

The opinion in support of the decision being entered today was **not** written for publication and is **not** precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YING-ZHONG SU and WEN-CHI WANG

Appeal No. 2005-1711
Application No. 10/217,370

ON BRIEF

Before KRATZ, JEFFREY T. SMITH, and PAWLIKOWSKI, **Administrative Patent Judges.**

PAWLIKOWSKI, **Administrative Patent Judge.**

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-20.

A copy of claims 1, 9, 17, and 20 are set forth below:

1. A gas distribution plate assembly for a process chamber, comprising:
 - a gas distribution plate;
 - a plurality of central openings extending through a central area of said plate;
 - a plurality of peripheral openings extending through a peripheral area of said plate, each of said peripheral openings having a diameter larger than a

diameter of said central openings, respectively, and said peripheral openings being variable in diameter; and

a plurality of middle openings extending through a middle area of said plate between said central area and said peripheral area, each of said middle openings having a diameter between said diameter of said central openings and said diameter of said peripheral openings.

9. A gas distribution plate assembly for a process chamber, comprising:

a gas distribution plate;

a plurality of central openings extending through a central area of said plate;

a plurality of peripheral openings extending through a peripheral area of said plate, each of said peripheral openings having a diameter larger than a diameter of said central openings, respectively;

a plurality of middle openings extending through a middle area of said plate between said central area and said peripheral area, each of said middle openings having a diameter between said diameter of said central openings and said diameter of said peripheral openings;

first and second peripheral regions located at diametrically-opposed positions to each other on said plate and third and fourth peripheral regions located at diametrically-opposed positions to each other on said plate;

wherein said plurality of peripheral openings comprises first and second groups of peripheral openings extending through said plate in said first and second peripheral regions, respectively, and third and fourth groups of peripheral openings extending through said plate in said third and fourth peripheral regions, respectively; and

wherein said first and second groups of peripheral openings each comprises openings having a first diameter; and wherein said third and fourth groups of peripheral comprises openings each comprises having a second diameter greater than said first diameter.

17. A gas distribution plate assembly for a process chamber, comprising;
a gas distribution plate;
a plurality of central openings extending through a central area of said plate;
first, second and third sets of peripheral openings extending through a peripheral area of said plate, said peripheral openings being variable in diameter between said first, second and third sets of peripheral openings and
a plurality of middle openings extending through a middle area of said plate between said central area and said peripheral area.

20. A gas distribution plate assembly for a process chamber, comprising:
a nozzle plate having a central nozzle opening;
an upper gas distribution plate disposed beneath said nozzle plate and having a plurality of plasma flow openings;
a lower gas distribution plate disposed beneath said upper gas distribution plate;
a plurality of central openings extending through a central area of said lower gas distribution plate;
a plurality of peripheral openings extending through a peripheral area of said lower gas distribution plate, each of said peripheral openings having a diameter larger than a diameter of said central openings, respectively, and said plurality of peripheral openings being variable in diameter; and
a plurality of middle openings extending through a middle area of said lower gas distribution plate between said central area and said peripheral area, each of said middle openings having a diameter between said diameter of said central openings and said diameter of said peripheral openings.

The examiner relies upon the following references as evidence unpatentability:

Ballance et al. (Ballance)	6,090,210	Jul. 18, 2000
Srivastava	6,225,745	May 01, 2001
Nogami	JP 04-237123	Aug. 25, 1992

(Japanese Patent Publication; English translation used)

Claims 1-19 stand rejected under 35 U.S.C. § 103 as being obvious over Ballance in view of Nogami.

Claim 20 stands rejected under 35 U.S.C. § 103 as being obvious over Srivastava in view of Nogami.

On page 8 of the brief, appellants group the claims as follows: claims 1-8 together, claims 9-16 together, claims 17-19 together, and claim 20. Accordingly, we consider claims 1, 9, 17, and 20 in this appeal. See 37 CFR § 41.37(c)(1)(vii) (September 2004); formerly 37 CFR § 1.192(c)(7) (2003). Also see Ex parte Schier, 21 USPQ2d 1016, 1018 (Bd. Pat. App. & Int. 1991).

We have carefully reviewed appellants' brief and the answer and the evidence of record. This review has led us to the following determinations.

OPINION

I. The 35 U.S.C. § 103 rejection of claims 1-19 as being obvious of Ballance in view of Nogami

We consider claims 1, 9, and 17 in this rejection.

