

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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LULULEMON USA INC.,  
Petitioner,

v.

NIKE, INC.,  
Patent Owner.

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Case IPR2023-01460  
Patent 9,730,484

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**DECLARATION OF DR. DAVID S. BROOKSTEIN IN SUPPORT OF  
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 9,730,484**

## TABLE OF CONTENTS

### Page No.

|                                                                           |    |
|---------------------------------------------------------------------------|----|
| <b>I. INTRODUCTION</b> .....                                              | 8  |
| <b>II. BACKGROUND AND QUALIFICATIONS</b> .....                            | 9  |
| <b>III. LEGAL PRINCIPLES</b> .....                                        | 12 |
| A. Claim Construction .....                                               | 12 |
| B. Prior Art.....                                                         | 12 |
| C. Obviousness.....                                                       | 13 |
| <b>IV. THE '484 PATENT</b> .....                                          | 16 |
| A. Specification of the '484 Patent .....                                 | 16 |
| B. Claims of the '484 Patent .....                                        | 17 |
| C. Prosecution History of the '484 Patent .....                           | 20 |
| D. Prosecution in the Related European '675 Application .....             | 21 |
| <b>V. BACKGROUND AND STATE OF THE ART</b> .....                           | 23 |
| A. Flat Knitting Was A Common Option For Clothing Articles.....           | 23 |
| B. Flat Knitting Was Used To Make Prior Three-Dimensional Structures..... | 27 |
| C. Domed, Three-Dimensional Structures in Uppers.....                     | 27 |
| <b>VI. LEVEL OF ORDINARY SKILL</b> .....                                  | 28 |
| <b>VII. CLAIM CONSTRUCTION</b> .....                                      | 30 |

**TABLE OF CONTENTS**  
**(cont'd)**

|                                                                                                                                                                                                                                  | <b>Page No.</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>VIII. OVERVIEW OF OBVIOUSNESS GROUNDS .....</b>                                                                                                                                                                               | <b>31</b>       |
| <b>IX. GROUND 1: LOCKWOOD AND DUA RENDER OBVIOUS</b>                                                                                                                                                                             |                 |
| <b>CLAIMS 1 AND 5–9 .....</b>                                                                                                                                                                                                    | <b>31</b>       |
| A. Summary of Lockwood (Ex.1003).....                                                                                                                                                                                            | 31              |
| B. Summary of Dua (Ex.1004) .....                                                                                                                                                                                                | 33              |
| C. Lockwood and Dua Render Obvious Claim 1 .....                                                                                                                                                                                 | 34              |
| 1. Preamble of Claim 1 .....                                                                                                                                                                                                     | 38              |
| 2. Limitation 1[a]: “an upper including a flat-knitted<br>element formed from at least one yarn mechanically<br>manipulated in a flat-knitting process, the flat-knitted<br>element including a first layer having” .....        | 38              |
| 3. Limitation 1[b]: “a central portion having a domed,<br>three-dimensional structure configured for extending<br>over the top of a foot” .....                                                                                  | 40              |
| 4. Limitation 1[c]: “a first side portion being formed of<br>unitary construction with the central portion and<br>extending from a first side of the central portion” .....                                                      | 41              |
| 5. Limitation 1[d]: “a second side portion being formed<br>of unitary construction with the central portion and<br>extending from a second side opposite the first side<br>of the central portion” .....                         | 43              |
| 6. Limitation 1[e]: “the domed, three-dimensional<br>structure shaped to extend above the plane of the first<br>side portion and the second side portion when the<br>flat-knitted element is in a flattened configuration” ..... | 44              |

**TABLE OF CONTENTS**  
**(cont'd)**

|                                                                                                                                                                                                                           | <b>Page No.</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| D. Lockwood and Dua Render Obvious Claim 5 .....                                                                                                                                                                          | 46              |
| E. Lockwood and Dua Render Obvious Claim 6 .....                                                                                                                                                                          | 47              |
| F. Lockwood and Dua Render Obvious Claim 7 .....                                                                                                                                                                          | 49              |
| G. Lockwood and Dua Render Obvious Claim 8 .....                                                                                                                                                                          | 50              |
| H. Lockwood and Dua Render Obvious Claim 9 .....                                                                                                                                                                          | 52              |
| <b>X. GROUND 2: LOCKWOOD, DUA, AND NORTON RENDER<br/>OBVIOUS CLAIMS 1 AND 5–9.....</b>                                                                                                                                    | <b>53</b>       |
| A. Summary of Norton (Ex.1011).....                                                                                                                                                                                       | 53              |
| B. Lockwood, Dua, and Norton Render Obvious Claims 1 and<br>5–9 .....                                                                                                                                                     | 55              |
| <b>XI. GROUND 3: DUA, HONG, AND LOCKWOOD RENDER<br/>OBVIOUS CLAIMS 1–19 .....</b>                                                                                                                                         | <b>57</b>       |
| A. Summary of Hong (Ex.1005).....                                                                                                                                                                                         | 57              |
| B. Dua, Hong, and Lockwood Render Obvious Claim 1 .....                                                                                                                                                                   | 59              |
| 1. Preamble of Claim 1 .....                                                                                                                                                                                              | 62              |
| 2. Limitation 1[a]: “an upper including a flat-knitted<br>element formed from at least one yarn mechanically<br>manipulated in a flat-knitting process, the flat-knitted<br>element including a first layer having” ..... | 63              |
| 3. Limitation 1[b]: “a central portion having a domed,<br>three-dimensional structure configured for extending<br>over the top of a foot” .....                                                                           | 64              |

# TABLE OF CONTENTS

## (cont'd)

|                                                                                                                                                                                                                            | Page No. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 4.    Limitation 1[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion”.....                                                    | 69       |
| 5.    Limitation 1[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion” .....                         | 70       |
| 6.    Limitation 1[e]: “the domed, three-dimensional structure shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration” ..... | 71       |
| C.    Dua, Hong, and Lockwood Render Obvious Claim 2 .....                                                                                                                                                                 | 73       |
| D.    Dua, Hong, and Lockwood Render Obvious Claim 3 .....                                                                                                                                                                 | 76       |
| E.    Dua, Hong, and Lockwood Render Obvious Claim 4 .....                                                                                                                                                                 | 76       |
| F.    Dua, Hong, and Lockwood Render Obvious Claim 5 .....                                                                                                                                                                 | 77       |
| G.    Dua, Hong, and Lockwood Render Obvious Claim 6 .....                                                                                                                                                                 | 78       |
| H.    Dua, Hong, and Lockwood Render Obvious Claim 7 .....                                                                                                                                                                 | 78       |
| I.    Dua, Hong, and Lockwood Render Obvious Claim 8 .....                                                                                                                                                                 | 79       |
| J.    Dua, Hong, and Lockwood Render Obvious Claim 9 .....                                                                                                                                                                 | 82       |
| K.    Dua, Hong, and Lockwood Render Obvious Claim 10 .....                                                                                                                                                                | 83       |
| 1.    Preamble of Claim 10 .....                                                                                                                                                                                           | 83       |
| 2.    Limitation 10[a]: “an upper including a flat-knitted element formed from at least one yarn mechanically                                                                                                              |          |

# TABLE OF CONTENTS

(*cont'd*)

|                                                                                                                                                                                                  | Page No. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| manipulated in a flat-knitting process, the flat-knitted element including a first layer and a second layer, the first layer including” .....                                                    | 83       |
| 3. Limitation 10[b]: “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot” .....                                                       | 84       |
| 4. Limitation 10[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion” .....                           | 84       |
| 5. Limitation 10[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion” ..... | 84       |
| 6. Limitation 10[e]: “the second layer being flat-knitted with the first layer at opposite ends of the second layer to form an overlapped loop” .....                                            | 84       |
| L. Dua, Hong, and Lockwood Render Obvious Claim 11 .....                                                                                                                                         | 86       |
| 1. Preamble of Claim 11 .....                                                                                                                                                                    | 86       |
| 2. Limitation 11[a]: “forming during a flat-knitting process an upper including a flat-knitted element including a first layer having” .....                                                     | 87       |
| 3. Limitation 11[b]: “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot” .....                                                       | 87       |

# TABLE OF CONTENTS

(*cont'd*)

|                                                                                                                                                                                                                                     | Page No.  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 4. Limitation 11[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion”.....                                                               | 88        |
| 5. Limitation 11[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion” .....                                    | 88        |
| 6. Limitation 11[e]: “wherein the domed, three-dimensional structure is shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration” ..... | 89        |
| M. Dua, Hong, and Lockwood Render Obvious Claim 12 .....                                                                                                                                                                            | 89        |
| N. Dua, Hong, and Lockwood Render Obvious Claim 13 .....                                                                                                                                                                            | 90        |
| O. Dua, Hong, and Lockwood Render Obvious Claim 14 .....                                                                                                                                                                            | 90        |
| P. Dua, Hong, and Lockwood Render Obvious Claim 15 .....                                                                                                                                                                            | 91        |
| Q. Dua, Hong, and Lockwood Render Obvious Claim 16 .....                                                                                                                                                                            | 91        |
| R. Dua, Hong, and Lockwood Render Obvious Claim 17 .....                                                                                                                                                                            | 92        |
| S. Dua, Hong, and Lockwood Render Obvious Claim 18 .....                                                                                                                                                                            | 93        |
| T. Dua, Hong, and Lockwood Render Obvious Claim 19 .....                                                                                                                                                                            | 93        |
| <b>XII. GROUND 4: DUA, HONG, LOCKWOOD, AND VOUGHLOHN<br/>RENDER OBVIOUS CLAIMS 2–4, 18, AND 19 .....</b>                                                                                                                            | <b>94</b> |
| A. Summary of Voughlohn (Ex.1006).....                                                                                                                                                                                              | 94        |

**TABLE OF CONTENTS**  
**(cont'd)**

|                                                                                      | <b>Page No.</b> |
|--------------------------------------------------------------------------------------|-----------------|
| B. Dua, Hong, Lockwood, and Voughlohn Render Obvious<br>Claims 2–4, 18, and 19 ..... | 95              |
| C. Dua, Hong, Lockwood, and Voughlohn Render Obvious<br>Claim 2 .....                | 96              |
| D. Dua, Hong, Lockwood, and Voughlohn Render Obvious<br>Claim 3 .....                | 97              |
| E. Dua, Hong, Lockwood, and Voughlohn Render Obvious<br>Claim 4 .....                | 99              |
| F. Dua, Hong, Lockwood, and Voughlohn Render Obvious<br>Claim 18 .....               | 99              |
| G. Dua, Hong, Lockwood, and Voughlohn Render Obvious<br>Claim 19 .....               | 99              |
| <b>XIII. SECONDARY CONSIDERATIONS.....</b>                                           | <b>100</b>      |
| <b>XIV. CONCLUSION.....</b>                                                          | <b>101</b>      |

## **I. INTRODUCTION**

1. I, Dr. David S. Brookstein, submit this declaration on behalf of lululemon usa inc. (“Petitioner”). I understand that this declaration will be submitted as Exhibit 1002 in support of a Petition for *Inter Partes* Review of U.S. Patent No. 9,730,484 (“the ’484 patent”) along with the exhibits listed in the table below.

| <b>Exhibit No.</b> | <b>Description</b>                                                                                                                               |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001               | U.S. Patent No. 9,730,484 to Dua, et al. (“’484 patent”)                                                                                         |
| 1003               | U.S. Patent No. 3,641,603 to Lockwood (“Lockwood”)                                                                                               |
| 1004               | U.S. Patent App. Publ. No. 2005/0193592 to Dua, et al. (“Dua”)                                                                                   |
| 1005               | Hong, et al., “The development of 3D shaped knitted fabrics for technical purposes on a flat knitting machine,” IJFTR 19(3), Sept. 1994 (“Hong”) |
| 1006               | U.S. Patent App. Publ. No. 2006/0053658 to Voughlohn (“Voughlohn”)                                                                               |
| 1007               | U.S. Patent No. 3,445,873 to Staden (“Staden”)                                                                                                   |
| 1008               | U.S. Patent No. 3,720,971 to Wyness, et al. (“Wyness”)                                                                                           |
| 1009               | Excerpts of Prosecution History for U.S. Patent No. 9,730,484                                                                                    |
| 1010               | U.S. Patent No. 6,367,168 to Hatfield, et al. (“Hatfield”)                                                                                       |
| 1011               | U.S. Patent No. 6,558,784 to Norton, et al. (“Norton”)                                                                                           |
| 1012               | U.S. Patent No. 2,042,149 to Gastrich (“Gastrich”)                                                                                               |
| 1013               | U.S. Patent No. 669,011 to Kahn (“Kahn”)                                                                                                         |
| 1014               | Spencer, David J., Knitting Technology: A Comprehensive Handbook and Practical Guide, Chapters 8, 12, and 18, Third Edition, 2001                |

| <b>Exhibit No.</b> | <b>Description</b>                                                                     |
|--------------------|----------------------------------------------------------------------------------------|
| 1015               | U.S. Patent No. 5,388,430 to Essig (“Essig”)                                           |
| 1016               | Declaration of Ingrid Hsieh-Yee, Ph.D.                                                 |
| 1017               | Excerpts of Prosecution History for European Patent App. No. 21166675.5                |
| 1018               | Curriculum Vitae of Dr. David S. Brookstein                                            |
| 1019               | Tortora et al., Excerpts of Fairchild’s Dictionary of Textiles, Seventh Edition, 1996  |
| 1020               | Calasibetta et al., Excerpts of Fairchild’s Dictionary of Fashion, Third Edition, 2003 |

2. This declaration is provided after my review and analysis of the ’484 patent, the prior art, relevant background technology, and is also based on my education and experience, as well as additional materials identified herein.

## **II. BACKGROUND AND QUALIFICATIONS**

3. I am qualified to testify as an expert in this case. I was awarded a Bachelor of Textile Engineering degree from the Georgia Institute of Technology (“Georgia Tech”) in 1971, a Master of Science degree in Textile Technology from the Massachusetts Institute of Technology (“MIT”) in 1973, and a Doctor of Science degree in the field of mechanical engineering from MIT in 1976.

4. I was a professor of Textile Engineering at Georgia Tech from 1975-1980. I was Associate Director of Albany International Research Co. (formerly Fabric Research Laboratories) from 1980-1994. I was Dean of the School of

Engineering and Textiles and Executive Director of Research at Philadelphia University (formerly Philadelphia College of Textiles and Science) from 1994 to 2010. In 2010, I was appointed Executive Dean for University Research at Philadelphia University and served in that position through June 2012. In July 2012, I resigned from Philadelphia University to become Dean of the Science, Technology, Engineering, and Mathematics Division of Montgomery County Community College in Pennsylvania. In August 2014, I was appointed Professor of Mechanical Engineering and Director of Undergraduate Affairs at the Temple University College of Engineering, and in July 2017 I was promoted to Senior Associate Dean for Undergraduate Studies at the Temple University College of Engineering. I retain my rank of Professor of Mechanical Engineering and I am responsible for the capstone senior design course required of all engineering graduates. In 1995 I was elected by my peers as a Fellow of the American Society of Mechanical Engineers, which is an honorific awarded to only about 1% of its members. In 1992 I was elected by my peers as a Fellow of The Textile Institute (United Kingdom). In 1998 I was awarded the ASTM Harold Dewitt Smith Award for textile fiber utilization. In 1993 I was awarded the Techtextil Innovation Prize (Germany). I have conducted research on knitting when I was employed at the Albany International Research Co. (formerly Fabric Research laboratories, Inc.). I taught courses in knitting technology during my period as an assistant professor of textile engineering at Georgia Tech and

as Dean of Engineering and Textiles at Philadelphia University (formerly Philadelphia College of Textiles and Science).

5. I am the named inventor on 13 U.S. patents, all of which relate to the to the field of structures made using the principles of textile engineering and science.

6. A copy of my curriculum vitae, attached as Exhibit 1018, contains further details concerning my education, experience, publications, patents, and other qualifications to render an expert opinion in this matter.

7. I am being compensated for my work in this matter at my standard hourly rate for consulting services. My compensation in no way depends on the outcome of this proceeding. I have no personal or financial stake or interest in the outcome of this proceeding.

8. I understand that Petitioner will cite and rely on significant portions of my testimony and analysis set forth in this declaration in support of its Petition challenging the patentability of the '484 patent. I have not been provided or reviewed the Petition or any drafts of the Petition, and, thus, the Petition or drafts of the Petition have not influenced my testimony or analysis set forth in this declaration.

9. Between now and such time that I may be asked to testify, I expect to continue my review, evaluation, and analysis of evidence presented before and/or at the hearing. I expect to review the declarations and other evidence submitted by Nike's experts. I reserve the right to amend or supplement this declaration, as

appropriate, after considering any opinions set forth by Nike's experts. In the event that additional relevant information becomes available to me, I also reserve the right to review and consider that information in further developing or refining my opinions.

### **III. LEGAL PRINCIPLES**

10. I am not an attorney or patent agent. Therefore, in formulating my opinions and conclusions in this proceeding, I have been provided with an understanding of the relevant aspects of U.S. patent law that govern the issues of patent validity by counsel for the Petitioner.

#### **A. Claim Construction**

11. I understand, in determining whether a patent claim is unpatentable in view of the prior art, the Patent Office construes the claim by giving the claim its ordinary and customary (i.e., plain and ordinary) meaning ascribed to it by a person of ordinary skill in the art at the time of the invention ("POSA"). For the purposes of my analysis and opinions, and to the extent necessary, I understand each claim to have its ordinary and customary meaning under the required standard.

#### **B. Prior Art**

12. I understand that, in this IPR proceeding, the prior art to the '484 patent includes patents and printed publications in the relevant field(s) that predate the '484 patent's priority date.

### **C. Obviousness**

13. I understand that a claim of a patent may be obvious to a person of ordinary skill in the art if the differences between the subject matter set forth in the patent claim and the prior art are such that the claimed subject matter as a whole would have been obvious at the time of the invention.

14. I understand that obviousness is a determination of law based on various underlying determinations of fact. In particular, these underlying factual determinations include (1) the scope and content of the prior art; (2) the level of ordinary skill in the art at the time the claimed invention was made; (3) the differences between the claimed invention and the prior art; and (4) the extent of any proffered objective “indicia” of non-obviousness. I understand that the objective indicia, also known as secondary considerations, which may be considered in such an analysis include, among other factors: the commercial success of the patented invention (including evidence of industry recognition or awards), the existence of a long-felt but unmet need in the field satisfied by the invention, the failure of others to arrive at the invention, industry acquiescence and recognition of the invention, initial skepticism of the invention by others in the field, the extent to which the inventors proceeded in a direction contrary to the accepted wisdom of those of ordinary skill in the art, and licensing of the patent.

15. In determining the scope and content of the prior art, I understand a

reference is considered prior art for the obviousness analysis if it falls within the inventors' field of endeavor. Additionally, a reference is prior art for the obviousness analysis, even if from a different field of endeavor, if it is reasonably pertinent to the particular problem for which the invention was made. A reference is reasonably pertinent if it is something a person of ordinary skill in the art would have looked to when attempting to solve the problem addressed by the patent at issue.

16. While multiple prior art references or elements may be combined to render a patent claim obvious, I understand that a patent claim composed of several elements is not proven obvious merely by demonstrating that each of its elements was, independently, known in the prior art. I understand that I should consider whether there is an "apparent reason" or motivation to combine the prior art references or elements in the way the patent claims. It is my further understanding that the law recognizes several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; a predictable use of prior art elements according to their established functions; applying a known technique to a known method or product

ready for improvement; and choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

17. I understand the obviousness analysis must be performed from the perspective of a person of ordinary skill in the art at the time of the alleged invention. This is to avoid using impermissible hindsight in the analysis. The claims of the patent must not be used to provide a road map for obviousness; instead, the claims would have been obvious if a person of ordinary skill in the art would have been motivated to combine the teachings of the prior art to arrive at the claimed invention and had a reasonable expectation of success in doing so.

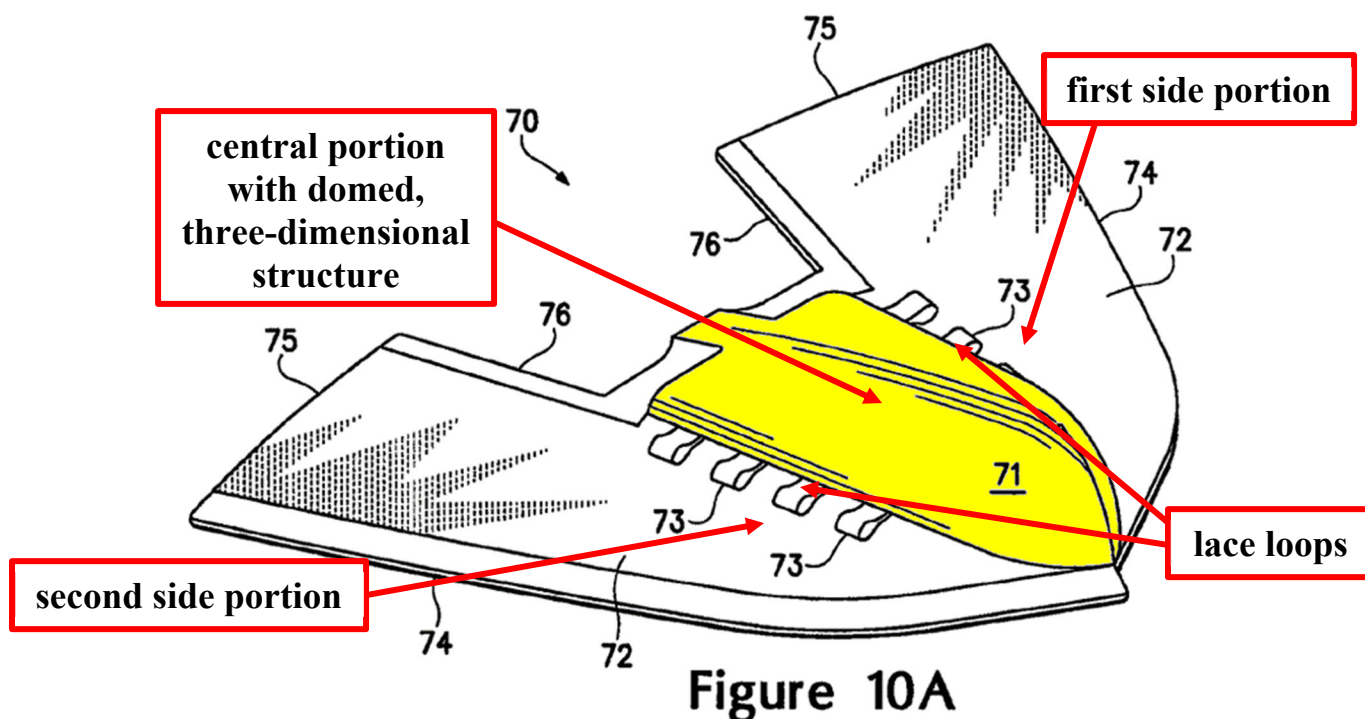
18. An obviousness analysis also must consider whether there are additional factors that would indicate that the invention would not have been obvious. These factors include whether there was: (i) a long-felt need in the industry; (ii) any unexpected results; (iii) skepticism of the invention; (iv) a teaching away from the invention; (v) commercial success; (vi) praise by others for the invention; and (vii) copying by others. I am not aware of any evidence that would suggest that the Challenged Claims of the '484 patent would have been non-obvious based on these additional factors.

