Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte DALE SCOTT CROMBEZ
and
STEVEN OTIS PATE

Appeal No. 2003-0405
Application No. 09/635,183

ON BRIEF

Before ABRAMS, McQUADE, and NASE, Administrative Patent Judges.

NASE, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection (Paper No. 6, mailed October 23, 2001) of claims 2, 3 and 16, which are all of the claims pending in this application.

We AFFIRM-IN-PART.

BACKGROUND

The appellants' invention relates to braking systems of electric drive vehicles (specification, p. 1). A copy of the claims under appeal is set forth in the appendix to the appellants' brief.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Cikanek	5,450,324	Sep. 12, 1995
Kidston et al. (Kidston)	5,615,933	Apr. 1, 1997

Claim 3 stands rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 2 and 3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kidston.[1]

[1] The record does not adequately reflect why the rejection of claim 16 under 35 U.S.C. § 102(b) as being anticipated by Kidston made in the first Office action (Paper No. 3, mailed July 20, 2001) was not maintained in the final rejection while the rejection of claim 2 under 35 U.S.C. § 102(b) as being anticipated by Kidston made in the first Office action was maintained in the final rejection.

Claims 2 and 16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Cikanek.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the answer (Paper No. 12, mailed August 27, 2002) for the examiner's complete reasoning in support of the rejections, and to the brief (Paper No. 10, filed June 3, 2002) and reply brief (Paper No. 13, filed November 4, 2002) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

The enablement rejection

We will not sustain the rejection of claim 3 under 35 U.S.C. § 112, first paragraph.

The test for enablement is whether one skilled in the art could make and use the claimed invention from the disclosure coupled with information known in the art without undue experimentation. See United States v. Telectronics, Inc., 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988), cert. denied, 109 S.Ct. 1954 (1989); In re Stephens, 529 F.2d 1343, 1345, 188 USPQ 659, 661 (CCPA 1976).

Thus, the dispositive issue is whether the appellants' disclosure, considering the level of ordinary skill in the art as of the date of the appellants' application, would have enabled a person of such skill to make and use the appellants' invention without undue experimentation. The threshold step in resolving this issue is to determine whether the examiner has met his burden of proof by advancing acceptable reasoning inconsistent with enablement.[2] This the examiner has not done.

The examiner's basis for this rejection (answer, pp. 3 and 6) is that dependent claim 3 recites limitations directed only towards the embodiment of Figure 1 while parent claim 2 is readable only on the embodiments of Figures 2-5. However, the examiner has not explained, even if this were true, why an enablement rejection is proper.

[2] See In re Marzocchi, 439 F.2d 220, 223-24, 169 USPQ 367, 369-70 (CCPA 1971).

Be that as it may, we find ourselves in full agreement with the appellants' position (brief, pp. 7-9; reply brief, pp. 2-3) that (1) both independent claim 2 and dependent claim 3 are readable on the embodiments of Figures 1-5; and (2) that the limitation of claim 3 that the processing system executes a strategy comprising operating the friction brakes to apply the entire reduction in regenerative braking torque as friction brake torque modifies the second wherein clause of claim 2[3] not the first wherein clause of claim 2.[4]

For the reasons set forth above, the decision of the examiner to reject claim 3 under 35 U.S.C. § 112, first paragraph, is reversed.

The anticipation rejection based on Kidston

We sustain the rejection of claims 2 and 3 under 35 U.S.C. § 102(b) as being anticipated by Kidston.

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[3] Wherein the vehicle includes friction brakes for applying friction brake torque to the wheels and the processing system executes a strategy comprising operating the friction brakes to apply at least some of the reduction in regenerative braking torque as friction brake torque.

[4] Wherein the processing system executes a strategy comprising reducing, but not completely eliminating, the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Bros. Inc. v. Union Oil Co., 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir.), cert. denied, 484 U.S. 827 (1987). The inquiry as to whether a reference anticipates a claim must focus on what subject matter is encompassed by the claim and what subject matter is described by the reference. As set forth by the court in Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984), it is only necessary for the claims to "'read on' something disclosed in the reference, i.e., all limitations of the claim are found in the reference, or 'fully met' by it."

