UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte W. ROBERT ABELL III,
E. DAVID SANTOLERI, and
JEFFREY S. ARMOUR

Appeal No. 2006-2539
Application No. 10/421,661

ON BRIEF

Before SCHEINER, MILLS, and GRIMES, Administrative Patent Judges.

GRIMES, Administrative Patent Judge.

DECISION ON APPEAL

This appeal involves claims to a method of making a layered polymer product. The examiner has rejected the claims as anticipated by or obvious in view of the prior art. We have jurisdiction under 35 U.S.C. § 134. We reverse all of the rejections.

Background

"A layer of synthetic rubber or some other elastomeric material . . . is sometimes bonded to one or more exterior surfaces of articles formed of rigid thermoplastic polymers. . . . The surface layer of rubber provides a soft, durable texture to the article and the rigid thermoplastic polymer provides structural strength to the article." Specification,

page 1. The rubber can be bonded to the rigid polymer by "mechanical bonding, by means of an applied fluid adhesive, [or] by melt-bonding/chemical-bonding." Id.

"Rigid polyvinylchloride ('rigid PVC') is, by far, the most widely used rigid thermoplastic polymer to which rubber surface layers are bonded. Some rubber compositions have melting points and chemical structures that are similar to rigid PVC. Thus, melt-bonds formed when both components are brought together under pressure at or very near their respective melt temperatures tend to be excellent." Id., pages 2-3. However, "in the production of some articles, the rigid PVC component must first be fully cooled to lock in its desired dimensions before the surface layer of rubber is applied. Under these circumstances, it is not possible to form a satisfactory melt-bond." Id., page 3.

The specification discloses a method for making "a multilayer polymer structure comprising a structural layer (A) of a rigid polymer composition, an intermediate layer (B) of a polymer composition comprising a thermoplastic polyurethane and a topcoat layer (C) of a polymer composition comprising a thermoplastic elastomer." Id. The method is said to be "particularly suitable for forming extruded articles such as composite rigid PVC outdoor deck planking, which must retain its dimensional stability during the application of the thermoplastic elastomer surface layer (C)." Id., page 4.

Discussion

1. Claims

Claims 1-8 are on appeal. Claim 17 has been indicated to be allowable.

Claim 1 is representative and reads as follows:

> 1. A method of forming a multilayer polymer structure comprising:
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> applying an intermediate layer (B) of a polymer composition comprising a thermoplastic polyurethane in a molten or plastic state to a dimensionally stable structural layer (A) formed of a rigid polymer composition comprising one or more polymers selected from the group consisting of vinyl halide polymers, polycarbonates, acrylonitrile-butadiene-styrene polymers, acrylic-styrene-acrylonitrile polymers, polyesters and blends of the foregoing; and
>
> applying a topcoat layer (C) of a polymer composition comprising a thermoplastic elastomer to layer (B) while layer (B) is still in the molten or plastic state.

Claim 1 is directed to a method of making a multilayer polymer structure. The first step comprises applying a "thermoplastic polyurethane in a molten or plastic state" to a structural layer formed of a "rigid polymer composition."

The specification states that "[t]hroughout the instant specification and in the appended claims, the term 'rigid polymer' refers to any polymer that exhibits a Shore 'D' hardness of 40 or higher according to ASTM Standard D2240 and/or exhibits a flex modulus above 15,000 psi according to ASTM Standard D790." Page 5. We interpret claim 1 to require applying a molten or plastic polyurethane composition to a structural layer comprising a "rigid polymer" as that term is defined in the specification.

In the second step of the claimed method, a composition comprising a thermoplastic elastomer is applied to the polyurethane layer while the polyurethane is still in a molten or plastic state.

2. Rejections based on LaVon

The examiner rejected claims 1 and 7 under 35 U.S.C. § 102(b) as anticipated by LaVon.[1] Examiner's Answer, page 3. The examiner reasoned that

> LaVon et al[.] disclose a method of forming a multilayer polymer structure comprising applying an elastomer polymer layer to a non-woven web comprising polyester fibers (claimed dimensionally stable layer A . . .), applying an adhesive polyurethane hot melt adhesive (claimed intermediate layer B) . . . to the surface of the fibrous substrate (See column 7, lines 58-67), and extruding the polymer in a molten state on the adhesive layer (claimed topcoat layer C).

Id.

The examiner reasoned that the fibrous substrates disclosed by LaVon are "rigid polymer structures" as defined by the instant specification because

> Lavon discloses that . . . the fibrous substrates 14 and/or 16 should preferably have a tensile strength of at least 1.5 N/cm (1.5 X 1.45 = 2.2 psi) and an elongation of at least 50% in both the machine and cross direction. . . . As well known in the art flex modulus also represents stress-strain of a material under dynamic load, flex modulus of a polymer is in fact or varies in direct proportion to tensile strength.
>
> It is the Examiner's position that fibrous substrates 14 and/or 16 having tensile strength of at least 1.5 N/cm in LaVon cover claimed rigid polymers (having flex modulus of more than 15,000 psi and Shore hardness of 40 or higher) since there is no upper limit in tensile strength . . . indicated in LaVon.