#### **IV. THE '484 PATENT**

##### **A. Specification of the '484 Patent**

19. The '484 patent relates to footwear articles such as shoes with uppers that include flat-knitted elements. Ex.1001, 4:28-48. As described herein, flat-knitting was a well-known process for making knitted apparel, including footwear.

20. The '484 patent explains that “[f]lat knitting allows production of textile structure (e.g., for use in footwear uppers) of a final desired shape such that textile cutting steps can be avoided.” *Id.*, Abstract. According to the '484 patent, “flat knitting can be used . . . such that textile cutting steps can be avoided (which eliminates waste, avoids the need for finish cut edges, saves time, saves money, etc.).” *Id.*, 4:51-55. The '484 patent states “[f]lat knitted elements also can be formed directly in desired three dimensional shapes, which can help avoid the need to use additional support structures (e.g., in footwear construction).” *Id.*, Abstract. In one example of a flat-knit structure, an upper 70 includes a “central portion 71, a pair of side portions 72, and eight lace loops 73.” *Id.*, 10:18-23.



*Id.*, Fig. 10A (annotated). The central portion 71 has a domed, three-dimensional structure, which is shaped to extend over a foot. *Id.*, 10:34-38.

21. In the '484 patent, “a domed, three-dimensional structure” feature is shown in only three figures (Figures 10A-10C) and there are only two short paragraphs of description about those figures. *Id.*, Figs. 10A-10C, 10:18-46. According to my review, the '484 patent does not provide any detail about how a POSA would knit such three-dimensional features.

## **B. Claims of the '484 Patent**

22. I have included independent claim 1 below with bracketed labels added for convenient referencing to the claim limitations.

| <b>Claim 1</b> |                                                                                                                                                                                              |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1[pre]         | An article of footwear comprising                                                                                                                                                            |
| 1[a]           | an upper including a flat-knitted element formed from at least one yarn mechanically manipulated in a flat-knitting process, the flat-knitted element including a first layer having:        |
| 1[b]           | a central portion having a domed, three-dimensional structure configured for extending over the top of a foot;                                                                               |
| 1[c]           | a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion; and                                               |
| 1[d]           | a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion,                         |
| 1[e]           | the domed, three-dimensional structure shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration. |

23. I include independent claim 10 of the '484 patent here for reference:

| <b>Claim 10</b> |                                                                                                                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10[pre]         | An article of footwear comprising                                                                                                                                                                                            |
| 10[a]           | an upper including a flat-knitted element formed from at least one yarn mechanically manipulated in a flat-knitting process, the flat-knitted element including a first layer and a second layer, the first layer including: |
| 10[b]           | a central portion having a domed, three-dimensional structure configured for extending over the top of a foot;                                                                                                               |
| 10[c]           | a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion; and                                                                               |
| 10[d]           | a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion; and                                                     |
| 10[e]           | the second layer being flat-knitted with the first layer at opposite ends of the second layer to form an overlapped loop.                                                                                                    |

24. Independent claim 11 of the '484 patent is further set forth below:

| <b>Claim 11</b> |                                                                                                                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11[pre]         | A method of manufacturing an article of footwear, the method comprising                                                                                                                                 |
| 11[a]           | forming during a flat-knitting process an upper including a flat-knitted element including a first layer having:                                                                                        |
| 11[b]           | a central portion having a domed, three-dimensional structure configured for extending over the top of a foot;                                                                                          |
| 11[c]           | a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion; and                                                          |
| 11[d]           | a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion,                                    |
| 11[e]           | wherein the domed, three-dimensional structure is shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration. |

### **C. Prosecution History of the '484 Patent**

25. I have reviewed the prosecution history of the application that led to the '484 patent. During prosecution of the '484 patent, the Examiner rejected the pending claims as being anticipated by Dua (Ex.1004) or obvious over Dua in view of Hatfield (Ex.1010). Ex.1009, 42-46. Dua is the same Dua reference that is part of Grounds 1-4 in this Petition. I have seen no indication that the Examiner considered Lockwood (Ex.1003) or Hong (Ex.1005), which form Grounds 1-4 with Dua.

26. Patent Owner replied to the Office Action by amending the independent claims to recite “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot” and/or “the domed, three-dimensional structure shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration.” Ex.1009, 25-28. The Examiner next issued a Notice of Allowance without providing additional comments regarding the claims. *Id.*, 11-15.

**D. Prosecution in the Related European '675 Application**

27. Subsequent to the '484 patent issuing, Nike filed a patent application in Europe that is related to the '484 patent. It is my understanding that Nike filed this European counterpart through its subsidiary entity NIKE Innovate C.V. This European patent application was assigned European Patent Application No. 21166675 (“the EP '675 application”). Claim 1 of the EP '675 application included similar limitations to claim 1 of the '484 patent. Ex.1017, 11.

28. The Examiner objected during examination to claim 1 of the EP '675 application for various reasons, including because, as the Examiner stated, the application included insufficient disclosure for a skilled person to carry out the claimed invention. *Id.*, 15. The Examiner stated that “the present subject-matter is only disclosed . . . at para. 54 and 55 of the description, wherein nothing is described nor disclosed nor explained on how a domed three-dimensional knitted element

could be manufactured through a flat-knitting process.” *Id.* The Examiner stated that “[i]t is clear to any skilled person that the present subject-matter lacks essential information on how such an effect (domed portion) could be achieved.” *Id.*

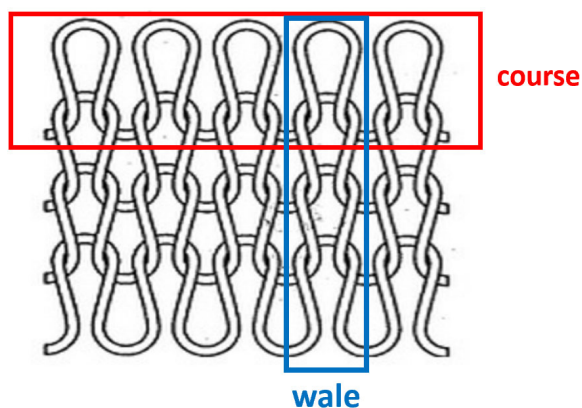
29. In reply, Nike stated the objection was unfounded because “[t]here are numerous prior art documents which disclose that achieving three-dimensional knitted textiles may generally be obtained through flat knitting, such as e.g. ‘The development of 3D shaped knitted fabrics for technical purposes on a flat knitting machine’, Hong et al.” *Id.*, 8. The Examiner did not maintain this objection in the next communication in the EP ’675 application. *Id.*, 1-6.

30. I agree with Nike’s statement that flat-knitting three-dimensional textiles was well-known at the time of the ’484 patent. The 1994 publication by Hong (Ex.1005) mentioned by Nike discusses what it refers to as a “new” commercial electronic flat-knitting machine and provides specifics of how the machine can produce three-dimensional shaped fabrics for different technical purposes. Ex.1005, 1-3. Hong also describes different three-dimensional shaped knitted fabrics developed on the machine, such as tubular forms, spherical forms, and others. *Id.*, 3-6. Hong states that “[o]ne of the main advantages [of such flat-knitting machines] is the facility of these machines to knit fabric pieces to a particular shape or form.” *Id.*, 1. This Hong reference is relied on for Grounds 3-4 and is discussed in greater detail below.

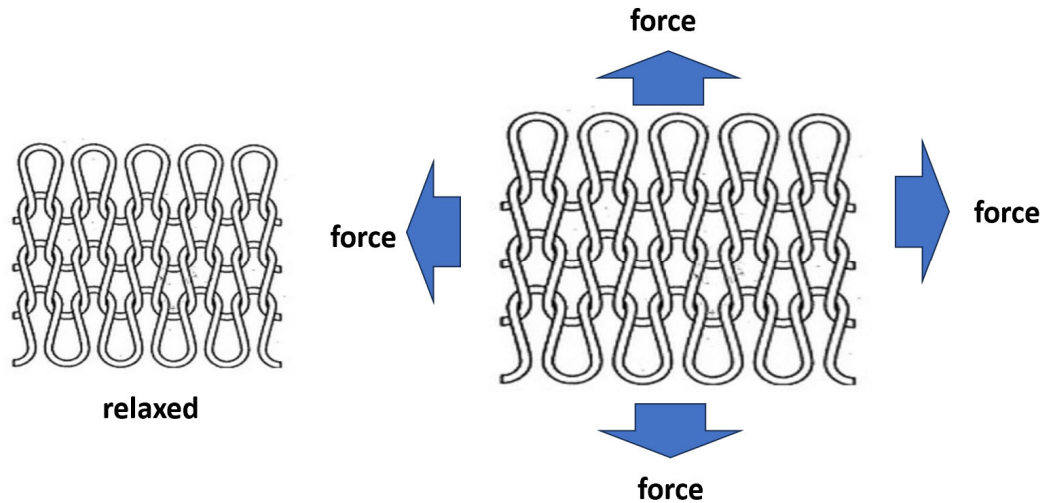
## **V. BACKGROUND AND STATE OF THE ART**

### **A. Flat Knitting Was A Common Option For Clothing Articles**

31. A POSA would have known that flat knitting can produce a textile fabric composed of one continuous yarn running widthwise across the fabric and forming all of the loops in each course. Below is a knit fabric drawing that identifies the general structure consisting of courses (widthwise) and wales (lengthwise).



32. A POSA would have known that a flat-knitted fabric like that shown in the previous paragraph is relatively extensible in both directions, even if the yarn from which the fabric is made from are not themselves relatively extensible. This is a result of the looped yarn configuration in the knitted fabric. Below is a drawing which shows this physical behavior.



33. A POSA would have been familiar with flat knitting by a machine and using this knitting process for clothing articles, including fabric-based footwear. The process of flat knitting articles had been used for decades before the '484 patent.

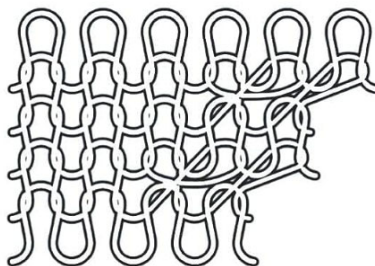
34. A POSA would have known that flat knitting can be performed on a knitting machine with knitting needles arranged in a straight line in plates or beds. Ex.1019, 3. Textile yarn travels alternately in a horizontal direction back and forth, and “the fabric may be shaped or varied in width, as desired, during the knitting process.” *Id.* “The principle of the flat knitting machine was invented in 1864 by William Cotton of Loughborough, England.” *Id.*

35. Flat knitting was not new and had known capabilities and benefits long before 2006. Gastrich (Ex.1012) is just one example of flat knitting a clothing article. Gastrich issued in 1936 and describes common flat-knit stockings made on a flat knitting machine. Ex.1012, 1:1-21(left) (“Full fashioned flat knit stocking

usually are made of plain fabric composed of successively knit transversely extending courses of regular stitches or needle loops . . . with parallel rows of loops formed by the sinkers of the machine, which are commonly termed ‘sinker wales.’”).

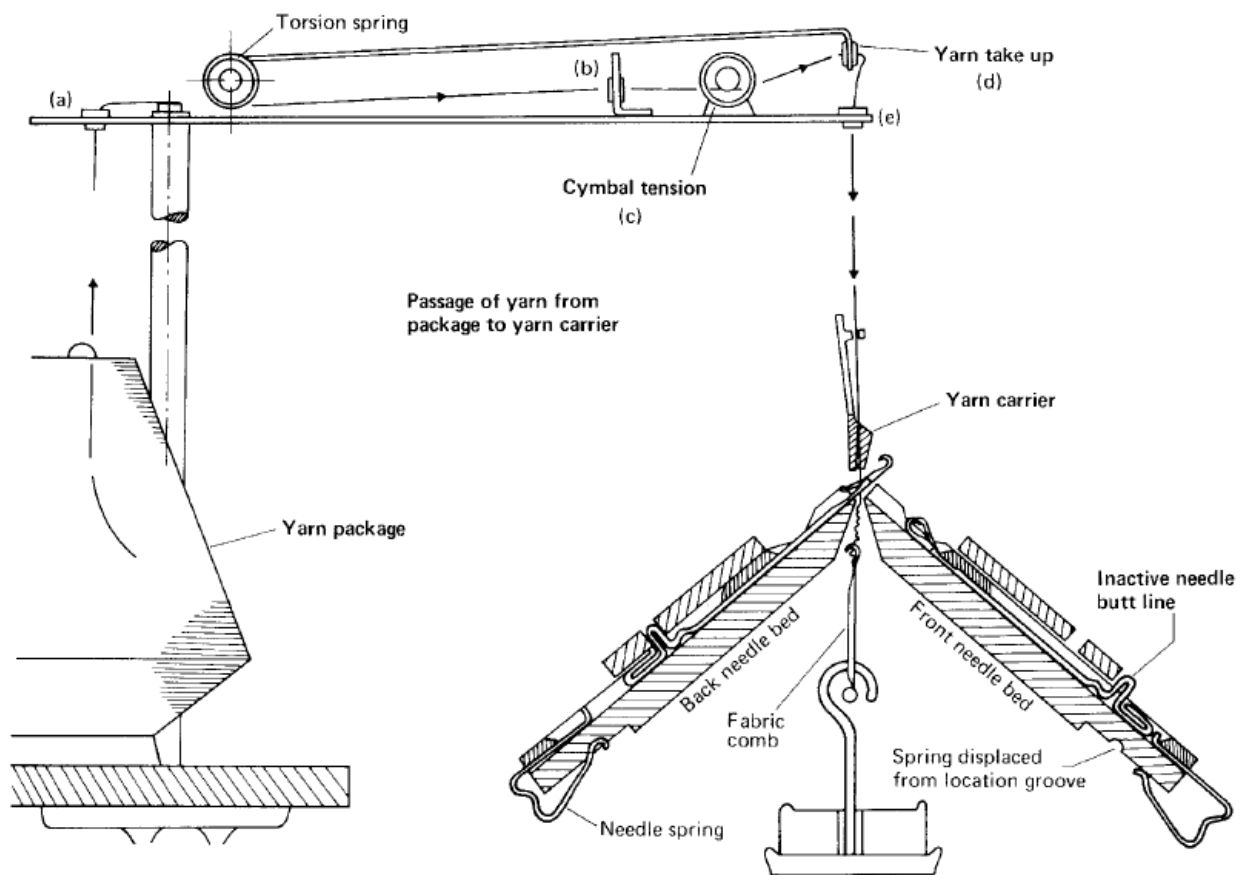
36. Kahn (Ex.1013) is another example of flat knitting a clothing article. Kahn issued in 1901 and describes a flat knit cap and the method for making the cap. Ex.1013, 1:43-51 (“I first knit (preferably upon a flat-knitting machine of the ordinary Lamb type) a piece of fabric . . .”).

37. A POSA would have known that the “full fashioned” knit structure in Kahn is a knit fabric made on a flat knitting machine and shaped by increasing or decreasing the number of wales in each course. For example, this is shown below.



38. These examples confirm that flat knitting clothing articles was common, at least by the early twentieth century. Later in the twentieth century, flat knitting continued to be a common option for making clothing articles. Essig (Ex.1015) is another example from 1995 which describes a “method of producing a fashioned, one-piece flat knitted article for a garment includes knitting several knitted article parts having a front part, a rear part and two sleeves separately and

sequentially so that in each knitted article part always several loop rows are knitted in accordance with a pattern for said each knitted article part before transferring to a next knitted article part.” Ex.1015, Abstract. Essig’s background section explains that a one-piece flat knitted article can be produced “on a two-bed flat knitting machine with at least one carriage” and that several “such methods for producing one-piece knitted articles for garments are known.” *Id.*, 1:10-32. A POSA would have known that the “two-bed flat knitting machine with at least one carriage” disclosed in Essig would generally look like the diagram shown below.



Ex.1014, 25.

39. In addition to stockings, shirts, and caps, flat knitting processes were also used to make footwear articles such as unitary shoe uppers. For example, Dua (Ex.1004) published in 2005 and discloses articles of footwear, including uppers produced using a flat knitting process. Ex.1004, Abstract, [0061]. I discuss Dua in further detail below.

**B. Flat Knitting Was Used To Make Prior Three-Dimensional Structures**

40. As I described above, Nike, through a subsidiary called NIKE Innovate C.V., filed the EP '675 application, which is a European application related to the '484 patent. In connection with the EP '675 application, Nike argued that “[t]here are numerous prior art documents which disclose that achieving three-dimensional knitted textiles may generally be obtained through flat knitting, such as e.g., ‘The development of 3D shaped knitted fabrics for technical purposes on a flat knitting machine’, Hong et al.” Ex.1017, 8. Hong (Ex.1005), a 1994 publication, describes flat knitting a variety of shapes for a variety of uses, including “protection clothing, transportation related textiles (cars, planes and space crafts), geotextiles, building construction related textiles, packaging materials, military related textiles, medical textiles, sports related textiles, etc.” *Id.*, 1. I discuss Hong in further detail below.

**C. Domed, Three-Dimensional Structures in Uppers**

41. A POSA would have been familiar with footwear uppers made with three-dimensional features to improve the manufacturing process. Specifically,

footwear uppers with domed, three-dimensional structures were well known prior to 2006. As one example, Lockwood (Ex.1003) was issued in 1972 and discloses “[m]ethods of preforming shoe uppers . . . using molds of a novel shape.” *Id.*, Abstract. I discuss Lockwood in further detail below.

42. There were other references that disclose this known concept of preshaping the upper and incorporating a domed, three-dimensional structure in the central portion of the upper. For example, Staden (Ex.1007) explains its “invention accordingly provides a method of preforming a blank intended for use as a shoe upper forepart, in which the blank is deformed from a generally planar or multiplanar shape into a shape more readily deformable into the shape subsequently required.” Ex.1007, 2:33-45. Similarly, Wyness (Ex.1008) discloses “techniques for conforming initially flat material . . . whereby the preformed upper is convertible to the shape of the last merely by a bending operation.” Ex.1008, Abstract.

## **VI. LEVEL OF ORDINARY SKILL**

43. I have been informed by counsel for Petitioner that for purposes of assessing the obviousness of the '484 Patent, the level of skill possessed by the hypothetical person of ordinary skill in the art is informed by several factors. These factors include the type of problems encountered in the relevant art, the prior art solutions to those problems, the rapidity with which innovations are made in the

relevant art, the sophistication of the relevant technology, and the educational level of active workers in the field.

44. The relevant field of the '484 patent relates to articles of footwear having an upper that includes a flat-knitted element. Ex.1001, 3:10-14. I consider myself to be an expert in the relevant field and have taught courses dealing with knitting to both undergraduate and graduate students at the Georgia Institute of Technology (Georgia Tech) School of Textile Engineering and at Philadelphia University (formerly Philadelphia College of Textiles and Science).

45. In my opinion, a POSA at the relevant time period, which I understand to be around the time of the earliest priority application, November 2006, would have had at least a bachelor's degree in mechanical engineering, textile engineering, or similar technical degree and at least 3 years of experience working with knitted textiles for use in fabric-based articles, including apparel such as footwear. For individuals with different educational backgrounds, a person could still be of ordinary skill in the art provided that person's additional experience compensates for any differences in that person's education as stated above. This education and background provide the necessary training and understanding of apparel articles described in the '484 patent. Thus, based on my experience in the field of textile engineering, the person of skill would have the education and experience described

above. All of my opinions set forth herein are provided from the perspective of a person having ordinary skill in the art.

## **VII. CLAIM CONSTRUCTION**

46. I understand the Patent Trial and Appeal Board (“PTAB”) construes the claims using the same claim construction standard that would be used in a district court case. Under this standard, I understand that claims are generally given their ordinary and customary meaning, as understood by a POSA.

47. I understand that Patent Owner has argued in the district court case that the “flat knitted element formed from at least one yarn mechanically manipulated in a flat knitting process” of claim 1 need not have the “domed, three-dimensional” structure recited in the claim. I understand that Patent Owner, in particular, stated a flat-knitted element that is knitted in a flat configuration and then formed into a domed, three-dimensional configuration after being knit would fall within the scope of the claim 1. But Patent Owner’s argument and interpretation conflicts with the claim’s language. Claim 1 states that the flat-knitted element having the claimed features is formed from a flat knitting process. Regardless, I address the challenged claims in Grounds 1-2 based on Patent Owner’s interpretation of the claims. I address the challenged claims in Grounds 3-4 under their plain and ordinary meaning, i.e., that a flat-knitted element having the claimed features is formed from a flat knitting process.

48. As I explain in detail below, the claims of the '484 patent would have been obvious to a POSA under either Patent Owner's interpretation or the plain and ordinary meaning of the claim terms.

