

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

In re Patent of: Lee et al.  
U.S. Patent No.: 11,222,448 Attorney Docket No.: 57721-0004IP1  
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Title: METHOD AND APPARATUS FOR MEASURING  
MEASUREMENTS OF TWO-DIMENSIONAL PATTERN  
CORRESPONDING TO THREE-DIMENSIONAL  
VIRTUAL CLOTHING

**DECLARATION OF DAN PERREAULT**

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I, Dan Perreault, of Lake Mary, Florida, declare that:

**I. ASSIGNMENT**

1. I have been retained as a technical expert by counsel on behalf of Zhejiang Lingdi Digital Technology Co., Ltd. (“Lingdi” or “Petitioner”). I understand that Lingdi is requesting that the Patent Trial and Appeal Board (“PTAB” or “Board”) institute an *inter partes* review (“IPR”) proceeding of claims 1-4 and 14-18 (“Challenged Claims”) of U.S. Patent No. 11,222,448 (“the ’448 patent”). I have been asked to provide my independent analysis of the ’448 patent in light of the prior art publications cited below.

2. I am not, and never have been, an employee of Lingdi. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing the ’448 patent, the prior art publications cited below, and the issues related thereto, and I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the ’448 patent.

**II. QUALIFICATIONS AND BACKGROUND INFORMATION**

3. I have extensive experience in many aspects of metrology and engineering design, including three-dimensional scanning, computer-aided design, 3D modeling, three-dimensional printing, and rapid prototyping.

4. I received a Bachelor of Science Degree in Aeronautical Engineering

from the Embry-Riddle Aeronautical University in 1989. My studies concentrated on engineering design, aerodynamics, aircraft structures, computer-aided design, and finite element analysis.

5. I am the founder and currently the President at NeoMetrix Technologies, Inc., and I have been providing engineering services in the field of prototyping and metrology for over 30 years. NeoMetrix provides a wide array of engineering services for rapid product development, including three-dimensional scanning, computer-aided inspection, on-site inspection, and professional training. As the founder of NeoMetrix, I built the organization from the ground up, going from a solo operation to leading a reputable engineering team that has been providing engineering solutions for a host of world class companies, such as Disney, Lockheed Martin, Northrop Grumman, and Johnson & Johnson.

6. In addition to serving as the President at NeoMetrix Technologies, Inc. (2003-present), my industry experience includes Sales Director at Direct Dimensions (2002-2003), Director in Applications Engineering at FARO Technologies (1997-2002), and Applications Engineer at FARO Technologies (1993-1997).

7. I began my career in the metrology and reverse engineering industry by serving as an applications engineer for FARO Technologies, where I worked hands-on with various portable coordinate measuring machines. I specifically

developed expertise in using the renowned FaroArm®—a portable, multi-jointed arm with a three-dimensional scanner/probe—for industrial applications. From 1993 to 1997, I traveled to various manufacturing sites throughout the United States, Latin America, and Europe to assist in developing applications to solve real manufacturing-related metrology issues, particularly in the automotive and aerospace industries. I also worked closely with FARO software engineers to adapt a medical measurement tool for industrial application.

8. By 1997, I was promoted to Director of Application Engineering at FARO. In this role, I recruited, hired, trained, and led a team of highly skilled applications engineers to promote the FaroArm® as the new standard in manufacturing metrology. I developed and deployed comprehensive training curriculum for data collection, computer-aided design, part inspection, and sheet metal measurement.

9. Before founding NeoMetrix Technologies, I also served as the Sales Director at Direct Dimensions, where I led sales of the portable coordinate measurement machines (e.g., FaroArm®), laser scanners (e.g., Perceptron & Minolta 3D Laser Scanners), and point cloud processing software (e.g., Geomagic™ and Polyworks™ software).

10. Throughout my career, including well before the April 2015 priority date of the '355 patent, I have gained specific experience with a variety of CAD

systems and the user interface features of such CAD systems. For example, while working for ECC International from 1990 to 1992 I became experienced with AutoCAD 10, which I used for 2D design of simulator components for C-17 jet engine maintenance trainer. This included the design and refinement of brackets, valves, tubing, and various other jet engine components. During this time I became experienced in the functionality and features of such CAD systems. While working with American General Aircraft from 1992 to 1993 I utilized Micro CADAM which I similarly used for 2D design of aircraft components, including updating of existing designs and incorporation of engineering change orders. From 1993 through 2002, my work for several different companies involved the use of AutoCAD 12, 13, & 14. I used these versions of AutoCAD for various projects including 3D & 2D design of structural components for flight simulator motion systems and CAD based computer aided inspection & reverse engineering. During this time frame I also used these versions of AutoCAD to import customer CAD files for comparison to manufactured parts using FARO Arm portable Coordinate Measuring Machine (CMM).

11. Since 2003, as part of my work for my company NeoMetrix, I have become familiar with and used a wide variety of CAD systems, including Rapidform, Geomagic Design X, Geomagic Studio, Geomagic Wrap, Solidworks, and Ansys SpaceClaim. Through my use of these and other CAD tools I have

become familiar with their features and functionality, including developing a knowledge of which features were common across various CAD platforms prior to the April 2015 priority date of the '355 patent. My use of CAD systems for NeoMetrix has included scan based reverse engineering, including for organic, free form geometry such as art, sculpture, bones & other anatomy, as well as organically shaped mechanical components; development of 3D CAD models from existing parts in aerospace, automotive, marine and general manufacturing applications; conversion of scan based CAD models to native parametric CAD for customers.

12. I am a co-inventor of two U.S. Patents relating to methods of using coordinate measuring machines: (1) U.S. Patent No. 6,820,346, titled "Method, System, and Storage Medium for Providing an Executable Program to A Coordinate Measurement System," filed August 26, 2003; and (2) U.S. Patent No. 6,879,933, titled "Method and System for Assisting a User Taking Measurements Using a Coordinate Measurement Machine," filed November 15, 2002.

13. A copy of my curriculum vitae ("CV") is submitted with this declaration as Appendix A. While not intended to be exhaustive, my CV provides a substantially complete list of my education, relevant experience, academic and employment history

### **III. LEGAL PRINCIPLES**

14. In forming my analysis and conclusions expressed in this declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by counsel for the Petitioner.

#### **A. Anticipation**

15. It is my understanding that invalidation by “anticipation” exists only if a single alleged prior art reference discloses each and every limitation of the claim at issue, either expressly or inherently. In other words, every limitation of the claim must appear in a single prior art reference for the reference to anticipate that claim. I also understand that all elements of the claim must be disclosed in the reference as they are arranged in the claim. I also understand that to be considered anticipatory, the prior art reference must be enabling and must describe the patentee’s claimed invention sufficiently to have placed it in the possession of a person of ordinary skill in the field of invention. Under the principles of inherency, I understand that if the prior art necessarily functions in accordance with or includes the claimed limitations, it anticipates.

16. I have been informed that a claim is invalid if the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention. I further have been informed that a claim is invalid if an invention

described by that claim was described in a U.S. patent granted on an application for a patent (or in a published application for a U.S. patent) that was filed by another in the U.S. before the effective filing date of the claimed invention.

17. I understand that a dependent claim contains all of the limitations of the independent claim from which it depends. To establish anticipation, every limitation set forth in a dependent claim as well as the independent claim from which it depends must be found in an anticipatory reference.

**B. Obviousness**

18. I have been informed that a patent claim is invalid as “obvious” in light of one or more prior art references if it would have been obvious to a person of ordinary skill in the art at the time of the effective filing date of the claimed invention (“POSITA”; refer to ¶23 below), taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called “secondary considerations” of non-obviousness, which include: (i) “long felt need” for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) “copying” of the claimed invention by others. I understand that a patent cannot be properly granted for subject matter that would have been obvious to a POSITA at the time of the effective filing date of the claimed invention, and that a patent claim directed to

such obvious subject matter is invalid under 35 U.S.C. § 103. It is also my current understanding that in assessing the obviousness of claimed subject matter one should evaluate obviousness over the prior art from the perspective of a POSITA at the time of the effective filing date of the claimed invention (and not from the perspective of either a layman or a genius in that art).

19. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason that would have prompted a POSITA to modify the single prior art reference, or combine two or more references, in a manner that provides the elements of the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference(s) themselves, the knowledge or “common sense” of a POSITA, or from the nature of the problem to be solved, and this reason may be explicit or implicit from the prior art as a whole. I have been informed that, under the law, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.

20. I know that the '448 patent claims priority to two Korean patent applications filed on August 19, 2019 and August 19, 2020 (EX1001 at Cover

Page). For purposes of my analysis here, I have applied a date of August 19, 2019 as the effective filing date of the claimed invention in my obviousness analysis.

### **C. Claim Construction**

21. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their “ordinary and customary meaning.” In determining the ordinary and customary meaning, the words of a claim are first given their plain meaning that those words would have had to a POSITA. I understand that the structure of the claims, the specification, and the file history also may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, treatises and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by a person of ordinary skill in the art to a claim term at the time of the effective filing date of the claimed invention. I have followed this approach in my analysis, and for all of the claim terms considered in this declaration, I have applied the plain and ordinary meaning of those terms.

22. I also understand that the words of the claims should be interpreted as they would have been interpreted by a POSITA at the time of the effective filing date of the claimed invention (not today). I have used the date of August 19, 2019 for reasons explained in ¶20, above.

#### **IV. PERSON OF ORDINARY SKILL IN THE ART**

23. Based on my knowledge and experience in the field and my review of the '448 patent and its file history, and my first-hand knowledge of and experience with people working in the relevant field at the time of the '448 patent priority date of August 19, 2019, I believe a person of ordinary skill in the art ("POSITA" as noted in ¶17 above) at the time of the earliest possible priority date of the '448 patent would have had a bachelor's degree in an engineering, computer science, graphic design, or a related field plus 2-3 years of work and/or research experience in the field of computer aided design (CAD) software. Additional education might substitute for some of the experience, and substantial experience might substitute for some of the educational background. For purposes of assessing this level of ordinary skill in the art, I have considered the types of problems encountered in the art, the prior solutions to those problems found in prior art references, the speed with which innovations were made at that time, the sophistication of the technology, and the level of education of active workers in the field. As previously described, I have reviewed and understand the '448 patent, and I understand these factors. I understand that a person of ordinary skill in the art is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors discussed above.

## **V. MATERIALS CONSIDERED**

24. My analyses set forth in this declaration are based on my experience in the field of CAD software. Based on my above-described experience in the field, I believe that I am considered to be an expert in the field. Also, based on my experiences, I understand and know of the capabilities of persons of ordinary skill in this field during the time before the alleged priority date (August 19, 2019) for the '448 patent and I participated in organizations and worked closely with many persons of such skill level in the field during that time frame.

25. As part of my independent analysis for this declaration, I have considered the following: the background knowledge/technologies that were commonly known to persons of ordinary skill in this field during the time before the alleged priority date for the '448 patent; my own knowledge and experiences gained from my work experience in the field of CAD software generally; my experience in teaching and advising others in such subjects; and my experience in working with others involved in the field of CAD software or similar fields. In addition, I have analyzed the following publications and materials:

- U.S. Patent No. 11,222,448 (“the '448 patent”) (LINGDI-1001)
- U.S. Patent No. 11,222,448 File History (“the '448 File History”) (LINGDI-1002)
- U.S. Pat. App. Pub. No. 2014/0114620 (“Grinspun”) (LINGDI-1004)

- Graphicxtras.com, *Photoshop CC : Smart guide align and spacing / distances* video (July 10, 2014), available at <https://www.youtube.com/watch?v=dgok9GunPa0&t=227s> (“Graphicxtras”) (LINGDI-1005)
- Canvai, *Photoshop CC 2014 : Smarter Smart Guides* (July 9, 2014), available at <https://tinytutorials.wordpress.com/2014/07/09/photoshop-cc-2014-smarter-smart-guides/> (“Canvai”) (LINGDI-1006)
- Adobe Photoshop CC Help (Sep. 29, 2014), available at [https://help.adobe.com/archive/en/photoshop/cc/2014/photoshop\\_reference.pdf](https://help.adobe.com/archive/en/photoshop/cc/2014/photoshop_reference.pdf) (“Adobe”) (LINGDI-1007)
- Marvelous Designer, *Marvelous Designer 6: Offset Pattern Outline* (August 23, 2016), available at <https://www.youtube.com/watch?v=lqyrHYjAjUk> (“Marvelous Designer-1”) (LINGDI-1008)
- Marvelous Designer, *Marvelous Designer 6: Align & Distribute* (August 23, 2016), available at <https://www.youtube.com/watch?v=tuN6kOxvXdQ> (“Marvelous Designer-2”) (LINGDI-1009)

26. I note that persons of ordinary skill in the art during the relevant time frame would have been well-aware of YouTube and would have turned to YouTube to find information on the latest developments in design and drawing software, including clothing design software. Persons of ordinary skill would have found such information by, for example, performing keyword searches or viewing the channels of users that regularly publish videos related to design software. I conducted such YouTube searches myself when researching the latest design software developments during the relevant time frame. In particular, a person of ordinary skill and other interested members of the public would have been able to

find Graphicxtras through the exercise of reasonable diligence by performing keyword searches using YouTube's search functionality.

27. Although for the sake of brevity this Declaration refers to selected portions of the cited references, it should be understood that one of ordinary skill in the art would have viewed the references cited herein in their entirety, and in combination with other references cited herein or cited within the references themselves. The references used in this Declaration should be viewed as being incorporated herein in their entirety.

## **VI. OVERVIEW OF THE '448 PATENT**

28. The '448 patent describes a CAD software that can be used to, in the depicted example, draw fabric patterns which are also displayed as "virtual clothing." LINGDI-1001, 1:55-60, 6:1-34, FIGS. 2A-B. Patent Owner provided such a CAD software—called Marvelous Designer—for many years before the priority date of the '448 patent, and a variety of other CAD systems also facilitated such "virtual clothing" using traditional CAD onscreen interfaces. *See* LINGDI-1008; LINGDI-1009; *see also* LINGDI-1004, [0010]-[0013], FIGS. 1-4 and 14-19.

29. Such background information is useful to a fulsome understanding of the '448 patent leading up to the relatively late time frame of the '448 patent. For example, Marvelous Designer-1 is a YouTube video publication showing the "Offset Pattern Outline" feature of "Marvelous Designer 6"—Patent Owner's

earlier commercial product—as it was widely known in August 2016. LINGDI-1008, (using “Marvelous Designer 6” software). Marvelous Designer-1 shows the classic user interface for such CAD software, including the option for a user extending or retracting a pattern outline while maintaining its original shape. LINGDI-1008, 0:20-1:50. This feature includes a “Distance” option that allows a user to set how much in distance a pattern outline is extended. *Id.* Another option of this feature is “Total Distance,” which is calculated by based on the “Distance” and the number of offsets to be created. *Id.*

30. As another example of this useful background information, Marvelous Designer-2 is a YouTube video publication showing the “Align & Distribute” user interface feature of “Marvelous Designer 6,” as it was widely known in August 2016. LINGDI-1009, 0:02-0:08 (using “Marvelous Designer 6” software). Marvelous Designer-1 shows a user aligning multiple patterns (or shapes) to be horizontally aligned with one another in the middle of a design space. *Id.* The user can also distribute the spacing of objects within the design space, e.g., by specifying a spacing between objects. *Id.*, 0:09-0:18.

31. These earlier publications describing Patent Owner’s CAD software system confirm that the ’448 patent does not claim to invent such CAD software itself, but instead it simply purports to describes an incremental change to an onscreen interface of such CAD software. LINGDI-1001, 2:8-15, 8:1-64, 9:53-57,

12:5-14:15, 15:42-50 (“may output, on a screen of a display ..., a length of a line segment”). Regardless of whether this incremental change to the onscreen interface was new to Patent Owner’s particular CAD software, it was a user interface option already implemented in other CAD systems (as articulated below).

32. Turning to the ’448 patent specification in more detail, the specification describes an example in which a “2D pattern” may include “pieces” corresponding to “body parts of the 3D avatar,” such as “arms (e.g., sleeves), torso (front and back), neck, and legs.” *Id.*, 5:62-6:14. The 2D pattern may also be “modeled with a mesh including a plurality of polygons,” e.g., “triangles, to simulate [a] 3D virtual clothing.” *Id.*, 6:15-34. Further, “[b]y draping a 2D virtual clothing pattern formed with a mesh over a 3D avatar, it is possible to embody 3D virtual clothing that looks natural based on the laws of physics.” *Id.* In the ’448 patent, a “drape” or “draping” refers to “a process of putting 3D clothing on a 3D avatar by combining a 2D pattern or 2D pattern pieces by a computer program.” *Id.*, 5:62-6:14.

