

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALBANY INTERNATIONAL CORP.,
Petitioner,

v.

VOITH PATENT GMBH,
Patent Owner

IPR2025-01116
U.S. Patent 11,261,566

**DECLARATION OF DR. DAVID BROOKSTEIN IN SUPPORT OF
PATENT OWNER'S RESPONSE**

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U.S. Patent & Trademark Office
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All emphases have been added, unless noted otherwise.

All figure annotates have been added, unless noted otherwise.

Objections in deposition testimony have been excluded.

I. INTRODUCTION AND BACKGROUND

I, David Brookstein, Sc.D., declare as follows:

1. I have been retained on behalf of Voith Patent GmbH (“Patent Owner”) in connection with the above-captioned inter parties review (IPR) to provide my opinion in support of Patent Owner’s Response. I have previously filed a declaration in this proceeding in support of Patent Owner’s Preliminary Response. I am being compensated for my work at my standard consulting rate of \$500 per hour.

2. I am over 18 years of age. I have personal knowledge of the facts stated in this Declaration and could testify competently to them if asked to do so.

3. I have been asked to provide my technical opinions on the validity of U.S. Patent No. 11,261,566 (“the ’566 Patent”) and regarding how a person of ordinary skill in the art (“POSITA”) would have understood the claims of the ’566 Patent at the time of the alleged invention, which I have been asked to assume is the 2018 timeframe, as explained herein. For purposes of whether the teachings of the prior art render the claims of the ’566 Patent obvious, I have been asked to assume that the priority date of the ’566 patent is March 15, 2018, which is the filing date of German Application No. 10-2018-105956 A1, to which the ’566 patent claims priority (’566 Patent (“EX1001”), Cover Page (30) (Foreign Application Priority Data)). I have also been asked to provide my technical opinions on how concepts in the ’566 Patent specification relate to claim limitations of the ’566 Patent.

4. In reaching the opinions provided herein, I have considered the '566 Patent, its prosecution history, and the materials cited in my Declaration and the Appendix. I have also drawn on my own education, training, research, knowledge, and personal and professional academic and industrial working experience in the field of the '566 Patent.

5. The statements made herein are based upon my own knowledge and opinion. This Declaration represents only the opinions I have formed to date. I may consider additional documents as they become available or other documents that are necessary to form my opinions. I reserve the right to revise, supplement, or amend my opinions based on new information and on my continuing analysis.

6. In general, I have been asked to cite to the specification of a patent or patent publication using the following formats: (Patent, Col:Line Number(s)) or (Patent Publication, Paragraph Number(s)). For example, the citation ('566 Patent, 1:1-10) points to the '566 Patent specification at column 1, lines 1-10. Unless otherwise noted, all emphasis by bold or underline and figure annotations have been added, and all quoted language of the claims of the '566 patent has been italicized.

7. I am being compensated for my time at my standard consulting rate. I am also being reimbursed for expenses that I incurred during the course of this work. My compensation is not contingent upon the results of my study and analysis, the

substance of my opinions, or the outcome of any proceeding involving the '566 patent.

II. Qualifications

8. I am well-qualified to render useful opinions on this matter. I will briefly summarize my knowledge, training, and experience here. A copy of my curriculum vitae that fully sets forth my qualifications is filed in the proceeding as EX2002. Below is a summary of my education, work experience, and other qualifications.

9. I am currently the sole owner and operator of Brookstein Consulting LLC, where I have worked since 2000. In this role, I provide engineering and litigation consulting services in the fields of textiles, mechanical assemblies made from textile materials, garment systems, fibers, yarns, woven fabrics, knitted fabrics, and fiber-reinforced composites.

10. I received a Bachelor of Textile Engineering from the Georgia Institute of Technology ("Georgia Tech") in 1971 (the only textile engineering program accredited by the Accreditation Board for Engineering and Technology (ABET) in the United States at that time), a Master of Science degree in Textile Technology from the Massachusetts Institute of Technology ("MIT") in 1973, and a Doctor of Science degree (Sc.D.) in the field of Mechanical Engineering from MIT in 1976, with Minor Studies in Management from Sloan School of Management. At MIT I

studied and did research at the Fibers and Polymers Division (formerly the Textiles Division) in the Department of Mechanical Engineering.

11. I worked as an Assistant Professor of Textile Engineering at Georgia Institute of Technology (“Georgia Tech”) between 1975-1980. At Georgia Tech, I taught classes and conducted research in the fields of textile engineering, which includes yarn manufacturing and mechanics, weaving and woven fabric design and mechanics, knitting and knitted fabric mechanics, and fiber reinforced composites engineering.

12. From 1980 to 1994, I was employed by Albany International Research Co. (formerly Fabric Research Laboratories, “Albany”). I started as a Senior Research Associate, was promoted to Assistant Director in 1983, and was again promoted to Associate Director in 1992. In these positions, I directed many of the activities of the professional engineering group responsible for contract research, development, and manufacture of advanced composite materials and technical polymeric materials of yarns and fabrics. Further, I was the lead engineer on an internal Albany project to develop advanced paper machine clothing (“PMC”) used by manufacturers of paper. At Albany I was also on the development team that produced needled (needle punched) strain isolator pad nonwovens for the skin of the US Space Shuttle. My textile engineering innovations during this time led to 13 U.S. patents (several involved woven structures) and many other unpatented trade secrets.

One of these trade secret projects involved a new method for drying paper on paper machine clothing during the papermaking process. While working at Albany, I supervised an engineering team that conducted a plant trial on a prototype paper making machine at the University of Maine Process Development Center (PDC). The PDC's pilot paper machine was capable of several processes, including complete equipment analysis, raw material studies, and process operation studies.

13. While employed at Albany, I also worked at a part-time position as an Adjunct Professor of Mechanical Engineering at Northeastern University in Boston between 1981-1983, where I taught undergraduate courses in statics, dynamics, and mechanics of deformable bodies and material science.

14. From 1994 to 2010, I worked as the Dean and Professor of Textile Engineering and Mechanical Engineering at the School of Engineering and Textiles at Philadelphia University (formerly Philadelphia College of Textiles and Sciences). Subsequently, from 2010 to 2012, I was the Executive Dean for University Research and Professor of Mechanical Engineering and Textile Engineering. During my time at Philadelphia University, I held many other positions, including Executive Director of the Institute for Textile and Apparel Product Safety, Executive Director of Pennsylvania Advanced Textile Research and Innovation Center including Biomedical Textile Structures Laboratory, and Executive Director of Research. I also taught courses dealing with weaving and woven fabric design.

15. From 2002 to 2003, I was on a part-time sabbatical as a Visiting Scholar at Harvard University Center for Textile and Apparel Research (Division of Engineering and Applied Sciences and Harvard Business School). During this time, I studied national and international trends in patent applications involving textile structures.

16. From 2009 to 2012, I also worked as a part-time consultant at MAG Industrial Automation Systems, where I was an engineering consultant to a worldwide manufacturer of engineered automation systems for the aerospace industry.

III. UNDERSTANDING OF RELEVANT LEGAL PRINCIPLES

17. I am not a patent attorney or a patent agent, and I will not provide any legal opinions. Although I am not a patent attorney, I have been advised by counsel that certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

A. The Person of Ordinary Skill in the Art (“POSITA”)

18. I understand that the disclosure of patents and prior art references are to be viewed from the perspective of a hypothetical person having ordinary skill in the art at the time of the invention (“POSITA”), who is presumed to (1) be aware of all pertinent art, (2) think along conventional wisdom in the art, and (3) be a person of ordinary creativity—not an automaton.

B. Anticipation and Obviousness

19. I have a general understanding of what constitutes prior art based on my discussions with counsel. I understand that a printed publication must be publicly available before the priority date of a particular patent claim in order to qualify as “prior art.”

20. It is further my understanding that a patent claim is invalid as “obvious” under 35 U.S.C. § 103 in light of one or more prior art references if it would have been obvious to a person having ordinary skill in the art, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called “secondary considerations” of non-obviousness, which include: (i) “long felt need” for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) “copying” of the claimed invention by competitors, praise for the invention, skepticism for the invention, or independent development.

21. I understand that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason to modify the single prior art reference, or combine two or more references, in order to achieve the claimed invention. This reason may come from a teaching, suggestion, or motivation

to combine, or may come from the reference or references themselves, the knowledge or “common sense” of a POSITA, or from the nature of the problem to be solved and may be explicit or implicit from the prior art as a whole. I also understand that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.

22. I further understand it is improper to rely on hindsight in making the obviousness determination. To guard against hindsight and an unwarranted finding of obviousness, I understand that an important component of any obviousness inquiry is whether any teaching, suggestion, or motivation that would have prompted a person of ordinary skill in the art to make the claimed combination and have a reasonable expectation of success in doing so. I understand that this test should not be rigidly applied but can be an important tool to avoid the use of hindsight in the determination of obviousness.

23. I further understand that the teaching, suggestion, or motivation may be found explicitly or implicitly: (1) in the prior art; (2) in the knowledge of those of ordinary skill in the art that certain references, or disclosures in those references, are of special interest or importance in the field; or (3) from the nature of the problem to be solved. Additionally, I understand that the legal determination of the motivation to combine references allows recourse to logic, judgment, and common sense. In order to resist the temptation to read the teachings of the invention at issue

into the prior art, however, it should be apparent that “common sense” should not be conflated with what only appears obvious in hindsight.

24. I understand that it is improper to combine references where the references teach away from their combination. I understand that a reference may be said to teach away when a person of ordinary skill in the relevant art, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. I further understand that if the teachings of a prior art reference would lead a person of ordinary skill in the art to make a modification that would render another prior art device inoperable, then such a modification would generally not be obvious. I also understand that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there would have been no suggestion or motivation to make the proposed modification.

IV. TECHNICAL BACKGROUND

25. The '566 Patent generally relates to a structure of woven clothing for a papermaking machine, known in the field as Paper Machine Clothing (“PMC”). PMC are highly specialized fabrics that work as the underlying support structure for the papermaking machine as it transforms slurry mixtures of water and cellulose fiber (known as pulp) into relatively thin sheets of paper, and must endure relatively high transverse compressive stresses, extreme heat, and moisture such that it can

support wet pulps of fiber as they go through sheet formation, pressing, and drying. I provide below a technical background to provide the context for the technical problem addressed by the '566 Patent.

A. Paper Machines and Paper Machine Clothing

1. The Papermaking Process

26. A typical paper making machine has three distinct connected sections: forming, pressing, and drying. (Adanur-1997, 6.) The fabrics used in these sections are called forming fabrics, press fabrics (press felts), and dryer fabrics, respectively, and each fabric type performs specific functions; therefore, each fabric type must be designed, engineered, and manufactured differently depending on the paper grade that is being produced, paper machine position, and size.

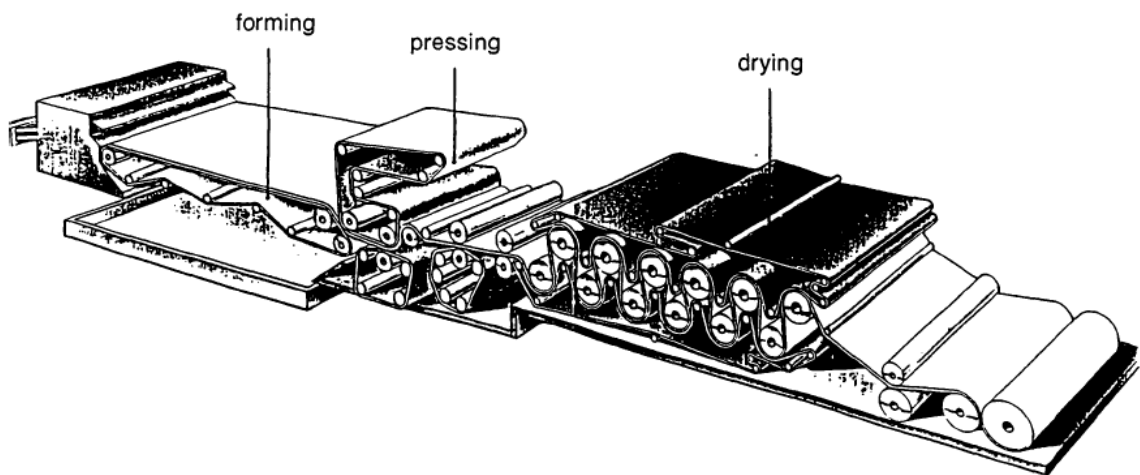


FIGURE 1.10. Schematic of a fourdrinier paper machine.

EX2013, 13

27. During the papermaking process, a fibrous web is formed by depositing a fibrous slurry—an aqueous dispersion of cellulosic fibers in water—onto a rapidly moving forming fabric in the forming section of a paper machine, where a relatively large amount of water is drained from the slurry through the forming fabric, leaving a wet fibrous web on the surface of the forming fabric. (Yook, 1:18-24.) At the end of the forming section, the sheet has a consistency or composition of approximately 20% fiber and 80% water. (Adanur-1997, 6.) The newly formed web then proceeds from the forming section to a press section, which includes a series of press rollers or nips, where the fibrous web passes through supported by a press fabric, or between two press fabrics, and is subjected to compressive forces which squeeze (express) water therefrom and adhere the fibers to one another to turn the fibrous web into a sheet. (Yook, 1:25-32.) Although it depends on sheet grade and paper machine, typical sheet consistency at the beginning of the press section is 20% fiber and 80% water, and at the end of the press section is about 45% fiber and 55% water. (Adanur, 103.) The web finally proceeds to a dryer section, which includes at least one series of rotatable dryer drums or cylinders internally heated by steam, where a dryer fabric holds the web closely against the surfaces of the drums and the heated drums reduce the water content of the web to a desirable level through water evaporation. (Yook, 1:34-42.)

28. Once fiber/water slurry stock leaves the headbox, the general requirement of the paper machine is to increase the fiber consistency of the sheet from 0.2–1.5% to 92–96%. (Adanur, 107.) After the forming section, the cost of additional water removal is far less in the press section than the dryer section; mechanically removing water in the press section by increasing nip pressures is far less costly than consuming thermal energy in the dryer section. (Adanur, 113.)

29. Below is a drawing from the Adanur textbook that shows elements of a typical paper making machine and the degrees of water removal at each machine section.

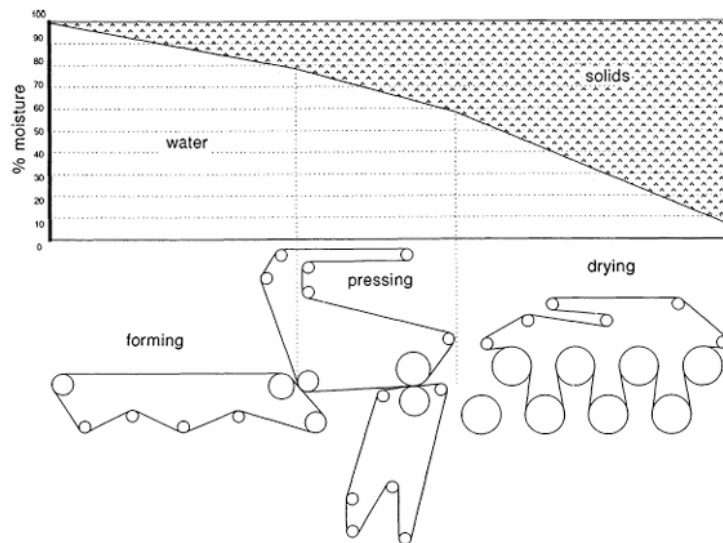


FIGURE 1.11. Sheet and water ratio through the fourdrinier machine.

EX2013, 13.

2. Operating Conditions and Demands on PMC

30. According to Yook, “the forming, press, and dryer fabrics all take the form of endless loops on the paper machine and function in the manner of conveyors,” and “paper manufacture is a continuous process which proceeds at considerable speed.” (Yook, 6:42-47.) “A modern paper machine can be as long as a football field [the longest one in the world is 275 m (902 ft) long] and as wide as 13 m (512 inch). The height of the machine can be equal to the height of a 3–4 story building.” (Adanur-1997, 25.) For instance, “[t]he speed of a modern high-speed tissue machine is close to 2134 m/min (7000 ft/min) which corresponds to 2.1 km of paper produced every minute (1.3 miles/min).” (Adanur-1997, 25.) “A paper machine costs several hundred million dollars to build which makes the cost of downtime very high. Therefore, efficient operation of the machine is extremely important which demands high quality fabrics with long life at high speeds and harsh environmental conditions such as high temperature, tension and humidity.” (Adanur-1997, 25)

31. Paper machine “[c]lothings which are used in paper machines usually consist of endless belt loops. These belt loops are guided continuously in circulation over a multiplicity of supporting and guiding elements... and... are subjected to loadings by presses, suction elements and the like.” (EX1001, 2:20-26.) To

withstand these loadings, paper-machine clothings frequently employ a woven base structure. (EX1001, 2:27-29.)

3. The Role of Press Felts

32. Press felts play an important role in the papermaking process: they provide a reservoir into which water that is expressed mechanically from the web can be carried for subsequent removal, and they provide a uniform, non-marking surface (e.g., no indentations or protrusions) upon which the web is conveyed as it passes through the press nips. (Xu, 1:43-51.) Press felts are typically constructed using a woven base fabric into which is needled punched (needled) with layers of a relatively fine fibrous batt material; typically, both the base fabric yarns and the batt fibers are comprised of hydrophobic nylon or similar polymer. (Xu, 1:43-51.) A primary function of a press felt is to act as a reservoir to transport water expressed from the sheet at the press nip, so the base fabric must provide void volume (empty interior space) to accept and hold water until removed later (e.g., by vacuum suction), which can be provided by weave structure and/or by adding additional woven or nonwoven structures. (Lee, p.3, ¶3-p.4, ¶1.)

B. Seam Structures

33. In this section, I provide technical and historical context for seam structures in papermaking fabrics, explaining why on-machine-seamable (“OMS”) designs emerged despite their inherent drawbacks. I begin by describing how early

press fabrics were made endless to preserve structural uniformity and avoid marking, as seams introduce discontinuities that can disrupt pressure and permeability in the press nip. I then explain how OMS fabrics gained widespread adoption due to safety, installation efficiency, and cost benefits, enabled by loop-and-pintle seam designs in which machine-direction yarns form interdigitated loops joined by a pintle. I further describe how such seams are constructed, particularly in flat-woven and folded laminate fabrics, and identify the core technical challenge: ensuring that the seam region matches the permeability, compressibility, and surface characteristics of the surrounding fabric. The prior art consistently recognizes that deviations in seam structure—whether from loop geometry, yarn removal, or batt disruption—can lead to marking, wear, and performance degradation, underscoring the difficulty of achieving a truly uniform seam.

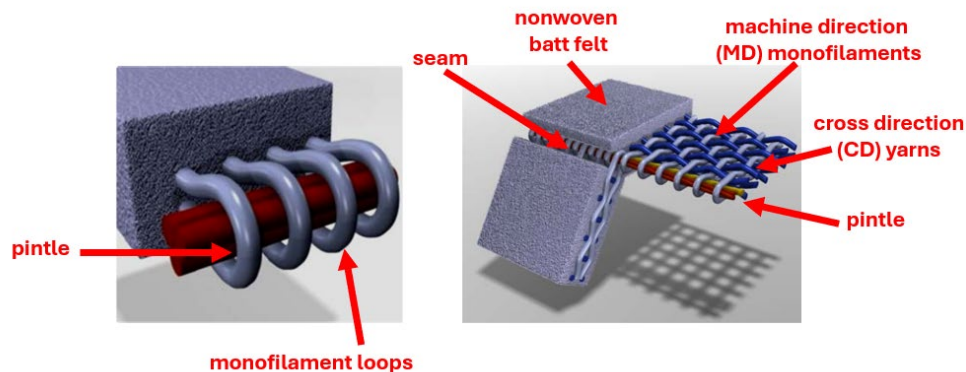
1. The Importance of On-Machine-Seamable (OMS) Fabrics

34. “[A]t one time, press fabrics were supplied only in endless form. This is because a newly formed paper sheet is extremely susceptible to marking in the press nip by any nonuniformity in the press fabric or fabrics.” (Yook, 1:51-56.)

35. “An endless, seamless fabric, such as one produced by the process known as endless weaving, has a uniform structure in both its longitudinal (machine) and transverse (cross-machine) directions,” (Yook, 1:57-60) and “[a] seam ... represents a discontinuity in the uniform structure of the press fabric. The use of a

seam, then, greatly increases the likelihood that the paper sheet will be marked in the press nip” (Yook, 1:60-65.) The fabrics used in paper machines can be endless or joined with a seam. (Adanur, 108.)

36. To assist the panel in having a clear understanding of a seamed fabric such as that found in press felts, I am providing several annotated figures from a presentation from a Technical Association of Paper and Pulp Industries (TAPPI) conference with published proceedings from 2008.



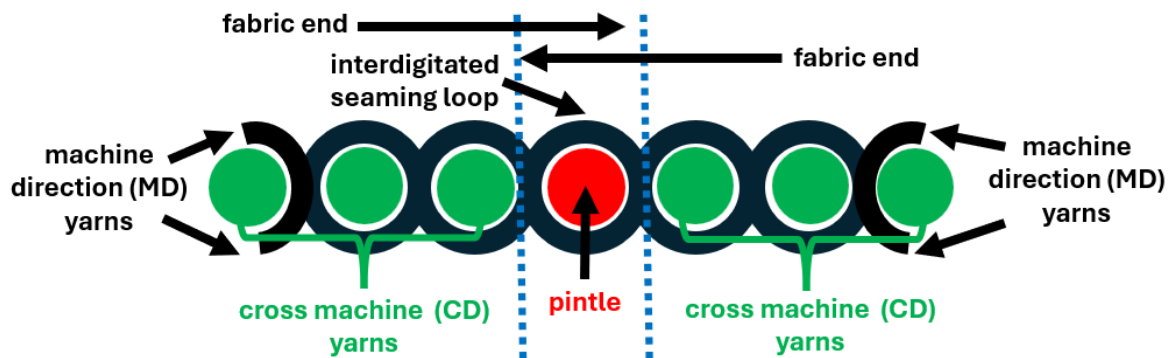
EX2017, 1 (annotated)

37. Seamed fabrics have shown a substantial increase in usage since their introduction in the late 1980s; in North America, approximately 75% of all press fabrics used are seamed (joined), and that proportion continues to grow as seam technology has proven suitable for more applications. (Adanur, 108.)

38. The primary factors for the increase in use of seamed products are safety, reduced installation time, and, in some cases, improved press fabric performance. (Adanur, 108.) In addition to quicker and easier press felt changes,

the seamed felt has a major advantage: machine run times became on average twice as long, with the cost of an endless press felt at 45–47 Swedish crowns per ton of paper produced dropping to about 32 Swedish crowns per ton with the seamed felt, in the 1992 timeframe. (Rydin, 1.)

39. Despite the considerable technical obstacles, “it remained highly desirable to develop an on-machine-seamable press fabric, because of the comparative ease and safety with which it could be installed on the press section” (Yook, 2:8-12); ultimately, these obstacles were overcome with the development of “press fabrics having seams formed by providing seaming loops on the crosswise edges of the two ends of the fabric. The seaming loops themselves are formed by the machine-direction (MD) yarns of the fabric” (Yook, 2:12-17), “a seam [being] formed by bringing the two ends of the press fabric together, by interdigitating the seaming loops at the two ends of the fabric, and by directing a so-called pin, or pintle, through the passage defined by the interdigitated seaming loops to [secure] the two ends of the fabric together.” (Yook, 2:15-19.) I prepared schematic drawing (below) that shows this general structure.



2. Loop-and-Pintle Seam Mechanics

40. Papermakers' fabrics are commonly produced either as flat-woven fabrics whose ends are joined, or as endless-woven fabrics. (Sudre, 3:6-9.) In flat-woven fabrics, warp yarns extend in the machine direction of the eventual fabric, and the fabric may be made endless by forming machine-direction loops at each end and inserting a pintle wire into the tunnel formed by interdigitated seaming loops. (Sudre, 3:10-18.)

41. Known seams may include loops or hooks at the fabric longitudinal ends that are aligned in an alternating intermeshing or interdigitated configuration, forming a passageway or tunnel through which a pintle connector is inserted to close the seam. (Penven, 1:18-24, 3:6-19.) As papermaking machines have increased in width and speed, seam strength and durability are prime considerations, but increasing loop and pintle size to improve reliability can increase seam thickness and cause undesirable marking (*e.g.* indentations) and irregularities; a tight fit

between pintle and seam is desirable to control lateral and twisting movement. (Penven, 1:40-53; 1:56-61.)

42. Uniformity in a loop-and-pintle seam requires the pintle to be close in size to adjacent cross-machine direction yarns and have minimum clearance within the interdigitated loops, and it is common to use pintles made of monofilaments that compress under pressure similar to the fabric to reduce seam marking. (Swaine, 2:7-24.)

3. Seam Formation in Folded Flat-Woven Laminate Constructions

43. In an example using a flat-woven fabric that is folded to form a two-ply tubular structure, weft yarns (cross machine CD) are removed from the fold regions to create outwardly extending loops. The structure is made endless by interdigitating loops and inserting a pintle wire into the tunnel formed by the seam loops.

44. The seam loops are not formed during the weaving process, but after the base structure is completely woven. The loops are formed by the removal of CD yarns on two opposite ends (180° apart) of the base fabric, which leaves an opening in the weave pattern where the MD yarns can mesh (interengage) together to form the loop. (Sudre, 1:22-2:4; 2:13-17; 3:22-4:1.) The number of CD yarns removed is dependent upon the desired length of the loops: longer loops if faster installation is the papermaker's top priority, and smaller loops if mark resistance is more important.

45. Seam loops are produced at the folding points by removing CD threads; after interengaging or interdigitating the seam loops of the two ends, an insertion element or pintle is inserted in the loop opening so that the two loop ends can no longer disengage, and pintles made from one or more polymeric monofilaments or metal can be used.

4. The Seam Permeability and Marking Problem

46. The seam region of any workable on-machine-seamable press fabric “must behave under load, that is, under compression in the press nip or nips, like the rest of the press fabric, and must have the same permeability to water and to air as the rest of the press fabric, in order to prevent the periodic marking of the paper product being manufactured by the seam region.” (Yook, 1:66-2:5.)

47. On the “roll” side of the press fabric, some of the staple (short) fiber needled batt must be removed from the seaming loops to facilitate the later passage of a pintle therethrough, and the removal of this generally small amount of staple fiber batt makes the seam region slightly more permeable to air and water than the rest of the press fabric—this difference in water permeability, or flow resistance, perhaps ever so slight, is enough to cause sheet marking in some situations. Moreover, the difference tends to become more pronounced with time as more batt fiber is lost from the “roll” side of the press fabric as it runs on the paper machine. (Yook, 3:31-42.)

48. The earliest seams had long loops—i.e., cross-threads in the weave were missing on both sides of the centerline of the seam—which had three consequences: (1) the two zones where cross-threads were missing could in some cases lead to marking due to lower press pressure in those zones; (2) the lower fiber anchoring in those zones led to increased batt wear in the seam zone, with the batt flap being sucked into the suction box slot, further worsening the wear of the press felt; and (3) high batt wear in the seam area contributed to an increased risk of mechanical wear, resulting in deteriorated strength properties. (Rydin, 1.) From a papermaking perspective, severe wear across the seam area causes marking in the finished paper, but even with negligible wear, the inhomogeneity that the seam represents in the felt structure is clearly capable of contributing to marking. (Rydin, 1.)

C. Woven vs. Non-Woven Fabrics

1. Flat-Woven and Endless-Woven Constructions

49. There are basically three types of forming [creating] fabric designs used in the papermaking industry—single layer, two layer, and three layer—and a fabric can be woven in two ways: flat weaving or endless weaving. (Adanur-1997, 38.) Flat-woven fabrics need be joined (seamed) to make an endless fabric for use on the paper machine; warp direction on the weaving machine becomes machine direction (MD) on the paper machine and filling direction on the weaving machine becomes

the cross machine direction (CD) on the paper machine. (Adanur-1997, 38.) In endless weaving, the fabric is woven as an endless belt; the warp direction on the weaving machine becomes the cross-machine direction (CD) on the paper machine and the filling direction on the weaving machine becomes the machine direction on the paper machine. (Adanur-1997, 38.)

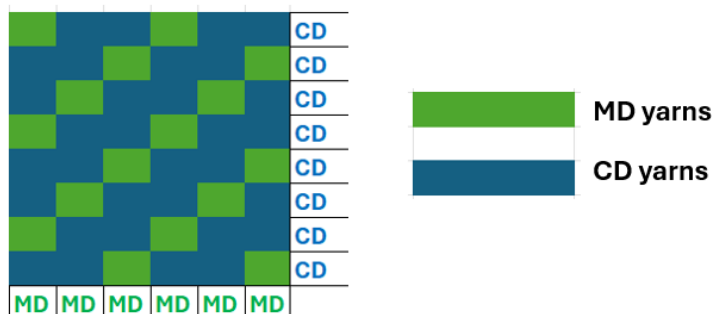
2. Single-Layer, Multi-Layer, and Laminated Woven Structures

50. The base fabric may have a single-layer woven construction (one layer of MD yarns and one layer of CD yarns), a woven multilayer construction (multiple layers of MD yarns with only one layer of CD yarns), or a laminated, multiple base construction with multiple layers of both; the advantage of the multiple base construction design is that the base layers can be of different designs, varying in yarn count, yarn size, and weave pattern. (Adanur, 108.) Flat-weave fabric belts are often built up in one, two, or more plies, in which case the individual woven plies may differ from one another in the material, strength and guidance of their yarns, and by the regular engagement of yarns of one woven ply to the weave of another woven ply, a stable sheet-like connection of individual woven plies can be achieved. (Straub, ¶5.)

51. Single-layer base products were quickly becoming inadequate on most paper machine applications, as they simply were not durable enough to withstand the forces generated on modern paper making machines. (Adanur, 108.)

3. Weave Patterns: Plain Weave and Floats

52. In a plain weave, the machine direction yarns form crimp after interweaving with two cross machine direction yarns, with the crimp having a length that includes two “knuckles” (protrusions) which form on opposite planes or surfaces of the base fabric, and the length of the crimp is measured between the points where the yarn intersects the center line through the base fabric. (Bennett, 3:24-33, 3:59-4:9.) To reduce the amount of knuckles, fabrics can have “floats”. A float is created when a warp or weft yarn skips over two or more opposing threads rather than interlacing. For example, a 2×1 twill is a fabric, with floats, in which each of the CD yarns passes over two adjacent MD yarns, passes beneath the next adjacent MD yarn, then repeats this pattern for subsequent MD yarns along its length, with adjacent CD yarns following a similar “over 2-under 1” pattern but offset by one MD yarn from adjacent CD yarns was sometime used as a base fabric. (Wilson, 3:66-4:19.) I prepared the diagram below to illustrate this weave pattern.



53. In woven strip-based press felt constructions, the interwoven “knuckles” can flatten in service, compacting the fabric and changing void volume

and dewatering performance over an initial “break-in” period; additionally, crimped yarn knuckles can create localized pressure points and cause sheet marking. (Lee, p. 4, ¶3.)