### **VIII. OVERVIEW OF OBVIOUSNESS GROUNDS**

49. Below is a table listing the grounds of unpatentability for the '484 patent:

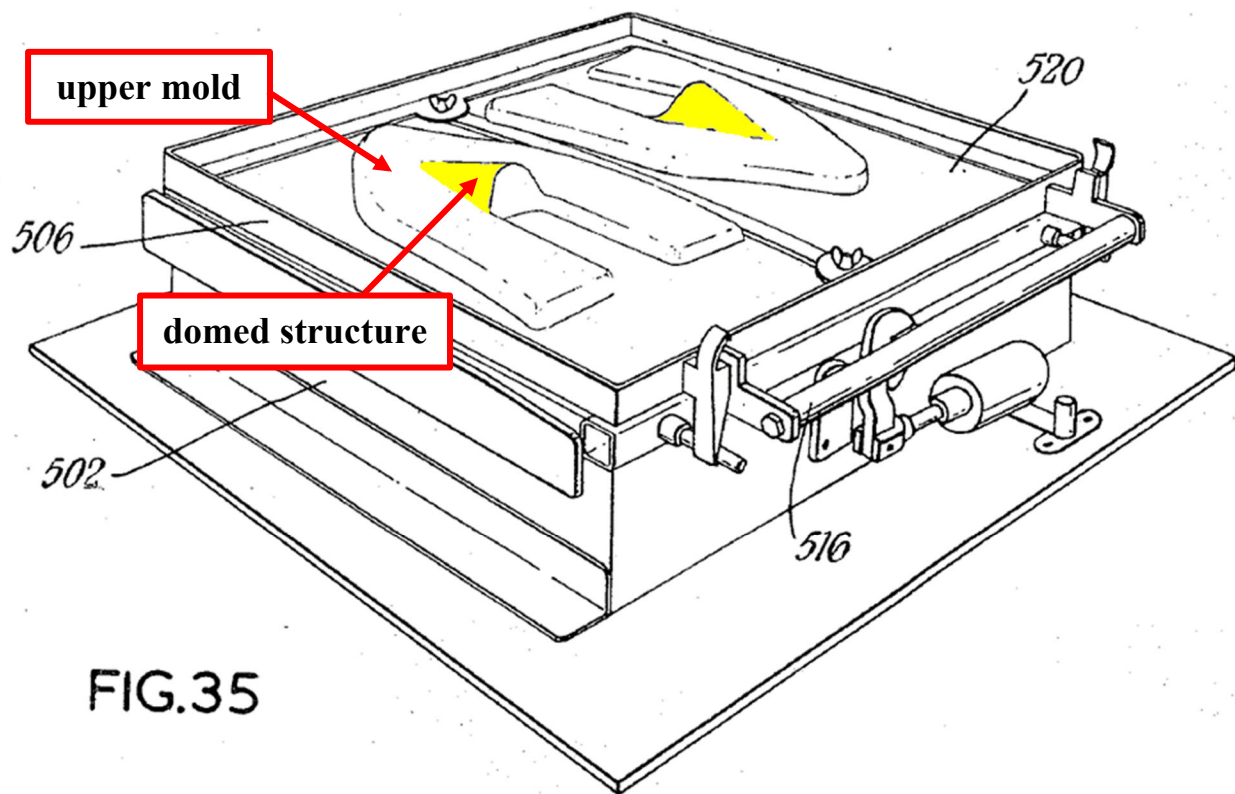
| <b>Ground</b> | <b>Reference(s)</b>                | <b>Basis</b> | <b>Challenged Claims</b> |
|---------------|------------------------------------|--------------|--------------------------|
| 1             | Lockwood and Dua                   | §103         | 1 and 5–9                |
| 2             | Lockwood, Dua, and Norton          | §103         | 1 and 5–9                |
| 3             | Dua, Hong, and Lockwood            | §103         | 1–19                     |
| 4             | Dua, Hong, Lockwood, and Voughlohn | §103         | 2–4, 18, and 19          |

### **IX. GROUND 1: LOCKWOOD AND DUA RENDER OBVIOUS CLAIMS 1 AND 5–9**

#### **A. Summary of Lockwood (Ex.1003)**

50. Lockwood is a patent issued in 1972. Ex.1003, Front Page. I understand that Lockwood was neither considered nor cited during prosecution of the '484 patent. Ex.1001. Lockwood discusses shoe making and “[m]ethods of preforming shoe uppers . . . using molds of a novel shape.” Ex.1003, Abstract. Lockwood states manufacturing an upper that is domed in the area covering a foot

simplifies assembly of the upper. *Id.*, Abstract, 2:60-62, 1:60-64. Lockwood refers to this domed area as a “vamp cone portion” of the upper. *Id.*, 2:60-64. The vamp cone portion is positioned around the upper’s median line in Lockwood. *Id.* Figure 35 below from Lockwood shows an upper shape with a vamp cone portion that is a domed, three-dimensional structure and extends above flattened side portions.



*Id.*, Fig. 35 (annotated).

51. Lockwood explains that uppers can incorporate a knitted element. Lockwood states that its uppers can include a “fibrous reinforcement.” *Id.*, 8:34-39, 8:66-69. This fibrous reinforcement may be a sheet of “woven, nonwoven or knitted textile fabrics” that is adhered to or embedded in a thermoplastic material. *Id.* The

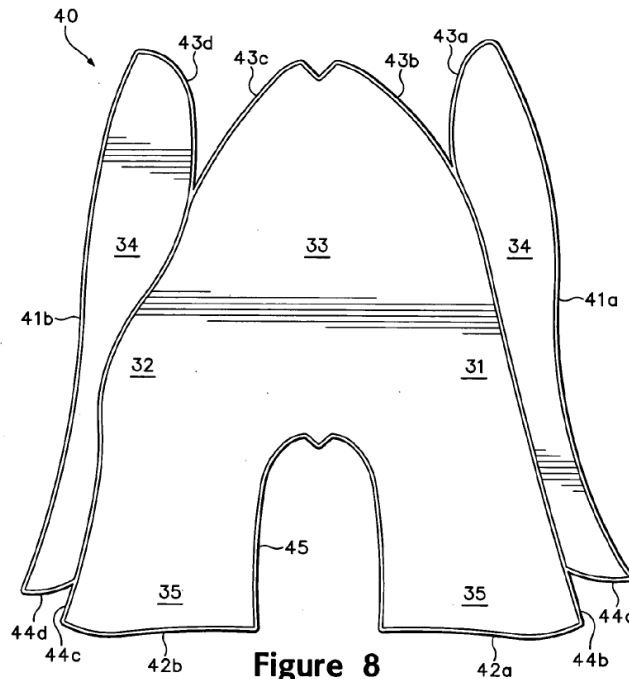
fibrous reinforcement and thermoplastic material are placed on Lockwood's mold, which deforms the fibrous reinforcement and thermoplastic material. *Id.*, 2:22-30. According to Lockwood, the described manufacturing process facilitates "a single-piece integral upper to be formed." *Id.*, 2:18-19.

**B. Summary of Dua (Ex.1004)**

52. Dua is a 2005 patent publication. Ex.1004, Front Page. Dua discusses articles of footwear and uppers produced by a flat-knitting process. Ex.1004, Abstract, [0061]. As I mentioned above, I understand that the Examiner relied upon Dua to reject claims during prosecution of the application that issued as the '484 patent. Ex.1009, 42-46. But I also understand that Dua was not considered in combination with Lockwood or Hong. Ex.1001. Dua discusses how flat knitting is a type of weft knitting. Ex.1004, [0044]. Weft knitting is one of the two primary mechanical processes developed for knitting a textile (i.e., warp and weft knitting). *Id.* Dua describes that flat-knitting can be used to "impart various textures, different properties, or different yarn types to the textile element." *Id.*, [0061]. As explained in Dua, the type of knitting or yarn utilized may vary to impart different properties to a textile element's different parts. *Id.*, [0056].

53. The upper in Dua "may be formed from multiple material layers that include an exterior layer, an intermediate layer, and an interior layer." *Id.*, [0006].

Figure 8 below from Dua shows “a plan view of a textile element that forms at least a portion of the upper” and includes at least one layer. *Id.*, [0025].



*Id.*, Fig. 8. According to Dua, by forming an upper to be a single, unitary element of material rather than numerous jointed elements, manufacturing efficiency is increased. *Id.*, [0060].

### C. Lockwood and Dua Render Obvious Claim 1

54. Lockwood describes an upper that has a central portion with a domed, three-dimensional structure. Ex.1003, Abstract, 2:60-62, 1:60-64. Lockwood also explains that its upper may include a knitted element that is a layer of the composite upper. *Id.*, 8:34-39, 8:66-69. Lockwood discloses each element of claim 1 other than that the knitted element is flat knit from at least one yarn. However, flat knitting

a knitted element from at least one yarn was well-known. This is confirmed by and disclosed in Dua. A POSA would have been motivated for many reasons to use a flat-knitted element, such as Dua's, for the knitted element in Lockwood's upper.

55. A POSA would have been motivated to combine the teachings of Lockwood and Dua. Lockwood and Dua are in the same field of endeavor and address the same problem as the '484 patent. Both Lockwood and Dua, like the '484 patent, are directed to manufacturing uppers, including uppers with knitted elements. Ex.1003, Abstract; Ex.1004, Abstract. Additionally, Lockwood and Dua address the same problem addressed in the '484 patent of forming uppers which provide benefits of reducing cost and increasing efficiency in manufacturing of uppers.

56. A POSA would also have understood the benefits of flat knitting the knitted element of Lockwood's upper. For example, Dua discloses flat knitting may be used to "impart various textures, different properties, or different yarn types to the textile element." Ex.1004, [0061]. Dua explains a unitary upper "formed from multiple material layers that include an exterior layer, an intermediate layer, and an interior layer." *Id.*, [0006]. According to Dua, by "forming textile element 40 to be a single, unitary element of material, however, efficiency is increased in that upper 20 may include a single textile element, rather than numerous jointed elements." *Id.*, [0060]. The motivations and benefits in the prior art thus match motivations and benefits of flat knitting discussed in the '484 patent.

57. Lockwood states that producing a “single-piece integral upper” having a domed, three-dimensional structure “simplif[ies] the assembly of uppers by a technique of preshaping the upper forepart component.” Ex.1003, 1:60-64, 2:18-62. Lockwood states that “preforming uppers for shoes, in which the uppers can be easily cut from a sheet of material after preforming and in which different style shoes can easily be formed from the same shape . . . is facilitated if the central raised portions 34 of the mold is smoothly curved.” *Id.*, 7:21-28.

58. A POSA would further have been motivated to use a flat knitting machine to produce the knitted element in Lockwood because flat knitting machines offered many knitting design options and ease of use. Ex.1014, 8. Flat knitting machines were known to be “the most versatile of the weft knitting machines.” *Id.* Flat knitting machines permit various stitch types and lengths and allow use of a wide range of yarns. *Id.* Flat knitting machines are also simpler to operate and supervise than other weft knitting machines. *Id.* A POSA would moreover have known that flat knitting machines could easily be programmed to construct a knitted element that has specific features and shape. *Id.*, 13.

59. A POSA would also have been motivated to select flat knitting for producing Lockwood’s knitted element because flat knitting is one of a finite number of options for producing the knitted element. Dua discusses knitting options for uppers, such as flat knitting. Ex.1004, [0006], [0061]. A POSA’s choice to flat knit

Lockwood's knitted element would have been a use of a known technique to improve similar upper elements in the same way. A POSA would have recognized that Lockwood discusses a textile knitted element but does not specifically state which knitting process should be implemented. As discussed in Dua, a POSA would have known there were a limited number of options of processes for knitting, including warp knitting (including tricot, raschel, and double needle-bar raschel) and weft knitting (including circular and flat knitting). *Id.*, [0044]. A POSA would have understood that Dua's discussion confirms the few, basic knitting options, including flat knitting.

60. A POSA would have reasonably expected success when implementing a flat-knitted element, such as Dua's flat-knitted element, in the upper in Lockwood. This would have involved no more than a selection of a flat-knitted element for the generic knitted element that is discussed in Lockwood. A POSA would have known that flat-knitting machines could readily construct a simple article like a knitted element with a layer before the earliest priority date of the '484 patent (November 10, 2006). Dua acknowledges that flat knitting was a known manufacturing process for apparel articles like shoe uppers. Ex.1004, [0006], [0061]. As a result, the combination of Lockwood and Dua would have involved just the routine selection of one species of knitting discussed in Dua for use in constructing the knitted element discussed in Lockwood.

61. I explain below how combining Lockwood and Dua meets every limitation of claims 1 and 5–9 of the '484 patent.

**1. Preamble of Claim 1**

62. The preamble of claim 1 recites: “An article of footwear comprising.” Both Lockwood and Dua disclose this preamble. Lockwood discloses articles of footwear. Ex.1003, Title (“Shoe Making”), 1:6-10 (shoe includes all forms of footwear), Claim 26. Dua also discloses articles of footwear. Ex.1004, Title (“Article of Footwear Having a Textile Upper”).

**2. Limitation 1[a]: “an upper including a flat-knitted element formed from at least one yarn mechanically manipulated in a flat-knitting process, the flat-knitted element including a first layer having”**

63. The combination of Lockwood and Dua discloses limitation 1[a]. According to the recited limitation, the upper includes a flat-knitted element. The limitation requires also that the flat-knitted element is “formed from at least one yarn mechanically manipulated in a flat-knitting process.” A POSA would have understood that any flat-knitted element would include at least one yarn that was mechanically manipulated in a flat-knitting process. Ex.1019, 3. Based on these limitations, a POSA would understand that the entire upper and the entire article of footwear need not be flat-knitted. Instead, the upper includes a flat-knitted element. The flat-knitted element has a first layer which has other features provided in other limitations recited later in claim 1.

64. Lockwood discusses “[m]ethods of preforming shoe uppers” which “include fibrous reinforcement for example in the form of a woven, knitted or nonwoven sheet adhered to or embedded in the water vapor permeable thermoplastic material.” Ex.1003, Abstract, 8:34-39, 8:66-69; *see also id.*, 8:38-39 (fibrous reinforcement may include “knitted textile fabrics”). Figure 35 below from Lockwood shows a mold for making Lockwood’s upper.

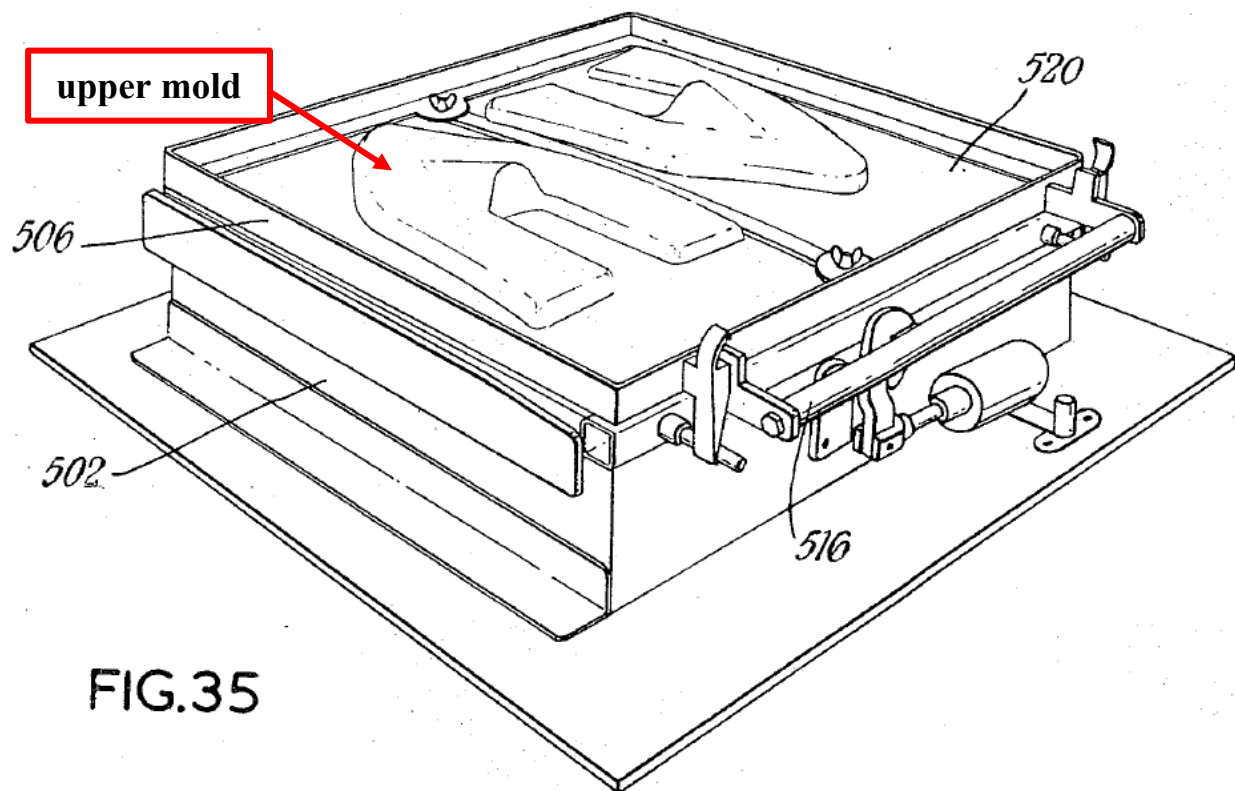


**FIG.35**

*Id.*, Fig. 35 (annotated).

65. According to Lockwood, its knitted reinforcement is a sheet that is layered on a sheet of extensible material. *Id.*, 8:66-72. Lockwood explains the sheets of knitted reinforcement and extensible material together form a composite

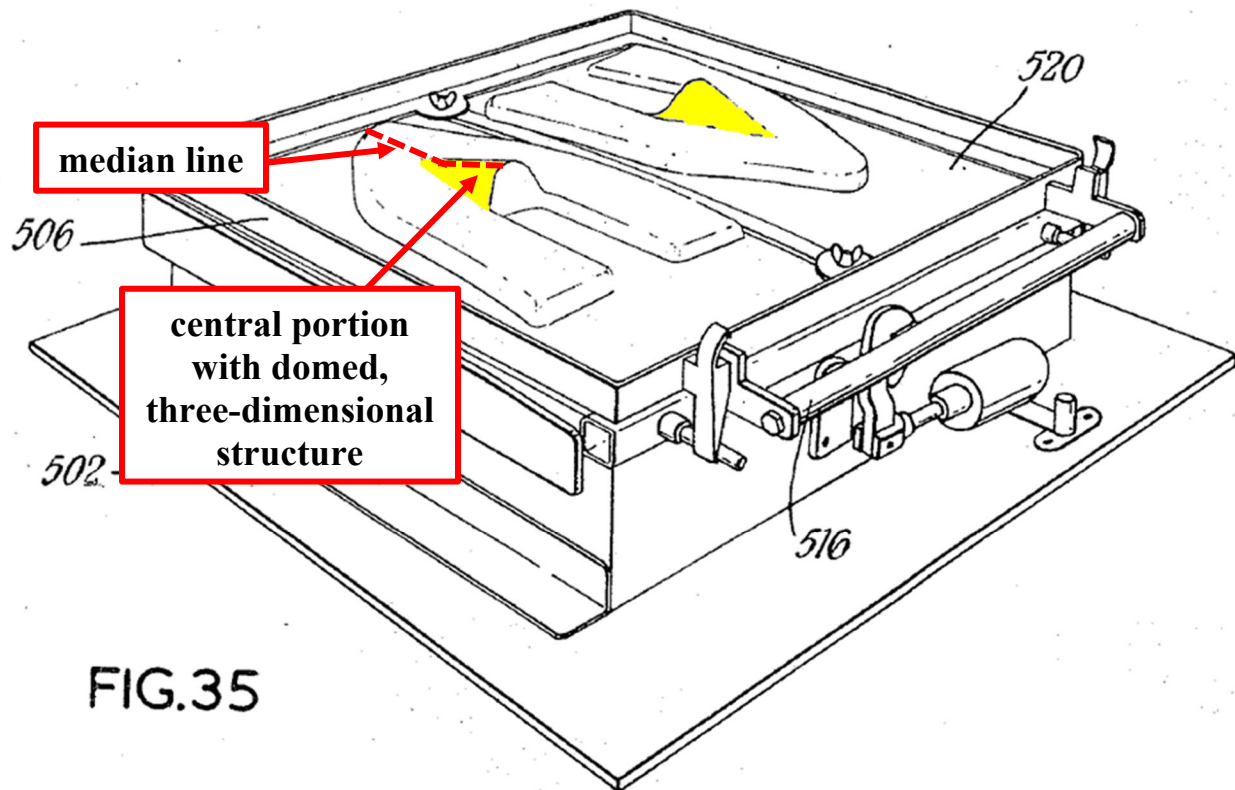
sheet used to create the upper. *Id.* As a result, Lockwood's upper includes a knitted element (knitted reinforcement layer) that includes a first layer.

66. Dua discloses an upper that has a flat-knitted element formed from at least one yarn mechanically manipulated in a flat-knitting process, the flat-knitted element including a first layer. Ex.1004, [0006], [0008], [0061]. For the reasons I explained above, a POSA would have been motivated to use flat knitting as discussed in Dua for the knitted element in Lockwood (knitted layer). Lockwood and Dua accordingly teach the features of limitation 1[a].

**3. Limitation 1[b]: “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot”**

67. Lockwood discloses this limitation. Lockwood discloses that “[p]roduction of upper components for mens shoes having a vamp cone portion will involve the use of molds having a vamp cone protuberance positioned around the median line.” Ex.1003, 2:60-64. A POSA would have understood that Lockwood's vamp cone portion is a three-dimensional dome structure in the central portion of the upper. A POSA would also have understood that the “vamp” of a shoe is the top portion that extends over the top of the foot. Ex.1020, 3 (vamp is the “[f]ront part of [a] shoe, covering toes and instep”); *see also* Ex.1003, 6:15-16 (vamp cone portion 34 “corresponds to the tongue area of the shoe”). Figure 35 below from Lockwood shows a mold for making an upper including a first layer (knitted

reinforcement) that includes a central portion with a domed, three-dimensional structure (vamp cone portion).

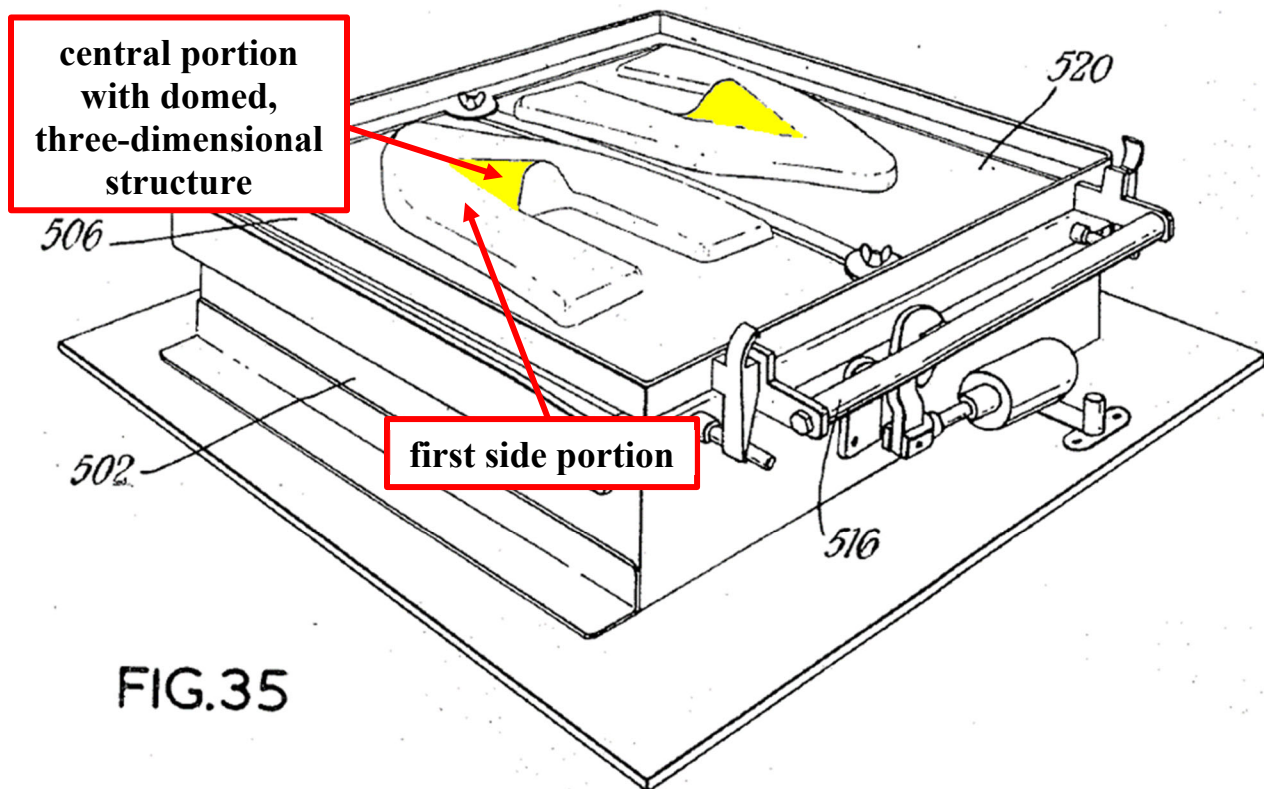


*Id.*, Fig. 35 (annotated). As a result, Lockwood explains that its knitted element (knitted layer) includes a first layer having a central portion with a domed, three-dimensional structure (vamp cone portion) and that the domed, three-dimensional structure is configured for extending over the top of a foot.

