UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MASAHIDE AKIYAMA,
and KOUJI TOKUNAGA

Appeal 2008-2662
Application 10/358,490
Technology Center 1700

Decided: September 18, 2008

Before BRADLEY R. GARRIS, CHUNG K. PAK, and
KAREN M. HASTINGS, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1, 3, 5, 7-11. We have jurisdiction under 35 U.S.C. § (b).

We AFFIRM.

BACKGROUND

The invention relates to an oxygen sensor having dimensions such that the oxygen sensor "can be quickly heated to exhibit excellent gas response performance" (Spec. 3: 11-14).

Claim 1 on appeal is illustrative:

> 1. An oxygen sensor comprising a solid electrolytic substrate of zirconia of the shape of an elongated flat plate, a measuring electrode and a reference electrode, said measuring electrode and said reference electrode being formed on both opposing surfaces at a front end portion of said solid electrolytic substrate so as to be opposed to each other and forming a sensing element,
>
> wherein the measuring electrode contacts an object gas,
>
> the reference electrode contacts a reference gas, and
>
> wherein said measuring electrode has an electrode area of from 8 to 18 mm^2, and said sensing element has a width w of from 2.0 to 3.5 mm at a side of a front end of the solid electrolytic substrate,
>
> wherein said measuring electrode is formed on an outer surface of the solid electrolytic substrate of zirconia, said reference electrode is formed on an inner surface of the solid electrolytic substrate of zirconia, a ceramic cover having a reference gas introduction hole is provided on the inner surface of the solid electrolytic substrate of a zirconia, and said reference electrode is exposed in said reference gas introduction hole,
>
> wherein the thickness t (mm) of the oxygen sensor satisfies a condition represented by the following formula,
>
> $3 \leq w \cdot t^2 < 28$
>
> wherein w is a width (mm) of the sensing element at the side of the front end of the solid electrolytic substrate, and
>
> wherein a heater device made of a ceramic insulator having a heat-generating member buried therein is formed on said ceramic cover integrally with said sensing element.

The following prior art is relied upon by the Examiner in rejecting the claims under appeal:

Mase	5,108,577	Apr. 28, 1992
Yamada	5,288,389	Feb. 22, 1994
Watanabe	5,830,339	Nov. 3, 1998
Nakae	6,340,419 B1	Jan. 22, 2002
Nelson	6,562,215 B1	May 13, 2002

The appealed claims stand rejected under 35 U.S.C. § 103(a) as follows:

(a) claims 1 and 7-11 over Nakae in view of Yamada,

(b) claim 3 over Nakae in view of Yamada and Mase,

(c) claim 5 over Nakae in view of Yamada and further with either of Watanabe or Nelson.

Appellants do not argue **any** of the claims separately with any reasonable specificity (App. Br. 7-15; Reply Br. 4-12). Therefore, we select independent claim 1, and dependent claims 3 and 5, as representative of the different grounds of rejection set forth above to decide the issue on appeal regarding all the claims.

ISSUE ON APPEAL

Have Appellants shown reversible error in the Examiner's determination that a person having ordinary skill in the art would have found it obvious to arrive at the claimed invention in view of the applied prior art?

PRINCIPLES OF LAW

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such

that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains.' " *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007).

Facts relevant to a determination of obviousness include (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objective evidence of obviousness or non-obviousness. *KSR,* 127 S. Ct. at 1734; *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966).

KSR also states:

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

KSR, 127 S. Ct. at 1740-41.

The Federal Circuit recently recognized that "[a]n obviousness determination is not the result of a rigid formula disassociated from the consideration of the facts of a case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not." *Leapfrog Ent., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007).

"The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. [Citations omitted]. These cases have consistently held that in such a situation, the applicant must show that the particular range is critical "

generally by showing unexpected results. *In re Woodruff,* 919 F.2d 1575, 1578 (Fed. Cir. 1990). "[T]he existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been obvious." *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003).

