United States District Court,
D. Massachusetts.

AXCELIS TECHNOLOGIES, INC,
Plaintiff.
v.
APPLIED MATERIALS, INC,
Defendant.

No. CIV.A. 01-10029DPW

Dec. 10, 2002.

MEMORANDUM REGARDING CLAIM CONSTRUCTION

WOODLOCK**, District J.**

Plaintiff Axcelis Technologies, Inc. ("Axcelis") alleges defendant Applied Materials, Inc. ("Applied") has infringed U.S. Patent No. 4,667,111 (the " '111 patent"). The '111 patent provides a method of and apparatus for ion implantation involving a radio frequency ("rf") ion accelerator.

At the threshold, the parties vigorously dispute construction of certain claims in the '111 patent. The parties' disagreement focuses at this point on three "means-plus-function" elements of claim 1, an apparatus claim, and their analogs in claims 17 and 29 (a method claim and another apparatus claim, respectively). In this Memorandum, I will construe each of these contested elements.

I. THE '111 PATENT

The '111 patent generally describes a technology that (i) generates charged atoms, called ions, (ii) accelerates those ions in a focused beam, using a rf accelerator, and (iii) implants the ions into a "workpiece." The patent's claims were initially rejected by the U.S. Patent and Trademark Office (the "PTO"); upon amendment, the patent was issued to Axcelis's predecessor, the Eaton Corporation, on May 19, 1987.

Since its issuance, the '111 patent has been subject to two reexamination requests by Applied, both of which were granted by the PTO and then consolidated into one reexamination proceeding. The PTO issued two Notices of Intent to Issue Reexamination Certificate, the first before consolidation of the two proceedings on June 22, 2000 (the "1st NIRC"), and the second on December 8, 2000 (the "2nd NIRC"). FN1 The PTO issued its reexamination certificate on April 10, 2001, confirming *inter alia* the patentability of claim 1 without modification, claim 17 as amended, and a newly added claim 29.

FN1. Axcelis filed for reconsideration of certain statements contained in the 2nd NIRC's Statement of Reasons for Patentability and/or Confirmation shortly after it was issued. (Applied Vol. 1, Ex. 15.) By order

dated January 30, 2001, the PTO declined Axcelis's request for reconsideration, but permitted entry of Axcelis's submission in the record of the reexamination proceeding, and noted that its denial of reconsideration would not "give rise to any negative inference." (Applied Vol. 1, Ex. 16.)

II. CLAIM CONSTRUCTION

I address below each of the aforementioned claims in turn, construing only those particular elements now in dispute.

A. *Claim 1*

An apparatus claim that was left unchanged by the PTO's reexamination of the '111 patent, claim 1 describes an ion implantation device comprising:

an ion source for directing charged ions having an initial energy along a travel path;

an ion accelerator including a plurality of spaced apart, accelerating electrodes which, when energized, create an alternating electric field to accelerate the ions in stages through a plurality of accelerating gaps between electrodes to a second energy;

energizing means coupled to the ion accelerator for applying an alternating accelerating potential of a specific frequency and amplitude to each accelerating electrode of a plurality of accelerating electrodes to accelerate the ions through said plurality of accelerating gaps;

implantation means for positioning a workpiece so that charged ions accelerated to the second energy impact said workpiece; and

control means coupled to the energizing means to control the relative amplitude and phase of the electric fields in the accelerating gaps.

'111 Patent (emphasis added).

The parties' respective positions require construction of the latter three elements italicized above, all set forth in the means-plus-function form: "energizing means," "implantation means," and "control means." The Federal Circuit has outlined the appropriate manner of proceeding in relation to such means-plus-function elements, as governed by 35 U.S.C. s. 112, para. 6, thus: "The first step ... is to identify the function explicitly recited in the claim. The next ... is to identify the corresponding structure set forth in the written description that performs the particular function set forth in the claim." Asyst Technologies, 268 F.3d 1364, 1369 (Fed.Cir.2001) (internal citation omitted).

