

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CASPER SLEEP INC.,
Petitioner,

v.

WERNER MEDIA PARTNERS LLC,
Patent Owner.

Case IPR2024-00474
Patent 10,842,301 B2

DECLARATION OF ANDREW GROSS UNDER 37 C.F.R. § 1.132

I, Andrew Gross, declare pursuant to 28 U.S.C. § 1746, and under penalty of perjury, as follows:

1. I have been retained as an expert witness to provide testimony on behalf of Werner Media Partners, LLC (“Patent Owner”) in support of its response to the Petition for Inter Partes Review of U.S. Patent No. 10,842,301 (the “’301 Patent”).
2. I am over 18 years and competent to make this declaration, which is based on my training and experience in the bedding industry.
3. I am being compensated for my time in reviewing the proceeding and prior art asserted in the IPR.
4. My opinion is unbiased. My payment is not dependent on the substance of my opinion, testimony, or the outcome of the proceeding.

5. Patent Owner asked me to provide an opinion as to the patentability of Claims 1 and 2 of the '301 Patent based on the cited prior art, particularly:
- a. NL 1020305 C2 ("Liestro") (Exhibits 1012 and 1013) in view of WO 2016/090258 A1 ("Schneider") (Exhibit 1010);
 - b. U.S. Publication No. 2014/0141233 A1 ("Crawford") (Exhibit 1011) in view of Liestro;
 - c. JP 4817757 B2 ("Ohta") (Exhibits 1008 and 1009) in view of Schneider; and
 - d. Ohta in view of Crawford.

Background and Experience

6. I earned a Bachelor of Arts from Cornell University and an MBA from the University of Michigan.
7. I spent my childhood weekends in my great uncle's machine shop, who was an inventor.
8. I have over 30 years of consumer products experience, both in fast moving consumer goods and consumer durables.
9. I have over 15 years' experience in the bedding industry as an Executive Vice President (Serta Brand) with Serta Simmons Bedding, LLC (which owns the Serta, Simmons, Beautyrest, and Tuft & Needle brands), a Senior Vice President (Marketing) for Serta International and a Board Director for Serta, Inc. (which held

the IP of the Serta brand), a consultant in the bedding industry, and a board member of a sleep accessories manufacturer.

10. At Serta, I led a range of functions including consumer insights, marketing, new product development, global licensing, channel marketing, and customer service.

11. I have led or played an instrumental leadership role in major new product development initiatives throughout my career, including:

- a. The iComfort by Serta gel memory foam sleep system, widely recognized as one of the most successful new product launches in category history;
- b. The iSeries hybrid mattress system, part of building a \$500MM+ franchise for Serta across the iComfort and iSeries lines;
- c. Multiple iterations and advances of the underlying technologies in Serta products, including the first mass commercialization of gel memory foam with iComfort, Serta's first PCM gel infused memory foam, Serta's first nano-graphite infused memory foam;
- d. Two of the most successful new mass market hair care product introductions in category history (ThermaSilk and Dove Hair Care); and

- e. Unilever's strategy to develop new volatile organic compound compliant hair spray and styling formulations while maintaining consumer acceptance.

12. I am also familiar with the patent process generally as I am a co-inventor of U.S. Design Patent No. D656,196 S1 ("Bed Display") and U.S. Utility Patent No. 9,538,855 B2 ("Component with Multiple Layers"), both directed to inventions in the bedding industry and owned by Serta, Inc.

13. A copy of my curriculum vitae is attached hereto as Exhibit 2002, which provides more thorough details about my education, work experience, and volunteer/advisory experience.

The Law

14. Although I am familiar with the patent process given my role as a co-inventor on the two listed patents, I am not an attorney. I have been informed about certain aspects of the law related to my review of the prior art and my opinion on combining the respective references as presented in the Petition.

15. I understand that the '301 Patent Claims 1 and 2 related to the process of making a bedding product that creates a cooling effect to the user, such as Patent Owner's GhostPillow found at <https://www.ghostbed.com/products/ghostpillow-memory-foam>. See Exhibit 2003.

16. I understand the practical considerations in combining references to assert that certain subject matter or combinations would or would not be obvious to a Person of Ordinary Skill in The Art (“POSITA”).

17. While a degree and technical training is important, practical understanding of the inventions, materials used, manufacturing processes, commercial ramifications, and purpose is important in assessing whether to combine such inventions/disclosures to create an obvious result.

18. Combining certain references may have unintended negative results that the original invention did not contemplate, which may nullify or negatively alter the originally disclosed product/process.

Person of Ordinary Skill In The Art

19. The relevant art surrounding the ‘301 Patent concerns bedding materials, including foam materials, applying PCM to the foam, and cutting holes into the foam to generate a cooling effect.

20. A person of ordinary skill in the art will have experience in product development, material selection, understanding of the manufacturing processes for the input materials (e.g., foam blocks), final assembly, and commercial ramifications as to what will drive consumer and retailer acceptance of the resulting product.