4. Prior Art Approaches to Seam Permeability and Durability

54. All prior art approaches were “designed to compensate for the differences between the water permeability or flow resistance of the seam region of an OMS® press fabric and the rest or body of the press fabric.” (Yook, 3:54-57.) “However, none of these approaches have yielded completely satisfactory results for all press types and positions and for all paper grades.” (Yook, 3:58-59.)

55. One prior art approach to solving the seam permeability problem involved “the use of stuffer yarns with the pintle when the press fabric is being joined into endless form on the paper machine.” (Yook, 3:44-47.) “In another approach, a press fabric comprises two on-machine-seamable base fabrics, one fitting inside the loop of the other, laminated to one another during the needling process. The seam regions of the inner and outer base fabrics are offset slightly... so that the seam region of each will coincide with a non-seam region of the other.” (Yook, 3:48-54.)

56. The strips of flow-resistant material compensate for any inadequate flow resistance in seams due to loss of batt fiber; the flow-resistant material may be a ribbon of fine woven or nonwoven material, or a ribbon of porous polymeric membrane applied to the seam area by sewing or adhesive prior to needling with batt

fiber, or inserted between the layers of a laminated fabric on each side of the seam region and attached there by sewing or adhesion prior to needling with batt fiber, with polymeric foams or liquid resins alternatively applicable instead of a ribbon or ribbons of the above-identified materials and cured to provide a desired additional flow resistance. (Yook, 7:6-32.)

57. An improvement in the seam was achieved by obtaining greater homogeneity in the seam zone combined with improved batt anchoring; through the use of a special weaving technique, the top of the loops was bridged with an in-woven batt-like yarn that acts as a flap covering the loops, with the diameter of the batt-like yarn on top of the loops in the same size range as the batt fiber diameter, and during the subsequent needling process, this yarn is largely integrated into the batt structure. (Rydin, 2.)

58. Voith (Patent Owner) also focused on improving seam durability and presented their results at the TAPPI/PIMA PaperCon '08 Conference in 2008 (EX2017.) At that time (about 10 years before the priority date of the '566 patent) the durability of the seam loop and seam area were a focus of the development of a new yarn for durable loop systems that could handle extreme running conditions. Voith's technology ensured seam flap integrity, batt entanglement and long-term durability. Improved durability in the seam flap area meant less seam flap wear and reduced sheet markings.

59. At that time, researchers at Voith knew that loop flexing (or bending) and transverse compression was present during press fabric use. As such, the monofilaments used for the seam loops had to be mechanically stiff against fabric running tension. Further, they had to be resilient (quick recovery) and wear resistant during flex deformation. Researchers at Voith found that polyamide (Nylon 66), which was used at the time (2008), was relatively brittle at high-speed impact resulting in premature failure. As a result, they developed a chemically modified Nylon 66 that toughened the monofilaments and that resulted in reduced sheet marking.

60. In single layer press fabrics there are three basic requirements, namely: (i) that the seam shall not be greater in thickness than the main body of the press fabric; (ii) that the permeability to water of the fabric and the seam must be substantially the same; if either of these conditions is not fully met, then the seam will have a detrimental effect upon the paper produced (Lees, 1:65-2:4); and finally (iii) that the monofilaments making up the seam loops should be mechanically tough and resilient. (EX2017, 2).

5. Spirally Wound (Multiaxial) Constructions

61. Press felts using relatively narrow (about 1 meter) wide strips of a base fabric spirally wound can provide the desired length and width of the final fabric, where a continuous relatively narrow woven base fabric strip is led from a narrow

relatively high-speed loom (wherein the weft insertion rate is relatively high) and directed around at least two large diameter rolls set a desired distance apart such that it is canted by a small angle of from about 1° to about 10° to the intended machine direction of the final product, with each successive turn of the fabric strip laid adjacent to, and bonded to, the previous one to build up sufficient length and width of a cohesive, tube-like precursor base fabric. (Xu, 2:4-36.)

62. When the precursor fabric is flattened, the spirally wound woven material from each side of the tube is brought into intimate contact with one another and, because the entire base fabric is woven according to the same weave pattern, interference patterns appear at locations where the warp and weft yarns from the opposing surfaces overlap but are not in exact alignment, forming distributed regions of low and high yarn densities throughout the fabric. (Xu, 2:37-56.) In spirally wound double-layer woven structures, misalignment between the two opposing sides can create interference patterns (regions of relatively low/high yarn density) that can cause uneven water removal, non-uniform batt adhesion, batt shedding where anchorage is poorer, and sheet marking. (Lee, p. 5, ¶1.)

6. Non-woven Constructions

63. In a nonwoven base structure design, the base fabric is not a woven fabric but is formed by two or more completely separate uncrimped yarn layers encapsulated within a fibrous membrane; such nonwoven structures are excellent in

providing pressure uniformity due to the absence of weaving knuckles, and the generally low void volume of these fabrics has also been applied successfully where immediate nip dewatering is desired for the PMC quickest break-in. (Adanur, 113.)

64. A nonwoven product is a manufactured sheet, web, or batt of directionally or randomly oriented fibers, produced by bonding or entangling fibers through mechanical, thermal, or chemical means, with the fibers being of natural or man-made origin. (Adanur-1997, 29.)

65. Lee also discloses a base-fabric architecture, where “[a]s shown in Figure 7, the first fabric structure 100 is provided as a continuous strip of an array 115 of polymeric monofilament yarns 110 each of which is parallel to the next and regularly spaced apart at a desired spacing, which spacing may be adjusted according to need.” (Lee, p. 24, ¶4.) Figure 7 (below) “is a diagrammatic illustration of a cross-section across the MD yarns of a first fabric structure which may be used in the assembly of **base fabrics for nonwoven press felts according to the present invention.**” (Lee, p. 15, ¶2.)

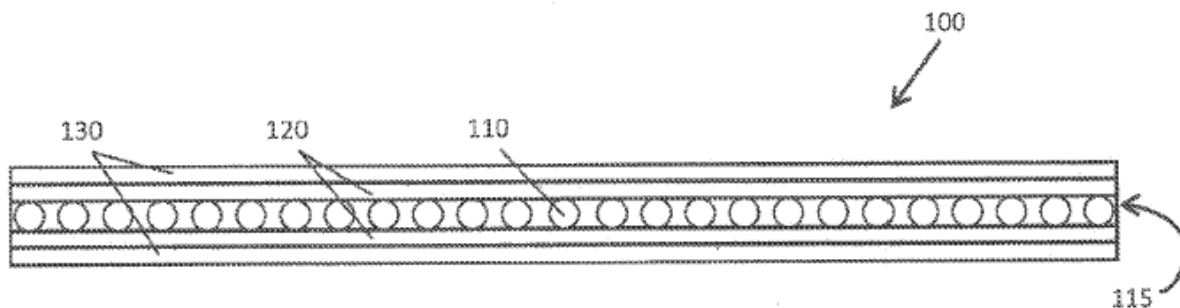
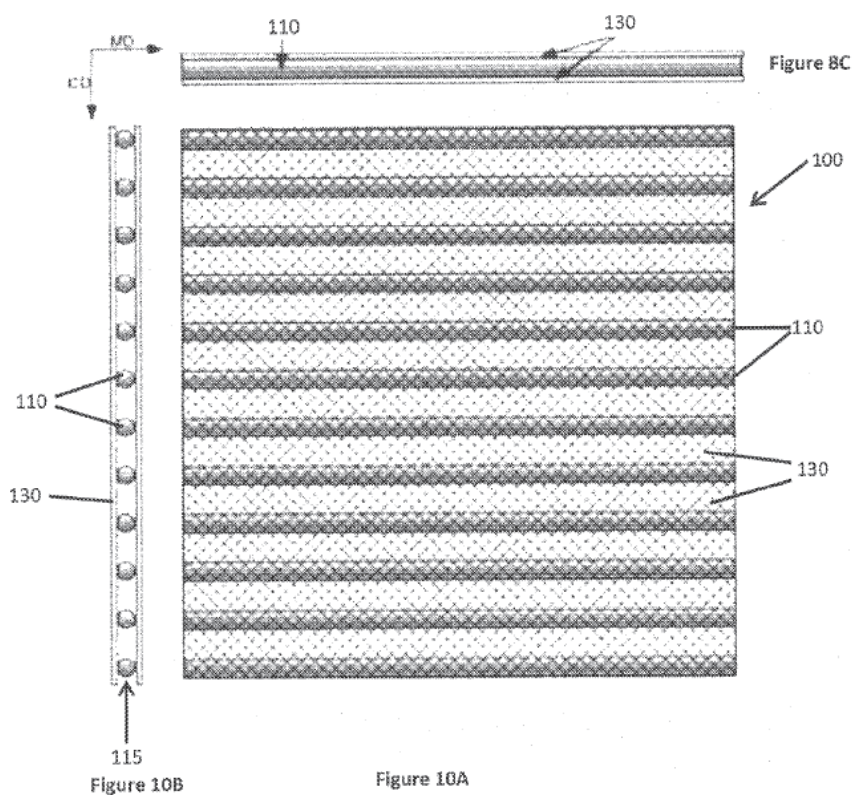


Figure 7

Lee, Figure 7

66. In Lee, “Figure 10A (below) is a planar view of the first fabric structure provided in Figure 7 showing the first (MD) yarn array oriented horizontally across the page including a layer of second [material] laid over the **first yarn array**,” “Figure 10B is a cross-section through the MD yarns of this structure located at the left” and “Figure 10C is a cross-section along an MD yarn provided at the top of Figure [10A].” (Lee, p. 15, ¶4.) Figures 10A-10C also relate to base fabrics for nonwoven press felts according to Lee’s invention.



Lee, Figures 10A-10C

V. THE '566 PATENT

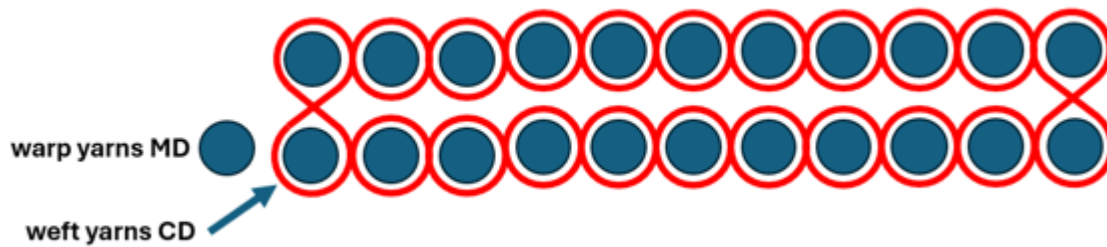
67. The '566 patent is titled “Clothing for a machine for producing a fibrous material web” and is generally directed to “[a] clothing, in particular a seam felt for a machine producing a fibrous material web, in particular a paper, paperboard, tissue or pulp web, includes a base structure including or formed of a two-layer laminate structure formed of one or more flat-woven fabrics.” (EX1001, Abstract.)

A. Overview of the '566 Patent

68. The '566 Patent claims priority to German Application No. 10-2018-105956, filed on March 15, 2018.

69. The '566 Patent is directed to paper machine press felt clothing, particularly a seam felt, for a machine producing a fibrous material web—such as paper, board, tissue, or pulp—having a base structure with MD threads that form seam loops at end sides, where the fabric is made endless by interengaging seam loops and inserting an insertion element (pintle). (EX1001, Abstract, 1:8-19; 2:50-62.)

70. The '566 Patent explains that an “endless” woven base structure was previously limited by producing tubular weaving which is limited by twice the width of the warp yarns in the loom. (EX1001, 1:30-40.) This is shown in the drawing that I produced shown below.



71. After weaving the woven tube is rotated by 90° so that the weft yarns are now in the machine direction (MD) of the paper making machine. This approach is time-consuming and requires prior knowing the final clothing length required for a paper machine press section during weaving, which prevents weaving for stock inventory. (EX1001, 1:30-40.)

72. To improve efficiency, prior art such as EP 0 425 523 (Sudre's German counterpart) proposed flat-woven webs provided at roughly twice the needed length, folded to form a two-layer laminate, with seam loops created by removing CD threads at the folds and then interengaging loops and inserting an insertion element (pintle) to make the structure endless—an approach that enabled efficient production, including the ability to produce fabric for stock and later cut to the required length and width. (EX1001, 1:41-56.)

73. The '566 Patent identifies disadvantages of folded flat-woven seam constructions, particularly that seam-region properties differ from the rest of the clothing. For example, the patent explains that permeability for water and air is often higher in the seam region than elsewhere, which can lead to quality losses such as

markings or indentations in the paper due to non-uniform dewatering behavior. (*See*, EX1001, 1:59-64.) In addition, the patent identifies a further critical region—the “join” area created by folding—where the long-side ends may butt, overlap, or be spaced apart. At this join, the base structure likewise exhibits property differences relative to the rest of the fabric, which can also result in marking defects in the produced paper. (*See*, EX1001, 1:65-2:4.)

74. The '566 Patent explains that these non-uniformities—both at the seam and at the join—are inherent drawbacks of flat-woven seam constructions and are associated with differences in structure and permeability that disrupt uniform paper formation. Consistent with this recognition, **one of the stated objectives of the invention is to provide paper machine clothing that can be produced and used “quickly and economically,” while at the same time overcoming these prior-art quality deficiencies, including seam- and join-related marking effects.** (EX1001, 2:5-10.)

75. The patent states that this objective is achieved by controlling the relationship between seam-loop diameter (LD) and the diameter of the associated MD threads (MD) such that the ratio LD/MDYD is between 2.5 and 4 (in particular, between 2.7 and 3.6). This specific range provides a seam with “very high strength, without which satisfactory use, for example as a seam felt, is not possible,” and further facilitates closure of the seam, simplifies inserting the pintle, reduces the time

to draw in clothing, and offers ergonomic advantages for the operator of the installation.

76. In addition to the LD/MDYD ratio, the '566 Patent discloses a structure in which the loop density of the seam is between 64% and 90%, a range that is optimal because it provides a seam with reduced permeability, while a loop density above 90% can result in losing the ability to seam the clothing by making it more difficult to arrange the seam loops to interengage; a PMC designed with the combination of the specific LD/MDYD ratio and loop density ranges is highly advantageous because it will have a seam which—as a result of the high loop density—has a low permeability and nevertheless—as a result of the optimal LD/MDYD ratio—can be closed easily. (EX1001, 6:12-40.)

B. Level of Ordinary Skill in the Art

77. A POSITA relevant to the '566 Patent at the time of the invention would have a bachelor's degree in Material Science, Materials Engineering, Mechanical Engineering, Textile Engineering, or a comparable field, and at least two years of practical experience in textile engineering (which includes weaving and design of two dimensional woven structures, fibers and textile manufacturing, or a related discipline). From my experience, including fourteen years working for Albany International (Petitioner), it became readily apparent that paper machine clothings

are complex textile structures, and the manner in which they are produced requires a high level of understanding of the principles of textile engineering.

78. It is my opinion that theoretical or academic understanding alone cannot substitute for the real working experience necessary to acquire this level of understanding.

79. Based on my education and professional experience, I am well-qualified, as discussed above, to render opinions from the perspective of a POSITA as of the March 15, 2018, filing date of the German patent application to which the '566 patent claims priority (the "Priority Date"), or before. I was a person of at least ordinary skill in the art at the time of the priority date of the '566 patent. Unless I state otherwise, I provide my opinion herein from the viewpoint of a POSITA as of the Priority Date, or before.

C. Prosecution History

80. The '566 Patent issued on March 1, 2022, from U.S. Application No. 16/980,449. (EX1001, 1.)

81. The '566 Patent underwent thorough examination spanning multiple substantive rounds: two non-final Office Actions (EX1002, 31-36 and 108-121), one final Office Action (EX1002, 67-80), an after-final submission (EX1002, 51-65), an Advisory Action (EX1002, 48-49), and an RCE (EX1002, 41-43)—all before allowance. The Examiner raised and maintained both formal objections (drawings,

abstract) and substantive rejections (indefiniteness and obviousness over two prior art references through successive rounds. Applicant responded with meaningful claim amendments, including the addition of specific quantitative limitations, such as loop density of 64%–90% and LD/MDYD ratio of 2.7–3.6 (EX1002, 62), and detailed technical arguments distinguishing the prior art. The Examiner’s express reasons for allowance (EX1002, 13) confirm that these limitations constitute the patentable distinction over the prior art of record, reflecting a rigorous, multi-stage examination process by the USPTO.

D. Claim Construction

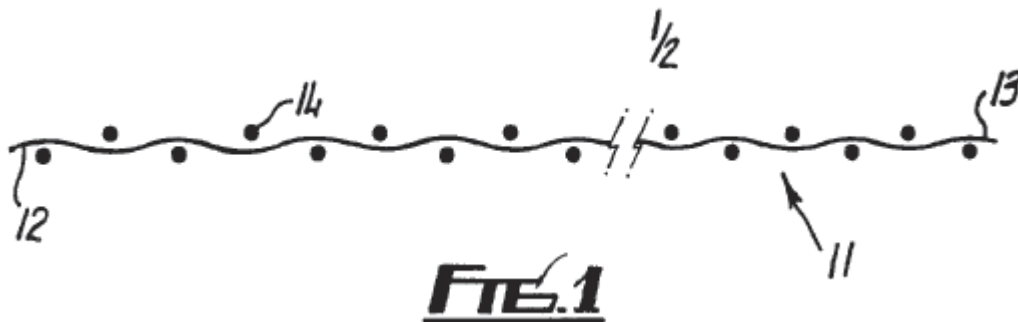
82. In my opinion, all claim terms should be given their ordinary meaning in light of the ’566 Patent specification.

VI. OVERVIEW OF THE CITED REFERENCES

A. Sudre [EX1004]

83. Sudre discloses a seamable papermaker’s fabric made from a *single* flat-woven or endless-woven fabric structure that is configured subsequently into a two-ply construction. Specifically, Sudre describes “providing a fabric of plural, superimposed layer configuration throughout substantially the full longitudinal extent thereof and having fold regions at the respective opposite ends thereof, and removing cross-machine direction yarns from said fold regions to leave machine-direction loops thereat.” (Sudre, 1:25-2:4.)

84. Sudre explains that “Figs. 1 to 3 respectively show successive stages in the production of an endless base material for use in a papermaker’s fabric and comprising a flat-woven single layer structure.” (Sudre, 2:25-3:2.) Specifically, Figure 1 (below) shows “a base material for use in the manufacture of a papermaker’s wet felt comprises a **flat-woven fabric 11** of open weave construction having a length approximately equal to twice the length of the intended end product, that is to say of the papermachine clothing.” (Sudre, 3:13-18.)



Sudre, Figure 1

85. During the next step in Sudre’s process “[t]he free ends 12, 13 are folded over to define a two-ply structure having fold regions 15, 16, the free ends being brought into substantial abutment as shown in Fig. 2.” I reproduce Figure 2 below.

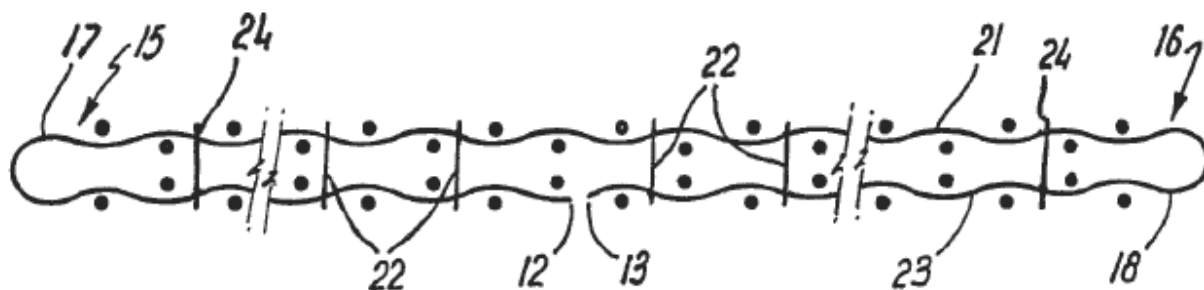


FIG. 2

Sudre, Figure 2.

86. In connection with Figure 3 (below), Sudre further explains that “[w]eft yarns 14 are removed from the fold regions 15, 16 either before or after folding, to give loops 17, 18 extending outwardly therefrom,” with the fabric made endless by “the interdigitation of such loops and the introduction of a pintle wire 19 into the tunnel 20 formed thereby as is shown in Fig. 3.” (Sudre, 3:22-4:1.)

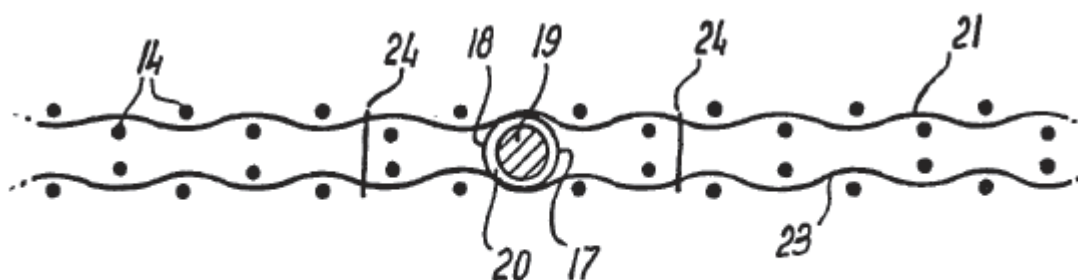


FIG. 3

Sudre, Figure 3.

87. According to Sudre, “[i]n producing a wet felt, [shown in Figure 5 (below)], a textile batt 25 is needled [needle punched] to each face of the endless

structure” and the “needling operation brings the batt at each face into coherent and homogeneous form through the base structure, and serves also to secure the individual plies of such base structure together.” (Sudre, 5:8-18.)

88. Critically, Sudre’s entire construction originates from a single woven-fabric structure. That is, there is no separate, second fabric structure being inserted into Sudre’s woven fabric structure.

89. Sudre also discloses no particular thread (yarn) diameters or seam-loop geometry parameters, as design targets.

B. Adanur [EX1021]

90. Adanur is a textbook describing paper machine clothing, including press fabrics made from woven and nonwoven base structures. Adanur explains that “[t]he base fabric may have a single-layer construction ... a woven multilayer construction ... or a laminated, multiple base construction.” (Adanur, 108.)

91. With respect to seamed press fabrics specifically, Adanur states that “[t]here are basically two major types of seamed products (Figure 3.8): conventionally woven base, and laminated, multiaxial base.” (Adanur, 108.)

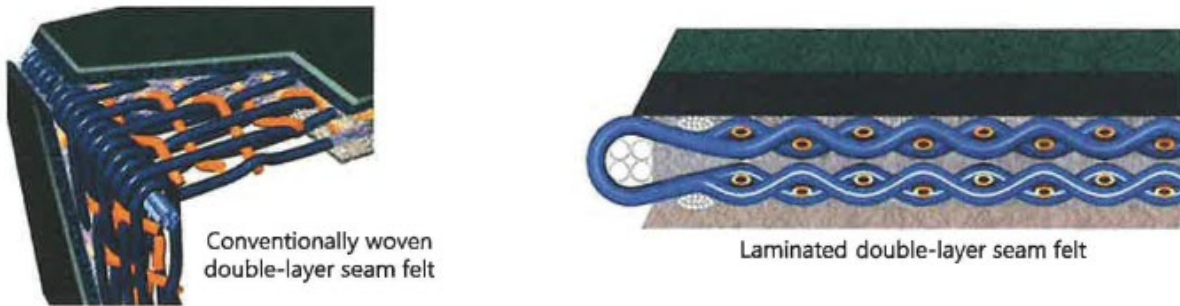
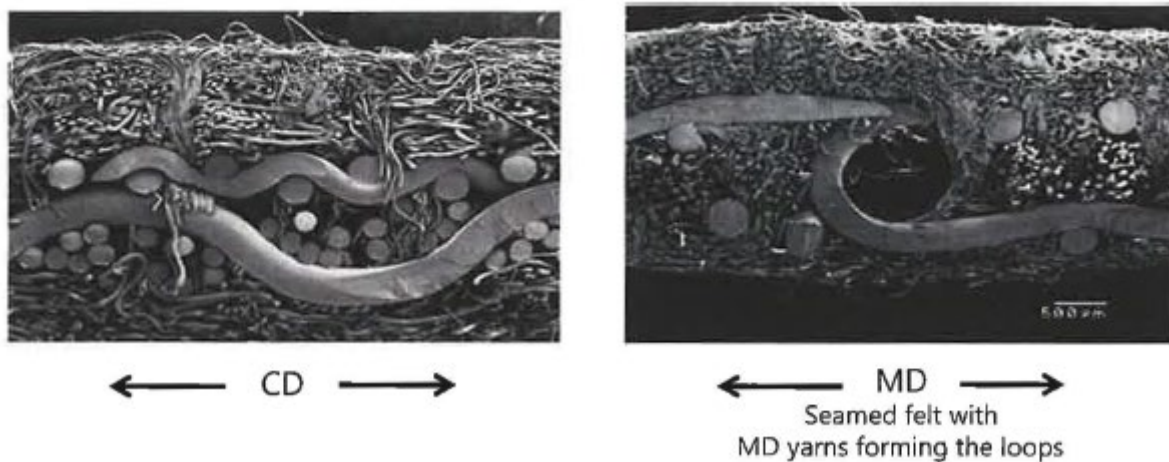


FIGURE 3.8. Seamed press fabrics.

Adanur, Figure 3.8

92. In the context of this proceeding, Dr. Pastore relies on Adanur’s Figure 3.15 (below) to extract dimensional parameters for a seamed press fabric. (See, EX1003, ¶¶67-73.)

93. However, Adanur’s Figure 3.15 caption identifies the example as an MD “[s]eamed felt with MD yarns forming the loops,” without disclosing any particular loop-diameter-to-MD-yarn-diameter (LD/MDYD) ratio as a design target.



Adanur, Figure 3.15 (Cross-sections of finished press fabrics.)

94. Adanur explains that “[m]any factors influence the selection process of the fiber denier (diameter)” and that “[f]ibers with different deniers [linear densities] can be blended or applied in stratified layers for design performance attributes.” (Adanur, 111.) Adanur discloses that “Figure 3.15 shows cross-sections of actual finished press fabrics.” (Adanur, 111.)

C. Lee [EX1005]

95. Lee discloses a seamed press felt incorporating a two-structure base-fabric architecture. Specifically, Lee discloses “a base fabric material including MD yarns arranged in two superimposed layers joined by the MD yarns at CD folds at opposing ends thereof to form a continuous unbroken tube-like structure,” where “[t]he MD yarns form loops at the folds to define a pintle channel,” along with “[a] generally planar yarn assembly including an array of polymeric yarns bonded to an elastic carrier material ... located inside the base fabric with the yarns of the array oriented in the CD.” (Lee, Abstract.)

96. Lee discloses both woven and non-woven embodiments. *See*, Lee, p. 8, ¶4 (“In one aspect, a seamed press felt is provided comprising a base fabric material, **which can be woven or non-woven...**”).

97. In connection with Lee’s *non-woven embodiments*, in Lee’s two-structure base-fabric architecture, “[a]s shown in Figure 7, the first fabric structure 100 is provided as a continuous strip of an array 115 of polymeric monofilament

yarns 110 each of which is parallel to the next and regularly spaced apart at a desired spacing, which spacing may be adjusted according to need.” (Lee, p. 24, ¶4.) Figure 7 (below) “is a diagrammatic illustration of a cross-section across the MD yarns of a first fabric structure which may be used in the assembly of **base fabrics for nonwoven press felts according to the present invention.**” (Lee, p. 15, ¶2.)

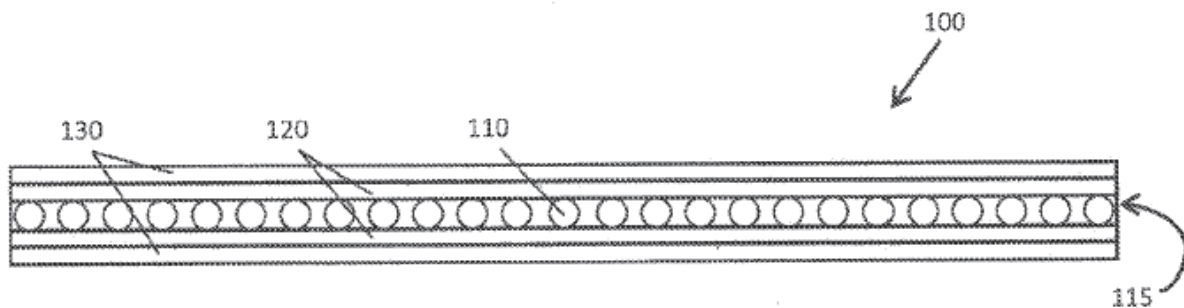
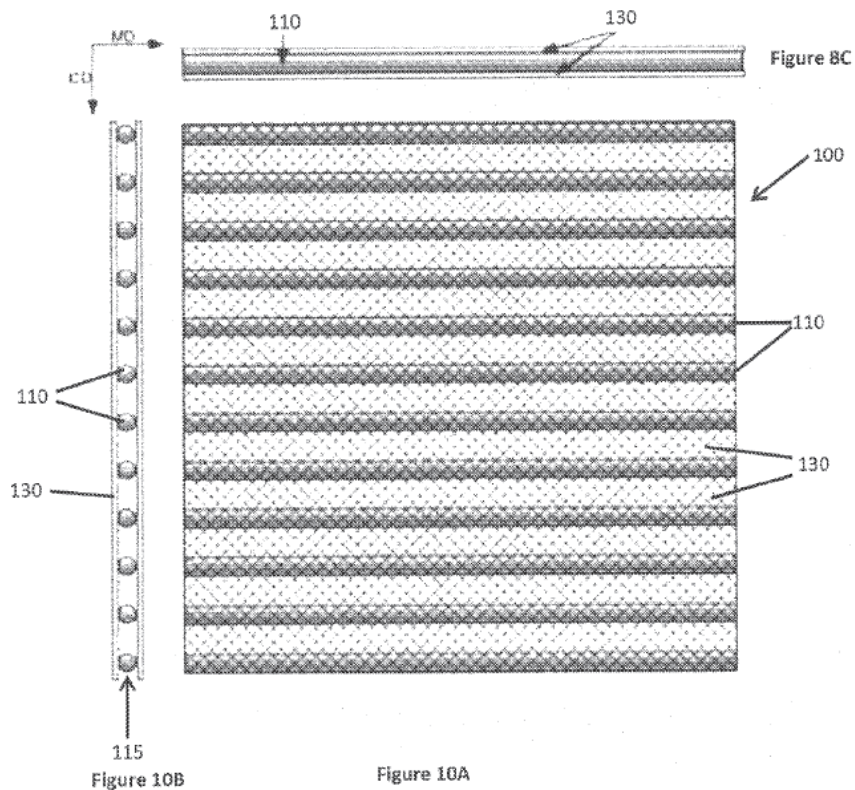


Figure 7

Lee, Figure 7

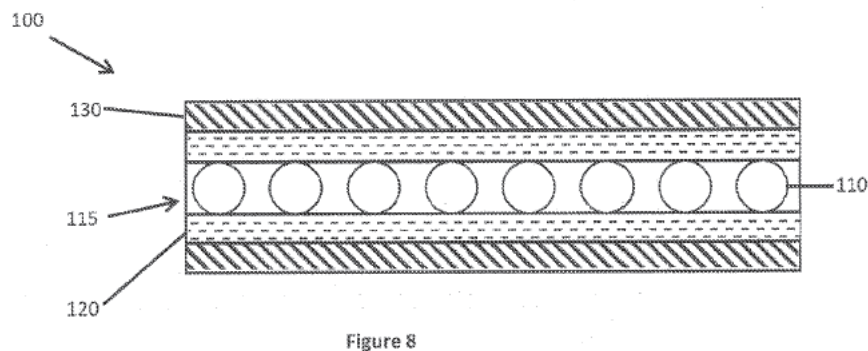
98. In Lee, “Figure 10A (below) is a planar view of the first fabric structure provided in Figure 7 showing the first (MD) yarn array oriented horizontally across the page including a layer of second [material] laid over the first yarn array,” “Figure 10B is a cross-section through the MD yarns of this structure located at the left” and “Figure 10C is a cross-section along an MD yarn provided at the top of Figure [10A].” (Lee, p. 15, ¶4.) Figures 10A-10C also relate to base fabrics for nonwoven press felts according to Lee’s invention.



