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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YAKOV ROIZIN, EVGENY PIKHAY,
VLADISLAV DAYAN, and MICHA GUTMAN

Appeal 2019-002099
Application 14/101,282
Technology Center 2800

Before CHRISTOPHER L. OGDEN, LILAN REN, and
JANE E. INGLESE, *Administrative Patent Judges.*

REN, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–23. *See* Non-Final Act. 8, 20, 24, 28, 35, 37, 38, 40, 43, 45.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

CLAIMED SUBJECT MATTER

The claims are directed to a "solid state direct radiation sensor that exhibits high sensitivity to ionizing radiation and excellent programming and readout controllability." Spec. ¶ 7. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A solid state direct radiation sensing device including a plurality of sensors formed on a semiconductor substrate, wherein each sensor comprises:
>
> at least one control gate including a first isolated P-well region formed in the substrate;
>
> a discrete dielectric portion formed on said substrate and entirely disposed over the first isolated P-well region; and
>
> a first floating gate structure including a control capacitor region disposed on the dielectric portion and over the first isolated P-well region, wherein the dielectric portion has a thickness greater than 500 Angstroms.

Claims Appendix (Appeal Br. 44).

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[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 the assignee, Tower Semiconductor Ltd. Appeal Br. 3.

[2] The record before us shows that the Examiner previously issued a Non-Final Action on September 30, 2015, a Final Action on April 7, 2016, and a Final Action on December 30, 2016.

REFERENCES

The prior art references relied upon by the Examiner are:

Name	Reference	Date
Chang	US 6,281,078 B1	Aug. 28, 2001
Hu	US 6,794,236 B1	Sept. 21, 2004
Umezawa	US 6,919,260 B1	July 19, 2005
Oberhuber	US 7,508,027 B2	Mar. 24, 2009
Roizin 2	US 7,679,119 B2	Mar. 16, 2010
Georgescu	US 8,139,408 B2	Mar. 20, 2012
Chen	US 8,243,510 B2	Aug. 14, 2012
Raaijmakers	US 2001/0024387 A1	Sept. 27, 2001
Black	US 2003/0125616 A1	July 3, 2003
Sudo	US 2007/0045715 A1	Mar. 1, 2007
Roizin 3	US 2008/0135904 A1	June 12, 2008
Roizin 1	US 2008/0137408 A1	June 12, 2008
Mitchell	US 2010/0039868 A1	Feb. 18, 2010
Arasalan	US 2010/0096556 A1	Apr. 22, 2010
Audzeyeu	US 2010/0157669 A1	June 24, 2010
Chiu	US 2014/0001531 A1	Jan. 2, 2014

REJECTION

Claim 1–6, and 14–16 are rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, and Chiu. Non-Final Act. 8.

Claims 17–19 are rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Raaijmakers, Mitchell, Chang, and Chiu. Non-Final Act. 20.

Claims 7 and 8 are rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, Hu, and Chen. Non-Final Act. 24–25.

Claims 9 and 10 are rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, Georgescu, Roizin 3, and Oberhuber. Non-Final Act. 29.

Claims 11 and 12 are rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, and Sudo. Non-Final Act. 35.

Claim 13 is rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Raaijmakers, Mitchell, Chang, Chiu, Chen, Hu, and Sudo. Non-Final Act. 37.

Claims 20 and 22 are rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Raaijmakers, Mitchell, Chang, Chiu, and Audzeyeu. Non-Final Act. 38.

Claim 21 is rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, and Umezawa. Non-Final Act. 40.

Claim 22 is rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Umezawa, and Audzeyeu. Non-Final Act. 43.

Claim 23 is rejected under 35 U.S.C. § 103 as being unpatentable over Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, and Black. Non-Final Act. 45.

OPINION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Cf. Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential), *cited with approval in In re Jung*, 637 F.3d at 1365 ("[I]t has long been the Board's practice to require an applicant to identify the alleged

error in the examiner's rejections."). After having considered the evidence presented in this Appeal and each of Appellant's contentions, we are not persuaded that Appellant has identified reversible error, and we affirm the Examiner's rejections for the reasons expressed in the Final Office Action and the Answer. We add the following primarily for emphasis.

Classification of Prior Art

Appellant argues that the claims have "been subjected to an unfair examination standard resulting from an erroneous" classification of the pending application. Appeal Br. 17. Appellant argues that the examination standard applied to the pending claims "improperly presumes one skilled in the art would be motivated to modify floating gate memory devices 'for the purpose of forming a radiation sensor.'" *Id.* at 19 (quoting Final Action of December 30, 2016 at 2).

