

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Fitesa Simpsonville, Inc.
Petitioner,

v.

The Procter & Gamble Company,
Patent Owner.

Case IPR: 2023-01451
U.S. Patent No. 11,326,276

PETITION FOR *INTER PARTES* REVIEW

PETITIONER'S EXHIBIT LIST

Exhibit Number	Document
1001	U.S. Patent No. 11,326,276
1002	U.S. Patent No. 6,013,223 – Schwarz
1003	PCT Application Publication No. WO 00/29658 – McDowall
1004	U.S. Patent Application Publication No. 2003/0211802 – Keck
1005	U.S. Patent No. 5,476,616 – Schwarz
1006	U.S. Patent No. 6,738,854 – Bond
1007	U.S. Patent No. 4,100,324 – Anderson
1008	U.S. Patent No. 4,923,454 – Seymour
1009	U.S. Patent No. 5,508,102 – Georger
1010	<i>The History of the Development of Melt Blowing Technology</i> , INJ 1999 – McCulloch
1011	<i>Meltblown Dies: A Hot Innovation Spot</i> , INJ Winter 2002, 37-38 – Zhao
1012	Intentionally left blank
1013	File History U.S. Patent No. 8,852,474
1014	Intentionally left blank
1015	Declaration of Dr. Gajanan Bhat
1016	U.S. Patent No. 3,825,379 – Lohkamp
1017	U.S. Patent No. 4,380,570 – Schwarz
1018	U.S. Patent No. 6,114,017 – Fabbicante

1019	U.S. Patent No. 6,200,120 – Fish
1020	Assignment Record for U.S. Patent No. 5,476,616
1021	CV of Dr. Gajanan Bhat
1022	G. S. Bhat et al., Polymer-laid web Formation, <i>Handbook of Nonwovens</i> , edited by S.J. Russel, Woodhead Publishing Limited, (2007)
1023	U.S. Patent No. 3,825,379 – Suzuka
1024	<i>ITMA 2007 Review: Implications for the Nonwovens Industry,”</i> J. of Engineered Fibers and Fabrics, Vol. 3, Issue 1 (2008), 38-47, 46 – Pourdeyhimi
1025	<i>Influence of Processing Conditions on Meltblown Wb Structure: Part 1 – DCD</i> , INJ Spring 2004, 49-55 - Bresee et al.
1026	<i>Influence of Processing Conditions on Meltblown Wb Structure: Part 2 – Primary Airflow Rate</i> , INJ Summer 2005, 11-18 - Bresee et al.
1027	<i>Effects of Melt-Blowing Process Conditions on Morphological and Mechanical Properties of Polypropylene Webs</i> , POLYMER 1992, Vol. 3, No. 6, 1200-1209 - Lee et al.
1028	File History U.S. Patent No. 11,326,276
1029	U.S. Patent Application Publication No. 2007/0202766-Ouellette

I. INTRODUCTION

Pursuant to 35 U.S.C. §§311, 314(a), and 37 C.F.R. §42.100, Fitesa Simpsonville, Inc. (“Petitioner”) respectfully requests that the Board cancel Claims 1-24 of U.S. Patent No. 11,326,276 (“’276 Patent,” Ex. 1001).

II. MANDATORY NOTICES

A. Real Party-In-Interest

The real party-in-interest is Fitesa Simpsonville, Inc., having a principal place of business at 840 SE Main Street, Simpsonville, South Carolina, 29681.

B. Related Matters

Petitioner is not aware of any related matters at this time, as understood according to 37 CFR § CFR 42.8(b)(2).

C. Lead and Back-up Counsel Information

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Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this Petition. Please address all correspondence to lead and back-up counsel. Petitioner consents to service by email at the addresses above.

III. GROUNDS FOR STANDING

The '276 Patent is eligible for IPR and Petitioner is not barred or estopped from requesting this IPR. 37 C.F.R. § 42.104(a).

IV. PRECISE RELIEF REQUESTED

The Petitioner respectfully requests that claims 1-24 of the '276 Patent be cancelled based on the following grounds, explained in detail below:

Ground 1: Claims 1-2, 6-9, 13-14, and 21-24 of the '276 Patent are anticipated under 35 U.S.C. §102 by PCT Application Publication No. WO 00/29658 ("McDowall") (Ex. 1003);

Ground 2: Claims 1-3, 5-10, and 13-24 of the '276 Patent are obvious under 35 U.S.C. §103 based on the teachings of U.S. Patent No. 6,013,223 ("Schwarz '223") (Ex. 1002) and U.S. Patent App. Publication No. 2003/0211802 A1 ("Keck") (Ex. 1004);

Ground 3: Claims 1-3, 5-10, and 13-24 of the '276 Patent are obvious under 35 U.S.C. §103 based on the teachings of U.S. Patent No. 5,476,616 ("Schwarz '616") (Ex. 1005) and Keck;

Ground 4: Claims 1-3, 5-9, 13-14, and 19-24 of the '276 Patent are obvious under 35 U.S.C. §103 based on the teachings of Schwarz '223 in view of McDowall;

Ground 5: Claims 11-12 of the '276 Patent are obvious under 35 U.S.C. §103 based on the teachings of Schwarz '223 in view of Keck or McDowall and in further view of U.S. Patent No. 6,783, 854 (“Bond”) (Ex. 1006);

Ground 6: Claims 1-4, 6-10, and 13-24 of the '276 Patent are obvious under 35 U.S.C. §103 based on the teachings of Keck in view of U.S. Patent No. 6,114,017 (“Fabbriante”) (Ex. 1018).

Ground 7: Claim 20 of the '276 Patent is obvious under 35 U.S.C. §103 based on the teachings of McDowall in further view United States Patent Application Publication No. 2007/0202766 (“Ouellette”) (Ex. 1028); or, in the alternative, either Schwarz '223 or Schwarz '616 in combination with Keck or McDowall in further view of Ouellette; or, in the alternative, Keck and Fabbriante in further view of Ouellette.

A. SPECIFICATION

The '276 Patent relates to processes for making fibrous structures comprising filaments. Ex. 1001, column 1, lines 17-19; These fibrous structures include paper, fabrics, absorbent pads, diapers, feminine hygiene products, and the like. *Id.*, column 3, lines 21-25. The '276 Patent claims a “coform” process

for making fibrous structures, which means that the fibrous structures comprise a mixture of two different materials – polymer filaments and a solid additive such as wood pulp fibers. *Id.*, column 1, lines 17-19; column 3, lines 50-58; Claim 1.

More specifically, the '276 Patent claims a coform process whereby a plurality of polymer filaments are extruded from a die and contacted with a fluid, such as air, after which the polymer filaments are combined with solid additives, such as wood pulp, and the mixture is collected on a surface to form a fibrous structure. Ex. 1001, Claims 1, 24.

The coform process in general is not new. *See, e.g.*, U.S. Patent No. 4,100,324 to Anderson (Ex. 1007) (directed to a coform process, wherein polymers, such as polypropylene, are initially formed by a primary airstream containing melt-blown microfibers and combined with additives, such as wood pulp fibers; U.S. Patent No. 4,923,454 to Seymour (Ex. 1008) (directed to a structure comprising an extended web of meltblown microfibers made from thermoplastic copolymers and combined with additives, such as staple fibers); U.S. Patent No. 5,508,102 to Georger (Ex. 1009) (directed to a fibrous nonwoven structure made from a coform process that provides for extruded polymers forming a nonwoven web and combined with cellulosic additives); *see also* Ex. 1015, Declaration of Dr. Gajanan Bhat, ¶¶ 26-32. Coform nonwovens have been used for decades in single-use disposable consumer products, including and most prevalently in baby

wipes. Ex. 1015, ¶ 32.

A step in the coform process is making polymer filaments. The '276 Patent discloses polymer filaments made from both meltblown and spunbond processes. Ex. 1001, column 4, lines 9-10.

In a meltblown process, polymers (typically thermoplastics), are heated and extruded through die openings into thin, fine fibers and are attenuated by a fluid (air) to produce fibers having diameters typically ranging from 1 to 10 microns. Ex. 1015, ¶¶ 26-27. A meltblown process can be designed with a single row of die openings or multiple rows of die openings. *Id.*, ¶¶ 37-38.

In the spunbond process, a molten thermoplastic material is extruded as filaments from a plurality of fine, usually circular, capillaries (filament forming holes) of a spinneret, with the filaments then being attenuated and drawn mechanically or pneumatically. *Id.*, ¶ 47. The filaments are deposited on a collecting surface to form a web of randomly arranged filaments which can be bonded together to form a coherent nonwoven fabric. *Id.* Generally, the spinneret die includes a plurality of rows of capillaries with each row comprising from 50 to 500 capillaries. *Id.*

Both meltblown and spunbond processes were well known long before the earliest priority date of the '276 Patent. The meltblown process began development around the middle of the 20th century. See McCulloch, *The History*

of the Development of Melt Blowing Technology, (Ex. 1010). The concept of melt blowing thermoplastics was first introduced to the public in 1954 through a (U.S.) Naval Research Laboratory project. McCulloch, Ex. 1010; *see also Meltblown Dies: A Hot Innovation Spot*, INJ Winter 2002, 37-38 (“Zhao”) (Ex. 1011).

As the main elements of the '276 Patent were long known in the art, the '276 Patent contains claims directed to specific configurations of filament-forming holes, fluid-releasing holes, and particular materials. The examiner did not analyze five of the seven prior art references presented in this Petition during prosecution. All of the claims of the '276 Patent are obvious.

B. PROSECUTION HISTORY

The '276 Patent, directed towards a process for making fibrous structures, was filed with 24 claims by The Procter & Gamble Company on December 4, 2019 as a continuation of Patent No. 10,513,801, which is a continuation of Patent No. 9,926,648, which is a continuation of Patent No. 8,852,474 and claims priority to Provisional Application No. 60/959,885, filed on July 17, 2007. Ex. 1001.

The Examiner initially rejected Claims 1-24 as obvious. Ex. 1028, at 190-197. Specifically, the Examiner rejected claims 1-9, 13-15, 19, and 21-23 as obvious over Anderson in combination with Schwarz '616. *Id.* The remaining claims were rejected as obvious over Anderson in combination with Schwarz

'616 and a third reference. *Id.*

In response, Applicant amended the claims to add the element of a belt instead of a “collection device” to the independent claims. *Id.*, at 180-188. Applicant then argued Anderson in combination with Schwarz '616 fails to teach using a belt as claimed in the independent claims. *Id.*

On April 16, 2021, the Examiner issued a final rejection and rejected Claims 1-24 as obvious, this time adding Pomplun for the disclosure of a belt, in addition to the previously cited references. *Id.*, at 155-166.

In response, Applicant argued Anderson cannot be used in combination with Schwarz '616 because Anderson teaches use of converging air flows that results in discontinuous microfibers, whereas Schwarz '616 teaches away from a die that breaks polymer streams into discontinuous microfibers. *Id.*, at 146-149.

The Examiner maintained all rejections, this time relying on Pomplun in combination with Schwarz '616 for the independent claims. *Id.*, at 71-82.

Applicant amended the independent claims to add three or more rows of three or more filament forming holes (instead of one or more filament forming holes in each row). *Id.*, at 51-59. Applicant argued that Pomplun and Schwarz '616 cannot properly be combined because Pomplun teaches a die that comprises a single row of filament forming holes wherein two streams of gas converge to form a single stream whereas Schwarz '616 teaches away from a die that uses

converging air flows to entrain and attenuate its threads, and therefore, there is no motivation to combine Pomplun with Schwarz '616. *Id.*

The Examiner maintained the objections, noting that Schwarz '616 teaches die that uses converging air flows to entrain and attenuate threads. *Id.*, at 37-43.

