

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MICHAEL J. HEALEY  
and RAYMOND JOHNSEN

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Appeal 2008-2262  
Application 10/466,673  
Technology Center 1700

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Decided: November 18, 2008

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Before CHARLES F. WARREN, PETER F. KRATZ, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON REQUEST FOR HEARING

Appellants request rehearing of our Decision of June 19, 2008. In that Decision, we sustained the Examiner's rejection of claims 1-24 under 35 U.S.C. § 102(b) as anticipated by Vane, and the Examiner's rejection of claims 1-24 under 35 U.S.C. § 103(a) over either Vane or Harpell.

In their Request, “Appellants contend that, in sustaining these rejections, the Board has made unsupported findings of fact both with respect to the scope of Appellants’ claims and the teachings of the Vane and Harpell references and therefore has committed reversible error.” (Request 2.)

*The Definition of “Fusible”*

With regard to the scope of Appellants’ claims, Appellants contend that we misapprehended the definition of “fusible” in Appellants’ Specification (Request 2). In this regard, Appellants agree that page 2, lines 15-16 of their Specification defines fusible as meaning “that the thread not only melts by itself when heated, but may also dissolve into a resin during processing at temperature” as we noted in our Decision (Decision 11). Appellants however, argue that we ignored the portion of the definition stating “into a resin during processing at temperature.” (Request 3.)

According to Appellants:

The specification definition is characterized in the subsequent sentence [of the Specification] which states “[t]herefore, by using a fusible thread, the stitched plies can be heated so as to soften or melt the fusible thread so as to improve the drape of the fabric” (emphasis added). These two sentences together define the fusible thread as a thread which melts by itself when heated or dissolves into resin “during processing at temperature.” The processing is clearly a reference to the draping process which cannot be the “resin” curing temperature because, as the Board and the Examiner admit a cured composite doesn’t “drape.”

(Request 2-3.)

We agree with Appellants that the Specification defines “fusible” as meaning “that the thread not only melts by itself when heated, but may also

dissolve into a resin during processing at temperature." (Decision 11.) However, we cannot agree that "processing at temperature" is defined in the Specification in such a way as to exclude temperatures at which the resin also cures. The Specification does not provide any sufficiently clear guidance on the meaning of "processing at temperature." The full paragraph of the Specification including the definition of "fusible" states as follows:

In use, the primary function of the stitch is to hold the fibres together during the non-crimp fabric manufacture and to aid resin infusion. Whilst the stitch initially restricts drape, the eventual fusion of the stitch overcomes that restriction. In the present application, the term fusible means that the thread not only melts by itself when heated, but may also dissolve into a resin during processing at temperature. Therefore, by using a fusible thread, the stitched plies can be heated so as to soften or melt the fusible thread so as to improve the drape of the fabric.

(Spec. 2:12-18.) Appellants have not pointed to any definition for "processing at temperature," nor do we find any definition excluding temperatures at which the resin will cure. In fact, the Specification does not define the curing temperatures at all, but instead it indicates that different process routes are encompassed, and resin can be present or not during draping. (*See, e.g., Spec 2:30-33; 3:7-11; 3:24-31; 4:1-7*)

Appellants state that "[t]he processing is clearly a reference to the draping process which cannot be the 'resin' curing temperature because, as the Board and the Examiner admit a cured composite doesn't 'drape.'" (Request 2-3.) But the fact that a cured resin cannot drape is immaterial to the question of whether "processing at temperature" must necessarily be different than the curing temperature: heating to cure takes place before curing is accomplished. In other words, to perform the process one must first heat a fabric impregnated with the uncured resin to the curing

temperature. The resin is cured only after the heating step. Heating to cure can also cause draping as the heating takes place before curing. The words "processing at temperature" as recited in the Specification does not exclude temperatures at which the resin also cures.

*Vane*

Appellants also contend we ignored the Specification's definition of "fusible" in considering the Vane reference (Request 3). We did not. What we stated was:

In fact, "fusible" is defined more broadly in the Specification to mean "that the thread not only melts by itself when heated, but may also dissolve into a resin during processing at temperature." (Specification 2:15-16). The stitching of Vane meets this definition because the stitching is thermoplastic.

