United States District Court,
D. Connecticut.

**PITNEY BOWES, INC,**
Plaintiff.
v.
**HEWLETT-PACKARD CO,**
Defendant.

No. CIV.A.3-95CV1764(JCH)

**May 1, 2001.**

Action was brought for infringement of a patent describing a method for generating printed images. After remand, 182 F.3d 1298, the District Court, Hall, J., construed various terms at issue from claims of the patent-in-suit, holding that: (1) "spots of different sizes" were areas of discharge on the photoreceptor that differed in size where such a difference in size was not caused by grouping together the same sized spots; (2) "controlling a parameter of the light beams" included controlling the length of time that the beam of light remains in contact with the photoreceptor; (3) "generated shapes" were letters, numbers, or other characters formed with fewer jaggies than under the prior art methods; and (4) "the appearance of smoothed edges" meant avoiding roughened edges and improving character formation so that the generated shapes have less of an uneven appearance or less "jaggies" than under prior printing methods.

Claims construed.

3,573,789, 4,095,216, 4,214,157, 4,310,757, 4,386,272. Cited.

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**MARKMAN RULING ON CLAIMS 1, 2, AND 3 OF** U.S. PATENT NO. 4,386,272

HALL**, District Judge.**

## I. INTRODUCTION

This is an action for infringement and damages brought pursuant to 35 U.S.C. s. 271(a). It concerns the alleged infringement of a patent describing a method for generating printed images. After more than five years of proceedings in this case, the parties have briefed the remaining claim construction issues, and the court will now construe terms at issue from Claims 1, 2, and 3 of the patent-in-suit, U.S. Patent No. 4,386,272 ("the 272 patent").

## II. PROCEDURAL BACKGROUND

The plaintiff, Pitney Bowes, Inc. ("Pitney"), filed its complaint against the defendant, Hewlett-Packard Co. ("Hewlett"), on August 23, 1995. In particular, Pitney alleged that Claims 1, 2, and 3 of the 272 patent were infringed by laser printers that Hewlett manufactured, used, or sold. Complaint, para. 5 [Dkt. No. 1]. On August 11, 1997, following discovery, Hewlett filed a motion for summary judgment of non-infringement on claim construction of the term "plurality of beams." On September 3, 1997, Pitney cross-moved for summary judgment with respect to construction of the same term. On November 7, 1997, Hewlett filed an additional summary judgment motion on non-infringement based on the claim construction of "spots of different sizes" and another motion for summary judgment on invalidity. The district court (AVC) ruled against Hewlett on "plurality of beams" and on its invalidity motion. *See* Pitney Bowes, Inc. v. Hewlett-Packard Co., 69 F.Supp.2d 309 (1998) [hereinafter *Pitney I* ]. The court ruled in favor of Hewlett on "spots of different sizes," and the case was dismissed on this basis. *See* Pitney Bowes, Inc. v. Hewlett-Packard Co., 69 F.Supp.2d 325 (1998) [hereinafter *Pitney II* ].

Pitney appealed the ruling of the district court and, on June 23, 1999, the Federal Circuit reversed the lower court's ruling, remanding the case for trial. Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298 (Fed.Cir.1999) [hereinafter *Pitney III* ]. On July 7, 1999, Hewlett filed a Request for Reexamination of the 272 patent with the Patent and Trademark Office ("PTO"). At the request of Hewlett, the court stayed the case until the reexamination of the patent was complete. As a result of the reexamination, the PTO confirmed the validity of the 272 patent. The case is now back before this court and ready to proceed to trial.

## III. FACTS

The 272 patent was issued on May 31, 1983 to Frank T. Cheek, Jr. and Ronald P. Sansome, and was assigned to Pitney. It is entitled "Apparatus and Method for Generating Images by Producing Light Spots of Different Sizes." The technology described in the patent is designed for application in a laser printing device.

Laser printers convert electronic information into hard copy representations of images and characters. As the Federal Circuit explained:

In general, laser printers operate by directing laser light onto a photoreceptor. Specifically, the photoreceptor consists of a drum, the surface of which is evenly covered with an electrical charge. When a beam of laser light strikes the drum, it dissipates a small area of the charge on the drum surface. This discharged area attracts charged toner, which is then transferred from the drum to the paper (by melting the toner particles into the paper fibers), thereby creating the final, permanent image. The photoreceptor drum is then cleaned and recharged so that the process can begin again. Each image (such as a letter or number) is composed of hundreds or thousands of these small dots of toner particles.

Pitney III, 182 F.3d at 1301.

When the printing process uses similarly sized toner dots or spots, FN1 the corners and edges of some characters can have an uneven appearance, a problem known in the printing industry as "jaggies." *Id*. The 272 patent seeks to address the problem of "jaggies" by teaching methods and an apparatus for varying toner dot size. 272 pat., col. 6, ll. 4-5. The methods and the apparatus used to create different sized spots of discharged areas are explained in Claims 1-3, the only claims at issue. They claim:

FN1. Both parties agree that the terms 'spots' and 'dots' have identical meanings when referring to a printed area.

