

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TAKAO KOJIMA,
HIDEKI TOYODA and TETSUMA SHIMOZATO

Appeal No. 95-4863
Application 07/865,993¹

ON BRIEF

Before GARRIS, JERRY SMITH and FLEMING, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

¹ Application for patent filed April 9, 1992.

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This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1, 2 and 4, which constituted all the claims remaining in the application. An amendment after final rejection was filed on November 18, 1994 and was entered by the examiner. This amendment cancelled claim 4. Therefore, this appeal involves only claims 1 and 2.

The claimed invention pertains to a piezoelectric sensor for measuring pressure in an internal combustion engine.

Representative claim 1 is reproduced as follows:

1. A piezoelectric sensor for an internal combustion engine having a cylinder, comprising:

a main body adapted to be attached to the cylinder and defining an axially extending hole therewithin;

a diaphragm attached to one end of said main body for closing said hole; and

a piezoelectric element in the form of a circular or polygonal disc whose major surface is in the x-y plane disposed within said hole so that the pressure within said cylinder is transmitted transverse to the x-y plane of said piezoelectric element disc through said diaphragm,

said piezoelectric element disc having a thickness in the range of 0.3-1.5 mm and being formed of a single crystal piezoelectric ceramic having a Curie temperature higher than the normal operating temperature of the engine and not less than 500EC and being polarized such that the direction of the polarization is oriented at an angle of 20E or less with respect to said disc x-y plane.

The examiner relies on the following references:

Epstein

3,714,476

Jan. 30, 1973

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McElroy	3,756,070	Sep. 04, 1973
Sonderegger et al. (Sonderegger)	4,519,254	May 28, 1985
Gürich	4,712,036	Dec. 08, 1987
Bundy et al. (Bundy)	4,893,049	Jan. 09, 1990
Lukasiewicz et al. (Lukasiewicz)	5,126,617	June 30, 1992 (effectively filed Nov. 09, 1987)

Claims 1 and 2 stand rejected under 35 U.S.C. § 103. As evidence of obviousness the examiner offers Sonderegger or Lukasiewicz in view of Epstein, Bundy, McElroy or Gürich.

Rather than repeat the arguments of appellants or the examiner, we make reference to the brief and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the brief along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the collective evidence relied upon and the level of skill in the particular art would not have suggested to one of

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ordinary skill in the art the obviousness of the invention as set forth in claims 1 and 2. Accordingly, we reverse.

Appellants have indicated that for purposes of this appeal claims 1 and 2 will stand or fall together as a single group [brief, page 5]. Accordingly, we will consider the rejection of independent claim 1 as representative of both of the claims on appeal. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983).

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044,

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1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

The primary references to Sonderegger and Lukasiewicz are cited by the examiner as examples of conventional cylinder pressure sensors. These references teach nothing about the operating features of the piezoelectric element as recited in claim 1. Each of the secondary references to Epstein, Bundy, McElroy and Gürich teaches a piezoelectric element made from

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lithium niobate crystal for its ability to operate in high temperature environments. The examiner holds generally that it would have been obvious to use a lithium niobate piezoelectric element in Sonderegger or Lukasiewicz if it was desired to operate them in a high temperature environment [answer, page 3].

Appellants present arguments as to the individual deficiencies of each of the applied references, and appellants also present arguments as to why the artisan would have found no motivation to combine the teachings of any of the secondary references with either of the primary references [brief, pages 6-14]. The examiner's response to appellants' arguments in the brief is that no additional response was felt to be necessary [answer, page 4].

We reverse all of the examiner's rejections because the examiner has failed to address legitimate factual questions raised by appellants, and because we find appellants' arguments persuasive in the absence of any rebuttal arguments by the examiner.

With respect to the rejections based on Epstein, appellants argue that Epstein is not a pressure sensor as claimed, there is no suggestion of a thickness of 0.3-1.5 mm as claimed, the polarization angle is not less than or equal to 20°

as claimed, and there is no motivation to use the Epstein sensor in an engine pressure sensor [brief, pages 8-9]. Other than to note that the thickness of the piezoelectric element would be obtained through routine experimentation of the routineer, the examiner has not addressed any of these questions. In our view, Epstein teaches nothing more than that piezoelectric elements made from lithium niobate crystal would operate in a high temperature environment. The examiner has not demonstrated any evidence in the record as to why the other specific parameters of the piezoelectric element as recited in claim 1 would have been obvious to the artisan in view of the applied references.

With respect to the rejections based on Bundy, appellants argue that Bundy is not a pressure sensor as claimed, there is no suggestion of a thickness of 0.3-1.5 mm as claimed, the polarization angle in Bundy is 90°, and there is no motivation to use the Bundy explosion monitoring device in an engine pressure sensor [brief, page 9]. Other than to note that the thickness of the piezoelectric element would be obtained through routine experimentation of the routineer, the examiner has not addressed any of these questions. In our view, Bundy teaches nothing more than that piezoelectric elements made from lithium niobate crystal would operate in a high temperature environment. The

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examiner has not demonstrated any evidence in the record as to why the other specific parameters of the piezoelectric element as recited in claim 1 would have been obvious to the artisan in view of the applied references or why an explosion monitoring sensor would be used in a pressure sensing device.

With respect to the rejections based on McElroy, appellants argue that McElroy is not a pressure sensor as claimed, there is no suggestion of a thickness of 0.3-1.5 mm as claimed, the polarization angle in McElroy is unrelated to an x-y plane for receiving pressure forces, and there is no motivation to use the McElroy inspection device in an engine pressure sensor [brief, pages 9-10]. Other than to note that the thickness of the piezoelectric element would be obtained through routine experimentation of the routineer, the examiner has not addressed any of these questions. In our view, McElroy also teaches nothing more than that piezoelectric elements made from lithium niobate crystal would operate in a high temperature environment. The examiner has not demonstrated any evidence in the record as to why the other specific parameters of the piezoelectric element as recited in claim 1 would have been obvious to the artisan in view of the applied references or why the teachings of McElroy

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would otherwise be combined with the teachings of the primary references.

With respect to the rejections based on Gürich, appellants argue that there is no suggestion of a thickness of 0.3-1.5 mm as claimed, and there is no motivation to use the pair of Gürich shearing force type sensors for the single transverse force type sensor in an engine pressure sensor such as suggested by Sonderegger or Lukasiewicz [brief, pages 11-12]. Other than to note that the thickness of the piezoelectric element would be obtained through routine experimentation of the routineer, the examiner has not addressed the question of why the piezoelectric elements of Gürich which measure shearing forces would have been substituted for the single element of the primary references which measure transverse forces. The examiner has not demonstrated any evidence in the record as to why the Gürich piezoelectric element would have been used in the primary references, or if used, why it would have the properties recited in claim 1.

In summary, no combination of either of the primary references with any of the secondary references teaches the invention as recited in appellants' claims, nor is there any suggestion for combining the teachings of the references other

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than to permit operation in a higher temperature environment. Since appellants have presented unrebutted arguments as to the impropriety of the rejections, we do not sustain any of the rejections. Accordingly, the decision of the examiner rejecting claims 1 and 2 is reversed.

REVERSED

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BRADLEY R. GARRIS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
JERRY SMITH)	
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