UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WILFRIED Von AMMON

Appeal 2008-3605
Application 10/350,570
Technology Center 1700

Decided: July 31, 2008

Before CHUNG K. PAK, LINDA M. GAUDETTE, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 the final rejection of claims 21-29, 32, 36, 39, and 40.[1] We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

INTRODUCTION

Appellant claims a process for producing a single crystal of semiconductor material comprising, in relevant part, melting granules of

[1] A hearing was held in this appeal on July 10, 2008.

semiconductor material in a vessel in order to maintain the growth of the single crystal, wherein the granules are inductively heated from a position above the vessel (claim 21).

Claim 21, 29, and 40 are illustrative:

21. A process for producing a single crystal of semiconductor material, comprising:
maintaining a melt of semiconductor material in a liquid state by a pulling coil;
growing a single crystal on a seed crystal by solidifying fractions of the melt;
melting granules of semiconductor material in a vessel in order to maintain the growth of the single crystal, wherein the granules are inductively heated from a position above the vessel;
feeding the melting granules to the melt; and
delaying the feed of the melting granules to the melt.

29. A process according to claim 21, comprising:
feeding the melting granules to the melt such that contact between molten material and quartz parts is completely avoided.

40. A process for producing a single crystal of semiconductor material, comprising:
maintaining a melt of semiconductor material in a liquid state by a pulling coil;
growing a single crystal on a seed crystal by solidifying fractions of the melt;
melting granules of semiconductor material in a vessel in order to maintain the growth of the single crystal, wherein the granules are inductively heated from a position above the vessel;
feeding the melting granules to the melt; and
delaying the feed of the melting granules to the melt such that substantially completely melted granules are fed to the melt.

The Examiner relies on the following prior art references as evidence of unpatentability:

Yamashita	5,034,200	Jul. 23, 1991

Bourbina	5,108,720	Apr. 28, 1992
Takase (as translated)[2]	WO 99/46433	Sep. 16, 1999

The rejections as presented by the Examiner are as follows:

1. Claims 21-28, 32, 36, 39, and 40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bourbina in view of Takase.
2. Claim 29 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Bourbina in view of Takase and Yamashita.

Appellant separately argues claims 21, 29, and 40. We address Appellant's arguments regarding the first rejection with respect to claims 21 and 40. With regard to the second rejection, we address Appellant's arguments with regard to claim 29.

OPINION

35 U.S.C. § 103 REJECTION OVER BOURBINA IN VIEW OF TAKASE

Appellant does not contest the Examiner's motivation for the combination of Takase's auxiliary crucible with Bourbina's apparatus for practicing a method of making single crystals. Rather, Appellant argues that neither Bourbina nor Takase discloses inductively heating the granules "from a position above the vessel" as claimed (i.e. a claim feature is not taught or suggested) (App. Br. 4). Appellant contends that Takase heats from the side not "from a position above the vessel" as claimed (App. Br. 4).

[2] The Examiner relies on Takase US 6,423,137 B1, the US Patent resulting from the national stage entry of the PCT document, as a translation of the Takase WO 99/46433 reference. Appellant does not dispute that US 6,423,137 B1 is an accurate translation of Takase. Accordingly, we cite to Takase US 6,423,137 B1 in the decision.

Appellant further contends that neither Bourbina nor Takase disclose a process which ensures that the granules do not reach the growing crystal in an unmelted state (i.e., "substantially completely melted granules are fed to the melt" (claim 40) or "delaying the feed of the melting granules to the melt" (claim 21)) (App. Br. 7).

We have fully considered all of Appellant's arguments and are unpersuaded for the reasons below.

We begin our analysis by construing the claim phrase "the granules are inductively heated from a position above the vessel."

During examination, claim terms are given their broadest reasonable interpretation consistent with the Specification. *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). The Patent and Trademark Office applies to the claim terms the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's Specification. *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

Appellant describes that a melting coil 5 is positioned above the bottom of a vessel (Spec. 7-8, Figure 1, ref. no. 1 and 5). The Figure 1 embodiment shows that the melting coil is positioned below the top of a pot-like vessel 1 and above the melt 17 and bottom of vessel (Figure 1). Appellant further describes other embodiments where the vessel 1 is shaped like a plate such that the quartz walls are dispensed with so that there is no oxygen doping of the single crystal (Spec. 11 and 15; Figures 2-4).

Appellant's disclosures indicate that the claim phrase "inductively heating from a position above the vessel" includes positioning the melt coil above a portion of the vessel (i.e., not completely above the vessel) as shown in Figure 1 such that the outer walls extend above the melt coil. In other words, the melt coil 5 shown in the Figure 1 embodiment is not above the uppermost portion or rim of the vessel 1 (i.e., the top of the side walls).

The Examiner defines "above" as "in a higher place" (Ans. 8). Appellant does not dispute this definition of "above."

Accordingly, we construe the claim phrase "the granules are inductively heated from a position above the vessel" as including positioning the melt coil such that it is in a higher place than a portion of the vessel containing the granules.

