United States District Court,
D. New Hampshire.

THERMAL DYNAMICS,
v.
TATRAS, INC.

Civil No. 04-152-PB

Dec. 9, 2004.

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MEMORANDUM AND ORDER

PAUL BARBADORO**, District Judge.**

Thermal Dynamics Corporation claims that TATRAS, Inc. is currently selling ridged electrodes that infringe U.S. Patent No. 4,782,210 ("'210 Patent"). In this Memorandum and Order, I construe several disputed terms in plaintiff's patent.

I. *BACKGROUND*

The '210 Patent claims a novel electrode design that was intended for use in a plasma-arc torch. The first part of this section describes what a plasma-arc torch is and how it operates. The second part describes both the patented technology and the specific claim that is at issue in this dispute. The third and final part describes the electrode design adopted by defendant: a design plaintiff alleges infringes its patent.

A. *The Plasma-arc Torch*

A plasma-arc torch cuts and welds hard metal. It operates by directing plasma FN1 onto a workpiece at varying temperatures. The plasma produced by the torch is created by bringing a gas, in its normal state, into contact with an electric current. The electric current ionizes and superheats the gas, which is then forced through a small orifice at the tip of the torch and onto a workpiece. A superheated stream of plasma can approach temperatures of 20,000 (deg.)C.

FN1. Plasma is an ionized, superheated gas sometimes described as the fourth state of matter.

The electrical current that is used to heat the gas is called a "pilot arc" and is generated by an electrode inside the torch. This process is initiated when the electrode assumes a negative charge. In this state, the electrode becomes a "cathode." The torch tip, in response, assumes a positive charge, becoming an "anode." When the torch is operating properly, electrons jump the gap between the electrode (cathode) and the torch tip (anode), creating an electrical current. When gas travels through the current, it becomes plasma.

Before plaintiff developed the technology described in the '210 patent, the electrodes used in Plasma-arc torches had smooth sides and required between 5 and 12 kilovolts ("KVs") of starting power to generate the "pilot arc." The use of such a high voltage was problematic both because it was a challenge to consistently produce the required voltage when the plasma-arc torch was first developed and because the required voltage caused the electrodes to rapidly decay. The '210 patent attempted to address these problems through an electrode design that allows a lower voltage to be used in producing the plasma.

B. ***Plaintiff's Electrode Design***

The '210 patent claims an electrode with ridges that facilitate pilot arching at lower energy levels of between 3-6 KV. The patent includes ten separate claims. Claim 1 is the patent's sole independent claim. Claims 2-10 are all dependent claims. The parties agree that their dispute is limited to the construction of portions of claim 1. Those portions claim the following:

In a plasma-arc system comprising spaced, electrically conductive electrode means defining an arc chamber therebetween, pilot arc voltage supplying means connected to said electrode means, and means for supplying a flow of plasma forming gas through said arc chamber, the improvement which comprises:

said electrode means including at least one electrode having at least one ridge being located substantially in said arc chamber and extending along said electrode so as to provide a path for arcing, thereby producing a longer wearing electrode.

In addition to its multiple claims, the '210 patent also contains a lengthy description of the invention's preferred embodiment. This embodiment illustrates the electrode's preferred shape and identifies its location inside the torch. *See* '210 Patent, Figure 1. The electrode is depicted as a cylinder with a domed top. The cylinder is situated in a chamber, leaving space between the top portion of the electrode and the body of the torch. Gas flows through the chamber and over the tip of the electrode. The tip of the electrode is situated directly behind the torch tip. The torch tip contains an orifice through which plasma is released. The ridges that comprise the invention are on the cylindrical side surface of the electrode and have a lengthwise orientation.

C. ***Defendant's Electrode Design***

Defendant produces and sells its own electrode. Like the plaintiffs' electrode, defendant's technology is intended for use in a plasma-arc torch. Additionally, like the preferred embodiment described in Patent '210, defendant's electrode has ridges on the surface of a cylindrical-sided electrode. These ridges, however, radiate from the center point on the electrode tip and toward the back portion of the electrode but stop at the point where the domed top of the electrode reaches its cylindrical sides.

Whether this design infringes plaintiff's patent will depend in large part upon how I construe plaintiff's patent claims. It is to this task that I now turn.