Id., pages 3-4.

Appellants argue that LaVon does not anticipate because, among other things, the fibrous substrates of the diapers taught by LaVon do not comprise a "rigid polymer," as defined in the instant specification. Appeal Brief, page 6.

[1] LaVon et al., U.S. Patent 5,938,648, issued August 17, 1999

We agree with Appellants that the examiner has not shown that the process taught by LaVon meets all the limitations of the instant claims. See Scripps Clinic & Research Found. v. Genentech, Inc., 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991) ("[A]nticipation requires that all of the elements and limitations of the claim are found within a single prior art reference.").

Here, the claims are directed to a process comprising applying "a thermoplastic polyurethane in a molten or plastic state to a dimensionally stable structural layer (A) formed of a rigid polymer composition." As discussed above, the specification expressly defines a "rigid polymer" as a "polymer that exhibits a Shore 'D' hardness of 40 or higher . . . and/or exhibits a flex modulus above 15,000 psi."

The examiner has argued that LaVon's process meets that limitation because LaVon states that the fibrous substrates of the disclosed diapers should have a tensile strength of at least 1.5 N/cm. The examiner also asserted that 1.5 N/cm is equal to 2.2 psi and that tensile strength is directly proportional to flex modulus. The examiner provided no basis for converting units of N/cm to psi, or for the proportionality of tensile strength and flex modulus, but we will accept the accuracy of both statements for present purposes.

Even assuming, however, that LaVon teaches that the fibrous substrate in diapers should have a tensile strength of at least 2.2 psi and that tensile strength is proportional to flex modulus, we do not agree that these teachings effectively disclose a rigid polymer having a flex modulus of at least 15,000 psi. A disclosure of a range is not a disclosure of every point within the range. See Atofina v. Great Lakes Chem. Corp., 441 F.3d 991, 1000, 78 USPQ2d 1417, 1424 (Fed. Cir. 2006) ("[T]he disclosure of a

range of 150 to 350 °C . . . is only that of a range, not a specific temperature in that range, and the disclosure of a range is no more a disclosure of the end points of the range than it is of each of the intermediate points.").

Thus, LaVon's disclosure of a material having a tensile strength of at least 2.2 psi (i.e., a range of tensile strengths ranging from 2.2 psi to infinity) is not a disclosure of materials having specific tensile strengths above 2.2 psi. More specifically, LaVon does not disclose a material having a tensile strength (or flex modulus) of 15,000 psi.

Even assuming that tensile strength and flex modulus are directly proportional, it is reasonable to expect that a material having a tensile strength of 2.2 psi will have very different properties from those of a material having a flex modulus of 15,000 psi. The examiner has provided no evidence or reasoned explanation of why those skilled in the art would consider the disclosure of a material having a tensile strength of 2.2 psi to effectively disclose a material having a flex modulus of 15,000 psi.

The examiner has pointed to Wnuk[2] as evidence that persons skilled in the art would have considered materials with a flex modulus of 15,000 psi to be suitable for use in LaVon's diapers. See the Examiner's Answer, pages 10-11.

We do not agree that Wnuk supports the examiner's position. Wnuk discloses that "films formed from the compositions of the present invention may be particularly well-suited for use as a biodegradable, liquid impervious backsheet in disposable absorbent articles such as diapers." Column 34, lines 21-24 (emphasis added). In this context, Wnuk teaches that "the tear strengths should be as high as possible consistent with the realization of other properties preferred for a backsheet. . . . It has been found

[2] Wnuk et al., U.S. Patent 5,939,467, issued August 17, 1999

that materials of sufficient modulus for use as backsheets demonstrate a tensile (Young's) modulus in the machine direction of manufacture of at least about 6.895 $x10^8$ dynes/cm^2 and below about 6.895 $x10^9$ dynes/cm^2 at room temperature." Column 35, lines 6-8 and 45-49 (emphases added).

The examiner's rejection, however, relies on LaVon's fibrous substrate as the "structural layer (A)" recited in the claims. See the Examiner's Answer, page 3. The backsheet discussed by Wnuk would correspond to LaVon's film layer (12), not the fibrous substrate (14 or 16). See LaVon, column 5, lines 4-6: "The composite sheet 10 is comprised of a fibrous substrate 14 to which a moisture vapor permeable and substantially liquid impermeable film 12 is adhered." Thus, although Wnuk teaches that the backsheet of a disposable diaper should have a high tensile strength, it does not teach that a material having a high tensile strength (and, according to the examiner, a proportionally high flex modulus) is appropriate as the fibrous substrate in a disposable diaper. Wnuk does not support the examiner's position.

In summary, the examiner has not adequately shown that LaVon discloses a process that includes a step of applying molten or thermoplastic polyurethane to a rigid polymer structure, as that term is defined in the specification. We therefore reverse the rejection for anticipation.