Kidston's invention relates to electric vehicles which use regenerative braking and which further have anti-lock friction brake systems. Such vehicles may be provided with a brake system capable of blending regenerative and friction braking at the front wheels so as to conserve battery charge. Such vehicles may be provided, either in addition or alternatively, with coastdown regenerative braking to simulate the "feel" of an internal combustion engine driven vehicle when coasting with no accelerator pedal depression. In one embodiment of Kidston's invention, the regenerative braking is blended with the friction braking when anti-lock braking is not activated so that battery charge is conserved. When the anti-lock braking is activated, however, the

regenerative braking is removed and full braking of the front wheel is handled by the friction braking system under anti-lock braking control. Kidston teaches (column 1, lines 50-52) that "[p]referably, the regenerative braking is not immediately removed but is ramped down to preserve smoothness in the braking."

Figure 1 of Kidston is a schematic diagram of an electric vehicle according to his invention. The electric vehicle comprises an electric motor propulsion system 11, a brake system 15 and a control unit 13. Electric motor propulsion system 11 includes a battery pack 10, an inverter 12 (for use with AC motors), an accelerator pedal 20 and an electric motor and drive train 18. Brake system 15 includes a brake pedal 70, a hydraulic braking system 17 and electric drum brakes 48 and 50. Control unit 13 includes a motor control 22 for controlling propulsion system 11 and a brake control 66 for controlling brake system 15.

In Kidston's propulsion system 11, battery pack 10 supplies power to the vehicle systems; and power inverter 12 responds to motor control 22 in controlling electric motor 18. Motor 18 provides drive force to vehicle drive wheels 24 and 26 and further provides regenerative braking, when commanded, by generating power and coupling the generated power to battery pack 10, thereby providing braking torque to wheels 24 and 26. Accelerator pedal 20 provides an accelerator command to motor control 22,

which responsively controls inverter 12 via command line 16 to provide power to motor 18 and thereby provide motive drive force to drive wheels 24 and 26.

In Kidston's brake system 15, hydraulic brake system 17 comprises master cylinder 78, hydraulic lines 40, 42, 86, 87, 94 and 96, accumulator 92, actuators 114 and 116, solenoid valves 102 and 104, brake calipers 36 and 38 and brake discs 32 and 34. Responding to operator depression of brake pedal 70, brake control 66 provides brake information to motor control 22 and controls hydraulic brake system 17, including solenoid valves 102 and 104, actuators 114 and 116, and electric rear brakes 48 and 50. Bypass valves 98 and 100 allow excess pressure from actuators 114 and 116 to flow to accumulator 92. Brake control 66 also monitors the rotational speeds of vehicle wheels 24, 26, 44 and 46 through speed sensors 28, 30, 52 and 54.

Kidston teaches (column 7, lines 9-51) that:

> Next, brake control determines how much regenerative braking (blend) to request from motor control 22 in subroutine DETERMINE REQUEST BLEND REGEN <208>. This subroutine is described in detail below with reference to the flow chart of FIG. 8. When the REQUEST BLEND REGEN torque is determined, a signal thereof is sent to motor control 22 <208> over dedicated PWM communication line 60. Motor control 22 derives and returns the ACHIEVED BLEND REGEN as previously described; and brake control 66 receives the ACHIEVED BLEND REGEN torque signal <212> over dedicated PWM communication line 62 and calculates <214> the FRONT FRICTION BRAKE TORQUE as the FRONT BRAKE TORQUE, determined in task 206, minus the ACHIEVED BLEND REGEN torque received from motor control 22. This may be better understood with reference to the graph of FIG. 9. This graph depicts three

