

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

L-3 Communications Corporation,

Plaintiff,

v.

**Sony Corporation, Sony Electronics Inc., and
Sony Mobile Communications (USA) Inc.,**

Defendants.

Civil Action No. 10-734-RGA

MEMORANDUM OPINION

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September 12, 2014


ANDREWS, U.S. District Judge:

Presently before the Court is Sony's Renewed Motion for Judgment As a Matter of Law That The Asserted Patent Claims Are Invalid And, In The Alternative, For a New Trial (D.I. 274) and related briefing. (D.I. 275, 283, 291). The Court heard oral argument on August 28, 2014. (D.I. 296).

I. BACKGROUND

In 2010, L-3 filed suit against Sony, asserting (as relevant for present purposes) infringement of independent claim 15, and several of its dependent claims, of U.S. Patent No. 5,541,654 ("the '654 patent"). In response, Sony counterclaimed that the asserted claims were not infringed and were invalid. After the close of discovery, the Court granted summary judgment that claim 15 and the relevant dependent claims were not infringed. Thereafter, Sony's invalidity counterclaims were tried to a jury. Following trial, the jury rendered a verdict that the asserted claims were not obvious.

The '654 patent is directed to a focal plane array imaging device. The patent states that the primary object of the invention is "random access" of pixels, which the patent accomplishes using an X-Y addressing scheme. ('654 patent at 3:13-16). Other objects of the invention include "windowing" and "snapshot." ('654 patent at 3:17-19, 3:45-50). Asserted claim 15 is a method claim from which all other asserted claims depend. It reads:

A method of providing an image scene, said method comprising the steps of:

- providing an image element including a photovoltaic element which provides electric charge in response to light flux incident thereon,
- storing electric charge from said photovoltaic element at said image element, and
- connecting said stored charge to an output device only in response to an interrogation signal to said image element;

further including the steps of providing an output amplifier at said image element as part of said output device; and

wherein said step of providing said output amplifier includes providing a transistor at said image element, and using said stored charge to control an output voltage signal by controlling conductance of said transistor.

(‘654 patent at 16:1-19). The dependent claims 16, 17, 19-21, 50, 60, 63, 70, 73, and 80 describe a variety of additional features.

During trial, Sony’s expert demonstrated how the primary Eto reference, modified according to the teachings of one or more of the amplifier references, rendered each asserted claim obvious. (Tr. at 299:12-309:19, 315:16-337:3).¹ L-3’s expert agreed that if the Eto reference were modified to include an in-pixel amplifier, as described in the prior art, that the combination would meet each limitation of the asserted claims. (Tr. at 527:11-21, 528:5-10, 537:12-14, 539:17-21, 567:21-568:6). Therefore, the only contested issue at trial was whether it would have been obvious to a person of ordinary skill in the art to add an amplifier to the Eto reference. During trial, L-3 did not contest that the combination of Eto with an in-pixel amplifier would result in the claimed invention, but argued that it would not have been obvious to modify the pixel design of Eto to add an amplifier.² (Tr. at 549:8-22). The jury found that it would not have been obvious to modify Eto to include an in-pixel amplifier.

The primary prior art reference, Eto, discloses a focal plane array imaging device having “random access,” “windowing,” and “snapshot” capabilities. (DX-0150 at 562-63, Figs. 1, 2, 6, 15, 16, 18; D.I. 276 at App. 21-22, 26-27, 30). The only difference between Eto’s MOS-based³

¹ The trial transcript is available at D.I. 245, 246, and 247.

² During oral argument of this motion, L-3 argued that even if there were motivation to add an amplifier, the location of the amplifier would not be obvious. As will be discussed below, this argument was not properly before the jury. In any event, L-3 did not present sufficient evidence to rebut the testimony of Dr. Yadid-Pecht on this issue.

³ MOS stands for Metal Oxide Semiconductor.

pixel design and claim 15 is that Eto does not include an amplifier.⁴ Eto also explains that MOS-based pixel designs have lower signal to noise ratios than CCD⁵ image sensors. (DX-0150 at 562). While Eto does not discuss the use of in-pixel amplifiers as a way of improving the signal to noise ratios of his pixel designs, Eto does disclose the use of an external image intensifier to amplify incoming light as a way to improve the signal to noise ratio of the pixels in his sensor. (DX-0150 at 565, Fig. 12; D.I. 276 at App. 24, 29).

