United States Court of Appeals for the Federal Circuit

01-1634, 02-1023

CREO PRODUCTS, INC.,

Plaintiff-Appellant,

v.

PRESSTEK, INC.,

Defendant-Cross Appellant.

Robert G. Krupka, Kirkland & Ellis, of Los Angeles, California, argued for plaintiff-appellant. With him on the brief were Boaz Brickman, Marc Cohen, Brian Arnold, and

Nick Saros, of Los Angeles, California; and Jay I. Alexander and Gregory F. Corbett, of Washington, DC.

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Appealed from: United States District Court for the District of Delaware

Judge Gregory M. Sleet

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DECIDED: September 17, 2002

Before CLEVENGER, RADER, and BRYSON, Circuit Judges.

Opinion for the court filed by Circuit Judge BRYSON. Dissenting opinion filed by

Circuit Judge CLEVENGER.

BRYSON, Circuit Judge.

Creo Products, Inc., appeals from the judgment of the United States District Court for the District of Delaware holding that two patents belonging to Presstek, Inc., are not invalid. Presstek cross-appeals from the district court's judgment that Creo's on-press imaging system does not infringe either of Presstek's patents. We affirm.

I

Although technology has made printing faster, cheaper, and more accurate, the underlying concept of the printing press has remained the same since its inception. Basically, an image is created on a printing plate by altering different surface areas of the plate so that they are either ink receptive or ink repellant. Today, one way to create such images is to expose the printing plate to a discharge source, such as a spark discharge electrode or a laser, so as to alter the surface properties of different areas of the plate. After the image is created on the printing plate, the plate is mounted on a cylinder and inked. When ink is applied to the printing plate, it attaches to certain areas and is repelled from others. The inked printing plate is then brought into contact with paper, and the image is transferred to the paper.

One of the most common methods of printing is offset lithography, in which the inked area on the printing plate contacts a soft blanket cylinder onto which the image is transferred. The cylinder then transfers the image to paper. The use of a blanket cylinder between the printing plate and the paper is what characterizes "offset" printing.

Color offset lithography, the subject matter of this dispute, adds an additional layer of complexity. The color image that is to be copied must first be separated into four components, typically yellow, cyan, magenta, and black. After color separation, the four components of the image are transferred to four printing plates, one for each color. The printing plates are then loaded onto cylinders at four print stations. When paper passes through each station, the ink is transferred from each printing plate to the paper to form a full color image.

A major problem associated with color offset lithography is that if the separately printed colors are not precisely aligned on the paper, the resulting image will appear distorted or discolored in various ways. The misalignment of the different color elements is referred to as misregistration. The naked eye is extremely sensitive to misregistration of color images; misalignment of an image by as little as one one-hundredth of an inch results in a visibly distorted image.

Different types of errors contribute to misregistration of color images. Generally, errors can be either non-uniform (affecting only parts of the image) or uniform (affecting the entire image). A non-uniform error usually occurs when there are imperfections on the printing plate itself. Uniform errors may occur for any number of reasons. An "axial error" results when the image from one printing plate is shifted to the left or right relative to the image from another plate. An "angular offset error" results when the image from one printing plate is shifted up or down relative to the image from another plate. A "size error" results when the image from one printing plate is larger or smaller than the image from another plate. A "skew error" results when the image on one plate is twisted or skewed relative to an image on another plate.

Although misregistration can be corrected manually by a skilled press operator, manual correction is expensive and time consuming. Furthermore, it is extremely difficult to correct non-uniform errors manually. Electronic error correction is now a preferred method because, in addition to being faster and cheaper, it can correct non-uniform as well as uniform errors. The key to electronic registration is creating the image directly on the plate while the plate is still on the press, i.e., applying the image to the plate at the print station rather than creating it off-press and then loading it onto the print station. Using electronics, the image destined for each plate can be modified so as to correct for both uniform and non-uniform errors while the image is being created on the printing plate.

Creo and Presstek are competing manufacturers of electronic imaging systems designed to be installed in printing presses. Presstek owns U.S. Patent Nos. 5,163,368 ("the '368 patent") and 5,174,205 ("the '205 patent"). Upon Creo's petition, both the '368 and '205 patents were reexamined by the Patent Office. They emerged from reexamination after amendment in August 1999. The '368 patent, entitled "Printing Apparatus With Image Error Correction and Ink Regulation Control," discloses a printing press capable of electronically correcting for mechanical imperfections that might otherwise result in alignment and registration errors. The only independent claim of the '368 patent at issue on appeal is claim 1, which is reproduced below:

1. Printing apparatus comprising:

a. a plurality of print stations, each station including a plate cylinder for supporting a printing plate, at least one discharge source for applying to the plate an image having a size, and means for moving each

discharge source relative to the plate cylinder so that when the plate cylinder is rotated, the at least one discharge source scans a raster on the surface of the plate;

b. means for rotating each cylinder; and

c. control means responsive to (1) electronic signals representing an original document for repeatedly actuating the discharge source momentarily during the scan thereof so that said discharge source forms on the plate surface an image comprised of dots corresponding to the original document, (2) angular offset parameters specifying angular inconsistencies among the plate cylinders, and (3) size difference parameters specifying inconsistencies among the image sizes, said control means including:

i. a dot position look-up table for storing the x and y coordinates corresponding to substantially all dot positions on each plate;

ii. means for actuating said discharge source to form image dots at selected ones of said dot positions when said electronic signals are present; and

iii. means for offsetting, with respect to said x and y coordinates, the action of the discharge-source actuation means in accordance with

the angular offset parameters to correct the angular inconsistencies; and

iv. means for altering the length of the scan in accordance with the size difference parameters to correct the image-size inconsistencies.

The ’205 patent, entitled “Controller For Spark Discharge Imaging,” discloses an apparatus and method for controlling the discharges used to image printing plates. The only independent claims of the ’205 patent at issue on appeal are apparatus claim 11 and the corresponding method claim 23, which are reproduced below:

11. An apparatus for imaging on a press including a plate cylinder and a lithographic plate having a printing surface, said apparatus comprising:

mounting means for mounting said plate on said cylinder;

discharge means for effecting discharges between an imaging device communicated with said printing surface and selected points thereon;

means for providing relative motion between the cylinder and the discharge means to effect a scan of the printing surface by the discharge means; and

controlling means responsive to image information specifying the locations on the cylinder at which discharges are to occur, position information specifying the location of the discharge means relative to the cylinder, and correction data specifying offsets to the image information, the controlling means being operatively coupled to the discharge means such that the discharges occur in response to the image information at selected discrete positions on the printing surface as specified by the image information offset by the correction data, thereby directly producing on the lithographic plate an array of image spots suitable for reproduction in a series of axially sequential, circumferential imaging swaths, each swath comprising a series of circumferentially spaced-apart image sports formed during one

revolution of said cylinder, the array of image spots corresponding to the image represented by the image information.

23. A method of imaging on a press including a plate cylinder and a lithographic plate having a printing surface, said method comprising the steps of:

mounting said plate on said cylinder;

receiving position information indicating the angular position of said cylinder;

storing (i) image information specifying locations on the cylinder at which image spots are to be placed and (ii) correction information specifying offsets to the image information;

exposing the printing surface at selected points to discharges from an imaging device to produce image spots at these points;

moving the imaging device and the print cylinder relatively to effect a scan of the printing surface by the imaging device; and

controlling the discharges in accordance with said image, correction and position information so that the discharges occur at selected positions on the printing surface, thereby directly producing on the lithographic plate an array of image spots suitable for reproduction in a series of axially sequential, circumferential imaging swaths, each swath comprising a series of circumferentially spaced-apart image spots formed during one revolution of said cylinder, the array of image spots corresponding to the image represented by the image information.

In 1997, Creo began developing an on-press imaging system ("the DOP System") for use in printing presses. Creo does not itself incorporate its DOP System into printing presses, but instead sells the DOP system as a kit to printing press manufacturers. The DOP System is connected to a computer containing a graphical user interface that allows a user to enter five geometric correction parameters to register images on the printing plates: (1) main scan shift, (2) sub scan shift, (3) main scan scale, (4) sub scan scale, and (5) track rotation. Main scan shift allows the user to

shift the image around the circumference of the printing plate (in the circumferential or y-direction). Sub scan shift allows the user to shift the image along the length of the printing plate (in the axial or x-direction). Main scan scale and sub scan scale allow the user to adjust the size of the image in the y-direction or x-direction, respectively. Finally, track rotation rotates the axis of the image to compensate for the orientation of the track on which the imaging head moves.

The first step in imaging with the Creo DOP System is to send a file of the image to be printed to an image processor, which breaks the image down into individual pixels and then builds a series of image "bitmaps" corresponding to each color for use in imaging each separate printing plate. After additional processing, each image bitmap is stored on a separate hard disk until imaging begins.

The Creo DOP System determines when to begin imaging based on the five geometric correction parameters. Upon reaching the appropriate spot on the plate, the DOP System reads the image bitmap out of the hard disk and sends groups of pixels to a first-in/first-out ("FIFO") memory on the Image Control Electronics ("ICE") board located at each print station. The DOP System then reads the groups of pixels out of the FIFO memory in groups of up to 240 pixels at a time and sends them to the Thermal Exposure Head, which uses a laser diode and a light valve with up to 240 separate laser channels to create the image on the printing plate. As the Thermal Exposure Head images the printing plate, it slowly moves axially along the length of the plate cylinder while the cylinder rotates underneath.

The Creo DOP System also includes a center frequency calculation ("CFC") to maintain uniform spacing of the pixels regardless of changes in the speed of the cylinder. The CFC analyzes the speed of the cylinder and the acceleration or

deceleration of the drum at any given moment, compares that information to similar data from the previous drum rotation, and then estimates how fast the drum will be moving during the next few clock pulses. The CFC is updated a fixed number of times during imaging. For example, on one system, the CFC is adjusted 256 times per cylinder rotation—once for every one-tenth inch of rotation.