Thermoplastic, by definition, melts when heated past its melting temperature. Moreover, the thread of Vane becomes "a part of the matrix" during the heating and pressurizing of the composite consolidation. The stitching is fusible as claimed.

(Decision 11.) What the claim requires is a step of "providing a non crimp fabric comprising a layup of plies stitched together using a thread at least part of which is fusible." (Claim 1.) Vane teaches such a non crimp fabric with a fusible thread. Vane's fabric contains a thermoplastic thread that "will become part of the matrix," (Vane, col. 3, ll. 41-44), i.e., melts, when the composite material is formed under heat and pressure, i.e., during processing at temperature (Decision 11).

Appellants also contend we did not adequately support our finding that Vane describes to one of ordinary skill in the art placing the non crimp fabric on a forming tool and heating to drape. (Request 3-9.) Appellants have not convinced us of a reversible error with regard to the forming tool limitation or heating step.

With regard to the step of placing the fabric on a forming tool, while Vane does not expressly disclose using a forming tool, our subsidiary finding of fact that Vane describes forming complex shapes under heat and pressure (Decision 11), a finding Appellants do not dispute, adequately supports our ultimate finding with regard to the forming tool. Forming a complex shape under heat and pressure necessarily requires a forming tool of some sort, it cannot be done in midair. Appellants' claims encompass any and all forming tools.

As we explained in our Decision, the teaching in Vane of forming a complex shape under heat and pressure requires one to place the non crimp fabric of Vane on the forming tool and heat the fabric while applying pressure so that the fabric conforms to the complex shape of the tool (Decision 11). During this process, as described by Vane, the stitching “becomes a part of the matrix,” i.e., it softens or melts and any restriction to drape is necessarily reduced (Decision 12).

Appellants contend that we selectively ignored the specific teaching in Vane that the stitching must “firmly hold” the different fabric layers together (Request 7). According to Appellants, this “clearly provides a ‘restriction to drape’ which is the direct opposite of the independent claim 1 (and all claims dependent thereon).” (Request 7; *see also* 8-9.) But this contention ignores Vane’s teaching of heating under pressure to form a complex shape during which the thermoplastic thread “will become part of the matrix.” (Vane, col. 3, ll. 41-44.) What happens in Vane’s process is no different than what happens in Appellants’ process: the threads hold the fabric together until heat is applied at which time the threads soften and melt and

thus no longer hold the fabric, i.e., movement of the fabric is no longer restricted by the threads (Spec. 2:12-14).

Appellants have not convinced us of a reversible error in our findings as they apply to the rejection over Vane.

*Harpell*

Turning to the obviousness rejection over Harpell, Appellants contend that our finding that “[o]ne of ordinary skill in the art would have recognized that forming such complex articles [such as helmets] requires draping over a forming tool and applying heat and pressure to shape the impregnated fabric” is unsupported by any evidence of record (Request 13 discussing our finding at Decision 13). Appellants offer the example of a football helmet as evidence that Harpell doesn’t teach using a forming tool (Request 13).

According to Appellants, “as will be readily apparent from looking at a helmet such as a football helmet, the lower portion of the helmet is sized to be narrower than the diameter of the helmet. While deformation of the helmet and the internal padding make it possible for a user [sic, user] to pull it on over his or her head, the sizing would make it impossible to remove such a helmet from a ‘forming tool’ if one had been used.” (Request 13).

First, Harpell is directed to forming ballistic articles such as helmets for military use, not football helmets (Harpell, col. 1, ll. 7-10). Appellants point to no evidence that football helmets are formed by the same process as fiber reinforced composite ballistic helmets and armor. Second, Harpell describes using “forming tools” even when describing forming the planar ballistic targets of the Examples (see, e.g., col. 9, ll. 7-12 describing sandwiching the prepreg sheets between two Apollo plates and applying heat

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and pressure to mold). Again, forming the prepregs (fabrics impregnated with resin matrix) under heat and pressure requires a forming tool of some kind, it does not happen in midair. Appellants' claims are not limited to any particular type of forming tool. Some type of forming tool would have to be used to mold the prepreg into the shape of a ballistic helmet using heat and pressure.

Appellants have not convinced us of any reversible error in our Decision.

#### IV. DECISION

Appellants request for rehearing is denied.

DENIED

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