United States District Court,
W.D. Washington, at Seattle.

Robert W. CARVER and Diana Carver,
Plaintiffs.
v.
VELODYNE ACOUSTICS, INC,
Defendant.

Nos. C00-1477L, C00-1194L

June 14, 2002.

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ORDER RE: *MARKMAN* HEARING

ROBERT S. LASNIK**, District Judge.**

On April 18, 2002, the Court held a *Markman* hearing to assist it in construing some of the claims at issue in the above-captioned case as well as Case No. C00-1477L. This Order resolves disputes between the parties as to the meaning of some of the terms in the claims. FN1

FN1. Claim construction is a matter of law. *See* Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed.Cir.1995).

BACKGROUND

Plaintiffs Robert and Diana Carver ("the Carvers") own rights to U.S. Patent Nos. 5,937,074 (the "'074 patent") and 6,130,954 (the "'954 patent"). They are suing Velodyne Acoustics, Inc. ("Velodyne") and Audio Products International Corp. ("API") for infringement. The two patents involve substantially the same invention: a small subwoofer with high sound volumes. The patents improved on existing speaker design by allowing small-sized speakers to deliver loud, low-frequency sounds. The invention accomplishes this by increasing the peak-to-peak excursion of the voice coil of the driver substantially over the prior art. This movement, in turn, generates a high "back emf." FN2 This high back emf limits the current in the voice coil

and precludes overheating.FN3

FN2. The back emf (i.e. electromotive force) is the voltage induced by the movement of the voice coil opposing the electrical signal being supplied by the amplifier.

FN3. This general description is extracted from claim 43 of the ' 074 patent and from statements made at the *Markman* hearing. It is intended to provide an overview of the invention rather than construe any of the terms in the claims. Claim construction follows in the next section.

ANALYSIS

Since the issues raised by the parties require resolution through repeated application of some key legal principles, these are discussed at the outset:

I. Limitations of a patent: Statutory limitations in 35 U.S.C. 112 para. 2 provide that claims are required to be "particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." The statutory requirement's "primary purpose ... is to guard against unreasonable advantages to the patentee and disadvantages to others arising from uncertainty as to their respective rights." Athletic Alternatives v. Prince Mfg., 73 F.3d 1573, 1981 (Fed.Cir.1996) (internal modifications and quotation marks omitted). The policy behind these requirements includes encouraging innovation: "The limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others and the assurance that the subject of the patent will be dedicated ultimately to the public." General Electric Co. v. Wabash Appliance Corp., 304 U.S. 364, 369 (1938) (internal quotation marks omitted). However, limitations may be expressed in different ways: "A patent applicant is free to recite features of an apparatus either structurally or functionally." In re Schreiber, 128 F.3d 1473, 1478 (Fed.Cir.1997).

II. Use of intrinsic evidence, particularly the specification: In construing claims, the court looks at the intrinsic evidence, including the language of the claim, the specification and the prosecution history. *See* Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996). The general rule is that "[r]eferences to a preferred embodiment, such as those often present in a specification, are not claim limitations." Laitram Corp. v. Cambridge Wire Cloth Co., 863 F.2d 855, 865 (Fed.Cir.1988). "Ordinarily a claim element that is claimed in general descriptive words, when a numerical range appears in the specification and in other claims, is not limited to the numbers in the specification or the other claims." Modine Mfg. Co. v. United States Int'l Trade Comm'n, 75 F.3d 1545, 1551 (Fed.Cir.1996). Moreover, "a claim is not invalid simply because it embraces subject matter that is not specifically illustrated." Wang Laboratories, Inc. v. America Online, Inc., 197 F.3d 1377, 1383 (Fed.Cir.1999). However, a claim may be limited based on its prosecution history. "Prosecution history estoppel requires that the claims of a patent be interpreted in light of proceedings in the PTO during the application process." *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.,* 535 U.S. ----, No. 00-1543, slip. op. at 8 (May 28, 2002).

III. When the specification limits claims: "Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question." SciMed Life Sys. v. Advanced Cardiovascular Sys., 242 F.3d 1337, 1341 (Fed.Cir .2001). Moreover "when the preferred embodiment is described in the specification as

the invention itself, the claims are not necessarily entitled to a scope broader than that embodiment." Modine Mfg., 75 F.3d at 1551. When there is no basis for construing an invention to include features not described in the specification, the claims are limited accordingly. *See* Toro Co. v. White Consolidated Industries, 199 F.3d 1295, 1302 (Fed.Cir.1999).

IV. Words of degree in a claim: Many of the issues raised by the parties involve interpretation of words of degree. With respect to such terms, the Federal Circuit has stated:

Definiteness problems often arise when words of degree are used in a claim. That some claim language may not be precise, however, does not automatically render a claim invalid. When a word of degree is used the district court must determine whether the patent's specification provides some standard for measuring that degree. The trial court must decide, that is, whether one of ordinary skill in the art would understand what is claimed when the claim is read in light of the specification.

