

The opinion in support of the decision being entered today
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte STEVEN D. TUCKER,
JASON F. ELSTON, and
RUSSELL F. JEWETT

Appeal 2006-2501
Application 10/104,468
Technology Center 1700

Decided: August 30, 2007

Before CHUNG K. PAK, PETER F. KRATZ, and
CATHERINE Q. TIMM, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's refusal to allow claims 1 through 5, 8 through 10, 12 through 17, and 19 through 21. Claims 6, 7, 11, 18, 22, and 23, the other claims pending in the above-identified application, stand withdrawn from consideration as

being directed to a non-elected invention. We have jurisdiction pursuant to 35 U.S.C. § 6.

STATEMENT OF THE CASE

The subject matter on appeal is directed to an apparatus “for delivering radio frequency (RF) power for process operations such as plasma processing and RF induction heating” (Specification 1, ll. 23-25). Further details of the appealed subject matter are recited in representative claims 1, 17, and 19 reproduced below:

1. An apparatus for inductively coupled RF power process operations, the apparatus comprising:

a process chamber;

an RF power source; and

an RF power induction coil, the RF power induction coil having substantially non-coplanar coil turns, at least one of the coil turns comprising an electrically conductive sheet having a large surface area, the coil being connected with the RF power source so as to receive RF power, the large surface area being oriented substantially perpendicularly to magnetic field lines caused by RF current flow through the coil, the coil being disposed so as to couple RF power to the chamber for the process operations, the process chamber and the coil being disposed so that the direction of RF power coupling is substantially parallel to the axis of the coil.

17. An apparatus for inductively coupling RF power to a load, the apparatus comprising:

an RF power source; and

an RF power induction coil, the RF power induction coil having a plurality of coil turns, the coil turns comprising an

electrically conductive sheet, the coil being substantially helical, the surface of the sheet being substantially perpendicular to the axis of the coil, the coil being connected with the RF power source so as to receive RF power, the load and the coil being disposed so that the direction of RF power coupling is substantially parallel to the axis of the coil.

19. In combination, an RF induction coil for transmitting RF power from an RF power source, the coil comprising a plurality of coil turns, the coil turns comprising a sheet of electrical conductor, the coil turns having an inner diameter and an outer diameter, the coil turns being substantially non-coplanar, the surface of the sheet being substantially nonparallel to the axis of the coil; and a load for receiving the RF power, the load being positioned with respect to the coil so that the direction of RF power coupling is substantially parallel to the axis of the coil.

According to pages 3, 4, and 15 of the Specification:

It is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. In addition, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out aspects of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

Further, the purpose of the foregoing abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientists, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application. The abstract is not intended to define the invention of the application, which is measured by the claims, nor is the abstract intended to be limiting as to the scope of the invention in any way.

....

While there have been described and illustrated specific embodiments of the invention, it will be clear that variations in the details of the embodiments specifically illustrated and described may be made without departing from the true spirit and scope of the invention as defined in the appended claims and their legal equivalents.

As evidence of unpatentability of the claimed subject matter, the Examiner has relied upon the following references:

Ekstrand	US 5,048,032	Sep. 10, 1991
Okumura	US 5,558,722	Sep. 24, 1996
Usui	US 5,591,268	Jan. 7, 1997
Takagi	US 5,681,393	Oct. 28, 1997
Bailey	US 6,320,320 B1	Nov. 20, 2001 (filed Nov. 15, 1999)

The Examiner has rejected the claims on appeal as follows¹:

¹ The Examiner states that the § 112, first paragraph rejection of claims 1 through 5, 8 through 10, 12 through 17, and 19 through 21 set forth in the final Office action dated August 27, 2004 has been withdrawn (Answer 29).

- 1) Claims 1 through 4, 9, 16, 17, and 19 through 21 under 35 U.S.C. § 102(b) as anticipated by the disclosure of Ekstrand;
- 2) Claims 8 and 10 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Ekstrand;
- 3) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Ekstrand and Bailey;
- 4) Claims 1 through 4, 8 through 10, 12 through 17, and 19 through 21 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Okumura and Ekstrand;
- 5) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Okumura, Ekstrand and Bailey;
- 6) Claims 1 through 4, 8 through 10, 12 through 17, and 19 through 21 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Takagi and Ekstrand;
- 7) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Takagi, Ekstrand and Bailey;
- 8) Claims 1 through 4, 8 through 10, 12 through 17, and 19 through 21 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Usui and Ekstrand; and
- 9) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Usui, Ekstrand and Bailey.

The Appellants appeal from the Examiner's decision rejecting the claims on appeal under 35 U.S.C. §§ 102(b) and 103(a).

DISPOSITIVE ISSUE

Does the prior art relied upon by the Examiner teach or suggest disposing a process chamber and an RF power induction coil “so that the direction of RF power coupling is substantially parallel to the axis of the coil” as required by the claims on appeal?

PRINCIPLES OF LAW

1. CLAIM INTERPRETATION

During prosecution of the application, the Examiner “applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art.” *In re Morris*, 127 F.3d 1048, 1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997).

2. ANTICIPATION

Under 35 U.S.C. § 102, to establish anticipation, a single prior art reference must describe, either expressly or under the principles of inherency, each and every element of a claimed invention. *See, e.g., In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990).

