

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent of: Eberhardt et al.  
U.S. Patent No.: 11,261,566 Attorney Docket No. 59054-0037IP1  
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Title: CLOTHING FOR A MACHINE FOR PRODUCING A FIBROUS  
MATERIAL WEB

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT  
NO. 11,261,566 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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**LIST OF EXHIBITS**

|        |                                               |
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| EX1001 | U.S. Patent No. 11,261,566                    |
| EX1002 | U.S. Patent No. 11,261,566 File History       |
| EX1003 | Declaration of Dr. Christopher M. Pastore     |
| EX1004 | PCT Publication No. WO 89/12717 (“Sudre”)     |
| EX1005 | PCT Publication No. WO 2014/172594 (“Lee”)    |
| EX1006 | U.S. Patent No. 4,806,208 (“Penven”)          |
| EX1007 | U.S. Publication No. 2006/0162312 (“Patel”)   |
| EX1008 | PCT Publication No. WO 2009/039633 (“Swaine”) |
| EX1009 | U.S. Patent No. 6,712,100 (“Yook”)            |
| EX1010 | U.S. Patent No. 5,887,630 (“Shipley”)         |
| EX1011 | U.S. Patent No. 5,167,262 (“Bennett”)         |
| EX1012 | U.S. Patent No. 5,937,914 (“Wilson”)          |
| EX1013 | U.S. Publication No. 2015/0096704 (“Straub”)  |
| EX1014 | U.S. Patent No. 6,531,418 (“Lidar”)           |
| EX1015 | U.S. Publication No. 2012/0031554 (“Eagles”)  |
| EX1016 | U.S. Patent No. 9,404,218 (“Xu”)              |
| EX1017 | U.S. Patent No. 4,026,331 (“Lees”)            |
| EX1018 | U.S. Patent No. 4,759,975 (“Sutherland”)      |

- EX1019 U.S. Patent No. 4,357,386 (“Luciano”)
- EX1020 U.S. Publication No. 2014/0186579 (“Botelho”)
- EX1021 Sabit Adanur, Paper Machine Clothing (2d ed. 2017) (“Adanur”)
- EX1022 Sabit Adanur, From the Faculty: Formed, pressed & dried, Auburn Engineer (May 18, 2018),  
<https://ecm.eng.auburn.edu/wp/emag/?p=5167>
- EX1023 Reserved
- EX1024 U.S. Patent No. 4,251,588 (“Goetemann”)
- EX1025 Sabit Adanur, Paper Machine Clothing (1<sup>st</sup> ed. 1997) (“Adanur-1997”)
- EX1026 Babaarslan, O., Hacioğullari, S.Ö. Effect of fibre cross-sectional shape on the properties of POY continuous filaments yarns. *Fibers Polym* 14, 146–151 (2013).
- EX1027 Björn Rydin, A new generation of seamed felt, Swedish paper magazine: Nordic cellulose (1992)
- EX1028 Translated Version of Björn Rydin, A new generation of seamed felt, Swedish paper magazine: Nordic cellulose (1992) (“Rydin”)
- EX1029 Teknisk Information Fran Albany Nordiskafilt, SEAMTECH, Pressfiltar med söm (1996).
- EX1030 Declaration of June Ann Munford (Adanur)
- EX1031 Declaration of June Ann Munford (Rydin)

**LISTING OF CLAIMS**

| <b>Claim 1</b> |                                                                                                                                                                                                                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [1.0]          | A clothing or a seam felt for a machine for producing a fibrous material, paper, board, tissue or pulp web, comprising:                                                                                                                                                                                                                                 |
| [1.1]          | a base structure including a two-layer laminate structure formed of one or a plurality of flat-woven fabrics, said base structure having two end sides;                                                                                                                                                                                                 |
| [1.2]          | said laminate structure having MD threads being monofilaments with a round cross section forming seam loops at said two end sides of said base structure, said seam loops interconnecting said two layers of said laminate structure, said seam loops having a diameter LD and said associated MD threads having a diameter MDYD;                       |
| [1.3]          | a seam interconnecting said end sides to make the clothing endless, said seam being formed by interengaging said seam loops of said two end sides and an insertion of an insertion element;                                                                                                                                                             |
| [1.4]          | said seam having a loop density of between 64% and 90%; and                                                                                                                                                                                                                                                                                             |
| [1.5]          | said diameter LD of said seam loops and said diameter MDYD of said associated MD threads having a ratio LD/MDYD of between 2.7 and 3.6.                                                                                                                                                                                                                 |
| <b>Claim 2</b> |                                                                                                                                                                                                                                                                                                                                                         |
| [2.0]          | The clothing according to claim 1, wherein at least one of said flat-woven fabrics have floats extending over two or a plurality of threads.                                                                                                                                                                                                            |
| <b>Claim 3</b> |                                                                                                                                                                                                                                                                                                                                                         |
| [3.0]          | The clothing according to claim 1, wherein each of said flat-woven fabrics has a first and a second long-side end, said two-layer laminate structure has at least one joint at which two of said long-side ends are interconnected, and said interconnected long-side ends belong to an identical flat-woven fabric or to different flat-woven fabrics. |

| Claim 4  |                                                                                                                                                                                                                                         |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [4.0]    | The clothing according to claim 3, wherein said two long-side ends are interconnected by a welded connection or a laser transmission welded connection.                                                                                 |
| Claim 5  |                                                                                                                                                                                                                                         |
| [5.0]    | The clothing according to claim 3, wherein said at least one joint has an extent in a machine direction of less than 15 mm.                                                                                                             |
| Claim 6  |                                                                                                                                                                                                                                         |
| [6.0]    | The clothing according to claim 5, wherein said extent of said at least one joint in the machine direction is less than 5 mm.                                                                                                           |
| Claim 7  |                                                                                                                                                                                                                                         |
| [7.0]    | The clothing according to claim 3, wherein said at least one joint is made by connecting elements or connecting threads being welded to at least one or both of said long-side ends.                                                    |
| Claim 8  |                                                                                                                                                                                                                                         |
| [8.0]    | The clothing according to claim 7, wherein said connecting elements are connecting threads disposed in a CD direction of the clothing, and at most three connecting threads or at most two connecting threads are provided for a joint. |
| Claim 9  |                                                                                                                                                                                                                                         |
| [9.0]    | The clothing according to claim 8, wherein one or a plurality of said connecting threads are woven with MD threads of at least one of said long-side ends.                                                                              |
| Claim 10 |                                                                                                                                                                                                                                         |
| [10.0]   | The clothing according to claim 1, wherein said diameter of said MD threads is between 0.15 mm and 0.7 mm.                                                                                                                              |

| Claim 11 |                                                                                                                                                                                                                                                                                                                                                                            |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [11.0]   | The clothing according to claim 10, wherein said diameter of said MD threads is between 0.3 mm and 0.5 mm.                                                                                                                                                                                                                                                                 |
| Claim 12 |                                                                                                                                                                                                                                                                                                                                                                            |
| [12.0]   | The clothing according to claim 1, wherein said loop density of said seam is between 72% and 86%.                                                                                                                                                                                                                                                                          |
| Claim 13 |                                                                                                                                                                                                                                                                                                                                                                            |
| [13.0]   | The clothing according to claim 1, which further comprises one or a plurality of layers of nonwoven fibers disposed at least on an upper side of the clothing for contacting the web.                                                                                                                                                                                      |
| Claim 14 |                                                                                                                                                                                                                                                                                                                                                                            |
| [14.0]   | The clothing according to claim 13, wherein at least some of said nonwoven fibers include or are formed of an elastomer or a polyurethane.                                                                                                                                                                                                                                 |
| Claim 15 |                                                                                                                                                                                                                                                                                                                                                                            |
| [15.0]   | The clothing according to claim 1, which further comprises at least one strip-shaped flow-impeding element provided in a vicinity of said seam, said at least one strip-shaped flow-impeding element being configured to cause a permeability for at least one of air or water in said vicinity of said seam to be substantially identical to a remainder of the clothing. |

## I. INTRODUCTION

U.S. Patent No. 11,261,566 (“the ’566 Patent”), assigned to Voith Patent GmbH (“Patent Owner” or “PO”) claims structural features of a belt-like fabric, referred to as paper machine clothing (“PMC”). PMCs are used in papermaking machines to make paper products. EX1001, 9:58-10:65; *see* §III. PO did not invent PMCs. Indeed, PMCs were used decades before the ’566 Patent. PO alleges that two specific claimed features—a loop density and a seam loop ratio—solve “disadvantages” that “lie in the region of [a] seam” area of the PMC. *Id.*, 1:57-2:3. But there is nothing special or new about these features. PO merely used uncommon terminology to name dimensionless relationships (*e.g.*, ratios without units of measure) of basic parameters already known in the art.

Unsurprisingly, evidence overwhelmingly demonstrates that PO’s claimed loop densities and seam loop ratios were present in the prior art long—*decades*—before the ’566 Patent’s earliest priority date. The Board should find the claims unpatentable.

## **II. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104**

### **A. Grounds for Standing Under 37 C.F.R. § 42.104(a)**

The '566 Patent is available for IPR. Petitioner is not barred or estopped from requesting this review challenging claims 1-15 (“the Challenged Claims”).

### **B. Challenge Under 37 C.F.R. § 42.104(b) and Relief Requested**

Petitioner requests an IPR of the Challenged Claims on Grounds 1A-3E below. Dr. Pastore provides supporting testimony in his Declaration. EX1003, ¶¶1-400.

| <b>Ground</b> | <b>Claims</b> | <b>Basis</b>                      |
|---------------|---------------|-----------------------------------|
| 1A            | 1, 3, 10-13   | §103: Sudre, Adanur               |
| 1B            | 2             | §103: Sudre, Adanur, Shipley      |
| 1C            | 4-9           | §103: Sudre, Adanur, Straub       |
| 1D            | 14            | §103: Sudre, Adanur, Lidar        |
| 1E            | 15            | §103: Sudre, Adanur, Yook         |
| 2A            | 1, 3, 10-13   | §103: Sudre, Lee, Penven          |
| 2B            | 2             | §103: Sudre, Lee, Penven, Shipley |
| 2C            | 4-9           | §103: Sudre, Lee, Penven, Straub  |
| 2D            | 14            | §103: Sudre, Lee, Penven, Lidar   |
| 2E            | 15            | §103: Sudre, Lee, Penven, Yook    |
| 3A            | 1, 3, 12-13   | §103: Sudre, Rydin <sup>1</sup>   |
| 3B            | 2             | §103: Sudre, Rydin, Shipley       |

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<sup>1</sup> Rydin (EX1028) is a certified translation of EX1027.

| Ground | Claims | Basis                      |
|--------|--------|----------------------------|
| 3C     | 4, 7-9 | §103: Sudre, Rydin, Straub |
| 3D     | 14     | §103: Sudre, Rydin, Lidar  |
| 3E     | 15     | §103: Sudre, Rydin, Yook   |

Adanur (EX1021) and Rydin (EX1028, EX1027) were publicly available as of 2017 and 1992, respectively. *See* EX1030 ¶¶9-11, EX1031, ¶¶6-9.

Petitioner does not concede that the '566 Patent is entitled to its earliest priority date of 3/15/2018 but applies prior art (*e.g.*, under 35 U.S.C. §§102(a)(1) and 102(a)(2)) as follows:

| Reference | Publication Date |
|-----------|------------------|
| Adanur    | 11/01/2017       |
| Sudre     | 12/28/1989       |
| Lee       | 10/23/2014       |
| Penven    | 2/1/1989         |
| Shiple    | 3/30/1999        |
| Straub    | 4/9/2015         |
| Lidar     | 3/11/2003        |
| Yook      | 3/30/2004        |
| Rydin     | 4/15/1992        |

### C. Claim Construction

No claim terms need be construed to resolve the present Petition. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); EX1003, ¶¶20-381

#### **D. Level of Ordinary Skill in the Art**

A person of ordinary skill in the art (“POSITA”) relating to the subject matter of the ’566 Patent as of 3/15/2018 would have had at least (1) a Bachelor’s Degree (or higher) in material science, materials engineering, mechanical engineering, textile engineering, or a related field, and (2) a minimum of two years of working experience in textiles engineering, fibers and textiles manufacturing, or a related field. Additional education could substitute for professional experience, and *vice versa*. EX1003, ¶¶21-22.

### **III. TECHNOLOGY BACKGROUND AND SUMMARY OF THE ’566 PATENT**

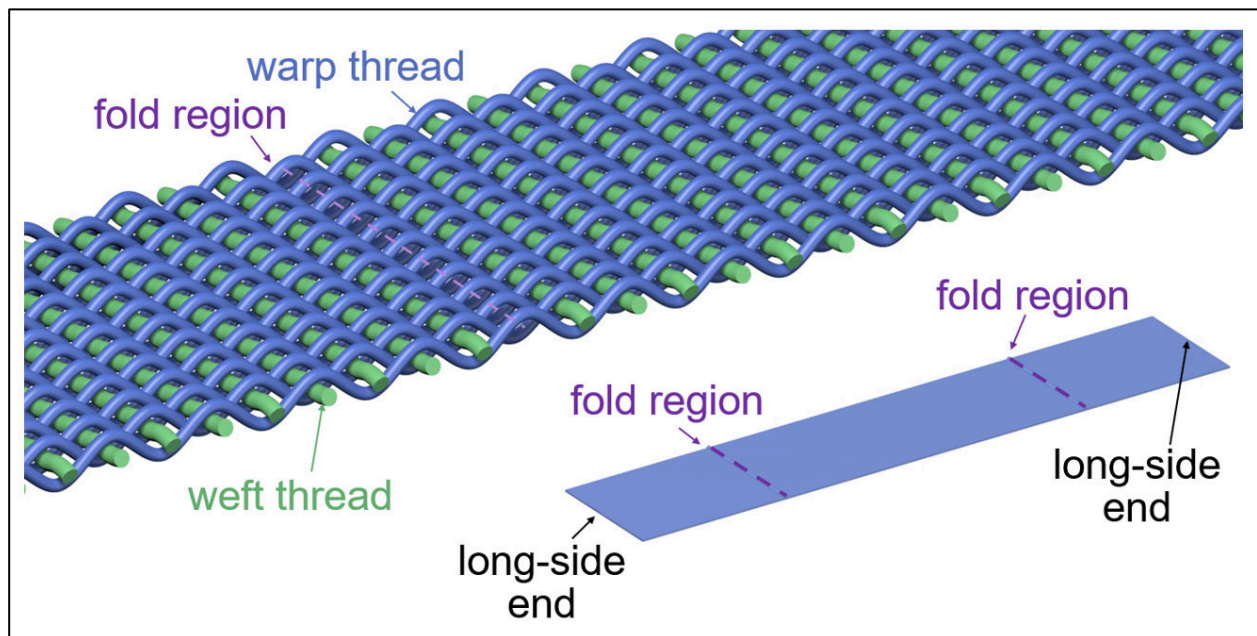
#### **A. Papermachine Clothing**

The ’566 Patent is about PMC. PMC has long been an integral part of the papermaking process. EX1025, vii-ix, *see* 6, 25. Generally, PMC is composed of warp threads (also known as machine-direction (MD) threads) interwoven with weft threads (also known as cross machine-direction (CD) threads). PMC also includes “batt”—a layer of fibers that are randomly bonded together rather than woven—surrounding the base woven fabric. *See* EX1025, 29, 38-58, 159; EX1003, ¶¶23-37.

PMC is typically prepared by either “flat weaving” or “endless weaving.” EX1025, 38. Endless weaving produces a continuous round belt of fabric. *Id.*, 38-

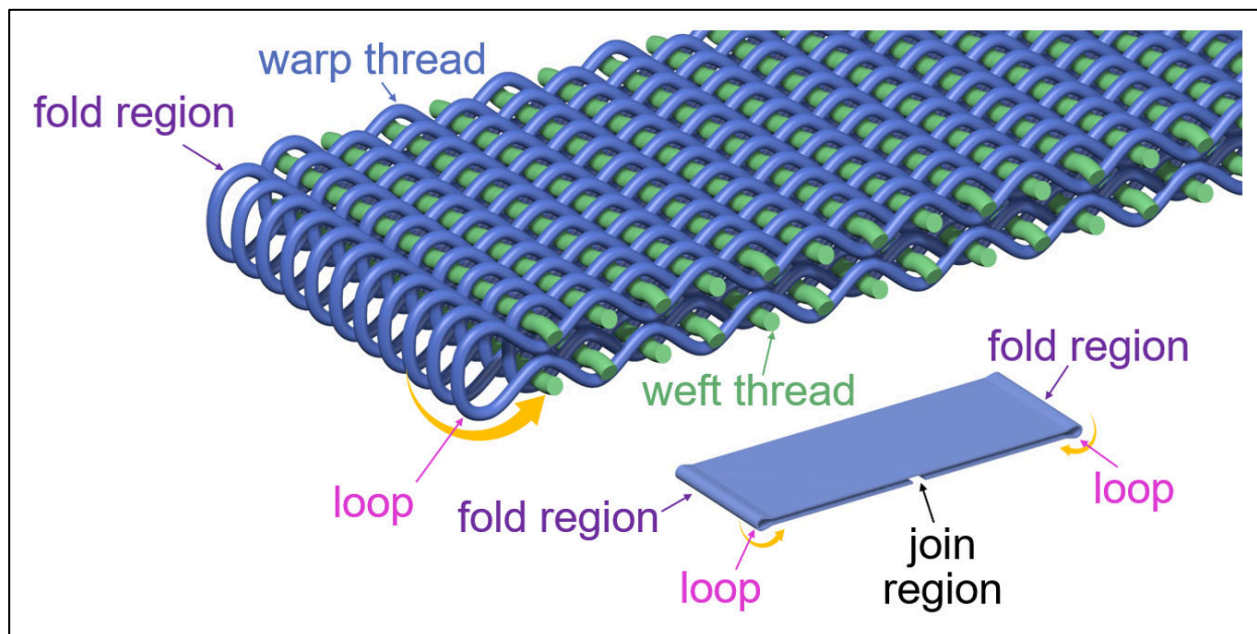
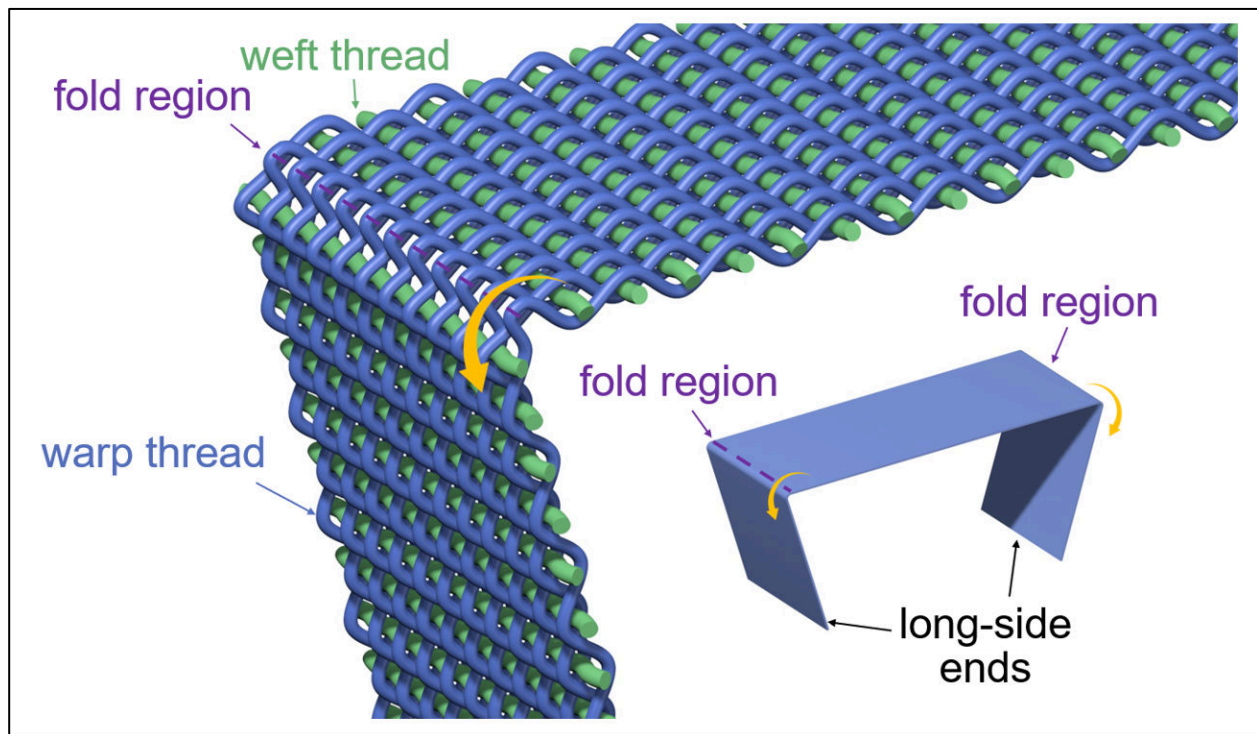
39. Flat weaving produces a flat sheet of fabric, the ends of which can be joined end-to-end to form a continuous belt. *Id.*, 38-39. To install a continuous-belt PMC on a papermaking machine, the two opposing ends of the belt are brought together and seamed, thereby transforming the belt into an “endless” structure. EX1003, ¶¶38-40.

The illustrations below explain the process for making a flat-woven fabric “endless,” which is similar to the processes described in prior-art reference Sudre (EX1004) and in the '566 Patent. MD threads are blue and CD threads are green. At fold regions, some CD threads are removed from the fabric, such that only MD threads remain. EX1004, 3:22-23; EX1003, ¶¶40-43.



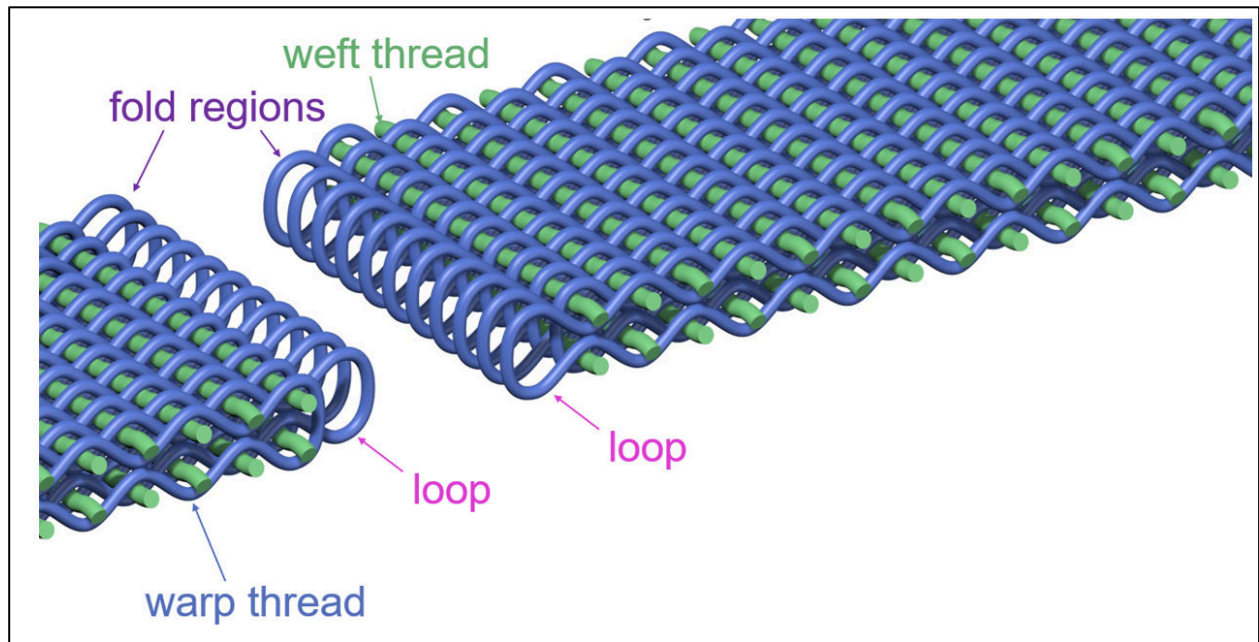
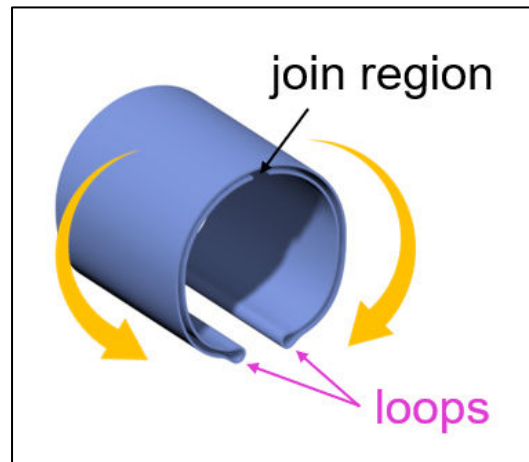
The fabric is folded at the fold regions, bringing its two free long-side ends together at a “join region” to produce a two-layer (laminated) structure. EX1004,

3:18-21; EX1003, ¶44.



As a result of folding, “seam loops” are formed by the MD threads (in the absence of the CD threads) at the fold regions. EX1004, 3:12-21; EX1001, 3:51-

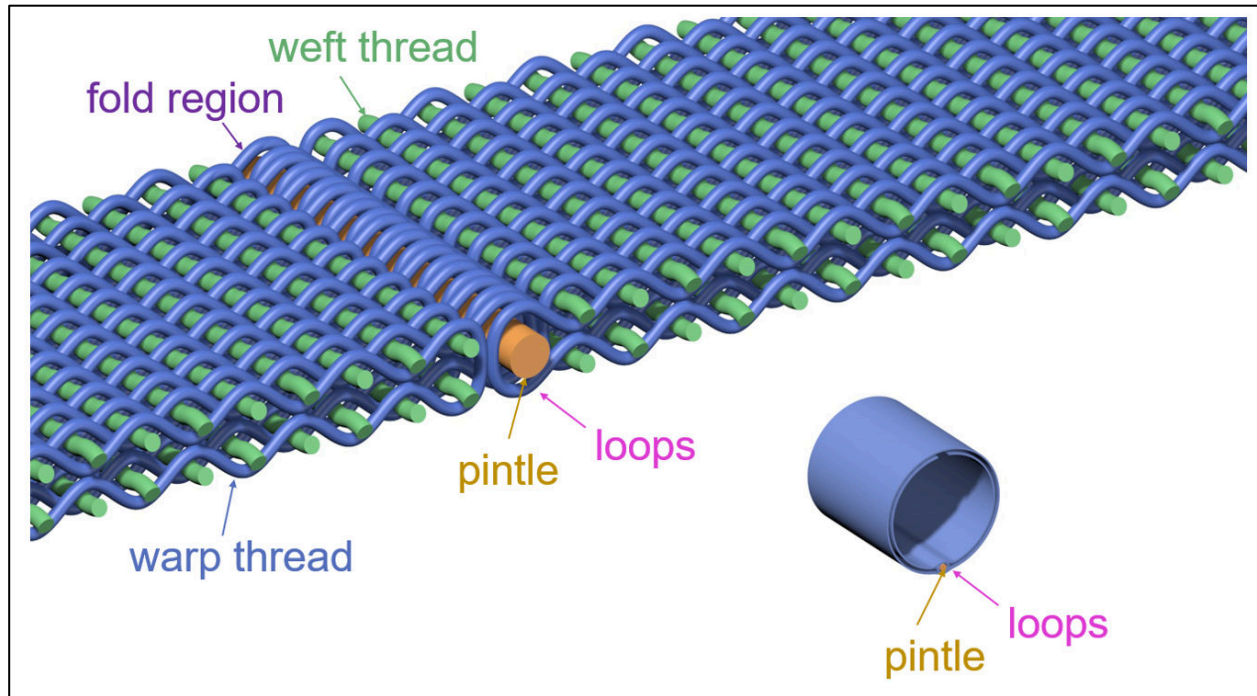
52, 8:33-34. The two-layer structure is folded again so that the seam loops of both fold regions are brought together, as shown in below. EX1004, 3:22-25; EX1001, 2:56-62; EX1003, ¶¶44-45.



