Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte DAVID S. BREED, WILBUR E. DUVALL,
WENDELL C. JOHNSON,
and
WILLIAM THOMAS SANDERS

_____

Appeal No. 2001-1186
Application No. 08/819,609

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ON BRIEF

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Before RUGGIERO, DIXON, and GROSS, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal from the final rejection of claims 1-20, which are all of the claims pending in the present application. Amendments filed July 5, 2000 and July 27, 2000 after final rejection have been denied entry by the Examiner.

The disclosed invention relates to a method and apparatus for measuring the volume of liquid in a fuel tank of a vehicle using a combination of one or more load cells or fuel level

measuring devices. In some cases, other sensors are also used which measure the pitch or roll angle of the vehicle or the fuel density. An approximate measure of the quantity of fuel in the tank is developed and an algorithm is utilized to correct for inaccuracies arising from the pitch and roll angles of the vehicle, other external forces, or from variations in fuel density.

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

> 1. A method for measuring the volume of a liquid in a fuel tank in a vehicle that is subject to varying external forces caused by movement or changes in the roll and pitch angles of the vehicle, comprising the steps of:
>
> conducting a plurality of measurements, each measurement including the known volume of the tank and the value of at least three parameters concerning the tank, said parameters being selected from the group consisting of the load of the tank on a load cell arranged at a first location, the load of the tank on a load cell arranged at a second location, the load of the tank at a load cell arranged at a third location, the pitch angle of the vehicle, the roll angle of the vehicle, the height of the fuel at a first location in the tank, the height of the fuel at a second location in the tank and the height of the fuel at a third location in the tank,
>
> generating an algorithm from said plurality of measurements for determining the volume of fuel in the tank upon the receipt of current values of said at least three parameters,
>
> inputting said algorithm into processor means arranged in connection with the vehicle,

measuring said at least three parameters during operation of the vehicle, and

inputting said at least three parameters into said algorithm in said processor means such that said algorithm provides the volume of fuel in the tank.

The Examiner relies on the following prior art:

G. I. Cohn et al. (G. I. Cohn)	3,447,374	Jun. 03, 1969
I. H. Cohn et al. (I. H. Cohn)	3,523,186	Aug. 04, 1970
Ellinger et al. (Ellinger)	4,815,323	Mar. 28, 1989
Grills et al. (Grills)	5,133,212	Jul. 28, 1992
Zfira	5,157,968	Oct. 27, 1992
Breed	5,809,437	Sep. 15, 1998 (filed Jun. 07, 1995)
Johnson	5,939,634 (effectively filed	Aug. 17, 1999 Mar. 10, 1995)

Claims 1-20 stand finally rejected under 35 U.S.C. § 103(a). With respect to claims 1-7, 9, 10, and 14, the Examiner, as evidence of obviousness, offers Grills in view of I. H. Cohn and G. I. Cohn. To this basic combination, the Examiner separately adds Ellinger with respect to claims 11 and 15, and separately adds Zfira with respect to claim 8. With respect to claims 16, 19, and 20, the Examiner offers Grills in view of Breed and G. I. Cohn, and adds Johnson to this basic combination with respect to claims 12, 13, 17, and 18.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Briefs,[1] the final Office action, and the Answer for the respective details.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner and the evidence of obviousness relied upon by the Examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, Appellants' arguments set forth in the Briefs along with the Examiner's rationale in support of the rejections and arguments in rebuttal set forth in the Examiner's Answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the invention as recited in claims 1-15, 17, and 18.

[1] The Appeal Brief was filed November 13, 2000 (Paper No. 20) in response to the final Office action mailed April 7, 2000 (Paper No. 11). In response to the Examiner's Answer mailed November 24, 2000 (Paper No. 21), a Reply Brief was filed December 6, 2000 (Paper No. 22), which was acknowledged and entered by the Examiner in the communication dated December 13, 2000 (Paper No. 23).

We reach the opposite conclusion with respect to the Examiner's obviousness rejection of claims 16, 19, and 20. Accordingly, we affirm-in-part.

Appellants' arguments in response to the Examiner's obviousness rejection of the appealed claims are organized according to a suggested grouping of claims indicated at pages 6 and 7 of the Brief. We will consider the appealed claims separately only to the extent separate arguments for patentability are presented. Any dependent claim not separately argued will stand or fall with its base claim. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983).

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073-74, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some

teaching, suggestion, or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

With respect to the Examiner's 35 U.S.C. § 103(a) rejection of independent claims 1 and 9, Appellants assert that the Examiner has failed to establish a prima facie case of obviousness since all of the limitations of claims 1 and 9 are not taught or suggested by the applied prior art references. In particular, Appellants contend (Brief, pages 10 and 11; Reply Brief, pages 1 and 2) that, in contrast to the applied prior art references, the appealed claims 1 and 9 require the derivation of an algorithm from either at least three parameters and the known

volume of the tank (claim 1) or parameters corresponding to output signals from at least three transducers and the volume of fuel in the tank (claim 9).

After careful review of the applied Grills, I. H. Cohn, and G. I. Cohn references, in light of the arguments of record, we are in general agreement with Appellants' position as stated in the Briefs. We find no indication from the Examiner as to how the applied references, even if combined, would meet the required combination of sensed parameters and the tank or fuel volume. As asserted by Appellants, Grills measures only load on the tank, I. H. Cohn senses pitch and roll angles and determines fluid mass, while G. I. Cohn utilizes the three parameters of fluid volume, pitch angle, and roll angle.

