Paper No. 33

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte ANUNCIA GONALEZ-MARTIN, JINSEONG KIM,
DALIBOR HODKO and CARLOS SALINAS

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Appeal No. 2003-0346
Application 09/113,925[1]

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ON BRIEF

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Before COHEN, PAK, and GROSS, Administrative Patent Judges.

PAK, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's refusal to allow claims 1 through 26, 33 through 36, 38 through 49, 51, 53, 55, 57 and 58, which are all of the claims pending in the above-identified application.

[1] Application for patent filed July 10, 1998

Claims 1, 33, 39, 47, 51, 53 and 55 are representative of the subject matter on appeal and a copy of these claims is appended to this decision.

The prior art references relied upon by the examiner are:

Porter et al. (Porter)	3,887,194	Jun. 03, 1975
Kihira et al. (Kihira)	4,806,849	Feb. 21, 1989
Homma et al. (Homma)	4,962,360	Oct. 09, 1990
Pletcher et al. (Pletcher)	5,071,526	Dec. 10, 1991
Tomantschger et al. (Tomantschger)	5,173,166	Dec. 22, 1992
Wolcott et al. (Wolcott)	5,346,605	Sep. 13, 1994
Kosek et al. (Kosek)	5,527,446	Jun. 18, 1996

The appealed claims stand rejected as follows:

1. Claims 1 through 11, 18, 19, 21 through 26, 33 through 36, 38 through 45, 47 through 49, 51, 53, 55 and 58 under 35 U.S.C. § 103 as unpatentable over "Homma in view of Tomantschger or Kosek" (Answer, page 3);

2. Claims 12 through 15 under 35 U.S.C. § 103 as unpatentable over "Homma in view of Tomantschger or Kosek and Wolcott" (Answer, page 4);

3. Claims 16, 17, 46 and 57 under 35 U.S.C. § 103 as unpatentable over "Homma in view of Tomantschger or Kosek and Kihira" (Answer, page 5); and

4. Claim 20 under 35 U.S.C. § 103 as unpatentable over "Homma in view of Tomantschger or Kosek and Pletcher or Porter". (Answer, page 5).

We reverse each of the aforementioned Section 103 rejections. Our reasons for this determination follow.

The subject matter on appeal is directed to a non-destructive evaluation/inspection sensor for detecting or measuring the early stages of corrosion in a metallic structure, which comprises, *inter alia*, a solid polymer electrolyte membrane and an electrode in electrochemical communication with the solid polymer electrolyte membrane. See claims 1, 33, 39, 47, 51, 53 and 55, together with the specification, page 2, lines 10-11 and page 8, lines 16-18. To detect or measure corrosion in the metallic structure, the solid polymer electrolyte membrane and the electrode must be appropriately arranged so that electro-chemical impedance can be measured upon applying a small AC signal perturbation between the structure and the electrode. See claims 1, 33, 39, 47, 51, 53 and 55, together with the specification, page 8, line 16 to page 15, line 8. Electrical impedance amplitude defines the level of corrosion damage in the structure. See the specification, page 7, together with, e.g., Figures 3 and 4.

As evidence of obviousness of the subject matter on appeal, the examiner relies primarily on the combined disclosures of Homma and either Tomantschger or Kosek. According to the examiner (Answer, page 3):

> Homma discloses an AC impedance corrosion detection device comprising an absorbent member 3 saturated with a liquid electrolyte arranged over an open end of a housing 20/22. An inernal [sic, internal] electrode 2 contacts the absorbent member and a biasing member 5 is provided for urging the absorbent member against a metal specimen, which acts as the other electrode. See col. 4, line 64 to col. 7, line 63.

The examiner recognizes that Homma does not disclose the claimed solid polymer electrolyte membrane. See the Answer, pages 3 and 4.

To remedy this deficiency, the examiner relies only on the disclosure of either Tomantschger or Kosek.[2] See the Answer, page 4. The examiner asserts (*Id.*) that:

> Tomantschger (col. 6, lines 61-63) or Kosek (col. 5, lines 7-10) discloses the use of a sold polymer electrolyte (Nafion) for an electrochemical detection device to be conventional.

The examiner then concludes (Id.) that:

> It would have been obvious for Homma to replace the absorbent member 3 with a solid electrolyte [membrane] in view of the secondary references . . .

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[2] The examiner does not rely on Pletcher, Porter, Wolcott and Kihira to teach the claimed solid electrolyte polymer membrane.

Therefore, the dispositive question is whether it would have been obvious to replace the super absorbent polymer employed in the corrosion sensor taught by Homma with the solid polymer electrolyte membrane taught by Tomantschger or Kosek. On this record, we answer this question in the negative.

At pages 7 and 8 of the Brief, the appellants correctly state that Homma employs a super absorbent polymer in its corrosion sensor for the purpose of using a liquid electrolyte in measuring corrosion damage in the metallic structure. See, e.g., column 3, lines 26-35, column 5, lines 39-45 and column 6, line 60 to column 7, line 7. The appellants also correctly state at page 8 of the Brief that:

> Homma discloses [using] electrolyte resins [(solid electrolyte polymers) to form the super absorbent polymer] because of the higher liquid electrolyte absorbency, *i.e.*, 3000-1000(g/g), as compared with the 20-500 (g/g) absorbency of non-electrolyte resins. *Homma*, col. 6, lines 6-15.