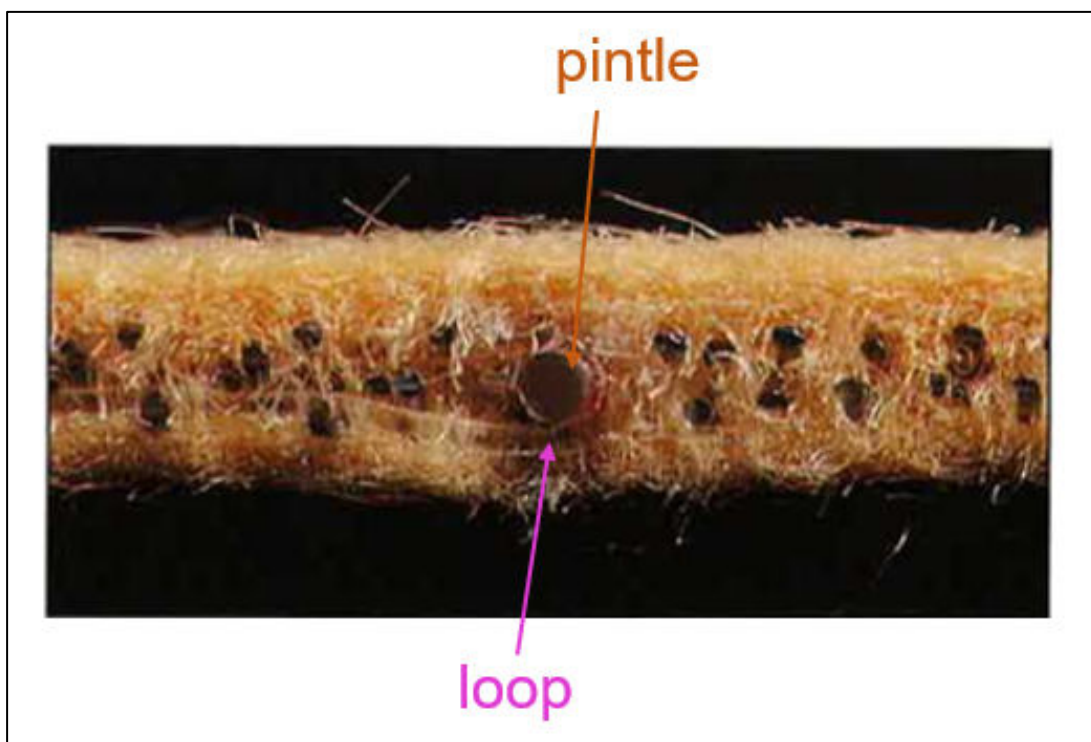
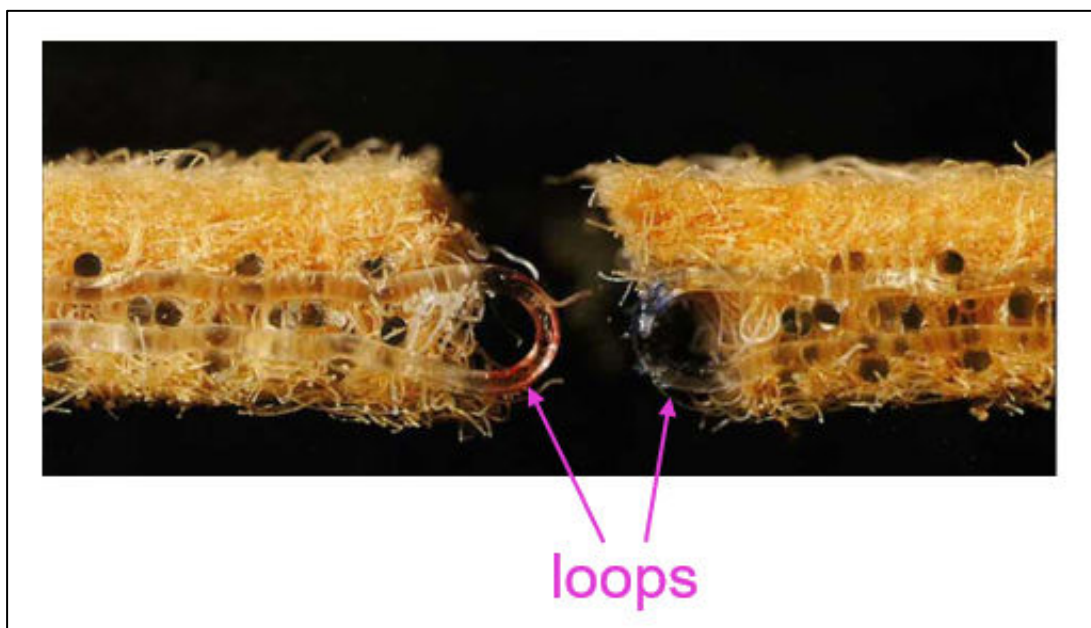
The seam loops from the two sides of the fabric are then interdigitated with one another, forming a single channel that extends through the openings in the interdigitated seam loops. EX1003, ¶46. A pintle is inserted into that channel to

connect the two ends of the fabric, forming a seam and rendering the fabric

“endless,” as shown below. *Id.*; EX1004, 3:24-4:1; EX1001, 1:8-19, 3:6-9.



Below, photographs from Petitioner’s 1996 SeamTech brochure show a specific PMC, a “press fabric” (or “press felt”), with translucent seam loops (top) and interdigitated seam loops connected by a pintle (bottom). EX1029, 1, 3-7; EX1003, ¶¶37, 47-48.



### **B. Brief Description of the '566 Patent**

The '566 Patent relates to a flat-woven PMC that purports to “overcome[] the quality deficiencies of the prior art.” EX1001, 2:10-11. This object is

allegedly “achieved by a clothing in which the diameter (LD) of the seam loops and the diameter (MDYD) of the associated MD threads has a ratio LD/MDYD between 2.5 and 4, in particular between 2.7 and 3.6.” *Id.*, 2:12-16, *see* 2:63-67; EX1003, ¶¶49-55.

But as noted previously, the PMC described in the '566 Patent is conventional. And the claimed parameters that the '566 Patent alleges are improvements were already present in the prior art.

### **C. Prosecution History**

During prosecution of the '566 Patent, the Examiner rejected the claims as obvious. *E.g.*, EX1002, 112-120. After several rounds of amendments, the Examiner erroneously allowed the claims, stating that the prior art did not teach or suggest a seam having a loop density of between 64% and 90% and a LD/MDYD ratio between 2.7 and 3.6. EX1002, 13.

#### IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

##### A. [GROUND 1A] – Sudre-Adanur Renders Obvious Claims 1, 3, and 10-13

###### 1. Sudre<sup>2</sup>

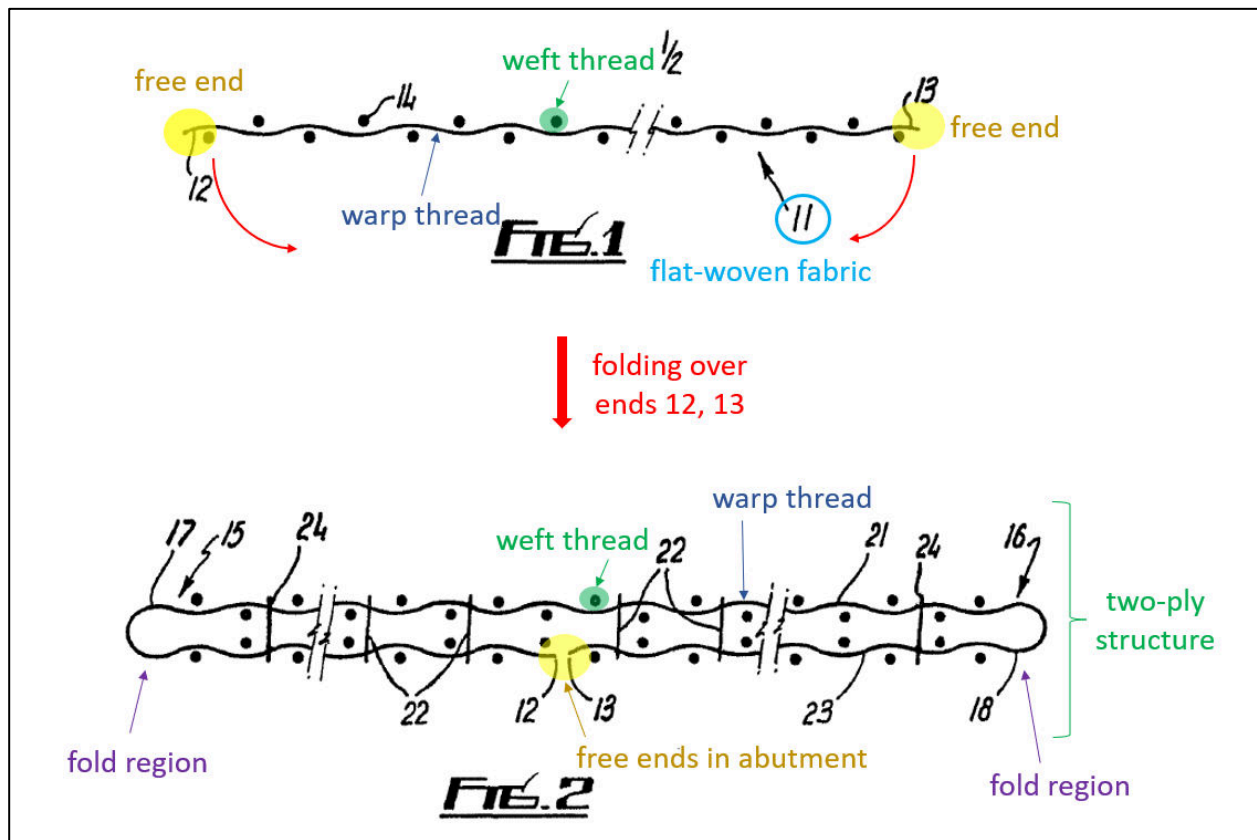
Sudre describes the well-known method for making flat-woven PMC “endless.” EX1004, 1:2-5, *see* 2:25-3:2; EX1003, ¶¶40-48, 58-62.

Sudre’s base material includes “a flat-woven fabric” composed of MD (warp) threads<sup>3</sup> interwoven with CD (weft) threads and having two “free ends 12, 13.” EX1004, 1:10-15, 3:13-22, Fig. 1. The free ends “are folded over,” indicated by the red arrows, “to define a two-ply structure having fold regions 15, 16, the free ends being brought into substantial abutment.” EX1004, 3:18-21, Fig. 2; EX1003, ¶59.

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<sup>2</sup> Descriptions of the references and combinations thereof are incorporated into each claim element mapping, including reference citations. Emphasis added unless otherwise indicated.

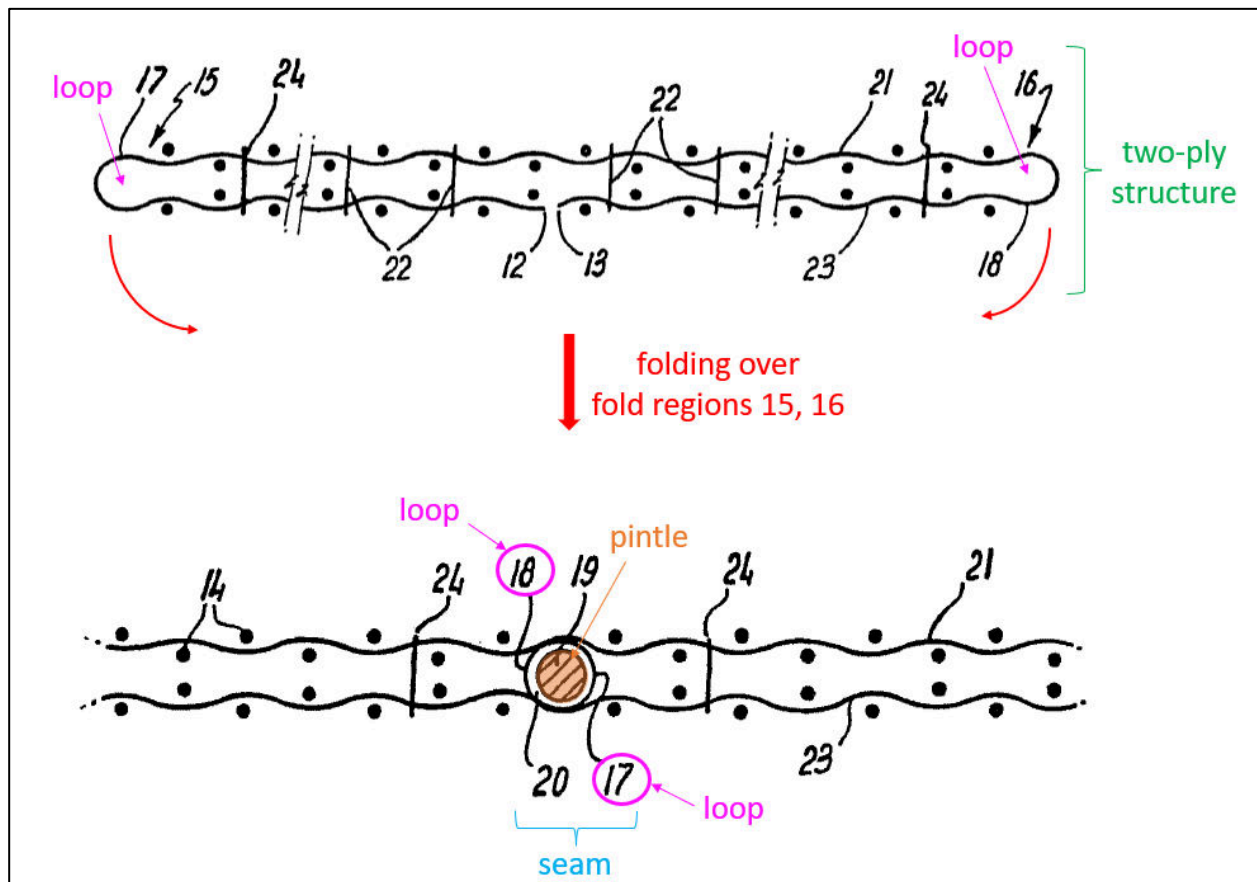
<sup>3</sup> The terms “thread” and “yarn” are used interchangeably in the art. EX1003, ¶32.



Sudre, Figs. 1 and 2<sup>4</sup>

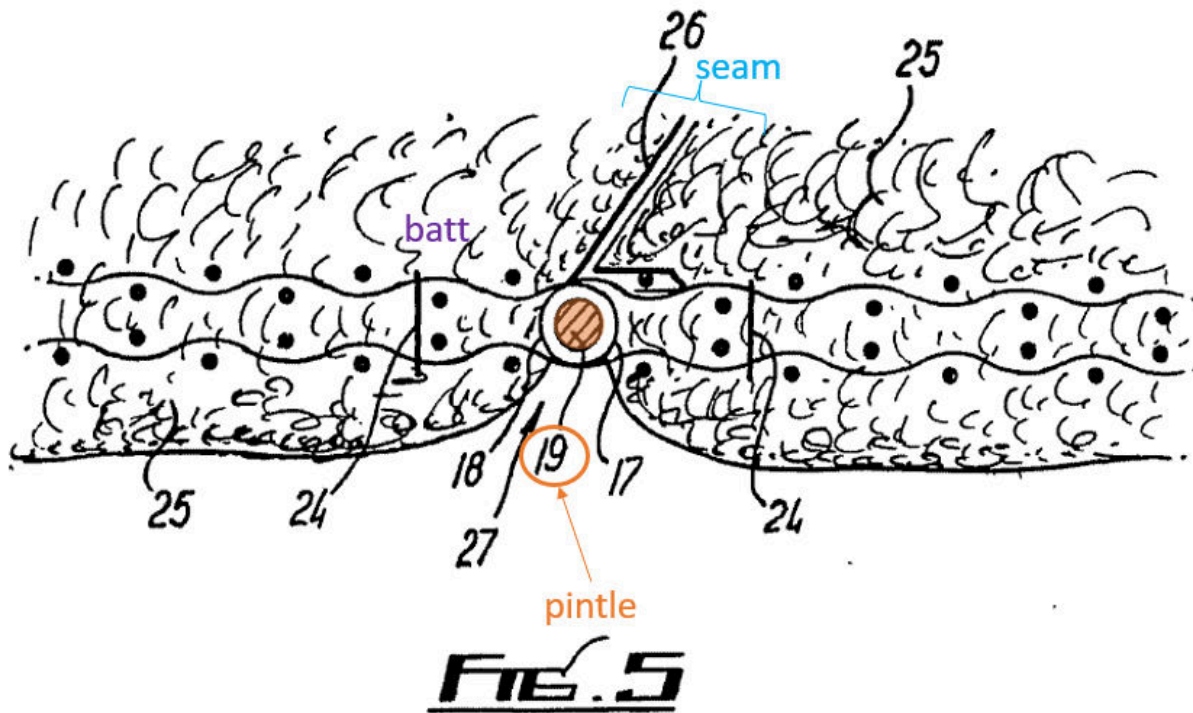
As was conventional, “[w]eft yarns 14 are removed from the fold regions...to give loops 17, 18 extending outwardly therefrom.” EX1004, 3:22-24; EX1003, ¶60.

<sup>4</sup> Annotations in figures throughout have been added by Petitioner.



Sudre, Figs. 2 (top) and 3 (bottom)

The two-ply (laminate) structure is folded (red arrows in Fig. 2) to bring the loops together. EX1004, 3:24-4:1. The loops are interdigitated, and a pintle is inserted into the tunnel formed by the loop interdigitation to make the fabric into an endless structure. See EX1004, Fig. 3, Fig. 5. “[T]extile batt 25 is needled” (*i.e.*, attached) “to each face of the endless structure.” EX1004, 5:8-10, 5:15-18, Fig. 5; EX1003, ¶¶61-62.



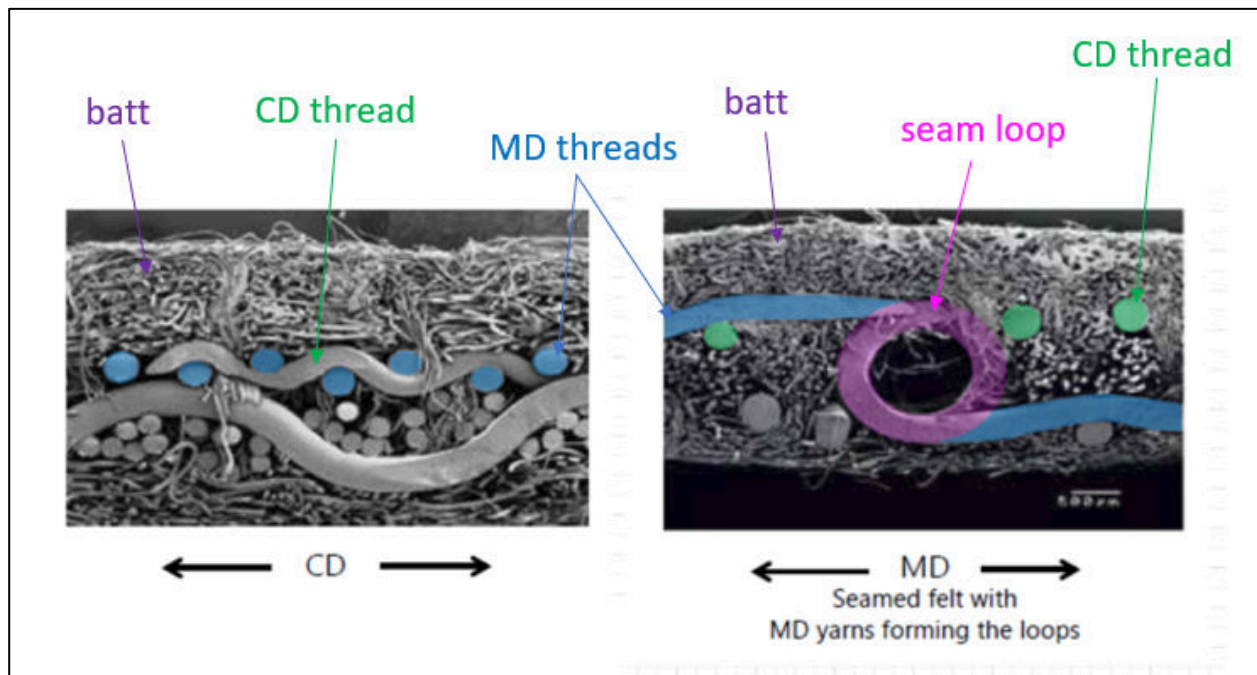
Sudre, Fig. 5

## 2. Adanur

Adanur is a well-recognized “*industry standard*” textbook “for papermakers, as well as for manufacturing of forming, pressing and drying fabrics.” EX1022, 1; EX1003, ¶¶63-65.

Adanur provides information on press fabrics and shows exemplary “cross-sections of actual finished press fabrics” in Figure 3.15 in the CD perspective (left) and the MD perspective (right). EX1021, 111; *see also id.*, 103, 107-108, 113.

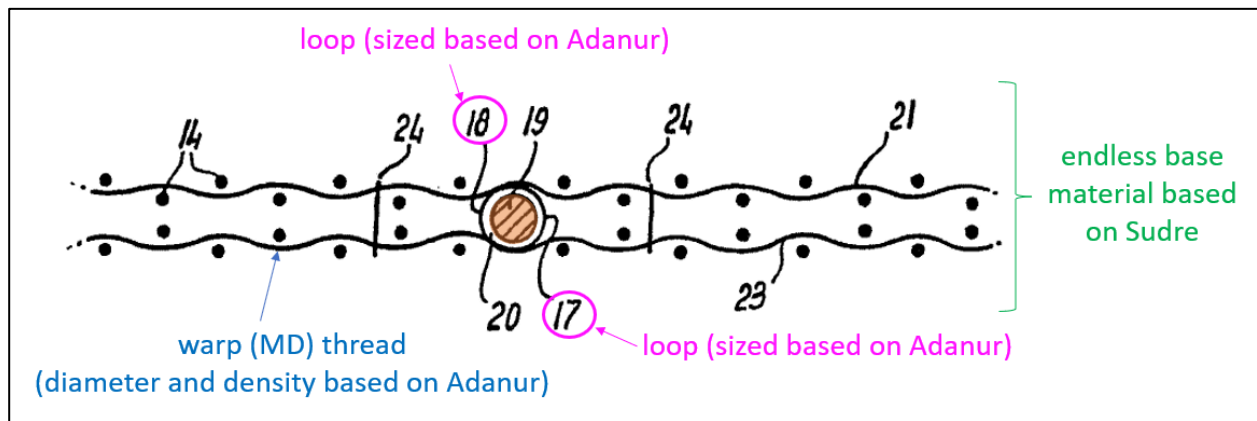
Adanur’s fabric is composed of round MD threads (blue) interwoven with CD threads (green) and batt. The MD threads form seam loops. EX1003, ¶66.



Adanur, Fig. 3.15

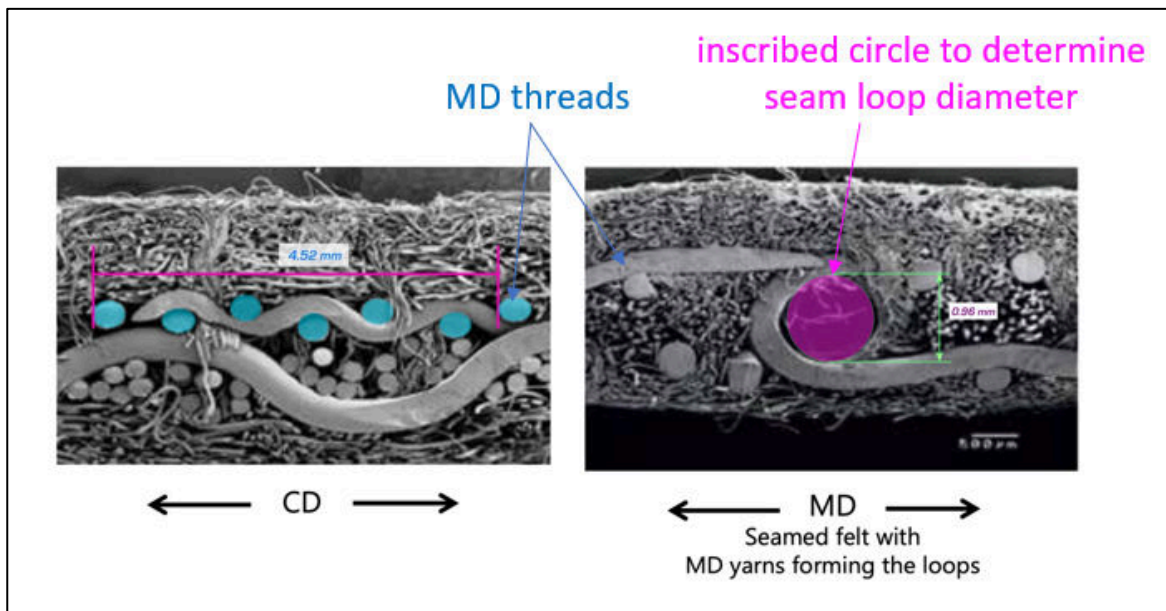
### 3. Sudre-Adanur Combination

The combination of Sudre and Adanur (“Sudre-Adanur combination”) is based on Sudre’s “endless base material” and Adanur’s PMC parameters (*e.g.*, shape and diameter of the MD (warp) threads, thread density, and loop size). EX1004, 2:25-3:2; EX1021, Fig. 3.15; EX1003, ¶¶58-74. The PMC parameters are measured and/or calculated from actual finished press fabrics in Fig. 3.15, above. EX1021, Fig. 3.15; EX1003, ¶¶63-75. The combination relies on Dr. Pastore’s measurements of Fig. 3.15, yielding an average MD thread diameter of about 0.32mm, a thread density of about 13.3 threads/cm, and a seam loop diameter of about 0.96mm. EX1003, ¶¶67-75.



Sudre-Adanur Composite Figure

Dr. Pastore's measurement of Adanur's loop diameter is consistent with the '566 Patent, which "determine[s] the diameter of a seam loop" by measuring the diameter of "the largest circle which can be inserted completely into the seam loop." EX1001, 2:46-49; EX1003, ¶¶67-68. The largest circle that can be inscribed into the seam loop of Adanur's Fig. 3.15 (below, right) has a diameter of 208 pixels. *Id.* Based on the 500  $\mu\text{m}$  scalebar in this image, which has a length of 108 pixels, Dr. Pastore converted the circle diameter in pixels to an actual diameter of 0.96mm. *Id.*



Adanur, Fig. 3.15

Dr. Pastore determined Adanur's MD thread diameter following convention—*i.e.*, by measuring a horizontal and a vertical diameter (in pixels) for each of the seven blue-highlighted MD threads in Adanur's Fig. 3.15 (above, left), yielding an average diameter of 69 pixels and a standard deviation of 9.6 pixels. EX1003, ¶¶69-70. As explained by Dr. Pastore, because the vertically-oriented diameter of the MD threads in the left image of Fig. 3.15 is generally consistent with the MD thread size in the right image, a POSITA would reasonably have expected the scale to be consistent between the two images. EX1003, ¶¶71-72. Thus, the average MD thread diameter in pixels corresponds to an average MD thread diameter of 0.32mm, with a standard deviation of 0.04mm. *Id.*

Dr. Pastore also measured the MD thread density of Adanur's fabric following convention: six MD threads in Adanur's Fig. 3.15 fabric span a distance (*i.e.*, the distance from the left edge of the first thread to the left edge of the last thread) of 967 pixels, corresponding to about 4.52mm. EX1003, ¶73. The MD thread density (number of threads per unit distance) is thus about 13.3 threads/cm (6 threads divided by 4.52 mm). *Id.* Notably, this ratio (6 threads / 967 pixels) does not rely on the scale being the same between the two images. *Id.*

As discussed further *infra*, these parameters correspond to a loop density of approximately 85%, and a ratio of LD/MDYD of approximately 3.0. EX1021, 111; EX1003, ¶¶67-73.

In view of Adanur's teaching that actual finished press fabrics were associated with these specific values for MD thread diameter, MD thread density, and loop size (and thus loop density and a LD/MDYD ratio), a POSITA would have recognized the applicability of these values to Sudre's "endless base material." EX1004, 2:25-3:2; EX1003, ¶¶74-77.

#### **4. Motivation for the Combination**

Sudre teaches that a PMC "meeting the *particular requirements of its intended end use*" can be produced from a stock "base fabric in *a simple and ready manner*," but does not expressly teach specific parameters of the PMC (*e.g.*,

MD thread size, spacing, loop size) for achieving those requirements (*e.g.*, performance objectives). EX1004, 6:14-17. A POSITA seeking to make a particular PMC (*e.g.*, press fabric) would have been motivated to look to other known sources to identify the parameters that result in a PMC meeting the desired “particular requirements.” EX1004, 6:14-17; EX1003, ¶78. A POSITA would have readily looked to Adanur because it was an “*industry standard for papermakers*” that “provid[es] valuable and *hard-to-find information* to the professionals.” EX1021, 111, EX1022; EX1003, ¶¶78-79.

A POSITA would have expected success in dimensioning Sudre’s PMC using parameters taught by Adanur because they both pertain to PMC, and specifically to press fabrics made “endless” by seaming flat-woven base fabrics, and because Sudre imposes no specific requirements that would provide any reason to deviate from the usage of these conventional parameters. *See* EX1004, 1:2-5, 6:14-17; EX1003, ¶80.

**(a) MD thread size**

A POSITA seeking MD thread size would have been motivated to seek that parameter from Adanur. EX1003, ¶81. A POSITA would have measured and implemented MD threads with a diameter of about 0.32mm, based on Adanur’s Fig. 3.15, so the PMC “meet[s] the *particular requirements of its intended end.*” EX1004, 6:14-17; EX1003, ¶¶81-83.