33. The ’448 patent also describes techniques to perform measurements in relation to 2D patterns. For example, “a length of two desired points” may be measured by “measuring a length on a two-dimensional (2D) pattern corresponding to three-dimensional (3D) virtual clothing or in a space in which the 2D pattern is displayed.” *Id.*, 1:55-60. Figure 1 depicts an example of a process

for measuring a measurement of a two-dimensional (2D) pattern:

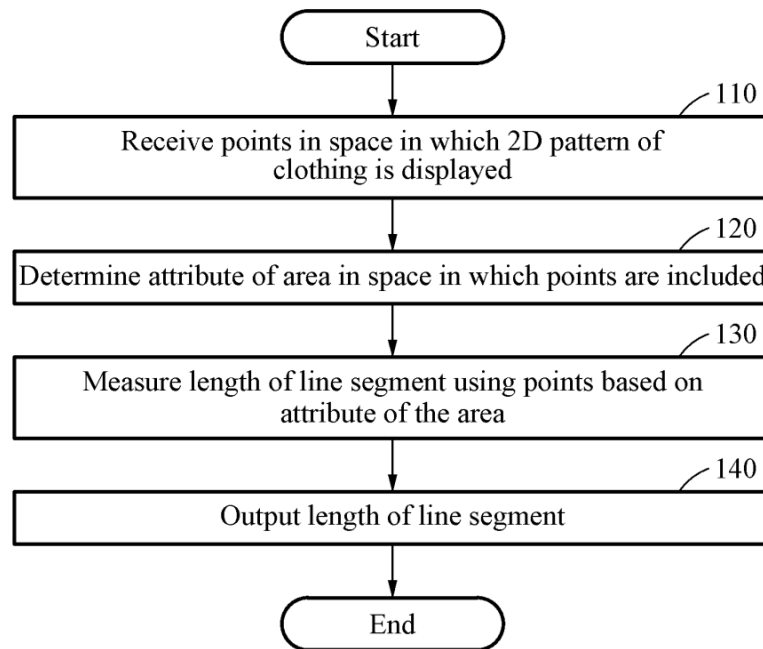


FIG. 1

LINGDI-1001, FIG. 1. In operation 110, “an apparatus for measuring a measurement of a 2D pattern” receives “a plurality of points in a space in which a 2D pattern of clothing is displayed.” LINGDI-1001, 5:62-6:14. This measurement is performed “through a screen of a user interface (UI).” *Id.*, 6:49-54.

34. In operation 120, the measuring apparatus “determine[s] [an] attribute of the area in which the points are included based on a data structure corresponding to each of the points.” LINGDI-1001, 6:49-54. Examples of “attributes” include a “first attribute indicating that an area in which points are included corresponds to a same pattern piece of the 2D pattern” and a “second attribute indicating that an

area in which points are included corresponds to a first pattern piece and a second pattern piece that are different from each other in the 2D pattern.” *Id.*, 7:6-24. The “data structure” may include “link-type information associated with at least one of a pattern piece in which each of the points is positioned, a line in a pattern piece in which each of the points is positioned, or a point on a line of a pattern piece.” *Id.*, 6:55-7:5.

35. In operation 130, the measuring apparatus “measures a length of a line segment using the points based on the attribute of the area determined in operation 120.” LINGDI-1001, 8:1-3. As an example, “when the attribute of the area is determined to be the second attribute” (i.e., points included in different 2D patterns), the measurement involves measuring “a second length of a second line segment that connects a start point input in a first pattern piece and an end point input in a second pattern piece.” *Id.*, 8:11-27.

36. In operation 140, the measuring apparatus “outputs the length of the line segment measured in operation 130.” LINGDI-1001, 8:59-9:3. The output may involve “output[ting], onto a screen of a display, a length of a line segment based on a plurality of points in a 2D pattern corresponding to draped simulated 3D clothing.” *Id.*

## **VII. OVERVIEW OF THE '448 PATENT PROSECUTION HISTORY**

37. The Application that led to the '448 patent was filed on September 21, 2020 and claimed priority to two earlier Korean patent applications (as explained in ¶19 above). LINGDI-1002, 5-11. The Examiner issued a Non-final Office Action on April 9, 2021, which included obviousness rejections based on U.S. Pat. App. Pub. No. 2016/0314604 (“Oh”) and U.S. Pat. No. 6,208,352 (“Blackwell”). *Id.*, 288-97.

38. Applicant filed a Response on July 8, 2021, which amended the independent claims (claims 1, 15, 16) to include two additional limitations: (A) “wherein the attributes indicate at least whether the points are located in a same pattern piece of the clothing or different pattern pieces of the clothing” and (B) “[determining]/[determine] a length of a line segment using the points based on the determined attributes of the areas, the determining length of the line segment reduced to account for separation between the pattern pieces responsive to determining that the points are located in different pattern pieces...” *See* LINGDI-1002, 329-37. In the Response, Applicant characterized feature (B) as being “advantageous” because “exaggeration of a length of line connecting two points in a 2D pattern when the points are located in different pattern pieces that are displayed as being separated may be prevented.” *Id.*, 325. Applicant also argued

that feature (B) was not disclosed or suggested by the Oh and Blackwell references cited in the Non-Final Office Action. According to the Applicant, “Oh does not disclose taking measurement from a point in one pattern piece to another point in a different pattern piece.” *Id.*, 326. Further, Applicant stated “[n]or does Oh describe reducing the length of the line between the two points if the two points are placed on different pattern pieces that are displayed as being separated.” *Id.*

39. The Examiner issued a Final Office Action on September 2, 2021. The Final Office Action included rejections of claims 1-20 under 35 U.S.C. § 112(a) in relation to feature (B) discussed above. LINGDI-1002, 340-47.

40. Applicant filed a Response on October 25, 2021, which included further amendments to the independent claims to substitute the term “replaced” with “changed.” LINDGI-1002, 359-66. The Response also addressed the § 112(a) rejection and identified paragraph [0089] of the original specification as allegedly providing sufficient written description support. *Id.*, 367-68.

41. Subsequently, a Notice of Allowance was issued on November 9, 2021. LINGDI-1002, 371-78. The Notice included the following statement regarding allowability:

...the prior art does not clearly disclose all the claimed limitations. Matsushita et al. discloses determining the distance between two keypoints of a clothing item. However, the above prior art whether

alone or in combination with the previously cited prior art does not clearly disclose all the limitations of claims 1-20.

*Id.*, 376.

### **VIII. INTERPRETATION OF THE '448 PATENT CLAIMS AT ISSUE**

42. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their plain meaning unless that meaning is inconsistent with the patent specification or the patent's history of examination before the Patent Office. I also understand that the words of the claims should be interpreted as they would have been interpreted by a POSITA at the time of the effective filing date of the claimed invention (not today). I have used the earliest alleged priority date of the '448 patent as the point in time for claim interpretation purposes. That date was August 19, 2019, as explained in ¶19 above.

### **IX. OVERVIEW OF CONCLUSIONS FORMED**

43. Based upon my knowledge and experience in this field and my analysis of the '448 patent and the materials cited in this Declaration, I have assessed the obviousness of particular claims of the '448 patent based on the legal principles described above. My analysis below provides the underlying facts and reasoning that leads to the following conclusion:

- Based upon my knowledge and experience and my review of the prior art publications listed above, I believe that claims 1-4 and 14-18 are rendered obvious by Grinspun in view of Graphicxtras.

## **X. ANALYSIS OF THE PRIOR ART**

### **A. GROUND 1—Claims 1-4 and 14-18 are rendered obvious by Grinspun in view of Graphicxtras**

44. For the reasons discussed below, and based on my review of the '448 patent and the Grinspun and Graphicxtras references, I am confident that a POSITA would have readily understood that the predictable combination of Grinspun in view of Graphicxtras provides all elements of claims 1-4 and 14-18.

#### **1. Overview of Grinspun**

45. Grinspun describes a CAD software enabling “interactive garment modeling and editing.” LINGDI-1004, [0010]-[0013], FIGS. 1-4 and 14-19, Abst. Grinspun’s CAD software provides an “interactive garment designing application that simultaneously and synchronously models a two-dimensional garment pattern and its corresponding three-dimensional draped representation.” *Id.*, [0003]. Much like the '448 patent, Grinspun’s CAD software is used for the “garment design process,” and Grinspun described an improvement over the traditional process that often involved “multiple iterations of drafting, synthesis, and revision.” *Id.*, [0004]. Grinspun sought to address challenges relating to garment

design and taught an improved CAD software that enables “interactive” garment modeling and edits (LINGDI-1004, [0009]) in an onscreen interface that “can simultaneously display two-dimensional [(2D)] flat patterns for constructing a garment and a three-dimensional [(3D)] draped representation of the garment” where the 2D flat patterns and the 3D draped representations can “maintain correspondence” in providing a “rendered draped form” (*id.*, [0010]). Grinspun’s system allowed “users to interactively edit [2D] flat patterns and instantaneously obtain feedback with the resulting [3D] draped representation, thereby enabling rapid prototyping of a garment and providing an understanding of the complex draped representation.” *Id.*, [0011]. According to Grinspun, the rendering of the 3D draped representation was “automatically updated” in “real time” while the 2D flat panel pattern is edited. *Id.* Grinspun taught that, through such “bidirectional editing,” a user can “interactively mark, sculpt, refine, and/or revise a three-dimensional draped representation of a garment.” *Id.*, [0012]; *see id.*, [0034]-[0035].

46. One example of Grinspun’s onscreen interface is depicted in Figure 1, which shows a “display screen 100 provides by the CAD software through an “interactive garment designing application”:

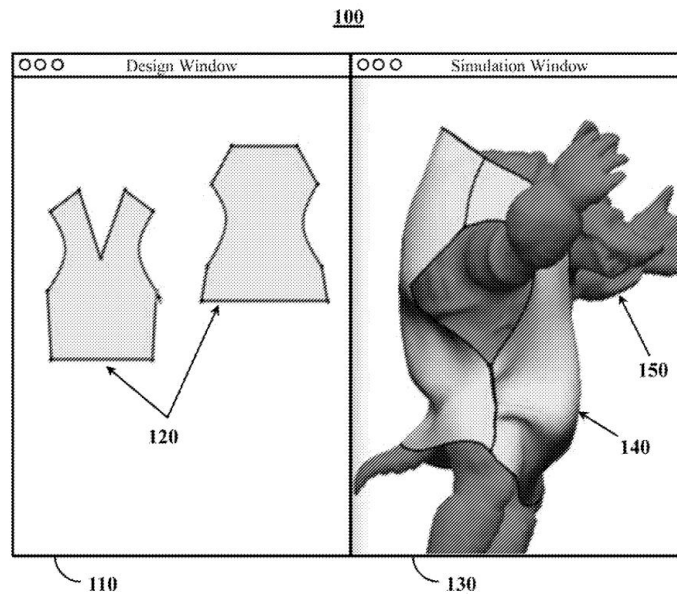


**FIG. 1**

LINGDI-1004, FIG. 1. As shown above, display screen 100 includes a “design window 110” and a “simulation window 130” that are “displayed side-by-side.” LINGDI-1004, [0036]-[0037]. Grinspun teaches that the design window 110 is intended to depict “[2D] flat patterns 120 used to create a garment.” *Id.* The neighboring simulation window 130 in Grinspun’s user interface includes a “[3D] simulation representation 140 resulting from the two-dimensional flat patterns draped over a body 150.” *Id.*

47. This prior art CAD software also achieved “an interactive bidirectional editing feature that maintains correspondence between the flat patterns 120 shown in the two-dimensional view 110 and the three-dimensional draped representation 140 shown in the three-dimensional view 130.” LINGDI-1004, [0038]. Grinspun explained that, “in response to altering the two

dimensional flat pattern,” the onscreen interface of the CAD software “simultaneously and/or synchronously simulate[s] and update[s] the corresponding three-dimensional draped representation with the alterations as the flat pattern is being altered.” *Id.* And Grinspun expressly contemplated that the alterations within the 2D design window 110 include “altering the shape or position of a pattern boundary.” *Id.*

48. Indeed, Grinspun explained that the design window 110 could be used to generate and organize a variety of patterns therein. LINGDI-1004, [0042]-[0044] (“generally create and/or edit patterns” in the design window 110). For example, the user can “begin with a blank screen” and use mouse movements for “sketching and creation of the flat patterns” for purposes of organizing the 2D design space within the design window 110. *Id.*; *see also* LINGDI-1004, [0038] (“altering the shape or position”), [0049] (“free-flowing design experience”), [0057] (“alters the two-dimensional pattern configuration”); [0069] (“uses the pointer to drag two-dimensional pattern elements”), [0084] (“using click, drag, and/or release mouse manipulations”). Based on Grinspun’s teachings, it was clear that the onscreen interface provided the user with a flexible opportunity to organize and reposition of the two-dimensional patterns within Grinspun’s design window 110, which was a common and useful user interface option in prior art CAD software when creating/inserting such 2D objects. Grinspun confirms the

conventional practice at the time for using a design window to organize and reposition of two-dimensional patterns for purposes of allowing user the opportunity to manage the onscreen space. Additionally, Grinspun shows that particular effectiveness of doing so in the context of a CAD software for virtual garment design, especially where the use of Grinspun's design window to organize and reposition of two-dimensional patterns ensured that new pattern pieces would be seamlessly integrated between or next to existing pattern pieces. By implementing this conventional onscreen interface in which the user has the freedom to organize/reposition 2D objects within the design window, Grinspun's user interface allowed the user to customize his or her optimal pattern layout and enhanced creativity in the design process.

49. Regarding Grinspun's "interactive bidirectional editing feature," one example is depicted in Figure 2:

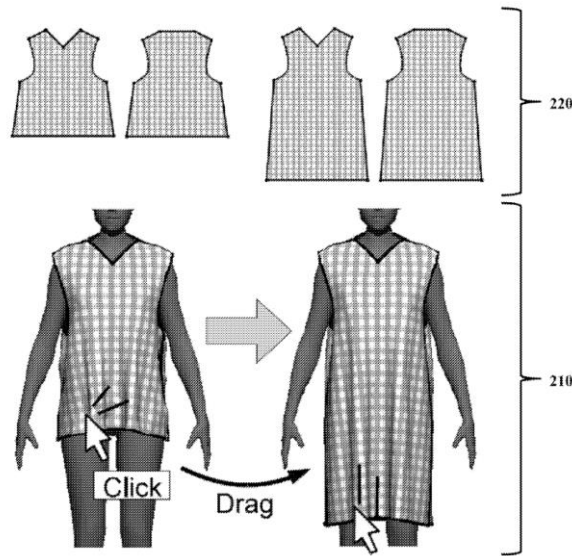


FIG. 2

LINGDI-1004, FIG. 2, [0039]. In this example, a user provides “user commands from a user input device (e.g., one or more mouse movements),” and the onscreen interface of the CAD software “update[s] the three-dimensional draped representation to reflect the alteration and can simultaneously update the corresponding two-dimensional flat patterns.” *Id.* As shown above, “the user selects the lower boundary of the three-dimensional draped representation and drags the mouse pointer in a downward direction to a new mouse position, thereby causing the application to lengthen the dress shown in the three-dimensional draped representation.” *Id.*, [0039]. Additionally, “as shown in area 220, the flat patterns of the garment are concurrently updated to reflect the alterations made to the three-dimensional draped representation.” *Id.*

50. Another example of Grinspun’s “interactive bidirectional editing

feature” is depicted in Figure 3:

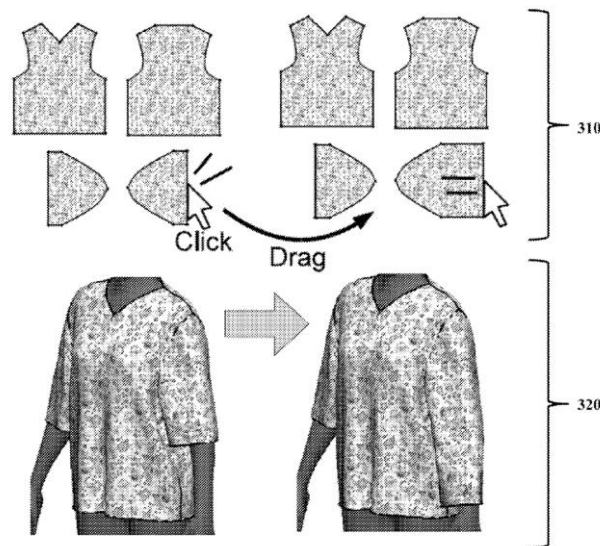


FIG. 3

LINGDI-1004, FIG. 3; [0040]. As shown above, “in area 310,” a user uses a mouse pointer to “select[] the right boundary line of a sleeve portion of a flat pattern and drags the mouse pointer in a lateral direction to a new mouse position,” which causes the application to “lengthen the sleeve of the garment.” *Id.*, [0040]. Additionally, “as shown in area 320, the sleeve of the drapped representation is concurrently updated to reflect the alterations made to the flat pattern.” *Id.* Again, these examples in Grinspun’s teaching demonstrate the conventional trend in CAD software at the time for providing more helpful onscreen information to the user, preferably in real time, during the design process.

