United States District Court,
N.D. Illinois, Eastern Division.

IP INNOVATION L.L.C. and Technology Licensing Corporation,
Plaintiffs.
v.
LEXMARK INTERNATIONAL, INC,
Defendant.
IP Innovation L.L.C. and Technology Licensing Corporation,
Plaintiffs.
v.
Dell Computer Corporation,
Defendants.

March 27, 2006.

Background: Owner of patents for improving image quality of pixelated displays sued printer manufacturers for infringement.

Holdings: Construing claims, The District Court, Kocoras, Chief Judge, held that:
(1) claim preambles were part of claims;
(2) "image display device" was not limited to video image displayers;
(3) "image element" was any element of image, regardless of whether it was complete or pixel-related; and
(4) "altering voids" meant filling voids by varying input signal without solely modifying on and off times of signal-carrying image.

Claims construed.

See also 303 F.Supp.2d 923.

5,424,780, 6,529,637. Construed.

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MEMORANDUM OPINION

KOCORAS**, Chief Judge.**

This matter comes before the court on the parties' requests for a construction of disputed terms within the claims of two patents. The terms at issue are construed as set forth below.

BACKGROUND

Plaintiffs IP Innovation and Technology Licensing Corporation (collectively referred to as "IP") own United States Patent No. 5,424,780 ("the '780 patent") and United States Patent No. 6,529,637 ("the '637 patent"). The original inventor of the two patented inventions is Carl Cooper. In the two complaints initiating these companion cases, IP alleges that Defendants Lexmark International, Inc. ("Lexmark") and Dell Corporation ("Dell") manufacture, sell, or offer to sell printers or fax machines that infringe one or both of the patents. In conjunction with its answer to IP's complaint, Dell filed a counterclaim seeking a declaratory judgment of invalidity of the patents as well as non-infringement. Although the pleadings do not specify any product other than printers or fax machines, the briefs indicate that Dell also produces televisions or other video displays that could be implicated by these proceedings.

The '780 patent describes an apparatus and method for improving the apparent visual quality of an image. The invention addresses an artifact that occurs when display devices show diagonal lines in low-resolution images as a series of diagonal blocks resembling a set of stairs rather than as a smooth and uniform line. The invention enables the device displaying the image to use information already within the image to change the illumination of image elements, making the image appear more refined without actually increasing its resolution or size. The original patent, issued in June 1995, contains 41 claims; a reexamination certificate issued in July 2002 amended certain aspects of the prior patent and increased the number of claims to 149.

The '637 patent, which contains 215 claims, was filed on March 3, 1993, as a continuation-in-part of the '780 patent. Rather than focusing on the invention contained in the '780 patent, the '637 patent is directed to a circuit used within the invention.

LEGAL STANDARD

[1] [2] [3] [4] Patent claims are construed as a matter of law. *See* Markman v. Westview Instruments, Inc., 517 U.S. 370, 372, 116 S.Ct. 1384, 1387, 134 L.Ed.2d 577 (1996). In general, claim terms are given the meaning they would have to a person of ordinary skill in the art at the time of the effective filing date of the application for the patent involved. *See* Phillips v. AWH Corp., 415 F.3d 1303, 1312-13 (Fed.Cir.2005) (en banc). FN1 To determine what a person of ordinary skill would understand the term to mean at the operative time, a court first considers the language of the claims themselves, the patent's specification, and the history of the patent's prosecution before the Patent and Trademark Office ("PTO")-the intrinsic evidence. *See* Unique Concepts v. Brown, 939 F.2d 1558, 1561 (Fed.Cir.1991). The intrinsic evidence forms the public record of what the patentee claimed, and the public is entitled to rely upon this record first and foremost to delineate the patent's scope. Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1583 (Fed.Cir.1996).

FN1. A patentee can also attach a meaning to a term other than its ordinary and customary meaning, but to do so, he or she must do so in the written description or prosecution history with "reasonable clarity, deliberateness, and precision." Golight, Inc. v. Wal-Mart Stores, Inc., 355 F.3d 1327, 1332 (Fed.Cir.2004).

[5] [6] In construing a particular claim term, a court must look first to the language of the claim or claims in which the term appears. Phillips, 415 F.3d at 1314. It provides a significant amount of information of the

meaning of particular terms through context and relationship to other claims, whether asserted or unasserted. Id. Because the use of particular terms is usually consistent, use of a term in one claim of the patent can provide insight into its meaning when it is used elsewhere as well. Id. The language of the claims is further illuminated by the specification; it is both highly relevant to and often dispositive of the meaning of a disputed term. Id. at 1315. However, the specification is not without pitfalls; limitations found within it cannot be read into claims that do not contain the same limitations. *See* Golight, 355 F.3d at 1331. The final piece of the intrinsic evidence of a term's meaning is the prosecution history. It may shed light on the definition of a disputed term and must be consulted to determine whether the patentee gave a special meaning to a term or disclaimed certain aspects of the invention in the course of obtaining PTO approval. *See generally* id. at 1331-33.

[7] [8] All other indications of a patent term's meaning derive from so-called extrinsic evidence, such as dictionaries, learned treatises, and expert and inventor testimony. Because extrinsic evidence is not necessarily available to the public as part of the patent record, it should only be relied upon in situations where the terms of a patent are still ambiguous after an examination of the intrinsic evidence. Phillips, 415 F.3d at 1317-19. Whatever extrinsic sources are consulted, they must not be allowed to contradict claim languagethat is unambiguously set forth in the intrinsic evidence. Id. at 1324.

With these principles in mind, we begin our examination of the disputed terms.

DISCUSSION

A. The '780 Patent

The parties dispute the meanings of certain terms within claims 15, 109, 110, and 146 of the '780 patent. Because they seek construction of a fairly large number of terms, we will proceed with the analysis claim by claim. Several disputed terms appear in multiple claims and some in both patents; unless specified otherwise, the construction given for the first appearance of the term will apply to all other appearances of the same term. *See* Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1342 (Fed.Cir.2001).