In response, Applicant reiterated its previous argument that Pomplun and Schwarz' 616 cannot properly be combined. *Id.*, at 32-36. For unknown reasons, the Examiner allowed the claims, and erred in doing so, because, as shown below, the claims are either anticipated or obvious. Applicant amended Claim 2 after the notice of allowance to change the number of required filament forming holes. *Id.*, at 9-15.

V. DISCRETIONARY DENIAL INAPPROPRIATE

The *Becton Dickinson* factors weigh in favor of institution under 35 U.S.C. §325(d). This Petition relies largely on references not identified or evaluated during any stage of the prosecution of the '276 Patent. Under 35 U.S.C. §325(d), the art and arguments must have been previously presented to the Office during prosecution for discretionary denial to be appropriate. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, at 8 (PTAB Feb. 13, 2020) (precedential). This Petition thus presents new issues warranting an exercise of discretion to institute trial. 35 U.S.C. §325(d). For example, Ground 1 relies on anticipation of challenged claims by McDowall,

which was not disclosed or evaluated by the Examiner.

Six of the seven grounds asserted rely upon references that were not cited or evaluated in any manner (Schwarz '223, McDowall, Bond, Fabbriante, and Ouelette). None of these references were before the Examiner, nor are they cumulative of art the Examiner considered.

Keck was disclosed in an IDS along with other references, but it was not substantively evaluated by the Examiner. The Examiner erred by not substantively evaluating it. See *Scientific Design Co. v. Shell Oil Co.*, IPR2021-01537, Paper 7 (P.T.A.B. Mar. 18, 2022) and IPR2022-00158, Paper 7 (P.T.A.B. Apr. 4, 2022). As shown below, Keck is highly relevant and, with other references, renders the claims of the '276 patent obvious.

The Examiner did evaluate Schwarz '616, and used it as a secondary basis to reject the claims (with Anderson and later Pomplun), but erred in withdrawing Schwarz '616 as a basis for rejection for the claims of the '276 Patent (without any stated reasoning). First, the Examiner should have used Schwarz '616 as a primary reference as he did during prosecution of the '474 Patent (in the same family). Ex. 1013, at 103-115. As shown below, Schwarz '616 teaches nearly all the claim elements on its own and also provides motivation to combine with other references such as McDowall and Keck. Second, the examiner should have used Schwarz' 616 in combination with analogous references, such as those identified in this

petition. Instead, the Examiner combined Schwarz '616 with Anderson and Pomplun, which Applicant successfully argued cannot properly be combined with Schwarz '616 (Applicant argued Anderson results in discontinuous fibers and Pomplun teaches converging air flows). Third, the Examiner withdrew all rejections based on Schwarz '616 without any stated reasons.

VI. LEVEL OF SKILL

A person of ordinary skill in the art (POSA) at the time of the effective filing date of the application that led to the '276 Patent would have been a person with a Bachelor of Science degree in Engineering (or a substantively related engineering or science degree) or equivalent work experience, and/or at least 3 to 5 years of experience in the field of nonwovens. Such experience could include, but is not necessarily required to include, knowledge about the design and operation of meltspun systems, such as meltblown and spunbond systems. Ex. 1015, ¶ 11.

VII. CLAIM CONSTRUCTION

Words in a claim are given their plain meaning, as understood by a POSA in view of the patent and file history. 37 C.F.R. §42.100(b); 83 Fed. Reg. 197, 51340 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). Other than following terms, Petitioner proposes no claim language requires express construction to resolve this Petition.

A. Polypropylene

The term “polypropylene” as used in the '276 Patent, must be a polyolefin because Claim 9 of the '276 Patent claims a polyolefin that comprises polypropylene. Ex. 1001, Claim 9. Moreover, polypropylene is a particular type of polyolefin. Ex. 1015, ¶ 54.

B. Synthetic Polymer

The term “synthetic polymer” as used in the '276 Patent must include polyolefins, polyesters, and polylactic acids because Claim 7 of the '276 Patent claims a synthetic polymer selected from the group including polyolefins, polyesters, and polylactic acids. Ex. 1001, Claim 7. Moreover, polyolefins, such as polypropylene, are considered synthetic polymers. Ex. 1015, ¶ 55.

C. Natural Polymer

The term “natural polymer” as used in the '276 Patent (Claims 11-12) must include starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives, and mixtures thereof because Claim 12 of the '276 Patent claims a natural polymer selected from the group consisting of starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives, and mixtures thereof. Ex. 1001, Claim 12. Moreover, starches and cellulose are natural polymers. Ex. 1015, ¶ 56.

D. Post Processing Operation

Claims 23 and 24 include a “post processing operation.” The specification of the ’276 Patent does not define “post processing operation,” but gives examples, including “tuft-generating operations” and “thermal bonding operations.” Ex. 1001, column 9, lines 44-51. “Post processing operation” must, therefore, be defined to include tuft-generating and thermal bonding operations. Ex. 1015, ¶ 57.

E. Second Polymer

The definition of “second polymer” must include the second polymer being the same as the first polymer because Claim 18 of the ’276 Patent, which depends on Claim 16, recites that the first and second polymer are the same. Ex. 1001, Claim 18.

F. Solid Additive Spreader

The ’276 Patent defines the term “solid additive spreader” as a device that comingles air with pulp or other solid additives and injects the mixture into the stream of meltblown filaments. Ex. 1001, column 16, lines 9-60.

G. Belt

The ’276 Patent does not provide a definition of the term “belt.” In the nonwoven industry, the term “belt” generally refers to a moving foraminous collection surface that is permeable and continuous, and onto which a nonwoven web is deposited following filament extrusion. Ex. 1015, ¶ 60.

VIII. PRIOR ART

A. U.S. Patent No. 6,013,223 (“Schwarz ’223”) (Ex. 1002)

Entitled “Process and Apparatus for Producing Non-Woven Webs of Strong Filaments,” Schwarz ’223 issued January 11, 2000. Ex. 1002, at 1. Schwarz ’223 was not cited or discussed by the examiner during prosecution. Schwarz ’223 qualifies as prior art to the ’276 Patent under 35 U.S.C. § 102(b) and (e)(pre-AIA).

Schwarz ’223 relates to an apparatus and process for extruding fiber forming thermoplastic polymers through multiple rows of spinning nozzles to produce a nonwoven web of high strength fibers. Ex. 1002, abstract. Schwarz ’223 is concerned with the same field of endeavor as the ’276 Patent. Ex. 1015, ¶ 107. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (a reference is analogous if from the same field of endeavor as the claimed invention). Schwarz ’223’s disclosures are also reasonably pertinent to the problems which the application sought to solve, such that Schwarz ’223 would “logically [] have commended itself to an inventor’s attention in considering his problem.” *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007).

B. PCT Published Application No. WO 00/29658 (“McDowall”) (Ex. 1003)

Entitled “Pulp-Modified Bicomponent Continuous Filament Nonwoven Webs,” McDowall was published May 25, 2000. Ex. 1003, p. 1. McDowall was

not cited or discussed by the Examiner during prosecution. McDowall qualifies as prior art to the '276 Patent under 35 U.S.C. § 102(b) (pre-AIA).

McDowall is directed to a conform nonwoven and processes of preparing the same. Ex. 1015, ¶ 79. McDowall is in the same field of the endeavor or the '276 patent. *Id.*

McDowall describes a process of preparing an absorbent nonwoven web comprising a combination of substantially continuous bicomponent thermoplastic filaments and pulp fibers. Ex. 1003, abstract. McDowall states that the continuous filaments may be combined with pulp fibers using a coform process. *Id.*, at 10, lines 1-6. McDowall describes that the integrated stream of continuous filaments and pulp fibers are deposited on a web forming conveyor and then subsequently subjected to a step of through-air bonding. Ex. 1003, at 16, lines 2-6.

McDowall states that the continuous filaments may be, without limitation, spunbonded or meltblown fibers. *Id.*, at 6, lines 1-3. McDowall states that “meltblown fibers used in the present invention are substantially continuous in length. *Id.*, at 4 lines 19-20. McDowall also describes that the pulp fibers may be of high average fiber length (e.g., lengths greater than 1.5 mm), low average fiber length (e.g., lengths less than about 1.5 mm), and mixtures thereof. *Id.*, at 10, lines 10-21.

C. U.S. Patent App. Publication No. 2003/0211802 A1 (“Keck”) (Ex. 1004)

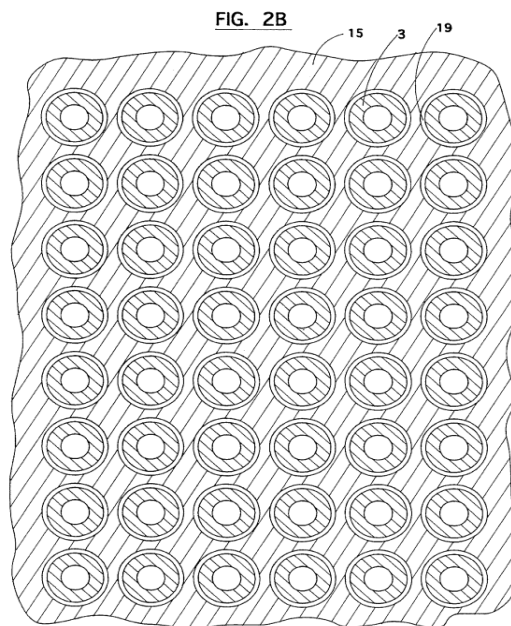
Entitled “Three-Dimensional Coform Nonwoven Web,” Keck was published November 13, 2003. Ex. 1003, p. 1. Keck qualifies as prior art to the ’276 Patent under 35 U.S.C. § 102(b) and (e)(pre-AIA).

Keck is concerned with the same field of endeavor as inventions claimed in the ’276 Patent. Ex. 1015, ¶ 90. Keck relates to a coform nonwoven web, prepared from thermoplastic filaments and at least one secondary material. Ex. 1004, ¶ 0002. Keck discloses that coform nonwoven webs have been used in applications such as disposable absorbent articles, absorbent dry wipes, wet wipes, wet mops, cleaning pads, and the like. Ex 1004, ¶ 0006.

D. U.S. Patent No. 5,476,616 (“Schwarz ’616”) (Ex. 1005)

Entitled “Apparatus and Process for Uniformly Melt-Blowing a Fiberforming Thermoplastic Polymer in a Spinnerette Assembly of Multiple Rows of Spinning Orifices,” Schwarz ’616 issued on December 19, 1995. Schwarz ’616 qualifies as prior art to the ’276 Patent under 35 U.S.C. § 102(b) and (e)(pre-AIA).

Schwarz ’616 is directed to an apparatus and method for preparing meltblown fibers and nonwovens comprising meltblown fibers. Schwarz ’616 is in the same field of the endeavor or the ’276 patent. Ex. 1015, ¶ 63. Schwarz ’616 describes a multirow meltblown die in which each filament nozzle is concentrically surrounded by an air orifice. *Id.*, abstract.



Schwarz '616 states that an object of the invention is to increase productivity and also provide a uniform stream of attenuating gas around each spinning nozzle. *Id.*, column 1, lines 20-28. The examples of Schwarz '616 show that higher throughput is achieved by increasing the number of filament nozzles in a given spinneret die area by increasing the number of rows of filament nozzles. Ex. 1005, table 1.

