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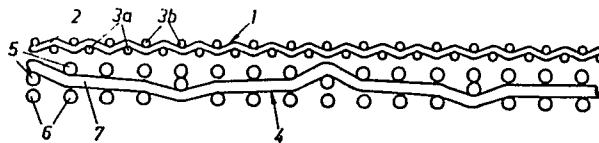
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54 An improved forming fabric.

57 A forming fabric for use in papermaking, cellulose and similar machines. The fabric consists of a first weave (1) which in position of use of the fabric faces the material to be formed, and of a second weave (4) which faces the dewatering elements. The two weaves (1, 4) are interconnected in a known manner. The second weave (4) consists of two systems of threads (5, 6) which are parallel to each other and which are positioned in superposed relationship. In addition, they are interconnected by means of a third thread system (7) the threads of which extend at right angles to the threads (6, 5) of said two systems.



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An improved Forming Fabric

The subject invention concerns an improved forming fabric for use in papermaking, cellulose and similar machines and comprising a first weave which in position of use of the fabric faces the material to be formed, and a second weave which is interconnected with the first weave.

In the conventional manufacture of paper in a papermaking machine a slurry of fibres suspended in water is discharged in a flow onto a cloth of a mesh-like construction. The water in the fibre slurry is drained off through the openings in the fabric and the fibres collect on the top face of the cloth where they are formed into a paper sheet.

The conventional process of paper information in the Fourdrinier machine is nowadays replaced to an increasing extent by the double-fabric formation process according to which a jet of pulp is directed straight into the press nip between two fabrics travelling at the same speed. The pulp is compressed between the fabrics, whereby water is extracted from the pulp.

In both cases the slurry of fibres, the pulp, usually contains more than 99% of water, the majority of which is to be drained off through the fabric. The water through-flow takes place in the portions of the fabric where the thread material of the latter does not prevent such through-flow. It is important that the throw-flow openings are very small, i.e. that the mesh-size of the fabric is small in order to avoid fibre losses. At the same time the permeability of the forming fabric must be of a certain magnitude in order to allow passage-through of large quantities of water. The surface of the fabric closest to the fibre web therefore must be designed so as to comprise a large number of minute through-flow openings, which means that the material of the fabric surface must be a thin thread material. However, the fine-mesh fabrics possess poor wear resistancy and are less stable and for this reason their serviceable life is greatly reduced. Fabrics of synthetic fibre

materials of single-layer design cannot be used in large and high-speed Fourdrinier papermaking machines on account of their poor stability. In these machines the forming fabric is subjected to considerable tensile stress which the fabric must
5 be able to take without stretching in its lengthwise direction and contracting in its transverse direction to such an extent that the fabric becomes unfit for its purpose.

Not until the advent of the so called double-layer forming fabrics did synthetic fibre materials begin to be used to
10 any large extent in these large and high-speed papermaking machines. This kind of fabrics consist of two layers of synthetic weft threads and synthetic warp threads which interconnect the two weft layers. In fabrics of this type it is possible to meet to a certain extent the conflicting requirements of a
15 fine-mesh forming fabric consisting of fine threads and a wear face consisting of coarser and more wear-resistant yarns by using different yarn dimensions and/or fibre materials in the two weft layers. However, these conflicting requirements cannot be met by the warp threads interconnecting the two weft layers.
20 From a formation point of view it is desirable that these threads are of as fine dimensions as possible but in their capacity of machine direction threads they should be able to take the tensile stress to which they are exposed without their elongating becoming abnormally high.

25 The next stage of development consisted in interconnection of two single-layer fabrics in the manner described in SE-PS 7806764-2. The purpose of the invention disclosed in this publication is to make it possible to interconnect two weaves without causing disturbance on the paper-facing side.
30 This purpose is met to the full and this type of forming fabric is used nowadays in the formation of the fine paper qualities for which up till then synthetic forming fabrics could not be used. The difficulties in correlating the properties of elongation and load of the two weaves have, however, lead to
35 the situation that one of the weaves take the majority of the load and that their properties are somewhat impaired compared

to those of double-layer fabrics. In addition, the strength of the seam of the fabric is not entirely satisfactory.

