The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JURGEN LANGE and NORBERT GILL

Appeal No. 1998-0091
Application No. 08/404,054[1]

ON BRIEF

Before KRASS, MARTIN, and RUGGIERO, Administrative Patent Judges.

MARTIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 3-6, all of the pending claims, under 35 U.S.C. § 103. We reverse.

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[1] Application for patent filed March 14, 1995.

A. The invention

The invention relates to a capacitive pressure sensor including a ceramic substrate and a ceramic diaphragm having respective electrodes which are spaced apart to form a cavity therebetween. Appellants' specification explains (at 2, lines 23-32) that in prior art pressure sensors of this type, short circuiting of the two electrodes may result from any of three different causes: (a) material particles coming between the electrodes during manufacture; (b) excessive pressure causing the electrodes to move into contact; and (c) part of an electrode becoming detached from the diaphragm or substrate and contacting the other electrode. Referring to Figure 2, appellants solve the short-circuiting problem by coating the substrate electrode 13 with a glass layer 14, which in turn is coated with an insulating layer 20. Spacers 17 separate the insulating layer from diaphragm electrode 15 to form a cavity therebetween. Figure 4 shows the same technique applied to a both halves of a capacitive differential pressure sensor.[2]

B. The claims

Claims 3 and 5 are directed to the Figure 2 embodiment and claims 4 and 6 to the Figure 4 embodiment. Although appellants treat claim 3 as representative (Brief at 4-5), pursuant to our authority under 37 CFR § 1.192(c)(7) we are treating claim 5 as representative because it is broader than

[2] No claims are directed to the embodiments of Figures 1 and 3, which omit the insulating layers of Figures 2 and 4, respectively.

claim 3 in at least the following respect: claim 5 does not require that the substrate be made of ceramic material.[3]

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[3] Claim 3 specifies that the "spacer [is] formed from the original glass frit" (emphasis added), an apparent reference to the previous recitation of "a glass layer formed from an original glass frit disposed on the first metallic electrode." This requirement that the spacer and the glass layer be formed from the same original glass frit, a process limitation in an apparatus claim, is entitled to no weight because the product will be the same whether the spacer and the glass layer are formed from the same glass frit or from different glass frits. See In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985):

> The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. In re Marosi, 710 F.2d 799, 803, 218 USPQ 289, 292-93 (Fed. Cir. 1983); Johnson & Johnson v. W.L. Gore, 436 F.Supp. 704, 726, 195 USPQ 487, 506 (D. Del. 1977); see also In re Fessman, 489 F.2d 742, 180 USPQ 324 (CCPA 1974).

Claim 5 reads as follows:[4]

5. A capacitive pressure sensor comprising

a substrate having a first surface,

a first metallic electrode appended to the first surface of the substrate,

a diaphragm having a first surface facing toward the substrate,

a second metallic electrode appended to the first surface of the diaphragm,

a glass layer having a first end appended to the substrate and a second end,

an insulating later situated between the second end of the glass layer and the diaphragm, and

a spacer situated between the diaphragm and the insulating layer, the spacer, insulating layer, and glass layer defining a cavity.

C. The references and rejections

The examiner's rejections are based on the following U.S. patents:

Bell et al. (Bell)	4,388,668	June 14, 1983

[4] The claims as reproduced in the Appendix to the Brief include the errors noted by the examiner (Answer at 3) and the following additional error: Line 5 of claim 5 should end with a comma rather than a semicolon.

Orlowski et al. (Orlowski) 4,531,415 July 30, 1985

Hegner et al. (Hegner) 5,400,489 Mar. 28, 1995
(filed Oct. 30, 1992)

Claims 3 and 5 stand rejected under § 103 for obviousness over Bell in view of Hegner.

Claims 4 and 6 stand rejected under § 103 for obviousness over Bell in view of Hegner and Orlowski.