E. U.S. Patent No. 6,783,854 (“Bond”) (Ex. 1006)

Entitled “Bicomponent Fibers Comprising A Thermoplastic Polymer Surrounding a Starch Rich Core,” Bond issued on August 31, 2004. Bond qualifies as prior art to the '276 Patent under 35 U.S.C. § 102(b) and (e)(pre-AIA). Bond was not disclosed during prosecution of the patent application.

Bond is directed to continuous bicomponent fibers that may be used in the preparation of meltblown and spunbond nonwoven fabrics. Ex. 1006. Bond teaches that the bicomponent filaments may be made with melt spinning processes, and may be used to produce continuous filaments through spunbond methods or melt blowing processes. *Id.*, column 12, line 61-column 13, line 4. Bond further teaches that the nonwovens prepared from the bicomponent fibers may be used in hygiene applications, which includes wipes and diapers. *Id.*, column 14, lines 30-45. Bond is concerned with the same field of the endeavor or the '276 Patent. Ex. 1015, ¶ 120.

F. U.S. Patent No. to 6,114,017 (“Fabbicante”) (Ex. 1018)

Entitled “Micro-Denier Nonwoven Materials Made Using Modular Due Units,” Fabbicante issued on September 5, 2000. Fabbicante qualifies as prior art to the '276 Patent under 35 U.S.C. § 102(b) and (e)(pre-AIA). Fabbicante was not disclosed during prosecution of the patent application.

Fabbicante is directed to nonwoven webs and processes for their production. Fabbicante is in the same field of the endeavor or the '276 Patent. Ex. 1015, ¶ 128.

Fabbicante describes a multirow meltblown die for preparing continuous meltblown filaments. Ex.1018, abstract. Fabbicante teaches that the multirow meltblown die produces meltblown webs having equal or superior strength to

nonwoven fabrics prepared with spunbond processes. *Id.*, abstract, column 2, lines 7-10. Fabbicante further teaches that the meltblown webs prepared with the modular multirow die exhibit significantly higher unbonded strength than typical meltblown webs. *Id.*, column 4, lines 1-10.

Fabbicante discloses that the modular multirow meltblown die provides economic advantages. Fabbicante teaches that it is well known in the nonwoven industry to be competitive in meltblowing polymers, a minimum flow rate per die hole must be maintained. *Id.*, column 1, lines 63-67. To meet this minimum polymer flow rate requirement, it may be necessary to use additional dies or beam to produce nonwovens at commercially acceptable rates. *Id.*, column 2, lines 1-2. Traditional meltblown beams are very expensive to produce. *Id.*, column 2, lines 2-7.

Fabbicante provides a solution and teaches that because of “inherent economies of manufacture,” the modular meltblown die allows multiple rows of die holes without high capital costs. *Id.*, column 3, lines 11-14. Fabbicante discloses the cost of manufacture of modular meltblown dies is about 10 to 20% of the cost of traditional dies. *Id.*, column 3, lines 6-9.

G. U.S. Patent Application Publication No. 2007/0202766 to Ouellette et al. (“Ouellette”) (Ex. 1029)

Patent Application Publication No. 2007/0202766 to Ouellette et al. (“Ouellette”) (Ex. 1029), entitled “Low Density Cleaning Substrate” published on

August 30, 2007, and was filed on February 24, 2006. Ouellette qualifies as pre-AIA prior art to the '801 Patent under 35 U.S.C. § 102(e)(1).

Ouellette is directed to a cleaning substrate comprising a nonwoven material, such as a meltblown or coform. Ex. 105, ¶ 146. Ouellette is in the same field of the endeavor or the '276 Patent. *Id.*

Ouellette discloses a nonwoven substrate particularly useful as a cleaning wipe. Ex. 1029, ¶¶ 0017, 0020. The nonwoven substrate has an optimized pore volume distribution in which at least 50 percent of the cumulative volume within the pores have a radius size of about 110 to 250 microns. *Id.*, abstract. Ouellette teaches that the optimized pore volume distribution of the substrate enables it to controllably release a fluid composition effectively onto a surface. *Id.*

Ouellette teaches that the substrate is a nonwoven material which may comprise a spunbond, meltblown, or coform nonwoven among others. *Id.*, ¶ 0019. Ouelette teaches that “the fibrous web or substrate may comprise natural fibers, synthetic fibers, polypropylene, polyethylene, polyester, PET, wood pulp, regenerated cellulose nylon, cotton, bicomponent fibers, continuous fibers, and combinations thereof...”. *Id.*, ¶ 0058.

IX. IDENTIFICATION OF HOW CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1-2, 6-9, 13-14, and 21-24 are anticipated by McDowall

1. Independent Claims 1 and 24

Claims 1 and 24 are so broad that any process of mixing continuous filaments with a solid additive, such as pulp fibers, where continuous filaments are prepared with a spinnerette die having three or more rows of filaments with the three or more rows including at least three filament-forming holes reads on the claims. As explained below, every element of independent Claims 1 and 24 is taught in McDowall.

Element a (Claims 1 and 24): providing a die comprising three or more rows of three or more filament-forming holes

McDowall describes preparing a coform nonwoven using continuous meltblown or continuous spunbond filaments. Ex. 1003, page, lines 1-3. It is well known that a spunbond spinnerette die comprises multiple rows (e.g., more than three) of spinning capillaries (filament-forming holes) with each row typically comprising from 50 to 500 spinning capillaries. Ex. 1015, ¶¶ 47, 151. Accordingly, McDowall teaches providing a die comprising three or more rows of filament-forming holes, and in which the rows include three or more filament-forming holes.

Element b (Claim 1): supplying at least a first polymer to the die

Element b (Claim 24): supplying a polyolefin polymer to the die

McDowall teaches that spunbond filaments are formed by extruding molten thermoplastic material from a plurality of capillaries of a spinnerette. Ex. 1003, page 3 line 30 - page 4, line 1. In order to prepare a spunbond web, a polymer

(first polymer) is supplied to a spinnerette die from which it is extruded as a plurality of continuous filaments that are drawn and then collected on a collection surface. Ex. 1015, ¶ 154. Thus, in order to form a spunbond web, it is necessary to supply at least a first polymer to a die. *Id.*

McDowall teaches the step of supplying at least a first polymer to the die as recited in Claim 1. McDowall further teaches preparing a spunbond web comprising continuous filaments comprised of polypropylene, which is a polyolefin (Ex. 1015, ¶ 85), as recited in Claim 24. Ex. 1003, page 15, lines 27-29.

Element c (Claim 1): producing a plurality of filaments comprising the first polymer from the die.

Element c (Claim 24): producing a plurality of filaments comprising the polyolefin from the die.

McDowall describes preparing the spunbond continuous filaments by extruding the filaments from the spinnerette die. Ex. 1003, at 15, line 30 - 16, line 5. McDowall states that immediately after extrusion, and prior to deposition of the filaments on a collection surface, the filaments were exposed to a charge. *Id.* In other words, McDowall teaches extruding (producing) a plurality of spunbond filaments comprising a (first) polymer from a die. Ex. 1015, ¶ 158.

McDowall also teaches making continuous filaments comprised of polypropylene, which is a polyolefin (Ex. 1015, ¶ 85), as recited in Claim 24. Ex.

1003, page 15, lines 27-29.

Element d (Claim 1): combining the filaments with solid additives to form a mixture

Element d (Claim 24): combining the filaments with wood pulp fibers to form a mixture

McDowall teaches mixing the filaments with pulp fibers prior to depositing the mixture on a web forming conveyer (e.g., a belt). *Id.*, page 16, lines 2-4. The '276 Patent provides pulp fibers as an example of a solid additive. Ex. 1001, column 3, lines 56-58.

Element e (Claims 1 and 24): collecting the mixture on a belt to produce a fibrous structure

McDowall teaches that the mixture of the continuous filaments and wood pulp are deposited onto a web forming conveyor. *Id.*, page 16, lines 2-4. A web forming conveyor is a moving continuous surface and is therefore synonymous with the term "belt." Ex. 1015, ¶¶ 60, 164.

2. Claim 2

The process according to Claim 1, wherein at least one row of the three or more rows comprises ten or more filament-forming holes

It is well known that a spunbond spinnerette die comprises multiple rows (e.g., more than three) of spinning capillaries (filament-forming holes) with each row typically comprising from 50 to 500 spinning capillaries. Ex. 1015, ¶ 165. As such, McDowall teaches a process in which at least one of the rows of spinnerettes (filament-forming holes) includes ten or more spinnerettes.

3. Claim 6

The process according to claim 1 wherein the first polymer comprises a synthetic polymer.

McDowall explicitly discloses synthetic polymers including polyolefins and polyesters and other high tensile materials. *Id.*, page 8; Ex. 1015, ¶ 167.

4. Claim 7

The process according to claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

McDowall explicitly discloses synthetic polymers including polypropylene and polyesters and other high tensile materials. *Id.*, page 8; Ex. 1015, ¶ 169.

5. Claim 8

The process according to claim 7 wherein the synthetic polymer comprises a polyolefin

McDowall discloses synthetic polymers including polypropylene (*Id.*, page 8), which is a polyolefin by definition because Claim 9 of the '276 Patent claims a synthetic polymer that is a polyolefin comprised of polypropylene. Ex. 1001, Claim 9; Ex. 1015, ¶ 171.

6. Claim 9

The process according to claim 8 wherein the polyolefin comprises polypropylene

McDowall discloses synthetic polymers including polypropylene. *Id.*, page 8, lines 27-29.

7. Claim 13

The process according to claim 1 wherein the solid additives comprise fibers

McDowall discloses that pulp fibers (solid additives) refers to fibers from natural sources such as woody and non-woody plants. *Id.*, page 4.

8. Claim 14

See Claim 13, discussed above.

9. Claim 21

The process according to claim 1 wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation

McDowall discloses “thermal point bonding” and teaches that it means passing a fabric or web of fibers to be bonded between a heated calender roll and an anvil roll to hold the laminate layers together and impart integrity to each individual layer by bonding filaments and/or fibers within each layer. Ex. 1003, at 6-7. In addition, the absorbent nonwoven webs prepared in the examples of McDowall were subjected to a step of through-air bonding. *Id.*, at 16.

10. Claim 22

The process according to claim 1 wherein the process is directly coupled to a post-processing operation

See Claim 21, discussed above. Further, McDowall describes depositing the nonwoven web of a conveyor and then subjecting the composite to through-air-bonding. *Id.*, page 10, lines 4-6. Such a bonding step immediately following

deposition on the conveyor is considered as being “directly coupled to a post-processing operation.” Ex. 1015, ¶ 181.

11. Claim 23

The process according to claim 1 wherein the process is closely coupled to a post-processing operation

McDowall describes that absorbent nonwoven composites can be used in various medical products, which contain alcohol or disinfectants. *Id.*, page 15, lines 16-18. The conversion of the absorbent nonwoven composite of McDowall into such medical products is normally completed at a separate facility and is therefore be considered a “closely coupled” post processing operation. Ex. 1015, ¶ 183.

