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Hall Estill - Seagate Technology LLC
100 North Broadway, Suite 2900
Oklahoma City, OK 73102-8820

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RYAN JAMES GOSS, MARK ALLEN GAERTNER, and ARA PATAPOUTIAN

Appeal 2018-001112
Application 13/762,765
Technology Center 2100

Before JOHN P. PINKERTON, JON M. JURGOVAN, and NABEEL U. KHAN, *Administrative Patent Judges*.

PINKERTON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1–20, which are all of the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Seagate Technology LLC. Appeal Br. 1.

STATEMENT OF THE CASE

Introduction

Appellant generally describes the disclosed and claimed invention as follows:

> Method and apparatus for managing data in a memory. In accordance with some embodiments, a data object is stored in a first non-volatile tier of a multi-tier memory structure. An [error correction code] ECC data set adapted to detect at least one bit error in the data object during a read operation is generated. The ECC data set is stored in a different, second non-volatile tier of the multi-tier memory structure.

Abstract. [2]

Independent claim 1 is representative of the subject matter on appeal and reads as follows (with paragraph lettering added and the disputed limitation *italized*):

> 1. A method comprising:
>
> (a) storing a data object in a first non-volatile tier of a multi-tier memory structure, the first non-volatile tier comprising memory cells having a first type of construction and a first parametric attribute comprising at least a selected one of an accumulated write count, an accumulated erase count, an accumulated read count or a bit error rate (BER);
>
> (b) selecting a different, second non-volatile tier of the multi-tier memory structure, the second non-volatile tier comprising memory cells having a second type of construction different from the first type of construction and a second parametric attribute comprising at least a selected one of an

[2] Our Decision refers to the Final Office Action mailed June 24, 2016 ("Final Act."), Appellant's Appeal Brief filed June 19, 2017 ("Appeal Br.") and Reply Brief filed Nov. 13, 2017 ("Reply Br."), the Examiner's Answer mailed Sept. 13, 2017 ("Ans."), and the original Specification filed Feb. 8, 2013 ("Spec.").

> accumulated write count, an accumulated erase count, an accumulated read count or a bit error rate (BER);
>
> (c) generating an ECC data set adapted to detect at least one bit error in the data object during a read operation upon the first non-volatile tier, *the ECC data set having a size and a strength each selected* in response to a data attribute of the data object and *in response to the second parametric attribute of the second non-volatile tier*; and
>
> (d) storing the ECC data set in the second non-volatile tier.

Claims App. 12.[3]

Rejections on Appeal

Claims 1, 3, 5, 6, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller (US 8,122,322 B2; issued Feb. 21, 2012) in view of Yoon et al. (US 2009/0144598 A1; published June 4, 2009) ("Yoon"), and Jeong et al. (US 2012/0271985 A1; published Oct. 25, 2012) ("Jeong"). Final Act. 2–8.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Boyle et al. (US 8,341,339 B1; issued Dec. 25, 2012) ("Boyle"). Final Act. 9.

Claims 14–19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller, Jeong, and Yoon. Final Act. 10–17.

Claims 4 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Carannante et al. (US 2012/0117303 A1; published May 10, 2012) ("Carannante"). Final Act. 17–19.

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[3] Claim 1 as reproduced in the appendix has two errors because it omits the term "strength," and includes the word "In," after the words "and a" in the fourth line from the bottom. These errors are harmless, however, because Appellant and the Examiner correctly recite claim 1 as amended pursuant to Appellant's response filed on March 26, 2016.

Claims 2 and 10–13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Carannante. Final Act. 19–26.

Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller, Jeong, Yoon, and Carannante. Final Act. 26–27.