3. OBVIOUSNESS

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary consideration (e.g., unexpected results). *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). “[A]nalysis [of whether the subject matter of a

claim is obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l v. Teleflex, Inc.*, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007) quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336-37 (Fed. Cir. 2006); see also *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361, 80 USPQ2d 1641, 1645 (Fed. Cir. 2006) (“The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself.”); *In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969) (“Having established that this knowledge was in the art, the examiner could then properly rely, as put forth by the solicitor, on a conclusion of obviousness ‘from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference.’”).

FACTS AND ANALYSES

The Appellants have not specifically challenged the Examiner’s finding that Ekstrand, Takagi and Usui teach an apparatus for inductively coupled RF power process operations, comprising a process chamber, a RF power source, and a RF power induction coil connected to the RF power source, wherein the RF power induction coil having substantially non-coplanar coil turns comprising an electrically conductive sheet having a

large surface area.² Compare Answer 5-30 with Br. 14-40 and Reply Br. 2-6. Nor have the Appellants challenged the Examiner's finding that the RF power induction coil taught by the above prior art references is disposed such that its large surface area is oriented substantially perpendicularly to magnetic field lines caused by RF current flow through the coil. Compare Answer 5-30 with Br. 14-40 and Reply Br. 2-6. The Appellants' main contention is that none of the applied prior art references teach or would have suggested the claimed limitation "the process chamber and the coil being disposed so that the direction of RF power coupling is substantially parallel to the axis of the coil" in claims 1, 17 and 19.

The dispositive question is, therefore, whether Ekstrand, Okumura, Takagi or Usui teaches or would have suggested the disposal of the process chamber and the coil so that "the direction of RF power coupling is substantially parallel to the axis of the coil" as required by the claims on appeal. On this record, we answer this question in the affirmative.

As pointed out by the Appellants (Br. 16), "the axis of the coil" is "a line at the center of the coil along the length of the coil." Following this definition, the Examiner has found that the RF power coils described in Ekstrand, Okumura, Takagi and Usui all have the same "axis of the coil" (Answer 16-29). The Examiner has also found that "the RF power coupling of the coil of the instant invention [like the RF power coupling of the coil of the prior art references] is ... distributed along the length of the coil" (Answer 17, 23, 26, and 28). As the Appellants have not specifically

² Okumura is cumulative with respect to Ekstrand, Takagi and Usui. Contrary to the Appellants' argument, Okumura teaches a RF power induction coil having coplanar or non-coplanar coil turns.

challenged these findings (Br. and Reply Br. in their entirety), we determine that the Examiner has correctly found that the prior art references show the RF power coupling substantially parallel to the axis of the coil.³

Accordingly, for the reasons set forth in the Answer and above, we affirm the decision of the Examiner rejecting:

i) Claims 1 through 4, 16, 17, and 19 through 21 under 35 U.S.C. § 102(b) as anticipated by the disclosure of Ekstrand;

ii) Claims 1 through 4, 8 through 10, 12 through 17, and 19 through 21 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Okumura and Ekstrand;

iii) Claims 1 through 4, 8 through 10, 12 through 17, and 19 through 21 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Takagi and Ekstrand; and

iv) Claims 1 through 4, 8 through 10, 12 through 17, and 19 through 21 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Usui and Ekstrand.

As to the Examiner's rejection of claims 8 and 9 based on the disclosure of Ekstrand, the Examiner has correctly found that Ekstrand teaches a RF power induction coil having a thickness of 0.7 mm (Answer 6 and Ekstrand, col. 3, ll. 60-63). We find that this thickness is less than about 12.7 mm and about 6.3 mm as required by claims 8 and 9.

³ The Appellants' arguments directed to the location of the process chamber with respect to the coil location are noted. However, the Appellants' claims 1, 17 and 19 do not recite such features. Moreover, Bailey at least teaches a RF power induction coil adjacent a plasma processing chamber (Figures 2 and 3, together with cols. 9-11).

Accordingly, for the reasons set forth in the Answer and above, we affirm the Examiner's decision rejecting claim 9 under 35 U.S.C. § 102(b) as anticipated by the disclosure of Ekstrand; and claim 8 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Ekstrand.

As to the Examiner's rejection of claim 10 based on the disclosure of Ekstrand, the Examiner has found that "the configuration of the coil is a matter of [design] choice . . ." (Answer 7). However, the Appellants have not specifically challenged this finding (e.g., Br. 25-27). Indeed, the inside diameter of the coil, which affects the claimed ratio, is dependent on the size of the process chamber.

Accordingly, for the reasons set forth in the Answer and above, we affirm the decision of the Examiner rejecting claim 10 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Ekstrand.

As to the Examiner's rejection of claim 5, we find that Ekstrand teaches employing a material, such as copper, to form a RF power induction coil (col. 3, ll. 52-68). Although Ekstrand does not mention that its copper coil can be coated, Bailey teaches forming a RF power induction coil with copper or copper coated with silver (Bailey, col. 12, ll. 3-8). Thus, the Examiner has correctly identified an appropriate reason for employing copper coated with silver (sheet comprises a deposited layer) to form a RF power induction coil. *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. at 1742, 82 USPQ2d at 1397 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.") .

Accordingly, for the reasons set forth in the Answer and above, we also affirm the decision of the Examiner rejecting:

ia) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Ekstrand and Bailey;

iiia) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Okumura, Ekstrand and Bailey;

iiia) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Takagi, Ekstrand and Bailey; and

via) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Usui, Ekstrand and Bailey.

ORDER

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

tf/lr

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