Lee, Figures 10A-10C

99. Similarly, “Figures 8 and 9 are illustrations showing the construction and composition of first [Figure 8] and second [Figure 9] generally planar yarn assemblies used **in the nonwoven press felt base fabrics of the present invention.**”

(Lee, p. 15, ¶3.)



Lee, Figure 8

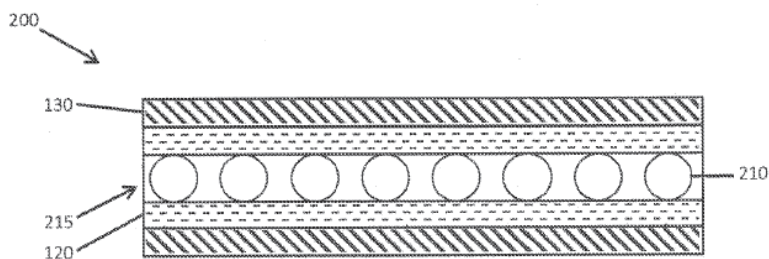


Figure 9

Lee, Figure 9

100. Lee describes that “[a] continuous length of the first fabric structure 100 is provided as described above and is **then spirally wound** and assembled in a known manner as shown in Figures 1- 3 and 11, to provide a continuous tube 300 that is open in the center area 310.” Figure 15 (below) “shows the freed MD yarn loops 340a, 340b exposed following [a] brushing process... At this point, the flattened tube 300 is ready for the generally planar yarn assembly that forms the second fabric structure 200 to be inserted into the open area 310 inside the collapsed tube 300.” (Lee, p. 30, ¶2.)

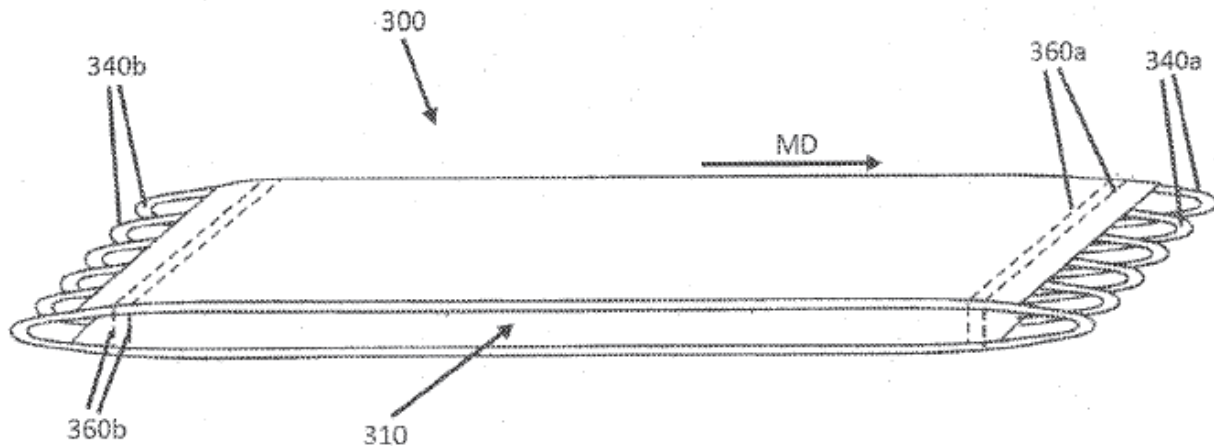


Figure 15

Lee, Figure 15

101. Lee discloses a second fabric structure inserted into Lee's first fabric structure, as shown in Figure 16 (below). Lee specifically describes inserting the "generally planar yarn assembly 200" into the "open central area 310" of the collapsed tube and stitching adjacent to the seam loops (shown as "stitches 360a, 360b"), explaining that one end is "held in position via a clamp ... so that the end touches the interior edge of the MD yarn loops at the fold," and that this creates "a uniform opening or channel between the first end of the yarn assembly 200 and the interior of the MD yarn loops," which "eventually becomes the pintle channel." (Lee, p. 31, ¶1).

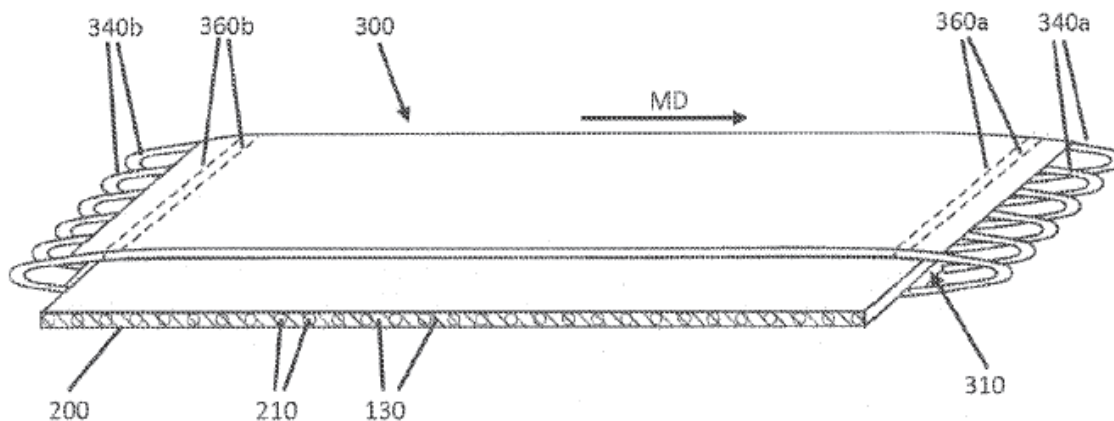


Figure 16

Lee, Figure 16

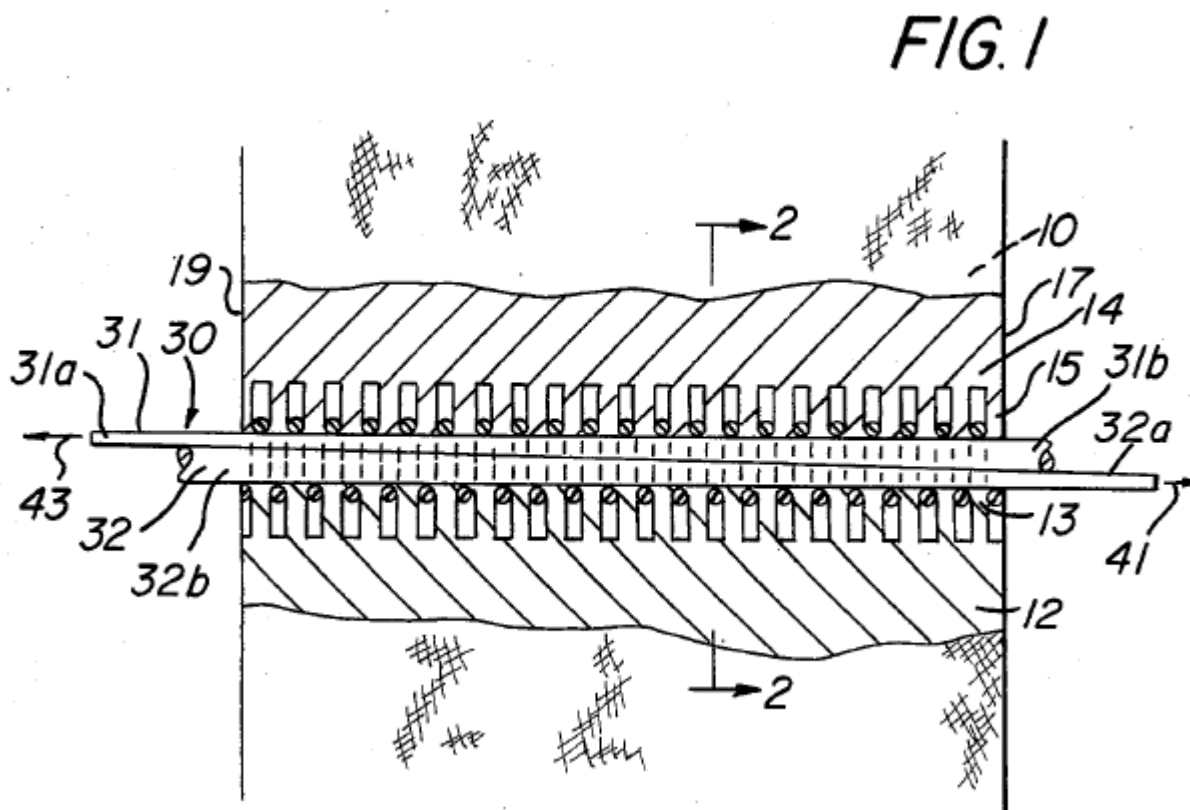
102. **The seam loops are formed exclusively from the first structure's yarns at the fold regions; the second fabric structure does not itself form any loops.** Lee states that “[y]arn loops 340a, 340b ... when brought together and intermeshed provide open channel 419 through which pintle 418 may be inserted to close the opposing ends.” (Lee, p. 32, ¶2.)

D. Penven [EX1006]

103. Penven relates to papermaking machine felts and seaming methods for joining the ends of a flat felt into an endless belt. Penven describes that seams “typically include loops or hooks on the end of the felt which are aligned in an alternating intermeshing relationship and a pintle connector which is inserted through the aligned loops or hooks to close the seam.” (Penven, 1:17-23.)

104. More specifically, in connection to Figure 1 (below), Penven discloses that “[s]paced apart loops ... are formed at end 12 so as to alternately intermesh with

[a] loop ... formed at end 14,” and “[o]rientation of loops ... forms a substantially tubular passageway 20 through which a locking element or pintle may be inserted.” (Penven, 3:10-17.) Penven further states that “[i]nsertion of a pintle through passageway 20 effectively closes the seam and provides the desired endless felt.” (Penven, 3:17-19.)

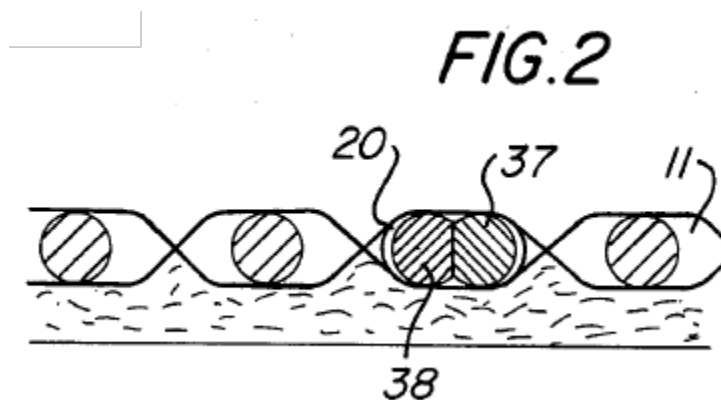


Penven, Figure 1

105. Penven further discloses that “[t]he pintle units 31 and 32 are provided with a long, relatively gradual taper so that **a tight fit along the complete length of the pintle unit** can be provided. For a typical seam in a papermaker’s fabric having an **internal void diameter** of about 50 mils, a pintle unit having a taper of about

0.075 mil/inch is effective for felts up to about 300 inches in width.” (Penven, 3:60-67.)

106. Penven’s Figure 2 (below) “is a cross section along line 2-2 of FIG. 1.” (Penven, 2:27.) In Penven, the “internal void diameter” is a parameter describing the composite passageway formed by the collective intermeshing of loops from both fabric ends. (See, Figures 1, 2.)



Penven, Figure 2

107. Penven’s base fabric is a conventional plain woven construction whose MD yarns pass over and under CD yarns, creating crossover/interlacing points throughout the fabric body — a feature that distinguishes Penven from Lee’s non-interwoven planar yarn arrays. Penven's focus is on the geometry and taper of the pintle element used to achieve a tight seam closure, and Penven does not teach any particular loop-diameter-to-MD-yarn-diameter ratio as an optimized design parameter.

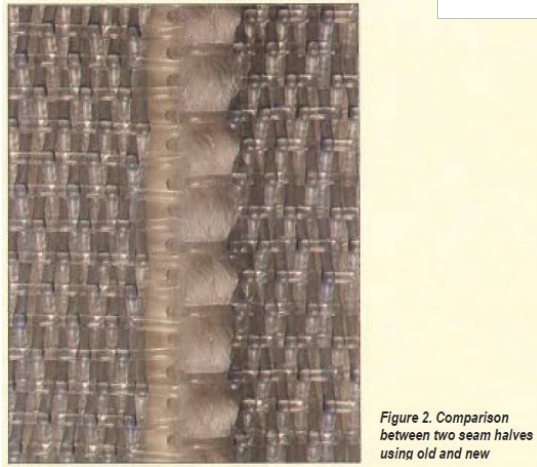
E. Rydin [EX1028]

108. Rydin is a trade article describing problems with early seamed press felts and improvements introduced by a “new generation” seamed felt design.

109. With respect to earlier designs, Rydin describes “[p]revious seams” where “[t]he earliest seams had long loops, i.e[.], cross-threads in the weave were missing on both sides of the centerline of the seam,” and lists consequences including marking and “lower fiber anchoring” leading to “increased batt wear in the seam zone.” (Rydin, 1.) Rydin summarizes that “the most common causes of marking can be attributed to an overly open seam, long loops, and a long flap, which quickly cause wear in the seam area.” (Rydin, 1.)

110. Rydin describes the solution adopted by the new generation design: a “special weaving technique” was used to “bridge the top of the loops with an inwoven batt-like yarn that acts as a flap covering the loops,” noting that “[d]uring the subsequent needling process, this yarn is largely integrated into the batt structure,” a change that Rydin states “has resulted in such a significant reduction in marking that it is clearly justified to speak of a new generation of seamed felt.” (Rydin, 2.)

111. In the context of this proceeding, Dr. Pastore relies on photographs in Rydin’s Figures 2 and 3 (below) to extract loop-density and LD/MDYD ratio values through pixel-based measurement.



Rydin, Figure 2



Rydin, Figure 3

112. Those photographs contain no measurement scale or calibration reference, and Rydin itself discloses no particular loop-diameter-to-MD-yarn-diameter (LD/MDYD) ratio as a design parameter or as a characteristic of the depicted product. Rydin's substantive disclosures concern marking problems, loop length, and the structural innovation of bridging loop tops with a batt-like in-woven yarn.

VII. GROUNDS 1A-1E: CLAIMS 1-15 ARE PATENTABLE OVER SUDRE, ADANUR, AND THE SECONDARY REFERENCES

A. Ground 1A: Sudre and Adanur Fail to Teach or Suggest the Claimed Loop Density and LD/MDYD Ratio

113. In Ground 1A, Dr. Pastore alleges that claims 1, 3, and 10-13 are obvious over the combination of Sudre and Adanur. (EX1003, ¶¶58-147.) For the reasons I present below, Petitioner's proposed combination of Sudre and Adanur would not render the identified claims obvious.

1. A POSITA Would Not Look Into Adanur to Modify Sudre

114. Dr. Pastore relies on only a half-sentence phrase in Sudre as motivation for a POSITA to look to other various prior art references, including Adanur, to determine the values of the claimed LD/MDYD ratio and loop density for designing a PMC. Specifically, Dr. Pastore alleges:

“While Sudre explains that ‘a papermaker’s fabric meeting the *particular requirements of its intended end use* as regards performance characteristics *can be produced from that base fabric in a simple and ready manner*,’ it does not provide the specific parameters, such as warp thread size and spacing. EX1004, 6:14-17. For this reason, a POSITA would have been motivated to look to other known sources to identify the ‘particular requirements’ of the fabric to obtain the necessary ‘performance characteristics’ for the base fabric. EX1004, 6:14-17.” (EX1003, ¶78 (original emphasis).)

115. First, neither Petitioner nor Dr. Pastore offer any specific reason or any substantive evidence explaining why or how this phrase would motivate a POSITA to look into Adanur or other references to find specific values of the LD/MDYD ratio and loop density for designing a PMC. (Petition, 79-80; EX1003, ¶78.)

116. Rather, Dr. Pastore relies on the *absence* of any quantitative information in Sudre to infer incorrectly the *presence* of a suggestion to add this quantitative information. (EX1003, ¶78.) But there are many other considerations

Sudre did “not provide,” such as batt fiber denier (diameter), batt fiber material composition, number of batt layers and batt weight, needling parameters, weave pattern specifics, overall fabric thickness and air permeability targets. Despite this long list of other considerations, Dr. Pastore only and selectively considers and relies upon one he was looking for – the LD/MDYD ratio and loop density, which happen to be the precise limitations recited in the ’566 Patent claims. As for other considerations are parameters Sudre equally “does not provide,” yet Dr. Pastore does not treat any of them as a motivation to consult secondary references. In reality, nothing in Sudre suggests a POSITA would focus just on one consideration and Dr. Pastore’s analysis seems to be informed only by the claims of the ’566 Patent. This confirms that Dr. Pastore’s selection was driven by hindsight knowledge of the ’566 Patent, not by anything Sudre itself would have directed a POSITA to investigate.

117. Second, the half-sentence phrase that Dr. Pastore relies on from Sudre is part of a paragraph in which Sudre discloses specific requirements for the fabric’s intended end use. But Dr. Pastore takes Sudre’s disclosure out of context to make up non-existent “requirements,” i.e., “warp thread size and spacing.” (EX1003, ¶78.) These made-up requirements are solely to support Dr. Pastore’s motivation-to-combine theory.

118. However, when the full statement is read, it is clear that a POSITA would have understood that Sudre explicitly refers to a “length” requirement as the

“particular requirement of [the fabric’s] intended end use.” The entire paragraph of Sudre is provided below:

“As will readily be appreciated, in the case of a flat-woven structure **requisite lengths of base fabric woven in any desired weave pattern** [sic] may be cut from a stock supply thereof, and a papermaker’s fabric meeting the particular requirements of its intended end use as regards performance characteristics can be produced from that base fabric in a simple and ready manner.” (Sudre, 6:11-17.)

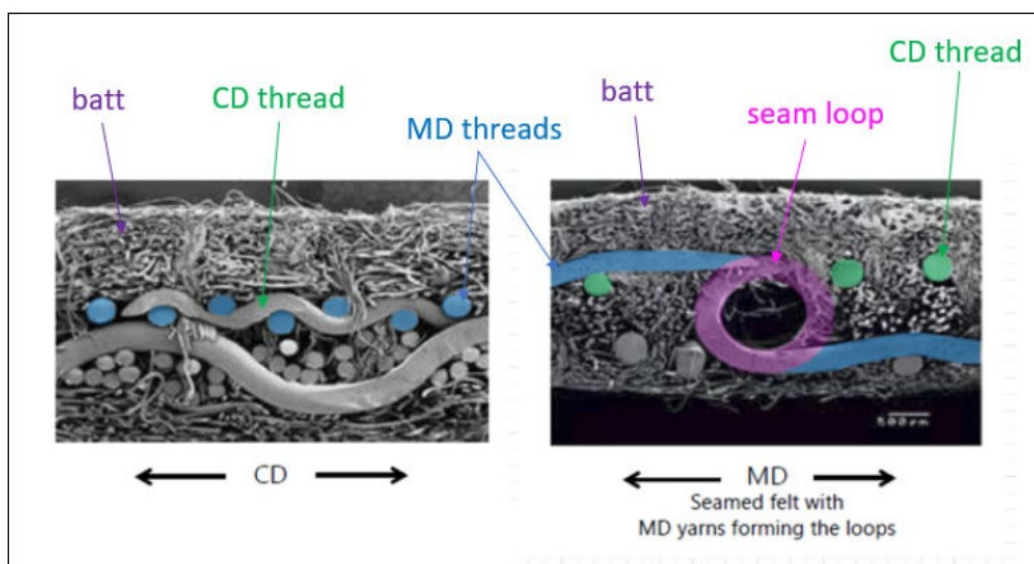
119. Accordingly, Sudre discloses the “particular requirements” of the fabric’s “intended end use” as the “requisite lengths” and “weave pattern” of the base fabric. If at all, a POSITA would have investigated how different lengths and weave patterns of the fabric to meet the requirements of its intended use. Dr. Pastore’s made-up “requirements” are solely guided by hindsight.

120. Sudre does not identify any technical problem related to seam loop density or loop diameter ratios. Sudre merely describes a conventional method for forming a seam in a flat-woven fabric but does not suggest any design of dimensional parameters or a reason to create the dimensions and characteristics in the ’566 Patent. (Sudre, 3:9-4:7.)

121. Adanur equally lacks such information. Adanur, for its part, is a paper machine clothing company handbook (AstenJohnson) that presents Figure 3.15 in a section titled, “The Batt,” with the apparent purpose of illustrating the batt fiber

structure, yet does not offer any teaching of seam configuration. The batt fiber structure is a needle punched assembly of nonwoven fibers. Like Sudre, Adanur does not suggest any design of dimensional parameters or a reason to create the dimensions and characteristics in the '566 Patent.

122. Dr. Pastore's reliance on this figure to derive seam related parameters is therefore misplaced. Indeed, the MD photograph of Figure 3.15 (below) does not appear to depict a seam like the seam formed in Sudre. A POSITA would have expected to find two MD threads (a top one and a bottom one) on both the left and right side of what Dr. Pastore identified as a seam in his annotated Figure 3.15 on page 39 of his declaration. (*See*, EX1003, p. 39.)



Adanur, Figure 3.15 (annotated by Petitioner)

123. Moreover, Adanur does not describe the illustrated parameters, such as monofilament diameter, seam loop diameter, or loop density, as advantageous or

optimized for seam performance. There is no indication that these values were selected to improve seam strength, uniformity, permeability, or any other functional property relevant to the claimed invention.

124. Dr. Pastore's arguments are solely premised on hindsight. Dr. Pastore does not explain how the prior art would have provided a POSITA with an apparent reason to calculate the seam loop density and the LD/MDYD ratio, as required by independent claim 1. Instead, Dr. Pastore used the '566 Patent as a measurement framework. Below I present testimony from Dr. Pastore's declaration that demonstrates how Dr. Pastore used the teachings of the '566 Patent as a roadmap to fill gaps of the prior art:

- Dr. Pastore uses the '566 Patent's definition of loop diameter to measure Adanur: "consistent with the process described by the '566 Patent: 'To determine the diameter of a seam loop, the largest circle which can be inserted completely into the seam loop is ascertained...' EX1001, 2:46-49.'" (EX1003, ¶68.) Dr. Pastore explicitly adopts the patent's measurement rule to extract values from prior art.
- Dr. Pastore uses the '566 Patent's formula for loop density to calculate Adanur's loop density: "Since the '566 Patent states that 'When determining the seam loop density...' ... EX1001, 6:11-18.'" (EX1003, ¶91.) Dr. Pastore applies the '566 Patent's loop density equation to the prior art.

- Dr. Pastore relies again on the '566 Patents loop-density calculation formula: "The loop density is calculated... consistent with the '566 Patent. *See* EX1001, 6:11-18." (EX1003, ¶130.)

125. Dr. Pastore doubled down on his reliance on the '566 Patent teachings during cross examination. I provide below deposition testimony from Dr. Pastore where he admitted that the prior art did not disclose the claimed features that he was trying to invalidate or that the prior art did not provide the necessary disclosure for his analysis, which he admits he used from the '566 Patent.

a) Dr. Pastore Used the '566 Patent's Definition of Loop Diameter on Adanur and Rydin

Q. Before reading the '566 Patent, have you had an idea on how to measure the seam loop diameter?

THE WITNESS: Before reading the '566 Patent, I never focused on seam loop diameters before.

(EX2012, 103:20–104:4.)

Q. So you used the method described in the '566 Patent to compare the claims of the '566 Patent with the prior art; correct?

A. Correct.

(EX2012, 101:1–4.)

Q. You used the '566 Patent's process to measure the loop diameter in Adanur's picture; correct?

A. Correct.

(EX2012, 100:4-7.)

Q. The '566 Patent defines loop diameter as the diameter of the largest circle that can be completely inserted into the seam loop; correct?

A. Correct.

Q. Adanur does not contain that definition; correct?

A. Correct.

Q. So, again, you applied the '566 Patent's loop diameter definition when measuring Adanur's Figure 3.15; correct?

A. Correct.

(EX2012, 101:15-102:3.)

Q. You used the '566 -- the '566 Patent's process to measure the loop diameter; correct?

A. Correct.

Q. And you used the '566 process to measure the loop diameter in Rydin's picture; correct?

A. Correct.

(EX2012, 102:13-19.)

Q. Rydin does not provide the definition of loop diameter as the largest circle which can be inserted completely into the seam loop; correct?

A. Correct.

Q. And you applied the '566 Patent loop diameter definition when measuring Rydin's figures; correct?

A. Correct.

(EX2012, 104:6-13.)

b) Dr. Pastore Used the '566 Patent's Formula to Calculate Loop Density for Every Prior Art Reference

Q: Now, the formula for calculating the loop density is provided by the '566 Patent; correct?

A. Correct.

Q. You applied to Adanur the formula described in the '566 patent to calculate the -- to calculate the loop density; correct?

A. Correct.

Q. You have not considered any other way of calculating a loop density that was not described in the '566 Patent; correct?

A. Correct.

Q. Like Adanur, Lee also does not provide a formula to calculate a loop density; correct?

A. Correct.

Q. Penven does not provide that formula either; correct?

A. Correct.

Q. Rydin does not provide that formula; correct?

A. Correct.

Q. So every time you calculated the loop density in the prior art, you applied the '566 Patent's loop density formula; correct?

A. Correct.

(EX2012, 114:15-115:17.)

c) Dr. Pastore Used the '566 Patent's Thermal Shrinkage Discussion to Interpret Prior Art Loop Density

Q. In Paragraph 132 of your declaration, you describe the '566 patent's discussion of thermal shrinkage; correct?

A. Correct.

Q. The '566 patent states that loop density can increase after thermal treatment; correct?

A. Correct.

Q. You used that statement to argue that even if prior art loop density was lower, it would fall within the claimed range after shrinkage; correct?

THE WITNESS: I argued that '566 tells us that the loop density can change as a result of processing and gives us some ranges of what a unfinished fabric might be and what a finished fabric might be.

Q. And you used that teaching from the '566 patent to form your opinion about the prior art; correct?

THE WITNESS: **Correct.**

(EX2012, 115:21-116:22)

Q. And in Paragraphs 379 and 380, if you can turn there, you used the '566 patent's thermal shrinkage statements to address the possibility that Rydin's measured loop density might not represent a finished fabric; correct?

A. Correct. The same logic applied to Lee.

Q. None of the prior art references you analyzed state that their loop density should be recalculated using the '566 patent's shrinkage discussion; correct?

THE WITNESS: Correct.

Q. Adanur did not instruct that analysis; correct?

A. Adanur did not say anything about that analysis.

Q. Lee also did not say anything about that analysis; correct?

THE WITNESS: Correct.

Q. Rydin did not instruct that analysis either; correct?

THE WITNESS: Correct.

(EX2012, 118:22-120:4.)

Q. And you offered these conclusions by using the '566 patent's description and discussion of thermal treatment; correct?

A. Correct.

(EX2012, 121:9-12.)

d) Dr. Pastore Applied the '566 Patent's Definitions and Formulas Across All Prior Art to Test Claim Satisfaction

Q. And you applied the '566 Patent's definitions and formulas to the prior art to see whether the prior art satisfied the patent's claim limitations; correct?

A. I used the definitions from '566 to see if they were novel or something that was just standard in the industry.

(EX2012, 124:17-125:1.)

Q. And you also used the formulas of the '566 Patent to the prior art in order to see whether the prior art itself satisfied the patent claims -- the patent claim limitations; correct?

A. Yes, again, to see if those ranges were anticipated.

(EX2012, 125:21-126:4.)

e) Dr. Pastore Admitted the LD/MDYD Parameter Would Not Have Been Identified Without the '566 Patent

Q. [The prior art] references do not discuss LD/MDYD as a parameter; correct?

A. Correct.

Q. Without the knowledge of the '566 Patent, someone would not have identified LD/MDYD as a parameter in the prior art references; correct?

THE WITNESS: Correct.

(EX2012, 122:19-123:5.)

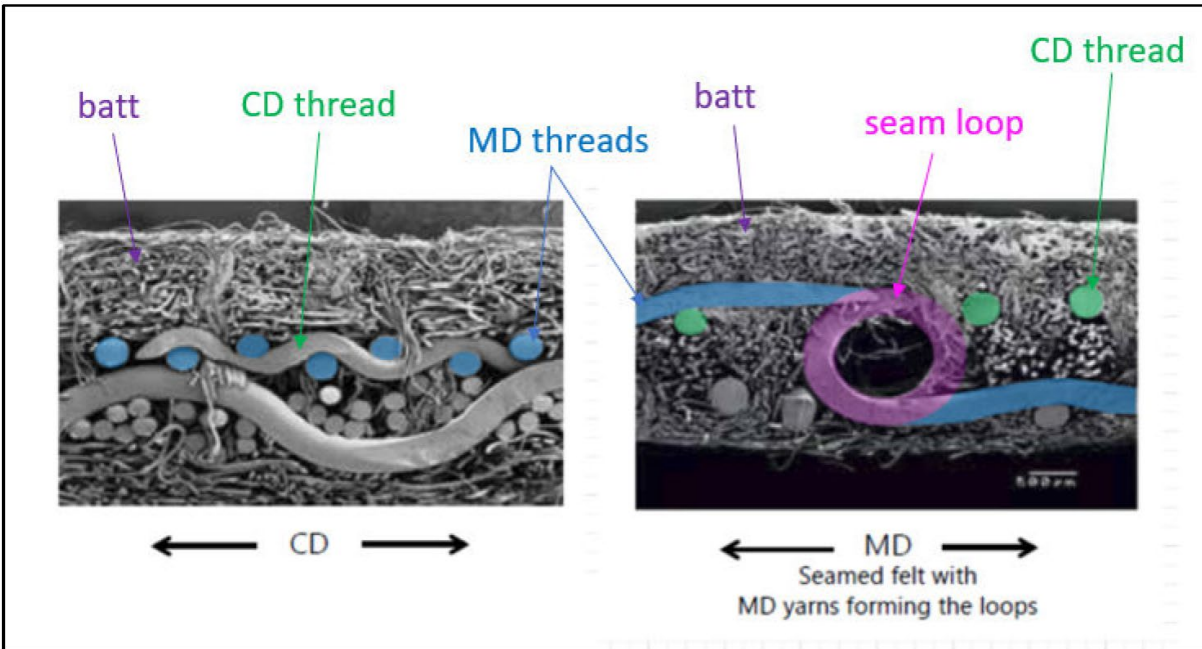
Q. But the motivation to do that calculation would come from the '566 Patent and someone trying to invalidate Claim 1; correct?