ANALYSIS

The dispositive issue raised by the arguments in Appellant's Briefs is whether the combination of Miller, Yoon, and Jeong teaches or suggests "the ECC data set having a size and a strength[4] each selected . . . in response to the second parametric attribute of the second non-volatile tier," as recited in method claim 1, and as commensurately recited in apparatus claim 14.[5]

The Examiner rejects claim 1 for obviousness over the combination of Miller, Yoon, and Jeong. Final Act. 2–8. Miller discloses a method of storing error correction data ("ECD"). Miller, code (57). The Examiner finds, and we agree, that Miller teaches storing the data object and the ECC data in two different memory tiers. Ans. 3 (citing Miller, Fig. 4, 6:4–6 ("storing the data 404 at a first memory 408")), 6:32–34 ("storing the ECD 428 at the second memory 418"); Final Act. 2–3 (citing Miller, 1:55–63 (method includes "storing data at a first memory having a first non-volatile

[4] The Specification explains that the "strength" of the ECC data set generally relates to how effective it is in detecting, and correcting, "up to a selected number of data bit errors" and that "[a] stronger ECC data set will generally detect and correct more errors than a weaker ECC data set." Spec. 7:23–26.

[5] Because this issue is dispositive of all of the obviousness rejections, we address the rejections together. Appellant argues the claims as a group focusing on claims 1 and 14. *See* Appeal Br. 6–11. Accordingly, we select claim 1 as representative, and the remaining claims stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

memory type" and "storing the error detection data at a second memory have a second non-volatile memory type")).

Yoon describes a method of storing information in a memory in which a portion of the memory is selected, and the information is stored in the selected portion with an ECC having a strength based on a usage history of the selected portion of the memory. Yoon, code (57). The Examiner finds, and we agree, that Yoon teaches "the first non-volatile tier comprising a first parametric attribute comprising . . . one of an accumulated write count . . . [or] an accumulated erase count." Final Act. 4 (citing Yoon Fig. 5, ¶¶ 61, 69, 70, 79). The Examiner also finds, and we agree, that Yoon teaches "the second non-volatile tier comprising a second parametric attribute comprising . . . one of an accumulated write count . . . [or] an accumulated erase count." *Id.*

The Examiner further finds, and we agree, that Yoon teaches "selecting the ECC data size and strength for the data object based on attributes of the [memory] tier in which the ECC data is stored." Ans. 4–5 (citing Yoon ¶ 11 ("a method of storing information that can include selecting the strength of the error correction coding based on the usage history of the selected portion of the memory by determining whether the usage history exceeds a usage threshold, and, if so adjusting the strength of the error correction coding"), ¶ 64 ("usage threshold" includes ranges for a variable count, which may represent "a number of times a memory unit has been erased"), ¶ 79 ("the ECC strength may be predicated on [] the number of erase or program cycles"); Final Act. 3–5 (citing Yoon, Figs. 4–6, ¶¶ 11, 64, 78 ("stronger ECCs may be assigned to a memory having a usage history that exceeds a particular threshold"), 79).

Moreover, the Examiner finds that a person of ordinary skill in the art would have been motivated to apply the ECC strength adjustment aspect of Yoon (i.e., select the ECC strength for the data object) to the ECC data tier of Miller (i.e., the second tier in which ECC data is stored, as taught in Miller) "to improve data integrity in a system having different degradation rates in different areas." Ans. 6. Thus, the Examiner determines that

> [t]he combination of Miller and Yoon would [have taught] the obviousness of selecting the ECC strength for the data object based on attributes of the second tier (i.e. the tier in which the ECC data is stored as taught in prior art Miller[]), to improve data integrity/reliability for memory systems having different/multiple degradation rates by adjusting the ECC strength as needed.

Id.

Appellant argues that the Examiner relies "solely on Yoon" for the disputed limitation of claim 1 and that "[t]he skilled artisan having read Yoon readily understands it does not teach or suggest the data object and the ECC data stored in different tiers with the ECC strength for the data object based on attributes of the memory where the ECC data are stored, as claimed." Appeal Br. 7–10. Appellant also argues that

> not once does the Office substantiate any *prima facie* showing that Yoon teaches storing the data object and the ECC data in two different memory tiers and selecting the ECC strength for the data object based on attributes of the tier in which the ECC data is stored, as claimed.

Id. at 7.

