

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(2) is not binding precedent of the Board.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. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte EDWARD F. DOWNS JR.

Appeal No. 95-3273
Application 08/136,856¹

ON BRIEF

Before HAIRSTON, MARTIN and LEE, Administrative Patent Judges.
MARTIN, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's rejections of claims 1-11, all of the pending claims, over prior art. The final Office action (paper No. 6) included a number of grounds of rejection, of which only the rejection of claim 1 under 35 U.S.C. § 102(b) as anticipated by

¹ Application for patent filed October 18, 1993.

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Geil et al. Patent 4,833,659 is repeated in the Answer.² In addition to maintaining the rejection based on Geil et al., the Answer added new grounds of rejection based on Rokurota Patent 4,747,192.

The invention is a piezoelectric microphone structure. Claim 1, which is one of three independent claims on appeal (claims 10 and 11 are the others), reads as follows:

1. A surface-laminated piezoelectric-film sound transducer, comprising:
 - A. a thin film of piezoelectric material having two opposite faces,
 - B. two thin films of conductive material, one of said films of conductive material being affixed to one of said two opposite faces and another of said films of conductive material being affixed to another of said two opposite faces, thereby forming a piezoelectric sandwich element with the thin film of piezoelectric material in the middle and the two thin films of conductive material on the outside,
 - C. a solid, flat, substantially inflexible substrate laminated to the piezoelectric sandwich element along substantially the entire surface of one of the two conductive layers, and

² The grounds of rejection which were not repeated in the Answer, i.e., the rejections based on D'Hoog Patent 3,941,932, Takeuchi et al. Patent 5,210,455, Dewberry et al. Patent 4,013,992, are treated as withdrawn.

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D. two connecting conductors connected to the two films of conductive material for conducting an electrical signal between the piezoelectric sandwich element and some external point.

The references relied by the examiner are:

Rokurota	4,747,192	May 31, 1988
Geil et al. (Geil)	4,833,659	May 23, 1989

As explained below, we are relying on definitions of "film" from the following dictionaries with respect to the rejection based on Rokurota:³

(a) McGraw-Hill Electronics Dictionary 208 (1994 ed.)

(b) IEEE Standard Dictionary of Electrical and Electronics Terms 219 (1972 ed.)

A. The rejection based on Geil

Claim 1 stands rejected under 35 U.S.C. § 102(b) as anticipated by Geil. The examiner reads claim 1 on the reference as follows (final Office action at 2-3):

Geil discloses in Figs. 5 and 6, a surface-laminated piezoelectric-film transducer, comprising: a thin film of piezoelectric material (PVF₂)^[4], two thin films of conductive material (28 and 29 or copper foil

³ Copies of these definitions are enclosed with this decision. Our reliance on these definitions from standard reference works does not constitute a new ground of rejection. See In re Boon, 439 F.2d 727-28, 169 USPQ 231, 234 (CCPA 1971).

⁴ Geil uses PVF₂ as an abbreviation for polyvinylidene fluoride, which appellant abbreviates as "PVDF."

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electrodes) forming a sandwich element; a solid, flat, inflexible substrate laminated to the piezoelectric sandwich element (substrate 20 containing aluminum layers 34 and 35 with damping layer therebetween) substantially the entire surface of one of the two conductive layers; and two connecting connectors (91 and 92, see Fig. 12A-12C).

The only point in dispute is whether Geil's substrate 20 satisfies the requirement of claim 1 (and claims 10 and 11) that the substrate be "substantially inflexible." Appellant argues (Brief at 12) that this term precludes the ability to be bent to conform to the curve of a boat hull, as shown in Geil's Figure 8, or the ability to bend in response to incident acoustic energy, as is the case with Geil's substrate (col. 4, lines 64-68). We do not agree. The term "substantially inflexible" is not defined in appellant's specification and therefore must be given the broadest reasonable interpretation consistent with appellant's disclosure. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (citing In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969)). The only disclosed example of a material suitable for use as the substrate is "a piece of printed circuit board material" (Spec. at 6, lines 16-18), whose material, thickness, and degree of stiffness are not disclosed. However, the specification states that "[t]he microphone can be molded into different shapes since