1. Claim 15

[9] Claim 15 is an independent claim, meaning that it does not refer back to or limit another claim in the patent. *See* 37 C.F.R. s. 1.75. As such, it is broader than any claims dependent upon it. *See* Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1123 (Fed.Cir.2004). The text of the claim reads:

A method of improving the quality of an image which may be displayed on an image display device, the image made up of a number of image elements, including the step of selecting a plurality of pixels of said image, the step of comparing a first of said selected pixels to at least a second of said selected pixels to select voids of said image to be altered and including the further step of altering voids in said image in response to said comparing step thereby improving the apparent resolution of the image without requiring an increase in the number of image elements originally making up the image.

a. *The Preamble*

[10] [11] [12] [13] The parties' first dispute focuses on whether the preamble of claim 15 FN2 should be construed as a limitation on the claim itself. To determine the amount of import that should be ascribed to the preamble, we must examine the claim as a whole. *See* Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1305 (Fed.Cir.1999). If the claim's overall meaning depends on the preamble, it should be read as part and parcel of the rest of the claim. *See* id. For instance, when terms used in the preamble serve as the antecedent of limitations within the claim body, those terms are a necessary part of the claim as a whole. *See* Eaton Corp. v. Rockwell Int'l Corp., 323 F.3d 1332, 1339 (Fed.Cir.2003). If the preamble gives

information such as the invention's purpose or intended use that does not impact or clarify the claim's meaning, it will not limit the terms within the main claim. *See* Pitney Bowes, 182 F.3d at 1305. In addition, when an inventor clearly relies on the preamble to separate the claimed invention from the prior art, it is proper to construe the preamble as a claim limitation, since it serves to define the claimed invention, at least in part. Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc., 289 F.3d 801, 808 (Fed.Cir.2002).

FN2. The preamble consists of the initial portion of the claim-"[a] method of improving the quality of an image which may be displayed on an image display device, the image made up of a number of image elements, including...."

[14] The preamble of claim 15 introduces three key terms: "image," "image display device," and "image elements." The first appears within the body of the claim four times; the third is used once. Also, the prosecution history reveals that Cooper added the phrase "the image made up of a number of image elements" during prosecution to highlight the distinctiveness of his invention over the prior art. S/N 08/119, 710 O.A. response 3/7/94 at 2, 12-13.

The second term, "image display device," does not appear in the body of claim 15, but it is contained in claim 109, a claim that refers back to claim 15 and thus is dependent upon it. *See* 37 C.F.R. s. 1.75. Without the antecedent use of the term in claim 15, the reference in claim 109 would make no sense. Furthermore, the use of the term "image display device" is integral to the overall meaning of claim 15 because without it, the scope of devices that could use the invention would be unlimited. *See* Pitney Bowes, 182 F.3d at 1305.

Because terms within the preamble both provide an antecedent basis for terms within the main body of the main claim and a dependent claim and allowed Cooper to distinguish his invention from the prior art during prosecution, we conclude that they must be read as a limitation on the claim itself.

b. "*Image Display Device*"

[15] The next disputed term in claim 15 is "image display device." FN3 IP argues that this term includes printers, whereas Lexmark and Dell contend that it encompasses only devices that display a video image on a screen. Both sides look to the prosecution history of the '780 patent to support their respective positions.

FN3. IP considers the operative phrase to be only "display device," but there is no indication that a display device would display anything but an image. Accordingly, though our analysis would be the same if the term "image" were excluded, we will treat the operative phrase as consisting of the full "image display device."

During prosecution, Cooper sought to add a description of printers to the original specification, new claims that included printers, and a new figure. The original examiner more than once rejected the amendments as new matter. Cooper eventually petitioned the Commissioner for Patents to overrule the rejections, but the petition was dismissed because his request should have been directed to the Board of Patent Appeals and Interferences.

Cooper cancelled the relevant claims and figure and petitioned the Commissioner again. However, he did not remove all references to printers in the specification. This time, the Commissioner found the petition was moot because the "new subject matters ha[d] either been deleted or cancelled by the petitioner." *See* S/N 07/355, 461 Commissioner's Decision 1/24/94 at 1. Before the Commissioner issued this decision, Cooper filed a continuation application, which was assigned to a new examiner, who never officially withdrew the previous new matter rejections. Some of the terms the prior examiner found objectionable appear in the patent as issued. Lexmark and Dell argue that the rejections relating to printer terminology in the patent

should exclude printers because the new matter rejections were never officially withdrawn. Although the prosecution history is less than pristine in this case, we disagree with Lexmark and Dell on its overall effect on this issue for several reasons.

First and foremost, Lexmark and Dell's argument would require us to ignore the references to printers within the specification, in essence writing them out of the patent entirely, which is not a proper exercise in circumstances such as these. *See* Purdue Pharma L.P. v. Boehringer Ingelheim GMBH, 237 F.3d 1359, 1364 (Fed.Cir.2001) (refusing to limit claims to single-dose administrations of medication when specification made reference to both single and multiple doses).

[16] [17] Second, the language of dependent claim 109 indicates that video monitors are but one kind of display device.FN4 The doctrine of claim differentiation creates a presumption that each claim in a patent differs in scope from any other claim. *See* Comark Communications, Inc. v. Harris Corp., 156 F.3d 1182, 1187 (Fed.Cir.1998). When applied in the context of dependent and independent claims, the doctrine generally leads to a conclusion that dependent claims are narrower than the claim on which they depend. Phillips, 415 F.3d at 1315. The presumption is extremely strong when the only meaningful difference between the independent and dependent claims is the limitation at issue, and one party is requesting that the limitation present in the dependent claim be imported into the independent claim. *See* Sunrace Roots Enterprise Co., Ltd. v. SRAM Corp., 336 F.3d 1298, 1303 (Fed.Cir.2003). To construe the claims in another fashion would typically render the dependent claims superfluous, a result we must strive to avoid. *See* Comark, 156 F.3d at 1187. Here, the limitation that Lexmark and Dell contend to be omnipresent in the term "image display device" is the very limitation made explicit in claim 109. Thus, the presumption that "image display device" applies to devices other than video monitors weighs particularly heavily in favor of IP's construction.

