tensile forces acting on the seam, and terminates at 16 adjacent to the cut off end of yarn 13. In reality, this weaving back would occur over a much greater distance than is shown in figure 1.

[0015] The path followed by first yarn 13 is opposite and symmetrical to the path followed by yarns 12 and 13a. In other words, first yarn 13 produces short floats on the machine side and knuckles on the paper side, weaving in a 3 + 5 pattern over an 8 end repeat, and the knuckles and floats of the yarns 12, 13a are symmetrically opposite and staggered by one weft yarn thereto.

[0016] This symmetrically opposite weave pattern means that there is no need for a twist to be put into first yarn 13, forming either the seam loop 14 or binder (not shown), due to the fact that the upper yarn path into which first yarn 13 is going to be woven, is simply an

inversion of it's previous path and so the crimp fits. Figs. 2 and 3 show the surface appearance of the fabric, respectively from the paper side and from the machine side. The weft yarns in the upper paperside layer are given odd numbers 1 - 19, and in the lower machine side layer are given even numbers 2 - 18. Exposed weft yarns are given longitudinal shading, whilst lower layer yarns are unshaded. Warp yarns are numbered in symmetrical pairs 1, 1a to 5, 5a disposed with their respective knuckles and floats on opposite sides of the fabric to those of the other yarn of the pair. Exposed parts of the respective warp yarns are shaded by cross-hatching, whilst other parts of the yarns are hidden. It will be seen that the paperside and machine side patterns are effectively identical.

[0017] The embodiments has been described by way of example only, and many variations are possible including the use of alternative; weave patterns and repeats, weft yarn stacking, more than two weft layers.

[0018] It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which is described by way of example only.

Claims

1. Paper machine clothing woven flat comprising weft yarns being interwoven with first and second warp yarns, wherein for seaming some of the first warp yarns are woven back to form loops, **characterized in that** at least in the seam zone the warp path of first warp yarns is symmetrically opposite to the warp path of second warp yarns so that the woven back portion of said first yarns can follow the warp path of said second yarns without being additionally twisted.
2. Paper machine clothing according to claim 1, **characterized in that** first and second warp yarns are arranged in pairs of first and second warp yarns.
3. Paper machine clothing according to one of the claims 1 to 2, **characterized in that** the weft yarns are arranged in one layer of weft yarns.
4. Paper machine clothing according to one of the claims 1 to 2, **characterized in that** the weft yarns are arranged in two or more layers.
5. Paper machine clothing according to claim 4, **characterized in**

that at least two layers are staggered with respect to each other.

6. Paper machine clothing according to one of the preceding claims, 5
characterized in
that second warp yarns are cut short before reaching the seam zone to leave empty warp paths for the woven back first warp yarns. 10
7. Paper machine clothing according to claim 6, 15
characterized in
that said cut short second warp yarns end on the machine side of said fabric. 20
8. Paper machine clothing according to one of the preceding claims, 25
characterized in
that the loops are formed by former floats in the warp paths of said first yarns. 30
9. Paper machine clothing according to one of the preceding claims, 35
characterized in
that the symmetrically opposite yarn paths of first and second warp yarns extend through the full length of the fabric. 40
10. Paper machine clothing according to one of the preceding claims, 45
characterized in
that the paper machine clothing is a dryer fabric. 50

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Fig. 1

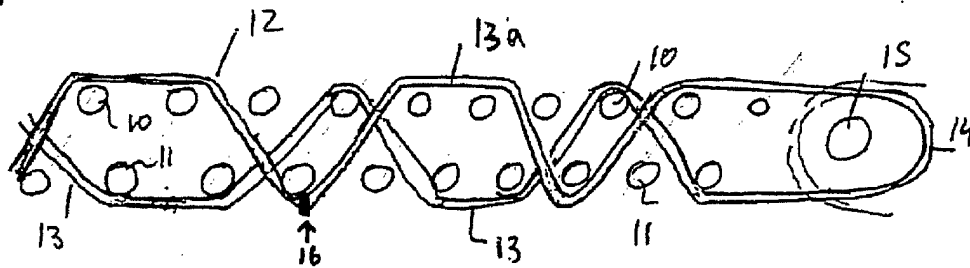


Fig. 2

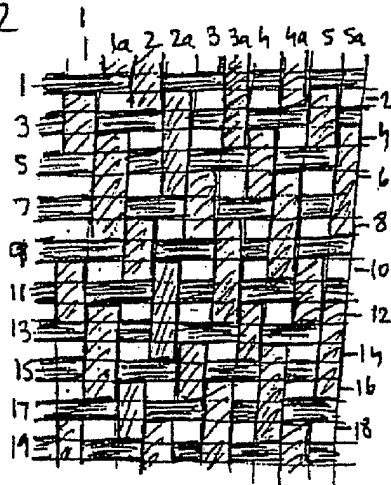
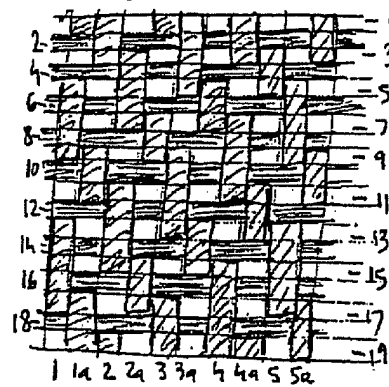


Fig. 3





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EUROPEAN SEARCH REPORT

Application Number
EP 04 10 3930

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X	US 5 458 161 A (SCARFE ALFRED) 17 October 1995 (1995-10-17) * column 7, line 24 - column 10, line 63; figures *	1,2,4,5, 9,10	D21F1/00
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search		Date of completion of the search	Examiner
Munich		23 November 2004	Helpö, T.
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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