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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* NICOLAAS RUDOLF KEMPER,  
SJOERD NICOLAAS LAMBERTUS DONDEERS,  
JOOST JEROEN OTTENS, EDWIN CORNELIS KADIJK, and  
SERGEI SHULEPOV

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Appeal 2018-004000  
Application 13/187,055  
Technology Center 2800

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BEFORE ST. JOHN COURTENAY III, JENNIFER S. BISK, and  
IRVIN E. BRANCH, *Administrative Patent Judges*.

BISK, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>2</sup> appeals from the Examiner’s decision to reject claims 21, 29, 33, 37, 45–53, and 55–61.<sup>3</sup> We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

CLAIMED SUBJECT MATTER

The claims are directed to “a lithographic apparatus and a method for manufacturing a device.” Spec. ¶ 2. The Specification describes providing for the removal of liquid from systems in which the substrate is immersed in a liquid. *Id.* ¶ 10. Claims 21 and 57, reproduced below, are illustrative of the claimed subject matter:

21. A lithographic apparatus, comprising:
  - a movable table;
  - a projection system configured to project a beam of radiation onto a surface;
  - a liquid supply system configured to provide a liquid to a space between an object, when on the table, and the projection system; and

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<sup>1</sup> Throughout this Decision we have considered the Specification filed July 20, 2011 (“Spec.”), the Final Office Action mailed May 25, 2016 (“Final Act.”), the Appeal Brief filed February 15, 2017 (“Appeal Br.”), the Examiner’s Answer mailed January 5, 2018 (“Ans.”), and the Reply Brief filed March 5, 2018 (“Reply Br.”).

<sup>2</sup> 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 ASML Netherlands B.V. Appeal Br. 2.

<sup>3</sup> Claims 1–20, 22–28, 30–32, 34–36, 39, 40, and 54 have been canceled. Appeal Br. 2. Claims 38 and 41–44 have been allowed. *Id.*; Final Act. 9.

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a drain in the table configured to contain liquid which leaks through a gap between an edge of the object and the table into the drain, the drain comprising:

a chamber having an opening; and

a porous structure to allow fluid therethrough, the porous structure vertically spaced apart from and below the top of the gap and having a width sufficient to extend at least across the opening.

Appeal Br. 21 (Claims App.).

57. A lithographic apparatus, comprising:

a movable table;

a projection system configured to project a beam of radiation onto a surface;

a liquid supply system configured to provide a liquid to a space between an object, when on the table, and the projection system; and

a passive liquid removal device in the table, the passive liquid removal configured to move liquid which leaks through a gap between an edge of the object and a nearest edge of the table to the edge of the object, by a force other than, or in addition to, gravity and low pressure toward an opening of a drain of the table.

Appeal Br. 25 (Claims App.).

## REJECTIONS

Claims 21, 29, 33, 37, 45–50, 53, 55, and 56 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of US 2004/0160582 A1, published Aug. 19, 2004 (“Lof”) and US 2005/0219488 A1, published Oct. 6, 2005 (“Nei”). Final Act. 2–6.

Claims 51 and 52 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Lof, Nei, and US 2005/0175776 A1, published Aug. 11, 2005 (“Streefkerk”). Final Act. 7.

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Claims 57–59 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Lof and US 2005/0231694 A1, published Aug. 11, 2011 (“Kolenychenko”). Final Act. 7–8.

Claims 60 and 61 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Lof, Kolenychenko, and Nei. Final Act. 9.

## ANALYSIS

We review the appealed rejections for error based upon the issues identified by Appellant, and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential). To the extent Appellant has not advanced separate, substantive arguments for particular claims, or other issues, such arguments are waived. 37 C.F.R. § 41.37(c)(1)(iv) (2017).

We have considered all of Appellant’s arguments and any evidence presented. We highlight and address specific findings and arguments for emphasis in our analysis below.

### *Obviousness Over Lof and Nei*

The Examiner rejected claims 21, 29, 33, 37, 45–50, 53, 55, and 56 as obvious over Lof and Nei. Final Act. 2–6. Specifically, the Examiner finds Lof discloses each of the limitations of claim 21 except “a porous structure to allow fluid therethrough, the porous structure vertically spaced apart from and below the top of the gap and having a width sufficient to extend at least across the opening” (the “porous structure limitation”). *Id.* at 2–3. For example, the Examiner points to Lof’s chamber 44 having an opening 47 as the claimed “drain in the table configured to contain liquid which leaks

through a gap between an edge of the object and the table into the drain.”  
Final Act. 3 (citing Lof Fig. 7c). Figure 7c of Lof is reproduced below.