1. A method of producing on a photoreceptor an image of generated shapes made up of spots, comprising: directing a plurality of beams of light towards a photoreceptor, each beam of light generating a spot on the photoreceptor and controlling a parameter of the light beams to produce spots of different sizes whereby the appearance of smoothed edges are given to the generated shapes.
2. The method of claim 1 wherein the parameter controlled is light beam intensity.

3. Apparatus for producing on a photoreceptor an image of generated shapes made up of spots, comprising: means for directing a plurality of beams of light toward a photoreceptor to generating [sic] a plurality of spots on the photoreceptor and means for generating spots of different sizes whereby the appearance of smoothed edges are given to the generated shapes.

272 pat., col. 6, ll. 21-41.
The 272 patent is the third patent claiming priority from an application filed by Pitney on July 7, 1978. The first two patents issued under the application were U.S. Patent No. 4,214,157 ("the 157 patent"), which claims an invention for correcting imperfections in the polygonal mirror during the scanning process, and U.S. Patent No. 4,310,757 ("the 757 patent"), which claims an invention for correcting the scanning speed during the scanning process. The 272 patent resulted from a continuation application filed in connection with the application that issued as the 757 patent. The 272 patent contains an identical, or virtually identical, description of the preferred embodiment as is contained in the 157 and 757 patents.

Before the 272 patent issued, Pitney filed a continuation-in-part application in connection with the 757 patent that was issued as U.S. Patent No. 4,809,021 ("the 021 patent"). A continuation-in-part application means that some disclosure was carried forward from the specification of the earlier application, and new disclosure was also added. Figure 1 of the 272 patent and the disclosure about dots of different sizes in the specification of the 272 patent were carried forward into the specification of the 021 patent.

## IV. LEGAL STANDARD

[1] All patents must "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. s. 112, para. 2. The claims "demarcate the boundaries of the purported invention." Athletic Alternatives, Inc. v. Prince Mfg., Inc., 73 F.3d 1573, 1581 (Fed.Cir.1996) (citation omitted).

[2] [3] The proper construction of patent claims is determined by the court as a matter of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed.Cir.1995). Claim terms are to be given their ordinary and

customary meaning unless it is apparent that the inventor expressly intended a different meaning. Hoechst Celanese Corp. v. BP Chems. Ltd., 78 F.3d 1575, 1578 (Fed.Cir.1996). In construing the claims, the court considers the claims, the specification, and the prosecution history of the patent. Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996).

[4] [5] [6] The court looks first to the claims themselves. *Id*. The court should then "review the specification to determine whether the inventor has used any terms in a manner inconsistent with their ordinary meaning." *Id*. In addition, the court should consider the prosecution history. *Id*. The prosecution history limits the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution. Southwall Techs., Inc. v. Cardinal IG Co., 54 F.3d 1570, 1576 (Fed.Cir.1995). If the intrinsic evidence does not sufficiently resolve ambiguities, the court may receive extrinsic evidence in order to determine the true meaning of the language employed in the patent as it would be interpreted by those skilled in the art. *See* Markman, 52 F.3d at 980-81 (citations omitted). Extrinsic evidence may not be used, however, to support an interpretation that contradicts the plain language of the claims. Id. at 981.

## V. INTERPRETATION OF DISPUTED CLAIM TERMS

In its opening memorandum regarding claim construction issues, Hewlett presented eight terms from Claims 1, 2, and 3 of the 272 patent that it argues must be construed before this case can proceed to trial. *See* Hewlett-Packard Co.'s Opening Mem. Regarding Claim Constr. Issues [Dkt. No. 265]. Hewlett argues that these terms were not previously addressed by the Federal Circuit or the district court. Pitney responds that each of the terms at issue have already been construed by at least one decision in this case and, therefore, the court should adopt the claim constructions already established. *See* Pl. Pitney Bowes' Mem. on Claim Const. [Dkt. No. 268]. The court will address each of the terms raised by Hewlett in its Opening Memorandum Regarding Claim Construction Issues.

### A. Spots of Different Sizes

[7] The term "spots of different sizes" is used in both Claim 1 and Claim 3 of the 272 patent. Hewlett argues that the term "spots of different sizes" must be construed by the court because, although the Federal Circuit specifically construed this phrase, it did not address how the specific size of a single spot is determined in order to determine if the spots are of different sizes. Pitney responds that the Federal Circuit has already defined "spots of different sizes" and that its definition should be adopted.

In 1997, Hewlett filed a motion for summary judgment in which it argued that the accused Hewlett products do not meet the "spots of different sizes" limitation because "spots" should be interpreted to be "light spots" rather than areas of discharge on the photoreceptor. Judge Covello granted the motion, agreeing that "spots" should be limited to "light spots." Pitney II, 69 F.Supp.2d at 328-31. The Federal Circuit vacated Judge Covello's ruling, finding that he had misconstrued the claim term "spots of different sizes." Pitney III, 182 F.3d at 1313. "The dispute centered on whether the term 'spots of different sizes' refers to the spots of light generated by the light beam on the photoreceptor ... or describes the spots of discharged area on the photoreceptor that result from contact with the light beam ...." Id. at 1303.