FN4. In its entirety, claim 109 states: "[t]he method of claim 15 characterized in that the image display device is a video monitor."

Third, Lexmark and Dell's primary support for their argument comes from a definition of "display" FN5 that states, in pertinent part:

FN5. The entry for "display device" merely directs the reader to the definition for "display."

1. A visible representation of information in words, numbers or drawings, as on the cathode-ray tube screen of a radar set, navigation system, or computer console.
2. The device on which the information is projected. Also known as display device.

McGraw-Hill Dictionary of Scientific and Technical Terms, 593 (5th ed.1994). Lexmark and Dell emphasize that the phrase "as on the cathode-ray tube screen" is especially supportive to their position, arguing that the inclusion of this phrase necessarily excludes other examples of display devices. Extrinsic evidence can be helpful in understanding the state of the art when a patent application was filed, but it cannot be used to contradict the plain language of the patent as issued. *See* Phillips, 415 F.3d at 1324. The construction that Lexmark and Dell propose would do more than explain the intrinsic evidence; it would stand in direct conflict.
[18] Moreover, extrinsic evidence must be considered in the context of the intrinsic evidence. *See* id. at 1319. When so viewed, the definition upon which Lexmark & Dell rely actually supports the conclusion that printers can be considered a "display device." The most natural reading of the definition reveals that the examples given are illustrative, not exhaustive. Printers, particularly laser printers, are capable of projecting a visible representation of information onto paper. Accordingly, we cannot agree with Lexmark and Dell that this definition excludes printers from its scope.

Lastly, in support of their argument, Lexmark and Dell rely on Dresser Indus., Inc. v. United States, 193 Ct.Cl. 140, 432 F.2d 787 (1970), in which the patentee filed a s. 312 amendment that redefined certain terms in a way that was inconsistent with the original specification. In that case, the court did not use the new language because it was clear that the amended text constituted new matter. Id. at 794. Here, by contrast, the history does not unequivocally indicate that a person of ordinary skill in the art would not have understood that the invention applied to printers.

Therefore, the court defines "image display device" as follows: a device for providing an image that may be viewed by a viewer. This construction will apply equally to the use of this term in claim 109 of the '780 patent.

c. "*Pixel*" *and* "*Image Element*"

[19] [20] The next two terms we must consider, "pixel" and "image element," are undeniably related, but the issue we need to decide is the extent of their similarity. IP differentiates between these two concepts; Lexmark and Dell ask that they be considered synonymous.FN6 According to IP, "pixel" refers to the smallest complete element of an image, and it can be formed of subpixels that contribute to the formation of a complete element but that are not complete in themselves. IP urges a broader construction for "image element" as any element found within an image, including complete pixels, portions of pixels, and other elements of images that are not pixel-related.FN7 Lexmark and Dell insist that "pixel" and "image element" are interchangeable. In their opinion, both terms refer to the smallest electronically coded part of an electronically coded input image. When the terms are used in the context of discussing a display device, Lexmark and Dell argue that they must mean the smallest addressable element of the display device.

FN6. In the joint claim construction chart, the parties also indicate that the meaning of the term "plurality" is disputed, but they offer no development of that issue. In light of the absence of a crystallized dispute, we offer no construction of that term.

FN7. Examples could include the RGB components of a video signal or the yellow, cyan, and magenta components of a single pixel used in color laser printing.

An examination of the intrinsic evidence reveals that IP has the better argument. For example, the specification of the '780 patent states that "[v]oids in the image may be filled with all or a portion of a pixel," which is consistent with IP's position that pixels can be formed of subpixels. U.S. Patent No. 5,424,780, col. 4, Ins. 50-51; *see also* col. 5, Ins. 48-50 ("New pixels or pixels used for filling, substitution or replacement may be comprised of all or a portion of a pixel."). Examples could include the RGB components of a video signal or the yellow, cyan, and magenta components of a single pixel used in laser printing.

Although in many circumstances the patents use the terms interchangeably, that is not inconsistent with IP's proposed definitions, wherein all pixels are image elements, but not all image elements are pixels. Though the intrinsic evidence from the '780 patent does not provide a great deal of illumination on these issues, the language of the '637 patent directly supports IP's position. The parties agree, and we concur, that the terms "image element" and "pixel" should be construed consistently as to both patents, so the guidance provided by the '637 patent clarifies the meaning of these terms in the '780 patent as well. Dependent claims 34, 51, 140, and 161 all have one limitation that states: "image elements are pixels." Here again, the doctrine of claim differentiation provides helpful guidance. *See* Comark, 156 F.3d at 1187. When applied to these four claims, the doctrine supports the conclusion that the image elements referenced in the independent claim are not always pixels, which indicates that they should not be treated as synonyms.

Furthermore, though the intrinsic evidence gives no indication that Cooper intended these terms to carry an idiosyncratic meaning, Lexmark and Dell's proposed definition adds in requirements that pixels and image elements must be an addressable element contained in electronically coded input image. They have not provided convincing support that these aspects are included in the ordinary and customary meaning of these terms, nor have they shown that Cooper intended to use these terms in an idiosyncratic way. *See* Phillips, 415 F.3d at 1312.