ANALYSIS

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter is unpatentable over the cited prior art. Since we concur with the Examiner's reasoned analysis and application of the prior art, as well as his thorough disposition of the arguments raised by Appellants, we will adopt the Examiner's reasoning as our own in sustaining the rejections of record. We add the following for emphasis only.

Claims 1, and 7-11

We select independent claim 1 to represent this issue on appeal.

There is no dispute that Nakae describes an oxygen sensor with all the elements of claim 1, including a value for the measuring electrode surface area of 10 mm^2 that falls within the claimed range, except that Nakae does not explicitly specify that "the sensing element has a width w of from 2.0 to 3.5mm" or that the "thickness t . . . satisfies the formula $3 < w \cdot t^2 < 28$" as recited in claim 1 (Ans. 3-4). There is also no dispute that Yamada describes an oxygen sensor with a width of between 2.8 and 4.0mm, and that if one used the values for the width in Nakae of between 2.8 and 3.5 along with the thickness of 2.0 mm taught in Nakae (col. 4, ll. 47-49), values that overlap the claimed formula range are obtained (*id.*).

The Examiner added Yamada to exemplify the obviousness of the claimed thickness dimension in an oxygen sensor so as to improve the sensor's resistance against breakage and the warm-up time for the sensor (Ans. 3). The Examiner concluded that "it would have been obvious to one of ordinary skill in the art . . . to utilize the teaching of Yamada for the sensor of Nakae so as to improve the sensor's resistance against breakage and its warm-up properties." (Ans. 3-4). We fully agree with the Examiner's findings of fact and conclusion of obviousness based these teachings.

The focus of Appellants' arguments is that there is no motivation, teaching or suggestion to combine the teachings of Yamada with Nakae, and, even if there were such motivation, the Appellants have provided evidence of unexpected results. Specifically, Appellants contends that: 1- there is no reasonable expectation of success of the combination because Yamada and Nakae are directed to different types of oxygen sensors (App. Br. 7-9; Reply Br. 4-9); 2- that the prior arts do not disclose the claimed ranges recited in claim 1, and furthermore, the Specification demonstrates unexpected results for the claimed ranges (App. Br. 11-12; Reply Br. 9-12); and 3- even if the prior arts teach dimensions within those claimed ranges, the prior art fails to recognize the critical relationship of the elements recited in claim 1 (App. Br. 13-14). None of Appellants' arguments convince us of reversible error in the Examiner's conclusion of obviousness.

As the Examiner pointed out, Yamada describes a similar basic structure of an oxygen sensor as Nakae, and furthermore the motivation for relying on the width of Yamada is "completely neutral to the precise sensing scheme of the sensor" (Ans. 6-7). Yamada explicitly describes the importance of a restricted size for "resistance against repeated thermal

shocks, and shorter warming-up time, which leads to greater accuracy and higher responsiveness in the oxygen content measurement." (Yamada, Abstract). Furthermore, we note that Nakae teaches that in order "[t]o realize prompt activation of the . . . sensing element, it is effective to downsize the sensor body so as to reduce the overall thermal capacity." (Nakae, col. 2, ll. 14-17).

We therefore find that these references exemplify that it was known in the prior art to make these types of sensors within restricted dimensions as claimed in order to obtain a prompt activation (i.e., decrease the warm-up time) as discussed in detail by the Examiner. We, therefore, determine that the use of a thickness as claimed for the sensor of Nakae would have been prima facie obvious for the predictable advantage of increased activation capabilities.

Moreover, Appellants' arguments that Yamada and Nakae are directed to different types of oxygen sensors miss the thrust of the Examiner's rejection, i.e., the obviousness of ensuring that the sensor element of Nakae has a thickness as exemplified in the secondary reference. It is well settled that it is not necessary for a finding of obviousness that all the features of one reference be bodily incorporated into the invention of another reference. *In re Griver*, 354 F.2d 377, 381 (CCPA 1966); *In re Billingsley*, 279 F.2d 689, 691 (CCPA 1960).