First, Adanur's Fig. 3.15 provides a SEM image of "actual finished press fabrics." As Dr. Pastore explains, it would have been straightforward for a POSITA to measure, based on the measurement scale, the MD threads in Fig. 3.15 and determine that the MD thread diameter is approximately 0.32mm. EX1021; EX1003, ¶84. A POSITA would have been motivated to use this diameter in Sudre's PMC since Adanur represents "the *industry standard for papermakers*." EX1004, 5; EX1022; *see* EX1016, 6:8-23, 6:59-64; EX1005, 12; EX1003, ¶84.

Second, MD threads sized based on Adanur (0.32mm) falls within the 0.3-0.6mm range of sizes that provides a number of advantages, such as being "sufficiently robust so as to withstand the various mechanical and environmental forces to which they may be exposed during use." EX1005, 26. A POSITA would have recognized the advantages of using this size of thread to achieve mechanically robust fabrics. *Id.*; EX1003, ¶85.

Third, MD threads sized based on Adanur is merely the application of known techniques (0.32mm MD threads in the context of PMC) to a known system (PMC) to yield predictable results (PMC with 0.32mm MD threads). *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415-421 (2007); EX1003, ¶¶86-87.

**(b) *Warp thread density***

A POSITA seeking MD thread density would have been motivated to seek that parameter from Adanur. EX1003, ¶¶88-90. In particular, a POSITA would

have been motivated to implement an MD thread density of about 13.3 threads/cm, based on Adanur (and which, in combination with the MD thread diameter of Adanur's fabric, corresponds to a loop density of approximately 85%, *see* [1.4]) in Sudre's fabric for multiple reasons. *Id.*

As an initial matter, it would have been conventional for a POSITA to measure the measurement scale and the diameters of the MD threads in Fig. 3.15 and determine that the MD thread density of Adanur's PMC was about 13.3 threads/cm in "actual finished press fabrics." EX1021; EX1003, ¶91. The MD thread density, together with the diameter of about 0.32mm, corresponds to a loop density of approximately 85%.<sup>5</sup> *Id.* Accordingly, a POSITA would have been motivated to use these parameters taught by Adanur in Sudre's PMC to achieve "particular requirements" associated with "finished press fabrics." EX1021, 111; EX1004, 6:14-17; EX1003, ¶91; EX1016, 6:8-23, 6:59-64; EX1005, 12.

Furthermore, Adanur's MD thread density of 13.3 threads/cm (and corresponding loop density) falls within the 5.9 to 15.7 threads/cm range of thread

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<sup>5</sup> The '566 Patent defines "seam loop density" as the "number of seam loops per unit length," where "the seam area has twice the number" of the "MD thread density" and "the number of threads is multiplied by the diameter." EX1001, 6:11-18; EX1003, ¶91.

densities that, as described by Lee, provides a number of advantages. For instance, thread densities in this range advantageously “present[s] an ‘open’ structure to the PS [paper side] surface of the press felt to maximize water removal, permeability and void volume in the completed press felt” for high quality seams, minimizes “undue distortion” for low-profile seams, and provides necessary seam tensile strength to the assembled press felt. EX1005, 26; EX1003, ¶¶92-94. These parameters are important for efficient manufacture of high-quality paper products. EX1003, ¶¶92-94.

Lastly, MD thread density and corresponding loop density based on Adanur is merely the application of known techniques (MD threads/loops provided in a specified range of densities in the context of PMC) to a known system (PMC) to yield predictable results (PMC with a MD thread density and corresponding loop density in a known range). *See KSR*, 550 U.S. at 415-421; EX1003, ¶¶95-96.

**(c) *Loop size***

A POSITA seeking loop size would have been motivated to seek that parameter from Adanur. EX1003, ¶97. Specifically, a POSITA would have been motivated to implement seam loops with a diameter of about 0.96mm and a MD thread size, as taught by Adanur, which corresponds to a ratio LD/MDYD of about 3.0 (*see* [1.5]) for at least the following reasons.

As an initial matter, a POSITA would have been motivated to implement the loop size (and, correspondingly, a ratio LD/MDYD) disclosed in Adanur's Fig. 3.15 because that SEM image shows "actual finished press fabrics" for PMC having seam loops with a diameter of about 0.96mm, and a corresponding ratio LD/MDYD of about 3.0. EX1003, ¶98. A POSITA would have also been motivated to use Adanur's loop size in Sudre's PMC to conform to standard practices, *e.g.*, for compatibility with standard weaving processes and other manufacturing techniques. EX1003, ¶98; EX1022. Notably, a LD/MDYD ratio of about 3.0 is consistent with conventional dimensions for PMC. *See* EX1017, 2:19-36; EX1003, ¶98. Indeed, Dr. Pastore explains that a POSITA would have understood that loops that are too big lead to defects in the paper product and loops that are too small lead to failures in the PMC. *Id.*

Furthermore, a POSITA would have been motivated to implement Adanur's loop size because that seam loop size is conventional in the art. For example, Penven teaches the benefits of having seam loops sized to match a standard pintle size for forming a low-profile seam to create high-quality, defect-free paper products. *See* EX1006, 3:64-66; EX1008, 2:7-19; *see* EX1007; EX1003, ¶¶99-100.

Lastly, seam loops (and a LD/MDYD ratio) dimensioned based on Adanur is merely the application of known techniques (seam loops of a specified dimension,

and in a specified ratio with the diameter of the MD threads, in the context of PMC) to a known system (PMC based on Sudre) to yield predictable results (PMC with seam loops of a specified size and with a specified size ratio). *See KSR*, 550 U.S. at 415-421; EX1003, ¶¶101-102.

**(d) *Round MD threads***

A POSITA seeking MD thread parameters would have been motivated to use MD threads with a round cross-section, based on Adanur. As Dr. Pastore explains, threads with a round cross-section were commonly used, less expensive, more uniform, and mechanically stronger than more complex threads. EX1003, ¶¶103-105 (citing EX1026). Additionally, twisting during weaving of round threads is less likely to have an adverse impact on quality of the resulting PMC than twisting of more complex threads. EX1003, ¶¶106-107. Use of round MD threads was standard practice, and is merely the application of known techniques to a known system to yield predictable results. *See KSR*, 550 U.S. at 415-421; EX1003, ¶108.

A POSITA would have expected success in incorporating round MD threads at least because, as noted *supra*, threads with a round cross-section were commonly used as warp threads in PMC, and thus the usage and implementation of such threads was well developed. EX1003, ¶109. Indeed, Sudre imposes no

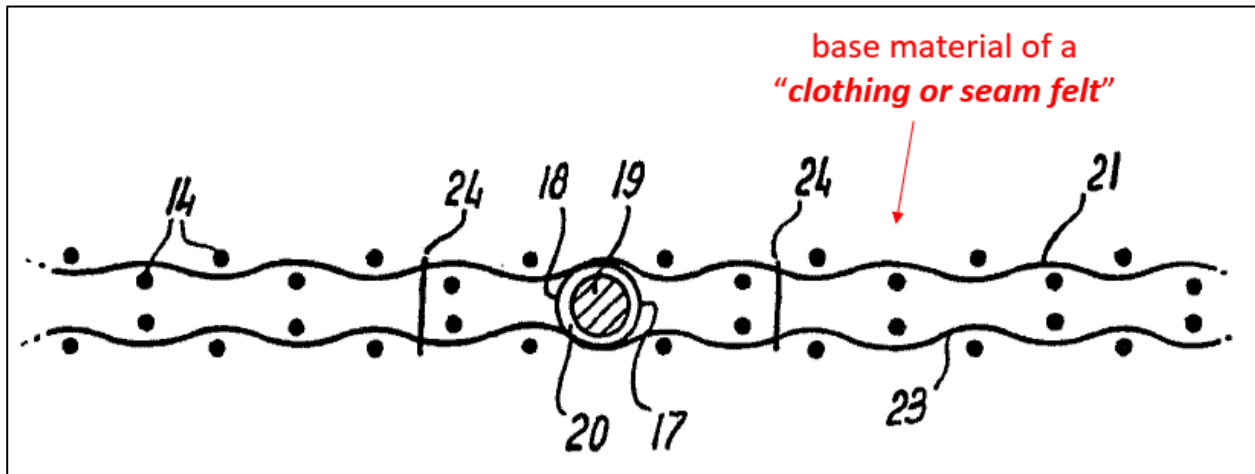
requirements on its MD threads that would indicate any reason to deviate from the usage of standard, round threads. *Id.*

## 5. Analysis

### (a) *Claim 1*

#### *[1.0] Preamble*

To the extent the preamble is limiting, Sudre-Adanur renders it obvious in view of Sudre's "a papermaker's wet felt," *i.e.*, "papermachine clothing" (*a clothing or seam felt*)<sup>6</sup>. EX1004, 3:13-18. "[S]uccessive stages in the production of an endless base material for use in a papermaker's fabric" are shown in Figs. 1-3. *Id.*, 2:25-3:2, *see* 1:2-5; Abstract, 1:22-24, 2:18-19, 5:8, 8:2-9, claim 1; EX1003, ¶110.



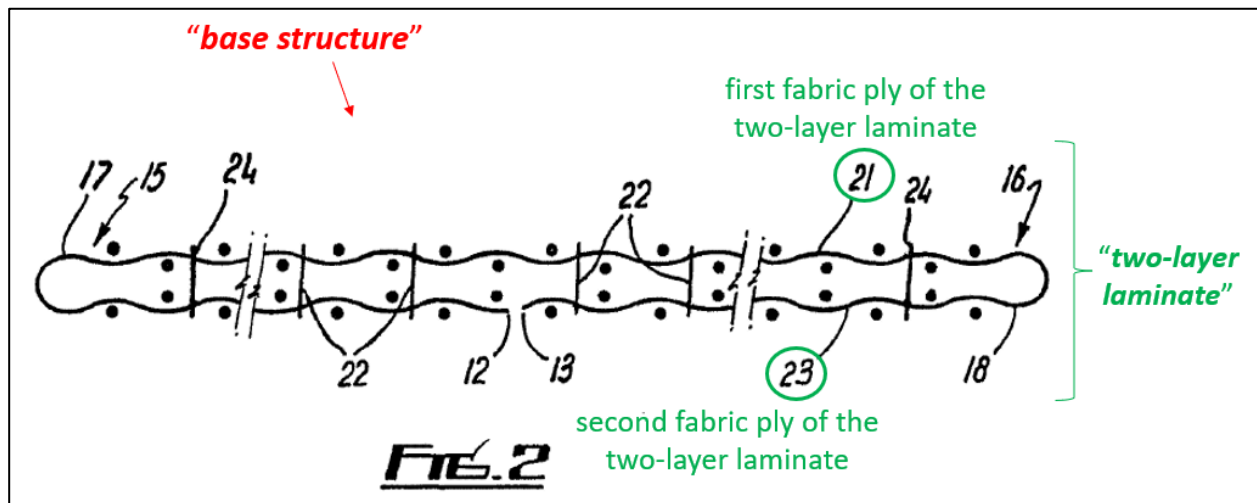
Sudre, Fig. 3

<sup>6</sup> Throughout this Petition, claim elements are indicated in boldface and italics.

As discussed in §III, papermaker's fabrics are used in papermaking machines for manufacture of paper products (*for a machine for producing a fibrous material, paper, board, tissue or pulp web*). See EX1021, 103; EX1013, [0002]; EX1003, ¶111.

**[1.1] “a base structure....”**

The Sudre-Adanur combination includes “a base material for use in the manufacture of a papermaker's wet felt” (*a base structure*), taught in Sudre.<sup>7</sup> EX1004, 3:13-15, Fig. 2, *see* 1:22-26, 2:25-3:2, 3:9-11, 5:20-21, 5:23-25, 6:11-17, Abstract, claim 1; EX1003, ¶112.

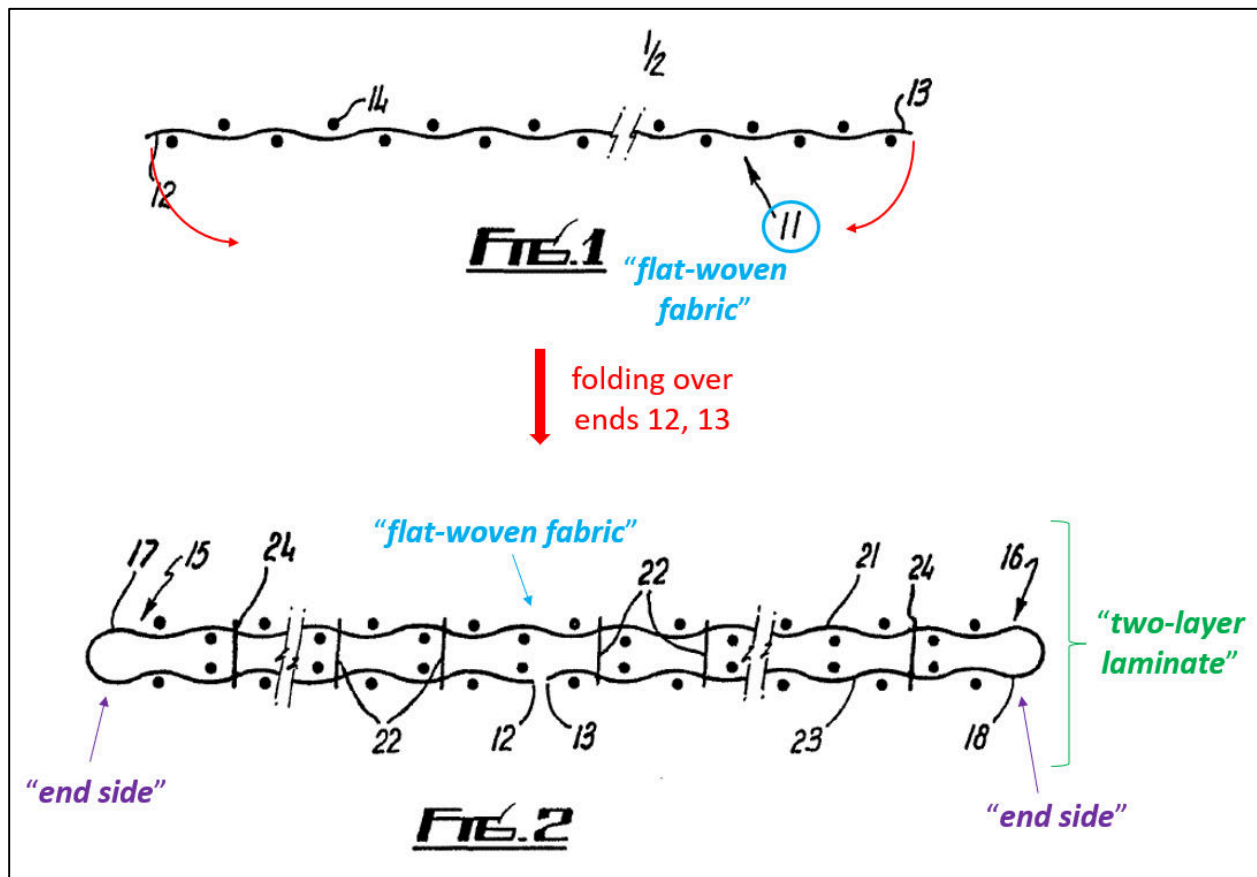


Sudre, Fig. 2

<sup>7</sup> Fig. 2 shows one “stage[] in the production of an endless base material for use in a papermaker's fabric,” *e.g.*, the base material of Fig. 3. EX1004, 2:25-3:2.

Sudre further teaches that the “base material ... comprises a flat-woven fabric 11,” the ends of which “are folded over to define a two-ply structure” (*base structure including a two-layer laminate structure*), green in Fig. 2. EX1004, 3:18-19, *see* 1:25-2:1, 2:5-6, Abstract, claim 1, claim 3; EX1003, ¶113. The “two fabric plies 21, 23” of the two-ply laminate are illustrated in Fig. 2. EX1004, 4:4; EX1003, ¶113.

Specifically, as illustrated *infra*, the “two-ply structure” is formed by “fold[ing] over” the “free ends 12, 13” of “a flat-woven fabric 11 of open weave construction” such that “the free ends [are] brought into substantial abutment” (*two-layer laminate structure formed of one ... flat-woven fabric[]*). EX1004, 3:14-19, Figs. 1-2, *see* 2:25-3:2, claim 5, 4:2-3; EX1003, ¶114. For instance, the single layer flat-woven fabric 11 (*flat-woven fabric*), blue in Fig. 1, is folded (as indicated by the red arrows) to form the “two-ply structure” (*two-layer laminate structure*) of Fig 2, such that one portion of the flat-woven fabric constitutes a first ply of the two-layer laminate structure (*e.g.*, fabric ply 21) and another portion of the flat-woven fabric constitutes a second ply of the two-layer laminate structure (*e.g.*, fabric ply 23). *See* EX1004, 4:2-7; EX1003, ¶114.



Sudre, Figs. 1-2

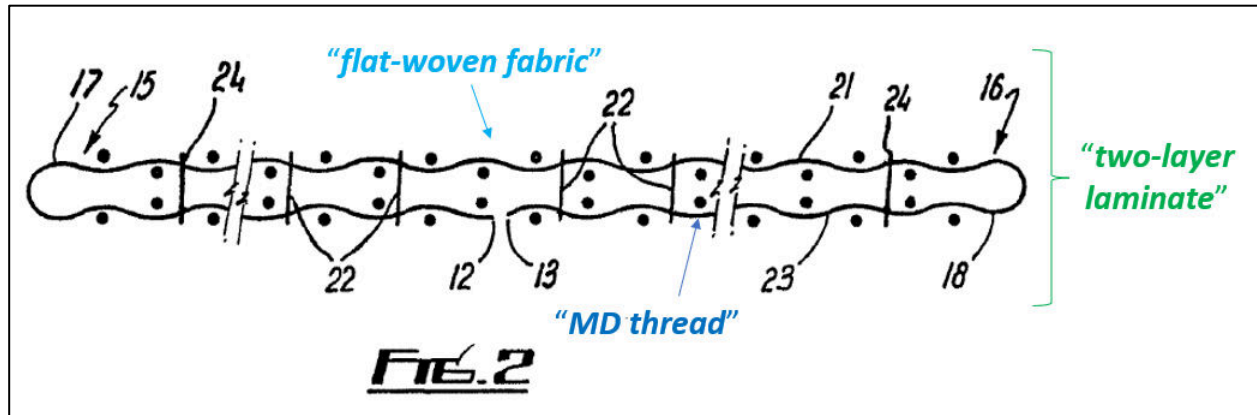
The “two-ply structure [has] fold regions 15, 16” (*end sides*), purple in Fig. 2, at its two opposing ends (*said base structure having two end sides*). EX1004, 3:18-19, *see* 1:25-2:2, claim 5, claim 1; EX1003, ¶115.

[1.2] “*said laminate structure....*”

MD threads

In Sudre-Adanur, the laminate structure includes “warp yarns” that “extend in the machine direction of the eventual papermaker’s fabric,” taught in Sudre.

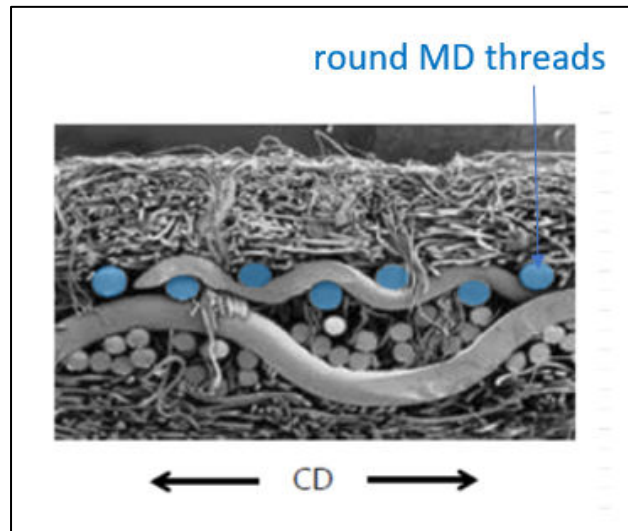
EX1004, 1:10-12. These warp threads (dark blue in Fig. 2) correspond to ***MD threads***. EX1003, ¶116.



Sudre, Fig. 2

Sudre teaches that “such machine direction yarns will ordinarily comprise monofilament yarns” (***MD threads being monofilaments***). EX1004, 4:23-25; EX1003, ¶117.

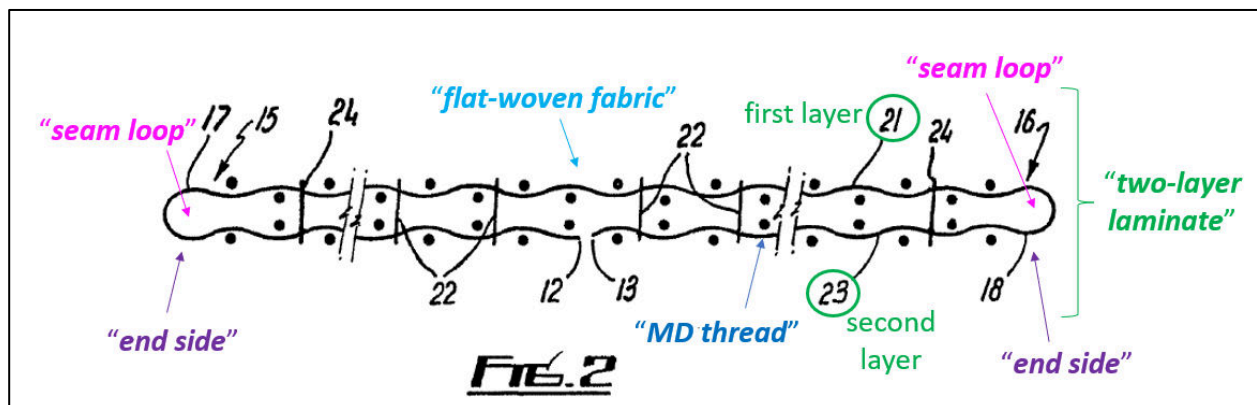
Also, for reasons discussed earlier (*see* Grounds 1A.3-4, *supra*), in the Sudre-Adanur combination, the monofilament machine direction threads are round (***MD threads being monofilaments with a round cross section***), as taught by Adanur. *See* EX1021, Fig. 3.15; EX1003, ¶118.



Excerpt from Adanur, Fig. 3.15

### Seam loops

In Sudre-Adanur, Sudre teaches that “[w]eft yarns 14 are removed from the fold regions 15, 16 ... to give loops 17, 18 extending outwardly therefrom” (*seam loops at said two end sides of said base structure*), pink in Fig. 2. EX1004, 3:22-24. That is, the loops (*seam loop*) are formed at the fold regions (*end sides*; see [1.1]). EX1003, ¶119; see EX1004, Abstract.

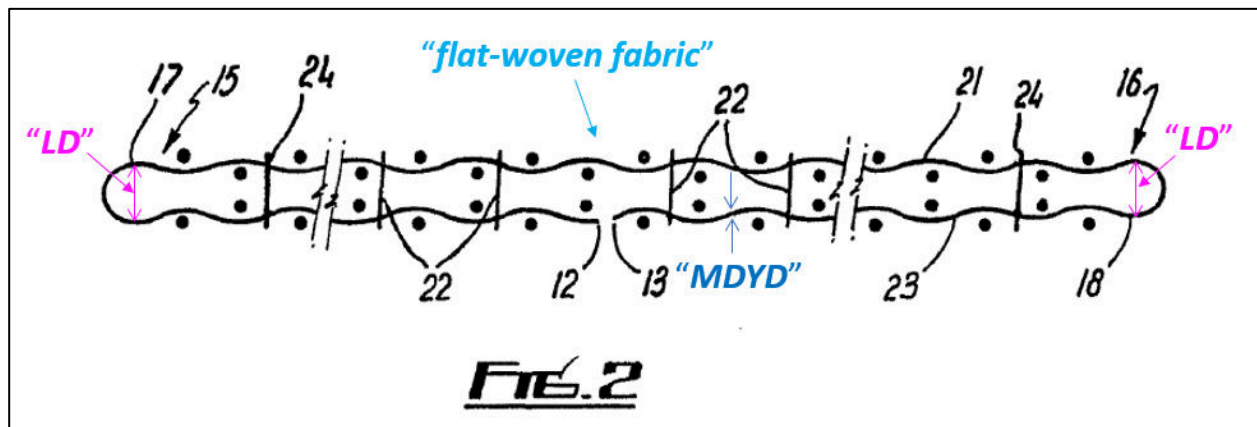


Sudre, Fig. 2

The seam loops are formed by the MD threads: “In the event that the machine direction yarns are to form loops at the respective fabric ends for interdigitation and receipt of a pintle wire” (*MD threads ... forming seam loops*). *Id.*, 4:21-23, *see* 2:2-4, claim 1, claim 5; EX1003, ¶120.

In Sudre-Adanur, *said seam loops interconnect said two layers of said laminate structure*, *e.g.*, the seam loops are formed of MD threads that extend from the first layer to the second layer of the laminate structure, thus interconnecting the two layers. *See* EX1004, Fig. 2; EX1003, ¶120.

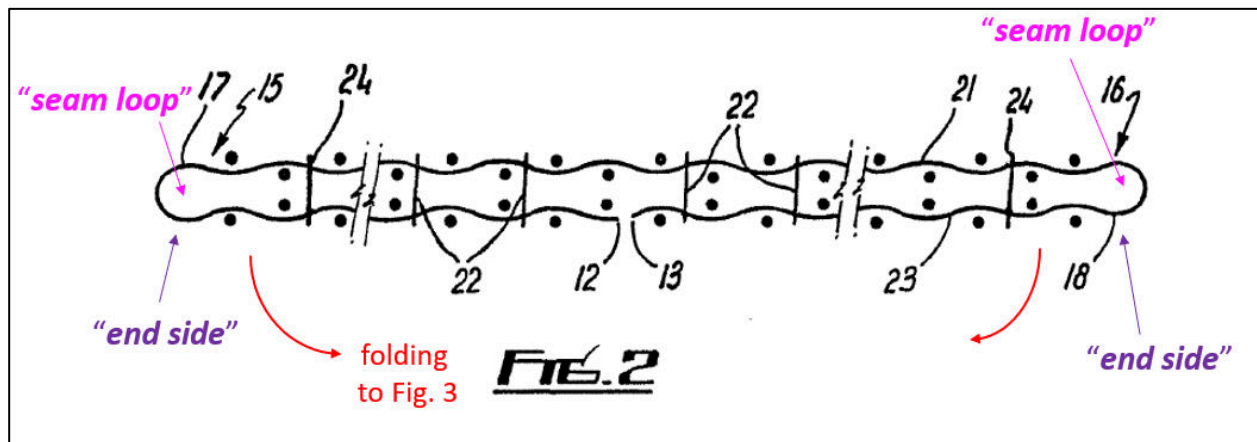
The inside diameter of the seam loops (*said seam loops having a diameter LD*), indicated in Sudre’s Fig. 2, is based on Adanur, discussed in [1.5]. *See* EX1021, Fig. 3.15; EX1003, ¶121. The MD threads that form the seam loops have a diameter (*associated MD threads having a diameter MDYD*), indicated in Fig. 2, that is also based on Adanur, discussed in [1.4]. *See* EX1021, Fig. 3.15; EX1003, ¶121.



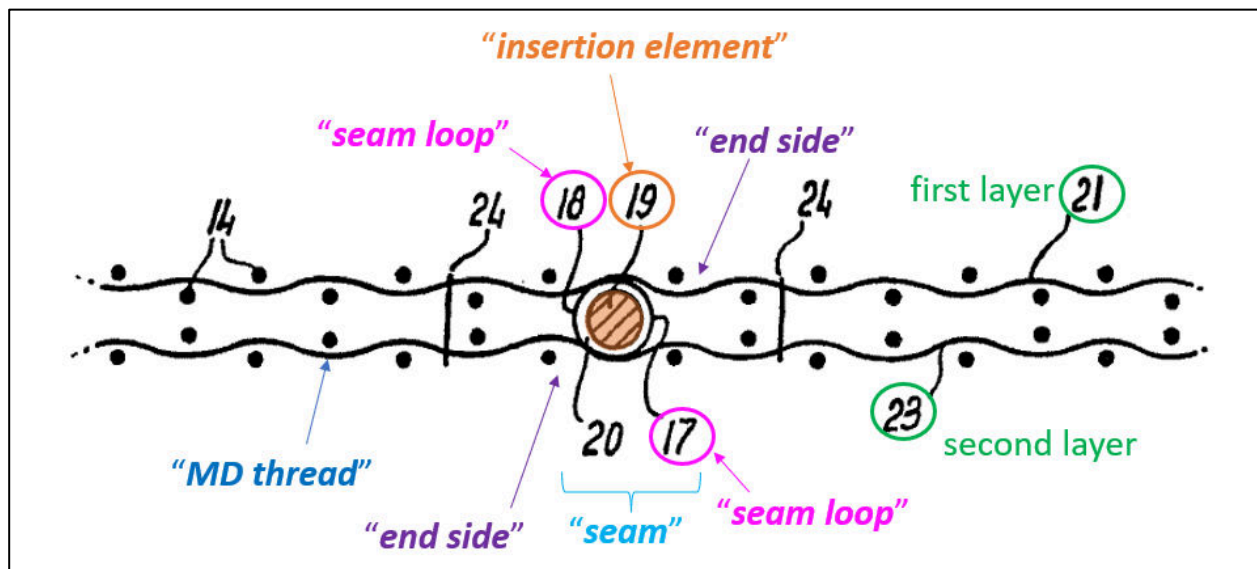
Sudre, Fig. 2

**[1.3] "a seam ...."**

In Sudre-Adanur, "the two-ply structure" (the two-layer laminate base structure; *see* [1.1]) of Sudre's Fig. 2 is "brought into endless form by the interdigitation of such loops" (*interengaging said seam loops of said two end sides*). EX1004, 3:24-26, Fig. 3; EX1003, ¶122. That is, Sudre's two-ply structure is folded, indicated by the red arrows in Fig. 2, such that the loops at the fold region 15 (*end side*) are interdigitated with the loops at the fold region 16 (*end side*), as shown in Fig. 3. EX1003, ¶122; *see* EX1004, Abstract, 1:14-18, 2:13-17, 3:9-10.