D. The merits of the rejections

The examiner's burden of proof in rejecting claims for obviousness and the appellant's burden of persuasion on appeal to show that the rejection is erroneous are explained as follows in In re Rouffet, 149 F.3d 1350, 1355 47 USPQ2d 1453, 1455 (Fed. Cir. 1998):

> To reject claims in an application under section 103, an examiner must show an unrebutted prima facie case of obviousness. See In re Deuel, 51 F.3d 1552, 1557, 34 USPQ2d 1210, 1214 (Fed. Cir. 1995). In the absence of a proper prima facie case of obviousness, an applicant who complies with the other statutory requirements is entitled to a patent. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of prima facie obviousness or by rebutting the prima facie case with evidence of secondary indicia of nonobviousness. See id.

Appellants contend that the evidence relied on by the examiner fails to establish a prima facie case of obviousness.

(a) Claims 3 and 5

Bell discloses various embodiments of capacitive pressure transducers, of which the examiner relies on the Figure 3 embodiment. This embodiment includes nonconductive disks 2 and 4

made from a zero hysteresis, nonconductive or electrically insulative elastic material such as alumina, fused silica, or a glass such as Pyrex (col. 5, lines 33-36) and whose facing surfaces have applied thereto respective conductive layers 6 and 8. These components are assembled with a glass frit or ceramic sealing material 32 forming a gap between the electrodes, after which the assembly is fired, causing the glass frit to fuse the components together (col. 5, lines 12-25). Although not mentioned by the examiner or appellants, Bell explains that high overload pressures can cause the electrodes to come into contact with each other. See Bell's column 10, lines 13-17 ("the thickness of the plates and the width of the gap can be designed such that under high overload

pressures the two discs bottom out against each other thereby preventing damage to the pressure sensor"). However, Bell does not describe this as constituting a short-circuit problem, presumably because the bottoming out occurs at pressures outside of the desired measurement range, as explained in the following limitation in Bell's claim 1:

> means including said members and said fused glass frit for permitting said electrically conductive plates to deflect toward one another without touching throughout said predetermined measurement range while allowing said plates to engage one another and bottom out under high overload pressure conditions, so that said pressure sensor is protected against impairment.

Hegner's "Background of the Invention" describes prior art capacitive pressure sensors of the type which include a diaphragm and substrate made, for example, of ceramic or glass, and having respective conductive layers formed of silicon carbide, niobium, or tantalum (col. 1, lines 10-25). These components are joined together using a ring-shaped part of active brazing material, which has the disadvantage that the uncovered (by conductive material) portions of the substrate and diaphragm become contaminated, making the

capacitance of the device vary as a function of humidity (col. 1, lines 26-52). Hegner explains that this effect is due to the fact that the uncovered portions of the substrate and diaphragm lose oxygen or nitrogen atoms, i.e., become reduced (col. 1, line 67 to col. 2, line 7). Referring to Figure 2, Hegner covers the facing surfaces of electrodes 14 and 15 on diaphragm 11 and substrate 12 with protective layers 21 and 22, respectively, made, for example, from one of the oxides of the material of which the electrode is formed (col. 4, lines 15-21). Appellants do not challenge the examiner's taking of official notice (Final Rejection at 6) that these oxide layers are insulating materials. Referring to Figure 4, protective layers 21 and 22 and the uncovered facing surface areas of diaphragm 11 and substrate 12 are then covered with spin-on glass layers 23, which "surprisingly seal[] the uncovered surface portions of diaphragm 11 . . . and substrate 12 . . . so perfectly that the above-mentioned reduction during the brazing process practically no longer occurs" (col. 5, lines 52-57). Hegner does not explain what type of protection is being provided by his protective layers

21 and 22 or mention short-circuiting as a problem to be solved by using his protective layers or his glass layers.

The examiner's argument for obviousness is that

> [i]t would have been obvious to one of ordinary skill in the art to dispose the glass layer and the insulation layer respectively [of Hegner] onto the electrode 8 of Bell et al. since this will provide a tight seal between the diaphragm and the substrate[] and prevent short-circuits. It would also have been obvious to one of ordinary skill in the art to use the original glass frit or a high temperature glass for the insulation since making the insulation of the same material as the glass layer[] will be beneficial for sealing the layers. [Answer at 5-6.]