21. A POSITA will have experience with manufacturing processes in the bedding industry in the 2016/2017 timeframe, and experimented with multiple

product and process combinations in the course of new product development and ongoing refinement of the manufacturing process for existing and new products.

22. A POSITA would also have a clear understanding of the consumer needs in the bedding categories and factors that drive successful product penetration to the market. A POSITA would understand retailer and channel partner needs in the bedding industry and the factors that will drive successful consumer acceptance of the products, such as ease of handling, transport, retail display and quality.

23. A POSITA does not necessarily need to have an engineering degree to understand the bedding industry materials and manufacturing process. It is more critical for a POSITA to have practical, hands-on experience knowing the strengths and weaknesses of the various materials used to make a bedding product, and the requirements of the manufacturing processes to produce bedding products.

24. In analyzing the processes protected by the '301 Patent and cited prior art, I have reviewed them from the point of view of a POSITA with practical experience in the bedding industry in 2016/2017, as detailed above.

Materials Reviewed

25. I have reviewed the following materials in forming my opinions herein:

- a. The '301 Patent (Exhibit 1001);
- b. '251 Reexam (Exhibit 1005);
- c. Lievestro (Exhibits 1012 and 1013);

- d. Schneider (Exhibit 1010);
- e. Crawford (Exhibit 1011);
- f. Ohta (Exhibits 1008 and 1009);
- g. Viscoelastic (Memory) Foam, by the Polyurethane Foam Association (“PFA”) (Exhibit 2004),
https://www.pfa.org/wp-content/uploads/2019/02/InTouch_v11.1.1.pdf;
- h. Flexible Polyurethane Foam: A Primer, by the PFA (Exhibit 2005),
<https://www.pfa.org/wp-content/uploads/2021/02/InTouch1.1.pdf>;
- i. “Reticulate”, *Merriam-Webster.com Dictionary*, Merriam-Webster,
<https://www.merriam-webster.com/dictionary/reticulate>. Accessed 8 Aug. 2024 (Exhibit 2006);
- j. “Infuse”, *Merriam-Webster.com Dictionary*, Merriam-Webster,
<https://www.merriam-webster.com/dictionary/infusing>. Accessed 12 Aug. 2024 (Exhibit 2007);
- k. Leggett & Platt To Market Serta-Branded Sleep Comfort Systems Products (April 5, 2005), by Furniture World Magazine,
<https://www.furninfo.com/furniture-world-archives/4960>
(Exhibit 2008); and
- l. Foam Equipment, by Wayne Bowman (Video Presentation to Polyurethane Foam Association)

<https://www.youtube.com/watch?v=5XThFsqqUvU&t=4s>

(Exhibit 2009).

Review of the Prior Art

Liestro

26. Liestro is a device and method for continuously making holes in deformable foam blocks using rotating rollers.

27. Liestro specifically avoids the drilling of holes in foam blocks using up and down movements by “configuring the die-roll body to compress the foam blocks and simultaneously punch holes in them during rotation.” (Exhibit 1013, p.3)

28. From my review of Liestro, the disclosure does not show the purpose of punching holes in a foam block (aside from punching the holes faster and more efficiently), the benefit of crushing the foam, and the purpose of the compression.

29. In the ‘301 Patent, the holes in the foam block are formed to enhance the feel and comfort of the pillow (or bedding). The holes are configured in the ‘301 Patent to improve the speed at which air is displaced when the pillow is compressed, thereby providing a cooling benefit to the user with the applicable bedding product with PCM.

30. Liestro does not disclose the purpose of the holes in terms of providing a benefit within a mattress, topper or pillow.

31. Lievestro describes “a device for making holes in deformable foam blocks such as mattress bodies.” By inference, a “mattress body” would typically be the support layer of the mattress; not necessarily the comfort layer, as would be the case for a pillow or mattress topper.

32. From my industry experience, a mattress support layer is typically made from a flexible polyurethane foam with a high firmness and less elasticity, which would better facilitate a hole puncturing process.

33. Furthermore, the Lievestro reference does not disclose the specification type and range of the “deformable foam blocks” for which it is relevant. “Foam Blocks” include different formulations (polyurethane, latex, etc.) and demonstrate different properties such as firmness, density, elasticity, tear strength, and recovery rate. Each of these properties influence the success of Lievestro’s invention.

34. A lower firmness, more elastic memory foam, as used in a pillow, may be problematic in a continuous punching process due to the material’s elasticity properties. This may make it difficult to maintain proper alignment of the foam through the rolling process and more challenging to achieve consistent, whole, and uniform punctures. See the Polyurethane Foam Association’s (“PFA”) literature on viscoelastic foams (Exhibit 2004), which notes the challenges of fabricating viscoelastic foams and the need to run processes slower to account for specific properties, such as recovery rate.

35. The PFA notes all the variables of foam, each of which can influence manufacturing and fabrication processes.

36. The Lievestro reference does not demonstrate the fundamental technical requirements of the cooling pillow created through the '301 Patent process detailed in Claims 1 and 2.