Sudre, Fig. 2

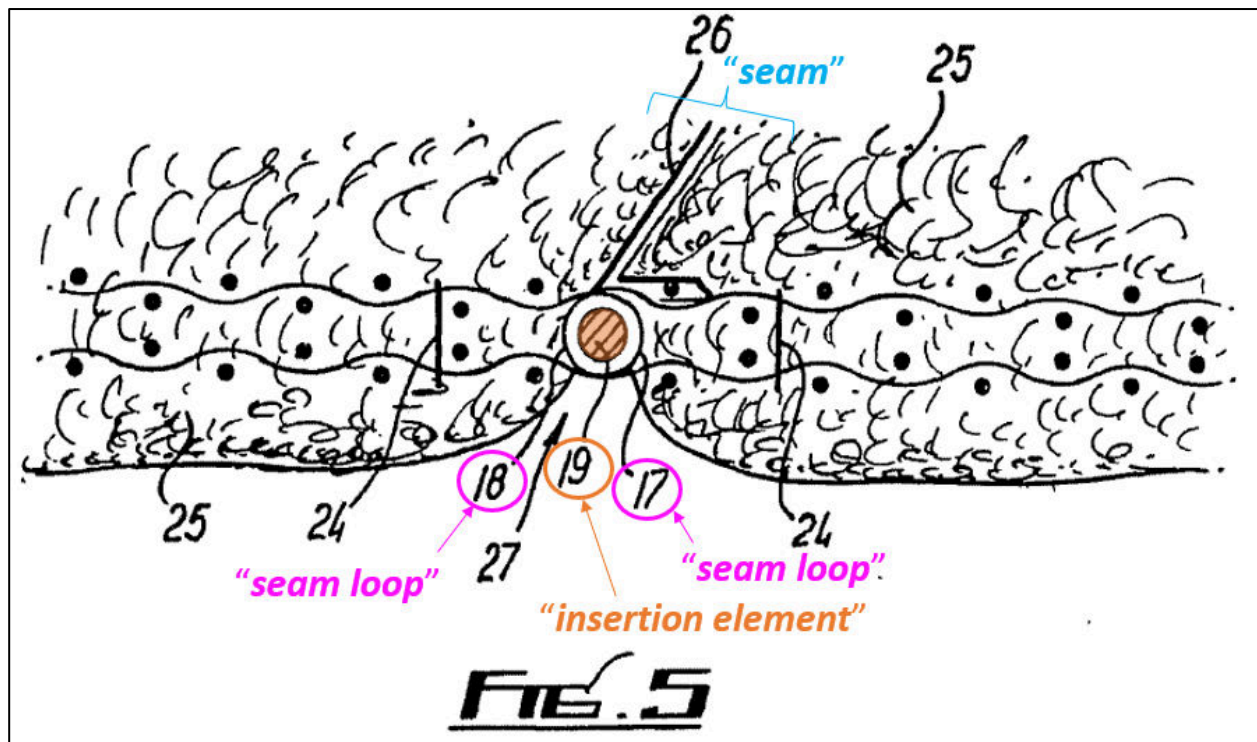


Sudre, Fig. 3

Sudre also describes "the introduction of a pintle wire 19 into the tunnel 20 formed thereby" (*insertion of an insertion element*). EX1004, 3:26-4:1; EX1003, ¶123. Specifically, the pintle wire (orange in Fig. 3) corresponds to an *insertion element* that is inserted into the tunnel formed by interengaging the loops. EX1003, ¶123; *see* EX1004, 4:21-24, Abstract, 1:14-18.

The interdigitation of the loops and insertion of the pintle wire form a seam:

“The loops (17, 18) may be interdigitated directly to receive a pintle wire into engagement and thus form a seam” (*said seam being formed by interengaging said seam loops ... and an insertion of an insertion element*), blue in Fig. 3 (*supra*) and Fig. 5 (*infra*). EX1004, Abstract, *see* 2:13-17; 3:9-10, 1:14-18; EX1003, ¶124.



Sudre, Fig. 5

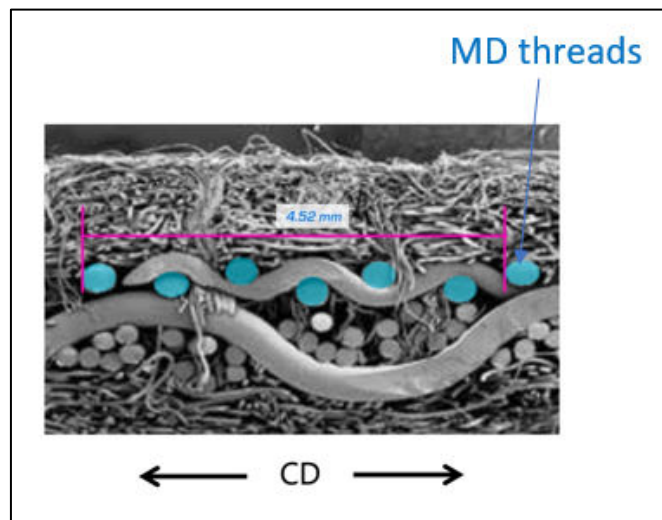
The seam *interconnects said end sides* because the loops of the two end sides are interdigitated and held together by the pintle wire. *See* EX1004, Abstract, 2:13-17; EX1003, ¶125.

The resulting fabric is now *endless*. See EX1004, 2:26-3:1, 1:3-4, 2:12, 5:9-10; EX1003, ¶126. Specifically, Sudre teaches that the interconnection of the end sides *makes the clothing endless*. EX1004, 3:24-26; EX1003, ¶126.

#### [1.4] Loop Density

For the reasons discussed earlier (*see* Grounds 1A.3-4, *supra*), in the Sudre-Adanur combination, both the MD thread density and the diameter of the MD threads of the combination fabric, which together dictate the loop density (*see* EX1001, 6:11-18), are based on Adanur. *See*; EX1003, ¶127.

Sudre-Adanur implements MD threads with a diameter of about 0.32mm based on measurements of Adanur’s “actual finished press fabrics,” as discussed above. *See* §IV.A.3; EX1021, 111; EX1003, ¶128.



Adanur, Fig. 3.15

The MD thread density in the Sudre-Adanur combination is based on Adanur's "actual finished press fabrics." EX1021, 111; EX1003, ¶¶128-129. As illustrated *supra*, the distance spanned by six MD threads in Adanur's Fig. 3.15 fabric (the distance from the left edge of the first thread to the left edge of the last thread) corresponds to a length of about 4.52mm, and the MD thread density (number of threads per unit distance) is thus about 13.3 threads/cm (6 threads divided by 4.52 mm). See §IV.A.3; EX1003, ¶129.

The loop density is calculated by multiplying twice the thread density times the MD thread diameter, consistent with the '566 Patent. See EX1001, 6:11-18; EX1003, ¶130. In the combination, the loop density is about 85% ( $2 * 13.3 \text{ threads/cm} * 0.32\text{mm}$ ). EX1003, ¶¶130-131.

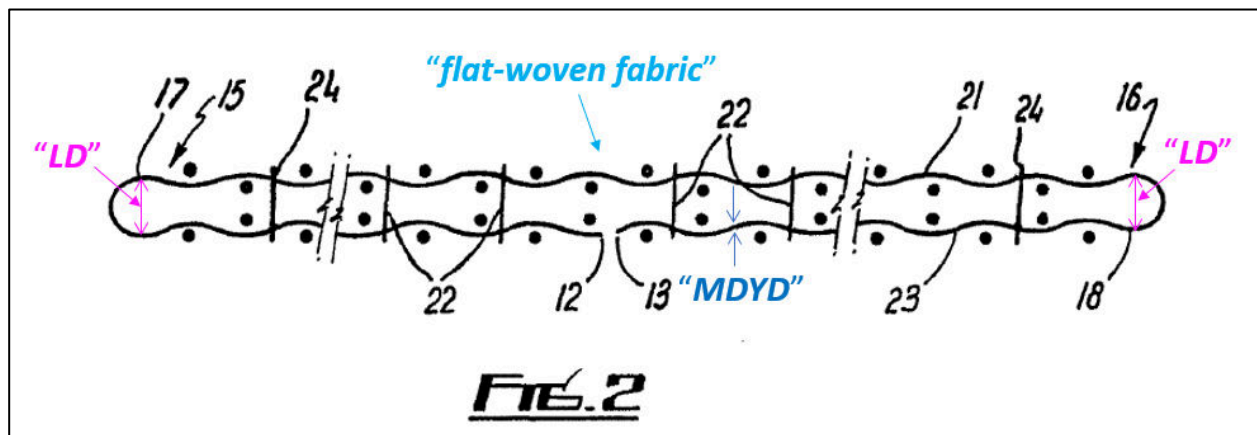
This loop density (85%) falls within the claimed loop density range (***said seam having a loop density of between 64% and 90%***). EX1003, ¶131 See *Ineos USA LLC v. Berry Plastics Corp.*, 783 F.3d 865, 869 (Fed. Cir. 2015) ("When a patent claims a range, as in this case, that range is anticipated by a prior art reference if the reference discloses a point within the range"); *Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 782 (Fed. Cir. 1985); *In re Petering*, 301 F.2d 676, 682 (1962).

The '566 Patent states that "thermal method steps can lead to shrinkage of the clothing in the transverse direction" and that "[t]he values of the seam loop

density indicated in this application relate to the finished clothing, if not otherwise specified.” EX1001, 6:29-35. The loop density discussed *supra* is for an “actual finished press fabric[,]” *i.e.*, after processing, and thus after any thermal treatment. EX1021, 111; EX1003, ¶132.

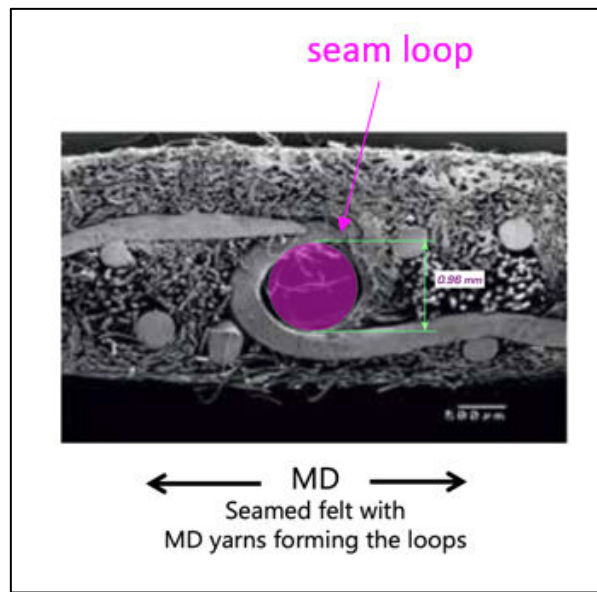
### [1.5] LD/MDYD Ratio

For the reasons discussed earlier (*see* Grounds 1A.3-4, *supra*), in the Sudre-Adanur combination, the inside diameter of the seam loops (*said diameter LD of said seam loops*) and the diameter of the MD threads that form the seam loops (*said diameter MDYD of said associated MD threads*), indicated in Sudre’s Fig. 2, are based on measurements of Adanur’s Fig. 3.15. EX1003, ¶133.



Sudre, Fig. 2

As discussed above, the seam loops in the Sudre-Adanur PMC have a diameter of about 0.96mm, based on the dimensions of Adanur’s “actual finished press fabrics.” EX1021, 111; *see* §IV.A.3; EX1001, 2:46-49; EX1003, ¶134.



Excerpt from Adanur, Fig. 3.15

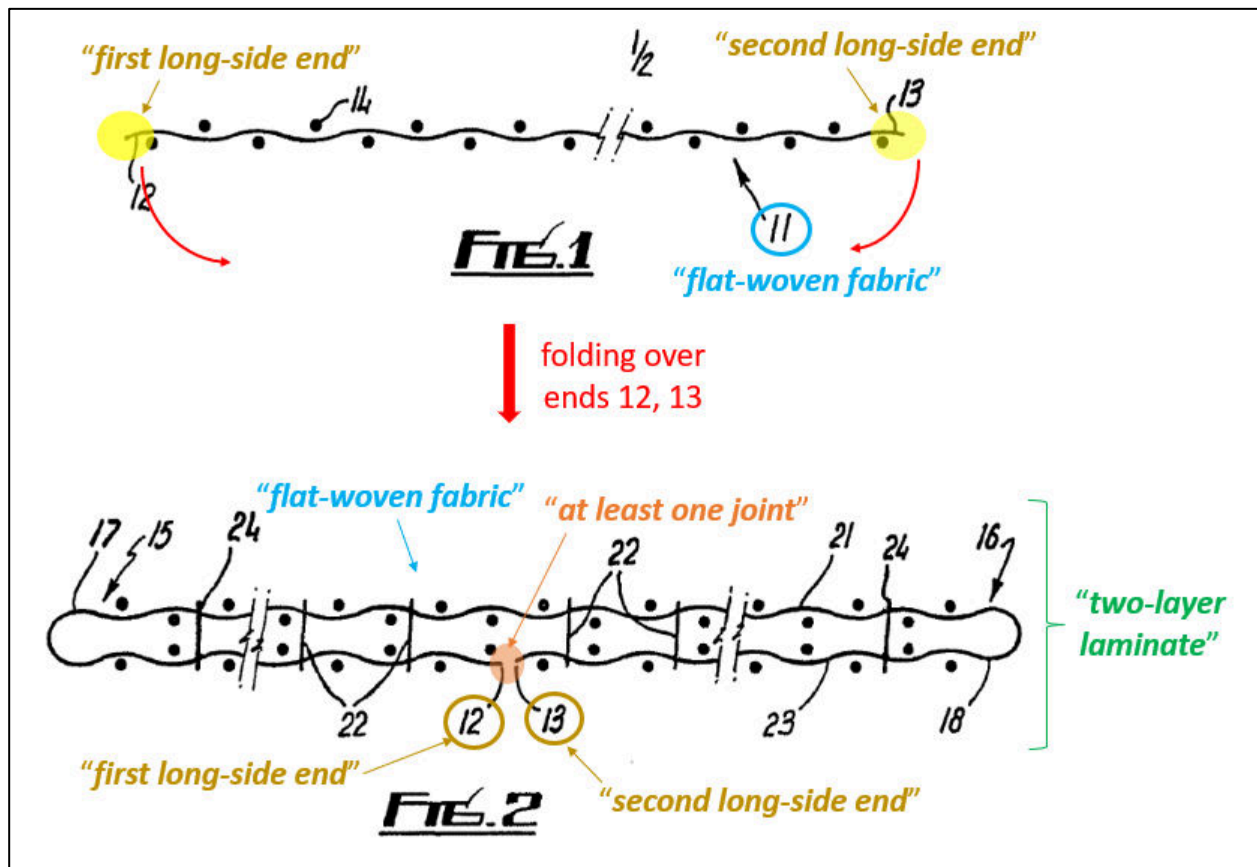
That is, Sudre-Adanur has an MD thread diameter MDYD of about 0.32mm (see [1.4]) and a seam loop diameter LD of about 0.96mm, and thus a *ratio LD/MDYD* of 0.96mm/0.32mm, *i.e.*, about 3.0. See EX1021, Fig. 3.15; EX1003, ¶¶134-136.

This ratio (3.0) falls within the claimed range (*a ratio LD/MDYD of between 2.7 and 3.6*). See *Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

**(b) Claim 3**

**[3.0]**

In Sudre-Adanur, Sudre’s “flat-woven fabric 11” (*said flat-woven fabric[]*) has “free ends 12, 13” (*a first and a second long-side end*), yellow in Fig. 1. EX1004, 3:14-18; EX1003, ¶137.



Sudre, Figs. 1 and 2

Sudre teaches that “[t]he free ends are folded over to define a two-ply structure” (*said two-layer laminate structure*) such that “the free ends [are] brought into substantial abutment.” EX1004, 3:18-20. This folding, indicated by the red arrows in Fig. 1, results in the “two-ply structure” of Fig. 2. *Id.*; EX1003, ¶138. Sudre also teaches that “the free ends [are] joined,” thus forming *at least one joint* (orange) *at which [the two] long-side ends are interconnected*. EX1004, 1:7-8, *see* 7:2-5, 5:26-6:1; EX1003, ¶138.

The joined free ends 12, 13 belong to the same flat-woven fabric 11 (*said interconnected long-side ends belong to an identical flat-woven fabric*). EX1003, ¶139; *see* EX1004, 1:7-8, 3:18-20, 5:26-6:1, 7:2-5, Figs. 1-2.

(c) *Claim 10*

*[10.0]*

Based on Adanur, the MD thread diameter is about 0.32 mm, which falls within the claimed diameter range (*said diameter of said MD threads is between 0.15 mm and 0.7 mm*). *See* EX1021, Fig. 3.15; [1.4] , EX1003, ¶140; *see Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

(d) *Claim 11*

*[11.0]*

Based on Adanur, the MD thread diameter is about 0.32 mm, which falls within the claimed diameter range (*0.3mm-0.5mm*). *See* EX1021, Fig. 3.15; [1.4] , EX1003, ¶141; *see Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

(e) *Claim 12*

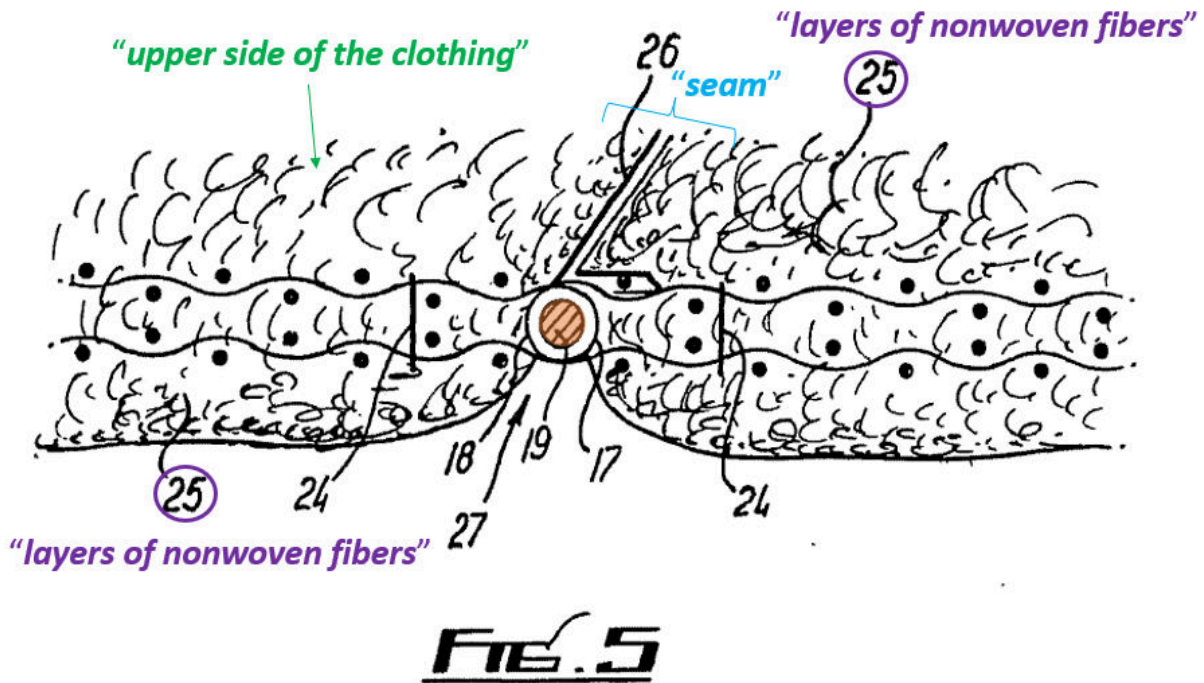
*[12.0]*

Based on Adanur, the loop density is about 85%, which falls within the claimed loop density range (*72%-86%*). *See* EX1021, Fig. 3.15; [1.4] , EX1003, ¶142; *see Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

(f) *Claim 13*

[13.0]

In Sudre-Adanur, Sudre teaches that “a textile batt 25 is needed to each face of the endless structure.” EX1004, 5:8-9. The textile batt, purple in Fig. 5, corresponds to *a plurality of layers of nonwoven fibers*. EX1003, ¶143; see EX1004, 5:19-20, claim 7, 2:10-12, 3:9-11.



Sudre, Fig. 5

A POSITA would have understood, or at least found obvious, that textile batt is composed of *nonwoven fiber* given the conventional usage of nonwoven fiber batt in the art. See EX1003, ¶144 (citing EX1009, 3:15-17, EX1019, 3:52-55; EX1014, Abstract).

The textile batt (*nonwoven fibers*) is “needed to each face of the endless structure,” *i.e.*, *disposed at least on an upper side of the clothing*. EX1004, 3:9-11, Fig. 5, *see* 3:9-11, 6:14-16, claim 7, 2:10-12; EX1003, ¶145.

The textile batt is provided in layers, *e.g.*, at least one layer applied to each of the two faces of the endless structure (*a plurality of layers of nonwoven fibers*), as illustrated in Fig. 5. *See* EX1004, 3:9-11, 6:14-16; EX1003, ¶146.

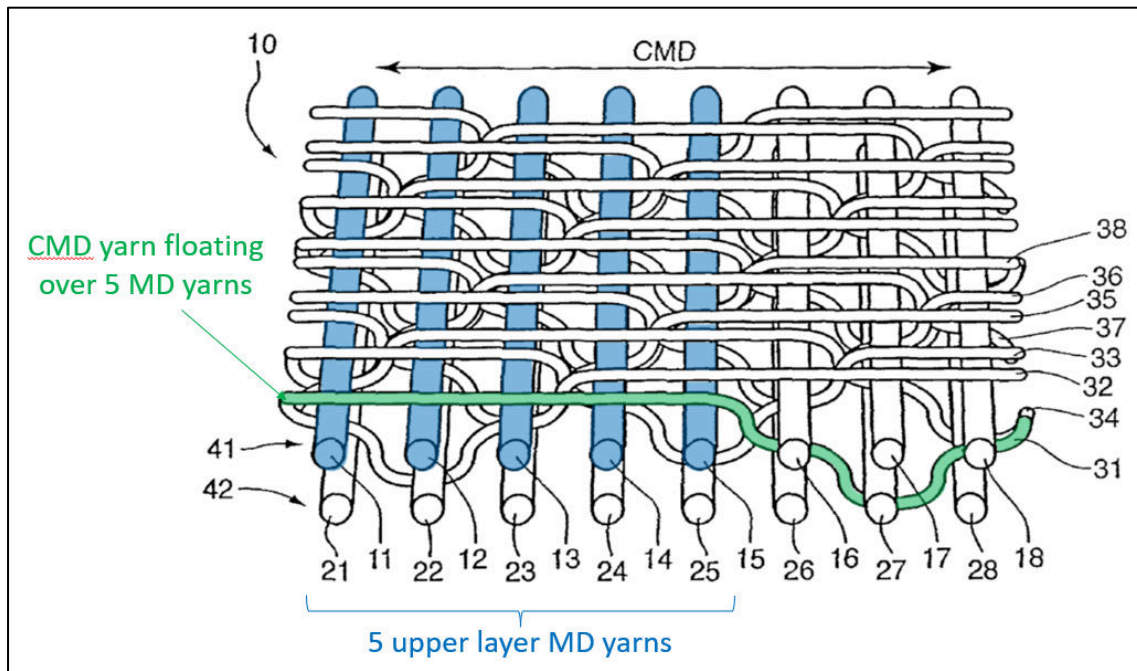
One side of the combination fabric is “the machine side ... 27” that faces the papermaking machine, and the other side is “the paper side ... 26” (*an upper side of the clothing*), green in Fig. 5, that faces and contacts the paper (*the web*). EX1004, 5:12-14; *see* §III.A; EX1003, ¶147. Both sides include the textile batt and thus the batt on the paper side contacts the paper (*for contacting the web*). EX1003, ¶147.

**B. [GROUND 1B] - Sudre-Adanur-Shipley Renders Obvious  
Claim 2**

**1. Shipley**

Shipley “relates to papermakers fabric,” and specifically to “the weave construction of...press felts.” EX1010, 1:7-9. Shipley’s fabric, shown in Fig. 1, can be a “flat woven fabric,” and has “a system of MD [machine direction] yarns interwoven with a system of CMD [cross-machine direction] yarns in a select

over MD yarns 11-15 [blue].” *Id.*, 3:13-18. EX1003, ¶¶148-149.



Shiple, Fig. 1

## 2. Sudre-Adanur-Shipley Combination

In the combination of Sudre, Adanur, and Shipley (“the Sudre-Adanur-Shipley combination”), the “flat-woven fabric” (based on Sudre; *see* [1.1]) has a weave pattern based on Shipley. EX1004, 3:13-18; EX1003, ¶150. Specifically, the combination fabric includes a “weave pattern...[that] repeats with respect to eight stacked pairs of MD yarns...and eight CMD yarns,” where “[e]ach of the CMD yarns in the repeat floats over five upper layer MD yarns, between one pair of stacked upper and lower MD yarns, under the next lower layer MD yarn,

between the next pair of upper and lower MD yarns and then continues to float over the next five upper layer MD yarns in its repeat.” EX1010, 3:6-13, *see* Figs. 1-3; EX1003, ¶¶150-151.

### **3. Motivation for the Combination**

A POSITA would have been motivated to structure the combination fabric such that each CD (or CMD) thread is woven over multiple MD threads, based on Shipley, because such a weave pattern “permits low flow resistance” to increase “water removal from the aqueous paper web.” EX1010, 2:26-28; EX1003, ¶¶152-153. A POSITA would have recognized that good water handling characteristics of a press fabric are relevant to the ability to manufacture high-quality paper products using such a press fabric. EX1003, ¶153.

Moreover, Shipley’s weave pattern has multiple benefits such as enhancing “[c]ompaction resistance of the press felts,” and providing felts that are “resilient maintaining the void volume and cleanability of the press felts” to improve felt durability and longevity. EX1010, 2:28-31; EX1003, ¶¶154-155. Also, such weave patterns provide the press fabric with “durable pressing uniformity,” which “results in a greater propensity for sheet smoothness and enhanced drying.” EX1010, 2:31-34. A press fabric (or felt) that is resistant to compaction has a longer usable lifetime in a papermaking machine before its compaction

necessitates replacement, and smoothness achieves high-quality paper products with few artifacts or distortions. EX1003, ¶¶154-156.

A POSITA also would have been motivated to incorporate a weave pattern in which each CD thread is woven over multiple MD threads because such a construction was conventional. *See* EX1011, Figs. 2-3; EX1012, 2:14-19; EX1003, ¶157. A weave pattern taught by Shipley is merely the application of known techniques (a weave pattern in which each CD thread is woven over multiple MD threads) to a known system (PMC) to yield predictable results (a press fabric having CD threads woven over multiple MD threads). *See KSR*, 550 U.S. at 415-421; EX1003, ¶¶157-158.