A. Trying to see if Claim 1 said anything new, one would look at that ratio.

(EX2012, 373:13-19.)

2. Adanur's Photographs Show Two Different Fabrics

126. Petitioner's arguments in Ground 1 rely on measurements (pixel counting) obtained by Dr. Pastore from two photographs provided in Figure 3.15 of Adanur (Adanur-1997), which I reproduce below with Dr. Pastore's annotations.



EX1003, p. 38 (showing Adanur, Figure 3.15 as annotated by Dr. Pastore).

127. The first photograph on the left is captioned “CD” (“CD Picture”) and the second photograph on the right is captioned “MD.” (“MD Picture”.) Even assuming, for the sake of argument, that counting pixels on Adanur’s Figure 3.15 is an appropriate methodology to calculate thread diameter, thread density, or seam loop density, such pixel counting requires at least that 1) the CD Picture and the MD Picture in Adanur are obtained from the same fabric, and 2) the CD Picture and the MD Picture are reproduced in the same magnification and resolution scales across the horizontal and vertical dimensions. **Both of these are necessary assumptions for Dr. Pastore’s measurements and not supported by the disclosure in Adanur.** The first assumption is necessary because claim 1 requires “a seam interconnecting said end sides...” where “*said seam* having a loop density...” and “said diameter

LD of *said seam loops*.” (EX1001, claim 1.) Accordingly, any loop density measurement and seam loop diameter (LD) measurement must correspond to the same “said seam,” i.e., the same seamed fabric.”

128. **Dr. Pastore either failed to appreciate this claim requirement or ignored it.** Dr. Pastore admitted that the “*seam* having a loop *density*” of claim 1 is the same seam as the “*seam* interconnecting said end sides...” of the previous limitation. (EX1001, claim 1.)

Q. Do you understand the seam “having a loop density of between 64 percent and 90 percent” to correspond to the seam of the limitation at Column 10 Line 5?

A. Yes.

Q. They’re the same seam; correct?

THE WITNESS: I believe so.

(EX2012, 92:8-15.)

129. However, when asked whether the claimed “loop *diameter*” also corresponded to the same seam defined previously in claim 1, Dr. Pastore failed to recognize any reference of the “said loop diameter” (LD) in claim 1 to the claimed “seam.” I have reproduced the deposition testimony below.

Q. And the seam loop density **and the seam loop diameter correspond to the seam that is defined in Column 10, Line 5; correct?**

A. I know this sounds pedantic, but the seam loop density clearly belongs to the seam.

Q. Okay.

A. Said seam having a loop density of.

Q. Okay.

A. **The said loop diameter makes no reference to the seam anywhere.**

(EX2012, 96:7-16.)

130. So, either Dr. Pastore failed to appreciate that the loop density and loop diameter (LD) correspond to the same seam—and therefore related measurements should be made from the same seam—or, and to the extend Dr. Pastore misspoke at this deposition, he ignored this requirement.

131. The second assumption is necessary because any measurement on a picture that has not been reproduced on the same horizontal and vertical scale, e.g., a distorted picture, would generate false measurements, when these measurements involve distances on both the horizontal and vertical dimension. As explained in detail below, Dr. Pastore (i) measured pixels on the horizontal and vertical dimensions on the CD picture and averaged his measurements, (EX1003, ¶¶69-70) and (ii) measured a vertical distance using a scalebar that only corresponded to the horizontal dimension on the MD picture of Figure 3.15 of Adanur. (EX1003, ¶68.)

132. Dr. Pastore failed to recognize these necessary requirements in his analysis of Ground 1A. **As such, his analysis is not credible.** For example, Dr. Pastore testified:

Q. Now, you testified that it wasn't necessary for your analysis that the fabric on the CD picture and the MD picture of Figure 3.15 of Adanur would be the same fabric; correct?

A. Correct.

(EX2012, 288:12-16.)

133. And Dr. Pastore despite recognizing the importance of not taking measurements on distorted pictures, as he testified, he not confirm, e.g., with measurements, whether the pictures in Figure 3.15 were not distorted, other than performing a visual inspection.

Q. And distorting the image is something that you don't want to do when you're taking measurements of pixels; correct?

A. Correct.

(EX2012, 214:10-16.)

Q. Did you measure the vertical and horizontal diameter of the CD threads?

A. I did not. I just used a visual approximation and saw that they looked approximately aspect ratio of 1.

(EX2012, 215:14-18.)

134. A POSITA performing measurements related to fabric dimensions would not rely on a visual inspection to confirm whether an image is distorted, and, therefore, inappropriate to use for measuring seam related measurements.

135. In any case, not only are these assumptions merely conjectures but they are **demonstrably false**. First, Adanur and Dr. Pastore **both** indicate that these

pictures illustrate two *fabrics*. For example, Adanur clearly states the pictures show “cross-sections of actual finished press fabrics.” (Adanur, 13.) Adanur uses the **plural** term (“fabrics”) and provides no statement that the fabrics in the MD and CD pictures are structurally linked or derived from the same fabric sample. Notably, as shown below, in Figure 3.15, Adanur only identifies the MD picture as depicting a “[s]eamed felt” (singular), while identifies the CD picture and the MD picture as illustrating “[C]ross-sections of finished press fabrics.” (Adanur, Figure 3.15.)

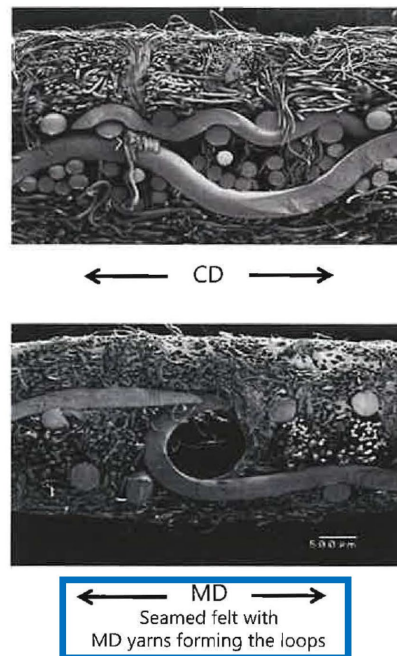
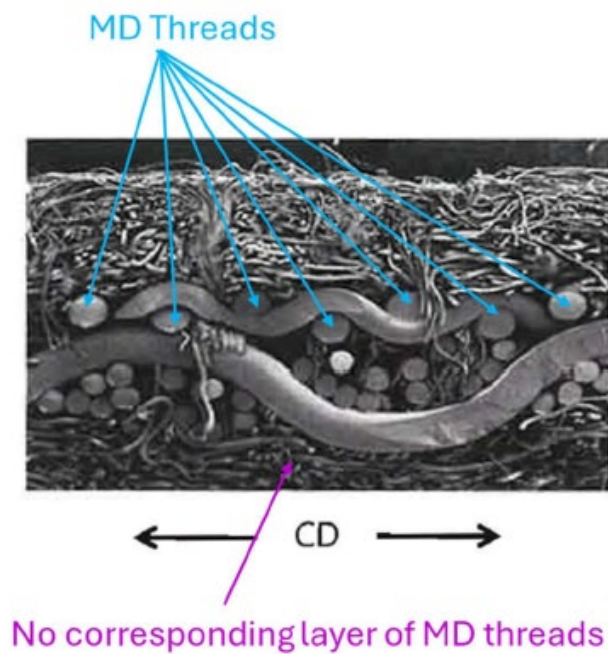


FIGURE 3.15. Cross-sections of finished press fabrics.

Adanur, Figure 3.15 (annotated to contrast the plural “fabrics” with the singular “seamed felt”)

136. Moreover, the structural inconsistencies between these two images are easily visually apparent. A POSITA visually inspecting the CD picture can readily

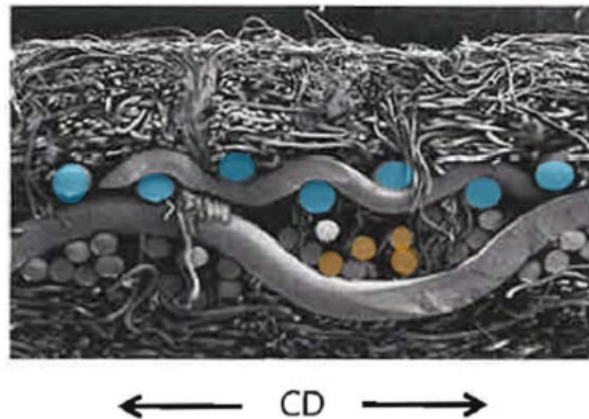
see that no MD threads are visible at the bottom of the structure. If the CD picture were from a two-layer structure created by folding a base weave, for example, as I described above with reference to Figures 1a and 1c of the '566 Patent, it would have two identical, "mirror image" layers of MD yarns (i.e., two identical layers having circular cross-sections similar to the cross-sections Dr. Pastore has colored blue). However, as I have shown below, the CD picture of Adanur does not have a second layer of MD threads that correspond to the top layer of MD threads.



Adanur, Figure 3.15 (partially reproduced and annotated)

137. Further, as shown below, there are fewer MD yarns on the top portion of the CD Picture when compared to the bottom portion of the CD Picture and the MD yarns on the top (annotated below in blue) appear to have larger dimensions than the MD yarns on the bottom (annotated below in orange) of the CD Picture. If

the CD and MD Pictures were photos of the same structure, MD threads would necessarily be visible at the bottom of the structure, especially if the structure were a two-layer laminate with continuous MD threads, as Dr. Pastore and the Petitioner assert.



Adanur, Figure 3.15 (partially reproduced and annotated)

138. Similarly, if the CD and MD Pictures were photographs of the same structure, then the more numerous, smaller MD yarns on the bottom of the CD Picture (annotated above in orange) would appear in the MD Picture. **They do not.**

139. Moreover, if the CD and MD Pictures were photographs of the same structure, then the thick thread traversing the entire width of the picture would appear in the MD Picture. As Dr. Pastore even admitted, **it does not.** (See, EX2012, 289:20-290:2 (“As you can see **in the CD picture, there’s an extra layer of fabric** beneath the top layer of the base fabric; and **when we get to the seam loop, that middle layer is not present at the seam loops.**”).)

140. Dr. Pastore made no assessment of these differences and lacks the knowledge sufficient to even appreciate the differences and their significance. Rather Dr. Pastore assumes they are the same because they coexist in a single figure.

Q. These are two different pictures, images of fabrics in Figure 3.15; correct?

A. **But it's one figure.**

(EX2012, 110:2-4.)

Q. One of the basis we just mentioned now for using the same scale bar in two different images is **the fact that these two images co-exist in the same figure**? Is that your testimony?

A. **They co-exist in the same figure**, and as I've described in my report, they had approximately the same number of pixels, which reasserts that they were the same scale.

(EX2012, 111:5-13.)

141. Later in his deposition, Dr. Pastore admitted that the fabrics in Figure 3.15 of Adanur may be different:

Q. You also made the assumption that the pictures of Figure 3.15 of Adanur correspond to the same fabric; correct?

A. They very well might, obviously from different locations in the finished press fabric. It's possible they're two different ones, but they may be the same one.

Q. So you've considered whether the press fabric shown in the two pictures do not correspond to the same fabric?

A. I considered that as a possibility, but it didn't change my analysis.

(EX2012, 271:18-272:7.)

142. Second, Dr. Pastore relies on several flawed assumptions in attempting to extract dimensions that simply do not exist in Adanur. Specifically, Dr. Pastore stated in his declaration: “I have taken measurements of the ‘actual finished press fabrics’ shown in Adanur.” (EX1003, ¶67.)

143. But as Dr. Pastore later admitted during cross-examination, he did not take measurements of the physical exemplars of the fabrics shown in Figure 3.15.

Q. Did Dr. Adanur provide you with access to the actual finished press fabrics shown in Figure 3.15 of the Adanur exhibit?

A. No.

(EX2012, 245:19-22.)

Q. So you didn’t actually take measurements of the actual press fabrics themselves?

A. I never touched the fabrics.

(EX2012, 246:22-247:3.)

Q. So no actual measurements were done in the 3D structures that correspond to the actual finished press fabrics; correct?

A. Correct.

(EX2012, 248:6-9.)

144. Instead, Dr. Pastore took “measurements” from pictures of them, and admitted in his deposition testimony that he would have preferred if the fabrics were made available to him:

THE WITNESS:. ...[I]t certainly would have been preferred if those materials were available to me.

Q. They were not made available to you; correct?

22 A. Correct.”

(EX2012, 248:15-22.)

145. The characteristics of these images are speculative, and, as discussed below, Dr. Pastore’s methodology is likewise speculative and unsupported.

146. Dr. Pastore’s assessment is based on assuming the same scale between the two images. Dr. Pastore relies on nothing but the existence of a single scale in one of the two images. But, as described above, the two images are fundamentally different, so there is no reason to assume the scale applies.

147. Moreover, a POSITA would also readily appreciate that the CD and MD pictures have different height and magnification levels, such that the scale bar of the MD Picture cannot be applied to measure any of the dimensional characteristics of the filaments of the CD picture. Even assuming only for the sake of argument that the two pictures are of the same fabric, the scale bar of the MD Picture can only be applied to the CD picture **if** the two pictures have the same magnification level and show the threads according to the same magnification scale. Specifically, a POSITA would understand that if he takes two photographs of the same press felt with the same magnification level—and from the same distance with the same lenses to account for lens distortion—the resulting depiction of the press

felt should have the same thickness in both pictures. However, the press felt shown in the CD Picture of Adanur is clearly at least about one third ($1/3$) thicker than the felt shown in the MD Picture. Thus, even if one incorrectly assumed these pictures were of the same fabric, they clearly are not of the same magnification and scale, which as Dr. Pastore admitted is a necessary requirement for this measurement methodology.

Q. You couldn't use the pixel measurements for the MD thread **if they were done at a different magnification** compared to the pixel measurements for the loop diameter; correct?

A. **The measurements have to be done at the same magnification**, or from the same picture, of course, is one way to accomplish that.

Q. And if they were not made at the same magnification, then those pixel measurements would not provide useful results in your analysis; correct?

A. Not for that ratio calculation, no.

(EX2012, 195:15-196:4.)

Q. What do you mean when you say "the same magnification"?

A. I was trying to communicate that it wouldn't make any sense to use the diameter measurements from Figure 2 and combine that with the loop diameter of Figure 3 because we have no way of knowing if they were the same magnification.

(EX2012, 194:15-21.)

148. Dr. Pastore failed to recognize these fundamental inconsistencies, which I find particularly surprising and problematic. An experienced textile engineer with experience examining woven textile fabrics should have recognized that the two images cannot represent the same fabric, especially considering the absence of MD threads in the CD image, and certainly are not of the same magnification and scale.

3. No Evidence that the CD Picture Depicts a Seam Structure

149. Compounding the problems of Adanur's pictures, the CD picture of Adanur does not depict a seam structure. Therefore, there is no basis for Dr. Pastore's use of the CD image to calculate the claimed "loop density," because claim 1 requires a "**seam** having a loop density of between 64% and 90%."

150. Contrary to Dr. Pastore's misplaced assumption, Adanur simply states that the CD and MD pictures show "the most common means of batt application." (Adanur-1997, 13.) There is no indication that the MD threads in the CD Picture form seam loops, nor is there any evidence that the illustrated fabric in the CD Picture is part of a seamed press felt, as discussed above.

151. In fact, considering that Figure 3.15 appears in a section of Adanur titled "The Batt," a POSITA would understand that the CD Picture is provided to illustrate the batt fiber structure, and not a seam region. In fact, Adanur states that "Figure 3.15 shows cross-sections of actual finished press fabrics" (Adanur-1997,

13) and identifies only the MD picture of Figure 3.15 as showing a “[s]eamed felt with MD yarns forming the loops.” Notably, Adanur refers to the “fabrics” in plural, but to the “seam felt” in singular, because as it is apparent in Figure 3.15, there is no seam depicted in the CD picture. And as Dr. Pastore admitted during cross-examination,

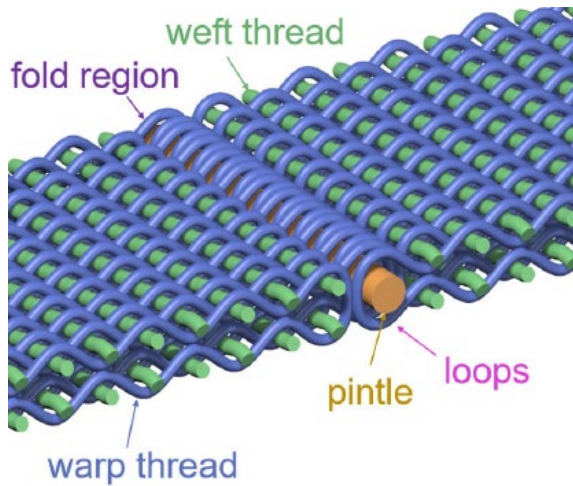
Q. [T]here can be pressed fabrics that are not seamed; correct?

A. There can be, yes.

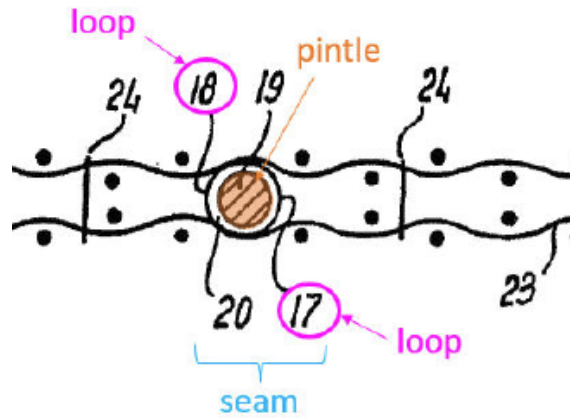
(EX2012, 291:18-20.)

152. Therefore, a POSITA would not have been motivated to rely on measurements of the CD picture of Adanur to calculate the “loop diameter.”

153. Similarly, there is no indication in Adanur that the MD picture depicts a seam structure, like Sudre’s seam structure. A POSITA would have understood that a formation of a seam loop requires the presence of two MD threads on either side of the seem loop. This is illustrated even in Dr. Pastore’s annotations. For example, Dr. Pastore shows the two MD threads (a top thread and a bottom thread) on each side of a seam loop throughout his declaration. I reproduce below illustrative examples from Dr. Pastore’s declaration.

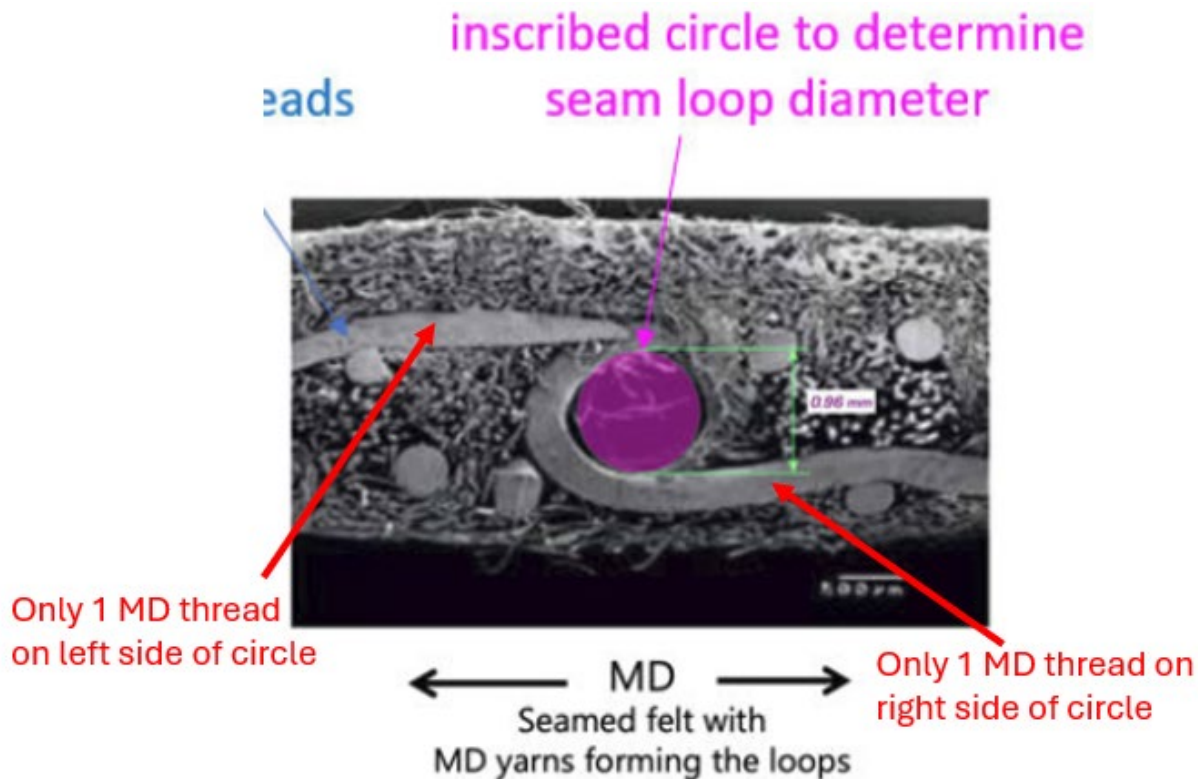


EX1003, p. 26



EX1003, p. 33

154. In contrast, the MD picture in Figure 3.15 of Adanur does not show two MD threads (a top thread and a bottom thread) on each side of a seam loop. Dr. Pastore's declaration failed to recognize this or failed to explain this inconsistency. Therefore, a POSITA would have understood that the MD picture in Figure 3.15 of Adanur does not depict a seam loop like Sudre's seam loop.



EX1003, Adanur, Figure 3.15 (partially reproduced and annotated by Dr. Pastore, and further annotated to show a single MD thread on either side of the circle)

155. **Because all of Dr. Pastore’s calculations are premised on these incorrect assumptions, the entirety of his Ground 1A analysis collapses.**

4. Dr. Pastore’s Analysis of the Pixel Measurements Is Statistically Unsound and Meaningless

156. Even setting aside the problems I analyzed in Sections VII.A-VII.A.3, Dr. Pastore’s methodology is independently unreliable on multiple reasons.

a) Dr. Pastore Provides No Scientifically Accepted Source or Literature for His Pixel Counting Methodology

157. Dr. Pastore explains that he first determined the MD thread diameter and MD thread density of the fabric shown on the picture labeled “CD” (“CD

Picture”) by directly measuring features of that picture. Dr. Pastore then measured the loop diameter of the seam loop in the picture labeled “MD” (“MD picture”) and converted his measurement from pixels to millimeters by relying on the scalebar of the MD picture. (EX1003, ¶¶66-68.) Based on these measurements, Dr. Pastore concluded that Adanur’s “exemplary base fabrics had a seam made of MD threads with a diameter of about 0.32 mm present at an MD thread density of about 13.3 threads/cm, and with a loop diameter of about 0.96 mm.” (EX1003, ¶ 68.)

158. Dr. Pastore calculated these values by counting pixels in Adanur’s images. **But nowhere does Dr. Pastore explain his methodology and/or how he counted the pixels that he claims correspond to the different distances he measured.** Instead, Dr. Pastore makes express references to “tak[ing] measurements ... using conventional approaches” (EX1003, ¶66) and “a standard measurement protocol.” (EX1003, ¶69.)

159. But Dr. Pastore does not provide any “source or literature” for his pixel measurement methodology, which is reminiscent of his “toothpick test” which was found to be “junk science” by the court in a recent patent litigation case in the Southern District of New York where he served as an expert witness. (EX2003, 1; EX2004, 9.) Dr. Pastore did not provide any “source or literature,” even though understood the importance of providing sources or literature for the reproduction of methodology results, as he admitted during cross-examination:

Q. So you did not know that Judge Subramanian referred to your toothpick test as junk science; correct?

A. No.

Q. Do you know what is junk science?

A. Seems that the judge is -- I'm sorry. It seems that the judge is suggesting that it was not grounded in the literature.

Q. So Judge Subramanian found that your toothpick test was not based on any source or literature. Why is it important for a scientific theory to be based on sources or literature?

THE WITNESS: Generally we want to see that other people have used similar techniques and came up with the same results.

Q. So people can reproduce the results; correct?

A. Correct.

(EX2012, 178:14-179:12.)

160. The photographs that Dr. Pastore used to determine the “pixel count” do not disclose their resolution and as such, there is no way of knowing if the resolution is adequate to obtain an accurate pixel count. That is, a picture with a higher resolution would allow a POSITA to identify a pixel that appropriately corresponds, e.g., to the top point of the seam loop, compared to a picture with a lower resolution.

161. Dr. Pastore’s pixel measurements are premised on the assumption that the MD and CD Pictures are included in Adanur for dimensional analysis. This assumption is incorrect because nowhere in Adanur is there any indication that

Adanur was provided the CD and MD pictures for dimensional analysis, and no indication that these photographs are provided to scale for use by a POSITA to determine dimensions of a base structure. To the contrary, the only reference made by Adanur to the CD and MD pictures is a single sentence that indicates “Figure 3.15 shows cross-sections of **actual** finished press fabrics.” (Adanur-1997, 13.)

b) Dr. Pastore’s Measurements Reveal Image Distortion

162. However, even ignoring the analytical flaws discussed above, there is an additional and critical observation that can be made by Dr. Pastore’s pixel measurements. First, even assuming that Adanur’s Figure 3.15 depicts photographs from the same fabric, the scale of the photographs would need to be adjusted to be the same before taking any measurements. Dr. Pastore did not make any adjustments to the scale of the photographs. Further, Dr. Pastore states that he “measured two diameters (in pixels).” (EX1003, ¶69.) For example, Dr. Pastore identified seven (7) MD threads in the CD Picture and measured a vertical diameter and a horizontal diameter for each thread, as shown in the table below, which I reproduce from Dr. Pastore’s declaration.

Horizontal diameter (pixels)	Vertical Diameter (pixels)
80	59
76	60
75	61
79	65
75	63
77	58
79	65

EX1003, ¶69.

163. Dr. Pastore subsequently “averaged these measurements and obtained obtain *an average MD thread diameter* of 69 pixels with a standard deviation of 9.6 pixels.” (EX1003, ¶70.)

164. But my inspection of Dr. Pastore’s data points reveals that the “horizontal diameter” is consistently larger than the “vertical diameter.” When I averaged the “horizontal diameter” of the seven measured threads the average “horizontal diameter” is 77.3 pixels and when I averaged the “vertical diameter” of the same seven measured threads the average “vertical diameter” is 61.5 pixels. That is, when the horizontal and vertical diameter data points Dr. Pastore measured are properly separated, the average “horizontal diameter” is approximately 25% greater than the average “vertical diameter.” **This indicates that the threads are oval in shape.**

165. As it is well-understood by a POSITA with experience in the paper machine clothing industry that MD threads that are produced from monofilaments are known to have a round cross-section, the oval presentation of the MD threads in the CD Pictures strongly suggests that the CD picture is distorted and cannot be relied upon for dimensional analysis. **This distortion makes Dr. Pastore's argument unreliable.** An oval-shaped thread presentation confirms the image cannot be relied upon for dimensioning. Second, and equally important, if one incorrectly assumed that the CD picture was not distorted and was in fact provided by Adanur for dimensional analysis, the oval-shaped nature of the MD threads directly contradicts the language of claim 1, which explicitly requires “**MD threads being monofilaments with a round cross section.**” Petitioner cannot have it both ways: either the images are distorted (and thus unusable), or the images depict oval monofilaments (and thus the disclosed structure lacks the “round cross section” the claim requires).

c) Dr. Pastore's Averaging Violates Basic Statistical Principles

166. Further, by simply averaging the vertical and horizontal diameters, Dr. Pastore overlooks fundamental and well-known principles of statistics and incorrectly assumes that the vertical and horizontal diameter samples have the same distribution. The T-Distribution (or Student's T-Distribution) Confidence Interval is a well-known data analysis scheme used for analyzing distribution of data obtained

from smaller sample sizes, where population variance is unknown. In order to construct a confidence interval, a sample mean is first constructed. This sample mean is the average of the sample data. Since Dr. Pastore uses two datasets (i.e., horizontal diameter dataset and a vertical diameter dataset), he would need to calculate two averages (or two means): one average for the horizontal diameter data and another average for the vertical diameter data:

$$\text{Mean (horizontal diameters)} = 77.29$$

$$\text{Mean (vertical diameters)} = 61.57$$

167. A sample standard deviation should then be calculated for each sample and each average:

$$\text{Standard Deviation (Horiz. Diam.)} = \sqrt{\frac{\sum_{n=1}^7 (\text{Hor. Diam.}_n)^2}{n-1}} = 2.06$$

$$\text{Standard Deviation (Vert. Diam.)} = \sqrt{\frac{\sum_{n=1}^7 (\text{Vert. Diam.}_n)^2}{n-1}} = 2.83$$

168. Individual T-Distribution confidence intervals can then be calculated for each dataset.

169. However, Dr. Pastore's calculations are not correct because he has incorrectly averaged measurements of two different sets of metrics to arrive at a **meaningless value** that fails to represent the actual aspects of the CD Picture.

170. Therefore, Petitioner and Dr. Pastore's arguments in Ground 1A rely on incorrect and unjustified assumptions, inaccurate measurements, and unsound analysis of those inaccurate measurements. These flaws in Dr. Pastore's analyses **undermine substantially** the entire arguments presented in Ground 1.

B. Ground 1A: Dependent Claims 3 and 10-13

171. Claims 3 and 10-13 depend from claim 1 either directly or indirectly and therefore incorporate all of its limitations. For at least the reasons discussed above in Section VII.A with respect to claim 1, it is my opinion that claims 3 and 10-13 are likewise patentable.

172. In addition, for dependent claims 10-12, Dr. Pastore relies on his pixel counting methodology to conclude that the Sudre-Adanur combination render claims 10-12 obvious. (*See*, EX1003, ¶¶140-143.) As I explained in connection with independent claim 1, Dr. Pastore's pixel counting methodology is unreliable. Therefore, claims 10-12 should be independently found patentable for their respectful limitations.

C. Grounds 1B-1E: Dependent Claims 2, 4-9, and 14-15 Are Patentable over Sudre, Adanur, and the Secondary References

173. Claims 2, 4-9, and 14-15 depend from claim 1 either directly or indirectly and therefore incorporate all of its limitations. For at least the reasons discussed above in Section VII.A with respect to claim 1, it is my opinion that claims 2, 4-9, and 14-15 are likewise patentable.

174. Below, I present separate and additional reasons why the dependent claims are patentable over Sudre, Adanur, and the secondary reference.