1. "*Energizing means*"

The parties are in agreement regarding the function recited at the "energizing means" element of claim 1: "to apply an alternating accelerating potential of a specific frequency and amplitude to each accelerating electrode of the plurality of accelerating electrodes to accelerate the ions through said plurality of accelerating gaps." As to the corresponding structure, Axcelis points to column 3:31-36 and column 5:45-50 of the '111 patent's specification as disclosing nothing more than a tank circuit and an rf generator.

Just a few lines beyond each of the passages Axcelis cites, however, there is particularity that appears to challenge Axcelis's generalized description. Column 3:41-43 discloses that the "tank coil is mounted in a separate cavity from the evacuated accelerating chamber." Column 5:64 to column 6:15 supplies yet further detail, stating that the preferred embodiment of the '111 patent will segregate the tank coil from the vacuum chamber (where the accelerating electrode is found) in a separate chamber containing an electronegative gas, and by means of a high voltage rf feedthrough, in order to meet the following independent "requirements" for the coil's environment: that it (i) "cools better than vacuum," (ii) has "a low dielectric constant to limit its self capacitance," and (iii) also has "low rf loss and good high voltage properties."

Axcelis seeks to diminish the significance of these details by reference to the principle that "[s]tructural features that do not actually perform the recited function do not constitute corresponding structure and thus do not serve as claim limitations." Asyst Technologies, 268 F.3d at 1370. In particular, Axcelis notes the distinction articulated in *Asyst Technologies* between a structural feature that "performs" the recited function (and hence is a limitation), and one that merely "enables" it. *Id*. at 1370-71.

Notwithstanding the specification's use of the term "requirements," I am persuaded that the tank coil's environment lies, for the most part, on the "enabling" side of the line. To be sure, the separate, "external" cable connected to the disclosed processor in *Asyst* presented a more compelling illustration of an enabling feature. Nevertheless, it remains the case that the tank circuitry's functioning here is not premised upon the environment that the '111 patent describes. The functioning may be substantially improved, for the reasons expressly noted, but there is no suggestion that it *inheres* in the segregation of the tank coil in a separate, gaseous chamber by means of a high voltage rf feedthrough. As a broad means-plus-function element, the energizing means of claim 1 must be limited by the structure disclosed in the specification, FN2 but limitation will not necessarily be drawn from the preferred embodiment. *See, e.g.,* Kemco Sales, Inc. v. Control Papers Company, Inc., 208 F.3d 1352, 1362 ("we have noted the danger of reading limitations into the claims from the preferred embodiments").

FN2. As the Federal Circuit has noted, "Congress decided to permit broad means-plus-function language, but provided a standard to make the broad claim language more definite.... A claim limitation described as a means for performing a function, if read literally, could encompass any conceivable means for performing the function. [The] second clause [of 35 U.S.C. s. 112, para. 6] confines the breadth of protection otherwise permitted by the first clause." Valmont Indus., Inc. v. Reinke Mfg. Co., Inc., 983 F.2d 1039, 1042 (Fed.Cir.1993).

For the same reasons, I also decline Applied's suggestion to limit this element to other structural features suggested by the '111 patent's specification: in particular, a 1/1 ratio between tank coil and rf generator, and the two-gap design with which that is associated. Neither is presented in the specification in terms as express as those regarding the tank coil's environment, and my exclusion of the latter from the "corresponding structure" to claim 1's energizing means applies with greater force against inclusion of these other features.

Accordingly, I construe the corresponding structure to the "energizing means" element of claim 1 to be a tank circuit coupled with an rf generator, and its equivalents.

2. "*Implantation means*"

The parties agree on the function recited for this element: "positioning a workpiece so that charged ions accelerated to the second energy impact said workpiece." As for the corresponding structure, Applied contends that it is limited to the spinning, batch wafer processor described by the specification at column 4:38-54 and represented in Figure 1. FN3 Axcelis seeks a much broader construction: namely, a "movable support for a workpiece."