B. Ground 2: Claims 1-3, 5-10, and 13-24 are obvious under 35 U.S.C. §103 based on the teachings of Schwarz '223 and Keck

1. Independent claims 1 and 24

Schwarz '223 explicitly discloses all but one element of independent Claims 1 and 24 of the '276 Patent. The remaining element – combining filaments with solid additives (wood pulp) to form a mixture – was well known in the art and would have been obvious to a POSA based on Schwarz’s disclosures in light of the teachings of Keck. An element-by-element analysis follows:

Preamble: A process for making a fibrous structure, the process comprising the steps of:

Schwarz '223 teaches a process for making a fibrous structure. Ex. 1002, abstract, Claim 1.

Element a (Claims 1 and 24): providing a die comprising three or more rows of three or more filament-forming holes

Schwarz '223 discloses a die body (Ex. 1002, column 2, line 31) through which pressurized hot air is blown out of holes (fluid releasing holes) around each spinning nozzle (filament-forming hole). Ex. 1002, column 1, lines 58-60; column 2, lines 30-35; figures 1, 2. Figure 2 is a partial view of the bottom cover plate of the die of Schwarz '223. The partial view shows that the die includes at least 6 rows of filament forming holes (identified by referenced character 3) with each row comprising a plurality of individual filament nozzles 3 (filament-forming holes). Here, the partial view of the bottom of the cover plate includes 6 rows with each row having 8 filament nozzles 3 (filament-forming holes). As figure 2 is only a partial view, the die of Schwarz '223 would have a significantly greater amount of filament nozzles per row than what is shown in figure 2. Ex. 1015, ¶ 187.

Schwarz '223 describes itself as an improvement on the meltblown die of Schwarz '616, and incorporates the its teachings. *Id.*, column 1, lines 7-10. The teachings of Schwarz '616 form part of the disclosure of Schwarz '223. The examples of Schwarz '616 describe a die having 8 rows of filament nozzles with the total number of filament nozzles being 500. Ex. 1006, Table 1, Example 3.

Based on these values, the average filament nozzles per row is 62.5. Ex. 1015, ¶ 189. Schwarz '223 discloses providing a die having three or more rows of three or more filament-forming holes.

Element b (Claim 1): supplying at least a first polymer to the die

Element b (Claim 24): supplying a polyolefin polymer to the die

Schwarz '223 discloses supplying thermoplastic fiber-forming polymer melt (first polymer) to a supply cavity in a die body (die). Ex. 1002, column 2, lines 30-32. Schwarz '223 discloses supplying polypropylene (first polymer) to the die body (die). Ex. 1002, column 2, line 65. Polypropylene is a particular type of polyolefin. This must be true because dependent Claim 9 of the '276 Patent claims a polyolefin that comprises polypropylene. *See also* Ex. 1015, ¶ 85.

Element c (Claim 1): producing a plurality of filaments comprising the first polymer from the die

Element c (Claim 24): producing a plurality of filaments comprising the polyolefin polymer from the die

Schwarz '223 discloses producing strong filaments (Ex. 1002, column 1, lines 10-12) by supplying thermoplastic fiber-forming polymer (first polymer) to a supply cavity on a die body (die). Ex. 1002, column 2, lines 30-39. In addition, Schwarz '223 discloses supplying polypropylene (first polymer) to the die body (die). Ex. 1002, column 2, line 65. Polypropylene is a particular type of polyolefin.

Element e (Claims 1 and 24): collecting the mixture on a belt to produce a fibrous structure.

Schwarz '223 discloses collecting said fibers on a receiver surface to form a nonwoven mat (fibrous structure). Ex. 1002, Claim 1, column 5, lines 34-36. Schwarz '223 also describes that it is known in the prior art to typically collect the fibers on a moving belt or screen. *Id.*, column 1, lines 48-50.

Element d (Claim 1): combining the filaments with solid additives to form a mixture

Element d (Claim 24): combining the filaments with wood pulp fibers to form a mixture

This is the only element of independent claims 1 and 24 that is not explicitly disclosed in Schwarz '223. But adding solid additives, or specifically wood pulp fibers, to polymer filaments to form a mixture has been long known in the art (referred to as coform), and is explicitly disclosed in Keck (and many other prior art references known at the time).

a. Motivation to Combine

Schwarz '223 and Keck are both analogous to the invention claimed in the '276 Patent because they concern the same field of endeavor. Ex. 1015, ¶¶ 90, 107. Prior to the patent owner's earliest possible priority date (July 17, 2007), a POSA would have been motivated to modify Schwarz '223 in view of Keck in order to provide a coform nonwoven having lower costs and exhibiting improved strength.

A “motivation to combine may be found explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *Zup v. Nash Mfg.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)).

In this case, a POSA would have known that the multirow meltblown die taught in Schwarz ’223 provides significant improvements with respect to throughput, and hence, productivity. Ex. 1015, ¶¶ 199-201. Schwarz ’223 teaches that the meltblown die provides “unusually high production capacities.” Ex. 1002, column 1, lines 20-21. As a consequence, the costs associated with manufacturing the coform nonwoven per unit would be decreased, which would improve the manufacturer competitiveness in the market and potentially provide a greater return on investment. *Id.*

The advantages obtained with a multirow meltblown die of the Schwarz ’223 Patent in comparison to a single row meltblown die were well known to POSA prior to the earliest priority date of the ’276 Patent and were explicitly recognized by others in the nonwovens field. Ex. 1015, ¶¶ 109, 200. In the *Zhao* publication the author recognized that the Schwarz multirow meltblown die

breaks the limitation of requiring air from each side of the tapered die tip, which allows the number of rows of filament nozzles present on the die head to be increased without a tremendous capital expense. Ex. 1011.

In addition, a POSA would be motivated to modify Schwarz '223 in view of Keck in order to improve the strength of the coform nonwoven. Ex. 1015, ¶ 201. Schwarz '223 explicitly states that the fibers prepared therein have improved tenacity. *Id.* As such, a POSA would have been motivated to modify Schwarz '223 in view of Keck to provide a coform nonwoven having improved strength. *Id.*

b. Reasonable Expectation of Success

A POSA would have had a reasonable expectation of success in modifying Schwarz '223 in use in a coform process as described in Keck. The simple substitution of a multirow meltblown die in lieu of a knife-edge meltblown die in the coform process would be within the routine skill of the POSA and such a substitution would not result in the coform process of Keck being inoperable.

2. Claim 2

The process according to Claim 1, wherein at least one row of the three or more rows comprises ten or more filament-forming holes

As can explicitly be seen in figure 2 of Schwarz '223, the die body includes multiple rows of nozzle (filament-forming holes) in which each row comprises a plurality of nozzles. Ex. 1002, column 2, lines 29-35 52-54; figure 2; Claim 1

(column 5, lines 39-45) (“multiplicity of nozzles arranged in at least two rows”). As figure 2 is only a partial view, the die of Schwarz ’223 would have a significantly greater amount of filament nozzles per row than what is shown in figure 2.

The examples of Schwarz ’616 (which form part of the disclosure of Schwarz ’223 (*Id.*, column 1, lines 7-10)), describe a die having 8 rows of filament nozzles with the total number of filament nozzles being 500. Ex. 1005, table 1, example 3. Based on these values, the average filament nozzles per row is 62.5. Ex. 1015, ¶ 207. Schwarz ’223 discloses providing a die having three or more rows of three or more filament-forming holes.

3. Claim 3

The process according to Claim 1 wherein one or more fluid-releasing holes are associated with a filament-forming hole.

Figure 2 of Schwarz ’223 shows that the die body includes multiple rows of filament nozzles (filament-forming holes) in which each filament nozzle 3 is concentrically positioned within an associated round hole 7 (fluid-releasing hole). Ex. 1002, column 2, lines 29-51; figure 2.

4. Claim 5

The process according to Claim 1 wherein at least one of the one or more fluid-releasing holes is concentrically positioned around one filament-forming hole

Schwarz '223 discloses multiple rows of nozzles (filament-forming holes) sticking through the round holes (which are concentrically positioned around fluid-releasing holes). Ex 1002, column 2, lines 51-54. Further, figure 2 of Schwarz '223 shows that the filament nozzle is centered in the round holes, which means that the round hole concentrically surrounds the filament nozzle.

5. Claim 6

The process according to Claim 1 wherein the first polymer comprises a synthetic polymer

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, line 65. Further, Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052. Polypropylene is a synthetic polymer.

6. Claim 7

The process according to claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, line 65. Polypropylene is a polyolefin. Further, Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052.

7. Claim 8

The process according to claim 7 wherein the synthetic polymer comprises a polyolefin

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, lines 65. Polypropylene is a polyolefin. Further, Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052.

8. Claim 9

The process according to claim 8 wherein the polyolefin comprises polypropylene

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, lines 65. Polypropylene is a polyolefin. Further, Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052.

9. Claim 10

The process according to claim 7 wherein the synthetic polymer is selected from the group consisting of: polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

Again, Keck discloses that thermoplastic meltblown filaments comprise a polymer selected from the group consisting of polyolefins, polyesters, polyamides, polycarbonates, polyurethanes, polyvinylchloride, polytetrafluoroethylene, polystyrene, polyethylene terephthalate, polylactic acid and copolymers and blends thereof. Ex. 1004, Claim 8.

10. Claim 13

The process according to claim 1 wherein the solid additives comprise fibers

Keck discloses that the secondary material (solid additives) includes fibrous organic materials (fibers) and superabsorbent particles and fibers. Ex. 1004, ¶ 0003.

11. Claim 14

The process according to claim 13 wherein the fibers comprise wood pulp fibers

Keck discloses that the secondary material (solid additives) includes fibrous organic materials such as woody and non-wood pulp. Ex. 1004, ¶ 0003.

12. Claim 15

The process according to claim 1 wherein the solid additives are combined with the plurality of filaments by a solid additive spreader

Keck teaches that the secondary fibers (solid additives) are introduced into a secondary gas stream via an apparatus having a housing that encloses a picker roll and is in communication with a nozzle, in which the stream of secondary fibers are entrained and subsequently introduced into the filament containing streams. Ex. 1004, ¶¶ 0088-0089. More specifically, Keck discloses that the secondary fibers (solid additives) are conveyed toward the stream of thermoplastic polymer fibers through a nozzle, with a housing that encloses the picker roll and provides a passageway or gap between the housing and the picker roll and that a gas (i.e. air) is supplied to the passage way or gap between the

surface of the picker roll and the housing by way of a gas duct. Ex. 1004, ¶ 0088. The gas is supplied by any conventional arrangement including a blower and is supplied in sufficient quantity to serve as a medium for conveying the secondary fibers through the nozzle. *Id.* Keck further discloses that it is contemplated that additives and/or other materials may be added to or entrained in the gas stream to treat secondary fibers. *Id.* Keck further discloses a “conventional particulate injection system” (solid additive spreader). Ex. 1004, ¶¶ 0092, 0108.; *see also* Ex. 1015, ¶ 95.

13. Claim 16

The process according to claim 1 wherein the process further comprises the step of: [17f] contacting a surface of the fibrous structure with a plurality of filaments comprising a second polymer

Keck discloses preparing a two-layer coform structure (two layered fibrous structure) in which a second coform layer is formed directly on the first coform layer. Ex. 1004, ¶ 0150. This would necessarily result in the filaments of the second coform layer contacting a surface of the first coform layer (fibrous structure). Keck further describes that the meltblown filaments of both coform layers comprise the same polypropylene resin. *Id.* The definition of “second polymer” must include the second polymer being the same as the first polymer because Claim 18 of the '276 Patent, which depends on Claim 16, recites that the

first and second polymer are the same. Ex. 1001, Claim 18; see also Ex. 1015, ¶ 231.