## 2. Overview of Graphicxtras

51. Graphicxtras is a Youtube video, which certainly was (and still is) an

established publisher for those demonstrating conventional CAD software, and Graphicxtras is demonstrating the known features of an onscreen interface for the 2014 version of Adobe Photoshop CC. LINGDI-1005, 0:00-0:20 (“new features in 2014 CC”), 2:59-3:27. Long before 2019, Adobe Photoshop CC was widely known for use in a variety of design fields for enhancing, editing, and manipulating 2D digital objects in the onscreen design interface. Graphicxtras is simply one publication that reinforces this fact, as evidenced by user’s colloquial use of the CAD system’s nickname (“2014 CC”). *Id.* Pertinent my analysis here, Graphicxtras shows the usefulness of the convention “Smart Guide” feature, which advantageously provided a user with onscreen real-time measurement information for spacing of objects within a design window. LINGDI-1005, 1:47-1:54 (“the distances between”); 2:59-3:27 (“which is really quite nice”).

52. And other corroborating publications from the same time further confirm that which was demonstrated in Graphicxtras and what a POSITA would have readily recognized from Graphicxtras. In one corroborating example, “Tiny Tutorial’s Adobe Classroom” is another publication from 2014 that likewise discussed various functions of the “Smart Guides,” including “Dragging a Layer,” “Cmd + hover” function, and other “Automatic Features when dragging layers.” LINGDI-1006, 1-2.

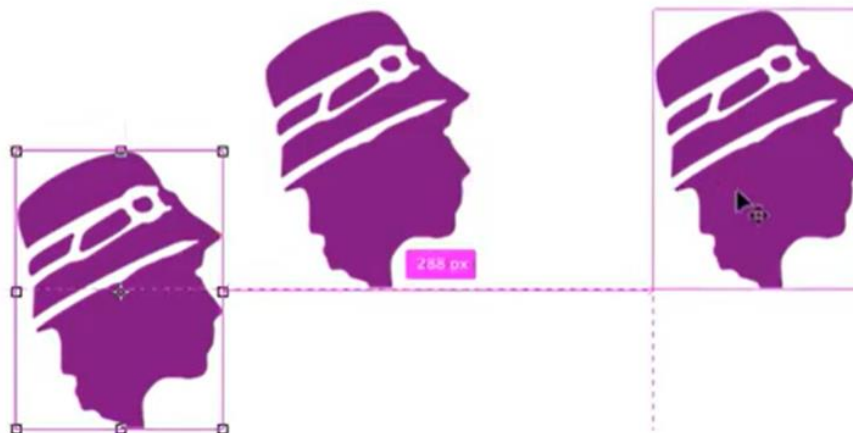
53. As another corroborating example of that which was demonstrated in

Graphicxtras, Adobe also published a manual for Adobe Photoshop CC on September 29, 2014. *See* LINGDI-1007, 14 (“Smart Guides” was a feature in the June 2014 release of Photoshop CC). Much like the demonstration from Graphicxtras, this Adobe manual also confirm that “[t]he 2014 release of Photoshop CC introduces many useful enhancements to Smart Guides[,]” include a user command that when a user “drag[s] a layer while keeping the Option (Mac) or Alt (Windows) key pressed, Photoshop displays reference measurement guides showing the distance between the original layer and the duplicate layer.” *Id.*, 14-15. Another feature is “[p]ath measurements,” where “Photoshop displays measurement guides while you're working with paths. Measurement guides are also displayed when you select the Path Selection tool and then drag a path within the same layer.” *Id.*, 15. Additionally, with “Matched Spacing,” a user can “duplicate or move an object” and “Photoshop displays measurement guides to visually indicate spacing between other objects that match the spacing between the selected object and its immediate neighbors.” *Id.* Simply put, Graphicxtras is a published video that demonstrates the well-known benefits of implementing the “Smart Guides” feature in an onscreen interface, and an ample number of other publications from 2014 corroborate this functionality demonstrated by Graphicxtras.

54. Turning to the particular demonstration taught in Graphicxtras, the

“Smart Guide” feature provides a measurement guide function that allows a user to “actually see the distance” between the first object and the second object, which can occur onscreen even when the user selects a first object and “move[s] it around.” LINGDI-1005, 2:59-3:27. This is consistent with the corroborating publication from Adobe, which explains that the user can conveniently access “display[ed] reference measurement guides showing the distance between” displayed objects). LINGDI-1007, 14 (also depicting a corroborating example display in which a first measurement guide shows a horizontal distance of “1.431 in” between two objects and a second measurement guide shows a vertical distance of “1.069 in” between objects).

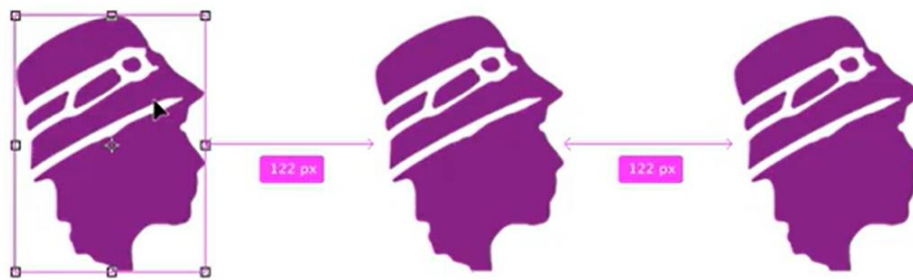
55. Graphicxtras demonstrates some working examples of this function, one of which is reproduced below:



LINGDI-1005, 2:59-3:27 (“which is really quite nice”). As shown above, a user

performs a measurement between a reference 2D object (left, with border and corners identified) and a hovered 2D object (right, with only border identified).

56. Graphicxtras also demonstrates how the “Smart Guide” feature provides a “matched spacing” function to display spacing between individual objects. See LINGDI-1005, 1:37-2:56. As shown in the reproduction below, a user can rapidly organize three objects within the design window so that they are uniformly spaced apart:

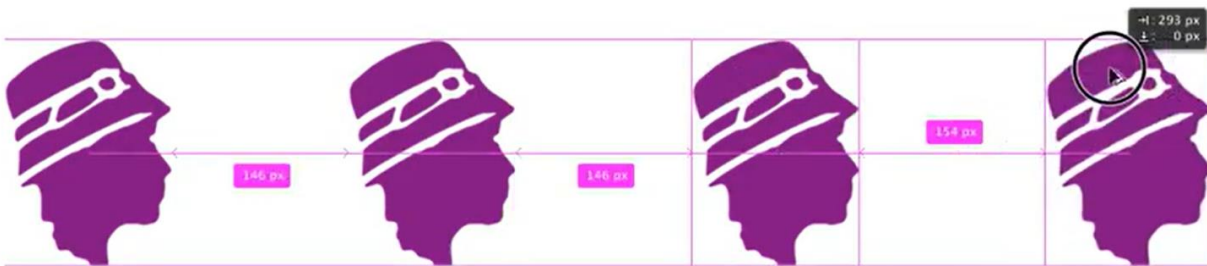


LINGDI-1005, 2:44. In the image above, “a user arranges three objects so that they are spaced apart by a horizontal distance of “122 pix.”

57. As a whole, the demonstration in Graphicxtras suggests how a user can advantageously use the “measurement guide” and “matched spacing” functions of the “Smart Guide” feature to achieve real-time display of changes to the length measurement while moving/interacting with the 2D objects displayed within a design window. See, e.g., LINGDI-1005, 5:47-6:00; see also *id.*, 2:54-3:39. Long before 2019, the traditional CAD user interface options would have been readily

recognized as advantageous for users organizing 2D objects (moving objects, opening sufficient space between objects for creation/insertion of new objects) in a design window of a CAD user interface.

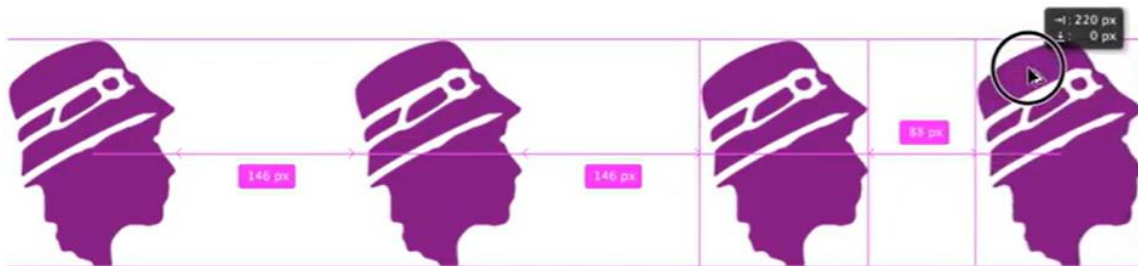
58. Indeed, Graphicxtras plainly explains this recognizable benefit—particularly in the example where one 2D object is moved relative to another 2D object within the 2D design window. When this occurs, the displayed length is changed in real time to account for the separation between those 2D objects. LINGDI-1005, 5:47-6:00. A POSITA would have plainly noticed that this provides helpful and convenient onscreen distance information to the user while organizing multiple objects within the 2D space. Turning to this onscreen example from Graphicxtras in more detail, at a first time point (selected at 5:47 by way of example here, which is a time point associated with the excerpted image below), a user demonstrates a first instance of the “measurement guide” function:



LINGDI-1005, 5:47. As shown above, a user selects a reference 2D object (left), and then moving the mouse cursor to hover over a second 2D object (right). In this

first instance, the relative x-coordinate of the second 2D object has a value of “293” (depicted in the dark gray box) and the “Smart Guide” feature shows a horizontal distance from the adjacent 2D object as a value of “154” (depicted in the pink box). LINGDI-1005, 5:47.

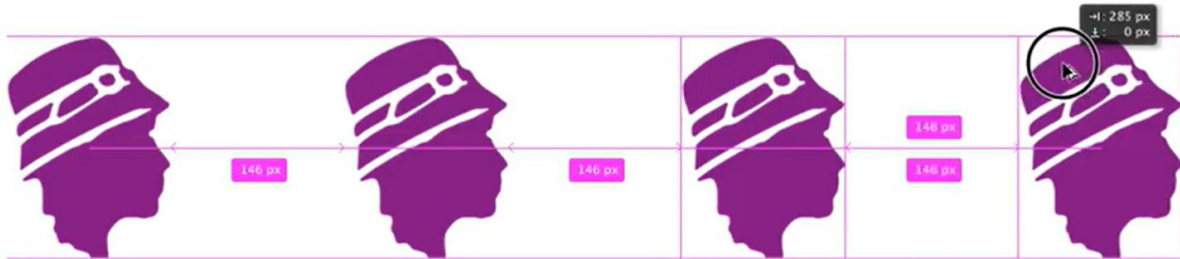
59. Graphicxtras then shows that, at a second time point (selected at 5:57 by way of example, image reproduced below), the user adjusts the position of the second 2D object (right). The displayed length is updated in real time using the “measurement guide” function:



LINGDI-10055:57. In this demonstration, a user uses a mouse cursor to select the second 2D object and drag it to a new position with a relative x-coordinate of “220” (depicted in the dark gray box) and the “Smart Guide” feature changes the horizontal distance measurement (from the adjacent 2D object) to a new value of “88” (depicted in the pink box). LINGDI-1005, 5:57.

60. Continuing with this example from Graphicxtras, at a third time point (selected at 6:00 by way of example, image reproduced below), the displayed

length is further updated using the “measurement guide” function:



LINGDI-1005, 6:00. At this time, a user places the second 2D object (right) at a final position, and the relative x-coordinate of the second 2D object has a value of “285” (depicted in the dark gray box) and the “Smart Guide” feature changes the horizontal distance measurement (relative to the adjacent 2D object) to a new value of “146” (depicted in the pink box). *Id.* Graphicxtras plainly demonstrates that all of this length information is displayed in the 2D design window and advantageously changed in real-time, which was a recognizable benefit to users for purposes of more rapidly organize/arrange the 2D objects within the 2D design window.

### 3. The Combination of Grinspun with Graphicxtras

61. As discussed in Section X.A.1 (§§44-49 above), Grinspun describes a conventional CAD software having an onscreen interface allowing users to “interactively edit two-dimensional flat patterns and **instantaneously obtain feedback** with [a] resulting three-dimensional draped representation.” LINGDI-1004, [0010] (emphasis added). Grinspun also emphasizes the benefits of

providing updated/real-time information at the onscreen interface, including for example, when the application “calculates and displays revisions or alterations to the three-dimensional draped representation and the flat patterns at an interactive rate to provide **real-time updates**.” *Id.*, [0043]. Grinspun also demonstrates the traditional onscreen interface in which multiple objects (patterns) can be created, spaced apart, and organized/positioned by a user within the two-dimensional space (design window 110). *Id.*, [0042]-[0044], [0049], [0057], [0069], [0084], FIGS. 1-4. In Grinspun’s depicted example, the user can organize and reposition the two-dimensional objects, but Grinspun does not expressly state that onscreen measurement/spacing information is displayed within the display window 110 during such organization/repositioning actions.

62. Even if Grinspun did not expressly disclose displaying an onscreen measurement that changes to account for a separation distance between two objects within the two-dimensional space, such a feature was implemented in other conventional CAD software (such as Graphicxtras) to achieve known benefits long before 2019. And, as articulated below, a POSITA would have recognized the benefits of implementing such a suggested improvement in Grinspun’s onscreen interface, especially because the predictable combination would have improved Grinspun’s onscreen interface by providing an onscreen length measurement which is changed to account for a separation distance between pattern pieces within

Grinspun's design window 110 (detailed below, by way of example in annotations to Grinspun's Figure 1, in ¶¶66-85).

**(a) Articulated Reasons for modifications based on Graphicxtras**

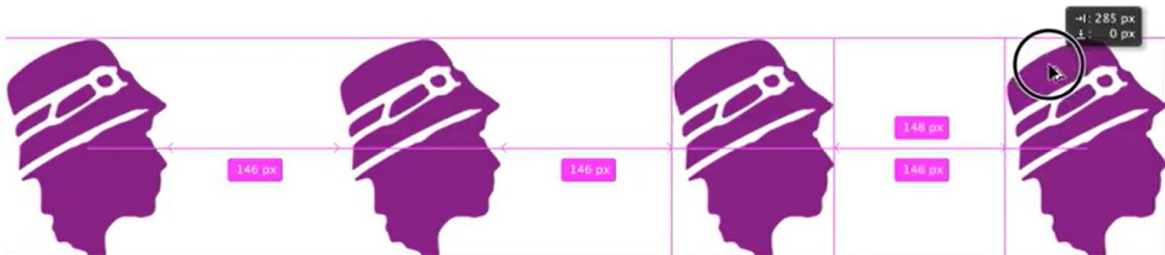
63. As articulated below, there are at least three reasons that would have prompted a POSITA to modify Grinspun's onscreen interface of the CAD software to include Graphicxtras' suggestions for improving such an onscreen interface.