We are not persuaded by Appellant because the fact that a reference patent was classified differently from the application at issue is of limited value in determining obviousness, because the considerations in forming a classification system differ from those relating to a person of ordinary skill seeking a solution for a particular problem. *In re Mlot-Fijalkowski*, 676 F.2d 666, 668, n.5 (CCPA 1982).

MPEP 2141.01(a)

Appellant argues that the Examiner reversibly erred under MPEP 2141.01(a) for using Roizin 1 "as the primary reference" because Roizin 1 is directed to a memory cell rather than a radiation sensing device as recited in claim 1. Appeal Br. 21. Appellant, however, does not address the Examiner's finding that the floating gate memory cell in Riozin 1 "is inherently a solid state device that is therefore in the same field of endeavor

as the recited 'solid state' device of the instant invention." *See* Ans. 4[3]; *see* Appeal Br. 21 (arguing that Roizin 1 is a logic memory cell for RFID application without addressing the criteria for assessing analogous art); *see also In re Clay*, 966 F.2d 656, 658–59 (Fed. Cir. 1992) ("Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.").

As with Roinzin 1, Appellant likewise does not analyze whether Arsalan is (1) from the same field of endeavor, regardless of the problem addressed, and (2) if Arsalan is not within the field of the inventor's endeavor, whether it still is reasonably pertinent to the particular problem with which the inventor is involved. Appeal Br. 22–25; *see also Clay*, 966 F.3d at 658–59. Appellant in fact acknowledges the Examiner's finding that Arsalan "relates to low power FGMOSFET sensor systems, and particularly to FGMOSFET radiation sensors and dosimeters for biomedical applications." Appeal Br. 23 (citing Arsalan ¶ 2). Appellant instead argues that the "FGMOSFET sensor systems" in Arsalan does not include "any FGMOSFET device, such as the memory cell taught by Roizin[ ]l." *Id.* at 24. We are not persuaded by Appellant's attorney's argument because it lacks evidentiary support, and because it is not based on the Examiner's fact finding in support of the rejection – which is that "Arsalan teaches [that a] CMOS floating gate MOSFET device may be used as [a] radiation sensor."

[3] Appellant did not file a Reply Brief.

Non-Final Act. 3; *see* Ans. 4 (providing that "Arsalan was used for the mere teaching of 'FGMOSFET radiation sensor' and not any other structural detail thereof").

Appellant next argues that the recited "radiation sensing device" is not functional language, but is a structural limitation that distinguishes the prior art device in Roizin 1. Appeal Br. 25. As the Examiner points out, "the claim limitation of 'radiation sensor' does not distinguish the claimed invention over the prior art of Roizin[ ]1 in view of Arsalan who teaches the structure (floating gate based CMOS radiation sensor) which is capable of performing the intended use as claimed." Non-Final Act. 3.

"[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). The patentability of claim 1, an apparatus claim, "depends on the claimed structure, not on the use or purpose of that structure." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 809 (Fed. Cir. 2002). Appellant's argument here does not structurally distinguish the prior art and is therefore unpersuasive.

MPEP 2143.02

Appellant argues that the apparatus resulting from combining the applied prior art would render the memory cell of Roizin 1 unsatisfactory as it "would produce a memory cell requiring impractical[] memory cell area." Appeal Br. 27. As the Examiner points out, instead of addressing the Examiner's obviousness analysis, Appellant's argument is based on bodily incorporating various features of the prior art into Roisin 1. Ans. 6 (explaining that the rejection is based on Arsalan's teaching of FGMOSFET radiation sensors without incorporating additional prior art structures). All of

the features of the cited references need not be bodily incorporated and the skilled artisan is not compelled to blindly follow the teaching of one prior art reference over the other without the exercise of independent judgment. *See Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 889 (Fed. Cir. 1984). We are therefore not persuaded that the Examiner reversibly erred here.

Patent Term Extension

Under 35 U.S.C. § 134, the Board reviews rejections of claims for propriety. *In re Hengehold*, 440 F.2d 1395, 1404 (CCPA 1971). We decline to consider Appellant's request for patent term extension (Appeal Br. 28–29). *See* 35 U.S.C. § 6(b). Such issues may be petitionable and are not subject to review by the Board. *See In re Berger*, 279 F.3d 975, 984–85 (Fed. Cir. 2002). Accordingly, we provide no opinion concerning the propriety of the request.

Claim 1

With regard to the prior art teachings in support of the rejection, Appellant first argues that Arsalan eliminates "a conventional control gate" and therefore teaches away from claim 1 which requires "at least one control gate." Appeal Br. 30 (citing Arsalan Abstract).