In construing the term, the Federal Circuit found that the term "spot" was used in several portions of the patent and the meaning varied depending on its use. "[W]here the language of the written description is sufficient to put a reader on notice of the different uses of a term, and where those uses are further apparent from publicly-available documents referenced in the patent file, it is appropriate to depart from the normal rule of construing seemingly identical terms in the same manner." Id. at 1311. The Federal Circuit found

that, in the context of the prosecution history, a reader was on notice that the term "spot" has different meanings in the written description depending on its context. *Id*. Turning to the disputed part of the written description, the Federal Circuit found that "spot size" means "the area of discharge on the photoreceptor." *Id*. The court held "that the 'spots' that can be 'of different sizes' are the spots of discharged area on the photoreceptor, not the spots of light produced by the laser beam." *Id*. at 1313.

Hewlett argues that the Federal Circuit's definition does not assist the fact finder in determining whether a given method or apparatus produces "spots of different sizes" because it does not address how to determine the size of a spot. According to Hewlett, most laser printers do not print with discrete, circular spots-they print with line segments. Hewlett argues that if Pitney's definition is adopted, the fact finder will not know, for example, whether each line segment is a single spot or each line segment is comprised of a number of spots.

Pitney responds that, although the Federal Circuit did not expressly address the actual size of the claimed "spots of different sizes," its definition is sufficient to define the term. Pitney thus proposes that "spots of different sizes" are "spots of discharged area on the photoreceptor that make up the generated shapes, which have the appearance of smoothed edges." According to Pitney, the 272 patent teaches how to combat the problem of "jaggies," which results from using similarly sized toner spots. In order to combat the problem of "jaggies," a printer must be able to produce spots that are smaller than the nominal spot size for that printer. The nominal spot size is based on the number of spots the printer prints per inch. For example, a 300 dpi printer prints a 300 spots per inch. To smooth "jaggies," such a printer must be able to print spots smaller than the spot necessary for a 300-spots-per-inch spot. Thus, according to Pitney, the meaning of "spots of different sizes" is clear from the Federal Circuit's definition.

In both Claim 1 and Claim 3, "spots of different sizes" are produced by the method or apparatus for the purpose of providing the appearance of smoothed edges. Neither of the claims limit how the size of the spot is determined. Thus, the ordinary meaning of "spots of different sizes" is simply spots that differ in size, regardless of the method used to determine that the sizes are different.

Neither the specification nor the prosecution history of the 272 patent limit how the size of the spot is determined. However, Pitney did limit the determination to some extent during the prosecution history of the 021 patent. It is appropriate to consider the prosecution of related applications in construing terms common to both the patent under consideration and the related application. Jonsson v. The Stanley Works, 903 F.2d 812, 818 (Fed.Cir.1990). The disclosure about "spots of different sizes" in the specification of the 272 patent was carried forward into the specification of the 021 patent. Therefore, the prosecution history of the 021 patent and any construction of the term "spots of different sizes" contained in the 021 patent are appropriately considered in construing this claim.

The PTO granted a request for reexamination of the 021 patent based, at least in part, on the existence of IBM's Sharp patent. Declaration of Perry M. Goldberg in Support of Hewlett-Packard Company's Opening Mem. Regarding Claim Const. Issues, Dkt. No. 267 [hereinafter HP Ex.], Ex. M at 2. The Sharp patent discloses a method and apparatus for increasing the resolution of an image by using fiber optics to direct beams of light to a film photoreceptor. U.S. Patent No. 3,573,789 ("Sharp patent"), HP Ex. C. Through a "Resolution Expander," data bits, or pixels, are expanded into several data bits, or sub-pixels. Sharp pat., col. 5, ll. 60-col. 6, ll. 2. Thus, the printer is no longer only limited to filling all or none of an original pixel. A fraction of the area of the original pixel can be filled, resulting in improved resolution.

In the reexamination of the 021 patent, Pitney argued that the Sharp patent did not disclose the use of "dots of different sizes." According to Pitney, the term "dots" means the basic, unitary elements comprising the printed characters or image and the basic, unitary element disclosed in the Sharp patent is a sub-pixel that is 1/4 an original pixel. Pitney argued that groups of sub-pixels could not be considered "dots of different sizes" because they were merely groupings of the same sized dots.

The examiner found that Sharp does use dots of different sizes because, when compared with the size of the original pixel, the sub-pixels were a range of four different sizes: 1/4 dot, 1/2 dot, 3/4 dot, and full dot. Pitney appealed and the Board of Patent Appeals and Interferences found that Sharp could not be considered to have dots of different sizes because the term "dots" is used with regard to the different sizes of the basic printing units. Pitney thus admitted, and the Board of Patent Appeals agreed, that the 021 patent is devoid of any suggestion that different groups of same-sized dots are to be considered dots of different sizes. The court concludes that a grouping of same sized spots that creates a larger spot is not a spot of a different size for purposes of the 272 patent.

Beyond this limitation, Hewlett argues that the size of each spot should be defined by reference to the basic, unitary elements in the on-off signal that make up each image. However, because the 272 patent discloses a method and apparatus for varying spot sizes by varying the intensity, time, or beam diameter of the individual light beams that create the spots, Hewlett's proposed definition for determining whether spots differ in size is too limited. Other than the limit Pitney admitted in distinguishing the Sharp patent, nothing in the claims, the specification, or the prosecution history indicates that Pitney intended to limit the way the size of the spots is determined.

