UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JIANBO LU

Appeal 2008-0414
Application 10/708,673
Technology Center 3600

Decided: July 23, 2008

Before MURRIEL E. CRAWFORD, JENNIFER D. BAHR , and STEVEN D.A. McCARTHY, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Jianbo Lu (Appellant) appeals under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1-6, 9-15, and 17-43. Claims 7, 8, and 16 have been canceled. We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

The Invention

Appellant's claimed invention is directed to a system and method for controlling brake-steer in the presence of a trailer (Specification, ¶ [0002]). Independent claim 1 is illustrative of the claimed invention and reads as follows:

> 1. A method of controlling an automotive vehicle and a trailer comprising:
>
> determining a presence of the trailer; and
>
> applying brake-steer to the vehicle in response to the trailer by applying at least one brake at a first vehicle wheel to reduce a vehicle turning radius of the vehicle and trailer.

The Rejections

The Examiner relies upon the following as evidence of unpatentability:

McColl	US 4,372,407	Feb. 8, 1983
Breen	US 5,005,130	Apr. 2, 1991
Schlichenmaier	US 5,120,114	Jun. 9, 1992
Urvoy	US 5,307,888	May 3, 1994
Noll	US 5,455,557	Oct. 3, 1995
Morita	US 5,480,221	Jan. 2, 1996
Wood	US 5,709,435	Jan. 20, 1998
Gerum	US 5,747,683	May 5, 1998
Matsuda	US 6,017,101	Jan. 25, 2000
Oyama	US 6,112,845	Sep. 5, 2000
Traechtler	US 6,600,974 B1	Jul. 29, 2003
Posselius	US 6,804,597 B1	Oct. 12, 2004
Kim	US 6,842,683 B2	Jan. 11, 2005
Koibuchi (Koibuchi '402)	US 2005/0027402 A1	Feb. 3, 2005
Ernst (as translated)	EP 0 253 964 A2	Jan. 27, 1988

Masaaki (as translated)	JP 14-012172	Jan. 15, 2002
Koibuchi (as translated) (Koibuchi '774)	JP 15-191774	Jul. 9, 2003

The following rejections under 35 U.S.C. § 103(a) are before us for review.

(1) Claims 1, 31, 36, and 37 as unpatentable over Schlichenmaier and Kim;

(2) Claim 2 as unpatentable over Schlichenmaier, Kim, and Ernst;

(3) Claims 3 and 5 as unpatentable over Schlichenmaier, Kim, Ernst, and Oyama;

(4) Claim 4 as unpatentable over Schlichenmaier, Kim, Ernst, and McColl;

(5) Claim 6 as unpatentable over Schlichenmaier, Kim, Ernst, and Koibuchi '774 (using Koibuchi '402 as an English language equivalent);

(6) Claims 9, 17, 29, and 30 as unpatentable over Schlichenmaier, Kim, and Wood;

(7) Claims 10 and 32 as unpatentable over Schlichenmaier, Kim, and Posselius;

(8) Claims 11, 12, 33, and 34 as unpatentable over Schlichenmaier, Kim, and Noll;

(9) Claims 13, 15, and 35 as unpatentable over Schlichenmaier, Kim, and Masaaki;

(10) Claim 14 as unpatentable over Schlichenmaier, Kim, and Traechtler;

(11) Claim 18 as unpatentable over Schlichenmaier, Kim, Wood, and Ernst;

(12) Claims 19 and 21 as unpatentable over Schlichenmaier, Kim, Wood, Ernst, and Oyama;

(13) Claim 20 as unpatentable over Schlichenmaier, Kim, Wood, Ernst, and McColl;

(14) Claim 22 as unpatentable over Schlichenmaier, Kim, Wood, Ernst, and Koibuchi ‘774 (using Koibuchi ‘402 as an English language equivalent);

(15) Claim 23 as unpatentable over Schlichenmaier, Kim, Wood, and Posselius;

(16) Claims 24 and 25 as unpatentable over Schlichenmaier, Kim, Wood, and Noll;

(17) Claims 26 and 28 as unpatentable over Schlichenmaier, Kim, Wood, and Masaaki;

(18) Claim 27 as unpatentable over Schlichenmaier, Kim, Wood, and Traechtler;

(19) Claim 38 as unpatentable over Schlichenmaier, Kim, and Urvoy;

(20) Claims 39 and 40 as unpatentable over Schlichenmaier, Kim, and Gerum;

(21) Claim 41 as unpatentable over Schlichenmaier, Kim, and Matsuda;

(22) Claim 42 as unpatentable over Schlichenmaier, Kim, Gerum, and Morita; and

(23) Claim 43 as unpatentable over Schlichenmaier, Kim, and Breen.

