United States District Court,
D. Massachusetts.

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

No. Civ.A. 01-10029-DPW

June 12, 2003.

MEMORANDUM REGARDING CLAIM CONSTRUCTION AS RESTATED IN ANTICIPATION OF TRIAL

WOODLOCK**, 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.

For purposes of summary judgment and as further refined for trial, the parties have disputed construction of certain claims in the '111 patent. In this Memorandum, following extensive motion practice, submissions and argument, I construe each of the 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.

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).

For trial, the parties' respective positions have required construction of the four elements italicized above; three are set forth in the means-plus-function form: "energizing means," "implantation means," and "control means;" the fourth, "ion accelerator" concerns a portion of the apparatus.

A. Means-Plus Function Elements

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 in the paragraph at column 4:38-54 from prior art references. Its March 17, 2000 Amendment cites to that paragraph and then quotes the first four sentences at column 4:38-47:

The implantation station 18 shown in FIG 1 is specifically arranged for ion implantation of semiconductor wafers 26. At a load/unload station 28, a technician or an automated device positions the wafers 26 about the periphery of a mounting disk 30. The disk 30 is then moved via disk exchange arms 32 to a vacuum process chamber 34. The disk and wafers are tilted up to an orientation to cause highly accelerated ions to impinge upon the wafers 26.

After this quotation, Axcelis states, "There is no teaching of this structure in either the [asserted prior art] references." Patent Hist. Vol 1, Ex. 10 at 14.

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. 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.*

Several of 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. I therefore consider Axcelis's representations before the PTO with fresh eyes. Doing so, I find the reference to "this structure" refers to the passage from the patent specification at column 4:38-47 quoted immediately prior.

Accordingly, I construe the corresponding structure to the "implantation means" element of claim 1 to be the implantation station, as described at column 4:38-47 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 either "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*. The essence of "control" is the power to determine or regulate the scope, range, or effect of a given activity by both fixing and adjusting. Control, by definition, includes the concept of fixing within its ambit in the same manner that the volume control on a radio not only "controls" the volume if it is constantly increasing or decreasing the volume but also when it fixes the volume as a particular level.

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.)

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, I find any suggested choice between defining "control" as either "fix or adjust," on the one hand, or merely "independently adjust/vary," on the other, to be a false one. Even defining control as exclusively "to adjust," say, does not seem to exclude a mechanism that actively works to maintain or fix 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. Control in this setting is the capacity to do both.

I find the corresponding structure to the "control means" element of Claim 1 to be a microprocesser with amplitude and phase outputs (as disclosed in Fig. 7) and its equivalents containing circuitry that would be recognized by those skilled in the art.

B. *Ion Accelerator*

The ion accelerator element of Claim 1 reads:

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;

The "ion accelerator" in the claim refers to a distinct portion of what claim 1 refers to overall as an "ion implantation apparatus ." In this connection, the "ion source" is not part of the ion accelerator, nor is the "implantation means" a part of the ion accelerator.

The term "accelerate the ions" means to increase the energy level of the ions in stages from the initial energy to a higher, second level of energy.

Thus, the "ion accelerator" is that part of the apparatus that "accelerates the ions" by increasing the energy level of the ions in stages from the "initial energy" to a higher, second level of energy.

The "accelerating gaps" are those gaps in the "ion accelerator," where the ions are accelerated in stages from the initial energy level, to the second energy, which is the energy at which the ions impact the wafers.

The "accelerating electrodes" are those electrodes in the "ion accelerator" which, when energized by RF energy, accelerate the ions from the initial energy level at which they emerge from the ion source in stages to a higher, second energy level.

D.Mass.,2003.
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