The court concludes that "spots of different sizes" are single spots, or areas of discharge on the photoreceptor, that differ in size. Such a difference in size is not caused by grouping together the same sized spots.

**B. Controlling a Parameter of the Light Beams**

[8] The dispute about the construction of "controlling a parameter of the light beams" centers on whether time is a parameter of the light beams. The term "parameter" is used in Claim 1 of the 272 patent as follows: "controlling a parameter of the light beams to produce spots of different sizes whereby the appearance of smoothed edges are given to the generated shapes." 272 pat., col. 6, ll. 27-30. Thus, based on the claim language, relevant parameters are any parameters that may be controlled to produce "spots of different sizes," which are used to generate shapes with "smoothed edges." Id. The plain meaning of the claim indicates that more than one parameter is disclosed. The issue is thus whether the 272 patent disclosed time as a parameter that may be controlled to produce such spots of different sizes.

The court finds that time is a parameter claimed in the 272 patent. As the Federal Circuit said:

The 272 patent teaches two methods for varying toner dot size. First, as illustrated in Figure 1 of the 272 patent, an intensity modulator 64 can be attached to the source of the light beam. The degree of exposure on the photoreceptor is determined by two factors: (1) the intensity of the beam of light; and (2) the length of time that the beam of light remains in contact with the surface of the photoreceptor (which factor is termed the 'pulse width').

Pitney III, 182 F.3d at 1302. The ordinary meaning of a parameter is "a typical element." Webster's II New

College Dictionary (1995). The pulse width or duration for which a light beam is on is a "typical element" of a light beam just as the intensity of the beam and the diameter of a beam are typical elements of a light beam. Thus, under its ordinary meaning, time is a parameter of a light beam.

In addition, the plain meaning of the language of Claim 1 indicates that the claim is not limited to the specific parameters of intensity and duration. Claim 1 claims a method for "controlling a parameter of the light beams to produce spots of different sizes ...." 272 pat., col. 6, ll. 27-28. Such language is inclusive. The claim provides for a method for controlling *a* parameter, meaning *any* parameter, not for controlling only specified parameters. FN2 Thus, under the ordinary meaning of the claim language, time is a parameter of the light beam. The issue is whether Pitney disclaimed time as a parameter in either the specification or the prosecution history.

FN2. Support for such a construction can be found by looking to Claim 2, which claims "[t]he method of claim 1 wherein the parameter controlled is light beam intensity." 272 pat., col. 6, ll. 31-32. The scope of Claim 2, which is dependent on Claim 1, is specifically limited to one parameter, which means that, in order to be broader than Claim 2, Claim 1 necessarily claims a method for controlling more than one parameter. Because, as the court has found, pulse width is a parameter of a light beam, the parameters disclosed in Claim 1 include pulse width.

During oral argument on April 24, 2001, Hewlett argued that, under the recent Federal Circuit decision in Network v. Centraal Corp., 242 F.3d 1347 (2001), the claims at issue could not be construed to include time as a parameter of a light beam. In *Network,* the Federal Circuit affirmed the district court's construction of a claim term where the district court relied on the specification and the explanation of an expert witness to limit the system at which the claim at issue was directed. *Id*. at 1351. The Federal Circuit stated:

Network's argument that the district court improperly limited the scope of claim 1 by importing the caching and pulling functions from the specification misperceives the role of 'claim construction' in infringement analysis. The role is neither to limit nor to broaden the claims, but to define, as a matter of law, the invention that has been patented. The claims are always construed in light of the specification, of which they are a part. The role of the specification includes presenting a description of the technologic subject matter of the invention, while the role of claims is to point out with particularity the subject matter that is patented. The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose.

*Id*. at 1352 (internal citations omitted). Hewlett argues that, based on this language, time cannot be a parameter of a light beam because the specification does not describe it as such.

Unlike *Network,* however, the specification in this case does not contain language that specifically limits parameters to intensity and diameter. In *Network,* the specification stated that the local server database that was the issue of the claim construction "contains *only* certain of the Resource Aliases and their records" and that the central registry computer "maintains the *entire* collection of Resource Aliases in its database." *Id*. at 1351 (emphasis added). The 272 patent specification does not similarly specify intensity and diameter as the *only* parameters or indicate that time is not a parameter. Pitney does not, therefore, disclaim time as a parameter in the specification.

Further, the specification refers to the on-off gating of the modulator. 272 pat., col. 2, ll. 20-23; col. 3, ll. 10-

11. The intensity modulator, used to control toner dot size, is attached to the source of the light beam and controls the degree of exposure on the photoreceptor by controlling either the intensity of the beam of light or the length of time that the beam of light remains in contact with the surface of the photoreceptor. 272 patent, Fig. 1. While not explicitly listing time, or pulse width, as a parameter of a light beam, the references to the on-off gating of the modulator in the specification indicate that Pitney did not intend to disclaim it as a parameter.