64. As a *first* reason, a POSITA would have been motivated to modify Grinspun's onscreen interface of the CAD software to include Graphicxtras' suggestion for a "measurement guide" to advantageously provide real-time measurement information within Grinspun's design window 110 and thereby facilitate the user's rapid organization/positioning of multiple garment pieces within the window 110. See LINGDI-1005, 2:29-4:03 ("which is really quite nice"). Again, Grinspun explained that the user can create and organize multiple pattern pieces within the design window 110 using traditional mouse movements. *Id.*, [0042]-[0044] ("can begin with a blank screen" and use mouse movements for "sketching and creation of the flat patterns"), [0049] ("free-flowing design experience"), [0057] ("alters the two-dimensional pattern configuration"); [0069] ("uses the pointer to drag two-dimensional pattern elements"), [0084] ("using click, drag, and/or release mouse manipulations"). And Graphicxtras' suggested

improvement would have recognizably enhanced this user interface by helpfully displaying real-time measurement information that accounts for the spacing of those objects within this 2D space, which would have advantageously allowed a user to more precisely position 2D flat patterns relative to one another within the design window 110. *See* LINGDI-1005, 2:59-3:27 (“which is really quite nice”), 5:54-6:22 (“very quick and easy”). This function would have also improved functionality described in Grinspun for “altering the [2D] flat pattern 120,” such as “altering the shape or position of a pattern boundary, etc.” LINGDI-1004, [0038]. Because Grinspun already teaches altering a “position” of a pattern 120, a POSITA would have recognized that incorporation of Graphicxtras’ suggestion for a “measurement” function within the Grinspun system would have allowed a user to achieve greater precision (especially where the user would be able view real-time measurements of relative spacing and rapidly select the user’s desired distances between the garment patterns 120 when performing alterations/positioning within the 2D design window 110). Based upon my knowledge and experience in this field and my analysis of the references, it is clear that implementing this user interface feature (as suggested by Graphicxtras) into Grinspun’s onscreen interface would have noticeably improved the user’s initial organization of the multiple patterns within Grinspun’s design window 110 and any subsequent reorganization/repositioning (e.g., when creating/inserting new garment pieces

between or adjacent to other garment pieces).

65. As a **second** reason, a POSITA would have been motivated to include Graphicxtras' suggestion for "match spacing" measurement information within Grinspun's design window 110 to improve the ease-of-use of the garment design processes described in Grinspun—particularly where such a feature would have beneficially helped the user to quickly align the 2D objects with uniform spacing. As previously described, Graphicxtras suggests this feature that provides both "snapping" alignment and measurement information confirming the equal measurements:



LINGDI-1004, 5:54-6:22 ("very quick and easy"). In light of Graphicxtras's demonstration of this rapid alignment/organization when populating the design window, a POSITA would have certainly known that such a conventional feature would have been useful for Grinspun's garment design process, which would have predictably involved the creation/arrangement of symmetric patterns and/or repeating design elements within the 2D design window.

66. **As a third** reason, a POSITA would have been prompted to combine the teachings of Grinspun and Graphicxtras because the combination was nothing more than using a known user interface improvement (as suggested in Graphicxtras) to address a known problem within onscreen displays of garment design applications like that of Grinspun. Again, Grinspun's discloses the use of the design window 110 and the creation/reorganization of various garment patterns within that window, but Grinspun did not expressly state that the user was provided with real-time spacing information that would have aided in the organization and spacing of those pattern pieces within the window 110. Graphicxtras suggested a plain solution that was "quite nice." LINGDI-1005, 2:59-3:27 ("which is really quite nice"), 5:54-6:22 ("very quick and easy"). I have been informed that, under the law, if there's a known technique to address a known problem using prior art elements according to their established functions, then there is a motivation to combine. That is the scenario here, and a POSITA would have surely recognized it. Indeed, Grinspun notes that the user's 2D design window may "begin with a blank screen" in which multiple pattern pieces are sketched/created, which can create spacing issues within the 2D design window when inserting/reorganizing the multiple pattern pieces. See LINGDI-1004, [0042]-[0044]. And, as explained above, a POSITA would have recognized Graphicxtras' suggested improvement to the (real-time display of measurements

when creating/positioning 2D objects within the 2D design window) was a well-known technique for addressing the space-planning concerns when creating/reorganizing multiple objects within such a 2D design window of a CAD software.

67. Based upon my review of Grinspun and my knowledge and experience of what a POSITA would have recognized by Graphicxtras' suggested improvement, one depiction of the predictable Grinspun-Graphicxtras system (by way of example only, for illustrative purposes) is shown below based on annotations to Grinspun's Figure 1 (modified to incorporate Graphicxtras' suggestion for improved onscreen information):

100

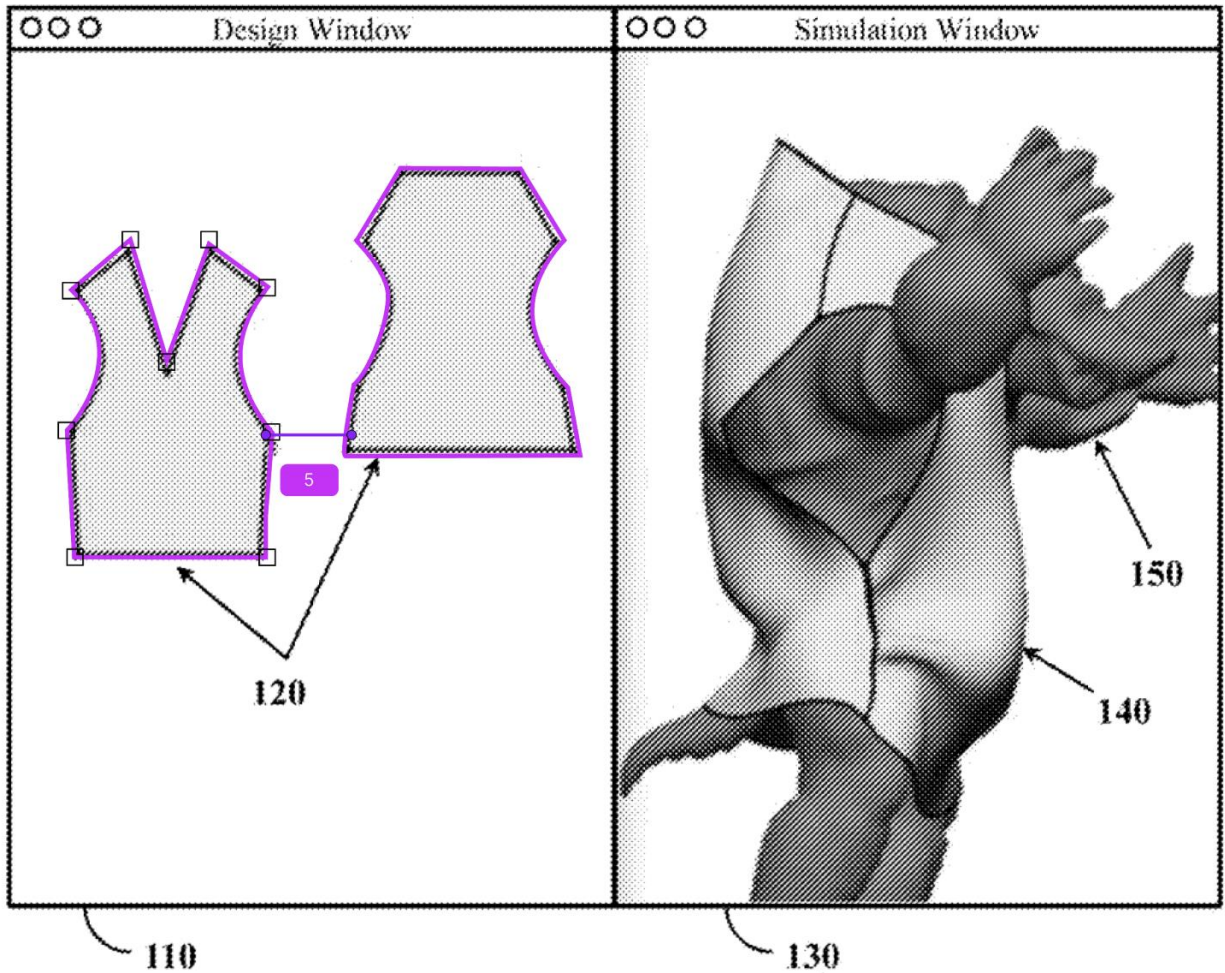


**FIG. 1**

The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicextras' suggested improvement. My testimony here presents such an illustrative depiction here (and in the paragraphs below) to visualize one predictable example of this resulting combination based on the articulated reasons above. Of course, the predictable Grinspun-Graphicextras combination is not circumscribed only to this illustrative *example* here, and certainly by the relatively

late time frame leading up to August 2019, the conventional user interface/menu options may have appeared differently from those based upon Grinspun's older Figure 1. Either way, the motivations (articulated above) for modifying Grinspun's onscreen interface to include Graphicxtras' suggested improvement would have predictably achieved the above-described benefits.

68. Finally, a POSITA would have had a reasonable expectation of success in incorporating Graphicxtras' suggested improvement into Grinspun's onscreen interface of the CAD software as articulated above. Again, as explained in Section X.A.2, Graphicxtras plainly suggested the benefits of using the "Smart Guide" feature in an onscreen interface of a CAD software allow users to visualize information (e.g., length measurements indicative of spacing information) relating to arrangements/organization of 2D objects within a design window. And as described above, a POSITA would have recognized that this suggested software functionality would have benefitted the user experience within Grinspun's two-dimensional design space (design window 110). This especially true because such improved user experience/organization within the 2D space would have furthered Grinspun's goal of "enabling rapid prototyping of a garment and providing an understanding of the complex draped representation." LINGDI-1004, [0034]; [0042]-[0044] ("can begin with a blank screen" and use mouse movements for "sketching and creation of the flat patterns"), [0069], [0084]. Here, implementing

such a software improvement to the onscreen interface would have required only routine knowledge—especially by the relatively late time frame leading up to August 2019. *Id.* Like Graphicxtras, Grinspun teaches using “mouse movements” to “generally create and/or edit patterns and draped forms,” and further suggests that “any suitable user input device for performing a gesture can be used.” LINGDI-1004, [0042]-[0044], [0049], [0057], [0069], [0084]. Based on Grinspun, a POSITA would have considered the specific input techniques for selecting and moving 2D flat patterns 120 within design window 110 (along with the real-time display of the length measurements) an ordinary user interface option, as confirmed by Graphicxtras long before the ’448 patent.

69. And in this same vein, a POSITA would have known that applying the suggestions of Graphicxtras to Grinspun’s onscreen interface would have led to the above-described predictable results without significantly altering or hindering the functions performed by Grinspun’s software. Again, Grinspun’s design window 110 of the display screen 100 would have continued to “provide the user with an interactive bidirectional editing feature that maintains correspondence between the flat patterns 120...and the three-dimensional draped representation 140.”

LINGDI-1004, [0038]. Further, the onscreen information (e.g., matched spacing, horizontal distance, vertical distance) would have been presented within a design window as suggested by Graphicxtras, which would have achieved improved

organization/real-time measurement information within the two-dimensional design window. LINGDI-1005, 5:47-6:00.

**4. Analysis of the Combination of Grinspun and Graphicxtras with respect to claims 1-4 and 14-18 of the '448 patent**

**(a) Claim 1**

***[1.pre] A method of taking a measurement of a two-dimensional (2D) pattern, comprising:***

70. This preamble recites a “method” followed by a recitation of intended use (“of taking a measurement ...”). I have been informed that, under the law, a recitation of purpose or intended use in a preamble is not a limitation. But even if this preamble was treated as a claim limitation, the Grinspun-Graphicxtras combination provides the recited **method** because, as detailed above (*supra* Section X.A.3), it would have predictably resulted a system that performed the recited method. *Supra*, ¶¶62-68. In particular, the resulting CAD software would have achieve improved user interaction capabilities, e.g., by enabling presentation of onscreen measurement information associated with 2D patterns within Grinspun’s design window 110. LINGDI-1004, [0036]-[0038], [0042]-[0044], FIG. 1; LINGDI-1005, 3:05-4:03.

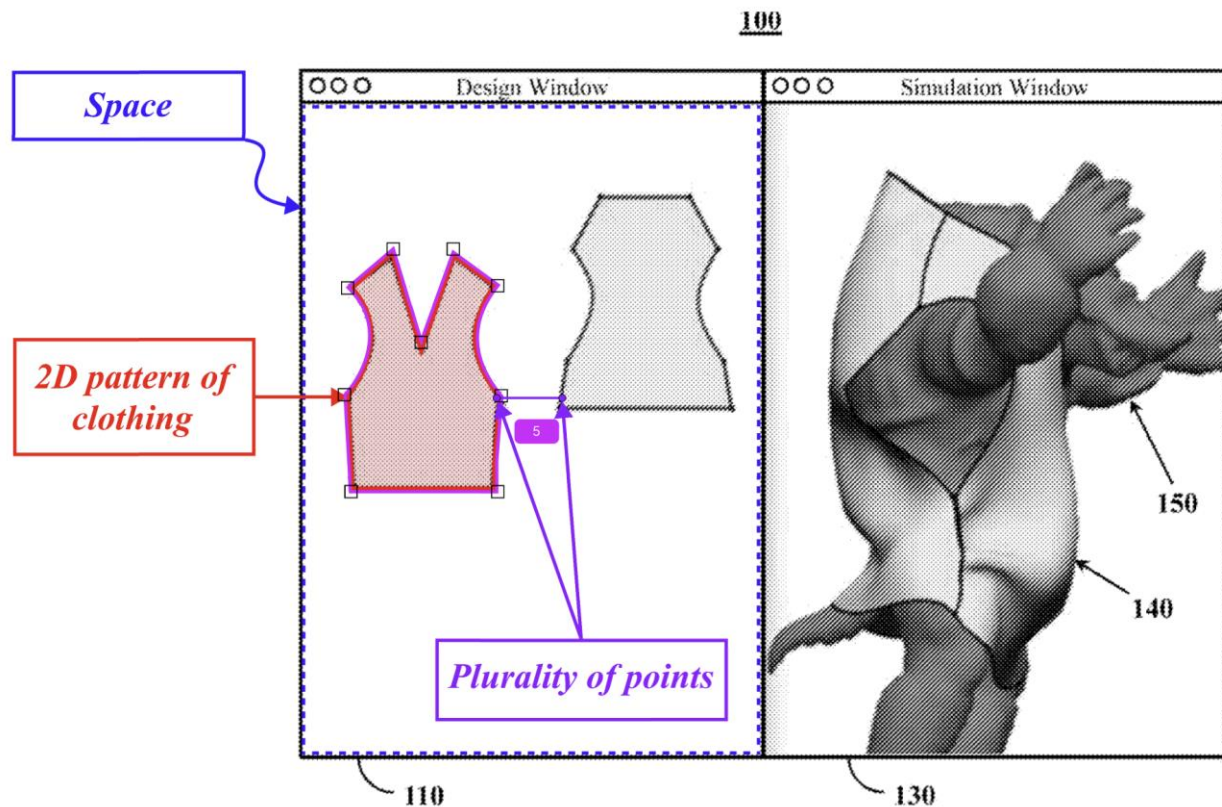
71. Specifically, a POSITA would have configured the Grinspun-Graphicxtras system to provide Grinspun’s display screen 100 (which includes a design window 110 and a simulation window 130). LINGDI-1004, [0037]-[0038],

[0042]-[0044], FIG. 1. Further, in the Grinspun-Graphicxtras combination, the display screen 100 would have implemented Graphicxtras' suggested improvement so that the design window 110 would display an onscreen measurement that changes to account for a separation distance between two objects within the two-dimensional space. *Supra*, ¶¶62-68. A user would have received additional useful information, for example, a real-time measurement of a line segment appearing between garment patterns 120 in the design window 110. *Id.*; LINGDI-1005, 5:47-6:00. As previously explained, these teachings from Graphicxtras would have been readily recognized by a POSITA, and other corroborating publications show that these suggested user interface improvements were indeed present in the CAD software of Graphicxtras. *See* LINGDI-1006, 1-2 (corroborating what is shown in Graphicxtras's demonstration); LINGDI-1007, 14-16, 59-61 (corroborating what is shown in Graphicxtras's demonstration).