The subject invention is characterized therein that the first weave comprises a first system and a second system of yarns which yarn systems are perpendicular to each other, said first weave being combined with the second weave, the latter consisting of a first system and a second system of yarns which are parallel to each other and which are positioned essentially in superposed relationship, and of a third system of yarns which are perpendicular to said two systems and which interconnect these two systems.

Preferably, the first and second systems of the second weave are weft threads whereas the third thread system consists of warp threads.

Preferably, the diameter of the threads of the first weave is smaller than the diameter of the threads of the second weave.

A forming fabric in accordance with the invention may be designed so as to comprise a first weave of a fine-mesh structure ensuring very even water through-flow without fibre losses or tendencies to mark the paper web. At the same time the stability is improved solely through the second weave. In this manner, the first weave need not be designed to take any load. The strength of the seam which has not been very satisfactory in prior-art forming fabrics comprising double weaves, is considerably improved.

In addition, a loop seam may be provided in the second weave in a more expedient manner. The dimension of the loops may be chosen smaller than the thickness of the second weave and therefore the loops of the seam are protected against abrasion.

Of the two parallel thread systems of the second weave the thread system closest to the machine dewatering elements can be made entirely of a highly wear-resistant material.

One advantage found in double fabric machines is the ability of the fabric to retain water. Another advantage is the

rigidity of the fabric, resulting in the fabric travelling in quite a planar condition through the machine without tendencies towards ridge formation.

5 The invention will be described in the following with reference to the accompanying schematical drawings, wherein

Figs. 1 - 4 are sectional views through the fabric in accordance with the invention as seen in one thread direction, preferably the warp thread direction, and showing a number of different binding patterns.

10 The forming fabric in accordance with the invention preferably is flat woven and joined to endless form. In this case the warp threads are the machine-direction threads of the fabric whereas the weft threads are the crosswise threads in the position of use of the fabric. Alternatively, the fabric
15 may be woven endless, in which case the thread directions relative to the machine direction are the opposite ones.

The embodiments illustrated in Figs. 1 - 4 show a first weave 1 which preferably is a fine-mesh weave which in position of use of the fabric faces the material to be formed. This
20 weave, in the following referred to as the top cloth, is a two-shaft pattern weave in accordance with the embodiments illustrated in Figs. 1, 2 and 4, which means that each thread 2 in one direction, e.g. the warp thread direction, binds above every other thread 3a and underneath every other thread
25 3b in the other direction, e.g. the weft thread direction. Other weaving patterns may be used in the top cloth, such as a Batavia weave illustrated in Fig. 3.

A second weave 4 is positioned underneath the top cloth and constitutes the bottom cloth of the fabric, which cloth
30 faces the dewatering elements of the machine. This second weave 4 preferably is a coarser-mesh weave and consists of double thread systems 5, 6 in one direction, for instance the weft thread direction. These thread systems are parallel and positioned in superposed relationship. A further thread system
35 7 is positioned in the other direction, for instance the warp thread direction, at right angles to the direction of extension

of the double thread systems 5, 6. The threads 7 may interweave with the threads 5, 6 in any suitable pattern, such as the eight-shaft patterns illustrated in Figs. 1, 2 and 3 or the four-shaft pattern illustrated in Fig. 4. The two thread systems 5 and 6 may comprise different numbers of threads. For instance, the number of threads making up thread system 5 may be double the number of threads of thread system 6, such as is the case in the embodiment illustrated in Fig. 2.

The two weaves are interwoven (not illustrated). Preferably, separate binder weft threads interweaving with warp threads from the two weaves may be used for this purpose. It is likewise possible to use binder warp threads. Some of the threads comprised in the thread systems of one of the weaves may also weave with perpendicular threads from the other weave.