The prior art describes several solutions to improve the signal to noise ratio of MOS-type pixel designs. One of the earliest pieces of prior art is Weimer, which describes the use of both in-pixel amplifiers and image intensifiers. (DX-0175 at 193; D.I. 276 at App. 52). Another reference, Yadid-Pecht,⁶ also describes signal to noise ratio improvements obtained by in-pixel amplifiers. (DX-0177; D.I. 276 at App. 88-96). In all, Sony presented nine references that teach the use of in-pixel amplifiers in MOS-based imaging sensors: Andoh (DX-0147; D.I. 276 at App. 132-34), Ginosar (DX-0156; D.I. 276 at App. 135-90), Hitachi (DX-0143; D.I. 276 at App. 97-131), Noble (DX-0166; D.I. 276 at App. 191-98), Tandon (DX-0173; D.I. 276 at App. 199-207), Weimer (DX-0175; D.I. 276 at App. 45-87), Yadid-Pecht (DX-0177; D.I. 276 at App. 88-96), and Zeevi (DX-0178; D.I. 276 at App. 208-20). In each case, the amplifier is a transistor. L-3 conceded at trial that the use of in-pixel amplifiers was known in the prior art, and that the benefits of using such amplifiers were known. (Tr. at 394:9-14, 725:24-726:2).

⁴ There is some confusion inherent in discussing a design as meeting a method claim. L-3 does not contest that if an amplifier were added to Eto's pixel in between switch transistor 32 and switch transistor 33, the modified pixel would operate according to the method of claim 15.

⁵ CCD stands for Charge Coupled Device.

⁶ Dr. Yadid-Pecht also testified at trial as Sony's expert.

II. LEGAL STANDARD

Judgment as a matter of law is appropriate if “the court finds that a reasonable jury would not have a legally sufficient evidentiary basis to find for [a] party” on an issue. FED. R. CIV. P. 50(a)(1). “Entry of judgment as a matter of law is a ‘sparingly’ invoked remedy, granted only if, viewing the evidence in the light most favorable to the nonmovant and giving it the advantage of every fair and reasonable inference, there is insufficient evidence from which a jury reasonably could find liability.” *Marra v. Phila. Hous. Auth.*, 497 F.3d 286, 300 (3d Cir. 2007) (internal citation omitted).

To prevail on a renewed motion for judgment as a matter of law following a jury trial, the moving party “must show that the jury’s findings, presumed or express, are not supported by substantial evidence or, if they were, that the legal conclusion(s) implied [by] the jury’s verdict cannot in law be supported by those findings.” *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1348 (Fed. Cir. 1998) (alteration in original). “‘Substantial’ evidence is such relevant evidence from the record taken as a whole as might be accepted by a reasonable mind as adequate to support the finding under review.” *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 893 (Fed. Cir. 1984).

In assessing the sufficiency of the evidence, the court must give the non-moving party, “as [the] verdict winner, the benefit of all logical inferences that could be drawn from the evidence presented, resolve all conflicts in the evidence in his favor and, in general, view the record in the light most favorable to him.” *Williamson v. Consol. Rail Corp.*, 926 F.2d 1344, 1348 (3d Cir. 1991). The court may not determine the credibility of the witnesses nor “substitute its choice for that of the jury between conflicting elements in the evidence.” *Perkin-Elmer Corp.*, 732 F.2d at 893. Rather, the court must determine whether the evidence supports the jury’s

verdict. See *Dawn Equip. Co. v. Ky. Farms Inc.*, 140 F.3d 1009, 1014 (Fed. Cir. 1998); *Gomez v. Allegheny Health Servs. Inc.*, 71 F.3d 1079, 1083 (3d Cir. 1995) (describing standard as “whether there is evidence upon which a reasonable jury could properly have found its verdict”); 9B CHARLES ALAN WRIGHT & ARTHUR R. MILLER, FEDERAL PRACTICE AND PROCEDURE § 2524 (3d ed. 2008) (“The question is not whether there is literally no evidence supporting the party against whom the motion is directed but whether there is evidence upon which the jury might reasonably find a verdict for that party.”).