Therefore, we construe "pixel" to mean the smallest complete element of an image and "image element" to mean any element of an image, whether complete or not and whether pixel-related or not.

d. "*Comparing a First of Said Selected Pixels to at Least a Second of Said Pixels*"

[21] This claim term appears solely in claim 15 of the '780 patent. IP proposes that we construe this term according to what it claims is the ordinary and customary meaning: taking selected pixels in an image, and within the group of them, comparing a pixel of the original image to at least a second of the selected pixels. Lexmark and Dell by and large agree with this construction, but they wish to add the phrase "electronically coded" or variants thereof to make the definition read as follows: taking the selected pixels of an electronically coded input image, and within the group of them, electronically comparing the pixel to be displayed to one or more of the surrounding selected pixels of the coded image.

As was the case with regard to the construction of "pixel" and "image element" discussed above, Lexmark and Dell's proposed construction unnecessarily adds limitations and features that are not supported by the specification, such as that the image be of the "electronically coded input" variety and that the comparator pixel be from the pixels "surrounding" the first pixel. The intrinsic evidence indicates that the addition of these terms would impermissibly narrow the scope of the claim. According to Lexmark and Dell, because the specification, particularly Figure 7, comports with their definition, we should import the limitations found in the specification into the claim itself. *See* Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 905 (Fed.Cir.2004). While the sections of the specification to which Lexmark and Dell point undeniably illustrate and discuss one way in which the comparison can be accomplished, we disagree that the process described in the plain language of the claim term could only be effectuated in that way. In addition, the insertion of the phrase "the pixel to be displayed" is not consistent with the specification or the claims; it requires that any comparison must be with the pixel that is ultimately to be displayed. Lexmark and Dell's definition would erase the possibility of a new pixel being generated from the comparison of two existing pixels, which the language of the patent anticipates. *See* United States Patent No. 5,424,780, col. 5, Ins. 33-50.

Therefore, the court adopts IP's proposed definition: taking the selected pixels of an image, and within the group of them, comparing a pixel of the original image to at least a second of the selected pixels.

e. "*Void*"

[22] The term "void" is used throughout both patents. IP proposes the following definition: space(s) in the image where a change of illumination may be made to cause an improvement of the perceived quality of the image. Lexmark and Dell propose that, with respect to still images, "void" should be construed to mean "an empty space, opening, gap, the quality of being without something between pixels of a displayed image." In the context of moving images, Dell asks for another construction: an empty space, opening, gap, the quality of being without something at all times.

The essence of the parties' dispute is whether "void" refers only to gaps or spaces between pixels or includes image elements and defective or turned-off pixels. Lexmark and Dell advance the former position, averring that Cooper disavowed a broader definition in the course of prosecuting the patent application. Specifically,

they point to a statement where Cooper referenced a dictionary defining the word "void" as "empty space, opening, gap, the quality of being without something, etc." *See S/N* 355,461 O.A. response 6/18/92 at 17; *S/N* 355,461 O.A. response 6/24/93 at 7. Cooper also stated in these two office action responses that "Applicant believes however that the examiner is incorrect in his assertion that a defective pixel such as corrected by the '070 invention is the same as, and would include, voids in the image as in the present disclosure and claims." Id. Lexmark and Dell believe that these statements show a clear intention on the part of the Cooper to redefine the term "void."

It is axiomatic that the prosecution history of a patent can show that a patentee intended to use a term in a way other than its ordinary and customary meaning, but the proceedings before the examiner must show a "clear and unmistakable departure" from the common understanding of the term. *See* Golight, 355 F.3d at 1332. If the statements made can reasonably be interpreted in more than one way, no clear and unmistakable departure is shown. *See* id.

In this case, the statements to which Lexmark and Dell refer can reasonably be interpreted as an attempt on Cooper's part to distinguish his present invention from a prior patent. The prior art patent filled in defective voids only, in contrast to the invention in the '780 patent, which ameliorates artifacts caused by defective pixels as well as by gaps or empty spaces between pixels. Rather than excluding defective pixels or image elements from the types of voids the invention could alter, Cooper illustrated that the '780 patent was more comprehensive. Because the reference to the dictionary definition can reasonably be interpreted in this way, there is no clear departure from the more expansive understanding of the term "void."

Last and most important, IP's position is consistent with the specification and the claims. Both the claims and the specification make reference to the possibility that voids need not be completely empty; claim 110 states that "the void can include at least in part a portion of a space occupied by another image element," and the specification states that "[n]ew pixels or pixels used for filling, substitution or replacement may be comprised of ... a portion of a pixel." U.S. Patent No. 5,424,780, col. 5, lns. 48-50; *see* Purdue, 237 F.3d at 1364. To accept Lexmark and Dell's definition, we would in essence read out these portions of the patent. Therefore, we construe this term to mean a space or spaces in the image where a change of illumination may be made to cause an improvement of the perceived quality of the image.

In the context of the '637 patent, Lexmark and Dell contend that this term should have a different meaning, relying on a portion of the specification in that patent that supplies illustrative examples of voids. As explained in the discussion of "display device" above, an illustrative list is not tantamount to an exhaustive description. Thus, Lexmark and Dell's arguments that this term should not be given a consistent meaning for both patents are unavailing, and we attribute the construction addressed here to all appearances of this term in both patents.

f. "*To Select Voids*"

[23] The parties next dispute the meaning of the term "to select voids" that first appears in claim 15. They agree that the construction should include the phrase "to identify particular voids to be altered," but Lexmark and Dell seek to add "as distinguished from the coincidental filling of all voids in a row between existing scan lines which results from deinterlacing" FN8 to the end of the definition.

FN8. Deinterlacing is a process in which a scan line, or voids in an image that appear in a row, are filled automatically.

During prosecution, Cooper sought to distinguish his invention from a prior art patent, which disclosed deinterlacing a video signal. He referred to the prior art process as "coincidental" and specified that his invention, by contrast, selectively detected voids before filling them. Lexmark and Dell contend that this

amounts to a disclaimer of coincidental filling caused by deinterlacing during prosecution.

As we read IP's proffered definition, the distinction Lexmark and Dell seek to make explicit is already contained within it. The phrase "identify particular voids" makes it clear that voids are not coincidentally or accidentally filled. Rather, the term "identify," much as the term "select," implies some purposeful or deliberate action that is neither coincidental nor accidental. Therefore, the court adopts IP's proposed construction: to identify particular voids to be altered.

