

16-1535

IN THE
United States Court of Appeals
FOR THE FEDERAL CIRCUIT

3FORM, INC.,

Plaintiff-Appellant,

—v.—

LUMICOR, INC.,

Defendant-Appellee.

ON APPEAL FROM THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF UTAH
JUDGE CLARK WADDOUPS
2:12-CV-00293-CW-BCW

BRIEF FOR PLAINTIFF-APPELLANT
[CORRECTED]

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3form, Inc.
2. The name of the real party in interest represented by us is:

3form, Inc. is now doing business as 3form, LLC.
3. All parent corporations and publicly held companies that own 10% or more of the stock of the party represented by us are:

Hunter Douglas, Inc.
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STATEMENT OF RELATED CASES

Counsel for Plaintiff-Appellant 3form, Inc. is unaware of any related cases within the meaning of Federal Circuit Rule 47.5.

JURISDICTIONAL STATEMENT

The District Court had jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338. Plaintiff-Appellant 3form, Inc.’s complaint includes claims for patent infringement under 35 U.S.C. § 271.

(Appx88–95.) In an order dated December 28, 2015, the District Court ruled that U.S. Patent No. 7,008,700 is invalid under 35 U.S.C. §§ 102 and 103, and also ruled that U.S. Patent No. D621,068 is invalid under 35 U.S.C. § 103. (Appx15–55.)

Plaintiff-Appellant 3form, Inc. filed its notice of appeal on January 25, 2016. (Appx1354–1355.) In an order dated March 21, 2016, the District Court certified that its December 28, 2015 ruling was final and appealable. (Appx1357.) This Court has jurisdiction over the appeal pursuant to 28 U.S.C. §§ 1292(a)(1), 1292(c)(1), and 1295(a)(1).

STATEMENT OF THE ISSUES

(1) Whether the District Court improperly construed the terms “unnatural appearing conformation,” “unnatural conformation,”

“unnatural appearance,” “substantially natural appearing conformation,” and “substantially natural conformation.”

(2) Whether the District Court improperly ruled that claims 1–3, 5–6, 8–14, and 16–19 of U.S. Patent No. 7,008,700 are invalid as anticipated pursuant to 35 U.S.C § 102(a);

(3) Whether the District Court improperly ruled that claims 4, 7, and 15 of U.S. Patent No. 7,008,700 are invalid as obvious pursuant to 35 U.S.C. § 103; and

(4) Whether the District Court improperly ruled that U.S. Patent No. D621,068 is invalid as obvious pursuant to 35 U.S.C. § 103.

STATEMENT OF THE CASE

Plaintiff-Appellant 3form, Inc. (“3form”) respectfully appeals from the December 28, 2015 order of the U.S. District Court for the District of Utah granting Defendant-Appellee Lumicor, Inc.’s (“Lumicor”) motion for summary judgment that U.S. Patent No. 7,008,700 (the ’700 Patent) is invalid under 35 U.S.C. §§ 102(a) and 103, and that U.S. Patent No. D621,068 (the ’068 Patent) is invalid under 35 U.S.C. § 103. (Appx15–55.)

As presented below, the District Court's decision improperly construed the claims, disregarded the summary judgment standard, and failed to identify sufficient evidence, let alone the requisite clear and convincing evidence, to invalidate 3form's patents. 3form respectfully requests that this Court reverse the District Court's order and remand for a trial to determine the issues of invalidity and infringement.

On March 26, 2012, 3form filed the instant action against Lumicor, alleging infringement of the '700 and '068 patents. With respect to the '700 Patent, 3form alleges that Lumicor infringed "by making, using, selling, and/or offering to sell, or inducing others to make, use, sell, and/or offer for sale, . . . products, such as the 'Lumicor Natural Décor panels.'" (Appx91.) Those panels include Lumicor's panels entitled "Zito," "Serengeti," "Kenya," "Savannah," "Pampas Reed," "Birch," "Rainforest," "Madagascar," "Ginko Reed," and "Tortoise Reed." (*Id.*) With respect to the '068 Patent, 3form alleges that Lumicor infringed "by making, using, selling, and/or offering to sell, or inducing others to make, use, sell, and/or offer for sale, . . . products,

such as the ‘Lumicor Natural Décor panels,’ including . . . those entitled ‘Spring Zito’ and ‘Autumn Zito.’” (Appx93.)

3form had previously filed an action against Lumicor on the same grounds on November 5, 2009. (Appx90.) That action was dismissed for lack of Article III standing based on issues relating to the ownership of the ’700 Patent at the time 3form filed its original complaint. (*Id.*) Since then, all questions of ownership have been resolved, and 3form is the current owner of all right, title, and interest in and to the ’700 Patent. (Appx91.) The parties also stipulated that all documents, depositions, and expert reports from the prior action shall be treated as if they were produced in this action. (Appx1484–1486.)

On November 22, 2013, the parties both moved for summary judgment. The District Court did not hold a separate *Markman* hearing, as the parties agreed to address claim construction simultaneously with their motions for summary judgment. (Appx15.) 3form moved for partial summary judgment that Lumicor infringed both the ’700 Patent and the ’068 Patent. Lumicor moved for summary judgment that both of 3form’s asserted patents are invalid. (*Id.*)

The District Court granted Lumicor's motion for summary judgment, holding both the '700 Patent and '068 Patent invalid. (Appx55.)

STATEMENT OF FACTS

A. 3FORM AND LUMICOR ARE COMPETITORS

3form designs, manufactures, and sells a wide variety of decorative laminate architectural panels. These panels include natural products embedded in plastic resins, such as the Thatch product shown below. (Appx412.)



As illustrated in this photograph, the resin panel allows a designer or architect to enhance a room with natural appearing objects encased in the plastic resin. Here, the natural appearing objects are thatch reeds. The substantially natural appearance of the embedded objects is important to their commercial success. (*Id.*)

B. 3FORM'S '700 PATENT

To protect its innovative laminate panels, 3form filed a patent application, which issued on March 7, 2006, as U.S. Patent No. 7,008,700. (Appx69–81.) As indicated in the title, “Architectural Laminate Panel with Embedded Compressible Objects and Methods for Making the Same,” the ’700 Patent is directed to the creation of panels with embedded three-dimensional objects that would otherwise be unnaturally compressed during the lamination process but for the inventive concepts disclosed in the patent. (Appx75.)

As background, the ’700 Patent describes the then-recent trend in architectural design of embedding various decorative objects within laminate panels in order to create attractive windows and partitions for offices and homes. (*Id.* at 1:27–30.) At the time, such decorative panels comprised two distinct groups of products: (1) panels made from acrylic

and cast in liquid form; and (2) panels made from solid (i.e., extruded) sheets of polycarbonates, PETG, and PMMA. Both manufacturing methods had distinct commercial advantages and disadvantages. (*Id.* at 1:39–2:46.)

Cast acrylic panels could be created with soft, three-dimensional objects embedded inside “by pouring the liquid acrylic around the desired objects, and then solidifying the acrylic into a hardened panel.” (Appx75 at 2:26–28.) Because this manufacturing process did not subject the embedded objects to significant pressure, the decorative objects maintained their natural, three-dimensional shape. Cast acrylic panels, however, are very expensive compared with the solid sheet (or extruded) laminates because of the “fairly high error rate due to the process of casting (pouring and setting),” which made the cast acrylic panels “more inefficient to produce.” (*Id.* at 2:42–44.) Additionally, cast acrylic panels are not very resistant to cracking or shattering compared with panels made from extruded sheet materials. (*Id.* at 2:38–42.)

Decorative panels made from solid sheets, on the other hand, were “suited primarily for embedding flat objects, such as flattened leaves, ferns, cutout designs, fabrics, and so forth,” or for embedding “fairly

rigid three-dimensional materials, such as crushed glass or rocks.” (*Id.* at 1:63–2:4) This is because conventional processes exerted pressures sufficient to collapse or otherwise compress softer three-dimensional objects; that is, they exerted pressures above the “critical pressure” of a compressible object.

Accordingly, the ’700 Patent sought to “combine the benefits of casting materials with the benefits of extruded sheet materials.” (*Id.* at 2:47–50.) That is, the inventors sought “the advantages of being able to embed compressible objects inside the panel . . . without significantly flattening the compressible objects,” while at the same time realizing the advantages of resiliency, ease of manufacture, and low costs from extruded sheet materials, such as PETG. (*Id.* at 2:50–56.)

The ’700 Patent describes a multiple-step process for embedding compressible objects within extruded sheets. Although the specification describes manufacturing methods and systems, the ’700 Patent claims only decorative architectural panels, albeit in the form of product-by-process claims. (Appx80.)

For example, claim one of the ’700 Patent (*id.*) claims a decorative architectural panel comprising:

one or more compressible objects suspended between two extruded resin sheets formed together about the one or more compressible objects using a plurality of pressures in a thermosetting process, at least one of the plurality of pressures being greater than or equal to a critical pressure sufficient to otherwise compress the one or more compressible objects to an unnatural appearing conformation;

wherein the one or more compressible objects maintain a substantially natural appearing conformation between the two formed resin sheets.

An exemplary process for manufacturing architectural panels with embedded compressible objects that maintain a natural conformation is pictured in Figure 3B of the '700 Patent. (Appx73.) A laminate assembly is placed into a thermosetting environment (e.g., stationary press) so that the assembly can undergo a series of pressure and temperature changes.

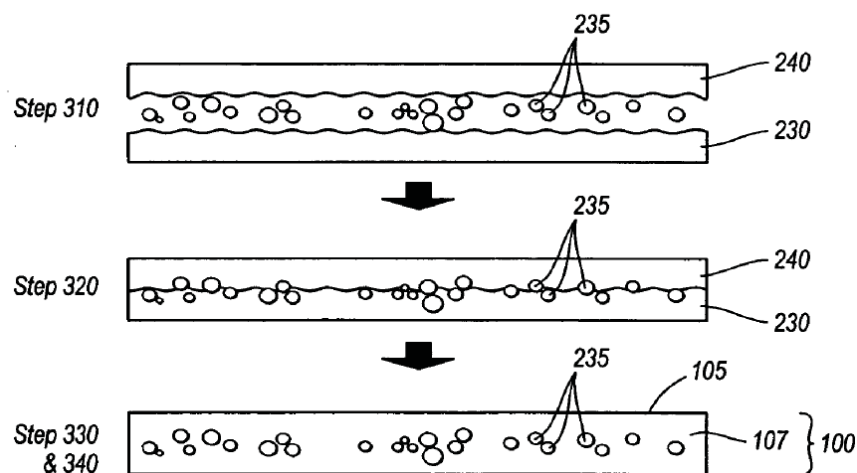
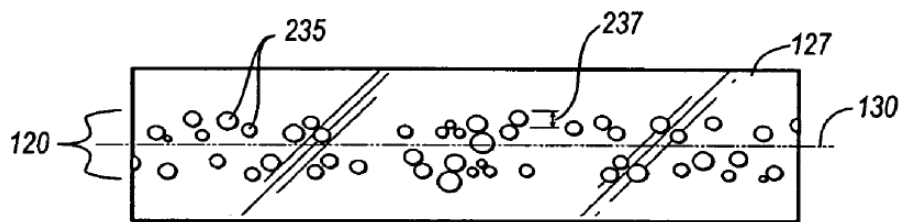
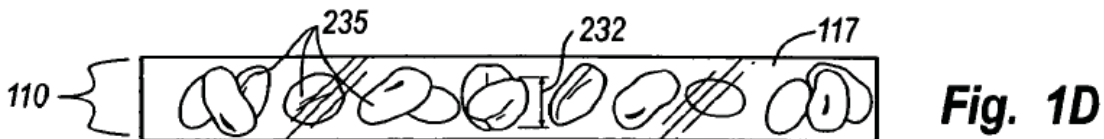
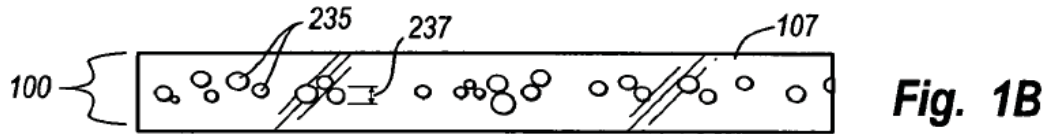


Fig. 3B

During the first step (310), a manufacturer applies between approximately 5 and 10 psi of pressure, and raises the temperature from approximately 70° F. to approximately 180° F., which causes the laminate sheets (230 and 240) to soften around the embedded materials (235). During the second step (320), the manufacturer raises the pressure between approximately 30 to 40 psi, and raises the temperature from approximately 180° F. to approximately 230° F., which causes the laminate sheets (230 and 240) to soften sufficiently that the embedded materials are completely enveloped. During the final steps (330 and 340), the manufacturer presses the laminate assembly into final form—by raising the pressure to approximately 92 psi and raising the temperature from approximately 230° F. to approximately 240° F.—and then cools the laminate assembly and removes the final, hardened decorative panel from the press. (Appx79 at 9:19–10:7.)

In this way, the '700 Patent teaches that objects that would otherwise be deformed by the pressures used in a conventional solid-sheet process can maintain a substantially natural conformation. Cross-sectional views show PETG panels embedded with compressible

objects that maintain their natural conformation: thatch reed (Fig. 1B), coffee beans (Fig. 1D), and bamboo (Fig. 1F). (Appx70–71.)

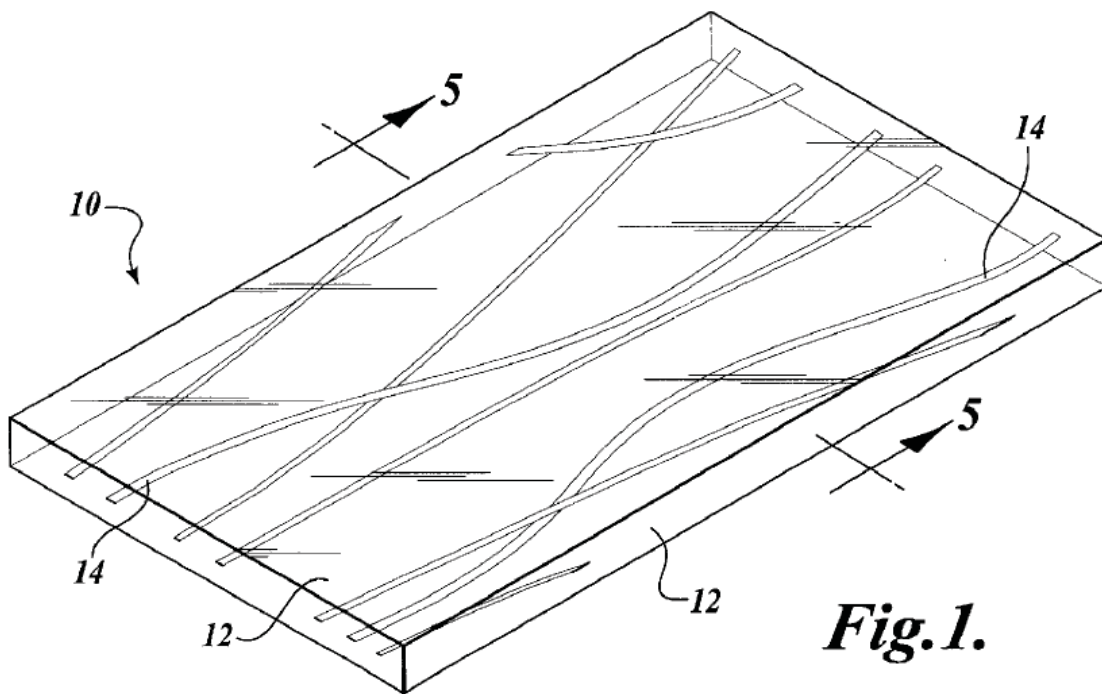


C. THE SCHOBER REFERENCE

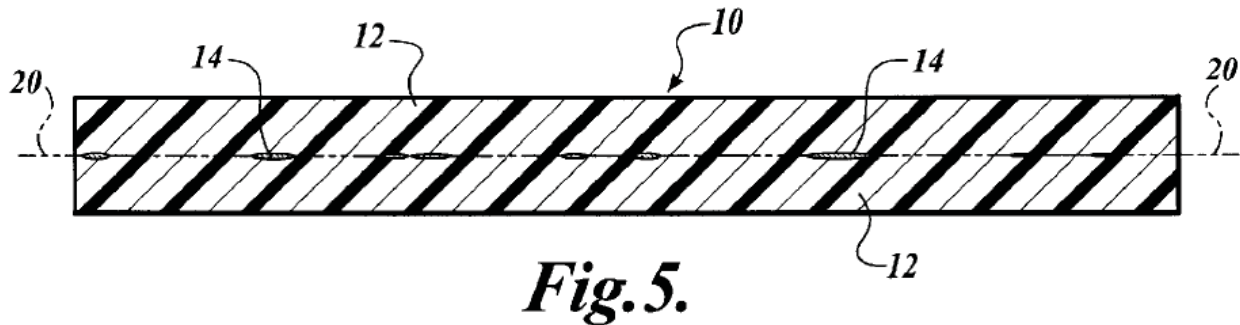
During prosecution of the '700 Patent, in an Information Disclosure Statement, 3form disclosed to the Patent Office U.S. Patent Application Publication No. 2003/0113485, which issued to Dennis A. Schober as U.S. Patent No. 6,743,327, on June 1, 2004 ("Schober"). (Appx708–721.) Mr. Schober is the President of Lumicor. Significantly, the examiner of the '700 Patent specifically considered Schober. Although the examiner rejected the original claims based on Schober,

he eventually concluded that amended claims were patentable over Schober and allowed the '700 Patent to issue. (Appx69.)

Schober describes and claims methods for manufacturing solid surface structures comprising polymeric (resin) sheets with decorative objects placed within the sheets. For example, FIG. 1 of Schober shows a solid laminate panel with embedded dried long-stem grass. (Appx709.)



Dried-stem grasses are substantially two-dimensional objects that do not substantially compress during the manufacturing process, as shown in FIG. 5 of Schober. (Appx710.)



Like the prior art described in the “Background of the Invention” of the ’700 Patent, Schober teaches and claims methods for pressing extruded laminate panels (solid sheets) with an intermediate layer of embedded two-dimensional objects, or rigid three-dimensional materials. Schober aims to solve “a long-felt need for a dry process for making a unitary solid surface product.” (Appx711 at 2:40–42.) According to Schober, those skilled in the art “believed that researchers who attempted to make such products using a dry process (that is, without using a mold and casting a liquid resin around the object to be fixated) produced products which contained defects such as air bubbles entrapped in the matrix, voids in the matrix, or cracks in the matrix.” (*Id.* at 2:50–55.) Critically, Schober is directed solely to using solid resin sheets in such a way as to avoid defects *in the resin sheets*—not to preserve the naturally appearing conformation of compressible objects embedded between those resin sheets.

In order to avoid defects in the resin sheets, Schober describes the following general process in its “Summary of the Invention”:

(a) providing a first flat non-porous unitary thermos-plastic polymeric sheet made of polymethylmethacrylate, polyvinyl chloride, or polycarbonate;

(b) placing a decorative object on the first sheet of polymeric material wherein the decorative object extends beyond at least one edge of the first sheet of polymeric material;

(c) placing a second flat non-porous unitary thermos-plastic polymeric sheet made of polymethylmethacrylate, polyvinyl chloride, or polycarbonate on top of the decorative object wherein the decorative object also extends beyond at least the corresponding edge of the second sheet of polymeric material, whereby a lay-up sandwich is formed comprised of the first flat sheet of polymeric material, the decorative object which extends beyond at least one edge of both of the sheets of polymeric material, and the second flat sheet of polymeric material;

(d) loading the lay-up sandwich into a press;

(e) applying a predetermined amount of heat and pressure to the lay-up sandwich for a predetermined period of time;

(f) opening the press to allow air and gases to escape from the lay-up sandwich;

(g) closing the press and applying a predetermined amount of heat and pressure to the lay-up sandwich for a predetermined period of time whereby the first and second polymeric material sheets melt together in the lay-up sandwich to provide a unitary product; and,

(h) allowing the product to cool while maintaining the pressure at a predetermined level until the product reaches a predetermined temperature at which point the press is opened and the product is removed from the press.

(Appx712.) In a section entitled “Manufacturing Processes,” Schober describes “process parameters [that] work well with most paper and fabric decorative materials,” including temperatures, pressures, and some time periods. (Appx715 at 9:1–3.) Notably, “paper” and “fabric” are not objects that substantially deform at pressures up to 82–90 psi and are therefore not “compressible objects.”

Although Schober describes the use of a “plurality of pressures,” as the ’700 Patent claims require, Schober makes no mention of the concept of compressible objects, critical pressures, or natural appearing conformations. Schober also does not describe any of the disclosed decorative objects as being compressible, having a critical pressure, or maintaining a natural appearing conformation after being subjected to a critical pressure. Neither the Abstract, Field of the Invention, Background of the Invention, nor Summary of the Invention disclose, or in any way describe, a decorative object that could be considered “compressible” or otherwise could not maintain a “substantially natural

appearing conformation” under conventional pressures. (Appx711–712.) Nor does Schober describe any steps that should be taken as a means to ensure that compressible objects maintain a substantially natural appearing conformation despite the use of such pressures.

Schober discloses five illustrated Figures and three “Example” embodiments. Of the five illustrated Figures, four disclose a panel with embedded dried long-stem grass (FIGS. 1, 2, 3, and 5) and another discloses a panel with a sheet of plastic resin as a decorative resin interlayer (FIG. 4). (Appx709–710.) The three “Example” embodiments disclose the application of Schober’s methods to make a panel with textile fabric (Example 1); a panel with delicate decorative papers, fabrics, or organic materials (Example 2); and a panel with a sheet of plastic resin as the layer of decorative material (Example 3), which is pictured in Figure 4. (Appx715–717.)

None of the illustrated Figures or “Example” embodiments discloses or describes the use of “compressible objects,” as defined by the ’700 Patent and as construed by the District Court: “The court . . . construes compressible objects to mean three-dimensional objects that substantially deform at pressures up to 80–92 psi.” (Appx23.)

In a section entitled “Materials for Decorative Object to be Fixated,” Schober speculates about additional materials that might be used as part of the disclosed methods of manufacturing. (Appx714 at 7:65–8:57.) For example, Schober discloses that the decorative objects “may be” textile fabrics, such as “synthetic, semi-synthetic, naturally occurring and polymeric, including for example, rayon, polyester, nylon, synthetic polyamides (such as nylon 66 and nylon 6), acrylic, modacrylic, cellulose, acetate, cotton, wool, silk, and fiberglass.” (*Id.* at 8:6–14.) Furthermore, these fabrics “may be woven, knitted, spun-bonded, or prepared by other well-known processes in the textile trade.” And the fabric also “may be printed, coated, dyed, sublimated or decorated by other techniques known within the textile trade.” (*Id.* at 8:14–18.) None of these fabrics are “compressible objects,” as that term was construed by the District Court. (Appx23.)

Schober also discloses that the decorative objects “may also” be made of “wood veneer, paper, dried plant fibers and parts,” including for example, “long-stem grass, leaves, petals, bark and twigs.” (Appx714 at 8:28–33.) Except for some varieties of twigs, none of these items are “compressible objects,” as that term was construed by the District

Court. (Appx23.) Even so, there is no disclosure in Schober that these items maintain a substantially natural conformation after being subjected to the pressures described in Schober.

Schober further discloses that the decorative objects “may also” be metallic “rod, mesh, sheet, perforated sheet, foil, strips, shavings, woven, and cable,” including for example, “copper, bronze, brass, steel, stainless steel, iron, nickel, and aluminum.” Furthermore, the metal “may be decorated such as etched, anodized, sanded, brushed, stained, painted, printed, chemically treated, galvanized, corroded, aged, polished, and plated.” (Appx714 at 8:37–45.) None of these are “compressible objects,” as that term was construed by the District Court. (Appx23.)

Additionally, Schober discloses that the decorative objects “may also” be “a plastic sheet or film,” and lists a number of examples that can be used for a resin interlayer. (Appx714 at 8:49–55.) None of these are “compressible objects,” as that term was construed by the District Court. (Appx23.)

Thus, Schober discloses more than forty (40) different classes of decorative objects, many of which have various subclasses, to be

embedded within three (3) possible sheet materials (including combinations): polymethyl-methacrylate, polyvinyl chloride, polycarbonate, and “combinations thereof.” (Appx712 at 3:39–44.)

Other than some varieties of twigs, none of these described decorative objects can be considered “compressible objects,” as that term was construed by the District Court. (Appx23.)

D. LUMICOR’S EXPERT’S REPORT

As evidence that Schober invalidates the ’700 Patent, Lumicor submitted the report of its expert witness Dr. Brian Flinn. Dr. Flinn opined on the properties of certain panels produced at Lumicor’s facilities. Specifically, Dr. Flinn opined on panels corresponding to seven Lumicor “décors” (Ginko Reed, Madagascar, Autumn Zito, Autumn Zito light, Tortoise Reed, Rainforest, and Birch). Lumicor created a representative panel of each décor using five different manufacturing methods. Of these five methods, *only one* (Test 2) purported to match a pressure profile consistent with the Schober disclosure—that is, using an initial pressure of 40 psi, opening or “bumping” the press to release air and gasses, and then using a second higher pressure of 160 psi. (Appx828–829.)

Dr. Flinn tabulated the results for four of these five tests into two different tables. The first table, shown below, records the results for Ginko Reed, Autumn Zito, Autumn Zito Light, Rain Forest, and Birch, and shows “the number of instances where decorative material was deformed by crushing, splitting, or cracking.” (Appx830, ¶48.)

Décor	Test 1 40/160 no bump	Test 2 40/160bump	Test 3 18/160 bump	Test 5 40/120 bump
Ginko Reed	1	1	2	0
Autumn Zito	4	4	4	
Autumn Zito Light	1	1	0	0
Rain Forest	2	0	0	0
Birch	0	0	0	0

Table 1: Number of observed cracks, splits or crushes in panels

The second table, shown below, records the results for Madagascar and Tortoise Reed. Dr. Flinn concludes that these panels have more instances of deformation because these panels have “larger décor” and “more crossing points in the décor,” meaning places where the decorative material crosses another piece of material. (Appx831, ¶50.)

Décor & Test No.	Cracks, splits, crushes	Undamaged crosses	Total crosses	% damaged
Madagascar Test 1	129	45	174	74.1
Madagascar Test 2	163	42	205	79.5
Madagascar Test 3	111	82	193	57.5
Madagascar Test 5	152	30	182	83.5
Tortoise Reed 1	395	5	400	98.5
Tortoise Reed 2	306	9	315	97.1
Tortoise Reed 3	426	6	432	98.8
Tortoise Reed 5	327	6	333	98.2

Table 2: Number of deformities as a percentage of crossovers

Dr. Flinn also attempted to measure the degree of flattening, but did not report conclusions about any panels other than Autumn Zito Light, at least in part because “the birch branches vary more widely before pressing, thereby making it impossible to reliably determine how much flattening is due to pressing and how much is due to the imperfections already naturally present in the branches.” (Appx832, ¶52.) For the Autumn Zito Light panels, the only panels for which Dr. Flinn offers any opinion regarding the degree of flattening (measured by the ratio of the major axis to the minor axis of a cross-sectional image of the panel), he concludes that “[i]n every case,” meaning every test (including Test 2), “the aspect ratio was greater than one, demonstrating at least some degree of flattening.” (*Id.* ¶54.)