**4. Limitation 1[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion”**

68. Lockwood discloses this limitation. Lockwood explains how its teachings permit “a single-piece integral upper to be formed.” *Id.*, 2:18-19.

Lockwood shows in Figure 35 forming an upper with a knitted reinforcement layer that has a first side portion formed of unitary construction with the central portion and extending from a first side of the central portion.



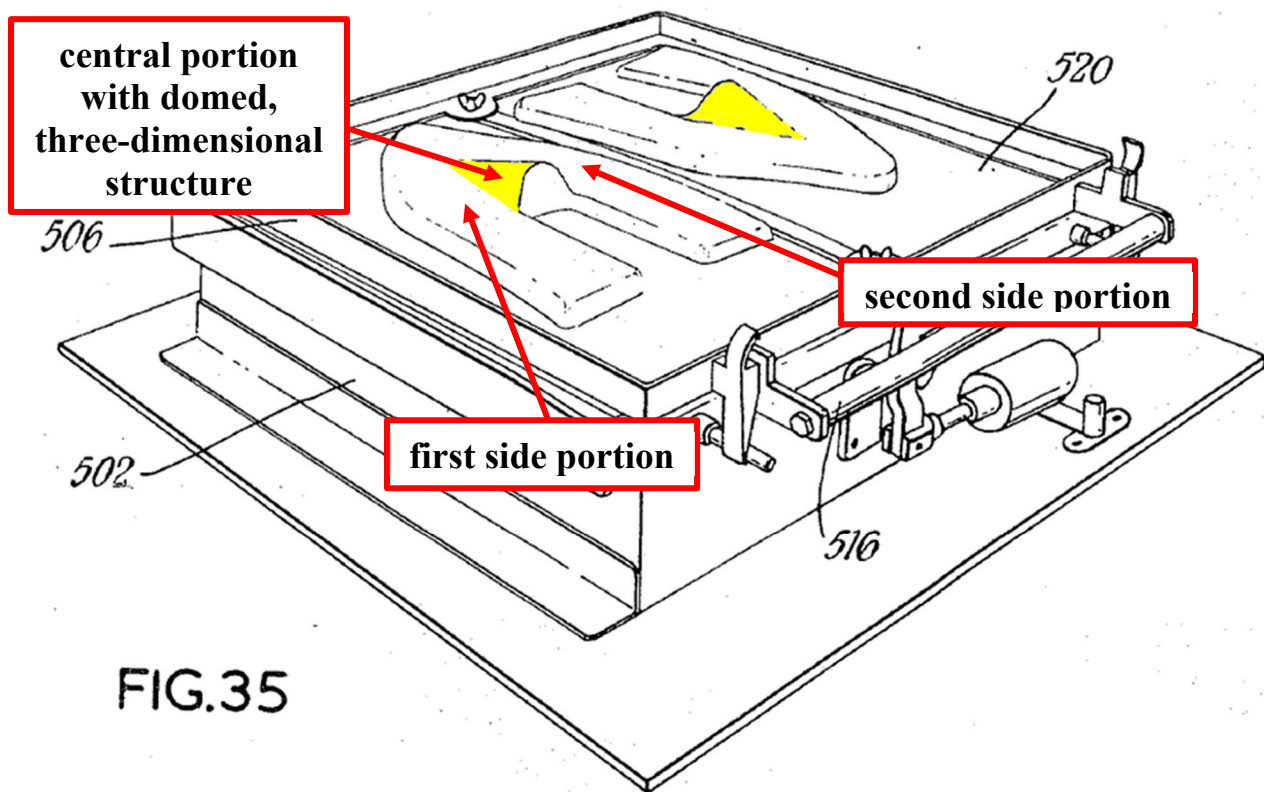
Ex.1003, Fig. 35 (annotated).

69. Additionally, Dua also discloses a knitted layer of an upper having a first portion of unitary construction with the central portion. Dua explains its “[t]extile element 40 is a single material element that is formed to exhibit a unitary (i.e., one-piece) construction, and textile element 40 is formed or otherwise shaped to extend around the foot.” Ex.1004, [0037], Fig. 8. Dua discloses that by forming the textile element 40 to be a single, unitary element of material, efficiency is

increased because the upper includes a single textile element, rather than numerous jointed elements. *Id.*, [0060].

**5. Limitation 1[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion”**

70. Lockwood discloses this limitation. Figure 35 below from Lockwood shows the shape for an upper including with a knitted reinforcement layer that has a second side portion formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion.



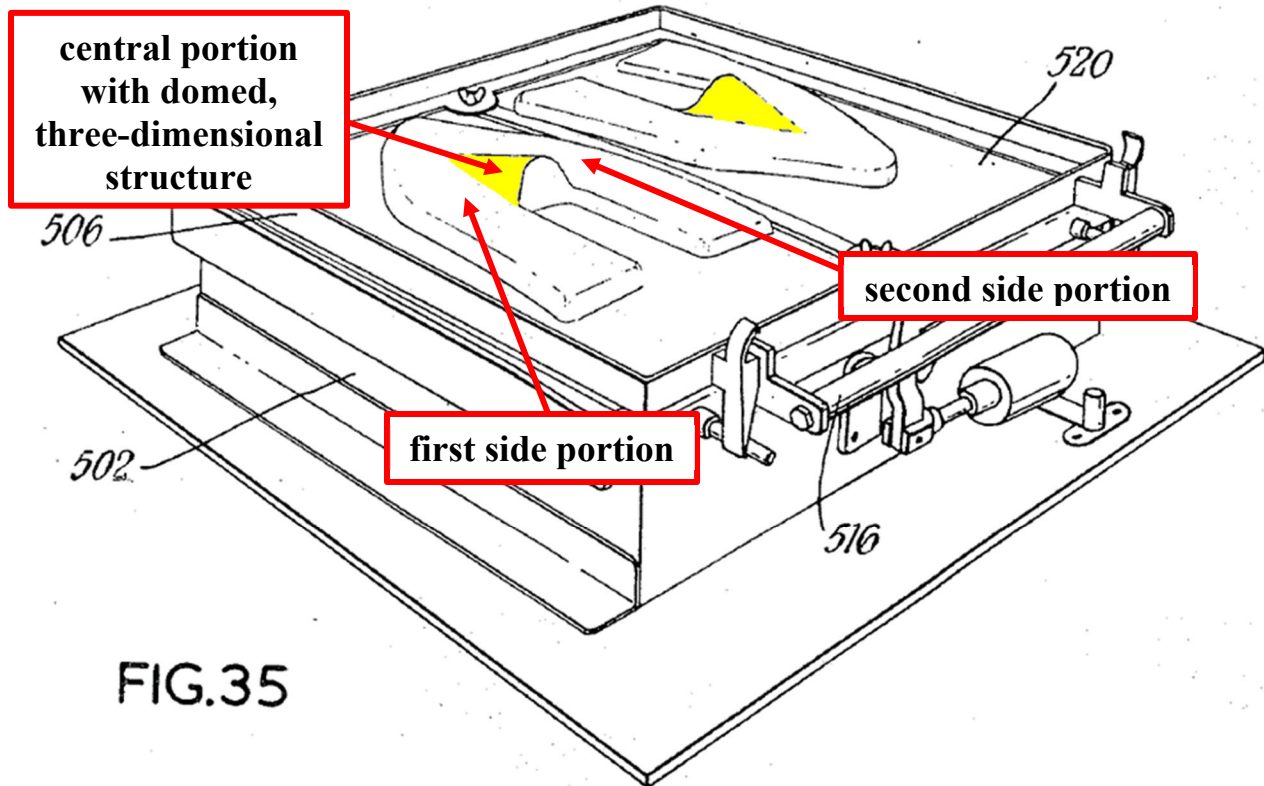
Ex.1003, Fig. 35 (annotated). Lockwood explains its upper is “a single-piece integral upper.” *Id.*, 2:18-19. As a result, Lockwood discusses that its knitted

element (knitted layer) includes a first layer that has first and second side portions of unitary construction with the central portion, upon completion of the molding process.

71. Additionally, as described above for the first portion, Dua also discloses a knitted layer of an upper having a second portion of unitary construction with the central portion.

**6. Limitation 1[e]: “the domed, three-dimensional structure shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration”**

72. The combination of Lockwood and Dua discloses this limitation. Lockwood discusses “[p]roduction of upper components for mens shoes having a vamp cone portion” that is positioned around a median line. Ex.1003, 2:60-64. A POSA would have understood that Figure 35 below from Lockwood shows the shape of Lockwood’s upper’s knitted layer that has a central portion with a domed, three-dimensional structure (vamp cone portion) shaped to extend above the plane of the first and second side portions when the upper and its knitted layer are in a flattened configuration.



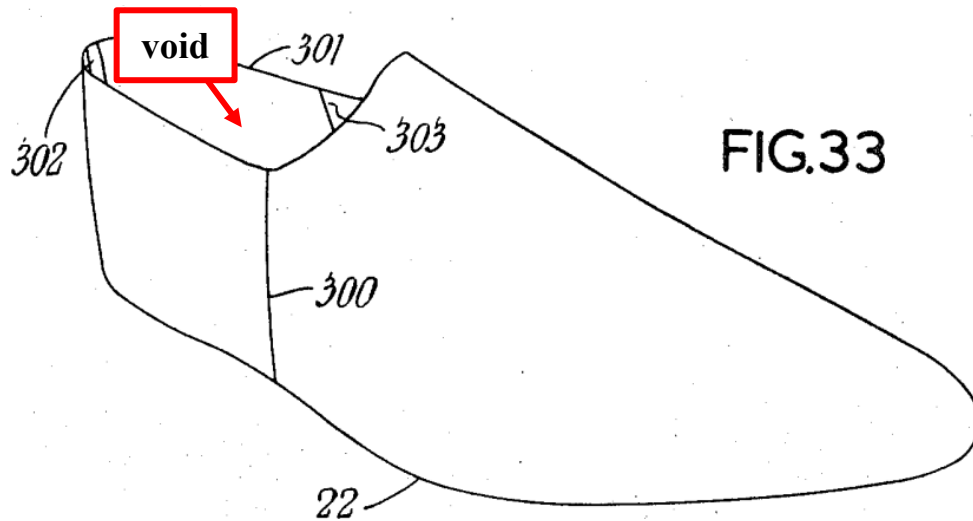
*Id.*, Fig. 35 (annotated). As illustrated by Figure 35, the knitted layer of Lockwood's upper will have a domed, three-dimensional structure (vamp cone portion) extending above the plane of the first side portion and the second side portion when the rest of the knitted layer is in a flattened configuration. According to Lockwood, the knitted layer is an additional sheet adhered to or embedded in the extensible member to form a composite sheet. Ex.1003, 8:66-9:2. As a result, Lockwood provides a knitted element (knitted layer) including a first layer with a domed, three-dimensional structure (vamp cone portion) and flattened first and second side portions.

73. As I explained above for limitation 1[a], it would have been obvious to a POSA in view of Dua to flat-knit the knitted layer disclosed in Lockwood. Dua

provides “[a] textile may be defined as any manufacture from fibers, filaments, or yarns characterized by flexibility, fineness, and a high ratio of length to thickness.” Ex.1004, [0008]. Dua specifies flat-knitting as one of a limited number of options for knitting an apparel article like an upper. *Id.*, [0044]. This confirms flat knitting was a well-known process for manufacturing a textile, including for uppers. Accordingly, it would have been obvious for a POSA to choose flat knitting for the knitted element in Lockwood (knitted layer).

**D. Lockwood and Dua Render Obvious Claim 5**

74. Claim 5 depends from claim 1 and recites “wherein the knitted element defines a void for receiving a foot of a wearer.” Lockwood discloses this limitation. Lockwood’s upper, which includes a knitted layer, defines a void for receiving the foot of a wearer. For example, Lockwood explains that one disclosed mold is for a foot. Ex.1003, 7:44. Figure 33 below from Lockwood illustrates the shell of a last shape (the shape of a foot) from which the shapes in Lockwood are derived. *Id.*, 3:73-75. A POSA would have understood that the knitted element of Lockwood’s upper, along with other layers of the upper, defines a void that receives a wearer’s foot.



*Id.*, Fig. 33 (annotated).

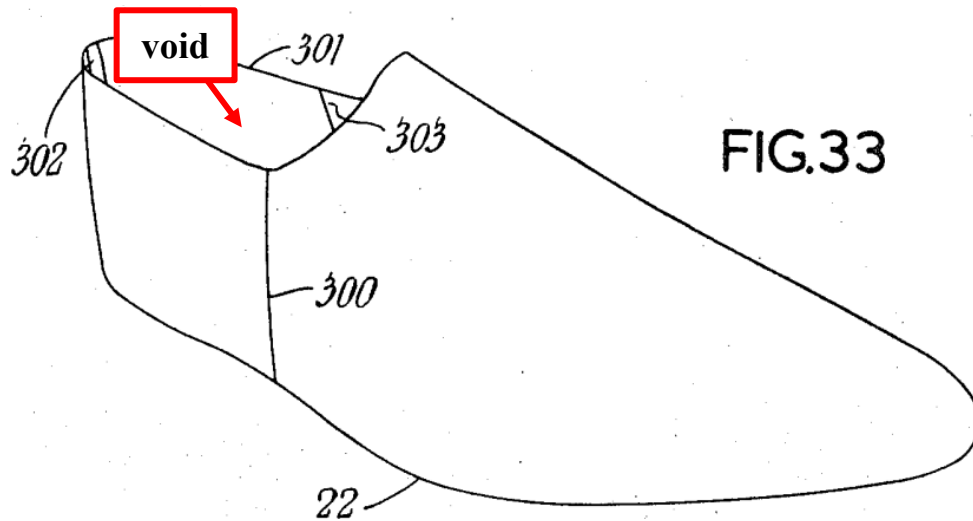
75. As I explained above with respect to the limitation 1[a] in this ground, Lockwood provides the knitted layer is a sheet embedded in or adhered to the extensible material that forms a composite sheet used in Lockwood's upper. As a result, after the molding process in Lockwood is completed, the knitted element (knitted layer) extends across the entire upper and defines a void (an opening) at the top of the knitted element (knitted layer) for receiving a foot.

#### **E. Lockwood and Dua Render Obvious Claim 6**

76. Claim 6 is a dependent claim from claim 1 that recites "wherein the knitted element defines at least a portion of an exterior surface of the upper, and the knitted element defines at least a portion of a void for receiving a foot of a wearer." Lockwood discloses these limitations. Lockwood explains its "extensible material may include fibrous reinforcement for example in the form of a woven, *knitted* or nonwoven sheet *adhered to* or embedded in the water vapor permeable

thermoplastic material.” Ex.1003, 8:34-39, 8:66-69. “Adher[ing]” Lockwood’s knitted layer to the extensible material indicates positioning the knitted layer as either an exterior or interior surface of Lockwood’s upper. A POSA would have found it obvious to adhere the knitted layer to the extensible material so that the knitted layer defines part of an exterior surface of the upper. For example, having the knitted layer define part of the exterior surface would allow for improved aesthetics because the textures and patterns created and yarns and colors used in knitting may be prominently displayed or improved dirt and debris resistance because the knitted layer would help prevent dirt and debris from sticking to the surface of the upper and make the upper easier to clean and maintain. *See e.g.*, Ex.1004, [0006]-[0009], [0011]-[0012], [0060]. Moreover, this would have involved no more than selection of one of a finite number of options, including either adhering Lockwood’s knitted layer as the exterior surface rather than the interior surface of the upper.

77. As I explained, Lockwood discloses shaping the upper for a foot. Ex.1003, 7:44. Lockwood’s Figure 33 below shows the shell of a last shape (the shape of a foot) from which the upper shapes in Lockwood are derived. *Id.*, 3:73-75. A POSA would have understood that Lockwood’s upper, which includes the first layer (knitted layer), defines at least a portion of a void for receiving a foot.



*Id.*, Fig. 33 (annotated).

#### **F. Lockwood and Dua Render Obvious Claim 7**

78. Claim 7 depends from claim 1 and recites “wherein the knitted element includes a first area and a second area, the first area including a first type of knit structure, and the second area including a second type of knit structure, the first type being different than the second type.” These limitations would have been obvious to a POSA in view of Lockwood and Dua. Dua discloses “an upper incorporating a textile element formed through a weft knitting process” where “the textile element has a first area and a second area with a unitary construction, the first area being formed of a first stitch type, and the second area being formed of a second stitch type that is different from the first stitch type to impart varying textures to a surface of the textile element.” Ex.1004, Claim 7; *see also id.*, Claims 47, 66. Dua further discusses the degree of stretch or wear resistance may vary in different areas depending upon the stitch used. *Id.*, [0055]; *see also id.*, [0060].

79. Moreover, it would have been obvious for a POSA to vary the type of knit structure at different areas of Lockwood's knitted element (knitted layer) to give the different areas different properties, such as different degrees of stretch or wear resistance. A POSA would have known that it is beneficial for some areas of the upper to stretch more than other areas and that some areas benefit from additional material or wear resistant features. Known benefits for giving the different areas different degrees of stretch or wear resistance would have included improving the durability of certain areas (e.g., tip or foxing (heel cup)) that are prone to greater wear and tear, enhancing performance by allowing for greater range of wearer movement and reducing a risk of damage to the upper, optimizing fit by helping accommodate various foot shapes and providing a more comfortable and customized fit, avoiding injuries by preventing the upper from losing its shape and support over time, maintaining aesthetics for the shoe by keeping the upper from looking worn out prematurely, increasing customer satisfaction by extending the useful life of the upper, and offering greater versatility by making shoes that can be used for a broad range of activities and under various different conditions. *See e.g.*, Ex.1004, [0006]-[0009], [0011]-[0012], [0060].

**G. Lockwood and Dua Render Obvious Claim 8**

80. Claim 8 depends from claim 1 and recites “wherein the at least one mechanically manipulated yarn includes a first yarn and a different second yarn, the

first yarn being located in a first area of the upper, and the second yarn being located in a second area of the upper.” Lockwood and Dua render obvious to a POSA these limitations at least because Dua discloses a first and second yarn in different areas of the knitted element. Dua explains the type of yarn utilized in different areas of textile elements can be changed to impart various properties. Ex.1004, [0056]; *see also id.*, Claim 66. “[Y]arn may be formed from cotton, wool, elastane, rayon, nylon, and polyester, for example.” *Id.*, [0056]. Dua further discusses the material of a yarn may be selected to impart a variety of physical properties, including strength, stretch, support, stiffness, recovery, fit, and form. *Id.*, [0052].

81. A POSA would have found it obvious to use different yarns at different areas of the knitted element (knitted layer) of Lockwood’s upper to impart the different areas with different properties, including different degrees of strength, stretch, support, stiffness, recovery, fit, or form. Known benefits for giving the different areas different properties from using different yarns would have included improving the durability or stretch of certain areas (e.g., tip or foxing (heel cup)) that are prone to greater wear and tear or benefit from additional support, enhancing wearer comfort and preventing irritation by using a softer yarn in areas that come into direct contact with a foot, improving ventilation of the upper during physical activities by using a yarn with greater air permeability (i.e., breathability) in specific regions (e.g., the vamp), creating various visually appealing designs on the upper by

mixing yarns of different colors or textures in different areas, decreasing weight of certain parts of the upper by using lighter yarns around those parts, and reducing cost of the upper by using lower cost yarn in areas with less demanding performance requirements. *See e.g.*, Ex.1004, [0006]-[0009], [0011]-[0012], [0060].

#### **H. Lockwood and Dua Render Obvious Claim 9**

82. Claim 9 depends from claim 1 and recites “wherein the knitted element forms a defined shape having finished edges during the flat knitting process.” The ’484 patent only uses the term “finish” or “finished” twice other than in claim 9. The ’484 patent states that “flat knitting can be used to provide textile structures for use in footwear uppers of a final desired shape such that textile cutting steps can be avoided (which eliminates waste, avoids the need to finish cut edges, saves time, saves money, etc.).” Ex.1001, 4:49-55. The ’484 patent also states flat knitting provides edges of textile elements that “do not need to be finished to prevent unraveling,” which is different from textile elements cut from a larger textile element. *Id.*, 8:16-26.

83. This limitation would have been obvious to a POSA in view of Lockwood and Dua. Dua discloses this limitation and it would have been obvious to include it in the knitted element of Lockwood’s upper. Dua discloses “the textile element may be removed from the textile structure and incorporated into footwear 10 . . . Similarly, other types of knitting, such as a flat knitting, may be utilized within

the scope of the present invention to impart various textures, different properties, or different yarn types to the textile element.” Ex.1004, [0061]. It would have been understood by a POSA that, when flat knitted, a knitted element would form a defined shape with finished edges during the flat knitting process. A POSA would also have found it obvious to flat knit Dua’s upper with a defined shape and finished edges. Flat knitting such knitted elements was well-known to a POSA, which is confirmed by the lack of discussion in the ’484 patent regarding how to achieve these features with a flat knitting process.