Settle Box Co. v. Industrial Crating & Packing, Inc., 731 F.2d 818, 826 (Fed.Cir.1984). However, *Seattle Box* makes clear that the specification may clarify that a word such as "substantially" may be interpreted through its relationship to another term or concept and need not be construed to apply to certain numerical limits. *See id*.

V. Use of extrinsic evidence: "Extrinsic evidence may also be considered, if needed to assist in determining the meaning or scope of technical terms in the claims." Pall Corp. v. Micron Separations, 66 F.3d 1211, 1216 (Fed.Cir.1995). Extrinsic evidence is that evidence which is external to the patent and file history, such as expert testimony, inventor testimony, dictionaries, and technical treatises and articles. Vitronics, 90 F.3d at 1584. In Pitney Bowes Inc. v. Hewlett-Packard Co., 182 F.3d 1298 (Fed . Cir.1999), the Federal Circuit clarified where such extrinsic evidence is useful:

[I]it is entirely appropriate, perhaps even preferable, for a court to consult trustworthy extrinsic evidence to ensure that the claim construction it is tending to from the patent file is not inconsistent with clearly expressed, plainly apposite and widely held understandings in the pertinent technical field. This is especially the case with respect to technical terms, as opposed to non-technical terms in general usage or terms of art in the claim-drafting art, such as "comprising". Indeed, a patent is both a technical and a legal document. While a judge is well-equipped to interpret the legal aspects of the document, he or she must also interpret the technical aspects of the document, and indeed its overall meaning, from the vantage point of one skilled in the art.

Id. at 1309. However, a court should not forget that "the claims and the written description remain the primary and more authoritative sources of claim construction. Thus, they always must be considered and where clear must be followed." Mantech Envtl. Corp. v. Hudson Envtl. Servs., 152 F.3d 1368, 1373 (Fed.Cir.1998).

VI. Means plus function claims: A means plus function claim is limited by 35 U.S.C. 112 para. 6: "An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." Such a claim usually contains language designating the "means" required to achieve a "function." However, "lack of such language does not prevent a limitation from being construed as a means-plus-function limitation." Mas-Hamilton Group v. LaGard, Inc. 156 F.3d 1206, 1214 (Fed.Cir.1998).

VII. The Court's role: "The *Markman* decisions do not hold that the trial judge must repeat or restate every claim term in order to comply with the ruling that claim construction is for the court. Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy." United States Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554, 1568 (Fed.Cir.1997).

With these principles in mind, the Court will consider each of the disputed terms:

1. "maximum peak-to-peak excursion strokes substantially in excess of 0.6 inches" ('074 patent**, claim 43**) FN4

FN4. The Order provides an example, or, in some cases examples, of where the disputed terms appear(s); the analysis applies to other usages of the terms used in the same context.

The disputed term refers to the peak-to-peak movement of the voice coil. Defendants would like the Court to construe the above language such that it is limited to a maximum peak-to-peak excursion stroke of between 2 and 2.5 inches. (Velodyne's Claim Construction Brief at 11; FN5 API's Opening Claim Construction Brief at 19.) The Carvers propose a reading of 50 percent in excess of the peak-to-peak movement of the prior art they disclosed in the patent i.e. 0.9 inches or greater.FN6 (Plaintiffs' Opening Patent Claim Interpretation Brief, Ex. G "Plaintiffs' Claim Construction of '074 Patent" at 13.)

FN5. Velodyne would like the Court to read the maximum peak-to-peak excursion value to be 2.5 inches.

FN6. According to the patent, prior art drivers had a peak-to-peak stroke of between 0.4 and 0.6 inches. ('074 patent, Col. 2, Ln. 26-27.)

It is true that the term "substantially greater than" in its ordinary sense does not connote a specific percentage above another number. However, the Court must examine the claims "from the vantage point of one skilled in the art." Pitney Bowes Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1309 (Fed.Cir.1999). The *Markman* hearing made clear that to a person skilled in the art of loudspeakers, the term *does* have a special meaning. The Carvers' invention provides increased power in part by moving the voice coil through a greater range than that contemplated by prior art. At the hearing, plaintiffs' expert Richard G. Plourde ("Plourde"), stated that doubling the power of the speakers over the prior art would be considered substantial by a person skilled in the art. (4/18/2002 Transcript of Markman Hearing at 78-81.) Plaintiffs' reading of the claim-a maximum peak-to-peak excursion of the voice coil of 0.9 inches and over-corresponds to double the power of the disclosed prior art subwoofers (with a maximum peak-to-peak excursion of 0.6 inches). If doubling of the power would provide adequate notice to a person with skills in the art, it stands to reason that a significant change in a variable that causes this doubling of power also provides adequate notice to a person skilled in the art. Indeed, Plourde's testimony established this at the *Markman* hearing. (4/18/2002 Transcript at 81.) The Carvers' patents recognize and utilize the relationship between the movement of the coil and the back emf. This relationship, which is described in claim 43, is not limited merely to the movement of the voice coil between the peak-to-peak excursion limits specified by the defendants, which are a small subset of points in a spectrum of possibilities.