FN3. Applied summarizes the features of this wafer processor as including a mounting disk, a motor for rotating the disk, a separate drive for translating the motor and disk, structures to hold multiple wafers around the periphery of each mounting disk, a load/unload station, disk exchange arms, and a vacuum process chamber. (Applied Memo. in Supp. of SJ: Implantation Means, 10.)

As grounds, Axcelis again principally relies on the distinction between structural features that perform and those that enable a claimed function. There is less need for me to dwell on this distinction for this element, however, because the prosecution history-and in particular, the reexamination-of the '111 patent substantially bolsters Applied's contrary view.

The Federal Circuit has emphasized that the prosecution history of a patent, including any express representations made by the *applicant* regarding the scope of the claim, is part of the "intrinsic" evidence to be considered in claim construction. Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582-83 (Fed.Cir.1996). Of particular relevance to reexamination proceedings, the Federal Circuit has noted that the prosecution history might reveal "whether the patentee has relinquished a potential claim construction in an amendment to the claim or in an argument to overcome or distinguish a reference." Bell Atlantic Network Services, Inc. v. Covad Communications Group, Inc., 262 F.3d 1258, 1268 (Fed.Cir.2001).

Axcelis's defense of claim 1, in the reexamination proceeding, was premised on distinguishing the detailed mechanism outlined at column 4:38-54 from prior art references. Its March 17, 2000 Amendment is quite clear, quoting column 4:38-54, then stating, "There is no teaching of this structure in either the [asserted prior art] references." Patent Hist. Vol 1, Ex. 10 at 14. Further, in the 2nd NIRC's Statement of Reasons for Patentability and/or Confirmation, December 8, 2000, the PTO identified this very point as critical to its intended finding of patentability: "All the independent claims now stress the automatic ion implantation device, including multiple semiconductor wafer workpieces, specifically used in conjunction with the RF acceleration means." Pat. Hist. vol 1, Ex. 14 at 3. Moreover, the Second NIRC stated the "The combination or the above two features is considered unique and novel to this particular claimed combination of an ion implantation/ion accelerator device." *Id.*

Axcelis's counter-arguments to the significance of this prosecution history are unavailing. Two merit summary dismissal. First, it is irrelevant that Applied (unsuccessfully) represented to the PTO, in the reexamination proceeding, its view that the "broadest reasonable interpretation" of this element was of "simply a holder for a workpiece." What matters for present purposes is the *patentee's* representations to the PTO, not those of any third party. It would be particularly inappropriate to hold Applied now to its earlier position when patentability was argued for (and granted) on the contrary grounds Axcelis now seeks to avoid. Second, it is equally irrelevant that the language of claim 1 was not amended by the PTO. Far more significant are the positions taken in advocating for, as well as the logic underlying, that result.

Axcelis is more compelling when it notes that it immediately disputed the application of the PTO's above cited statement to claim 1 of the '111 patent, and that the PTO's denial of reconsideration disclaimed giving

rise to any negative inference, presumably of a type that might bind a court. While I consider Axcelis's representations before the PTO with fresh eyes, I find the exercise not helpful to Axcelis's position here. In its opposition brief, Axcelis notes that, in its March 17, 2000 Amendment, the reference to "this structure" refers to nothing but the passage from the patent specification quoted immediately prior. That passage-which logically carries over into the rest of Axcelis's discussion of "implantation means" in its March Amendment-is precisely the passage which supports a narrower construction than a "movable support for a workpiece."

Accordingly, I construe the corresponding structure to the "implantation means" element of claim 1 to be a spinning, batch wafer processor, as described at column 4:38-54 of the '111 patent, and its equivalents.

3. "*Control means*"

Agreeing that the function recited at this element is of "control[ling] the relative amplitude and phase of the electric fields in the accelerating gaps," the parties' dispute centers on the meaning to be accorded to the term "control." Apparently because Applied's allegedly infringing machine does not allow for the independent adjustment of the relative phase of the electric fields in the accelerating gaps, (Applied Memo. in Supp. of SJ: Control Means), the parties each seek a definition of "control" keyed to this circumstance.