**X. GROUND 2: LOCKWOOD, DUA, AND NORTON RENDER OBVIOUS CLAIMS 1 AND 5–9**

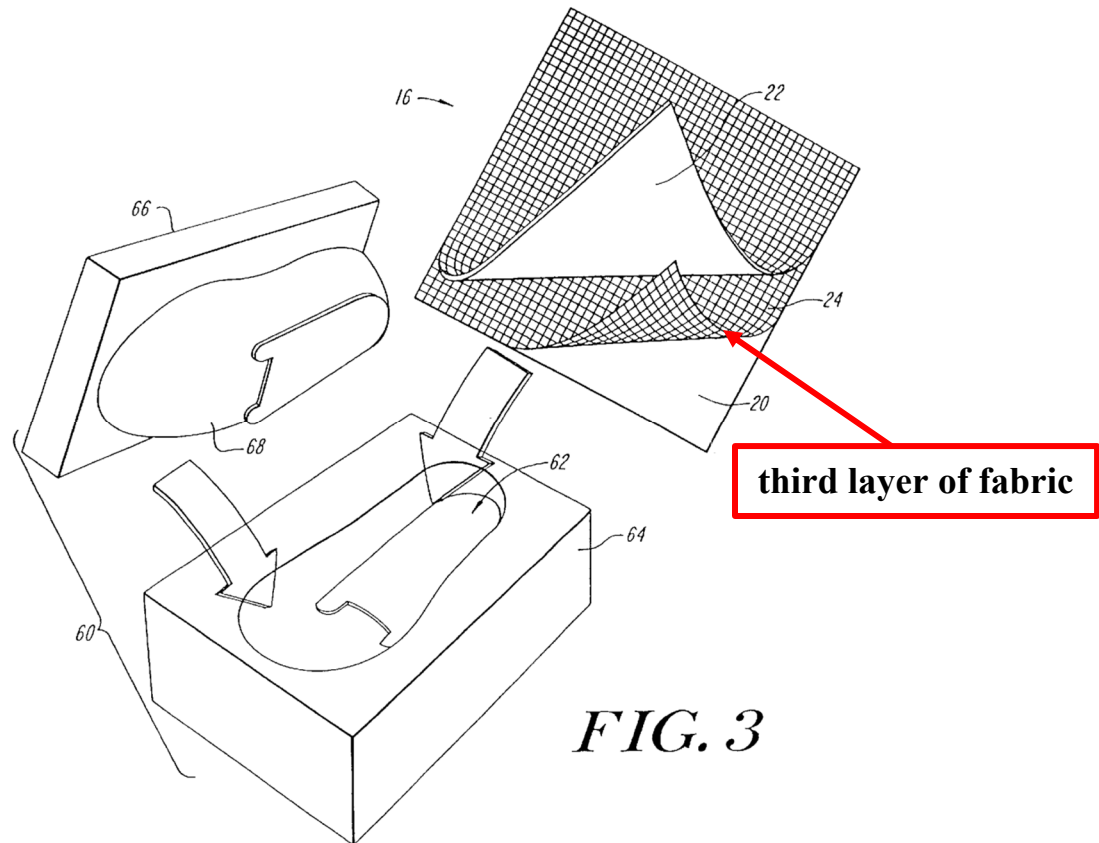
84. As I have explained in Ground 1 above, Lockwood and Dua render obvious claims 1 and 5–9 to a POSA. In Ground 2, I add Norton to Ground 1 and address the obviousness of the challenged claims in Ground 1 if somehow the disclosures of Lockwood and Dua are insufficient for limitations generally relating to the size and structure of Lockwood’s knitted element (knitted layer). I understand that Norton was cited during prosecution of the ’484 patent. Ex.1001. However, I also understand that Norton was not considered in combination with Lockwood. *Id.*

**A. Summary of Norton (Ex.1011)**

85. Similar to ’484 patent, Dua and Lockwood, Norton discloses features related to an upper with a knitted element. Specifically, Norton (Ex.1011) discloses “[a] method of manufacturing a multi-layer, composite footwear upper having a

three-dimensional geometry includes the steps of forming a substantially planar composite sheet from two or more layers, heating the composite sheet, and compression molding the composite sheet into the three-dimensional geometry of the footwear upper.” Ex.1011, Abstract. Norton states that its “composite sheet 16 comprises a first layer 20 of thermoplastic foam, such as EVA [ethylene-vinyl acetate] foam, and a second layer 22 of thermoplastic urethane (TPU)” and that “a third layer 24 of fabric can be interposed between the first layer 20 and the second layer 22.” *Id.*, 4:7-13. Norton provides that knit fabric is preferred for third layer 24. *Id.*, 4:14-18.

86. A POSA would have understood that the fabric sheet of Norton’s composite sheet extends across the entirety of the composite sheet and upper. In Figure 3 below, Norton illustrates the third layer 24 of fabric extending across the entirety of its composite sheet 16 that is used in the mold to form the upper.



*Id.*, Fig. 3. Norton explains the third layer 24 of fabric provides stretchability and moisture and wear resistance. *Id.*, 4:18-22.

#### **B. Lockwood, Dua, and Norton Render Obvious Claims 1 and 5–9**

87. To the extent that Lockwood somehow fails to disclose a knitted layer coextensive with the other extensible material sheets that form a composite upper, it would have been obvious to a POSA in view of Norton to construct a knitted layer in Lockwood's upper to be coextensive with the other extensible material sheets. A POSA would have done this so that the knitted layer extends across the entire upper and thus take on the shape of the entire upper after the molding process, which would providing the benefits of the knitted layer to the entire upper. Norton's third layer

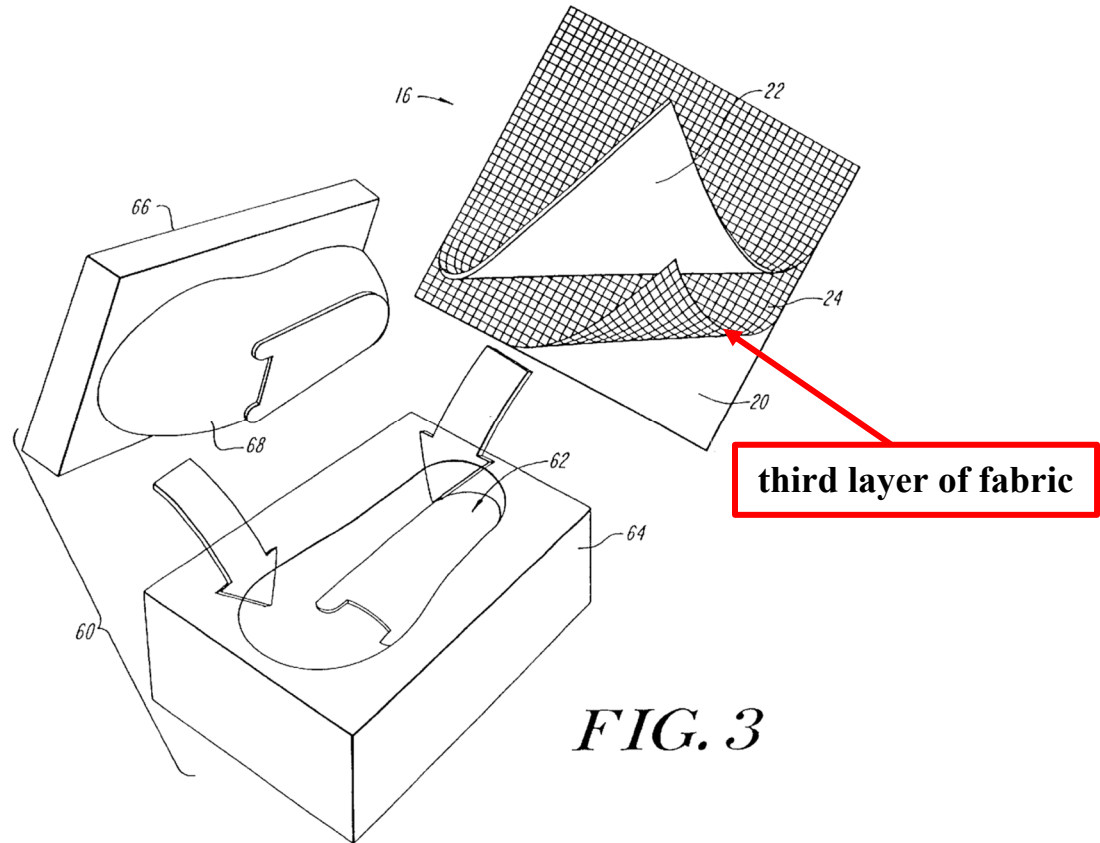


*FIG. 3*

Ex.1011, Fig. 3 (annotated).

88. Regarding claims 7 and 8, Norton discloses these limitations and confirms the benefits of varying the knit structure and/or yarn of a knitted layer such as Lockwood's knitted layer. For example, Norton discloses its third layer 24 of fabric provides stretchability and wear resistance. *Id.*, 4:18-22. It would have been obvious to a POSA in view of Norton to vary the characteristics like the knit structure or yarn of the knitted layer in an upper like Lockwood's at different positions as described in Dua. A POSA would have been motivated to vary the knit structure or

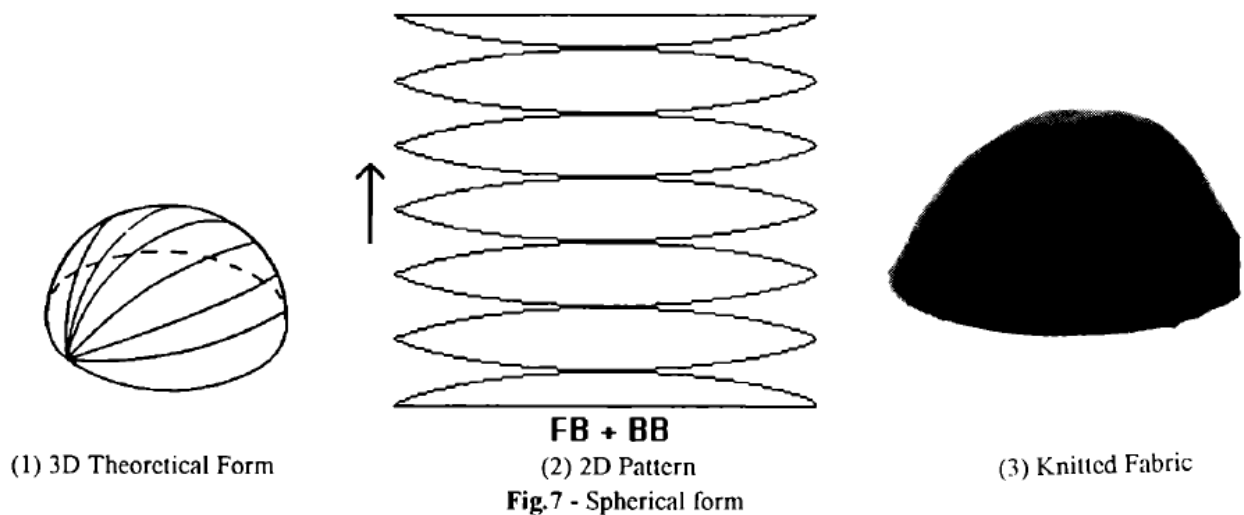
yarn, for instance, to adjust the upper's stretchability or wear resistance to suit the intended use for the upper, such as to improve the durability of certain areas (e.g., tip or foxing (heel cup)) that are prone to greater wear and tear, enhance performance by allowing for greater range of wearer movement and reducing a risk of damage to the upper, optimize fit by helping accommodate various foot shapes and providing a more comfortable and customized fit, avoid injuries by preventing the upper from losing its shape and support during use over time, maintain aesthetics for the shoe by keeping the upper from looking worn out prematurely, increase customer satisfaction by extending the useful life of the upper, or offer greater versatility by allowing shoes to be constructed which are usable for a broad range of activities and under various different conditions. *See e.g.*, Ex.1004, [0006]-[0009], [0011]-[0012], [0060].

## **XI. GROUND 3: DUA, HONG, AND LOCKWOOD RENDER OBVIOUS CLAIMS 1-19**

### **A. Summary of Hong (Ex.1005)**

89. Hong published in 1994. Ex.1005, 1. I understand that Hong was not considered during prosecution of the '484 patent. Ex.1001. Hong describes flat knitting different shapes for many uses, including “protection clothing, transportation related textiles (cars, planes and space crafts), geotextiles, building construction related textiles, packaging materials, military related textiles, medical

textiles, sports related textiles, etc.” Ex.1005, 1. I provide an example of one of Hong’s flat-knit shapes below.



Ex.1005, Fig. 7. Regarding this figure, Hong describes that a three-dimensional concept (left) may be envisioned as a two-dimensional pattern (middle), which is used by an electronically controlled flat knitting machine to produce a knitted three-dimensional shaped fabric (right). *Id.*, 1, 4-5. Hong describes three processes for flat knitting three-dimensional shapes, including “using different structural combinations, using different loop lengths, and altering the number of knitting needles and knitted courses.” *Id.*, 1.

90. Hong also describes the benefits and advantages of flat knitting. For example, Hong states “[f]lat knitting machines are traditionally used for producing pullovers and other outerwear garments. One of the main advantages is the facility of these machines to knit fabric pieces to a particular shape or form.” *Id.* Hong

further explains, “By using the new flat knitting machines, it is possible not only to knit the new loop structures which are not possible on the conventional flat knitting machines, but also knit fully fashioned garments.” *Id.*

91. Hong explains other benefits of flat knitting. For instance, flat knitting can be used to produce fully fashioned garments, which “is very important to reduce the waste of expensive materials during cutting as well as in eliminating the additional making up operation.” *Id.* As described by Hong, “knitting directly the 3D shapes can overcome fabric waste and diminish the labour cost inherent to the use of two-dimensional fabrics which have to fit the variable geometry of a three-dimensional seat bum.” *Id.*, 5. Hong also provides several examples of three-dimensional shaped knitted fabrics and provides reasons why a POSA would have used the capacity of a flat knitting machine to “knit more types of three-dimensional knitted fabrics.” *Id.*, 6.

#### **B. Dua, Hong, and Lockwood Render Obvious Claim 1**

92. Dua discloses an upper with a flat-knitted element that includes a first layer and the first layer has a central portion and first and second side portions that extend from opposite sides of the central portion. The only element of claim 1 that Dua may not disclose is the central portion having a domed, three-dimensional structure. But such three-dimensional structures were well-known in flat-knitted apparel articles. Hong discloses flat knitting three-dimensional structures, including

domed, three-dimensional structures, and a POSA would have been motivated to include such a three-dimensional structure in an upper like Dua's. Lockwood discloses an upper with a domed, three-dimensional structure in the claimed location. Lockwood itself identifies benefits of such a structure, namely that such a domed, three-dimensional structure desirably simplifies assembly of the upper, reduces the necessary cutting, and reduces waste. Ex.1003, 1:60-64, 2:18-62, 6:40-45, 7:21-37; *see also* Ex.1007, 2:33-45; Ex.1008, Abstract. A POSA would have been motivated for multiple reasons to use the known three-dimensional flat knitting of Hong to include a structure like Lockwood's domed, three-dimensional structure in an upper like Dua's.

93. A POSA would have been motivated to combine the teachings of Dua, Hong, and Lockwood for multiple reasons, particularly in view of Hong's explicit teachings. For example, these three references are directed to manufacturing textile articles with knitted elements, such as apparel articles or footwear and specific shaping features. Ex.1003, Abstract; Ex.1004, Abstract; Ex.1005, 1. Similar to the '484 patent, Lockwood and Dua are directed to manufacturing uppers for shoes, including uppers with knitted elements. Ex.1003, Abstract; Ex.1004, Abstract. Hong, similar to the '484 patent, relates to flat knitting articles to a desired shape "to reduce the waste of expensive materials during cutting as well as in eliminating the additional making up operation." Ex.1005, 1. Hong explains that "knitting directly

the 3D shapes can overcome fabric waste and diminish the labour cost inherent to the use of two-dimensional fabrics which have to fit the variable geometry of a three-dimensional seat bum.” *Id.*, 5. As discussed above, Nike previously cited to Hong for its teachings that a POSA would know how to create a three-dimensional, flat-knitted upper and stated the teachings would have been part of the knowledge of one skilled in the art of the ’484 patent. Ex.1017, 8.

94. A POSA would have been motivated to use flat knitting, as disclosed by Hong, and would have specifically used flat knitting of three-dimensional structures to create a domed, three-dimensional structure in an upper like Dua’s. A POSA would have also been motivated to include a domed, three-dimensional structure (vamp cone portion) in the central portion of an upper like Dua’s to “simplify[] the assembly of uppers by a technique of preshaping the upper forepart component” as disclosed in Lockwood. Ex.1003, 1:60-64. Lockwood states that making different shoe styles “is facilitated if the central raised portions 34 of the mold is smoothly curved.” *Id.*, 7:21-28. A POSA also would have known that including a domed, three-dimensional structure in an upper’s central portion (like Dua’s central portion) would provide the benefits discussed by Hong, including overcoming fabric waste and diminishing labor cost.

95. A POSA would have had a reasonable expectation of success in implementing Lockwood’s domed, three-dimensional structure (vamp cone portion)

by flat knitting such a structure in an upper like Dua's, as described by Hong. Hong describes the wide range of flat knit three-dimensional structures and that such three-dimensional structures provide benefits, such as reducing material waste, eliminating additional making up operation, diminishing labor cost, and knitting fully fashioned garments. Ex.1005, 1, 5. A POSA would have understood that the general flat knitting of three-dimensional structures described in Hong could easily be applied to knitted elements for footwear uppers. Hong describes flat knitting a variety of shapes for a variety of uses, including "protection clothing, transportation related textiles (cars, planes and space crafts), geotextiles, building construction related textiles, packaging materials, military related textiles, medical textiles, sports related textiles, etc." *Id.*, 1. Lockwood also describes how its domed, three-dimensional structure (vamp cone portion) "simplif[ies] the assembly of uppers by a technique of preshaping the upper forepart component." Ex.1003, 1:60-64. This combination of prior art teachings would have involved no more than implementing a known approach to flat knitting to achieve a known domed, three-dimensional structure (vamp cone portion) that was known to provide benefits like improving the assembly process for an upper like Dua's.

#### **1. Preamble of Claim 1**

96. The preamble of claim 1 states: "An article of footwear comprising." Dua discloses an article of footwear. For example, Dua's title is "Article of

Footwear Having a Textile Upper.” Ex.1004, Title. Lockwood also discloses articles of footwear. Ex.1003, Title, 1:6-10, Claim 26.

**2. Limitation 1[a]: “an upper including a flat-knitted element formed from at least one yarn mechanically manipulated in a flat-knitting process, the flat-knitted element including a first layer having”**

97. Dua discloses an upper meeting limitation 1[a]. For example, Dua explains “[a]n article of footwear and a method of manufacturing the article of footwear are disclosed. The footwear may include an upper and a sole structure.” Ex.1004, Abstract. Dua further explains the “[u]pper 30 is at least partially formed from a textile element 40 that defines an interior void for comfortably receiving a foot” and “other types of knitting, such as a flat knitting, may be utilized within the scope of the present invention to impart various textures, different properties, or different yarn types to the textile element.” *Id.*, [0033], [0061]. According to Dua, “[t]he upper of an article of athletic footwear, for example, may be formed from multiple material layers that include an exterior layer, an intermediate layer, and an interior layer.” *Id.*, [0006].

98. As shown below in Dua’s Figure 8, Dua discloses “a textile element that forms at least a portion of the upper” and includes at least one layer. *Id.*, [0025]; *see also id.*, [0008], Claim 11. The knitted element can be made using a flat knitting process that includes at least one yarn. As a result, Dua discloses an article of

footwear with an upper including a flat-knitted element formed from yarn in a flat-knitting process, and the flat-knitted element includes a first layer.

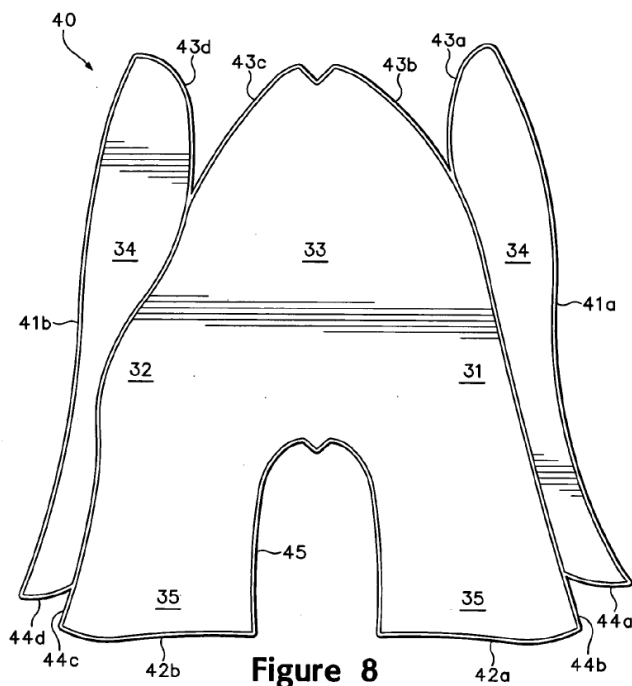
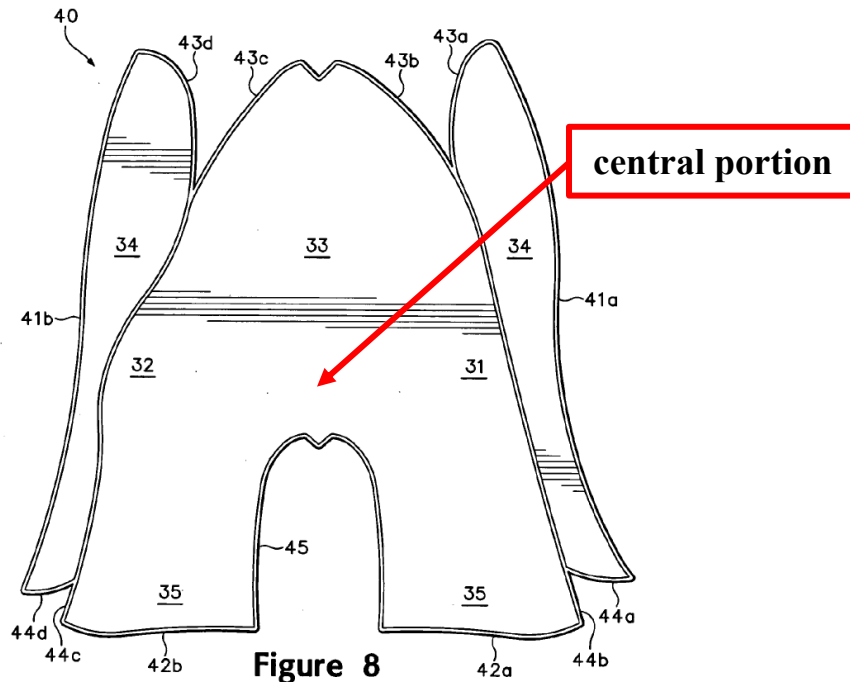


Figure 8

Ex.1004, Fig. 8.

**3. Limitation 1[b]: “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot”**

99. This limitation would have been obvious to a POSA in view of Dua, Hong, and Lockwood. Figure 8 below from Dua shows that Dua’s first layer of the flat-knitted element has a central portion configured for extending over the top of a foot.



Ex.1004, Fig. 8 (annotated). Dua explains “instep region 33 extends over an instep area of the foot.” *Id.*, [0036]. A POSA would have understood that the instep area refers to the arched, top part of the foot. In view of the prior art, it would have been obvious for a POSA to incorporate a domed, three-dimensional structure in a central portion like Dua’s.