The Court holds that as understood by a person of ordinary skill in the art of loudspeakers and subwoofers, plaintiffs' reading of the claim as it relates to the movement of the voice coil is reasonable. Therefore, the disputed language should be read to mean peak-to-peak excursion equal to or greater than 0.9 inches.

2. "establishing a voice coil back emf that is substantially in excess of 13 volts rms when a 25 Hertz signal is supplied to said voice coil at an amplitude sufficient to cause said maximum peak-to-peak excursion" ('954 Patent, **claim 11)**

The language refers to the back emf established when the subwoofer is in operation.

Defendants have proposed limiting the language to voice coil back emf that is at least 77.8 volts peak or 55 volts rms. (Velodyne's Opening Claim Construction Brief at 14; API's Opening Claim Construction Brief at 8-9.) Plaintiffs propose construing the language of the claim to include a back emf of 19.5 volts rms or greater. (Plaintiffs' Opening Patent Claim Interpretation Brief, Ex. H "Plaintiffs' Claim Construction of '954 Patent" at 5.)

As already noted, the movement of the voice coil generates a back emf. This back emf limits the current in the voice coil and precludes overheating. Here, the source of notice provided by the claim to a person skilled in the art is the reduction in the heat dissipated. (4/18/2002 Transcript at 82-83.) Plourde testified at the *Markman* hearing that the heat dissipated is reduced by a factor greater than 2 when the voice coil back emf is increased by 50 percent. Plourde's uncontroverted testimony was that the heating of the voice coil is a significant factor in speaker design. (4/18/2002 Transcript at 72-74). He also testified that a reduction by a factor of two in this variable would be considered substantial to a person of ordinary skill in the art. (4/18/2002 Transcript at 74, 82-83.) Plaintiffs' reading of the disputed terms to mean a back emf of 19.5 volts rms or greater is a 50 percent increase in emf from the disclosed prior art. Since such an emf would reduce the heating of the coil by factor of two, the Court holds that the claim language provides sufficient notice to a person skilled in the art that this is what the claim means. Plaintiffs' reading is adopted.FN7

FN7. Velodyne also has sought to limit the back emf characteristics of plaintiffs' invention on the basis that claim 1 of the '074 patent states that the back emf is to be "at a level sufficiently high relative to maximum voltage output of said amplifier so as to limit the input current to a level to preclude overheating of the voice coil members." Velodyne claims that the term "preclude overheating" is unclear to a person with ordinary skill in the art. Velodyne's argument is unpersuasive. Plourde's testimony made clear that reducing overheating is a common problem confronted by the designers of speakers. (4/18/2002 Transcript at 77-78.) Overheating of the voice coil simply means, in this context, that the current in the coil is increased to the extent that it generates enough heat to fail. (4/18/2002 Transcript at 77.)

3. "maximum pressure ... is substantially greater than 0-2 lbs/in ^{2}" ('074 patent**, claim 43)**

The disputed term refers to the air pressure in the cabinet. Defendants would like to limit the reading of this term to peak cabinet pressure between 1.5 psi and 3.0 psi. (API's Opening Claim Construction Brief at 6; Velodyne's Opening Claim Construction Brief at 12.) Plaintiffs have proposed reading the term so that the peak cabinet pressure is equal to or greater than 0.3 psi. (Plaintiffs' Claim Construction of '074 Patent at 14.)

The analysis discussed with respect to the peak-to-peak excursion is directly applicable to this cabinet

pressure. At the *Markman* hearing, it was made clear to the Court that the cabinet pressure is directly related to the power output. In fact, an increase in cabinet pressure (at the maximum excursion of the voice coil) of 50 percent is correlated with a doubling of the power output. (4/18/2002 Transcript at 79.) Plaintiffs' proposal is that the term "substantially in excess of" be read to mean an increase of 50 percent in the cabinet pressure over prior art. It is reasonable and is adopted.

4. "generally circular surround formed of flexible, resilient, self-supporting material ... the thickness of said surround being substantially in excess of 0.02"" ('954 patent**, claim 1)**

Defendants have claimed that the claim language is ambiguous and the claim should therefore be limited to the specification described in the patent. (API's Opening Claim Construction Brief at 20; Velodyne's Opening Claim Construction Brief at 15.) Plaintiffs assert that the claim should be read to mean a thickness of 0.03" and greater. (Plaintiffs' Claim Construction of ' 954 Patent at 2.)