14. Claim 17

The process according to claim 16 wherein the plurality of filaments comprising the second polymer are in the form of a fibrous structure

Keck discloses that the second layer is a coform nonwoven (fibrous structure) comprised of a mixture of thermoplastic filaments and wood pulp fibers (solid additive). Ex. 1004, ¶ 0150.

15. Claim 18

The process according to claim 16 wherein the second polymer is the same as the first polymer

Keck discloses in example 5 that the filaments of the first coform layer and the filaments of the second coform layer both comprise the same grade polypropylene resin. As such, the filaments of the first coform layer and the second coform layer comprise the same polymer (i.e., the second polymer is the same as the first polymer). Ex. 1004, ¶ 0150.

16. Claim 19

The process according to claim 3 wherein a fluid released by the fluid-releasing holes comprises air

Schwarz '223 discloses that the gas released through the holes (fluid releasing holes) in the cover plate is air. Ex. 1002, column 2, lines 29-51. Keck further discloses “fibers formed by extruding a molten thermoplastic material

through a plurality of fine, usually circular, die capillaries as molten threads or filaments into converging high velocity, usually hot, gas (e.g. air) streams which attenuate the filaments of molten thermoplastic material to reduce their diameter, which may be to microfiber diameter.” Ex. 1004, ¶ 0035.

17. Claim 20

The process according to claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 um to about 200 um

The '276 Patent discloses that the spinnerette used in the examples of preparing the claimed fibrous structure was obtained from Biax-Fiberfilm Corporation (“Biax”). Ex. 1001, column 16, lines 3-5. Notably, Schwarz '223 was assigned to Biax. Ex. 1002, page 1.

Thus, it appears that the examples in the '276 Patent were prepared with the same or similar meltblown die described in Schwarz '223. Ex. 1015, ¶ 240. Given the similarities between the Biax meltblown die described in the '276 Patent and that of Schwarz '616, it is reasonable that a coform nonwoven prepared based on the combination of Schwarz '223 and Keck would have the same properties. *Id.* That is, it would be expected that a process of preparing a coform nonwoven using the meltblown die of Schwarz '223 in combination with the solid additive process of Keck would produce a coform nonwoven having a pore volume distribution such that greater than about 40% of the total pore volume present in

the fibrous structure exists in pores of radii of from about 121 um to about 200 um. *Id.*

It is well known that pore size, and hence pore size distribution, in meltblown webs varies depending on process conditions, such as processing temperatures, increasing air flow rate at the die, and decreasing the distance between the filament nozzles and the collection surface, and the speed of the collection surface. *Id.*, ¶ 241; Bresee et al., *Influence of Processing Conditions on Melt Blown Web Structure: Part 1 – DCD*, INJ Spring 2004, 49-55 (Ex. 1025); Bresee et al., *Influence of Processing Conditions on Melt Blown Web Structure: Part 2 – Primary Airflow Rate*, INJ Summer 2005, 11-18 (Ex. 1026); and Lee et al. *Effects of Melt-Blowing Process Conditions on Morphological and Mechanical Properties of Polypropylene Webs*, POLYMER 1992, Vol. 3, No. 6, 1200-1209 (Ex. 1027). For example, changing one or more of the process parameters by increasing the air flow rate, decreasing the distance between the collection surface and filament nozzles, or increasing the speed of the collection surface is well known to decrease pore size in the meltblown web. *Id.*, ¶ 241. Similarly, decreasing air flow rate, increasing the distance between the collection surface and filament nozzles, or decreasing the speed of the collection surface is well known to increase pore size in the meltblown web. *Id.* As such, it is reasonable to expect that obtaining a coform nonwoven having the recited pore distribution is

well within the routine skill of a POSA, and that doing such is merely an optimization of known parameters that affect pore size distribution. *Id.*

18. Claim 21

The process according to claim 1 wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation

Keck discloses “pattern bonded” which is a process of thermal bonding a nonwoven web in a pattern by the application of heat and pressure or other methods, such as ultrasonic bonding. Keck discloses that thermal pattern bonding typically is carried out at a temperature in a range of from about 80 C. to about 180° C. Ex. 1004, ¶ 0047. Keck also discloses that due to the fact that thermoplastic polymer fibers are usually semi-molten and tacky at the time of incorporation of the secondary fibers, the secondary fibers are thermally bonded or joined to the thermoplastic polymer fibers. Ex. 1004, ¶ 0109.

19. Claim 22

The process according to claim 1 wherein the process is directly coupled to a post-processing operation

Keck discloses “pattern bonded” which is a process of bonding a nonwoven web in a pattern by the application of heat and pressure or other methods, such as ultrasonic bonding. Keck discloses that thermal pattern bonding typically is carried out at a temperature in a range of from about 80 C. to about 180° C. Ex. 1004, ¶ 0047. The '276 Patent expressly discloses that post-processing operations

as that term is used in the '276 Patent includes thermal bonding operations. Ex. 1001, column 9, lines 44-51. Keck also describes additional steps (post-processing operations) of depositing the second composite stream onto the deposited layer as a matrix of meltblown filaments and a secondary material to form a two layer tufted coform nonwoven web. Ex. 1004, ¶¶ 0015-0018. The '276 Patent expressly discloses that post-processing operations as that term is used in the '276 Patent includes tuft-generating operations. Ex. 1001, column 9, lines 44-51.

Thermal bonding, such as the “pattern bonded” process described in Keck and the tufting-generating operations are typically performed during the manufacturing process of the nonwoven web, and are therefore considered as being “directly coupled to a post-processing operation.” Ex. 1015, ¶ 246.

20. Claim 23

The process according to claim 1 wherein the process is closely coupled to a post-processing operation

The '276 Patent expressly discloses that post-processing operations as that term is used in the '276 Patent includes application of lotions and mixtures. Ex. 1001, column 9, lines 44-51.

Keck describes preparation of cleaning sheets using the nonwoven web. Such cleaning sheets may include treatment with a liquid or other materials Ex. 1004, ¶¶ 0137-0140. The conversion of Keck's nonwoven web into such treated cleaning sheets typically occurs at a separate facility from that of manufacture of

the nonwoven web and is therefore considered a “closely coupled” post processing operation. Ex. 1015, ¶ 249.

C. Ground 3: Claims 1-3, 5-10, and 13-24 are obvious under 35 U.S.C. §103 based on the teachings of Schwarz '616 (Ex. 1005) and Keck (Ex. 1004)

1. Independent claims 1 and 24

Schwarz '616 teaches an apparatus and process for meltblowing fiberforming thermoplastic polymers to form fine fibers by extruding through spinning nozzles arranged in four or more rows. Ex. 1005, abstract. The molten fibers are accelerated to high velocity by gas being blown in parallel flow through small circular gas orifices surrounding each nozzle. *Id.* The air orifices are formed by a family of plates which affect the perfect centering of each nozzle in each of the circular air orifices. *Id.*

Schwarz '616 explicitly discloses all but one element of independent claims 1 and 24 of the '276 Patent. The remaining element – combining the filaments with solid additives (wood pulp) to form a mixture – would have been obvious to a POSA based on Schwarz '616's disclosures in light of the teachings of Keck. An element-by-element analysis follows:

Preamble: A process for making a fibrous structure, the process comprising the steps of:

Schwarz '616 teaches a process for making a fibrous structure. Ex. 1005, abstract, Claim 5.

Element a (Claims 1 and 24): providing a die comprising three or more rows of three or more filament-forming holes

Schwarz '616 discloses this element, providing a die body 1 (die) comprising spinning nozzles 3 (filament-forming holes), wherein gas cavity 5 (fluid-releasing holes) are associated with spinning nozzles 3 (filament-forming holes). Ex. 1005, column 2, lines 15-52, Claim 5, figure 1, figure 2A, figure 2B.

Figure 2B is a partial view of the bottom cover plate of the die of Schwarz '616. The partial view shows that the die includes at least 6 rows of filament forming holes (identified by referenced character 3) with each row comprising a plurality of individual filament nozzles 3 (filament-forming holes). Here, the partial view of the bottom of the cover plate includes 6 rows with each row having 8 filament nozzles 3 (filament-forming holes). *Id.* As figure 2B is only a partial view, the die of Schwarz '616 would have a significantly greater amount of filament nozzles per row than what is shown in figure 2B. Ex. 1015, ¶ 255.

The examples of Schwarz '616 describe a die having 8 rows of filament nozzles with the total number of filament nozzles being 500. Ex. 1005, Table 1, Example 3. Based on these values, the average filament nozzles per row is 62.5. Ex. 1015, ¶ 256. Thus, Schwarz '616 discloses providing a die having three or more rows of three or more filament-forming holes.

Element b (Claim 1): supplying at least a first polymer to the die

Element b (Claim 24): supplying a polyolefin polymer to the die

Schwarz '616 discloses both these elements of Claims 1 and 24. Schwarz '616 discloses supplying thermoplastic fiber-forming polymer melt (first polymer) to a supply cavity in a die body (die). Ex. 1005, column 2, lines 30-32, 63-66. More particularly, Schwarz '616 discloses supplying polypropylene (first polymer) to the die body (die). Ex. 1005, column 2, lines 63-66. Polypropylene is a particular type of polyolefin. Ex. 1015, ¶ 258.

Element c (Claim 1): producing a plurality of filaments comprising the first polymer from the die

Element c (Claim 24): producing a plurality of filaments comprising the polyolefin polymer from the die

Schwarz '616 discloses producing a plurality of filaments comprising the polypropylene (first polymer) from the die body 1 (die). Ex. 1005, Claim 5, figure 1, figure 2A, figure 2B.

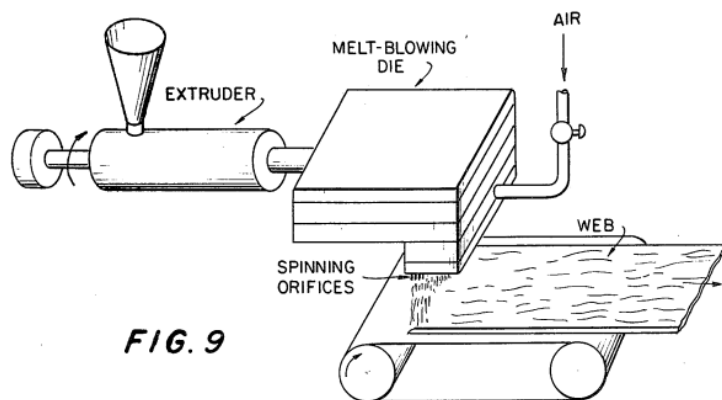
In addition, Schwarz '616 discloses supplying polypropylene (first polymer) to the die body (die). *Id.*, column 2, lines 63-66. Polypropylene is a particular type of polyolefin. Ex. 1015, ¶ 261.

Element e (Claims 1 and 24): collecting the mixture on a belt to produce a fibrous structure.

Schwarz '616 discloses collecting the mixture on a receiver (e.g., to produce a fibrous structure). Ex. 1005, Claim 5. Schwarz '616 describes itself as an improvement on the meltblown die of Schwarz '570, and incorporates the

teachings of Schwarz '570. *Id.*, column 1, lines 9-12. As such, the teachings of Schwarz '570 form part of the disclosure of Schwarz '616.

Figure 9, below, of Schwarz '570 is a schematic illustration of the system of Schwarz '570. Ex. 1017, column 2, lines 34-35.