Hewlett argues that the only parameters Pitney refers to in the prosecution history prior to the reexamination are intensity and diameter and, therefore, Pitney disclaimed time as a parameter. Hewlett points to Pitney's response to the Examiner's rejection on September 23, 1981. HP Ex. K. One of the concerns raised by the Examiner was that it was unclear how one photoreceptor would distinguish between a plurality of beams and how one or both beams would be controlled. Pitney responded that "[u]se of such plural beams is only one parameter that may be used for controlling dot sizes." Id. at 3. Pitney noted that "the size of a dot can be controlled by varying the intensity." Id. Hewlett argues that, because Pitney did not mention duration as a parameter, it cannot be considered one. There is nothing to suggest in its response that Pitney was making an exclusive list of the parameters that could be varied. It was responding to a specific concern about the use of plural beams and mentioned another parameter, intensity, that could be controlled. This response was not a disclaimer of time as a parameter.

Hewlett also argues that time cannot be considered a "parameter" of the light beams because of the Examiner's treatment during reexamination of a character rounding technique disclosed in an article by J.R. Kinghorn ("Kinghorn"). HP Ex. S. Such character rounding is accomplished by controlling the duration for which the electron beam is on. HP Ex. S at 230. Hewlett argues that, because the Examiner did not cite Kinghorn as an invalidating reference but did reference prior art that disclosed the parameters of diameter and intensity, the Examiner did not consider time a parameter of the light beams. There is no basis to assume, however, that the Examiner excluded the Kinghorn cite because she did not consider time a parameter of the light beam, as opposed to some other reason.

Hewlett finally argues that Pitney disavowed time as a parameter of the light beams in distinguishing the Spicer reference during the reexamination. Spicer discloses a system for generating dot matrix characters in a CRT display that uses a technique for "smoothing between the parts of a character in one row and the next." U.S. Patent No. 4,095,216 ("Spicer patent"), col. 3, ll. 11-12. Pitney distinguished Spicer first by noting that Spicer is "directed towards a display of alpha-numeric data on TV receivers. Thus, no light beams are involved in the creation of this display." HP Ex. G at 40. Pitney further distinguished it from the 272 patent because Spicer "generates dot matrix characters in which a diagonal line in a character is formed by causing the focused scanning beam to turn on for a longer period of time." Id. at 40-41. Thus, Spicer applies "full length traces and half length traces next to each other ... [T]here is no change in spot size, only in the length of the trace on the CRT screen." Id. at 41. Pitney did not disavow time as a possible parameter of a light beam in distinguishing Spicer because Pitney distinguished Spicer based on the fact that Spicer does not disclose a light beam and does not disclose a means for changing spot size. In making this distinction, Pitney did not state that time was not a parameter of a light beam controlled by the method disclosed in the 272 patent.

During the reexamination of the 272 patent, Pitney made several statements in which it described time as a parameter of the light beams. Arguments made during reexamination proceedings "are relevant prosecution history when interpreting claims." E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co., 849 F.2d 1430, 1439 (Fed.Cir.1988); *accord* Moleculon Research Corp. v. CBS, Inc., 793 F.2d 1261, 1270 (Fed.Cir.1986).

These statements were made during reexamination while this litigation was pending and may, therefore, be self-serving statements, which should be "accorded no more weight than testimony of an interested witness or argument of counsel." Moleculon, 793 F.2d at 1270. Hewlett attempts, however, to use other statements made during the reexamination as evidence that Pitney gave up time as a parameter. For example, as discussed above, Hewlett argues that Pitney disclaimed time as a parameter in distinguishing the 272 patent from the Spicer patent during reexamination and that the PTO did not consider time a parameter because of its treatment of Kinghorn. Hewlett cannot have the court examine some remarks but ignore others made during the same proceeding.

During the reexamination proceedings, Pitney described time as a parameter when it explained that "intensity and duration have equivalent effects on the size of the spot on the photoconductor, as does laser beam diameter." Affidavit of Katie Crosby in Support of Pl. Pitney Bowes' Mem. on Claim Constr., Dkt. No. 269 [hereinafter PB Ex.], Ex. 17 at 25. Pitney also stated "it can be seen that the spot size of the discharged area on the photoreceptor is a function of the exposure of that area to the laser beam. Therefore, varying the exposure or energy (either intensity or duration) of the laser beam, will create different size spots on the photoreceptor." *Id*. at 13-14. Finally, Pitney noted that "[a]ccording to the invention, if the intensity is reduced, or its equivalent time of exposure is made shorter, a smaller spot is produced." *Id*. at 41. Such statements indicate that Pitney did not disclaim time as a parameter. In addition, the statements demonstrate that, even if prior art controlled the time that a laser was left on, the patent office reissued the patent over such prior art when Pitney specifically claimed that time was one of the parameters that the method in Claim 1 controlled.

Because the ordinary meaning of parameter includes the pulse width and because neither the specification nor the prosecution history demonstrate that Pitney intended to exclude pulse width as a parameter, the court concludes that the term "controlling a parameter of the light beams" includes controlling the length of time that the beam of light remains in contact with the photoreceptor. The parameters or typical elements of the beams that may be varied to produce spots of different sizes to smooth the edges of generated shapes include intensity, time, and beam diameter.

**C. Generated Shapes**

[9] "Generated shapes" is used in Claim 1 and Claim 3. In Claim 1 it is used in claiming a method of producing "the appearance of smoothed edges are given to the generated shapes." 272 patent, col. 6;ll. 29-30. In Claim 3 it is used in claiming an "[a]pparatus for producing on the photoreceptor an image of generated shapes made up of spots." Id., col. 6;ll. 33-34. The dispute about the construction of "generated shapes" centers on whether "generated shapes" are limited to characters. Hewlett argues that "generated shapes" should not be limited to characters but should include all shapes brought into being on the photoreceptor. Pitney argues that the term has already been defined and limited to characters by the Federal Circuit.