37. The '301 Patent discloses that the benefit of crushing the foam is to open the cell wall structure.

38. Opening the cell wall structure is beneficial as it improves airflow through the material and better ensures that the firmness/softness of the pillow experienced by the user on day one of use will be closer to the user experiences over time.

39. Lievestro does not disclose the benefits of crushing the foam in order to open the cell wall structure.

40. While Lievestro does mention a secondary benefit of crushing the foam at the moment of hole puncture, it does not disclose the level of compression (deformation of the foam), the duration of the deformation, and the resultant impact of the compression to the cell structure of the foam.

41. The '301 Patent process for a cooling pillow describes and claims the foam being compressed, and subsequently punched to create the holes in the foam block while compressed (claim 2).

42. In Lievestro, it is not clear to me that the process would produce a meaningful benefit to the foam itself. Lievestro merely shows a continuous process for punching holes in foam compared to a platen process.

43. A POSITA would not consider the invention disclosed in Lievestro to punch holes in a PCM laminated foam due to risk of the roller press causing more damage/delamination to the PCM material compared to a platen punch system that exerts more uniform pressure on the PCM laminated foam.

44. Moreover, friction from the continuous roller process in Lievestro may result in a higher operating temperature between the rollers and the PCM laminated foam that could transfer to the foam, compared to a platen press.

45. As stated in Lievestro: “Figure 4 of Lievestro shows a second step of the process, in which block 1 is passed between the rolling bodies 3, 6 and is compressed by the rolling bodies 3, 6. The holes 2 in block 1 are thereby punched by cooperation of the punch sleeves 5 of the punch roller body 3 with an outer circumference of the counter punch roller body 6. Preferably, the angular velocities v_3 , v_6 of the roller bodies are selected such that the punched ones holes 2 extend in a desired direction in the block 1. Figures 5 and 6 show a possible result of this method, wherein the holes 2 are punched substantially perpendicular to the block 1. In particular with relatively thick foam blocks 1, for example with a thickness in the range of 1 cm - 400 cm, it may be desirable to make the roller body angular speeds v_3 , v_6 different

from each other around the holes 2 perpendicular to the blocks 1 to die.” See Exhibits 1012 and 1013.

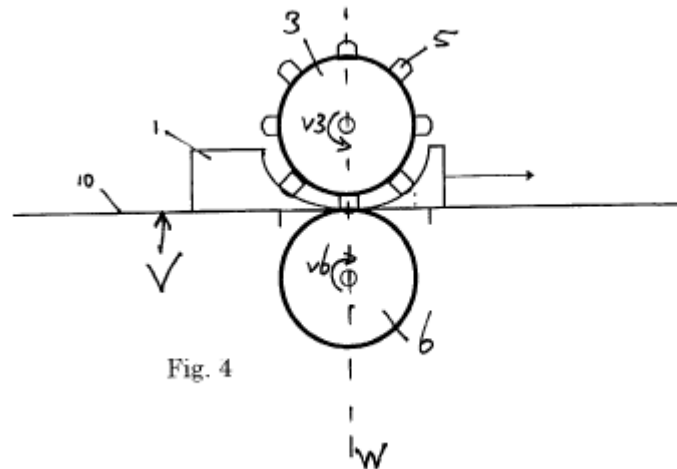


Figure 4 of Lievestro

46. In my opinion, it is not feasible that Lievestro’s rotatable punch-roll body can operate with foam blocks up to 400 cm thick, which equates to over 13 feet high.

47. Practically, the rollers and tines would need to be enormous. Even at 40 cm (which would be nearly 16 inches), the rolling operation seems impractical.

48. The likely range is probably up to 4 cm, which would be significantly shorter than the profile of most foam blocks used in a pillow or premium mattress topper.

49. Furthermore, the fact that Lievestro calls out that “relatively thick” foam blocks are above 1 cm in thickness suggests that the real intent of the invention is for very thin pieces of foam, such as the continuous rolled quilting foam used in the quilt layer of a traditional innerspring mattress.

Schneider

50. Schneider discloses a washable mattress assembly with an encasement and panels. The focus of the Schneider reference concerns the prevention of moisture penetration (i.e., a waterproof mattress assembly) into a mattress base (102) and hold up through the washing/drying process effectively.

51. In Schneider, multiple foam panels 128 create absorbent foam 126.

52. As shown in Figures 3, 6, and 8 of Schneider, multiple foam panels 128 are included in other layers on top of mattress base 102.

53. The Schneider reference does not disclose the hole punch process disclosed in the '301 Patent.

54. Schneider does not use foam that is punched, but rather reticulated foam, which is polyurethane foam created by an entirely different process and for a different purpose, i.e. a Washable Mattress Assembly.

55. While the Figures 6 and 8 in Schneider purport to show layers with “holes” that imply some sort of hole punch process to ventilate the foam, Schneider specifically discloses the foam being “reticulated” with a range of densities of the “cells (holes)” within the foam.