1. Ground 1D: Dependent Claim 14 Is Patentable over Sudre, Adanur, and Lidar

a) Claim 14 Requires Elastomer or Polyurethane in the Nonwoven Fibers Themselves

175. Claim 14 requires “[t]he clothing according to claim 13, wherein at least some of said **nonwoven fibers** include or are formed of an elastomer or a polyurethane.” (EX1001, claim 14.) The decisive question is whether Lidar discloses that the **nonwoven fibers** include or are formed of elastomer or polyurethane. **They do not.**

b) Lidar Expressly Distinguishes Nonwoven Batt Fibers from Reinforcing Yarns

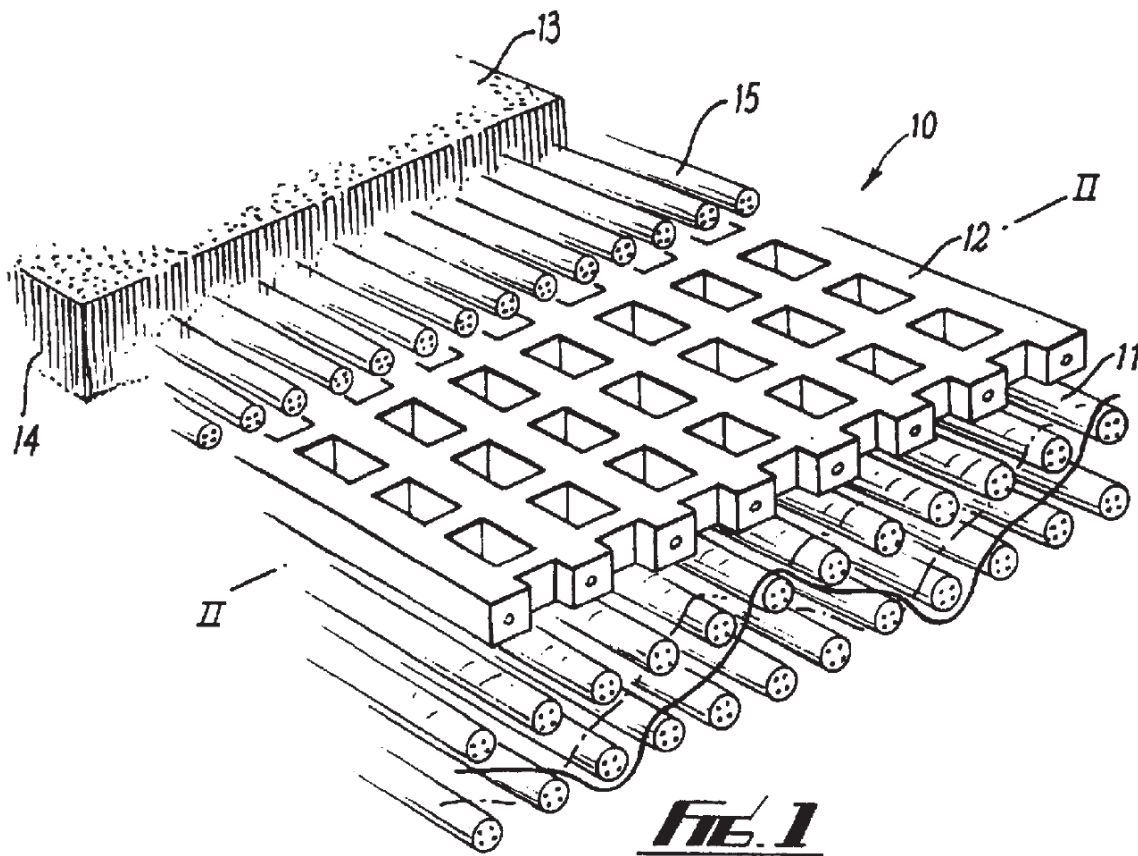
176. Dr. Pastore’s argument for claim 14 is that “[i]n the combination clothing, one or both of the layers of textile batt (*nonwoven fibers*; see my discussion above for claim 13) includes ‘a batt of synthetic fibrous material 14 that contains a plurality of non-crimped reinforcing yarns 15’ (*at least some of said nonwoven fibers*), as taught by Lidar.” (EX1003, ¶220 (emphasis in original).) This argument conflates two structurally and functionally distinct elements that Lidar itself keeps expressly separate.

177. Lidar discloses that “[t]he batt layer 13 of the papermachine clothing consists of a batt of synthetic fibrous material 14 that contains a plurality of non-

crimped reinforcing yarns 15.” (Lidar, 3:29-31.) As shown in Figure 1 (below) the batt layer 13 is composed of (i) the synthetic fibrous material 14 and (ii) the reinforcing yarns 15 contained within it. **These are two distinct elements.**

178. The reinforcing yarns “extend in the machine direction of the fabric.” (Lidar, 3:31-32.) The batt fibrous material 14 and the reinforcing yarns 15 are not the same structure. A textile batt is a nonwoven array of needled fibers; a reinforcing yarn is a composite structure, e.g., a bundle of linear filaments, which is embedded within the batt. In textile engineering, this distinction is fundamental: fibers are the discrete filamentary elements constituting the nonwoven layer, while yarns are multi-component linear assemblies of fibers or filaments formed into a single strand.

179. Lidar confirms this by describing the batt separately: “[t]he batt preferably comprises one or more nylon fibre materials, optionally with different dtex values. The batt fibres may be predominantly orientated in the machine direction or cross-machine direction, or they may be randomly orientated.” (Lidar, 2:48-52.) Lidar’s batt fibers neither include nor are formed of an elastomer or polyurethane.



Lidar, Figure 1

180. Dr. Pastore’s relies on the reinforcing yarns 15 to meet the claimed “at least some of said nonwoven fibers” in the ’566 Patent. (EX1003, ¶220.) However, this is not supported by Lidar’s own terminology. Lidar uses “fibrous material 14” and “reinforcing yarns 15” as separate components throughout the specification. Dr. Pastore collapses them into a single category, and then attributes Lidar’s elastomer disclosures, which are directed to the yarns, to the fibers. This structural conflation misreads Lidar.

c) Lidar's Elastomer and Polyurethane Disclosures Are Directed Exclusively to the Reinforcing Yarns — Not to the Batt Fibers

181. Dr. Pastore's entire claim 14 argument rests on passages from Lidar describing the material composition of the reinforcing yarns 15. Lidar states:

“The reinforcing yarns in the batt preferably comprise a monofilament, multifilament, or twisted cabled yarn (monofilament and/or multifilament component) which may be at least partially encapsulated in and/or may be at least partially impregnated with polymer. Twisted monofilament yarns are preferred. This polymer preferably comprises one or more of the following: polyurethane (e.g. thermoplastic polyurethane), polyester or copolyester, polyamide or copolyamide, silicone or thermoplastic elastomer. The yarns of the non-woven array are preferably coated with an elastomeric polymer, particularly when the optional thermoplastics mesh layer is not present.”
(Lidar, 2:19-30.)

182. But the reinforcing yarns are not the fibrous material. Moreover, in the embodiment described in Figures 1 and 2, Lidar further discloses that the “reinforcing yarns comprise multifilaments fully encapsulated in an elastomeric thermoplastic polymer material.” (Lidar, 3:33-34.)

183. Every one of these disclosures is directed to the reinforcing yarns 15, and not to the batt fibrous material 14. Dr. Pastore cites these exact passages for argument that “the reinforcing yarns of the batt layer (at least some of said nonwoven

fibers) are ‘at least partially encapsulated in and/or ... at least partially impregnated with ... polyurethane (e.g., thermoplastic polyurethane) ... or thermoplastic elastomer.’” (EX1003, ¶221.) But Dr. Pastore does not identify any disclosure that the **batt fibers** are made of, include, or incorporate elastomer or polyurethane. This is because Lidar does not contain any such disclosure. But claim 14 requires that **the nonwoven fibers “include or are formed of” these materials**. The fibers are not the yarns. Lidar’s disclosure does not bridge this gap. And fibers do not include yarns, as Dr. Pastore admitted during cross-examination:

Q. Do fibers include yarns?

THE WITNESS: No.

(EX2012, 87:19-21.)

d) Lidar’s Claims Further Confirm the Absence of Elastomeric Batt Fibers

184. Lidar’s claims 4 and 5 recite “wherein the said yarns of the non woven array are at least partially encapsulated in polymer” (Lidar, claim 4) and “wherein the said yarns of the non-woven array are at least partially encapsulated in at least one of the following: polyurethane; polyester; copolyester; polyamide; copolyamide; silicone and thermoplastic elastomer.” (Lidar, claim 5). Likewise, Lidar’s claims 11 and 12 recite “the said yarns of the non-woven array are at least partially impregnated with polymer” (Lidar, claim 11) and impregnation with

“polyurethane, polyester; copolyester; polyamide; copolyamide; silicone and thermoplastic elastomer.” (Lidar, claim 12.)

185. Every one of these claims is directed to the **yarns of the non-woven array** — that is, the reinforcing yarns 15, not the batt fibers 14. Lidar does not claim, or even suggest anywhere in its specification or claims, that batt fibers are made of or include elastomeric material. Instead, Lidar consistently and exclusively assigns elastomeric material to the reinforcing yarns. By collapsing the yarn-fiber distinction, Dr. Pastore effectively reads out of Lidar a structural distinction that Lidar maintains throughout.

e) Dr. Pastore’s Motivation to Combine Analysis Does Not Restore the Structural Deficiency

186. Dr. Pastore contends that a POSITA would have been motivated to incorporate reinforcing yarns into the batt because non-crimped reinforcing yarns “offer[] the advantage of providing a greater pressure contact area,” which “provid[es] enhanced dewatering with reduced marking tendency.” (EX1003, ¶216.) Dr. Pastore further contends that the reinforcing yarns, “when provided together with the mesh membrane, ‘offer[s] vastly improved resistance to compaction and therefore longer working life’ for the fabric.” (EX1003, ¶217.)

187. Even assuming these statements as correct, for the sake of argument, these statements would explain why a POSITA would incorporate Lidar’s reinforcing yarns 15 into the combination fabric. These statements would not

motivate a POSITA to use elastomeric or polyurethane batt fibers in the textile batt. Dr. Pastore's motivation analysis is addressed entirely at the structural benefit of the reinforcing yarn array. None of these rationales suggest that the nonwoven batt fibers themselves should be made of or include elastomers. A motivation to incorporate reinforcing yarns does not supply a motivation, let alone a disclosure, to use elastomeric fibers in the batt.

188. Claim 14 requires that at least some of the nonwoven fibers include or are formed of an elastomer or polyurethane. (EX1001, claim 14.) Dr. Pastore's mapping of Lidar's reinforcing yarn disclosures onto claim 14's "nonwoven fibers" limitation conflates two structurally distinct elements, and therefore, fails.

189. Accordingly, claim 14 is patentable over the combination of Sudre, Adanur, and Lidar.

VIII. GROUNDS 2A-2E: CLAIMS 1-15 ARE PATENTABLE OVER SUDRE, LEE, PENVEN, AND THE SECONDARY REFERENCES

190. The hindsight defects established in Ground 1A apply with equal strength to Grounds 2A-2E. The motivational foundation remains the same single half-sentence or phrase from Sudre, and Dr. Pastore again improperly uses the '566 Patent as his road map for a motivation to combine, where none exists in the cited references. **Ground 2 presents three additional, independent failures:** (1) Petitioner incorrectly assumes that the relied-upon dimensions from Lee correspond to woven fabric; (2) Petitioner reads Lee against its own express teachings to extract

a 0.4 mm diameter that Lee assigns exclusively to the loop-less second fabric structure; and (3) Petitioner treats Penven's passageway-sizing approximation as an individual loop diameter — a structural misidentification that no POSITA would make.

A. Ground 2A: Sudre, Lee, and Penven Fail to Teach or Suggest the Claimed Loop Density and LD/MDYD Ratio

1. Petitioner's Basis for Combining Sudre with Lee Is Premised on a Misunderstanding of Lee

a) Petitioner Improperly Transplants Thread Dimensions from Lee's *Non-Woven* Base Fabrics Into Sudre's *Woven* Fabric

191. Petitioner's basis for applying Lee's and Penven's teachings to Sudre is that all three reference pertain to woven base fabrics. Specifically, as Dr. Pastore testified:

“More specifically, **all three of these references** pertain to seamable press felts formed from flat **woven base fabrics**, and **with this common context**, it is my opinion that a POSITA would have understood the applicability of Lee's and Penven's teachings to the generic press felt disclosure of Sudre.”

(EX1003, ¶249.)

192. During cross-examination Dr. Pastore confirmed:

Q. And **this common context** in Paragraph 249 is that Sudre, Lee, and Penven pertain to seamable -- seamable press felts formed from flat **woven base fabrics**; correct?

A. **Correct.**

(EX2012, 326:10-14.)

Q. ... Paragraph 249 says that a POSITA would have understood **the applicability of Lee's teachings to the generic press felt disclosure of Sudre because** both Sudre and Lee pertain to seamable press felts formed from flat **woven base fabrics**; correct?

A. Correct.

Q. And, similarly, Paragraph 249 says that a POSITA would have understood the applicability of Penven's teachings to the generic press felt disclosure of Sudre because both Sudre and Penven pertain to seamable press felts formed from flat woven base fabrics; correct?

A. Correct.

Q. So your opinion is that **a POSITA would have applied Lee's and Penven's teachings to Sudre's generic press felt because** all three of these references pertain to seamable press felts formed from flat **woven base fabrics**; correct?

A. Correct.

(EX2012, 327:2-21.)

193. Accordingly, Petitioner's Ground 2A begins with the premise that Sudre, Lee, and Penven all pertain to seamable press felts formed from *flat-woven base fabrics*, and that Lee's yarn dimensions are therefore directly transplantable into Sudre's flat-woven laminate structure. **But**, that characterization of Lee is incorrect as a matter of Lee's own express definitions, and it is the premise upon which the entire Ground 2A dimensional analysis rests.

194. Lee discloses embodiments of woven and non-woven base fabrics. (See, e.g., Lee, p. 8, ¶4 (“In one aspect, a seamed press felt is provided comprising a base fabric material, which can be woven or non-woven....”).) But Petitioner and Dr. Pastore transplant dimensions from Lee’s *non-woven* base fabrics into Sudre’s *woven* fabric. As I explain below, Dr. Pastore relies on Lee’s disclosures that are exclusively limited to Lee’s non-woven fabric structure constructed from a first and second **array**. However, Lee expressly defines **arrays** as structures that are **not woven**. Specifically, Lee discloses that “[t]he term ‘**array**’ refers to a generally planar group of mutually *parallel yarns which are not interwoven or interconnected with one another by interlacing*.” (Lee, p. 19, ¶1.)

195. Dr. Pastore’s analysis is centered around a specific example disclosed in Lee at page 28, second paragraph. (See, EX1003, ¶244 (“Lee provides a specific example that I would like to address as a particular implementation of this combination fabric: the warp threads have ‘a diameter of about 0.4mm’ and are present in a ‘yarn density’ of ‘24 yarns/in (9.45 yarns/cm).’” (citing Lee, p. 28, ¶2)).) This “specific example” discloses dimensions of an “**array**.” Lee explains that “[p]referably **the yarns of the first array** are single circular cross-sectional shaped monofilaments having a diameter of from about 0.3mm to 0.6mm and are preferably arranged to provide a yarn density of from 15 to 40 yarns/inch (5.9 to 15.7 yarns/cm).

More preferably, the diameter of the yarns in the first array is about 0.5mm.” (Lee, p. 12, ¶1.)

196. In fact, throughout his declaration, Dr. Pastore discusses dimensions of fabrics in Lee that are exclusively directed to **array** structures. For example, Dr. Pastore testified that “Lee specifically 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**.” (EX1003, ¶245 (citing Lee, p. 29, ¶1).) Dr. Pastore also testified that “Lee teaches that it is appropriate to implement the same warp thread density and warp thread size for both the **first and the second array**.” (EX1003, ¶245.) (*See also*, EX1003, ¶245 (“This is reinforced elsewhere in Lee: 29 (2nd paragraph) (“the yarns 210 of the **second array 215** may be provided at a density equal to, but not less than, the yarn density of the **first array 115**....”); *see also* EX1003, ¶243 (citing Lee, p. 12, ¶1)); EX1003, ¶244 (citing Lee, p. 28, ¶2)); EX1003, ¶246 (citing Lee, p. 12, ¶1)); EX1003, ¶237 (citing Lee, p. 26, ¶2).)

197. Dr. Pastore confirmed during cross-examination that in his proposed Sudre-Lee-Penven combination he relied upon disclosures related to Lee’s first and second **arrays**. Specifically, Dr. Pastore testified that Lee teaches “the yarn density and size in the second array 215 be equal to that in the first array 115,” and relied on those disclosures in forming his opinions.

Q. And you specifically read about certain applications may dictate that “the yarn density and size in the **second array** 215 be equal to that in the **first array** 115”; correct?

A. Correct.

...

Q. So Lee provides a specific example, but you write you “would like to address as a particular implementation of this combination of fabric: the warp threads have ‘a diameter of about .4’ millimeters and are present in a ‘yarn density’ -- and are present, ... “in a ‘yarn density’ of 24 yarns per inch”; correct?

A. Correct.

...

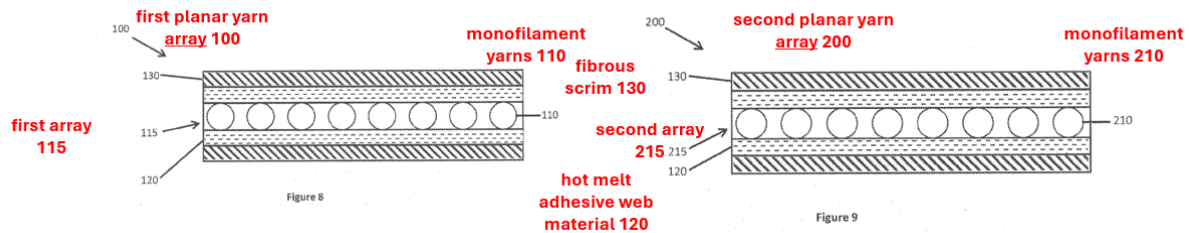
Q. So you propose essentially copying -- copying the yarn diameter and yarn density of the **second array** into the **first array**; correct?

A. **Right.**

(EX2012, 316:10-318:4.)

198. However, as I explained before, Lee expressly defines arrays as structures that are **not woven**. Specifically, Lee discloses that “[t]he term ‘**array**’ refers to a generally planar group of mutually *parallel yarns which are not interwoven or interconnected with one another by interlacing.*” (Lee, p. 19, ¶1.) This is illustrated in Figures 8 and 9 of Lee (reproduced annotated below), which “are illustrations showing the construction and composition of first and second

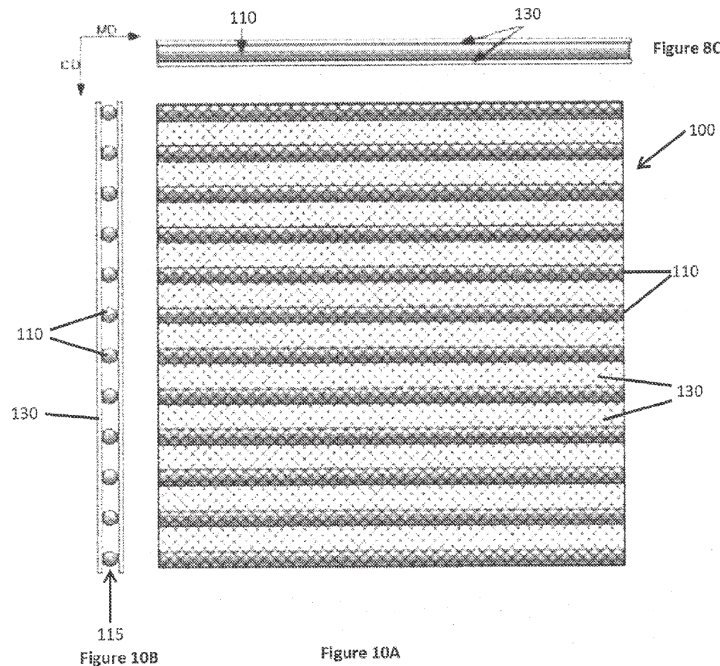
generally planar yarn assemblies used in the **nonwoven press felt base fabrics of the present invention.**” (Lee, p. 15, ¶3; *see also*, Lee, p. 24, ¶5-p. 25, ¶2; p. 27, ¶3-p. 28, ¶1.)



Lee, Figure 8

Lee, Figure 9

199. Figure 10A of Lee (below) “is a planar view of the first fabric structure 100 shown schematically in Figure[] 8. In Figure 10A, the first yarn **array** 115 is comprised of a plurality of single monofilaments 110 having a desired size and a selected regular spacing which are bonded together between two layers of the fine fibrous [material] 130 using two layers of a hot melt adhesive web (not shown) to retain them in a desired position....” (Lee, p. 29, ¶2; *see also*, Lee, p. 34, ¶5-p. 34, ¶1.)



Lee, Figure 10A

200. Lee’s definition of “**array**” confirms that an “**array**” is a non-interlaced, non-woven planar yarn group, that is **a group of parallel yarns that are not interlaced with one another**. (See, Lee, p. 19, ¶1.) Lee’s first and second structures are not woven fabrics as Dr. Pastore incorrectly assumed; they are planar arrays of parallel, non-interlaced yarns that are bonded—**not woven**—together through an elastic carrier layer or equivalent mechanism.

201. Accordingly, Petitioner’s premise—that Lee’s relied-on “**array**” dimensions apply to a woven fabric context—is expressly inconsistent with Lee’s own definition. Because Petitioner’s entire dimensional mapping (yarn diameter, yarn density, and thus loop density) depends on misunderstanding of Lee and treating Lee’s non-woven array parameters as if they described a flat-woven

structure, Dr. Pastore's analyses are based on a wrong foundation, which undermines his conclusions.

202. The distinction between woven and non-woven fabrics is not merely a matter of classification. Claim 1 of the '566 Patent affirmatively requires "***a two-layer laminate structure formed of one or a plurality of flat-woven fabrics.***" (EX1001, 9:61-62.) In a flat-woven fabric, MD yarns are interlaced with CD yarns in a particular weave pattern, and that weaving directly affects yarn spacing, apparent yarn diameter in cross-section, and the geometric relationships that determine loop density and LD/MDYD ratio. In Lee's non-interlaced **arrays**, no such weaving configuration exists, and yarn spacing is determined by the bonding architecture of the elastic carrier — a fundamentally different geometric configuration. A POSITA would not treat yarn dimensions and densities from a non-woven, non-interlaced **array** as interchangeable with those of a flat-woven structure without a technical basis for doing so. **Dr. Pastore has provided no such basis.**

**b) Lee's *Multiaxial* Base Is Structurally Incompatible
with Sudre's Conventional Woven Base**

203. Petitioner's proposed combination of Sudre and Lee requires merging fundamentally different and incompatible base fabric architectures. Sudre is directed to conventional woven fabrics, whereas Lee relies on multiaxial laminated structures. These are not interchangeable design choices; rather they are structurally

distinct technologies with different formation mechanisms, yarn orientations, and seam constructions.

(1) Sudre Requires a Conventional Interwoven Base Fabric

204. Sudre is explicitly directed to **flat-woven fabrics** formed by interweaving machine-direction and cross-direction yarns. In such structures the MD and CD yarns are **orthogonal and interlaced** (EX1025, 16.) The fabric integrity is achieved through **mechanical interweaving** (Adanur, 12) and seam loops are formed as part of the **woven structure itself**.

205. Conventional woven bases “have multiple layers of MD yarns with only one layer of CD yarns that are interwoven to lock the structure together.” (EX1021, 12.) Thus, Sudre’s base fabric depends on the **interrelationship** between MD and CD yarns, including their diameters, spacing, and weave pattern, all of which are constrained by requirements of an interwoven structure.

(2) Lee’s Multiaxial Base That Dr. Pastore Relies on Is a Laminated, Non-Interwoven Structure

206. In contrast, Lee is directed to **multiaxial base fabrics**, which are structurally different in multiple respects. These fabrics are constructed from **multiple layers that are laminated or bonded**, not interwoven (EX1021, 12.) The yarns in each layer are **angled relative to one another**, rather than orthogonal

EX1021, 12) , and the base structure is formed first, and **seam loops are created later** by removing CD yarns. (EX1021, 12.)

207. Multiaxial bases have “base layers slightly angled to one another.” (EX1021, 11.) “Multiple base layers are laminated together with each layer angled in the opposite direction from the previous layer.” (EX1021, 12.) In addition, seam loops in multiaxial fabrics “are not formed during the weaving process,” but instead are formed after bonding by removing CD yarns. Accordingly, Lee’s structure that Dr. Pastore relies on is a **layered composite**, not a woven grid.

(3) The Structural Differences Preclude Transferring Yarn Diameter or Density

208. These structural differences are critical because yarn diameter and yarn linear density are not independent variables that a textile engineer would know. They are functionally tied to the underlying fabric architecture. In a **conventional woven fabric (Sudre)**, yarn diameter and spacing must enable interweaving without distortion or interference and MD and CD yarns must physically pass over and under each other. In Sudre’s fabric, yarn density governs crimp, permeability, and seam loop formation. In contrast, in the **multiaxial fabric that relies on have** yarns that are **not interwoven**, but instead arranged in **angled, laminated layers**. As such, yarn spacing and linear density are governed by **layer stacking and bonding**, not interlacing, and there is **no requirement** for over-under weave geometry.

209. Because of these differences, the same yarn diameter or linear density values would **not perform the same function**, or even be physically suitable, across the two structures.

(4) Dr. Pastore Failed to Appreciate These Differences in His Analysis

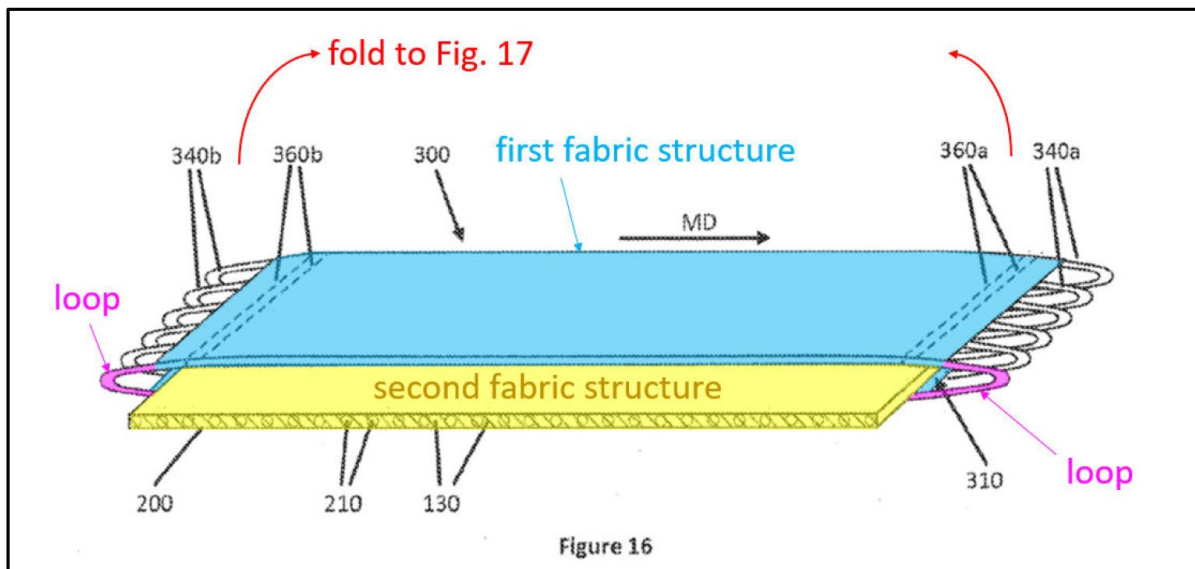
210. Because Lee's yarn diameter and density values are derived from a multiaxial laminated structure, they cannot be meaningfully applied to Sudre's interwoven fabric. A POSITA would have understood that yarn diameter and density must be co-designed with the weave structure. Parameters from a non-interwoven laminate cannot simply be transplanted into a woven system, because doing so would risk producing a fabric that cannot be woven or function as intended.

211. Dr. Pastore's analysis ignores these constraints, because he failed to appreciate that the embodiments he relies on for diameter/density analysis correspond to multi-axial *non-woven fabrics*. As a result, Dr. Pastore's analysis instead treats yarn parameters as **abstract, transferable numbers divorced from structure**. Lee's multiaxial fabric is not merely a variation of Sudre's woven base. Rather, it is a **fundamentally different structural system**. A POSITA would not have transferred such parameters between these incomparable systems.

c) Lee's *Multi-Component Architecture* Is Structurally Incompatible with Sudre's Single Flat-Woven Fabric

212. The incompatibility between Lee and Sudre runs deeper than the woven/non-woven distinction. As I described in Section VI.C, Lee discloses a complex two-layer fabric structure having two distinct first and second structures arranged such that the first structure forms the seam loops and is responsible for the mechanical integrity of the seam loops and the second fabric structure is a different “generally planar yarn assembly” that is inserted into the tube formed by the first fabric structure. (Lee, p. 16, ¶2.)

213. Lee's two-layer fabric—which Dr. Pastore acknowledges—is illustrated in Lee's Figure 16, which I reproduce below as annotated by Petitioner.



Petition, 74 (reproducing Lee, Figure 16 (annotated by Petitioner))

214. Lee discloses that “the flattened tube 300 [first fabric structure (shaded blue)] is ready for the generally planar yarn assembly that forms the second fabric structure 200 [second fabric structure (shaded yellow)] to be inserted into the open area 310 inside the collapsed tube 300; this is illustrated in Figure 16.” (Lee, p. 30, ¶2.) Lee further discloses “[y]arn loops 340a, 340b [shaded pink] formed by the yarns 110 of the first fabric structure 100 at the opposing first and second fold regions 320a, 320b of the continuous tube 300...” (Lee, p. 29, ¶3-p. 30, ¶1.) That is, Lee discloses forming loops in the first fabric structure 300. Lee’s second fabric structure does not form loops.

215. Sudre, by contrast, discloses a fundamentally different laminate configuration. As I explained in Section VI.A, Sudre’s base material is a flat-woven fabric. Specifically, Sudre’s structure is a single flat-woven fabric folded over itself **with no separate inner planar yarn assembly**, no elastic carrier layer, and no tube within which a second fabric is inserted.