In 1999, Creo filed a declaratory judgment action claiming that the '368 and '205 patents are invalid, not enforceable, and not infringed by Creo's on-press imaging system. Presstek filed a counterclaim alleging that Creo had induced others to infringe those two patents. The district court held a Markman hearing and issued two orders construing the disputed limitations of the '368 and '205 patents. After a bench trial on the issue of liability, the district court found the '368 and '205 patents not invalid, and held Creo not liable for contributory infringement.

Creo appeals from the portion of the court's judgment that was adverse to it. First, Creo argues that claim 1 of the '368 patent is invalid because it was broadened during reexamination. Second, Creo argues that claim 1 of the '368 patent and claim 11 of the '205 patent are invalid for indefiniteness because the patents fail to recite structure corresponding to certain means-plus-function limitations in those claims. Presstek cross-appeals, arguing that the district court erred in its construction of claim 1 of the '368 patent and claims 11 and 23 of the '205 patent, and that the court committed clear error by finding that the Creo DOP System did not infringe either the '368 patent or the '205 patent.

II

A

A patentee is not permitted to enlarge the scope of a patent claim during reexamination. 35 U.S.C. § 305. Whether amendments made during reexamination enlarge the scope of a claim is a matter of claim construction, which this court reviews de novo. Hockerson-Halberstadt, Inc. v. Converse Inc., 183 F.3d 1369, 1373, 51 USPQ2d 1518, 1521 (Fed. Cir. 1999). In so doing, we must analyze the scope of the claim prior to reexamination and compare it with the scope of the claim subsequent to reexamination. A reexamined claim that is broader in any respect is considered to be broader than the original claim even though it may be narrower in other respects. Id.

The disputed claim limitation is reproduced below, with the matter enclosed in brackets having been deleted from the claim during reexamination, and the underlined matter having been added to the claim during reexamination:

> iii. means for offsetting, with respect to said x and y coordinates, the action of the discharge-source actuation means in accordance with the angular offset parameters to correct [imaging errors] the angular inconsistencies; and
>
> iv. means for altering the length of the scan in accordance with the size difference parameters to correct the image-size inconsistencies.

The meaning and scope of the relevant limitations of reexamined claim 1 are not disputed. At issue in this appeal is the scope of claim 1 as originally issued.

The written description of the '368 patent discloses four types of imaging errors that are correctable by use of the claimed invention: axial (x-direction) errors, circumferential (y-direction) errors, image size errors, and skew errors. The parties dispute whether original claim 1 required structure capable of correcting all four imaging errors disclosed in the patent, as Creo contends, or whether it required structure capable of correcting for any imaging error.

Creo argues that the structure corresponding to the "means for offsetting" limitation in original claim 1 is a computer programmed to correct for all four types of errors. According to Creo, Presstek's amendments during reexamination broadened claim 1 so as to require only that the claimed system be capable of correcting two types of errors: y-direction errors and image length errors. Under Creo's theory, reexamined claim 1 would be invalid because a hypothetical device that permits a user to enter offsets to correct for y-direction errors and image length errors, but not x-direction errors or skew errors, could infringe the reexamined claim but would not infringe the original claim. See Hockerson-Halberstadt, 183 F.3d at 1373; 51 USPQ2d at 1521 (a reexamined patent claim is broader in scope than the original claim if it contains within its scope any conceivable apparatus or process which would not have infringed the original patent).

The flaw in Creo's argument is that it attempts to redefine the function of the "means for offsetting" limitation by adopting a function different from that explicitly recited in original claim 1. The function of a means-plus-function limitation, however, must come from the claim language itself. Micro Chem., Inc. v. Great Plains Chem. Co., 194 F.3d 1250, 1258, 52 USPQ2d 1258, 1263 (Fed. Cir. 1999). In original claim 1, the function of this means-plus-function limitation is "offsetting, with respect to said x and y coordinates, the action of the discharge-source actuation means to correct imaging errors." On its face, the broad term "imaging errors" does not appear to require any particular combination of error corrections.

Creo argues that the disclosure of four separate algorithms for correcting different types of errors in the written description necessarily limits the corresponding structure of the "means for offsetting" in original claim 1 to a single computer

programmed with algorithms to correct all four types of errors. Creo relies on WMS Gaming, Inc. v. Int'l Game Tech., 184 F.3d 1339, 1348, 51 USPQ2d 1385, 1391 (Fed. Cir. 1991), for the proposition that a computer-implemented means-plus-function claim is limited to a computer programmed to perform the algorithm disclosed in the specification. While that proposition is correct, WMS Gaming does not require that a computer corresponding to the "means for offsetting" recited in original claim 1 perform all four of the algorithms disclosed in the written description. This court has held, in the case of a means-plus-function claim, that the written description may disclose distinct and alternative structures for performing the claimed function. Serrano v. Telular Corp., 111 F.3d 1578, 1583, 42 USPQ2d 1538, 1542 (Fed. Cir. 1997). We read the written description in the '368 patent as disclosing four individual types of error corrections, one or more of which can be performed by different alternative embodiments of the claimed invention. Nothing in the patent requires a single structural embodiment corresponding to the "means for offsetting" in original claim 1 to be capable of performing all four of the algorithms disclosed.