***[1.1] receiving a plurality of points in a space in which a 2D pattern of clothing is displayed;***

72. As discussed above, the Grinspun-Graphicxtras system would have provided this ***receiving*** function. In the resulting system, Grinspun's display screen 100 (which includes a design window 110 and a simulation window 130) would have been modified as articulated above. LINGDI-1004, [0037]-[0038]. In one example of the resulting combination (depicted below), a user would have

received a length measurement of a spacing line between two patterns 120 (including a **2D pattern of clothing**) that are used to create a garment within design space (**space**) defined by Grinspun's design window 110. *Id.*, [0036]. In this example, and consistent with Graphicxtras's suggestion, upon the user providing an input command initiating the "measurement guide" function, the Grinspun-Graphicxtras system would have established two points (**plurality of points**, depicted below). LINGDI-1005, 0:15-0:19 ("ALT and CMD, or control on the PC"); LINGDI-1006, 2 (corroborating Graphicxtras's demonstration of a "CMD + hover" command); LINGDI-1007, 59-61 (same). By way of example for this predictable combination, each point is associated with a line segment representing a horizontal distance between the two 2D patterns 120 depicted in Grinspun's Figure 1 (annotated below):



The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicextras' suggested improvement. See LINGDI-1005, 5:47-6:00.

***[1.2] determining attributes of areas in which the points are located, wherein the attributes indicate at least whether the points are located in a same pattern piece of the clothing or different pattern pieces of the clothing;***

73. As I've discussed in Section X.A.3 (§§62-68) and in analyzing Element [1.1], in one example of the Grinspun-Graphicextras combination, a user initiates an input command for the "measurement guide" function. LINDGI-1004, 1:06-1:12; LINGDI-1005, 0:15-0:19 ("ALT and CMD, or control on the PC"). Upon receiving this input command, the Grinspun-Graphicextras system would

have determined that two points (***plurality of points***) associated with a line segment are each associated with distinct 2D patterns 120. *Id.*. Again, a POSITA would have readily recognized these teachings from Graphicxtras's video demonstration (cited in this Declaration) regarding the "measurement guide" function. Other corroborating publications show that this suggested user interface improvement was in fact present in the CAD software of Graphicxtras. See LINGDI-1006, 1-2 (corroborating what is shown in Graphicxtras's demonstration); LINGDI-1007, 14-16, 59-61 (corroborating what is shown in Graphicxtras's demonstration).

74. Consistent with Graphicxtras' suggestion (refer to the onscreen examples at 3:05-4:03 and 5:47-6:00), a POSITA would have recognized that the process of establishing points for distance measurement by the system would have involved ***determining attributes of areas in which the points are located*** in that the establishment of the two points represents ***attributes*** indicating that ***the points are located in... different pattern pieces of the clothing***:

100

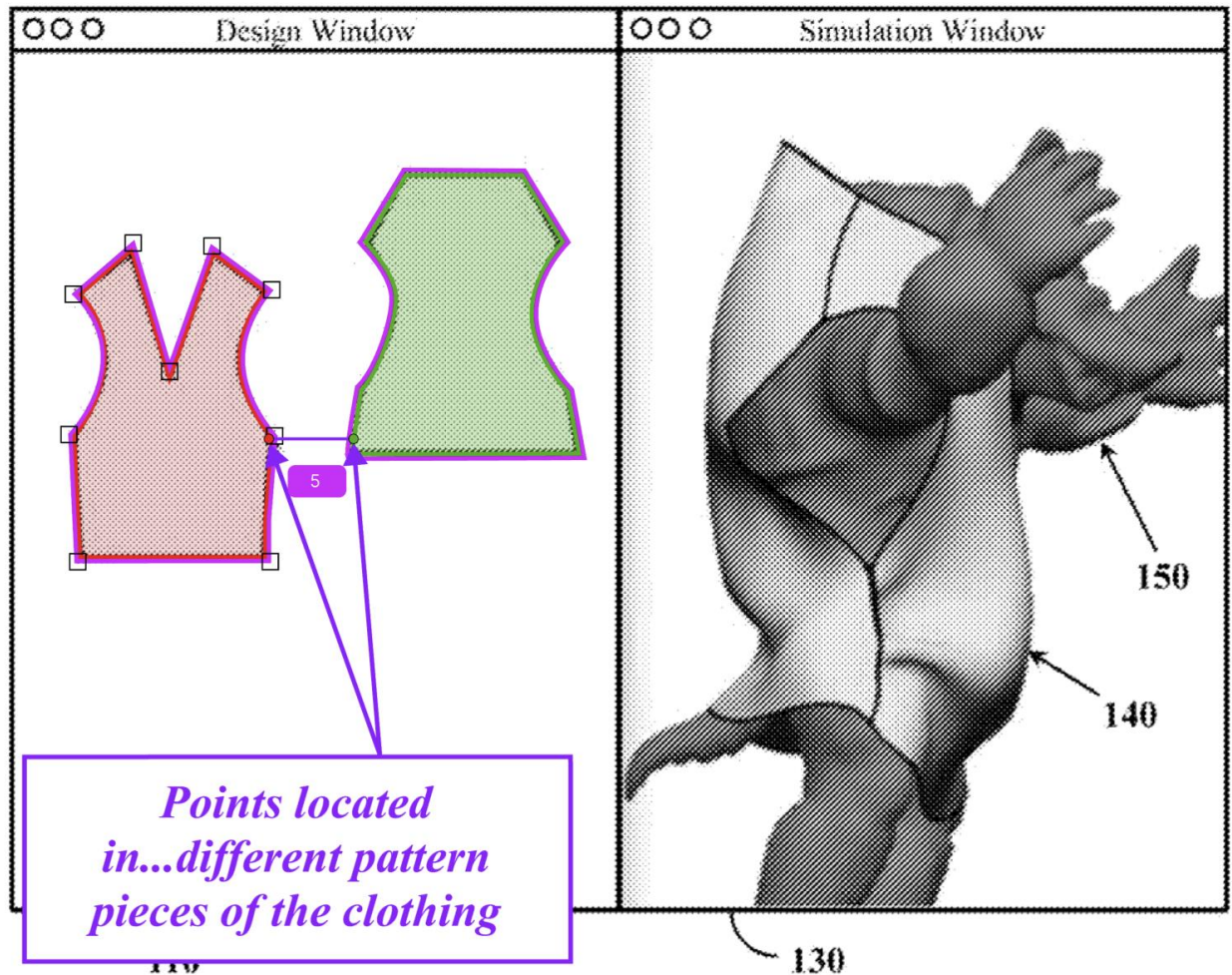


**FIG. 1**

The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicxtras' suggested improvement. See LINGDI-1005, 5:47-6:00. A POSITA would have recognized that such a distance measurement involves determining attributes of areas because the CAD software (both in Grinspun and Graphicxtras) represented the spatial relationships and dimensions within a design. The accuracy of distance measurements between points is influenced by factors like scale,

layout, and spatial constraints. Recognizing and determining these attributes can be important for precise and reliable measurements in 2D design projects. This is illustrated, for example, in Graphicxtras' demonstration in which the 2D objects are inserted as rectangular objects spaced apart from one another, and points are highlighted along the selected rectangular objects in the design window when using the "measurement guide" function. LINGDI-1005, 3:05-4:03, 5:47-6:00.

***[1.3] determining a length of a line segment using the points based on the determined attributes of the areas, the determined length of the line segment changed to account for separation between the pattern pieces responsive to determining that the points are located in different pattern pieces; and***

75. In accordance with my previous analysis for Element [1.2], in one example of the Grinspun-Graphicxtras combination, upon a user providing an initiating an input command for the "measurement guide" function, the Grinspun-Graphicxtras system would have established a line segment to be indicative of a spacing distance between the points of the two patterns 120. LINGDI-1005, 5:47-6:00; *see id.*, 0:15-0:19 ("ALT and CMD, or control on the PC"). Again, a POSITA would have readily recognized these "measurement guide" suggestions from Graphicxtras's video demonstration (cited in this Declaration), and other corroborating publications show that this suggested user interface improvement was in fact present in the CAD software of Graphicxtras. *See* LINGDI-1006, 1-2 (corroborating what is shown in Graphicxtras's demonstration); LINGDI-1007, 14-

16, 59-61 (corroborating what is shown in Graphicxtras's demonstration). Further, the line segment is defined by the two points as depicted above in Element [1.2] (where one point is a starting point of the line and the other point is a terminating point of the line). The **length** of the line segment **uses** the points. *Supra*, Analysis of Element [1.2].

76. In the example discussed above, each point is also associated with a distinct two-dimensional flat pattern 120 and represents **attributes** indicating that *the points are located in... different pattern pieces of the clothing*. See LINGDI-1005, 5:47-6:00. And, because the **length** of the line segment is used to represent spacing between the *different pattern pieces of the clothing*, the **length** is **determine[ed]** is **based on** the points being located with the distinct two-dimensional flat patterns 120 (**determined attributes of the areas**). See also, *infra*, ¶¶76-81.

77. Further, as depicted by way of example below, the Grinspun-Graphicxtras system provides that the determined length of the line segment is **changed to account for separation between** distinct two-dimensional flat patterns 120.<sup>1</sup> In particular, based on Grinspun's teaching for digital garment design, a user

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<sup>1</sup> Element [1.3] describes that the determined length is changed to account for separation between the pattern pieces, but I note that the claim language does not

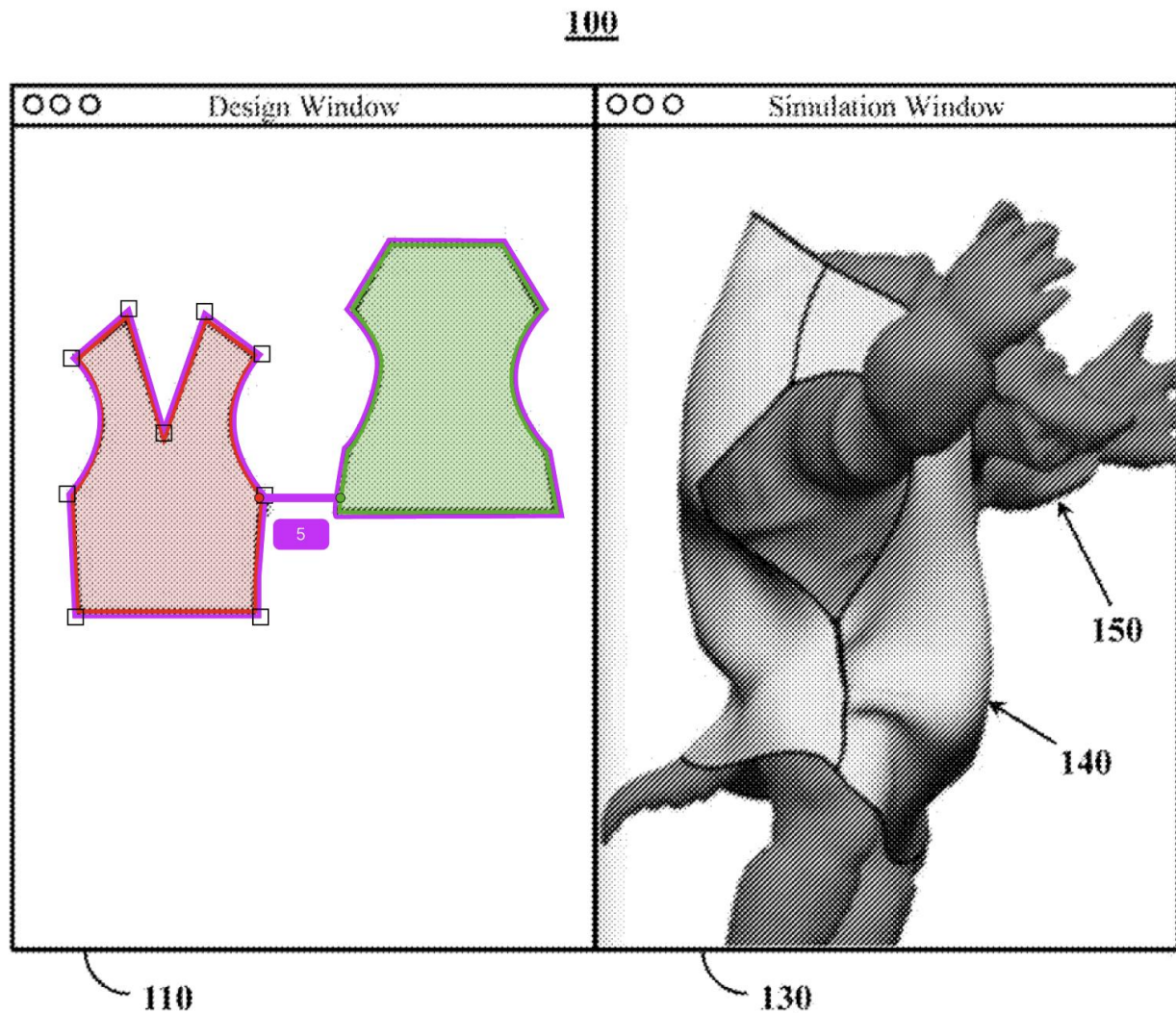
would have “generally create[d] and/or **edit[ed]** patterns and draped forms using mouse movements” within the 2D design window 110. LINGDI-1004, [0042] (“any suitable user input device for performing a gesture can be used”), [0043] (“the application calculates and displays revisions or alterations to the three-dimensional draped representation and the flat patterns at an interactive rate to provide real-time updates”). And Graphicxtras plainly suggests that a POSITA would have found it beneficial to visualize measurement guides, e.g., to confirm a desired positioning adjustment of 2D objects within the design window by comparing an initial measurement and a subsequent measurement before and after the repositioning. LINGDI-1005, 2:59-3:27 (“which is really quite nice”).

78. As discussed in Section X.A.3, and consistent with Graphicxtras’s

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specify how this separated is “accounted for.” LINGDI-1001, 18:1-4. The specification of the ’448 patent mentions an “example” embodiment in which a length is measured “by subtracting” a first length of one line from a second length of another line, and then further explains that this length value “maybe be changed” as a user deforms or changes a position or size of a pattern piece. LINGDI-1001, 4:20-34. Here, Element [1.3] does not mention “subtracting” a first length of one line from a second length of another line; it instead uses different language that is not specifically focused on the mere example in column 4.

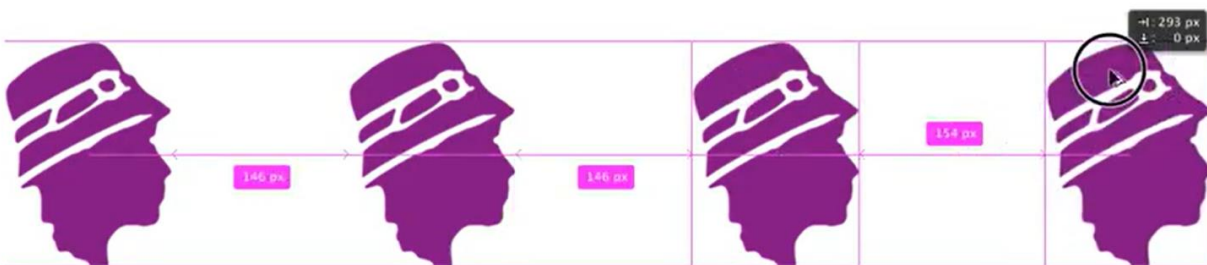
suggestion for real-time changes to the display length measurement, the user would have performed an initial measurement at a first time point ( $T_1$ ) using a first instance of the “measurement guide” function:



The figure above is an annotated version of Grinspun’s FIG. 1 based on Graphicxtras’ suggested improvement. See LINGDI-1005, 5:47-6:00. As shown, when the user initiates the first instance of the “measurement guide” function, the

length value of the line segment based on the positioning of the two-dimensional flat patterns 120 is “5.”

79. For reasons I previously explained, this is consistent with Graphicxtras’ suggestion for using the “measurement guide” function to measure a horizontal distance between two objects within the 2D design window.



80. See LINGDI-1005, 5:47-6:00; *see also* LINGDI-1006, 1-2 (corroborating what is shown in Graphicxtras’s demonstration); LINGDI-1007, 14-16, 59-61 (corroborating what is shown in Graphicxtras’s demonstration).