This construction applies equally to the related terms "indicating voids" in claim 146 of the '780 patent and "to determine the presence of a void" in claims 1 and 107 of the '637 patent.

g. "*Altering Voids*"

[24] The parties next set their sights on the term "altering voids." IP contends that the term should bear its ordinary and customary meaning and that one of ordinary skill in the art at the time of filing would understand what "altering voids" means. Lexmark and Dell ask that this term be construed to mean filling voids by varying the input signal without modifying the on and off times of the signal carrying the image.

Lexmark and Dell again point to the prosecution history to support their argument. During prosecution, Cooper attempted to distinguish his invention from the prior art by pointing out that the prior art only modified the on and off times of an input signal. In a response to an office action, Cooper cited three prior art references to the examiner. He went on to explain what each patent disclosed and why his invention was distinguishable. He differentiated the first on the basis that, unlike his invention, it did not modify character scanning or fill voids except by modifying the length of a horizontally adjacent character element via the on and off times of character elements. This operation also affected the size of the object. *See S/N* 355,461 O.A. response 12/11/91 at 17. Similarly,with respect to the second prior art patent, Cooper contended that the invention did not fill voids or modify the laser beam used in constructing the image except in modifying the on and off times of the beam. *See* id. at 18, 19. The third discussion proceeded on similar lines. Id. at 20.

The doctrine of prosecution disclaimer provides that, if a patentee disclaims or disavows certain subject matter in order to obtain patentability, the disclaimed matter cannot be recaptured during claim construction. *See* Omega Engineering, Inc. v. Raytek Corp., 334 F.3d 1314, 1323 (Fed.Cir.2003). This prevents a patentee from construing the claims of the patent narrowly before the PTO to achieve patentability but later attempting to broaden the same claims when asserting infringement. Autogiro Co. of America v. United States, 181 Ct.Cl. 55, 384 F.2d 391, 399 (1967). Here, Cooper introduced to the examiner three prior art patents related to printers and distinguished each from his invention by pointing out that no voids are filled, and that the patents only modify the on and off times. In so doing, he clearly and unambiguously disclaimed simple modification of on and off times of the input signal. Thus, we agree with Lexmark and Dell to a point, but their proposed definition goes further to exclude any way of altering a void that includes modifying on and off times, even if that is done in combination with some other method. The court therefore construes the term to mean filling voids by varying the input signal without solely modifying the on and off times of the signal carrying the image.

h. "*Improving the Apparent Resolution of the Image Without Requiring an Increase in the Number of Image Elements Originally Making Up the Image*"

[25] For this term, which appears in claims 15 and 146 of the '780 patent, IP proffers the following construction: improving the original image to make it appear to have a higher resolution when displayed without actually increasing the number of image elements originally making up the image. Lexmark and Dell contend that this term means improving the electronically coded input image to make it appear to have a higher resolution when displayed, but without actually increasing the number of image elements making up the image (without interpolation).

Lexmark and Dell's proposed definition again relies heavily on the prosecution history of the '780 patent. During prosecution, the examiner made the following statement to which Cooper apparently acquiesced:

First, King does not improve the apparent resolution of the image without requiring an increase in the number of image elements originally making up the image as required by claims 1-25. Instead, King performs interpolation which generates new pixels. Therefore, there is an increase in the number of image elements originally making up the image.

S/N 90/005, 484 O.A. 5/16/00 at 16. Lexmark and Dell contend that since Cooper acquiesced to this statement by the examiner, the phrase "without interpolation" must be included. The statements made by the examiner are not inconsistent with IP's proposed definition, which includes a limitation that there is no actual increase in the number of image elements displayed. Much as was the case with respect to the term "to select voids" in claim 15, Lexmark and Dell's definition seeks to specify a distinction implicitly contained in IP's definition. Accordingly, we accept IP's construction of this term.

2. Claim 146

Like claim 15, claim 146 is an independent claim. In its entirety, it reads:

Apparatus for improving the image quality of a displayed image, the image made up of a number of image elements carried by a signal, the apparatus including in combination,

a neighboring pixel means responsive to the signal carrying said displayed image to provide a plurality of image elements including a central pixel and a plurality of neighboring pixels and a fill calculator means responsive to said central and neighboring pixels to generate a fill signal indicating voids in said displayed image which may be filled which filling can include movement of image elements,

which said displayed image is displayed by a display device thereby improving the apparent resolution of the image without requiring an increase in the number of image elements originally making up the image.

a. *The Preamble*

[26] Much as was the case with claim 15, the parties dispute whether the preamble of this claim should be construed as a limitation.FN9 The preamble introduces two elements vital to the claim: displayed image and image element. Each term appears three times in the body of the claim and provides the antecedent basis necessary for the body of the claim to make sense. Moreover, no description of the invention would be possible in this claim without these terms. Therefore, based on the principles recited above with regard to claim preambles, we construe the preamble of claim 146 as a limitation.

FN9. The operative language we consider is as follows: "[a]pparatus for improving the image quality of a displayed image, the image made up of a number of image elements carried by a signal."

b. "*Displayed Image*"

[27] For the term "displayed image" in claim 146, IP proposes the following construction: an image presented by a display device. Lexmark and Dell propose this definition: an image displayed on a display device. Lexmark and Dell's proposed definition excludes printers as a permissible type of display device. As discussed above, we conclude that printers are within the scope of the '780 patent. Therefore, we construe this term to mean an image presented by a display device.

c. "*Neighboring Pixel Means*"

[28] This term, by virtue of the use of the word "means" in conjunction with a function, implicates 35 U.S.C. s. 112 para. 6, which provides that

[a]n 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.

