

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

Paper No. 34

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TOSHIHISA NOZAWA, KEIJI HORIOKA,
and ISAHIRO HASEGAWA

Appeal No. 1997-3312
Application No. 08/183,787

HEARD: January 16, 2001

Before JOHN D. SMITH, KRATZ, and DELMENDO, Administrative Patent Judges.

JOHN D. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal pursuant to 35 U.S.C. § 134 from the final rejection of claims 2, 8, and 9.

Claim 9 is representative and is reproduced below:

9. A magnetron plasma process apparatus comprising:

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a process chamber having a transfer port for an object to be processed;

a first electrode horizontally extending within said process chamber and supporting said object to be processed;

a second electrode located within said process chamber and extending above said first electrode and parallel thereto;

gas-supplying means for supplying a process gas into a space between said electrodes;

electric field generating means for generating an electric field in the space between said electrodes, to thereby form plasma of the process gas;

magnetic field generating means having at least two permanent magnets located outside said process chamber, two of said permanent magnets being oppositely positioned so as to sandwich the space between said electrodes, for generating a horizontal magnetic field which extends through the space between said electrodes, from one of said magnets to the other thereof and substantially parallel to said electrodes;

means for rotating said permanent magnets in a horizontal plane; and

drive means for moving said first electrode in a vertical direction between a process position at which said object is located in said process chamber and within the horizontal magnetic field and a transfer position which is below said process position and at which said object is located on the same level as said transfer port which is located at a level lower than said two permanent magnets which sandwich the space between said electrodes, so as to move said object into and from said process chamber.

The references of record relied upon by the examiner are:

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Kinoshita 27, 1989	4,842,707	Jun.
Nakazato et al. (Nakazato) 1986	4,631,106	Dec. 23,
Ukai et al. (Ukai) 1989	4,816,638	Mar. 28,
Sekine et al. (Sekine) 1989	4,838,978	Jun. 13,

The appealed claims stand rejected under 35 U.S.C. § 103 as unpatentable over Kinoshita in view of either of Nakazato, Ukai, or Sekine.

We cannot sustain the stated rejection.

The subject matter on appeal is directed to a magnetron plasma process apparatus for use in manufacturing semiconductor devices, e.g., for plasma etching of semiconductor wafers. The claimed apparatus includes a process chamber having a transfer port for an object such as a semiconductor wafer to be processed. The chamber includes an upper electrode and a lower electrode which are parallel to each other. Further the claimed apparatus provides for a magnetic field generating section which comprises a pair of permanent magnets. The magnets are located outside the chamber and are rotatable in a horizontal plane. Since the permanent magnets are located so as to surround or sandwich

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the space between the upper and lower electrodes, the magnets are capable of generating a magnetic field which extends in a substantially horizontal direction through the space between the electrodes. Respecting this feature of the claimed magnetron plasma process apparatus, appealed Claim 9 calls for a "magnetic field generating means having at least two permanent magnets located outside said process chamber, two of said permanent magnets being oppositely positioned so as to sandwich the space between said electrodes, for generating a horizontal magnetic field which extends through the space between said electrodes, from one of said magnets to the other thereof and substantially parallel to said electrodes." This feature of the claimed apparatus permits the apparatus to efficiently process an entire surface of a semiconductor wafer on the lower electrode while not being adversely influenced by a vertical component of the magnetic field. Further, as illustrated in Figure 5 of the application, the claimed apparatus also includes a mechanism for raising and lowering the lower electrode. This feature of the claimed invention is set forth in appealed Claim 9 as a "drive means for moving said first electrode in a vertical direction between a process

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position at which said object is located in said process chamber and within the horizontal magnetic field and a transfer position which is below said process position and at which said object is located on the same level as said transfer port which is located at a level lower than said two permanent magnets which sandwich the space between said electrodes, so as to move said object into and from said process chamber."

The examiner's conclusion that the herein claimed subject matter would have been obvious within the meaning of 35 U.S.C. § 103 rest on the examiner's contention that it would have been obvious to modify the apparatus of Kinoshita by employing drive means for inserting and removing a semiconductor wafer into and from the process chamber "as taught by the secondary references" relied upon, i.e., Nakazato, Ukai, or Sekine. Based on the examiner's statement of this rejection at pages 3 and 4 of the answer, it is apparent that the examiner believes that the claimed apparatus defined by Claim 9 on appeal finds substantially identical correspondence in the Figure 18 embodiment of Kinoshita with the primary exception being that the Kinoshita prior art apparatus does not provide for a drive

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means as required by appealed Claim 9. On the other hand, appellants point out in their brief at page 7 that the Kinoshita reference only describes a magnet having a circular ring shape and thus Kinoshita's magnetic field generating means does not provide for at least two permanent magnets located outside Kinoshita's process chamber. More importantly, Kinoshita does not disclose a magnetic field generating means having two permanent magnets positioned oppositely for the function of sandwiching the space between the upper and lower electrodes for the purpose of generating a horizontal magnetic field which extends through the space between the electrodes. Thus contrary to the examiner's implicit factual findings regarding the disclosures in Kinoshita, Kinoshita does not disclose a magnetic field generating means as required by appealed Claim 9.

In his answer at page 5, the examiner argues that the proper inquiry here is what the references, "taken collectively," would have suggested to one of ordinary skill in the art. However, even if we agreed with the examiner that it would have been obvious to a person of ordinary skill in the art to modify the Kinoshita apparatus in the manner

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proposed by the examiner, the examiner has failed to meet his burden of demonstrating that such a modification would result in the claimed apparatus. See Uniroyal Inc. v Rudkin-Wiley Corp., 837 F.2d 1044, 1052, 5 USPQ2d 1434, 1439-40 (Fed. Cir.) cert. denied, 489 U.S. 825 (1988) (a structure created from the combined teachings of the prior art references "would, in any event, fall short of the invention" defined by the claims).

Further, as discussed in the oral hearing of the appeal in this case, certain elements of appellants' claimed apparatus had been drafted in "means-plus-function" format such as the claimed "drive means". Such terms must be interpreted as limited to the corresponding structure described in appellants' specification or the equivalence thereof consistent with 35 U.S.C. § 112, sixth paragraph. In re Donaldson, 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1848 (Fed. Cir. 1994) (en banc). Here, the examiner has not established whether or not the "drive means" relied upon in each of the secondary references has either a corresponding structure to the described drive means in appellants' specification (see Figure 5) or equivalence thereof consistent with 35 U.S.C. §

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112, sixth paragraph.

The decision of the examiner is reversed.

REVERSED

JOHN D. SMITH)	
Administrative Patent Judge)	
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)	
)	BOARD OF PATENT
PETER F. KRATZ))
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
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ROMULO H. DELMENDO)	
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