In construing claims, the Federal Circuit has held that the terms used in a claim bear a " 'heavy presumption' that they mean what they say and have the ordinary meaning that would be attributed to them by persons skilled in the relevant art." Texas Digital Systems, Inc. v. Telegenix, Inc., 308 F.3d 1193, 1202, (Fed.Cir.2002), (*quoting* CCS Fitness, Inc. v. Brunswick Corp., 288 F.3d 1359, 1366 (Fed.Cir.2002)). This presumption may be overcome however, where the patentee, acting as his or her own lexicographer, has clearly set for an explicit definition of the term different from its ordinary meaning. *See* Texas Digital, 308 F.3d at 1204 (*citing* In re Paulsen, 30 F.3d 1475, 1480 (Fed.Cir.1994) and Intellical, Inc. v. Phonometrics, Inc., 952 F.2d 1384, 1387-88 (Fed.Cir.1992)).

Here Axcelis argues that there is no evidence that the patent applicant sought "to be a lexicographer by providing an explicit definition in the specification," Renishaw PLC v. Marposs Societa' Per Azioni, 158 F.3d 1243, 1249 (Fed.Cir.1998). Therefore, Axcelis asserts the "ordinary meaning" of "control" ought to be adopted suggesting that the Court consult a dictionary for the applicable definition. *Id*. In *Texas Digital, Inc. v. Telegenix, Inc*. the Federal Circuit clarified the rule governing the proper use of dictionaries in claim construction. 308 F.3d at 1201-1206. The court explained that "dictionaries, encyclopedias and treatises publicly available at the time a patent is issued, are objective resources that serve as reliable sources of information on the established meanings that would have been attributed to the terms of the claims by those of skill in the art." Id. at 1203. Indeed, the court cautioned that an over-reliance on the written description and prosecution history of a patent "invites a violation of our precedent counseling against importing limitations into the claims." *See* id. at 1204. Rather than relying on the preferred embodiment described in the disclosure, courts should look first for an objective definition discernible from the ordinary and customary meaning of a given term. *Id.; see also,* Generation II Orthotics, Inc., v. Medical Technology Inc., 263 F.3d 1356, 1367 (Fed.Cir.2001); Loctite Corp. v. Ultraseal Ltd., 781 F.2d 861, 867 (Fed.Cir.1985). Nevertheless, the *Texas Digital* court also stated that, in selecting the appropriate relevant definition from a dictionary or other reference text, a court should consider the intrinsic record to identify the meaning of the claim term most consistent with the inventor's use of that term. *See* Texas Digital, 308 F.3d at 1203; Dow. Chem. Co. v. Sumitomo Chem. Co., 257 F.3d 1364, 1372-73 (Fed.Cir.2001); Multiform Dessicants, Inc. v. Medzam, Ltd., 133 F.3d 1473, 1478 (Fed.Cir.1998). Drawing on Webster's Ninth New Collegiate Dictionary

(1987), FN4 Axcelis posits the ordinary meaning of "control" to be "regulate," which it further defines as "fix or adjust."

FN4. The Federal Circuit has noted that dictionaries, which technically count as extrinsic evidence, nonetheless "hold a 'special place' and may sometimes be considered along with the intrinsic evidence when determining the ordinary meaning of claim terms." Bell Atlantic, 262 F.3d at 1267 (quoting Vitronics, 90 F.3d at 1584 n. 6).

Applied, on the other hand, contends that the specification's numerous references to the ability independently to adjust or vary the phase of the electric fields gives rise to a perhaps "unconventional meaning" that, at any rate, does not include the concept of "fix." FN5 Applied supplies its own dictionary definitions as well to advance this meaning. Citing the 1980 "New College Edition" of the *American Heritage Dictionary,* Applied asserts that the definition of control requires "the ability to *adjust* " (emphasis in original) (Applied Resp. to Axcelis Supp.Memo. on Recent Fed. Cir. Precedent at 3). Applied acknowledges that its dictionary provides several definitions of control, but urges particular consideration of the definition of control as "regulate." *Id*. Applied then provides a definition of regulate, again from the *American Heritage Dictionary,* as "to adjust in conformity to a specification or requirement." *Id*. In essence, Applied contends that because neither the definition of regulate nor control contain the word "fix," adjust and fix must therefore be mutually exclusive. *Id*.