The examiner's position for this rejection is set forth pages 2-6 of the final office action mailed January 15, 2004. Appellants' position for this rejection is set forth on pages 12-15 of the brief.

With regard to claim 1, appellants do not dispute the findings made by the examiner with regard to the teachings of Ballance. Brief, page 12. Appellants argue that Figure 4b of Nogami shows that all of the peripheral openings have the same diameter, and therefore Nogami fails to teach that the peripheral openings in the gas distribution plate are "variable in diameter" as recited in claim 1.

At the top of page 5 of the answer, the examiner responds and states that the word "peripheral" encompasses an area of significant thickness to encompass holes with sizes that change in the angular direction, and that this feature is shown by Nogami's Figure 4b. We agree. That is, as depicted in appellants' Figure 5, and as described on pages 15-16 of appellants' specification, there are peripheral regions C1-C4. If one were to divide the figure shown in Nogami's Figure 4b into such respective peripheral regions, the examiner is correct that each of such regions would have peripheral openings that are "variable in diameter." Hence, we agree with the examiner's rejection of claim 1 in this regard.

Furthermore, as pointed by the examiner, Ballance teaches that it may be desirable to vary the sizes of the holes and their distribution, in ways that are known to person skilled in the art, so as to adjust and/or tailor the flow of process gas over the surface of the substrate. See col. 6, lines 58-61 of Ballance. Absent evidence of critically, we agree with the examiner that the subject matter of claim 1 is prima facie obvious.

With regard to claim 9, appellants' position is set forth on pages 16-17 of the brief. Appellants argue that, for the same reasons regarding the rejection of claims 1-8, Ballance in view of Nogami fails to suggest or give any direction as to which of many possible size variations and distributions of holes in a gas distribution plate are critical to achieve the desired affect of optimizing flow of gas over a substrate.

Claim 9 differs from claim 1 by reciting that the peripheral regions C1-C4 having peripheral openings that differ in size relative to respective peripheral regions. That is, regions C2 and C4, shown in appellants' Figure 5, have

peripheral openings 39 having a diameter that is greater than the diameter of the peripheral openings 40, located in regions C1 and C3.

Again, if one were to divide the diagram of Nogami's Figure 4b in a likewise manner, such respective regions would have peripheral openings having a larger diameter than the diameter of peripheral openings of the other respective peripheral regions. Hence, in the same manner, we agree with the examiner's rejection of claims 9-16.

With regard to claim 17, appellants' position is set forth on pages 17-18 of the brief. Appellants' basically repeat similar arguments that were presented with regard to the rejection of claims 1-16.

Claim 17 recites first, second, and third sets of peripheral openings extending through a peripheral area of the plate, wherein the peripheral openings are variable in diameter between the first, second, and third set of peripheral openings. For the same discussed above, Figure 4b of Nogami suggests such variable diameter.

Furthermore, Ballance also suggests that the choice of diameter size and hole distribution are known to persons skilled in the art so as to adjust and tailor the flow of process gas over the surface of the substrate. Absent evidence of critically, the examiner has set forth a prima facie case of obvious.

In view of the above, we affirm the 35 U.S.C. § 103 rejection of claims 1-19 as being obvious over Ballance in view of Nogami.

II. The 35 U.S.C. § 103 rejection of claim 20 as being obvious over Srivastava in view of Nogami

The examiner's position for this rejection is set forth on pages 6-7 of the final Office action mailed January 15, 2004. Appellants' position with regard to this rejection is set forth on pages 19-20 of brief. Appellants do not dispute any of the findings the examiner has made with regard to the teaching of Srivastava. Appellants again argue that Nogami does not teach peripheral openings having variable diameter.

For the reasons discussed, supra, with regard to the teachings of Nogami, we are not convinced by such argument. Accordingly, we also affirm the rejection of claim 20.

In view of the above, we affirm the 35 U.S.C. § 103 rejection of claim 20 as being obvious over Srivastava in view of Nogami.

III. Conclusion

Each of rejections is affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv)(effective September 13, 2004; 69 Fed. Reg. 49960 (August 12, 2004); 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)).

AFFIRMED

PETER F. KRATZ)
Administrative Patent Judge)
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JEFFREY T. SMITH) INTERFERENCES
Administrative Patent Judge)
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BEVERLY A. PAWLIKOWSKI)
Administrative Patent Judge)

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BACHMAN & LAPOINTE, P.C.
900 CHAPLE STREET
SUITE 1201
NEW HAVEN, CT 06510-2802