In this case, the *Markman* hearing made clear that a person skilled in the art would not get adequate notice from the language of the claim.FN8 In fact, when asked how a person skilled in the art would know that the claim covered a surround with a thickness less than 0.1", Plourde could only point to the disclosed *prior art* which had a thickness of 0.02". (4/18/2002 Transcript at 111-12.) However, Plourde did not provide any relationship between power and surround thickness as he had done for the voice coil excursion and cabinet pressure. The Court therefore holds that the language "substantially in excess of 0.02"" does not provide notice to a person skilled in the art. This is a situation in which there is no basis for reading the claims relating to the thickness of the surround in a manner more expansive than the specification itself. In accordance with the legal rules discussed above, the Court will therefore limit such claims to the specification itself i .e. "a minimum of about 0.1" in thickness ranging up to about 0.14" in thickness or more." (' 954 patent, Col. 18).

FN8. The Order should not be read to mean that the Court believes such a relationship does not exist. The Court's job is to figure out the notice provided to a person with ordinary skills in the art by the language in the claims.

5. "the diameter of said edgeroll being selected to allow a maximum peak-to-peak excursion of the movable driver components that substantially exceeds 0.6"" ('954 patent**, claim 1)**

Velodyne's contention is that this claim language is ambiguous. (Velodyne's Opening Claim Construction Brief at 17.) It is clear, however, that the diameter of the edgeroll is directly related to the movement of the voice coil, i.e. the claim has a functional limitation. Since the Court has, in this Order, read the claim language relating to the voice coil movement such that the latter is not vague or ambiguous, the Court holds that the above language pertaining to the diameter of the edgeroll is also not ambiguous.

6. "a flexible resilient suspension for supporting said speaker cone and said voice coil member" ('074 patent**, claim 43)**

Velodyne asserts that the quoted language should be interpreted as a "means plus function" claim. (Velodyne's Opening Claim Construction Brief at 21.) The Carvers dispute this, asserting that "the structure (geometry) of the surround, its material and the function performed are recited in the claims." (Plaintiffs' Second Claim Interpretation Brief at 23.) The Court agrees with Velodyne because the claim in question does not provide a description of the "flexible resilient suspension." Neither have plaintiffs shown that the

term has "a well-understood structural meaning in the art." Mas-Hamilton, Group, 156 F.3d at 1215. Since the claim merely recites a function for the suspension, it is a "means plus function" claim without the formal language that usually accompanies such claims. It is therefore to be construed as such i.e. limited to the structure and material in the specification.

7. "amplifier" ('074 Patent, **claim 1)**

API claims that the term "amplifier" on its own does not enable the invention and proposes limiting the term to a "tracking downconverter amplifier, capable of delivering 2,700 watts rms into a nominal 4 ohm load, and capable of swinging 104 volts rms." (API's Opening Claim Construction Brief at 21.) However, the purpose of the amplifier is to provide sufficient current to flow through the voice coil to overcome the back emf and provide maximum peak-to-peak excursion that substantially exceeds 0.6". When this is understood, it is clear that the term as used in the plaintiffs' claims should not be limited to the construction proposed by API, particularly since the Court has ruled that the terms defining the peak-to-peak excursion of the voice coil and the back emf of the invention are not to be constrained by the strict limits proposed by the defendants. If any limits are to be read into the term "amplifier", they are to be inferred from the functional limitations imposed by a requiring a maximum peak-to-peak excursion that substantially exceeds 0.6", something plaintiffs have conceded. (Plaintiff's Second Claim Interpretation Brief at 25.) Barring this limitation, plaintiffs's claims need not define amplifier more specifically.

8. "cabinet air volume is sufficiently small relative to said maximum air displacement volume so that the peak cabinet pressure at maximum peak-to-peak excursions is substantially greater than 0.2 lbs/in ^{2}" ('074 Patent, **claim 1)**

API asks the Court to construe the term "sufficiently" to mean only 4 or 5 times the maximum air displacement volume. (API's Opening Claim Construction Brief at 18.) However, as plaintiffs point out, the cabinet air volume is constrained by a functional limitation imposed on the peak cabinet pressure (since pressure is inversely proportional to volume). The Court already has read the limitations on peak cabinet pressure such that it must equal or exceed 0.3 lbs/in ^{2}. Imposing a separate limitation on the cabinet air volume may not only conflict with the restriction already imposed, but would unnecessarily limit the invention to a certain size. The Court rejects API's reading of the claim. Instead, the Court holds that the claim as it stands is to be read as constrained by the limitations on the cabinet pressure.

CONCLUSION

For the foregoing reasons, the Court construes the disputed terms as described above.

W.D.Wash.,2002.
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