Recently, in *KSR Int'l Co. v. Teleflex Inc.,* the Supreme Court advised that the analysis in support of a conclusion of obviousness need not seek out express teachings that are directed to the subject matter of Appellants' claim since the inferences and creative steps that a person of ordinary skill in the art would have employed can be considered. *KSR,* 127 S. Ct. at 1740-41.

One of ordinary skill in the art is also a person of ordinary creativity, not an automaton. *KSR,* 127 S. Ct. at 1742. Certainly, skill in the art is presumed and based on the collective teachings of the applied prior art we find that one of ordinary skill in the art would have readily appreciated that making the sensing element of Nakae a width between 2.8 and 3.5 mm (noting that concomitantly Nakae would have satisfied the claimed thickness/width relationship as claimed) would have achieved the predictable result of ensuring prompt activation of the sensing element. *Id.* at 1739, 1740. *See also Pfizer, Inc. v. Apotex, Inc.,* 480 F.3d 1348, 1364 (Fed. Cir. 2007) (the expectation of success need only be reasonable, not absolute).

Appellants have not shown that there is more than a predictable result flowing from the use of a width between 2.8 and 3.5 mm for the oxygen sensor element of Nakae. We emphasize that the oxygen sensor of Nakae inherently is of a thickness, which is unspecified in Nakae. We determine that the common sense of those skilled in the art would have appreciated that the thickness range taught in Yamada would have been an obvious thickness for the oxygen sensor in Nakae. *Leapfrog Ent., Inc.*, at 1161 (Fed. Cir. 2007).

Appellants' argument regarding that the "prior arts do not disclosed (*sic,* disclose) the ranges" recited in claim 1 is not well taken (App. Br. 11), since the references clearly do describe or suggest dimensions within, or overlapping, each claimed range, that is, for the measuring electrode area, thickness, and thickness/width relationship, as discussed previously. Thus, the burden is upon Appellants to demonstrate that the particular ranges are critical, generally via a showing of unexpected results from the claimed ranges. *See In re Peterson* at 1329-1330; see also *In re Woodruff* at 1578.

Appellants cite Specification data which allegedly demonstrate that sensors within the claimed ranges of dimensions (e.g., for thickness, electrode area, thickness/width relationship) have an "unexpected short activating time" (*see*, e.g., App. Br. 11)[1]. However, Appellants have not shouldered their burden of establishing that these results would have been considered unexpected by one of ordinary skill in the art. *In re Merck & Co., Inc.,* 900 F.2d 1091 (Fed. Cir. 1986). Indeed, it would appear that, based on the Yamada and Nakae disclosures, one would have reasonably expected the results reported in the Specification, since both prior art references teach that a small sensor size as claimed is desirable for prompt activation of the sensor. It is well settled that expected beneficial results are evidence of obviousness, just as unexpected results are evidence of non-obviousness. *In re Skoner*, 514 F.2d 747, 460 (CCPA 1975). Thus, the alleged "unexpected results" do not serve to rebut the inference of obviousness established by the applied prior art.

For the foregoing reasons and those stated in the Answer, we sustain the rejection of claim 1 (and claims 7-11 which stand or fall with claim 1) under § 103(a) over Nakae in view of Yamada.

Claims 3 and 5

Since Appellants have not presented any separate arguments concerning the rejections of claims 3 and 5 (App. Br. 14-15), we adopt the

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[1] We note that in reaching the conclusion of obviousness, the Examiner properly took account of Appellants' evidence of nonobviousness, i.e., the examples in the Specification (*see* Ans. 10). *See In re Soni*, 54 F.3d 746, 750 (Fed. Cir. 1995) (noting that all evidence of nonobviousness, including data in the specification, must be considered when assessing patentability).

Examiner's factual findings and conclusion of law concerning those claims (Ans. 5-6), and also sustain those rejections.

DECISION

In summary, we sustain each of the Examiner's § 103 rejections of the claims on appeal.

The Examiner's decision is AFFIRMED.

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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