56. The “holes” represented in Figures 6 and 8 in Schneider are either a poor graphical representation of the porous reticulated foam itself, or perforations in the

“fabric coating the foam of a foam panel 128”, as described in paragraph 20 of Schneider; not the foam itself.

57. The reticulated foam layer is housed inside a foam mesh encasement to maintain its position in the fabric cover during washing.

58. A background as to reticulated foam is important to understand the use of the reticulated foam in Schneider.

59. The ‘301 Patent discloses a mechanical post-process step on the foam, such as punching the foam. The ‘301 Patent does not refer to a reticulation process to physically create the foam as described in Schneider.

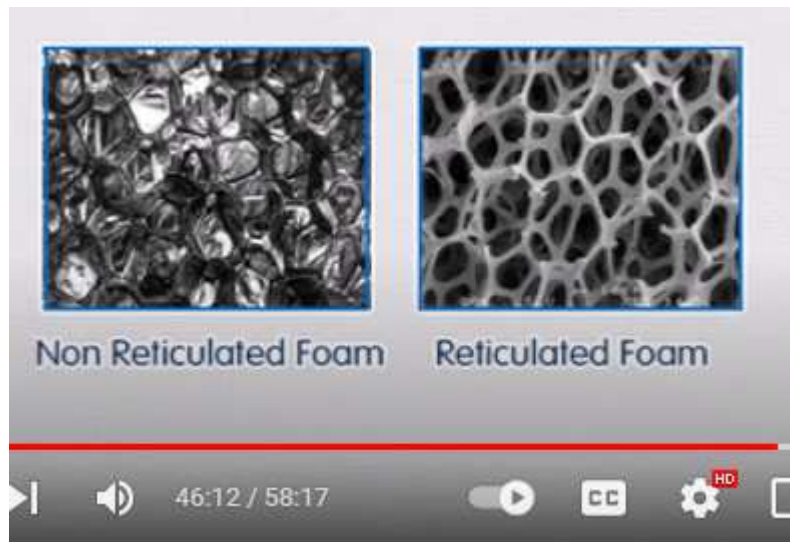
60. Reticulation means “structured or arranged like a net,” which is why reticulated foam has a net or lattice-like appearance. See Miriam Webster definition shown in Exhibit 2006.

61. Reticulation is a chemical/physical process to create the foam itself, not a mechanical post-handling process on the foam, such as hole punching.

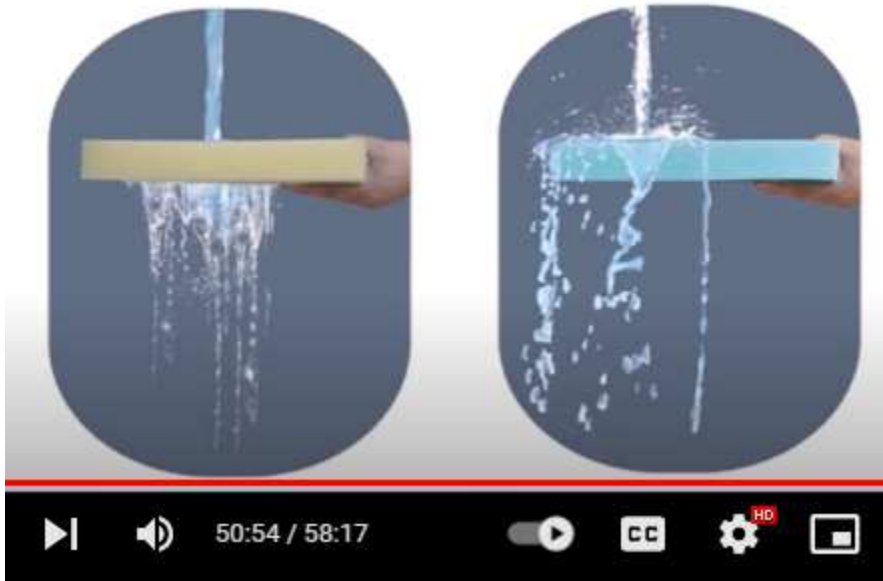
62. A foam manufacturer uses either a chemical or thermal process to break down the cell walls when producing the foam block, leaving only the lattice structure intact. The result is a low density, extremely porous material used for certain specialty applications, not as a comfort layer in a mattress. See Exhibit 2009 (timestamp 46:10 through 48:08),

<https://www.youtube.com/watch?v=5XThFsqqUvU&t=4s>.

63. A screenshot from Exhibit 2009 showing the cellular structure of non-reticulated versus reticulated foam is provided below.



64. Reticulated foam is used in an outdoor seat cushion for the purpose of ensuring the cushion will drain quickly following a rainstorm. This is in line with the stated purpose of Schneider in developing a Washable Mattress Assembly, i.e. a wet environment. See the use of reticulated foam in outdoor furniture in Exhibit 2009, timestamp 50:52 through 51:02. A screenshot from Exhibit 2009 showing water pouring through reticulated foam (left) and non-reticulated foam (right) is shown below.