We further agree with Appellants' assertion (Brief, page 10; Reply Brief, page 20) that the Examiner has not provided convincing motivation for the proposed combination of references so as to establish a prima facie case of obviousness. The Grills and I. H. Cohn references utilize load values and pitch and roll values, respectively, to provide a continuous determination of actual fuel volume. In contrast, the G. I. Cohn reference, using resonant frequency sensing, determines pitch and roll angle and fuel tank occupancy values to develop an algorithm which is

applied to provide the current volume of fuel in a tank. In our view, the techniques utilized by these three references are so opposite in approach that any attempt to combine them could only come from Appellants' own disclosure and not from any teaching or suggestion in the references themselves.

We have reviewed the Ellinger and Zfira references applied by the Examiner to address, respectively, the specific gravity determination feature of dependent claim 8 and the ultrasonic transducer features of dependent claims 11 and 15. We find nothing in either of these references which would overcome the innate deficiencies in Grills, I. H. Cohn, and G. I. Cohn discussed supra.

In view of the above discussion, since it is our opinion that the Examiner has not established a prima facie case of obviousness, we do not sustain the Examiner's 35 U.S.C. § 103(a) rejection of independent claims 1 and 9, nor of claims 2-8, 10, 11, 14, and 15 dependent thereon.

We also do not sustain the Examiner's obviousness rejection of independent claim 12, as well as dependent claims 13, 17, and 18 in which the Johnson reference was applied to the combination of Grills, G. I. Cohn, and Breed to address the ultrasonic transducer feature of these claims. We agree with Appellants

(Brief, page 15) that there is no apparent motivation to apply the ultrasonic transducer teachings of Johnson to those of Grills and G. I. Cohn. In our view, we fail to see how or why the skilled artisan would be led to the teachings of Johnson since the problems associated with providing an accurate indication of fuel volume in a tank in a moving vehicle such as those in Grills and a fuel tank subject to pitch and roll variations such as in G. I. Cohn are non-existent in a stationary storage tank such as that described by Johnson. Further, our review of the Breed reference, directed to the development of a neural network useful in automobile diagnostic testing, reveals nothing which would overcome the deficiencies of Grills, G. I. Cohn, and Johnson.

Turning to a consideration of independent claim 16, the representative claim for Appellants' suggested grouping of claims 16, 19, and 20, we note that while we found Appellants' arguments to be persuasive with respect to the Examiner's obviousness rejection of claims 1-15, 17, and 18 discussed supra, we reach the opposite conclusion with respect to the rejection of claim 16. Our review of the disclosure of G. I. Cohn, directed to the development of an algorithm based on measurements of different values of pitch and roll angles at different levels of fuel tank volume, reveals, in our view, that all of the limitations of

claim 16 are disclosed with the exception of the specific disclosure of the use of neural network principles in the algorithm development. In making this determination, it is our opinion that the disclosure at column 6, lines 55-65 of G. I. Cohn, which describes the algorithm development based on measurement values of pitch and roll taken at values from maximum positive to maximum negative, clearly suggests measurements taken over the claimed driving conditions from rest (i.e., zero pitch and roll) to various motion driving states.

We further find no persuasive arguments from Appellants that would convince us of any error in the Examiner's line of reasoning (Answer, page 6) that the skilled artisan would recognize and appreciate that the neural network technique disclosed by Breed has obvious application to the development of the "training" functional relationship described by G. I. Cohn. In particular, we find to be without merit Appellants' contention (Brief, page 16) that Breed does not disclose an algorithm based on measurements related to different fill states of fuel in a tank under different conditions. The Breed reference was used by the Examiner in combination with other prior art to establish the basis for the obviousness rejection. As previously discussed, the measurement features asserted by Appellants to be lacking in

Breed all exist in the algorithm development procedure disclosed by G. I. Cohn. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 1097, 231 USPQ 375, 380 (Fed. Cir. 1986).

For the above reasons, it is our opinion that, since the Examiner's prima facie case of obviousness has not been rebutted by any convincing arguments from Appellants, the Examiner's obviousness rejection of representative independent claim 16, as well as dependent claims 19 and 20 grouped together with claim 16 and not separately argued by Appellants, is sustained. We note that the Examiner, in the statement of the grounds of rejection of claim 16 (final Office action, page 7), has included the Grills reference, ostensibly for a disclosure of tank fuel level determination using multiple load sensors. Since independent claim 16, however, has no recitation directed to the use of load sensors, we therefore sustain the rejection of claims 16, 19, and 20 based solely on the combination of G. I. Cohn and Breed.[2]

[2]The Board may rely on less than all of the references applied by the Examiner in an obviousness rationale without designating it as a new ground of rejection. In re Bush, 296 F.2d 491, 496, 131 USPQ 263, 266-67 (CCPA 1961); In re Boyer, 363 F.2d

In summary, with respect to the Examiner's 35 U.S.C. § 103(a) rejection of the appealed claims, we have not sustained the rejection of claims 1-15, 17, and 18, but have sustained the rejection of claims 16, 19, and 20. Therefore, the Examiner's decision rejecting claims 1-20 is affirmed-in-part.

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

AFFIRMED-IN-PART

JOSEPH F. RUGGIERO Administrative Patent Judge	)	
JOSEPH L. DIXON Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
ANITA PELLMAN GROSS Administrative Patent Judge	)	

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455, 458 n.2, 150 USPQ 441, 444 n.2 (CCPA 1966).

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