Appellant further argues that:

> Yoon's abstract clearly discloses the ECC strength is associated with attributes of the memory tier where the information is stored. The only circumstance where that memory tier is also where the ECC data resides is when the information and the ECC data reside in the same memory tier, which is distinguished by

> the independent claims as a whole which feature the information and the ECC data residing in separate memory tiers.

Id. at 8.

In addition, Appellant argues that based on the above admission, the Examiner shifted the burden to Appellant "to show why the skilled artisan would not be motivated to modify and combine Miller and Yoon to arrive at the claimed invention." Reply Br. 2. Appellant then argues that the burden has not shifted because the claim language "*as a whole* **specifically excludes** the Examiner's suggested combination of Yoon and Miller." *Id.* at 2–3.

We are not persuaded by Appellant's arguments that the Examiner erred. First, Appellant's argument that the Examiner failed to make a *prima facie* showing that the art teaches the disputed limitation of claim 1 is not persuasive because the Examiner met the notice requirement for a *prima facie* case, pursuant to 35 U.S.C. § 132(a). In rejecting claims under 35 U.S.C. § 103, an examiner bears the initial burden of establishing a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992); *see also In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). An examiner's rejection establishes a *prima facie* case when it provides notice of the reasons for the rejection, and the rejection is deficient when it "is so uninformative that it prevents the applicant from recognizing and seeking to counter the grounds for rejection." *In re Jung*, 637 F.3d 1356, 1362 (Fed. Cir. 2011) (citations omitted). If this initial burden is met, the burden of coming forward with evidence or argument shifts to Appellant. *See In re Oetiker*, 977 F.2d at 1445. Obviousness is then determined on the basis of

the evidence as a whole and the relative persuasiveness of the arguments. *Id.*

Here, the Examiner provided sufficient notice of the reasons for the rejection of claim 1 by identifying the relevant portions of the cited references and by explaining how the references disclose the claim limitations, including the disputed limitation of claim 1. *See* Final Act. 2–6. The Examiner also explained why a person of ordinary skill in the art would have been motivated to make the proposed combinations. *Id.* at 5–6; *see also*, Ans. 6. Accordingly, the Examiner satisfied the notice requirement for a *prima facie* case of obviousness of claim 1. Furthermore, we are also not persuaded by Appellant's argument that the Examiner does not "substantiate any *prima facie* showing that Yoon teaches storing the data object and the ECC data in two different memory tiers and selecting the ECC strength for the data object based on attributes of the tier in which the ECC data is stored, as claimed" (*see* Appeal Br. 7) because, as discussed herein, the Examiner relies on the combination of Miller and Yoon to teach or suggest this limitation.

Second, contrary to Appellant's arguments (*see* Appeal Br. 7–10), the Examiner does not rely "solely on Yoon" to teach the disputed limitation of claim 1. As discussed *supra*, the Examiner relies on the combination of Miller and Yoon to teach or suggest the disputed limitation. The Examiner finds, and we agree, that Appellant is arguing one reference, Yoon, and "not the combination of the cited references as a whole." Ans. 2–3. The Examiner also finds, and we agree, that Appellant has not addressed Miller's teachings of "storing the data object and the ECC data in two different tiers." *Id.* at 3. "Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a

combination of references . . . . [The reference] must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole." *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Thus, Appellant's argument that a person of ordinary skill in the art would understand that Yoon does not teach or suggest "the data object and the ECC data stored in different tiers with the ECC strength for the data object based on attributes of the memory where the ECC data are stored, as claimed" is unavailing because the Examiner's rejection with respect to the disputed limitation is based on the combined teachings and suggestions of Miller and Yoon, which Appellant does not address.

Third, we do not agree with Appellant's assertion that the Examiner shifted the burden to Appellant "to show why the skilled artisan would not be motivated to modify and combine Miller and Yoon to arrive at the claimed invention." Reply Br. 2. Although the Examiner noted Appellant's acknowledgment that "the only circumstance where that memory tier is also where the ECC data resides is when the information and the ECC data reside in the same memory tier" (Ans. 4), the Examiner did not propose this circumstance as the suggested combination of Miller and Yoon, but explained how the combination of Miller and Yoon teaches or suggests the disputed limitation to a person of ordinary skill in the art (*id.* at 5–6).