216. Dr. Pastore proposes to combine Sudre’s single-fabric laminate structure with Lee’s two-component system to extract yarn dimensions, without explaining how Lee’s dimensional parameters, which are defined in the context of a tube-and-inner-assembly architecture with a non-woven first structure, translate into Sudre’s entirely different flat-woven, folded-single-fabric configuration. **A POSITA would not have been motivated to combine Sudre with Lee as they are**

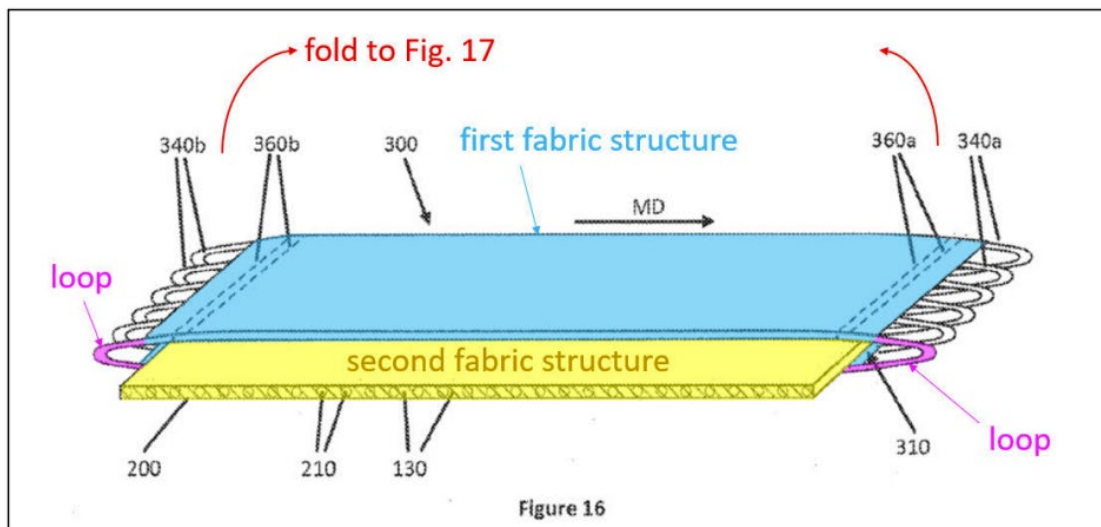
references describing structurally different fabric configurations. Accordingly, Dr. Pastore's proposed combination does not render obvious claim 1 of the '566 Patent.

2. Petitioner Extracts the MD Yarn Diameter from the Wrong Structure in Lee

a) Lee Expressly Distinguishes the Loop-Forming First Structure from the Loop-Less Second Structure

217. As I discussed in Section VII.A.1, Dr. Pastore identifies a specific example from Lee where warp threads have “a diameter of about 0.4 mm” and are present in a yarn density of “24 yarns/in (9.45 yarns/cm).” (EX1003, ¶244.) Dr. Pastore acknowledges that Lee describes “this specific example” in the context of Lee's *second* fabric structure, i.e., the planar yarn assembly inserted into the center of Lee's seamable endless first fabric, and not the first structure. (See, EX1003, ¶245.)

218. Lee's first fabric structure includes loops but its second fabric structure does not. Dr. Pastore clearly shows this in his annotated figure on page 126 of his declaration.



Excerpt from Lee, Fig. 16 (annotated)

EX1003, p. 126 (reproducing Lee, Figure 16)

219. Further, Lee explicitly indicates that the diameter of the yarns of the second structure is generally less than the diameter of the yarn in the first structure and states that a second structure having 0.4 mm yarn diameter and 9.45 yarns/cm density is used with its preferred first structure that has 0.5 mm yarn diameter and 7.1 yarns/cm density.

220. **The structural distinction resolves the issue.** The seam loops, which are the very elements whose dimensional relationship is claimed in the '566 Patent, reside exclusively in the first fabric structure, which Lee instructs should have larger yarns (preferably 0.5 mm diameter). The second structure, with its 0.4 mm preferred diameter, has no seam loops. A POSITA seeking to obtain relevant parameters for

the seam would not look into the second structure of Lee that does not have seam loops.

221. Significantly, Lee ties first-array yarn sizing directly and explicitly to seam performance requirements. Lee specifically states that this configuration of the yarns of the first structure is necessary for providing sufficient “tensile strength to the assembled press felt” for ensuring that the press felt is “sufficiently robust so as to withstand the various mechanical and environmental forces to which they may be exposed during use.” (Lee, p. 26, ¶2.)

222. Despite these explicit teachings of Lee, Petitioner and Dr. Pastore rely on the yarn diameters of the second fabric structure (**which does not have loops for interengaging seaming**) to argue that a POSITA would have been motivated to apply the yarn diameters of the second fabric structure to the first fabric structure to arrive at claims of the ’566 Patent.

223. The yarn diameter and spacing in this structure are therefore critical design parameters, **not merely interchangeable details**. Arbitrarily transferring values from the second structure to the first would contradict Lee’s explicit instruction that these parameters must be carefully selected to ensure seam strength and durability.

**b) Petitioner's Sole Basis for Using the 0.4 mm Diameter
for the Loop-Forming MD Yarns Is Founded on an
Incorrect Reading of Lee**

224. Petitioner's sole basis for using the 0.4 mm diameter in the first (loop-forming) structure is a single conditional sentence: "certain applications may dictate that the yarn density and size in the second array 215 be equal to that in the first array 115." (Lee, p. 29, ¶1.) That reading is unsupported and is incorrect for multiple reasons.

225. First, the sentence permits equality of the yarn density and size in unspecified "certain applications." This sentence does not generally suggest or direct a POSITA to use equal yarn density and size. In fact, this sentence does not even identify what are those "certain applications." A POSITA would have understood the conditional "certain applications" language as a caveat that operates as a safety valve for exceptional circumstances, not as a license to override the engineering preferences that Lee derives from principles of seam mechanics. But Dr. Pastore never identified any "certain application" in Lee that would call for equally sized arrays, let alone tied that application to Sudre's flat-woven base or to the permeability and closure tradeoffs addressed by the '566 Patent.

226. Second, before this sentence, Lee expressly discloses a structural instruction, e.g., "for this reason ... preferably larger." The "particular applications" sentence cannot override this structural instruction. Lee's rationale for the structural

changes is straightforward: yarn diameter in the first array directly affects seam tensile strength and the ability of the loops to intermesh without undue distortion. These are important considerations. Rather, they reflect a deliberate design choice tied to the functional performance of the seam. When Lee states that certain applications may call for different sizing, a POSITA would have understood that to mean unusual design scenarios where seam strength is a secondary concern, not a general suggestion that 0.4 mm is an equally viable option for the loop-forming yarns of Lee's first structure. Nothing in Lee identifies what such an "application" might look like, and Dr. Pastore offers no technical basis for departing from Lee's seam-strength rationale. **A POSITA reading Lee as a whole would not treat that single "certain application" sentence as undermining the express preference Lee sets out just sentences before.**

227. Third, and most importantly, Lee's disclosure 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" **does not apply to Sudre**. (Lee, p. 29, ¶1.) Because Sudre does not involve a structure with a second array (Sudre is a single layer fabric), Lee's "certain applications" necessarily involve structures with a first array and a second array. A second array is a prerequisite in the structure to have the "equality" of the yarn densities and sizes. Dr. Pastore proposes to apply an

equality provision that presupposes a two-array structure to Sudre, which has no second array at all. This is logically, as well as structurally, inconsistent.

3. Dr. Pastore's Alternative Thread Density Theory

228. I understand that Dr. Pastor presents an alternative loop-density theory based on selectively choosing values from Lee's disclosed ranges of MD yarn diameter and MD yarn density, and applies the '566 Patent's own loop-density equation to those values to argue that Lee's disclosure encompasses the claimed loop-density range of 64%–90%. (EX1003, ¶¶294-297.) I address below why that range-based approach does not establish that a POSITA would have been motivated to select the claimed loop-density range, or that the prior art provided meaningful guidance to do so.

229. While Lee identifies yarn type, size, and spacing as important features for achieving general performance characteristics such as water removal, permeability, void volume, and seam tensile strength, Lee does not describe loop density itself as a design parameter, nor does Lee provide a target loop-density value or a process for selecting MD yarn diameter and MD yarn density in a coordinated manner to achieve a particular loop-density outcome.

230. Lee discloses MD yarn diameter of approximately 0.3 mm to 0.6 mm and MD yarn density of approximately 5.9 to 15.7 yarns/cm. When Petitioner's own calculation method — drawn from the '566 Patent's equation — is applied across

the full extent of those disclosed ranges, the resulting computed loop density spans approximately 35% to 188%. A computed loop density of 188%, produced by combining the upper bound of Lee's diameter range with the upper bound of Lee's density range, is physically impossible. Yarns of 0.6 mm diameter cannot be packed at 15.7 yarns/cm in a seam region without geometric overlap that would preclude seam closure and interengagement. Dr. Pastore's approach results in a non-physical and impossible result.

231. The appearance of physically impossible values as outputs of Dr. Pastore's own methodology is a technically significant indicator that Petitioner's approach is not anchored to the engineering realities of seam design. It demonstrates that MD yarn diameter and MD yarn density are not freely interchangeable independent variables that can be combined arbitrarily from a disclosed range. In a woven seam structure, yarn diameter and yarn density are physically constrained by one another and by the weave architecture, seam geometry, and the requirements of seam closure. A POSITA designing a seam would not proceed by arbitrarily selecting values at or near the extreme ends of independently stated numerical ranges, because doing so would yield configurations that are geometrically impossible.

232. Dr. Pastore's theory range-based theory treats yarn diameter and yarn density as if they were independently selectable variables, but provides no analysis

of how those variables interact with one another or with other fabric parameters — including weave pattern, CD yarn spacing, and seam-region geometry — that constrain feasible combinations in practice. From a textile engineering standpoint, the selection of MD yarn diameter affects and constrains the feasible range of MD yarn density, and vice versa. Dr. Pastore's failure to analyze this interdependence means that the purported 35%–188% loop-density range overstates the actual design space available to a POSITA and provides no basis for understanding how the claimed 64%–90% window would be reached. This is something that a textile engineer with experience with PMCs would not arbitrarily do.

233. Even if one excludes the non-physical outcomes and narrows the computed range to approximately 35%–100%, the result remains extremely broad and technically uninformative. A range of that breadth does not guide a POSITA to any particular loop-density value, and it certainly does not identify the specific 64%–90% window claimed in the '566 Patent as a functionally meaningful or preferred design target. The fact that a broad mathematical range can be made to overlap with the claimed range does not mean that the prior art taught or suggested designing to that specific window, particularly where the prior art provides no mechanism for doing so.

234. The '566 Patent's claimed loop-density range reflects a functional balance between two competing requirements: the loop density must be high enough

to reduce seam permeability and avoid sheet marking, but not so high that seam interengagement becomes difficult or that pintle insertion during installation is impaired. The '566 Patent discloses that loop densities above approximately 90% can impair the practical closure of the seam. This functional balance represents a specific engineering insight. Lee does not reflect awareness of this balance, does not describe loop density as a variable to be optimized in light of competing seam-performance requirements, and provides no framework for navigating the tradeoff between seam permeability and seam closure that the '566 Patent's claimed range addresses.

4. Petitioner's Thermal-Processing Mapping Argument Is Not in Prior Art but Is Found in the '566 Patent

235. Petitioner argues that even if Lee's example values (24 yarns/inch, 0.4 mm diameter) produce an initial loop density of 75.6%, the '566 Patent's discussion of thermal processing shows that pre-treatment loop densities of 55%–80% correspond to finished clothing loop densities of 64%–90%. (*See*, EX1003, ¶¶259, 293.) Accordingly, Dr. Pastore improperly uses the '566 patent's own disclosure to fill gaps in the prior art combination about the loop density.

a) The '566 Patent's Shrinkage Discussion Is Not a General Teaching About Prior-Art Press Felts

236. Dr. Pastore acknowledges that the '566 Patent discloses 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.” (EX1003, ¶292 (citing EX1001, 6:27-30, 6:33-35).) Dr. Pastore then uses the ’566 Patent’s mapping of pre-treatment loop densities of “between 55% and 80%” to finished-clothing loop densities of “between 64% and 90%” to argue that even if the Sudre-Lee-Penven combination’s pre-treatment loop density falls below 64%, thermal treatment would bring it into the claimed range. (EX1003, ¶293 (citing EX1001, 6:30-40).)

237. While it is true that the PMC shrinks when thermally treated, the shrinkage *percentage* depends on the thermal treatment temperature conditions. A prior art peer-reviewed research paper reports the shrinkage percentage for different clothings (Nylon 6/Nylon 66) as a function of thermal treatment. (EX2014, 4.)

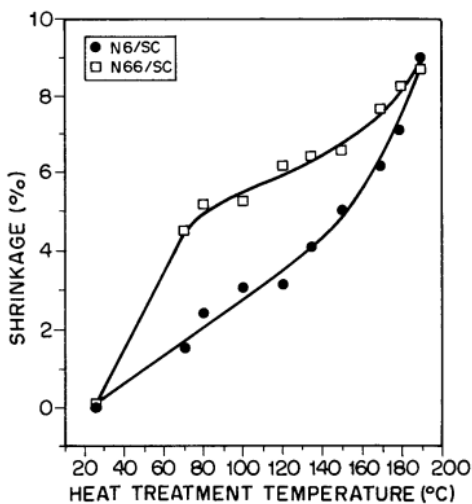


Figure 1 Shrinkage percentage vs. annealing temperatures for the Nylon 6 (●) and Nylon 6.6 (□) fibers. N6, Nylon 6; N66, Nylon 6.6; SC, heat treated under slack condition.

EX2014, 4

238. Accordingly, the increase in seam loop density post thermal treatment—as a result of the clothing shrinkage—depends on the thermal treatment temperature, as well as the type of clothing, e.g., Nylon 6 vs. Nylon 66. Neither Sudre nor Lee quantifies the degree of thermal treatment as, such how much of an effect thermal treatment shrinkage of the clothing has in the transverse direction for any of the structures of their inventions.

239. The '566 Patent's thermal-processing discussion is the inventors' own disclosure of how their specific claimed structure responds to their specific claimed processing steps. The '566 Patent does not teach a general textile engineering principle applicable to all press felt constructions. This is nothing more than an improper use of the '566 Patent's own disclosure to fill gaps in the prior art, which implicitly admits the existence of those gaps and which is unproven factually for Lee's and Sudre's structures.

**b) Neither Sudre nor Lee Quantifies Thermal Shrinkage
or Its Effect on Loop Density**

240. As I described in Section VI.A, Sudre describes a flat-woven open-weave base with fold regions from which CD yarns are removed to create loops. (*See*, Sudre, 3:22-4:7.) Sudre does not discuss thermal processing, shrinkage, dimensional change, or the effect of any thermal treatment on loop density or loop geometry. This is important because as I explained above the variations in seam

loop density as a result of thermal processing depends on the type of thermal processing conditioning.

241. Similarly, Lee's disclosure of yarn dimensions and densities makes no reference to thermal shrinkage or post-processing dimensional change. Neither reference contains the technical data, like thermal shrinkage coefficients, processing conditions, dimensional response curves, necessary to reliably predict the loop density of the Sudre-Lee-Penven combination after thermal processing.

242. Accordingly, there is no basis for assuming that Lee's and Sudre's materially different structures would shrink at rates comparable to the '566 Patent's structures. Importing the '566 Patent's own shrinkage mapping to validate Petitioner's combination corresponds to hindsight use of the '566 Patent's disclosures as a blueprint to aid it in picking and choosing from the prior at what the art would not actually have taught or suggest to a POSITA at a time before the filing of the '566 Patent.

5. Lee Teaches Away from Sudre-Type Single Layer Flat-Woven Structures

243. Petitioner's proposed combination of Sudre and Lee fails for an additional and independent reason: Lee teaches affirmatively away from Sudre-type flat-woven base fabrics and expressly distinguishes and discourages Sudre-type single-structure flat-woven fabrics in two separate respects.

a) Lee Criticizes Sudre-Type Flat-Woven Fabrics as Time-Consuming and Capital-Intensive

(1) Lee's Background Section Directly Criticizes the Manufacturing Paradigm That Sudre Represents

244. The defining structural characteristic of Sudre's invention is a flat-woven fabric that spans the full width and length of the intended press felt, i.e., a full-width flat-woven base fabric. However, this is precisely the textile engineering approach that Lee targets for criticism and replacement.

245. For example, Sudre discloses "a method for the manufacture of a papermaker's fabric or of a base material for use therein, the method comprising the steps of providing a fabric of plural, **superimposed layer configuration throughout substantially the full longitudinal extent thereof** and having fold regions at the respective opposite ends thereof, and removing cross- machine direction yarns from said fold regions to leave machine-direction loops thereat." (Sudre, 1:22-3:4.)

246. While Lee's background section identifies full-width flat-woven base fabrics as one known base-fabric construction (citing US 7,892,402 (titled "Flat woven full width on-machine-seamable fabric" (EX2015, "Hawes"))) as a representative example), but then proceeds to teach away from the limitations of such solutions. (Lee, p. 2, ¶2.) As Lee explains, these flat-woven base constructions "require that the base fabric be woven to the full width and length of the machine,"

which Lee describes as “a time-consuming process” requiring “high capital investment in wide industrial looms.” (Lee, p. 2, ¶2.) Lee frames the full-width flat-woven approach as a problem to be solved, a deficiency that motivated the development of a different manufacturing method.

247. The consequence of this criticism is that a POSITA attempting to design a press felt with optimized seam geometry would be directed away from Sudre’s flat-woven fabric disclosures and toward the solution Lee proposes – and thus away from the invention of the ’566 Patent.

**(2) Lee Affirmatively Directs the POSITA Toward
Spiral-Wound Multiaxial Constructions Instead of
Sudre**

248. Having identified the time and capital costs of flat-woven base fabrics as a deficiency, Lee explains that “so-called ‘multiaxial fabrics’ have recently been introduced for the production of press felts” as the solution “to reduce manufacturing time and costs.” (Lee, p. 2, ¶2.) Consistent with this preference, Lee describes multiaxial base fabrics as being “comprised of a plurality of spirally wound and edgewise joined turns of a material strip,” which are assembled turn-to-turn to build a continuous tube-like base fabric width without the need for relatively expensive custom-built paper making fabric wide industrial looms. (Lee, p. 3, ¶1.)

249. Lee’s transition from criticizing flat-woven bases to endorsing multiaxial constructions is the foundation of Lee’s inventive contribution. Every

dimensional parameter that Lee discloses for its yarn arrays, including the thread diameters and thread densities that Petitioner seeks to import into Sudre's flat-woven architecture, is disclosed **in the context of Lee's multiaxial, spiral-wound construction**. By framing Sudre's approach, i.e., the full-width flat-woven fabric, as "time-consuming" and demanding "high capital investment," and then proposing multiaxial winding as the superior alternative, Lee affirmatively leads the POSITA in a direction divergent from Sudre's manufacturing method.

(3) A POSITA Directed Toward Lee's Multiaxial Constructions Would Not Seek to Optimize Sudre's Flat-Woven Geometry Using Lee's Parameters

250. Dr. Pastore's argument requires a POSITA, after having selected Sudre's flat-woven, full-width laminate as the base structure, to consult Lee to determine appropriate MD thread diameters and thread densities for the seam-loop region. But a POSITA reading Lee in its entirety would appreciate Lee's explicit distancing from the textile engineering approach Sudre represents before reaching any of Lee's dimensional specifications. A POSITA would have understood Lee as teaching that the development in the art teaches away from Sudre-like structures, not toward their dimensional refinement. A POSITA guided by Lee's background section would have no reason to insist on Sudre's flat-woven structure, and, correspondingly, would have no reason to seek Lee's parameters for use within it. Dr. Pastore has not explained why a POSITA would disregard Lee's directional

critique and extract its dimensional parameters for application to the very architecture Lee discredits.

b) Lee Distinguishes Its Two-Fabric Reservoir Structure from Single-Structure Fabrics, Expressly Offering an Alternative Approach to Sudre

(1) Lee Identifies Two Competing Structural Approaches to Void Volume and Water Transport

251. Beyond the textile engineering critique, Lee also draws a second, equally significant structural distinction between its invention and the type of single-structure fabric that Sudre represents. This distinction concerns the core fabric design used to provide void volume and water transport, which Lee identifies as the primary function of a press felt.

252. Lee explains that the press felt's primary essential function is to act as a "reservoir to transport water away from the paper sheet," and that achieving adequate void volume for this reservoir function is a central design objective. (Lee, p. 3, ¶3-p. 4, ¶1.) Lee then explicitly contrasts two structural approaches to providing the necessary void space: first, void space "provided ... by the weave structure of the base fabric in the manner described in US 7,207,355"; and second, inclusion of "at least one additional fabric structure, such as a woven or nonwoven fabric." (Lee, p. 3, ¶3-p. 4, ¶1.)

253. This is not a description of two equivalent design options that a POSITA might freely choose between for identical results. It is a structural

distinction in which Lee identifies (1) single-structure woven base fabrics (US 7,207,355 (“EX2018”)) as one approach to void volume and (2) then distinguishes its own invention as a different approach, i.e., one that uses an additional internal fabric structure to achieve superior water transport characteristics. Lee’s express description of its invention by contrast to single-structure woven bases makes the structural distinction an element to Lee’s inventive identity.

(2) Lee Implements the Two-Different Fabric Engineering Approach as the Core of Its Invention

254. Lee’s inventive solution to the void volume and water transport challenge is the incorporation of a “generally planar yarn assembly,” as a distinct second fabric structure bonded to an “elastic carrier material” and inserted inside the tube formed by the first fabric structure and oriented in the cross-machine direction. (Lee, p. 8, ¶4-p. 9, ¶1.) This insertion provides an internal reservoir layer that a single-structure woven base fabric inherently lacks. This two-fabric architecture is not a design preference Lee is willing to trade away under “certain applications,” without proper justification—which the Lee reference does not provide—because, it is the structural mechanism through which Lee achieves the functional advantages it claims over the prior art structures like those disclosed by Sudre.

(3) A POSITA Would Recognize Lee's Structural Distinctions as Directed Against Single-Structure Fabric Design

255. By expressly contrasting the void space achieved through “the weave structure of the base fabric” (US 7,207,355’s single structure) with the approach of adding “at least one additional fabric structure,” and then building its entire invention around that additional structure, Lee would further confirm to a POSITA that it’s teachings would not be used to refine single-structure woven base fabrics like the ones disclosed by Sudre.

256. Sudre discloses a single-structure flat-woven fabric, which is precisely the type that Lee distinguishes as a different approach to void volume and water transport. The dimensional parameters Lee discloses for its first and second fabric structures (including the thread diameters and thread densities at the core of Petitioner’s Ground 2A calculations) are specified in the context of Lee’s two-fabric, elastic-carrier-bonded architecture. Those parameters are not disclosed as general values applicable to any press felt seam. Instead, they are engineering specifications for a defined, two-component structural system whose functional performance depends on the interaction between the two fabric structures and the elastic carrier.

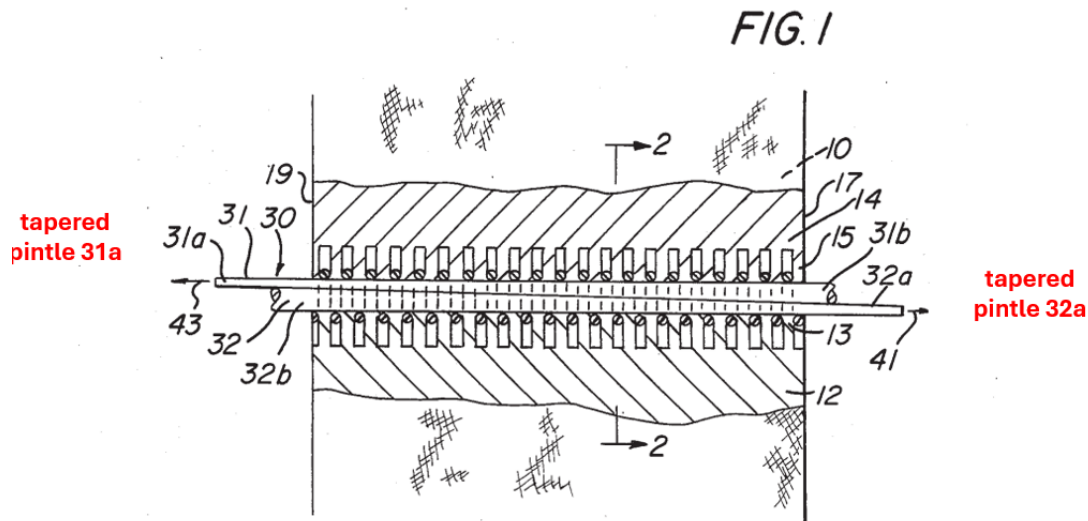
257. A POSITA seeking to optimize the thread and seam-loop diameters of Sudre’s single-structure flat-woven fabric would recognize that Lee’s parameters are defined for a structurally incompatible system, e.g., one without a second planar

array—a system that Lee itself contrasts with, and presents as an improvement over, the single-structure approach. Accordingly, a POSITA would have understood that applying Lee’s two-fabric dimensional parameters to Sudre’s single-structure architecture would neither replicate Lee’s functional advantages nor constitute a technically logical design choice. The teaching-away effect here is pronounced, being both structural (incompatible architecture) and functional (different mechanisms for achieving void volume and water transport). **Lee’s express departure from single-structure fabrics on both dimensions would have provided a POSITA with affirmative reason not to consult Lee for Sudre’s dimensional specifications.**

6. Penven’s “50-Mil Internal Void Diameter” Is Not the Claimed Loop Diameter

a) Penven Describes a Composite Seam Passageway Dimension, Not an Individual Loop’s Inscribed-Circle Diameter

258. Penven discloses that “[f]or a typical seam in a papermaker’s fabric having an internal void diameter of about 50 mils, a pintle unit having a taper of about 0.075 mil/inch is effective for felts up to about 300 inches in width.” (Penven, 3:64-68.) Figure 1 of Penven (below) shows tapered pintles 31a and 32a.



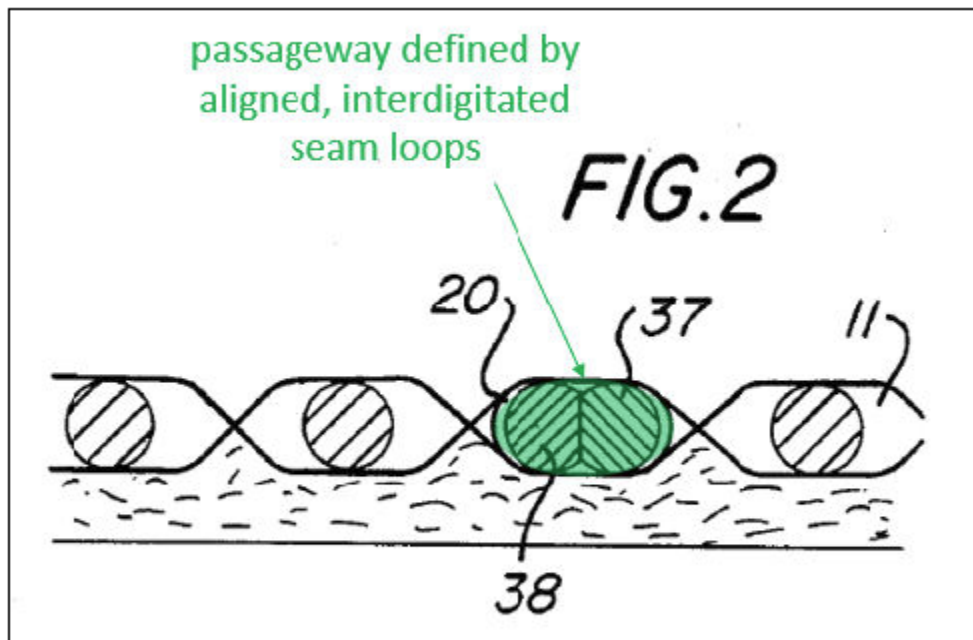
Penven, Figure 1.

259. Penven's primary feature is an "improved method of closing the seam of a papermaker's felt and an improved pintle design which provides a seam having improved strength, marking resistance and resistance to wear." (Penven, 1:64-68.) "The seam is closed with a pintle unit made up of a plurality of **pintle elements which are tapered** and pulled into the seam to interact in a wedging fashion." (Penven, Abstract.) Penven discloses that "[t]he relatively thin insertion ends 31a and 32a allow for the the [sic] elements 31 and 32 to oriented so as to be **easily inserted simultaneously from opposite edges of the felt 10 if desired**. The taper of the elements 31 and 32 further provides a wedging action when the elements 31 and 32 are pulled in opposite directions as indicated by arrows 41 and 42." (Penven, 4:16-22).

260. By enabling the two-part wedged pintles to be inserted from opposite edges of the felt two press felt installers could halve the time required for seaming since the two halves could be inserted simultaneously.

261. Accordingly, the “internal void diameter” disclosure appears in the context of Penven’s core concept, which is a pintle unit made up of two independent complementary pintle elements that are oppositely tapered, pulled into the seam to interact in a wedging fashion, providing a tight closure along the full length of the seam. (*See*, Penven, 3:20-33.) In Penven, the “internal void diameter” is not a specification of individual loop geometry. Rather, it is a sizing reference for calculating the appropriate pintle taper, e.g., a parameter describing **the composite passageway formed by the collective intermeshing of loops from both fabric ends**. (Penven, 3:56-68.)

262. Dr. Pastore agrees. When Dr. Pastore reproduced Figure 2 of Penven in his declaration, he admitted that the passageway is defined by the “interdigitated seam loops” (EX1003, p. 131), that is the passageway is not defined by a single loop. As Dr. Pastore’s annotation indicates, there is no evidence that the “internal void diameter” corresponds to the largest circle that can be inscribed into the seam loop. In fact, a POSITA looking at Figure 2 of Penven would have understood that the “internal void diameter” more appropriately corresponds to the horizontal diameter of the passageway.



Excerpt from Penven, Fig. 2 (annotated)

EX1003, p. 131 (reproducing Penven, Figure 2 (annotated by Dr. Pastore.))

263. Penven's "internal void diameter" is introduced in the context of describing the seam passageway through which the pintle wire is inserted and wedged to achieve closure. Penven does not describe the 50-mil value as the inside diameter of *an individual seam loop* (LD) or as a dimension chosen based on base fabric weave, MD yarn diameter, or permeability and closure tradeoffs. Even Dr. Pastore admitted during cross-examination that the "internal void diameter" does not correspond to the "largest circle which can be inserted completely into the seam loop." (EX1001, 9:22-23.) Dr. Pastore specifically testified:

Q. But if the loop -- the seam loop didn't have a circular shape, the void defined by the loop would be larger than the diameter of the circle; correct?

A. Correct.

(EX2012, 296:22-297:4.)

264. Indeed, neither Penven nor any prior art in the combination (Sudre, Lee) discloses that the seam loops are confined to circular shapes.

b) Penven's "Internal Void Diameter" Does Not Correspond to the Largest Circle Which Can Be Inserted Completely Into the Seam Loop

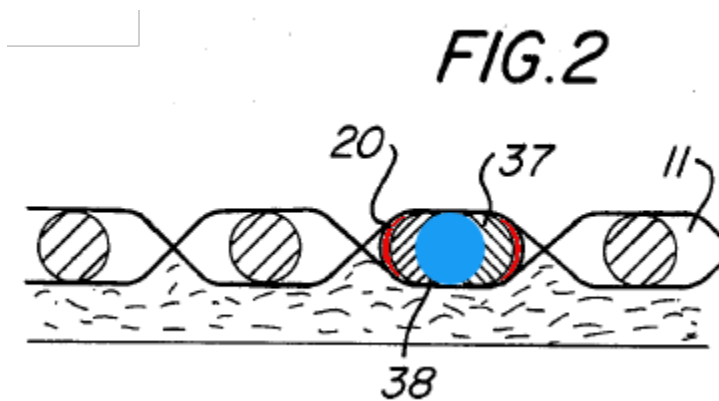
265. The '566 Patent states that "[t]o determine the diameter of a seam loop, the largest circle which can be inserted completely into the seam loop is ascertained. The diameter of this circle is then viewed as the diameter of the seam loop." (EX1001, 2:46-49.) But Dr. Pastore incorrectly asserts that Penven's "'internal void diameter' refers to the inside diameter of the seam loops. (EX1003, ¶241. (Dr. Pastore relies on Penven's Fig. 2 in his opinions).) As discussed above, Dr. Pastore testified:

Q. But if the loop -- the seam loop didn't have a circular shape, the void defined by the loop would be larger than the diameter of the circle; correct?