In his report, Dr. Flinn opined about the validity of the ’700 Patent. In an attempt to describe the legal standard of inherency, Dr. Flinn stated, “I understand that if the Lumicor patent [Schober] necessarily *can* produce a panel that is within the scope of the 3form patent claims then it would invalidate those same claims.” (Appx841, ¶75, emphasis added.) Dr. Flinn later summarized the results of his tests as follows: “As noted in my analysis above, the accused Lumicor

panels are made using a process that causes some flattening of the natural décor materials and, depending on factors such as crossovers, thickness, and others, may cause cracking or splitting in some instances.” (Appx842, ¶76.) In his report, Dr. Flinn never opined that the test panels (including Test 2, which purported to be consistent with Schober) resulted in compressible objects that maintained a substantially natural conformation. Instead, Dr. Flinn opined only that “3form has accused Lumicor of infringing the ’700 patent by selling panels having the same or similar degrees of flattening, cracking, splitting, and the like,” and that “[i]n so doing, 3form has necessarily stated that the ’700 patent encompasses panels produced using prior art processes.” (*Id.*)

E. 3FORM’S ’068 PATENT

U.S. Patent No. D621,068 (the ’068 Patent) issued from the USPTO on August 3, 2010, bearing the title “Architectural Panel with Thatch Reed Design.” (Appx82–87.) The ’068 patent has a single claim, which reads: “The ornamental design for an architectural panel with thatch reed design, as shown and described.” (Appx82.) It includes the following drawings:

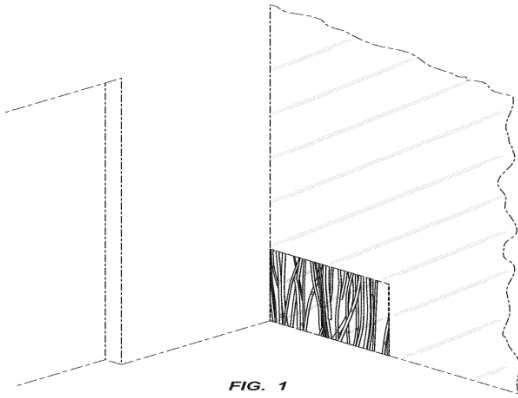


FIG. 1

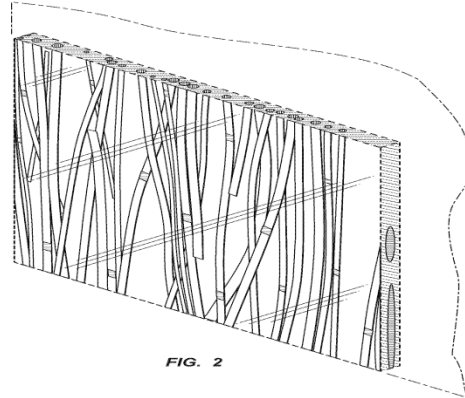


FIG. 2



FIG. 6

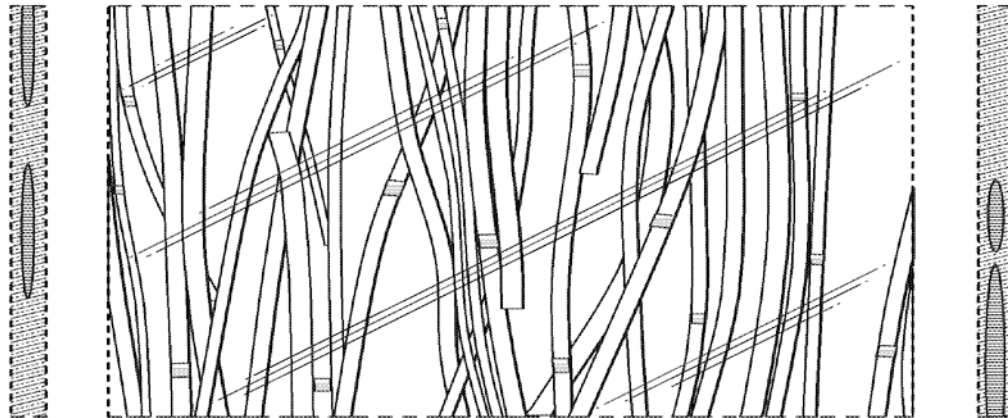


FIG. 4

FIG. 3

FIG. 5



FIG. 7

F. THE DISTRICT COURT'S DECISION

Lumicor moved for summary judgment that both the '700 Patent and '068 Patent were invalid.

With respect to the '700 Patent, Lumicor asserted that, in view of Schober, claims 1–3, 5–6, 8–14, and 16–19 are invalid as anticipated pursuant to 35 U.S.C. § 102(a). (Appx26–43.) Lumicor did not assert that claims 4, 7, and 15 are invalid as anticipated, and the District Court did not address the issue. Although Lumicor argued that all of the '700 Patent claims were also obvious under 35 U.S.C. § 103, the District Court observed that “each of the '700 patent claims was not individually briefed as being obvious” and, therefore, “decline[d] to address whether claims 1–3, 5–6, 8–14, and 16–19 are obvious.” (Appx45.) The District Court then ruled claims 4, 7, and 15 of the '700 Patent invalid as obvious in view of Schober. (Appx45–48.)

With respect to the '068 Patent, Lumicor argued that it is invalid under 35 U.S.C. §§ 102(a), 102(b), and 103. The District Court ruled that the '068 patent is invalid as obvious and declined to address Lumicor's arguments regarding anticipation and on sale bar. (Appx49–55.)

SUMMARY OF ARGUMENT

The District Court erred by giving insufficient attention to Lumicor's burden to prove invalidity by clear and convincing evidence and by impermissibly resolving genuine issues of material fact in favor of the movant Lumicor. More specifically:

(1) The District Court improperly construed the terms “unnatural appearing conformation” and “substantially natural appearing conformation” (and similar terms) to exclude “splitting” or “cracking” as types of deformation that cause an unnatural conformation, despite express language in the specification to the contrary.

(2) The District Court improperly ruled that claims 1–3, 5–6, 8–14, and 16–19 of the '700 Patent are invalid as anticipated. First, although 3form does not dispute that some varieties of twigs are compressible objects (i.e., that they split, crack, or otherwise substantially deform at pressures up to 80–92 psi), Schober does not expressly disclose any examples of architectural panels with resin sheets formed together about compressible objects, including the particular panels that Lumicor's expert relied upon for his conclusions. Instead, Schober discloses methods of manufacturing a broad genus of panels, and at the

very least, there are genuine issues of fact as to whether the particular panels Lumicor's expert tested are species of that genus and, if so, whether Schober discloses such species. Second, the single test performed by Lumicor's expert does not demonstrate that the embedded compressible objects actually meet the claimed "natural conformation" requirement, in light of the significant splitting and cracking he observed. There is also insufficient evidence that the tested panels comprise "twigs," and as such they cannot be evidence that Schober inherently anticipates the '700 Patent. Furthermore, because Lumicor's expert never tested polycarbonate panels, there is no evidence, much less clear and convincing evidence, that claims 5 and 16, which require polycarbonate sheets, are inherently anticipated by Schober.

(3) The District Court improperly ruled that claims 4, 7, and 15 of the '700 Patent are invalid as obvious. First, because the District Court predicated its conclusion of obviousness for claims 4, 7, and 15 on its conclusion of anticipation for claim 1, its conclusion of obviousness is incorrect for the same reasons its conclusion of anticipation was incorrect. Second, because Lumicor's expert never tested PETG panels, there is no evidence, much less clear and convincing evidence, that

dependent claims 4, 7, and 15, which require PETG sheets, are obvious in view of Schober and the Eckart patents. The District Court's finding that Schober inherently discloses a compressible object with a natural conformation embedded in *acrylic panels* is not evidence that the same object would have maintained its natural conformation in panels *made of PETG*. Third, the District Court failed to identify any specific evidence that a skilled artisan would have been motivated to combine the Schober methods with the Eckart patents, and also impermissibly resolved a genuine issue of material fact in Lumicor's favor by ignoring the testimony of 3form's expert witness that a skilled artisan had no motivation to combine the Schober methods with the Eckart patents.

(4) The District Court improperly ruled that the '068 Patent is invalid as obvious. First, the District Court impermissibly resolved reasonable factual inferences against 3form. Second, the District Court's designation of Exhibit 5 as the primary reference was improper. Third, the District Court improperly used design concepts instead of actual appearances in making its invalidity determination. Finally, questions of fact exist regarding what reeds look like. Each of these errors is fatal to the District Court's ruling.

ARGUMENT

A. STANDARD OF REVIEW

“In asserting an invalidity defense, an alleged infringer must contend with . . . § 282, which provides that ‘[a] patent shall be presumed valid’ and ‘[t]he burden of establishing invalidity . . . rest[s] on the party asserting such invalidity.’” *Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 97 (2011) (quoting 35 U.S.C. § 282). The Supreme Court recently confirmed that the standard of proof for establishing invalidity is one of “clear and convincing evidence.” *Id.* at 95; *see also Transclean Corp. v. Bridgewood Servs., Inc.*, 290 F.3d 1364, 1370 (Fed. Cir. 2002) (“Because a patent issued by the U.S. Patent and Trademark Office is presumed to be valid, the evidentiary burden to show facts supporting a conclusion of invalidity is clear and convincing evidence.” (citation omitted)).

Thus, parties challenging the validity of a patent, whether on summary judgment or otherwise, shoulder “an especially heavy burden.” *Koito Mfg. Co. v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1151 (Fed. Cir. 2004) (quotation omitted); *Schumer v. Lab. Computer Sys., Inc.*, 308 F.3d 1304, 1316 (Fed. Cir. 2002) (“The burden of proving

invalidity on summary judgment is high.”). Moreover, “[o]n summary judgment, all justifiable inferences are made in favor of the nonmovant.” *Schumer*, 308 F.3d at 1315. Therefore, “a moving party seeking to invalidate a patent at summary judgment must submit such clear and convincing evidence of invalidity so that no reasonable jury could find otherwise.” *Eli Lilly & Co. v. Barr Labs., Inc.*, 251 F.3d 955, 962 (Fed. Cir. 2001).

With respect to claim construction, “when the district court reviews only evidence intrinsic to the patent . . . the judge’s determination will amount solely to a determination of law, and the Court of Appeals will review that construction *de novo*.” *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015).

B. THE DISTRICT COURT ERRONEOUSLY CONSTRUED THE TERM “UNNATURAL APPEARING CONFORMATION” AND THE TERM “SUBSTANTIALLY NATURAL APPEARING CONFORMATION.”

1. The District Court Erred in Construing the Term “Unnatural Appearing Conformation.”

The District Court properly construed the term “compressible objects,” but erred in construing the meaning of “unnatural appearing conformation,” “unnatural conformation,” and “unnatural appearance” (considered together by the District Court as one term having the same

meaning). The District Court construed these terms to mean “an object that has compressed in an amount equal to or greater than 75% of its thickness in one direction.” (Appx25.) This construction departs significantly from both 3form’s and Lumicor’s proposed constructions. More importantly, it is contrary to the ’700 Patent specification.

The term “unnatural conformation” is described in the following passage from the specification of the ’700 Patent:

For the purposes of this specification and claims, “critical pressure” refers to the pressure at which the structural integrity of the object collapses, such that the object splits, cracks, or otherwise compresses into an **unnatural conformation**. There are, of course, varying grades of collapse, or compression, for any given compressible object, such that an “**unnatural conformation**” may mean that an object has compressed to 90% of its thickness in one direction, 75% of its thickness in one direction, and so on. Most generically, therefore, compressible objects will be understood to fill a modicum of three-dimensional space, such as objects that would otherwise appear unnaturally shaped when collapsed a given amount.

(Appx76 at 4:36–48, emphasis added.) Based on the above passage, 3form proposed that an “unnatural appearing conformation” be construed as: “The appearance of an object when its structural integrity collapses, such that the object splits, cracks, or substantially deforms.” (Appx437.) Lumicor generally agreed with 3form’s proposed

construction, but argued that “significantly” should be used instead of “substantially.” (Appx1000.)

The District Court rejected both 3form’s and Lumicor’s constructions after concluding that an “unnatural conformation” does not include splitting or cracking. The District Court read the specification to define an unnatural conformation “solely in terms of compression, with some sort of collapse envisioned.” (Appx25.) In support, the District Court emphasized the following language from the passage above: “‘critical pressure’ refers to the pressure at which the structural integrity of the object collapses, such that the object splits, cracks, **or otherwise** compresses into an unnatural conformation.” (*Id.*, emphasis in original.) Highlighting the use of commas to denote a disjunctive series, the District Court apparently concluded that the term “into an unnatural conformation” applied only to the third item in the series (“otherwise compresses”) and not to the first two items (“splits” or “cracks”). As such, the District Court ruled that “[b]oth 3form and Lumicor incorrectly contend that an unnatural conformation also includes splitting and cracking.” (*Id.*)

The District Court misreads the relevant language in a manner that is grammatically inconsistent and also contrary to its clear meaning in light of the specification. The comma-denoted series identifies three distinct categories of collapse, each of which results in an “unnatural conformation.” The specification identifies “splits” and “cracks” as categories of collapse, and then identifies a third category comprising all other types of collapse by stating “or otherwise compresses.” (Appx76 at 4:39–40.) Each of these three categories results in an “unnatural conformation.” Thus, with respect to “splits,” the sentence should be read as follows: “‘critical pressure’ refers to the pressure at which the structural integrity of the object collapses, such that the object splits . . . into an unnatural conformation.” Likewise, with respect to “cracks,” the sentence should be read as follows: “‘critical pressure’ refers to the pressure at which the structural integrity of the object collapses, such that the object . . . cracks . . . into an unnatural conformation.” Thus, the District Court erroneously concluded that only the last item in the series (“otherwise compresses”) could result in “an unnatural conformation.”

While the District Court was correct that the specification defines unnatural conformation “solely in terms of compression, with some sort of collapse envisioned,” the District Court apparently failed to appreciate that objects will split and crack due to compression, and that both splitting and cracking are types of collapse resulting in an unnatural conformation. Thus, the language “or otherwise compresses” is a broad category comprising any type of object collapse in addition to splits or cracks, all of which result from compression to some degree. Indeed, in the context of the ’700 Patent, objects would not split or crack absent some degree of compression. The District Court’s construction improperly ignores the specification’s references to splitting and cracking and gives that part of the specification absolutely no weight, treating it as completely irrelevant.

The District Court also erred by construing “unnatural appearing conformation” to mean a specific amount of compression “equal to or greater than 75%.” (Appx25.) The District Court based its construction on the following language: “an ‘unnatural conformation’ may mean that an object has compressed to 90% of its thickness in one direction, 75% of its thickness in one direction, and so on.” (Appx76 at 4:42–45.) The

District Court's construction would rewrite "may" to mean "shall" and would also effectively strike the phrase "and so on" from the specification. This is improper. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) ("Because the patentee is required to define precisely what his invention is . . . it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms." (quotation omitted)). Contrary to the District Court's reading, the quoted language is non-limiting. Although an unnatural appearing conformation may mean compression of "75% of its thickness in one direction," that is just one example of an "unnatural appearing conformation." Other listed examples include when an object splits or cracks. Further, the inclusion of "and so on" suggests that there are also other examples in which an object with different amounts of compression in different dimensions may have an unnatural conformation.

Moreover, although District Court's construction purported to rely on the example given in the specification, it strayed significantly from the example actually given, requiring "an object that has *compressed in an amount* equal to or greater than 75% of its thickness in one

direction,” (Appx25, emphasis added), rather than “an object [that] has *compressed to . . . 75% of its thickness in one direction*,” (Appx76 at 4:43–45, emphasis added). Thus, if an object was originally 1 centimeter thick, the specification describes an object that is *compressed to 0.75 centimeters in thickness*. But the District Court’s construction requires that an object be *compressed in an amount of 0.75 centimeters or more* so that its thickness would become 0.25 centimeters or less. This is not what the specification describes. Indeed, the District Court construction essentially inverts the amount of compression required to result in an unnatural conformation.

Accordingly, the District Court erred by not adopting 3form’s construction of “unnatural appearing conformation” as meaning “the appearance of an object when its structural integrity collapses, such that the object splits, cracks, or substantially deforms.”

2. *The District Court Erred in Construing the Term “Substantially Natural Appearing Conformation.”*

The District Court also erred in construing the terms “substantially natural appearing conformation” and “substantially natural conformation” (considered together by the District Court as one term having the same meaning). The District Court concluded that,

while it is “the only disputed term not explicitly defined in the specification,” the term is nevertheless “defined by exclusion.”

(Appx25.) Relying on its improper construction of “unnatural appearing conformation”—as limited to compression in an amount equal to or greater than 75%—the District Court construed “substantially natural appearing conformation” to mean “any conformation where the object has experienced compression of less than 75% of its thickness in one direction.” (Appx26.)

For all of the reasons that an “*unnatural* appearing conformation” is not limited to compression equal to or greater than 75% of an object’s thickness in one direction, a “substantially natural appearing conformation” is not limited to compression of less than 75% of an object’s thickness in one direction. For example, as explained above, the specification identifies splits and cracks as additional types of collapse. Thus, the meaning of “substantially natural appearing conformation” should be broad enough such that splits and cracks are taken into consideration in determining whether an object maintains a substantially natural appearing conformation.

There is also an additional reason why the Court's definition of this term is incorrect. It would cause the very example relied on by the District Court, and identified in the specification as having an "unnatural conformation," to be classified as having a "substantially natural appearing conformation." In that example, an object is compressed to 90% of its thickness in one direction. Thus, if an object was originally 1 centimeter thick, it would be compressed to 0.90 centimeters in thickness. Such an object would have "experienced compression of less than 75% of its thickness in one direction," and under the District Court's construction, would qualify as having a "substantially natural appearing conformation." But such a result is clearly contrary to the example given in the specification, where it is identified as an object with an "*unnatural* conformation." By essentially inverting the amount of compression required to result in an unnatural conformation, the District Court's construction would treat significantly compressed objects (up to 74% of thickness in one direction) as having substantially natural conformations, contrary to the specification.

In light of the foregoing, 3form's proposed construction should be adopted: "The appearance of an object in a relatively uncompressed or

natural state, even if not perfectly natural or uncompressed.”

(Appx438, Appx76 at 3:25.)

C. THE DISTRICT COURT ERRONEOUSLY FOUND CLAIMS 1–3, 5–6, 8–14, AND 16–19 OF THE ’700 PATENT INVALID AS ANTICIPATED.

“A claim is anticipated only if each and every limitation is found either expressly or inherently in a single prior art reference.” *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1224 (Fed. Cir. 2014). “Cases involving novelty [anticipation], with its strict identity requirement, are *quite rare*.” *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1297 (Fed. Cir. 2002) (emphasis added). “Because patents are presumed valid, anticipation must be proven by clear and convincing evidence.” *Ericsson*, 773 F.3d at 1224.

Cobbling together disclosures from different locations in Schober, the District Court determined that Schober expressly discloses an “(1) [a]n architectural panel . . . (2) with twigs from reed and bamboo . . . which are suspended between two polymeric sheets, (3) where heat is applied to the lay up sandwich, whereby the first and second polymeric sheets melt together to provide a unitary product, applying first 40 psi and then later 160 psi (i.e., a plurality of pressures).” (Appx27, citations omitted.) The District Court then concluded that Schober inherently

discloses the remaining limitations of the independent claims. With respect to the limitation that the embedded compressible objects maintain a substantially natural conformation, the District Court relied on a single test reported by Lumicor's expert. In that test, Lumicor placed certain decorative materials between acrylic sheets and applied 40 psi and then 160 psi. Relying on the purported results of that single test, using decorative materials not disclosed in Schober, the District Court concluded that the Schober methods, when used with compressible objects, *inherently* produce panels, not just the tested panels, in which compressible objects maintain a substantially natural conformation, as required by the '700 Patent claims. (Appx80.)

The District Court's conclusion is doubly flawed, particularly on summary judgment. First, although 3form does not dispute that some varieties of twigs are compressible objects (i.e., that they split, crack, or otherwise substantially deform at pressures up to 80–92 psi), Schober does not expressly disclose any examples of architectural panels with resin sheets formed together about compressible objects, including the particular panels that Lumicor's expert relied upon for his conclusions. Instead, Schober discloses methods of manufacturing a broad genus of

panels, and at the very least, there are genuine issues of fact as to whether the particular panels Lumicor's expert tested are species of that genus and, if so, whether Schober discloses such species.

Second, the test panels observed by Lumicor's expert do not demonstrate that the embedded compressible objects actually meet the claimed "natural conformation" requirement. There is also insufficient evidence that the tested panels comprised "twigs," and as such they cannot be evidence that Schober inherently anticipates the '700 Patent. Furthermore, because Lumicor's expert never tested polycarbonate panels, there is no evidence, much less clear and convincing evidence, that dependent claims 5 and 16, which require polycarbonate sheets, are inherently anticipated by Schober. Accordingly, the District Court's grant of summary judgment of anticipation was improper and should be reversed.

1. The District Court Erred in Finding that Schober Expressly Discloses Architectural Panels with Resin Sheets Formed Together About Compressible Objects.

The District Court erred in its finding that Schober "expressly" discloses "(1) [a]n architectural panel . . . (2) with twigs from reed and bamboo . . . which are suspended between two polymeric sheets, (3)

where heat is applied to the lay up sandwich, whereby the first and second polymeric sheets melt together to provide a unitary product, applying first 40 psi and then later 160 psi (i.e., a plurality of pressures).” (Appx27, citations omitted.)

Each architectural panel claimed in the ’700 Patent comprises two extruded resin sheets formed together around compressible objects. (Appx80.) Although Schober discloses *methods* for manufacturing a broad genus of architectural panels that comprise polymeric sheets melted together around a wide variety of decorative objects to make a unitary product, (Appx708), Schober specifically discloses only a handful of *panels*, and none of these panels comprise “compressible objects,” as construed by the District Court—that is, “three-dimensional objects that substantially deform at pressure up to 80–92 psi,” (Appx23).

Two of the disclosed panels are pictured in the Figures, and the others are described in the “Example” embodiments. The illustrated Figures disclose one panel with embedded dried long-stem grass (FIGS. 1, 2, 3, and 5) and another panel with a sheet of plastic resin as a decorative plastic resin interlayer (FIG. 4). (Appx709–710.) The three

“Example” embodiments disclose the application of Schober’s methods to make a panel with textile fabric (Example 1); a panel with delicate decorative papers, fabrics, or organic materials (Example 2); and a panel with a sheet of plastic resin as a layer of decorative material (Example 3), which is pictured in Figure 4. (Appx715–717.) There was no evidence before the District Court that any of these decorative materials are “compressible objects” as construed by the District Court. Nor could there have been such evidence because these materials are not, in fact, compressible objects.

While it is true that Schober discloses a generic process by which a wide variety of materials may “be fixated” in resin sheets—and twigs “may also be” one of the materials (Appx714 at 8:28–33)—Schober does not, however, disclose any example panels that specifically comprise twigs as the decorative interlayer. Accordingly, the District Court erred in finding that Schober expressly discloses an architectural panel formed together around compressible objects.

Although in some circumstances the disclosure of a broad genus may also disclose a limited number of species, this is not such a case. “It is well established that the disclosure of a genus in the prior art is

not necessarily a disclosure of every species that is a member of that genus.” *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006); *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1262 (Fed. Cir. 1989) (“Under [defendant’s] theory, a claim to a genus would inherently disclose all species. We find [this] argument wholly meritless . . .”). Indeed, unless the description of the genus would lead a skilled artisan to a “small recognizable class with common properties,” it is not anticipatory of every species falling within the genus. *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075, 1084 (Fed. Cir. 2008) (citing *In re Ruschig*, 343 F.2d 965, 974 (CCPA 1965)).

Here, Schober discloses methods for manufacturing a broad genus of architectural panels, including a diverse range of potential decorative materials to be used during manufacture, including non-compressible materials such as fabrics, plants, metals, and plastics. Indeed, Schober describes more than forty (40) separate classes of non-compressible decorative materials—such as nylon (fabric), grass (plant), steel (metal), and polycarbonate (plastic)—and further describes additional subclasses—such as woven, knitted, or spun-bonded fabrics, or metals formed in the shape of rods, meshes, sheets, and so forth. (Appx714 at

7:65–8:57.) Schober also discloses three (3) different materials (including combinations) to be used as the solid resin sheets in which to embed the decorative objects: polymethylmethacrylate, polyvinyl chloride, polycarbonate, and “combinations thereof.” (Appx712 at 3:39–44.)

Thus, a skilled artisan following Schober would have to choose between more than forty (40) separate classes of decorative materials (as well as scores of subclass varieties) in combination with three (3) different solid resin sheets (and “combinations thereof”), resulting in more than 120 possible total combinations (and hundreds more counting the subclass varieties). Such a broad genus is not specific enough to anticipate. *In re Ruschig*, 343 F.2d 965 (CCPA 1965) (disclosure of 130 or 156 possible combinations held not anticipatory); *see also ArcelorMittal France v. AK Steel Corp.*, 700 F.3d 1314, 1323 (Fed. Cir. 2012) (“There is insufficient evidence that the varieties of paints and metal alloys are sufficiently narrow that one of ordinary skill in the art would at once envisage *each member* of this limited class.” (quotation omitted)); *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 471 F.3d 1369, 1376 (Fed. Cir. 2006).

Significantly, Schober does not disclose any “expressed preference” for compressible objects or explain why its manufacturing methods would be “especially suitable” for compressible objects. *Sanofi-Synthelabo v. Apotex, Inc.*, 470 F.3d 1368, 1376 (Fed. Cir. 2006) (genus not anticipatory, in part, because “a chemist theoretically had at least fifty different pharmaceutically acceptable salts from which he could have chosen for formulation”). When a skilled artisan is required “randomly to pick and choose” among various combinations, the reference is not anticipatory. *Akzo N.V. v. U.S. Int’l Trade Comm’n*, 808 F.2d 1471, 1480 (Fed. Cir. 1986) (reference not anticipatory because it required skilled artisan “randomly to pick and choose among a number of different polyamides, a plurality of solvents, and a range of inherent viscosities”).

Lumicor’s attempt here to handpick certain undisclosed panels for testing and then extrapolate such tests to invalidate the ’700 Patent is foreclosed by this Court’s decision in *Ultradent Products, Inc. v. Life-Like Cosmetics, Inc.*, 127 F.3d 1065 (Fed. Cir. 1997). In *Ultradent*, an accused infringer submitted tests purporting to show that certain undisclosed species (dental bleaching compositions containing,

respectively, 3% and 5% of carboxypolymethylene) within the genus of a prior art reference (disclosing amounts of carboxypolymethylene between 0.05% to 5%, but only specifically disclosing examples using 0.6% and 1.0%) anticipated claims for a dental bleaching composition that was sufficiently viscous and sticky to retain and hold a bleaching tray. *Id.* at 1070–71. The jury, however, found the claims were not anticipated, and this Court affirmed, explaining:

Even if the . . . tests confirm [the accused infringer’s] contention that the compositions containing 3% and 5% carboxypolymethylene provide the level of viscosity and stickiness required by the claims . . . , that does not mean that the claimed matrix material is necessarily described by the [the prior art]. As [the patent owner] argues, there are many possible compositions that could be made within the range of carboxypolymethylene concentration (0.05% to 5%) that the [prior art] discloses. [The accused infringer’s] burden at trial was to show that the [prior art] would describe to one of skill in the art the tested combinations, or other combinations meeting the limitations of the claims, from among the many possible candidates. [The accused infringer], however, has not satisfied us that it met that burden so plainly that the district court should have rejected the jury’s contrary verdict.

Id. at 1071–72 (citations omitted).

Similar to the accused infringer in *Ultradent*, Lumicor’s expert Dr. Flinn submitted tests purporting to show that certain panels that were not disclosed in Schober (Lumicor’s Ginko Reed, Autumn Zito, Autumn

Zito Light, Rain Forest, and Birch décors) inherently demonstrate the attributes of the invention claimed in the '700 Patent. But even if Dr. Flinn's tests could show that the acrylic panels he tested inherently satisfy the claims' requirement that compressible objects maintain a substantially natural conformation (they do not), Lumicor has not proven that these specific acrylic panels (Lumicor's Ginko Reed, Autumn Zito, Autumn Zito Light, Rain Forest, and Birch décors) are described by the broad genus set forth in Schober. For example, there is no evidence that these panels comprise "twigs." As in *Ultradent*, there are "many possible" panels that could be made within the broad generic disclosure of Schober. At the very least, there are genuine issues of fact as to whether the particular panels Lumicor's expert tested are species of the genus disclosed in Schober, and if so, whether Schober is sufficiently specific to disclose such species.

It was Lumicor's burden to prove that Schober describes these tested panels "from among the many possible candidates." Lumicor has not done so by clear and convincing evidence, let alone so plainly that a jury could not find otherwise. At a minimum, there is a genuine issue as to what Schober discloses, and this precludes the entry of summary

judgment of anticipation. Accordingly, the District Court erred in granting summary judgment to Lumicor.