In figure 9, the meltblown web is deposited onto a moving endless belt. Ex. 1015, ¶ 264. Schwarz '616 teaches the step of collecting the mixture on a belt.

Element d (Claim 1): combining the filaments with solid additives to form a mixture

Element d (Claim 24): combining the filaments with wood pulp fibers to form a mixture

This is the only element of independent claims 1 and 24 that is not explicitly disclosed in Schwarz '616. But adding solid additives, or specifically wood pulp fibers, to polymer filaments to form a mixture has been long known in the art (referred to as coform), and is explicitly disclosed in Keck (and many other prior art references known at the time).

a. Motivation to Combine

Prior to the patent owner's earliest possible priority date (July 17, 2007), a POSA would have been motivated to modify Schwarz '616 in view of Keck in order to provide a coform nonwoven having lower manufacturing costs.

More specifically, a POSA would have known that the multirow meltblown die taught in Schwarz '616 provides significant improvements with respect to throughput, and hence, productivity. As a consequence, the costs associated with manufacturing the coform nonwoven per unit would be decreased, which would improve the manufacturer's competitiveness in the market and potentially provide a greater return on investment.

b. Reasonable Expectation of Success

A POSA would have had a reasonable expectation of success in modifying Schwarz '616 in use in a coform process as described in Keck. The relatively simple substitution of a multirow meltblown die of Schwarz '616 in lieu of a knife-edge meltblown die in the coform process is well within the routine skill of the POSA and such a substitution would not result in either the coform process of McDowall or the meltblown process of Schwarz '616 being inoperable.

2. Claim 2

The process according to claim 1 wherein at least one row of the three or more rows comprises ten or more filament-forming holes

Schwarz '616 discloses a die comprised of multiple rows of spinning orifices or nozzles (filament-forming holes). Ex. 1005, column 1, lines 20-28; 49-51; figure 2A; Claim 1 (“a multiplicity of nozzles arranged in at least four rows”). As can explicitly be seen in figure 2B of Schwarz '616, the die body includes multiple rows of nozzle (filament-forming holes) in which each row comprises a plurality of nozzles.

As figure 2B is only a partial view, the die of Schwarz '616 would have a significantly greater amount of filament nozzles per row than what is shown in figure 2B. In addition, the examples of Schwarz '616 describes a die having 8 rows of filament nozzles with the total number of filament nozzles being 500. Ex. 1005, Table 1, Example 3. Based on these values, the average filament nozzles per row is 62.5. Ex. 1015, ¶ 273. Thus, Schwarz '616 discloses providing a die having three or more rows of three or more filament-forming holes.

3. Claim 3

The process according to claim 1 wherein one or more fluid-releasing holes are associated with a filament-forming hole.

Figure 2B of Schwarz '616 shows that the die body includes multiple rows of filament nozzles (filament-forming holes) in which each filament nozzle 3 is concentrically positioned within an associated round hole 7 (fluid-releasing hole). Ex. 1005, column 2, lines 15-38; figure 2B.

4. Claim 5

The process according to claim 1 wherein at least one of the one or more fluid-releasing holes is concentrically positioned around one filament-forming hole

Schwarz '616 discloses multiple rows of nozzles (filament-forming holes) sticking through the round holes (which are concentrically positioned around fluid-releasing holes). Ex 1005, column 2, lines 51-54. Further, figure 2B of Schwarz '616 shows that each individual filament nozzle is centered in the round holes, which means that the round hole concentrically surrounds the filament nozzle.

5. Claim 6

The process according to claim 1 wherein the first polymer comprises a synthetic polymer

Schwarz '616 explicitly discloses using polypropylene. Ex. 1005, column 2, lines 63-65. Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052. Polypropylene is a synthetic polymer. Ex. 1015, ¶¶ 281-282.

6. Claim 7

The process according to claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

Schwarz '616 explicitly discloses using polypropylene. Ex. 1005, column 2, lines 63-65. Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052. Polypropylene is a polyolefin. Ex. 1015, ¶¶ 284-285.

7. Claim 8

The process according to claim 7 wherein the synthetic polymer comprises a polyolefin

Schwarz '616 explicitly discloses using polypropylene. Ex. 1005, column 2, lines 63-65. Polypropylene is a polyolefin. Further, Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052.

8. Claim 9

The process according to claim 8 wherein the polyolefin comprises polypropylene

Schwarz '616 explicitly discloses using polypropylene. Ex. 1005, column 2, lines 63-65. Polypropylene is a polyolefin. Further, Keck also discloses that the continuous filaments may comprise a polyolefin, such as polypropylene, Ex. 1004, ¶ 0052.

9. Claims 10, 13-18

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claims 10, 13-18.

10. Claim 19

The process according to claim 1 wherein a fluid released by the fluid-releasing holes comprises air

Schwarz '616 discloses that the gas released through the holes (fluid releasing holes) in the cover plate is air. Ex. 1005, column 2, lines 21-23. See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claim 19. The combination of Schwarz '616 and Keck teaches every element of Claim 19.

11. Claim 20

The process according to claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 um to about 200 um

The '276 Patent discloses that the spinnerette used in the examples of preparing the claimed fibrous structure was obtained from Biax. Ex. 1001, column 16, lines 3-5. Notably, Schwarz '616 was assigned to Biax between July 23, 2001 and January 28, 2010. Ex. 1020, page 1.

Thus, it appears that the examples in the '276 Patent were prepared with the same or similar meltblown die described in Schwarz '616. Ex. 1015, ¶ 308. Given the similarities between the Biax meltblown die described in the '276 Patent and that of Schwarz '616, it is reasonable to expect that a coform nonwoven prepared based on the combination of Schwarz '616 and Keck would have the same pore

volume distribution properties as recited in Claim 20. *Id.* That is, it would be expected that a process of preparing a coform nonwoven using the meltblown die of Schwarz '616 as modified with the solid additive process of Keck would produce a coform nonwoven having a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 um to about 200 um. *Id.*

Moreover, it is well known that pore size, and hence pore size distribution, in meltblown webs varies depending on process conditions, such as processing temperatures, increasing air flow rate at the die, and decreasing the distance between the filament nozzles and the collection surface, and the speed of the collection surface. *See, Bresee et al., Influence of Processing Conditions on Melt Blown Web Structure: Part 1 – DCD*, INJ Spring 2004, 49-55 (Ex. 1025); Bresee et al., *Influence of Processing Conditions on Melt Blown Web Structure: Part 2 – Primary Airflow Rate*, INJ Summer 2005, 11-18 (Ex. 1026); and Lee et al. *Effects of Melt-Blowing Process Conditions on Morphological and Mechanical Properties of Polypropylene Webs*, POLYMER 1992, Vol. 3, No. 6, 1200-1209 (Ex. 1027). For example, changing one or more of the process parameters by increasing the air flow rate, decreasing the distance between the collection surface and filament nozzles, or increasing the speed of the collection surface is well known to decrease pore size in the meltblown web. Ex. 1015, ¶ 309. Similarly,

decreasing air flow rate, increasing the distance between the collection surface and filament nozzles, or decreasing the speed of the collection surface is well known to increase pore size in the meltblown web. *Id.* As such, it is reasonable to expect that obtaining a coform nonwoven having the recited pore distribution is well within the routine skill of a POSA, and that doing such is merely an optimization of known parameters that affect pore size distribution. *Id.*

12. Claims 21-23

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claims 21-24.

D. Ground 4: Claims 1-3, 5-9, 13-14, and 19-24 are obvious under 35 U.S.C. §103 based on the teachings of Schwarz '223 (Ex. 1002) and McDowall (Ex. 1003)

1. Independent Claims 1 and 24

As discussed above, Schwarz '223 explicitly discloses all but one element of independent claims 1 and 24 of the '276 Patent. The remaining element – combining the filaments with solid additives (wood pulp) to form a mixture – would have been obvious to a POSA based on Schwarz's disclosures in light of the teachings of McDowall. An element-by-element analysis follows:

Preamble: A process for making a fibrous structure, the process comprising the steps of:

Schwarz '223 teaches a process for making a fibrous structure. Ex. 1002, abstract, Claim 1.

Element a (Claims 1 and 25): providing a die comprising three or more rows of three or more filament-forming holes

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Schwarz '223 with regard to Claim 1.

Element d (Claim 1): combining the filaments with solid additives to form a mixture

Element d (Claim 24): combining the filaments with wood pulp fibers to form a mixture

This is the only element of independent claims 1 and 24 that is not explicitly disclosed in Schwarz '223. But adding solid additives, or specifically wood pulp fibers, to polymer filaments to form a mixture has been long known in the art (referred to as coform), and is explicitly disclosed in McDowall (and many other prior art references known at the time). Ex. 1003, Claim 1; page 4.

a. Motivation to Combine

Prior to the patent owner's earliest possible priority date (July 17, 2007), a POSA would have been motivated to modify Schwarz '223 in view of McDowall in order to provide a coform nonwoven having lower manufacturing costs and exhibiting improved strength. Schwarz '223 and McDowall are both analogous to the invention claimed in the '276 Patent because they concern the same field of endeavor. Ex. 1015, ¶¶ 79, 107.

More specifically, a POSA would have known that the multirow meltblown die taught in Schwarz '223 provides significant improvements with respect to

throughput, and hence, productivity. As a consequence, the costs associated with manufacturing the coform nonwoven per unit would be decreased, which would improve the manufacturer competitiveness in the market and potentially provide a greater return on investment. In addition, a POSA would be motivated to modify Schwarz '223 in view of McDowall in order to improve the strength of the coform nonwoven. Schwarz '223 explicitly states that the fibers prepared therein have improved tenacity. As such, a POSA would have been motivated to modify Schwarz '223 in view of McDowall to provide a coform nonwoven having improved strength.

Further, McDowall teaches that both meltblown continuous filaments and spunbond continuous filaments may be used interchangeably to prepare McDowall's absorbent nonwoven. Ex. 1015, ¶ 84. In addition, it is clear that McDowall is not limited to only using spunbond or meltblown filaments, but rather embraces other methods of preparing filaments by extrusion from a spinnerette. *Id.*

b. Reasonable Expectation of Success

A POSA would have had a reasonable expectation of success in modifying Schwarz '223 in use in a coform process as described in McDowall. The relatively simple substitution of a multirow meltblown die of Schwarz '223 in lieu of a knife-edge meltblown die in the coform process is well within the routine

skill of the POSA and such a substitution would not result in either the coform process of McDowall or the meltblown process of Schwarz '223 being inoperable.

2. Claim 2

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Schwarz '223 with regard to Claims 2-3, 5.

3. Claim 6

The process according to claim 1 wherein the first polymer comprises a synthetic polymer

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, line 65. Polypropylene is a synthetic polymer. Ex. 1015, ¶ 349. Further, McDowall explicitly discloses synthetic polymers including polyolefins and polyesters and other high tensile materials. Ex. 1003, page 8.

4. Claim 7

The process according to claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, line 65. Polypropylene is a polyolefin. Ex. 1015, ¶ 351.

McDowall also explicitly discloses synthetic polymers including polypropylene, polyesters, and other high tensile materials. Ex. 1003, page 8.

5. Claim 8

The process according to claim 7 wherein the synthetic polymer comprises a polyolefin

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, lines 65. Polypropylene is a polyolefin. Ex. 1015, ¶ 354.