II. *STANDARD OF REVIEW*

Claim construction presents a question of law for the court to resolve. Markman v. Westview Instruments, Inc., 517 U.S. 370, 372 (1996); Liquid Dynamics Corp. v. Vaughan Co., 355 F.3d 1361, 1367 (Fed.Cir.2004). The starting point is the language of the claim itself. *Id*. "There is a 'heavy presumption' that the terms used in claims 'mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art.' " Superguide Corp. v. DirecTv Enters., Inc., 358 F.3d 870, 874 (Fed.Cir.2004) (quoting Tex. Digital Sys ., Inc. v. Telegenix, Inc., 308 F.3d 1193, 1202 (Fed.Cir.2002). Dictionary definitions are "often useful" in construing disputed patent terms. *Id*. at 875. Once a range of possible meanings has been identified through the use of dictionary definitions, the context in which a disputed term is used in the claims and the specification must be carefully scrutinized to determine the preferred interpretation. *See* Int'l Rectifier Corp. v. IXYS Corp., 361 F.3d 1363, 1369-70 (Fed.Cir.2004). While the specification must always be considered in this process, claim terms ordinarily are not limited to the embodiments disclosed in the specification. *See* Amgen Inc. v. Hoechst Marion Roussel, Inc., 314 F.3d 1313, 1328 (Fed.Cir.2003). Extrinsic evidence may also prove helpful but such evidence may not be used to alter the meaning of a claim term whose definition can be discerned from intrinsic evidence. C.R. Bard, Inc. v. United States Surgical Corp., 388 F.3d 858, 861 (Fed.Cir.2004).

Although each claim in a patent is an independent invention, dependant claims can aid in interpreting the scope of the claims upon which they depend. Laitram Corp. v. NEC Corp., 62 F.3d 1388, 1391 (Fed.Cir.1995). Under the doctrine of claim differentiation, where claims in the same patent use different terms, those differences are presumed to reflect a difference in the scope of the claims. Forest Laboratories, Inc. v. Abbot Laboratories, 239 F.3d 1305, 1310 (Fed.Cir.2001); *see also* Ecolab Inc. v. Paraclipse, Inc., 285 F.3d 1362, 1375-76 (Fed.Cir.2002) (stating that under the doctrine of claim differentiation "each claim in a patent is presumptively different in scope"); Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 910 (Fed.Cir.2004) (holding that the "presence of a dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim.").

A court must depart from this methodology in two circumstances. First, it must do so if the patentee has acted as its own lexicographer by clearly defining the term in the specification. In this situation, the court must adopt the meaning selected by the patentee. *See* Inverness Med. Switz. GmbH v. Princeton Biomeditech Corp., 309 F.3d 1365, 1371-72 (Fed.Cir.2002). Second, it must do so if the patentee clearly surrendered an interpretation during the prosecution of the patent. *See* Superguide Corp., 358 F.3d at 875.

I apply these interpretive standards in construing the '210 patent.

III. *CLAIM CONSTRUCTION*

The parties dispute the meaning of one term and two phrases in claim 1. They first disagree as to the meaning of the term "arc chamber." They next dispute the meaning of the phrase "extending along said electrode so as to provide a path for arcing." Finally, they offer different interpretations of the phrase "so as to provide a path for arcing, thereby producing a longer wearing electrode."

1. "*Arc Chamber*"

The parties agree that the patentees acted as their own lexicographer by defining the term "arc chamber" as the area between "a pair of spaced-apart electrodes ... in which electric arcs are to be formed." '210 patent col. 2, 11. 59-61. Plaintiff contends that this definition does not require elaboration. Defendant, by contrast,

argues that the specification further limits the term to the area between the cylindrical side surface of one electrode and the surface of another electrode.

Defendant's argument fails because it is based on the flawed premise that the '210 patent only covers plasma-arc systems that use cylindrical electrodes. This premise is plainly wrong. Claim 1 does not limit the shape that an electrode must take. Indeed, dependant claim 2 claims "the invention of claim 1 wherein said electrode is of generally rod shape so that the surface is cylindrical." '210 patent, col. 6, ll. 57-59. In cases like this, where a dependant claim contains a limitation that is not expressed in an independent claim, a presumption exists that the independent claim is not subject to the limitation described in the dependant claim. *See* LiebelFlarsheim Co., 358 F.3d at 910. Defendant has failed to identify sufficient evidence to overcome this presumption. Thus, I reject its argument that the patentee's definition of arc chamber should be further limited to the area that lies between the cylindrical side surface of one electrode and the surface of another electrode.

