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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/304,665	06/13/2014	Rudolf Zelsacher	INF 2014 P 50600 US	2176
48154	7590	12/30/2019	EXAMINER	
SLATER MATSIL, LLP/Infineon			RIDDLE, CHRISTINA A	
17950 PRESTON ROAD			ART UNIT	
SUITE 1000			PAPER NUMBER	
DALLAS, TX 75252			2882	
			NOTIFICATION DATE	
			DELIVERY MODE	
			12/30/2019	
			ELECTRONIC	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RUDOLF ZELSACHER and PETER IRSIGLER

Appeal 2019-001179
Application 14/304,665
Technology Center 2800

Before BRADLEY R. GARRIS, KAREN M. HASTINGS, and JAMES C. HOUSEL, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–14 and 16–18. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.²

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Infineon Technologies AG. Supplemental Appeal Brief (“Appeal Br.”) filed July 27, 2018, 2.

² Our Decision refers to the Specification (“Spec.”) filed June 13, 2014, and the Examiner's Answer (“Ans.”) dated September 21, 2018.

CLAIMED SUBJECT MATTER

The claims are directed to a method and an apparatus for exposing a structure on a substrate during photolithographic manufacturing. Spec. ¶ 1. The method involves positioning an invariable reticle and a programmable reticle in a light path between a light source and a layer on a substrate, and exposing the layer to light from the source passing through both reticles. *Id.* ¶ 3. The apparatus includes the light source, a first reticle carrier configured to carry the invariable reticle, a second reticle carrier configured to carry the programmable reticle, and a substrate carrier configured to carry the substrate. *Id.* ¶ 4. Appellant discloses that the use of an invariable reticle and a programmable reticle together may enable a flexible exposure of different structures caused by different settings of the programmable reticle, while equal, and possibly smaller, structures caused by the invariable reticle. *Id.* ¶ 16.

Claims 1 and 14, reproduced below from the Claims Appendix to the Supplemental Appeal Brief, are illustrative of the claimed subject matter:

1. A method for exposing a structure on a substrate, the method comprising:
 - positioning an invariable reticle and a programmable reticle in a single light path between a first light source and a layer on the substrate, the layer to be exposed to light; and
 - exposing the layer on the substrate by light from the first light source passing through both the invariable reticle and the programmable reticle.

14. An apparatus for exposing a structure on a substrate, the apparatus comprising:
 - a first light source;

a first reticle carrier configured to carry an invariable reticle;
a second reticle carrier configured to carry a programmable reticle; and
a substrate carrier configured to carry a substrate,
wherein the first light source, the first reticle carrier, the second reticle carrier and the substrate carrier are arranged to enable exposing a layer on the substrate carried by the substrate carrier by light from the first light source passing through both the invariable reticle carried by the first reticle carrier and the programmable reticle carried by the second reticle carrier.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Wada et al. (“Wada”)	US 5,329,335	July 12, 1994
Matsunami	US 7,220,606 B2	May 22, 2007
Case et al. (“Case”)	US 2003/0128347 A1	July 10, 2003
Ishikawa et al. (“Ishikawa”)	US 2003/0214571 A1	Nov. 20, 2003
Sewell	US 2006/0286482 A1	Dec. 21, 2006
Miller	US 2008/0245975 A1	Oct. 9, 2008

REJECTIONS

The Examiner maintains, and Appellant requests our review of the following grounds of rejection under 35 U.S.C. § 103:

1. Claims 1, 4, 6–11, 14, and 16–18 as unpatentable over Wada in view of Sewell;
2. Claims 2 and 3 as unpatentable over Wada in view of Sewell, and further in view of Miller;
3. Claim 5 as unpatentable over Wada in view of Sewell, and further in view of Case;
4. Claim 12 as unpatentable over Wada in view of Sewell, and further in view of Ishikawa; and
5. Claim 13 as unpatentable over Wada in view of Sewell, and further in view of Matsunami.

OPINION

After review of the Examiner's and Appellant's opposing positions and the appeal record before us, we determine that Appellant's arguments are sufficient to identify reversible error in the Examiner's obviousness rejections. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011). Accordingly, we reverse the stated rejections applied to method claims 1–13 and to apparatus claims 14 and 16–18 for substantially the reasons set forth in the Appeal Brief. We offer the following for emphasis only.