A forming fabric in accordance with the invention may consist of a fine-mesh top cloth comprising 30 threads/cm of 0.17 mm polyester monofilaments 2, 3 in both directions. The thread system 7 of interconnecting threads in the bottom cloth may consist of 0.25 mm polyester monofilaments having a thread density of 30 threads/cm. Of the double parallel thread systems 5, 6 in the bottom cloth the threads 5 closest to the top cloth may consist of 0.22 mm polyester monofilaments with a thread density of 15 threads/cm. The lower one 6 of the two parallel thread systems preferably consists wholly or partly of a wear-resistant monofilament material, such as polyamide, which does not, however, exclude the use of other materials. The yarn dimensions of the thread system 6 preferably is 0.30 mm and the thread density 15 threads/cm or 7.5 threads/cm, when the pattern according to Fig. 2 or an equivalent pattern is used.

The invention is not limited to the embodiments illustrated in the drawings or exemplified herein but many other designs and modifications thereof are possible within the scope of the appended claims.

C L A I M S

1. A forming fabric for use in papermaking, cellulose and similar machines, said fabric comprising a first weave which in position of use of the fabric faces the material to be formed, and a second weave, which is interconnected with the first weave, c h a r a c t e r i z e d therein that the first weave (1) consists of a first system and a second system of threads (2, 3) which yarn systems are perpendicular to each other, said first weave being combined with the second weave (4), which second weave consists of a first system and a second system of threads (5, 6) which are parallel with each other and which are positioned essentially in superposed relationship, and of a third system of threads (8), which are perpendicular to said two systems (5, 6) and which interconnect said two systems (5, 6).

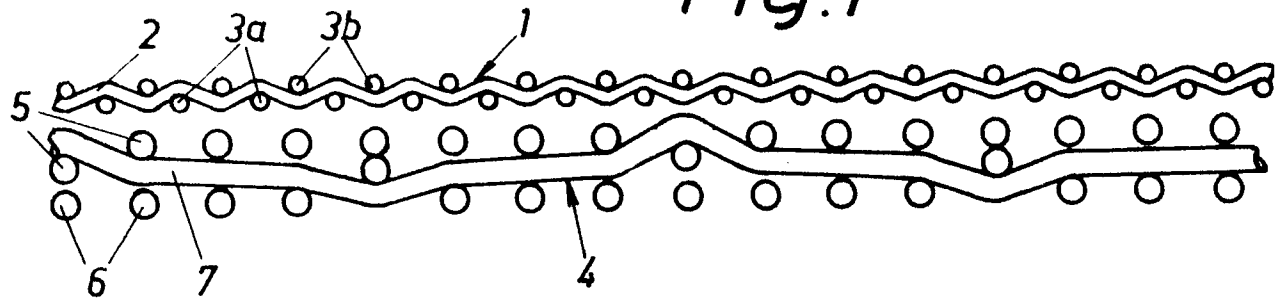
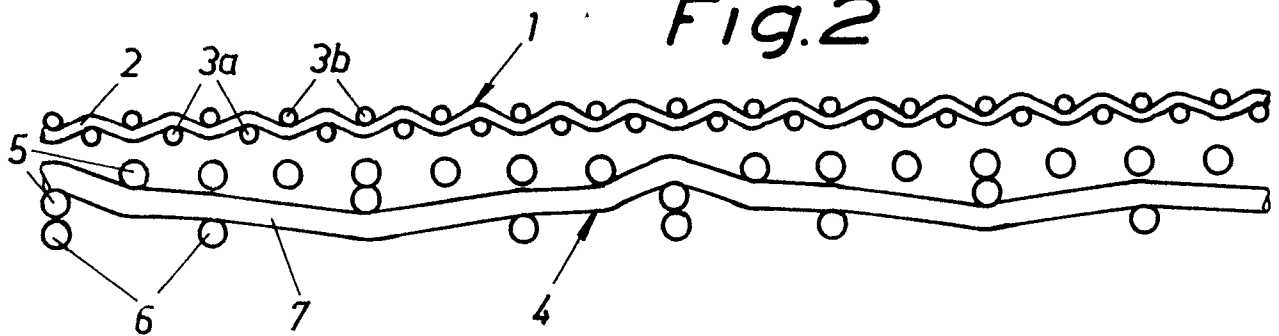
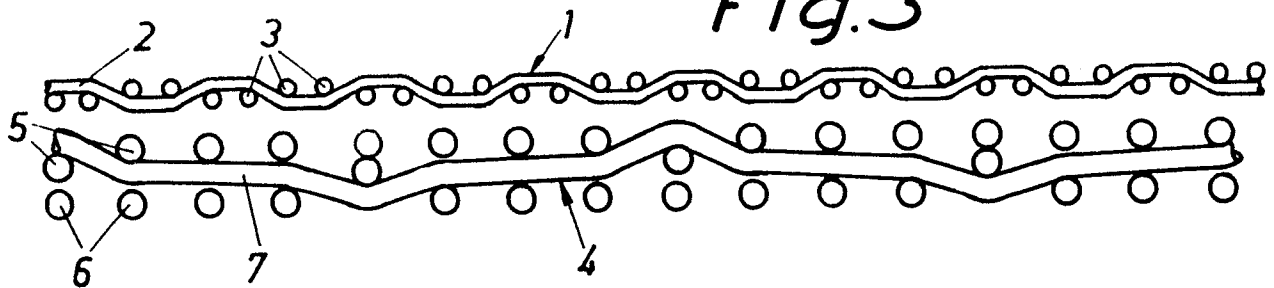
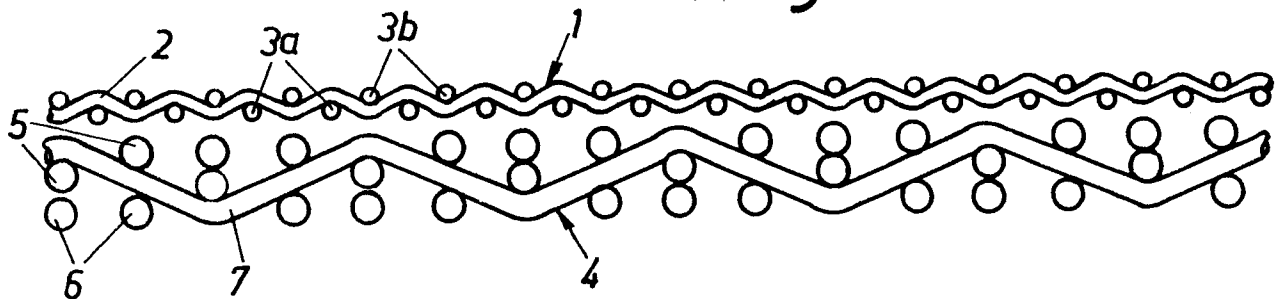
2. A forming fabric as claimed in claim 1, c h a r a c t e r i z e d therein that the two parallel systems (5, 6) of said second weave (4) are weft threads whereas threads of the third system (7) are warp threads.