Based on this construction, we agree with the Examiner that the combination of Bourbina and Takase discloses the argued claim feature. Specifically, Takase discloses an auxiliary crucible having a high frequency coil 4 extending the entire height of the crucible (Takase, Figure 4). Takase's Figure 4 clearly shows an upper section of the coil at a higher place than the lower portion of the vessel containing the melt. Namely, at least the last two windings of the coil are above the lower portion of the crucible and above the melt. Accordingly, we agree with the Examiner that Takase discloses the argued claim feature.

Appellant argues that Takase's coil arrangement inductively heats such that the heating occurs near the crucible wall, which would not sufficiently melt the particles near the overflow drain in the middle of the crucible thereby undesirably allowing unmelted granules to overflow into

the primary crucible (Reply Br. 1-2).[3] Regarding claims 21 and 40, Appellant further argues that Takase does not teach "delaying the feed of the melting granules to the melt" (claim 21) or "delaying the feed of the melting granules to the melt such that substantially completely melted granules are fed to the melt" (claim 40) (App. Br. 7). However, these arguments are unpersuasive for two reasons.

First, Appellant's position that unmelted particles or granules overflow into the primary crucible is contrary to Takase's express disclosure that "all of the raw material inside the auxiliary crucible is heated . . . and melted" (Takase, col. 4, ll. 35-50; col. 5, ll. 24-27). Moreover, Takase plainly discloses delaying feeding of the material to the main crucible such that all the raw materials (i.e., particles or granules) are melted in the auxiliary crucible 1 prior to feeding to the main crucible 11 (Takase, col. 4, ll. 45-50; col. 5, ll. 26-27).

Second, Appellant has provided no objective evidence to substantiate the argument that Takase's inductive heating does not fully melt the particles. Appellant's mere argument is insufficient to establish that Takase

[3] Assuming *arguendo* that Appellant is correct that unmelted particles descend into the main crucible 11 from the auxiliary crucible, the combination of Takase's inductively heated auxiliary crucible with Bourbina's method of making single crystals would still have rendered obvious the claimed subject matter. Specifically, Takase's auxiliary crucible would have been positioned above Bourbina's housing 1 to receive the particulate silicon. Accordingly, the unmelted particles descending from Takase's auxiliary crucible would enter Bourbina's silicon conduit 3 (i.e. a vessel) where further heating and thus melting occurs. Accordingly, the silicon particles would be inductively heated in Takase's auxiliary crucible above Bourbina's silicon conduit 3 (i.e. vessel) where the silicon particulate is finally melted, thereby satisfying the argued claim feature.

is incapable of achieving a fully melted material prior to feeding to the main crucible as plainly disclosed by Takase.

We add that generally the placement or arrangement of a prior art feature would have been obvious provided no novel or unexpected result is achieved by such placement or arrangement. *In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975). *See also*, *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740 (2007) ("[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established function."); *In re Attwood*, 253 F.2d 234, 237 (CCPA 1958) ("Appellant has done no more than to select a plurality of individual features from the prior art and incorporate them into a unitary structure without materially altering the structure or function of each individual feature and without producing any new or unexpected result.").

In the present case, Appellant's disclosure to place the melting coil 5 directly above the vessel produces only the expected result: the silicon particulate melts. Moreover, Appellant does not disclose or provide any showing of unexpected results associated with the placement of the heating coil. Accordingly, rearranging Takase's coil to be positioned directly above the auxiliary crucible (i.e., vessel) so as to inductively heat from a position above the vessel would have been obvious.

For the above reasons, we sustain the Examiner's § 103 rejection of claims 21-28, 32, 36, 39, and 40 over Bourbina in view of Takase.

35 U.S.C. § 103 REJECTION OVER BOURBINA IN VIEW OF TAKASE AND YAMASHITA

Appellant argues that Yamashita does not teach "feeding the melting granules to the melt such that the contact between molten material and

quartz parts is completely avoided" as recited in claim 29 (App. Br. 8). Appellant contends that Yamashita's disclosure to use different materials for the crucible is not the same as the requirement of Appellant's claim 29 because quartz material may be present in Appellant's claimed invention, but contact is avoided between the melt and the quartz (App. Br. 8). We do not agree.

The Examiner clearly indicates motivation for modifying Bourbina's and Takase's crucibles to be made of Yamashita's non-quartz crucible materials: to use higher melting temperature crucible materials that are less reactive than quartz (Ans. 7). Appellant has not indicated any flaw in the Examiner's motivation. Rather, Appellant argues that Yamashita's disclosure to use different materials is not the same as the requirements of claim 29.

Claim 29 merely requires feeding the melting granules such that the contact between the molten material and quartz parts is completely avoided. Making the substitution of Yamashita's non-quartz crucible materials for the quartz crucible materials of Takase and Bourbina would have clearly resulted in a method where there is no contact between the molten material and quartz material (i.e., there can be no quartz-molten material contact when there is no quartz material in the crucible). Accordingly, the claim 29 feature is taught by Yamashita and the Examiner has provided motivation for the combination of Yamashita's crucible materials with Bourbina's in view of Takase's method that remains unchallenged by Appellant.

For the above reasons, we sustain the Examiner's § 103 rejection of claim 29 over Bourbina in view of Takase and Yamashita.

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

tc

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