In other words, Homma teaches that electrolyte resins (solid electrolyte polymers) are effective **only as an absorbent containing a liquid electrolyte** in detecting or measuring corrosion damage in a metallic structure. There is nothing in Homma, which recognizes that electrolyte resins (solid

electrolyte polymers) in the form of membrane are useful as part of a corrosion sensor.

Similarly, neither Tomantschger nor Kosek relied upon by the examiner recognizes that a solid electrolyte polymer membrane can be effective in detecting or measuring corrosion. Specifically, both Tomantschger and Kosek are limited to employing a solid electrolyte polymer membrane for a purpose and a manner materially different from those described in Homma (i.e., detecting gases by contacting the gases (rather than corrosion in a metal substrate) directly with an electrode, rather than with a solid electrolyte polymer containing a liquid electrolyte). Compare, e.g., the Brief, pages 8 and 9 and the Answer, pages 7 and 8. Thus, on this record, we determine that the examiner has not demonstrated that solid electrolyte polymers in the form of membrane are useful for the corrosion sensor of the type described in Homma. The examiner has not supplied sufficient evidence to show that one of ordinary skill in the art would have recognized the viability of using a solid electrolyte polymer membrane in the sensor of the type described in Homma. It follows that the applied prior art references as a whole would not have provided sufficient suggestion or motivation to arrive at the subject matter on appeal.

In view of the foregoing, we reverse the examiner's decision rejecting claims 1 through 26, 33 through 36, 38 through 49, 51, 53, 55, 57 and 58 under 35 U.S.C. § 103.

REVERSED

IRWIN CHARLES COHEN Administrative Patent Judge	)	
CHUNG K. PAK Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
ANITA PELLMAN GROSS Administrative Patent Judge	)	

CKP:vsh

Appeal No. 2003-0346
Application No. 09/113,925

STREETS & STEELE
13831 NORTHWEST FREEWAY
SUITE 355
HOUSTON, TX 77040

APPENDIX
Claims 1, 33, 39,
47, 51, 53, 55

1. An apparatus for detecting corrosion in an electronically conducting metal substrate comprising:

(a) a housing having an open end portion;

(b) a solid polymer electrolyte membrane coupled over the open end portion of the housing and having a first exposed surface adapted to be positionable in contact with a surface of the substrate; and

(c) an electrode disposed in the housing and in electrochemical communication with a second surface of the solid polymer electrolyte membrane, wherein the first exposed surface of the membrane directly opposes the electrode.

33. An apparatus for analyzing corrosion comprising:

(a) a solid polymer electrolyte membrane having a first exposed surface adapted to be positionable in contact with a surface of a substrate;

(b) an electrode in electrochemical communication with a second surface of the solid polymer electrolyte membrane; and

(c) a source of a fluid for hydrating the solid polymer electrolyte membrane.

39. An apparatus for analyzing corrosion comprising:

(a) a sensor having a solid polymer electrolyte membrane, an electrode in electrochemical communication with the solid polymer electrolyte membrane, and a source of a fluid for hydrating the solid polymer electrolyte membrane; and

(b) an impedance measuring instrument in electrical contact with the electrode.

47. An apparatus for detecting corrosion in an electronically conducting metal substrate comprising:

(a) a housing having an open end portion;

(b) a solid polymer electrolyte membrane coupled over the open end portion of the housing and having a first exposed surface adapted to be positionable in contact with a surface of the substrate;

(c) an electrode disposed in the housing and in electrochemical communication with a second surface of the solid polymer electrolyte membrane; and

(d) a voltage source having a first terminal in electronic communication with the electrode and a second terminal in electronic communication with the substrate for providing an AC source voltage at a selected frequency.

51. An apparatus for detecting corrosion in an electronically conducting metal substrate comprising:

(a) a housing having an open end portion;

(b) a solid polymer electrolyte membrane coupled over the open end portion of the housing and having a first exposed surface adapted to be positionable in contact with a surface of the substrate; and

(c) an electrode disposed in the housing and in electrochemical communication with a second surface of the solid polymer electrolyte membrane, wherein the first surface of the membrane is free from electrodes.

53. An apparatus for detecting corrosion in an electronically conducting metal substrate comprising:

(a) a housing having an open end portion;

(b) a solid polymer electrolyte membrane coupled over the open end portion of the housing and having a first exposed surface adapted to be positionable in contact with a surface of the substrate; and

(c) a thin film electrode fixed to a second surface of the solid polymer electrolyte membrane.

55. An apparatus for detecting corrosion in an electronically conducting metal substrate comprising:

(a) a housing having an open end portion;

(b) a solid polymer electrolyte membrane coupled over the open end portion of the housing and having a first exposed surface adapted to be positionable in contact with a surface of the substrate; and

(c) an electrode disposed in the housing; and

(d) a biasing member disposed in the housing to urge the electrode into contact with a second surface of the solid polymer electrolyte membrane and urge the solid electrolyte into contact with the substrate.