

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KOJI KANDA

Appeal 2007-1891
Application 10/694,884
Technology Center 2800

Decided: November 9, 2007

Before KENNETH W. HAIRSTON, JOSEPH L. DIXON, and
JEAN R. HOMERE, *Administrative Patent Judges*.

HOMERE, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1 through 21. We have jurisdiction under 35 U.S.C. § 6(b) to decide this appeal. We affirm.

The Invention

Appellant invented a vehicle steering apparatus for supplying to a steering wheel a reaction force corresponding to an extracted component within a predetermined frequency range of current of a steering motor.

(Spec. 3.)

An understanding of the invention can be derived from exemplary independent claim 1, which reads as follows:

1. A vehicle steering apparatus which uses a steering motor to supply a steering mechanism with steering force corresponding to a steering amount applied to a steering member, comprising:

a reaction force motor for supplying the steering member with steering reaction force;

a current sensor for detecting a motor current of the steering motor;
and

a controller for performing operations of:

extracting component within a predetermined frequency range out of the motor current detected by the current sensor; and

driving the reaction force motor so as to supply the steering member with steering reaction force corresponding to the extracted component and steering reaction force corresponding to the steering amount.

In rejecting the claims on appeal, the Examiner relies upon the following prior art:

Discenzo	US 6,097,286	Aug. 01, 2000
Kurishige	US 6,161,068	Dec. 12, 2000

The Examiner rejects the claims on appeal as follows:

Claims 1 through 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Discenzo and Kurishige.

First, Appellant contends¹ that the combination of Discenzo and Kurishige does not render claims 1 through 21 unpatentable. Particularly, Appellant contends that the Examiner has not identified a proper motivation² for combining Discenzo and Kurishige. (App. Br. 5-8, Reply Br. 1-5.) Appellant further contends that even if the references were properly combined, they would still not teach the claimed invention.³ (App. Br. 8-11,

¹ This decision considers only those arguments that Appellant submitted in the Appeal Brief. Arguments that Appellant could have made but chose not to make in the Brief are deemed to have been waived. *See* 37 C.F.R. § 41.37(c)(1) (vii)(eff. Sept. 13, 2004). *See also In re Watts*, 354 F.3d 1362, 1368 (Fed. Cir. 2004).

² Appellant contends that Discenzo is a steer-by-wire system with a separate torque sensor that does not require the assist torque used in the Kurishige system. Therefore, one of ordinary skill would have no reason to remove Discenzo's torque sensor to monitor current based on the references of record. (App. Br. 7.) Appellant further contends that Kurishige teaches away from Discenzo since integrating the teachings of the former reference into the latter's would render Discenzo inoperable. (App. Br. 7, Reply Br. 5.)

³ Appellant states that “[t]he Examiner relied on Kurishige as a teaching reference to show that it is well-known in the art that torque and current are proportional. . . . Applicant acknowledges 1) some traditional power steering systems may produce a steering motor assist current approximately proportional to torque on a steering column and 2) increasing the current input in some motors, under some conditions, will increase the torque output by those motors. However, these facts in no manner suggest that the torque applied against a steering gear box by vehicle wheels is proportional to the current produced by the steering motor used to move those wheels.” (App. Br. 8.)

Reply Br. 5.) In response, the Examiner contends that Discenzo's disclosure of a torque sensor that senses the torque of a steering motor to generate a corresponding reaction force to a steering wheel teaches the invention in light of the fact that torque is known to be proportional to current, as evidenced by Kurishige. (Answer 8-10, App. Br. 8.)

ISSUE

The *pivotal* issue in the appeal before us is as follows:

Has Appellant shown⁴ that the Examiner failed to establish that the combined disclosures of Discenzo and Kurishige render the claimed invention unpatentable under 35 U.S.C. § 103(a)? Particularly, does Discenzo's disclosure of a torque sensor that senses the torque of a steering motor to supply a corresponding reaction force to a steering wheel in

⁴ In the examination of a patent application, the Examiner bears the initial burden of showing a *prima facie* case of unpatentability. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). When that burden is met, the burden then shifts to the applicant to rebut. *Id.*; *see also In re Harris*, 409 F.3d 1339, 1343-44 (Fed. Cir. 2005) (finding rebuttal evidence unpersuasive). If the applicant produces rebuttal evidence of adequate weight, the *prima facie* case of unpatentability is dissipated. *Piasecki*, 745 F.2d at 1472. Thereafter, patentability is determined in view of the entire record. *Id.* However, Appellant has the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

combination with Kurishige's disclosure that torque is known to be proportional to current, render the claimed invention unpatentable?

