

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

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CLAES H. BJORKMAN

Appeal 2006-3419
Application 10/269,129
Technology Center 1700

Decided: November 17, 2006

Before KIMLIN, GARRIS, and WARREN, *Administrative Patent Judges*.
KIMLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal involving claims 1-9 and 15-42. Claims 10-14 have been withdrawn from consideration pursuant to a restriction requirement.

Claims 1 and 29 are illustrative:

1. A magnetic field-enhanced plasma reactor, comprising:
 - a reaction chamber adapted to apply a plasma to a substrate; and
 - a first and second set of primary electromagnets having inner and outer perimeters disposed about said reaction chamber, said first set of

primary electromagnets being provided with a first adjustable current and said second set of primary electromagnets being provided with a second adjustable current; and

a secondary electromagnet nested within the inner perimeter of one of said primary electromagnets;

wherein the reactor is adapted to maintain the ratio $R = I_2/I_1$ during etching within the range $-1 < R < 1$, wherein I_1 is the current provided by the first current source, wherein I_2 is the current provided by the second current source, and wherein $I_1 > I_2$.

29. A magnetic field-enhanced plasma reactor, comprising:

a reactor chamber for applying a plasma to a substrate, said reaction chamber comprising a reaction region;

a first plurality of electromagnets disposed about said reaction region;

a second plurality of electromagnets, each of which is disposed in the vicinity of at least one corner of a first region defined by the right rectangular prism of smallest perimeter which encompasses the first plurality of electromagnets; and

at least one current modulator adapted to modulate the current applied to said first and second plurality of electromagnets such that an adjustable magnetic field is created in the vicinity of at least one corner of the first region.

In the rejection of the appealed claims, the Examiner relies upon the following references:

Cheng	US 4,842,683	Jun. 27, 1989
Sato	US 4,963,242	Oct. 16, 1990
Pu	US 5,674,321	Oct. 7, 1997
Shan	US 6,113,731	Sep. 5, 2000
Horioka	US 2003/0006008 A1	Jan. 9, 2003
Horioka	US 2003/0085000 A1	May 8, 2003

Appellant's claimed invention is directed to a magnetic field-enhanced plasma reactor having first and second sets of primary electromagnets and a secondary electromagnet nested within the inner perimeter of one of the primary electromagnets.

Appealed claims 29-37 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sato. Also, the appealed claims stand rejected under 35 U.S.C. § 103(a) as follows:

- (a) claims 1-9 and 15-42 over Shan in view of Sato;
- (b) claims 1-9 and 15-42 over Pu in view of Sato;
- (c) claims 1-9 and 15-42 over Cheng in view of Sato, and
- (d) claims 1-3 over Sato.

In addition, claims 1-9 and 15-38 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting over the claims of US Application Nos. 10/146,443 and 10/205,870¹

We consider first the Examiner's Section 102 rejection of claims 29-37 over Sato. We agree with the Examiner that Sato, like Appellant, describes a magnetic field-enhanced plasma reactor comprising a reaction chamber and a first plurality of electromagnets disposed about the reaction chamber, as well as a second plurality of electromagnets nested within the inner perimeter of the first plurality of electromagnets. It is Appellant's contention that secondary magnets 30 and 32 of Sato "are not arranged so that they are disposed in the vicinity of at least one corner of a first region defined by a right rectangular prism of smallest perimeter which

¹ Appellant has not contested the double patenting rejections but respectfully requests that "the provisional rejections for double patenting over the claims of two co-pending applications continue to be held in the abeyance, as discussed in response to the Office action" (Br. 13 last ¶).

encompasses the primary magnets (e.g., magnets 31 and 33)” (Br. 8, 3rd ¶). However, while the arrangement of Sato’s electromagnets does not correspond to the arrangement of the electromagnets depicted in Appellant’s Specification drawings, we fully concur with the Examiner that the claim language “in the vicinity” is sufficiently broad to embrace Sato’s arrangement of electromagnets. Contrary to the implication of Appellant’s arguments, limitations in the specification, including the drawings, are not to be read into the claims. *See In re Etter*, 756 F.2d 852, 858, 225 USPQ 1, 5 (Fed. Cir. 1985).

We now consider the rejection of all the appealed claims over Shan, or Pu, or Chng in view of Sato. With the exception of claims 29-37, the claims require a secondary electromagnetic in a nested relation with respect to the primary electromagnets. As recognized by the Examiner, neither Shan, Pu, nor Cheng discloses such a nested relationship between the first and second electromagnets. While the Examiner relies upon Sato for the nested relationship of the electromagnets, the Examiner has not responded to the particular arguments made by Appellant concerning modifying Shan, Pu, or Cheng in accordance with the electromagnets of Sato. For instance, Appellant points out that the first and second primary electromagnets of Sato do not have an orientation that is not orthogonal to the surface of the cathode, and discloses electromagnets that are disposed *above* and *below* the chamber. On the other hand, Shan, Pu, and Cheng all disclose electromagnets arranged around the sides of the cylindrical chamber. We agree with the Appellant that the Examiner has not explained why and how one of ordinary skill in the art would have modified the electromagnets of Shan, Pu, and Cheng, which are disposed around the sides of the chamber, in

accordance with the nested relationship of electromagnets of Sato that are disposed above and below the chamber. The Examiner has not articulated the requisite reasonable expectation of success in modifying the electromagnet arrangements of the primary references in accordance with the disclosure of Sato. The Examiner's recitation of legal principles that it is not necessary to bodily incorporate the structure of one reference into the structure of another reference, and that obviousness is in a sense necessarily based upon hindsight reasoning, is not a substitute for the required fact-based analysis of the prior art which results in a reasonable expectation of success. Accordingly, we will not sustain the Examiner's Section 103 rejections of claims 1-9, 15-28, and 38-42. We note, however, that Appellant's arguments based upon the recited ratio of the first and second current sources is non-persuasive since such recitation imparts no structure to the claimed reactor, and Appellant has not demonstrated that the apparatus of the cited references are not capable of controlling the current accordingly.

Finally, we will sustain the Examiner's Section 103 rejection of claims 1-3 over Sato. As acknowledged by Appellant, Sato discloses a secondary electromagnet nested within the inner perimeter of one of the primary electromagnets. As for the claimed ratio of the current provided by the first current source to the current provided by the second current source, the fact that Sato discloses that the current in the electromagnets can be controlled establishes that the reactor of Sato is capable of maintaining a ratio R within the claimed range. As correctly pointed out by the Examiner, claims 1-3 are apparatus claims, and Appellant has not explained how apparatus within the scope of claims 1-3 are structurally distinct from the

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apparatus disclosed by Sato. *See In Yanush*, 477 F.2d 958, 959-60, 177 USPQ 705, 706-07 (CCPA 1973).

In conclusion, based on the foregoing, the Examiner's rejections of claims 29-37 under Section 102 and claims 1-3 under Section 103 over Sato are affirmed, while the Examiner's rejections under Section 103 of claims 1-9, 15-28, and 38-42 over Shan, or Pu, or Cheng in view of Sato are reversed. Accordingly, the Examiner's decision rejecting the appealed claims is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (2004).

AFFIRMED-IN-PART

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