In addition, Creo's interpretation of original claim 1 runs afoul of the doctrine of claim differentiation. Original dependent claim 2 recited: "The apparatus defined in claim 1 and further including means for applying position offset signals to said control means to shift the x and y coordinates of said dot positions on said plate." Those x-direction and y-direction corrections are for imaging errors that Creo asserts were already covered by original claim 1. If, as Creo asserts, the "means for offsetting" in original claim 1 was already required to correct for all four types of imaging errors, then original claim 2 would be redundant and meaningless.

Nor does the prosecution history support Creo's position. Original claim 1, as filed, did not include any limitations regarding image correction; those capabilities were found in dependent claims 2 and 3. The Patent Office rejected claim 1 under 35 U.S.C. § 103 as being obvious in light of U.S. Patent Nos. 4,718,340 ("Love"), 4,524,364 ("Bain"), and 4,835,544 ("Winterburn"). To overcome the rejection, Presstek added the "means for offsetting" limitation. Creo directs us to the following statement in the remarks accompanying the amendment:

> We have added new limitations to claim 1 to overcome the rejections over the primary references Love, III and Lew et al., and the secondary references cited in connection therewith. Specifically, the primary references, alone or in combination with the secondary references, do not discuss offsetting control signals in order to correct image length, registration, or skew errors.

(emphasis added). We reject Creo's invitation to read that statement as restricting the "means for offsetting" to a single structure with the ability to correct all four of the imaging errors detailed in the written description. Nothing in the prosecution history persuades us that the "means for offsetting" limitation in original claim 1 should be narrowly construed to require structure capable of correcting of all four types of imaging errors disclosed in the specification.

This court has repeatedly held that it is improper to restrict a means-plus-function limitation by adopting a function different from that explicitly recited in the claim. See, e.g., Generation II Orthotics Inc. v. Med. Tech. Inc., 263 F.3d 1356, 1363-64, 59 USPQ2d 1919, 1926 (Fed. Cir. 2001); Micro Chem., 194 F.3d at 1258, 52 USPQ2d at 1263; Rodime PLC v. Seagate Tech., Inc., 174 F.3d 1294, 1302-03, 50 USPQ2d 1429, 1435 (Fed. Cir. 1999). Here, the district court looked at the function specifically recited in original claim 1 and properly concluded that it does not require correction of all four

types of errors disclosed in the specification. The district court therefore properly held that claim 1 was not impermissibly broadened during reexamination.

B

Creo asserts that claim 1 of the '368 patent is invalid for indefiniteness because the specification of that patent does not adequately disclose sufficient structure corresponding to the "means for rotating each cylinder" limitation of that claim. Creo advances a similar argument with respect to the "mounting means for mounting said plate on said cylinder" limitation in claim 11 of the '205 patent.

As a preliminary matter, we reject Presstek's argument that Creo has failed to preserve its indefiniteness arguments for appeal. In its briefing to the district court on claim construction, Creo urged the district court to rule that the patents failed to disclose structure corresponding to those two means-plus-function limitations, and that those claims were therefore invalid. The district court implicitly rejected Creo's indefiniteness arguments by identifying sufficient corresponding structure in each of its two claim construction orders. Later in the proceedings, the district court on two separate occasions noted that Creo had preserved the arguments it made during the claim construction proceedings: once orally on the first day of trial, and a second time in a footnote in its written opinion. Accordingly, Creo preserved its indefiniteness arguments.

We first address the "means for rotating each cylinder" limitation of the '368 patent. The specification of that patent describes the invention as it is applied to two different embodiments. The more conventional embodiment is an arrangement of the printing stations in a straight or "in-line" configuration. The second embodiment relies on a central impression cylinder that carries a sheet of recording material past each

print station, eliminating the need for mechanical transfer of the medium to each print station.

"[P]roper application of § 112 ¶ 6 generally reads the claim element to embrace distinct and alternative described structures for performing the claimed function. Specifically, 'disclosed structure includes that which is described in a patent specification, including any alternative structures identified.'" Ishida Co. v. Taylor, 221 F.3d 1310, 1316, 55 USPQ2d 1449, 1452-53 (Fed. Cir. 2000) (quoting Serrano, 111 F.3d at 1583, 42 USPQ2d at 1542). Accordingly, where the specification discloses different alternative embodiments, the claim is valid even if only one embodiment discloses corresponding structure. Cardiac Pacemakers, Inc. v. St. Jude Med., Inc., 296 F.3d 1106, 1113-14 (Fed. Cir. 2002). With respect to the "central-impression" embodiment, the written description expressly discloses that "the impression cylinder drives each plate cylinder." '368 patent, col. 9, lines 28-30. Although the disclosure with respect to the "in-line" embodiment is less clear, Figure 1 of the '368 patent indicates that each print cylinder in that embodiment rotates on a spindle through its axis, and Presstek's expert testified that such spindles are commonly used for rotating plate cylinders in printing presses. Thus, we conclude that the specification of the '368 patent discloses adequate structure corresponding to the "means for rotating" limitation of claim 1.