FINDINGS OF FACT

The following findings of fact are supported by a preponderance of the evidence.

The Invention

1. Appellant invented a vehicle steering apparatus (Figure 1) for supplying to a steering wheel (2) a reaction force corresponding to a current extracted from a steering motor (5). (Spec. 3.)

2. As depicted in Figure 1, a current sensor (8a) detects the current within a predetermined frequency (3 Hz to 15 Hz) as it is flowing in a steering motor (5) while the vehicle is in motion. The current sensor (8a) subsequently supplies the detected current to a main controller (4), which generates a reaction force corresponding to the detected current. (Spec. 9.)

3. A reaction force controller (7) uses the generated reaction force to drive a reaction force motor (3), which ultimately supplies the generated reaction force to the steering wheel (2). (*Id.*)

The Prior Art Relied Upon

4. Discenzo discloses a steer-by-wire system for providing a steering reaction force to a steering wheel based on the torque values extracted from a steering motor. (Col. 1, ll. 41-49.)

5. As shown in Figure 1, Discenzo discloses a torque sensor (36) that senses high frequency torque signals, between 0.5 Hz to 5 KHz, in a

steering motor (28) as the wheels of a vehicle are turning. (Col. 2, ll. 29-37, ll. 50-54.)

6. Discenzo discloses that the torque sensor (36) sends the detected torque signals to a servo motor (38). Alternatively, the torque sensor generates a frequency and amplitude corresponding to the detected torque signal, and supplies said frequency and amplitude to the steering wheel to indicate the actual road disturbances sensed by the torque sensor. (Col. 2, ll. 54-62.)

7. Kurishige discloses that in the prior art when a torque sensor is used to sense the torque in a motor while a vehicle is in motion, a torque controller computes an assist torque current almost proportional to the output signal of the torque sensor. The computed assist torque current is then used to assist the steering torque of the driver. (Col. 1, ll. 42-54.)

PRINCIPLES OF LAW

OBVIOUSNESS (Reason to Combine)

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called

secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 (“While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”)

In *KSR*, the Supreme Court emphasized “the need for caution in granting a patent based on the combination of elements found in the prior art,” *id.* at 1739, and discussed circumstances in which a patent might be determined to be obvious. In particular, the Supreme Court emphasized that “the principles laid down in *Graham* reaffirmed the ‘functional approach’ of *Hotchkiss*, 11 How. 248 [(1850)].” *KSR*, 127 S.Ct. at 1739 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 12 (1966) (emphasis added)), and reaffirmed principles based on its precedent that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* The Court explained:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

Id. at 1740. The operative question in this “functional approach” is thus “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.*

The Supreme Court stated that there are “[t]hree cases decided after *Graham* [that] illustrate this doctrine.” *Id.* at 1739. “In *United States v. Adams*, ... [t]he Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *Id.* at 1740. “*Sakraida and Anderson’s-Black Rock* are illustrative – a court must ask whether the improvement is more than the predictable use of prior art elements according to their established function.” *Id.* at 1740.

The Supreme Court stated that “[f]ollowing these principles may be more difficult in other cases than it is here because the claimed subject matter may involve more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement.” *Id.* The Court explained, “[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *Id.* at 1740-41. The Court noted that “[t]o facilitate review, this analysis should be made explicit.” *Id.*, citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the

legal conclusion of obviousness”). However, “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.*

The Federal Circuit recently concluded that it would have been obvious to combine (1) a mechanical device for actuating a phonograph to play back sounds associated with a letter in a word on a puzzle piece with (2) an electronic, processor-driven device capable of playing the sound associated with a first letter of a word in a book. *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007) (“[a]ccommodating a prior art mechanical device that accomplishes [a desired] goal to modern electronics would have been reasonably obvious to one of ordinary skill in designing children’s learning devices”). In reaching that conclusion, the Federal Circuit recognized that “[a]n obviousness determination is not the result of a rigid formula disassociated from the consideration of the facts of a case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not.” *Id.* at 1161 (citing *KSR*, 127 S. Ct. 1727, 1739 (2007)) (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”). The Federal Circuit relied in part on the fact that Leapfrog had presented no evidence that the inclusion of a reader in the combined device was “uniquely challenging or difficult for one of ordinary skill in the art” or “represented an unobvious step over the prior art.” *Id.* at 1162 (citing *KSR*, 127 S. Ct. at 1740-41 (2007)).

