THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 30

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JOHN A. JOHNSON,
NOEL I. SHEPHERD,
KEITH G. SHUPE
and JAMES P. NIELSEN

Appeal No. 94-4396
Application 07/924,355[1]

HEARD: MARCH 7, 1997

Before STONER, Chief Administrative Patent Judge, and CALVERT and CRAWFORD, Administrative Patent Judges.

CRAWFORD, Administrative Patent Judge.

DECISION ON APPEAL

Appellants appeal[2] from the examiner's final rejection[3] of claims 1 through 10 under the provisions of 35 U.S.C. § 103.

[1] Application for patent filed August 3, 1992. According to appellants, this application is a continuation of Application 07/630,149, filed December 19, 1990, now abandoned.

[2] Notice of Appeal filed January 21, 1994.

[3] Final Office action mailed August 30, 1993.

Claims 1 through 10 are all the claims pending in the application.

The claimed subject matter is a delivery head for a fiber placement machine and can be readily understood from a consideration of independent claim 1 which reads as follows:

1. A delivery head assembly for a fiber placement machine, having an input end for entry of a plurality of resin impregnated fibrous tows and an output end for applying superimposed layers of the tows in the form of a band in a helical pattern onto a mandrel to produce an article having varying contours, comprising:

a) distributing means being located at said input end of the delivery head assembly for receiving and spacing the tows in a single plane and feeding the tows inwardly in said assembly,

b) ribbonizing means for spreading the tows to a desired width and thickness by heating and applying pressure, flattening the tows into intimate contact with one another and fusing the tows to each other, thus forming a quality tape band,

c) chilling means for cooling the tape band coming from the ribbonizing means,

d) cutting means for cutting complete across the tape in a single action while the delivery head assembly is in motion,

e) add means upstream from said cutting means for holding said cut tape band and adding [said cut tape] on demand to permit the application of tape band to the mandrel where desired, and

f) compaction roller means for applying superimposed layers of the tape band onto the mandrel.

The references relied upon by the examiner are:

Sherwood	3,313,670	Apr. 11, 1967
Karlson et al. (Karlson)	3,775,219	Nov. 27, 1973

Corbett et al. (Corbett)	4,610,402	Sept. 9, 1986
Woods	4,790,898	Dec. 13, 1988
Alenskis et al. (Alenskis)	4,867,834	Sept. 19, 1989
Weingart et al. (Weingart)	4,822,444	Apr. 18, 1989
Vaniglia (Vaniglia '754)	4,907,754	Mar. 13, 1990
Benson et al. (Benson)	5,045,147	Sept. 3, 1991 (filed Nov. 23, 1988)
Vaniglia (Vaniglia '395)	5,110,395	May 5, 1992 (filed Dec. 4, 1989)

The Rejections

Claim 1 stands rejected under 35 U.S.C. § 103 as unpatentable over Vaniglia '754 in view of Weingart and any one of Vaniglia '395, Benson or Alenskis (Examiner's Answer, page 3). Claim 2 stands rejected under 35 U.S.C. § 103 as unpatentable over Vaniglia '754 in view of Weingart and any one of Vaniglia '395, Alenskis or Benson as applied to claim 1 and further in view of either Woods or Corbett (Examiner's Answer, pages 11-12). Claim 3 stands rejected under 35 U.S.C. § 103 as unpatentable over Vaniglia '754 in view of Weingart and either one of Alenskis or Vaniglia '395 as applied to claim 1 and further in view of Benson and either one of Woods or Corbett (Examiner's Answer, page 12). Claim 4 stands rejected under 35 U.S.C. § 103 as being unpatentable over Vaniglia '754 in view of Weingart and any one of Benson, Alenskis or Vaniglia '395 as applied to claim 1 and

further in view of Karlson (Examiner's Answer, page 14). Claims 5, 7 and 9 stand rejected under 35 U.S.C. § 103 as being unpatentable over Vaniglia '754 in view of Weingart and any one of Benson, Alenskis or Vaniglia '395 and Karlson as applied to claims 5, 7 and 9 and further in view of Woods (Examiner's Answer, page 15). Claims 6, 8 and 10 stand rejected under 35 U.S.C. § 103 as being unpatentable over Vaniglia '754, Weingart, any one of Benson, Alenskis or Vaniglia '395, Karlson and Woods as applied to claims 5, 7 and 9 and further in view of Sherwood (Examiner's Answer, page 17).

