

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 46

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANDY D.C. CHAN, JOSEPH S. FOOS,
JAMES E. RASMUSSEN, RICHARD L. SCHULKIND
and JOHN A. ZALENSKI

Appeal No. 2001-0246
Application No. 08/921,103¹

ON BRIEF

Before THOMAS, KRASS and SAADAT, Administrative Patent Judges.
SAADAT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the Examiner's final rejection of claims 47 and 49. Claims 22-25, 27-46, 48 and 51-53 have been canceled and claim 50 has been allowed.²

We affirm.

¹ Application for patent filed August 29, 1997, which is a continuation-in-part of the Application No. 08/552,833, filed November 3, 1995, now abandoned.

² The rejection of claim 50 under 35 U.S.C. § 103(a) as being unpatentable over Europe and Hofmeier in view of the admitted prior art is withdrawn by the Examiner (answer, page 2).

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BACKGROUND

Appellants' invention relates generally to a reference electrode device for use in an electrochemical analyzer, and more specifically, to a device of the constrained-diffusion liquid junction type. In a reference electrode of the open junction type, the liquid junction operates by free diffusion, whereas in a constrained-diffusion junction, a barrier membrane or porous material is placed at the site of the liquid junction (specification, page 1). The interfacial potential across the liquid junction between the liquid junction solution or the system calibrator and a sample solution determines the characteristics of the sample solution. According to Appellants, in an open junction, the liquid junction solution must be usually discarded after each reading due to contamination by the sample solution whereas in a constrained-diffusion junction, the liquid junction solution is not contaminated but the barrier membrane is required to be soaked prior to the first use (specification, page 3). Appellants' invention provides for a reservoir for holding and recirculating the liquid junction solution in a constrained-diffusion liquid junction.

Representative independent claim 47 is reproduced as follows:

47. A method of providing reference signal in a system for potentiometric quantitative analysis, said method comprising the steps of:

(a) providing a flow cell in any of a plurality of electrode receiving positions on a sensor support member of said system, each of said electrode receiving positions adapted to support one of a plurality of working electrodes or said flow cell, wherein said flow cell is adapted to be serially retained within a sample flow path of the system;

(b) interfitting said flow cell in series with ones of said plurality of working electrodes within said plurality of electrode receiving positions;

© storing a liquid junction solution in a remote reservoir connected to said flow cell for delivery of said liquid junction solution to said flow cell and for receipt of said liquid junction solution therefrom;

(d) moving a sample solution through said sample flow path to said flow cell to form a liquid junction between the sample solution and said liquid junction between the sample solution and said liquid junction solution about a porous constraint whereby said sample solution is disposed in contact with one side of said porous constraint, said constraint being adapted to substantially prevent bulk flow of said liquid junction solution therethrough; and

(e) circulating said liquid junction solution, comprising a non-saturated equitransferent salt, in conjunction with said step of moving said sample solution, whereby a volume of said liquid junction solution is pumped from said remote reservoir towards said flow cell and from said flow cell towards said reservoir, whereby said liquid junction solution is disposed in contact with an other side of said porous constraint and whereby said liquid junction solution is electrically connectable to sensing equipment by a reference contact region in physical contact with said liquid junction solution, said reference contact region providing said reference.

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The references relied on by the Examiner in rejecting the claims are:

Hofmeier et al. (Hofmeier)	4,714,527	Dec. 22, 1987
McNeal et al. (Europe) (European Patent Application)	0 338 017 A2	Sep. 19, 1990

A. K. Covington et al. (Covington), "Improvements in the Precision Of PH Measurements - A Laboratory Reference Electrode With Renewable Free-diffusion Liquid Junction," *Analytica Chimica Acta*, 169 (1985), pp. 221-229.

Claim 47 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Europe and Hofmeier.

Claim 49 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Europe and Hofmeier in view of Covington.

We make reference to the answer (Paper No. 40, mailed February 28, 2000) for the Examiner's reasoning and to the brief (Paper No. 38, filed October 7, 1999) and the reply brief (Paper No. 41, filed April 24, 2000) for Appellants' arguments thereagainst.

OPINION

At the outset, we note that Appellants indicate their intention that claims 47 and 49 stand or fall together (brief, page 5). Thus, we will consider the claims separately only to the extent they correspond to each ground of rejection and will limit our consideration to independent claim 47.

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Appellants contrast the claimed liquid junction solution about a porous constraint with the prior art device and assert that the disclosure of Europe is focused on the structure of the constrained-diffusion junction or salt bridge that is permanently installed in a flow cell (brief, pages 13 & 14). Appellants argue that Europe's reference to fluid chamber 21 for removal of the reference fluid is limited to elimination of air bubbles without teaching or suggesting the flow of the reference fluid at any other time (brief, pages 15 & 16). Appellants further argue that Hofmeier's teaching of circulating the liquid junction relative to the sample solution pertains to a free-diffusion junction and cannot be combined with the salt bridge of Europe (brief, page 18 and reply brief, pages 2-4).

The Examiner responds to Appellants' arguments by pointing out that the fact that a constraint junction can operate without a flowing junction solution does not mean that flowing the reference fluid can not or should not be employed in a constraint junction (answer, page 6). The Examiner adds that, in fact, a flowing junction solution enhances the purity of the solution in a constraint junction as it does in a free junction (id.). Additionally, the Examiner argues that Europe does teach that the junction element is exposed to sample flow on one side

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and the junction solution flow on the other surface of the junction which indicates a flowing junction solution (answer, pages 7 and 8).