To the extent that Creo contends that additional structure is required for completely performing the function of "rotating each cylinder," we consider such structure to be implicit in the disclosure of the '368 patent. Under our case law interpreting § 112, ¶ 6, knowledge of one skilled in the art can be called upon to flesh out a particular structural reference in the specification for the purpose of satisfying the

statutory requirement of definiteness. See, e.g., S3 Inc. v. nVIDIA, 259 F.3d 1364, 1370, 59 USPQ2d 1745, 1749-50 (Fed. Cir. 2001) (holding that the specification's reference to a "selector" sufficed as one skilled in the art would have understood the term); Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1382, 58 USPQ2d 1801, 1810-11 (Fed. Cir. 2001) (holding that the specification's reference to "commercially available vacuum sensors" constituted sufficient structure, as one skilled in the art would have understood the reference); Atmel Corp. v. Info. Storage Devices, Inc., 198 F.3d 1374, 1378-79, 53 USPQ2d 1225, 1227-28 (Fed. Cir. 1999) (holding that the determination of whether sufficient structure is disclosed in the specification to support a means-plus-function limitation is based on the understanding of one skilled in the art). Thus, in addressing the question whether a means-plus-function limitation satisfies the definiteness requirement, we focus our inquiry on whether one skilled in the art would have understood that the specification of each patent disclosed structure capable of performing the function recited in the claim limitation. Budde, 250 F.3d at 1376, 58 USPQ2d at 1806 ("Whether or not the specification adequately sets forth structure corresponding to the claimed function necessitates consideration of that disclosure from the viewpoint of one skilled in the art."). Here, the parties agree that the manner of rotating plate cylinders in a printing press was well known in the art and need not have been explained in great detail in the specification. For example, the record before us includes Presstek's U.S. Patent No. 4,911,075 ("the '075 patent"), a grandparent to the '368 patent. The '075 patent discloses that the print cylinder on an in-line printing press "is rotatively supported by the press frame and rotated by a standard electric motor or other conventional means," '075 patent, col. 7, lines 61-63 (emphasis added), a

description that suggests such structures are well within the knowledge of those of ordinary skill in the art.

As for the "mounting means for mounting said plate on said cylinder" limitation found in claim 11 of the '205 patent, Figure 1 of that patent indicates the presence of a V-shaped "cut-out portion or void" in the print cylinder. The purpose of that "cut-out portion or void," as disclosed in the written description, is that it "allows access for securing or removing the printing plate." Presstek's expert testified that the V-notch is a conventional system for mounting plates on a press, and that it contains a hold-down mechanism to hold printing plates in place. That testimony is consistent with other indicia of the knowledge of those having ordinary skill in the art. For example, Figure 1 of the '075 patent depicts a cut-out portion or void identified as "12a" that is similar in appearance to that disclosed in Figure 1 of the '205 patent. The written description of the '075 patent identifies 12a as follows: "Press 10 includes a print cylinder or drum 12 around which is wrapped a lithographic plate 13 whose opposite edge margins are secured to the plate by a conventional clamping mechanism 12a incorporated into cylinder 12." '075 patent, col. 6, lines 54-58 (emphasis added). The characterization of such structure as "conventional" suggests that the use of a V-notch for mounting a printing plate on a cylinder is well within the knowledge of those of ordinary skill in the art. We therefore conclude that the '205 patent discloses sufficient structure corresponding to the "means for mounting" limitation of claim 11.

In sum, Presstek's expert offered unrebutted testimony that the structures disclosed in the specifications of the '368 and '205 patents corresponding to each of the two disputed limitations were well known in the art. That testimony is confirmed by the characterization of such structures as "conventional" and "standard" in patent

applications filed prior to the filing of the '368 and '205 patents. Further, Creo did not present any evidence that the opinion of Presstek's expert is incorrect and that, in truth, one skilled in the art would not have known what structures correspond to the "means for mounting" or the "means for rotating" limitations. Given the structures disclosed in the specifications of the two patents and the record evidence of the knowledge of those having ordinary skill in the art, we hold that Creo has not made a sufficient showing of indefiniteness to overcome the presumption of validity that attaches to the claims of the '368 and '205 patents.

III

The district court concluded that Creo's DOP System did not satisfy every limitation of claim 1 of the '368 patent, or of claims 11 and 23 of the '205 patent. Because neither of those findings is clearly erroneous, as explained below, we affirm the district court's judgment of non-infringement.