2. *The District Court Erred in Finding that Schober Inherently Discloses Compressible Objects Maintaining a Substantially Natural Appearing Conformation Upon Undergoing the Schober Manufacturing Methods.*

“Inherent anticipation requires that the missing descriptive material is *necessarily present*, not merely probably or possibly present, in the prior art.” *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002) (quotation omitted) (emphasis added). More specifically, a prior art process cannot anticipate a claimed product unless clear and convincing evidence establishes that the process *always* results in the claimed product. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995) (“[T]he [district] court [correctly] found that [the defendant] had not carried its burden of proving by clear and convincing evidence that practice of [the prior art process] always produced [the claimed product].”).

Thus, the Schober manufacturing methods anticipate the architectural panels claimed in the ’700 Patent only if a method that Schober discloses *always results* in panels with embedded compressible objects that maintain their substantially natural appearing

conformation. *See, e.g., id.* at 1047–48 (finding no inherent anticipation because practice of prior art process “could yield” different products); *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991) (“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.” (quotation omitted)); *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554 (Fed. Cir. 1983) (“Anticipation of inventions set forth in product claims cannot be predicated on mere conjecture respecting the characteristics of products that might result from the practice of processes disclosed in references.”).

The District Court’s finding that Schober inherently discloses panels with compressible objects that maintain a substantially natural appearing conformation is supported by a *single* test executed by Lumicor’s expert witness Dr. Brian Flinn. (Appx828.) A single test cannot be clear and convincing evidence of inherency because inherency requires a conclusion that something “always” occurs. *See Glaxo*, 52 F.3d at 1047–48 (affirming district court finding of no inherency even though process performed thirteen times by defendant’s expert made

claimed product each time; inherency was still inapplicable because plaintiffs' expert showed that process nevertheless "could yield" a different result).

Although the District Court asserts that "every single panel produced utilizing the procedure set forth in the '327 patent [Schober] resulted in a substantially natural conformation," (Appx29), only one of Dr. Flinn's tests (Test 2) was actually consistent with the Schober disclosure (i.e., 40/160 psi with bump), (Appx828, ¶44). Even the District Court had to acknowledge that this was the only evidence that Schober "could yield" the claimed panels. (Appx29.) That finding alone should have led the District Court to end the analysis and deny summary judgment on the inherency issue. The District Court never ruled, nor could it have, that Dr. Flinn's single test was evidence that Schober *always* results in the claimed product.

Instead, the District Court faulted 3form for "fail[ing] to produce evidence to show that any nonconforming product could be produced using [Schober]." (*Id.*) But it was not 3form's burden to prove that the Schober methods, when used with compressible objects, result in panels with unnatural conformations; rather, it was Lumicor's burden to prove

by clear and convincing evidence that a process disclosed in Schober, when used with compressible objects, always results in panels with a substantially natural conformation. The same party that has the burden at trial has the burden on summary judgment, and the clear-and-convincing standard of proof is just as applicable on summary judgment as it is at trial. *Anderson v. Liberty Lobby*, 477 U.S. 242, 254–55 (1986). Moreover, even if a single test were sufficient evidence to prove inherency (it is not), Dr. Flinn’s results are not sufficient for at least the following three reasons.

First, Dr. Flinn’s tests actually prove that the Schober methods result in “cracks, splits, or crushes” in the compressible objects. For Lumicor’s Ginko Reed, Autumn Zito, Autumn Zito Light, Rain Forest, and Birch décors, Dr. Flinn reported the following observable cracks, splits, or crushes in the test panels created by Lumicor:

Décor	Test 1 40/160 no bump	Test 2 40/160bump	Test 3 18/160 bump	Test 5 40/120 bump
Ginko Reed	1	1	2	0
Autumn Zito	4	4	4	
Autumn Zito Light	1	1	0	0
Rain Forest	2	0	0	0
Birch	0	0	0	0

Table 1: Number of observed cracks, splits or crushes in panels

(Appx830, highlight added.) As can be seen from the above Table 1, Dr. Flinn's Test 2, even though it was the only test that used a process consistent with Schober (i.e., 40/160 psi with bump), resulted in observable cracks, splits, or crushes in three of the five tested panels (Ginko Reed, Autumn Zito, and Autumn Zito Light).

The deformations reported for Lumicor's Madagascar and Tortoise Reed décors were significantly higher:

Décor & Test No.	Cracks, splits, crushes	Undamaged crosses	Total crosses	% damaged
Madagascar Test 1	129	45	174	74.1
Madagascar Test 2	163	42	205	79.5
Madagascar Test 3	111	82	193	57.5
Madagascar Test 5	152	30	182	83.5
Tortoise Reed 1	395	5	400	98.5
Tortoise Reed 2	306	9	315	97.1
Tortoise Reed 3	426	6	432	98.8
Tortoise Reed 5	327	6	333	98.2

Table 2: Number of deformities as a percentage of crossovers

(Appx831, highlight added.) As can be seen from the above Table 2, Dr. Flinn's Test 2, even though it was the only test that used a process consistent with Schober (i.e., 40/160 psi with bump), resulted in hundreds of cracks, splits, or crushes in both of the panels tested.

The District Court failed to take these results into account because it construed the terms “unnatural appearing conformation,” “unnatural conformation,” “unnatural appearance,” “substantially

natural appearing conformation,” and “substantially natural conformation” to exclude any consideration of cracks or splits. As explained in Section B, the District Court’s claim construction was in error because the ’700 Patent expressly describes both cracks, splits, or crushes as types of unnaturally appearing conformations. Because Test 2 (the only test using a process consistent with Schober) shows some cracks, splits, or crushes in five of the seven panels tested, Dr. Flinn’s report is not clear and convincing evidence that Schober *always* results in panels with a substantially natural conformation.

Indeed, Dr. Flinn misunderstood the appropriate standard for inherency, believing that it was sufficient to show that Schober “necessarily *can* produce a panel that is within the scope of the 3form patent claims,” (Appx841, ¶75, emphasis added), rather than showing that Schober *always* results in such a panel, as is required. Moreover, of the seven test panels, Dr. Flinn reported the degree of flattening for only one of them (Autumn Zito Light, which demonstrated “some degree of flattening”) and even concluded that, for birch branches, it was “impossible to reliably determine how much flattening is due to pressing and how much is due to the imperfections already naturally

present in the branches.” (Appx832 ¶¶ 52, 54.) Significantly, Dr. Flinn’s conclusion that the Schober “process . . . causes some flattening of the natural décor materials and, depending on factors such as crossovers, thickness, and others, may cause cracking or splitting in some instances,” (Appx842, ¶76), can hardly be considered clear and convincing evidence that Schober *always* results in panels with compressible objects that maintain a substantially natural appearing conformation.

Second, there is insufficient evidence that the tested panels comprise “twigs,” and as such they cannot be evidence that Schober inherently anticipates the ’700 Patent.

Third, as mentioned above, Dr. Flinn tested only *acrylic* panels, not panels made from polyvinyl chloride or polycarbonate. (Appx730.) The District Court failed to note this distinction while invalidating claims 5 and 16 of the ’700 Patent, which require polycarbonate. (Appx34, Appx42, Appx80.) There is *no record evidence*, much less clear and convincing evidence, that a process disclosed in Schober using polycarbonate sheets would yield a panel with embedded compressible objects that maintain a substantially natural conformation. As such,

even if Lumicor has clear and convincing evidence that Schober inherently anticipates independent claims 1 and 19 (it does not), Lumicor has not proved that Schober inherently anticipates claims 5 and 16 of the '700 Patent.

In light of the foregoing, the District Court erred in invalidating claims 1–3, 5–6, 8–14, and 16–19 of the '700 Patent as anticipated by Schober under 35 U.S.C. § 102(a).

D. THE DISTRICT COURT ERRONEOUSLY FOUND CLAIMS 4, 7, AND 15 OF THE '700 PATENT INVALID AS OBVIOUS.

“[B]y statute a patent is valid upon issuance and included within the presumption of validity is a presumption of non-obviousness.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1359 (Fed. Cir. 2007) (citation omitted). Because courts presume a patent valid, “the patent challenger bears the burden of proving the factual elements of invalidity by clear and convincing evidence” and “[t]hat burden of proof never shifts to the patentee to prove validity.” *Id.* (citing *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1375 (Fed. Cir. 1986)). Despite the demanding standard of clear and convincing evidence, the District Court found, on summary judgment, that there were no

genuine issues of material fact and that claims 4, 7, and 15 of the '700 Patent are invalid as obvious. This finding is not supported.

Claims 4 and 15 depend directly or indirectly from claim 1 and expressly require the use of extruded resin sheets comprising PETG. Claim 7 also depends from claim 1 and requires extruded sheets comprising “a copolyester that has a melting point between 180° F. and 230° F. in a pressure range of up to 40 psi.” PETG is such a copolyester. (Appx47, Appx80.) Lumicor argued that these claims are invalid for obviousness in light of Schober and the Eckart patents, which disclose the use of extruded sheets of PETG. The District Court concluded that the only reasonable conclusion is that these claims are invalid for obviousness in light of Schober and the Eckart patents. (Appx43–48.)

There are at least three reasons to reverse the District Court’s finding that claims 4, 7, and 15 of the '700 Patent are invalid for obviousness. Each is addressed below.

1. *The District Court’s Conclusion of Obviousness Should Be Rejected for the Same Reasons as Its Conclusion of Anticipation of Claim 1.*

First, the District Court’s conclusion of obviousness for claims 4, 7, and 15 should be rejected for the same reasons as its conclusion of

anticipation for claim 1. As noted above, each of claims 4, 7, and 15 depends directly or indirectly from claim 1. In its summary judgment briefing, 3form argued that the combination of Schober and the Eckart patents does not teach the use of PETG in combination with the requirements of claim 1, including compressible objects, a plurality of pressures, a critical pressure, or maintaining a substantially natural appearing conformation. (Appx1074–1076.) The District Court rejected this argument because “the court has now construed each of these terms and found that they are all anticipated” by Schober. (Appx44.) Thus, the District Court predicated its conclusion of obviousness for claims 4, 7, and 15 on its conclusion of anticipation of claim 1. Therefore, for all the reasons that the District Court’s grant of summary judgment of anticipation of claim 1 was incorrect, its grant of summary judgment of obviousness for claims 4, 7, and 15 is equally incorrect.

2. *Lumicor’s Evidence Did Not Show that a Schober Process Using Compressible Objects and PETG Sheets Results in Objects that Maintain a Substantially Natural Conformation.*

Second, even if the District Court’s grant of summary judgment of anticipation of claim 1 is correct, its grant of summary judgment of obviousness for claims 4, 7, and 15 was incorrect. As noted above,

these claims depend from claim 1 and further require the use of PETG. Therefore, reading the requirements of these claims together with those of claim 1, they require a panel with “one or more compressible objects” suspended between two PETG sheets and “formed together” using “a plurality of pressures,” at least one of which is “greater than or equal to a critical pressure sufficient to otherwise compress the one or more compressible objects to an unnatural appearing conformation,” wherein “the one or more compressible objects maintain a substantially natural appearing conformation” between the two PETG sheets. (Appx80.)

The District Court failed to recognize, however, that, as explained above in connection with claims 5 and 16, its finding of inherent anticipation for claim 1 was based on a test using *acrylic* panels. (Appx730.) Therefore, even if this evidence was sufficient to show that the use of a Schober process with compressible objects placed between *acrylic* sheets would inherently result in embedded objects maintaining “a substantially natural appearing conformation” (and it was not), this evidence was not sufficient to demonstrate by clear and convincing evidence that a panel *made of PETG* using a process disclosed in

Schober would also inherently result in embedded objects maintaining “a substantially natural appearing conformation.”

In other words, neither Schober nor the Eckart patents disclose panels comprising compressible objects embedded in PETG that maintain their substantially natural appearing conformation after being subjected to a critical pressure. The District Court’s finding that Schober inherently discloses a compressible object with a natural conformation embedded in *acrylic* panels is not evidence that the same object would have maintained its natural conformation in panels *made of PETG*. Accordingly, the District Court’s grant of summary judgment of obviousness should be reversed for this reason as well.

3. *The District Court Failed to Identify Any Evidence that a Skilled Artisan Would Have Been Motivated to Combine the Schober Methods with the Eckart Patents.*

In ruling that claims 4, 7, and 15 of the ’700 Patent are invalid as obvious, the District Court never acknowledged Lumicor’s burden to prove obviousness by clear and convincing evidence. Indeed, without identifying any evidence, much less clear and convincing evidence, the District Court merely opined that a skilled artisan would implement the “predictable variation of material types” by using the Schober methods

in combination with PETG. (Appx46.) As support, the District Court asserted that “design incentives” to do so are “explicit” in Schober, yet never cited to any disclosure in Schober to support its opinion. (*Id.*) Again without citation, the District Court opined that the “point” of Schober “is to aesthetically embed a wide range of decorative objects within a variety of resin matrices by using a two-step process that includes a lower pressure first step to limit deformation of the decorative layers.” (*Id.*) But Schober never discloses any purpose for its lower pressure first step, and even more importantly, never refers to “deformation” or any other form of compression or collapse of decorative objects as a purpose for that step.

Instead, Schober expressly states that its process was designed to solve the problem of “products which contained defects such as air or gas bubbles entrapped in the matrix, voids in the matrix, or cracks in the matrix”—the “matrix” referring to the finished decorative panel. (Appx711 at 2:53–55.) Schober, however, never describes or discloses any objective to prevent the deformation—by compression or otherwise—of compressible objects. In contrast, the ’700 Patent was directed entirely to embedding compressible objects and also expressly

noted the advantageous qualities of PETG for maintaining the natural conformation of such objects. (Appx78 at 8:4–9.)

Thus, the District Court failed to identify any evidence of a true motivation to combine Schober methods with PETG. That is reason alone for reversal. A conclusion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

The District Court also ignored 3form’s evidence that there was no motivation to combine, and also minimized the fact that Schober does not claim PETG for use with its methods. At the very least, this creates a genuine issue of material fact on the issue of obviousness.

First, the District Court never addressed 3form’s record evidence that a skilled artisan would not have been motivated to combine the Schober methods with PETG. The ’700 Patent expressly teaches why PETG is advantageous for embedding compressible objects: “One reason PETG and related materials are particularly useful with the present invention is that they have a [lower] melting point that renders

them particularly suitable for embedding materials that would otherwise collapse at conventional pressures, or that otherwise [would] be destroyed at conventional temperatures.” (Appx78 at 8:4–9.) Even if a skilled artisan had knowledge of the benefits of using a lower melting point in connection with compressible objects, a skilled artisan would have had no reason to use the Schober methods with PETG because almost every decorative object disclosed in Schober is not compressible. In light of Schober’s disclosure, 3form’s expert, Dr. Gotro, concluded that “the effect of temperature on the lamination of decorative panels containing compressible objects was not obvious to a person of ordinary skill in the art at the time of the invention.” (Appx1118–1119.) Accordingly, Dr. Gotro concludes that, “it was not obvious to Schober that the use of PETG was preferred for the fabrication of decorative laminates containing three dimensional compressible objects.” (Appx1130.)

“When a motion for summary judgment is before the court, ‘the evidence of the nonmovant is to be believed, and all justifiable inferences are to be drawn in [its] favor.’” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). Thus, at a minimum,

Dr. Gotro's testimony, (Appx1118–1119, Appx1122–1123, Appx1125–1132), raises a genuine issue of material fact as to whether a skilled artisan would have been motivated to combine Schober's methods with PETG.

Second, Schober itself actually demonstrates that using PETG would not have been obvious. Schober expressly notes the prior use of PETG for decorative panels (in other patents), yet then teaches the use of three other materials for use with the disclosed methods. Had such a combination been obvious, Dr. Gotro concludes that Schober would have disclosed or claimed its use. (Appx1122, Appx1129–1130.) The fact that Schober acknowledges use of PETG with decorative panels, but never suggests using PETG in combination with Schober's disclosed methods, is strong evidence that the use of PETG with Schober would not have been obvious. At the very least, it raises a genuine issue of material fact that the District Court improperly resolved in Lumicor's favor.

Accordingly, the District Court erred in granting summary judgment of obviousness on claims 4, 7, and 15 of the '700 Patent.

E. THE DISTRICT COURT ERRONEOUSLY INVALIDATED THE '068 PATENT.

1. The District Court Impermissibly Resolved Reasonable Factual Inferences Against 3form on Summary Judgment.

The District Court granted summary judgment on grounds that it was “undisputed” that “other materials such as twigs from reed may be used instead of grass” as decorative, ornamental material and that therefore the combination of Exhibit 5 with the verbiage found in Schober would have the same “overall visual appearance” as the '068 Patent. (Appx52–53.) But the District Court could have come to this conclusion only by impermissibly resolving factual inferences against 3form. That is impermissible on summary judgment.

As this Court has held, “[i]n the design patent context, the ultimate inquiry under section 103 is whether the claimed design would have been obvious to a designer of ordinary skill who designs articles of the type involved.” *Durling v. Spectrum Furniture Co.*, 101 F.3d 100, 103 (Fed. Cir. 1996). In opposition to Lumicor’s motion for summary judgment, 3form submitted the testimony of Ms. Caroline Lewis, a “textile designer for commercial companies and international development organizations.” (Appx1156.) Ms. Lewis testified that “a

designer would not substitute a reed product, such as the reed product illustrated in the '068 patent, into a product made of grass."

(Appx1248.) She further explained that:

The flat grasses depicted in Schober's declaration exhibits 1-3 and 5-7 are also substantially different from round 3-dimensional reeds with nodes, such that **a designer of ordinary skill would not substitute one for the other, or visa versa, even having read the disclosure in the Schober patent that reeds could be substituted for grasses.** Side-by-side comparisons of the '068 patent and the Schober grass panels demonstrate the visual differences:

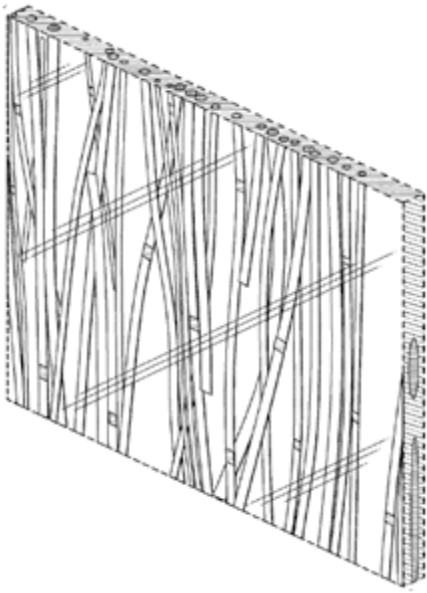
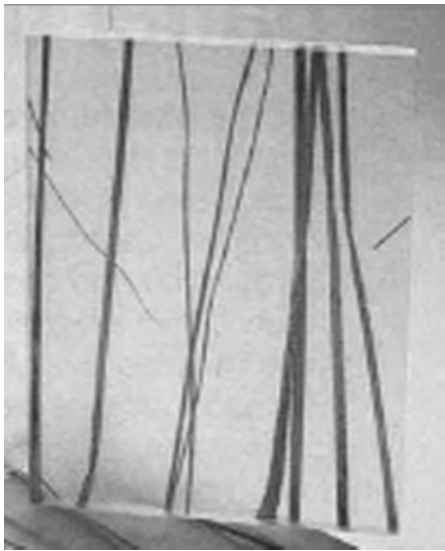
Illustration from '068 Patent	NeoCon Trade Show
 Figure 2	 Schober Declaration, Ex. 1

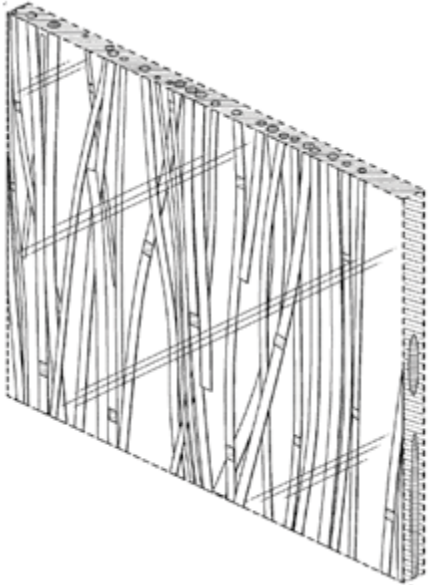
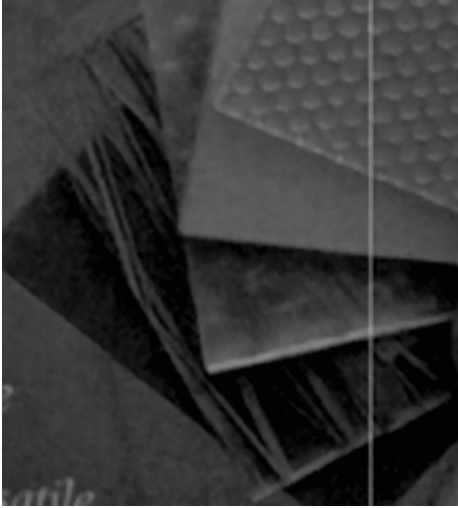
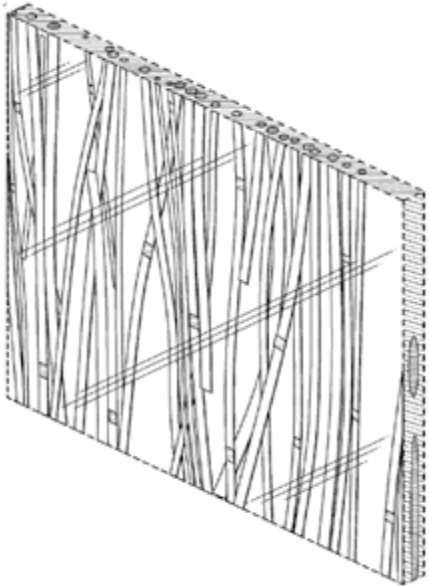
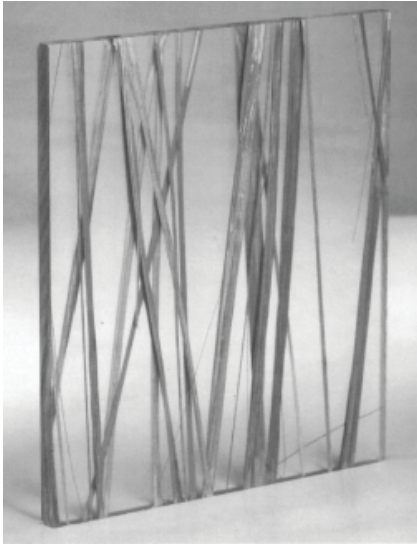
Illustration from '068 Patent	Puget Sound Business Journal
 Figure 2	 Schober Declaration, Ex. 2
Illustration from '068 Patent	Beach Grass Product
 Figure 2	 Schober Declaration, Ex. 3

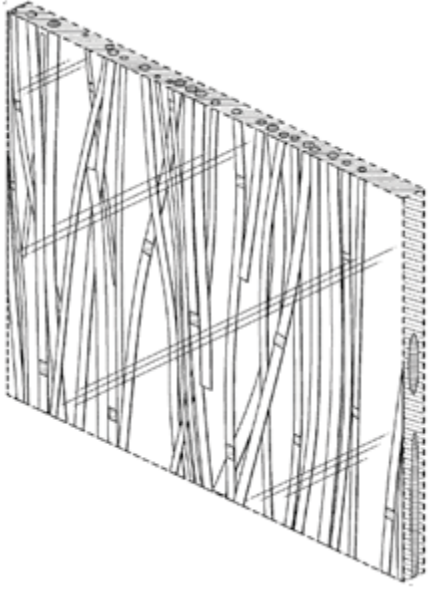
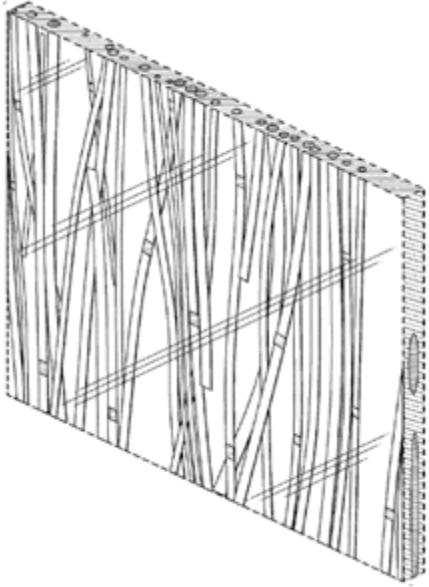
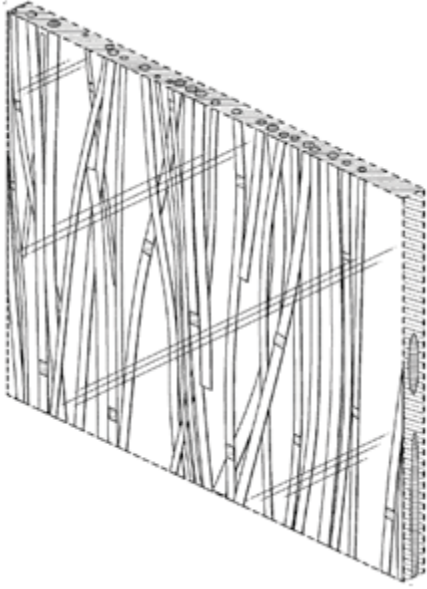
Illustration from '068 Patent	Beach Grass BBEACHGR CU 09-2002
 Figure 2	 Schober Declaration, Ex. 5
Illustration from '068 Patent	Mountain Grass Product
 Figure 2	 Schober Declaration, Ex. 6

Illustration from '068 Patent	DesignTex Brochure
 Figure 2	 Schober Declaration, Ex. 7

(Appx1248–1251, emphasis added.) Ms. Lewis concludes that the:

listed grass panels creates a visual impression that is distinct from the visual impression of the '068 patent because Lumicor's grass in Lumicor's panels is flat, whereas the '068 patent's reeds are cylindrical. Lumicor's embedded grass panels also do not depict the nodes of the '068 patent. Moreover the density of the embedded grass panels shown in the Exhibits 1, 3 and 5 is very sparse, especially in comparison with the density of the '068 patent.

(Appx1252.) She also stated in her rebuttal report that:

the ornamental impact of embedded grass is quite different than that of reed. The grass is flat whereas the reed is cylindrical; the grass depicted does not exhibit nodes; the density of the layup is very sparse. If a designer were going

to choose the reed product of the Goodson patent '068, he would likely not substitute a product made of grass.

(Appx1160.) Given all of this evidence, the District Court impermissibly resolved reasonable factual inferences against 3form by concluding that an ordinary designer would have substituted the reeds mentioned in Schober into the grass design shown in Exhibit 5. The District Court was only able to reach its obviousness determination by discounting and disregarding Ms. Lewis' testimony regarding the motivation to combine. That is impermissible on summary judgment.

The District Court also misread Ms. Lewis's testimony and then used it against 3form. The District Court concluded that Ms. Lewis "agreed that if the grass in Lumicor's Exhibit 6 . . . were replaced with reeds having nodes, the panel that resulted would have the same design as shown in the '068 patent." (Appx53.) The District Court based this conclusion on the following deposition testimony:

Q: Let me ask you with respect to Exhibit 376, if you replaced the grass in Exhibit 376 with reeds having nodes, would you end up with the same design as that shown in the '068 patent?

A: I would say it would be close enough. If you substituted the reeds, yes, and, you know---yes.

(Appx760.) However, the hypothetical question Lumicor posed to Ms. Lewis in this colloquy is based on a false predicate because it assumes there is already a motivation to substitute reeds having nodes for the grass in Exhibit 376. As already demonstrated above, Ms. Lewis explained that *an ordinary designer would not substitute reeds for grass*.

Even though Ms. Lewis testified that she was a “textile designer for commercial companies and international development organizations,” (Appx1156), the District Court discounted her testimony because it concluded that Ms. Lewis made her statements as an “interior designer choosing panels” instead of as a “designer of interlayers.” (Appx54–55.) However, that conclusion was erroneous.

In her rebuttal report, Ms. Lewis discusses issues related to both infringement and validity. The District Court takes language from Ms. Lewis’ discussion of infringement (e.g., the “market reasons” the District Court mentions) and misconstrues this language to relate to Ms. Lewis’ discussion on the motivation to combine. (Appx54–55.) For example, in her discussion on infringement, Ms. Lewis says:

The actual reeds used in the making of the accused product and the way they are placed as an interlayer meet all the

characteristics listed above such that an ordinary purchaser, viewing the designs as a whole, would be deceived into believing the Lumicor product is the same as 3form's patented design.