"Under the proper legal standard, a reference will teach away when it suggests that the developments flowing from its disclosures are unlikely to produce the objective of the applicant's invention." *Syntex (U.S.A.) LLC v. Apotex, Inc.*, 407 F.3d 1371, 1380 (Fed. Cir. 2005) (citations omitted). In this case, the Examiner points out that Arsalan does not teach away because it "was merely relied upon to show that Roizin is capable of radiation sensing and not any other structural specifics thereof." Ans. 7. As noted *supra*, all of the features of the cited references need not be bodily

incorporated and the skilled artisan is not compelled to blindly follow the teaching of one prior art reference over the other without the exercise of independent judgment. *See Lear Siegler*, 733 F.2d at 889. Moreover, Arsalan's teaching for increased sensitivity and cost-effectiveness (Araslan Abstract) is consistent with the stated objectives of the Specification (Spec. ¶ 8) and does not support the argument that "the developments flowing from its disclosures are unlikely to produce the objective of the applicant's invention." *Syntex (U.S.A.)*, 407 F.3d at 1380.

Appellant next argues that the Examiner reversibly erred in finding that Riozin 2 teaches or suggests "a discrete dielectric portion . . . entirely disposed over the first isolated P-well region . . . whereas the dielectric portion has a thickness greater than 500 Angstroms" as recited in claim 1. Appeal Br. 32. Appellant argues, without citation to the record, that the claim term "discrete" "means 'completely separate and unconnected.'" *Id.* Appellant's argument is unpersuasive, first and foremost, because Appellant's proposed definition is not supported by intrinsic or extrinsic evidence. Even under this interpretation, Appellant's argument is unpersuasive nonetheless because it attacks the references individually, rather than considering what the combined references would have suggested to the person of ordinary skill in the art – which is the basis of the rejection.

"Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references." *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). In this case, the Examiner finds that the combined teaching of the prior art including Roizin 1, Arsalan, Roizin 2 and Umezawa would have suggested the limitation at issue to the skilled artisan. Ans. 8; Non-Final Act.

11. Although Appellant argues that Roizin 2 does not teach this limitation, Appellant does not address the combined teaching based on additional references including Roizin 1. *Compare* Appeal Br. 33, *with* Ans. 8 (finding that figure 1 of Roizin 1 teaches a "dielectric portion . . . entirely disposed over the first isolated P-well region" and that the combined teaching of Roizin 1 and the STI dielectric of Roizin 2 teaches "a discrete dielectric portion"). Appellant's argument that Umezawa does not teach or suggest "a radiation sensing device" as recited in claim 1 is not persuasive because it neither addresses the Examiner's finding based on Umezawa nor the Examiner's rationale in combining Umezawa with the other references. *Compare id.* at 33–34, *with* Non-Final Act. 11 (finding that Umezawa teaches the advantage of STI for miniaturization); *see also* Ans. 9 (again stating that Umezawa is cited for the teaching of the advantage of STI for miniaturization).

Appellant's argument regarding Raaijmakers is not persuasive because the argument does not address the Examiner's rationale for the rejection. More specifically, Appellant argues that Raaijmakers does not provide motivation to modify "the floating gate memory cell of Roizin[ ]1." Appeal Br. 34–35. Appellant, however, does not address the Examiner's rationale that Raaijmakers teaches a correlation between dielectric thickness and capacitance and therefore a skilled artisan would have combined Raaijmakers with Mitchell, Chang, and Chiu to arrive at the recited dielectric thickness. *Compare id.*, *with* Non-Final Act. 12–13; Ans. 9.

Appellant's argument regarding Chiu is not persuasive also because the argument does not address the Examiner's fact findings in support of the rejection. More specifically, Appellant argues that Chiu does not teach or

suggest "a discrete dielectric portion . . . entirely disposed over the first isolated P-well region . . . whereas the dielectric portion has a thickness greater than 500 Angstroms" as recited in claim 1, but Appellant does not address the Examiner's finding that Chiu teaches a control gate dielectric thickness of 100 to 500 Angstroms. *Compare* Appeal Br. 35–36., *with* Non-Final Act. 12; Ans. 9–10.