Rather than reiterate the respective positions of the appellants and the examiner, reference is made to appellants' brief (Paper No. 23)[4] and the examiner's answer (Paper No. 24)[5] for the full exposition thereof.

OPINION

In arriving at our decision in this appeal, we have given careful consideration to appellants' specification and claims, to the applied prior art, and to the respective positions advanced by the appellants and by the examiner. Upon evaluation of all the evidence before us, it is our conclusion that the evidence

[4] Filed April 18, 1994.

[5] Mailed May 24, 1994.

adduced by the examiner is insufficient to establish a prima facie case of obviousness with respect to all claims on appeal. Our reasoning for this determination follows.

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993); In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). "A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Bell, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

Considering first the rejection of claim 1, we find that Vaniglia '754 discloses a delivery head assembly for a fiber placement machine including a distributing means 804 located at the input of the delivery head assembly for receiving and spacing fiber tows in a single plane and feeding the fiber tows inwardly of the assembly. A cutter 832 for cutting fiber tows and an add means 830 upstream of the cutter 832 for holding the cut fiber tows and adding on demand to permit the application of the fiber tows to a layout surface is also disclosed. Vaniglia '754 also

discloses a compaction roller 803 for applying fiber tows to the layout surface. Vaniglia '754 does not disclose a ribbonizing means to form a quality tape band or a chilling means for cooling the tape band coming from the ribbonizing means as recited in claim 1.

The examiner has relied on the Weingart reference for teaching a ribbonizing means.

We find that Weingart discloses a pay-off head 10 for a filament winding mechanism including, as depicted in Figures 2 and 3, eyelets 80 for feeding a plurality of fiber tows 104 into the device. The fiber tows 104 are impregnated with a resin composition (Column 1, lines 27 through 29, lines 43 through 44). The fiber tows 104 are fed across sets of comb bars 96 and plain bars 98 to a collection bar 102. The comb bars 96 and plain bars 98 flatten the fiber tows to substantially twice their normal width as depicted in Figures 7, 8A and 8B (Column 4, lines 40 through 41). The tines of comb bars 96 and the plain bars 98 position the fiber tows in an overlapped or shingled relative position (Column 4, lines 41 through 46) so that the overlapped fiber tows form a continuous gap-free band (Column 2, lines 8 through 9). As the fiber tows pass around comb bars 96 and plain bars 98, hot air is directed out of tubes 74. This hot air is

applied to the fiber tows immediately prior to passage of the fiber tows out of the payout head so that (1) the viscosity of the resin is reduced which in turn reduces fiber drag and fuzzing as the fiber tows pass through the payout head 10 and (2) wet-out or saturation of the fiber tows by the resin is improved (Column 2, lines 2 through 7). A tape 94, which may be plastic, paper or the like, is inserted between the tape band and the roller 84 to prevent the fiber tows from sticking to roller 84 while being applied to the mandrel.

The examiner is of the opinion that the comb bars 100, plain bars 98 and hot air directed out of the tubes 74 of Weingart is a ribbonizing means which forms a quality tape band as recited in claim 1. We note that appellants' specification discloses that a "quality" tape band is formed by heating and flattening the fiber tows into contact with each other thereby fusing the tows together (Specification at page 11 through 12). Appellants argue that Weingart does not teach the formation of a quality tape band wherein the fiber tows are fused together but rather the formation of a multiplicity of fiber tows in an overlapped position which require the addition of paper tape 94 to maintain the integrity of the overlapped positions.

We agree with the examiner that as the fiber tows of Weingart are subjected to heat and pressure thereby forming a tape band wherein the fiber tows are in intimate contact and fused to each other as depicted in Figures 7 and 8C, Weingart discloses a ribbonizing means as recited in claim 1. With regard to appellants' argument concerning paper tape 94, in our opinion, paper tape 94 is applied to the quality tape band after its formation by comb bars 96, plain bars 98 and the heat from tubes 74 and after the quality tape band passes through collection roll 102. Paper tape 94 is applied to the quality tape band after its formation to prevent tape wrap around and its effect on the position integrity of the band which may occur if the entire quality tape band or portions thereof stick to payoff roller 84.