Where the moving party bears the burden of proof, the Third Circuit applies a different standard. This standard “requires the judge to test the body of evidence not for its insufficiency to support a finding, but rather for its overwhelming effect.” *Fireman’s Fund Ins. Co. v. Videfreeze Corp.*, 540 F.2d 1171, 1177 (3d Cir. 1976) (quoting *Mihalchak v. Am. Dredging Co.*, 266 F.2d 875, 877 (3d Cir. 1959)). The Court “must be able to say not only that there is sufficient evidence to support the finding, even though other evidence could support as well a contrary finding, but additionally that there is insufficient evidence for permitting any different finding.” *Id.* (quoting *Mihalchak*, 266 F.2d at 877).

Invalidity must be proved by clear and convincing evidence. *Microsoft Corp. v. i4i Ltd. P’ship*, 131 S. Ct. 2238, 2242 (2011). A claim is invalid as obvious “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103. Obviousness is a question of law decided on the basis of the four *Graham* factors: (1) the level of ordinary skill in the art; (2) the scope and content of the prior art; (3) the differences between the prior art and the challenged claim; and (4) secondary considerations of non-obviousness. *Kinetic Concepts, Inc. v.*

Smith & Nephew, Inc., 688 F.3d 1342, 1359-60 (Fed. Cir. 2012) (citing *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966)).

In *KSR International Co. v. Teleflex, Inc.*, the Supreme Court instructed courts to take an “expansive and flexible approach” to determining obviousness. 550 U.S. 398, 415 (2007). The Court emphasized that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* at 416. It also stated that “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *Id.* at 417. Ultimately, “a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.*

In making this assessment, courts must consider whether there was a reason to combine the known elements in the fashion claimed by the patent at issue. *Id.* at 418. The reason can come from the prior art, the background knowledge of one of ordinary skill in the art, the nature of any problem or need to be addressed, market demand, or common sense. *Id.* While motivation to combine is an issue of fact, district courts cannot accept a jury’s finding that motivation is lacking when the motivation is evident in the prior art references themselves or a matter of common sense. See *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1243, 1245 (Fed. Cir. 2010).

III. DISCUSSION

The parties’ post-trial briefing raised only one issue: whether it was obvious to add an in-pixel amplifier to Eto’s pixel. Sony contends that it is. L-3 contends that it is not, as the jury

held. During oral argument, L-3 raised a new argument.⁷ L-3 argued that even if it was obvious to add an in-pixel amplifier to Eto's pixel, the location of the amplifier was not obvious. This was unexpected, as it was never raised in the briefing, nor at trial. L-3 did not raise this issue in its opening statement nor argue it in its closing argument. While I believe that the argument is waived at this point, I will address it after discussing the briefed obviousness argument.

I believe that the jury's finding of non-obviousness was erroneous, both legally and because it was not supported by the evidence. There was a clear motivation to add an in-pixel amplifier to Eto's pixel design. Eto disclosed that one of the problems with his pixel was low signal to noise ratio. (DX-0150 at 562). Eto solved this by using an image intensifier. (DX-0150 at 563). The prior art, in particular, Weimer, taught that in-pixel amplifiers were another method to increase signal to noise ratio. (DX-0175 at 193). The problem of signal to noise ratio was known. The methods of curing that problem were known. Eto chose one of those methods. The person of ordinary skill in the art would have found it obvious to have chosen the other.

L-3 presented evidence at trial that the person of ordinary skill in the art would not incorporate an in-pixel amplifier into Eto's design because of "tradeoffs." Essentially, L-3 argues that the presence of tradeoffs teaches away from making the combination. L-3 hangs its hat on two statements in the Weimer reference that supposedly teach away from using in-pixel amplifiers. The first statement equates image intensifiers with in-pixel amplifiers:

Since the multiplex method of scanning of XY arrays yields a poor signal-to-noise ratio at low light levels it would be desirable to provide some means of increasing the signal level prior to scanning. The addition of an MOS amplifier stage at each element (such as shown in Fig. 6e) would improve signal-to-noise ratio but

⁷ During oral argument of this motion, the Court asked whether L-3 made this argument in its brief. L-3's counsel responded, "I believe we touched on it, but the focus was on their arguments." (D.I. 296 at 29:7-10). As far as the Court can tell, the only mention of this argument in L-3's brief is the following statement: "Thus, in her own pixel design, Dr. Yadid-Pecht did not place her switch in the same place as Dr. Roberts did in his invention...." (D.I. 283 at p. 9-10).

introduces other problems of complexity and nonuniformity. The use of an image intensifier stage prior to the array would be another method of increasing the final signal-to-noise ratio.