65. Reticulated foam can be found in common household products such as a scrub sponge (e.g., a Scrub Daddy pictured below), where the combination of the foam's rigidity, porosity and glass transition point (when the foam changes from rigid to flexible) allow the reticulated foam to function as either an abrasive or gentle, quick rinsing pot scrubber depending on water temperature.



66. A POSITA in the bedding industry would know that reticulated foam is not typically used as a comfort layer in a mattress, pillow or topper.

67. Reticulated foam material is generally either too hard to be comfortable or too soft to be supportive.

68. The reticulated foam in Schneider differs from the foam in the '301 Patent because the non-reticulated hole punched foam used in the '301 Patent is done to provide comfort to the user, not to facilitate the washability of the product.

69. Reticulated foam is not a strong candidate to be hole punched as punching the reticulated foam could tear the lattice structure and weaken the foam, depending on the properties of the underlying foam.

70. As a practical matter, punching holes into reticulated foam would provide minimal practical benefit given its natural porosity, as shown in its net or lattice-like appearance.

71. In addition, the porosity of reticulated foam makes it difficult to generate the active vertical airflow characterized by the processes claimed in the '301 Patent.

72. When reticulated foam is compressed, air is displaced in random directions due to the porous nature of the reticulated foam.

73. Punching holes in reticulated foam will not create a singular longitudinal air pathway to the user.

74. Reticulated foam is also not a good candidate for the application of phase change materials (PCM) to the surface, as reticulated foam has far less surface contact area and far greater porosity than a typical polyurethane and viscoelastic foam.

75. It would be difficult to apply and maintain the PCM near the surface of the reticulated foam to produce the desired cooling effect as disclosed in the '301 Patent. The PCM would seep through the porous reticulated foam and leave minimal PCM on the minimal top surface contact area.

76. The Petition argues that Schneider discloses a PCM material. However, the reference in Schneider to Rossi (WO2011/107849) includes an absorbent gel (Exhibit 1010, ¶ 0029) that acts as a waterproof barrier above the upholstery levels of the mattress, thereby negating airflow through those layers of the mattress (i.e., inhibiting the holistic cooling properties of the mattress).

77. Schneider refers to the gel's ability to absorb thermal energy on a layer of memory foam.

78. There is a distinct difference in the coating of gel on a removable layer of foam (i.e., foam panel 128 compared to mattress base 102) versus a coating of phase change materials applied on the actual foam base with holes (as required in process of the '301 Patent).

79. Schneider differs from the '301 Patent because in the '301 Patent the punched holes are on the top surface of the pillow (which includes PCM), which provides airflow vertically through the pillow (or bedding), thereby maximizing the cooling effect of the pillow.

80. The use of reticulated foam as a primary comfort layer in a bedding product is not practical or consumer acceptable.

Crawford

81. Crawford discloses a composition and method of making a novel liquid gel. Crawford's focus is using the "liquid gel mixture for making surface-infused layers on layering substrates" at varying penetration depths.

82. Infused is defined as to be caused to be permeated with something or to inject. See Exhibit 2007.

83. Crawford's liquid-gel is not simply a PCM, it is a gel that includes PCM or other additives.

84. Crawford does not disclose applying PCM to a surface (as in the '301 Patent), only liquid-gel with additives.

85. Crawford discloses compression of the foam in the context of infusing the liquid gel deeper into the foam to impact the structure of the foam.

86. There is no support in Crawford that compression of the foam block had any benefit (e.g., cracking) to Crawford's invention that is focused on the surface infusion of the liquid gel, or what that benefit would be.

87. While Crawford discloses compressing foam up to 90% of its height, this compression is for the purpose of enhancing the application of the liquid gel mixture during the lamination process and not specifically to "crack" or open the cells of the foam as described by Claims 1 and 2 of the '301 Patent.

88. The Crawford reference discloses a process to improve heat transfer in foam by penetrating a liquid gel. This is passive heat dissipation compared to an active, perceptible cooling effect to the user.

89. In the Crawford reference the foam substrate is already "open cell" material. The PFA defines "open cell" as greater than 2 cfm airflow, as measured by ASTM D3574 standard. This appears necessary for the gel mixture to penetrate the foam in a way that maintains the desired airflow and provides the enhanced thermal properties claimed in the Crawford reference.

90. The inventor of Crawford and his company are well known in the industry for pioneering and commercializing high performance open cell viscoelastic foams that deliver high airflow while also retaining the properties that have made viscoelastic foam as preferred bedding material.

91. As such, a POSITA would not contemplate the additional step of punching holes in this open cell material given its already strong airflow properties.

Ohta

92. Ohta discloses a method for manufacturing a perforated pillow having through holes.

93. The objective of the Ohta invention is to remove the cut pieces of foam, i.e., the “punched portion.”

94. The Ohta reference does not show any motivation to coat the foam with PCM to create a cooling effect to the user.

95. The background section of Ohta describes piercing holes in the foam to prevent an “oppressive, muggy feeling [of the pillow] during use”, not for cooling of the user.