B. "*Extending Along said Electrode so as to Provide a Path for Arcing*"

Claim 1 also states that a '210 electrode must have at least one ridge "extending along said electrode so as to provide a path for arcing." '210 patent col. 6, 11. 53-54. Defendant proposes alternative contextual meanings for the term "along." First, it argues that dictionary definitions and the figures that illustrate the invention's preferred embodiment demonstrate that "along" means "lengthwise over the longest side surface." Somewhat less restrictively, it contends that the patent's prosecution history demonstrates that "along" means "over the side surface." I examine each argument in turn.

Neither party argues that "along" has a specialized meaning. Thus, general use dictionaries serve as a useful starting point for analysis. One such dictionary defines "along" as (1) '[b]y the length; in a line with the length; lengthwise" and (2) "by the length of, as distinguished from across." WEBSTER' S REVISED UNABRIDGED DICTIONARY (1996). In another, "along" is defined as (1) "Over the length of" and (2) "On a line or course parallel and close to; continuously beside." THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (4th ed.2000). A third defines "along" as (1) "through, on, beside, over, or parallel to the length or direction of, from one end to the other of" and (4) "by the length; lengthwise." THE RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE (2d ed.1987). In still a fourth, "along" is defined as "in a line with the length, parallel to the longest dimension or course (of something understood)...." THE COMPACT EDITION OF THE OXFORD ENGLISH DICTIONARY (1971). Neither party disputes the validity of these definitions. Rather, they disagree first over which definition to invoke, and next over how that definition should apply in this case.

Although all of the above-cited dictionaries recognize that "along" generally connotes a lengthwise orientation, the definitions do not support defendant's more restrictive interpretation that a ridge extends along an electrode only to the extent that it extends lengthwise over the electrode's longest surface. An electrode may have many surfaces of varying lengths that together comprise an electrode that is longer than it is wide. In such cases, a ridge that extends lengthwise in a line over the electrode's entire surface from one end to the other will extend over multiple surfaces. Some of these surfaces may be parallel to the electrode's longest surface and others may not. Nevertheless, each segment of such a ridge has a lengthwise orientation with respect to the electrode as a whole regardless of whether the segment is on or parallel to the electrode's longest surface. The dictionaries cited by the defendant in no way foreclose such an interpretation because they do not require that the lengthwise orientation must be with respect to an object's longest surface rather than the object as a whole.

To further support its position, defendant points to figures depicting the invention's preferred embodiment. Although defendant correctly claims that these figures depict cylindrical electrodes that have ridges only on their cylindrical side surfaces, such figures cannot be used to read into the claim a limitation that it does not contain. *See* Fuji Photo Film Col, Ltd. v. International Trade Comm'n, 386 F.3d 1095, 1106 (Fed.Cir.2004). Claim 1 is quite clear in stating that the ridges that comprise the invention must extend along the electrode rather than along the electrode's longest side surface. This usage leaves no room for defendant's narrower interpretation.

Defendant alternatively argues that the patent's prosecution history demonstrates that along means "extending over the side surface." This argument is based on the history of the amendment to the original application that added the phrase "extending along said electrode" to what ultimately became claim 1. The original application included a claim 1 ("original claim 1"), which was ultimately abandoned, and a claim 10 ("original claim 10"), which ultimately became what is now claim 1. Original claim 1 provided in pertinent part for "relief means on said side surface [of the electrode] extending over a portion of said side surface intermediate said ends so as to provide a path for arcing...." Original claim 10 initially provided in pertinent part for an "electrode having at least one ridge formed thereon, said ridge being located substantially in said arc chamber." The examiner rejected both claims based in part on Patent No. 3,296,410 (the "Hedger Patent"), which describes an "induction plasma generator that has as one element an electrode with a barbed projection at one end. In response, the applicants explained that their claims differed from the Hedger Patent because they claimed a ridge which, unlike the barb claimed in the Hedger Patent, provided a "definition of length" and a "path to direct the arc." They went on to state that

Since independent claim 1 already recites that the relief means on the side surface is "extending over a portion of said side surface intermediate said ends *so as to provide a path for arcing* between the electrode ..." (emphasis added), it is believed that this amended claim defines over the Hedger reference. By this amendment, dependent claim 10 FN2 has been amended to recite that the ridge is "extending along said electrode means."

FN2. Although this reference refers to original claim 10 as a dependant claim, all other references to the claim in the prosecution history refer to the claim as an independent claim. Moreover, the claim does not appear to be a dependant claim because it does not contain, as it must, a "reference to a claim previously set forth." 35 U.S.C. s. 112. Accordingly, I assume for purposes of analysis that original claim 10 was intended to be an independent claim.