3. A forming fabric as claimed in claim 1, c h a r a c t e r i z e d therein that the threads (2, 3) of the first weave (1) are of smaller diameter size than the threads (5, 6, 7) of the second weave (4).

4. A forming fabric as claimed in any one of the preceding claims, c h a r a c t e r i z e d therein that the two weaves (1, 4) are interconnected by means of separate binder weft threads.

5. A forming fabric as claimed in any one of the claims 1 - 3, c h a r a c t e r i z e d therein that the two weaves (1, 4) are interconnected by means of separate binder warp threads.

6. A forming fabric as claimed in any one of claims 1 - 3, c h a r a c t e r i z e d therein that the two weaves (1, 4) are interconnected by interlacing some of the threads comprised in the thread systems of one of the weaves with perpendicular threads in the other weave.

Fig.1*Fig.2**Fig.3**Fig.4*



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EUROPEAN SEARCH REPORT

0141791

Application number

EP 84 85 0316

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	EP-A-0 012 519 (ALBANY) *Figure 1; page 3, lines 16-33; page 4, lines 6-29*	1,2,6	D 21 F 1/00 D 03 D 11/00
Y		3-5	
Y	--- EP-A-0 069 101 (NORDISKAFILT) *Figure 1; abstract*	3	
A		6	
Y,D	--- GB-A-2 022 638 (NORDISKAFILT) *Claim 1; figures*	4	
Y	--- US-A-2 047 610 (BARRELL) *Figure 7; page 1, column 2, lines 22-29*	5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D 21 F D 03 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28-01-1985	Examiner BOULEGIER C.H.H.
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	