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it is a film and can be built into the head liner of a helmet, hat or sweat band" (Spec. at 8, lines 10-12), which suggests that the substrate is flexible enough to be bent to conform to the curve of a head liner, which would appear to be curved at least as much as the boat hull shown in Geil's Figure 8. Furthermore, the invention is described as an improvement over prior art piezoelectric microphones which employ a piezoelectric film membrane stretched tight between two or more stretching points to form a vibrating piezoelectric diaphragm (Spec. at 2, lines 7-12). More particularly, the specification explains that

[b]ecause there is no necessity of a vibrating diaphragm with the present invention, the PVDF sandwich element is preferably firmly affixed to a firm, flat, substantially non-vibrating substrate to form a mounted PVDF sandwich element. [Emphasis added.] [Spec. at 3, line 17.]

Consequently, we believe the artisan would have understood the term "substantially inflexible" as used in claim 1 (and claims 10 and 11) to mean substantially incapable of vibrating in the manner of a diaphragm. This conclusion is also consistent with appellant's description of his invention as operating in only a compression mode (Brief at 3):

Applicant has found that he can use the much smaller signal which results from mere compression of the sandwich to produce a signal which is at least as good as and possibly better than those produced from flexing the sandwich in a diaphragm, because in the compression

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mode, the sound which affects the electrical output can be effectively limited to that within a pressure field or in which the microphone is in direct contact with some physical body (more substantial than open air) through which the sound is being carried.

Geil's piezoelectric device is likewise designed to operate essentially in the compression mode. Unwanted signals due to lateral elongation of the piezoelectric polymer film are reduced by using a steel substrate having a Young's modulus at least an order of magnitude greater than that of the piezoelectric polymer material (col. 6, lines 10-25). Unwanted signals due to bending and acceleration are reduced by appropriate selection of the polarities of the piezoelectric layers and the interconnections between the electrodes (col. 6, line 26 et seq.; Figs. 12A-C, 13A-C, 14A-C, and 15A-C). Moreover, the bending motion of the piezoelectric sandwich members may be reduced by using a viscoelastic material in the substrate (col. 7, lines 58-63). Consequently, although the individual piezoelectric sandwich members 22 and 23 experience some bending, they are substantially prevented from experiencing diaphragm-like vibration and thus satisfy the requirement of claim 1 for a "substantially inflexible" substrate. Accordingly, we are affirming the rejection of claim 1 under 35 U.S.C. § 102(b) as anticipated by Geil.

B. The rejections based on Rokurota

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as anticipated by Rokurota and claims 3-11 stand rejected under § 103 as unpatentable over that reference. The examiner reads claims 1-2 onto the reference as follows (Answer at 4):

Regarding claims 1-2, Rokurota discloses in Fig. 3, a piezoelectric-film sound transducer comprising: a thin film of piezoelectric material (38) having two opposite faces, two thin films (40, 42) of conductive material, thereby forming a piezoelectric sandwich element, a solid, flat, substantially inflexible substrate (printed circuits formed on the substrate 34, see column 4, lines 11-12) laminated to the piezoelectric sandwich element along substantially the entire surface of the conductive layers, and two connecting conductors (60) connected to the two films for conducting an electrical signal between the piezoelectric sandwich element and some external point.

Appellant does not dispute that Rokurota's substrate 34 is substantially inflexible. Instead, appellant argues (Reply Brief at 3) that Rokurota's piezoelectric material 38 fails to satisfy claim 1's requirement for a "thin film of piezoelectric material," because the only piezoelectric material Rokurota discloses is a ceramic material (col. 3, line 68 to col. 4, line 2; col. 4, lines 49-52), in which notches 64 (Fig. 4E) may be cut with a diamond saw (col. 5, lines 36-37). According to appellant,

[e]ssentially, a thin film element is, except for its electrical characteristics, about like any sheet of

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plastic which can be cut with a pair of scissors. A ceramic piezoelectric element is, except for its electrical characteristics, about like a piece of stone, and it can be cut with a diamond saw. [Reply Brief at 3.]