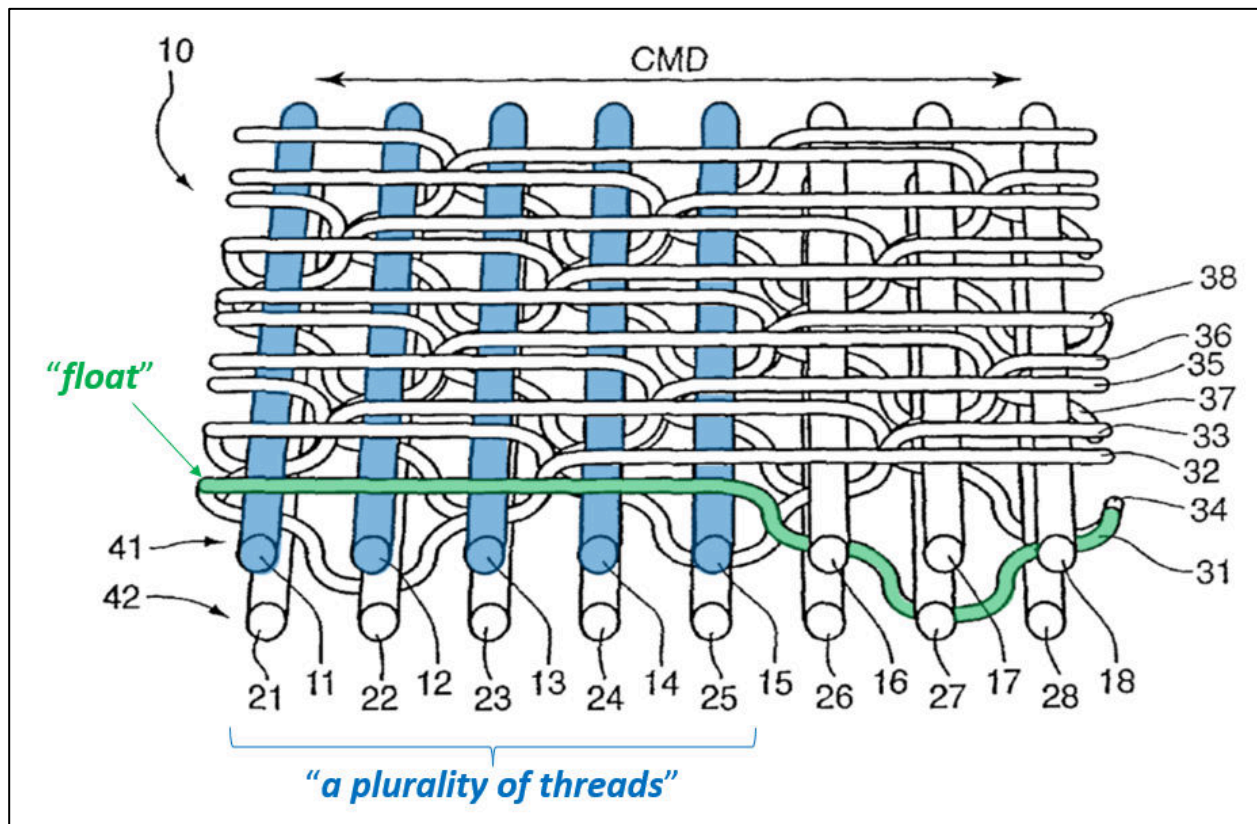
A POSITA would have reasonably expected success because Shipley, like Sudre and Adanur, pertains to PMC, and specifically to press fabrics formed from flat-woven base fabrics, and the use of CD yarns that float over multiple MD yarns in such fabrics was conventional. *See* EX1010, Abstract; EX1003, ¶159. Additionally, the MD thread diameter of Shipley's fabric (0.010"-0.020" [0.25-0.5mm]) overlaps with that of in the combination fabric (*e.g.*, 0.32mm based on Adanur; *see* [1.4]), indicating compatibility of these teachings. *Compare* EX1010, 3:48-52; EX1021, Fig. 3.15; EX1003, ¶¶160-162.

#### 4. Analysis

##### (a) *Claim 2*

*[2.0]*

The combination flat-woven fabric (*see* [1.1]) is woven based on Shipley's weave pattern, shown in Fig. 1. EX1003, ¶163. Specifically, "[e]ach of the CMD yarns in the repeat floats over five upper layer MD yarns" (*floats extending over two or a plurality of threads*). EX1010, 3:8-12; EX1003, ¶163 (citing EX1018, 3:30-35). One such CD (or CMD) thread (*float*), annotated green in Fig. 1, "floats over MD yarns 11-15" (*extends over ... a plurality of threads*). EX1010, 3:12-18, *see* Abstract, 2:9-11, claim 1, 3:19-28; EX1003, ¶163.

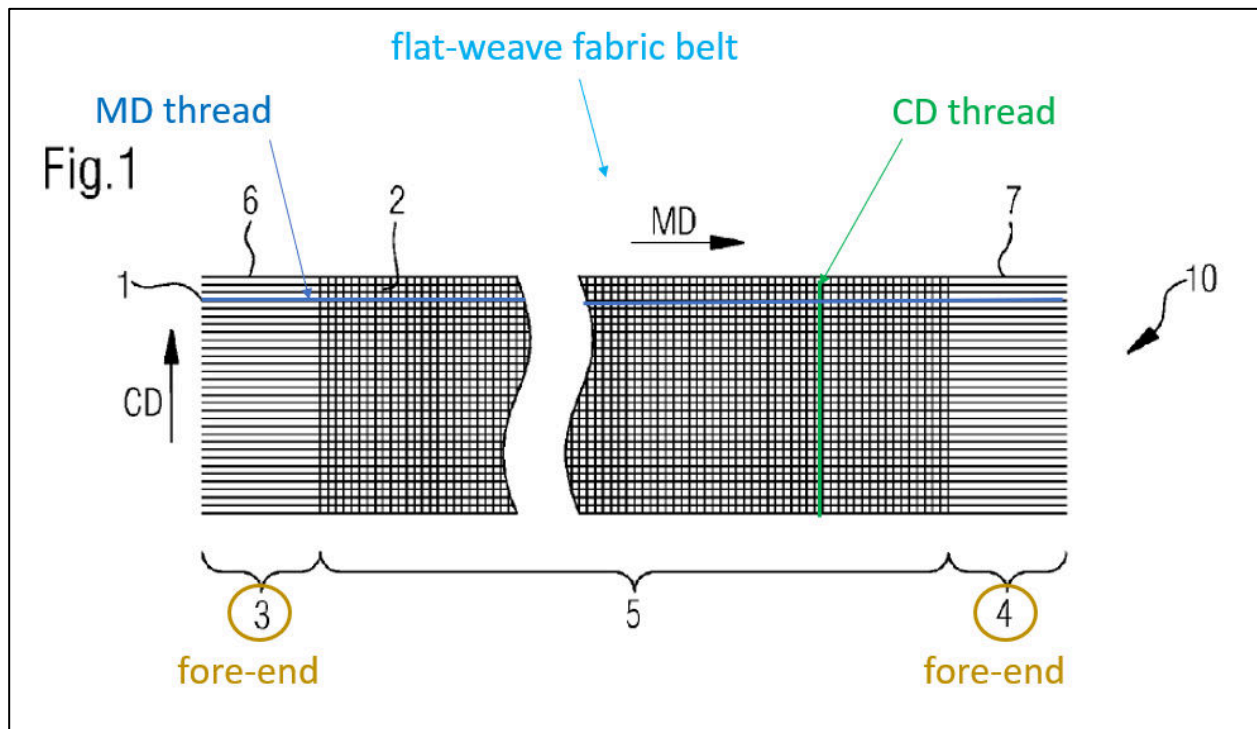


Shipley, Fig. 1

**C. [GROUND 1C] – Sudre-Adanur-Straub Renders Obvious Claims 4-9**

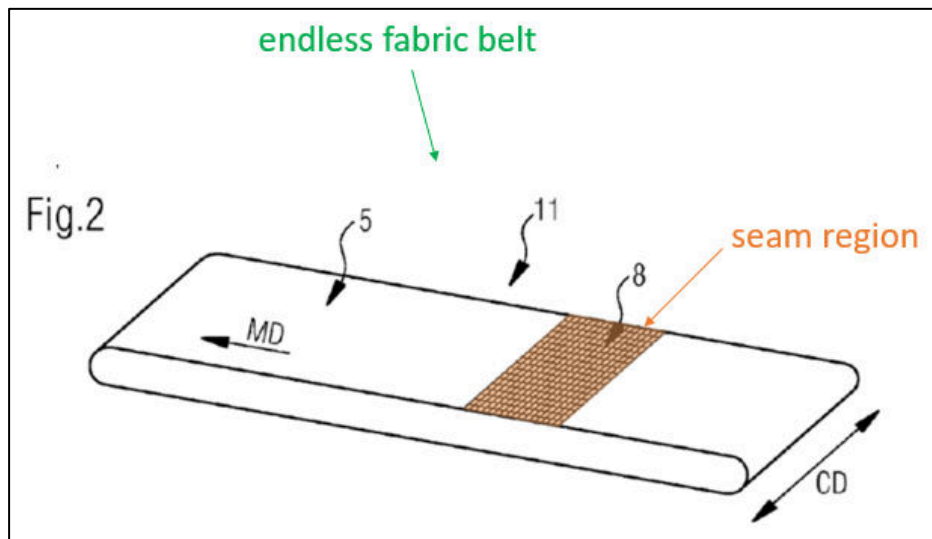
**1. Straub**

Like Sudre and Adanur, Straub describes press fabric formed from a “flat-weave fabric belt” composed of MD threads 1 (dark blue) and CD threads 2 (green). EX1013, [0054] , *see* Fig. 1. EX1003, ¶164.



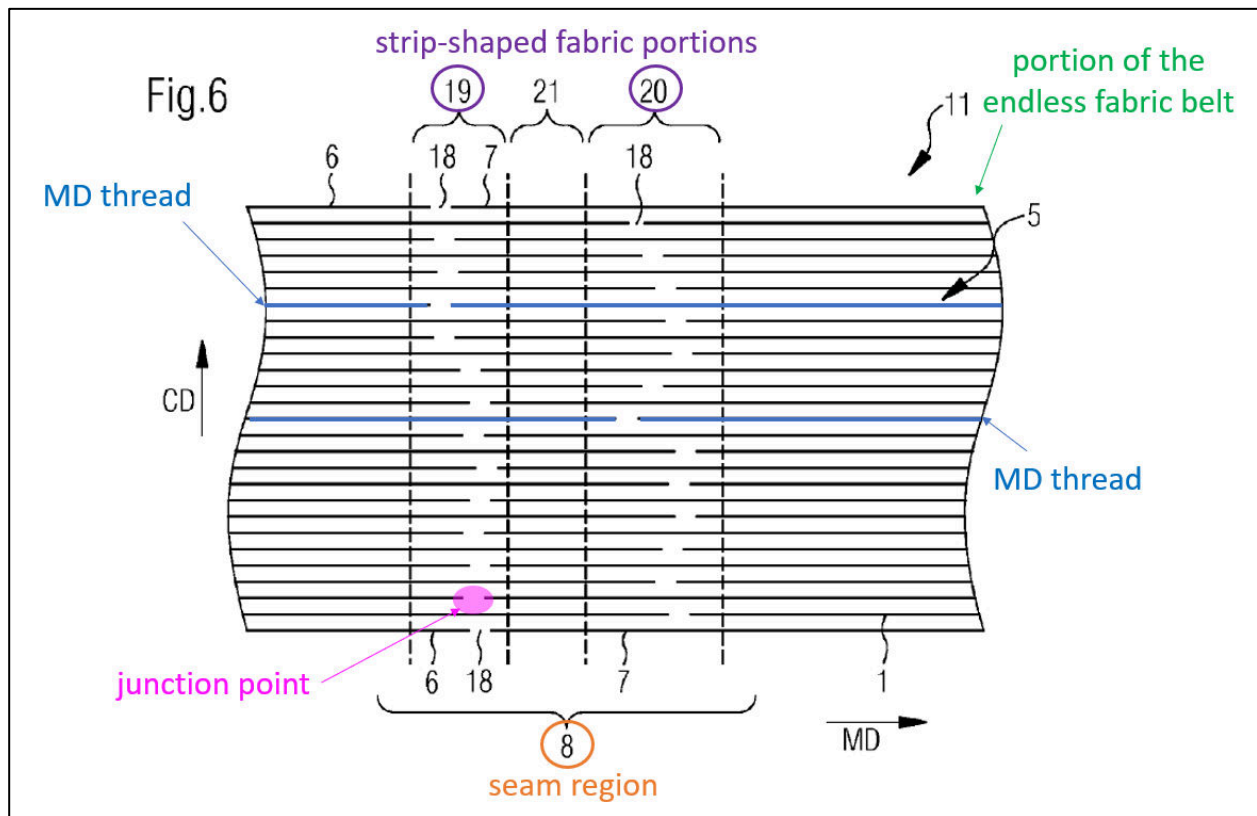
Straub, Fig. 1

As was conventional, the flat-weave fabric belt is folded over and “the two fore-ends 3 and 4 of the fabric belt 10 [are] connected to one another” to “form a woven seam.” *Id.*, [0055]. The resulting “endless fabric belt 11” has an end-to-end “seam region 8,” orange in Fig. 2, where the two ends are connected. *Id.*, [0057]; EX1003, ¶165.



Straub, Fig. 2

In this end-to-end seam region, “an end portion 6 of the machine direction threads 1 of one fore-end and an end portion of the machine direction threads 1 of the other fore-end of the fabric belt [] are brought together in pairs to form in each case a junction point 18,” one of which is highlighted in pink in Fig. 6. EX1013, [0070]. The MD threads in the seam region (dark blue) “are interwoven with machine cross-direction threads (not illustrated).” *Id.* The junction points are arranged in “two strip-shaped fabric portions 19, 20 which are spaced apart from one another” by “a strip-shaped fabric portion 21 in which no junction points ... are formed.” *Id.*, [0071]. Examples of the weave structure at the junction points are shown in Straub’s Figs. 7a-7d. *Id.*, [0076]-[0078]; EX1003, ¶¶165-168.



Straub, Fig. 6

The MD and CD threads at the junction points are “connected to one another in a materially integral manner by laser light radiation at yarn contact points formed by crossing points,” *e.g.*, using “a transmission welding method.” EX1013, [0059]-[0060], *see* [0065]; EX1003, ¶169.

## 2. Sudre-Adanur-Straub Combination

In the combination of Sudre, Adanur, and Straub (the “Sudre-Adanur-Straub combination”), Sudre teaches that “[t]he free ends” of the flat-woven fabric “are folded over to define a two-ply structure..., the free ends being brought into

substantial abutment” and “joined.” EX1004, 1:7-8, 3:18-21, Fig. 2; *see* [3.0]; EX1003, ¶¶170-172.

Based on Straub, to join the free ends, the MD threads of the free ends “are brought together in pairs to form in each case a junction point.” EX1013, [0070]-[0071]; EX1003, ¶¶170-172. The resulting arrangement is consistent with the structure illustrated in Straub’s Fig. 6, and each individual junction point is configured, *e.g.*, based on the structures of Straub’s Figs. 7a-7d. EX1003, ¶171. The MD and CD threads at each junction point are connected by “a transmission welding method.” EX1013, [0073]; EX1003, ¶171.

### **3. Motivation for the Combination**

A POSITA would have been motivated to join the free ends of a flat-woven fabric using a junction structure based on Straub because Straub teaches that, in such structure, “the strength of the seam is markedly increased,” providing a more robust seam and achieving increased fabric longevity. EX1013, [0016]-[0017]; EX1003, ¶¶173-174. Additionally, with Straub’s joint structure, “stretching of the fabric belt can...be reduced, and also the shear strength can be increased” to prevent “transverse distortion of the fabric belt.” EX1013, [0017]; EX1003, ¶¶175-176.

Straub's junction points and structures also help reduce manufacturing defects (*e.g.*, loose MD threads resulting in manufacturing delays and product defects) and achieve uniform water permeability, which avoids artifacts in the resulting paper products that can catch on the papermaking machine. EX1013, [0018], [0020]; EX1003, ¶¶177-178.

Additionally, formation of junction points by welding was conventional and well-understood. *See* EX1015, [0011], [0017]; EX1003, ¶179. Utilizing Straub's joints is merely the application of known techniques (joining free ends of a flat-woven fabric by welding junction points) to a known system (PMC) to yield predictable results (an endless structure formed by joining free ends of a flat-woven fabric at junction points). *See KSR*, 550 U.S. at 415-421; EX1003, ¶180.

A POSITA would have reasonably expected success at least because Straub, like Sudre and Adanur, pertains to PMC, and specifically to press fabrics formed from making flat-woven base fabrics "endless." *See* EX1013, [0001]; EX1003, ¶¶181-182. Furthermore, Sudre imposes no requirements or incompatibilities with respect to joining the free ends of its flat-woven fabric to form an endless structure, and indeed indicates that the free ends "may be joined together ... in any other manner." EX1004, 7:3-5; EX1003, ¶¶181-182. In fact, Straub indicates that its approach is compatible with "a fabric with only a few fabric plies," and with a fabric having "a thread density of 20 to 100 machine direction threads per inch,

which are both consistent with the Sudre-Adanur combination fabric. EX1013, [0039]; *see* EX1004, 3:24-4:1; EX1021, Fig. 3.15; EX1003, ¶¶180-182.

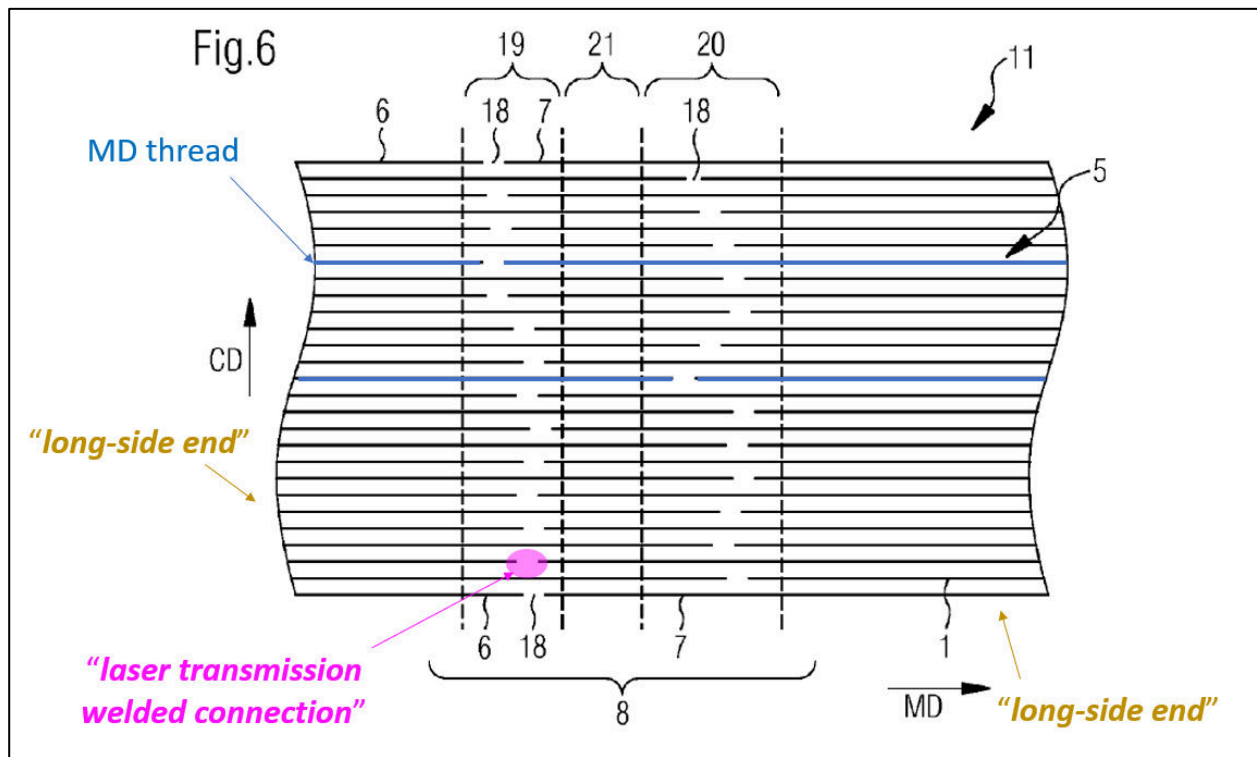
#### 4. Analysis

##### (a) *Claim 4*

###### *[4.0]*

In Sudre-Adanur-Straub, “the free ends” of the flat-woven fabric are “joined” (*said two long-side ends are interconnected*; *see* [3.0]) using “a transmission welding method,” based on Straub, which involves “light [] radiated by a laser” that “is guided onto the intersections to be welded of machine direction and machine cross-direction threads” (*laser transmission welded*). EX1004, 1:7-8; EX1013, [0060]-[0061], *see* [0065], [0030], [0047]-[0051], [0067]-[0068], Figs. 3-5; EX1003, ¶183.

The seam region formed by laser transmission welding is illustrated in Straub’s Fig. 6. *See* EX1013, [0051]; EX1003, ¶¶183-184.



Straub, Fig. 6

This seam region includes “junction points” (one highlighted in pink) at which “pairs” of MD threads from the two “fore-end[s]” (*long-side ends*) of the flat-woven fabric “are interwoven with machine cross-direction threads” and “connected to one another in a materially integral manner by laser radiation,” thus interconnecting the two long-side ends. EX1013, [0059], [0069]-[0070], *see* [0061], [0065]; EX1003, ¶185. That is, each junction point is *a laser transmission welded connection* because it connects, via laser welding, MD threads from the two long-side ends of the flat-woven fabric. EX1003, ¶185.

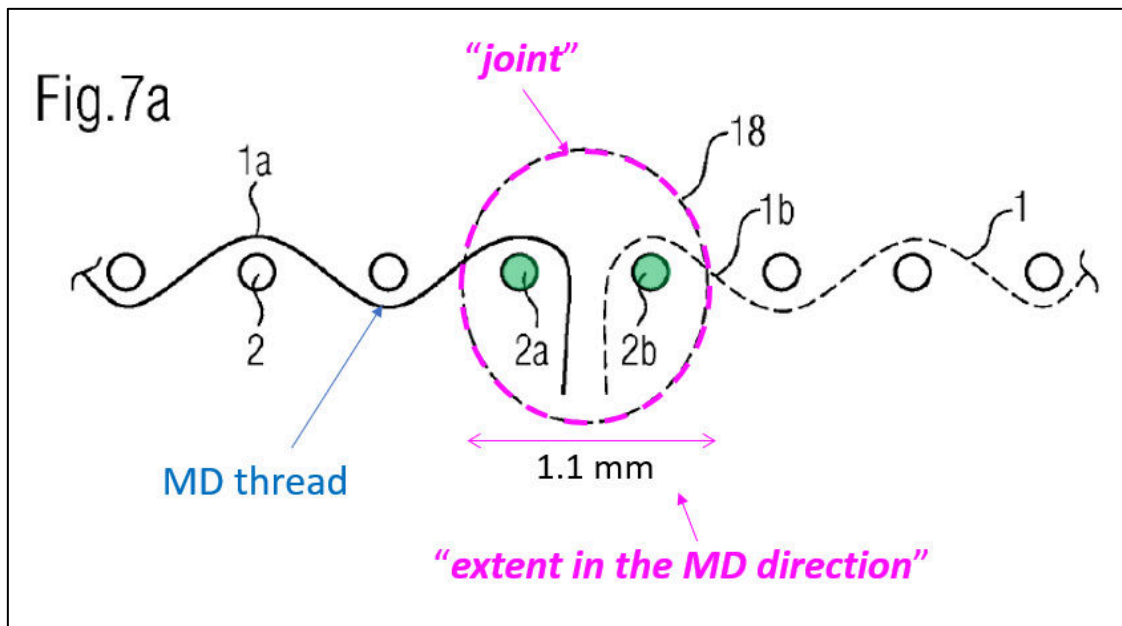
(b) *Claim 5*

**[5.0]**

*Each junction point is a joint*

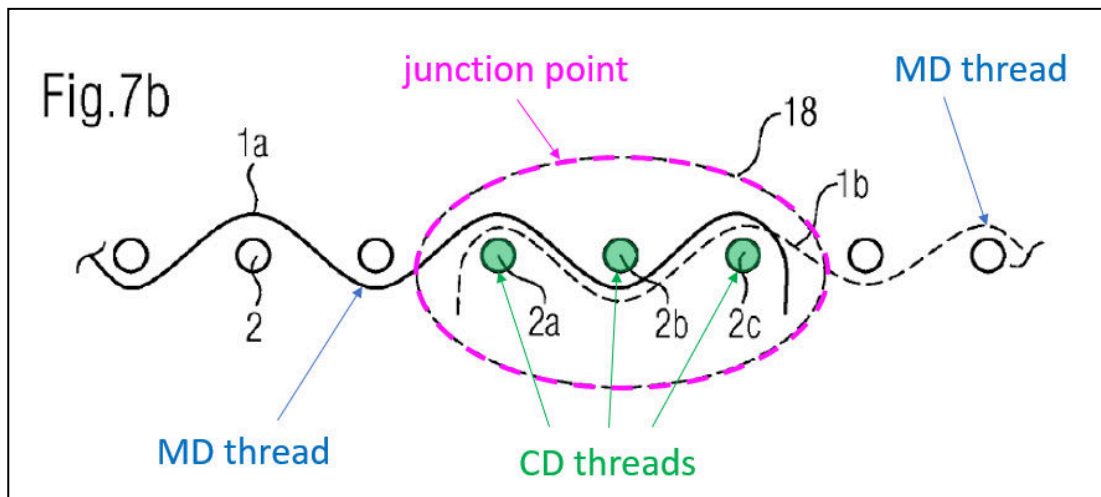
In Sudre-Adanur-Straub, “the free ends” of the flat-woven fabric are “joined” based on the junction points described by Straub, where at each junction point, a pair of MD thread ends from the two free ends of the flat-woven fabric “are interwoven with machine cross-direction threads.” EX1013, [0001], Figs. 7a-7d; EX1004, 1:7-8; EX1003, ¶186. Thus, each junction point corresponds to a *joint* because it is a region of the fabric *at which two of said long-side ends are interconnected* (see [3.0]). EX1003, ¶186; see EX1013, [0056], [0001], [0008], [0015], [0026], [0070].

The example junction point (*joint*) of Straub’s Fig. 7a, “extends from the machine cross-direction thread 2a as far as the machine cross-direction thread 2b, as seen in the machine direction MD,” *i.e.*, *extends in the machine direction* (the direction of the MD thread (blue)) by a distance approximately equal to the distance occupied by two CD threads (green). EX1013, [0076]; EX1003, ¶¶186-187.



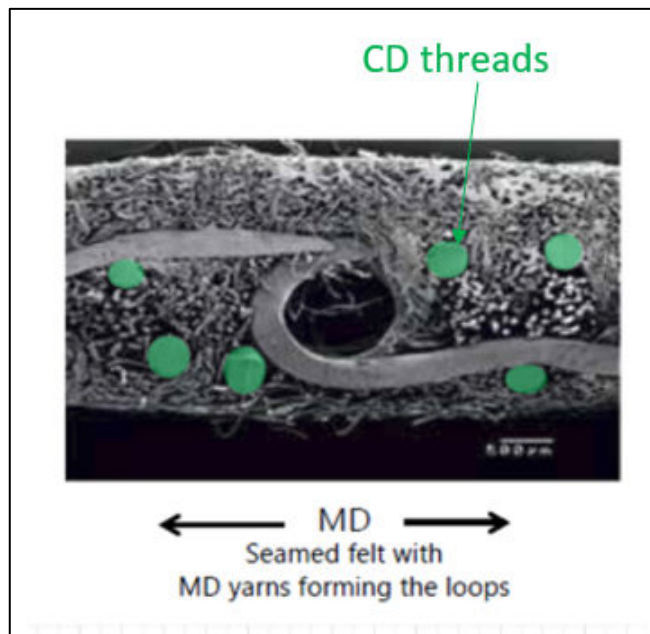
Straub, Fig. 7a

Similarly, the joint of Straub's Fig. 7b encompasses three CD threads and thus extends in the machine direction by a distance approximately equal to the distance occupied by two CD threads (green). See EX1013, [0077]; EX1003, ¶190. And Straub's Fig. 7c joint encompasses four CD threads. See EX1013, [0078]; EX1003, ¶191.



Straub, Fig. 7b

In the combination, based on Adanur, the joints of Figs. 7a and 7b extend in the MD by ***less than 15 mm***. EX1003, ¶¶188-192. Specifically, based on Adanur's actual finished press fabric, the density of the CD threads (green in Fig. 3.15) in the combination fabric is about 17.4 threads/cm, as Dr. Pastore explains. EX1003, ¶192. With this CD thread density, the two CD threads in the joint of Fig. 7a occupy a distance in the MD of about 1.1mm (2 threads / 17.4 threads/cm). EX1003, ¶189. That is, the junction point of Straub's Fig. 7a (***joint***) ***extends in the machine direction*** by about 1.1mm (***less than 15 mm***). Similarly, the joint of Fig. 7b, which encompasses three CD threads, extends in the MD by about 1.7mm (***less than 15 mm***). See EX1013, [0077]; EX1003, ¶190. The joint of Fig. 7c, which encompasses four CD threads, extends in the MD by about 2.3mm (***less than 15 mm***). See EX1013, [0078]; EX1003, ¶191.



Excerpt from Adanur, Fig. 3.15

A POSITA would have found it obvious to implement a CD thread density of about 17.4 threads/cm based on Adanur. EX1003, ¶¶193-198. For instance, consistent with the discussion above for MD thread density (*see* §IV.A.4), it would have been conventional to determine that the CD thread density of Adanur’s fabric was about 17.4 threads/cm, and a POSITA would have been motivated to use these “**industry standard**” parameters to achieve their desired “particular requirements” associated with “finished press fabrics.” EX1004, 6:14-17; EX1022; EX1003, ¶194. Indeed, it was conventional to provide CD threads in densities similar to that of the MD threads, and Adanur’s 17.4 CD threads/cm is consistent with the combination fabric’s MD thread density of about 13.3 threads/cm. EX1003, ¶195.