In its opinion in this case, the Federal Circuit stated " 'generated shapes' are, of course, the letters, numbers or other characters formed with fewer jaggies than under the prior art methods." Pitney III, 182 F.3d at 1305. Pitney argues that this definition is now the law of the case. The law of the case doctrine was judicially created to ensure judicial efficiency and to prevent the possibility of endless litigation. Central Soya Co. v. Geo. A. Hormel & Co., 723 F.2d 1573, 1580 (Fed.Cir.1983). The doctrine applies not only to issues discussed and decided but also those decided by necessary implication. W.L. Gore & Assoc., Inc. v. Garlock, Inc., 842 F.2d 1275, 1278-79 (Fed.Cir.1988) (citing Smith Int'l, Inc. v. Hughes Tool Co., 759 F.2d

1572, 1577 (Fed.Cir.1985)). Thus, although the Federal Circuit did not specifically address the question of whether the "generated shapes" could be shapes other then characters, it did define it in construing what "spots of different sizes" meant. In order to construe "spots of different sizes," the court had to consider what "generated shapes" the spots of different sizes were producing. In so doing, it limited the claim to "... letters, numbers or other characters...." Pitney III, 182 F.3d at 1305. The definition is thus the law of the case. FN3

FN3. Under its newly-cited precedent, Hewlett admitted at oral argument on April 24, 2001 that generated shapes should be limited to letters, numbers or other characters because it was so limited in the patent specification. *See* Network, 242 F.3d at 1351.

In allowing the 272 claims, the PTO specifically stated that several patents disclosing half-tone reproducing devices disclosed "patently different technology" than the 272 patent. FN4 PB Ex. 19, at 1 ("a half-tone reproducing device, as compared to that of a character generator which actually produces an image of generated shapes (or characters) made up of spots, is a patently different technology and is not quite concerned with *generating shapes* using spots of different sizes.")

FN4. Half-toning uses spots of different sizes to allow the eye to see the pattern of dots as a continuous tone image. PB Mem. on Claim Construction at 17. The focus of half-toning is on reproducing images by varying tone or shade. Id. at 18.

The PTO's conclusion supports the Federal Circuit's construction and indicates that the construction remains the same after reexamination.

Based on the Federal Circuit's construction of the term and the PTO's support of that construction, "generated shapes" are letters, numbers, or other characters formed with fewer jaggies than under the prior art methods. FN5

FN5. Hewlett indicated that there was a dispute between the parties regarding the necessity of a character generator in creating "generated shapes." Pitney did not address this dispute and seems to have conceded that "generated shapes" need not come from a character generator. The court thus finds that "generated shapes" are not limited to characters that originate from a character generator.

**D. Means for Directing a Plurality of Beams of Light Toward a Photoreceptor**

[10] [11] "Means for directing a plurality of beams of light toward a photoreceptor" is a means-plus-function limitation of Claim 3. As such, it covers only "the corresponding structure ... described in the specification [for performing the recited function] and equivalents thereof." 35 U.S.C. s. 112, para. 6. To construe this type of claim limitation, the court must identify (1) the claimed function and (2) the corresponding structure for performing that function. Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc., 145 F.3d 1303, 1308-09 (Fed.Cir.1998).

The claimed function is determined by the language of the claim. WMS Gaming, Inc. v. Int'l Game Tech., 184 F.3d 1339, 1349 (Fed.Cir.1999). Accordingly, the claimed function of "means for directing a plurality

of beams of light toward a photoreceptor" is "directing a plurality of beams of light toward a photoreceptor." FN6

FN6. Judge Covello construed the term "plurality of beams" as it is used in both Claims 1 and 3 in his previous ruling. *See* Pitney I, 69 F.Supp.2d at 313-16. He concluded that "plurality of beams" means "multiple beams of light generated sequentially from one or more light sources." Id. at 317. Hewlett argues that this court should reconsider Judge Covello's ruling in light of Ishida Co. v. Alfred A. Taylor, 221 F.3d 1310 (Fed.Cir.2000). *Ishida* held that, where a patent contains two or more distinct embodiments, each claim does not need to encompass both embodiments. *Id*. at 1316. The Federal Circuit found that the district court properly identified the corresponding structures for each embodiment as required by 35 U.S.C. s. 112, para. 6. *Id*.