[29] When a function appears in a claim in conjunction with the word "means," it is presumed that the apparent broad scope of the claim will be restricted by the structure, material, or acts contained in the specification. *See* Micro Chemical, Inc. v. Great Plains Chemical Co., Inc., 194 F.3d 1250, 1257 (Fed.Cir.1999). This presumption may be rebutted, and a broader construction permitted, if the claim recites sufficient structure to perform the recited function. Id. If the claim is found to be governed by s. 112 para. 6, a proper construction must both identify the claimed function and determine the corresponding structure that performs that function. *See* id. at 1258.

According to Lexmark and Dell, the phrase immediately following the term "neighboring pixel means" FN10 constitutes a function, thus bringing this claim within the ambit of s. 112 para. 6 and narrowing its potential application only to the structure recited within the specification. IP urges that this claim does not contain means-plus-function language and asks that we consider the phrase "neighboring pixel means" as synonymous with element. IP's preferred construction finds no support in the plain language of the claim. Moreover, to accept it, we would have to ignore both the presence of the word "means" and the phrase "to provide a plurality of image elements including a central pixel and a plurality of neighboring pixels," which on its face describes what the neighboring pixel means does, i.e., its function. Consequently, we agree with Lexmark and Dell that claim 146 contains means-plus-function language sufficient to invoke s. 112 para. 6.

FN10. In its entirety, this phrase reads "responsive to the signal carrying said displayed image to provide a plurality of image elements including a central pixel and a plurality of neighboring pixels."

Having concluded that claim 146 is a means-plus-function claim, we must determine the structure given within the specification that corresponds to the means and function identified unless the claim itself recites an adequate structure. *Id*. Because the claim language consists only of the disputed language and the recitation of the function, we must look to the specification.

Lexmark and Dell would restrict the structure provided in the specification to only that describing the preferred embodiment. In their brief, IP merely cite to a number of sections in the '780 patent as disclosing the relevant structure, but do nothing more to help the court determine that structure. In contrast, Lexmark and Dell list out in detail what they believe to be the relevant structure, but their construction would limit the structure only to the preferred embodiment, to the exclusion of other structures disclosed within the specification and their equivalents. This approach is too restrictive to be true to the provisions of s. 112 para. 6 in these circumstances. *See* Versa Corp. v. Ag-Bag Int'l, Ltd., 392 F.3d 1325, 1329 (Fed.Cir.2004).

The structure disclosed for the preferred embodiment places the neighboring pixel means between an analog video signal input and the display device. It uses the delay lines, shift registers or other delay devices to allow all nine of the pixels to be present simultaneously and includes an analog to digital converter 29, sync stripper and PLL circuit 30 coupled to timing and clock, digital delays 31, 32, and 33, compensating delay 34, and digital to analog converter and video fill circuit 35. The specification also states that the neighboring pixel means can connect to a video amplifier rather than directly to the signal input. In some circumstances, there are also variations in the delays 31-34. As is apparent from the contents of this description and the notation within the specification that it pertains to a video monitor, which the specification denotes at col. 4,

lns. 10-14 as the display device used by way of example. Lexmark and Dell's proposed structure would make a video monitor the only display device capable of having a neighboring pixel means, which is directly contrary to the language of the specification and our construction of prior terms. Thus, we construe the corresponding structure to be that described for the preferred embodiment and equivalents thereof in other display devices within the ambit of the '780 patent.

d. "*Fill Calculator Means*"

[30] The term "fill calculator means" appears in claim 146 in the '780 patent. IP argues that although the presumption is raised that s. 112 para. 6 applies because the "means" appears in the term, the term "calculator" itself recites sufficient structure to rebut the presumption that this is a means-plus-function term with the corresponding structure given in the specification. *See* Micro Chemical, 194 F.3d at 1257. IP contends that "calculator" is akin to terms like "circuit," which denote sufficient structure that it is unnecessary to provide further description in the specification. While we do not quarrel with the idea that such terms do exist, IP does little beyond a naked assertion that "calculator" is one of them. Such an underdeveloped presentation is insufficient to overcome the presumption implicit in Federal Circuit precedent. *See* Phillips, 415 F.3d at 1311.

Because we conclude that this is in fact a means-plus-function claim, we engage in the two-step analysis described above, determining first the function described and then the corresponding function. *See* Micro Chemical, 194 F.3d at 1258. IP's proposed definition seeks to add possible ways a void might be filled along with other language for which there is no support. Lexmark and Dell propose using the exact language of the claim for the function. Therefore we construe the function to be to generate a fill signal indicating voids which may be filled in the image to be displayed in response to the central and neighboring pixels.

Next, the court must determine the relevant structure. IP quotes a passage from the specification which expansively describes the types of hardware that "can be" used to implement the invention. Lexmark and Dell again point to the structure described for the preferred embodiment: coupled to the video fill circuit 35 and containing rank logic means 27, fill logic circuit 28, difference determining circuits 36, difference comparison circuits 37, and individual ranking circuit 38.

As was the case with the term "neighboring pixel means," to accept the preferred embodiment as the only applicable structure would limit the term only to video applications. However, IP's more expansive construction provides only examples of types of hardware that could be used within the fill calculator means rather than the structure that performs the function listed in the claim. Thus, we construe the corresponding structure to be that described for the preferred embodiment and its equivalents in other display devices within the patent's reach.

e. "*Generate a Fill Signal*"

[31] The term "generate a fill signal" appears in claim 146 of the '780 patent. IP asks the court to adopt the following definition: to generate a signal which indicates voids which may be filled by changing the image. Lexmark and Dell ask for a definition similar to the definition of "altering voids": to generate a signal which fills voids by varying the input signal without modifying the on and off times of the signal carrying the image.

As was the case for the related term "altering voids," we agree with a portion of Lexmark and Dell's argument, but they take the concept too far. Therefore, the court adopts Lexmark and Dell's construction: to generate a signal which fills voids by varying the input signal without solely modifying the on and off times of the signal carrying the image.