81. After the first time point ( $T_1$ ), a user would have performed a positioning adjustment (consistent with Graphicxtras’ suggestion), e.g., by dragging one two-dimensional flat pattern (green) and moving its position within the design window 100 relative to the position of the other two-dimensional flat pattern (red). See LINGDI-1005, 5:47-6:00. In light of this suggestion, I refer by way of example to the annotated version of Grinspun’s FIG. 1 below:

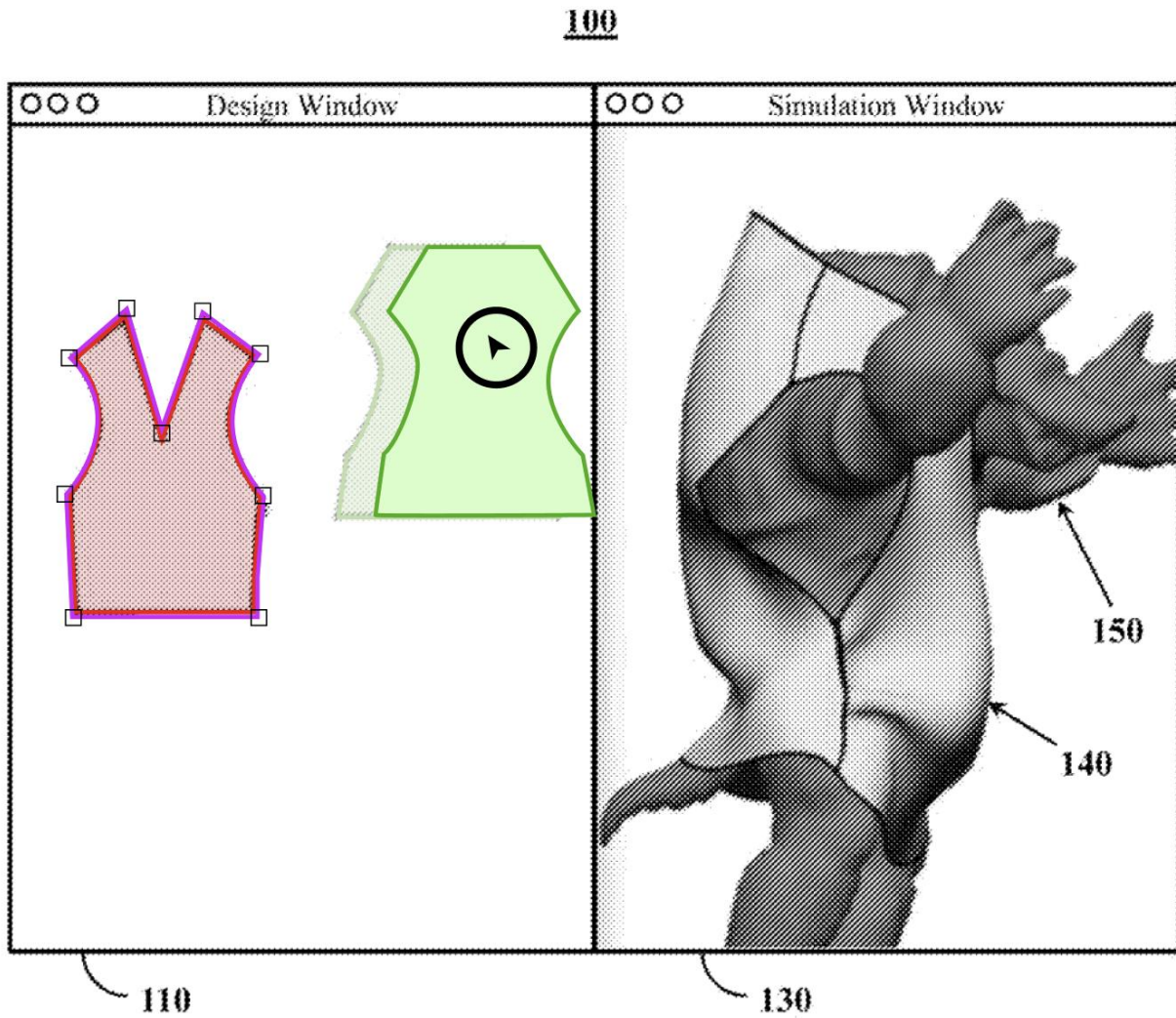
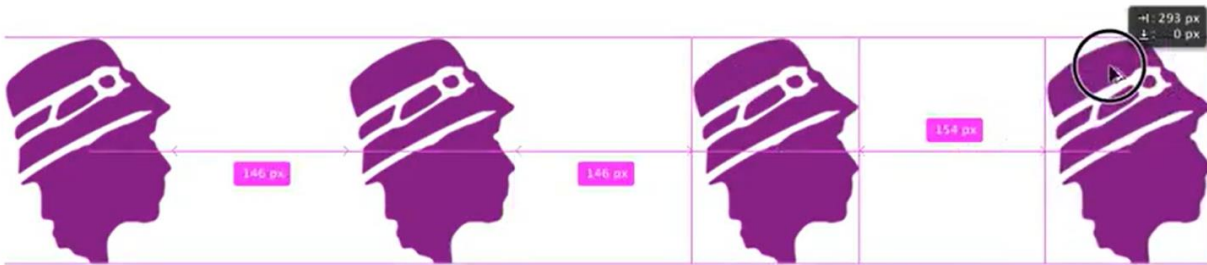


**FIG. 1**

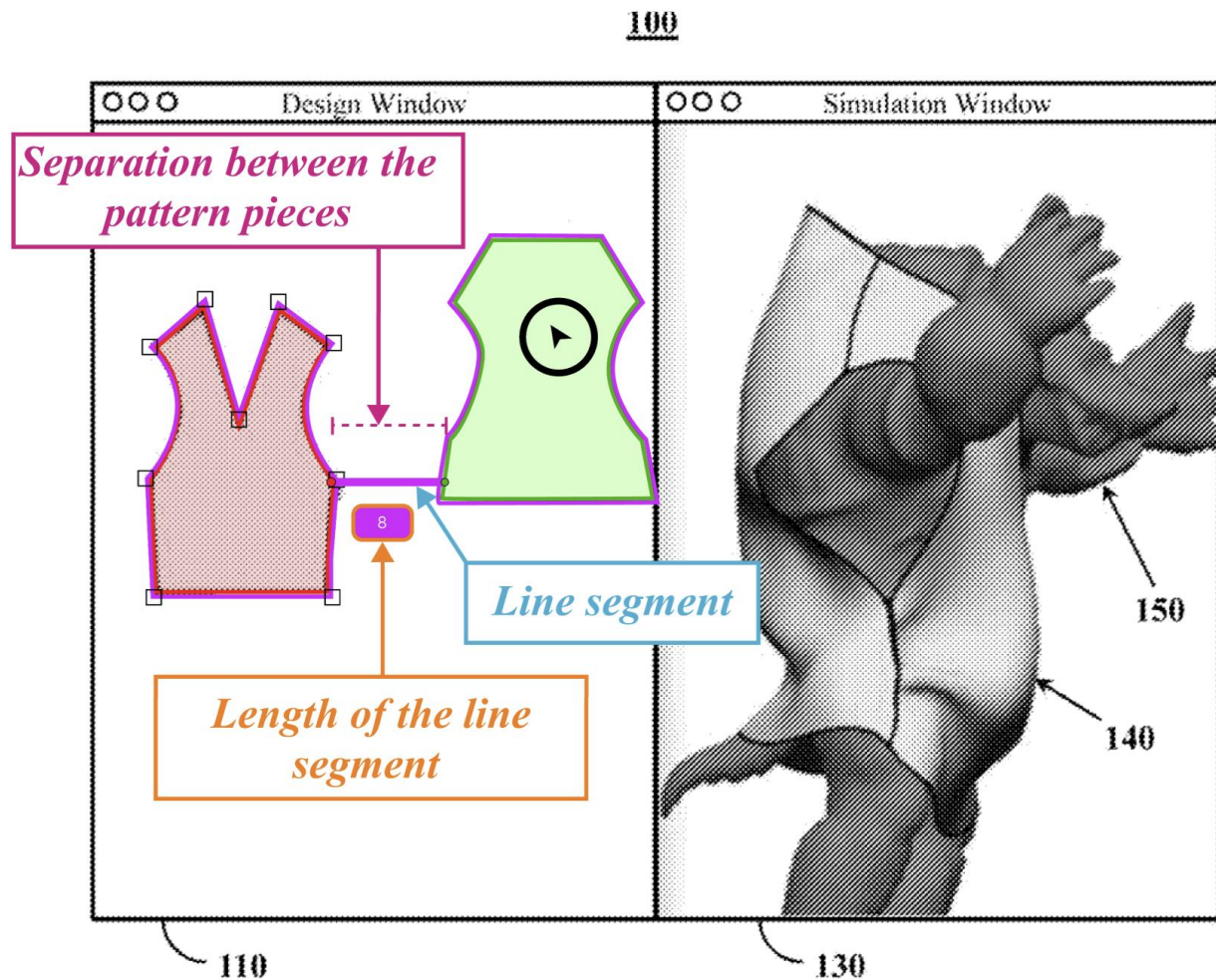
The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicxtras' suggested improvement. See LINGDI-1005, 5:47-6:00. As shown, the user would have performed the positioning adjustment by selecting a 2D pattern (green) using a mouse cursor and dragging it to a new position (shaded as darker green) within the design window 100. This interaction technique is consistent with the suggested use/reorganization of the 2D objects in Graphicxtras:



LINGDI-1005, 5:47; *see also* LINGDI-1006, 1-2 (corroborating what is shown in Graphicxtras’s demonstration); LINGDI-1007, 14-16, 59-61 (corroborating what is shown in Graphicxtras’s demonstration).

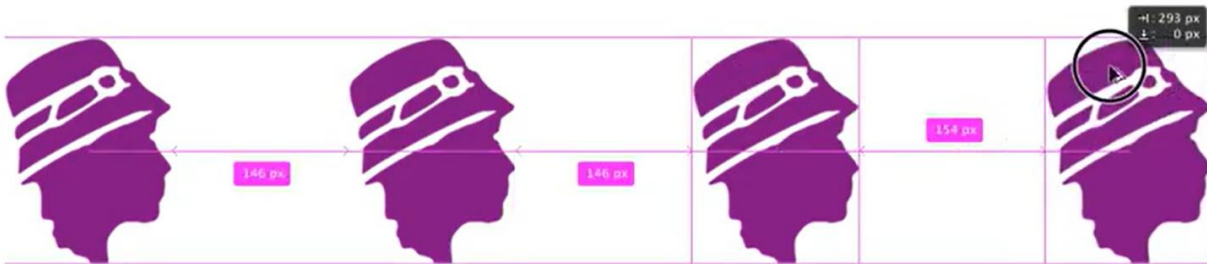
82. I note that this resulting combination discussed above is also consistent with Grinspun, which teaches that its application allows a user to “modify a [2D] flat pattern,” using a variety of “mouse manipulations,” such as “using click, drag, and/or release mouse manipulations,” and in response, “perform various determinations (e.g., sensitivity analysis, tensor mesh manipulation, etc.) and display the resulting effects on the three-dimensional form, thereby providing instantaneous feedback during editing.” LINGDI-1004, [0084].

83. Based on the Graphicxtras’ suggested improvement, after performing the positioning adjustment at the second time point ( $T_2$ ) as depicted above, the distance measurement displayed onscreen is changed, e.g., based on the new position of the selected pattern piece:



Again, the figure above is an annotated version of Grinspun's FIG. 1 based on Graphicextras' suggested improvement. See LINGDI-1005, 5:47-6:00. In this illustrative example at the second time point ( $T_2$ ), the length of the line segment represents the determined length that was ***changed to account for the separation between*** the two patterns 120 (after the positioning adjustment). In this example, the distance measurement between the two patterns is changed to a value of "8" to reflect the adjusted relative positioning. Here again, this is consistent with the

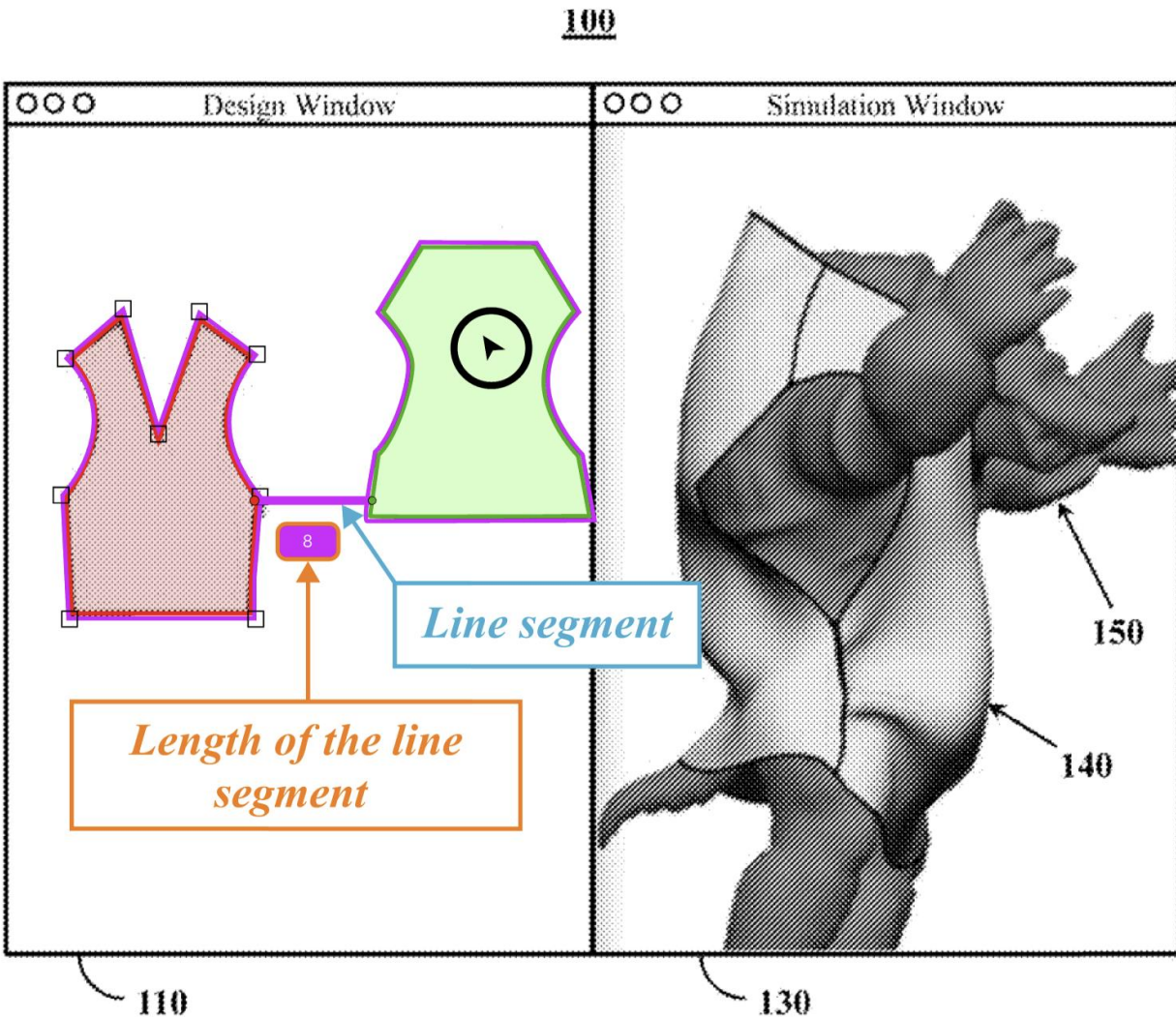
suggestion of Graphicxtras, which teaches that the “measurement guide” function should provide real-time changes to the length value of the line segment displayed onscreen based on the repositioning of one of the 2D objects within the design window:



LINGDI-1005, 5:57; *compare id.*, 5:47 (relative horizontal distance value of “154”) and 5:57 (relative horizontal distance value of “88”).

***[1.4] outputting the length of the line segment.***

84. In accordance with my previous analysis of Element [1.3], the Grinspun-Graphicxtras system renders obvious usage scenarios in which the line segment used for distance measurement is ***changed to account for separation between*** distinct 2D flat patterns 120. And also consistent with Graphicxtras’ suggested improvement, the Grinspun-Graphicxtras system ***outputs the length of the line segment*** by displaying onscreen the length measurement within design window 110:



The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicxtras' suggested improvement. See LINGDI-1005, 5:47-6:00.

(b) **Claim 2**

- **[2] The method of claim 1, wherein the determining of the attributes of the areas comprises: analyzing a data structure corresponding to each of the points to determine the attributes.**

85. In accordance with my previous analysis for Element [1.1], a user

may provide an input command initiating the “measurement guide” function.