FN5. In particular, Applied notes that column 5:10-15 of the specification explains that "[a] broad range of charge to mass ratios (q/A) can be accelerated by independently adjusting the rf field phase of successive accelerating electrodes," and that " *this control* insures a particle bunch arrives at each gap at a time in the rf cycle so that the electric field accelerates the ion." (Emphasis added.)

Applied's argument is unpersuasive. The essence of "control" is nothing less than the power to determine the scope, range, or effect of a given activity. To say therefore that control may not, by definition, include the concept of fixing within its ambit is a bit like saying the volume control on a radio only "controls" the volume if it is constantly increasing or decreasing the volume.

As a preliminary matter, I find there is nothing in the specification to indicate that the inventor used the term "control" in an extraordinary way, given that no explicit definition of control is provided in the disclosure. Next, in the context or this case, the choice between defining "control" as "fix or adjust," on the one hand, or "independently adjust/vary," on the other, seems a false one. Applied's allegedly infringing technology, after all, is not indifferent to the relative phase of the electric fields in the accelerator. Rather, it employs feedback loops actively to stabilize them. Even defining control as exclusively "to adjust," say, does not seem to exclude a mechanism that actively works to maintain a desired level.

Accordingly, I find it sufficient to define "control" as "regulate," without needing to distinguish between the concepts of "fix" and "adjust" for purposes of this case. I note that my construction of this element of claim 1 effectively moots the parties' related dispute over whether the "buncher" employed by Applied's allegedly infringing machine qualifies as part of the ion accelerator or not.

B. *Claim 17*

As noted, claim 17 is a method claim that was amended by the PTO pursuant to its reexamination of the '111 patent. The parties' dispute the construction of two elements that essentially map out against claim 1's "control means" and "implantation means," respectively. Separate analysis is required, however; as the Federal Circuit has held, "[t]he mere fact that a method claim is drafted with language parallel to an apparatus claim with means-plus-function language does not mean that the method claim should be subject to an analysis under s. 112, para. 6." Generation II Orthotics, 263 F.3d at 1367.

That cautionary observation is not relevant with respect to one of claim 17's two contested elements, that of "controlling a relative phase of the electric fields in the accelerating gaps." Because my analysis of the term "control" concerned the proper definition to apply, rather than the effect of a particular structure or embodiment, I find that there is no reason why the definition of control should be different here.

Claim 17's second contested element, however,-"positioning a semiconductor wafer workpiece or a plurality of semiconductor workpieces at an implantation station"-presents a more demanding issue. I find compelling, however, that after asserting that "[a]ll of the independent claims now stress the automatic ion implantation device" specifically described by Axcelis in its March 17, 2000 Amendment, the PTO amended the preamble of claim 17 to specify a "method for ion implantation of a *plurality of semiconductor wafer* workpieces" (modification emphasized), and the substance of the relevant element to read "a *semiconductor wafer* workpiece *or a plurality of semiconductor wafer workpieces at an implantation station* " (modification emphasized). Noting Applied's point that a single wafer may be placed in the spinning, batch wafer processor described by the specification at column 4:38-54, I find these modifications, along with the PTO's previously quoted language from the 2nd NIRC's Statement of Reasons for Patentability and/or Confirmation, instructive. They lead me to the conclusion that there should be no different reading here than of "implantation means" under claim 1.FN6

FN6. In this connection, I note that Axcelis only challenged the NIRC's Statement of Reasons for Patentability and/or Confirmation *with respect to claim 1*.

C. *Claim 29*

Claim 29 is an apparatus claim added by the PTO pursuant to its reexamination of the '111 patent. Its contested elements-"energizing means," "automated implantation means," and "control means"-are for all intents and purposes identical to those of claim 1, and as such, the preceding analysis and claim construction is entirely applicable.

D.Mass.,2002.
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