100. Hong confirms a POSA would have known that flat knitting three-dimensional structures was well-known and common. Hong explains that flat-knitted “[t]echnical textiles have been applied in different fields such as protection clothing, transportation related textiles (cars, planes and space crafts), geotextiles, building construction related textiles, packaging materials, military related textiles, medical textiles, sports related textiles, etc.” Ex.1005, 1. A POSA would have

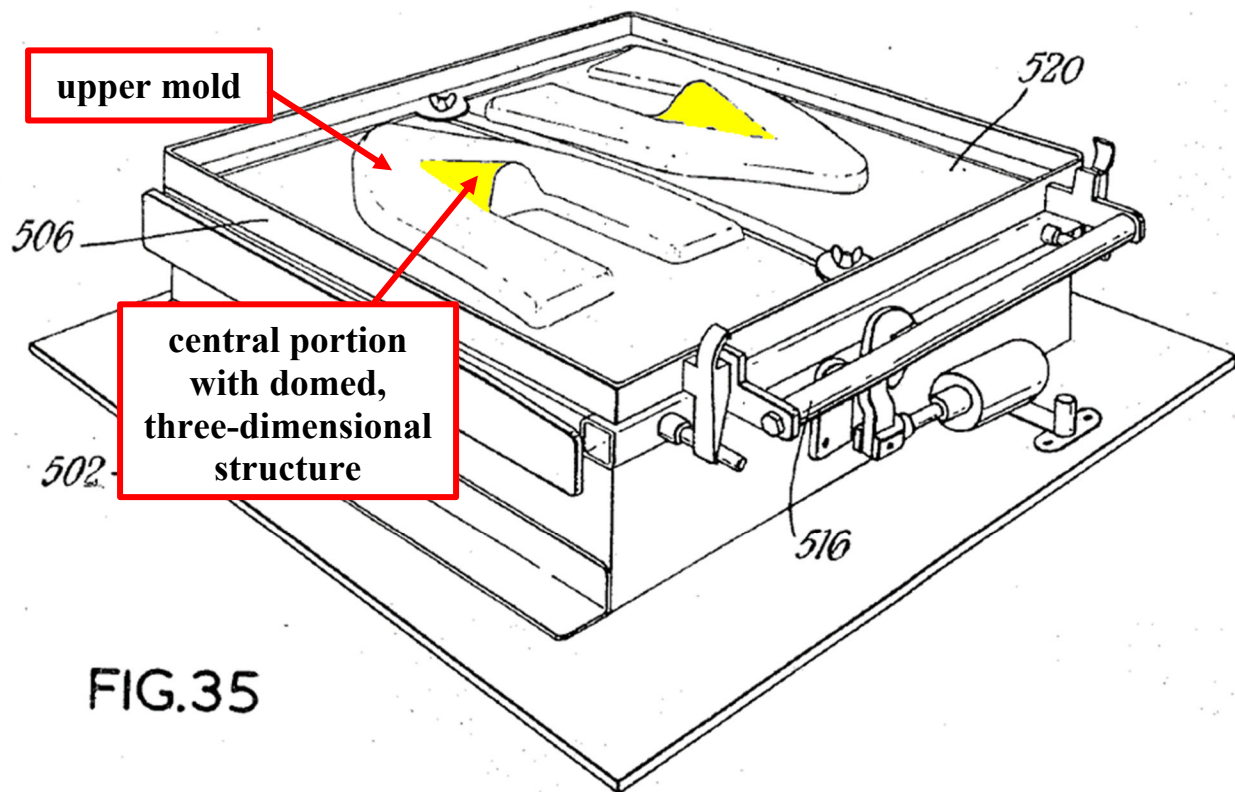
understood that many of the knitted items mentioned by Hong are three-dimensional. Hong further discloses “[f]lat knitting machines are traditionally used for producing pullovers and other outerwear garments. One of the main advantages is the facility of these machines to knit fabric pieces to a particular shape or form.” *Id.*

101. Hong confirms also that “[b]y using the new flat knitting machines, it is possible not only to knit the new loop structures which are not possible on the conventional flat knitting machines, but also knit fully fashioned garments.” *Id.* Hong continues “[t]his is very important to reduce the waste of expensive materials during cutting as well as in eliminating the additional making up operation.” *Id.* In addition, Hong states that “knitting directly the 3D shapes can overcome fabric waste and diminish the labour cost inherent to the use of two-dimensional fabrics which have to fit the variable geometry of a three-dimensional seat bum.” *Id.*, 5. Hong accordingly provides several examples of the beneficial flat knitting process and the resulting three-dimensional structures. This disclosure in Hong confirms that flat knitting three-dimensional shapes in knitted elements was well-known to a POSA and had known benefits, such as reducing fabric waste and labor costs.

102. Similar to Dua, Lockwood describes a footwear upper with a knitted layer that has a central portion and side portions. Ex.1003, 8:66-69, 2:18-19, 5:26-29. Lockwood also discloses a domed, three-dimensional structure in the central portion and configured for extending over the top of the foot. For example,

Lockwood discloses production of “upper components for mens shoes having a vamp cone portion” to “simplify[] the assembly of uppers by a technique of preshaping the upper forepart component.” *Id.*, 1:60-64, 2:60-62. Lockwood describes that pre-shaping separates and simplifies manufacturing steps for uppers and reduces cutting and waste. *Id.*, 1:60-64, 2:18-62, 6:40-45, 7:21-37; *see also* Ex.1007, 2:33-45 (“preforming a blank intended for use as a shoe upper forepart, in which the blank is deformed from a generally planar or multiplanar shape into a shape more readily deformable into the shape subsequently required”); Ex.1008, Abstract (“the preformed upper is convertible to the shape of the last merely by a bending operation”). As a result, Lockwood discloses pre-shaping an upper to incorporate a central domed structure and explains the desirability of implementing such a structure and pre-shaping the upper for the benefit of simplifying assembly.

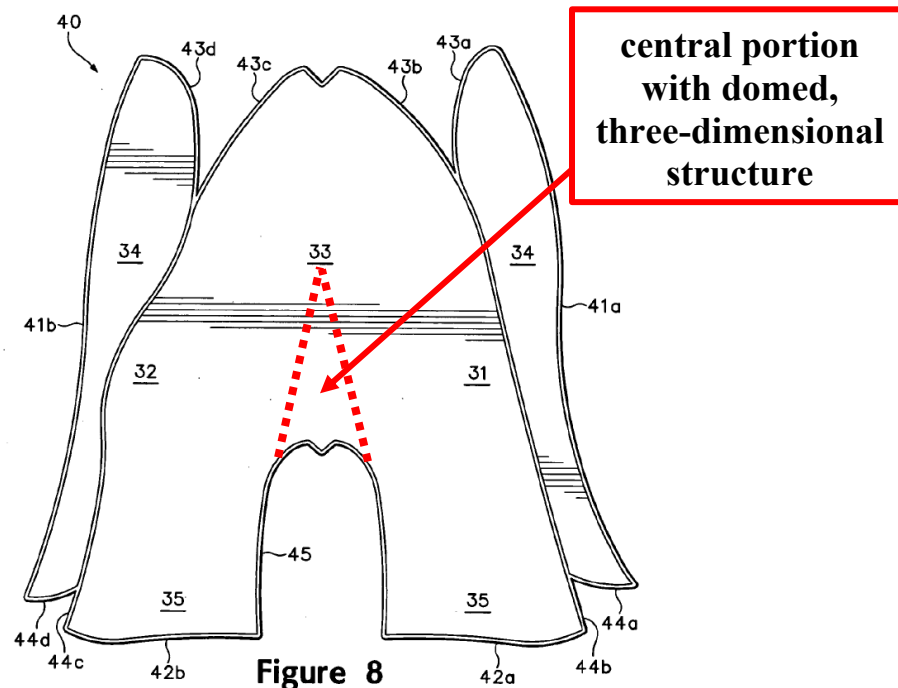
103. In Figure 35 of Lockwood below, Lockwood shows an upper shape with a central portion which has a domed, three-dimensional structure (vamp cone portion).



Ex.1003, Fig. 35 (annotated).

104. In view of Hong and Lockwood, it would have been desirable and obvious for a POSA to use a flat knitting process to include a domed, three-dimensional structure in the central portion of a flat-knitted layer like Dua's to simplify the assembly process, reduce the waste of expensive materials, eliminate additional making up operation, and diminish labor cost. As confirmed by Hong, a POSA would have been familiar with creating such flat-knitted three-dimensional structures and would have known the benefits and motivations for doing so. A POSA also would have known how to incorporate such a structure in a flat-knitted upper like Dua's. Annotated Figure 8 from Dua below shows how a POSA would

incorporate a domed, three-dimensional structure in the central portion of Dua's knitted layer as taught by Lockwood.

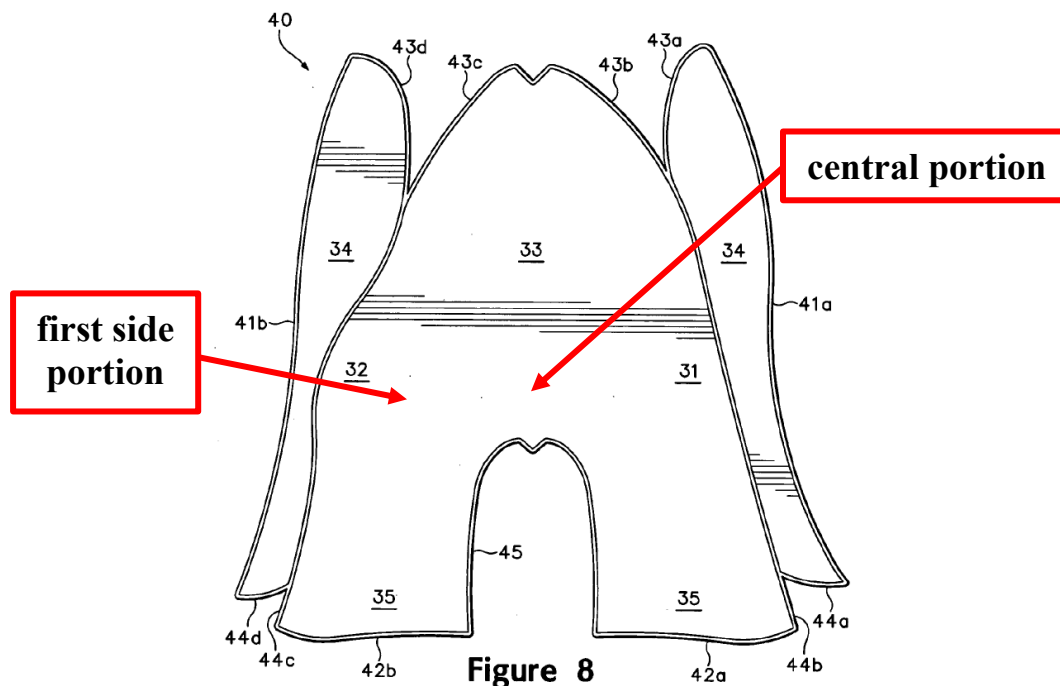


Ex.1004, Fig. 8 (annotated).

**4. Limitation 1[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion”**

105. Dua discloses this limitation. Dua discloses a flat-knitted layer with a first side portion that is unitary with the central portion and extending from the side. For example, “[t]extile element 40 is a single material element that is formed to exhibit a unitary (i.e., one-piece) construction, and textile element 40 is formed or otherwise shaped to extend around the foot.” Ex.1004, [0037]; *see also id.*, [0060]. Dua’s figures clearly show a central portion and side portions. For example, Figure 8 below from Dua illustrates how Dua’s first layer has a first side portion that is

formed of unitary construction with the central portion and extends from a first side of the central portion.



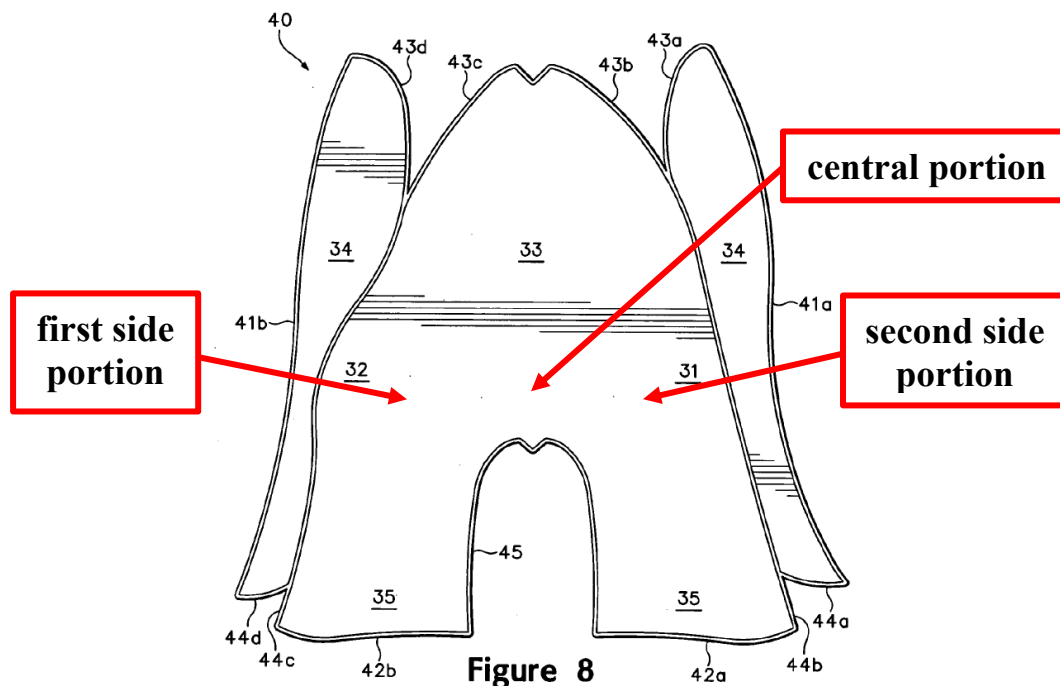
Ex.1004, Fig. 8 (annotated).

106. As a result, Dua discloses this limitation, and it would also have been obvious for a first layer like Dua's to have a first side portion formed of unitary construction with the central portion such that the first side portion extends from a first side of the central portion.

**5. Limitation 1[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion”**

107. Dua discloses this limitation for the reasons I explained with respect to limitation 1[c] in this ground. Also, as shown below in Figure 8 from Dua, the first layer in Dua has a second side portion that is formed of unitary construction with the

central portion and extends from a second side of the central portion opposite the first side of the central portion.



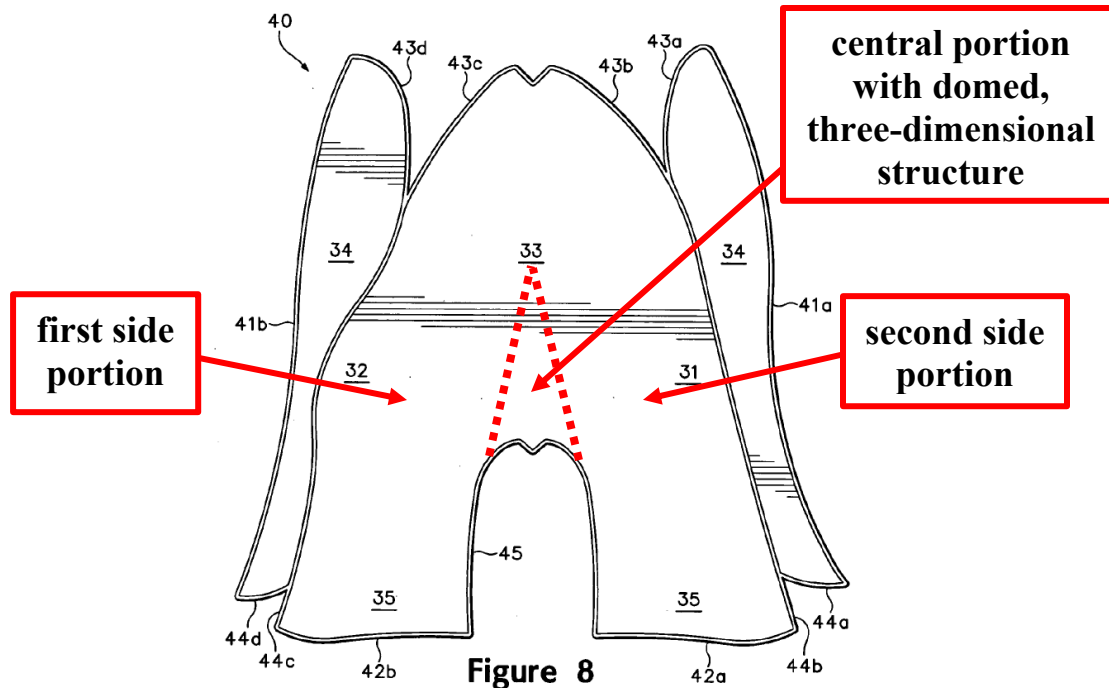
Ex.1004, Fig. 8 (annotated).

108. As a result, Dua discloses this limitation, and it would also have been obvious for a first layer like Dua’s to have a second side portion formed of unitary construction with the central portion such that the second side portion extends from a second side of the central portion opposite the first side.

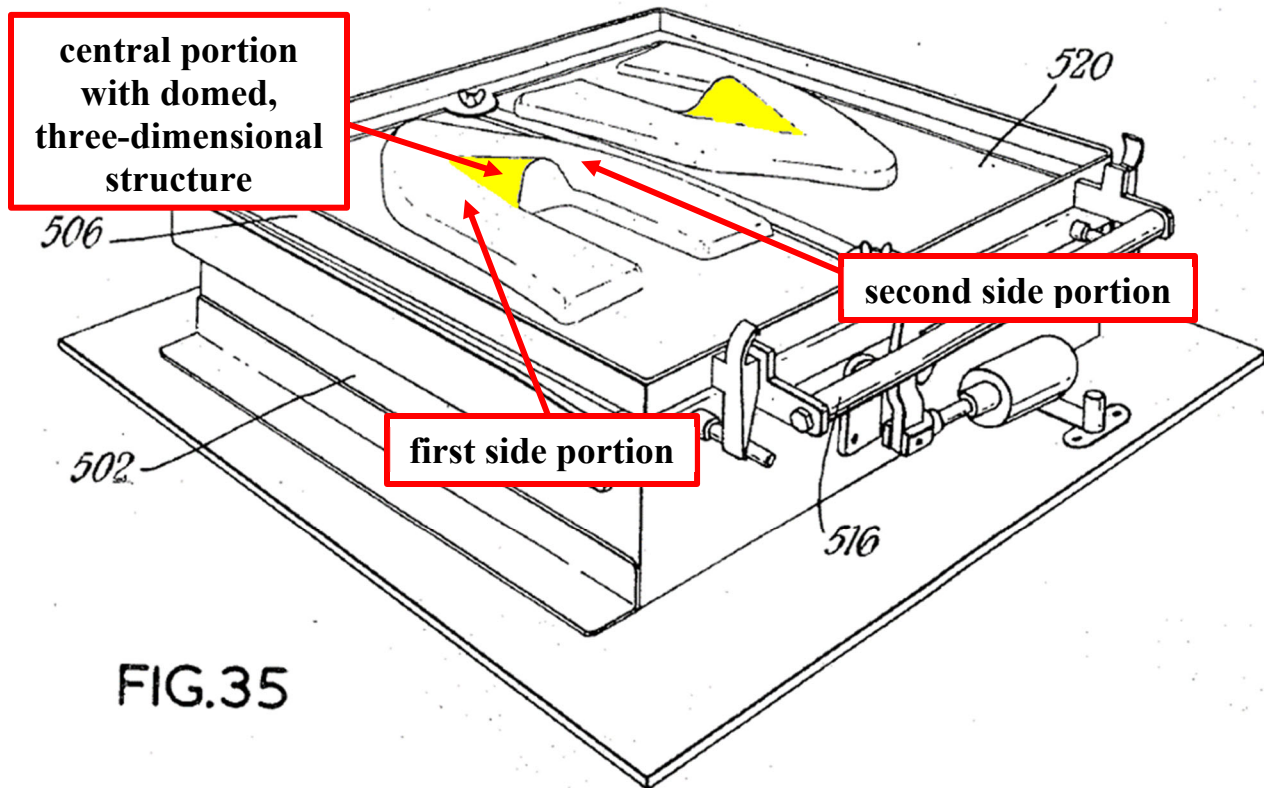
6. **Limitation 1[e]: “the domed, three-dimensional structure shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration”**

109. This limitation would have been obvious to a POSA in view of the combination of Dua, Hong, and Lockwood for the reasons I explained with respect

to limitations 1[b]-[d] in this ground. For example, a first layer like Dua's, as modified in view of Hong and Lockwood, would include a domed, three-dimensional structure (vamp cone portion) as shown in the below modified Dua Figure 8.



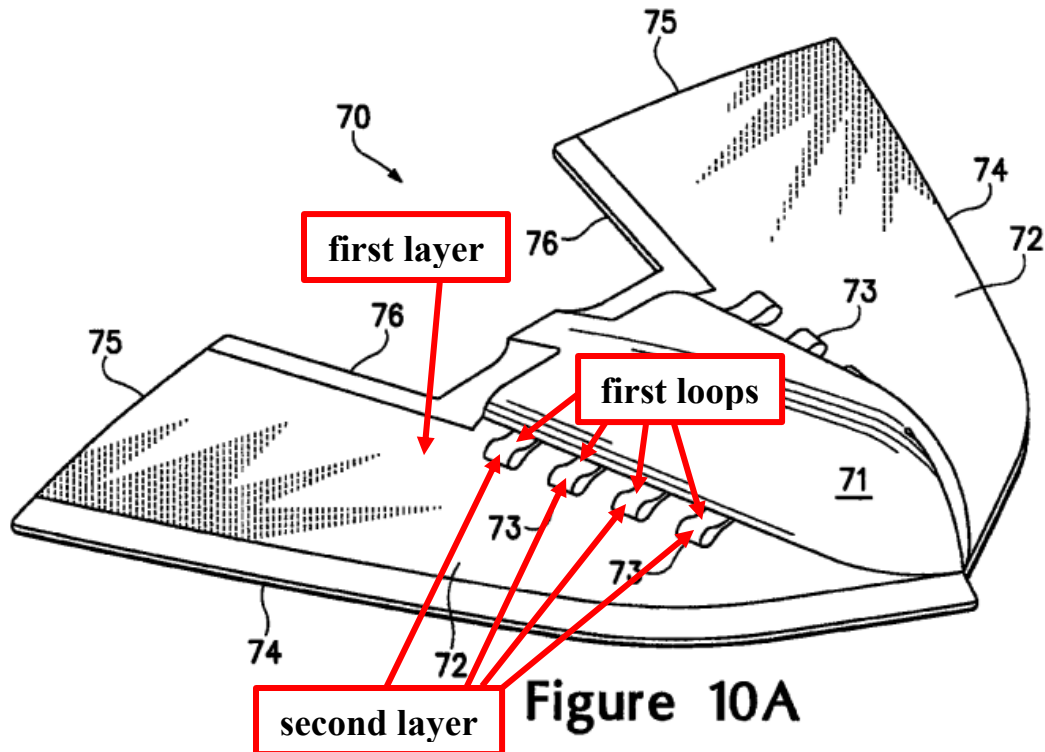
Ex.1004, Fig. 8 (annotated). A POSA would understand that the domed structure would extend above the plane defined by the rest of the surrounding layer portions. As shown in the figure, when the upper with the first layer is in a flattened configuration, the first layer's domed, three-dimensional structure (vamp cone portion) is shaped to extend above the plane of the first side portion and the second side portion. This domed structure that extends above the flattened side portions is also shown below in Lockwood's Figure 35.



Ex.1003, Fig. 35 (annotated).