96. Ohta references that the underlying materials would be a class of polyurethane foams that would include foams with viscoelastic (memory) properties, not for the active, perceptible cooling of the user. Based on the state of the art of the technology at the time in 2005, these materials were likely closed cell viscoelastic memory foams.

97. Based on the state of the memory foam technology at the time, Ohta’s foam was undoubtedly closed cell memory foam which was known to cause sleepers to experience a hot, muggy feeling when sleeping on the product.

98. Ohta is trying to neutralize a problem associated with the memory foam technology of the time (the year 2005) compared to providing an active benefit to the user.

99. Ohta also discloses that the foam pillow would be a molded product, which often has an outer “crust,” resulting from how cleanly or not cleanly the product is released from the foam mold that can limit airflow through the product.

100. Ohta does not disclose changing the cellular structure of the foam body 11 during the compression step, nor the impact or benefit or such compression.

101. Ohta does not disclose the benefit of the compression to the cellular structure of the foam itself, or the benefit the holes create to direct air from inside the foam body to the user (with or without PCM on the foam block).

102. As such, besides showing an improved method for punching holes in a pillow, the Ohta reference does not disclose the benefit of the holes in relation to active cooling or compression in terms of opening or cracking the cell structure to provide a comfort benefit to the user.

The Prior Art Does Not Render the ‘301 Patent Claim Obvious

1st Combination: Liestro in view of Schneider (Claims 1 and 2)

103. As detailed above, Schneider does not suggest applying PCM to the surface of a foam block. Specifically, Schneider suggests applying a water-resistant gel barrier for a washable mattress assembly, not for the comfort of the user.

104. I would not combine or modify Liestro in view of Schneider because it would not result in a viable process to create a cooling pillow as claimed in the '301 Patent.

105. The principal issue here is Petitioner's misinterpretation of Schneider. The supposed foam with holes, is actually reticulated foam.

106. In the context of bedding materials, reticulated foam is an entirely different class of material intended for different purposes.

107. The reference to applying the PCM to a foam layer speaks to the upholstery layers of the claimed mattress construction, which are separate from the washable, reticulated foam layer that is attached to the mattress cover.

108. Based on this corrected interpretation, a POSITA would not combine the hole punch process described in Liestro with a water resistant PCM coated foam block that is intended to be a lower upholstery layer of a mattress, as opposed to the top comfort layer of a pillow or mattress topper. This applies to Claim 1 and Claim 2 in the '301 Patent.

109. Furthermore, combining Liestro and Schneider would render the process of the '301 Patent unsuccessful because a reticulated foam pillow would not be acceptable from a comfort perspective and would prove challenging to apply PCM in a way that would yield the demonstrable cooling effect of the '301 Patent.

110. In addition, this combination would not have the airflow properties along the vertical dimension as described in the specification of the ‘301 Patent.

111. A POSITA would not have coated the surface of foam panels or the mattress base in Schneider given the reticulated nature of the foam and the water-resistant nature of the gel.

112. A POSITA would not combine the reticulated foam (with an absorbent gel) in Scheider with the rolling process of Lievestro.

113. Petitioner acknowledges that the holes in the ‘301 Patent process provide a cooling effect in the pillow. Neither Lievestro nor Schneider disclose any cooling effect from air flowing from the foam material to the user.

114. A POSITA in the years 2016/2017 would not have thought to combine Lievestro and Schneider given the stated purpose of the washability of Schneider and its use of reticulated foam to achieve washability.

115. The porous nature of reticulated foam, as detailed above in Schneider, does not generate targeted airflow that provides a cooling effect to the user.

116. While reticulated foam is effective to permeate water for washability, which is the objective of Scheider’s invention, the use of reticulated foam as a comfort layer for bedding is not generally considered practical or used in the industry.

117. The Petition is inaccurate when it states that both Lievestro with Schneider “deal with enhancing comfort, which includes thermal comfort.” See Petition, p. 66.

The stated purpose of Schneider is to provide a washable mattress assembly, not comfort or thermal comfort to the user. The stated purpose of Liestro is to provide a continuous hole punch roller assembly, not comfort or thermal comfort to the user.

118. Schneider is completely different from the '301 Patent based on its use of reticulated foam, which does not provide comfort to the user as a comfort layer in bedding.

119. The combination of the reticulated foam of Schneider with the rolling process of Liestro will cause more inconsistencies with PCM applied on the porous surface of reticulated foam passing through the continuous rollers of Liestro.

120. Moreover, it is not clear that a reticulated material would be successful in the Liestro process given the nature of the reticulated material and the described parameters of the Liestro reference. It is unclear whether reticulated meets the definition of a deformable foam block in all instances.

121. Liestro does not disclose the effect of the rolling process to the cellular structure of the foam, only that the foam is compressed by the rollers.