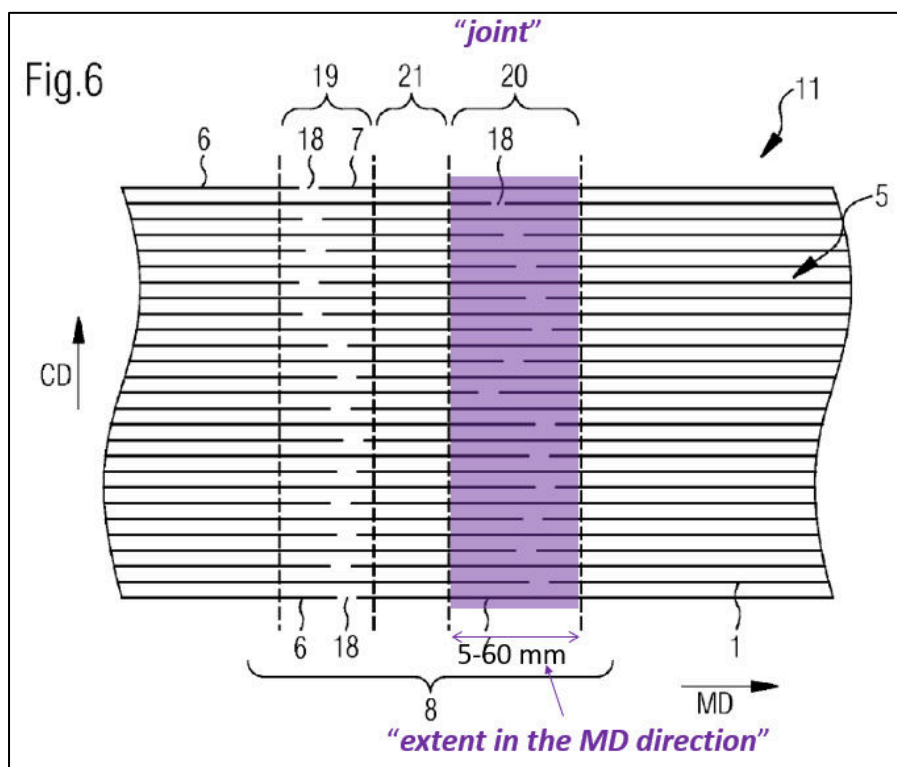
Moreover, CD thread density based on Adanur is merely the application of known techniques (CD threads provided in a specified thread density in the context of PMC) to a known system (PMC) to yield predictable results (PMC with a conventional CD thread density). *See KSR*, 550 U.S. at 415-421; EX1003, ¶196.

A POSITA would have reasonably expected success because this CD yarn density was conventional and compatible with standard weaving techniques, and because Sudre imposes no requirements on its weave configuration or CD thread density that would indicate any incompatibility with the CD thread density teachings of Adanur. EX1003, ¶¶195-198.

*Each strip-shaped fabric portion is a joint*

In Sudre-Adanur-Straub, each of the “strip-shaped fabric portions” that contains the junction points alternatively/additionally corresponds to a ***joint*** because it is a region of the fabric ***at which two of said long-side ends are interconnected*** (*see* [3.0]), *e.g.*, via the junction points contained therein. EX1013, [0071], *see* claim 1; EX1003, ¶199;

Each “strip-shaped fabric portion[]” (***joint***) has “an extent of 5 to 60 mm in the machine direction MD.” EX1013, [0074], Fig. 6, claim 38; EX1003, ¶¶199-200.



Straub, Fig. 6

The recited MD extent of the joint (*less than 15 mm*) overlaps with the MD extent of the strip-shaped fabric portion of the PMC (5-60 mm). The '566 Patent provides no discussion, much less any evidence, of criticality or unexpected results associated with the claimed MD extent of the joint. EX1003, ¶201. As such, the overlapping MD extent of the joint in Sudre-Adanur-Straub would have been obvious. *See In re Geisler*, 116 F.3d 1465, 1469–70 (Fed. Cir. 1997) (“When an applicant seeks to overcome a prima facie case of obviousness by showing improved performance in a range that is within or overlaps with a range disclosed in the prior art, the applicant must ‘show that the [claimed] range is *critical*,

generally by showing that the claimed range achieves unexpected results relative to the prior art range” (quoting *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) (alteration and emphasis in original)); *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003).

Alternatively/additionally, the MD extent of the strip-shaped fabric portion (*joint*) is an obvious design choice, *e.g.*, because, as Dr. Pastore explains, a POSITA would have been motivated to construct a joint with a small MD extent to avoid formation of distortions on paper products formed thereon. EX1003, ¶202 (citing EX1020, [0011]). The specific “less than 15 mm” MD extent of the claim 5 joint presents no unexpected results or solution, nor is there any indication in the ’566 Patent that a joint of “less than 15 mm” would function differently than a 5-60mm joint. EX1003, ¶202; *see In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975) (use of claimed feature solves no stated problem and presents no unexpected result and “would be an obvious matter of design choice within the skill of the art”).

**(c) Claim 6**

**[6.0]**

The junction points of Straub’s Fig. 7a, 7b, and 7c (*said at least one joint*) *extend in the machine direction* by about 1.1mm, 1.7mm, and 2.3mm, respectively (*less than 5 mm*). *See* [5.0]; EX1003, ¶203.

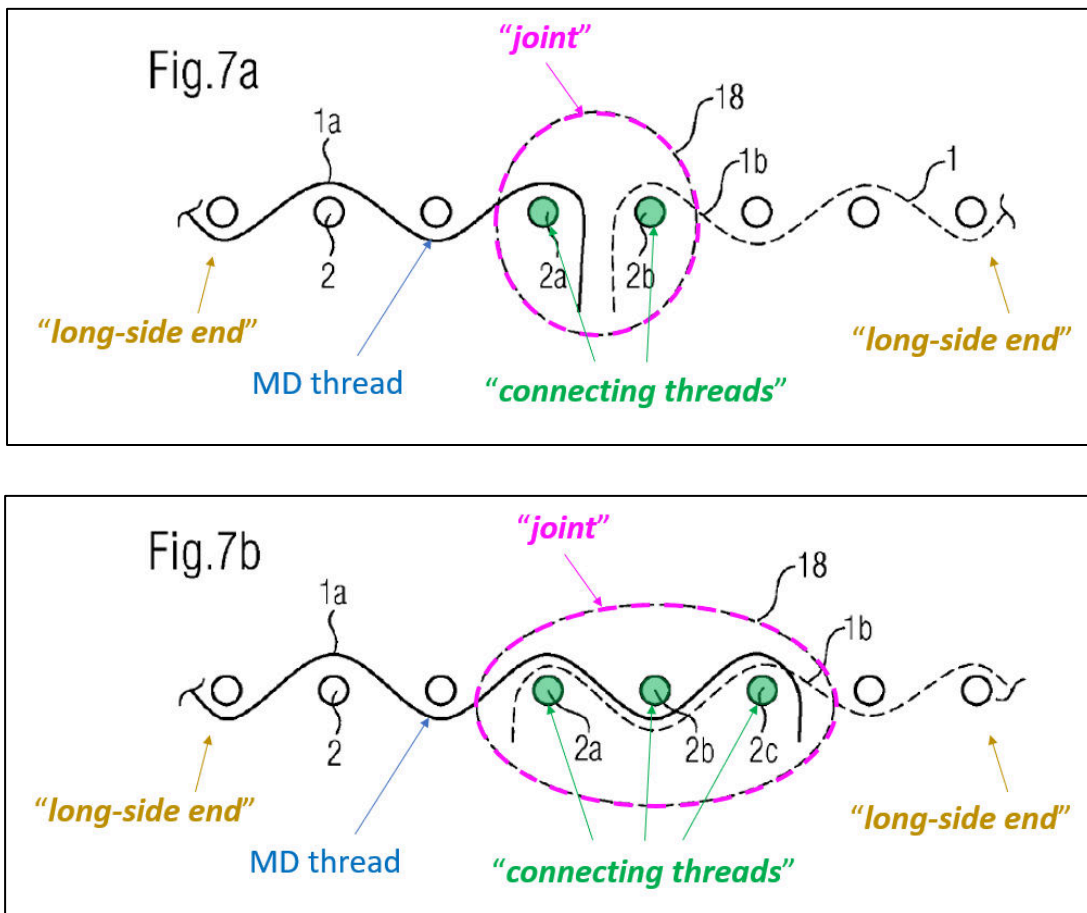
Alternatively/additionally, implementation of the strip-shaped fabric portion (*joint*) with an MD extent of *less than 5 mm* is an obvious design choice given (1) lack of unexpected results or different functionality between the '566 Patent's "less than 5 mm" joint and that of the 5-60mm Sudre-Adanur-Straub joint and (2) the near-overlap between the recited "less than 5 mm" range and the 5-60mm range of the combination. *See* [5.0]; EX1003, ¶¶204-205; *Kuhle*, 526 F.2d at 555.

**(d) Claim 7**

**[7.0]**

In the combination, a junction point (*said at least one joint*) based on Straub's Fig. 7a includes "two directly adjacent machine cross-direction threads 2a and 2b," green (*connecting threads*). EX1013, [0076]; EX1003, ¶206.

Alternatively/additionally, a junction point (*said at least one joint*) based on Straub's Fig. 7b includes "three directly adjacent machine cross-direction threads 2a, 2b and 2c," green (*connecting threads*). EX1013, [0077]; EX1003, ¶206.



Straub, Figs. 7a-7b

The CD threads (*connecting threads*) are connected to “end portions 1a and 1b of one and the same machine direction thread,” where the end portions of the MD thread are from “one fore-end and ... the other fore-end of the fabric belt” (*long-side ends*, yellow). EX1013, [0070]; EX1003, ¶207.

Specifically, the “yarn intersections” between MD and CD threads are “welded,” *i.e.*, the CD threads in the junction points are welded to the MD threads from the two long-side ends (*connecting threads being welded to at least one or both of said long-side ends*). EX1013, [0067]; EX1003, ¶208.

(e) *Claim 8*

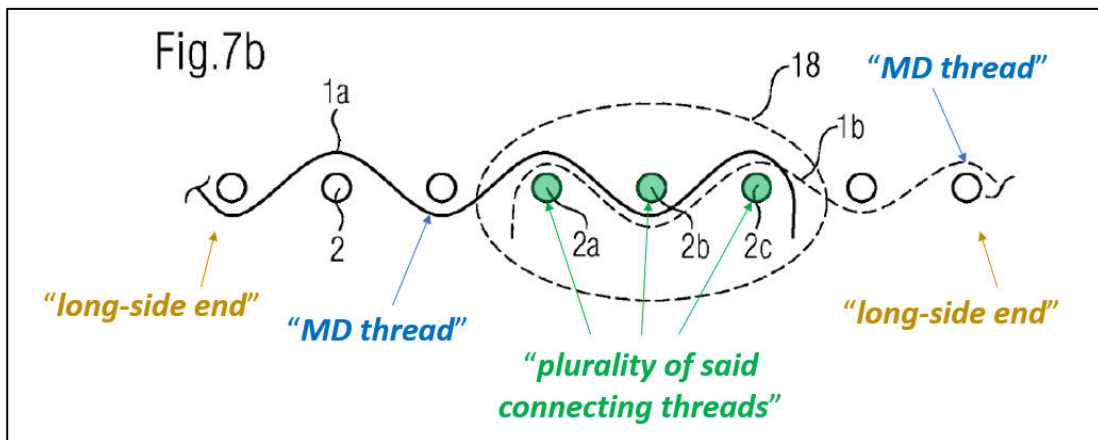
**[8.0]**

In the combination, a junction point based on Straub's Fig. 7a includes "two directly adjacent machine cross-direction threads 2a and 2b," and the Fig. 7b junction point includes "three directly adjacent machine cross-direction threads 2a, 2b and 2c" (*at most three connecting threads disposed in a CD direction of the clothing*). EX1013, [0076]-[0077], *see* claim 33; *see* [7.0]; EX1003, ¶209.

(f) *Claim 9*

**[9.0]**

In the combination, Straub's Fig. 7b junction point includes "the two brought-together end portions 1a and 1b of one and the same machine direction thread 1" (*MD threads of at least one of said long-side ends*). EX1013, [0077]. The MD thread end portions (yellow) "are jointly interwoven with three directly adjacent machine cross-direction threads 2a, 2b and 2c" (green) (*connecting threads are woven with MD threads*). *Id.*, [0077], *see* [0001]; EX1003, ¶210.

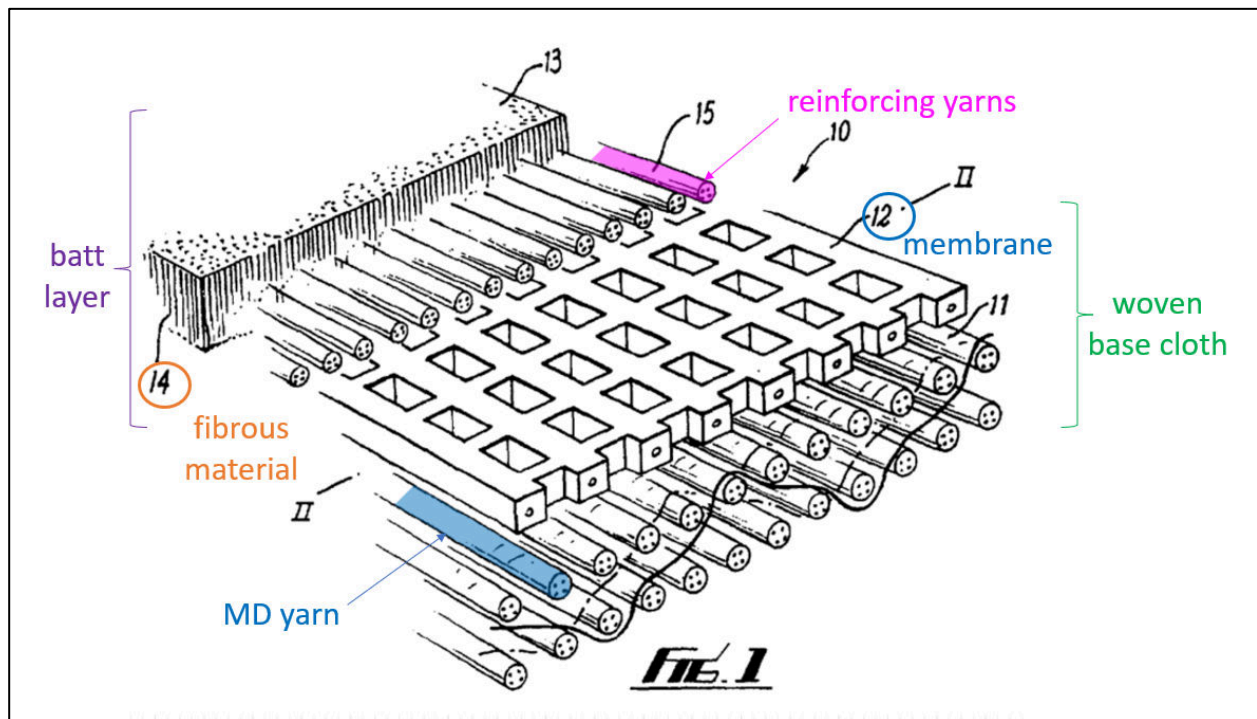


Straub, Fig. 7b

**D. [GROUND 1D] – Sudre-Adanur-Lidar Renders Obvious Claim 14**

**1. Lidar**

Lidar describes PMC that includes “a woven base cloth 11” and a “batt layer 13,” which includes “a batt of synthetic fibrous material 14 that contains a plurality of non-crimped reinforcing yarns 15.” EX1014, 3:18-21, 3:29-32, Fig. 1, *see* 2:29-30. These reinforcing yarns 15 are “at least partially encapsulated in and/or...at least partially impregnated with polymer,” and “preferably coated with an elastomeric polymer.” *Id.*, 2:22-30; EX1003, ¶¶211-212.



Lidar, Fig. 1

## 2. Sudre-Adanur-Lidar Combination

In the combination of Sudre, Adanur, and Lidar (the “Sudre-Adanur-Lidar combination”), combination, the textile batt (*see* [13.0]) includes “a batt of synthetic fibrous material 14 that contains a plurality of non-crimped reinforcing yarns 15,” based on Lidar. EX1014, 3:29-31, *see* 2:24-27, Fig. 1; EX1003, ¶¶213-214. Optionally, the combination PMC also includes “a moulded mesh membrane 12.” EX1014, 3:20-21; EX1003, ¶¶213-214.

### 3. Motivation for the Combination

A POSITA would have been motivated to incorporate reinforcing yarns into the batt of the PMC because this structure can “offer[] the advantage of providing a greater pressure contact area,” which “provid[es] enhanced dewatering with reduced marking tendency,” thus enabling production of higher quality paper products. EX1014, 2:3-8; EX1003, ¶¶215-216. Moreover, the reinforcing yarns, together with the mesh membrane, “offer[s] vastly improved resistance to compaction and therefore longer working life” for the fabric. EX1014, 2:13-18; EX1003, ¶217.

Reinforcing yarns in the batt of the combination fabric is merely the application of known techniques (reinforcing yarns in a batt layer) to a known system (a PMC that includes a batt layer) to yield predictable results (a press fabric having reinforcing yarns in its batt layer). *See KSR*, 550 U.S. at 415-421; EX1003, ¶218.

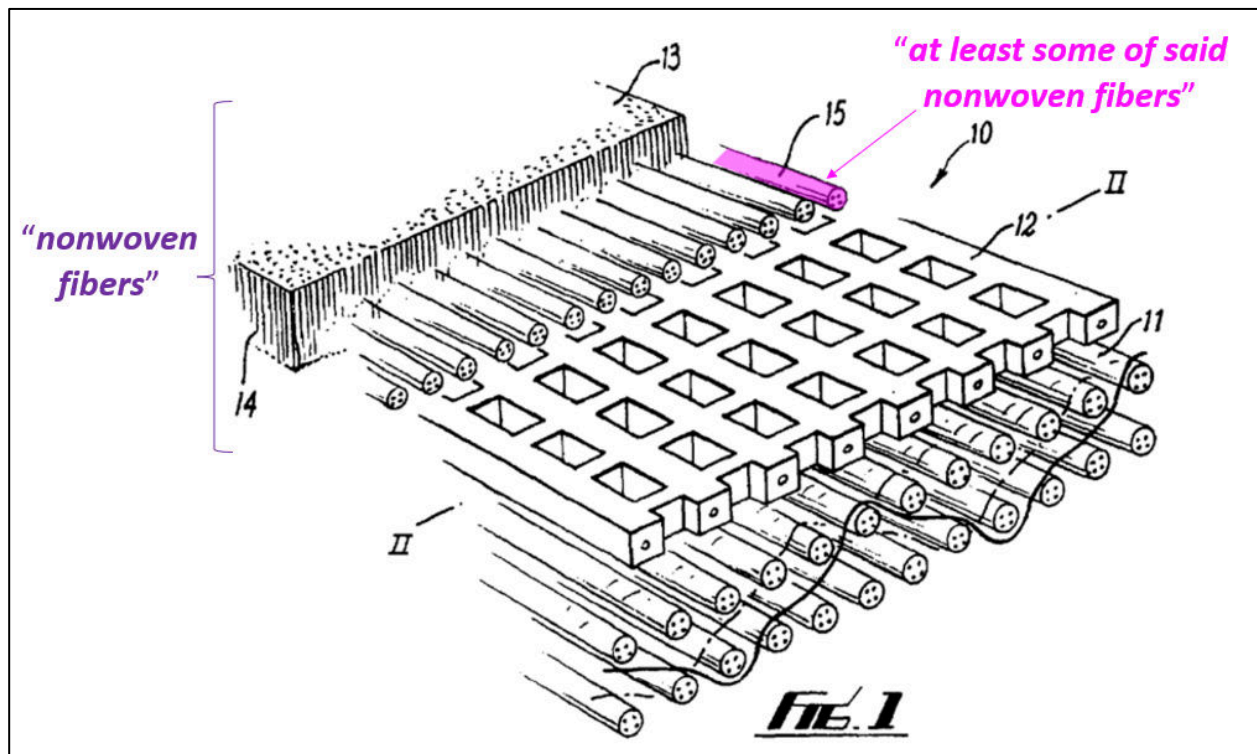
A POSITA would have reasonably expected success because Lidar, like Sudre and Adanur, pertains to PMC, and specifically to press fabrics formed from flat-woven base fabrics. *See* EX1014, Abstract; EX1003, ¶219.

#### 4. Analysis

##### (a) Claim 14

[14.0]

In the Sudre-Adanur-Lidar combination, Lidar teaches that one or both layers of textile batt (*nonwoven fibers*; see [13.0]) includes “a batt of synthetic fibrous material 14 that contains a plurality of non-crimped reinforcing yarns 15” (*at least some of said nonwoven fibers*), pink in Fig. 1. EX1014, 3:29-31, see 1:38-40, 2:1-3, 3:49-54, claim 1, claim 13; EX1003, ¶220.



Lidar, Fig. 1

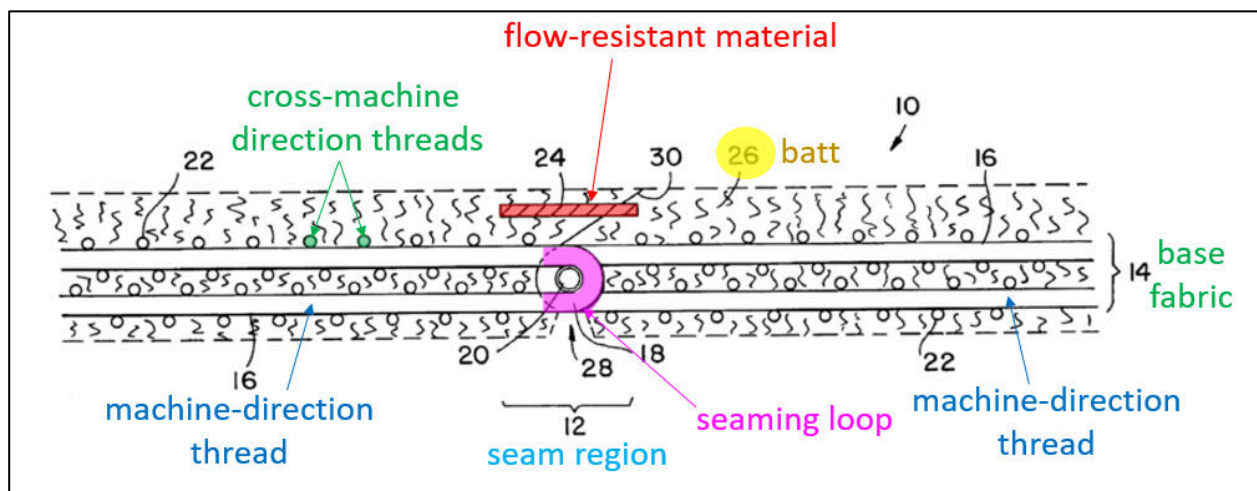
The reinforcing yarns (*at least some of said nonwoven fibers*) are “at least partially encapsulated in and/or...at least partially impregnated with...one or more

of...polyurethane (e.g., thermoplastic polyurethane)...or thermoplastic elastomer”  
*(include or are formed of an elastomer or a polyurethane)*. EX1014, 2:24-29,  
3:33-34, claim 5, claim 12; EX1003, ¶221.

**E. [GROUND 1E] – Sudre-Adanur-Yook Renders Obvious  
Claim 15**

**1. Yook**

Yook describes a PMC having a loop seam region, shown in Fig. 1, that includes a woven base fabric having loop-forming MD threads (dark blue) woven with CD threads (green). *See* EX1009, 1:12-16, 4:62-5:5, 5:10-13. The fabric also includes a “strip 24 of flow-resistant material” (red) that “is disposed over the seam region” to “compensate for differences between the permeabilities to air and water of the seam and of the rest of the papermaker's fabric.” *Id.*, 3:66-4:2, 4:16-18, 5:6-10; EX1003, ¶¶222-223.



Yook, Fig. 1

## **2. Sudre-Adanur-Yook Combination**

In the Sudre-Adanur-Yook combination, a “strip [] of flow-resistant material” is “disposed over the seam region” of the Sudre-Adanur fabric (cross-reference), and “attached thereto by sewing or by an adhesive,” based on Yook. EX1009, 5:6-10; EX1003, ¶¶224-225.

## **3. Motivation for the Combination**

A POSITA would have been motivated to incorporate a strip of flow-resistant material in the seam region of a press fabric to “provide[] the seam with permeabilities to air and water substantially identical to that of the rest of the papermaker's fabric” so as to prevent deformation (e.g., “sheet marking”) from occurring on the paper products. EX1009, 3:37-41, 4:16-18; EX1003, ¶¶226-227. Incorporation of a strip of flow-resistant material would have also avoided exacerbation of any such remaining differences. EX1009, 3:39-41; EX1003, ¶228.

Moreover, placement of a strip of flow-resistant material in the seam region of the combination fabric is merely the application of known techniques (strips of flow-resistant material in the seam region of a press fabric) to a known system (PMC) to yield predictable results (a press fabric having a strip of flow-resistant material in its seam region). *See KSR*, 550 U.S. at 415-421; EX1003, ¶229.

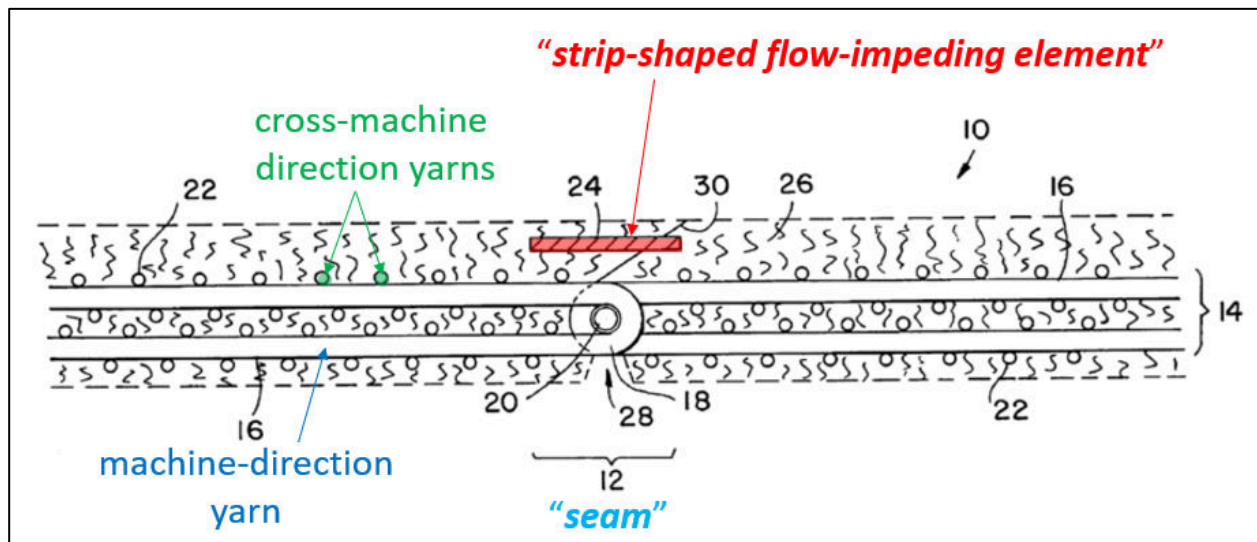
A POSITA would have reasonably expected success at least because Yook, like Sudre and Adanur, pertains to PMC, and specifically to press fabrics formed from flat-woven base fabrics. *See* EX1009, Abstract; EX1003, ¶230.

#### 4. Analysis

##### (a) *Claim 15*

*[15.0]*

In the Sudre-Adanur-Yook combination, Yook teaches a “strip 24 of flow-resistant material...disposed over the seam region” (*at least one strip-shaped flow-impeding element provided in a vicinity of said seam*). EX1009, 5:6-8, Fig. 1, *see* 3:65-67, 4:15-16, 7:21-30, 4:22-32, 5:55-59, 7:6-9, claim 1, claims 4-9; EX1003, ¶231.