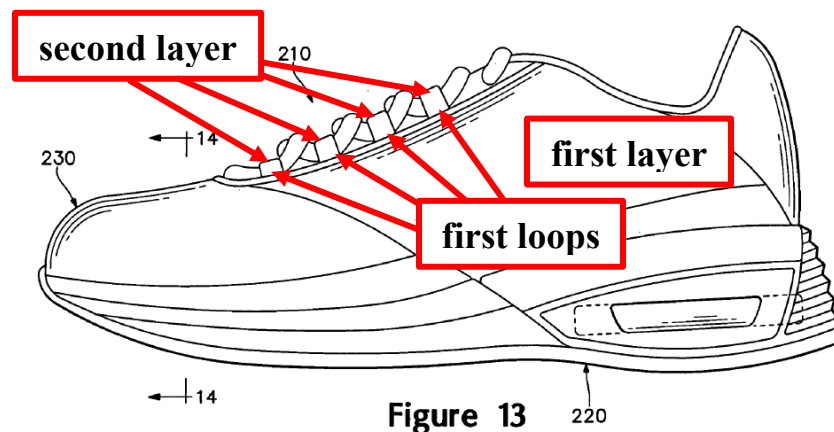
### C. Dua, Hong, and Lockwood Render Obvious Claim 2

110. Claim 2 is a dependent claim from claim 1 that recites “further comprising a first loop being formed as a second layer of unitary construction with the first layer.” As described in the ’484 patent, each of lace loops 73 is a first loop that is formed as a second layer of unitary construction with the first layer. An example of this is illustrated in Figure 10A of the ’484 patent below.



Ex.1001, Fig. 10A (annotated).

111. Dua discloses this limitation and includes similar loops. Dua explains that its textile element 40 can include laces and be “a single material element that is formed to exhibit a unitary (i.e., one-piece) construction.” Ex.1004, [0037]; *see also id.*, [0041], [0060]. Figure 13 below from Dua illustrates first loops for laces which are formed as a second layer of unitary construction with the first layer.



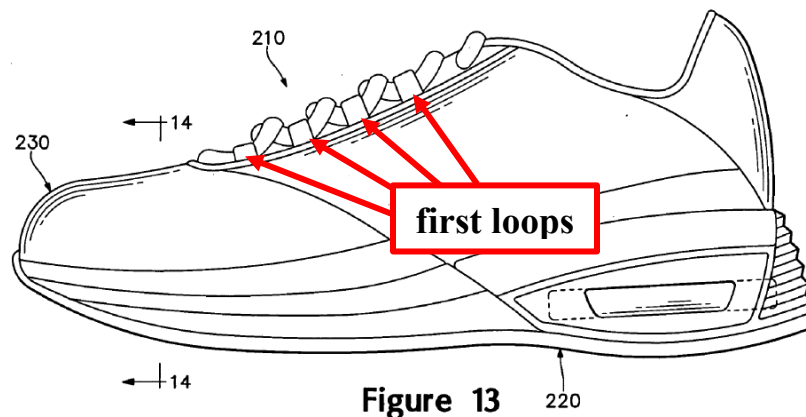
*Id.*, Fig. 13 (annotated).

112. The limitations of claim 2 would have also been obvious to a POSA in view of Hong. For example, Hong discloses “[b]y using the new flat knitting machines, it is possible not only to knit the new loop structures which are not possible on the conventional flat knitting machines, but also knit fully fashioned garments.” Ex.1005, 1. This disclosure confirms a POSA would have understood that flat-knitting machines like those in Hong could desirably create integrated loops, such as loops for laces, that permit creation of fully fashioned uppers with integrated lace loops like those illustrated in Dua.

113. As a result, these loop limitations were well known to a POSA. Dua discloses such loop features, and it would also have been obvious to a POSA in view of Hong to form a first loop as a second layer and as a unitary construction with a first layer to flat knit Dua’s upper as a fully fashioned article of footwear, or at least closer to a fully fashioned article of footwear.

#### **D. Dua, Hong, and Lockwood Render Obvious Claim 3**

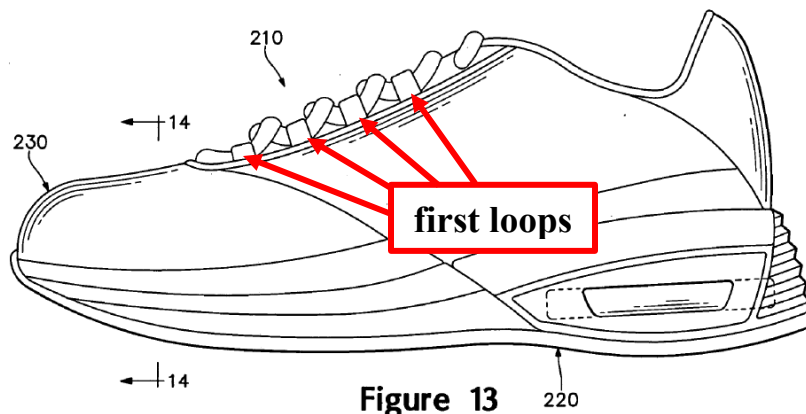
114. Claim 3 depends from claim 2 and states “wherein the first loop extends outward from the central portion.” Dua discloses a first loop that extends outward from the central portion, as shown in the figures. For example, Figure 13 below from Dua shows the first loops that extend outward from the central portion of Dua’s first layer.



Ex.1004, Fig. 13 (annotated); *see also id.*, [0005], [0037], [0041].

#### **E. Dua, Hong, and Lockwood Render Obvious Claim 4**

115. Claim 4 depends from claim 2 and recites “further comprising eight loops being formed as a second layer of unitary construction with the first layer.” Dua discloses this limitation for the reasons I explained above with respect to claim 2 in this ground. As shown below, Figure 13 from Dua shows four loops for laces on one side of the article of footwear.



Ex.1004, Fig. 13 (annotated). A POSA would understand that the other side of Dua’s article of footwear, which is not shown in Figure 13, would similarly have four loops for laces. *Id.*, [0005], [0037], [0041]. As a result, Dua discloses an article of footwear with eight loops for laces extending from the first layer. It would have also been obvious to incorporate eight loops for laces on an upper like Dua’s to ensure that the upper is sufficiently secured by the laces so that the article of article of footwear remains in place on a foot during use.

#### **F. Dua, Hong, and Lockwood Render Obvious Claim 5**

116. Claim 5 depends from claim 1 and recites “wherein the knitted element defines a void for receiving a foot of a wearer.” Dua discloses this limitation because its flat-knitted element, as part of Dua’s upper, defines a void for receiving the foot. For example, Dua discloses “[t]he upper forms a void on the interior of the footwear for receiving the foot.” Ex.1004, [0005]; *see also id.*, Abstract, [0033], Claim 1.

### **G. Dua, Hong, and Lockwood Render Obvious Claim 6**

117. Claim 6 depends from claim 1 and recites “wherein the knitted element defines at least a portion of an exterior surface of the upper, and the knitted element defines at least a portion of a void for receiving a foot of a wearer.” For example, Dua provides “[t]he upper of an article of athletic footwear, for example, may be formed from multiple material layers that include an exterior layer, an intermediate layer, and an interior layer.” Ex.1004, [0006]. Dua also explains that these layers can be flat-knitted. *Id.*, [0008], [0061]. Dua further explains “[t]he upper forms a void on the interior of the footwear for receiving the foot.” *Id.*, [0005].

### **H. Dua, Hong, and Lockwood Render Obvious Claim 7**

118. Claim 7 depends from claim 1 and recites “wherein the knitted element includes a first area and a second area, the first area including a first type of knit structure, and the second area including a second type of knit structure, the first type being different than the second type.” Dua describes “an upper incorporating a textile element formed through a weft knitting process” and that “the textile element has a first area and a second area with a unitary construction, the first area being formed of a first stitch type, and the second area being formed of a second stitch type that is different from the first stitch type to impart varying textures to a surface of the textile element.” Ex.1004, Claim 7; *see also id.*, Claims 47, 65. Dua also provides “the degree of stretch in areas with textures 46”-48” may be different, or

the wear resistance of the areas may vary depending upon the stitch utilized.” *Id.*, [0055]; *see also id.*, [0060]. It would have been obvious to a POSA to vary the type of knit structure at different areas of an upper like Dua’s to give the different areas different properties, such as different degrees of stretch or wear resistance. Known benefits for giving the different areas different degrees of stretch or wear resistance would have included improving the durability of certain areas (e.g., tip or foxing (heel cup)) that are prone to greater wear and tear, enhancing performance by allowing for greater range of wearer movement and reducing a risk of damage to the upper, optimizing fit by helping accommodate various foot shapes and providing a more comfortable and customized fit, avoiding injuries by preventing the upper from losing its shape and support during use over time, maintaining aesthetics for the shoe by keeping the upper from looking worn out prematurely, increasing customer satisfaction by extending the useful life of the upper, and offering greater versatility by allowing shoes to be constructed which are usable for a broad range of activities and under various different conditions. *See e.g.*, Ex.1004, [0006]-[0009], [0011]-[0012], [0060]. As a result, Dua discloses these limitations and it would have been obvious to include them.

#### **I. Dua, Hong, and Lockwood Render Obvious Claim 8**

119. Claim 8 depends from claim 1 and states “wherein the at least one mechanically manipulated yarn includes a first yarn and a different second yarn, the

first yarn being located in a first area of the upper, and the second yarn being located in a second area of the upper.” Dua discloses “the type of yarn utilized in various areas of textile elements 40’ and 40” may be changed to impart different properties.” Ex.1004, [0056]; *see also id.*, Claim 66. Dua’s textile element 40’ is shown below left and Dua’s textile element 40” is shown below right.

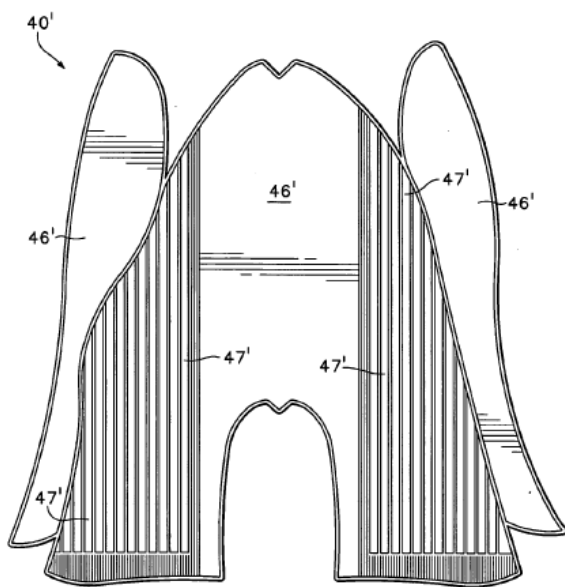


**Figure 10**

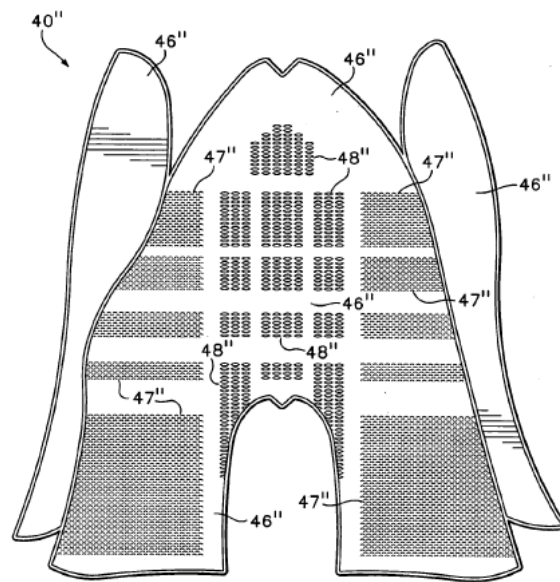


**Figure 11**

*Id.*, Figs. 10-11. Dua also claims “an upper incorporating a textile element formed through a flat knitting process, the textile element having a first area and a second area with a unitary construction, the first area having a first set of properties, and the second area having a second set of properties that are different from the first set of properties to impart varying characteristics to the textile element” where the first set of properties and the second set of properties include a yarn type. *Id.*, Claim 66.

Dua also discloses “the materials comprising the yarn may be selected to impart a variety of physical properties to textile element 40, and the physical properties may include, for example, strength, stretch, support, stiffness, recovery, fit, and form.” *Id.*, [0052].

120. As a result, Dua discloses this limitation. It also would have been obvious to a POSA to use different yarns at different areas of an upper like Dua’s to give the different areas different properties, such as different degrees of strength, stretch, support, stiffness, recovery, fit, or form. Known benefits for giving the different areas different properties from using different yarns would have included improving the durability or stretch of certain areas (e.g., tip or foxing (heel cup)) that are prone to greater wear and tear or benefit from additional support, enhancing wearer comfort and preventing irritation by using a softer yarn in areas that come into direct contact with a foot, improving ventilation of the upper during physical activities by using a yarn with greater air permeability (i.e., breathability) in specific regions (e.g., the vamp), creating various visually appealing designs on the upper by mixing yarns of different colors or textures in different areas, decreasing weight of certain parts of the upper by using lighter yarns around those parts, and reducing cost of the upper by using lower cost yarn in areas with less demanding performance requirements. *See e.g.*, Ex.1004, [0006]-[0009], [0011]-[0012], [0060].

**J. Dua, Hong, and Lockwood Render Obvious Claim 9**

121. Claim 9 depends from claim 1 and states “wherein the knitted element forms a defined shape having finished edges during the flat knitting process.” The ’484 patent provides “flat knitting can be used to provide textile structures for use in footwear uppers of a final desired shape such that textile cutting steps can be avoided (which eliminates waste, avoids the need to finish cut edges, saves time, saves money, etc.).” Ex.1001, 4:49-55. The ’484 patent also explains flat knitting provides edges of textile elements that “do not need to be finished to prevent unraveling,” unlike textile elements cut from a larger textile element. *Id.*, 8:16-26.

122. Dua discloses this limitation. According to Dua, flat knitting was a known process for making textile elements with defined shapes and finished edges. For example, Dua provides “the textile element may be removed from the textile structure and incorporated into footwear 10 . . . Similarly, other types of knitting, such as a flat knitting, may be utilized within the scope of the present invention to impart various textures, different properties, or different yarn types to the textile element.” Ex.1004, [0061]. It would have been understood by a POSA that, when flat knitted, a knitted element like Dua’s or Lockwood’s would form a defined shape with finished edges as a result of the flat knitting process. A POSA also would have found it obvious to flat knit an upper like Dua’s to have a defined shape and finished edges. Flat knitting such knitted elements would have been well-known to a POSA.

That flat knitting such knitted elements would have been well-known is confirmed by the lack of disclosure in the '484 patent about achieving these features using a flat knitting process. Other than claim 9, the '484 patent includes only two mentions of the term “finish” or “finished.” *See* Ex.1001, 4:49-55, 8:16-26.

**K. Dua, Hong, and Lockwood Render Obvious Claim 10**

**1. Preamble of Claim 10**

123. The preamble of claim 10 recites: “An article of footwear comprising.”

Both Dua and Lockwood disclose articles of footwear as I explained with respect to the preamble of claim 1 in this ground.

**2. Limitation 10[a]: “an upper including a flat-knitted element formed from at least one yarn mechanically manipulated in a flat-knitting process, the flat-knitted element including a first layer and a second layer, the first layer including”**

124. This limitation would have been obvious in view of the combination of Dua, Hong, and Lockwood as I explained with respect to limitation 1[a] in this ground. In addition, Dua provides an upper having multiple layers, including a first and second layer. For example, Dua discloses “[t]he upper of an article of athletic footwear, for example, may be formed from multiple material layers that include an exterior layer, an intermediate layer, and an interior layer.” Ex.1004, [0006]. Dua also explains the exterior and interior layers often include textile materials. *Id.*, [0008]; *see also id.*, [0037] (textile element 40 forms both exterior and interior

surfaces of upper 30 and is a single material element formed to exhibit a unitary construction), Claim 11.

**3. Limitation 10[b]: “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot”**

125. This limitation would have been obvious in view of the combination of Dua, Hong, and Lockwood for the reasons I explained with respect to limitation 1[b] in this ground.

**4. Limitation 10[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion”**

126. Dua discloses this limitation for the reasons I provided above with respect to limitation 1[c] in this ground.

**5. Limitation 10[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion”**

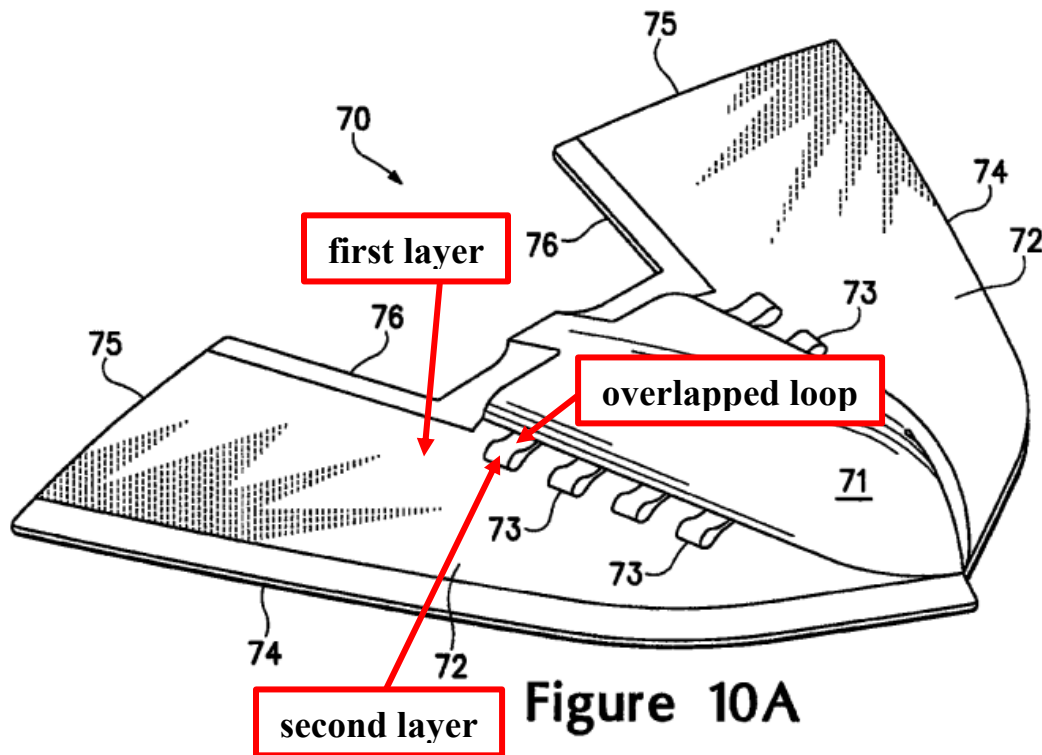
127. Dua discloses this limitation for the reasons I explained with respect to limitation 1[d] in this ground.

**6. Limitation 10[e]: “the second layer being flat-knitted with the first layer at opposite ends of the second layer to form an overlapped loop”**

128. Dua discloses this limitation for the reasons I explained with respect to claim 2 in this ground. This limitation would also have been obvious in view of the

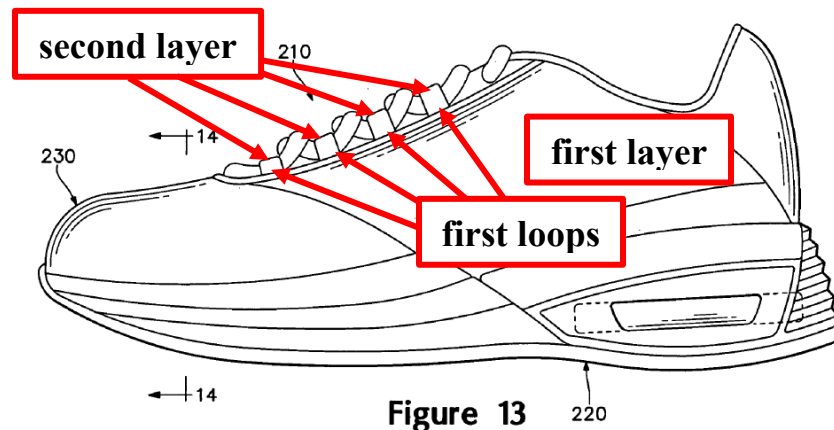
combination with Hong for the reasons I explained with respect to claim 2 in this ground.

129. The '484 patent describes each of the lace loops 73 includes a second layer that is flat-knitted with the first layer at opposite ends of the second layer to form an overlapped loop, as illustrated below in Figure 10A from Dua.



Ex.1001, Fig. 10A (annotated).

130. As shown below, Figure 13 from Dua similarly shows loops for laces that are formed by knitting at opposite ends of the second layer to form an overlapped loop.



*Id.*, Fig. 13 (annotated).

131. It would have been obvious to a POSA in view of Hong to form an overlapped loop as a second layer and form the overlapped loop as a unitary construction with the first layer to flat knit a first layer like Dua’s in a manner that is closer to fully fashioned article of footwear, which would permit creation of fully fashioned uppers with integrated lace loops like those illustrated in Dua.

## **L. Dua, Hong, and Lockwood Render Obvious Claim 11**

### **1. Preamble of Claim 11**

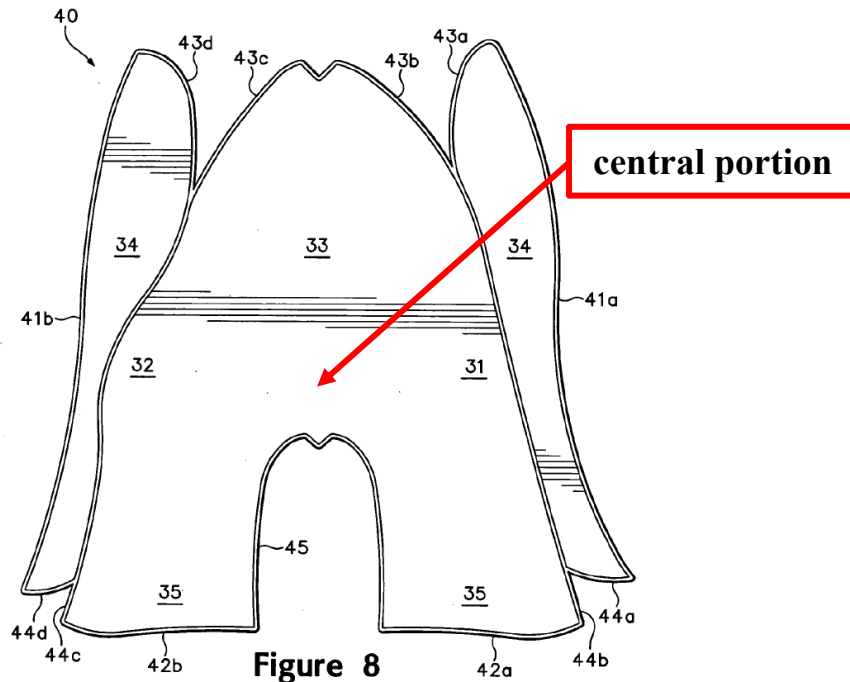
132. The preamble of claim 11 states: “A method of manufacturing an article of footwear, the method comprising.” Dua and Lockwood each disclose a method of manufacturing an article of footwear. For example, Dua provides “[a]n article of footwear and a method of manufacturing the article of footwear are disclosed. The footwear may include an upper and a sole structure.” Ex.1004, Abstract. Lockwood provides “[m]ethods of preforming shoe uppers.” Ex.1003, Abstract.