B. The '637 Patent

Having completed our construction of terms appearing within the '780 patent, we turn our attention to the '637 patent. Here, the parties dispute the meanings of certain terms within claims 1, 13, 94, and 107.

1. Claim 1

Like claims 15 and 146 of the '780 patent, claim 1 of the '637 patent is an independent claim. In its entirety, it reads:

An improved signal processing circuit for selectively filling a void located at a particular position having at least partially surrounding image elements respectively,

said circuit comprising: neighboring element means to provide said at least partially surrounding image elements in respect to said particular position,

inspection means to inspect a plurality of said at least partial surrounding image elements of the image to determine the presence of a void at said particular position,

and replication means for selectively filling in the void at said particular position with a value which decreases the visibility of the void, which void can include a location between at least partially surrounding image elements.

a. ***The Preamble***

[32] The parties dispute whether the preamble of claim 1 in the '637 patent should be construed as a limitation. Lexmark and Dell point out that two terms are introduced in the preamble: void and image element. Void appears four times in the body of the claim; "image element" appears three times. Similar to terms used in the preambles discussed for the '780 patent, the use of these terms in this preamble provides the necessary antecedent basis for their use in the body. Moreover, they are crucial to the claim for describing how the invention improves the apparent resolution. Therefore, we construe this preamble as a limitation as well.

b. "*Neighboring Element Means*"

[33] The term "neighboring element means" appears in claims 1 and 13 of the '637 patent. This term again contains the word "means," and the presumption that s. 112 para. 6 governs its construction has not been overcome. *See* Micro Chemical, 194 F.3d at 1257. IP proposes the following definition of the function: being responsive to an input signal which carries the image to provide a plurality of picture elements which at least spatially and/or temporally partially surround a particular position in the image. Lexmark and Dell propose using the claim language itself: to provide said at least partially surrounding image elements in respect to said particular position. This is a similar situation to that presented by the parties' construction of terms such as "to select voids." The points that IP seeks to make explicit are implicit in Lexmark and Dell's definition. The term "surround" does not imply any spatial or temporal limitation, so it is unnecessary to specify that pixels can surround each other spatially or temporally. As a result, we determine that the function of the neighboring element means is to provide image elements that at least in part surround a particular void.

Having identified the applicable function, we must next determine the relevant structure. For the reasons discussed above with regard to other means-plus-function claims, we determine the structure to be that given with respect to the preferred embodiment as well as its equivalents in nonvideo display devices that are within the ambit of the '637 patent. As stated in the specification, the preferred embodiment consists of memories, delay lines, shift registers or other delay devices that allow a finite number of elements to be present simultaneously and includes an analog to digital converter 29, sync stripperand PLL circuit 30 coupled to timing and clock, digital delays 31, 32, and 33, a compensating delay 34, and digital to analog

converter and video fill circuit 35. U.S. Patent No. 6,529,637, col. 11, lns.7-12; col. 15, ln. 52-col. 16, ln. 54.

c. "*Inspection Means*"

[34] Because of the presence of the word "means" in this term, the presumption is that s. 112 para. 6 governs our analysis. *See* Micro Chemical, 194 F.3d at 1257. IP proffers the following function: to determine the presence of a void at the particular position in the image. Lexmark and Dell propose using the claim language itself: to inspect a plurality of said at least partial surrounding image elements of the image to determine the presence of a void at said particular position. IP's description of the relevant function reads out two limitations explicit in the claim language: that a plurality of elements must be inspected and that they must at least in part surround the void identified. Because Lexmark and Dell's proposed construction include these important limitations, we conclude that it is the more appropriate.

Having determined the applicable function, we turn our attention to determining the corresponding structure identified in the specification. Lexmark and Dell again point to the preferred embodiment, while IP does not identify a specific structure. For the reasons identified in similar discussions above, we determine the structure for this term to be the rank logic means 27 within the element replication means 9, and includes difference determining circuits, difference comparison circuits 37, and individual ranking circuits 38 and equivalent structures in other display devices within the reach of the '637 patent.

d. "*Replication Means*"

[35] This term again contains the word "means," and the presumption that s. 112 para. 6 governs its construction remains intact. *See* Micro Chemical, 194 F.3d at 1257. Thus, we determine the function identified in the claim and the corresponding structure disclosed within the specification. Looking first to the function: IP proposes the following: selectively filling in the void at the particular position. Lexmark and Dell propose using the claim language itself: selectively filling in the void at said particular position with a value which decreases the visibility of the void, which void can include a location between at least partially surrounding image elements. IP's definition is underinclusive in that it reads out the specific textual limitation "with a value which decreases the visibility of the void," but Lexmark and Dell's definition includes language about the location of the void which simply describes a possible operation rather than a necessary component of the function. Therefore, we determine that the function of the replication means is to selectively fill a void at an identified particular position with a value that decreases the visibility of the void.

Turning to the next step, the determination of the applicable structure, we note that Lexmark and Dell's proffered definition embraces the structure that has already been identified as corresponding to the inspection means discussed above. IP's definition is largely a list of examples of software and circuitry that can be used within the structure, without a comprehensive exposition of the structure itself. Once these discrepancies are reconciled, the resulting structure would be as follows: a fill or replication logic circuit 28, which is connected to the inspection means, coupled to replication circuit 35. As was true for other means-plus-function claims, our construction includes equivalents of this structure.

e. "*Selectively Filling in the Void*"

[36] The term "selectively filling in the void" appears in claims 1 and 107 of the '637 patent. This claim term brings up the issues similar to those encountered in the terms "to select voids" and "altering voids" and related terms. For the reasons stated in the discussions pertaining to those terms, we construe this term to mean filling in, replicating, creating, modifying, replacing, substituting, adding to, providing, correcting, or improving the void by varying the input signal without solely modifying the on and off times of the signal carrying the image. Although IP requests that we construe this term differently between these two claims, this construction will apply to both. *See* Rexnord, 274 F.3d at 1342.

f. "*Decreases the Visibility*"

[37] The term "decreases the visibility" appears in claims 1 and 107. IP asks for the following definition: decreases the visibility of a void in the displayed image relative to the original image. Lexmark and Dell propose the following: improving the apparent resolution of the electronically coded input image to make the void appear less visible, but without actually increasing the number of image elements making up the image.