A

The district court determined that the Creo DOP System does not infringe claims 11 and 23 of the '205 patent for three independent reasons: (1) the DOP System does not have the ability to correct or control discharges on a "point-by-point" basis; (2) the imaging head of the DOP System does not create "a series of axially sequential, circumferential imaging swaths"; and (3) the evidence does not support a finding that each swath comprises "a series of circumferentially spaced-apart image spots." For purposes of this appeal, we need address only the first basis of the district court's decision: the absence of "point-by-point" correction in the Creo DOP System.

Claim 11 requires that the "controlling means" be coupled to the discharge means "such that the discharges occur in response to the image information at selected

discrete positions on the printing surface" (emphasis added). Similarly, claim 23 requires that the "discharges occur at selected positions on the printing surface" (emphasis added). The district court construed claims 11 and 23 to require that the claimed apparatus and method have the capability to correct errors on a "point-by-point" basis.

The district court's construction of the disputed claim limitations is in accordance with the written description of the '205 patent, which describes how "the firing of the electrodes 20 must be carefully controlled in order to discharge sparks at the appropriate times to form image spots in the correct locations on the printing surface." '205 patent, col. 5, lines 39-42. It further discloses that "[t]he present invention permits independent control of the timing of the discharges from each imaging device." Id. at col. 2, line 68, to col. 3, line 2.

The strongest support for the district court's interpretation, however, can be found in the record of the reexamination proceedings, in which Presstek made numerous representations to the effect that claims 11 and 23 require control and correction of discharges on a "point-by-point" basis in order to distinguish its invention from prior art and thereby secure allowance of the '205 patent. For example, when the examiner rejected claims 11 and 23 as obvious over U.S. Patent No. 4,911,075 ("Lewis") in light of U.S. Patent No. 4,591,880 ("Mitsuka"), Presstek amended the claims and distinguished Mitsuka as follows: "Mitsuka et al. . . . contemplates synchronous, analog recording and output; . . . . This is inconsistent with the notion of discrete image spots, intervals between spots, positional correction of individual spots, and spot offset in accordance with the present claims."

Presstek specifically distinguished claim 11 as follows: "Claims 11 and 12 require 'that the discharges occur at selected discrete positions on the printing surface as specified by the image information offset by the correction data.' Mitsuka et al. fails to anticipate or even suggest correction of individual discharges by resort to correction data." (emphasis in original). Similarly, Presstek expressly distinguished claim 23 as follows:

> Claims 19 and 23 require explicit storage of image data and position-correction data "specifying offsets to the position information," and generating a control signal in response to image data, position-correction data, and a sensed position. Because the concept of position-correction data is foreign to Mitsuka et al., its use in deriving a control signal based thereon cannot reasonably be inferred from the reference.

Presstek's arguments directed at claims 11 and 23 particularly emphasized the importance of "discrete image spots," "positional correction of individual spots," and "a sensed position."

Presstek made other representations during the reexamination that lend additional support to the district court's claim construction. In an information disclosure statement filed on September 3, 1997, Presstek broadly stated that its invention was "designed to permit corrections to be effected on a point-by-point basis." Similarly, in a supplemental information disclosure statement submitted on March 29, 1999, Presstek stated that a disclosed reference failed to effect an "alteration of dot-to-dot spacing as required by the relevant claims of the present patent." Thus, in addition to the remarks made by Presstek while distinguishing claims 11 and 23 from the prior art, the totality of the reexamination proceedings further convinces us that the district court correctly interpreted the "discrete" and "selected" language of those claims to require the capability to correct errors on a point-by-point basis.

Presstek argues that the doctrine of claim differentiation precludes any interpretation of claims 11 and 23 that requires "point-by-point" correction. Specifically, Presstek notes that claims 12 and 24 are identical to claims 11 and 23, except that the final clauses of claims 12 and 24 each require the correction data to be used for "varying the intervals between discharges." We do not find any redundancy between claims 11 and 23, and claims 12 and 24, as properly construed. While the "discrete" and "selected" language of claims 11 and 23 requires correction on a point-by-point basis, claims 12 and 24 provide additional specificity as to how such point-by-point correction must occur, i.e., by varying the intervals between discharges. There is no overlap and thus no force to Presstek's claim differentiation argument.

Presstek next attempts to recharacterize the district court's claim construction by arguing that "point-by-point" correction requires only that corrections are applied to all points in an image, whether they be uniform or non-uniform. Presstek's position on this issue is flatly inconsistent with the representations it made during reexamination in order to secure allowance of the '205 patent. We share the district court's view that the claim limitations specifying that discharges occur at "discrete" and "selected" positions require the capability for independent correction of individual points.