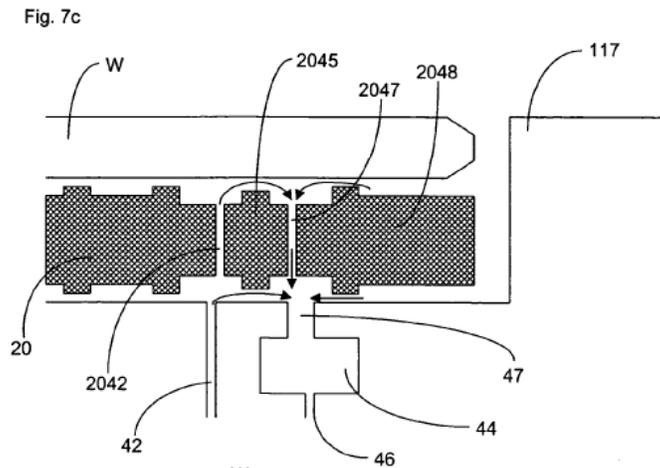


Figure 7c of Lof, above, shows Lof’s disclosed lithographic apparatus with “annular compartment 44” “positioned between an annular port 47 open to the gap.”

The Examiner relies on Nei’s structure 21 as teaching or suggesting the porous structure limitation. *Id.* at 3 (citing Nei Fig. 6, ¶ 66). Figure 6 of Nei is reproduced below.

**Fig. 6**

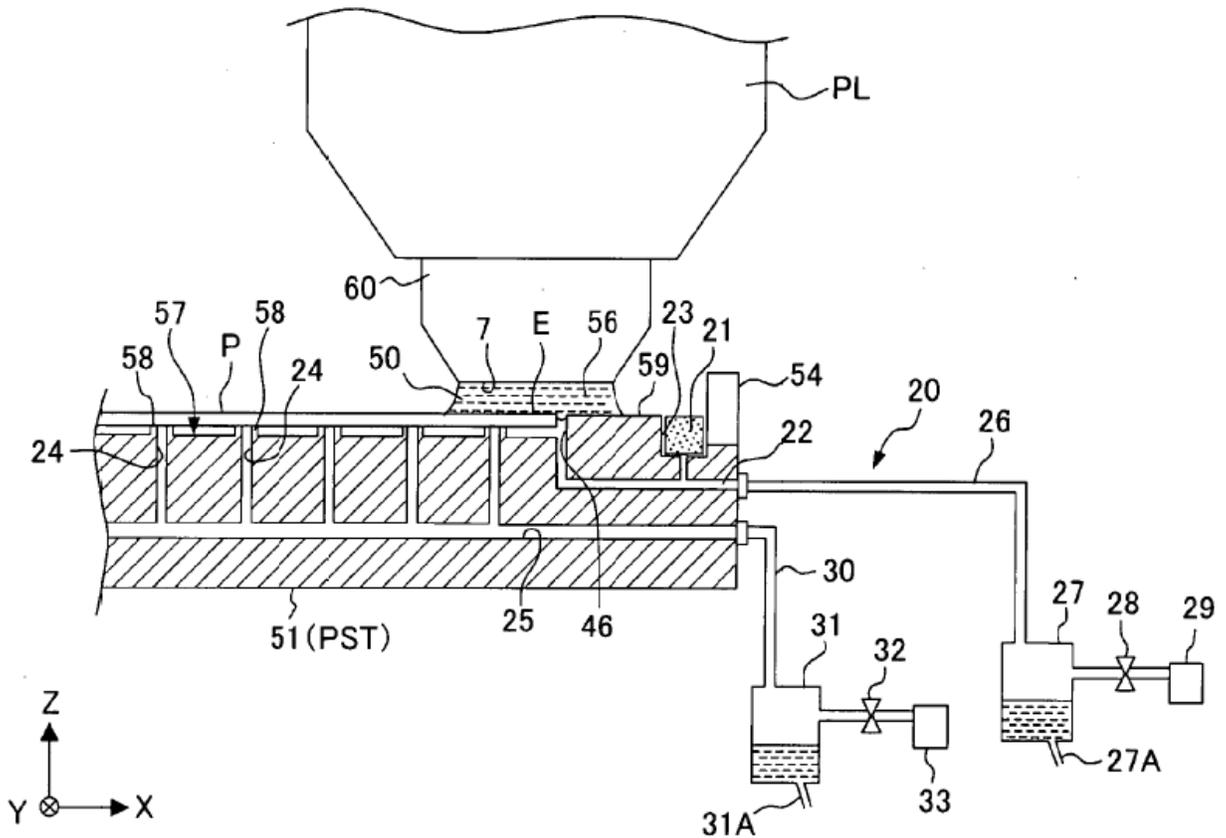


Figure 6 of Nei, reproduced above, “shows a magnified section view illustrating major parts” of Nei’s disclosed exposure apparatus, including “recovery unit 20 for recovering the liquid outflowed to the outside of substrate P.” Nei ¶¶ 41, 65. “[M]ember 21 is an annular member having a predetermined width,” “arranged in a groove 23,” and is “composed of, for example, a porous material such as porous ceramics” that “is capable of retaining the liquid in a predetermined amount.” *Id.* ¶ 66.