Most purchasers are making a variety of design decisions at roughly the same time. . . . If a designer decides they want to use a resin panel, they will weigh their decision against other options, and finally against vendors who might offer similar products. Their final choice will likely be based on look, price, availability, quality and customer service. The time devoted to comparing the "look" of a product is not excessive, so it would be easy for them to mistake two products from different vendors when the products look alike.

(Appx1159–1160.) When read in context, these paragraphs relate to infringement, not to invalidity. In the next paragraph, Ms. Lewis transitions to a discussion on invalidity. More specifically, she discusses Lumicor's expert's statements regarding Schober's relevance to a motivation to combine, which is clearly an invalidity concept. It is in this paragraph that Ms. Lewis makes her rebuttal. The full text is as follows:

Mr. Schober's assertion (on p. 12 of Schober Report) that, "The application for the '327 patent illustrates a panel incorporating dried stem material, shown being arranged in a generally parallel fashion with stems adjacent one another and sometimes overlapping. The patent then stated that reeds, twigs, and other dried materials could be used instead of grass. Based on this explanation, a person of ordinary skill in the art would have readily substituted the reeds for the

grasses, as Lumicor expressly instructed, to produce the 3form panel as shown in the '068 patent.” does not hold up, as the ornamental impact of embedded grass is quite different than that of reed. The grass is flat whereas the reed is cylindrical; the grass depicted does not exhibit nodes; the density of the layup is very sparse. If a designer were going to chose [sic] the reed product of the Goodson patent '068, he would likely not substitute a product made of grass.

(Appx1160.) When read in context, this paragraph relates to invalidity, not to infringement. The District Court’s misreading of this paragraph led it to discount Ms. Lewis’s testimony and to grant summary judgment in spite of a clear and genuine issue of material fact. Therefore, 3form requests that this Court reverse the grant of summary judgment of invalidity of the '068 Patent.

2. The District Court’s Designation of Exhibit 5 as the Primary Reference Was Improper.

Even though Lumicor argued in its summary judgment papers that Schober was the primary reference for purposes of its obviousness analysis, (Appx493, Appx515–516, Appx1314–1315), the District Court surprisingly identified Lumicor’s Exhibit 5 depicting beach grass as the primary reference (Appx52). 3form was not given the opportunity to brief the appropriateness of Exhibit 5 as the primary reference, and, in any event, the District Court’s designation was improper.

Assessing the potential obviousness of a design patent involves two distinct steps: first, “one must find a single reference, a something in existence, the design characteristics of which are basically the same as the claimed design”; second, “[o]nce this primary reference is found, other references may be used to modify it to create a design that has the same overall visual appearance as the claimed design.” *High Point Design, LLC, v. Buyers Direct, Inc.*, 730 F.3d 1301, 1311 (Fed. Cir. 2013) (quoting *Durling v. Spectrum Furniture Co.*, 101 F.3d 100, 103 (Fed.Cir.1996) (internal quotation marks omitted)). In accordance with this framework, Lumicor identified Schober as the primary reference in making its arguments that the ’068 Patent was obvious. (Appx493, Appx515–516, Appx1314–1315.) Despite this fact, the District Court determined that another alleged prior art reference, Exhibit 5 of the Schober declaration, should be the primary reference.

This designation is problematic because Lumicor does not have corroboration that Exhibit 5 is even prior art. Mr. Schober’s declaration provides evidence about the date that the photograph comprising Exhibit 5 was created, but the only evidence that Lumicor provides about whether the photograph/product was publicly available is this

statement in Mr. Schober's declaration: "I recall that Lumicor made and publicly displayed and offered beach grass panels of the type of Exhibit 5 in 2002." (Appx527.) That is naked uncorroborated oral testimony. The law does not permit such testimony for purposes of invalidating patents. *Finnigan Corp. v. U.S. Int'l Trade Comm'n*, 180 F.3d 1354, 1366-70 (Fed. Cir. 1999) ("[C]orroboation is required of any witness whose testimony alone is asserted to invalidate a patent . . ."). Mr. Schober does point to an email (Exhibit 9) that says "please send me samples of beach grass," (Appx528, Appx542), but Mr. Schober says that both Exhibit 3 and Exhibit 5 are "beach grass" (Appx526-528), and so the email does not corroborate his assertion that Exhibit 5 (as opposed to Exhibit 3) was publicly available.

Because the District Court's designation of Exhibit 5 as the primary reference was contrary to the theory proposed by Lumicor, because 3form has not had an opportunity to respond to the appropriateness of Exhibit 5 as a primary reference until now, and because there is only naked oral testimony that Exhibit 5 is even prior art, 3form respectfully requests that this Court reverse the District Court's grant of summary judgment of obviousness.

3. *The District Court Improperly Used Design Concepts Instead of Actual Appearances.*

The District Court identified Schober as the “most relevant secondary prior art reference.” (Appx52.) The District Court then stated that Schober “can be used to modify Lumicor Exhibit 5 [an embedded beach grass design] to create a design with the same ‘overall visual appearance’ as the ’068 patent” because Schober states that “other materials such as twigs from reed may be used instead of grass.” (Appx52-53.) The District Court then concluded that because Schober teaches that “reeds may replace grass as decorative, ornamental material,” it is “*not difficult for the court to imagine*” a panel with the “same ‘overall visual appearance’ as the ’068 patent.” (Appx53, emphasis added.)

This type of analysis is contrary to this Court’s precedent. Without any specific visual depiction, the District Court used written verbiage from a utility patent to create a hypothetical invalidating prior art reference. This approach is incorrect. For example, in *In re Harvey*, this Court held that the Board had erroneously analyzed a prior art vase as a “design concept” rather than the disclosure of specific design characteristics. *In re Harvey*, 12 F.3d 1061, 1064 (Fed. Cir. 1993); *see*

also Durling v. Spectrum Furniture Co., 101 F.3d 100, 104 (Fed. Cir. 1996) (“the focus in a design patent obviousness inquiry should be on visual appearances rather than design concepts”). The Court explained that “in considering prior art references for purposes of determining patentability of ornamental designs, the focus must be on appearances and not uses.” *In re Harvey*, 12 F.3d at 1064. The rationale behind this approach is that unlike an invention in a utility patent, a patented ornamental design has no use other than its visual appearance. This Court further held that “the Board should have focused on actual appearances, rather than ‘design concepts.’” *Id.* Viewing the prior art reference as a “design concept produced a type of post-hoc rationalization of the claimed designs that is improper.” *Id.*

In this case, the District Court made a similar mistake. It took a reference to the “design concept” that reeds may replace grass from the verbiage of a utility patent and then “imagined” a hypothetical reference that it determined would have the “same overall appearance” as the ’068 Patent. (Appx52–53.) It did not, as is required by this Court’s precedent, focus on “actual appearances.” *In re Harvey*, 12 F.3d at 1064; *see also In re Jennings*, 182 F.2d 207, 208 (C.C.P.A. 1950) (the

claimed design “must be . . . compared with something in existence – not with something that might be brought into existence by selecting individual features from prior art and combining them”). For this reason, the District Court erred in granting summary judgment for obviousness of the ’068 Patent.

4. *Questions of Fact Exist Regarding What Reeds Look Like.*

Notably absent from the District Court’s opinion is any reference or support for what the “twigs from reed” look like. This absence demonstrates a disputed issue of fact and also reflects the inability of Schober to teach any specific design characteristics necessary to invalidate the ’068 Patent. 3form explains the disputed nature of the facts surrounding the parties’ understandings of the meaning of “reeds” in its Opposition to Lumicor’s Motion for Summary Judgment where 3form specifically disputes Lumicor’s allegations that “reeds are well understood to be tall grasses having jointed stalks” and that “reeds used in the accused products and in the ’068 patent are the most basic and commonly available reed.” (Appx1038.) Even Lumicor’s counsel agreed that there are “different kinds of reeds.” (Appx1194.) For example, Schober does not show or discuss the spacing and layout or whether or

not the “twigs from reed” have nodes. In essence, the District Court’s opinion assumes all “twigs from reed” look alike. On this record, summary judgment should not have been granted—let alone summary judgment on a clear and convincing standard.

CONCLUSION AND STATEMENT OF RELIEF SOUGHT

Based on the foregoing, 3form respectfully requests that this Court reverse and vacate the District Court’s December 28, 2015 order granting Lumicor’s motion for summary judgment that claims 1–3, 5–6, 8–14, and 16–19 of the ’700 Patent are invalid as anticipated; that claims 4, 7, and 15 of the ’700 Patent are invalid as obvious; and that the ’068 Patent is invalid as obvious. 3form further requests that the Court remand this case for a trial to determine the issues of invalidity and infringement.

DATED this 10th day of May, 2016.

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PROOF OF SERVICE

I hereby certify that on this 10th day of May, 2016, I electronically filed the foregoing **CORRECTED BRIEF FOR APPELLANT 3FORM, INC.** using the court's CM/ECF system which will send notification of such filing to the following:

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ADDENDUM

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF UTAH, CENTRAL DIVISION

3FORM, INC., a Utah corporation,
Plaintiff,

v.

LUMICOR, INC., a Washington corporation,
Defendant.

**MEMORANDUM DECISION AND
ORDER GRANTING LUMICOR'S
MOTION FOR SUMMARY JUDGMENT**

Case No. 2:12-cv-00293-CW

Judge Clark Waddoups

INTRODUCTION

This case is before the court on 3form, Inc.'s ("3form") Motion for Partial Summary Judgment, (Dkt. No. 45), and Lumicor, Inc.'s ("Lumicor") Motion for Summary Judgment, (Dkt. No. 48). There has been no Markman hearing. Instead, the parties opted to address the issue of claim construction simultaneously with their motions for summary judgment. A hearing was held on the motions and the matters were taken under advisement. For the reasons set forth below, the court GRANTS Lumicor's Motion for Summary Judgment, and DENIES 3form's Motion for Partial Summary Judgment.

BACKGROUND

3form and Lumicor are competitors in the manufacture of decorative laminate panels for use in architecture and interior design. The disputes in this case concern panels made of thermoplastic sheets that contain embedded objects. 3form argues that certain Lumicor products infringe two of its patents: U.S. Patent No. 7,008,700, "Architectural laminate panel with

embedded compressible objects and methods for making the same,” (“the ‘700 patent”), and U.S. Patent No. D621,068, “Architectural panel with thatch reed design,” (“the ‘068 patent”).¹ Lumicor counterclaims seeking a declaratory judgment of noninfringement and invalidity on the ground that both patents are anticipated and/or obvious in light of its own earlier patent, U.S. Patent No. 6,743,327, “Solid surface products,” (“the ‘327 patent”), alone or in combination with other prior art references.

Decorative panels with embedded objects have historically been made by pouring “liquid acrylic around the desired objects, and then solidifying the acrylic into a hardened panel.” ‘700 patent, col. 2:26–28; *see also* ‘327 patent, col. 1:27–31. A set of patents filed by Michael Eckart and Raymon Goodson (“the Eckart patents”) from 1995 to 1998, and assigned to Eastman Chemical Company, demonstrate that this can also be accomplished through a single pressure lamination process. All of the Eckart patents call for the use of polyethylene terephthalate glycol, generally known as PETG, and the application of a pressure ranging from about 40 to 500 psi. The embedded objects can be: “a polymeric film with a high resolution printed thereon,” U.S. Patent No. 5,643,666; “a printed or colored film layer having opposed surfaces wherein at least one of the surfaces is colored or has an image printed thereon,” U.S. Patent No. 5,894,048; “a fabric comprised of textile fibers selected from cotton, wool, silk, rayon, polyesters, synthetic polyamides, acrylic, modacrylic and cellulose acetate fibers,” U.S. Patent No. 5,958,539; “metallic wire, rod and/or bar,” U.S. Patent No. 5,998,028; and “a film which is colored or which bears an image or pattern,” U.S. Patent No. 6,025,069.

¹ The Lumicor products accused of infringing the ‘700 patent are: “Zito (Spring and Autumn versions, including those designated as ‘Light’), Serengeti, Kenya, Savannah, Pampas Reed, Birch, Rainforest, Madagascar (standard and fade), Ginko Reed, Tortoise Reed).” (Dkt. No. 48-2, p. 35; *see also* Dkt. No. 2, ¶ 14). Those accused of infringing the ‘068 patent are: “Spring Zito and Autumn Zito panels . . . (including ‘Light’ versions).” (Dkt. No. 48-2, p. 41; *see also* Dkt. No. 2, ¶ 25).

Lumicor's '327 patent was issued on June 1, 2004, and is the first to instruct on the use of two pressures (40 psi and 160 psi) to embed decorative objects ("a dry material selected from the group consisting of textile fabric, paper, plastic film, plastic sheet, metallic wire, rod, mesh, bar, wood veneer, dried natural materials, tree bark, plant leaves, petals, and twigs") between two plastic resins ("polymethylmethacrylate, polyvinyl chloride, and polycarbonate"). *See* '327 patent, claims 1 & 2. While the '327 patent application claims the benefit of a provisional application filed on July 25, 2001, Lumicor concedes that the provisional application did not disclose the use of two pressures, and as such, that the earliest priority date that can be claimed is the patent's filing date of March 25, 2002.

The '700 patent also uses a plurality of pressures to embed objects (organic materials like thatch, bamboo, tree or bush branches or stems, willow reed, leaves, beans, and inorganic materials like rock, glass, and other types of minerals) between two extruded resin sheets (made of PETG, polycarbonate, and related copolyesters), which retain a substantial natural conformation despite the fact that one of the applied pressures, if used independently, would result in an unnatural conformation. The application for the '700 patent was filed on April 9, 2004, but was provisionally rejected by the PTO examiner on multiple grounds, including that it was either anticipated or obvious in light of the Eckart and '327 patents.

3form appealed the rejection and distinguished the cited art. With respect to Eckart, 3form argued that the only compressible object cited was textile fabric, which is essentially a two-dimensional, i.e. flat, object rather than a three-dimensional object. With respect to the '327 patent, 3form argued that the prior disclosed objects were either two-dimensional (textile fabric, mesh, wood veneer); rigid and non-compressible at 160 psi (metallic wire, rod, mesh, bar, wood veneer, textile, or tree bark); or, in the case of the remaining objects that could be considered

compressible (plant leaves, petals, or dried twigs), “would be significantly flattened to a primarily two-dimensional conformation” that did not “preserve the given object’s respective natural cross-sectional diameter(s) [at the recited pressures].” (Dkt. No. 48-2, p. 136). The PTO subsequently issued the ‘700 patent on March 7, 2006. For purposes of priority, the ‘700 patent is argued to be a continuation-in-part of application No. 10/465,465, filed on June 18, 2003. The ‘068 patent was filed on March 20, 2009 and has an issue date of August 3, 2010. It concerns a specific design using thatch reeds on the type of panels made following the ‘700 patent. Although the ‘068 patent cites to various other related documents, including the ‘700 patent, 3form does not currently contest that the ‘068 patent is entitled to a priority date no earlier than April 9, 2004.

ANALYSIS

Summary judgment is appropriate “if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law.” FED. R. CIV. P. 56(a). “A ‘material fact’ is one which could have an impact on the outcome of the lawsuit, while a ‘genuine dispute’ of such a material fact exists if a rational jury could find in favor of the non-moving party based on the evidence presented.” *Chasteen v. UNISIA JECS Corp.*, 216 F.3d 1212, 1216 (10th Cir. 2000). “Only disputes over facts that might affect the outcome of the suit under the governing law will properly preclude the entry of summary judgment. Factual disputes that are irrelevant or unnecessary will not be counted.” *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986).

Since an invalid patent cannot be infringed, considerations of judicial economy dictate that the court address the question of validity before making any determinations of infringement. The Patent Act grants issued patents a presumption of validity. *See* 35 U.S.C. § 282. This presumption applies to each claim of a patent, independent of the validity of other claims, and regardless of

whether a claim is independent, dependent, or in multiple dependent form. *Id.* Accordingly, Lumicor has the burden of proving invalidity by clear and convincing evidence. *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S. Ct. 2238, 2242 (2011). A determination of validity first requires that the court construe any disputed claims. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313 (Fed. Cir. 2002). In the second step, the court then addresses whether “the claims as properly interpreted are met by the prior art.” *Id.* (quoting *Beachcombers, Int'l, Inc. v. Wildewood Creative Prods.*, 31 F.3d 1154, 1160 (Fed. Cir. 1994)).

I. ‘700 PATENT

A. Claim Construction

Claim construction is a question of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 387 (1996). This inquiry starts with the language of the claims themselves, which “define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (quoting *Inova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Because they are part of a fully integrated document, claims “must be read in view of the specification,” *Id.* at 1315 (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d, 967, 979 (Fed. Cir. 1995)), which “is the single best guide to the meaning of a disputed term.” *Id.* at 1315 (quoting *Vitronics Corp. v. Conceptronic*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). In addition to consulting the specification, the court must also consider the patent’s prosecution history, which “consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent.” *Id.* at 1317.

There is a presumption that the words of a claim are generally given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art in question at

the time of the invention. *Id.* at 1312, 1320. However, “a definition of a claim term in the specification will prevail over a term’s ordinary meaning if the patentee has acted as his own lexicographer and clearly set forth a different definition.” *3M Innovative Props. Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1371 (Fed. Cir. 2003). In determining whether a patentee has acted as his own lexicographer, the court must analyze whether a statement was intended to define the terms as used in the specification and claims or whether it was intended to describe or apply only to a preferred embodiment. *LG Elecs. Inc. v. Bizcom Elecs., Inc.*, 453 F.3d 1364, 1374 (Fed. Cir. 2006), *rev’d on other grounds sub nom Quanta Computer, Inc. v. LG Elecs., Inc.*, 553 U.S. 617 (U.S. 2008). *See also E-Pass Techs., Inc. v. 3COM Corp.*, 343 F.3d 1364, 1369 (Fed. Cir. 2003). In making that determination, the court must consider the context in which the definition is used as well as the parameters used by the patentee.

A patentee is required to set forth his claims with sufficient definiteness so as to point out and distinctly claim the subject matter which the inventor regards as the invention. 35 U.S.C. § 112(b). To fulfill this requirement, “[t]he claims, when read in light of the specification and prosecution history, must provide objective boundaries” for those skilled in the art. *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014). Where a patent’s claims fail to inform those skilled in the art about the scope of the invention with reasonable certainty, the patent will be found to be invalid for indefiniteness. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

With those principles in mind, the court now turns to the disputed terms, as indicated in *italics*. Claim 1 of the ‘700 Patent states:

A decorative architectural panel comprising: one or more *compressible objects* suspended between two extruded resin sheets formed together about the one or more *compressible objects* using a plurality of pressures in a thermosetting process, at least one of the plurality of pressures being greater than or equal to a

critical pressure sufficient to otherwise compress the one or more *compressible objects* to an *unnatural appearing conformation*; wherein the one or more *compressible objects* maintain a *substantially natural appearing conformation* between the two formed resin sheets.

This claim contains all disputed terms and is a representative example of how they are used in the remaining claims.

1. “*compressible objects*”

This term appears in independent claim 1 and in dependent claims 8, 10–12, 17–18.² 3form contends that “compressible objects” should be construed as “Three-dimensional objects with a critical pressure of up to approximately 80-92 psi, depending on the extruded sheet materials, related temperatures and pressures, including, but not limited to, objects such as thatch, willow reed, straw, coffee beans, twigs, bamboo and similar objects.” (Dkt. No. 45-1, p. 29). Lumicor argues that 3form’s proposed interpretation is unduly lengthy, cumbersome, and improperly reads concepts from the specification into the claims. Lumicor argues that because the term uses ordinary words, a person of ordinary skill would understand that “compressible objects” means “An object that is capable of being flattened under pressure.” (Dkt. No. 55, p. 23).

In the patent, 3form provides an express definition of the term: “As used herein, ‘compressible objects’ refers to three-dimensional objects that substantially deform at pressures up to 80–90 psi.” ‘700 patent, col. 4:33–35. The definition appears in a section entitled “Detailed Description of the Preferred Embodiments.” Thus, as required by *LG Elecs., Inc.* and *E-Pass*, the court must determine whether the definition “as used herein” is intended to apply just to the preferred embodiment or to the claims and specifications as well. In the very next sentence, the patent reads, “That is, each ‘compressible’ object can be thought of as having a ‘critical

² “Three-dimensional object” is used in independent claim 19, rather than “compressible object.” The parties do not appear to argue that this term needs to be construed or has any meaning different from its ordinary meaning. The court finds that the term has its ordinary meaning and does not require construction.

pressure.” *Id.* at 35-36. To understand the meaning of compressible objects one must also understand critical pressure. The two concepts are intrinsically linked. The patent then continues, “For the purposes of this specification and claims, ‘critical pressure’ refers to the pressure at which the structural integrity of the object collapses” *Id.* at 36-39. Thus, the patentee expressly states that the term is to apply, not just to the preferred embodiment, but to the specification and claims.

The context in which the definition is provided makes this conclusion clear. Within that same paragraph, the specification adds a further clarification that “for extruded PETG materials, compressible objects will be understood as having a critical pressure of up to approximately 92 psi using conventional thermosetting processes.” *Id.* at 51–54. The phrases “As used herein” and “will be understood as,” together with the term being set off by quotation marks, provide clear evidence that the patentee intended these definitions to be used to define his invention. Moreover, earlier in the patent, the patentee distinguishes his invention by comparing its application to prior art applied to “fairly rigid three-dimensional materials, such as crushed glass or rocks that can withstand the conventional pressure (80 psi or greater).” *Id.*, col. 2:1-5. The patentee continues: “It would be impossible, however, to embed compressible objects (i.e. relatively soft objects, such as objects that would flatten at pressures of 80 psi or greater), such as thatch, willow reed, straw, coffee beans, twigs, bamboo, and so forth, having any measurable diameter, in extruded sheets using the pressure of conventional processing methods. In particular, compressible natural objects would not carry their natural appearance in the final decorative laminate panel since they would be flattened under conventional pressure.” *Id.* at 5-13. From this discussion it is clear that the inventive idea was to apply the technology to “soft” objects within a range of psi. This range of pressures is used throughout the specification, not just in describing a preferred embodiment.

Indeed, the so-called description of the preferred embodiments focuses primarily on the type of laminate and the application of the process rather than on the pressure range for compressible objects. Finally, 3form itself proposes a definition that is cabined by the pressure ranges set forth in the definition used in the patent. The additional language 3form proposes either does not relate to the inherent structure of the object or provides examples, which by their very nature are not definitional. The court concludes that the express definition provided in the patent was intended to apply to both the specification and the claims, not just to the preferred embodiment. *See Sinorgchem Co. v. ITC*, 511 F.3d 1132, 1136 (Fed. Cir. 2007). “As such, the patentee must be bound by the express definition.” *Id.* Moreover, reading the patent as a whole and in context, the court concludes the same definition is the correct definition for compressible objects as used in the claims, even if the patentee intended it only to apply to the preferred embodiment. Absent the pressure parameters, the patent would not provide sufficient boundaries for one skilled in the art to meaningfully understand the scope of the claimed invention and what other practices would be excluded. The court therefore construes compressible objects to mean three-dimensional objects that substantially deform at pressures up to 80–92 psi.

2. “critical pressure”

This term appears in independent claims 1 and 19, and dependent claims 8, 10–11. As discussed above, it is also expressly defined in the specification, stating that “For the purposes of this specification and claims, ‘critical pressure’ refers to the pressure at which the structural integrity of the object collapses, such that the object splits, cracks, or otherwise compresses into an unnatural conformation.” ‘700 patent, col. 4:36–40. That definition is the same as 3form’s proposed construction. For the same reasons stated above the court concludes that the express definition was also intended to apply to the claims. Lumicor presents no construction and

contends that the term is ambiguous because it calls for a single pressure at which an object collapses into an unnatural conformation. This is something that Lumicor believes is a subjective judgment call, given that an object may experience some discernible flattening and still retain a natural conformation. There is no argument that splitting or cracking are ambiguous. Accordingly, because unnatural conformation is also a disputed term which the court found amenable to construction, Lumicor's objections on the basis of ambiguity are rejected. The term "critical pressure" is construed to mean the pressure at which the structural integrity of the object collapses, such that the object splits, cracks, or otherwise compresses into an unnatural conformation.

3. *"unnatural appearing conformation"; "unnatural conformation"; "unnatural appearance"*

This term appears in independent claims 1 and 19, and in dependent claims 11 and 12. 3form contends that it should be construed as "The appearance of an object when its structural integrity collapses, such that the object splits, cracks, or substantially deforms." (Dkt. No. 45-1, p. 32). Lumicor accepts most of 3form's proposed construction, but contends that "significantly" should be used instead of "substantially." (Dkt. No. 55, p. 24). While Lumicor concedes that "an object that is split or cracked has become unnatural in its appearance," it reiterates the argument that the amount of flattening in the absence of cracking required to convert an object from a natural to an unnatural conformation is indeterminate and maintains that the word substantially only serves to magnify that ambiguity. *Id.* Since it agrees that "this term would be understood to exclude small or minor degrees of deformation," it contends that "significantly deforms" is more consistent with the specification. *Id.* In the end, Lumicor concludes that no construction can resolve the inherent ambiguity in this term.

The court again notes that this term is expressly defined in the specification, which states that “an ‘unnatural conformation’ may mean that an object has compressed to 90% of its thickness in one direction, 75% of its thickness in one direction, and so on.” ‘700 patent, col. 4:42–45. The specification defines an unnatural conformation solely in terms of compression, with some sort of collapse envisioned. *Id.* at 47–48. Both 3form and Lumicor incorrectly contend that an unnatural conformation also includes splitting and cracking, but that is explicitly foreclosed by the use of commas to denote a series, together with the disjunctive “or otherwise” directly preceding the term “unnatural conformation.” *See id.* at 36–40 (“‘critical pressure’ refers to the pressure at which the structural integrity of the object collapses, such that the object splits, cracks, or otherwise compresses into an unnatural conformation.”) (emphasis added). Absent a reference point, it is impossible for the court to determine the line between what is natural and unnatural. In order to resolve the ambiguity, the court limits construction of the term to at least its stated range. *See* ‘700 patent, col. 4:42–45. Accordingly, the court construes this term to mean an object that has compressed in an amount equal to or greater than 75% of its thickness in one direction.

4. “*substantially natural appearing conformation*”; “*substantially natural conformation*”

This term appears in independent claims 1 and 19. 3form proposes that this term be construed as “The appearance of an object in a relatively uncompressed or natural state, even if not perfectly natural or uncompressed.” (Dkt. No. 45-1, p. 33). Lumicor contends that the term is insolubly ambiguous and proposes no construction. This is the only disputed term not explicitly defined in the specification. The court concludes, however, that this term is defined by exclusion. Because anything that falls outside of the 75% plus compression range cannot be unnatural, it

must necessarily mean that it is natural. As such, the court construes the term to mean any conformation where the object has experienced compression of less than 75% of its thickness in one direction.

B. Anticipation

Novelty is a prerequisite for patentability. 35 U.S.C. § 102. Where 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,” it is said to be anticipated and therefore invalid. *Id.*; see also *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). “It is well settled that a claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference.” *Celeritas Techs., Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998). And while “those elements must be arranged or combined in the same way as in the claim, the reference need not satisfy an *ipsissimis verbis* test.” *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009). It is also necessary that the prior art reference “enable one of ordinary skill in the art to make the invention without undue experimentation.” *Impax Labs., Inc. v. Aventis Pharms. Inc.*, 545 F.3d 1312, 1314 (Fed. Cir. 2008). “Anticipation is a question of fact, including whether an element is inherent in the prior art.” *In re Gleave*, 560 F.3d at 1334–35. “If an inventor seeks to claim an advantage or modification that flows *necessarily* from a prior art reference, the reference inherently anticipates the inventor’s claim,” *Glaxo, Inc. v. Novopharm, Ltd.*, 830 F. Supp. 871, 874 (E.D.N.C. 1993) (emphasis added), *aff’d*, 52 F.3d 1043 (Fed. Cir. 1995), “even if the advantage was not appreciated by the inventor of the prior art.” *Id.* Furthermore, “[i]n order for a claim to be inherent in the prior art it is not sufficient that a person following the disclosure sometimes obtain the result set forth in the claim, it must invariably happen.” *Id.* “Whether a prior art reference is [thus] enabling is a question of law based

upon underlying factual findings.” *Minn. Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1301 (Fed. Cir. 2002).