We do not agree that the term "thin film" as used in claim 1 would have been understood by the artisan to necessarily mean a sheet of plastic-like material that is capable of being cut with scissors.⁵ While this is an accurate description of a PVDF film, which is appellant's only disclosed example of a suitable piezoelectric film material, it is improper to read limitations from examples given in the specification into the claims.

Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 1571, 7 USPQ2d 1057, 1064 (Fed. Cir. 1988). On the record before us, we believe the artisan would have construed the term "thin film" in claim 1 broadly to mean "[a] thin sheet or coating of material," which is the broader of the two definitions given for "film" in McGraw-Hill Electronics Dictionary 208 (1994 ed.). As a result, the phrase "thin film of piezoelectric material" is broad enough to read on Rokurota's piezoelectric element 38, which may have a thickness of, for example, 0.3 millimeters (col. 4, lines 54-55). We note that since 0.3 millimeters is the

⁵ As appellant correctly notes in the reply thereto, the Supplemental Examiner's Answer mischaracterized their position to be that the term "thin film of piezoelectric material" must be construed to mean a PVDF film.

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same as 0.03 centimeters, these piezoelectric elements also fall within the following definition of "film" in IEEE Standard Dictionary of Electrical and Electronics Terms 219 (1972 ed.):

"(1) (rotating machinery). Sheetting having a nominal thickness not greater than 0.030 centimeters and being substantially homogeneous in nature." In holding that Rokurota's piezoelectric ceramic element 38 is a "thin film of piezoelectric material," we are mindful of our conclusion, supra, that the artisan would have construed the phrase "substantially inflexible substrate" to mean a substrate substantially incapable of vibrating in the manner of a diaphragm. This does not necessarily imply that the claimed "thin film of piezoelectric material" would be capable of vibrating in the manner of a diaphragm if it were not laminated to the substrate.

For the foregoing reasons, the rejection of claim 1 as anticipated by Rokurota is affirmed. The rejection of claim 2 as anticipated by that reference is affirmed because it was not separately argued. In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987).

Claims 3-11 stand rejected under § 103 as unpatentable over Rokurota. Of these claims, only claim 3 is separately argued by appellant. This claim requires that the piezoelectric sandwich and substrate be sealed between two water resistant

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layers for protection against environmental moisture. The examiner stated the case for obviousness as follows:

[S]ince Rokurota's ultrasonic transducer is being used on [sic] human body, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide water-resistant protective layers for Rokurota's piezoelectric sandwich and the substrate because this would protect Rokurota's ultrasonic transducer from moisture generated by the human body.
[Answer at 5.]

Appellant responds by arguing that "the logically obvious extension of the Examiner's argument is that Rokurota was not skilled in the art to which his invention pertained" (Reply Brief at 4). Assuming this is intended as a challenge to the examiner's argument for obviousness, it is unpersuasive.

Inasmuch as Rokurota was under no obligation to describe every obvious modification of his invention of which he was aware when he filed his application, his failure to disclose a particular modification does not imply that it was beyond his skill or, more important, the skill of a person having ordinary skill in the art. Hence, the failure of a reference to disclose a claimed feature does not, in and of itself, constitute a "teaching away" from modifying the reference to include that feature. See *Par Ordnance Manufacturing v. SGS Importers International*, 73 F.3d 1085, 1090, 37 USPQ2d 1237, 1241 (Fed. Cir. 1995) (failure of reference to disclose using a convergence frame is not a teaching

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away from using such a frame). The rejection of claim 3 under § 103 as unpatentable over Rokurota is therefore affirmed.

The rejection of claims 4-11 under § 103 as unpatentable over Rokurota is also affirmed, because those claims were not separately argued. Nielson, 816 F.2d at 1572, 2 USPQ2d at 1528.

In summary, the rejection of claim 1 under 35 § U.S.C. 102(b) as anticipated by Geil is affirmed, as are the rejection of claims 1 and 2 under § 102(b) as anticipated by Rokurota and the rejection of claims 3-11 under § 103 as unpatentable over Rokurota.

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

AFFIRMED

KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
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JOHN C. MARTIN)	BOARD OF PATENT
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)	INTERFERENCES
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