(DX-0175 at 193). The second statement expands on the issue of complexity:

Photodiode area-type sensors were slow in being developed, probably because of the rather small picture signals which could be stored on the small elemental capacitors. A possible method for increasing the signal level is to include a voltage-sampling MOS current amplifier at each element (19). (See Fig. 6e.) This structure is too complex to be practical in high resolution arrays.

(DX-0175 at 199). L-3's expert, Dr. Neikirk, interpreted these statements and testified that "[Weimer] said don't use an amplifier, use an image intensifier." (Tr. at 550:18).

This is an incorrect characterization of the prior art. Weimer did not say "don't use an amplifier." Weimer merely stated that there were tradeoffs to using an amplifier—an increase in complexity and nonuniformity. Weimer stated his belief that in-pixel amplifiers were not practical at the time, which was 1975. The '654 patent was filed in 1993. Dr. Neikirk testified that, in 1992, "these problems identified by Weimer hadn't disappeared." (Tr. at 550:23-551:1). However, the prior art references belie that statement. For instance, the Andoh reference, published in 1990, is titled, "A 250,000-Pixel Image Sensor with FET Amplification at Each Pixel of High-Speed Television Cameras." (DX-0147 at 212).⁸ Zeevi discloses a 512 x 512 image sensor with in-pixel amplification. (DX-0178 at 7:68, 8:23-25). Both of these references are a higher resolution than Eto, which teaches a 256 x 256 array. (DX-0150 at 565). Clearly in-pixel amplification was not too complex by 1993, as it had been used in high resolution arrays.

L-3 also argues that adding an in-pixel amplifier to Eto would not have solved the problem that Eto was trying to solve, namely signal to noise ratio in low light situations, and that Eto taught away from using amplifiers. I disagree. Eto never once mentions amplifiers. It

⁸ 250,000 pixels corresponds to a 500 x 500 array.

therefore cannot possibly teach away from their use. See *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1364 (Fed. Cir. 2006) (“We will not read into a reference a teaching away from a process where no such language exists.”). Additionally, the express teaching of Weimer states that the use of in-pixel amplifiers is one way to fix “poor signal-to-noise ratio at low light levels.” (DX-0175 at 193).

It is undisputed that “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). The test for a teaching away is whether “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). However, the presence of tradeoffs does not constitute a teaching away. “[A] finding that the prior art as a whole suggests the desirability of a particular combination need not be supported by a finding that the prior art suggests that the combination claimed ... is the preferred, or most desirable, combination.” *Bayer Healthcare Pharm., Inc. v. Watson Pharm., Inc.*, 713 F.3d 1369, 1376 (Fed. Cir. 2013) (citing *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004)). Here, the prior art clearly equated image intensifiers with in-pixel amplifiers. That there were tradeoffs does not make the combination non-obvious. I find that a person of ordinary skill in the art at the time of the invention would have been motivated to add an in-pixel amplifier to Eto’s pixel design.⁹

⁹ The parties agree that the level of ordinary skill in the art is a person with either a master’s degree in electrical engineering or a bachelor of science degree and at least two years of experience in engineering fields or industries pertinent to the art. (D.I. 211 at 5). L-3 agrees that all of Sony’s references are prior art to the ‘654 patent. (Tr. at 698:16-699:7). L-3 presented no evidence of secondary considerations of non-obviousness. (Tr. at 602:2-23).

I next address L-3's arguments concerning the location of the amplifier. During oral argument, L-3 contended that even if there were motivation to add an in-pixel amplifier to Eto's pixel, the location of the amplifier was not obvious. In support of this, L-3 cited to portions of the transcript as well as figures taken from the prior art. While I will discuss the cited portions of the transcript, I do not reach L-3's arguments regarding the prior art. L-3 never made this argument in its opening statement, its closing argument, or in this briefing. I therefore find that the arguments regarding whether the prior art teaches the placement of the amplifier are waived. Had L-3 wished to contest what the prior art taught about amplifier placement, it should have raised it earlier, either at trial or during the post-trial briefing.¹⁰ I do, however, find that Sony met its burden to show that the location of the amplifier was obvious.