1. Independent Claims 1 and 19

a. Claim 1

Claim 1 of the ‘700 patent is anticipated. Its limitations are: (1) a decorative architectural panel, (2) with a compressible object(s) (such as reed and bamboo) suspended between two extruded resin sheets, (3) which are formed together about the object(s) using a plurality of pressures in a thermosetting process, (4) at least one of the plurality of pressures being greater than or equal to a (critical) pressure sufficient to otherwise compress the object(s) to an unnatural appearing conformation, (5) wherein the compressible object(s) maintains a substantially natural conformation between the two formed resin sheets. ‘700 patent, col. 11:1-13.

The ‘327 patent expressly discloses the following limitations: (1) An architectural panel (“A flat non-porous unitary solid surface structure,” for “kitchen countertops and decorative architectural surfaces or facades”) with “a visible decorative object,” ‘327 patent, col. 1:9-15, 66-67, (2) with twigs from reed and bamboo (which are undisputed compressible objects), *Id.*, col. 8:32-33, which are suspended between two polymeric sheets, *Id.*, col. 3:8-19, (3) where heat is applied to the lay up sandwich, whereby the first and second polymeric sheets melt together to provide a unitary product, *Id.*, col. 3:24-32, applying first 40 psi and then later 160 psi (i.e. a plurality of pressures), *Id.*, col. 9:14-29.

The remaining limitations are also inherent in the ‘327 patent: (4) a critical pressure, whereby 160 psi is greater than the pressure required to unnaturally conform the disclosed reeds and bamboo, and (5) that this process used with compressible objects will always produce a product which maintains their substantially natural conformation within two formed resin sheets.

The concept that objects compress under some critical pressure was not invented by 3form and is inherent in all objects. 3form's expert admitted that all objects, even hard objects like steel, are compressible given an appropriate amount of force.³ (Dkt. No. 63-1, p. 16:6-20). This inherent property of all objects is a law of nature not subject to patentability by 3form, *see Bilski v. Kappos*, 561 U.S. 593, 611 (2010), though it is also a law of nature applicable to the '327 patent. Furthermore, 3form did not invent a method for measuring the amount of force required to deform an object until it appears unnatural. *Id.* (noting that the application of a law of nature to a product or process may be patentable). Instead, it is inevitable that when subjected to an appropriate amount of force, all objects will become deformed. *See Glaxo, Inc.* 830 F. Supp. at 874.

During the process of sandwiching decorative objects between two layers of plastic resin, the '700 patent limitations (4) and (5) disclose that at some point an undefined amount of pressure will be applied that would otherwise be high enough to compress an object, such as a reed, to the point where it is compressed too much to appear natural. Given that all objects inherently deform at some pressure, for the '327 patent to anticipate the '700 patent requires the use of one pressure high enough to definitively deform anticipated objects such as reeds and bamboo, and the use of another pressure that will not. Inherency does not require that the patentees realize that something is inherent; what matters is that here, the '327 patent explicitly discloses the pressure of 40 psi (which does not compress reeds and bamboo to an unnatural conformation), and 160 psi (which always will). '327 patent, col. 9:13-38. Therefore, even though the exact words "critical pressure"

³ Notwithstanding that both parties focused argument on softer objects typically thought of as compressible, the court notes that both the '700 patent and the '327 patent disclose three-dimensional hard objects typically thought of as noncompressible as examples of decorative materials each party's process could incorporate, such as "rock, glass, other types of minerals" '700 patent, col. 7:16-23, and a variety of metals in shapes including rods and cables. '327 patent, col. 8:37-47.

and “unnatural conformation” were not used, the ‘327 patent inherently anticipates those concepts.

The final question regarding limitation (5) is whether the process set forth in the ‘327 patent always enables the production of a panel with a substantially natural conformation. Although someone using the processes in the ‘327 patent might “sometimes obtain” architectural panels with compressible objects which maintain their substantially natural conformation within two formed resin sheets, to inherently anticipate, such panels must “invariably happen.” *See Glaxo Inc.*, 830 F. Supp. at 874. *Glaxo* underscores how predictable a prior art process must be to anticipate a product claim. 52 F.3d 1043. In *Glaxo*, the defendant’s experts performed a process “thirteen times and each time they made” the claimed product. *Id.* at 1047. But the fact that plaintiff’s experts “could yield” a different result following the same process meant inherency was inapplicable. *Id.* at 1047-48.

Here, the record shows that with the exception of the tests performed by 3form’s expert, Jeffrey T. Gotro, Ph.D., every single panel produced utilizing the procedure set forth in the ‘327 patent resulted in a substantially natural conformation. (Dkt. No. 50-7, pp. 15-16). While the court acknowledges that this is evidence that the ‘327 patent methods “could yield” such panels, 3form failed to produce evidence to show that any nonconforming product could be produced using the ‘327 patent methods. The Gotro tests, which are the only evidence cited by 3form to dispute that the ‘327 patent always produces a panel with a substantially natural conformation, are either inadmissible due to unreliability or, even if admissible, failed to use the process taught in the ‘327 patent and are thus irrelevant.

Under Federal Rule of Evidence 702, “A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or

otherwise if: . . . the expert has reliably applied the principles and methods to the facts of the case.” Gotro failed to reliably apply the principles and methods to the facts of this case. When he produced panels with deformed objects and bowed polymer, he failed to follow the ‘327 patent methods.

First, Gotro’s test applied too high a temperature for the specific resin used. (Dkt. No. 57-2, p. 13). The ‘327 patent clearly teaches, both descriptively and in specification sheets for each resinous material, that an appropriate temperature must be applied to the corresponding material. ‘327 patent, cols. 5-9. Gotro admitted that a person ordinarily skilled in the art would have used the temperature outlined on the spec sheet for the given material, (Dkt. No. 63-1, p.4:13-16, “one skilled in the art would know that heating a polymer too hot is going to cause degradation of the polymer. That’s known.”), and that the method he used ignored that principle. *Id.* at 10-13 (“I mean, I don’t know that a person of ordinary skill in the art would -- I mean, if they look at the data sheet, they would say the temperature was -- the melt – the softening point is low, so they would adjust it,” p. 12:17-21, and “Q. So a person of ordinary skill in the art wouldn’t use the acrylic melting temperatures when trying to make a PETG laminate panel; right? . . . A. Correct.” p. 13:2-6).

Second, Gotro’s test also failed to track the time at which the higher pressure and temperature were held. *Id.* at 6-7, “Q. Did you track temperature over time? A. . . .So we didn’t actually track it with a data log, no,” p. 6:5-19, and “Q: So you don’t have any idea how long the test took? You didn’t keep that data? A. No.” pp. 6:25-7:3). Furthermore, Gotro did not personally know how long the higher pressure and temperature were held because he did not perform the tests nor was he there when the tests were performed. *Id.* at 7:22-8:3. The ‘327 patent specifically states a duration of 1 to 6 minutes, depending on thickness. ‘327 patent, col. 9:35-37.

Finally, Gotro's test consisted of a two-step process wherein a high pressure (between 120 psi and 160 psi) was applied at a low temperature (195°), following which the same high pressure (between 120 psi and 160 psi) was applied at a higher temperature (235°). (Dkt. No. 57-2, p. 13). By contrast, '327 specifically teaches that a lower pressure (40 psi) should be applied at the lower temperature relevant to the resinous material used. '327 patent, col. 9:4-54. Because Gotro's tests did not apply the relevant teachings of the '327 patent, they are unreliable and inadmissible pursuant to Rule 702. Even if the tests were admissible, however, the evidence he produced is irrelevant to dispute that the use of the process set forth in the '327 patent will always produce a panel with a substantially natural conformation because he did not follow that process.

Thus, claim one of the '700 patent is anticipated and invalid because the court finds clear and convincing evidence that limitations (1), (2), and (3) were expressly anticipated by the '327 patent, and limitations (4) and (5) were inherently anticipated by the '327 patent.

b. Claim 19

Claim 19 of the '700 patent is also anticipated. It is a restatement of claim one's limitations in a different order, with the addition of the phrase "the image layer" to refer to the layer of decorative objects between the top and bottom layers of resin. The following chart compares the limitations of claim one with claim nineteen:

Claim 1	Claim 19
(1) A decorative architectural panel comprising: (2) One or more <i>compressible objects</i> suspended between two extruded resin sheets (3) formed together about the one or more <i>compressible objects</i> using a plurality of pressures in a thermosetting process,	(1) A decorative architectural resin panel comprising: (2) first and second extruded resin sheets formed together with a (3) plurality of pressures, (4) at least one of the plurality of pressures being greater than a critical pressure at which one or more

Claim 1	Claim 19
(4) at least one of the plurality of pressures being greater than or equal to a critical pressure sufficient to otherwise compress the one or more <i>compressible objects</i> to an unnatural appearing conformation; (5) Wherein the one or more <i>compressible objects</i> maintain a substantially natural appearing conformation between the two formed resin sheets. ‘700 patent, col. 11:2-13	(2),(4) <i>three-dimensional objects</i> ordinarily collapse to a substantially unnatural conformation; and an image layer (2) positioned between the first and second extruded sheets that are (3) formed together, the image layer (2),(5) comprising the one or more <i>three-dimensional objects</i> in a substantially natural conformation; wherein the one or more <i>three-dimensional objects</i> of the image layer (4),(5) maintain an appearance of the substantially natural conformation despite having been subjected to the critical pressure. ‘700 patent, col. 12:36-52

Given the essentially identical claims, and because each party argued the two claims identically, the same analysis that applies to the limitations in claim one applies to the limitations in claim nineteen. The court does note, however, that the italicized terms “compressible objects” and “three-dimensional objects” are equivalent, consistent with its claim construction of the term “compressible objects” as “*three-dimensional objects* that substantially deform at pressures up to 80–92 psi.” *See supra*, Part A1. Finally, the addition of the phrase “the image layer” in claim nineteen is insignificant as both parties and the court understood the term to refer to the layer of decorative objects between two sheets of resinous material.

2. *Dependent Claims 2-3, 5-6, 8-14, and 16-18*

Dependent claims 2-3, 5-6, 8-14, and 16-18, as discussed below, are anticipated. The court will consider dependent claims 4, 7 and 15 below under the section discussing obviousness.

a. *Claim 2*

Claim two of the '700 patent is expressly anticipated. It refers to the panel in claim one being "at least partially translucent." '700 patent, col. 11:14-15. The sheets in the '327 patent are illustrated and described as being translucent. '327 patent, col. 5:20-23. 3form's argument is unavailing that because the '327 patent provides that the sheets may also be colored, textured, frosted, opaque and/or contain fire-retardant additives and performance additives that translucency was not anticipated. The court finds that "translucent" sheets are expressly described and anticipated by the '327 patent, whatever other finishes the sheets may also have.

b. *Claim 3*

Claim three of the '700 patent is expressly anticipated. It refers to the laminate panel in claim one having "a thickness of between 0.25 and 2 inches." '700 patent, col. 11:16-17. The '327 patent anticipates the claimed range by explaining that "the thickness of product 10 may range from about 0.030 inch (0.7937 mm) to 2.0 inches (50.80 mm). However, thicker and thinner gauges are possible based on the press capabilities and starting material availability," '327 patent at col. 5:12-15, and "the polymeric sheets 16 and 18 may vary in thickness from about 0.004 inch (0.100 mm) to 1.0 inch (25.4)." *Id.*, col. 5:25-26. Prior art that discloses a range is anticipatory if it "describes the claimed range with sufficient specificity such that a reasonable fact finder could conclude that there is no reasonable difference in how the invention operates over the ranges." *Ineos USA LLC v. Berry Plastics Corp.*, 783 F.3d 865, 869 (Fed. Cir. 2015). The '327 patent discloses a range from 0.004 inch to 2.0 inches, and explains that differences in thickness are a

factor of press capability and starting material. The ‘700 patent range of 0.025 and 2 inches is encompassed entirely within the ‘327 patent ranges. The court finds that patent differences in the range of thickness sizes are a reflection of press capability and starting material and there is no reasonable difference in how the invention operates over the ranges.

c. Claim 5

Claim five of the ‘700 patent is expressly anticipated. It refers to the panel in claim one, “wherein at least one of the first and second extruded sheets comprise extruded polycarbonate having a thickness of between 0.1 inches and 0.50 inches.” ‘700 patent, col. 11:22-25. The ‘327 patent describes the use of polycarbonate, which 3form admits. 3form disputes that this claim is anticipated only because the thickness range described by the ‘327 patent does not perfectly match its own claim. However, as analyzed above for claim 3, the court finds that 3form’s range of thickness is within the ranges disclosed by Lumicor and that the patent differences in the range of thickness sizes is a reflection of press capability and starting material, with there being no reasonable difference in how the invention operates over the ranges.

d. Claim 6

Claim six of the ‘700 patent is expressly anticipated. It refers to the panel in claim one “wherein at least one of the first and second extruded sheets has a width and length dimensions of approximately 3’x5’, approximately 4’x8’, or approximately 5’x10’.” ‘700 patent, col. 11:26-29. The ‘327 patent describes several examples with 4’x8’ dimensions, i.e. “a bottom sheet of the preferred polymethylmethacrylate material that is . . . 48 inches wide, and 96 inches long,” ‘327 patent, col. 10:35-37. The ‘700 patent only requires *at least one* of the panels to have dimensions in the stated ranges, which the ‘327 patent does (4’x 8’). Furthermore, the ‘327 patent dimensions fall directly between the ‘700 patent ranges. When it is the patent at issue claiming a range, rather

than the prior art reference claiming a range as in claims 3 and 5 above, the patent at issue's "range is anticipated by a prior art reference if the reference discloses a point within the range." *Ineos USA*, 783 F.3d at 869. Moreover, there is nothing in the '700 patent to suggest that the size points are unique, that the size is critical to the invention or that the invention would work differently than when using the size disclosed in the prior art. *See id.* at 869-70. The '327 patent having disclosed a size point (4'x8' panels) within the range of the '700 patent sizes (3'x5', 4'x8', 5'x10' panels), the court finds that the '700 patent is anticipated by the '327 patent.

e. Claim 8

Claim eight of the '700 patent is expressly anticipated. It refers to the panel as in claim one, wherein "one or more compressible objects," such as "bamboo" and twigs, have a "natural diameter that is substantially compressed at a critical pressure between about 10 psi and about 100 psi." '700 patent, col. 11:34-39. The '327 patent discloses "the material to be fixated in the matrix 12 may also be made of . . . plant fiber and parts. Non-limiting examples are: . . . dried plant materials and fibers including long-stem grass, . . . bark and twigs from reed, bamboo, papyrus, banana, mulberry, and wicker," '327 patent, col. 8:25-35, that would lose their "aesthetically pleasing" aspect, *Id.*, col. 2:62-63, cols. 8-9, when compressed at pressures higher than 40 psi and up to 160 psi. *Id.*, col. 9:14-28. The parties do not dispute that bamboo and twigs are disclosed by the '327 patent, and it is undisputed by the parties that the critical pressure for twigs and reeds is about 75 psi, (Dkt. No. 57, p. 9), which falls directly within this range. The court notes that after describing "compressible objects" to mean three-dimensional objects that substantially deform at pressures up to 80–92 psi in the specification, the '700 patent is internally inconsistent when in claim eight it claims an object "is substantially compressed at a critical

pressure between about 10 psi and about 100 psi.”⁴ Nevertheless, because twigs and bamboo deform at pressures up to 80-92 psi, the court finds that their disclosure in the ‘327 patent anticipates claim eight of the ‘700 patent.

f. Claim 9

Claim nine of the ‘700 patent is inherently anticipated. It refers to the panel as in claim one, wherein there is uniformity in the viewable surface of the decorative panel “such that no lakes or air bubbles are exposed.” ‘700 patent, col. 11:40-43. The ‘327 patent specification states “[i]n order to produce products which are free of defects (such as air or gas bubbles entrapped in the matrix, voids in the matrix, or cracks in the matrix), it has been found to be critical to process the above-described basic lay-up sandwich according to the following operating parameters.” ‘327 patent, col. 8:60-col. 9:5. 3form does not dispute that defects *such as* gas and air bubbles were anticipated in the ‘327 patent, merely that the ‘327 patent did not aim to produce a panel free of any kind of defect whatever. This dispute is immaterial because 3form does not dispute that the ‘327 patent discloses the defect at issue, and because the ‘327 patent describes how this defect can be avoided, thus providing the court with clear and convincing evidence that it inherently anticipates the ‘700 patent.

g. Claim 10

Claim ten of the ‘700 patent is inherently anticipated. It refers to the panel as in claim one, “wherein the one critical pressure is less than about 92 psi for the one or more compressible objects.” ‘700 patent, col. 11:44-46. After the court’s construction of the term “compressible objects,” all of the decorative objects in the ‘700 patent must have a critical pressure of less than 92 psi to count as a “compressible object.” For this claim to be anticipated, however, the ‘327

⁴ By arguing that a “compressible object” should be construed to be an object that deforms at “a critical pressure of up to approximately 80-92 psi,” 3form must be found to have abandoned any claim that a compressible object has a different meaning in claim eight. *See* 3form’s Mot. Partial Summ. J., (Dkt. No. 45-1, p. 29).

patent is only required to disclose at least *one* compressible object with a critical pressure of less than 92 psi. 3form does not dispute that at least one of the decorative objects (twigs) in the ‘327 patent has a critical pressure of less than 92 psi, (Dkt. No. 57, p. 15), which is all that is required. Additionally, it is undisputed by the parties that the critical pressure for reeds is about 75 psi, *Id.* at 9, which makes a second anticipated object that compresses at less than 92 psi. Finally, the ‘327 patent describes numerous objects, softer than twigs, as examples that inherently compress at pressures less than 92 psi. ‘327 patent, col. 8:28-33 (such as “cellulose, cotton, linen, pulp, rag, dried plant materials and fibers including long-stem grass, leaves, petals . . .”). *Id.* at col. 8:4, 30-32. Because one or more qualifying objects is expressly disclosed, the court finds clear and convincing evidence that claim ten is inherently anticipated by the ‘327 patent.

h. Claim 11

Claim eleven of the ‘700 patent is inherently anticipated. It refers to the panel in claim ten, where a lower limit of 10 psi is identified and “compressible three-dimensional objects ordinarily appear to have an unnatural conformation when subjected to the critical pressure of between about 10 psi and 92 psi.” ‘700 patent, col. 11:47-51. As discussed in the court’s analysis of claim one, because the pressure at which any object ultimately deforms is an inherent property of the given object, the ‘327 patent disclosures of the same types of objects disclosed in the ‘700 patent (that necessarily fall within the psi range identified by this claim in the ‘700 patent) are inherent disclosures of the pressures that would deform the objects listed by the ‘700 patent. The ‘700 patent describes as examples of objects that compress at pressures between 10 psi and 92 psi “any natural or synthetic decorative materials, such as thatch, bamboo, tree or bush branches or stems, willow reed, leaves, beans (e.g. coffee beans), and so forth.” *Id.* at col. 7:12-16. The ‘327 patent describes as examples “wood veneer, paper, dried plant fibers and parts[, n]onlimiting examples

. . . [such as] long-stem grass, leaves, petals, bark and twigs from reed, bamboo, papyrus, banana, mulberry, and wicker.” ‘327 patent, col. 8:29-33. Each patent’s examples were nonlimiting and directed toward one or more class of objects (“any natural . . . decorative material,” “such as” and “so forth” in the ‘700 patent; “plant fibers and parts,” “[n]onlimiting examples” in the ‘327 patent), although exact matches were also present (bamboo, reed, leaves). Because each patent described natural, plant materials as a general class as well as one or more identical compressible objects, the court finds that the relevant pressures at which these objects deform are inherently disclosed and anticipated by the ‘327 patent.

i. Claim 12

Claim twelve is similarly inherently anticipated. It refers to the panel in claim ten (identifying a pressure to be applied not more than 92 psi), where the “unnatural appearance comprises a substantially flattened appearance for the one or more compressible three-dimensional objects when viewed through the first or second extruded sheet.” ‘700 patent, col. 11:52-col. 12:2. Again, only *one* object is required to have a critical pressure of less than 92 psi in this claim. Because the pressure at which any object ultimately deforms is an inherent property of the object, the ‘327 patent disclosures of three-dimensional objects that inherently compress at pressures less than 92 psi would necessarily have the same unnatural, substantially flattened appearance when viewed through the sheets if subjected to pressures greater than 92 psi. 3form “does not dispute that certain twigs or reeds [described in the ‘327 patent] may flatten if subjected to the critical pressure,” (Dkt. No. 57, p. 16). This is clear and convincing evidence that at least two sets of objects (twigs and reeds) disclosed by the ‘327 patent anticipate claim twelve of the ‘700 patent.

j. Claim 13

Claim thirteen of the ‘700 patent is expressly anticipated. It refers to the laminate sheet assembly used to create the panel recited in claim one, where the assembly “is subjected to the plurality of pressures in the thermosetting process” and consists of: (1) “the first extruded sheet,” (2) “one or more three-dimensional objects arranged on the first extruded sheet,” (3) “a second extruded sheet positioned about the one or more embedded objects, and where when so positioned, (4) “sufficient air escapes from between the embedded objects as pressure is increased, such that lakes or air bubbles are avoided” when the sheets are formed together. ‘700 patent, col. 12:3-19.

Figure 2 of the ‘327 patent illustrates the configuration of the laminate assembly, with a (1) bottom sheet 16, (2) decorative materials 14 arranged on the bottom sheet, and (3) a top sheet 18. ‘327 patent, sheet 1 of 2. 3form does not dispute this configuration, although it argues that the ‘327 patent primarily addresses two-dimensional objects rather than three-dimensional objects. The ‘700 patent, however, only requires *one* three-dimensional object and 3form does not dispute that at least some of the ‘327 patent objects are three-dimensional. Therefore, the court finds that limitations 1-3 in the ‘700 patent are anticipated by the ‘327 patent.

As for limitation (4), claim one of the ‘327 patent states that “a lay-up sandwich is formed comprised of said first flat sheet of polymeric material, said decorative object *which extends beyond at least one edge of both of said sheets of polymeric material*, and said second flat sheet of polymeric material.” ‘327 patent, col. 14:3-7 (emphasis added). The specification further states that the decorative object layer “*functions as a breather layer for air and gases to escape during the manufacturing process*,” *Id.*, col. 4:50-63 (emphasis added), and explains that the “decorative material 14 extends beyond the edges of polymeric sheets 16 and 18 . . . [to] provide[] an *escape*

path for air, water, vapor, and gasses generated during the pressing operation.” Id. at 63-67 (emphasis added). 3form admits that the layer of decorative objects as a whole acts as a “breather layer.” It disputes that the ‘327 patent *explains* that these resulting “escape paths” avoid creation of lakes and air bubbles when forming the panel. (Dkt. No. 57, p. 17.) The court finds this dispute to be immaterial. The ‘327 patent discloses both the problem and the placement that solves the problem. It discloses in several places that the placement of the decorative object layer is for the purpose of allowing trapped air and gases to escape. Its background discloses one of the problems solved by this invention is avoiding the creation of defects such as “air bubbles entrapped in the matrix, voids in the matrix, or cracks to the matrix.” ‘327 patent, col. 2:54-55. Because all it takes to *explain* that air bubbles and lakes in the finished product can be avoided by arranging the materials in the decorative layer such that trapped air and gas can escape during the pressing process is to put these two disclosures together, the court finds that claim thirteen is anticipated.

Claim four of the ‘327 patent also states that after “applying a pressure of about 40 psi . . . [the press is opened and pressure is removed] from the lay-up *sandwich to allow air and gases to escape from the lay-up sandwich*; [after which the press is closed and 160 psi is applied for a period of time such that] “said first and second . . . sheets melt together in the lay-up sandwich to provide a unitary product.” *Id.*, col. 15:27-37 (emphasis added). Claim four of the ‘327 patent applies to claim thirteen of the ‘700 patent because it explicitly addresses the “plurality of pressures” and “thermosetting process” noted therein. It is also worth noting that the parties referred to the step involving opening and closing the press to release air and gases as “bumping.” 3form’s expert admitted that the ‘327 patent teaches a method for eliminating “trapped air and gases,” although he also claims that not only were the bubble-free products produced by Lumicor’s experts without following the “bumping” method, but that Lumicor’s current

commercial manufacturing process similarly does not use the “bumping” method to produce defect-free products. This does not change the court’s analysis, except to note that in addition to being anticipated, arrangement of the decorative object layer as a method of eliminating defects caused by air and gas bubbles may also be obvious.

k. Claim 14

Claim fourteen of the ‘700 patent is expressly anticipated. It refers to the laminate sheet assembly recited in claim thirteen, which further has “a pressure pad positioned about one of the first and second extruded sheets.” ‘700 patent, col. 12:20-23. The use of pressure pads in an assembly to create laminate panels is described in significant detail in the ‘327 patent, ‘327 patent, col. 11:56-65, as well as in the Eckart patent ‘028, col. 4:53-59, and this fact was admitted by 3form’s expert. (Dkt. No. 57-2, p. 26). In detail, the ‘327 patent describes the pressure pads as follows: “First, an intermediate lay-up book is made consisting of the following sequence from top to bottom: (1) *four plies of canvas padding*; caul plate; (2) textured release paper or plate providing 0.005 inch relief; (3) 0.060 inch clear polymethylmethacrylate sheet (size 48 inches by 96 inches); (4) a layer of the delicate decorative material; (5) 0.060 inch clear polymethylmethacrylate sheet (size 48 inches by 96 inches); (6) textured release paper or plate providing 0.005 inch relief; (7) caul plate; and, (8) *four plies of canvas padding*.” ‘327 patent, col. 11:56-65 (emphases added). 3form expert witness Jeffrey T. Gotro admitted this and its implication by refuting as incorrect a statement that “the Lumicor patent does not describe the use of pressure pads.” He stated that it does, because “the ‘327 patent specifically calls out ‘Four plies of canvas . . . placed below the bottom caul plate and above the top caul plate to evenly distribute the pressure and heat during the pressing/heating operation.’ (327 patent, column 10:62-

67).” (Dkt. No. 57-2, p. 26). This admission demonstrates that pressure pads were anticipated by the ‘327 patent.

l. Claim 16

Claim sixteen of the ‘700 patent is expressly anticipated. It refers to the laminate sheet assembly recited in claim thirteen, “wherein the first and second extruded sheets comprise polycarbonate.” ‘700 patent, col. 12:27-29. The ‘327 patent expressly discloses the use of polycarbonate, ‘327 patent, col. 7:22-24, and 3form admitted this fact in its response to claim five, which it incorporated in its response to claim 16. This is clear and convincing evidence that claim 16 is anticipated by the ‘327 patent.

m. Claim 17

Claim seventeen of the ‘700 patent is expressly anticipated. It refers to the panel recited in claim one, “wherein the one or more compressible objects comprise thatch or willow reed.” ‘700 patent, col. 12:30-33. The ‘327 patent expressly describes the use of “twigs from reed.” ‘327 patent, col. 8:32-33, and 3form admits this is the case. Because this claim requires only *one* object comprising either thatch *or* willow reed and 3form has admitted that the ‘327 patent contains at least one qualifying object, the court finds clear and convincing evidence that claim seventeen is anticipated. Lumicor, additionally, argues that “thatch is a generic word for reeds,” and thus the term “reed” is encompassed by the word “thatch.” 3form disputes that “thatch is a generic word for reeds.” The court takes judicial notice that “thatch” generically refers to reeds and similar plant material, and thus by referring to reeds in the ‘327 patent, thatch is also anticipated. *See Thatch, Oxford Dictionaries*, http://www.oxforddictionaries.com/us/definition/american_english/thatch (last visited December 22, 2015).

n. Claim 18

Claim eighteen is expressly anticipated as it refers to the panel recited in claim one, “wherein the one or more compressible objects comprise bamboo.” ‘700 patent, col. 12:33-35. After the court’s construction of “compressible objects” as three-dimensional objects that substantially deform at pressures up to 80–92 psi, the court notes that bamboo will not count as a “compressible object” for the ‘700 patent unless it has a critical pressure of less than 92 psi. The specific critical pressure of bamboo was not addressed by the parties. However, the ‘327 patent expressly discloses bamboo, ‘327 patent, col. 8: 28-33, (“the material to be fixated in the matrix 12 may also be made of . . . bamboo”) and this is not disputed by the parties. Therefore, the disclosure of bamboo is clear and convincing evidence that claim eighteen is anticipated by the ‘327 patent.