According to the Examiner, “it would have been obvious to . . . incorporate a porous structure as claimed in order to retain the liquid spilled from space 56.” Final Act. 3. The Examiner adds that “the porous material

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of Nei has a predetermined size, and the height is not limited to be flush with the top of groove 23.” Ans. 5. According to the Examiner, a person of ordinary skill in the art would have been motivated “to reduce the size (in a way the height) of the porous material (for example) to reduce the amount of liquid absorbed and thus lower weight of the substrate table.” *Id.* (citing Nei ¶ 80).

Appellant argues that Nei does not disclose that member 21 is “vertically spaced apart from and below the top of a gap between an edge of the object and the table” as claimed. Appeal Br. 7–8. Instead, Appellant asserts that member 21 “is shown flush with the top of groove 23 and either flush with or above the top of hole 46.” *Id.* at 8. Appellant disagrees with the Examiner’s finding that a person of ordinary skill in the art would reduce the height of Nei’s member 21 because “doing so would appear to defeat Nei’s purpose of preventing liquid from the auxiliary plate 59 going past groove 23 of Nei.” *Id.* at 9. Finally, Appellant argues that nothing in the Examiner’s reasoning explains why a person of ordinary skill in the art would have changed the vertical relationship of member 21 and the table. *Id.* at 10.

We agree with Appellant that the Examiner has not sufficiently explained why a person of ordinary skill in the art would have changed the size of Nei’s member 21 or its vertical relationship to the table. The Examiner’s explanation that a person of ordinary skill in the art would have been motivated to reduce the size of member 21 to lower the weight of the substrate table has multiple problems. First, the Examiner does not explain why a person of ordinary skill in the art would want to reduce the weight of the substrate table. *See* Reply Br. 4 (“[I]t is not apparent at all why a person of ordinary skill in the art would want to ‘reduce the amount of liquid

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absorbed.’’). Second, the Examiner does not explain how reducing the size of member 21 would reduce the weight of the substrate table. The portion of Nei to which the Examiner points for support for this assertion does not mention lowering the weight of the substrate table, but instead states that “liquid 50, which is absorbed by the liquid-absorbing member 21, is always discharged to the outside of the substrate stage PST,” thus, “it is possible to suppress the variation of the weight of the substrate stage PST, which would be otherwise caused by the liquid 50.” Nei ¶ 80. We agree with Appellant that this disclosure refers to reducing variation in weight, as opposed to lowering weight, which “is accomplished by retaining, recovering and exhausting the liquid” and not to simply reducing the amount of liquid absorbed by member 21. Reply Br. 5. Third, we agree with Appellant that even if a person of ordinary skill would have been motivated to reduce the size of member 21, there is no reasoning provided by the Examiner explaining why a reduction in size would lead to member 21 being “vertically spaced apart from and below the top of the gap” as claimed.

Accordingly, we are persuaded of error in the Examiner’s rejection of claim 21 as obvious over the combination of Lof and Nei. Independent claims 37 and 53 contain similar limitations to those of claim 21 and, therefore, their rejection suffers from the same issues as the rejection of claim 21. Claims 29, 33, 45–50, 55, and 56 depend from claims 21 and 53, and, therefore, their rejections suffer from the same problems as the rejection of claim 21.

Thus, we reverse the Examiner’s rejection of claims 21, 29, 33, 37, 45–50, 53, 56, and 57 as obvious over Lof and Nei.

*Obviousness Over Lof, Nei, and Streefkerk*

The Examiner rejected claims 51 and 52 as obvious over Lof, Nei, and Streefkerk. Final Act. 7. Claims 51 and 52 depend from claim 21 and, therefore, their rejections suffer from the same problems as the rejection of claim 21. Accordingly, we reverse the rejection of claims 51 and 52 over Lof, Nei, and Streefkerk.

*Obviousness Over Lof and Kolesnychenko*

The Examiner rejected claims 57–59 as obvious over Lof and Kolesnychenko. Final Act. 7–8. Claim 57 is independent and claims 58 and 59 depend from claim 57.

Specifically, the Examiner finds Lof discloses each of the limitations of claim 57 except,

a passive liquid removal device in the table, the passive liquid removal configured to move liquid which leaks through a gap between an edge of the object and a nearest edge of the table to the edge of the object, by a force other than, or in addition to, gravity and low pressure toward an opening of a drain of the table

(the “passive liquid removal device limitation”). *Id.* at 8. The Examiner points to groove 100 and outlet 120 in Kolesnychenko as teaching the passive liquid removal device limitation. *Id.* (citing Kolesnychenko ¶ 64). According to the Examiner, it would have been obvious to one of ordinary skill in the art to use this method in Lof’s immersion system “in order to remove liquid through the drain effectively.” *Id.* The Examiner adds that Kolesnychenko’s capillary action system would also reduce stage disturbance. Ans. 25–26.