L-3 implied that Sony's proof on this issue was conclusory, citing a snippet of testimony from Dr. Yadid-Pecht's cross examination where she stated that, "Both [locations to place the amplifier] are obvious." (Tr. at 659:3-6). However, this was a gross oversimplification of Dr. Yadid-Pecht's testimony. A fairer view of her testimony is disclosed in the excerpt below:

Q. Very good. Okay. And the Eto design, you said that was different. What kinds of design considerations would be presented to a circuit designer who wants to put an amplifier in there in this design?

A. So in Eto's pixel design, he has two output transistors for his reasons. He has XY scanning. He has the X and the Y in the pixel. So should someone want to put an amplifier in his design, in his pixel design, again, you have to have one switch before the common output, but these two transistors are in the pixel. So basically you have two options of putting the amplifier there. You can either put it here between the two switches or here where the capacitor is. So because he has two switches, then two[,] there are two possibilities of putting an amplifier, and you can decide on any of these two.

¹⁰ While there are some times when raising an issue for the first time at oral argument will not result in a waiver, it cannot be the case that a jury verdict can be sustained based on arguments and evidence that were never presented to the jury. *See, e.g., Tomasko v. Ira H. Weinstock, P.C.*, 357 F. App'x 472, 479 (3d Cir. 2009) (holding that arguments raised for the first time at oral argument in the district court were waived because that method of proceeding could "deprive one's opponent of any meaningful opportunity to respond.").

Q. Okay. And, again, just for the record, will you please indicate the two locations maybe with reference to the numbers that are indicated?

A. Yes. So you have here two transistors, switch transistors. This is 32 in the diagram. And this is 33. So there are two output switches. This is the output. The amplifier can come – it has to be before the last switch.

Q. And that's 33; is that correct?

A. That is 33. But it can come either before 33 or it can come before 32. There are two locations that can be used in his design, not just one like in mine.

Q. Okay. And you have opinions as to which locations would or would not be obvious to the person of skill in the art?

A. Both are obvious.

(Tr. at 657:14-659:6). Dr. Neikirk never actually rebutted this testimony. Dr. Neikirk repeatedly opined that there was no motivation to add an in-pixel amplifier to Eto, and did question why one of ordinary skill would arrive at the identified location. (Tr. at 549:3-7, 621:11-22, 626:9-14). However, when asked squarely where a person of ordinary skill would add an amplifier, he replied, "One of ordinary skill in the art wouldn't want to put an amplifier in this, that pixel, because Eto has told them use this design with an image intensifier." (Tr. at 584:5-8). When questioned about the Fossum reference, Dr. Neikirk again did not answer the question:

A. Oh, I would agree that certainly one of ordinary skill in the art in 1993 would be aware of amplifiers and pixel circuits. Of course, this does suggest the specific location by indicating that this is to increase the signal level prior to scanning as opposed to setting a signal level during scanning. And it certainly doesn't indicate the location of the amplifying transistor after the storage capacitor with the switch in between.

Q. Right. But there's only a finite number of places you could put an amplifier in a pixel circuit?

A. I think the question is what it is you want to achieve given the location.

Q. Why don't you answer my question first. There's only a finite number of places you can put an amplifier in a pixel circuit; would you agree?

A. There's only a finite number of locations to put anything in a finite world.

Q. Okay. All right. But again, you will agree with me that this expressly teaches someone that you could put an amplifier in each pixel to increase signal-to-noise ratio?

A. I think there's no question that's true.

(Tr. at 676:22-628:23). Dr. Neikirk's testimony on this issue did not rebut Dr. Yadid-Pecht's regarding the location of the amplifier. Dr. Neikirk simply never reached the possible locations of the amplifier, opining merely that one would not add an amplifier or asking why one would arrive at the location. Conversely, Dr. Yadid-Pecht testified that there were only two possible locations to add the amplifier, at that both would be obvious. I therefore hold that the location of the amplifier was also obvious, as there were only a finite number (two) of places in which to add the amplifier, each of which would yield predictable results. Sony has met its burden to show by clear and convincing evidence that the asserted claims are invalid.

IV. CONCLUSION

For the reasons stated above, Sony's Renewed Motion for Judgment As a Matter of Law That The Asserted Patent Claims Are Invalid And, In The Alternative, For a New Trial (D.I. 274) is granted. Claims 15, 16, 17, 19-21, 50, 60, 63, 70, 73, and 80 of the '654 patent are invalid as obvious.