The Examiner found that Wada discloses a method for exposing a structure on a substrate, the method comprising positioning an invariable reticle and a second reticle in a single light path between a light source and a layer on the substrate, and exposing the layer to light from the light source passing through both reticles. Ans. 3–4. The Examiner also found that Wada discloses an apparatus for performing this method comprising first and second photo mask 6, 8 in the light path between light source 1 and substrate 10. *Id.* Although the Examiner acknowledged that Wada fails to teach that the second reticle is programmable, the Examiner found that Sewell

discloses a programmable reticle PD and that static or dynamic patterning devices are art-recognized functional equivalents. *Id.* at 4. The Examiner concluded that it would have been obvious to have replaced Wada's second reticle with a programmable reticle as taught by Sewell "since including a programmable reticle allows the pattern to be changed more quickly to reduce costs by minimizing the number of static reticles required. *Id.*

Appellant argues that because Wada discloses that the first and second masks operate in tandem in order to provide a phase shift mask for improving exposure resolution, replacing one of these masks necessitates replacing the other mask as well. Appeal Br. 7. Appellant contends that Wada discloses separating the conventional mask into a light shielding film 552 and a phase shifting film 554 because the conventional mask is extremely difficult to manufacture. *Id.* at 6. Appellant also contends that although Sewell teaches that a double exposure method for improving resolution may use either a static patterning device or a dynamic patterning device, Sewell fails to describe performing this method using a combination of a static patterning device and a dynamic patterning device. *Id.* at 6-7. Appellant urges that one skilled in the art would not replace Wada's static mask with a more complex programmable mask in order to achieve the same result as with two static masks. *Id.* at 7.

Appellant's arguments are persuasive of reversible error in the Examiner's obviousness rejections applied to method claims 1-13. We note that the Examiner does not address Appellant's argument that because Wada discloses that the first and second masks operate in tandem in order to provide a phase shift mask for improving exposure resolution, replacing one of these masks necessitates replacing the other mask as well. As Appellant

contends, Wada teaches separating a single photo mask of a two-layer structure having both a phase shift film and a light shielding film into two independent photo masks, each having single-layer structure of one of the phase shift film and the light shielding film. Wada 2:33–39. Further, Wada states that these two photo masks achieve substantially the same effect as that of the prior phase shift method. *Id.* at 2:40–41. Thus, although Sewell teaches that patterning devices can be either static or dynamic, Sewell fails to address the situation where each of the masks performs a different function as in Wada.

Absent such a teaching, the Examiner’s obviousness conclusion lacks sufficient rational underpinning. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”), *quoted with approval in KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). We will not sustain the Examiner’s decision to reject claim 1, and claims 2–13 which depend therefrom.

Turning to apparatus claim 14, we note that both the Examiner and Appellant appear to interpret this claim similarly to claim 1 as requiring a first invariable reticle and a second programmable reticle. Ans. 7 (“Wada does not appear to explicitly describe a programmable reticle.”); Appeal Br. 8 (“Independent claim 14 includes similar claim elements as claim 1”) Based on this undisputed interpretation, we do not sustain the Examiner’s decision to reject claim 14, and claims 16–18 which depend therefrom. However, the recitations of the first and second reticle carriers merely require that these carriers are configured to carry the invariable and

programmable reticles, respectively. The record is unclear how the configuration of the second reticle carrier enabling it to carry or hold the programmable reticle differs from Wada's second reticle carrier 9. Upon further prosecution in this application, the Examiner and Appellant should clarify the record as to the distinction between the recited second reticle carrier and Wada's second reticle carrier 9.

CONCLUSION

Upon consideration of the record, and for the reasons given above and in the Appeal Brief, the decision of the Examiner rejecting claims 1–14 and 16–18 under 35 U.S.C. § 103 as unpatentable over Wada in view of Sewell, alone or further in view of Miller, Case, Ishikawa, or Matsunami, is *reversed*.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1, 4, 6–11, 14, 16–18	103	Wada, Sewell		1, 4, 6–11, 14, 16–18
2, 3	103	Wada, Sewell, Miller		2, 3
5	103	Wada, Sewell, Case		5
12	103	Wada, Sewell, Ishikawa		12
13	103	Wada, Sewell, Matsunami		13
Overall Outcome				1–14, 16–18

Appeal 2019-001179
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REVERSED