Based on the foregoing, we sustain the rejection of claim 1. Appellant does not argue separately the rejection of claims 2–6 and 14–16, and we sustain this rejection as well. *See* Appeal Br. 37; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claims 17–19

Appellant does not argue separately the rejection of claims 17–19 and we sustain this rejection as well. *See* Appeal Br. 37; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claims 7 & 8

Appellant does not argue separately the rejection of claims 7 and 8 and we sustain this rejection as well. *See* Appeal Br. 38; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claims 9 & 10

Appellant does not argue separately the rejection of claims 9 and 10 and we sustain this rejection as well. *See* Appeal Br. 38; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claims 11 & 12

Appellant does not argue separately the rejection of claims 11 and 12 and we sustain this rejection as well. *See* Appeal Br. 39; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claim 13

Appellant does not argue separately the rejection of claim 13 and we sustain this rejection as well. *See* Appeal Br. 39; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claims 20 & 22

Appellant does not argue separately the rejection of claims 11 and 12 over Roizin 1, Arsalan, Raaijmakers, Mitchell, Chang, Chiu, and Audzeyeu and we sustain this rejection as well. *See* Appeal Br. 40; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Appellant also does not argue separately the rejection of claim 12 over Roizin 1, Arsalan, Rozin 2, Umezawa, and Audzeyeu and we sustain this rejection as well. *See* Appeal Br. 42; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

Claim 21

Appellant's argument with regard to claim 21 mirrors those raised for claim 1. *Compare* Appeal Br. 32–34, *with id.* at 40–41. We sustainhe rejection of claim 21 for the reasons provided *supra* with regard to claim 1. *See also* 37 C.F.R. § 41.37(c)(1)(vii).

Claim 23

Independent claim 23 recites:

> 23. A CMOS circuit including a functional circuit and a solid state direct radiation sensing device formed on a semiconductor substrate, wherein the sensing device includes a plurality of sensors for generating dosage data and means for transmitting the dosage data to the functional circuit, wherein the functional circuit includes means for automatically correcting circuit operating parameters in accordance with said transmitted dosage data, and wherein each sensor of said sensing device comprises:

> at least one control gate including a first isolated P-well region formed in the substrate;
>
> a dielectric portion formed on said substrate and disposed over the first isolated P-well region; and
>
> a first floating gate structure including a control capacitor region disposed on the dielectric portion and over the first isolated P-well region, wherein the dielectric portion comprises shallow trench isolation (STI) and has a nominal thickness of at least 500 Angstroms.

Claims Appendix (Appeal Br. 53–54).

Appellant's argument that Black does not teach or suggest "a solid state direct radiation sensing device" that includes a "floating gate structure" (Appeal Br. 42–43) is not persuasive because it does not address the Examiner's fact finding in support of the rejection. More specifically, the obviousness rejection is based, in relevant part, on the Examiner's finding that Black teaches various limitations of claim 23 including "a functional circuit . . . wherein the sensing device includes a plurality of sensors for generating dosage data and means for transmitting the dosage data to the functional circuit, wherein the functional circuit includes means for automatically correcting circuit operating parameters in accordance with said transmitted dosage data. Non-Final Act. 50. Appellant's argument does not address the Examiner's fact findings with regard to Black and therefore does not identify reversible error.

To the extent that Appellant's argument is directed to the issue of whether Black is analogous art, we again note that Appellant has not sufficiently explained why the Examiner reversibly erred based on whether Black is (1) from the same field of endeavor, regardless of the problem addressed, and (2) if Black is not within the field of the inventor's endeavor,

whether it still is reasonably pertinent to the particular problem with which the inventor is involved. Appeal Br. 42–43; *see also Clay*, 966 F.3d at 658–59. We accordingly sustain the rejection of claim 23.

CONCLUSION

The Examiner's rejections are affirmed.

More specifically,

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–6, 14–16	103	Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu	1–6, 14–16	
17–19	103	Roizin 1, Arsalan, Raaijmakers, Mitchell, Chang, Chiu	17–19	
7, 8	103	Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, Chen	7, 8	
9, 10	103	Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, Georgescu, Roizin 3, Oberhu	9, 10	
11, 12	103	Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers,	11, 12	

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
		Mitchell, Chang, Chiu, Sudo		
13	103	Roizin 1, Arsalan, Rozin 2, Raaijmakers, Mitchell, Chang, Chiu, Chen, Hu, Sudo	13	
20, 22	103	Roizin 1, Arsalan, Raaijmakers, Mitchell, Chang, Chiu, Audzeyeu	20, 22	
21	103	Roizin 1, Arsalan, Rozin 2, Umezawa	21	
22	103	Roizin 1, Arsalan, Rozin 2, Umezawa, and Audzeyeu	22	
23	103	Roizin 1, Arsalan, Rozin 2, Umezawa, Raaijmakers, Mitchell, Chang, Chiu, Black	23	
Overall Outcome:	103		1–23	

TIME PERIOD FOR RESPONSE

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

AFFIRMED