The examiner further explains that

> [a]lthough Hegner et al. does not specifically disclose that the glass layer and the insulating layer are used to prevent short circuit[s], it would have been obvious to one skilled in the art that if two conductive surfaces are separated from [sic, by?] a distance, then short circuit[s] can be avoided. Therefore, applying further layers onto electrode surfaces will prevent short circuits in the capacitive transducer. [Answer at 8.]

We agree with appellants that the rejection cannot be sustained, because the examiner has failed to establish that one skilled in the art would have been motivated to combine the teachings of Bell and Hegner for the purpose of curing a

short-circuit problem in the Bell device.[5] Neither of Bell and Hegner identifies short-circuiting of the electrodes as a problem. In fact, Bell, as already noted, describes bottoming out under high overload feature (which inherently results in a short circuit) as advantageous because it avoids damage to the sensor. If the examiner's position is that the artisan nevertheless would have considered the short-circuiting that inherently occurs in Bell to be a problem, the rejection should so state and explain why. See In re Bozek, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969) (a determination of obviousness may be based on the "common knowledge and common sense of the person of ordinary skill without any specific hint or suggestion in a particular reference"). On the other hand, if the examiner's position is that appellants' description of the short-circuit problem at page 2, lines 23-32 of their specification constitutes an admission that short-

[5] To the extent, if any, the examiner is relying on Hegner's suggestion of using the protective and glass layers to diminish surface reduction problems, the rejection fails because Bell's device is not subject to such problems, as it is not made using a high-vacuum, high-temperature brazing technique.

circuiting was known to be a problem, that alleged admission should be identified in the statement of the rejection. Cf. MPEP § 706.02(j) (7th ed., July 1998, rev. 1, Feb. 2000) ("Where a reference is relied on to support a rejection, whether or not in a minor capacity, that reference should be positively included in the statement of the rejection. In re Hoch, 428 F.2d 1341, 1342 n.3, 166 USPQ 406, 407 n.3 (CCPA 1970)."). Accord Ex parte Movva, 31 USPQ2d 1027, 1028 n.1 (Bd. Pat. App. & Int. 1993); Ex parte Raske, 28 USPQ2d 1304, 1304-05 (Bd. Pat. App. & Int. 1993); Ex parte Hiyamizu, 10 USPQ2d 1393, 1394 (Bd. Pat. App. & Int. 1988).[6]

For the foregoing reasons, the rejection of claims 3 and 5 for obviousness over Bell in view of Hegner is reversed.

We note in passing that appellants have not challenged the examiner's contention that it would have been obvious, when

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[6] We note that neither the specification nor the brief asserts that appellants were the first to recognize the causes of the short-circuit problem. Cf. In re Sponnoble, 405 F.2d 578, 585, 160 USPQ 237, 243 (CCPA 1969)(discovery of the source of the problem is part of the inquiry under § 103).

applying Hegner's teachings to Bell's device, to implement Hegner's protective layers 21 and 22 as glass layers.

(b) Claims 4 and 6

Claims 4 and 6, which are directed to the differential capacitive pressure sensor shown in appellants' Figure 4, recite two pressure sensors sharing a common substrate. Claim 6 additionally specifies that "the substrate [is] formed to include an aperture connecting the first and second cavities and the outside surface of the substrate." The rejection of these claims is based on Bell in view of Hegner and Orlowski.

Although Figures 4 and 5 of Orlowski show a differential capacitive pressure sensor having insulating post-like supports 20 extending through holes in electrodes 22 and insulating annular supports 21 surrounding the electrodes in order to prevent short-circuits between the electrodes 22 and 23 (col. 3, lines 36-40), the rejection does not rely on Orlowski's recognition of short-circuiting as a problem and thus fails to provide the motivation that is missing in the rejection of claims 3 and 5. Instead, the examiner states

that he "only used the Orlowski et al. reference to support the positions of [the] mirror-image [sensors] and the aperture for connecting the cavities" (Answer at 8). For this reason, the rejection of claims 4 and 6 is also reversed.

REVERSED

ERROL A. KRASS Administrative Patent Judge	)	
JOHN C. MARTIN Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
JOSEPH F. RUGGIERO Administrative Patent Judge	)	

JCM

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