The district court found that the Creo DOP System did not have the ability to perform corrections on a point-by-point basis. The court stated that "[t]here is nothing in the DOP System, including the ICE, that affects individual points independently of other points." Presstek's only argument with respect to the presence of "point-by-point" correction in the Creo DOP System focuses on the Center Frequency Calculation ("CFC"). The Creo DOP System uses the CFC to detect and correct for variations in the speed of the plate cylinder. Both parties agree, however, that the CFC can make

corrections only every one-tenth inch, or every 50,000 points, rather than by the independent correction of individual points, as required by claims 11 and 23. We therefore affirm the district court's finding of non-infringement of the '205 patent. We do not reach Presstek's argument that the NTU buffer and tach history buffer, which provide inputs to the CFC, comprise "predefined parameters" within the meaning of claims 11 and 23, nor do we address Presstek's arguments regarding the other grounds for the district court's finding of non-infringement, namely the "series of axially sequential, circumferential imaging swaths" limitation and the "series of circumferentially spaced-apart image spots" limitation.

B

As in the case of the '205 patent, the district court found three independent grounds to support its finding that the Creo DOP System does not infringe claim 1 of the '368 patent. The court found that the Creo DOP System lacks (1) "a dot position look-up table for storing the x and y coordinates corresponding to substantially all dot positions on each plate," (2) the "means for actuating" the discharge source, as construed by the district court, and (3) the "control means . . . for repeatedly actuating the discharge source momentarily." For purposes of this appeal, it is necessary to address only the "dot position look-up table" issue.

The district court rejected Presstek's theory that the image bitmap in the Creo DOP System satisfies the claim limitation requiring "a dot position look-up table for storing the x and y coordinates corresponding to substantially all dot positions on each plate." Instead, the district court found that "[t]he dot position look-up table in the '368 patent is the pedigree for each print station; it does not change for each different image.

In contrast, the bitmap in the DOP System is not the pedigree for each print station; it changes with every image."

Presstek argues that the district court improperly read an additional limitation into the claim when it determined that the "dot position look-up table" is the pedigree for each print station. Presstek contends that "dot position look-up table" simply takes its ordinary meaning of "a structure comprised of rows and columns which stores data for future reference," and should not be limited to storing any particular type of information, whether it be image information, correction information, or corrected image information. Under that construction, Presstek asserts that the "dot position look-up table" limitation reads on the image bitmap in the Creo DOP System, which it characterizes as being organized into logical rows and columns that indicate the positions of all bits in the image.

The flaw in Presstek's argument is that it improperly focuses only on a look-up table in general, ignoring the remainder of the limitation that specifies that the purpose of the claimed look-up table is "for storing the x and y coordinates corresponding to substantially all dot positions on each plate." The written description explains the meaning of the "substantially all" language in the claim limitation: it discloses that the dot positions are permanently stored in the controller "as the pedigree for each of the print stations." '368 patent, col. 9, lines 65-68.

The district court found that the bitmap in the Creo DOP System, unlike the claimed dot position look-up table, "contains image information rather than plate information." The district court correctly found that the image bitmap cannot be regarded as "storing the x and y coordinates corresponding to substantially all dot positions on each plate" because the size of the image bitmap changes with every

image. For example, the bitmap for a two-inch by two-inch image is smaller than the bitmap for a six-inch by six-inch image. The image bitmap thus does not store "substantially all" dot positions on each plate, but instead stores varying amounts of image information destined to be placed somewhere on a printing plate. The district court therefore did not commit clear error in concluding that the accused device does not literally contain "a dot position for storing the x and y coordinates corresponding to substantially all dot positions on each plate."

Notwithstanding that conclusion, Presstek argues that the Creo DOP System contains an equivalent of the "dot position look-up table." In particular, Presstek relies on the five geometric correction parameters ("GC_Params") stored in the DOP System as correction data for each print unit. The DOP System uses GC_Params in a series of algorithms to calculate corrections "on the fly" rather than storing corrections for every individual point on the plate in a larger look-up table.

Presstek directs us to testimony by its expert that the use of a large look-up table versus performing calculations "on the fly" from a smaller look-up table like GC_Params is a design choice, and that a software developer would consider them to be equivalents. The district court heard testimony on equivalence both from Presstek's expert and from Creo's expert, and concluded that the Creo DOP System's use of GC_Params is not equivalent to the claimed dot position look-up table because it does not perform substantially the same function in substantially the same way to achieve substantially the same result. The district court focused on the differences between such algorithms and the claimed dot position look-up table in terms of complexity, computing speed and time requirements, as well as other variables. In addition, Creo's expert testified that such formulas do not allow for independent control of each dot

position on each plate, as would be possible with the claimed dot position look-up table. In light of that evidence, Presstek has not demonstrated that the district court's finding of non-equivalence is clearly erroneous.

We therefore affirm the district court's conclusion that the Creo DOP System does not infringe claim 1 of the '368 patent. We do not reach Presstek's arguments with respect to the other two independent grounds for the district court's finding of non-infringement: the absence of both the "means for actuating" limitation and the "control means . . . for repeatedly actuating the discharge source momentarily" limitation.

AFFIRMED

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United States Court of Appeals for the Federal Circuit

01-1634, 02-1023

CREO PRODUCTS, INC.,

Plaintiff-Appellant,

v.