C. Obviousness

“A patent for a claimed invention may not be obtained . . . if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103. “The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l Co. v. Teleflex*, 550 U.S. 398, 416 (2007). “When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *Id.* at 417. On the other hand, when “the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *Id.* at 416.

“Whether a claimed invention would have been obvious is a question of law, based on factual determinations regarding the scope and content of the prior art, differences between the prior art and the claims at issue, the level of ordinary skill in the pertinent art, and any objective indicia of non-obviousness.” *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013) (citing *KSR Int’l Co.* at 406; *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966)).

1. Level of ordinary skill

Lumicor’s expert opined that “an individual with a Bachelor’s degree in materials science and engineering or related technology and 3 to 5 years of experience in the design, fabrication or manufacture of laminated resin panels, or equivalent work experience, would have ordinary skill in the relevant art at the time of filing of the subject patents.” (Dkt. No. 50-7, p. 9 ¶ 28.) Because both parties and their experts’ arguments relied on this level of expertise as constituting the level of ordinary skill in the pertinent art, so does the court.

2. Scope and content of prior art

Each party limited its argument on the relevant prior art to the ‘327 patent and the five Eckart patents; therefore, the court finds that the parties agree on the scope of the prior art and similarly limits its discussion to these patents. The parties disagree, however, on the content of the teachings of the prior art. Each party agrees that the use of PETG in the production of laminate panels is taught by the Eckart patents. 3form contends that the combination of the Eckart patents and the ‘327 patent do not teach the use of PETG with compressible objects, plurality of pressures, a critical pressure, or maintaining a substantially natural appearing conformation. However, the court has now construed each of these terms and found that they are all anticipated by the ‘327 patent; therefore, 3form’s contention that the ‘327 patent does not teach these concepts is rejected as immaterial. The ‘327 patent and the five Eckart patents contain all of the

content necessary to analyze whether 3form's combination of these familiar elements yields predictable results.

3. Obviousness of '700 patent as a whole

While Lumicor argued that its '327 patent, alone or with prior art, renders all of the asserted claims of the '700 patent obvious under 35 U.S.C. § 103, each of the '700 patent claims was not individually briefed as being obvious. Accordingly, the court declines to address whether claims 1-3, 5-6, 8-14, and 16-19 are obvious because it has already found them to be anticipated and therefore invalid. The remaining claims of the '700 patent, claims 4, 7, and 15, all deal with the use of polyethylene terephthalate glycol, generally known as PETG, which the court will now address.

a. Claim 4

Claim four is obvious. It recites the panel as in claim one, "wherein at least one of the first and second extruded sheets comprise extruded PETG having a thickness of between 0.1 inches and 0.50 inches." '700 patent, col. 11:18-21. As previously noted, the parties agree that the Eckart patents teach the use of PETG in the production of decorative laminate panels (with neither party arguing about thickness, although the court notes that the Eckart '028 patent describes PETG sheets in the relevant range with a thickness of 0.25 inches). Lumicor argues that this teaching makes it obvious to try combining the use of PETG material with the method for embedding decorative objects taught by the '327 patent, even if its patent did not list it as a preference. 3form argues that if it had been obvious, Lumicor would have included PETG in its patent, but it failed to do so because "the vast majority of the decorative materials taught in the '327 patent are not compressible," (Dkt. No. 57, p. 65), and thus Lumicor failed to notice the advantages of PETG's lower melting point when used with three-dimensional compressible objects. Thus, 3form argues

that the advantages of PETG were not obvious until its own invention and that the ‘327 patent teaches away from combining its method with the use of PETG.

The court disagrees. 3form’s argument relies on its assertion that “the vast majority of the decorative materials taught in the ‘327 patent are not compressible.” This is at odds with the opinion of 3form’s expert (as well as the inherent law of nature) that all objects are compressible upon application of an appropriate amount of force. Therefore all of the objects taught by the ‘327 patent are “compressible” in the sense required by 3form’s argument, even if neither they nor some of the objects listed in the ‘700 patent are “*compressible objects*” as construed by the court above. Rather, the court finds that a person of ordinary skill in the art would implement this predictable variation of material types, particularly because the design incentives to do so are explicit in the ‘327 patent, the point of which is to aesthetically embed a wide range of decorative objects within a variety of resin matrices by using a two-step process that includes a lower pressure first step to limit deformation of the decorative layers. The ‘700 patent merely combines old elements (PETG and the method anticipated by the ‘327 patent) “with no change in their respective functions . . . withdraw[ing] what already is known into the field of its monopoly and diminish[ing] the resources available to skillful” persons. *KSR Int’l*, 550 U.S. 398 at 416 (citing *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152-153 (1950)). This is impermissible pursuant to § 103. Furthermore, “A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation” into the claimed invention. *Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009). The expression of a preference for a group of resins that happens not to include PETG in the ‘327 patent does not teach away from the use of that resin.

c. Claim 7

Claim seven is obvious. It recites the panel as in claim one, “wherein at least one of the first and second extruded sheets comprises a copolyester that has a melting point between 180° F. and 230° F. in a pressure range of up to 40 psi.” ‘700 patent, col. 11:30-33. Eckart patent ‘028 describes temperature ranges for copolyester sheets with a melting point between 194° to 572° F., noting that “the optimal temperature for bonding the thermoplastic sheets will vary, for example, depending on the particular copolyester(s) employed and the thickness of the sheet materials used, and may be determined by those skilled in the art.” Eckart ‘028 patent, col. 4:20-28. Eckart patent ‘066 similarly describes PETG temperature melting ranges between 195° to 510° F. and notes that “[a] person of ordinary skill in the art can select [a temperature suitable to cause the PETG layers to bond together without causing decomposition, distortion, or other undesirable effects] without undue experimentation.” Eckart ‘066 patent, col. 6:66-68, col. 7:1-10. The ‘327 patent describes a pressure range of 40 psi. ‘327 patent, col. 9:14.

Lumicor’s argument is that the Eckart patents describe copolyester resins having melting points within the range of the ‘700 patent, and particularly that both patents identify that the appropriate temperature range for use for a particular resin material can be determined without undue experimentation by one ordinarily skilled in the art. Lumicor further argues that the parties do not disagree that the appropriate melting temperature for PETG would be obvious to one ordinarily skilled in the art, in part because 3form admitted that the Eckart ‘028 patent states it and because 3form did not dispute that PETG resins are sold with a data sheet that identifies its softening or melting temperatures. 3form’s argument is again that a person of ordinary skill in the art would not have “appreciated the use of PETG with compressible objects,” and reiterates that its argument is not that “the temperatures that would work with PETG would not be obvious,” but

that Lumicor failed to recognize the advantages of PETG's lower melting point for use with compressible objects. (Dkt. No. 57, p. 66).

The court disagrees with 3form for reasons similar to those regarding claim four, namely, that 3form cannot rely on compressibility as the nonobvious element that distinguishes this claim from the prior art. Because the temperatures at which PETG melts is either obvious based on data sheets that arrive with the manufactured material or because one ordinarily skilled in the art can determine the appropriate temperature of this copolyester without undue experimentation, the design incentives explicit in the '327 patent make it obvious to combine the use of the proper copolyester temperature at 40 psi to aesthetically embed a wide range of decorative objects within the resin matrix. The '700 patent's definition of "compressible objects" has been construed such that they are a subset of the set of all objects capable of compression, which means that the Eckart patents and their use of PETG with its associated temperatures along with the '327 patent and its associated teachings make 3form's known subset of "compressible objects" obvious. Therefore, compressibility as a distinction fails to distinguish claim seven as being nonobvious.

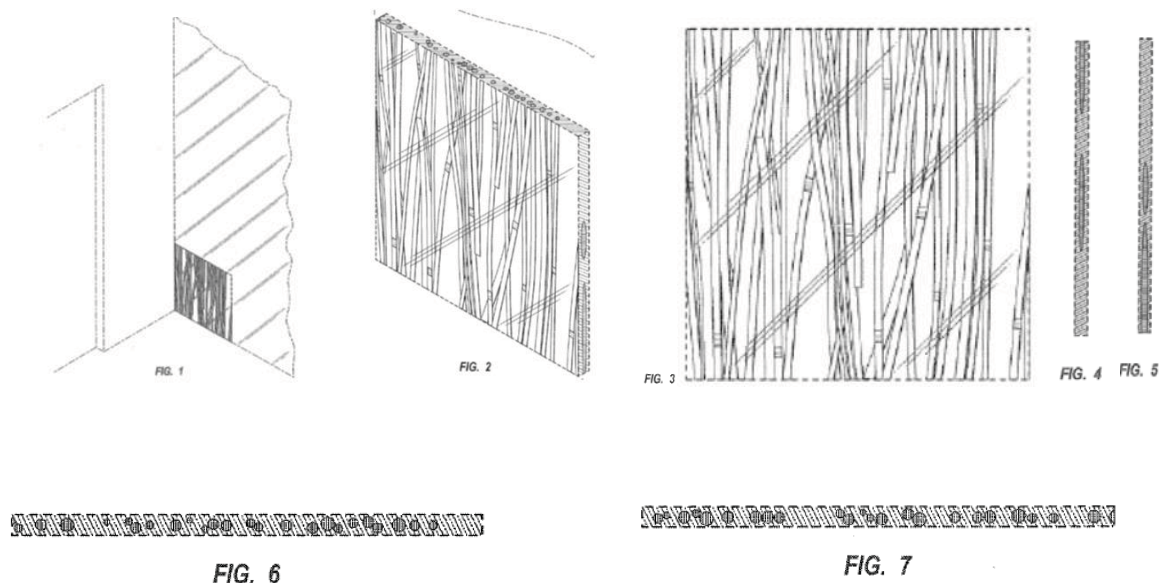
d. Claim 15

Claim fifteen is obvious. It refers to the "laminate sheet assembly as recited in claim 13, wherein the first and second extruded sheets comprise PETG." '700 patent, col. 12:23-25. As previously discussed, the only term in this claim that the '327 patent does not make obvious is the use of PETG as the laminate material, and it is undisputed that the Eckart patents teach the use of PETG. The parties argued this claim precisely the same as they argued claim four; therefore, the court finds this claim obvious and invalid for the reasons cited therein.

II. '068 PATENT

A. Claim Construction

The parties do not dispute the construction of the '068 patent. Because design patents are generally claimed as shown in drawings, claim construction for design patents does not typically require “a detailed verbal description of the claimed design, as is typically done in the case of utility patents,” although the decision to do so is left to the court’s discretion. *Egyptian Goddess, Inc. v. Swisa, Inc.*, 543 F.3d 665, 679 (Fed. Cir. 2008). Instead, claim construction for “a design is better represented by an illustration ‘than it could be by any description.’” *Id.* at 679 (quoting *Dobson v. Dornan*, 118 U.S. 10, 14 (1886)). The court accordingly construes the patent claims as an architectural panel with thatch reed design as shown below in figures 1-7 of the '068 design patent.



Having set forth the claimed design in the '068 patent, the court next turns to whether this design is met by the prior art.

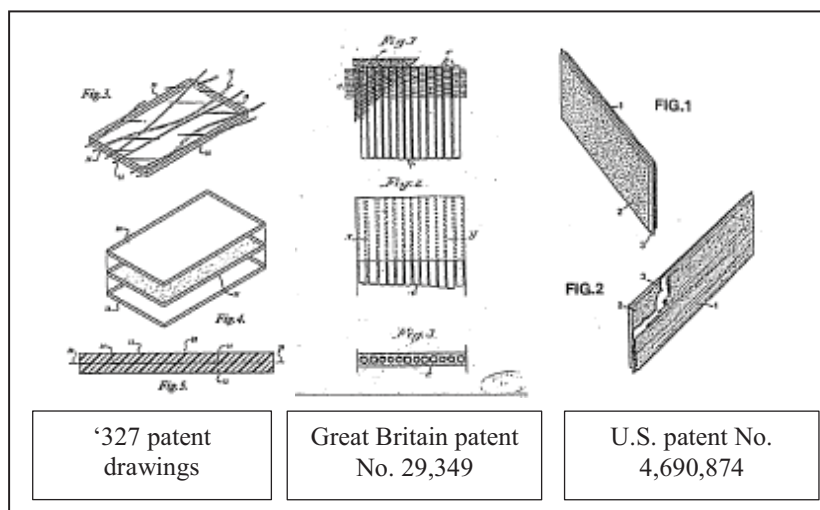
B. Obviousness

While Lumicor has argued that the '068 patent is invalid as obvious and under the on-sale bar, 35 U.S.C. § 102(b), the court finds that an analysis of the patent's obviousness in light of the prior art conclusively resolves the question of validity and as such, there is no need to address the on sale bar.

The elements of obviousness have been set forth in 35 U.S.C. § 103, *KSR Int'l Co.*, 550 U.S. at 406, 416-417, *Randall Mfg.*, 733 F.3d at 1362, and *Graham*, 383 U.S. at 1, 17-18 as previously discussed in subsection I(C), *supra*. In addition, "in the design patent context, the ultimate inquiry under section 103 is whether the claimed design would have been obvious to a designer of ordinary skill who designs articles of the type involved." *Durling v. Spectrum Furniture Co.*, 101 F.3d 100, 103 (Fed. Cir. 1996). Specifically, the court must determine whether a designer of ordinary skill "would have combined teachings of the prior art to create the same overall visual appearance as the claimed design." *Id.* As a prerequisite to combining the prior art designs for this assessment, the court must follow a two-step process: first, find a single reference in existence which has "basically the same" design characteristics as the claimed design, and second, once this reference is found, then other references may be used to modify the primary reference to create a design that has the same "overall visual appearance as the claimed design," *High Point Design, LLC v. Buyers Direct, Inc.*, 2013 U.S. App. Lexis 18836 (Fed. Cir. 2013), *aff'd in part, rev'd in part on other grounds*, 2015 U.S. App. Lexis 13621 (Fed. Cir. 2015), as long as such secondary references are related enough that the appearance of certain "ornamental features in one . . . suggest the application of those features to the other." *Durling*, 101 F.3d at 103. In addition, particularly for simple technologies, obviousness may be a matter of common sense and logic that may not require explicit teachings in published references or resort

to expert opinions. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009).

Lumicor has proposed numerous alternatives as prior art that render the '068 patent obvious. Some of those include the following three patent drawings:



and others include Lumicor's embedded grass products produced pursuant to its '327 patent (Dkt. No. 48-1, ex. 1-3, 5-6), shown below:

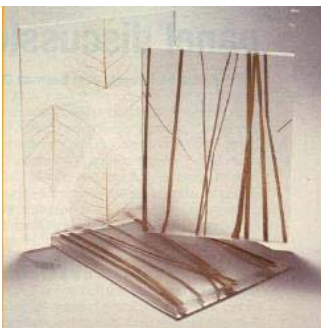


Exhibit 1

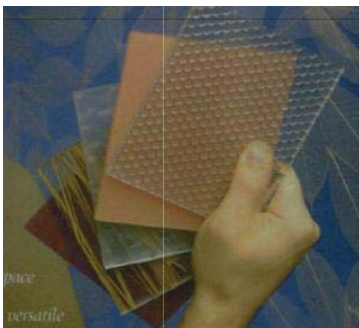


Exhibit 2



Exhibit 3



Exhibit 5



Exhibit 6

The court notes that 3form's argument focused on drawings from the '327 patent which it criticized as dissimilar due to having "flat" grass with no nodes versus "cylindrical" reeds with nodes, and sparse density versus the more closely set density of the '068 design. The court dismisses this argument because 3form did not address the primary or secondary prior art references that are most similar to its '068 patent design. Because of the similarity in density, use of long-stemmed plant material, and organization in a generally parallel fashion with some overlap of plant stalks, the court determines that the single prior art reference with "basically the same" design as a primary reference for the '068 patent is Lumicor's Exhibit 5 depicting embedded beach grass, as shown by its comparison to the '068 patent below:



Lumicor Exhibit 5



'068 patent

Having thus determined the primary reference pursuant to *High Point Design, LLC*, the court notes that the most relevant secondary prior art reference that can be used to modify Lumicor Exhibit 5 to create a design with the same "overall visual appearance" as the '068 patent is

Lumicor's own '327 patent, which states that other materials such as twigs from reed may be used.

instead of grass. '327 patent, col. 8:31-34. This statement is undisputed by 3form and is “related enough” pursuant to *Durling* because it expressly states, rather than merely suggests, that reeds may replace grass as the decorative, ornamental material. That this replacement would create a panel with the same “overall visual appearance” as the '068 patent is not difficult for the court to imagine. It would have the same overall visual appearance as 3form's Varia Thatch product⁵ shown below, (Dkt. No. 48-4, p. 81), if each stalk of grass in Lumicor's exhibit 5 were replaced with a stalk of reed in exactly the same position.



Lumicor Exhibit 5



3form Varia Thatch

As support for the court's reasoning on this point, the court notes that 3form's design expert, Caroline Lewis, agreed that if the grass in Lumicor's Exhibit 6, shown below, were replaced with reeds having nodes, the panel that resulted would have the same design as shown in the '068 patent. (Q: “If you replaced the grass [in deposition exhibit 376, which is Lumicor Exhibit 6



Lumicor Exhibit 6



3form Varia Thatch

⁵ 3form undisputedly described the Varia Thatch product in a press release dated August 2002.

herein] with reeds having nodes, would you end up with the same design as that shown in the ‘068 patent? A: “I would say it would be close enough. If you substituted reeds, yes, and you know – yes.”) (Dkt. No. 48-2, p. 191:14-21). If this is true about Lumicor Exhibit 6, which is less dense than Lumicor Exhibit 5, the court finds it would be equally or more true about the denser Lumicor Exhibit 5.

Having identified the primary and secondary prior art relevant to the court’s analysis, it remains only to determine whether a designer of ordinary skill would be motivated to combine the teachings of the prior art to create a panel with the same “overall visual appearance as the claimed design” pursuant to *High Point Design, LLC*. The motivation to do so is contained within the text of the Lumicor ‘327 patent itself. The direction to try reeds--along with a large number of other natural and synthetic materials--as the ornamental layer of its lay-up sandwich could not be more clear in the ‘327 patent. 3form’s argument that such motivation would not exist is based on its expert’s opinion, which mistakes the standard. Lewis argues in terms of a designer choosing to purchase a reed-based product as part of an overall aesthetic design for a room or building, and then states that such a designer would not be motivated to substitute a grass product for a reed product that fits in with the overall impact of other design choices for such room or building. (Dkt. No. 57-4, p. 7). The *Durling* test, however, is directed to a “designer of ordinary skill who *designs articles of the type involved.*” 101 F.3d at 103 (emphasis added). The question is whether a “designer of interlayers,” as Lewis later clarifies in deposition testimony, rather than an “interior designer choosing panels,” would be motivated to substitute reed for grass. (Dkt. No. 48-2, p.189:6-7). For the very market reasons described by Lewis, the court concludes that a *designer of laminate architectural panels* would be motivated not to stop at grass panels, but to proceed to produce panels using a wide variety of decorative materials—including the explicitly disclosed

reed material—from among which *interior designers* could choose. Given that the prior art identifies predictable solutions to the market pressure to produce decorative panels with a wide variety of ornamental designs, a designer of such panels “has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.” *KSR Int’l Co.*, 550 U.S. at 421. No prior art teaches away from combining the prior art in this way, as 3form’s expert essentially admitted. *See supra*. For the foregoing reasons, the court finds clear and convincing evidence that the ‘068 design patent was obvious in light of the prior art.

CONCLUSION

Because the court holds that the ‘700 and ‘068 patents are INVALID, the court GRANTS Lumicor’s Motion for Summary Judgment, (Dkt. No. 48), and DENIES 3form’s Motion for Partial Summary Judgment, (Dkt. No. 45).

SO ORDERED this 28nd day of December, 2015.

BY THE COURT:

A handwritten signature in blue ink, appearing to read "Clark Waddoups", written over a horizontal line.

Clark Waddoups
United States District Court Judge



US007008700B1

(12) United States Patent
Goodson et al.**(10) Patent No.: US 7,008,700 B1****(45) Date of Patent: *Mar. 7, 2006****(54) ARCHITECTURAL LAMINATE PANEL WITH EMBEDDED COMPRESSIBLE OBJECTS AND METHODS FOR MAKING THE SAME****(75) Inventors:** **Raymond Lynn Goodson**, Sandy, UT (US); **R. Talley Goodson**, Salt Lake City, UT (US); **Boyd T. Goodson**, Salt Lake City, UT (US)**(73) Assignee:** **3-Form**, Salt Lake City, UT (US)**(*) Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/821,307****(22) Filed:** **Apr. 9, 2004****Related U.S. Application Data****(63)** Continuation-in-part of application No. 10/465,465, filed on Jun. 18, 2003, and a continuation-in-part of application No. 10/086,269, filed on Mar. 1, 2002, now abandoned.**(60)** Provisional application No. 60/389,392, filed on Jun. 18, 2002, provisional application No. 60/273,076, filed on Mar. 5, 2001.**(51) Int. Cl.**
A47G 29/093 (2006.01)**(52) U.S. Cl.** **428/542.2**; 428/339; 428/335;
428/336; 428/332; 428/480; 428/483; 428/13;
17/18; 17/55; 17/542.6**(58) Field of Classification Search** 428/339,
428/335, 336, 332, 480, 483, 13, 17-18,
428/22, 542.6

See application file for complete search history.

(56) References Cited**U.S. PATENT DOCUMENTS**

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Primary Examiner—Ling Xu*(74) Attorney, Agent, or Firm*—Workman Nydegger**(57) ABSTRACT**

A decorative laminate panel comprises compressible objects embedded inside, wherein the compressible objects would be flattened in unnatural shapes under conventional processes. For example, an exemplary decorative laminate product comprises thatch reed, willow reed, bamboo, weeds, grasses, twigs and branches of a tree or bush, beans, and so forth. In at least one exemplary implementation of the present invention, an extruded sheet, such as PETG or polycarbonate, is softened and melted around the compressible materials such that the compressible materials do not deform. Imperfections in the decorative laminate panel can be easily removed, thereby allowing for producing a high quality decorative laminate panel with high efficiency and relatively low cost compared with conventional methods and materials.

19 Claims, 5 Drawing Sheets

U.S. Patent

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Sheet 1 of 5

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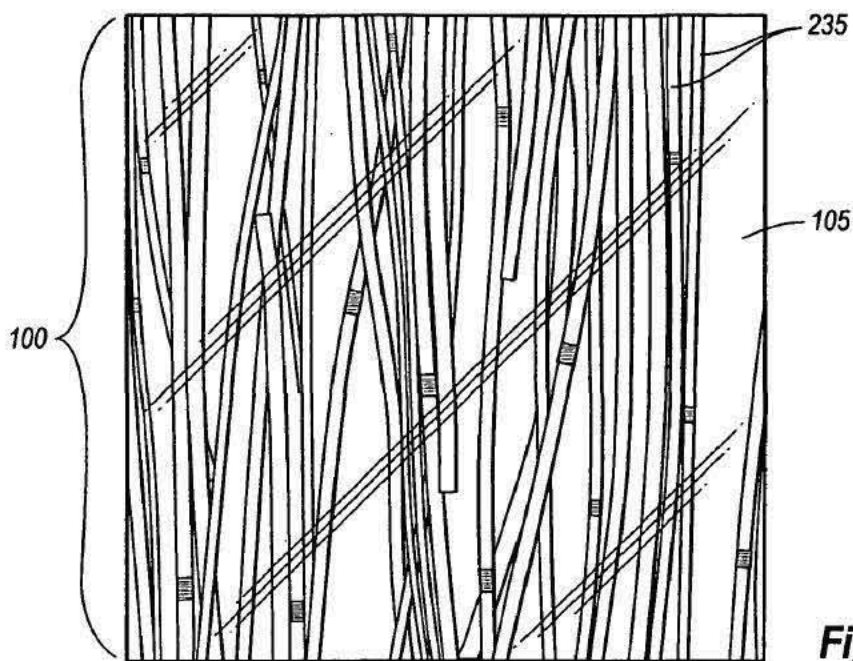


Fig. 1A

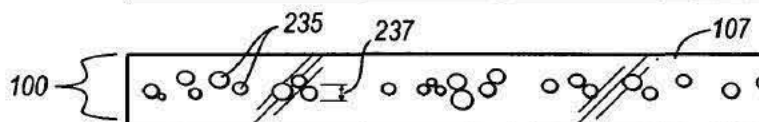


Fig. 1B

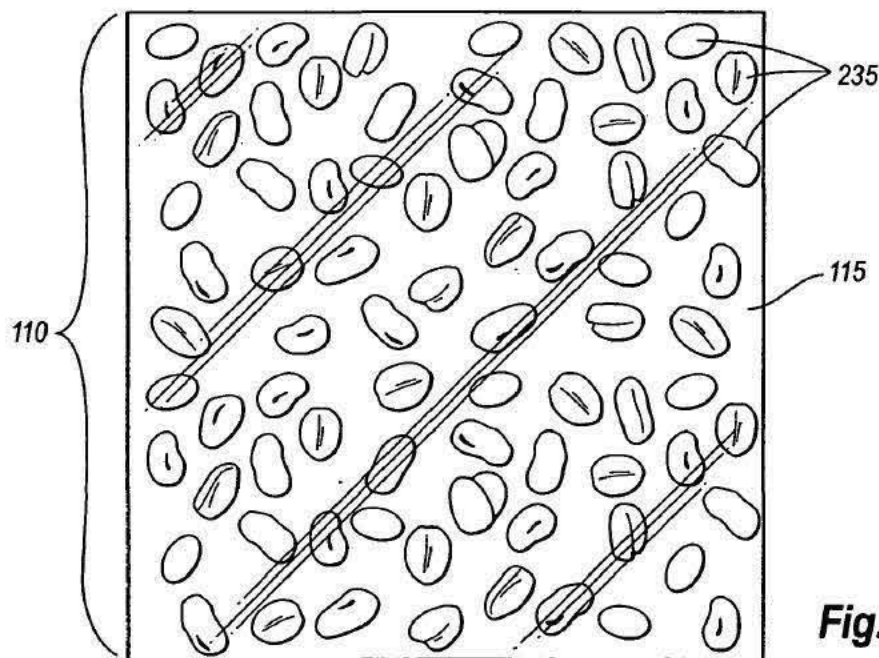


Fig. 1C

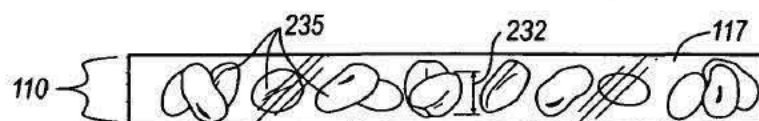


Fig. 1D

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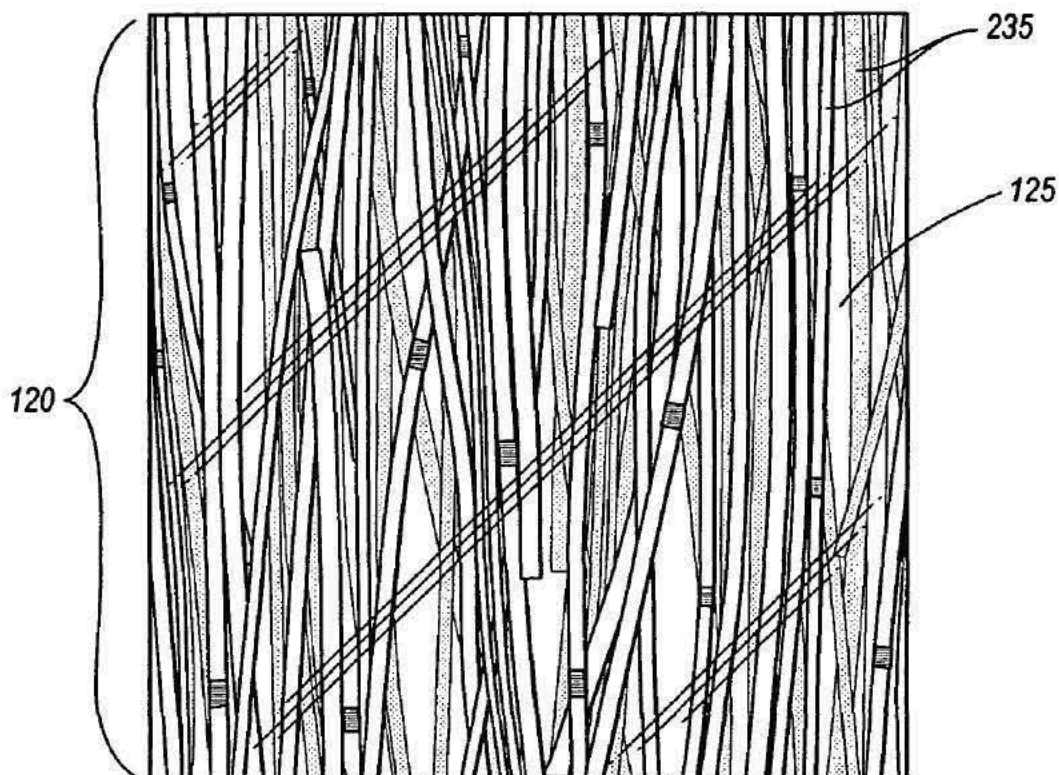