Here, Figure 1 is the corresponding structure for Claims 1 and 2. As Judge Covello found, the file history reveals that Figure 1 relates to Claims 1 and 2 of the 272 patent, rather than Claims 4-7 as Hewlett then argued and continues to argue. Pitney I, 69 F.Supp.2d at 314 n. 3. In considering Figure 1 it is clear to the court that "plurality of beams" does not require two or more lasers. Judge Covello cited several reasons for his ruling, including the ordinary language of the claim, the specification, and the prosecution history. Id. at 313-14. While he did note that adopting Hewlett's definition of "plurality of beams" would cause Figure 1 of the patent to fall outside of the claims, the 272 patent does not contain the several embodiments as did the patent at issue in *Ishida*. *Id*. at 314. The court does not find that *Ishida* requires reconsideration of Judge Covello's ruling and, even if it did, this court reaches the same result for the additional reasons stated in Judge Covello's ruling.
Having identified the function, the court must next identify the corresponding structure identified in the specification to perform that function. Micro Chemical, Inc. v. Great Plains Chemical Co., Inc., 194 F.3d 1250, 1258 (Fed.Cir.1999). "[S]tructure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history links or associates that structure to the function recited in the claim." B. Braun Med., Inc. v. Abbott Lab., 124 F.3d 1419, 1424 (Fed.Cir.1997). Interpretation of what is disclosed must be made in light of the knowledge of one skilled in the art. Atmel Corp. v. Information Storage Devices, Inc., 198 F.3d 1374, 1380-81 (Fed.Cir.1999). Identification of corresponding structure may embrace more than the preferred embodiment. Micro Chemical, Inc., 194 F.3d at 1258. However, s. 112, para. 6 does not "permit incorporation of structure from the written description beyond that necessary to perform the claimed function." *Id*.

The 272 patent's summary of the invention explains that:

[t]he light source, such as a laser beam, is acousto-optically modulated in accordancewith selected input data. The laser beam so modulated is directed toward a multi-faceted polygon driven at a constant angular velocity. As the successive mirrored facets of the polygon are illuminated, the light reflected generates a plurality of scan lines formed by successive dots which move across a moving photoreceptor ....

272 pat., col. 1, ll. 54-61. The summary of the invention thus indicates that the means for directing a plurality of light beams toward the photoreceptor is the mirrored facets of the polygon.

In describing Figure 1, the specification states that the light source generates a light beam which "passes through a modulator 16, such as an acousto-optical modulator" and is then "directed through a first lens 20 and intercepted by a knife edge 22 ...." Id. col. 2, ll. 65-68. The beam is then "directed toward a second lens 24 which directs a converging beam onto a reflecting face or facet 26 of a rotating polygonal mirror, herein

referred to as a polygon 28." Id. col. 3, ll. 19-22. "The beam 12 is thus reflected successively from each of the facets 26 of the rotating polygon 28 and onto the photoreceptor 32." Id. col. 3, ll. 30-32. In addition the specification states that when a defect in the rotating mirror introduces a facet-to-axis error, "[t]he present invention provides a spot correction assembly 36 for optically detecting and correcting for these facet-to-axis errors." Id. col 3, ll. 55-58.

Based on the specification, Hewlett argues that, in addition to the laser and rotating polygon mirror, the corresponding structure also includes an acousto-optical modulator, spot correction assembly, knife-edge, and lenses in the light beam path between the laser and the polygonal mirror. However, the recited function is limited to "directing a plurality of beams of light toward a photoreceptor." The function does not include the source of the beams of light or provide for correcting any errors. The means by which a plurality of beams of light are directed toward the photoreceptor in the 272 patent is the rotating polygonal mirror.

Further support for this conclusion is found in the reexamination of the 272 patent. During the reexamination, Pitney explained that the only means for "directing a plurality of beams of light toward a photoreceptor" is the rotating polygonal mirror and the laser. PB Ex. 17, at 23. "The only such means disclosed in the specification is a rotating polygonal mirror 28 ... [and] the only source of light disclosed is the laser 10 ...." Id. The PTO did not object to or take issue with Pitney's recitation of the corresponding structure.

Although the specification discloses the specific structures Hewlett argues are part of the corresponding means, those structures are not necessary to perform the claimed function of directing a plurality of beams toward a photoreceptor. Micro Chemical, Inc., 194 F.3d at 1258; Chiuminatta, 145 F.3d at 1308. Therefore, those structures do not correspond to the recited function. The court concludes that the supporting structure is thus a rotating polygon mirror that reflects each beam of light generated from one or more laser sources onto a photoreceptor.

**E. Means for Generating Spots of Different Sizes**

[12] Claim 3 provides "means for generating spots of different sizes." This is another "means plus function" limitation and, therefore, the court must identify (1) the claimed function and (2) the corresponding structure for performing that function. Chiuminatta, 145 F.3d at 1308-09.

The function, based on the claim language, is "generating spots of different sizes." The specification describes two structures for performing this function. The first consists of attaching an intensity modulator to the source of the light beam. The specification states:

The intensity modulator 64 could [ ] be used for control of spot size by varying the intensity [of laser 10]. The use of different spot sizes can effectively be employed as letters or numbers are created so as to avoid roughened edges and improve character formation.

272 patent, col. 5, ll. 68-col. 6, ll. 5. The second structure consists of two lasers. The specification states:

The system of this invention can also employ two power sources using parallel laser beams with each of the beams being of a different diameter and corresponding spot size.

272 pat., col. 6, ll. 5-8. The parties agree that the second structure includes two power sources using parallel

laser beams, each of a different diameter. The parties disagree, however, about what the first structure includes. Pitney argues that the structure includes any modulator while Hewlett argues that the structure is limited to an intensity modulator. Based on the plain language of the specification, the first structure is limited to a laser plus an intensity modulator that varies the intensity of the laser. Therefore, the structures that correspond to the function of generating spots of different sizes are 1) a laser plus an intensity modulator that varies the intensity of the laser; and 2) two power sources using parallel laser beams, each of a different diameter.