ISSUES

Appellant argues that "[n]either Schlichenmaier nor Kim teaches anything regarding the reduction of a turning radius selected by a driver; they teach a treatment for yaw, which is characterized by a departure from the turning radius in excess of what the driver desired" (Appeal Br. 6; *see also* Reply Br. 2[1]). The first issue presented in this appeal is whether this argument demonstrates reversible error in the Examiner's rejections.

A second issue is whether Appellant's arguments demonstrate that the Examiner erred in rejecting claims 9, 17, and 31, and the claims depending therefrom, which require application of brake-steer to both a vehicle brake and a trailer brake to reduce the turning radius of the vehicle and trailer. This issue turns on whether the Examiner has satisfied the burden of establishing a prima facie case that it would have been obvious to use both the vehicle brakes and the trailer brakes to apply brake-steer to reduce the turning radius of the vehicle and trailer in a braking system for a vehicle towing an attached trailer, such as that of Schlichenmaier.

FINDINGS OF FACT

FF1 The braking system of Appellant's invention applies brake-steer in step 262 "[i]f the yaw rate from the hand wheel varies from the yaw rate from the yaw rate sensor (which indicates that the driver's intent is not being followed)" (Specification ¶ [0127] and fig. 19).

[1] We make reference in this opinion to the Appellant's Appeal Brief ("Appeal Br."), filed December 8, 2006, and Reply Brief ("Reply Br."), filed March 28, 2007.

FF2 Schlichenmaier discloses a brake system for a tractor equipped for pulling trailers (col. 1, ll. 28-33), the brake system being provided with a control unit 3 for controlling braking applied at each wheel of the tractor to prevent locking of any of the wheels (col. 1, l. 63 to col. 2, l. 5) and a trailer detection unit 7 for detecting the absence of a trailer (col. 2, ll. 55-56). The control unit 3 includes a yawing moment attenuator 9, which prevents an excessively great difference in brake pressure on the two sides of the tractor if tire grip with the road is highly variable (col. 2, ll. 15-20). If the trailer detection unit detects the absence of a trailer, the yawing moment attenuator causes the brake pressure difference between the right and left brake cylinders 6 of the tractor to be kept lower than in the case where a trailer is detected (col. 2, ll. 28-37). The objective of Schlichenmaier's yawing moment attenuator 9 is to reduce the danger of a truck overturning when driven without a trailer (col. 1, ll. 30-34).

FF3 Schlichenmaier alludes to the possibility of an anti-skid braking system on the trailer (col. 2, ll. 7-9), but does not mention the use of a trailer brake to apply brake-steer to reduce the turning radius of the tractor and trailer.

FF4 Kim discloses a vehicle stability control system that prevents loss of steering control by applying a braking force to an inner rear wheel when understeering (i.e., the vehicle turning radius is larger than the desired radius) is detected and by applying braking force to an outer front wheel when oversteering or spinning out (i.e., the vehicle turning radius rapidly decreases and vehicle stability is lost) is detected (col. 2, ll. 46-54). The system operates by setting the driver's

desired yaw rates on various road conditions using a detected steering wheel angle and vehicle speed while turning, judging road surface conditions, determining the driver's desired yaw rate corresponding to the judged road conditions as a reference yaw rate, determining whether the vehicle is understeered or oversteered by comparing the determined reference yaw rate with an actual yaw rate as measured by a yaw rate sensor, and controlling braking force and driving force accordingly (col. 2, ll. 1-17, and col. 3, l. 4 to col. 4, l. 58). Stated differently, Kim applies brake-steer by applying braking force on vehicle wheels so as to reduce the vehicle turning radius when understeering is detected and applies brake-steer to increase the turning radius when oversteering is detected.

FF5 Kim does not specifically address vehicles towing trailers and, thus, provides no teaching with regard to applying brake-steer to trailer brakes to reduce or increase turning radius.