Yook, Fig. 1

This flow-impeding element “provides the seam with permeabilities to air and water substantially identical to that of the rest of the papermaker’s fabric”  
*(configured to cause a permeability for at least one of air or water in said vicinity of said seam to be substantially identical to a remainder of the clothing).*

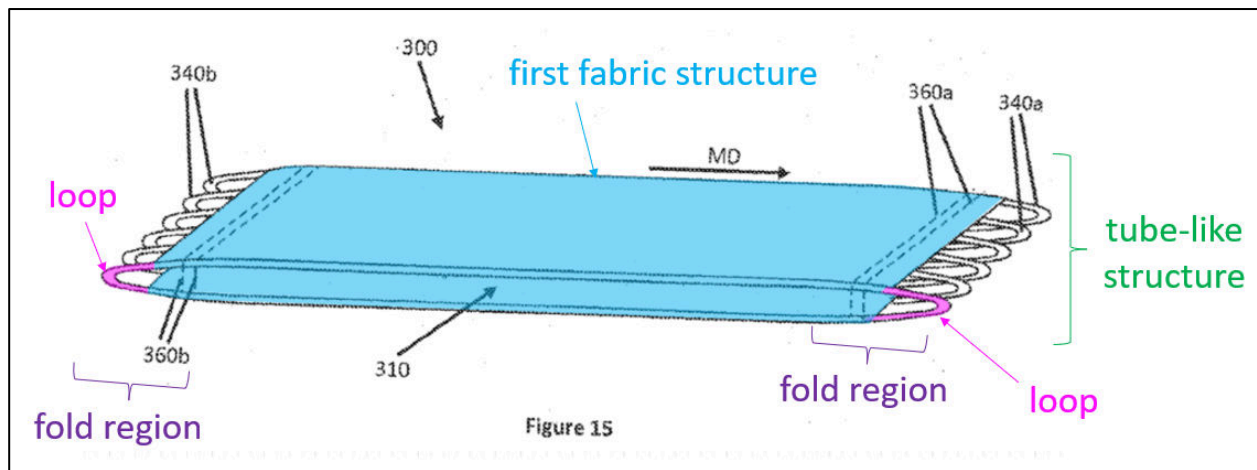
EX1009, 4:16-18, *see* 4:32-34, claim 1, claim 9, Abstract; EX1003, ¶232.

**F. [GROUND 2A] – Sudre-Lee-Penven Renders Obvious Claims 1, 3, and 10-13**

**1. Lee**

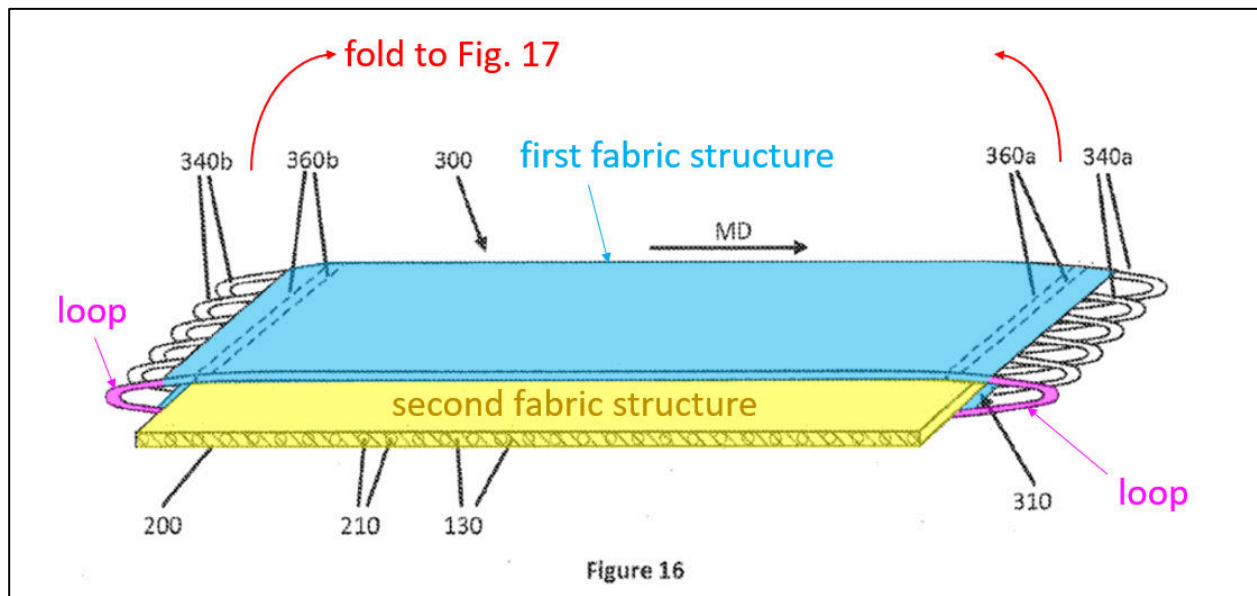
Like Sudre, Lee relates to “seamed press felts for use in the manufacture of paper and similar products in a papermaking or like machine.” EX1005, 1; EX1003, ¶233.

Lee's seamed press fabric (felt) includes a "base fabric material" formed of a "first fabric structure," *e.g.*, a flat-woven fabric. EX1005, 2, 8, 11. As was conventional, Lee's first fabric structure (blue in Fig. 15) is a two-layer, "tube-like structure" that has "MD oriented yarns" that "form loops [pink] at the fold regions to define a uniform channel extending the CD width of the press felt." EX1005, 8; EX1003, ¶234.



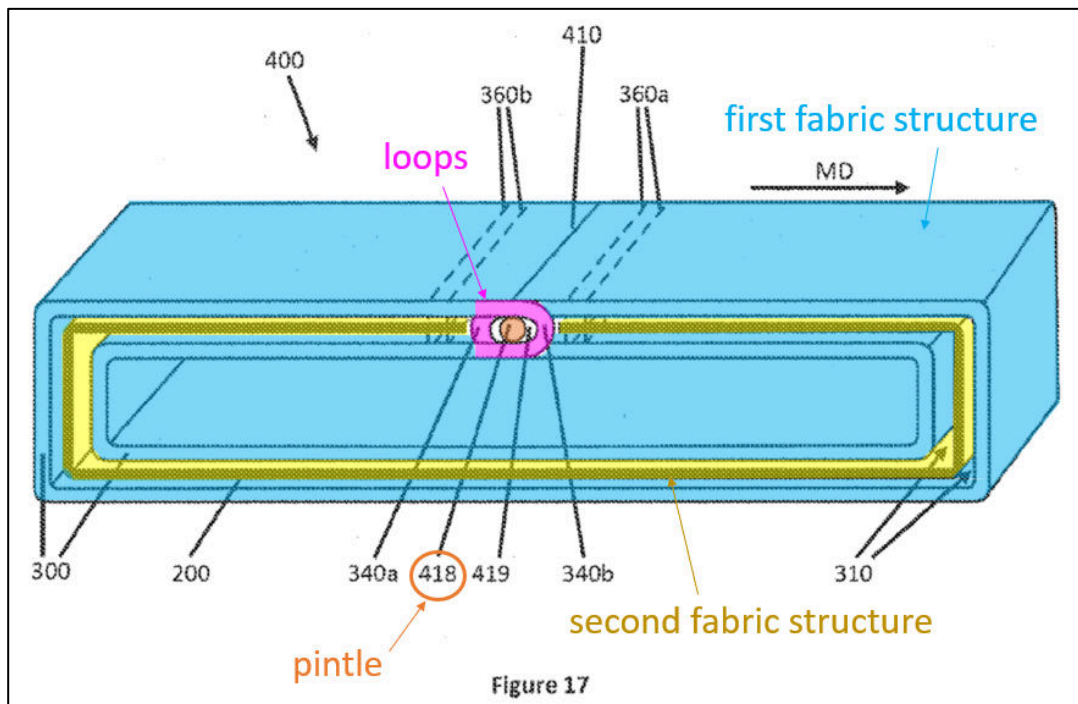
Lee, Fig. 15

A "second fabric structure 200" (yellow) "is inserted into the open central area 310 interior to the flattened continuous tube 300" of Fig. 15 to produce the structure of Fig. 16. EX1005, 30-31; EX1003, ¶235.



Lee, Fig. 16

Fig. 17 shows an assembled press fabric in which the fabric assembly of Fig. 16 is folded (indicated by the red arrows) such that the loops of the first fabric structure are “brought together and intermeshed,” and a pintle (orange) is inserted. *Id.*, 32; EX1003, ¶236.



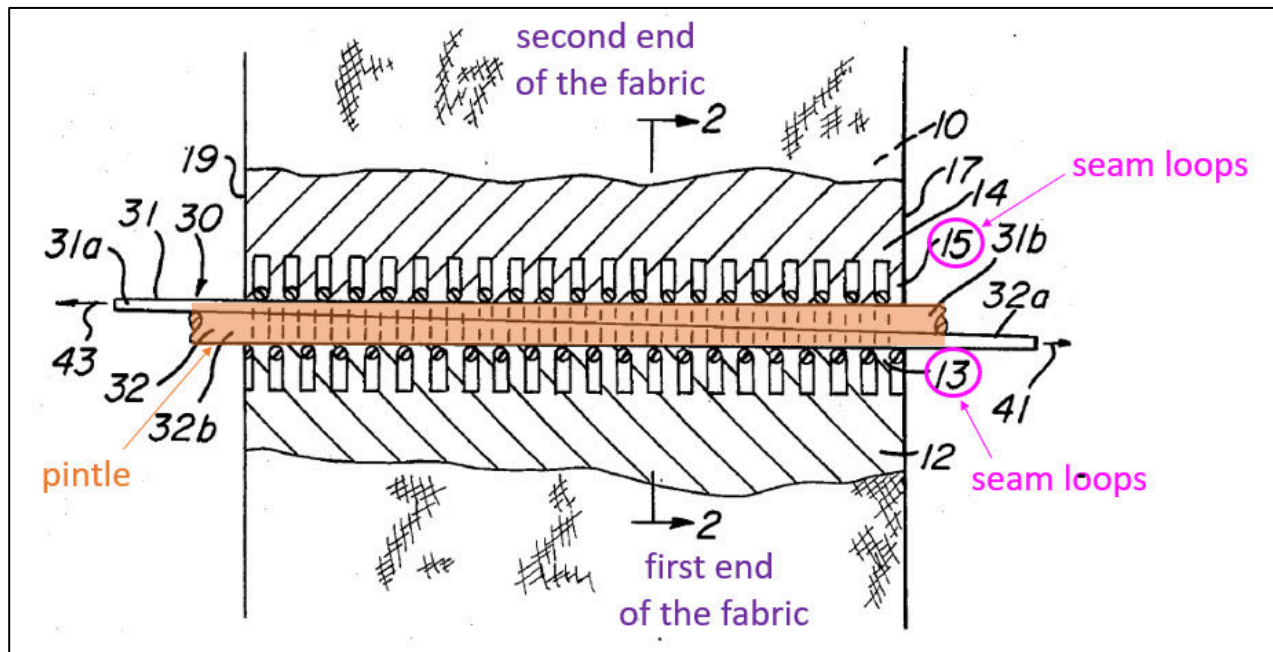
Lee, Fig. 17

The MD threads of Lee’s first fabric structure are “single circular cross-sectional shaped monofilaments having a diameter of from about 0.3mm to 0.6mm,” and “provide a yarn density of from 15 to 40 yarns/inch (5.9 to 15.7 yarns/cm).” EX1005, 12, *see* 26; EX1003, ¶237.

Lee provides similar ranges for thread diameter and density of the second fabric structure. *See* EX1005, 12. Furthermore, Lee indicates that “certain applications may dictate that the yarn density and size in the second array 215 [of yarns in the second fabric structure] be equal to that in the first array 115 [of yarns in the first fabric structure].” *Id.*, 29; EX1003, ¶238.

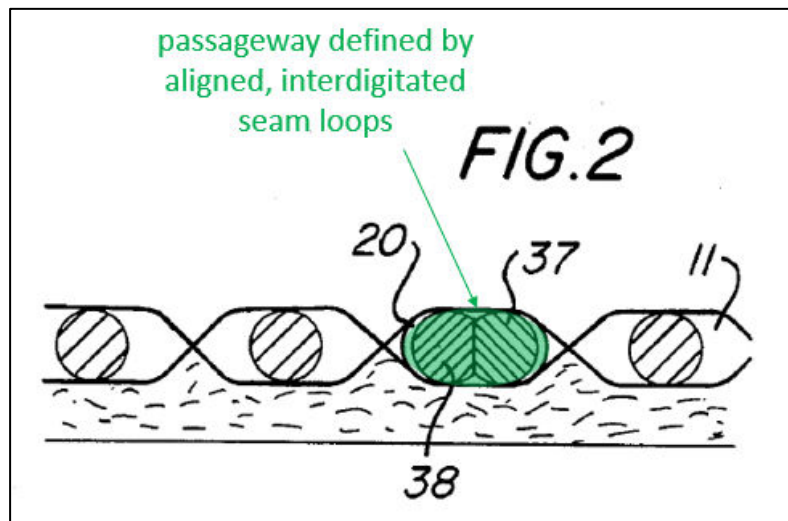
## 2. Penven

Like Sudre and Lee, Penven relates to “papermaking machine felts,” describing a “conventional” endless press felt that includes a loop seam region formed of interdigitated loops, where interdigitation of the loops “forms a substantially tubular passageway 20 through which a locking element or pintle may be inserted” to thereby “provide[] the desired endless felt.” EX1006, 1:8-10, 3:8-19, *see* 2:65-67; EX1003, ¶¶239-240.



Penven, Fig. 1

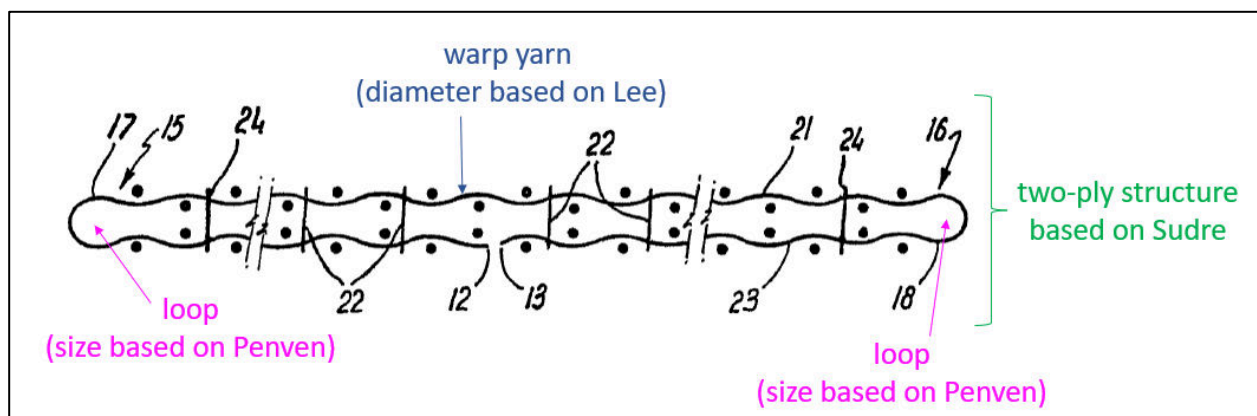
In the context of these conventional fabrics, Penven teaches that “a typical seam in a papermaker’s fabric [has] an internal void diameter of about 50 mils,” *i.e.*, the inside diameter of the seam loops. EX1006, 3:64-66, *see* the cross-sectional view of Fig. 2; EX1003, ¶¶240-241.



Penven, Fig. 2

### 3. Sudre-Lee-Penven Combination

Sudre-Lee-Penven is based on Sudre's "endless base material." EX1004, 2:25-3:2; EX1003, ¶242. In the combination, illustrated below, the diameter of the MD (warp) threads and the warp thread density are based on Lee, and the loops are dimensioned based on Penven to "have an internal void diameter of about 50 mils." EX1006, 3:64-66; EX1003, ¶242.



Sudre-Lee-Penven Composite Figure

In particular, the warp threads in the combination have “a diameter of from about 0.3mm to about 0.6mm,” and are provided in “a yarn density of from 15 to 40 yarns/inch (5.9 to 15.7 yarns/cm),” based on Lee. EX1005, 12; EX1003, ¶243.

In one of Lee’s examples, the warp threads have “a diameter of about 0.4mm” and are provided in a “yarn density” of “24 yarns/in (9.45 yarns/cm).” EX1005, 28; EX1003, ¶244. While this example relates to Lee’s second fabric structure, (EX1005, 28, these values also apply to Lee’s first fabric structure, *i.e.*, to an endless base material. EX1003, ¶245. Specifically, Lee states that “certain applications may dictate that the yarn density and size in the second array 215 be equal to that in the first array 115,” thus indicating the suitability of implementing the same yarn density for both the first and the second array. EX1005, 29; *see* 22. Indeed, the yarn diameter and density ranges specified for Lee’s first fabric structure encompass these example values given in the context of Lee’s second fabric structure. EX1005, 12; EX1003, ¶245.

In view of Lee’s teaching that its first fabric structure and second fabric structure can have equal yarn diameter and density, and because Lee’s specific example values (0.4mm diameter warp yarns, and a warp yarn density of 9.45 yarns/cm) fall within the indicated range for the first fabric structure, a POSITA would have understood, or at least found obvious, that these specific values also apply to Lee’s first fabric structure, *i.e.*, to an endless base material. EX1003,

¶¶246-247. As such, in Sudre-Lee-Penven, these specific example values are applied to the “endless base material” based on Sudre. EX1004, 2:25-3:2; EX1003, ¶¶246-247.

#### **4. Motivation for the Combination**

As discussed for Ground 1A, while Sudre teaches a method for manufacturing PMC, it does not provide specific parameters, such as warp thread size and spacing. *See* EX1004, 6:14-17. For this reason, a POSITA would have been motivated to look to other known sources, *e.g.*, Lee and Penven, to identify parameters that enable satisfaction of “particular requirements” for the fabric. EX1004, 6:14-17; EX1003, ¶248.

A POSITA generally would have reasonably expected success in dimensioning a press fabric such as Sudre’s based on dimensions from Lee and Penven because Lee and Penven, like Sudre, pertain to PMC, and specifically to press fabrics made “endless” from flat-woven base fabrics, and because Sudre imposes no specific requirements that would provide any reason to deviate from the usage of these conventional dimensions. *See* EX1004, 1:2-5, 6:14-17; EX1003, ¶¶248-250.

##### **(a) *Warp thread size and density***

A POSITA would have been motivated to use warp threads sized based on Lee, and warp thread density based on Lee, and would have expected success in

doing so, at least as discussed for Ground 1A. EX1003, ¶¶251-261; *KSR*, 550 U.S. at 415-421.

Notably, Lee's warp thread diameters and warp thread densities are consistent with "the industry standard" fabrics described by Adanur; indeed, Lee's warp thread diameters and densities were conventional. EX1022; *see* EX1016, 6:59-64; EX1024, 2:1-2; EX1003, ¶259. A POSITA would have been motivated to use Lee's thread size and density consistent with that standard practice, *e.g.*, for compatibility with standard processing. EX1003, ¶¶251-261.

**(b) *Seam loop size***

A POSITA would have been motivated to implement, for example, the seam loops of the combination fabric based on Penven's teachings, and would have reasonably expected success in doing so, at least as discussed for Ground 1A. EX1003, ¶¶262-266; *KSR*, 550 U.S. at 415-421.

Notably, Penven's loop size is consistent "the industry standard" fabrics described by Adanur, and indeed, Penven's loop size was conventional. EX1022; *see* EX1006, 3:64-66; EX1003, ¶264. A POSITA would have been motivated to implement this standard seam loop size for compatibility with conventionally sized pintles. EX1003, ¶264.

(c) *Round warp threads*

A POSITA would have been motivated to incorporate warp threads with a round cross-section, based on Lee, and would have expected success in doing so, at least for the reasons discussed for Ground 1A. EX1003, ¶¶267-270; KSR, 550 U.S. at 415-421.

5. Analysis

(a) *Claim 1*

*[1.0]-[1.1]*

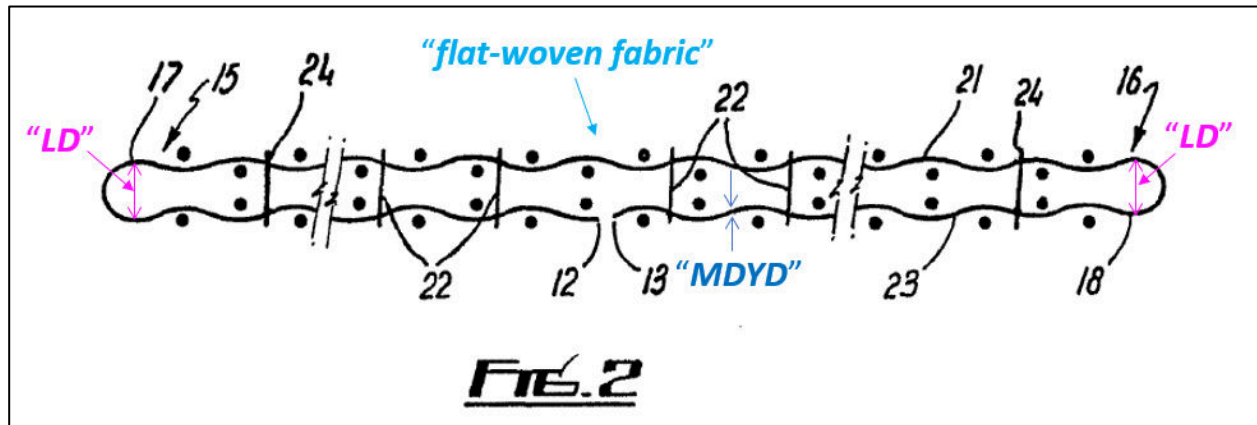
For the same reasons discussed above ([1.0]-[1.1], Ground 1A), Sudre-Lee-Penven renders obvious [1.0]-[1.1]. EX1003, ¶¶271-276.

*[1.2]*

For the same reasons discussed above ([1.2], Ground 1A), Sudre-Lee-Penven renders obvious *said laminate structure having MD threads being monofilaments...forming seam loops at said two end sides of said base structure, said seam loops interconnecting said two layers of said laminate structure.* EX1003, ¶¶277-281.

In the combination, the MD threads are “circular cross-sectional shaped monofilaments” (*MD threads being monofilaments with a round cross section*), based on Lee. EX1005, 12, *see* 26-27, claims 27-28, claim 32; EX1003, ¶¶279-282.

The inside diameter of the seam loops (*said seam loops having a diameter LD*) and the MD thread diameter (*associated MD threads having a diameter MDYD*), indicated in Sudre's Fig. 2, are based on Penven (*see* [1.5]) and Lee (*see* [1.4]), respectively. *See* EX1006, 3:64-66; EX1005, 12, 28; EX1003, ¶282.



Sudre, Fig. 2

[1.3]

For the same reasons discussed above ([1.3], Ground 1A), Sudre-Lee-Penven renders obvious [1.3]. EX1003, ¶¶283-287.

[1.4]

In Sudre-Lee-Penven, both the MD thread density and the MD thread diameter, which together dictate the loop density (*see* EX1001, 6:11-18), are based on Lee. EX1003, ¶288.

*The loop density of Lee's specific example falls within the claimed loop density range*

The thread density and MD thread diameter is implemented in the combination based on a specific example of Lee, in which “the yarn density” of the MD threads “is 24 yarns/in (9.45 yarns/cm),” and the MD threads have “a diameter of about 0.4mm.” EX1005, 28. These values correspond to loop density (calculated as discussed above) is 75.6%. EX1003, ¶¶289-291; *see also* [1.4] in Ground 1A, *supra*.

This loop density (75.6%) falls within the claimed loop density range (***said seam having a loop density of between 64% and 90%***). EX1003, ¶¶291; *see Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

To the extent that the loop density value of 75.6% is a loop density prior to thermal processing of the PMC (which Petitioner does not necessarily concede), a POSITA nevertheless would have understood, or at least found obvious, that thermal treatment would result in a PMC having a loop density that would still fall within the claimed range. EX1003, ¶¶292-293; *see* EX1001, 6:27-40. The '566 Patent validates this understanding. The '566 Patent indicates that pre-treatment loop densities of “between 55% and 80%” correspond to loop densities in the finished clothing of “between 64% and 90%,” *i.e.*, the claimed loop density range. EX1001, 6:30-40. Because the Sudre-Lee-Penven loop density value falls within

the 55%-80% range of suitable pre-treatment values, and because the thread composition and fabric structure of the Sudre-Lee-Penven clothing is similar to that of the '566 Patent's clothing, a POSITA would have expected the post-treatment loop density of the Sudre-Lee-Penven fabric likewise to fall within the claimed 64%-90% range. EX1003, ¶¶292-293.

Lee's ranges of thread density and MD thread diameter renders obvious the claimed range

Alternatively/additionally, the thread density and MD thread diameter is implemented in the PMC based on Lee's teachings of ranges of values for these two parameters. EX1003, ¶294. Specifically, in the combination, the MD threads are "arranged to provide a yarn density of from 15 to 40 yarns/inch (5.9 to 15.7 yarns/cm)," and have "a diameter of from about 0.3mm to about 0.6mm," based on Lee. EX1005, 12; *see* 26-27, claim 28; EX1003, ¶294.

Lee's disclosed thread density range (5.9-15.7 threads/cm) and MD thread diameter range (0.3-0.6mm) together correspond to a loop density range of greater than 35%, e.g., 35-100%. EX1003, ¶295 (explaining that a POSITA would have recognized that within the context of Lee's disclosed thread density and MD thread diameter ranges, the maximum loop density is no more than 100%).

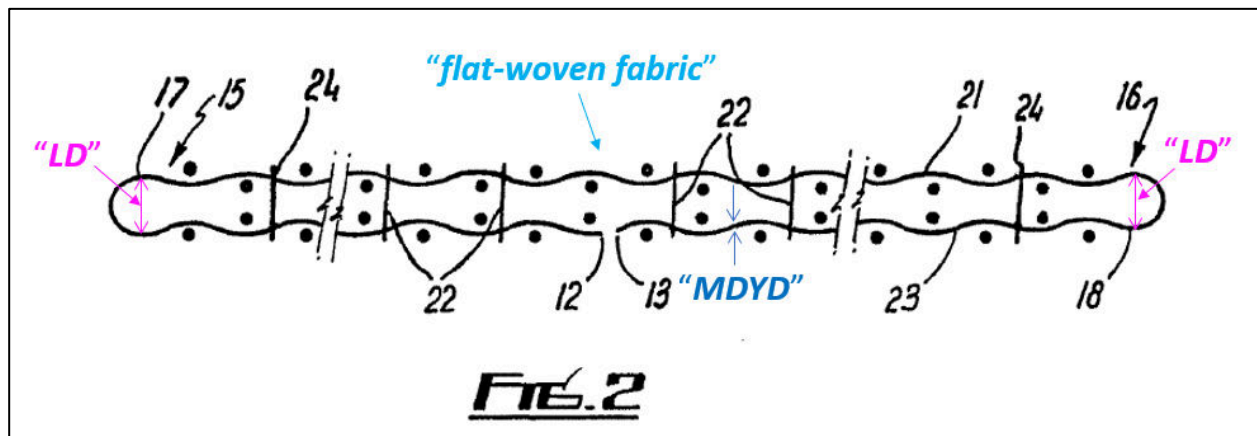
The claimed loop density range (*said seam having a loop density of between 64% and 90%*) falls within the loop density range of the combination

(greater than 35%, *e.g.*, 35%-100%) and is taught by Lee. Moreover, the '566 Patent provides no evidence of criticality or unexpected results associated with the claimed loop density range. EX1003, ¶296; *see Geisler*, 116 F.3d at 1469–70.; *Peterson*, 315 F.3d at 1329.

As discussed *supra*, to the extent that the Sudre-Lee-Penven loop density range (greater than 35%, *e.g.*, 35%-100%) refers to the pre-treatment fabric, this range overlaps with the '566 Patent's pre-treatment loop density range (55%-80%), and thus a POSITA would have expected the corresponding post-treatment loop density range of the Sudre-Lee-Penven fabric likewise to overlap with the claimed 64%-90% range. EX1003, ¶297.

**[1.5]**

The inside diameter of the seam loops (*said diameter LD of said seam loops*) and the diameter of the MD threads that form the seam loops (*said diameter MDYD of said associated MD threads*), which are based on Lee and Penven (discussed below), are shown in Sudre's Fig. 2 (below). EX1003, ¶298.



Sudre, Fig. 2

MDYD is based on Lee, discussed in [1.4]. EX1003, ¶299.

Penven teaches the diameter LD of the seam loops, b such that the “seam ... [has] an internal void diameter of about 50 mils,” *i.e.*, about 1.27mm. EX1006, 3:64-66; EX1003, ¶300.

The loop density of Lee’s specific example falls within the claimed loop density range

When the PMC is implemented according to Lee, the MD thread diameter (**MDYD**) is “about 0.4mm.” EX1005, 28; *see* [1.4]; EX1003, ¶301. The combination fabric thus has a **ratio LD/MDYD** of 1.27mm/0.4mm, *i.e.*, 3.175. EX1003, ¶¶301-302. This ratio (3.175) falls within the recited range of ratios (**a ratio LD/MDYD of between 2.7 and 3.6**). *See Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

Lee's ranges of thread density and MD thread diameter renders obvious the claimed range

Alternatively/additionally, when the combination fabric is implemented according to Lee's disclosed range of MD thread diameters, the MD thread diameter (**MDYD**) is "from about 0.3mm to about 0.6mm." EX1005, 12, *see* 27, claim 28; [1.4]; EX1003, ¶303. The combination fabric thus has a **ratio LD/MDYD** that ranges from 2.1 (1.27mm/0.6mm) to 4.2 (1.27mm/0.3mm). EX1003, ¶¶303-305.