LINGDI-1005, 0:15-0:19 (“ALT and CMD, or control on the PC”). Upon receiving this input, the Grinspun-Graphicxtras system would have established two points that are defined at the periphery of the area of each of the two patterns (**plurality of points**). *Id.* As I explained previously, a POSITA would have readily recognized these teachings from Graphicxtras’s video demonstration (cited in this Declaration) regarding the “measurement guide” function. Other corroborating publications show that this suggested user interface was in fact present in the CAD software of Graphicxtras. *See* LINGDI-1006, 1-2 (corroborating Graphicxtras’s demonstration of a “CMD + hover” command); LINGDI-1007, 14-16, 59-61(same).

86. In accordance with my previous analysis for Element [1.2], Graphicxtras provides onscreen examples (at 3:05-4:03 and 5:47-6:00) that the process of establishing points for distance measurement by the system would have involved **determining attributes of areas in which the points are located** in that the establishment of the two points represents **attributes** indicating that **the points are located in... different pattern pieces of the clothing**. *Id.*

100

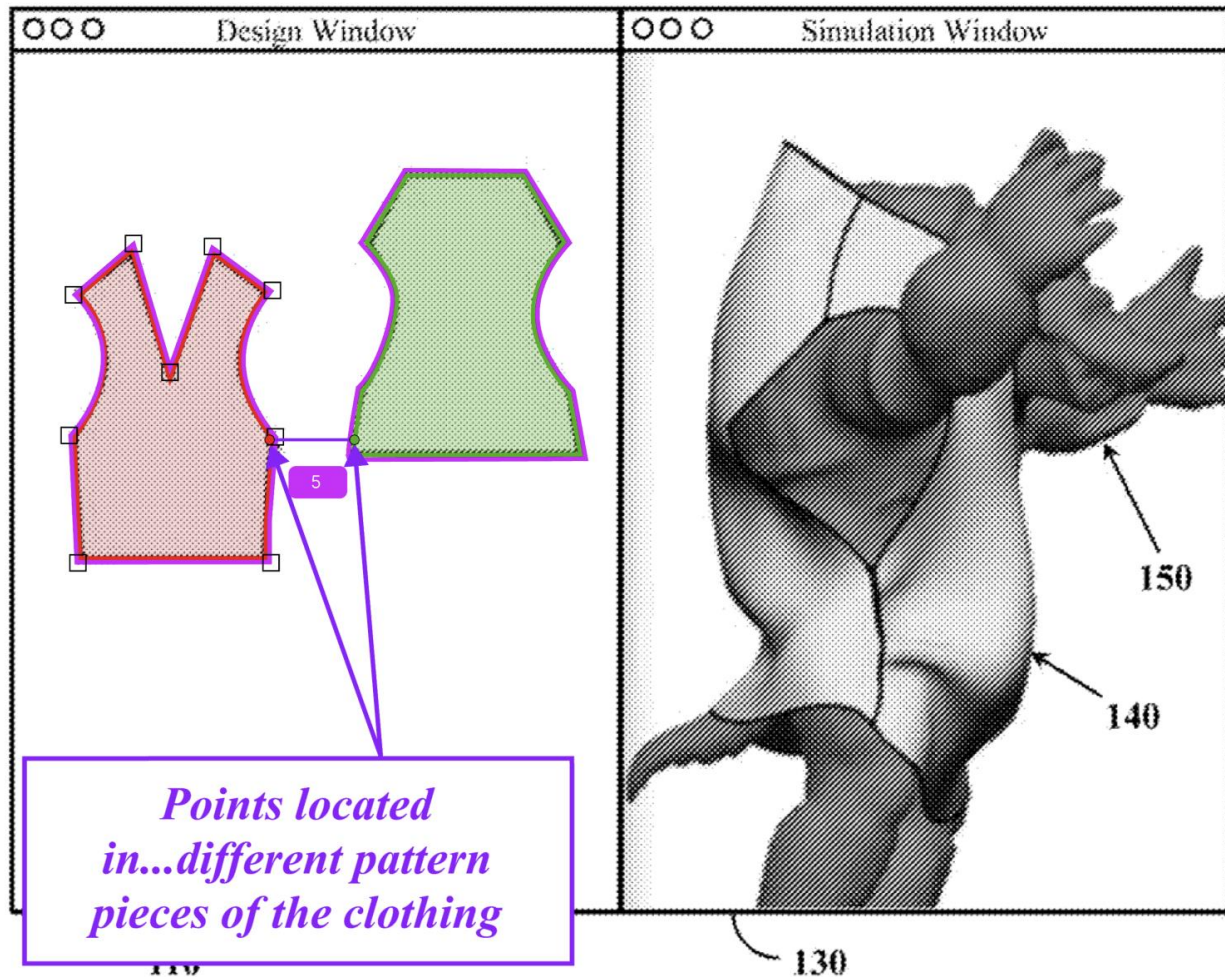


**FIG. 1**

The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicxtras' suggested improvement. See LINGDI-1005, 5:47-6:00. A POSITA would have recognized that such a distance measurement involves determining attributes of areas because the CAD software (both in Grinspun and Graphicxtras) represented the spatial relationships and dimensions within a design.

87. Based on the suggestion discussed above (points at the periphery of an

inserted 2D object), the Grinspun-Graphicxtras system also would have established the points through analysis of coordinates/area associated with each point within the 2D object. Graphicxtras (for example, at 3:37) shows that a set of current coordinates associated with the selected/repositioned 2D object are visualized to a user as the user adjusts the location of the 2D object within the design window.



See, e.g., LINGDI-1005, 3:37. A POSITA would have understood that this feature is enabled by software tracking a current coordinate location of the 2D object. Indeed, because coordinates of an object are updated in real-time within an onscreen interface (as suggested in Graphicxtras), this indicates that CAD software continuously monitors and processes positional data of the 2D object. The results of the processing are then reflected as changes on the onscreen interface. The

software may use tracking mechanisms to capture and relay coordinate changes dynamically. One example is through use of a parametric model, where changes in dimensions or constraints of 2D objects are processed to automatically update the coordinates and geometry of the 2D objects in real-time. Parameters are linked, so modifying one aspect triggers updates throughout the model. These features were well-known and easily incorporated in the Grinspun-Graphicxtras system.

The Grinspun-Graphicxtras system is also configured to analyze coordinates of the points. When a user engages the “measurement guide” function, the system uses these coordinates to identify attributes of a line segment (e.g., starting coordinate, terminating coordinate) used for measurement. LINGDI-1005, 5:47-60. As I previously explained, a POSITA would have readily recognized from Graphicxtras’s video demonstration (cited in this Declaration) regarding the “measurement guide” function. Other corroborating publications show that this suggested user interface was in fact present in the CAD software of Graphicxtras were well-known. *See* LINGDI-1006, 1-2 (corroborating Graphicxtras’s demonstration of a “CMD + hover” command); LINGDI-1007, 14-16, 59-61 (same).

88. The discussion of the Grinspun-Graphicxtras system above is very similar to examples of data structures described in described in the ’448 patent specification. The ’448 patent specification explains that examples of a “data

structure corresponding to each of the points data structure” includes “a link, information associated with at least one of a pattern piece in which each of the points is positioned, a line in a pattern piece on which each of the points is positioned, or a point on a line in a pattern piece.” LINGDI-1001, 2:20-25. As I’ve explained above, because Graphicxtras suggests that coordinates of an object are updated in real-time within an onscreen interface, this indicates that CAD software of the Grinspun-Graphicxtras system would have continuously monitored and processed “information associated with at least one of a pattern piece in which each of the points is positioned.” LINGDI-1005, 3:37. Analysis of the coordinates associated with the two points of the Grinspun-Graphicxtras system) as depicted in Elements [1.1] and [1.2]) would have provided the step of ***analyzing a data structure corresponding to each of the points to determine the attributes*** recited in claim 2. *Id.*

(c) **Claim 3**

- ***[3] The method of claim 2, wherein the data structure corresponding to each of the points includes, in a form of a link, information associated with at least one of a pattern piece in which each of the points is positioned, a line in a pattern piece on which each of the points is positioned, or a point on a line in a pattern piece.***

89. Based on the language used in claim 3, the claim requires a single ***data structure*** that is only one of three listed elements. This is a natural reading of the claim for several reasons. First, use of the article ***the*** and reference to ***data***

**structure** as a single element suggests that claim 3 can be satisfied where the **data structure** is one of the three listed elements but not necessarily the others. For example, a **data structure** that is a **point on a line in a pattern piece** (but not the entirety of the **line** or a **pattern piece**) would seem to satisfy the claim language of claim 3 without the **data structure** being all three listed elements.

90. Additionally, the presence of the conjunction “or” in separating individual elements within the list also confirms that claim 3 requires one of the three listed elements. If the claim was intended to cover a “data structure” that is each and every one of the three listed elements, then the claim language would not have included the phrase “at least one of” and would have also used the conjunction “and” to separate individual elements within the list.

91. In accordance with my previous analysis for Claim 2, because Graphicxtras suggests that coordinates of an object are updated in real-time within an onscreen interface, this indicates that CAD software of the Grinspun-Graphicxtras system would have continuously monitored and processed coordinates associated with each point within the design window 110. See LINGDI-1005, 3:37. For example, when a user engages the “measurement guide” function, the CAD software of the Grinspun-Graphicxtras system would have used identified attributes of a line segment associated with these coordinates (e.g., starting coordinate, terminating coordinate). LINGDI-1005, 5:47-60. These

attributes are then used to perform a distance measurement. Other corroborating publications show that this suggested user interface was in fact present in the software of Graphicxtras. See LINGDI-1006, 1-2 (corroborating Graphicxtras's demonstration of a "CMD + hover" command); LINGDI-1007, 14-16, 59-61 (same). This process would have provided an analysis of a ***data structure*** that is ***information associated with at least one of a pattern piece in which each of the points is positioned*** because the Grinspun-Graphicxtras system may analyze coordinate identifying a point on a boundary of a 2D flat pattern 120. Similarly, the process would have provided an analysis of a ***data structure*** that is ***a line in a pattern piece on which each of the points is positioned*** because the Grinspun-Graphicxtras system may analyze a line segment used for measurement when a user engages the "measurement guide" function. Further, the process would have also provided analysis of a ***data structure*** that is ***a point on a line in a pattern piece*** because the Grinspun-Graphicxtras system may analyze a starting point on a boundary of a reference object when a user engages the "measurement guide" function). See LINGDI-1001, 2:20-25.

(d) **Claim 4**

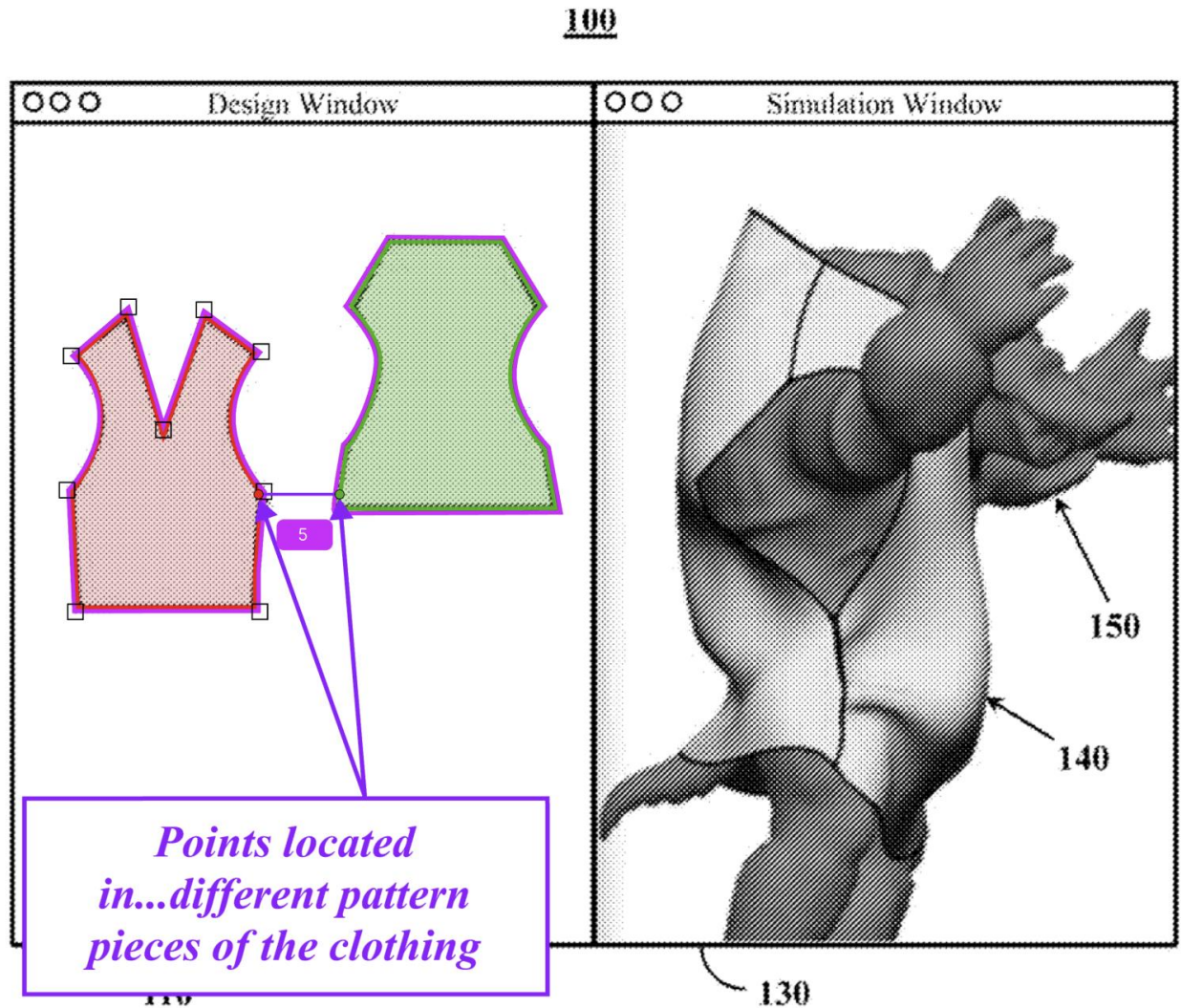
***[4] The method of claim 1, wherein the attributes of the areas comprises at least one of: a first attribute indicating that an area in which points are located corresponds to a same pattern piece of the 2D pattern; a second attribute indicating that an area of one of the points is located in a first pattern piece and an area of another of the***

*points is located in a second pattern piece different from the first pattern piece; a third attribute indicating that an area in which a start point and an end point of the points are located corresponds to an outer arc of a same pattern piece of the 2D pattern; a fourth attribute indicating that an area including one of the start point and the end point of the points corresponds to a pattern piece of the 2D pattern, and an area including the other of the start point and the end point corresponds to a remaining area excluding the pattern piece of the 2D pattern; or a fifth attribute indicating that areas including the points outside the 2D pattern.*

92. Based on the language used in claim 4, the claim requires **attributes** that are only one of five listed **attribute** elements. Use of the article **or** suggests that claim 4 can be satisfied where the “attributes” is one of the five listed elements but not necessarily the others. For example, **attributes** that *indicat[e] that an area of one of the points is located in a first pattern piece and an area of another of the points is located in a second pattern piece different from the first pattern piece* (but not the other four attributes listed in the claim) would seem to satisfy the claim language of claim 4.

93. In accordance with my previous analysis for Element [1.2], the Grinspun-Graphicxtras system would have provided at least the **second attribute** option based on the suggestions of an example where a measurement is provided between a first point (**one of the points**) on the boundary of a first object (**first pattern piece**) and a second point (**another of the points**) on the boundary of a second object (**second pattern piece**). *Supra* Analysis of Elements [1.2]-[1.3]. As

previously explained, one depiction of the Grinspun-Graphicxtras system (by way of example only, for illustrative purposes) is shown below based on annotations to Grinspun's Figure 1 (modified to incorporate Graphicxtras' suggestion for improved onscreen information).



See LINGDI-1005, 5:47-6:00. Consistent with Graphicxtras' suggestion that the points are located at the border of each inserted 2D object, the example shown

above confirms that each of the points are associated with *different* 2D patterns 120.