Figure 5 of Kolesnychenko is reproduced below.

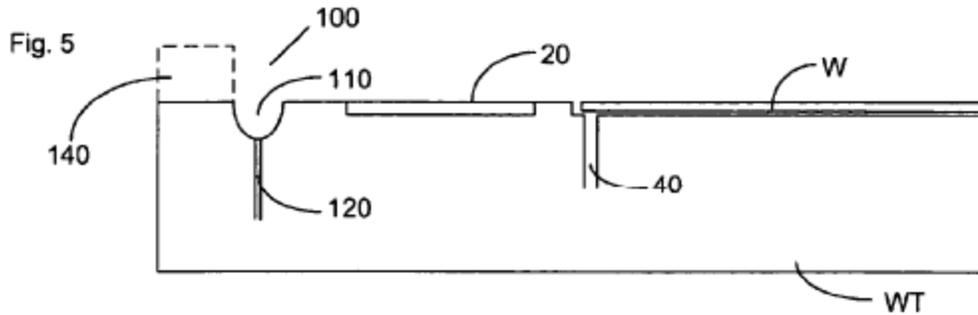


Figure 5 of Kolesnychenko “illustrates, in cross-section, a barrier according to a first embodiment of the invention.” Kolesnychenko ¶ 41. In Figure 5, substrate table WT is provided with “a drainage ditch or barrier 40 surrounding an outer peripheral edge of the substrate W.” *Id.* ¶ 59. “A barrier 100 surrounds the substrate W, the drainage ditch 40 and the closing disk 22.” *Id.* ¶ 61. The barrier 100 “comprises a groove 110 which is recessed into the upper surface of the substrate table WT.” *Id.* ¶ 62. “In an embodiment, the groove 100 is formed as a U-shape in cross-section and is sized such that capillary forces act on liquid in the groove so that the liquid can be transported to the outlet(s) 120 and removed from the substrate table WT.” *Id.* ¶ 64.

Appellant argues that that Kolesnychenko shows drainage ditch 40 located between a nearest edge of the table and an edge of an object, not groove 100. Appeal Br. 16.

We agree with Appellant that because gap 40 is between substrate W and Kolesnychenko’s passive liquid removal device including groove 100 and outlet 120, it is not clear how the groove 100 and outlet 120 “move liquid which leaks through a gap between an edge of the object and a nearest edge of the table to the edge of the object” as claimed. The Examiner does not explain why or how a person of ordinary skill in the art would modify

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the system of Lof such that the passive liquid removal device moves liquid from the claimed location. *See* Final Act. 8 (not addressing the location of the passive liquid removal device relative to the edge of the table or object); Ans. (stating only that “there is no reason to prevent or discourage [a person of] ordinary skill in the art to apply such teaching of capillary force, to remove liquid through outlets of Lof’s immersion system at any particular location on the substrate support . . . to avoid stage disturbance.”).

Accordingly, we are persuaded of error in the Examiner’s rejection of claim 57 as obvious over the combination of Lof and Kolesnychenko. Claims 58 and 59 depend from claims 57, and, therefore, their rejections suffer from the same problems as the rejection of claim 57.

Thus, we reverse the Examiner’s rejection of claims 57–59 as obvious over Lof and Kolesnychenko.

*Obviousness Over Lof, Kolesnychenko, and Nei*

The Examiner rejected claims 60 and 61 as obvious over Lof, Kolesnychenko, and Nei. Final Act. 9. Claims 60 and 61 depend from claim 57. Claims 60 and 61 depend from claim 57 and, therefore, their rejections suffer from the same problems as the rejection of claim 57. We, therefore, reverse the rejection of claims 60 and 61 over Lof, Kolesnychenko, and Nei.

CONCLUSION

We reverse the Examiner’s decision rejecting claims 21, 29, 33, 37, 45–53, and 55–61 under 35 U.S.C. § 103.

DECISION SUMMARY

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>References/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
21, 29, 33, 37, 45-50, 53, 55, 56	103	Lof, Nei		21, 29, 33, 37, 45-50, 53, 55, 56
51, 52	103	Lof, Nei, Streefkerk		51, 52
57-59	103	Lof, Kolesnychenko		57-59
60, 61	103	Lof, Kolesnychenko, Nei		60, 61
<b>Overall Outcome</b>				21, 29, 33, 37, 45-53, 55-61

REVERSED