As described earlier, the Lexmark and Dell's proposed definition impermissibly attempts to add the phrase "electronically coded," which is not supported by the specification or the prosecution history. In addition, the final phrase they propose improperly conflates the notion that the invention does not increase the size or resolution of the image with the possibility that the number of image elements may increase during the operation of the inventive process. Therefore, the court adopts IP's definition: decreases the visibility of a void in the displayed image relative to the original image without actually increasing the size or resolution of the image.

2. Claim 13

Claim 13 is a dependent claim that depends on claim 1. In its entirety, it reads:

The circuit of claim 1 wherein said neighboring elements means provides at least one set of image elements extending across sequential fields.

a. "*Extending Across Sequential Fields*"

This is the sole term apparently disputed by the parties in this claim. However, neither party offers a proposed construction or any argument in support of one. In the absence of an identifiable dispute, we will not construe this term.

3. Claim 94

Like claim 13, claim 94 depends upon claim 1. It reads:

The processing circuit of claim 1 characterized in that said replication means utilizes a horizontal deflection circuit.

a. "*Horizontal Deflection Circuit*"

[38] For this term, IP requests the following definition: the circuit which causes the displayed image elements to be placed in position for each horizontal row thereof. Lexmark and Dell propose: a circuit which produces a continuously variable alteration of the path of a particle beam, as distinguished from address or pixel selection as might be applied to LCD type displays.

As is apparent, neither party's definition is grounded in the plain language of the claim, and neither provides convincing argument or support why its proposed language should supplant the plain meaning of the words used within this claim and those used in claim 1, upon which it depends. Therefore, we construe this term to mean a circuit that assists selective filling of a void at an identified particular position by deflecting an image element to a new position along a horizontal plane.

4. Claim 107

Like claim 1, claim 107 is an independent claim. It reads:

A method for selectively filling a void located at a particular position having at least partially surrounding image elements respectively, said method comprising: providing said at least partially surrounding image elements in respect to said particular position, inspecting a plurality of said at least partially surrounding image elements of the image to determine the presence of a void at said particular position, and selectively filling in the void at said particular position with a value which decreases the visibility of the void, which void can include a location between at least partially surrounding image elements.

a. *The Preamble*

[39] The parties dispute whether the preamble of claim 107 in the '637 patent should be construed as a limitation. The term "void" is introduced in the preamble and appears in the body of the claim four times; "image element" appears three times. As was true for the other preambles discussed above, this is a sufficient basis to conclude that the preamble should be construed as a limitation.

b. "*Inspecting*"

[40] For this term, IP offers the following definition: analyzing a certain element or location and one or more at least partially surrounding or neighboring elements of an image to determine the desirability of creating elements (in time or space) or modifying the location, value, brightness, shape, position, intensity or size of at least one element so as to improve the spatial and/or temporal resolution relationship between the elements, which may neighbor in time or space. Lexmark and Dell offer the following: examining or measuring to verify whether an item or activity conforms to specified requirements.

IP's definition of "inspecting" is overly broad and impermissibly reads limitations from the specification into the claim. The intrinsic evidence may disclose the subject matter of IP' definition, but the intrinsic evidence does not support the conclusion that the patentee gave a special meaning to the term "inspecting" as IP suggests. In such circumstances the ordinary and customary definition is to be used. Therefore, the court adopts Lexmark and Dell's definition: examining or measuring to verify whether an item or activity conforms to specified requirements.

c. "*Inspecting a Plurality of Said at Least Partially Surrounding Image Elements of the Image to Determine the Presence of the Void*"

[41] IP offers the following definition for this term: inspecting two or more of the at least partially surrounding image elements of the group from the original image for the purpose of determining the presence of a void at the particular position. Lexmark and Dell propose: taking the at least partially surrounding pixels of the electronically coded input image, and examining or measuring two or more of those pixels without matching them to a pattern of elements.

Lexmark and Dell's definition seeks to add impermissible language such as "a pattern of elements" and "electronically coded." The defendant is adding the language based on the prosecution history of the '637 patent. On the hand, IP's definition reflects the ordinary and customary meaning of the term. Similar to the situation with the term "comparing a first of said selected pixels to at least a second of selected pixels" in claim 15 of the '780 patent, Lexmark and Dell's proposed definition includes limitations not found in the plain language of the claim. Therefore, we construe this term to mean inspecting two or more of the at least partially surrounding image elements of the group from the original image for the purpose of determining the presence of a void at the particular position.

d. "*Providing Said At Least Partially Surrounding Image Elements In Respect To Said Particular Position*"

[42] Though this term appears in the claim construction chart, the only discussion provided for its construction appears in IP's brief, which advances its definition and provides what it contends to be

Lexmark and Dell's proposed definition. IP proposes that the term means making at least some of the image elements of the original image that surround the particular position available for inspection. Lexmark and Dell supposedly propose that it means making the pixels of the electronically coded input image that at least partially surround the particular position simultaneously available for electronic inspection.

Lexmark and Dell's apparent position would add terms unsupported by the plain language of the claim, namely that the input image be "electronically coded," that the pixels be "simultaneously" available, and that inspection be "electronic." For the reasons described above where similar insertions were attempted, we conclude that IP's definition is preferable here. Thus, we construe this term to mean making at least some of the image elements of the original image that surround the particular position available for inspection.

CONCLUSION

The disputed terms appearing in claims 15, 109, 110, and 146 of United States Patent No. 5,424,780 and in claims 1, 13, 94, and 107 of United States Patent No. 6,529,637 are construed consistent with the contents of this opinion.