122. The combination of Liestro and Schneider would not create "a rush of air that is cooled by the cooling layer [with PCM]" and onto the head/neck of the user. See Exhibit 1001 (Col 12, line 23 of '301 Patent).

123. Moreover, Lievestro's continuous rolling process creates two distinct practical issues that differ from the processes of the '301 Patent.

124. First, the continuous rolling process may generate excessive heat that will transfer to the foam and PCM material (if combined with the gel of Schneider). A continuous process with metal rollers and permanent punches may generate heat from the constant movement of the roller against the foam. The heat may increase as the roller machine is continually operated.

125. The heat built-up on the rollers and punches may continue to elevate and could eventually compromise the integrity of the PCM layer on the foam, provided PCM is applied prior to the punching process. The built-up heat from the rollers may transfer to and negatively impact the integrity of the inserted foam and PCM.

126. Second, the use of a rolling process that exerts a gradient compression force as the foam is inserted through the rollers can negatively impact the PCM layer. A platen press applies more uniform force on the pillow/bedding when punching holes, which minimizes the disturbance to the PCM layer. A gradient force applied to the inserted foam, as shown in Figure 4 of Lievestro, may crack or break the PCM layer.

127. A POSITA would not consider the Lievestro method of hole punching PCM laminated foam due to risk of the roller press causing damage/delamination to the PCM material versus a platen punch system that places more uniform pressure on the PCM laminated foam during compression. Given the porous construction of

reticulated foam, a POSITA would not apply PCM material to reticulated foam to achieve a targeted cooling process to the head or body of the user.

128. Moreover, a POSITA would not use the Lievestro process as is not clear that the process would work for the types of materials contemplated in the ‘301 Patent or the height (greater than 4 cm) of those materials when used in a pillow or premium mattress topper.

Crawford in view of Lievestro

129. A POSITA would not combine or modify Crawford and Lievestro because there would be no reasonable expectation of success. While Crawford discloses compressing foam to 90% of its height, this compression is for the purpose of enhancing the application of the liquid gel mixture during the lamination process and not specifically to “crack” or open the cells of the foam as described by Claims 1 and 2 of the ‘301 Patent.

130. The Crawford reference discloses a process to improve heat transfer in foam by penetrating a liquid gel. This is passive heat dissipation compared to an active, perceptible cooling effect to the user like the ‘301 Patent.

131. In the Crawford reference, the foam substrate is already “open cell” material, which appears necessary for the gel mixture to penetrate the foam in a way that maintains the desired airflow and provides the enhanced thermal properties claimed in the Crawford reference.

132. As such, a POSITA would not necessarily interpret that this compression step would also enhance the breathability of a foam that is already described as “open cell.”

133. Given that the foam is already described as open cell (see paragraph 11 of Crawford, Exhibit 1011, where “open cell” is explicitly referenced in the description of materials), a POSITA would not see any reason to add holes using the Lievestro roller process to further increase airflow. Note that Melamine and Latex (other foam materials described in Crawford) are both considered open cell.

134. While Petitioner’s expert Mr. Brienza argues that it would be a simple mechanical process change for a POSITA to add one of Lievestro’s die rollers into the Crawford process either before or after the gel/PCM application, this ignores the real challenges in the application and curing of materials applied to the surface of foam, practical challenges that would be well known to a POSITA.

135. A POSITA reading the Crawford reference would not think to add a hole cutting process prior to lamination as the laminated material would potentially build up in the holes and otherwise complicate the curing process.

136. Likewise, assuming that the process disclosed in the reference is meant to be a continuous process comprised of a set of adjacent steps (regardless of order), adding the die roller system immediately after application may not be feasible depending on the cure time required.

137. In addition, as discussed above it is not clear that Lievestro would function for the foam material types listed in the Crawford reference as these may have properties such as elasticity, tear strength and recovery that are not easily compatible with a continuous die roller punching process.

138. The Lievestro invention may not be effective for foam blocks of the thickness typically contemplated for a pillow or premium mattress topper (i.e., greater than 4 cm).

139. In view of these observations, a POSITA would not conclude that compression would achieve a meaningful change in the cell structure of the foam or that adding a hole punch stage to the process is either necessary or feasible from a manufacturing perspective. The combination of Crawford and Lievestro would not lead to success because, from a process point of view, such said combination will not be feasible to manufacture a product at the rate needed.

140. A POSITA would not consider the Lievestro method of hole punching a PCM laminated foam due to risk of the roller press causing more damage/delamination to the PCM material versus a platen punch system.

141. Lievestro's continuous process with metal rollers and permanent punches may generate excessive heat from the constant movement, which could build up as the roller machine is continually operated.

142. The heat buildup on the rollers and punches may continue to elevate and could eventually compromise the integrity of the PCM layer on the foam, provided PCM is applied prior to the punching process.

143. A POSITA would not consider combining Crawford and Lievestro to generate cool airflow to the user. Notably, neither reference discloses airflow to the user.

144. It is not a “predictable result” that bedding that absorbs heat also provides enhanced cooling effect to the user, as alleged in the Petition (p. 71). The material must both absorb and transmit the heat at a sufficient rate to create such a cooling effect.