Lastly, we agree with the Examiner that a person of ordinary skill in the art would have been motivated to apply the ECC strength adjustment of Yoon to the ECC data tier of Miller to improve data integrity for memory systems having different degradation rates. Ans. 6. Consistent with the Examiner's findings, Yoon broadly discloses adjusting the size and strength of ECC data based on the usage history, i.e., write or erase counts, of portions of the memory. Yoon ¶¶ 11, 61, 64, 69–72, 79. Although Yoon

discloses that the data object and ECC data set are stored in the same memory tier, Miller teaches storing the data object and the ECC data in two different memory tiers, as discussed *supra*. Thus, we agree with the Examiner's finding that a person of ordinary skill in the art desiring to improve data integrity for memory systems having different degradation rates in different tiers of memory would be motivated to use Yoon's method of adjusting the size and strength of the ECC data based on the second memory tier of Miller in which the ECC data is stored. Ans. 6. We also agree with the Examiner that this combination of Yoon and Miller teaches or at least suggests "the ECC data set having a size and strength each selected . . . in response to the second parametric attribute of the second non-volatile tier," as recited in the disputed limitation of claim 1. *See Merck & Co., Inc. v. Biocraft Labs, Inc.*, 874 F. 2d 804, 807–808 (Fed. Cir. 1989) ("[T]he question under 35 U.S.C. 103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made.").

We find the Examiner's stated rationale for the proposed combination of Yoon and Miller constitutes articulated reasoning with some rational underpinning in accordance with *KSR*. See *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Moreover, as the Supreme Court held in *KSR*, an obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.* In other words, "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.

Here, as the Examiner finds, a person of ordinary skill at the time of the invention would have recognized the value of using a known technique—the ECC strength adjustment aspect of Yoon—to solve the need to improve data integrity in memory systems with different degradation rates. Ans. 6; s*ee In re Translogic Technology, Inc.*, 504 F.3d 1249, 1262 (Fed. Cir. 2007).

Accordingly, for these reasons, we determine (1) the combination of Miller and Yoon teaches or at least suggests the disputed limitation of claim 1, and (2) the Examiner set forth a sufficient rationale, which constitutes articulated reasoning with some rational underpinning, that would have motivated a person of ordinary skill to combine the teachings of Miller and Yoon to achieve the claimed invention. Therefore, we also determine that the combination of the cited references would have rendered claim 1 obvious under § 103(a). Thus, we sustain the Examiner's rejections of claims 1 and 14, and dependent claims 2–13 and 15–20, under 35 U.S.C. § 103(a).

CONCLUSION

We affirm the Examiner's rejection of claims 1, 3, 5, 6, and 9 under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, and Jeong.

We affirm the Examiner's rejection of claims 2 and 10–13 under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Carannante.

We affirm the Examiner's rejection of claims 4 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Carannante.

We affirm the Examiner's rejection of claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Boyle.

We affirm the Examiner's rejection of claims 14–19 under 35 U.S.C. § 103(a) as being unpatentable over Miller, Jeong, and Yoon '598.

We affirm the Examiner's rejection of claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Miller, Yoon, Jeong, and Carannante.

Because we affirm at least one ground of rejection with respect to each claim on appeal, the Examiner's decision is affirmed. *See* 37 C.F.R. § 41.50(a)(1).

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3, 5, 6, 9	103(a)	Miller, Yoon, Jeong	1, 3, 5, 6, 9	
2, 10–13	103(a)	Miller, Yoon, Jeong, Carannante	2, 10–13	
4, 8	103(a)	Miller, Yoon, Jeong, Carannante	4, 8	
7	103(a)	Miller, Yoon, Jeong, Boyle	7	
14–19	103(a)	Miller, Jeong, Yoon '985	14–19	
20	103(a)	Miller, Yoon, Jeong, Carannante	20	
Overall Outcome			1–20	

TIME PERIOD FOR RESPONSE

No period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv). *See* 37 C.F.R. § 41.50(f).

AFFIRMED