The examiner also rejected several claims as obvious in view of LaVon, alone or in combination with other prior art references, as follows:

- claim 3, based on LaVon and Marsan[3] (Examiner's Answer, page 5);

[3] Marsan et al., U.S. Patent 4,392,862, issued July 12, 1983

• claim 3, based on LaVon, Marsan, "and incorporated by reference Hartwell"[4] (Examiner's Answer, page 6);

• claim 5, based on LaVon (Examiner's Answer, page 7); and

• claim 6, based on LaVon and Sabee[5] (Examiner's Answer, page 8).

In each case, the examiner relied on LaVon "for the same reasons as above," and cited additional evidence to show that the limitations of the dependent claims would have been obvious. As discussed above, LaVon does not teach all of the limitations of independent claim 1. The examiner has pointed to nothing in the additional references as a basis for concluding that it would have been obvious to practice the method disclosed by LaVon using a rigid polymer structure as that term is defined in the instant specification. The rejections based on § 103 therefore suffer from the same deficiency as the rejection based on § 102 and must be reversed for the same reason.

3. Rejections based on Andre and Chi

The examiner rejected claims 1, 2, 5, and 6 under 35 U.S.C. § 103 as obvious in view of Andre[6] and Chi.[7] Examiner's Answer, page 4. The examiner reasoned that Andre discloses a method of making pipes having an inner layer that can be polybutylene terephthalate and an outer layer of vulcanized elastomer, where the layers are connected by "a film 12 of polyurethane type adhesive (See column 1, lines 63-67; column 2, lines 1-5). The pipe is advantageously manufactured by coextrusion." Examiner's Answer, page 4. The examiner cited Chi as "teaching that a laminate can

[4] Hartwell, U.S. Patent 3,881,489, issued May 6, 1975
[5] Sabee, U.S. Patent 4,618,384, issued October 21, 1986
[6] Andre, U.S. Patent 5,799,704, issued Sept. 1, 1998
[7] Chi, U.S. Patent 4,251,591, issued Feb. 17, 1981

be formed by conventional techniques such as . . . by extrusion of one component into contact with a preformed sheet of the other component." Id., page 5.

The examiner concluded that "[i]t would have been obvious . . . to have modified a method of Andre by first p[re]forming a [rigid polymer structural] layer 10 and then coextruding layers 12 and 14 . . . since Chi teaches that a laminate can be formed either by co-extrusion or by extrusion of one component into contact with a preformed sheet of the other component." Id.

Appellants argue that the references do not support a prima facie case because, among other things, they do not teach all the limitations of the claimed method: "[T]hat a topcoat layer C is applied to layer B while B is still molten, is nowhere disclosed or suggested in Andre or Chi." Appeal Brief, page 11.

We agree with Appellants that, even if the methods disclosed by Andre and Chi were combined, they would not result in the process defined by instant claim 1. As the examiner noted, the two layers of the pipe disclosed by Andre are held together by a "film of a polyolefin or polyurethane type adhesive." Andre, column 2, lines 2-3. The examiner has pointed to nothing in the cited references that teaches a method of applying a molten or plastic polyurethane to a rigid polymer structure (e.g., layer 10 in Andre) and then applying an elastomer layer while the polyurethane is still in a molten or plastic state. Thus, even they were combined, the references would not teach a method meeting all the limitations of instant claim 1, and the examiner has not adequately explained why they would have suggested the limitations that are not expressly taught. We therefore reverse the § 103 rejection based on Andre and Chi.

The examiner also rejected claim 8 under 35 U.S.C. § 103 as obvious based on Andre, Chi, and Hartitz.[8] Examiner's Answer, page 9. This rejection relies on the same reasoning as the rejection of claim 1, and cites Hartitz only for the additional limitation recited in claim 8. Since Andre and Chi do not teach or suggest all of the limitations of claim 1 and the examiner has pointed to nothing in Hartitz to remedy the deficiency discussed above, this rejection must be reversed for the same reason.

Finally, the examiner rejected claim 4 under 35 U.S.C. § 103 as obvious based on "LaVon et al[.]/Andre in view of Chi, further in view of Krebs."[9] Examiner's Answer, page 7. Since neither LaVon nor the combination of Andre and Chi support a prima facie case with respect to claim 1, and the examiner has not pointed to anything in Krebs that would make up for the deficiencies discussed above, this rejection is also reversed for the same reasons that the rejections based on LaVon or on the combination of Andre and Chi are reversed.

[8] Hartitz, U.S. Patent 4,115,495, issued Sept. 19, 1978
[9] Krebs et al., U.S. Patent 6,465,104, issued October 15, 2002

Summary

The examiner has not adequately explained how the cited references would have made obvious a process meeting all the limitations of the rejected claims. We therefore reverse all of the rejections on appeal.

REVERSED

Toni R. Scheiner	)
Administrative Patent Judge	)
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Demetra J. Mills	)
Administrative Patent Judge	) APPEALS AND
	)
	) INTERFERENCES
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