The recited range of ratios (**a ratio LD/MDYD of between 2.7 and 3.6**) falls within the range of ratios of the combination fabric (between 2.1 and 4.2). The '566 Patent offers no evidence of criticality or unexpected results associated with the claimed range of ratios, but instead provides merely unsubstantiated assertions that "given the LD/MDYD ratios according to the invention, the seam produced is optimal." EX1003, ¶306; EX1001, 3:1-3. As such, the range of LD/MDYD ratios in the combination, which encompasses the claimed range, presents at least a *prima facie* case of obviousness. *See Geisler*, 116 F.3d at 1469–70; *Peterson*, 315 F.3d at 1329.

**(b) Claim 3**

**[3.0]**

For the same reasons discussed above ([3.0], Ground 1A), *Sudre-Lee-Penven* renders obvious [3.0]. EX1003, ¶¶307-308.

(c) **Claim 10**

**[10.0]**

The MD thread diameters of the combination (0.4mm or 0.3mm to 0.6mm, based on Lee) fall within the claimed diameter range (***between 0.15 mm and 0.7 mm***). See EX1005, 12, 27-28, claim 28; [1.4], EX1003, ¶309; see *Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

(d) **Claim 11**

**[11.0]**

The MD thread diameter of the combination (0.4mm) falls within the claimed diameter range (***0.3mm-0.5mm***). EX1005, 28 (2<sup>nd</sup> paragraph); [1.4]; EX1003, ¶¶310-311; see *Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

Alternatively/additionally, the recited diameter range (***0.3mm-0.5mm***) falls within the MD thread diameter range of the combination (0.3mm to 0.6mm). See EX1005, 12 (1<sup>st</sup> paragraph); [1.4]; EX1003, ¶311. In the absence of evidence of criticality or unexpected results associated with the claimed MD thread diameter range (see EX1003, ¶311), the MD thread diameters in *Sudre-Lee-Penven*, which encompasses the claimed range, presents a *prima facie* case of obviousness of the claimed range. *Geisler*, 116 F.3d at 1469–70; *Peterson*, 315 F.3d at 1329.

(e) *Claim 12*

*[12.0]*

The loop density of Sudre-Lee-Penven (75.6%) falls within the claimed loop density range (*said loop density of said seam is between 72% and 86%*). See EX1005, 28; [1.4]; EX1003, ¶312; see *Ineos*, 783 F.3d at 869; *Titanium Metals*, 778 F.2d at 782.

Alternatively/additionally, the claimed loop density range (*said loop density of said seam is between 72% and 86%*) falls within the Sudre-Lee-Penven loop density range (greater than 35%, *e.g.*, 35%-100%). See EX1005, 12; [1.4]; EX1003, ¶¶312-314. In the absence of evidence of criticality or unexpected results associated with the claimed loop density range (*Id.*), the combination's loop density range, which encompasses the claimed range, presents a *prima facie* case of obviousness of the claimed range. *Geisler*, 116 F.3d at 1469–70; *Peterson*, 315 F.3d at 1329.

As discussed for [1.4], to the extent that the Sudre-Lee-Penven loop density value (75.6%) or loop density range (greater than 35%, *e.g.*, 35%-100%) refers to the fabric prior to thermal treatment, a POSITA would have expected the corresponding post-treatment loop density value or range of values of the Sudre-Lee-Penven fabric likewise to fall within or overlap with the claimed 72%-86% range. EX1003, ¶314.

**(f) Claim 13**

**[13.0]**

For the same reasons discussed above ([13.0], Ground 1A), Sudre-Lee-Penven renders obvious [13.0]. EX1003, ¶¶315-316.

**G. [GROUND 2B] - Sudre-Lee-Penven-Shipley Renders Obvious Claim 2**

**1. Sudre-Lee-Penven-Shipley Combination**

In the Sudre-Lee-Penven-Shipley, the “flat-woven fabric” (based on Sudre; *see* [1.1]) utilizes weave patterns based on Shipley, as discussed for Ground 1B. EX1003, ¶317.

A POSITA would have been motivated to pursue the Sudre-Lee-Penven-Shipley combination, and would have expected success in doing so, at least as discussed for Ground 1B. EX1003, ¶¶318-319; *KSR*, 550 U.S. at 415-421.

Dr. Pastore explains that a POSITA also would have expected success because the MD thread diameter and MD thread density of Shipley’s fabric overlaps with these parameters in the combination fabric (*e.g.*, based on Lee; *see* [1.4]), indicating compatibility of these teachings. *Compare* EX1010, 3:48-52; EX1005, 12, 28; EX1003, ¶¶320-321. Indeed, Shipley expressly teaches the suitability of its weave pattern for the combination’s thread density range, stating

that “[t]he weave enhances the stability of the felt by allowing more machine direction yarns per inch.” EX1010, 2:24-26; EX1003, ¶¶320-321.

## **2. Analysis**

### **(a) Claim 2**

**[2.0]**

For the same reasons discussed above ([2.0], Ground 1B), Sudre-Lee-Penven-Shipley renders obvious [2.0]. EX1003, ¶322.

## **H. [GROUND 2C] – Sudre-Lee-Penven-Straub Renders Obvious Claims 4-9**

### **1. Sudre-Lee-Penven-Straub Combination**

The free ends of the combination flat-woven fabric are joined via laser-welded junction points based on Straub, as discussed in Ground 1C. *See* EX1013, [0070]-[0073], Fig. 6, Figs. 7a-7d; EX1003, ¶¶323-324.

A POSITA would have been motivated to pursue the Sudre-Lee-Penven-Straub combination, and would have expected success in doing so, at least as for the reasons discussed in Ground 1C. EX1003, ¶¶325-328; *KSR*, 550 U.S. at 415-421.

## 2. Analysis

### (a) Claim 4

**[4.0]**

For the same reasons discussed above ([4.0], Ground 1C), Sudre-Lee-Penven-Straub renders obvious [4.0]. EX1003, ¶¶329-331.

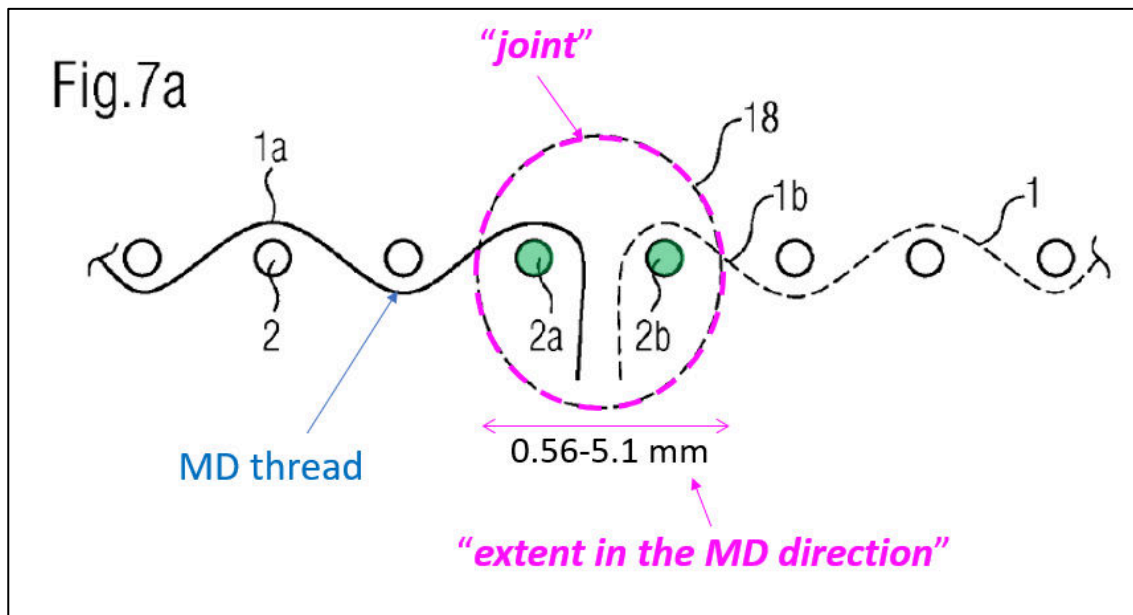
### (b) Claim 5

**[5.0]**

Each junction point in the combination endless structure is a joint

As discussed for [5.0] in Ground 1C, in Sudre-Lee-Penven-Straub, each junction point corresponds to a **joint**. EX1003, ¶332; *see* EX1013, [0056], [0001], [0008], [0015], [0026], [0070], Figs. 7a-7d.

The junction point (**joint**) of Straub's Fig. 7a "extends from the machine cross-direction thread 2a as far as the machine cross-direction thread 2b, as seen in the machine direction MD" (**joint extends in the machine direction**). *Id.*; EX1003, ¶333.



Straub, Fig. 7a

A POSITA would have found it obvious that the joint of Fig. 7a extends in the MD by ***less than 15 mm***. For instance, a POSITA would have provided the CD threads in the combination fabric at a density of “10 to 90 machine cross-direction threads per inch,” based on Straub, discussed below. EX1013, [0039], *see* claim 34; EX1003, ¶¶334-335. With a CD thread density of 10 or 90 threads per inch, the two CD threads in the joint of Fig. 7a extend in the MD by 5.1mm or 0.56mm, respectively. *Id.* That is, the junction point of Straub’s Fig. 7a (***said at least one joint***) ***extends in the machine direction*** by 0.56-5.1mm (***less than 15 mm***). Similarly, the joint of Fig. 7b, which encompasses three CD threads, extends in the MD by 0.84-7.65mm (***less than 15 mm***). *See* EX1013, [0077]; EX1003,

¶¶336-338. The joint of Fig. 7c encompasses four threads, and 1.12-10.2mm. *See* EX1013, [0078]; EX1003, ¶¶336-338.

A POSITA would have found it obvious to implement a CD thread density of 10-90 threads per inch because: (i) CD threads in press fabrics were conventionally provided in densities similar to that of the MD threads, (ii) a CD thread density range of 10-90 threads per inch was commonly used in press fabrics, and (iii) implementing the CD thread density based on Straub is merely the application of known techniques (CD threads provided in a specified thread density range in the context of PMC) to a known system (PMC) to yield predictable results (PMC with a CD thread density in a known range). *See* [5.0] of Ground 1B; EX1003, ¶¶339-344; EX1005, 12; *see KSR*, 550 U.S. at 415-421.

A POSITA would have expected success because Sudre imposes no requirements on its weave configuration or CD thread density that would indicate any incompatibility with the thread density teachings of Straub, as discussed *supra*. EX1003, ¶343.

*Each strip-shaped fabric portion in the combination endless structure is a joint*

As discussed for [5.0] of Ground 1C, the recited MD extent of the joint (*less than 15 mm*) overlaps with the 5-60mm MD extent of the strip-shaped fabric portion (*joint*), and thus a *prima facie* case of obviousness of the claimed range is

presented. EX1003, ¶¶345-346; *Geisler*, 116 F.3d at 1469–70; *Peterson*, 315 F.3d at 1329.

Alternatively/additionally, the MD extent of the strip-shaped fabric portion (*joint*) is an obvious design choice. *See* [5.0] of Ground 1C; EX1003, ¶347; *see Kuhle*, 526 F.2d at 555.

(c) *Claim 6*

**[6.0]**

The junction point of Straub’s Fig. 7a (*said at least one joint extends in the machine direction*) by 0.56-5.1mm, which overlaps the claimed range. *See* [5.0]; EX1003, ¶¶348-349; *see Geisler*, 116 F.3d at 1469–70; *Peterson*, 315 F.3d at 1329.

Alternatively/additionally, the MD extent of the strip-shaped fabric portion (*joint*) is an obvious design choice. *See* [6.0] of Ground 1C; EX1003, ¶350; *see Kuhle*, 526 F.2d at 555.

(d) *Claim 7-9*

**[7.0]-[9.0]**

For the same reasons discussed above ([7.0]-[9.0], Ground 1C), *Sudre-Lee-Penven-Straub* renders obvious [7.0]-[9.0]. EX1003, ¶¶351-354.

**I. [GROUND 2D] – Sudre-Lee-Penven-Lidar Renders Obvious Claim 14**

**1. Sudre-Lee-Penven-Lidar Combination**

In Sudre-Lee-Penven-Lidar, the batt includes “non-crimped reinforcing yarns,” based on Lidar, and as discussed for Ground 1D. EX1014, 3:29-31, *see* Fig. 1, 2:24-27, 3:20-21; EX1003, ¶355.

A POSITA would have been motivated to pursue the Sudre-Lee-Penven-Lidar combination, and would have expected success, at least as discussed for Ground 1D. EX1003, ¶¶356-357; *KSR*, 550 U.S. at 415-421.

**2. Analysis**

**(a) Claim 14**

**[14.0]**

For the same reasons discussed above ([14.0], Ground 1D), Sudre-Lee-Penven-Lidar renders obvious [14.0]. EX1003, ¶¶358-359.

**J. [GROUND 2E] – Sudre-Lee-Penven-Yook Renders Obvious Claim 15**

**1. Sudre-Lee-Penven-Yook Combination**

A “strip [] of flow-resistant material” is “disposed over the seam region” of the Sudre-Lee-Penven fabric, based on Yook. EX1009, 5:6-10; EX1003, ¶360.

A POSITA would have been motivated to pursue the Sudre-Lee-Penven-Yook combination, and would have expected success, at least as discussed for Ground 1E. EX1003, ¶¶361-362; *KSR*, 550 U.S. at 415-421.

## **2. Analysis**

### **(a) Claim 15**

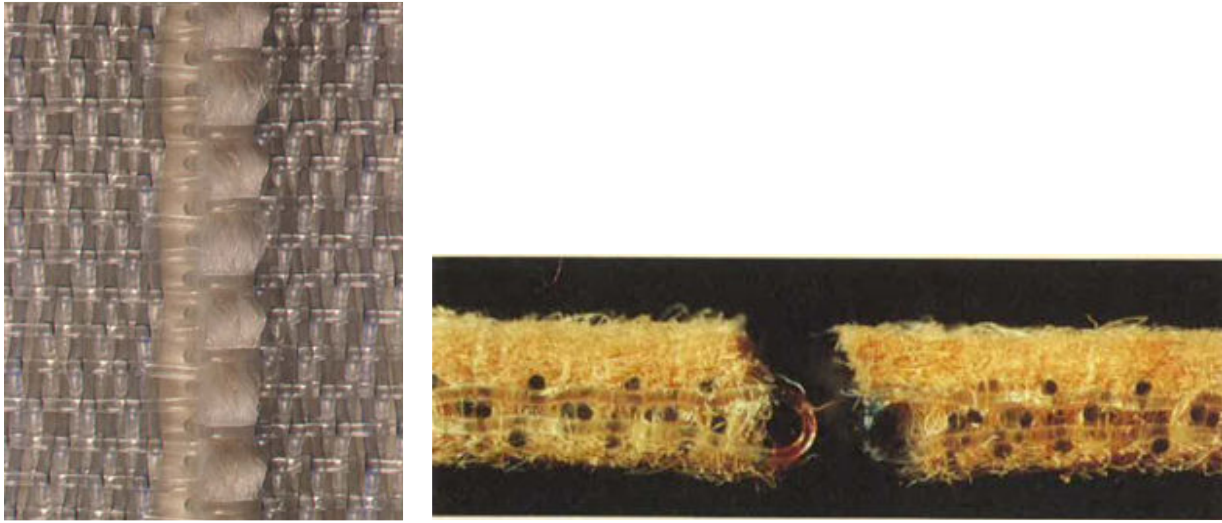
#### **[15.0]**

For the same reasons discussed above ([15.0], Ground 1E), Sudre-Lee-Penven-Yook renders obvious [15.0]. EX1003, ¶¶363-364.

## **K. [GROUND 3A] – Sudre-Rydin Renders Obvious Claims 1, 3, and 12-13**

### **1. Rydin**

Rydin, a 1992 Swedish article, relates to a “[n]ew generation seam felt” for PMC that advantageously provides “considerable seam improvement [] based on achieving a greater homogeneity in the seam zone” and “improved [batt] anchorage.” EX1028, 1. Below, photographs show the underlying seam (right side of Fig. 2) and “finished felt” cross-section (Fig. 3) of Petitioner’s product, SeamTech. EX1003, ¶365; EX1028, 2 (Fig. 3), EX1029, 4 (Fig. 10).



EX1028, Fig. 2 (left), Fig. 3 (right).

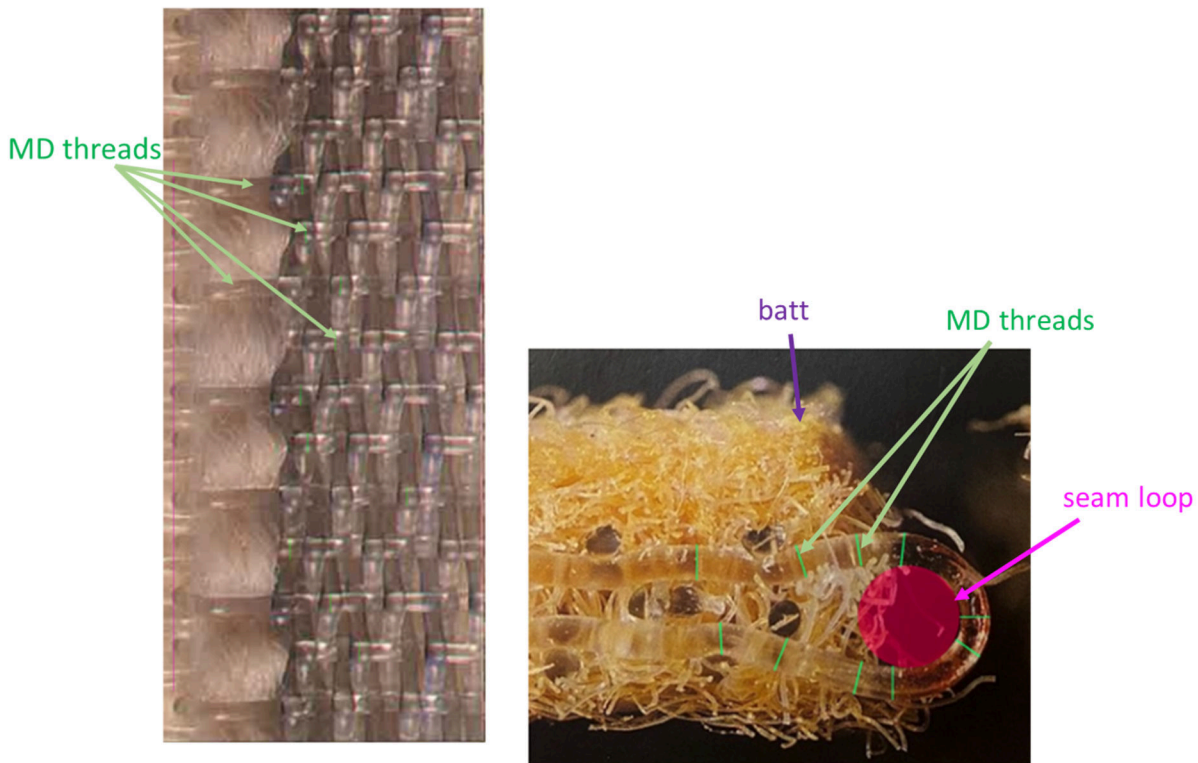
## 2. Sudre-Rydin Combination

For the reasons discussed above in the Sudre-Adanur grounds (Grounds 1A-1E), Sudre and Rydin also renders obvious the challenged claims of the '566 patent. EX1003, ¶366. This ground provides yet another example of the numerous PMCs, available by the early 1990s, possessing the claimed features of the '566 Patent. Specifically, Rydin shows actual photographs (Figs. 2-3) of a “finished” PMC that was available in 1992.

In the combination, the PMC parameters (*e.g.*, shape of the MD threads, thread density, and relative size of MD threads and loops) are based on photographs of an underlying seam and a “finished felt” of Rydin’s newly designed PMC. EX1028, Figs. 2-3; EX1003, ¶¶367-372. By applying similar measurement techniques as previously described (*see* Grounds 1A.3-4), the

combination incorporates Rydin's round MD threads with a diameter of about 42.6 pixels and a thread density about 0.0091 threads/pixel, consistent with Rydin's Fig. 2, and a seam loop diameter of about 167 pixels and MD thread diameter of 53 pixels, consistent with Rydin's Fig. 3. *Id.* These parameters correspond to the claimed features: a loop density of approximately 78% and a LD/MDYD ratio of approximately 3.2. *Id.*

As explained by Dr. Pastore, while Rydin does not provide a metric unit of measurement for its parameters, this is unnecessary for assessing *dimensionless* relationships, *e.g.*, loop density and ratio. *Id.* A POSITA would have naturally looked to sources, like Rydin, to determine a relative loop ratio and loop density for a particular thread size of a specific application. *Id.* For instance, a POSITA would have known that Rydin's relative loop ratio would be applicable for any thread diameter based on the principle that the loop diameter relative to the MD thread diameter correlates to a maximum strain relationship in a curved thread. *Id.*



EX1028, Fig. 2 (left, partial), Fig. 3 (right, partial).

### 3. Motivation for the Combination

For many of the same reasons discussed above in Grounds 1A-1E, a POSITA would have been motivated to look to Rydin to identify the “particular requirements” for Sudre’s PMC to determine parameters informative of thread shape and relative loop sizing and thread spacing, and would have reasonably expected success in dimensioning Sudre’s PMC using Rydin’s information. EX1028, Figs. 2-3; EX1027; EX1003, ¶¶373-374. Specifically, since Sudre is silent as to its fabric’s parameters, a POSITA seeking the “particular requirements” of Sudre’s fabric would have looked to Rydin’s parameters since Rydin describes

PMC of a well-known manufacturer, Nordiskafilt (aka Albany International), and describes many desirable improvements. *Id.*

#### 4. Analysis

##### (a) *Claim [1]*

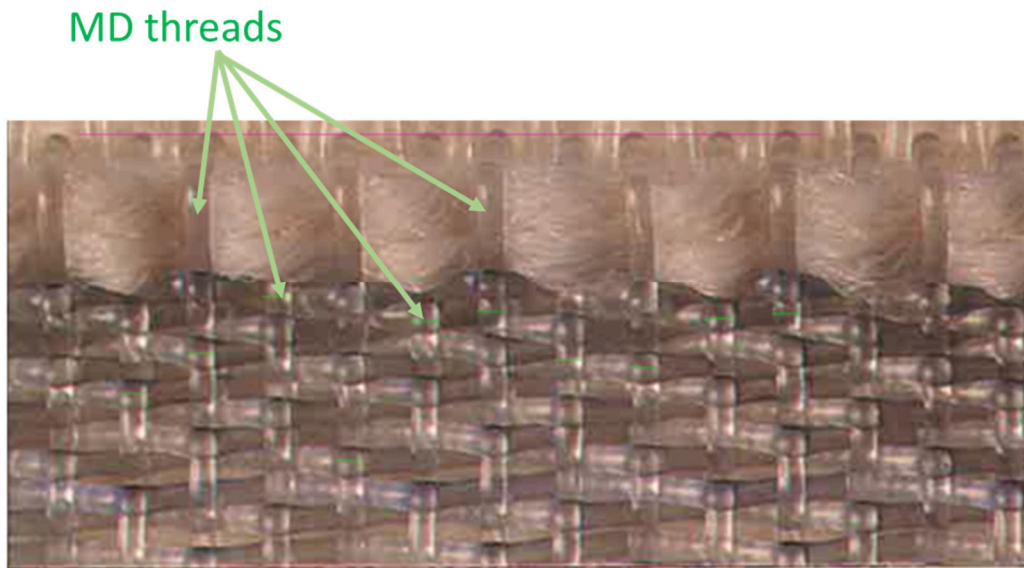
As discussed in Ground 1A, Sudre teaches all limitations of Claim 1 except for limitations [1.2], [1.4] and [1.5]. For those limitations, a POSITA would have been prompted to apply the teachings of Rydin to Sudre for the reasons as discussed in Grounds 1A (*see* §IV.A), and would have had a reasonable expectation of success. EX1003, ¶¶375-380.

Specifically, for [1.2], the combination implements round threads, as taught by Rydin. EX1028, Figs. 2-3. Based on Rydin's teaching of using round threads in Fig. 3, it would have been reasonable for a POSITA to have expected both MD and CD threads to have the same consistent round shape. EX1003, ¶381.

Specifically, for [1.4], Sudre-Rydin combination implements a MD thread diameter and a density of about 42.6 pixels and 0.0091 threads/pixel, respectively, based on measurements of Rydin's PMC in Fig. 2, which corresponds to a ***loop density*** of about 78% ( $2 * 0.0091 \text{ threads/pixel} * 42.6 \text{ pixels}$ ). EX1028, Figs. 2-3; EX1027; EX1003, ¶375. To the extent that the seam in Fig. 2 has not been thermally treated, a POSITA would have reasonably assumed that Rydin's loop density of about 78% falls within the '566 patent's claimed density range (64%-

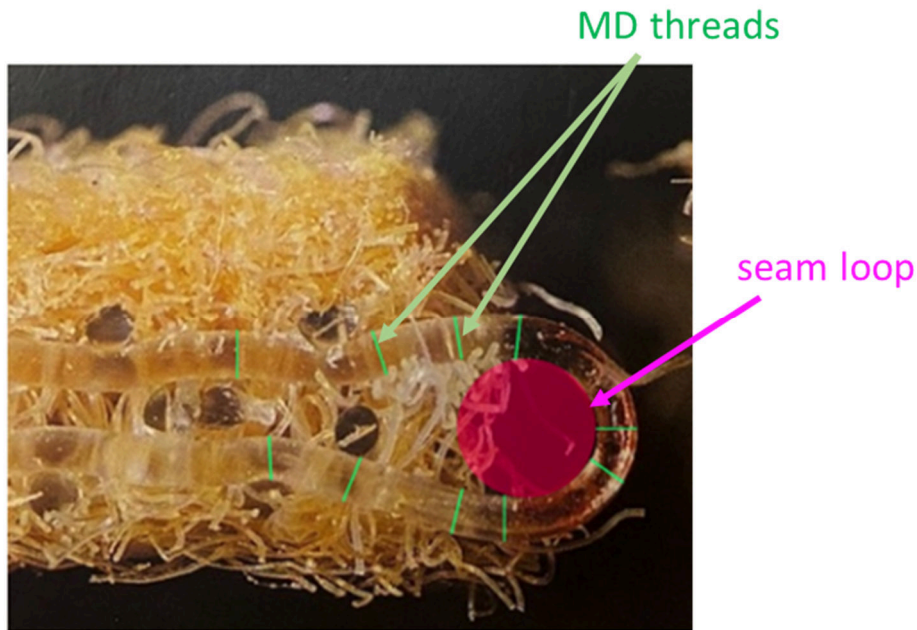
90%) since this value falls within the final and pre-thermal loop density ranges.

See EX1001, 6:27-40 (“the seam loop density before the first thermal method step is normally lower, usually between 55% and 80.”); EX1003, ¶¶377-380.



EX1028, Fig. 2 (partial)

For [1.5], Sudre-Rydin implements a seam loop diameter and a MD thread diameter of about 167 pixels and 53 pixels, respectively, based on measurements of Rydin’s PMC in Fig. 3, which corresponds to a ratio ***LD/MDYD*** of about 3.2 (167 pixels / 53 pixels). EX1028, Figs. 2-3; EX1003, ¶381.



EX1028, Fig. 3 (right, partial).

Sudre-Rydin also renders obvious claims 3, and 12-13 based on Sudre, as explained *supra*. §IV.A.5; EX1003, ¶382.

**L. GROUNDS 3B-3E: The Sudre-Rydin Combination Render Obvious the Remaining Claims**

A POSITA would have been prompted to apply the teachings of Shipley, Straub, Lidar, and Yook to the Sudre-Rydin combination as discussed in Grounds 1B-1E (*see* §IV.B-E), and would have had a reasonable expectation of success. EX1003, ¶381. The only difference between Grounds 3B-3E and Grounds 1B-1E is that the former relies on fabric parameters taught in Rydin. All other elements of the claims in Grounds 3B-3E are disclosed by the respective combinations for the reasons discussed in respective Grounds 1B-1E. EX1003, ¶383.

## **V. CONCLUSION AND FEES**

The Challenged Claims are unpatentable. Petitioner authorizes charge of fees to Deposit Account 06-1050.

## **VI. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(a)(1)**

### **A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)**

Albany International Corp. is the petitioner and the real party-in-interest.

### **B. Related Matters Under 37 C.F.R. § 42.8(b)(2)**

Petitioner is not aware of any disclaimers, reexamination certificates or petitions for *inter partes* review for the '566 Patent.

### **C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)**

Petitioner provides the following designation of counsel.

| <b>Lead Counsel</b>                                                                                                                                                                                                                         | <b>Backup counsel</b>                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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**D. Service Information**

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at [IPR59054-0037IP1@fr.com](mailto:IPR59054-0037IP1@fr.com).

Respectfully submitted,

Dated: June 6, 2025

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(Control No. IPR2025-01116)

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**CERTIFICATION UNDER 37 CFR § 42.24**

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,944 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: June 6, 2025

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**CERTIFICATE OF SERVICE**

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on June 7, 2025, a complete and entire copy of this Petition for *Inter partes* Review, Power of Attorney, and all supporting exhibits were provided via USPS Priority Express Mail, to the Patent Owner by serving the correspondence address of record as follows:

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