ANALYSIS

Claims 1, 2, 5-7, 9, 10, 11-21

We begin our analysis by noting that independent claims 1, 11, and 21 recite data current sensor that detects the current in a steering motor to supply a steering wheel with a reaction force corresponding to the detected motor current. (App. Br., Claim Appendix.) We find that Discenzo's disclosure in combination with Kurishige's disclosure reasonably teaches this limitation.

As detailed in the Findings of Fact section above, we have found that Discenzo, similarly to the claimed invention, discloses a sensor that senses signals within a steering motor while a vehicle is in motion. The sensor subsequently outputs a corresponding reaction force, which is supplied to the steering wheel of the vehicle. (Findings 4 through 6.) We have also found that the disclosed sensor is a torque sensor for extracting torque signals ranging from 0.5 Hz to 5 KHz. (*Id.*) Additionally, we have found in Kurishige that, customarily in the art, when a torque sensor senses a torque signal in the motor of a vehicle, a torque controller is known to compute an assist torque current that is almost proportional to the sensed torque signal. (Finding 7.) The computed torque current is also known to assist in providing the reaction force to the steering wheel of the vehicle. (*Id.*) Therefore, we find that one of ordinary skill would have readily recognized that Discenzo's apparatus, taken in

combination with Kurishige's disclosure, would have *predictably* included a controller that computes an assist torque current almost proportional to the sensed torque signal to produce the reaction force supplied to the steering wheel.⁵

In our view, Appellant's arguments that the proffered combination is improper for allegedly lacking motivation or because Kurishige's teaching would allegedly render Discenzo's apparatus inoperable⁶ are unpersuasive. Appellant's arguments are erroneously directed to the combination of Kurishige's electric power steering system with Discenzo's Steer-by-wire system with feedback. In contrast, the Examiner's proffered combination, relies only upon Discenzo's disclosure and Kurishige's "background of the invention section," as evidence of the state of the prior art at the time of

⁵ [I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826 (CCPA 1968). The Supreme Court has held that in analyzing the obviousness of combining elements, a court need not find specific teachings, but rather may consider "the background knowledge possessed by a person having ordinary skill in the art" and "the inferences and creative steps that a person of ordinary skill in the art would employ." *See KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-41 (2007). To be nonobvious, an improvement must be "more than the predictable use of prior art elements according to their established functions." *Id.* at 1740.

⁶ See *supra* note 2.

Appellant's invention.⁷ It follows that the Examiner did not err in rejecting independent claims 1, 11, and 21 as being unpatentable over the combination of Discenzo and Kurishige.

Appellant did not provide separate arguments with respect to the rejection of claims 2, 5 through 7, 9, 10, and 12 through 20. These arguments are deemed to have been waived.⁸ Therefore, we select independent claims 1 and 11 as being representative of the cited claims. Claims 2, 5 through 7, 9, 10, and 12 through 20 consequently fall together with representative claims 1 and 11. *See In re Young*, 927 F.2d 588, 590 (Fed. Cir. 1991).

Claims 3, 4, and 8,

Appellant alleges that the combination of Discenzo and Kurishige does not render claims 3, 4, and 8 unpatentable. (App. Br. 9-10.) However, Appellant's allegations failed to show how the portions of Discenzo and Kurishige upon which the Examiner relies in the rejection do not teach limitations of the cited claims. We note that Appellant's mere allegations do not amount to an argument that particularly shows how the Examiner's reliance on the cited textual portions of Discenzo and Kurishige failed to render the cited claims unpatentable. In our view, such allegations do not rebut the Examiner's prima facie case of obviousness against the cited

⁷ As rightfully noted by Appellant, the Examiner only relies on Kurishige as evidence that it was well-known in the art that assist current and torque are almost proportional when a torque sensor is used to sense a torque signal in a motor. See supra note 3.

⁸ See supra note 1.

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claims. It follows that the Examiner did not err in rejecting independent claims 3, 4 and 8 as being unpatentable over the combination of Discenzo and Kurishige.

CONCLUSION OF LAW

On the record before us, Appellant has not shown that the Examiner failed to establish that the combination of Discenzo's disclosure and Kurishige's disclosure render claims 1 through 21 unpatentable under 35 U.S.C. § 103(a).

DECISION

We have affirmed the Examiner's decision rejecting claims 1 through 21.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747