A. Correct.

(EX2012, 296:22-297:4.)

266. The evidence Dr. Pastore's relies on suggests that Penven's "internal void diameter" does not correspond to the largest circle that can be inscribed into the seam loop. Rather, a POSITA looking at Figure 2 of Penven would have understood that the "internal void diameter" to the horizontal diameter of the passageway. Specifically, as depicted, the passageway is bounded on its top and bottom by the MD yarns forming the interdigitated seam loops. These MD yarns constrain the vertical dimension of the channel **with essentially no void**. That is, the looping MD yarns leave no gap above or below the pintle elements. Horizontally, however, the cross-section reveals lateral void space (annotated **red**) between the sidewalls of passageway 20 and the pintle elements.



Penven, Figure 2

267. This geometry confirms that Penven's "diameter of seam passageway 20" captures the horizontal span (diameter) of the assembled interdigitated woven channel. That is, Penven's "internal void diameter" corresponds to the wider,

laterally-open dimension, not the tightest vertical constraint that would govern the largest inscribable circle (annotated **blue**) within a *single* uninterdigitated loop.

268. This is confirmed by Penven. Specifically, Penven discloses “that the pintle unit 30 is of a diameter **which is less than the diameter of seam passageway 20.**” (Penven, 3:42-43.) The pintle’s diameter is “less than the diameter of seam passageway 20” (Penven, 3:43) in the horizontal dimension (as evidenced by the void space) and not the vertical dimension (as evidenced by the lack of any void space). Accordingly, Penven’s “internal void diameter” does not correspond to the claimed “loop diameter.”

c) Penven’s “Typical Seam” Approximation Is Not a Design Specification for Sudre-Lee’s Structure

269. Penven’s method is “intended primarily for use in joining the ends of a papermaker’s wet felt to form an endless felt,” where “[a] *typical* papermaker’s wet felt is constructed of a base fabric, either single or multiple ply onto which a layer or layers of non-woven batts are needled.” (Penven, 2:59-65.) Penven’s “about 50 mils” is explicitly designated as the void diameter of a “*typical* seam,” that is, a generalized reference point for a conventional press felt construction, not a specification targeted at any specific seam geometry or base fabric architecture. (Penven, 3:64-68.) But Penven’s “typical seam” dimensions for conventional single-layer loop seams are inconsistent with Sudre’s base fabric *as modified by Lee* in Dr. Pastore’s proposed combination. As I discussed in Section VIII.A.2.b, Dr.

Pastore resorts to Lee's "certain applications" to modify Sudre's base fabric. Accordingly, Sudre's base fabric—as modified by Lee—would not qualify as a "typical seam", and as such a POSITA would not have been motivated to further modify the Sudre-Lee structure based on Penven's "typical seam" specification of an "about 50 mils" internal void diameter.

7. Petitioner Has Not Established a Non-Hindsight, Prior Art-Grounded Motivation to Combine Sudre, Lee, and Penven in the Claimed Manner

a) Sudre, Lee, and Penven Address Different Engineering Problems

270. Dr. Pastore opines that a POSITA would have been motivated to look to Lee and Penven to fill in the specific parameters absent from Sudre, because "press felt technology was already a well-developed field as of the Critical Date" and "such design parameters can be easily identified." (EX1003, ¶248.) But the fact that a field is "well-developed" and that design parameters can "be identified" does not explain why a POSITA would have selected these three specific references in combination, or why that POSITA would have chosen the specific values that produce the claimed numerical results.

271. **The three references cited by the Petitioner and Dr. Pastore address fundamentally distinct press fabric textile engineering problems with distinct solutions.** Sudre discloses a method for manufacturing a seamable papermaker's fabric by providing a superimposed-layer fabric and removing CD

yarns from fold regions to create MD seam loops, that is, it addresses the *method* of seam formation, not seam dimensional optimization. (See, Sudre, 1:2-9, 1:22-2:4.)

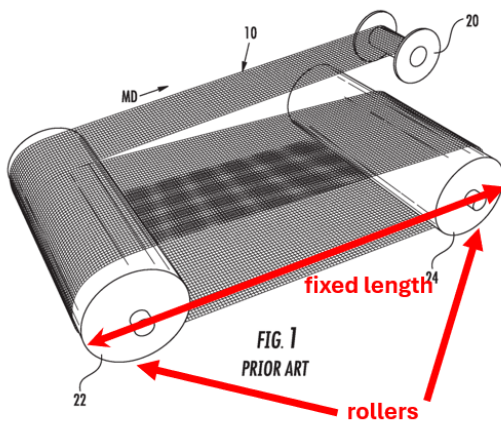
272. Lee is “particularly concerned” with the problem of sheet marking, batt fiber shedding, fabric compaction, and non-uniform void volume in multiaxial press felts, and its inventive solution is an elastic carrier layer (a generally planar orthogonal parallel yarn assembly). (Lee, p. 1, ¶1; p. 8, ¶4-p. 9, ¶1 .) Lee’s focus is on the functional properties of the body and seam regions through the incorporation of a novel multi-component architecture.

273. Penven is concerned with providing a tight seam closure across the full width of a single-layer wide press felt by using a pintle unit made up of two oppositely tapered, complementary pintle elements that interact in a wedging fashion. (Penven, Abstract.) Penven addresses the seam-closing mechanical method, not the geometric specification of the seam loops themselves.

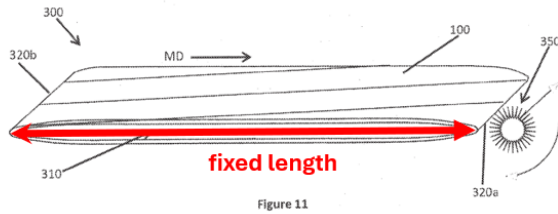
274. These references do not share a common design objective relevant to the claimed aspects of the ’566 Patent. **None of them identifies loop density or the LD/MDYD ratio as a design parameter, none of them treats those parameters as design goals, and none of them suggests that a specific combination of the three references would achieve any particular loop density or LD/MDYD ratio value.** Dr. Pastore has not identified any statement in any of the three references suggesting that the dimensional parameters of one should be imported into the seam

geometry of another. Dr. Pastore's theory treats loop density and LD/MDYD as unrelated numbers, fails to show that the references recognize the '566 Patent's identified seam/permeability/closure compromise problem, and reverse-engineers the claimed ratio by selecting Lee's 0.4 mm (**from the wrong structure**) and Penven's 50 mils to arithmetically "hit" the claimed range without prior-art support for that ratio as a design target.

275. Moreover, a POSITA would not have been motivated to look at Lee, which discloses a spiral wound base fabric, because Lee has a distinct limitation that is not present in the '566 Patent. The '566 Patent permits the producer of the base fabric to weave relatively long lengths of base fabric for stock inventory purposes and then be able to size the base fabric belt to the exact requirements of the papermaker. On the other hand, for Lee the length of the final base fabric belt is determined by a fixed distance between rollers. Accordingly, while the fabric producers could make large lengths of relatively narrow fabrics for subsequent spiral winding the distance between the rollers would need to be changed based on the paper maker's needs. As I illustrated in ¶29 of this declaration, the press section has at least two press felts (sometimes more than two) and each press felt length could be different.



Lee, Figure 1



Lee, Figure 11

b) A POSITA Would Not Have Extracted Penven's "About 50 Mils" as a Loop Design Specification

276. Penven's background section describes seam loops or hooks as the mechanism through which a pintle connector is inserted to close the seam. (See, Penven, 1:18-23.) **Penven's invention is a novel pintle system; it is not a novel loop design.** The "about 50 mils" void diameter appears as a reference dimension for sizing the pintle taper calculation, not as a specification for how to design seam loops. Dr. Pastore alleges that a POSITA seeking a seam loop size would have turned to Penven and would have been motivated to implement seam loops of "about 50 mils" because Penven indicates that "a typical seam in a papermaker's fabric [has] an internal void diameter of about 50 mils" and these sizes "are compatible with conventionally sized pintles." (EX1003, ¶¶262-264.)

277. But this reasoning is circular. Penven does not teach that seam loops should be designed to have a 50-mil void diameter. Penven describes that they *happen to have* that dimension in an alleged “typical” seam, as background context for a pintle-taper calculation. Accordingly, a POSITA reading Penven would have understood that Penven is teaching how to taper a two-part pintle to fit an existing seam, not how to design the seam loops themselves. The motivation to choose a 50 mils overall composite pintle diameter as a design target for seam loop diameter does not come from Penven. The motivation comes from knowing, only with the benefit of hindsight equipped with the teachings of the ’566 Patent, that 50 mils divided by 0.4 mm (from Lee’s thread diameter) would yield a ratio that Dr. Pastore set out to find.

c) The Structural Incompatibility Among Sudre, Lee, and Penven Defeats the Expectation of Success

278. As I have already discussed, Sudre’s two-layer final structure, Lee’s multi-component architecture consisting of interlaced woven fabric and orthogonal layers of non-woven yarns, and Penven’s conventional single-layer seam are all different systems with structurally distinct configurations with distinct and different requirements. Combining Lee’s non-woven first-structure loop geometry with Penven’s “typical seam” void diameter approximation and embedding both into Sudre’s flat-woven laminate architecture requires reconciling at least three structurally incompatible systems. Dr. Pastore has provided no engineering analysis

demonstrating that such a combination would predictably achieve the claimed geometric relationships. The absence of a reasonable expectation of success is an independent basis for denying Ground 2A.

**d) Petitioner's Arguments Constitute Impermissible
Hindsight Reconstruction**

279. Consistent with Ground 1A, Dr. Pastore repeatedly uses **the '566 Patent specification as a roadmap** for combining and interpreting the prior art references, which I am informed by counsel is a classic example of impermissible hindsight reconstruction.

280. The Petitioner or Dr. Pastore do not explain how the prior art would have provided a POSITA with an apparent reason to calculate the seam loop density and the LD/MDYD ratio, as required by independent claim 1. Instead, Dr. Pastore used the '566 Patent as a measurement framework, as I explained in Section VII.A.1. Below I present testimony from Dr. Pastore's declaration that demonstrates how Dr. Pastore used the teachings of the '566 Patent to fill gaps of the prior art in Ground 2A:

- Dr. Pastore relies again on the '566 Patents loop-density calculation formula: "The '566 Patent explains that loop density is calculated by multiplying twice the thread density by the MD thread diameter. *See* EX1001, 6:11-18." (EX1003, ¶290.)
- Dr. Pastore relies on the '566 Patent's description of pre- and post-thermal loop density ranges:

- “I also note that the ’566 Patent states that ‘the seam loop density of a clothing can change during the production process,’ and ‘thermal method steps can lead to shrinkage of the clothing in the transverse direction.’ EX1001, 6:27-30.” (EX1003, ¶292.)
- “The ’566 Patent also states that ‘[t]he values of the seam loop density indicated in this application relate to the finished clothing, if not otherwise specified.’ *Id.*, 6:33-35.” (EX1003, ¶292.)
- “This is because 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.” (EX1003, ¶293.)

281. In addition, the temporal mismatch of the references confirms hindsight.

- Sudre and Penven were published in the late 1980s. Lee was published in 2014. The temporal gap reinforces that Lee addresses a fundamentally different problem—how to insert a supplemental yarn assembly into an existing structure—not how to optimize the seam geometry of a conventional flat-woven felt. For example, in 1981 only about 10% of wet press fabrics were seamable. (EX2016, p. 59.) By 2008, 60% of wet press fabrics were seamable (EX2013, p. 1.)

8. There Is No Reasonable Expectation of Success in Combining Sudre's Flatwoven Technology with Lee's Non-Woven Spiral-wound Array Fabric

282. Dr. Pastore argues all three references generally concern press fabrics made endless from “**flat-woven base fabrics**” and that the attributes from Lee and Penven were conventional and could be easily utilized. (EX1003, ¶¶249-256.) But as described above in Section VIII.A.1, the Lee embodiments Dr. Pastore relied on are not flat-woven, nor are the attributes from these references conventional.

283. Critically, all of Petitioner's arguments fail to account for or even consider the structural differences between Lee and Sudre/Penven. First, as I explained in Section VIII.A.1, the cited Lee embodiments concern a complex multi-layer, multi-axial non-woven array structure, not the flat woven fabrics Petitioner purports to create by combination. These differences would directly impact the ability to combine these references and reach the required density and ratios, among other limitations. For example, changing Lee's array to a woven structure would change the yarn/mm numbers that Petitioner relies upon because there are different density considerations for a planar woven fabric compared to when the yarns of the fabric need to be woven. Second, Lee concerns multiaxial fabrics, where the overall fabric is constructed in a manner different than Penven. (See, Section VIII.A.1. These differences would impact the ability to combine these references and reach

the required limitations. Petitioner's failure to even account for let alone discuss these differences render their claims of reasonable expectations of success improper.

284. More fundamentally though, Dr. Pastore relies on speculative reasons as to why a POSITA would have had a reasonable likelihood of success. But even then, none of these explain how a POSITA would have come to the specific ratio and density, other than lucky guesswork and a POSITA that ignores or misunderstands the very references themselves. For example, that a POSITA would take Sudre's single line about flatwoven fabrics to use a dimensions from non-woven Lee as opposed to another flatwoven fabric. Moreover, that the POSITA would ignore Lee's teachings against flatwoven fabrics and pick just the right attributes from its 57-page disclosure. Even then, the POSITA would still have to guess what to use for the loop diameter. But according to Petitioner, he would know that Penven describes a *typical* conventional diameter, even though it is at odds with Petitioners own alleged "conventional" diameters from Adanur. The reality is that no POSITA could have reasonably been expected to do this and succeed in creating the combination of elements in the '566 Patent. Nor has Petitioner provided any basis to conclude otherwise.

B. Ground 2A: Dependent Claims 3 and 10-13

285. Claims 3 and 10-13 depend from claim 1 either directly or indirectly and therefore incorporate all of its limitations. For at least the reasons discussed

above in Section VIII.A with respect to claim 1, it is my opinion that claims 3 and 10-13 are likewise patentable.

C. Grounds 2B-2E: Dependent Claims 2, 4-9, and 14-15

286. Claims 2, 4-9, and 14-15 depend from claim 1 either directly or indirectly and therefore incorporate all of its limitations. For at least the reasons discussed above in Section VIII.A with respect to claim 1, it is my opinion that claims 2, 4-9, and 14-15 are likewise patentable.

287. Below, I present separate and additional reasons why the dependent claims are patentable over Sudre, Lee, Penven, and the secondary reference.

1. Ground 2D: Dependent Claim 14 Is Patentable Over Sudre, Lee, Penven, and Lidar

288. For the reasons I explained in Section VII.C.1 in connection with Lidar, the combination of Sudre, Lee, Penven, and Lidar does not render obvious claim 14.

IX. GROUNDS 3A-3E: CLAIMS 1-15 ARE PATENTABLE OVER SUDRE, RYDIN, AND THE SECONDARY REFERENCES

289. As an initial note, Dr. Pastore does not challenge claims 10 and 11 under Grounds 3A-3E. (*See*, EX1003, ¶¶382-383.)

A. Ground 3A: Sudre and Rydin Fail to Teach or Suggest the Claimed Loop Density and LD/MDYD Ratio

290. In Ground 3A, Dr. Pastore asserts that claims 1, 3, and 12-13 are rendered obvious by the combination of Sudre and Rydin, relying on Rydin as

“another example of PMC possessing the claimed loop density and loop ratio recited in claim 1 of the ’566 Patent.” (EX1003, ¶366.)

291. According to Petitioner, the parameter details of the PMC, such as the shape and diameter of the MD (warp) threads, thread density, and loop size, can be obtained from the photographs of an underlying seam and a finished product of the PMC shown in Rydin’s Figures 2 and 3, and these parameter details allegedly “correspond to the ’566 patent’s claimed features: a loop density of approximately 78%, and a LD/MDYD ratio of approximately 3.2.” (EX1003, ¶367.)

292. **For the reasons I explain below, each of these assertions is technically unfounded.** Dr. Pastore’s analysis for Ground 3A suffers from the same fundamental methodological defects that undermine his Ground 1A analysis, and it introduces several new and independent errors specific to Rydin that further confirm the unreliability of his conclusions. Accordingly, the combination of Sudre and Rydin does not render claims 1, 3, or 12-13 of the ’566 Patent obvious.

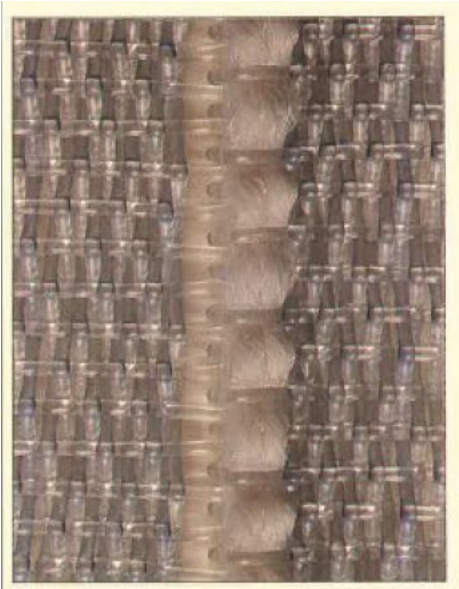
1. Dr. Pastore Improperly Combines Measurements from Two Structurally Different Figures That Depict Different Fabrics

293. Dr. Pastore’s entire Ground 3A approach rests on combining “parameter details of the PMC” derived from two separate Rydin photographs: measurements of MD thread diameter and thread density taken from Figure 2, and a seam loop diameter measurement taken from Figure 3. (EX1003, ¶367.) This combination is scientifically unjustifiable because Figures 2 and 3 of Rydin do not

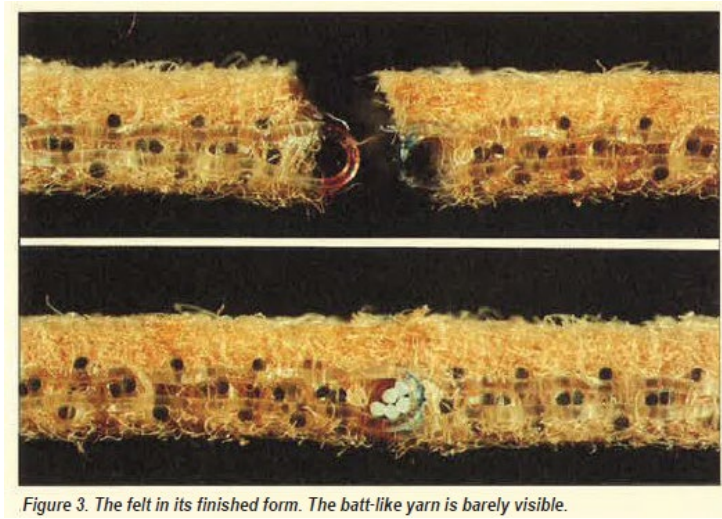
depict the same fabric or even the same stage of fabrication. This undermines Dr. Pastore's conclusions, because if the two figures do not depict the same material, no dimensional values extracted from one can be combined with values from the other to derive a meaningful ratio, which is what Dr. Pastore did.

294. First, Dr. Pastore incorrectly relies on pictures from two different photographs in Rydin and combines measurements and features across these photographs. However, there is no indication in Rydin that these pictures are from the same press felt. In fact, it is readily visually apparent that Figure 2 and Figure 3 (below) depict different objects: Figure 2 shows a photograph of a purely woven fabric (Rydin, Figure 3), while Figure 3 shows a finished felt with one or more batt layers needle punched into it. (Rydin, Figure 3.)

295. The structural differences are also obvious even to a lay observer, and as such, a POSITA would immediately recognize that these are not the same material.



Rydin, Figure 2.



Rydin, Figure 3.

296. Figure 2 depicts the raw, underlying base fabric, which is a purely woven structure with no batt layers applied. Rydin’s central innovation is the integration of a batt-like yarn into the base fabric that “acts as a flap covering the loops,” with the diameter of this yarn in “the same size range as the batt fiber diameter,” and during the subsequent needling process, “this yarn is largely integrated into the batt structure.” (Rydin, 2.) Figure 3 depicts precisely this finished, needled product, which is a completely different structural state. The needling process dramatically alters the geometry of the fabric, including the seam zone, compressing and integrating the batt layers in ways that would change thread spacing, loop configuration, and overall fabric dimensions. A POSITA would have understood that the dimensional parameters of a base fabric (Figure 2) and a finished, needled felt (Figure 3) cannot be treated as interchangeable.

297. Moreover, Rydin does not even describe or analyze a specific press felt product. Rather, Rydin introduces a new design concept, namely, the integration of a special batt-like yarn into the base fabric. As the Rydin article headline indicates, the article discusses an entire new generation of press felts. There is no suggestion that Figures 2 and 3 refer to the same sample, nor that their geometric features are intended to be combined or compared.

298. Second, Dr. Pastore's position is in direct contrast with how a POSITA would use photographic images from an undated trade publication. A POSITA skilled in the paper machine clothing field would know that photographs in a promotional or trade journal article are published to convey qualitative concepts—in this case, the novel design concept of the inwoven batt-like yarn—and not to provide dimensional data for engineering analysis. The photograph in Rydin was taken probably for promotional marketing purposes to illustrate a novel seam concept involving additional yarns, and there is no reason to believe that special care was taken to ensure geometric accuracy or thread alignment. The combination of measurements from two images that depict two structurally distinct objects is precisely the kind of speculative, cherry-picked methodology that a POSITA with genuine engineering and scientific rigor would reject.

299. Accordingly, Dr. Pastore and Petitioner's attempt to derive dimensional values by combining measurements from two unrelated and uncalibrated images is

speculative and methodologically unsound. Because all of Dr. Pastore's Ground 3A calculations, including both the loop density calculation (based on Figure 2) and the LD/MDYD ratio calculation (which combines a loop diameter from Figure 3 with a thread diameter from Figure 3 that is itself rendered unreliable by the cross-figure nature of the overall analysis), rest on this impermissible cross-figure combination, the entirety of his Ground 3A analysis is undermined.

2. Dr. Pastore's Mapping Cannot Satisfy Simultaneously the Seam Loop Density and Seam Loop Diameter Limitations

300. Claim 1 requires “**a seam** interconnecting said end sides...” where “*said seam* having a loop density...” and “said diameter LD of *said seam loops*.” (EX1001, claim 1.) Accordingly, any loop density measurement and seam loop diameter (LD) measurement must correspond to the same “said seam,” i.e., the same seamed fabric. **Dr. Pastore either failed to appreciate this claim requirement or ignored it.** Dr. Pastore admitted that the “*seam* having a loop *density*” of claim 1 is the same seam as the “**seam** interconnecting said end sides...” of the previous limitation. (EX1001, claim 1.)

Q. Do you understand the seam “having a loop density of between 64 percent and 90 percent to correspond to the seam of the limitation at Column 10, Line 5?

A. Yes.

Q. They're the same seam; correct?

THE WITNESS: I believe so.

(EX2012, 92:8-15.)

301. However, when asked whether the claimed “loop *diameter*” also corresponded to the same seam defined previously in claim 1, Dr. Pastore failed to recognize any reference of the “said loop diameter” (LD) in claim 1 to the claimed “seam.” I have reproduced the testimony below.

Q. And the seam loop density **and the seam loop diameter correspond to the seam that is defined in Column 10, Line 5; correct?**

A. I know this sounds pedantic, but the seam loop density clearly belongs to the seam.

Q. Okay.

A. Said seam having a loop density of.

Q. Okay.

A. **The said loop diameter makes no reference to the seam anywhere.**

(EX2012, 96:7-16.)

302. So either Dr. Pastore failed to appreciate that the loop density and loop diameter (LD) correspond to the same seam—and therefore related measurements should be made from the same seam—or, and to the extend Dr. Pastore misspoke at this deposition, he ignored this requirement. In either case, Dr. Pastore calculated the claimed “loop density” from one seam (Figure 2 of Rydin) and the claimed “LD/MDYD” ratio from a different seam (Figure 3 of Rydin).

303. That is, Dr. Pastore's used different seams to calculate (1) the range of the loop density of the seam and (2) the diameter (LD) of the seam loop, which is necessary for the calculation of the range of the LD/MDYD ratio. In fact, he even admitted during cross-examination that he did not consider it a requirement that Figure 2 and Figure 3 show the same seam:

Q. In your analysis it wasn't a requirement that the seam of the fabric in Figure 2 was the same as the seam of the fabric in Figure 3; correct?

A. It was not necessary to do the calculations I performed.

(EX2012, 190:1-6.)

Q. And it's your testimony doesn't matter whether the seam loop in one picture was different than a seam loop in the second picture; correct?

A. Correct...

(EX2012, 272:18-21.)

304. Accordingly, his mapping cannot satisfy simultaneously the seam loop density and LD/MDYD ratio limitations.

3. Dr. Pastore's Measurements and Statistical Analysis Are Statistically Unsound

305. Even setting aside the threshold problem of combining measurements from two different figures depicting two different fabrics, Dr. Pastore's specific measurement methodology for Ground 3A is independently flawed and fails to meet even the most basic standards of scientific rigor. These flaws compound the

structural problems identified above and independently render his calculations unreliable as a basis for establishing the claimed dimensional parameters.

306. Dr. Pastore claims to have determined Rydin's MD thread diameter by "measuring the diameter (in pixels) for ten (10) MD threads" in Figure 2, which he describes as a "conventional way" of measuring. (EX1003, ¶368.) He similarly measured MD thread density by identifying "ten MD threads in Rydin's Fig. 2 fabric" spanning 1,090 pixels, to arrive at a thread density of "approximately 0.0091 threads/pixel." (EX1003, ¶369.) (emphasis in original.)

307. However, as in Ground 1A, Dr. Pastore provides no scientific source or published methodology to support his claim that these measurement approaches reflect any accepted "standard" or "conventional" practice in the field. His reference to "conventional" methods without citation to any standard, protocol, or published authority does not constitute a scientific methodology. A POSITA relying on measurement data to design a high-precision industrial fabric would have required a documented, validated measurement protocol with traceable calibration. **Dr. Pastore provides none.**

308. Dr. Pastore reports his measured values with excessive precision, for example, 0.0091 threads/pixel, without providing any indication of measurement accuracy, standard deviation, or error margins. This false precision is telling, and it is particularly misleading in the context of Dr. Pastore's loop density calculation.

Dr. Pastore calculated the loop density as “ $2 * 0.0091 \text{ threads/pixel} * 42.6 \text{ pixels}$,” yielding a value of approximately 78%. (EX1003, ¶370.) However, Dr. Pastore does not provide any analysis of how the measurement uncertainty in the thread diameter (42.6 pixels) or the thread density (0.0091 threads/pixel) propagates through this multiplication and affects the reliability of the resulting 78% figure. This is a fundamental omission. As any engineer or scientist with basic training in measurement analysis would know, the certainty in a derived quantity depends on the certainties of the input measurements. Here, even a modest uncertainty of ± 2 pixels in the thread diameter measurement, which is entirely plausible given the nature of a scanned photograph without a calibrated scale bar, would produce a materially different loop density result.

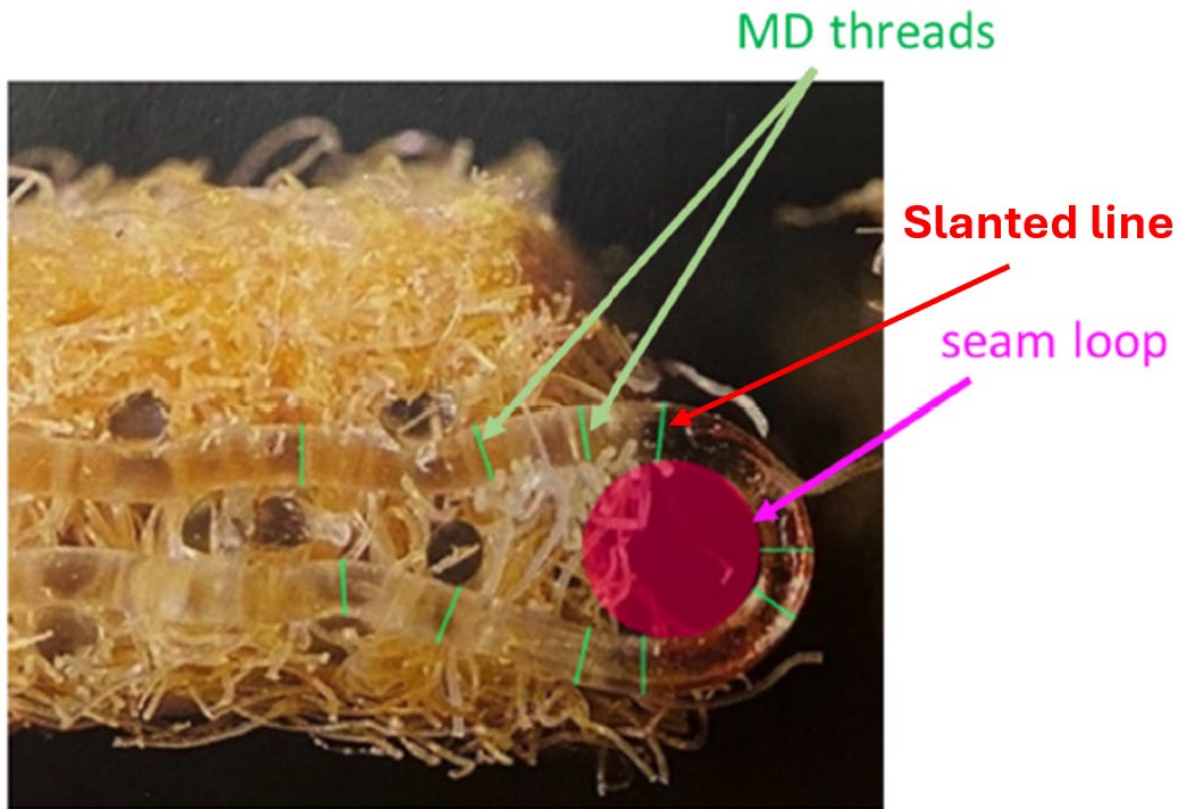
309. For the determination of the loop diameter in Figure 3 of Rydin, Dr. Pastore performed only a single measurement, and no repeat measurements were taken. (See, EX1003, ¶367 (showing a single inserted circle within the seam loop).) A single measurement, with no repeat, provides no statistical basis for confidence in the result. Dr. Pastore knew this, as he measured the diameter of the MD threads ten times in connection with Figure 2 and ten more times in connection with Figure 3. (EX1003, ¶¶368, 371.) In addition to the statistical inadequacy, a single measurement is additionally particularly problematic because Dr. Pastore is measuring from a scanned marketing photograph taken with unknown camera

settings, at an unknown focal length, and with no stated scale bar. The absence of any quantification of measurement reproducibility, let alone accuracy, means that the reported 167-pixel loop diameter cannot be accepted as a reliable number.