PRESSTEK, INC.,

Defendant-Cross Appellant.

CLEVENGER, Circuit Judge, dissenting in part.

The court holds that there is sufficient structure disclosed in the '368 and '205 patents to salvage the means-plus-function limitations in those patents from invalidity for failure to recite structure corresponding to the means limitations, as is required by

35 U.S.C. § 112(2). I respectfully dissent from the court's decision regarding the '205 patent.

With respect to the '368 patent, the question is whether there is any structure disclosed in the written description to mate with the "means for rotating." The majority opinion is somewhat opaque regarding the structure that corresponds to the means for rotating the plate cylinder. Figure 1 (with numbers identifying pieces of structure) discloses the alternative embodiment in which the "impression cylinder" drives each plate cylinder. From Figure 1 it is clear that the impression cylinder 28d, itself rotated by some undisclosed structure, indirectly causes the plate cylinder 24d to rotate because the rotation of the impression cylinder forces the blanket cylinder 26d to rotate, which causes the plate cylinder next to it to rotate. Since the "means for rotating" applies only to plate cylinders, and not to the "driving" impression cylinder, no structure need be disclosed to cause the impression cylinder to rotate. So long as the written description includes specific structure that corresponds to the means for rotating the plate cylinders, the patent survives the validity challenge.

Because of the presence of the impression cylinder as the "means for rotating" the plate cylinders, I agree that the '368 patent survives the validity challenge. I would not, however, retrieve that patent from the invalidity grave because of the drawing of the plate cylinder in Figure 1, which the majority concedes is somewhat shaky evidence of structure to mate with the means for rotating. All that Figure 1 shows regarding the plate cylinder is that it has a hole in it. Figure 1 does not depict a spindle, or any other kind of structure to rotate the plate cylinder, beyond the "driving" impression cylinder 28d discussed above. Figure 1 is depicted below, so the reader can easily know what I (and the majority) am talking about.

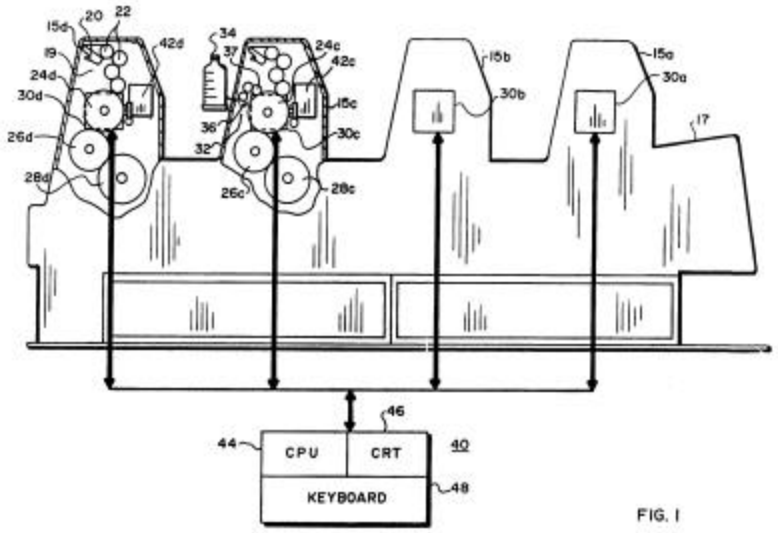

FIG. 1

The '205 patent is not so lucky. It does not have an alternative embodiment for the "mounting means" to fall back on where the written description otherwise fails to disclose any structure that corresponds to the mounting means.

Claim 11 of the '205 patent recites a "mounting means for mounting said plate on said cylinder." The district court found the corresponding section 112(6) structure to consist of "the structure disclosed in Figure 1 of the patent." Figure 1 discloses a cut-out V-notch section of the cylinder, while the specification provides that, "[t]he cylinder 10 includes a cut-out portion or void 14 which allows access for securing or removing the printing plate 12." '205 patent, col. 4, lines 14-16 (emphasis added).

While the V-notch structure may indicate the location of the mounting means, it says nothing about the structure itself. Indeed, the underlined language above in the patent itself strongly suggests that the V-notch merely provides access to the mounting means located therein.

The testimony at trial corresponds to this:

Q: And what would normally be in a V notch of that sort?
A: It would be the hold-down mechanism. To hold plates in place.

To be sure, as the majority notes, there is ample evidence in the form of testimony and prior art patents saying that some kind of hold down mechanism is placed in the V-notch to act as the means for mounting. But under our precedent, that evidence is simply irrelevant (even inadmissible) if there is no structure disclosed in the written description that corresponds to the means limitation. Here, there is no such structure to which the majority can point.

The specification's bare disclosure of the V-notch is not structure for the purposes of section 112(6). Consequently, the '205 patent should be held invalid for failure to meet the statutory test for section 112(6) claims. On this point, I depart from the majority opinion, which otherwise I join in full.