**2. Limitation 11[a]: “forming during a flat-knitting process an upper including a flat-knitted element including a first layer having”**

133. Dua discloses this limitation for the reasons I explained with respect to the limitation 1[a] in this ground. Dua discloses “[a]n article of footwear comprising: an upper incorporating a textile element formed through a flat knitting process . . . .” Ex.1004, Claim 65. Dua provides “other types of knitting, such as a flat knitting, may be utilized within the scope of the present invention to impart various textures, different properties, or different yarn types to the textile element.” *Id.*, [0061]. Dua also explains “[t]he upper of an article of athletic footwear, for example, may be formed from multiple material layers that include an exterior layer, an intermediate layer, and an interior layer.” *Id.*, [0006]. Dua states the exterior layer and the interior layer are often formed of textile materials. *Id.*, [0008]; *see also id.*, [0037], Claim 11.

**3. Limitation 11[b]: “a central portion having a domed, three-dimensional structure configured for extending over the top of a foot”**

134. This limitation would have been obvious in view of the combination of Dua, Hong, and Lockwood for the reasons I explained with respect to limitation 1[b] in this ground. For example, as illustrated below in Figure 8 from Dua, the first layer in Dua has a central portion configured for extending over the top of a foot.



Ex.1004, Fig. 8 (annotated). It would have been obvious to incorporate a domed, three-dimensional structure in a central portion like Dua’s configured for extending over the top of the foot in view of the teachings of Hong and Lockwood.

4. **Limitation 11[c]: “a first side portion being formed of unitary construction with the central portion and extending from a first side of the central portion”**

135. Dua discloses this limitation for the reasons I explained with respect to limitation 1[c] in this ground.

5. **Limitation 11[d]: “a second side portion being formed of unitary construction with the central portion and extending from a second side opposite the first side of the central portion”**

136. Dua discloses this limitation for the reasons I explained with respect to limitation 1[d] in this ground.

**6. Limitation 11[e]: “wherein the domed, three-dimensional structure is shaped to extend above the plane of the first side portion and the second side portion when the flat-knitted element is in a flattened configuration”**

137. This limitation would have been obvious in view of the combination of Dua, Hong, and Lockwood for the reasons I explained with respect to limitation 1[e] in this ground.

**M. Dua, Hong, and Lockwood Render Obvious Claim 12**

138. Claim 12 depends from claim 11 and recites “wherein the flat knitting process includes forming a first area and a second area, a stitch type of the first area being different that a stitch type of the second area.” Dua provides “an upper incorporating a textile element formed through a weft knitting process” and that “the textile element has a first area and a second area with a unitary construction, the first area being formed of a first stitch type, and the second area being formed of a second stitch type that is different from the first stitch type.” Ex.1004, Claim 7; *see also id.*, Claims 20, 30, 66. Dua also discloses “[t]he different textures 46”-48” are formed by merely varying the type of stitch formed by the wide-tube circular knitting machine at each location of textile element 40”. Textures 46”-48” may exhibit aesthetic differences, or the differences may be structural. For example, the degree of stretch in areas with textures 46”-48” may be different, or the wear resistance of the areas may vary depending upon the stitch utilized.” *Id.*, [0055]; *see also id.*, [0060]. Thus, Dua discloses this limitation. It would have also been obvious to a

POSA to vary the type of stitch used at different areas of Dua's upper to give the different areas different characteristics, such as different textures, aesthetics, structures, or wear resistance, for instance, for the reasons I explained with respect to claim 7 in this ground.

**N. Dua, Hong, and Lockwood Render Obvious Claim 13**

139. Claim 13 depends from claim 11 and recites “wherein the flat knitting process includes forming a first area and a second area, a yarn type of the first area being different than a yarn type of the second area.” Dua discloses and renders obvious this limitation for the reasons I explained with respect to claim 8 in this ground.

**O. Dua, Hong, and Lockwood Render Obvious Claim 14**

140. Claim 14 depends from claim 11 and recites “wherein the flat knitting process includes forming a first area and a second area, a stitch type and a yarn type of the first area being different than a stitch type and a yarn type of the second area.” Dua discloses this limitation for all the reasons I explained with respect to claims 8 and 12 in this ground. Indeed, Dua claims “the first set of properties and the second set of properties are at least one of a stitch configuration and a yarn type” and that “an upper incorporating a textile element formed through a flat knitting process, the textile element having a first area and a second area with a unitary construction, the first area having a first set of properties, and the second area having a second set of

properties that are different from the first set of properties.” Ex.1004, Claim 66. As a result, Dua discloses flat knitting to form a first area and second area that have different stitch types and yarn types.

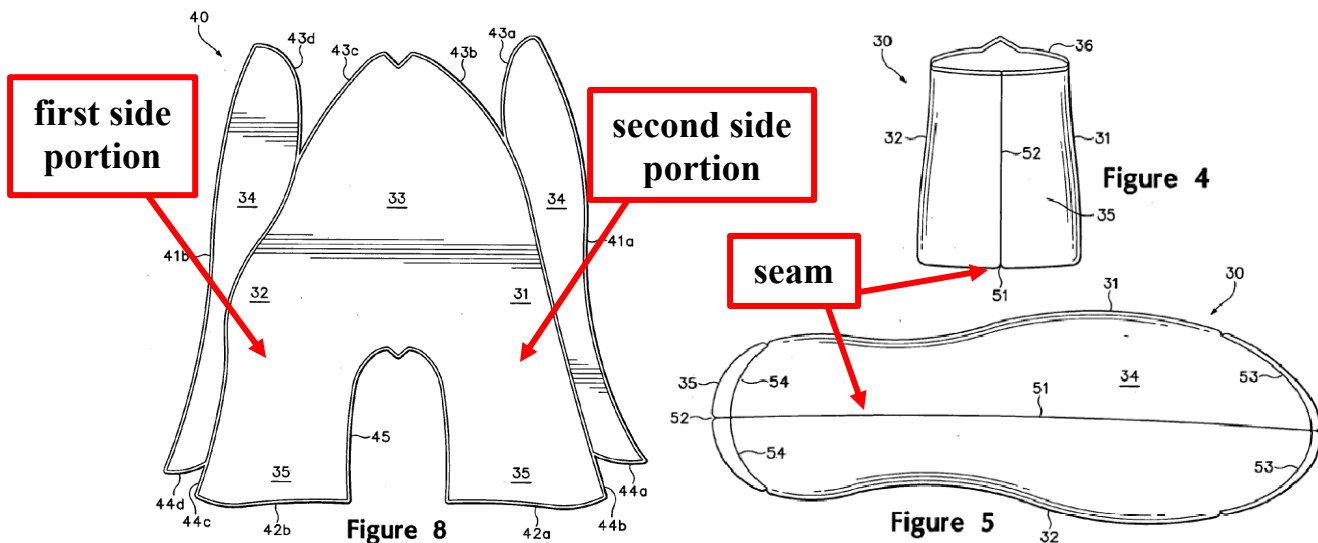
**P. Dua, Hong, and Lockwood Render Obvious Claim 15**

141. Claim 15 depends from claim 11 and recites “further comprising assembling the flat-knitted element into an article of footwear.” Dua discloses this limitation for the reasons I explained with respect to the preamble of claim 11 in this ground. In addition, Dua describes that different assembly line techniques can be used to prepare upper material to be incorporated into footwear. Ex.1004, [0012].

**Q. Dua, Hong, and Lockwood Render Obvious Claim 16**

142. Claim 16 depends from claim 15 and recites “wherein the assembling includes joining side edges of the first side portion and the second side portion to form a seam extending under a foot and along a longitudinal length of the foot.”

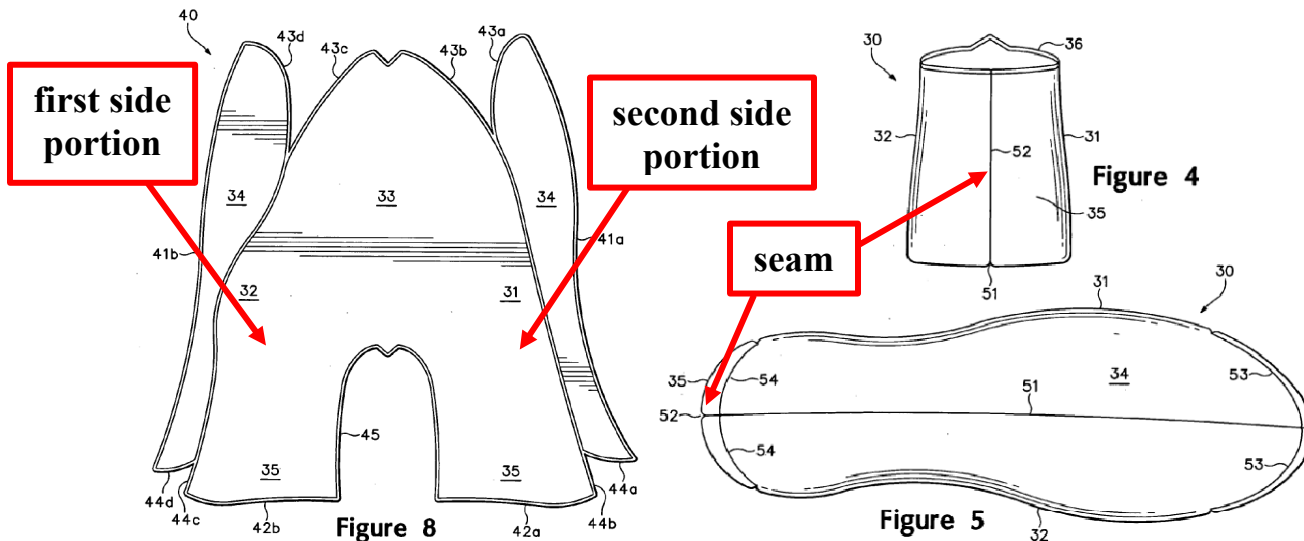
143. Dua provides “the textile element has edges that are joined together to define at least a portion of a void for receiving a foot.” Ex.1004, [0013]. Dua also provides “[a] plurality of seams 51-54 are formed, therefore, when joining the edges of the textile element. Seam 51 extends along the longitudinal length of lower region 34 and is centrally-located with respect to lateral region 31 and medial region 32.” *Id.*, [0037]. Thus, Dua discloses this limitation. Figures 4, 5, and 8 below from Dua show upper 30 and seam 51.



*Id.*, Figs. 4-5 (annotated), 8 (annotated). As a result, Dua provides the assembling includes joining side edges of the first side portion and the second side portion to form a seam (seam 51) extending under a foot and along a longitudinal length of the foot.

#### R. Dua, Hong, and Lockwood Render Obvious Claim 17

144. Claim 17 depends from claim 15 and recites “wherein the assembling includes joining rear edges of the first side portion and the second side portion to form a seam that extends upward along a heel.” Dua provides “Seam 52 is also centrally-located and extends upward along heel region 35.” Ex.1004, [0037]. Figures 4, 5, and 8 below from Dua show upper 30 and seam 52.



*Id.*, Figs. 4-5 (annotated), 8 (annotated). As a result, Dua provides the assembling includes joining rear edges of the first side portion and the second side portion to form a seam (seam 52) that extends upward along a heel.

#### S. Dua, Hong, and Lockwood Render Obvious Claim 18

145. Claim 18 depends from claim 11 and recites “wherein the flat knitting process includes forming a first loop of unitary construction in the textile element.” Dua discloses this limitation for the reasons I explained with respect to claim 2 in this ground. A POSA would have also found obvious this limitation in view of Hong for the reasons explained with respect to claim 2 in this ground.

#### T. Dua, Hong, and Lockwood Render Obvious Claim 19

146. Claim 19 depends from claim 18 and recites “further comprising extending a lace element through the first loop.” Dua discloses this limitation for the reasons I explained with respect to claim 2 in this ground. Indeed, Dua explains

that “upper 130 includes a lace 131 and a plurality of elements 132-135 that also form a portion of the exterior surface. Lace 131 extends through a plurality of apertures formed in textile element 140.” Ex.1004, [0057]; *see also id.*, [0005], [0037], [0041]. Lockwood also discloses its upper has holes for receiving laces. Ex.1003, 6:74-75. As a result, Dua and Lockwood each provide extending a lace through the first loop.

## **XII. GROUND 4: DUA, HONG, LOCKWOOD, AND VOUGHLOHN RENDER OBVIOUS CLAIMS 2–4, 18, AND 19**

147. Dua, Hong, and Lockwood render obvious to a POSA claims 2–4, 18, and 19 as I explained in Ground 3 above. Ground 4 addresses the obviousness of the challenged claims in Ground 3 were the disclosures of Dua, Hong, and Lockwood somehow found insufficient for teaching limitations relating to producing one or more loops of unitary construction with first layer of an upper like Dua’s.

### **A. Summary of Voughlohn (Ex.1006)**

148. Similar to the ’484 patent, Dua, and Lockwood discussed above, Voughlohn discloses features related to fabric-based apparel articles like footwear. Specifically, Voughlohn discloses systems and methods for fastening footwear, including footwear composed of fabric. Ex.1006, Title, [0345]. As shown in Figs. 1A and 10 below from Voughlohn’s, Voughlohn discloses embodiments of footwear with different fasteners for laces.

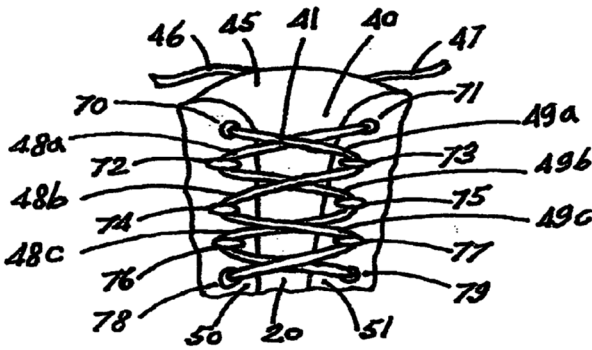


**Fig. 1A**

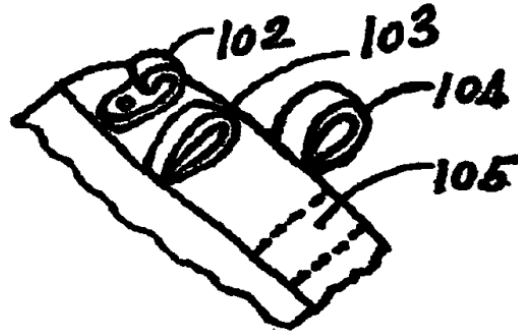


**Fig. 10**

*Id.*, Figs. 1A, 10. Voughlohn’s Figure 10 shows and discloses “[t]he lace receiver and/or a part of the lace-section fastener can comprise: . . . a plastic or fabric ring 103, 104, or 105, attached to or integrated into the under-side of a footwear with rivet(s) or thread(s) (each of rings 103, 104, and 105 is a strip of material riveted or sewn to the footwear to create a fixed or movable ring). Rings 103, 104, and 105 are disposed on the top-side of, at the edge of, and on the under-side of one of the two opposite sides of the footwear, respectively.” *Id.*, [0377]-[0379].

**B. Dua, Hong, Lockwood, and Voughlohn Render Obvious Claims 2–4, 18, and 19**

149. Voughlohn discusses different options for constructing lace receivers, including fabric rings that are attached to or integrated into a footwear. Ex.1006, [0377]-[0379]. A POSA would have been motivated to incorporate Voughlohn’s fabric rings in an upper like Dua’s for many reasons, including to realize the benefits described in Voughlohn like providing “a convenient, safe, and aesthetic system,

which could fasten a footwear quickly and easily, and is affordable, compact, and simple without exposing a bow knot.” *Id.*, [0001].

150. A POSA would have had a reasonable expectation of success in integrating the lace receivers in Voughlohn (loops for laces) in an upper like Dua’s. Voughlohn explains its lace receivers (loops for laces) are desirably integrated with its upper. Ex.1006, [0001], [0377]-[0379]. Dua also provides its upper components are desirably formed of a unitary construction. Ex.1004, [0037], [0060]. As a result, the combination would have involved no more than integrating a known structure in an upper like Dua’s for a readily understood benefit to a POSA, such as permitting creation of fully fashioned uppers with integrated lace loops like those illustrated in Dua’s Figure 13.

### **C. Dua, Hong, Lockwood, and Voughlohn Render Obvious Claim 2**

151. Claim 2 depends from claim 1 and states “further comprising a first loop being formed as a second layer of unitary construction with the first layer.” As I explained in the previous ground, Dua discloses this limitation and Hong renders obvious this limitation. Nonetheless, to the extent Dua and Hong are insufficient for this limitation, it is disclosed by and would have been obvious to a POSA in view of Voughlohn.

152. As I explained above, Voughlohn discloses an upper wherein “The lace receiver and/or a part of the lace-section fastener can comprise: ... a plastic or fabric

ring 103, 104, or 105, attached to or integrated into the under-side of a footwear with rivet(s) or thread(s) (each of rings 103, 104, and 105 is a strip of material riveted or sewn to the footwear to create a fixed or movable ring). Rings 103, 104, and 105 are disposed on the top-side of, at the edge of, and on the under-side of one of the two opposite sides of the footwear, respectively.” Ex.1006, [0377]-[0379]. Figure 10 below from Voughlohn shows rings 103 and 104.

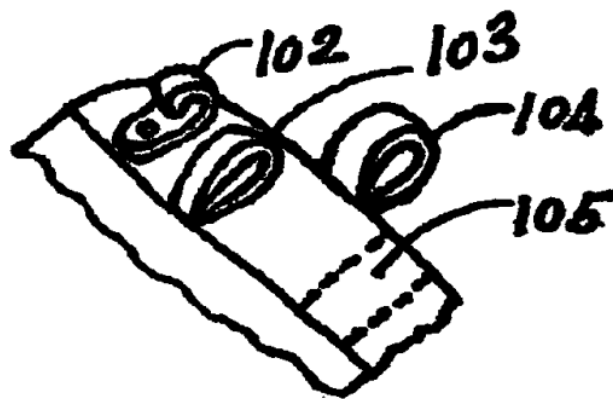


**Fig. 10**

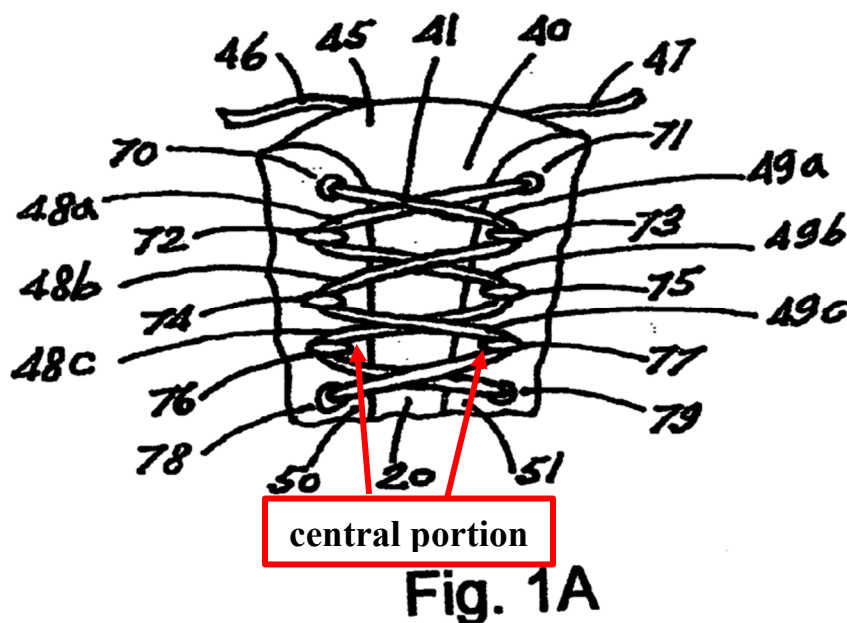
*Id.*, Fig. 10. As a result, a POSA would have found it obvious in view of Voughlohn to form a first loop as a second layer and form the first loop as a unitary construction with a first layer to flat knit a first layer like Dua’s closer to fully fashioned article of footwear.

**D. Dua, Hong, Lockwood, and Voughlohn Render Obvious Claim 3**

153. Claim 3 depends from claim 2 and states “wherein the first loop extends outward from the central portion.” As I explained in the previous ground, Dua

discloses this limitation. However, if Dua is somehow insufficient for this limitation, Voughlohn also discloses this limitation and it would have been obvious to a POSA in view of Voughlohn.

154. Voughlohn discloses “[r]ings 103, 104, and 105 are disposed on the top-side of, at the edge of, and on the under-side of one of the two opposite sides of the footwear, respectively.” Ex.1006, [0379]. As shown below, Figure 1A from Voughlohn illustrates lace-receivers which extend outward from a central portion of the upper.



*Id.*, Fig. 1A (annotated). A POSA would also understand from Figure 10 in Voughlohn that lace-receivers extend outward from a central portion of Voughlohn’s upper.

**E. Dua, Hong, Lockwood, and Voughlohn Render Obvious Claim 4**

155. Claim 4 depends from claim 2 and states “further comprising eight loops being formed as a second layer of unitary construction with the first layer.” As I explained in the previous ground, Dua discloses this limitation. Voughlohn also discloses this limitation and it would have been obvious for a POSA, in view of Voughlohn’s Figure 10, to form eight loops as a second layer of unitary construction with Dua’s first layer to ensure that the upper is sufficiently secured by laces extending through the eight loops so that the article of footwear remains in place on a foot during use. *See also* Ex.1004, [0005].

**F. Dua, Hong, Lockwood, and Voughlohn Render Obvious Claim 18**

156. Claim 18 depends from claim 11 and recites “wherein the flat knitting process includes forming a first loop of unitary construction in the textile element.” As I explained in the previous ground, Dua and Hong disclose this limitation. It would have also been obvious in view of Voughlohn for the reasons I explained regarding claim 2 in this ground.

**G. Dua, Hong, Lockwood, and Voughlohn Render Obvious Claim 19**

157. Claim 19 depends from claim 18 and states “further comprising extending a lace element through the first loop.” As I explained in the previous ground, Dua and Lockwood disclose this limitation for the reasons I provided above with respect to claim 19 in the previous ground.

158. Voughlohn additionally discloses “[l]acing-type footwear is an important part of our life, but adjusting, tying, and untying a lace are time-consuming and frustrating.” Ex.1006, [0001]. Thus, this limitation would have been obvious in view of Voughlohn as Voughlohn expressly discloses tying a lace of an article of footwear like Dua’s.

### **XIII. SECONDARY CONSIDERATIONS**

159. I am not aware of any secondary considerations of non-obviousness that would support non-obviousness of the ’484 patent. I am not aware of any products sold by Patent Owner in the United States that would be covered by the ’484 patent.

160. Given that the articles of footwear claimed in the ’484 patent are not new, and were invented long before November 2006, I am not aware of any long-felt need in the industry, unexpected results, skepticism of the invention, or teaching away from the invention. I am also not aware of any praise for the alleged inventions or copying of the alleged inventions by other companies. If Patent Owner identifies any alleged evidence of secondary considerations in the future, I reserve the right to respond to that information.

#### **XIV. CONCLUSION**

161. For the foregoing reasons, it is my opinion that claims 1-19 of the '484 patent would have been obvious to a POSA at the relevant time in view of the prior art referenced above.

162. I declare that all statements made herein on my own knowledge are true and that all statements 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 Section 1001 of Title 18 of the United States Code.

Dated: 9/25/2023

By: / David S. Brookstein/  
Dr. David S. Brookstein