Pl.'s Response to Oct. 16, 1987 P.T.O. Official Action at 3. Defendant argues that this passage demonstrates that the patentee incorporated original claim 1's side surface limitation into original claim 10 when it amended that claim.

I am unpersuaded by the defendant's argument. The Federal Circuit has repeatedly warned district courts that "it is inappropriate to limit a broad definition of a claim term based on prosecution history that is itself ambiguous." Mars Inc. v. H.J. Herz Co. L.P, 377 F.3d 1369, 1377 (Fed.Cir.2004); *Inverness Med. Switz. GmbH v. Warner,* 309 F.3d at 1382. The prosecution history cited by the defendant does not come close to providing unambiguous support for its position. If, as defendant claims, the applicants intended original claim 10 to include original claim 1's side surface limitation, one would expect that the applicants would have explicitly included the side surface limitation in the amendment to original claim 10. Moreover,

although the applicants' intentions are not clear, a fair reading of the above-cited passage suggests that they most likely intended the amendment merely to emphasize that their invention, unlike the Hedger Patent, taught a ridge that had a "definition of length" and therefore provided a path for arcing. In short, the evidence relied on by defendants is too weak to justify a reading of "along" that is contrary to its customary meaning.FN3 Accordingly, I decline to adopt either of defendant's proposed interpretations of "along."

FN3. Plaintiff asserts that "along" is synonymous with "on." Thus, from its perspective, the orientation of the ridges is irrelevant. I decline to adopt this proposed construction because I am not satisfied that I must do so to resolve this case. I lack the power to give advisory opinions concerning the meaning that patent terms may have in cases that are not before me. Accordingly, until it becomes clear that I must either adopt or reject plaintiff's proposed interpretation to resolve this case, I decline to do so. It is sufficient at the present time to merely state that defendant's proposed interpretations are unjustifiably narrow.

C. "*So as to Provide a Path For Arcing Thereby Producing a Longer Wearing Electrode*

Two additional questions remain regarding the proper interpretation of claim 1. Both concern the phrase "so as to provide a path for arcing, thereby producing a longer wearing electrode." Plaintiff asks me to construe the phrase "thereby producing a longer wearing electrode." Defendant asks me to construe the phrase "so as to provide a path for arcing." Because I conclude that the phrase "thereby producing a longer wearing electrode" merely describes an expected result of the invention claimed in the '210 patent, I hold that it does not limit the patent's scope. On the other hand, because the plaintiff concedes that the phrase "so as to provide a path for arcing" is an explicit claim limitation, I accept that conclusion without undertaking further analysis.

1. "*Thereby producing a longer wearing electrode*"

Claim 1 states that ridges shall be formed along an electrode "thereby producing a longer wearing electrode." Plaintiff argues that this phrase does not further limit what is otherwise claimed under the patent. I agree.

In *Texas Instruments v. United States Int'l Trade Comm'n,* the Federal Circuit held that "a 'whereby' clause that merely states the result of a limitation in the claim adds nothing to the patentability or substance of the claim." 988 F.2d at 1172 (citing Israel v. Cresswell, 166 F.2d 153, 156 (C.C.P.A.1948)). That is because stating the result of an invention in a patent does not affect its patentability. Israel, 166 F.2d at 156.

In this case, the "thereby" clause, like the "whereby" clauses in *Texas Instruments* and *Israel,* merely states one result of the '210 patent: a longer wearing electrode. I therefore conclude that the phrase does not limit plaintiff's patent claims in any way.

2. *Construing "so as to provide a path for arcing"*

Claim 1 also states that ridges shall be carved into its electrode "so as to provide a path for arcing." Defendant argues that this phrase should be construed as a functional limitation on the scope of the subject matter protected by plaintiff's patent. Plaintiff concedes this point. I therefore accept this construction.

IV. *CONCLUSION*

For the reasons set forth in this Memorandum and Order, I:(1) adopt the definition of "arc chamber" that is provided in the specification; (2) reject defendant's proposed contextual interpretations of "along"; (3) determine that the phrase "thereby producing a longer wearing electrode" does not operate as a claim limitation; and (4) agree that the phrase "so as to provide a path for arcing" serves as a functional limitation on the scope of claims.

SO ORDERED.

D.N.H.,2004.
Thermal Dynamics v. Tatras, Inc.

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