FF6 The Examiner concedes that Schlichenmaier is silent with regard to applying a trailer brake and a vehicle brake (Answer 8[2]).

FF7 Wood teaches a towed vehicle brake control system including a trailer brake system completely independent of the brake system of the tractor in a hydraulic sense (col. 3, l. 66 to col. 4, l. 2). Functionally, however, the trailer brake system is "operated in a slave fashion without invasion of the two respective hydraulic systems" (col. 4, ll. 2-4). In other words, "when the brakes of the tractor are operated by the driver, the brakes of the trailer are synchronously operated

[2] We make reference in this opinion to the Examiner's Answer, mailed March 22, 2007.

insuring equal or balanced braking of both tractor and trailer" (col. 4, ll. 4-7). Wood's system senses the position of tractor brake pedal 18, amplifies the signal produced by the brake pedal position sensor, and transmits the amplified signal to comparator 36, which compares the amplified tractor brake pedal position signal with a second input derived from a trailer brake position sensor. The trailer brake position sensor senses brake position by sensing the position of the trailer brake pedal 28, if one is provided, or, if a trailer brake pedal is not provided, by measuring actuator extension in trailer master cylinder 26. The output from comparator 36 is applied to a linear actuator 48, which actuates the trailer brake pedal 28, if one is provided, or the trailer master cylinder 26, if a trailer brake pedal is not provided. (Col. 4, l. 22 to col. 5, l. 14.) Thus, Wood teaches that when the driver of the tractor applies pressure to the tractor brake pedal 18, the trailer braking system is synchronously and proportionally operated to apply equal braking to both the tractor and the trailer (col. 5, ll. 16-20). In the system taught by Wood, the trailer braking system operates in response to a signal derived directly from the tractor brake pedal position sensor, not in response to a signal derived from any of the tractor brake cylinders associated with a particular wheel. Consequently, in essence, Wood only teaches transmitting the braking intentions of the tractor driver to the trailer braking system. Wood does not teach using the trailer braking system for applying brake-steer to reduce a turning radius of the tractor and trailer.

FF8 The Examiner relies on Wood (col. 5, ll. 16-19) for a teaching of applying a trailer brake and a vehicle brake (Answer 8). The

Examiner does not rely on any other reference for any teaching directed to the use of both a vehicle brake and a trailer brake to apply brake-steer to reduce the turning radius of the vehicle and trailer.

FF9 Gerum teaches that prior art investigations were conducted to analyze the performance of a coordinated braking and steering system for a tractor-trailer combination. The investigator concluded that while generating braking force on one side of a towed trailer can stabilize the trailer's behavior very well, the application of the trailer's brakes did not improve the behavior of the towing unit (the tractor) and, in fact, increased the towing unit's yaw rate. (Gerum, col. 3, ll. 26-42).

FF10 The Examiner relies on Gerum for a teaching to use a control mechanism including a reverse directional signal (from wheel speeds) and steering wheel angle signal inputs (Answer 13). The Examiner does not rely on Gerum for any teaching directed to the use of both a vehicle brake and a trailer brake to apply brake-steer to reduce the turning radius of the vehicle and trailer.

PRINCIPLES OF LAW

"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 combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id*. at 1739.

"[I]f 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. We must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id*.

It is well established that limitations not appearing in the claims cannot be relied upon for patentability. *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982).

ANALYSIS

In contesting the rejection of claim 1 as unpatentable over Schlichenmaier and Kim, Appellant does not dispute the Examiner's determination that it would have been obvious to modify Schlichenmaier's method by applying brake steering by applying at least one brake at a first wheel to reduce a vehicle turning radius, as taught by Kim, in order to provide a means for improving vehicle stability (Answer 5). Nor do we perceive any error in the Examiner's position, in light of the teachings of Schlichenmaier (FF2) and Kim (FF4).[3] Instead, Appellant argues that

[3] The proposed combination is nothing more than the predictable use of prior art elements (i.e., an electronically controlled braking system for a tractor-trailer combination, provided with a trailer detection unit and brake-steer capability to improve handling, and brake-steering to reduce turning radius in understeer situations) according to their established functions.