McDowall also explicitly discloses synthetic polymers including polypropylene (Ex. 1003, page 8), which is a polyolefin by definition because Claim 9 of the '276 Patent claims a synthetic polymer that is a polyolefin comprised of polypropylene. Ex. 1001, Claim 9.

6. Claim 9

The process according to claim 8 wherein the polyolefin comprises polypropylene

Schwarz '223 explicitly discloses using polypropylene. Ex. 1002, column 2, lines 65. Polypropylene is a polyolefin. Ex. 1015, ¶ 357. McDowall also explicitly discloses synthetic polymers including polypropylene. Ex. 1003, page 8.

7. Claim 13

The process according to claim 1 wherein the solid additives comprise fibers

McDowall discloses that pulp fibers (solid additives) refers to fibers from natural sources such as woody and non-woody plants. *Id.*, at 4.

8. Claim 14

The process according to claim 14 wherein the fibers comprise wood pulp fibers

McDowall discloses that pulp fibers (solid additives) refers to fibers from natural sources such as woody and non-woody plants. *Id.*, at 4.

9. Claim 19

The process according to claim 3 wherein a fluid released by the fluid-releasing holes comprises air

Schwarz '223 discloses that the gas released through the holes (fluid releasing holes) in the cover plate is air. Ex. 1002, column 2, lines 29-51.

McDowall also discloses extruding filaments from die capillaries (fluid-releasing holes) with “converging high velocity heated gas (e.g., air)” streams. Ex. 1003, page 4.

10. Claim 20

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Schwarz '223 with regard to Claim 20.

11. Claims 21-23

See discussion above in Ground 1 (incorporated herein by this reference) for the teachings of McDowall with regard to Claims 21-23.

E. Ground 5: Claims 11-12 are obvious based on the teachings of Schwarz '223 in view Keck (or McDowall (Ex. 1003)), and in further view of Bond (“Bond”)

As discussed previously, Schwarz '223 discloses each element of Claim 1 except the step of combining the filaments with solid additives to form a mixture, which is disclosed by both Keck and McDowall.

Dependent Claim 11 of the '276 Patent, further claims where the polymer disclosed in Claim 1 is a natural polymer, and Claim 12 claims a specific type of natural polymer. U.S. Patent No. 6,783,854 to Bond explicitly discloses such natural polymers, and it would have been obvious to a POSA to combine the teachings of Schwarz '223 with Keck (or McDowall) and Bond.

Bond is directed to continuous bicomponent fibers that may be used in the preparation of meltblown and spunbond nonwoven fabrics. Bond teaches that the bicomponent filaments may be made with melt spinning processes, and may be used to produce continuous filaments through spunbond methods or meltblowing processes. Ex. 1006, column 12, line 61-column 13, line 4. Bond further teaches that the nonwovens prepared from the bicomponent fibers may be used in hygiene applications, which includes wipes and diapers. *Id.*, column 14, lines 30-45.

Prior to the patent owner's earliest possible priority date (July 17, 2007), a POSA would have been motivated to modify the process of Schwarz '223 as modified by Keck or McDowall to include a thermoplastic starch (natural polymer) as taught by Bond in order to provide a coform nonwoven that is environmentally degradable and thus flushable. Ex. 1015, ¶ 126. Schwarz '223, Keck, McDowall, and Bond are all analogous to the invention claimed in the '276 Patent because they concern the same field of endeavor. Ex. 1015, ¶¶ 79, 90, 107,

120. Combining Schwarz '223 with Keck or McDowall along with Bond would not make any of them inoperable. *Id.*

1. Claim 11

The process according to claim 1 wherein the first polymer comprises a natural polymer

Bond describes bicomponent fibers having a sheath/core configuration in which a non-starch thermoplastic polymer (defining the sheath) surrounds a thermoplastic starch (defining the core). Ex. 1006, abstract. Bond states that the thermoplastic starch is a naturally occurring biopolymer. *Id.*, column 4, lines 58-60.

2. Claim 12

The process according to claim 11 wherein the natural polymer is selected from the group consisting of: starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives, and mixtures thereof

Bond expressly identifies suitable starches, including corn starch, potato starch and many others. Ex. 1006, column 5, line 51-57.

F. Ground 6: Claims 1-4, 6-10, and 13-24 are obvious on the teachings of Fabbriante and Keck

1. Independent claims 1 and 24

Keck is directed to a coform nonwoven and processes of preparing the same. Ex. 1004, abstract, Claims 1, 34. Keck describes a process of preparing a coform nonwoven (a “fibrous structure”) prepared from meltblown filaments and

a secondary additive. *Id.*, abstract. Keck describes that the coform nonwoven may be used to form “a presaturated or absorbent cleaning sheet used as a wiper,...” *Id.*, ¶ 0135. Keck states that “[c]oform nonwoven webs have been used in applications such as disposable absorbent articles, absorbent dry wipes, wet wipes, wet mops and absorbent dry mops.” *Id.*, ¶ 0006.

Keck explicitly discloses all but one element of independent Claims 1 and 24 of the '276 Patent. The remaining element – providing a die comprising three or more rows of three or more filament-forming holes – was well known in the art and would have been obvious to a POSA based on Keck’s disclosures in light of the teachings of Fabbriante. An element-by-element analysis follows:

Preamble: A process for making a fibrous structure, the process comprising the steps of:

Keck teaches a process for making a fibrous structure. Ex. 1004, abstract, Claim 34.

Element 1a: providing a die comprising three or more rows of three or more filament-forming holes

As shown in figure 3, Keck discloses a pair of extruders 14, 14' that feed molten polymer into a pair of corresponding meltblowing dies 16, 18, respectively, that contain “small holes or orifices 24 and 24'” (filament forming holes). Ex. 1004, ¶¶ 0084, 0085. Each meltblowing die produces a stream of gas (from one or more fluid releasing holes) that contacts and attenuates the filaments

as they exit small holes or orifices of the meltblowing die to form a filament containing stream. *Id.*, ¶ 0085.

Keck does not explicitly disclose a die comprising three or more rows of three or more filament-forming holes, but Fabbriante teaches providing a meltblown die having at least three rows of filament nozzles (filament-forming holes) in which the rows include three or more filament nozzles. Ex. 1018, column 5, lines 58-62; figure 2; figure 3a.

Moreover, Keck further states that “[t]he term “meltblown” is also intended to cover other processes in which a high velocity gas (generally air) is used to aid in the formation of the filaments, such as melt spraying or centrifugal spinning.” *Id.* ¶ 0034. Such “other processes” would include the meltblown process described in Fabbriante, which uses a multirow meltblown die.

In addition, Fabbriante discloses a multirow meltblown die having a primary plate that includes a polymer orifice (filament-forming hole) in which the polymer orifice is flanked on opposing sides by a pair of air nozzles (fluid-releasing holes). Ex. 1018, column 5, lines 24-48. Accordingly, Fabbriante discloses a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole.

Element 1b (Claim 1): supplying at least a first polymer to the die

Element 1b (Claim 24): supplying a polyolefin polymer to the die

Keck discloses that thermoplastic meltblown filaments comprise a polymer selected from the group consisting of polyolefins, polyesters, and the like. *Id.*, ¶ 0052, Claim 8. More specifically, Keck teaches that meltblown filaments may comprise polyolefins, such as polypropylene. *Id.*, ¶ 0052. In addition to polyolefins, Keck teaches that the meltblown filaments may comprise biodegradable filaments, such as polylactic acids. *Id.* Fabbicante also teaches preparing continuous meltblown filaments comprising a polypropylene, which is a polyolefin. Ex. 1018, column 8, lines 61-63.

Element 1c (Claim 1): producing a plurality of filaments comprising the first polymer from the die

Element 1c (Claim 24): producing a plurality of filaments comprising the polyolefin polymer from the die

Keck discloses that thermoplastic continuous meltblown filaments comprise a polymer. *Id.*, ¶ 0052, Claim 8. Fabbicante also teaches producing a plurality of filaments comprising a polymer, and in particular, polypropylene, which is a polyolefin. Ex. 1018, column 8, lines 38-41.

Element 1d (Claim 1): combining the filaments with solid additives to form a mixture

Element 1d (Claim 24): combining the filaments with wood pulp fibers to form a mixture

Keck discloses that a secondary gas stream containing secondary fibers (solid additives), such as pulp fibers, is directed between the two filament streams at the impingement zone 30. Ex. 1004, ¶ 0093. The resulting composite stream 56

comprising the merged filament streams and gas stream containing secondary fibers is deposited on a collecting device, such as an endless forming surface 58. *Id.*, ¶ 0097.

Keck discloses that the secondary material (solid additives) includes fibrous organic materials (fibers) and superabsorbent particles and fibers. Ex. 1004, ¶ 0003. Keck teaches that the secondary material (secondary fibers) of the coform nonwoven may be an absorbent material, such as absorbent fibers. *Id.*, ¶ 0056. Examples of such secondary fibers include cellulosic derived fibers, such as wood pulp fibers. *Id.*

Fabbricante teaches use of the meltblown web in combination with cellulose fibers and that the meltblown layer may be a single layer or may be combined with other layers to form a multi-layer laminate wherein the layers are composed of any combination of various nonwovens, including cellulose fibers. Ex. 1018, column 7, lines 60-66.

As Fabbricante teaches the meltblown web may be used in wiper applications, it would be desirable to use cellulose fibers in combination with Fabbricante's meltblown web in order for the resulting article to function effectively as a wiper.

Element 1e: collecting the mixture on a belt to produce a fibrous structure.

Keck discloses that the resulting composite stream 56 comprising the merged filament streams and gas stream containing secondary fibers is deposited on a collecting device, such as an endless forming surface 58. Ex. 1004, ¶ 0097. In particular, Keck teaches that the forming surface may be any type of plate, drum, belt or wire. *Id.*, ¶ 0063. Therefore, the combination of Keck and Fabbriante teaches this element of Claims 1 and 24.

a. Motivation to Combine

Prior to the earliest possible priority date (July 17, 2007), a POSA would have been motivated to modify Keck in view of Fabbriante in order to provide a coform nonwoven exhibiting significantly improved strength. A POSA would have known that the modular multirow meltblown die taught in Fabbriante provides significant improvements with respect to strength in comparison to typical meltblown webs (prepared with a single row knife edge meltblown die) because Fabbriante states as much. Ex. 1018, column 2, lines 41-48.

A POSA would have been motivated to modify Keck in view of Fabbriante to provide a process of preparing a fibrous structure (e.g., coform) that exhibits significant improvements in strength. Fabbriante teaches that the modular meltblown die described therein produces a meltblown web having “higher unbonded strength than a typical meltblown web.” Ex. 1018, column 4, lines 7-8. In view of the known desire to improve the strength of meltblown webs,

a POSA would have been motivated to use the multirow meltblown die of Fabbicante in the coform process of Keck in order to provide a higher strength coform nonwoven.

A POSA would be motivated to combine Keck with Fabbicante to provide higher polymer throughputs without the significant capital expense typically associated with machining a traditional meltblown die.

Finally, Fabbicante contemplates that the meltblown web may be used in combination with cellulose fibers, and also contemplates use of the meltblown web in a wiper application. In view of this suggestion, a POSA would be motivated to use Fabbicante's multirow meltblown die in a process to prepare a coform nonwoven, such as the coform process disclosed in Keck.

b. Reasonable Expectation of Success

A POSA would have had a reasonable expectation of success in modifying the coform process in Keck with the multirow meltblown die of Fabbicante. The relatively simple substitution of a multirow meltblown die of Fabbicante in lieu of a knife-edge meltblown die in the coform process is well within the routine skill of the POSA and such a substitution would not result in either the coform process of Keck or the meltblown process of Fabbicante being inoperable.