310. The lack of error analysis in Dr. Pastore's measurements is particularly relevant because if the reported LD/MDYD ratio of 3.2 carries an uncertainty of 10-15%, the true value may fall outside the claimed range of 2.7-3.6. Given the observed spread in the underlying measurements, such an error margin is very likely. A ratio of 3.2 sits in the interior of the claimed range of 2.7–3.6, but it is not far from the boundaries. If the loop diameter (167 pixels) is even slightly overestimated, or the thread diameter (53 pixels) is slightly underestimated, which is entirely possible given the absence of any calibration standard, the computed ratio could fall outside the claimed range. Dr. Pastore's failure to conduct any uncertainty analysis conceals this critical possibility.

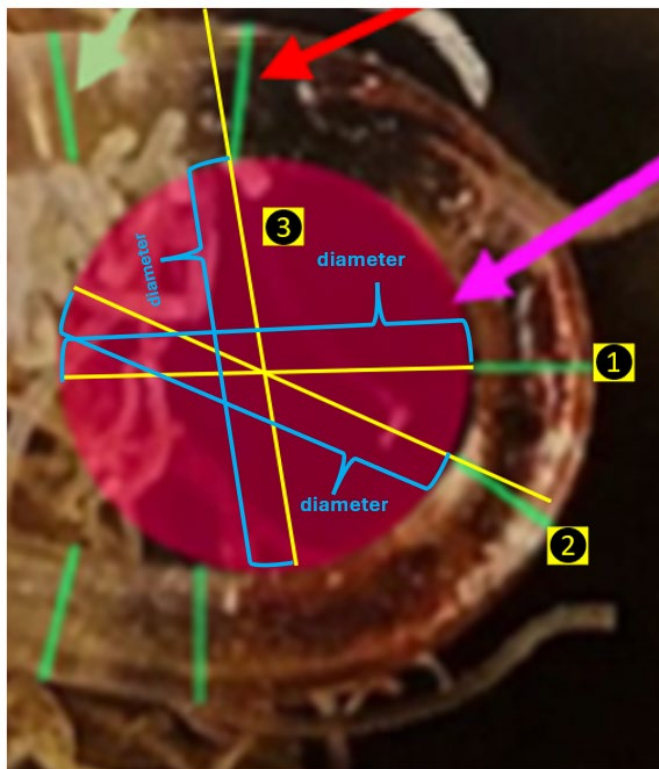
311. Dr. Pastore's identification of thread diameters in Figure 3 of Rydin is also demonstrably incorrect, further undermining his methodology. The green lines that Dr. Pastore uses to measure thread diameters need to correspond to the smallest distance between two opposite points (top-bottom) on the thread, i.e., the true diameter. However, a simple inspection of the annotated Figure 3 of Rydin reveals slanted green lines that do not correspond to the shortest distance across the thread. For example, as indicated in Figure 3 below, at the point where the inscribed circle

and the MD thread share the same curvature, i.e., where the thread is tangential to the circle, the green line should have been drawn as an extension of the circle's diameter. Dr. Pastore's methodology ignores even basic geometry.



(EX1003, ¶371) (annotated by Dr. Pastore and further annotated to indicate slanted line)

312. Based on my observations of Dr. Pastore's annotations on Figure 3 of Rydin, I prepared a detail of Figure 3 with additional annotations, which I reproduce below.



313. The yellow lines in the above figure represent the diameters (which are extended) of the inscribed circle. A POSITA would have observed that 3 of the green lines that Dr. Pastore drew are not aligned with the diameter lines that I extended and that I drew through Dr. Pastore's inscribed circle. This suggests that Dr. Pastore did not draw the green lines to properly align to the diameters of the MD thread lines.

314. The failure to properly draw some of the green lines confirms that Dr. Pastore's green lines do not correspond to the thread diameter but instead measure a chord or a diagonal cross-section, which is necessarily larger than the true thread diameter. Accordingly, Dr. Pastore's measured MD diameter value of 53 pixels likely overestimates the true thread diameter, which in turn means that the computed

LD/MDYD ratio of 3.2 is correspondingly underestimated. The true ratio, properly measured, would be even further from the claimed range than Dr. Pastore's calculations suggest.

315. Further, again Dr. Pastore relies on using pixel measurements without knowing the resolution of the photograph and as I stated in Section VII.A.4 this means that his measurements are unreliable.

316. Dr. Pastore determines values for loop diameter and thread diameter by manually drawing lines and circles over a scanned image of a marketing photograph. This approach is very unreliable because the conditions under which the original image was taken are unknown. Dr. Pastore implicitly assumes that the image is free of distortion and that the MD thread run perfectly horizontal. But since the photograph was taken for promotional purposes to illustrate a novel seam concept involving additional yarns, there is no reason to believe that special care was taken to ensure geometric accuracy or thread alignment. Dr. Pastore provides no additional information regarding these potential sources of error or their impact on the measurement results. Additionally, the number, placement, and orientation of the green lines used to determine the MD thread diameters appear arbitrary and are not justified. Taken together, these methodological shortcomings render the measurements unreliable and unsuitable as a basis for establishing the claimed dimensional parameters.

317. A particularly revealing inconsistency in Dr. Pastore's flawed methodology is the shift in his approach between Ground 1A and Ground 3A. In Ground 1A, Dr. Pastore measured the MD thread diameter in the CD Picture of Adanur's Figure 3.15 and not in the MD Picture where he had inscribed the circle. In Ground 3A, realizing the magnification problems of measuring thread diameter from different pictures, Dr. Pastore instead measures the thread diameter from Figure 3 of Rydin, the same figure in which he inscribed the circle. This inconsistency highlights the untrustworthiness of his approach: it possesses no scientific rigor. An accepted scientific methodology, applied consistently across both grounds, would not selectively change measurement approaches based on which approach produces the more favorable result. That Dr. Pastore's approach migrates between grounds is itself strong evidence of hindsight-driven analysis.

318. For all of the foregoing reasons, Dr. Pastore's measurements of Rydin are scientifically unsound. His calculations of loop density (~78%) and LD/MDYD ratio (~3.2) are not reliable, and they cannot serve as evidence that the combination of Sudre and Rydin teaches or suggests the claimed limitations of the '566 Patent.

4. A POSITA Would Not Look into Rydin to Modify Sudre Because Sudre and Rydin Address Fundamentally Different Technical Problems

319. Independent of the measurement failures described above, Petitioner's Ground 3A fails for a separate and equally fundamental reason: there is no credible

motivation for a POSITA to combine Sudre and Rydin for the purpose of arriving at the specific loop density and LD/MDYD ratio required by claim 1 of the '566 Patent. The technical problems addressed by these two references are different and a POSITA seeking to solve the problem addressed by one would have had no reason to consult the other.

320. Sudre is directed to a method for the manufacture of a seamed endless structure for use as paper machine clothing. Sudre's disclosure describes two conventional methods of producing papermakers' fabrics: flat-woven and endless-woven. (Sudre, 1:2-9.) The inventive step of Sudre is the provision of a fabric of plural, superimposed layer configuration having fold regions at the respective opposite ends, from which cross-machine direction yarns are removed to leave machine-direction loops thereat. (Sudre, 1:22-2:4.) Sudre's technical concern is the method of manufacture, specifically, how to form a seamable, multi-layer structure using a folded flat-woven or endless-woven base fabric. Sudre is entirely silent on seam loop geometry, loop diameter, loop density, the dimensional relationship between loop and thread size, or any optimization of seam performance parameters. Dr. Pastore relies on a single half-sentence or phrase in Sudre (Sudre, 6:14-17) to argue that "a POSITA would have been motivated to looked 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." (EX1003, ¶¶373-374.)

321. However, neither Petitioner nor Dr. Pastore offer any specific reason or substantive evidence explaining why or how this single sentence would motivate a POSITA to look to Rydin to find specific values of the LD/MDYD ratio and loop density for designing a PMC. The disclosure of Sudre also does not identify any technical problem related to seam loop density or loop diameter ratios. It merely describes a conventional method for forming a seam in a flat-woven fabric but does not suggest any optimization of dimensional parameters. A POSITA reading Sudre would not come away with any instruction, suggestion, or motivation to optimize seam loop geometry, because Sudre does not identify seam geometry as a problem to be solved.

322. Rydin, by contrast, addresses a wholly different technical concern. Rydin introduces a new design concept involving the integration of a specialty batt-like yarn into the base fabric to improve press felt performance. Rydin discusses a “new generation of seamed felt” (Rydin, 1) and focuses on material innovation and not geometric optimization. Rydin’s contribution to the art is the use of an inwoven batt-like yarn to bridge the top of the loops and improve seam zone homogeneity and batt anchorage. This new generation seamed felt achieves “greater homogeneity in the seam zone combined with improved batt anchoring,” (Rydin, 2) through a special weaving technique that “managed to bridge the top of the loops with an inwoven batt-like yarn that acts as a flap covering the loops.” (EX1028, 2) The

technical objective of Rydin is to address seam marking caused by the openness of the seam zone, it is not to optimize the dimensional ratio between loop diameter and thread diameter.

323. The divergence in technical focus between these two references is significant. A POSITA confronting the manufacturing problem described by Sudre, i.e., how to form a seam in a multi-layer, flat-woven PMC structure, would not have turned to a 1992 trade journal article about a novel batt-integration technique to obtain loop geometry parameters. Rydin does not present itself as a dimensional reference for seam loop design. Rather, it presents itself as describing a qualitative material innovation in batt anchorage. Nothing in Rydin directs a reader's attention to specific values of loop diameter or thread spacing as design parameters to be replicated. Accordingly, a POSITA reading Rydin for its stated purpose would not have extracted pixel measurements from its photographs for use in designing a different fabric structure.

324. As discussed, Dr. Pastore's sole stated justification for combining Sudre and Rydin is that a POSITA would have been motivated to look to Rydin because "Sudre is silent as to specific parameters relating to its loop spacing and loop diameter," and Rydin allegedly would have provided information about "relative proportions and sizes, such as a relative loop density and loop ratio." (EX1003, ¶373.) But under this rationale, any two references that relate to press

felts could be combined, because Sudre is silent on virtually all dimensional parameters. The mere fact that Sudre does *not* specify dimensional parameters does not provide a POSITA with a principled basis for selecting Rydin, out of the entire universe of PMC literature, as the source from which to import those parameters. Dr. Pastore has provided no evidence that a POSITA would have identified Rydin as the appropriate reference for seam geometry parameters, as opposed to any other PMC publication.

5. Petitioner's Arguments Constitute Impermissible Hindsight Reconstruction

325. Consistent with Grounds 1A and 1B, Dr. Pastore repeatedly uses the '566 Patent specification as a roadmap for combining and interpreting the prior art references, which I am informed by counsel is a classic example of impermissible hindsight reconstruction. Dr. Pastore does not explain how the prior art would have provided a POSITA with an apparent reason to calculate the seam loop density and the LD/MDYD ratio, as required by independent claim 1. Instead, Dr. Pastore used the '566 Patent as a measurement framework, as I explained in Section VII.A.1. Below I present testimony from Dr. Pastore's declaration that demonstrates how Dr. Pastore used the teachings of the '566 Patent as a roadmap to fill gaps of the prior art in Ground 3A:

- Dr. Pastore measured seam loop diameter "consistent with the '566 Patent," quotes the same "largest circle" technique, and

uses it to obtain a 167-pixel loop diameter and derive an LD/MDYD ratio of approximately 3.2. (EX1003, ¶371.)

- For Rydin, he again states that loop density is calculated as $2 \times (\text{thread density}) \times (\text{MD thread diameter})$, “consistent with the ’566 Patent”, to obtain a loop density of approximately 78%. (EX1003, ¶370.)
- For Rydin, he again relies on the ’566 patent’s statements about thermal shrinkage and the patent’s pre-thermal loop density range to argue that even if Rydin Fig. 2 is “not finished,” its measured 78% loop density still supports meeting the claimed range. (EX1003, ¶¶379-380.)

B. Ground 3A: Dependent Claims 3 and 12-13

326. Claims 3 and 12-13 depend from claim 1 either directly or indirectly and therefore incorporate all of its limitations. For at least the reasons discussed above in Section IX.A with respect to claim 1, it is my opinion that claims 3 and 12-13 are likewise patentable.

327. Below, I present separate and additional reasons why the dependent claims are patentable over Sudre, Lee, Penven, and the secondary reference.

X. GROUNDS 3B-3E: DEPENDENT CLAIMS 2, 4-9, AND 14-15

328. Claims 2, 4-9, and 14-15 depend from claim 1 either directly or indirectly and therefore incorporate all of its limitations. For at least the reasons

discussed above in Section IX.A with respect to claim 1, it is my opinion that claims 2, 4-9, and 14-15 are likewise patentable.

1. Ground 3D: Dependent Claim 14 Is Patentable Over Sudre, Rydin, and Lidar

329. For the reasons I explained in Section VII.C.1 in connection with Lidar, the combination of Sudre, Rydin, and Lidar does not render obvious claim 14.

XI. Dr. Pastore Lacks the Relevant Expertise and Experience to Offer Reliable Opinions on Paper Machine Clothing

330. Petitioner's obviousness theories depend heavily on the opinions of Dr. Pastore. But the record demonstrates that Dr. Pastore is **not a qualified expert in textile engineering or paper machine clothing fabrics**. I present below testimony from Dr. Pastore when asked about his relevant experience during his deposition that demonstrates this point.

A. Dr. Pastore Has No Hands-On Experience with Paper Machine Clothing

331. Dr. Pastore admitted that he has **zero hands-on experience** in the design, manufacture, or operation of PMC fabrics. For example, he has never been employed by a PMC manufacturer.

Q. You have never been employed by a paper machine clothing manufacturer; correct?

A. Correct.

(EX2012, 48:14–16.)

332. He has never fabricated or manufactured a PMC seam structure.

Q. How many paper machine clothing seam structures have you personally fabricated or manufactured in a production setting?

A. **Zero.**

(EX2012, 48:17–20.)

333. He has never worked inside a PMC manufacturing plant.

Q. How many years have you spent working inside a PMC manufacturing plant as opposed to academic or consulting work?

A. **Zero.**

(EX2012, 48:21–49:2.)

334. Dr. Pastore has **never designed** or optimized seam loops for press felts.

Q. Have you ever been employed to design or optimize seam loops for commercial press felts for a PMC manufacturer?

A. No.

(EX2012, 49:3–6.)

335. He has never designed seam loop geometry for commercial press felts.

Q. You have never designed a seam loop geometry for commercial press felts; correct?

A. Correct.

(EX2012, 49:17–19.)

336. He has never supervised weaving of PMC fabrics.

Q. Have you ever supervised weaving of flat woven PMC based fabrics?

A. No.

(EX2012, 49:11–13.)

337. He has never removed CD yarns to form seam loops.

Q. You have never personally removed CD yarns to form seam loops; correct?

A. No.

(EX2012, 49:14–16.)

338. Dr. Pastore further conceded that his PMC experience is purely academic or consulting-based, not practical.

Q. So any PMC-specific experience you have is academic and consultancy based; correct?

A. Correct.

(EX2012, 49:20–22.)

339. Dr. Pastore further admitted that his opinions are not based on any practical PMC experience, rather they are based on literature review.

Q. You don't have any hands-on experience on PMC manufacturing; correct?

A. Correct.

(EX2012, 50:1–3.)

Q. [Y]our opinions here are based on literature review and analysis, not hands-on personal experience in PMC manufacturing; correct?

A. It's based on my experience as a textile engineer and literature, yes.

Q. And this experience as a textile engineer is not built by hands-on PMC manufacturing experience; correct?

A. Correct.

Q. So you don't have any hands-on experience on PMC manufacturing; correct?

A. Correct.

(EX2012, 50:4–15.)

Q. Your opinions are formed without any hands-on experience on PMC manufacturing; correct?

A. Correct.

(EX2012, 51:13–16.)

Q. So any PMC-specific experience you have is academic and consultancy based; correct?

A. Correct.

(EX2012, 49:20–22.)

B. Dr. Pastore Has No Real-World Experience with Paper Machines

340. Dr. Pastore also admitted that he has never worked with or even observed a paper making machine in operation:

Q. Have you seen in real life a paper machine like the one that you show on Page 14 of your declaration?

A. I have never been near one of the machines physically, no.

(EX2012, 52:7–11.)

Q. You've never been near one of the papermaking machines that use the fabrics that is the subject of the '566 Patent;

correct?

A. Correct.

(EX2012, 52:12–15.)

Q. You've only seen paper machines in pictures; is that fair?

A. Pictures and videos, yes.

(EX2012, 52:16–18.)

C. Dr. Pastore Has Not Taught or Published on PMC Fabrics and His Formal Education Lacks Specialization in Flat-Woven PMC Fabrics and Seam Structures

341. Dr. Pastore admitted that his academic work does not focus on PMC fabrics:

Q. So in the list of courses taught in your CV, you have not taught a course on fabric design specifically related to paper machine - - papermaking machines; correct?

A. Correct.

(EX2012, 41:8–12.)

Q. How many peer-reviewed papers have you published in the field of two-dimensional woven fabrics for papermaking machines?

A. I don't recall ever publishing such a paper.

Q. So you have not published any papers in the field of two-dimensional woven fabrics for papermaking machines; correct?

A. Correct.

(EX2012, 48:5–13.)

342. Dr. Pastore's degrees are in mathematics and materials science, not textile engineering or PMC engineering.

Q. You received a bachelor in mathematics; correct?

A. That is correct.

(EX2012, 22:7–9.)

Q. Then you received a Master's in mathematics; correct?

A. Correct.

(EX2012, 23:11–13.)

Q. [Y]our concentration during your Master's was computer-aided geometric design; correct?

A. Correct.

Q. This is software-related; correct?

A. It's software and theoretical, yes.

Q. Not related to paper machine clothing; correct?

A. Correct.

(EX2012, 24:16–25:2.)

Q. Then you received a Ph.D. in material science; correct?

A. Correct.

(EX2012, 25:8–10.)

Q. [Y]our Ph.D. thesis was titled "A Processing Science Model for Three-Dimensional Braiding"; is that correct?

A. That is correct.

(EX2012, 27:5–8.)

Q. Your Ph.D. thesis did not discuss papermaking; correct?

A. No, it did not.

Q. Your Ph.D. thesis did not discuss press felts; correct?

A. Correct.

(EX2012, 28:13–15)

Q. Your Ph.D. thesis did not discuss seamed textiles; correct?

A. Correct.

(EX2012, 28:16–18)

Q. Nothing about textiles used in papermaking in your Ph.D. thesis; correct?

A. Correct.

(EX2012, 28:19–21.)

Q. Three-dimensional braided fabrics are not used in papermaking machines; correct?

A. Correct.

(EX2012, 29:4–6.)

343. A textile engineer would know that textile braiding is an entirely different textile manufacturing process than textile weaving.

D. Dr. Pastore Was Unfamiliar with Voith and the PMC Industry

344. Dr. Pastore also admitted that he was unfamiliar with key participants in the PMC industry:

Q. When did you first hear about the Patent Owner Voith?

A. I've never really been familiar with Voith prior to this case.

(EX2012, 61:6–10.)

Q. As you sit here, the only supplier of paper machine clothing that you knew before you were engaged in this case was Albany

International?

A. I think so, yes.

(EX2012, 131:19–22.)

345. These admissions confirm that Dr. Pastore lacks the type of practical, industry-specific experience that is central to understanding how PMC fabrics are actually designed, manufactured, and used. This is critical. The '566 Patent concerns fabrics used in operational papermaking environments, where seam performance, marking, and mechanical behavior are highly context-dependent. Dr. Pastore's complete lack of real-life exposure to such machines undermines his ability to opine on how a POSITA would evaluate or modify these fabrics.

346. These are not minor gaps—they go to the **core qualifications required to opine on seam structures, loop geometry, and fabric performance in papermaking environments.**

XII. OBJECTIVE INDICIA OF NON-OBVIOUSNESS

A. The Prior Art Taught Away from the '566 Patent Technology and Its Improvements

347. As I discussed in Section VIII.A.5, Lee expressly criticizes flat-woven base fabrics as time-consuming and capital-intensive, and affirmatively directs the POSITA toward spiral-wound multiaxial constructions as the superior alternative. That teaching-away effect independently defeats Petitioner's motivation-to-combine theory. It also constitutes objective evidence of non-obviousness: a POSITA reading

Lee at the priority date would have been affirmatively directed away from the flat-woven technology that the '566 Patent sought to improve.

348. The broader commercial and industry history confirms and reinforces this directional teaching. The basic flat-woven fabric technology was developed in the late 1980s. (Sudre, 1; Penven, 1.) By the 2010s, the industry had shifted its focus toward multiaxial fabrics precisely because, as Adanur explains, “the product quality and production rates [of multiaxial fabrics] are far superior to that of a conventional weaving loom.” (Adanur-1997, 109.) Industry participants and researchers were directing their efforts toward new constructions for spiral-wound fabrics—not toward optimizing or improving flat-woven solutions like those claimed in the '566 Patent.

B. There Were Long-felt, Unmet Needs to Develop a Durable and Improved Flat Woven Solution

349. I have been informed by counsel and I understand that evidence of a long felt but unresolved need tends to show non-obviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious. This is the case here. The well-known yet unaddressed disadvantages and limitations of flat woven designs were not addressed or improved until the '566 Patent. (EX1001, 1:41-8:10.) Following some initial development of flat-woven endless fabrics in the late 1980s (Sudre), the industry broadly moved toward multiaxial fabrics, perceiving flat-woven solutions as commercially infeasible. The seam remained the critical

weakness: its permeability differed from the rest of the fabric, causing marking and quality defects (EX1001, 1:57-64); the optimal method of joining the two fabric ends remained unsettled (EX1001, 1:65-2:4); and the structural requirements for maintaining strength while balancing competing seam considerations were unknown (EX1001, 3:4-35; 5:11-22; 6:7-7:22).

350. These issues were long known but the solution of the '566 patent—using an LD/MDYD ratio and certain loop density—was not known or developed. Instead, others sought to implement alternatives like adding flow resistant material adjacent or over the seam (Yook, 3:65-4:2). Others sought to use light absorbing junctions and lasers to strengthen the connections at the seams (Straub, ¶¶1, 5-6).

C. Unexpected Results

351. The claimed LD/MDYD ratio—and in particular the 2.7–3.6 range—produces unexpected results that the prior art neither taught nor predicted.

1. The Claimed Invention Reflects a Non-Obvious Identification of the Controlling Variables

352. *First*, the invention reflects a non-obvious discovery of the governing variables—seam strength, ease of pintle insertion, permeability control, and avoidance of marking—are controlled by the non-dimensional *ratio* LD/MDYD, rather than by absolute dimensions.

353. The '566 Patent expressly identifies this conceptual breakthrough, stating that “it is not the absolute loop diameter ... but the relative value LD/MDYD that has to be used as the characteristic variable.” (EX1001, 3:32-35.)

Q. So according to the '566 patent, the LD/MDYD ratio affects seam strength, ease of pintle insertion, marking tendency and seam permeability; correct?

A. Correct.

(EX2012, 365:13-17.)

354. The prior art contains no such teaching. As Dr. Pastore admitted, the prior art “do[es] not identify LD/MDYD as a parameter,” does not identify it “even as a parameter,” and “without the knowledge of the '566 patent, someone would not have identified LD/MDYD as a parameter.” (Ex. 2012, 122:5-123:5.)

Q. Going back now to the prior art references in this proceeding, none of these references explicitly disclose the LD/MDYD ratio; correct?

A. None of the rest of the prior art references do that calculation.

Q. They don't even mention a ratio between seam loop diameter and the MD diameter; correct?

A. Correct.

(EX2012, 364:7-15.)

355. Dr. Pastore further admitted there would have been “no reason to look for these ratios without the existence of the '566 patent.” (EX2012, 130:22-131:2.)

356. These admissions establish that the claimed ratio is not merely an optimized known variable, but rather a previously unrecognized relationship.

357. The prior art treated loop diameter and yarn diameter, as independent design parameters, not as a coupled relationship, such as a ratio. Dr. Pastore testified that:

Q. You haven't provided any prior art that discusses the relationship between the loop diameter and the MD thread diameter; correct?

THE WITNESS: I have not shown anything that did that calculation, no.

Q. Okay. And loop diameter and yarn diameter are two different features; correct?

THE WITNESS: Correct.

(EX2012, 369:4-14; *see also*, EX2012, 364:16-374:4.)

358. Accordingly, the inventors' identification of LD/MDYD as the controlling variable was itself a non-obvious conceptual advance, not predictable from the art.

2. The Claimed Range Achieves a Non-Predictable Balance of Competing Objectives

359. *Second*, the claimed range yields a non-predictable balance of multiple competing performance objectives. The '566 Patent explains that seam design involves conflicting constraints, including seam strength, ease of pintle insertion, permeability control, and avoidance of marking. (EX1001, 3:1-37) The Patent

further explains that smaller loops hinder seam closure (EX1001, 3:8-14), larger loops increase marking and permeability defects (EX1001, 3:22-28), and the claimed range “has proven to be the optimum compromise.” (EX1001, 3:29-31.)

360. This is not a simple optimization of a single variable. It is a multi-variable tradeoff problem, where improving one parameter degrades another, and no single parameter independently predicts overall performance.

361. Dr. Pastore confirmed exactly that seam performance depends on multiple variables, not just loop diameter or yarn diameter, and no prior art isolates the effect of the ratio.

362. The claimed LD/MDYD ratio range enables sufficient loop size for pintle insertion, maintains seam strength, minimizes permeability variation, and avoids both mechanical and hydraulic marking. No prior art teaches that a single ratio window could simultaneously satisfy all of these competing objectives.

3. The Results Were Not Predictable

363. The record further confirms that the claimed results were not predictable from the prior art. As Dr. Pastore admitted, he used the '566 Patent's methodology to measure loop diameter, applied the '566 Patent's formulas to calculate loop density, and had not previously focused on seam loop diameter. (EX2012, 99:4–8; 104:2–4.) He further admitted that no prior art teaches the claimed range, and that the 2.7–3.6 range appears only in the '566 Patent. (EX2012,

122:1-7; 123:7-13; 373:13–374:4.) The claimed results were thus not predictable from the prior art and were only reconstructed using the patent itself.

4. Nexus

364. There is a direct nexus between the claimed invention and the unexpected results. The LD/MDYD ratio within 2.7–3.6 is explicitly recited in the claims, expressly identified in the specification as the governing variable, and directly tied to the performance improvements (seam strength, ease of pintle insertion, permeability, and marking).

365. Thus, the improved results are not incidental, are not attributable to unclaimed features, and flow directly from the claimed ratio and its range.

XIII. CONCLUSION

366. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If required, I will appear for cross-examination at the appropriate time. I reserve the right to offer opinions relevant to the validity of the challenged claims at issue and/or offer testimony in support of this Declaration.

I hereby declare that all statements made herein of my own knowledge are true and that all statements are made on information and belief are believed to be

true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001.

Dated: March 30, 2026

Respectfully submitted,

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

David Brookstein, Sc.D.

APPENDIX

Exhibit	Description
1001	U.S. Patent No. 11,261,566
1002	U.S. Patent No. 11,261,566 File History
1004	Declaration of Dr. Christopher M. Pastore
1005	PCT Publication No. WO 89/12717 (“Sudre”)
1006	PCT Publication No. WO 2014/172594 (“Lee”)
1007	U.S. Patent No. 4,806,208 (“Penven”)
1008	U.S. Publication No. 2006/0162312 (“Patel”)
1009	PCT Publication No. WO 2009/039633 (“Swaine”)
1010	U.S. Patent No. 6,712,100 (“Yook”)
1011	U.S. Patent No. 5,887,630 (“Shipley”)
1012	U.S. Patent No. 5,167,262 (“Bennett”)
1013	U.S. Patent No. 5,937,914 (“Wilson”)
1014	U.S. Publication No. 2015/0096704 (“Straub”)
1015	U.S. Publication No. 2012/0031554 (“Eagles”)
1016	U.S. Patent No. 9,404,218 (“Xu”)
1017	U.S. Patent No. 4,026,331 (“Lees”)
1018	U.S. Patent No. 4,759,975 (“Sutherland”)
1019	U.S. Patent No. 4,357,386 (“Luciano”)
1020	U.S. Publication No. 2014/0186579 (“Botelho”)
1021	Sabit Adanur, Paper Machine Clothing (2d ed. 2017) (“Adanur”)

Exhibit	Description
1022	Sabit Adanur, From the Faculty: Formed, pressed & dried, Auburn Engineer (May 18, 2018), https://ecm.eng.auburn.edu/wp/emag/?p=5167
1023	Reserved
1024	U.S. Patent No. 4,251,588 (“Goetemann”)
1025	Sabit Adanur, Paper Machine Clothing (1st ed. 1997) (“Adanur-1997”)
1026	Babaarslan, O., Hacioğullari, S.Ö. Effect of fibre cross-sectional shape on the properties of POY continuous filaments yarns. <i>Fibers Polym</i> 14, 146–151 (2013).
1027	Björn Rydin, A new generation of seamed felt, Swedish paper magazine: Nordic cellulose (1992)
1028	Translated Version of Björn Rydin, A new generation of seamed felt, Swedish paper magazine: Nordic cellulose (1992) (“Rydin”)
1029	Teknisk Information Fran Albany Nordiskafilt, SEAMTECH, Pressfiltar med söm (1996)
2001	Declaration of Dr. David Brookstein
2002	CV of Dr. David Brookstein
2003	<i>Nike v. Lululemon</i> (1:23-cv-00771) Order (Exclusion of Dr. Pastore Testimony) (Dec. 20, 2024)
2004	<i>Nike v. Lululemon</i> (1:23-cv-00771) Hearing Transcript (“Junk Science”) (Dec. 19, 2024)
2005	Adanur & Rydin Figures Comparison
2006	Rydin Fig. 3 Seam Loop Detail

Exhibit	Description
2007	Adanur Fig. 3.15 Scale Bar Detail
2008	Adanur Fig. 3.15 Seam Loop Detail
2009	Adanur Fig. 3.15 MD Thread Detail
2010	Rydin Fig. 2 MD Thread Detail
2011	Second Declaration of Dr. David Brookstein
2012	Transcript of Dr. Christopher Pastore's 3/23/2026 Deposition
2013	Adanur, 1st Edition (excerpts)
2014	Simal et al., "Structure of Heat-Treated Nylon 6 and 6.6 Fibers. I. The Shrinkage Mechanism"
2015	U.S. Patent No. 7,892,402 to Hawes ("Hawes")
2016	TAPPI Press, "The Paper Machine Wet Press Manual," Copyright 1991
2017	Matthias W. Schmitt, "Advanced Innovative Fabric Materials for Paper Machine Clothing (PMC)" TAPPI/PIMA PaperCon '08 Conference, May 4-7 2008, Dallas, TX
2018	U.S. Patent No. 7,207,355 to Lee ("Lee_355")