Fig. 1E

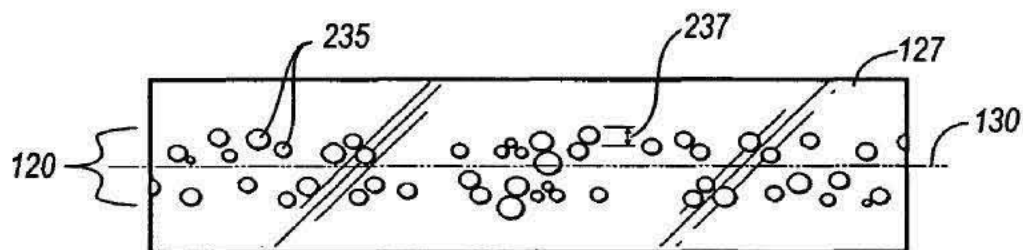


Fig. 1F

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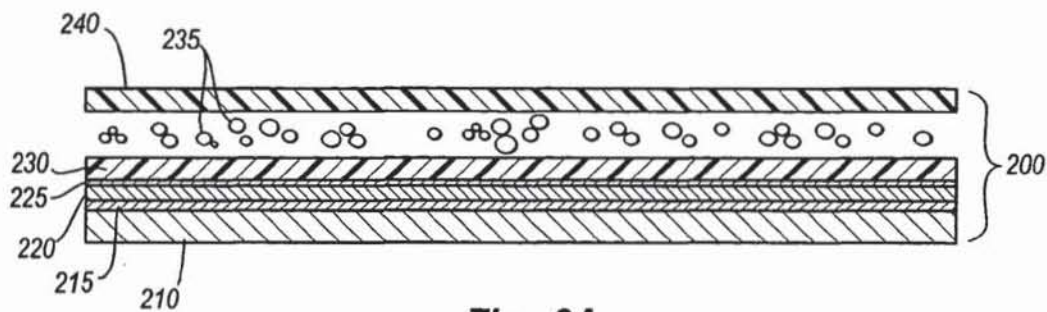


Fig. 2A

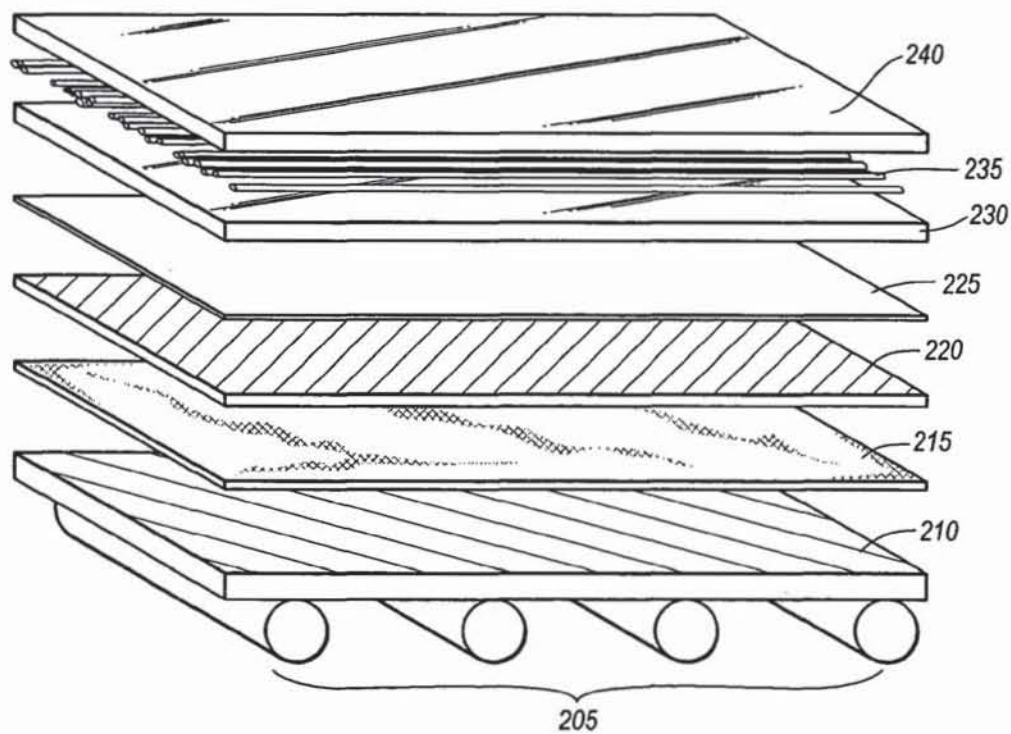


Fig. 2B

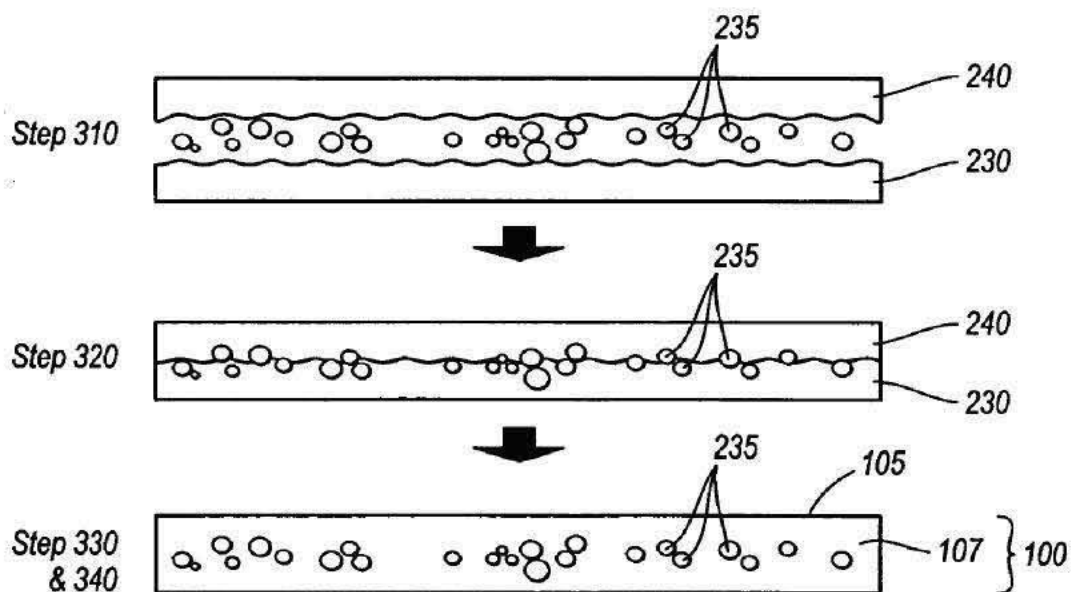
U.S. Patent

Mar. 7, 2006

Sheet 4 of 5

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		<u>PSI</u>	<u>START</u>	<u>STOP</u>
310	1)	5 - 10	70°	180°
320	2)	30 - 40	180°	230°
330	3)	92	230°	240°
340	4)	92	240°	70°

Fig. 3A**Fig. 3B**

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Sheet 5 of 5

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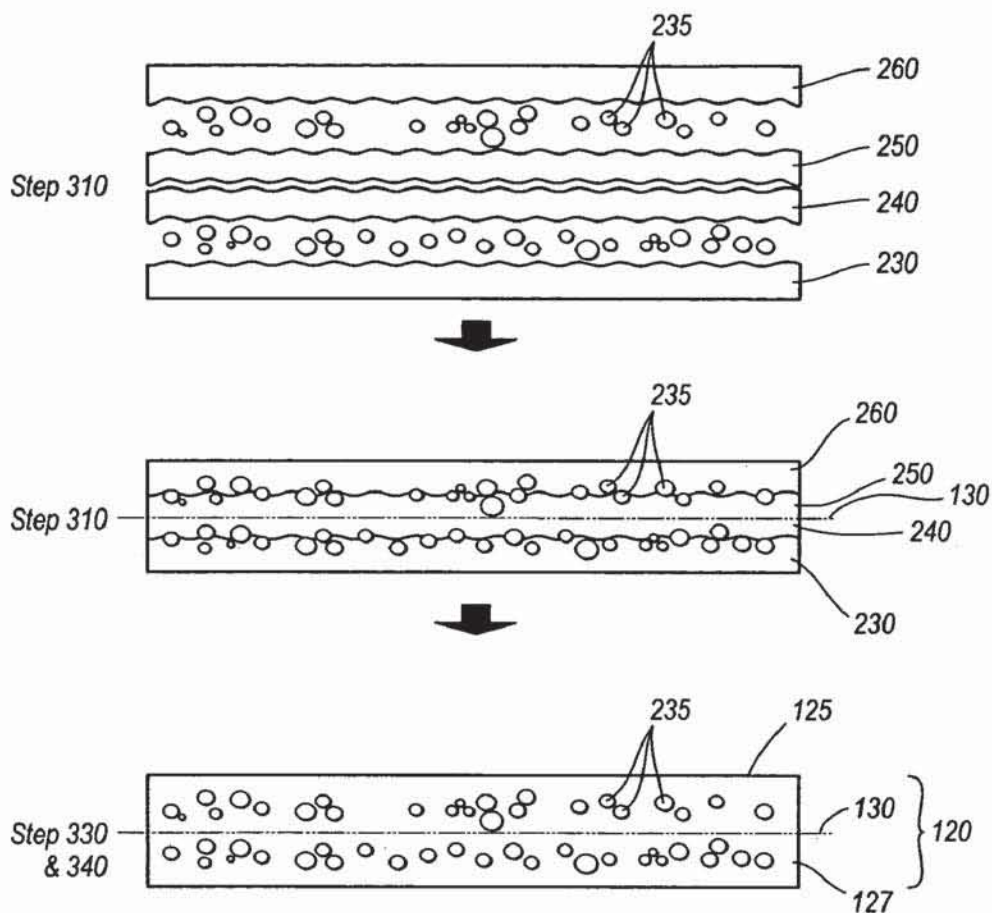


Fig. 3C

US 7,008,700 B1

1

ARCHITECTURAL LAMINATE PANEL WITH EMBEDDED COMPRESSIBLE OBJECTS AND METHODS FOR MAKING THE SAME

This application is a continuation-in-part of U.S. patent application No. 10/465,465, filed on Jun. 18, 2003, entitled "Laminate Structure with Polycarbonate Sheet and Method of Making", which claims priority of U.S. Provisional application Ser. No. 60/389,392, filed Jun. 18, 2002, entitled "Lamination of Polycarbonate to Dissimilar Materials and Method for Making Same". The parent U.S. patent application (10/465,465) is also a continuation-in-part of U.S. patent application Ser. No. 10/086,269, filed on Mar. 1, 2002, now abandoned, entitled "Laminated Article and Method of Making Same", which claims the benefit of priority to U.S. Provisional Patent Application No. 60/273,076, filed on Mar. 5, 2001, entitled "Lamination of Dissimilar Materials and Method for Making Same".

BACKGROUND OF THE INVENTION

1. The Field of the Invention

This present invention relates generally to decorative laminate products and processes, for use in architectural design.

2. Background and Relevant Art

Recent architectural designs have focused on decorative laminate panel products, such as glass or laminate products, which can be used as decorative windows, and as partitions in offices and homes. In particular, decorative laminate panels are now particularly popular compared with decorative glass panels since decorative laminate panels can be manufactured to be more resilient, and to have the same appearance as glass but with less cost. Furthermore, decorative laminate products (or "laminate products", or "laminates") more readily enable a recent trend in architectural design of embedding decorative objects within the decorative laminate panel product.

Present laminate products generally used for creating decorative laminate panels comprise polyvinyl chloride, acrylic, poly(methylmethacrylate) or "PMMA", poly(ethylene-co-cyclohexane 1,4-dimethanol terephthalate) or "PETG", as well as related polycarbonates. While each of the aforementioned laminates can serve as an appropriate glass substitute, each laminate material varies in physical properties from one material to the next. For example, polycarbonates, PETG, and PMMA are generally received for use in solid sheet form (i.e., extruded). An extruded sheet is generally a solid preformed sheet, such as a solid 4'x8' PETG sheet (alternatively, 3'x 5' sheet, 5'x10' sheet, etc.), which ultimately can form a surface of a decorative laminate panel when the panel is in final form. By contrast, acrylic materials used in decorative panels are generally handled in liquid form. The different physical properties ultimately have a result on the manufacturing cost, as well as the ultimate look of the clear product, depending on the application.

To embed decorative objects inside extruded sheets, two or more extruded sheets are pressed and heated around the decorative objects. The final decorative product therefore typically comprises two viewable surfaces of the final decorative laminate panel inside of which can be viewed the decorative objects. Due, however, to the conventional pressure (e.g., 80–100 psi) used to press and set the decorative laminate panel, extruded decorative laminate panels are suited primarily for embedding flat objects, such as flattened leaves, ferns, cutout designs, fabrics, and so forth. Extruded

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panels, however, are also suited for embedding fairly rigid three-dimensional materials, such as crushed glass or rocks that can withstand the conventional pressure (80 psi or greater).

It would be impossible, however, to embed compressible objects (i.e., relatively soft objects, such as objects that would flatten at pressures of 80 psi or greater), such as thatch, willow reed, straw, coffee beans, twigs, bamboo, and so forth having any measurable diameter, in extruded sheets using the pressure of conventional processing methods. In particular, compressible natural objects would not carry their natural appearance in the final decorative laminate panel since they would be flattened under conventional pressure. Furthermore, when the compressible objects are compressed between the extruded sheets, air bubbles can form that are very difficult to remove. This can result in air bubbles that are easy to see inside the decorative laminate panel, as well as imperfections on the surface of the decorative laminate panel.

By contrast, acrylic decorative panels do not use pressure that would otherwise crush compressible objects. Furthermore, acrylic panels do not have the same difficulty with air bubbles that would be common with decorative laminate panels made by embedding objects between extruded sheets. For example, liquid acrylic can be cast around flat, rigid, or soft and compressible objects, by pouring the liquid acrylic around the desired objects, and then solidifying the acrylic into a hardened panel. The liquid acrylic generally forces out air as it moves around the object. As such, acrylic panels can include a wider variety of objects embedded inside, whether flat, rigid, or soft and compressible natural objects. In particular, the hardened acrylic panel therefore can be viewed having a wide variety of objects inside that have not been flattened, and hence maintain a three-dimensional shape.

Unfortunately, acrylic is not an ideal material for creating decorative panels for use in architectural design. For example, acrylic panels are not every resistant to cracking or shattering compared with some decorative laminate panels made from extruded sheet materials, such as extruded PETG sheets. Furthermore, acrylic panels have a fairly high error rate due to the process of casting (pouring and setting), and are thus more inefficient to produce. For these and other reasons, cast acrylic panels are also much more expensive compared with extruded PETG laminate panels.

Accordingly, an advantage in the art can be realized with decorative laminate panels that combine the benefits of casting materials with the benefits of extruded sheet materials. In particular, an advantage in the art can be realized with decorative laminate panels that have the advantages of being able to embed compressible objects inside the panel without air bubbles, and without significantly flattening the compressible objects. Such decorative laminate panels should also have the advantages of resiliency, ease of manufacture, and should be relatively low in cost.

BRIEF SUMMARY OF THE INVENTION

The present invention solves one or more of the foregoing problems in the art with processing methods that allow compressible objects to be embedded in extruded laminate materials without flattening the objects, and without significantly trapping air. In particular, novel processing methods allow compressible objects, such as thatch, willow reed, coffee beans, bamboo, and similar objects to be embedded within opposing, extruded laminate sheets.

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In one exemplary implementation, compressible objects are arranged on a first extruded laminate sheet. The compressible objects are arranged so that one or more passageways between the compressible objects allow air to escape in the forming process. A second extruded laminate sheet is then positioned against the compressible objects so that the compressible objects are set between opposing first and second laminate sheets in a laminate sheet assembly.

The laminate sheet assembly is ultimately placed in a compression chamber and subjected to a relatively low first pressure of up to approximately 10 psi. Temperature is then elevated to a first elevated temperature, such that the laminate sheets begin to soften. The laminate sheet assembly is then subjected to a relatively higher second pressure of up to approximately 40 psi. The temperature is also then elevated to a second elevated temperature, such that the compressible objects begin to sink into the opposing first and second laminate sheets without significantly flattening. Remaining steps in the process subject the laminate sheet assembly to relatively high pressure of up to approximately 100 psi, and temperature of up to approximately 240 degrees so that the laminate sheet assembly can be pressed into final form. When the laminate sheet assembly is cooled, a final product is formed that comprises the compressible objects in a relatively uncompressed, or natural, state, relatively free of visibly trapped air.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by the practice of the invention. The features and advantages of the invention may be realized and obtained by means of the instruments and combinations particularly pointed out in the appended claims. These and other features of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to describe the manner in which the above-recited and other advantages and features of the invention can be obtained, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

FIG. 1A illustrates a plan view of a surface of an exemplary implementation of a final product of the present invention in which thatch reed is embedded in a single image layer;

FIG. 1B illustrates a cross-sectional view of FIG. 1A;

FIG. 1C illustrates a plan view of a surface of an exemplary implementation of a final product of the present invention in which coffee beans are embedded in a single image layer;

FIG. 1D illustrates a cross-sectional view of FIG. 1C;

FIG. 1E illustrates a plan view of a surface of an exemplary implementation of a final product of the present invention in which thatch reed is embedded between multiple image layers;

FIG. 1F illustrates a cross-sectional view of FIG. 1E;

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FIG. 2A illustrates a partially exploded, cross-sectional view of a laminate sheet assembly for use in accordance with an implementation of the present invention;

FIG. 2B illustrates an exploded perspective view of a sequence for positioning components of the laminate sheet assembly in FIG. 2A in accordance with an exemplary implementation of the present invention;

FIG. 3A illustrates a chart of processing steps and corresponding pressure and temperature ranges for implementing a process for forming a decorative laminate panel product in accordance with an exemplary implementation of the present invention;

FIG. 3B illustrates a sequence of physical changes in a single-layered laminate assembly when the single-layered laminate assembly undergoes inventive process steps as exemplified in FIG. 3A; and

FIG. 3C illustrates a sequence of physical changes in a two-layered laminate assembly when the two-layered laminate assembly undergoes inventive process steps as exemplified in FIG. 3A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention extends to both methods and systems that allow compressible objects to be embedded in extruded laminate materials without flattening the objects, and without significantly trapping air. In particular, processing methods as detailed herein allow compressible objects, such as thatch, willow reed, coffee beans, bamboo, and similar objects to be embedded within opposing, extruded laminate sheets.

As used herein, "compressible objects" refers to three-dimensional objects that substantially deform at pressures up to 80–90 psi. That is, each "compressible" object can be thought of as having a "critical pressure". For the purposes of this specification and claims, "critical pressure" refers to the pressure at which the structural integrity of the object collapses, such that the object splits, cracks, or otherwise compresses into an unnatural conformation. There are, of course, varying grades of collapse, or compression, for any given compressible object, such that an "unnatural conformation" may mean that an object has compressed to 90% of its thickness in one direction, 75% of its thickness in one direction, and so on. Most generically, therefore, compressible objects will be understood to fill a modicum of three-dimensional space, such as objects that would otherwise appear unnaturally shaped when collapsed a given amount. Furthermore, the term "compressible" is relative to the extruded sheet materials, and related temperatures and pressures. Hence, for extruded PETG materials, compressible objects will be understood as having a critical pressure of up to approximately 92 psi using conventional thermosetting processes.

FIGS. 1A–1F provide an overview of exemplary embodiments of final decorative laminate panels **100**, **110**, and **120** in accordance with aspects of the present invention. In particular, FIG. 1A illustrates a surface view of an exemplary implementation of a final product of the present invention in which thatch reed is embedded between two extruded laminate sheets. As shown, a finalized laminate panel **100** product can comprise a viewable surface **105** and a cross section **107** (see FIG. 1B). In addition, as will be detailed herein, the laminate panel depicted in FIG. 1A is properly understood to be a single image layer. That is, the single image layer comprises only a single layer of embedded objects **235**.

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Since the laminate panel is generally transparent or translucent on both sides (although this is not required), each viewable side of the panel can be properly referred to as the viewable surface **105**. By contrast, the cross section **107** (FIG. 1B) will be understood for the purposes of this specification and claims to refer to the depth or thickness of the laminate panel **100**, which is generally perpendicular to the viewable surface **105**. These distinctions between viewing sides and cross sections are consistent for FIGS. 1C through 1F.

Generally, the embedded objects **235** will be positioned within the laminate panel **100** so that the objects are interposed between an oriented in a plane that is roughly parallel with the opposing viewable surfaces **105**. This is typically true for more elongate objects, such as thatch, willow reed, and so forth; whereas, less elongate objects, such as coffee beans, may align in the plane, or in a rotated position relative to the plane. In any case, a cross section of the embedded objects **235** can also generally be viewed when viewing the cross section **107** of the laminate panel **100**. In FIG. 1A, the embedded objects **235** are natural elongated materials, such as thatch, bamboo, or willow reed. Furthermore, as shown in FIG. 1B, the cross section **107** of the panel **100** shows that the embedded objects **235** in panel **100** are relatively uncompressed when the panel **100** is in final form. As such, their respective diameters **237** are substantially the same as prior to being embedded in the panel **100**.

FIG. 1C illustrates a surface view of an exemplary implementation of a final product of the present invention in which decorative beans, such as coffee beans, are the embedded objects **235** within laminate panel **110**. The laminate panel **110** further has a viewable surface **115**, and a cross section **107** (see FIG. 1D), which further depicts corresponding views of the embedded objects **235**. FIG. 1C, therefore, shows a single image layer of a different implementation of embedded objects **235** compared with FIG. 1A. Furthermore, as shown in FIG. 1D, the cross section **117** of the panel **110** shows that the embedded objects **235** in panel **110** are relatively uncompressed. As such, the respective diameters **232** of the embedded objects **235** are substantially the same as prior to being embedded in the panel **110**.

FIG. 1E illustrates a surface view of an exemplary implementation of a final product of the present invention in which thatch reed, as in FIG. 1A, is embedded in multiple layers of a laminate panel **120**. The laminate panel **120** further has a viewable surface **125**, and a cross section **127** (see FIG. 1F). In particular, FIG. 1E is distinguished from FIGS. 1A through 1D at least for having two or more image layers being bisected by an imaginary plane **130**. Because of the multiple image layers, the viewable surface **125** of panel **120** therefore contrasts with the viewable surface **105** of panel **100** by having a greater density of embedded objects **235**. Furthermore, the cross section **127** of the panel **120** shows that the embedded objects **235** in panel **120** are relatively uncompressed, and are not split or cracked. As such, their respective diameters **237** are substantially the same as prior to being embedded in the panel **120**.

FIG. 2A illustrates an overview of a laminate sheet assembly **200** for use in accordance with an exemplary implementation of the present invention. While FIG. 2B illustrates a sequential overview for positioning components of the laminate sheet assembly **200** in FIG. 2A, albeit rotated by 90°. As shown, a laminate sheet assembly **200** has a bottom layer **210** that will be used to guide the laminate sheets and embedded objects **235** into a thermosetting press (not shown), such as a stationary press. The process of sending a laminate assembly **200** through a stationary press

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to form a final product is described in greater detail in U.S. Pat. Nos. 6,025,069, 5,998,028, 5,958,539, 5,894,048, and 5,643,666, each of which is incorporated herein.

In at least one implementation, the bottom layer **210** is a metal plate, such as a steel or aluminum plate having a thickness of approximately 2 mm. Because the metal plate **210** is subject to repeated stresses from continual direct contact with the stationary press platens (not shown), metal plate **210** is typically not a perfectly flat surface. Accordingly, it can be useful to use a soft, albeit heavy duty, next layer which is generally a pressure pad **215** positioned on top of the metal plate **210**. The pressure pad **215** can be useful to help equalize the pressure on, and temperature of, the remaining layers, thereby helping form a highly uniform surface of the decorative laminate panel in final form. The pressure pad **215** preferably comprises a compressible fabric prepared from copper, silicone, or NOMEX®, or a combination of the preceding. NOMEX® is an aramid fabric available from DuPont de Nemours, E.I. & Company.

A flexible metal plate **220**, such as a flexible aluminum plate of approximately 20–140 mm (508 to 3556 microns), is then placed on top of the pressure pad **215**. Although the metal plate **220** is flexible, the metal plate **220** is preferably a substantially smooth, flat surface. A paper layer **225** (e.g. acrylic paper) is also then placed against the flexible metal plate **220**. Preferably, the paper layer **225** comprises an adhesive surface (e.g., acrylic adhesive, not shown) on at least one side. The adhesive surface of the paper **225** is positioned facing away from the flexible metal plate **220**, such that the adhesive surface will adhere to the next layer, the extruded sheet **230**. As such, the paper layer **225** will removably adhesive to the final decorative product during the setting process, and can be peeled away from the decorative laminate panel when the decorative laminate panel is ultimately put to use. The paper layer **225** therefore provides a layer of surface finish to the corresponding extruded sheet **230** (and **240**, if appropriate).

A first laminate sheet **230** is then positioned on top of the paper layer **225**. In at least one exemplary implementation of the present invention, the first laminate sheet **230** (as well as the second laminate sheet **240**) comprises transparent or translucent extruded copolyesters containing repeating units of terephthalic acid residues (e.g., PETG), ethylene glycol residues, and cyclohexanedimethanol residues.

The first and second laminate sheets **230** and **240** can also comprise extruded polycarbonate. The term “polycarbonate” refers generally to thermoplastic, aromatic polymers including homopolycarbonates, copolycarbonates, copolyestercarbonates and mixtures thereof having average molecular weights of between approximately 8,000 amu (atomic mass units) and 200,000 amu. Preferably, polycarbonates for use with some implementations the present invention have molecular weights of between approximately 20,000 amu and 80,000 amu, and have an intrinsic viscosity (I.V.) of approximately 0.40 to approximately 1.5 dl/g as measured in methylene chloride at approximately 25° C.

The first and second laminate sheets **230** and **240** each have a thickness of generally between approximately 0.1 inches and approximately 0.2 inches, depending on the desired thickness of the final decorative laminate panel. For example, a relatively thin decorative laminate panel will comprise a single image layer of two laminate sheets each having a thickness of approximately 0.118 inches. While on the other hand, a thicker decorative laminate panel will comprise a single or double image layer of two or more laminate sheets each having a thickness of approximately 0.177 inches. Additional considerations for choosing thinner

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or thicker first and second laminate sheets **230** and **240** can depend on the thickness of the embedded objects **235** placed inside.

Embedded objects **235** can then be positioned against the first laminate sheet **230**. For the purposes of this specification and claims, the term "embedded objects" refers to any objects that are intended to be, or have already been, embedded in a decorative laminate panel, such as any organic and inorganic materials. In addition, "embedded objects" comprises any organic or inorganic materials that can be construed as "compressible objects".

For the purposes of this specification and claims, organic materials will be understood to comprise any natural or synthetic decorative materials, such as thatch, bamboo, tree or bush branches or stems, will reed, leaves, beams (e.g., coffee beans), and so forth. The foregoing list, however, is not intended to be exhaustive, but merely illustrative of the type of materials that can be used in accordance with the present invention, and that otherwise would not be suitable for use in conventional thermosetting processes. Similarly, inorganic materials, by contrast, can comprise may natural or synthetic items, such as rock, glass, other types of minerals, and so forth. Such inorganic items will ordinarily be crushed so that the final decorative product does not exceed a desired thickness, or thinness, and to make sure the final panel has a smooth, uniform surface (e.g., viewable surfaces **105**, **115**, **125**). The thickness of either organic or inorganic materials will be between approximately 0.05 and approximately 0.5 inches.