The examiner has relied on Vaniglia '395, Benson or Alenskis for teaching a chilling means.

We find that Vaniglia '395 discloses a fiber placement head in which individual fiber tows impregnated with a binder or matrix material or composite fiber tows 14a and 14b are fed through a cooling assembly 98, a cut, clamp and restart mechanism 100 and then through a guide chute 102 onto the surface of mandrel 16 beneath a compaction shoe 104 (Figure 2, Column 8, lines 11 through 12, Column 9, lines 58 through 62). The cooling

assembly 98 includes cooling chutes 116 for passage of individual fiber tows therethrough (Figure 4, column 5, lines 47 through 60). The fiber tows are cooled before entry into the cut, clamp and restart mechanism 100 so that the material which impregnates the fiber tows does not become tacky as the fiber tows proceed through the cut, clamp, and restart mechanism 100 or guide chute 102 (Column 10, lines 31 through 36).

We find that Benson discloses a filament winding system in which individual fiber tows which compose a winding band 12 are fed through a heating section 26 where the fiber tows 12 are spread to a desired width and thickness (Figure 2, Column 2, lines 64 through 65). The fiber tows 12 are next fed to a chilling section 28, which includes a chill roller 52, wherein the fiber tows 12 are chilled and stiffened so that they may be better handled downstream in the add and cut assemblies 30 and 32 respectively (Figure 16, Column 3, lines 45 through 51). The fiber tows are chilled to permit a clean cut in the cut assembly (Column 6, lines 44 through 47). Individual fiber tows 12 are pressed onto a mandrel 18 by roller 16 (Figures 1 and 3, Column 2, lines 44 through 46).

We find that Alenskis discloses a filament winding section which includes a hot zone 26 and a cold zone in the vicinity of a

knife 34 and roller 36 (Figure 3, Column 3, lines 14 through 17, Column 6, lines 4 through 8). Fiber tows are cooled so that the fibers have sufficient stiffness to facilitate cutting and so that the fiber tows will maintain their integrity and not droop (Column 5, line 67 through Column 6, line 3). The examiner is of the opinion that:

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a chill means downstream of a ribbonizing means in order to facilitate cutting of the ribbonized band of fibers (which were heated in the ribbonizing mechanism to produce a quality tape band) as taught by any one of Benson et al, Alenskis et al or Vaniglia '395 where a ribbonizing (the application of heat and pressure to the filament tows to flatten the same and fuse the tows together) means would have been employed for the filament tows to form a gap free belt or web of fiber (a quality band) as taught by Weingart et al (this would have been desired to form a gap free band which as noted above provides the final product with greater uniformity (in the spacing between the filaments) and thus a stronger final product) in the device for fiber placement taught by Vaniglia '754 where all of the fibers are fed, cut and restarted at the same time (as in a tape laying device) for forming a composite article. [Examiner's Answer, page 10]

While it may be true, as concluded by the examiner that a quality tape band is produced by the comb bars 100, plain bars 98 and hot air directed upward out of tubes 74 in Weingart, we do not find suggestion in the cited prior art for cooling the quality tape band formed in Weingart after the band comes from the ribbonizing means, as recited in claim 1. In fact, as Weingart teaches that the fiber tows are heated immediately prior to passage to compaction roller 84 to reduce fiber drag and fuzzing as it passes out of the payout head, cooling the gap free band before passage out of the payout head would defeat the purpose of heating the fiber tows. As such we find no motivation to combine the chilling means teachings of Vaniglia '395, Benson or Alenskis with the teachings of Weingart, and as such we will not sustain the rejection of claim 1.

The rejections of claims 2 through 10 rely on the combination of Weingart and either Vaniglia '395, Benson or Alenskis and thus we will not sustain the rejection of claims 2 through 10.

The decision of the examiner is reversed.

REVERSED

BRUCE H. STONER, JR.
Chief Administrative Patent Judge

IAN A. CALVERT
Administrative Patent Judge

MURRIEL E. CRAWFORD
Administrative Patent Judge

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) APPEALS AND
) INTERFERENCES

Appeal No. 94-4396
Application 07/924,355

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