

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte KENNETH B. LAZARUS, MARK E. LUNDSTROM,  
JEFFREY W. MOORE, and EDWARD F. CRAWLEY

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Appeal No. 1997-1003  
Application No. 08/188,145

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ON BRIEF<sup>1</sup>

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Before KRASS, RUGGIERO, and GROSS, Administrative Patent Judges.  
GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 through 5, 7 through 18, 32 through 34, and 36 through 38, which are all of the claims pending in this application.

Appellants' invention relates to an actuator device in which a thin plate of piezoelectric material is sandwiched

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<sup>1</sup> We note that the hearing scheduled for this case was waived on September 12, 2001 as per Administrator Craig Feinberg.

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between flex circuits. A thin layer of curable material forms a planarizing layer between an electrode pattern formed on the flex circuit, mechanically coupling the piezoelectric plate to the flex circuit while allowing the electrodes and piezoelectric elements to electrically contact each other.

Claim 1 is illustrative of the claimed invention, and it reads as follows:

1. An electro-active device comprising a plurality of flex circuits, each having a sheet of film and a conductor forming electrodes on at least one surface of the film, said plurality including at least first and second flex circuits, means forming a recess between said first and second flex circuits, and an electro-active element in said recess having opposed first and second surfaces which are bonded to the flex circuits such that said surfaces are mechanically coupled and electrically contacted thereto over a distributed contact area, wherein the electrodes have an electrode pattern, and said element is bonded to said flex circuits by a planarizing layer of curable material having a pattern complementary to the electrode pattern.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Sonderegger et al. (Sonderegger)	3,582,691	Jun. 01, 1971
Larson, III et al. (Larson)	4,404,489	Sep. 13, 1983
Kaneko et al. (Kaneko)	4,651,310	Mar. 17, 1987
Fujii et al. (Fujii)	4,701,659	Oct. 20, 1987



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active] element is bonded to said flex circuits by a planarizing layer of curable material having a pattern complementary to the electrode pattern." In other words, the curable material must be patterned complementary to the electrode pattern and must have a surface level with the electrodes.

The examiner states (Answer, page 4) that "planarizing layer" and phrases from other claims are "basically functional recitations which do not alter the claimed combination of structural elements." Thus, the examiner ignores the claim language noted above.

Appellants argue (Brief, page 9) that "[t]he art does not show a layer which planarizes - i.e., entirely fills and flattens an area between electrodes - yet provides direct electrical contact between the sheet and those electrodes over a distributed area." We agree. As indicated by appellants (Brief, page 9), Larson discloses a thin epoxy bond 28 (or conductive adhesive) between the electrodes and the block of piezoelectric material, Fujii shows conductive adhesive bonds 34 and 36 over the entire conductive layer and discloses that the bond should be thin to assure good conductivity (between

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the electrodes and the piezoelectric elements), and Kaneko shows adhesive layer 5 over the entire electrode layer such that it is between the electrodes and the piezoelectric member. In other words, none of the references disclose patterning the adhesive with a pattern complementary to the electrodes, and the examiner has provided no motivation for modifying the references to meet the claims. Consequently, the examiner has failed to establish a *prima facie* case of obviousness, and we cannot sustain the rejection of claim 1 nor of its dependents, claims 2 through 5 and 7 through 18.

Independent claims 32, 34, and 36 each recite, in pertinent part, "the flex circuit is assembled with at least some of its conductors bonded to and in direct electrical contact with the sheet strain element," where the sheet strain element refers to the piezoelectric or other electro-active element. As explained above, each of Larson, Fujii, and Kaneko discloses an adhesive layer between the electrodes and the piezoelectric elements. Therefore, none of the references teach or suggest the direct electrical contact recited in the claims, and the examiner has failed to provide any motivation

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why the skilled artisan would have modified the references to meet such claim limitations.

In addition, claim 32 recites "transfer efficiency ' of strain through the flex circuit bonded to the sheet strain element is greater than  $5 \times 10^{10}$  pounds/inch<sup>4</sup>," claim 34 recites "strain of the electro-active device constitutes at least fifty percent of free element strain of said sheet strain element," and claim 36 recites "ratio of package to free element curvature is greater than .7." The examiner (Answer, page 3) refers to each of these limitations as "dimensions" and states that "to discover optimum or workable ranges or values as such involves only routine skill in the art," referring to *In re Boesch*, 205 USPQ 215 and *In re Aller*, 105 USPQ 233. However, the court in *In re Boesch* and *In re Aller* held that optimization of result effective variables would have been obvious. However, neither case supports the examiner's assertion that optimization of any variable would have been obvious. Since the examiner has not provided any evidence that the limitations are directed to result effective

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variables, the examiner has failed to establish the obviousness of the particular values or ranges recited.

Furthermore, we find no disclosure of the above-noted limitations in any of the references, nor has the examiner pointed to any portion in any of the references which would suggest them. Accordingly, the examiner has failed to establish a *prima facie* case of obviousness, and we cannot sustain the rejection of claims 32, 34, and 36, nor of their dependents, claims 33, 37, and 38.

Regarding the rejection of claim 10, the examiner contends (Answer, pages 3-4) that

Sonderegger teaches a device using one PCB laminated to piezoelements with different response/actuation directions. Iten teaches it is convenient to use a PCB on each side of a plurality of piezoelements to form a laminated structure that fully encloses the piezoelements to provide an easily manufactured, fully protected piezoelectric transducer.

Sonderegger and Iten are directed to two completely different types of structures, and it is unclear to us how or why one would combine the two to arrive at the claimed invention.

Furthermore, claim 10 depends from claim 1, and, therefore, includes all of the limitations thereof. Thus, claim 10, for example, requires a planarizing layer of curable material

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having a pattern complementary to the electrode pattern of the flex circuit. We find no suggestion in either reference to include such a patterned planarizing layer, and the examiner has provided no guidance. In fact, the examiner has failed to specifically point out where any of the claimed limitations are disclosed in the references. Accordingly, we cannot sustain the obviousness rejection of claim 10.

CONCLUSION

The decision of the examiner rejecting claims 1 through 5, 7 through 18, 32 through 34, and 36 through 38 under 35 U.S.C. § 103 is reversed.

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REVERSED

ERROL A. KRASS	)	
Administrative Patent Judge	)	
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	)	
	)	BOARD OF PATENT
JOSEPH F. RUGGIERO	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
	)	
ANITA PELLMAN GROSS	)	
Administrative Patent Judge	)	

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