**F. The Appearance of Smoothed Edges**

[13] Both Claims 1 and 3 of the 272 patent conclude with the limitation that the recited method or apparatus be used so that the "appearance of smoothed edges are given to the generated shapes." Pitney argues that this means "avoiding roughened edges and improving character formation so that the generated shapes have less of an uneven appearance or less 'jaggies' than under prior printing methods." Hewlett argues that the phrase has a broader meaning of "improves image quality or more precisely reproduces the details of an original image by reducing edge roughness."

The court first considers the ordinary meaning of "the appearance of smoothed edges." "Smooth" means "having a surface free from roughness, irregularities, or projections." Webster's II New College Dictionary (1995). "Appearance" means "outward aspect." Id.

The specification does not indication that Pitney meant to either expand or limit this definition. The specification states that "[t]he use of different spot sizes can effectively be employed as letters or numbers are created so as to avoid roughened edges and improve character formation.... The different size dot will intermesh to create letters and numerals having a smoother appearance." 272 pat., col. 6, ll. 2-12. As the Federal Circuit said, "the 272 patent teaches an apparatus and method for combating the problem of jaggies by using toner dots of different sizes." Pitney III, 182 F.3d at 1301.

Hewlett argues that the term should be more broadly construed because, during the prosecution history of the related 021 patent, the Board of Patent Appeals stated that they "[did] not consider the terms "smoothed" and "smooth" to distinguish" the 021 patent from another which discloses an "image of high quality" or "an exact reproduction." HP Ex. CC at 626-43. However, the Yamada patent, the patent being distinguished, is an ink jet systemwhich does not use a photoreceptor or create an image on a photoreceptor, nor does it create a plurality of beams of light or control a parameter of light beams. U.S. Patent No. 4,050,077 ("Yamada patent"). Under its plain meaning, the term "the appearance of smoothed edges" in the 272 patent is distinguishing the benefit of the 272 patent over prior products comparable to it, which is that the method and the apparatus disclosed produce generated shapes with the appearance of smoother edges. A person of ordinary skill in the art would know that this means the generated shapes will have fewer "jaggies."

Because there is nothing in the specification or prosecution history to suggest either a broader or a narrower meaning than the ordinary meaning of "the appearance of smoothed edges," the court concludes that "the appearance of smoothed edges" means avoiding roughened edges and improving character formation so that the generated shapes have less of an uneven appearance or less "jaggies" than under prior printing methods.

**G. Beams of Light**

[14] The term "beams of light" is used in both Claims 1 and 3. While some of Pitney's representations during reexamination of the 272 patent suggest a dispute between the parties regarding the meaning of this

term, Pitney now states that there is no dispute. Judge Covello found the term "a plurality of beams of light" to mean "multiple beams of light generated sequentially from one or more light sources." Pitney I, 69 F.Supp.2d at 317. The parties agree that such "beams of light" include any type of light beam and are not limited to laser beams or diffraction limited systems. The court therefore agrees with Judge Covello's definition and does not limit "beams of light" to any particular type of light beam.

**H. Photoreceptor**

Although Hewlett originally presented this term as one that the court needed to construe, the parties' memoranda indicate that the parties do not have any dispute about the term. Based on the agreement between the parties, the court construes photoreceptor to mean a drum or other surface which is evenly covered with an electrical charge. A photoreceptor includes not only a photoconductive photoreceptor, but other types of photoreceptive surfaces, including film.

**VI. CONCLUSION**

For the foregoing reasons, the court construes the terms at issue as follows:

(1) "Spots of different sizes" are areas of discharge on the photoreceptor that differ in size where such a difference in size is not caused by grouping together the same sized spots.

(2) "Controlling a parameter of the light beams" includes controlling the length of time that the beam of light remains in contact with the photoreceptor. The parameters of the beams that may be varied to produce spots of different sizes to smooth the edges of generated shapes include intensity, time, and beam diameter.

(3) "Generated shapes" are letters, numbers, or other characters formed with fewer jaggies than under the prior art methods.

(4) The claimed function of "means for directing a plurality of beams of light toward a photoreceptor" is "directing a plurality of beams of light toward a photoreceptor." The supporting structure is a rotating polygon mirror that reflects each beam of light generated from one or more laser sources onto a photoreceptor.

(5) The claimed function of "means for generating spots of different sizes" is "generating spots of different sizes." The supporting structures are a) a laser plus an intensity modulator that varies the intensity of the laser; and b) two power sources using parallel laser beams, each of a different diameter.

(6) "The appearance of smoothed edges" means avoiding roughened edges and improving character formation so that the generated shapes have less of an uneven appearance or less "jaggies" than under prior printing methods.

(7) "Beams of light" include any type of light beam and are not limited to laser beams or diffraction limited systems.

(8) "Photoreceptor" means a drum or other surface which is evenly covered with an electrical charge. A photoreceptor includes not only a photoconductive photoreceptor, but other types of photoreceptive surfaces, including film.

**SO ORDERED.**

D.Conn.,2001.
Pitney Bowes, Inc. v. Hewlett-Packard Co.

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