Schlichenmaier and Kim address yaw, which is a departure from the turning radius in excess of what the driver desired, and that neither Schlichenmaier nor Kim teaches the reduction of a turning radius selected by a driver (Appeal Br. 6 and Reply Br. 2). This argument is not persuasive, as claim 1 does not require reduction of a turning radius selected by the driver, as opposed to a reduction of an actual or measured turning radius of the vehicle and trailer. Moreover, Appellant's argument is not even consistent with the underlying disclosure in Appellant's Specification, which, like Kim (FF4), describes applying brake-steer when the driver's desired yaw rate (turning radius), as determined by the steering wheel angle, differs from the yaw rate measured by the yaw rate sensor (FF1).

For the above reasons, Appellant fails to demonstrate reversible error in the Examiner's rejection of claim 1 as unpatentable over Schlichenmaier and Kim. We sustain the rejection.

In contesting the Examiner's rejections of claims 2-6 and 10-15, Appellant simply relies on the argument advanced with respect to claim 1 and points out that any additional references applied do not cure the perceived deficiency in the combination of Schlichenmaier and Kim (Appeal Br. 6-8). This argument is likewise unpersuasive as to claims 2-6 and 10-15, which, like claim 1, do not require reduction of a turning radius selected by the driver, as opposed to a reduction of an actual or measured turning radius of the vehicle and trailer. Accordingly, we also sustain the Examiner's rejections of claims 2-6 and 10-15.

Independent claims 17 and 31 and claim 9, which depends from claim 1, require application of brake-steer to both a vehicle brake and a trailer brake to reduce the turning radius of the vehicle and trailer. The Examiner

concedes that Schlichenmaier does not teach applying a trailer brake and a vehicle brake to reduce turning radius of the vehicle and trailer (FF6). *See also* FF3 and FF5. The Examiner relies on Wood (col. 5, ll. 16-19) for a teaching of applying a trailer brake and a vehicle brake (FF8). The Examiner does not rely on any other reference for any teaching directed to the use of both a vehicle brake and a trailer brake to apply brake-steer to reduce the turning radius of the vehicle and trailer (FF8 and FF10). Wood, however, only teaches transmitting the braking intentions of the tractor driver to the trailer braking system (FF7). Wood does not teach using the trailer braking system for applying brake-steer to reduce a turning radius of the tractor and trailer (FF7). Moreover, the conclusions of the prior art investigation discussed by Gerum (FF9) raise some uncertainty as to whether the results of applying brake-steer by applying braking force to one side of a towed trailer would have been viewed by a person of ordinary skill in the art as either predictable or desirable with regard to stability or turning radius of the vehicle and trailer. Consequently, we conclude that the Examiner has not satisfied the burden of establishing a prima facie case that it would have been obvious to use both the vehicle brakes and the trailer brakes to apply brake-steer to reduce the turning radius of the vehicle and trailer in a braking system for a vehicle towing an attached trailer, such as that of Schlichenmaier.

Although Appellant does not explicitly point out the deficiency of the prior art in teaching the use of both the vehicle brakes and the trailer brakes to apply brake-steer to reduce the turning radius of the vehicle and trailer in contesting the rejection of independent claim 31, Appellant does allude to this deficiency in contesting the rejections of claims 38-41, which depend

from claim 31 and incorporate this feature from claim 31 (Appeal Br. 10-11). Likewise, while Appellant does not expressly state this argument in contesting the rejections of claims 18-28, which depend from independent claim 17 and thus incorporate this feature from claim 17, Appellant does direct this argument to claim 9, which requires this feature, and to independent claim 17, and claims 29 and 30 depending from claim 17 (Appeal Br. 7). We thus credit Appellant with this argument as directed to claim 9, to claim 17 and claims 18-30 depending from claim 17, and to claim 31 and claims 32-43 depending from claim 31, in order to avoid an inconsistent and inequitable result. In light of our conclusion above that the Examiner has not satisfied the burden of establishing a prima facie case that the subject matter of these claims would have been obvious at the time of Appellant's invention, Appellant demonstrates error in the Examiner's rejections of these claims. Accordingly, we cannot sustain the Examiner's rejections of claims 9 and 17-43.

DECISION

The decision of the Examiner to reject claims 1-6, 9-15, and 17-43 is affirmed as to claims 1-6 and 10-15 and reversed as to claims 9 and 17-43.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED-IN-PART

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