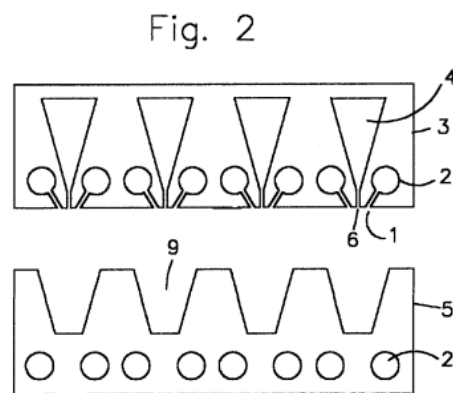
In addition, Fabbriante contemplates the use of cellulose fibers in combination with a meltblown web prepared with Fabbriante's multirow meltblown die.

Accordingly, modifying Keck to include the multirow meltblown die of Fabbriante is well within the routine skill of a POSA, and therefore, a POSA would have a reasonable expectation of success in making the modification.

2. Claim 2

The process according to claim 1, wherein at least one row of the three or more rows comprises ten or more filament-forming holes

Fabbriante discloses in figure 2 a primary plate 3 and secondary plate 5 when assembled provides a modular multirow meltblown die having at least four rows of polymer orifices 6. Ex. 1018, figure 2, column 5, lines 49-51.



Id., figure 2. Although Fabbriante does not explicitly disclose that at least one of the rows would include ten or more die holes (filament-forming holes), the

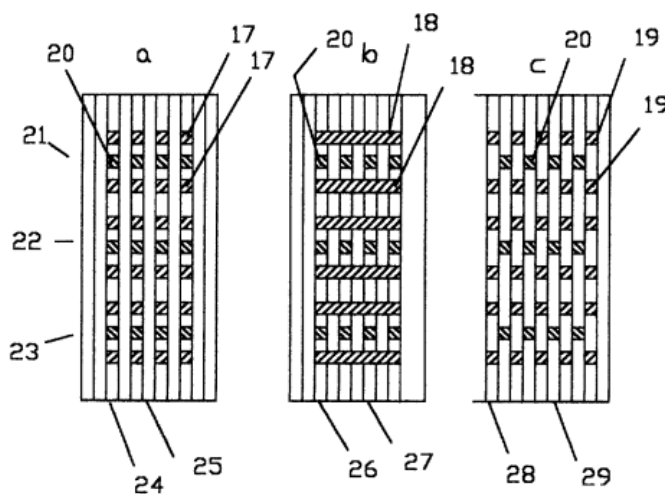
presence of ten or more die holes per row would be obvious. In 2007, the typical single row meltblown die include 30 HPI, which is equivalent to approximately 1,181 filament nozzles for a die with a width of one meter. Ex. 1023, page 46. Thus, in order to provide a commercially viable meltblown die, it is a necessity that Fabbriante's meltblown die include significantly more die holes per row than 10.

3. Claim 3

The process according to claim 1 wherein one or more fluid-releasing holes associated with a filament-forming hole

Fabbriante discloses in figure 3, below, a plan view that depicts three different assembled die bodies comprising a plurality of primary plates and secondary plates in an assembled state.

Fig. 3



Ex. 1018., figure 3. In the assembled die body a, the assembled die includes 3 rows of polymer orifices 20 in which each row includes at least 4 polymer orifices, and in which each individual polymer orifice is flanked on opposing sides by a pair of air nozzles 17. *Id.*, figure 3, column 5, lines 53-65. Thus, figure 3a shows a meltblown die in which a one or more fluid-releasing holes are associated with a filament-forming hole.

4. Claim 4

The process according to claim 3 wherein more than one fluid-releasing holes is associated with a filament-forming hole

Fabbricante discloses in figure 3, the assembled die includes 3 rows of polymer orifices 20 in which each row includes at least 4 polymer orifices, and in which each individual polymer orifice is flanked on opposing sides by a pair of air nozzles 17. *Id.*, figure 3, column 5, lines 53-65. The pair of air nozzles are associated with the individual polymer orifice that is disposed between the pair of air nozzles.

5. Claim 6

The process according to claim 1 wherein the first polymer comprises a synthetic polymer

Keck discloses that thermoplastic meltblown filaments comprise a polymer selected from the group consisting of polyolefins, polyesters, polyamides, polycarbonates, polyurethanes, polyvinylchloride, polytetrafluoroethylene,

polystyrene, polyethylene terephthalate, polylactic acid and copolymers and blends thereof. *Id.*, ¶ 0052, Claim 8. More specifically, Keck teaches that the meltblown filaments may comprise polyolefins, such as polypropylene. *Id.*, ¶ 0052.

Fabbricante also teaches producing a plurality of filaments comprising a polymer, and in particular, polypropylene, which is a polyolefin. Ex. 1018, column 8, lines 38-41.

Polypropylene is considered a synthetic polymer.

6. Claim 7

The process according to claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

Keck discloses that thermoplastic meltblown filaments comprise a polymer selected from the group consisting of polyolefins, polyesters, polyamides, polycarbonates, polyurethanes, polyvinylchloride, polytetrafluoroethylene, polystyrene, polyethylene terephthalate, polylactic acid and copolymers and blends thereof. Ex. 1004, ¶ 0052, Claim 8.

Fabbricante also teaches producing a plurality of filaments comprising a polymer, and in particular, polypropylene, which is a polyolefin. Ex. 1018, column 8, lines 38-41.

7. Claim 8

The process according to claim 7 wherein the synthetic polymer comprises a polyolefin

Keck discloses that thermoplastic meltblown filaments comprise a polymer selected from the group consisting of polyolefins, polyesters, polyamides, polycarbonates, polyurethanes, polyvinylchloride, polytetrafluoroethylene, polystyrene, polyethylene terephthalate, polylactic acid and copolymers and blends thereof. Ex. 1004, ¶ 0052, Claim 8.

Fabbricante also teaches producing a plurality of filaments comprising a polymer, and in particular, polypropylene, which is a polyolefin. Ex. 1018, column 8, lines 38-41.

8. Claim 9

The process according to claim 8 wherein the polyolefin comprises polypropylene

More specifically, Keck teaches the meltblown filaments may comprise polyolefins, such as polypropylene. Ex. 1004, ¶ 0052.

Fabbricante also teaches producing a plurality of filaments comprising a polymer, and in particular, polypropylene, which is a polyolefin. Ex. 1018, column 8, lines 38-41.

9. Claim 10

The process according to claim 7 wherein the synthetic polymer is selected from the group consisting of: polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof

Keck discloses that thermoplastic meltblown filaments comprise a polymer selected from the group consisting of polyolefins, polyesters, polyamides, polycarbonates, polyurethanes, polyvinylchloride, polytetrafluoroethylene, polystyrene, polyethylene terephthalate, polylactic acid and copolymers and blends thereof. Ex. 1004, Claim 8 (emphasis added).

10. Claim 13

The process according to claim 1 wherein the solid additives comprise fibers

Keck discloses that the secondary material (solid additives) includes fibrous organic materials (fibers) and superabsorbent particles and fibers. Ex. 1004, ¶ 0003.

11. Claim 14

The process according to claim 13 wherein the fibers comprise wood pulp fibers

Keck discloses that the secondary material (solid additives) includes fibrous organic materials such as woody and non-wood pulp. Ex. 1004, ¶ 0003.

12. Claims 15-18

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claims 15-18.

13. Claim 19

The process according to claim 3 wherein the fluid released by the fluid-releasing holes comprises air

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claim 19. In addition to the teachings of Keck, Fabbicante teaches that the meltblown die uses high velocity air to attenuate the filaments. Ex. 1018, column 5, lines 24-48.

14. Claim 20

The process according to claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 μ m to about 200 μ m

Preparing a meltblown web having a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 μ m to about 200 μ m as recited in Claim 20 is within the routine skill of a POSA. See discussion of Claim 20 in Ground 2 (incorporated herein by this reference).

15. Claim 21

The process according to claim 1 wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claim 21. In addition to the teachings of Keck, Fabbicante also teaches that the meltblown web may be thermally bonding using a heated calender. Ex. 1018, column 7, lines 42-44.

16. Claims 22-23

See discussion above in Ground 2 (incorporated herein by this reference) for the teachings of Keck with regard to Claims 22-23.

G. Ground 7: Claim 20 is obvious based on the teachings of McDowall in view of United States Patent Application Publication No. 2007/0202766 to Ouellette et al. (“Ouellette”) (Ex. 1028)

1. Claim 20

The process according to claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 um to about 200 um

It is well known that pore size, and hence pore size distribution, in meltblown webs varies depending on process conditions, such as processing temperatures, increasing air flow rate at the die, and decreasing the distance between the filament nozzles and the collection surface, and the speed of the collection surface. Ex. 1015, ¶ 461. Accordingly, providing a coform nonwoven having the recited pore size distribution is well within the routine skill of a POSA. *Id.*

Ouellette explicitly discloses a nonwoven material for use as a wipe having a pore size distribution that overlaps with that recited in Claim 20 of the '276 Patent. Ex. 1029, abstract. More specifically, Ouellette teaches a nonwoven material having an optimized pore volume distribution in which at least 50 percent of its cumulative volume within pores as a radius size of about 110 to 250

microns. *Id.* Ouellette further teaches that the nonwoven material may be a spunbond, meltblown or coform, and may include polypropylene and wood pulp fibers. *Id.*, ¶¶ 0019, 0058.

Ouellette explains that the “optimized pore volume distribution of the substrate enables it to controllably release a fluid composition effectively onto a surface.” *Id.*, abstract. Accordingly, the combination of McDowall in further view of Ouellette teaches each and every element of Claim 20.

In addition, the combinations of 1) Schwarz '616 with either Keck or McDowall and in further view of Ouellette, 2) Schwarz '223 with either Keck or McDowall and in further view of Ouellette and 3) Keck and Fabbriante in further view of Ouellette teaches each and every element of Claim 20. As such, Claim 20 is also obvious in view of these additional grounds of invalidity.

A POSA would be motivated to modify any one of McDowall, Schwarz '223, Schwarz '616, or Fabbriante in view of Keck or McDowall and in further view of Ouellette to have the recited pore volume distribution in order to provide a wipe that controllably releases a fluid composition onto a surface. Ex. 1015, ¶ 466. That is, a POSA would be motivated to modify the combination of references in order to provide a more effective wipe. *Id.*

X. Secondary Considerations of Non-Obviousness

The '276 Patent does not claim any unexpected results or other secondary considerations, because the results of combining a known process of preparing meltblown filaments using a multirow die with the well-known coform process of adding wood pulp fibers to continuous meltblown or spunbond filaments was well known prior to the earliest priority date of the '276 Patent.

XI. Conclusion

An IPR should be instituted with respect to claims 1-24 of the '276 Patent and all 24 claims should be found invalid.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

In accordance with 37 C.F.R. § 42.24, excluding table of contents, table of authorities, mandatory notices under §42.8, certificate of service, word count, appendix of exhibits, and listing of claims, the undersigned certifies that the number of words contained in this Petition is 13,998.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of this Petitioner's Petition for *Inter Partes* Review has been served on September 22, 2023 in its entirety by UPS on the Patent Owner and following counsel of record for Patent Owner:

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