145. In fact, the ‘301 Patent discloses a cooling effect due to the airflow through the holes of the pillow and past the PCM surface (which is cooled to ambient air temperature). The ‘301 Patent does not disclose absorption of heat.

146. Given the objective of Crawford to infuse the liquid gel carrier into the substrate, a POSITA would not combine Crawford and Lievestro to create the compression and cracking processes as described in Claims 1 and 2 of the ‘301 Patent.

Ohta in view of Schneider

147. The Ohta reference does not discuss the application of applying PCM to foam. The background section of Ohta describes piercing holes in the foam to prevent an “oppressive, muggy feeling [of the pillow] during use.”

148. There is no disclosure in Ohta that its improved process to cut holes into the foam somehow improves the interaction (or comfort or cooling) between the user and the bedding.

149. The objective of the Ohta invention is to efficiently remove the cut pieces of foam. The Ohta reference does not show any motivation to coat the foam with PCM to create a cooling effect to the user.

150. A POSITA would not combine or modify Ohta with Schnieder because there would be no reasonable expectation of success.

151. Schnieder discloses that an upholstery layer of his mattress system may be comprised of PCM coated foam, this is entirely separate from the washable, reticulated foam layer attached to the mattress cover that has been misinterpreted as having “holes.”

152. Schneider’s creation of a water barrier, comprised of PCM infused water resistant gel, is not practical to create a cooling effect to the user as disclosed by the process of the ‘301 Patent due to the restriction of airflow. This layer is entirely

different than the washable, reticulated foam layer attached to the mattress cover that has been misinterpreted as having “holes.”

153. Moreover, it is unclear whether the types of mattress upholstery layer foam materials disclosed in Schneider would fall into the range of materials disclosed in Ohta, thus rendering the probability of yielding a successful product uncertain.

154. Combining the reticulated foam described in Schneider with Ohta’s process would yield a poor comfort product, possibly prone to defects due to potential tearing of the reticulated material during the cutting process of Ohta.

155. Moreover, the removal of reticulated punched holes would likely lead to inconsistencies during the removal process in Ohta. The reticulated punched foam holes will behave differently when being ejected during the Ohta process given the differing structure of the foam compared to the foam material described in the Ohta reference.

156. A POSITA would not conclude that the combination of Ohta and Schneider would lead to success.

Ohta in view of Crawford

157. A POSITA would not combine or modify Ohta and Crawford because there would be no reasonable expectation of success.

158. The background section of Ohta describes piercing holes in the foam to prevent an “oppressive, muggy feeling [of the pillow] during use”, not for cooling of the user.

159. Moreover, Ohta does not discuss the compression and cracking steps in Claims 1 and 2 of the ‘301 Patent, in conjunction with a PCM layer, to create a cooling effect to the user.

160. Crawford discloses the process to apply a PCM infused gel (or other gel additives) to an “open cell” foam, providing additional thermal benefits.

161. Crawford uses a liquid gel as a carrier for the PCM.

162. Crawford does not refer to other processes to increase airflow or thermal activity, such as punching holes.

163. It is assumed that the materials already have strong airflow, and such a step would be unnecessary.

164. A POSITA familiar with the state of the art (and the ‘301 Patent and commercial success related to open cell memory foams) would not see a need to add holes to these materials.

165. Ohta describes a process to add holes to a pillow to improve thermal properties of the pillow itself.

166. Ohta references that the underlying materials would be a class of polyurethane foams that would include foams with viscoelastic (memory) properties.

167. Ohta also discloses that the foam pillow would be a molded product, which often has an outer “crust,” resulting from how cleanly it is released from the foam mold that can limit airflow through the product.

168. Nowhere in the Ohta reference does it mention that these foams are “open cell”. In fact, at the time of the patent application in 2005, effective premium open-cell foams were just emerging on the market. For an example of such an introduction, which used foam technology developed by the same company where Crawford worked, see <https://www.furninfo.com/furniture-world-archives/4960> (Exhibit 2008).

169. As such, the hole punching in Ohta is necessary to add airflow to the product whereas such an operation is not necessary for the product described in Crawford.

170. Moreover, it is not clear if the material created through the process in Crawford would be amenable to such punching, even after sufficient cure time.

171. The gel described by Crawford may be prone to clogging or sticking to the Ohta punching apparatus.

172. Thus, combining Ohta and Crawford would not lead to the successful resulting product derived from the ‘301 Patent process to create a cooling pillow effect.

173. As such a POSITA would not combine the Ohta process for perforating an (assumed) closed cell pillow with Crawford's disclosure of a process for laminating PCM on open cell foam.

174. Given the objective of Crawford to infuse the liquid gel carrier into the substrate, a POSITA would not see a reason to combine Crawford with Ohta to create the compression and cracking processes as described in Claims 1 and 2 of the '301 Patent.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on: August 18, 2024,

By: _____



Andrew Gross