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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MAX U. KISMARTON

Appeal 2010-012314
Application 11/118,594
Technology Center 3600

Before STEVEN D.A. McCARTHY, JAMES P. CALVE, and BARRY L. GROSSMAN, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134 from the rejection of claims 26, 27, 44, and 46-48. App. Br. 1.[1] Claims 1-25, 28-31, 33, 43, and 45 are cancelled and claims 34-42 are withdrawn. *Id.* We have jurisdiction under 35 U.S.C. § 6(b). We REVERSE.

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[1] Because Appellant does not appeal the rejection of pending claim 32, the Examiner should consider canceling claim 32. *See Ex parte Ghuman*, 88 USPQ2d 1478 (BPAI 2008) (per curiam) (precedential).

CLAIMED SUBJECT MATTER

Claims 26 and 46 are independent. Claim 46 is reproduced below:

> 46. A stringer for an aerospace vehicle, the stringer comprising first and second flanges and a web between the flanges, at least one of the flanges and web including first, second and third plies of reinforcing fibers, the fibers in the first ply oriented at a non-zero angle between 0 and 20 degrees with respect to an axis of loading, the fibers in the second and third plies oriented at an angle of about +65 degrees and -65 degrees with respect to the axis.

REJECTIONS

Claims 26, 27, and 48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bronowicki (US 5,342,465; iss. Aug. 30, 1994), Piening (US 6,355,337 B1; iss. Mar. 12, 2002), Kingston (US 5,733,390; iss. Mar. 31, 1998), and Matsui (US 6,511,570 B2; iss. Jan. 28, 2003).

Claims 44, 46, and 47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bronowicki, Piening, and Kingston.

ANALYSIS

Claims 26, 27, and 48 unpatentable over Bronowicki, Piening, Kingston, and Matsui

The Examiner found that Bronowicki discloses a fiber-reinforced composite stringer for an aerospace vehicle with a plurality of plies but does not teach the recited ply angles. Ans. 4-5. The Examiner found that Piening teaches fabricating an aircraft stringer from multiple plies of carbon fiber reinforced material with the fibers alternating in specified directions. Ans. 5. The Examiner found that Kingston teaches that it is known to vary the amount and orientation of carbon fibers to manipulate a composite's strength for intended loading. *Id.* The Examiner determined that it would have been

obvious to place the fibers of Bronowicki at various orientations and alter the orientations from one layer to the next as taught by Piening and Kingston to achieve the claimed angular orientations as a discovery of optimum values of a result effective variable involving only routine skill in the art. Ans. 5-6. The Examiner also found that the prior art teaches the advantages of varying the angle of fibers of multi-layered composites to put the required strength where it is needed and each layer is limited to a finite number of possible fiber orientations ranging from 0 to +/- 90 degrees. *See* Ans. 10-11, 12.[2]

Appellant argues that Piening teaches orienting fibers at angles of 0, 45, and 90 degrees. App. Br. 7. Appellant argues that Piening also suggests deviating from 45 degrees to a range of 35 to 55 degrees to support coupling between shear layers but does not teach orienting fibers at +/-65 degrees to replace three fiber plies at angles of +45, -45, and 90 degrees. Reply Br. 2; App. Br. 7 & n. 1. Appellant also asserts that the prior art teaches orienting reinforcing fibers at 0 degrees in relation to the longitudinal axis (i.e., the direction of loading). Reply Br. 2. Appellant further argues that Kingston's teaching to vary the orientation of carbon fiber to put the strength where it is needed and not add unnecessary weight in lightly stressed sections does not suggest an angle of 65 degrees for shear loads or provide a basis to deviate from 0 degrees in the load direction to arrive at the claimed angles because this alternative would be viewed as reducing beam strength, not increasing it. App. Br. 7, 9.

The Examiner has not adequately established that it was known to orient reinforcing fibers at non-zero angles in a load direction or beyond 55

[2] The Examiner relied on Matsui to disclose a fiber-reinforced skin attached to a stringer flange as recited in claim 26. Ans. 6.

degrees in a shear layer such that it would have been obvious to arrive at the claimed fiber orientations through routine experimentation. Although the prior art teaches that the angles of reinforcing fibers are varied in multi-ply configurations to put the required strength where needed, the prior art only teaches orienting the fibers at 0 degrees, +/- 45 degrees, and 90 degrees and varying the 45 degree fiber angle in shear layers by +/- 10 degrees. Piening, col. 4, ll. 12-41. Piening also discloses that fibers in structural elements are subjected to purely longitudinal loading forces. Piening, col. 3, ll. 19-23 and 44-46; col. 4, ll. 1-7. Thus, the Examiner has not adequately established that it would have been obvious to experiment with angles of shear reinforcing fibers beyond 35 to 55 degrees as result effective variables to arrive at fiber orientations of +/- 65 degrees through routine experimentation, or that it would have been obvious to experiment with orienting fibers at a non-zero angle in a load direction to arrive at an angle of between 0 and 20 degrees relative to the axis of loading through routine experimentation.

Nor has the Examiner established that a finite number of identified, predictable solutions existed at the time of the invention such that it would have been obvious to arrive at the claimed arrangement of a first ply with fibers at a non-zero angle of between 0 and 20 degrees, a second ply with fibers oriented at an angle of about +65 degrees, and a third ply with fibers oriented at an angle of about -65 degrees. A range of 0 to +/- 90 degrees does not provide a finite number of fiber orientations as the Examiner found. *See* Ans. 11 ("approximately five degrees may constitute one of a finite number of segments that is comprised of three to six degrees and so on"). This range provides at least 180 possible solutions per layer (one for each degree) or 5,832,000 possible solutions for a three layer ply (180 x 180 x

180). *See Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1366 (Fed. Cir. 2007) (prior art identified 53 pharmaceutically acceptable anions and established that a skilled artisan could narrow that list to a much smaller group with a reasonable expectation of success). To the extent that the Examiner relies on the prior art to reduce the number of possible solutions, the prior art directs a skilled artisan away from shear angles beyond 35-55 degrees and non-zero angles relative to the axis of loading as discussed *supra*.

We cannot sustain the rejection of claims 26, 27, and 48.

Claims 44, 46, and 47 unpatentable over Bronowicki, Piening, and Kingston

The Examiner rejected claim 46 based on Bronowicki, Piening, and Kingston on the same grounds as claim 26. Ans. 8-9. Appellant traverses the rejection of claim 46 for the same reasons as claim 26. App. Br. 12. These arguments are persuasive for the reasons discussed *supra* for claim 26. We cannot sustain the rejection of claim 46 or its dependent claims 44 and 47.

DECISION

We REVERSE the rejection of claims 26, 27, 44, and 46-48.

REVERSED

Klh