(e) **Claim 14**

***[14.1] The method of claim 1, wherein the 2D pattern is modeled with a mesh including a plurality of polygons,***

94. As explained above in Section X.A.1, Grinspun teaches that that 2D flat pattern 120 (***2D pattern***) is “concurrently updated” with 3D simulated representation 140. LINGDI-1004, [0039]; *see also id.*, [0036]-[0038], [0042]. Grinspun also explains that the 3D simulated representation 140 is “shown in the three-dimensional view 130” and is “simultaneously and/or synchronously” updated based on alterations to 2D flat pattern 120 (e.g., “altering the shape or position of a pattern boundary”). *Id.*, [0038]. This suggests that the CAD software of Grinspun can utilize, for example, data links to ensure that modifications made to flat pattern 120 are instantly reflected in 3D simulated representation 140. Use of data links would have enabled real-time synchronization between 2D and 3D representations, enhancing design accuracy and efficiency.

95. Additionally, based on Grinspun’s teachings, each 2D flat pattern 120 would have been understood to be uniquely tied (or otherwise linked) to a corresponding 3D simulated representation 140. LINGDI-1004, [0040]. Grinspun describes that “[a]s the three dimensional draped representation is updated in

response to the alteration in real time, the application shows the modifications to the two-dimensional flat patterns in real time.” LINGDI-1004, [0039]. From this teaching, a POSITA would have realized that real-time synchronization between 2D and 3D representations is an important aspect to Grinspun since a user may make changes to either a 2D or a 3D representation, which would then need to be reflected in the other corresponding representation. One way of achieving such real-time synchronization is through use of data links in CAD software. For example, parametric constraints define relationships and constraints between different design elements (e.g., virtual objects), which ensures that changes in one representation (e.g., a 2D representation) automatically updates a related representation (e.g., a 3D representation) and vice versa. Another example is associative geometry, which is a link type that ensures geometric entities in different views or models are interconnected so that modifications in one representation (e.g., altering a line or curve in a 2D representation) are immediately reflected in a corresponding 3D model. These data links maintain consistency and accuracy across different representations of a design, facilitating an integrated and dynamic design process.

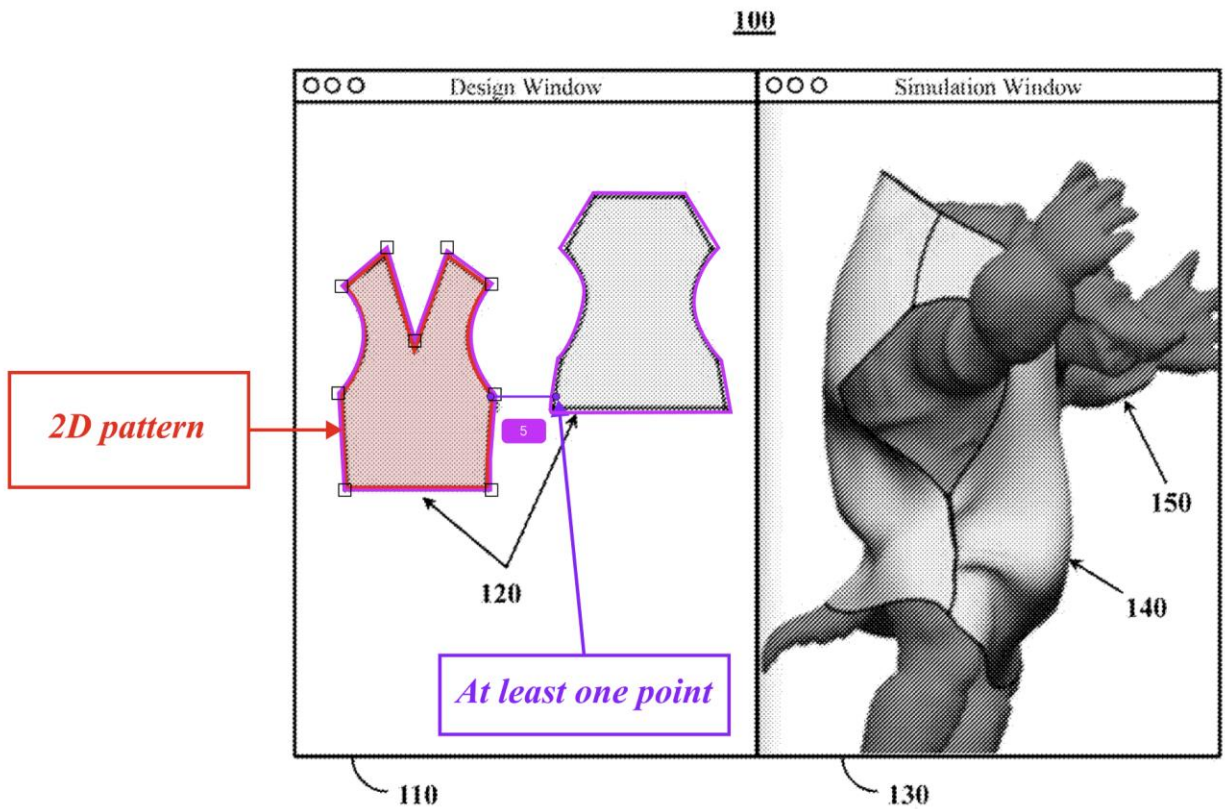
96. In generating 3D simulated representations 140, the Grinspun-Graphicxtras system would have used polygon-based mesh structures (as described in Grinspun) such that 2D flat patterns 120 are ***modeled with a mesh including a***

**plurality of polygons.** See LINGDI-1004, [0067]. Grinspun describes that CAD software can “include [a] selection of one or more cloth models[,]” including use of “**triangle meshes** with multiple models that treat bending and stretching models separately.” LINGDI-1004, [0067] (emphasis added). Grinspun also teaches using several types of meshing techniques to generate 3D simulated representations for the 2D flat patterns. See, e.g., LINGDI-1004, [0069], [0071]-[0074], [0080]-[0084]. These techniques convert 2D patterns into 3D simulated representations by creating a mesh composed of numerous interconnected polygons. The mesh allows a 2D fabric pattern to be accurately draped and visualized on a 3D model (e.g., reflecting realistic garment behavior and fit).

***[14.2] wherein at least one point outside the 2D pattern is defined by a relative position of the at least one point with respect to the 2D pattern.***

97. In accordance with my previous analysis for Element [1.2], in one example of the Grinspun-Graphicxtras, a user activates the “measurement guide” function during the garment design process. In this example, the system would have determined that two points associated with a line segment are each associated with distinct 2D patterns 120. LINGDI-1004, [0036], [0038]; see LINGDI-1005, 5:47-6:00. As shown in the annotated figure below, a point in this example is associated with a boundary of a second 2D pattern (***at least one point***) and has a coordinate (***relative position***) that is ***outside*** the boundary of the reference 2D

pattern (*the 2D pattern*):



The figure above is an annotated version of Grinspun's FIG. 1 based on Graphicxtras' suggested improvement. See LINGDI-1005, 5:47-6:00.

(f) **Claim 15**

***[15.pre] A non-transitory computer-readable storage medium storing instructions thereon, the instructions, when executed by a processor, cause the processor to:***

98. This preamble recites a “non-transitory computer-readable storage medium” followed by a recitation of intended use (“storing instructions” that “when executed by a processor, cause the processor to:”). As I’ve explained for

[1.pre], I have been informed that, under the law, a recitation of purpose of intended use in a preamble is not a limitation. But even if this preamble was treated as a claim limitation, the Grinspun-Graphicxtras system provides the recited non-**transitory computer-readable storage medium**, as confirmed by Grinspun. *Supra* Element [1.pre]; see also LINGDI-1004, [0091]-[0095]. Grinspun teaches that “any suitable computer readable media can be used for storing instructions for performing the processes described herein, can be used as a content distribution that stores content and a payload, etc.,” e.g., “computer readable media [that] can be transitory or non-transitory.” LINGDI-1004, [0094].

***[15.1] receive a plurality of points in a space in which a 2D pattern of clothing is displayed;***

99. *Supra* Element [1.1].

***[15.2] determine attributes of areas in which the points are located, wherein the attributes indicate at least whether the points are located in a same pattern piece of the clothing or different pattern pieces of the clothing;***

100. *Supra* Element [1.2].

***[15.3] determine a length of a line segment using the points based on the determined attributes of the areas, the determined length of the line segment changed to account for separation between the pattern pieces responsive to determining that the points are located in different pattern pieces; and***

101. *Supra* Element [1.3].

***[15.4] output the length of the line segment.***

102. *Supra* Element [1.4].

(g) **Claim 16**

***[16.pre] An apparatus for taking a measurement of a two-dimensional (2D) pattern, comprising:***

103. This preamble recites an “apparatus” followed by a recitation of intended use (“for taking a measurement of a two-dimensional (2D) pattern...”). As I’ve explained for [1.pre], I have been informed that, under the law, a recitation of purpose or intended use in a preamble is not a limitation. But even if this preamble was treated as a claim limitation, the Grinspun-Graphicxtras system provides the recited ***apparatus***, as confirmed by Grinspun. *Supra* Element [1.pre]; *see also* LINGDI-1004, [0096]-[0101]. Grinspun describes a “user computer 1801” (***apparatus***) which “include[s] processor 1902, display 1904, input device 1906, and memory 1908...” on which CAD software of the Grinspun-Graphicxtras system may be implemented. LINGDI-1004, [0096]; *see id.*, [0100] (describing a garment application that may include “client side software, hardware, or both”). Grinspun describes other device implementation examples of its CAD software, such “a personal computer (‘PC’), a main frame computer, a dumb terminal, a data display, a two-way pager, a wireless terminal, a portable telephone, a portable computer, a palmtop computer, an H/PC, an automobile PC, a laptop computer, a cellular phone, a personal digital assistant (‘PDA’), a combined cellular phone and

PDA, etc.)...” *Id.*, [0101].

***[16.1] a user interface (UI) device configured to receive, from a user, a plurality of points in a space in which a 2D pattern of clothing is displayed;***

104. As explained above in Section X.A.3 and Element [1.1], the Grinspun-Graphicxtras system would have been implemented in a computing device with a graphical user interface (***user interface (UI device)***). This configuration would have allowed the graphical user interface provide the suggested improvement of Graphicxtras (such as the “measurement guide” and “matched spacing” functions of the “Smart Guide” feature) within Grinspun’s design window 110. *Supra* Element [1.1]. Grinspun describes that a “user computer 1801,” which “include[s] processor 1902, **display 1904**, input device 1906, and memory 1908...” LINGDI-1004, [0096] (emphasis added). Grinspun also describes that access to its CAD software may be provided through “distribution to user computer 1802” using a “a graphical user interface (‘GUI’), which allows a user to interact with the application resident at, for example, server 1810.” LINGDI-1004, [0099]. These computing architectures could be easily configured to implement the aspects of the Grinspun-Graphicxtras system described in Section X.A.3.

***[16.2] a processor coupled to a memory to execute instructions on the memory the memory instructions causing the processor to: determine attributes of areas in which the points are located,***

***wherein the attributes indicate at least whether the points are located in a same pattern piece of the clothing or different pattern pieces of the clothing, and***

105. As explained above in Section X.A.3 and Elements [1.2]-[1.4], the Grinspun-Graphicxtras system would have been implemented in a computing device with a processor (***processor***). This configuration would have allowed the processor to execute operations related to the suggested improvement of Graphicxtras (such as the “measurement guide” and “matched spacing” functions of the “Smart Guide” feature). *Supra* Element [1.2]. The processor is coupled to associated storage (***memory***) to perform instructions (***instructions on the memory***) corresponding to processing functions previously discussed in Elements [1.2], [1.3], and [1.4]. *Supra* § X.A.3; Elements [1.2]-[1.4].

106. As I’ve discussed above for Element [16.1], Grinspun describes that its CAD software may be provided on a “user computer 1801,” which “include[s] processor 1902, display 1904, input device 1906, and **memory 1908**...” LINGDI-1004, [0096]. The memory 1908 “contains a storage device for storing a computer program for controlling processor 1902.” *Id.* Additionally, “processor 1902 uses the computer program to present on display 1904 the application and the data received through communications link 1804 and commands and values transmitted by a user of user computer 1802.” *Id.*, [0097]. These computing elements could be easily configured to implement the aspects of the Grinspun-Graphicxtras system

described in Section X.A.3.

***[16.3] determine a length of a line segment using the points based on the determined attributes of the areas, the determined length of the line segment changed to account for separation between the pattern pieces responsive to determining that the points are located in different pattern pieces; and***

107. *Supra* Element [1.3].

***[16.4] an output device configured to output the length of the line segment.***

108. *Supra* Element [1.4].

(h) **Claim 17**

***[17] The apparatus of claim 16, wherein the instructions further cause the processor analyze a data structure corresponding to each of the points to determine the attributes.***

109. *Supra* Elements [2] and [16.2].

(i) **Claim 18**

***[18] The apparatus of claim 16, wherein the attributes of the areas comprises at least one of: a first attribute indicating that an area in which points are located corresponds to a same pattern piece of the 2D pattern; a second attribute indicating that an area of one of the points is located in a first pattern piece and an area of another of the points is located in a second pattern piece different from the first pattern piece; a third attribute indicating that an area in which a start point and an end point of the points are located corresponds to an outer arc of a same pattern piece of the 2D pattern; a fourth attribute indicating that an area including one of the start point and the end point of the points corresponds to a pattern piece of the 2D pattern, and an area including the other of the start point and the end point corresponds to a remaining area excluding the pattern piece of the 2D pattern; or a fifth attribute indicating that areas including the points outside the 2D pattern.***

110. *Supra* Element [4].

**XI. ADDITIONAL REMARKS**

111. I currently hold the opinions set expressed in this declaration. But my analysis may continue, and I may acquire additional information and/or attain supplemental insights that may result in added observations.

112. I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare 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 the Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this proceeding.

Dated: 5/28/2024

By:   
Dan Perreault of Lake Mary, Florida

# **APPENDIX A**

# DAN PERREAULT

AERONAUTICAL ENGINEER,  
ENTREPRENEUR

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## SUMMARY

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I am an engineer with 30 years of professional experience, including 30+ years in 3D. I graduated from Embry Riddle Aeronautical University in 1989 with a bachelor's degree in Aeronautical Engineering. I started my 3D career as the first Applications Engineer at FARO Technologies, having evangelized 3D metrology in the manufacturing environment using the FARO Arm portable CMM. I started NeoMetrix Technologies, Inc. in 2003 in the metro Orlando, FL region as a Konica-Minolta 3D scanner sales representative, and engineering service provider. In 2008 NeoMetrix expanded into 3D printing by adding Objet 3D printers to the product portfolio. NeoMetrix currently represents Creaform, Geomagic, Markforged & BigRep and provides services such as 3D scanning, 3D printing, reverse engineering and rapid prototyping in Florida and throughout the United States.

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## SKILLS

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Computer Aided  
Design  
3D Laser Scanning  
Reverse Engineering  
Computer Aided  
Inspection  
3D Printing  
Rapid Prototyping  
Engineering Project Management

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## EXPERIENCE

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### **President & CEO 2003 - Present**

NeoMetrix Technologies, Inc.

NeoMetrix provides solutions for rapid product development, including 3D scanning, 3D printing, rapid prototyping and reverse engineering. Our customers range from 1 person operations to world class companies such as Disney, Lockheed Martin, NBC Universal, & Northrop Grumman.

### **Sales Director 2002 - 2003**

NeoMetrix Technologies, Inc.

Sale of FARO Arms, Perceptron & Minolta 3D Laser Scanners, Geomagic & Polyworks software. Promoting the use of non-contact laser scanning solutions for 3D measurement, reverse engineering, and computer aided inspection.

### **Director, Applications Engineering 1997 to 2002**

FARO Technologies

### **Applications Engineer 1993 - 1997**

FARO Technologies

Promote portable coordinate measuring machines as a real alternative to traditional CMM's and other measurement systems for reverse engineering and computer aided inspection. Traveled extensively throughout the U.S., Latin America and Europe to assist in the development of applications to solve real manufacturing related metrology issues in the automotive and aerospace industries. Helped FARO software and hardware engineers adapt a medical measurement tool for industrial applications.

### **Mechanical Engineer**

ECC

Mechanical design of components for C17 jet engine maintenance trainer.

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## EDUCATION

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### **Bachelor of Science Aerospace Aeronautical and Astronautical Engineering 1989**

Embry-Riddle Aeronautical University

### **High School Diploma 1985**

Mount Saint Charles Academy