In any case, embedded objects **235** are prepared to ensure no quality loss in the decorative laminate panel surface, or to the embedded objects **235** themselves. For example, a manufacturer will generally ensure that the randomly-placed objects do not form completed shapes, such as, for example, a completed circle or square. Completed shapes would otherwise trap air in the decorative laminate panel, and can result in surface imperfections, sometimes referred to as "lakes", on the surface of the decorative laminate panel surface (e.g., **105**, **115**, **125**). In some cases, the like can appear as a slightly shinier portion of the decorative laminate surface compared with the remainder of the surface. Furthermore, the manufacturer can make sure the embedded objects **235** have been dried sufficiently, to prevent complications due to moisture exiting the object **235**. As well, the manufacture can also apply a fungicide or bacterial agent to the embedded objects **235** to remove growths that could potentially damage the embedded objects **235** in the final product.

With the embedded objects **235** positioned appropriately, the manufacturer can then position a second laminate sheet **240** against the embedded objects **235**, such that the embedded objects **235** are surrounded on two sides by opposing laminate sheets **230** and **240**. As shown in FIGS. **2A** and **2B**, the assembly **200** forms a single image layer. If the manufacturer intends only to create a single image layer, then the preceding layers of paper **225**, metal sheet **220**, and so forth are added to the opposing side of the second laminate sheet **240** prior to sending the assembly **200** through a stationary press. On the other hand, if the manufacturer desires to create multiple image layers, preceding steps are merely repeated iteratively as desired into a larger stack. Hence, a double image layer will comprise two sets of first and second laminate sheets **230** and **240** stacked together, at triple image layer will comprise three sets of first and second laminate sheets **230** and **240** stacked together, and so on.

FIG. **3A** illustrates a chart of primary processing steps and corresponding pressure and temperature ranges for imple-

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menting a process for forming a decorative laminate panel. The temperatures and pressures illustrated in FIG. **3A** are specific to extruded PETG sheets, and extruded copolyester sheets having similar properties. One reason PETG and related materials are particularly useful with the present invention is that they have a melting point that renders them particularly suitable for embedding materials that would otherwise collapse at conventional pressures, or that otherwise be destroyed at conventional temperatures.

In addition, PETG panels are resilient, resistant to cracking and other stresses that would damage other materials. By contrast, while polycarbonate is also a similarly strong material, extruded polycarbonate has a higher melting point than that extruded PETG. As such, embedded materials **235** for use with extruded polycarbonate would need to be chosen that have melting points higher than the appropriate range for extruded polycarbonate, and that are of sufficient integrity as not to be destroyed in the thermosetting process. Thus, though there may be some variance in choosing embedded materials to fit the properties of a given extruded sheet material, the processes in accordance with the present invention can be applied to a broad range of extruded and embedded materials.

By way of the explanation and not of limitation, PETG and related copolyesters include a polyethylene terephthalate polyester modified with 2 mole % to 99 mole % of cyclohexanedimethanol repeat unit. The cyclohexanedimethanol may be either the 1,4- or 1,3-isomer and may be either in the cis- or trans- form or a mixture of the isomers. The copolyester may be semi-crystalline or amorphous, preferably amorphous.

The copolyester contains repeat units from a dicarboxylic acid and a diol, based on 100 mole % dicarboxylic acid and 100 mole % diol. The dicarboxylic acid component contains at least 80 mole % of terephthalic acid or dimethylterephthalate. The copolyester may optionally be modified with up to 20 mole % of one or more different dicarboxylic acids other than terephthalic acid or dimethylterephthalate such that the total dicarboxylic acid content is equal to 100 mole %. Examples of other dicarboxylic acids which may be used with terephthalic acid include phthalic acid, isophthalic acid, 1,4-, 1,5-, 2,6-, and 2,7-naphthalenedicarboxylic acid, 1,3-, 1,4-cyclohexanedicarboxylic acid, cyclohexanediadic acid, oxydibenzoic acid, 4,4-biphenyldicarboxylic acid, succinic acid, glutanic acid, glutaric acid, adipic acid, azelaic acid, sebacic acid, suberic acid, pimelic acid, and 1,12-dodecanedioic acid. The copolyester may be prepared from one or more of the above dicarboxylic acids.

It should be understood that use of the corresponding acid anhydrides, esters, and acid chlorides of these acids is included in the term "dicarboxylic acid".

The diol component contains repeat units from 98 to 1 mole % ethylene glycol and 2 to 99 mole % 1,4-cyclohexanedimethanol and/or 1,3-cyclohexanedimethanol. The cyclohexanedimethanol may be present as the cis or trans isomer or mixtures thereof. In addition, the diol component can optionally be modified with up to 20 mole % of one or more different diols other than ethylene glycol and cyclohexanedimethanol such that the total diol content is equal to 100 mole %. the additional diols include cycloaliphatic diols having 6 to 16 carbon atoms and aliphatic diols having 3 to 16 carbon atoms.

Examples of diols which may be used with ethylene glycol and cyclohexanedimethanol include diethylene glycol, triethylene glycol, propane-1,3-diol, butane-1,4-diol, pentane-1,5-diol, hexane-1,6-diol, 3-methylpentanediol-(2, 4), 2-methylpentanediol-(1,4), 2,2,4-trimethylpentane-diol-

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(1,3), 2-ethylhexanediol-(1,3), 2,2-diethylpropane-diol-(1,3), hexanediol-(1,3), 1,4-di-(hydroxyethoxy)-benzene, 2,2-bis-(4-hydroxycyclohexyl)-propane, 2,4-dihydroxy-1,1,3,3-tetramethyl-cyclobutane, 2,2-bis-(3-hydroxyethoxyphenyl)-propane, and 2,2-bis-(4-hydroxypropoxyphenyl)-propane. The copolymer may be prepared from one or more of the above diols. The copolyesters may also be modified with polyethylene glycols or polytetramethylene glycols to enhance elastomeric behavior.

As used herein, the related copolyester also has an inherent viscosity of 0.5 to 1.2 dL/g. Preferably, the copolymer has an inherent viscosity of 0.6 to 0.9 dL/g as measured at 25° F. using 0.50 grams of polymer per 100 ml of a solvent consisting of 60% by weight phenol and 40% by weight tetrachloroethane. It is especially preferred that the copolyester be prepared from or derived from repeating units consisting of terephthalic acid units, ethylene glycol units and 1,4-cyclohexanedimethanol units.

Referring again to the figures, steps 310, 320, 330, and 340 are described with respect to the illustrations of FIGS. 3B and 3C. In particular, FIG. 3B illustrates a sequence of physical changes in a single-layered laminate assembly when the single-layered laminate assembly undergoes process steps 310, 320, 330, and 340. Similarly, FIG. 3C illustrates a sequence of physical changes in a multi-layered laminate assembly when the two-layered laminate assembly undergoes process steps 310, 320, 330, and 340.

As previously indicated, a manufacturer places the laminate assembly 200 in a thermosetting environment (e.g., stationary press) so that the laminate assembly 200 can undergo a series of pressure and temperature changes. In a first step 310, for example, a manufacturer can apply between approximately 5 to 10 psi of pressure on the laminate assembly 200, and raise the temperature from between approximately 70° F. to approximately 180° F. As illustrated in FIGS. 3B and 3C, the first and second laminate sheets 230 and 240 (as well as sheets 250 and 260 for multiple layers, etc.) begin to soften around the embedded materials 235. In addition, air between the laminate sheets preferably begins to evacuate as the laminate sheets compress together during step 310. At this temperature and pressure, however, the embedded materials 235 are unlikely to be enveloped entirely by either of the first or second laminate sheets 230 and 240.

The manufacturer can then perform a second step 320 of raising the pressure to between approximately 30–40 psi, and raising the temperature between approximately 180° F. and approximately 230° F. As illustrated in FIGS. 3B and 3C, therefore, the first and second laminate sheets 230, and 240 (as well as sheets 250 and 250 for multiple layers, etc.) soften sufficiently that the embedded materials 235 are completely enveloped by the corresponding opposing first and second laminate sheets. Preferably, air between the laminate sheets has then completely evacuated from the laminate assembly 230, such that the laminate assembly 200 becomes substantially free of air.

The manufacturer then finalizes the decorative laminate panel in steps 330 and 340, whereby the laminate assembly 200 is pressed into final form 330, and then cooled 340. For example, in step 330, the manufacturer can raise the pressure to approximately 92 psi, and raise the temperature to between approximately 230° F. and approximately 240° F. The manufacturer holds this temperature and pressure for a time of up to approximately 5 minutes or less, until the assembly 200 is pressed into final form. Thereafter, the manufacturer cools the laminate assembly 200 to a temperature approaching 70° F., and removes the final, hardened

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decorative laminate panel 100 (or 120) from the stationary press, and from the metal trays (e.g., 210, 220) of the laminate assembly 200. Cross sectional views 107 and 127 of the corresponding decorative laminate panel 100 and 120 show that the embedded materials 235 have been substantially preserved such that they have not been significantly crushed in the laminating process.

Of course, the manufacturer can also adjust the foregoing temperatures and pressures, as described herein, in order to suit the melting points of other extruded materials. With respect to extruded polycarbonate, for example, the manufacturer may adjust the temperatures described for the table in FIG. 3A by adding approximately 120° F. to many of the higher-end temperatures.

As such, step 310 would comprise implementing a pressure of approximately 5–10 psi on an extruded polycarbonate assembly, and raising the temperature from approximately 70–80° F. to approximately 300° F. Furthermore, step 320 would comprise implementing a pressure of approximately 30–40 psi on the extruded polycarbonate assembly, and raising the temperature from approximately 300° F. to 350° F. Step 330 would comprise implementing a pressure of approximately 92 psi, and raising the temperature from approximately 350° F. to approximately 360° F. And step 340 would comprise holding a pressure of approximately 92 psi on the polycarbonate assembly, and reducing the temperature from 360° F. to as low as approximately 70–80° F. Of note, the low end values of 70–80° are typically lowest approximations of a final or initial cooling value, and may be higher or lower as appropriate without affecting the quality of the decorative laminate product.

Accordingly, one will appreciate that the foregoing pressure and temperature values for extruded PETG sheets and extruded polycarbonate sheets are merely exemplary implementations of the invention. Even further, the previously described temperatures are each, nevertheless, only an approximate value existing within a range of $\pm$ approximately 15°–20° F. As such, a manufacturer need not ensure that the temperatures and pressures of a given process reach the previously described pressures and temperatures exactly. In particular, the manufacturer need only ensure that the temperatures and pressures of a given process are in a suitable range for softening and melting the respective extruded sheet materials about the corresponding embedded objects 235.

In any case, and regardless of the material and process values implemented, the manufacturer then reviews the decorative laminate panel 100, 120 and observes the product for trapped air, which can be evidenced by surface lakes. The manufacturer, however, can easily remove the lakes by sending the now-hardened, decorative product back through the stationary press one or two more times, as necessary. As such, there is relatively little need to discard errant decorative laminate panels, which thereby enhances the production efficiency for the decorative laminate panels. Thus, the foregoing apparatus and processes in accordance with the present invention allow for a large volume of decorative laminate panels to be created with a relatively low error rate.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

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We claim:

1. A decorative architectural panel comprising:

one or more compressible objects suspended between two extruded resin sheets formed together about the one or more compressible objects using a plurality of pressures in a thermosetting process, at least one of the plurality of pressures being greater than or equal to a critical pressure sufficient to otherwise compress the one or more compressible objects to an unnatural appearing conformation;

wherein the one or more compressible objects maintain a substantially natural appearing conformation between the two formed resin sheets.

2. The panel as recited in claim 1, wherein the first and second extruded sheets are at least partially translucent.

3. The panel as recited in claim 1, wherein the decorative laminate panel has a thickness of between 0.25 and 2 inches.

4. The panel as recited in claim 1, wherein at least one of the first and second extruded sheets comprise extruded PETG having a thickness of between 0.1 inches and 0.50 inches.

5. The panel as recited in claim 1, wherein at least one of the first and second extruded sheets comprise extruded polycarbonate having a thickness of between 0.1 inches and 0.50 inches.

6. The panel as recited in claim 1, wherein at least one of the first and second extruded sheets has a width and length dimensions of approximately 3'x5' approximately 4'x8', or approximately 5'x10'.

7. The panel as recited in claim 1, wherein at least one of the first and second extruded sheets comprises a copolyester that has a melting point between 180° F. and 230° F. in a pressure range of up to 40 psi.

8. The panel as recited in claim 1, wherein the one or more compressible objects comprise any one or more of bamboo, beans, straw, a tree branch, a tree twig, a bush branch, a bush twig, or any other object having a natural diameter that is substantially compressed at a critical pressure between about 10 psi and about 100 psi.

9. The panel as recited in claim 1, wherein a viewable surface of the decorative laminate panel is substantially uniform from one end to the next such that no lakes or air bubbles are exposed.

10. The panel as recited in claim 1, wherein the one critical pressure is less than about 92 psi for the one or more compressible objects.

11. The panel as recited in claim 10, wherein the critical pressure is greater than about 10 psi, such that the one or more compressible three-dimensional objects ordinarily appear to have an unnatural conformation when subjected to the critical pressure of between about 10 psi and 92 psi.

12. The panel as recited in claim 10, wherein the unnatural appearance comprises a substantially flattened appearance

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for the one or more compressible three-dimensional objects when viewed through the first or second extruded sheet.

13. A laminate sheet assembly configured to create the decorative architectural panel recited in claim 1 when the laminate assembly is subjected to the plurality of pressures in the thermosetting process comprising:

the first extruded sheet;

the one or more three-dimensional objects arranged on the first extruded sheet; and

a second extruded sheet positioned about the one or more embedded objects;

wherein the one or more three-dimensional objects are arranged in a position between the first and second extruded sheet such that sufficient air escapes from between the embedded objects as pressure is increased, such that lakes or air bubbles are avoided when the first extruded sheet and second extruded sheet are formed together.

14. The laminate sheet assembly as recited in claim 13, further comprising a pressure pad positioned about one of the first and second extruded sheets.

15. The laminate sheet assembly as recited in claim 13, wherein the first and second extruded sheets comprise PETG.

16. The laminate sheet assembly as recited in claim 13, wherein the first and second extruded sheets comprise polycarbonate.

17. The decorative architectural panel as recited in claim 1, wherein the one or more compressible objects comprise thatch or willow reed.

18. The decorative architectural panel as recited in claim 1, wherein the one or more compressible objects comprise bamboo.

19. A decorative architectural resin panel comprising:

first and second extruded resin sheets formed together with a plurality of pressures, at least one of the one plurality of pressures being greater than a critical pressure at which one or more three-dimensional objects ordinarily collapse to a substantially unnatural conformation; and

an image layer positioned between the first and second extruded sheets that are formed together, the image layer comprising the one or more three-dimensional objects in a substantially natural conformation;

wherein the one or more three-dimensional objects of the image layer maintain an appearance of the substantially natural conformation despite having been subjected to the critical pressure.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,008,700 B1
APPLICATION NO. : 10/821307
DATED : March 7, 2006
INVENTOR(S) : Raymond Lynn Goodson et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 4

Line 28, change "particular" to --particular--

Column 6

Line 32, change "adhesive to" to --adhere--

Column 7

Line 15, change "will" to --willow--

Line 21, change "may" to --any--

Line 39, change "like" to --lake--

Column 9

Line 50, change "250 and 250" to --250 and 260--

Line 55, change "230" to --200--

Column 11

Line 28, change "4'x8°" to --4'x8'--

Line 44, remove [one]

Column 12

Line 11, before "second" change "a" to --the--

Line 39, remove [one]

Signed and Sealed this

Fifteenth Day of August, 2006

A handwritten signature in black ink, reading "Jon W. Dudas". The signature is stylized, with a large, looped initial "J" and a distinct "D".

JON W. DUDAS

Director of the United States Patent and Trademark Office



US00D621068S

(12) **United States Design Patent**
Goodson et al.

(10) **Patent No.:** **US D621,068 S**

(45) **Date of Patent:** **** *Aug. 3, 2010**

(54) **ARCHITECTURAL PANEL WITH THATCH REED DESIGN**

(75) Inventors: **Raymond Lynn Goodson**, Sandy, UT (US); **R. Talley Goodson**, Salt Lake City, UT (US); **Boyd T. Goodson**, Salt Lake City, UT (US)

(73) Assignee: **3Form, Inc.**, Salt Lake City, UT (US)

(*) Notice: This patent is subject to a terminal disclaimer.

(**) Term: **14 Years**

(21) Appl. No.: **29/334,111**

(22) Filed: **Mar. 20, 2009**

Related U.S. Application Data

(60) Continuation of application No. 11/203,985, filed on Aug. 15, 2005, now Pat. No. 7,550,057, which is a division of application No. 10/821,307, filed on Apr. 9, 2004, now Pat. No. 7,008,700, which is a continuation-in-part of application No. 10/465,465, filed on Jun. 18, 2003, said application No. 10/821,307 is a continuation-in-part of application No. 10/086,269, filed on Mar. 1, 2002, now abandoned.

(51) **LOC (9) CL.** **25-01**

(52) **U.S. CL.** **D25/108**

(58) **Field of Classification Search** D25/103, D25/104, 105, 111, 108; 52/306, 307, 308, 52/315; 428/325, 322.2, 323, 13, 17, 18, 428/22

See application file for complete search history.

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Primary Examiner—Doris Clark

(74) *Attorney, Agent, or Firm*—Workman Nydegger

(57) **CLAIM**

The ornamental design for an architectural panel with thatch reed design, as shown and described.

DESCRIPTION

FIG. 1 is a front perspective view of an architectural panel portion incorporating the architectural panel with thatch reed design as used in a wall structure;

FIG. 2 is an enlarged view thereof;

FIG. 3 is a front elevational view thereof, the rear elevational view being a mirror image thereof;

FIG. 4 is a left elevational view thereof;

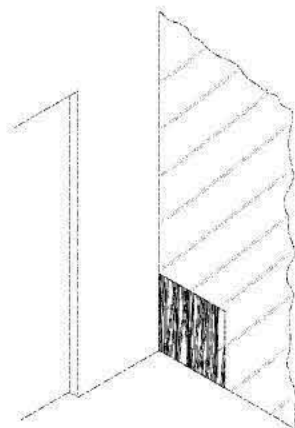
FIG. 5 is right elevational view thereof;

FIG. 6 is a top plan view thereof; and,

FIG. 7 is a bottom plan view thereof.

The broken lines are for illustrative purposes only and form no part of the claimed design.

1 Claim, 3 Drawing Sheets



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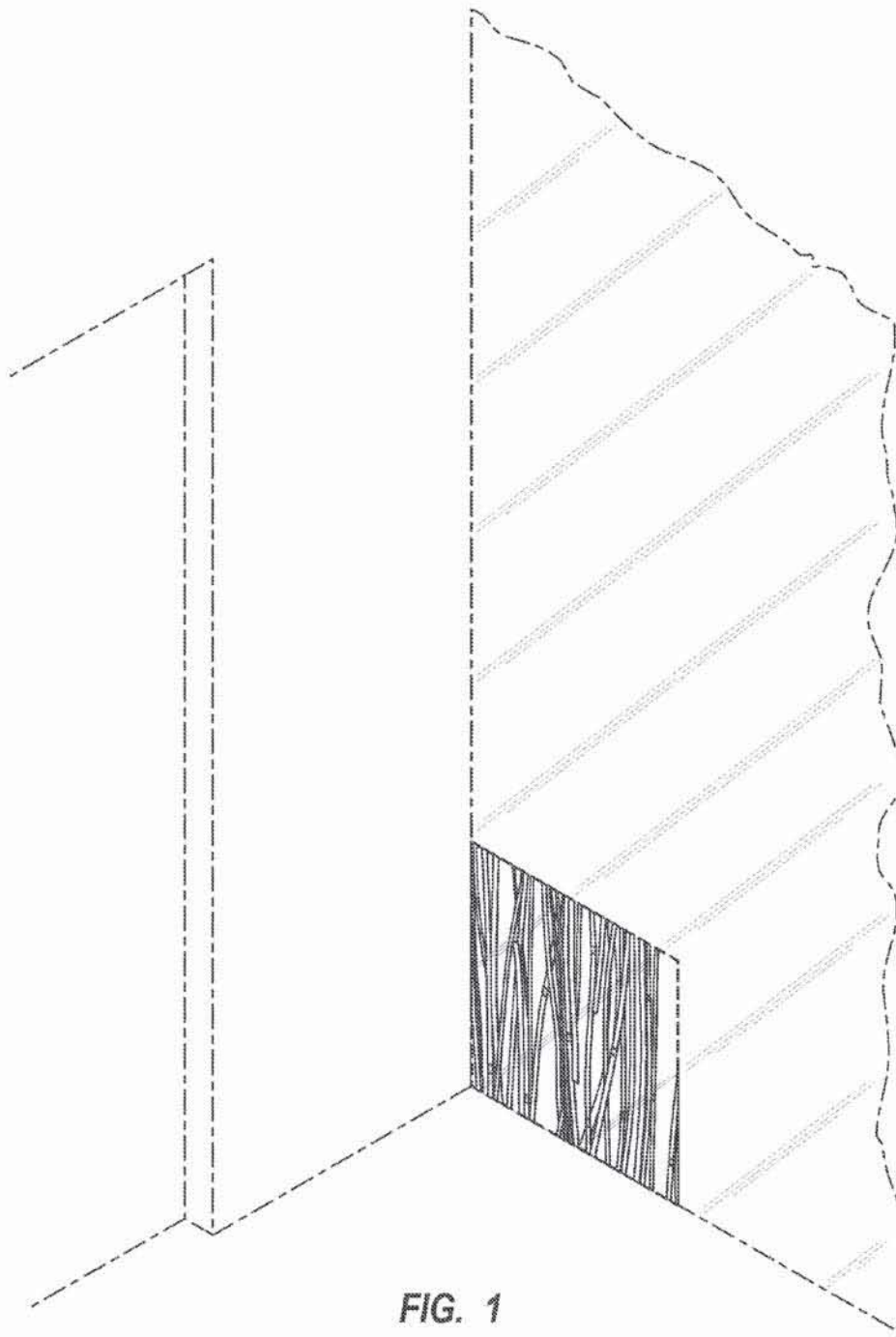
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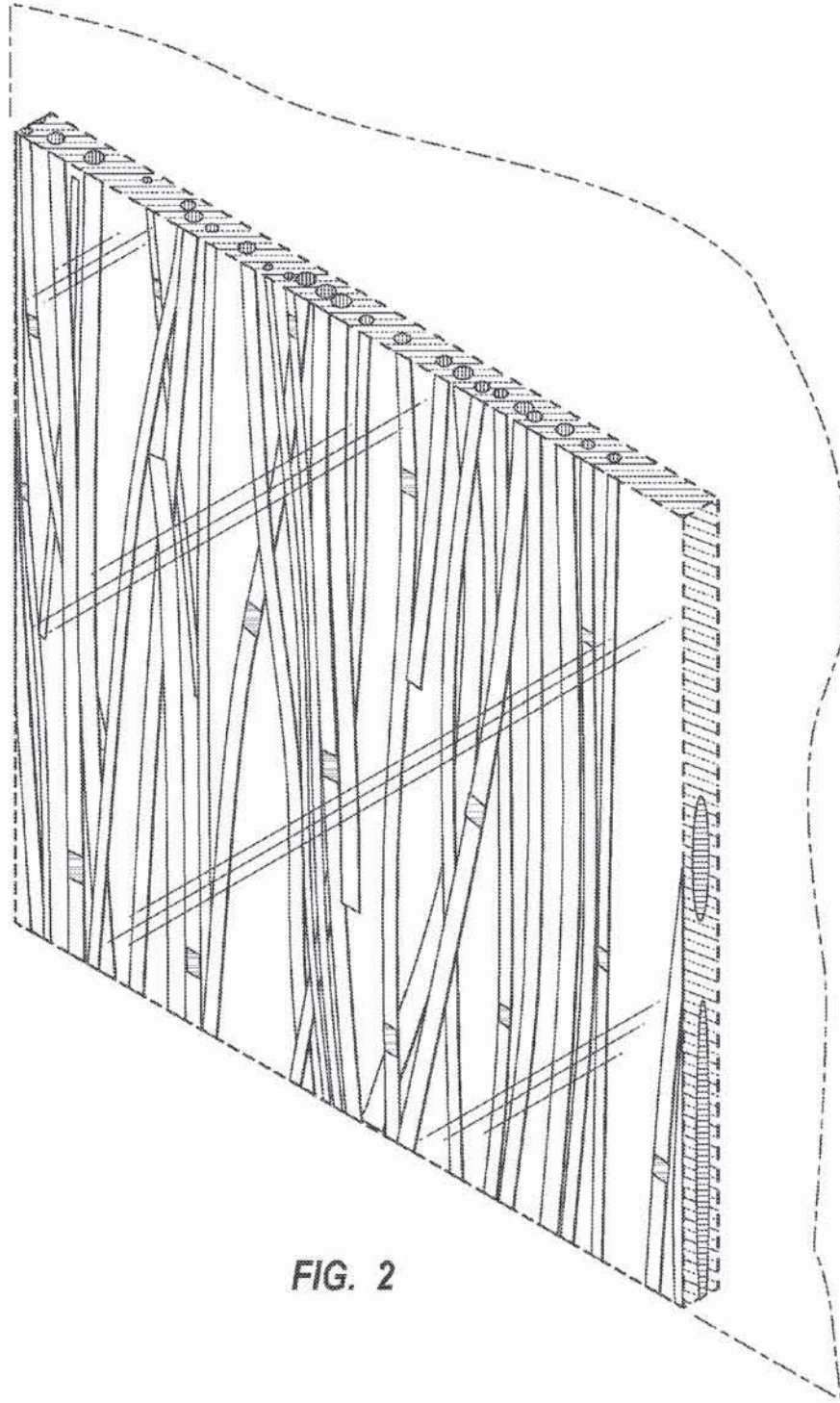


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FIG. 6

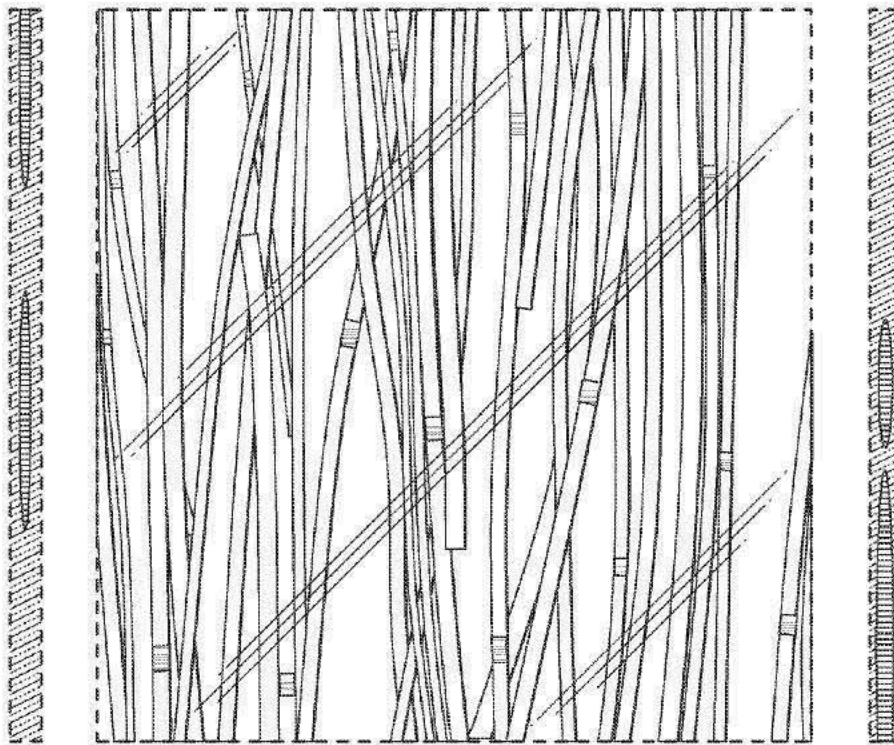


FIG. 4

FIG. 3

FIG. 5



FIG. 7