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. See In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). A prima facie case of obviousness is established by presenting evidence that the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed combination or other modification. See In re Lintner, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

After reviewing Europe, we agree with the Examiner that the disclosed porous salt bridge has one surface exposed to the flow of the sample fluid and the other surface exposed to the flow of a reference fluid (col. 1, lines 49-53). As depicted in Figure 2, Europe discloses flow cell 10 in which the sample fluid passes through flow path 13 on one side of porous bridge element 17 (col. 2, lines 45-48) and reference fluid passes through tubes 15 and 16 into chamber 21 on the other side of the porous bridge element (col. 3, lines 4-11). As also pointed out by Appellants (brief, page 14), Europe further discloses that the

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reference fluid enters the bridge through inlet tube 15 directly or indirectly from a container and exits through outlet tube 16 directly or indirectly to a suitable reservoir (col. 2, lines 49-55). In fact, Europe teaches that the reference fluid flows to and from a container into chamber 21 on one side of the porous bridge element while the sample fluid flows on the other side of the bridge for chemistry analyzing.

Hofmeier, on the other hand, relates to a free-diffusion liquid junction in which the reference fluid is pumped from reservoir 17 and returned to the reservoir after the reading of the sample fluid. As shown in Figure 1, Hofmeier discloses that sample fluid 2 is purged from measuring channel 3 by cleansing fluid 9 after each reading is completed (col. 4, lines 16-22). However, Hofmeier returns reference fluid 18 to the same container after the reading (col. 4, lines 26-32) and reuses the reference fluid for future readings. Similarly, Covington discloses that the flow rate of the reference fluid in a fresh liquid junction (free junction) is set such that a fresh liquid junction may be established each time the sample fluid is removed. Covington further suggests that the pumps need only be running long enough to reform or refresh the junction by flowing a small amount of the reference fluid (page 224).

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Appellants also argue that there would have been no suggestion or motivation for using the recirculating reference fluid of Hofmeier or the intermittent flow of Covington in a constraint junction (brief, page 18). Appellants further assert that modifying the constraint junction of Europe with the features of a free junction, as disclosed in Hofmeier and Covington, would not have been obvious (brief, page 21 and reply brief, pages 4 & 5).

Initially we note that while there must be some teaching, reason, suggestion, or motivation to combine or modify existing elements to produce the claimed device, it is not necessary that the cited references or prior art specifically suggest making the combination (see B.F. Goodrich Co. v. Aircraft Braking Systems Corp., 72 F.3d 1577, 1583, 37 USPQ2d 1314, 1319 (Fed. Cir. 1996) and In re Nilssen, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988)). Rather, "the suggestion to combine may come *from* the prior art, as filtered through the knowledge of one skilled in the art." Motorola Inc. v. Interdigital Technology Corp., 121 F.3d 1461, 1472, 43 USPQ2d 1481, 1489 (Fed. Cir. 1997). See also In re Jones, 958, F.2d 347, 351, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992) ("there must be some suggestion for [combining prior art references], found

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either in the references themselves or in the knowledge generally available to one of ordinary skill in the art") and In re Oetiker, 977 F.2d 1443, 1449, 24 USPQ2d 1443, 1446-47 (Fed. Cir. 1992) ("[W]e must look at the obviousness issue through the eyes of one of ordinary skill in the art and what one would be presumed to know with that background."). The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved. See In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999).

Based on these well-settled principles, we disagree with Appellants' assertion that Europe's reference fluid does not flow unless the bridge is to be purged of air bubbles. In particular, we are unpersuaded by Appellants' assertion that in a constrained junction, because the physical barrier prevents bulk fluid flow, fresh reference fluid does not need to be flowed (brief, page 18). In that regard, we agree with the Examiner that the reference fluid of Europe flows into and out of chamber 21 as indicated by the description of the embodiments depicted in Figures 2 and 4 (col. 3, lines 6-11 and col. 4, lines 26-33). Europe further teaches that trapping air bubbles

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is also prevented by the specific configuration of the inflow and exit tubes 15 and 16 (col. 4, lines 17-20). However, Appellants have not pointed to any specific teaching in Europe, nor have we found any, that limits the flow of the reference fluid to only the period after installing or replacing of the salt bridge.

In this case, the reason to combine the references is derived from the nature of the subject matter involved, flowing the reference fluid from and to the junction into the same container where the reference liquid may be recirculated for further measurements of the sample liquid. As we discussed above, although Europe does not explicitly indicate that the reference fluid is recirculated through a container, we find that the Examiner has reasonably concluded that if the reference fluid in a free junction, where sample back diffusion may affect the purity of the reference fluid, is recirculated for economical reasons, there is an even stronger desire to do so in a constraint junction where the reference fluid is less likely to become contaminated (answer, page 9). The Examiner has relied on Europe for generally disclosing a constraint junction configuration while Hofmeier is relied on for suggesting the recirculating of the reference fluid even in a free junction in

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which the reference liquid contacts the sample liquid and the possibility of cross contamination is increased. Therefore, as the Examiner asserts, one of ordinary skill in the art would have used the recirculating layout of Hofmeier for the reference liquid of Europe which includes a constraint junction wherein contamination of the reference fluid is less likely.

Based on our findings related to the applied prior art and the analysis made above, we find that the Examiner has established a prima facie case of obviousness. Therefore, the 35 U.S.C. § 103 rejection of claim 47 over Europe and Hofmeier and of claim 49 over Europe, Hofmeier and Covington is sustained.

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CONCLUSION

In view of the foregoing, the decision of the Examiner rejecting claims 47 and 49 under 35 U.S.C. § 103 is affirmed.

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

AFFIRMED

JAMES D. THOMAS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
ERROL A. KRASS)	APPEALS
Administrative Patent Judge)	AND
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