

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(2) is not binding precedent of the Board.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. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PERRY J. THUENTE

Appeal No. 1997-1215
Application 08/092,684

ON BRIEF

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

DECISION ON APPEAL

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This is a decision on appeal under 35 U.S.C. § 134 from the rejection of claims 1 and 4, the claims having been twice rejected. Claim 3 has been canceled and claims 2 and 5 have been indicated as being allowable by the Examiner.

The invention relates to the field of navigation systems which use a constellation of Earth-orbiting satellites to determine the position of a receiver at or near the Earth's surface. More specifically, the invention relates to a method and apparatus for detecting and quickly compensating for large cycle slips to improve the accuracy of position estimates. A cycle slip occurs when a receiver loses track of the phase of a carrier wave, for example, due to shading of the receiver from direct line-of-sight reception from the satellite or from noise. Using accumulated delta range (ADR) techniques, a cycle slip will introduce error into the position computations. The conventional navigation system, i.e., the

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Kalman filter of the navigation system, will correct for the error, however, it may take tens of seconds before compensation for the error begins and several minutes before the error is substantially eliminated from the position estimates. These times are too long for real time positioning in many applications.

Representative independent claim 1 is reproduced as follows:

1. A method for detecting carrier signal cycle slip errors in a position determining system which receives navigation signals at a receiver from a plurality of satellites, the method comprising the steps of:

(a) receiving, at the receiver, a navigational signal from a satellite, said navigation signal including a continuous carrier wave;

(b) counting cycles of said carrier wave over a time $>t$;

(c) computing, from said time $>t$ and said cycle count, a first velocity of the receiver along a vector between the receiver and said satellite;

(d) receiving a second velocity of the receiver from an inertial reference unit;

(e) computing a component of said second velocity along said vector;

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(f) computing a difference between said first velocity and said component of said second velocity;

(g) comparing said difference to a predetermined value; and

(h) indicating a cycle slip error if said difference exceeds said predetermined value.

The Examiner relies on the following references:

Yokouchi et al. 4,903,212 Feb. 20, 1990

Appellant's admitted prior art (APA)

Survey Lapucha et al., "The Use of INS/GPS in a Highway System", IEEE 1990, pp. 413-420. (Lapucha)

Claims 1 and 4 stand rejected under 35 U.S.C. § 103 as being unpatentable over Yokouchi in view of APA and Lapucha.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the brief and answer for the respective details thereof.

OPINION

After a careful review of the evidence before us, we

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will not sustain the rejection of claims 1 and 4 under 35
U.S.C. § 103.

The Examiner has failed to set forth a **prima facie** case. It is the burden of the Examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the reasonable teachings or suggestions found in the prior art, or by a reasonable inference to the artisan contained in such teachings or suggestions.

In re Sernaker, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983). "Additionally, when determining obviousness, the claimed invention should be considered as a whole; there is no legally recognizable 'heart' of the invention." **Para-Ordnance Mfg. v. SGS Importers Int'l, Inc.**, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995) (**citing W. L. Gore & Assocs., Inc. v. Garlock, Inc.**, 721 F.2d 1540, 1548, 220 USPQ 303, 309 (Fed. Cir. 1983), **cert. denied**, 469 U.S. 851 (1984)).

With regard to the rejection of claims 1 and 4 under 35 U.S.C. § 103, the Examiner reasons that Yokouchi discloses a GPS/self-contained combination type navigation system which

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calculates a first velocity of the receiver from the GPS data and receives a second velocity of the receiver from an inertial reference unit within the receiver. Also, Yokouchi discloses computing a difference between the first and second velocities and compares this difference to a predetermined value. The Examiner explains that Yokouchi does not explicitly disclose the use of carrier phase tracking but this is found in the APA of the accumulated delta range technique, and used to improve accuracy. The Examiner also explains that Yokouchi does not explicitly disclose indicating a cycle slip error if the velocity difference exceeds a predetermined error, however, Lapucha suggests that a cycle slip has occurred based on the comparison of the data collected from the INS system and GPS system. Thus one of ordinary skill in the art would have been motivated to utilize the velocity difference data of Yokouchi as an indication of cycle slip error. (Answer-pages 3 and 4.)

There is no dispute that all aspects of the claimed invention can be found in the three references applied in the rejection (Brief-page 5). However, Appellant contends that

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the Examiner has used impermissible hindsight to combine the references, with "Appellant's own disclosure as a blueprint..." (Brief-page 2). "The Examiner has not explained why anyone of ordinary skill, without having had the benefit of Appellant's novel teaching before them, would have been motivated to make the novel combination." (Brief-page 6.)

The Examiner responds that it is not necessary that the references actually suggest, expressly or in so many words, the changes or improvements that Appellant has made, that it is what the references as a whole would have suggested to one of ordinary skill in the art, and that such a teaching, suggestion or inference can be found not only in the references but also from

knowledge generally available to one of ordinary skill in the art. (Answer-page 7.)

Thus, both parties agree that motivation to combine the cited references cannot be found in the references themselves. Although the Examiner contends that "the references as a whole" and "knowledge generally available" can

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supply motivation, with nothing more than these bare statements, we agree with Appellant. We see no reasoning by the Examiner to combine the cited references.

The Federal Circuit states that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." **In re Fritch**, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir. 1992), **citing In re Gordon**, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). "Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor." **Para-Ordnance Mfg. v. SGS Importers Int'l**, 73 F.3d at 1087, 37 USPQ2d at 1239, **citing W. L.**

Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d at 1551, 1553, 220 USPQ at 311, 312-13.

Since there is no evidence in the record of the

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desirability of such a combination, we will not sustain the Examiner's rejection of claims 1 and 4.

We have not sustained the rejection of claims 1 and 4 under 35 U.S.C. § 103. Accordingly, the Examiner's decision is reversed.

REVERSED

James D. Thomas)
Administrative Patent Judge)
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) BOARD OF
)
Errol A. Krass) PATENT
Administrative Patent Judge)
) APPEALS AND
)
)

INTERFERENCES

Stuart N. Hecker)
Administrative Patent Judge)

JT/dm

Sterne, Kessler, Goldstein & Fox

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