> brake torques over time during a typical brake pedal application. Curve 130 describes the requested total brake torque, which is to be made up of regenerative torque to the degree possible, represented by curve 133, and friction brake torque, represented by curve 136. Thus, the system must calculate, at any time, the friction brake torque required, when added to the regenerative torque achieved, to produce the total requested brake torque. It can be seen that there is a delay in the achievement of regenerative torque, so that the initial braking is almost all by the friction brake system. When regenerative braking is finally achieved, it quickly goes to its achieved level, which results in a temporary significant reduction in friction brake torque. When the achieved regenerative torque reaches its achieved level and flattens out, there is an additional increase in friction brake torque before it levels out also. At any time, however, the sum of the values of curves 133 and 136 should equal the value of curve 130. In the event of anti-lock brake activity, this system will ramp down the regenerative blended brake torque, as shown with respect to curve 133 starting with the ABS event indicated. As this ramp down occurs, of course, the friction brakes, which will be under the control of the anti-lock brake system, will make up the difference in total brake torque, as shown. Returning to the flow chart of FIG. 5, the FRONT BRAKE FRICTION TORQUE signal is finally output to actuators 114 and 116 to apply friction braking to front wheels 24 and 26.

The appellants argue (brief, pp. 9-11; reply brief, pp. 3-4) that Kidston teaches completely eliminating the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs and therefore does not teach the following:

(1) the processing system executing "a strategy comprising reducing, but not completely eliminating, the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs" as recited in claim 2;

(2) the processing system executing "a strategy comprising operating the friction brakes to apply at least some of the reduction in regenerative braking torque as friction brake torque" as recited in claim 2; and

(3) the processing system executing "a strategy comprising operating the friction brakes to apply the entire reduction in regenerative braking torque as friction brake torque" as recited in claim 3.

In our view, the above-quoted limitations of claims 2 and 3 are readable on Kidston when Kidston executes his strategy of ramping down the regenerative blended brake torque, as shown in Figure 9 with respect to curve 133 starting with the ABS event indicated. As this ramp down of regenerative blended brake torque occurs, the friction brakes will correspondingly ramp up as shown in Figure 9 with respect to curve 136 to produce the total requested brake torque (curve 130 in Figure 9). At the end of this strategy of ramping down the regenerative blended brake torque and the ramping up of the friction brake torque, Kidston will execute his strategy of eliminating regenerative brake torque and utilizing only friction brake torque as shown in Figure 9. We find that the processing system of Kidston does

(1) execute a strategy comprising reducing, but not completely eliminating, the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs (see Kidston's regenerative braking torque

curve 133 starting with the ABS event and ending just prior to elimination of the regenerative braking torque);

(2) execute a strategy comprising operating the friction brakes to apply at least some of the reduction in regenerative braking torque as friction brake torque (see Kidston's friction braking torque curve 136 starting with the ABS event); and

(3) execute a strategy comprising operating the friction brakes to apply the entire reduction in regenerative braking torque as friction brake torque (see Kidston's friction braking torque curve 136 starting with the ABS event and Kidston's teaching that the friction brakes will make up the difference in total brake torque).

For the reasons set forth above, the appellants have not pointed out how the claimed subject matter of claims 2 and 3 is novel over the teachings of Kidston. Accordingly, the decision of the examiner to reject claims 2 and 3 under 35 U.S.C. § 102(b) as being anticipated by Kidston is affirmed.

The anticipation rejection based on Cikanek

We will not sustain the rejection of claims 2 and 16 under 35 U.S.C. § 102(b) as being anticipated by Cikanek.

Cikanek's invention relates generally to antiskid braking and traction control for a vehicle and, more particularly, to a system and method for providing such control in an electric or hybrid vehicle having a regenerative braking system operatively connected to an electric traction motor, and a separate hydraulic braking system.

The appellants argue (brief, pp. 11-12; reply brief, p. 4) that Cikanek does not teach the following:

(1) the processing system executing "a strategy comprising reducing, but not completely eliminating, the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs" as recited in claim 2;

(2) the processing system executing "a strategy comprising operating the friction brakes to apply at least some of the reduction in regenerative braking torque as friction brake torque" as recited in claim 2; and

(3) the step of "reducing, but not completely eliminating, the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs, and operating friction brakes of the vehicle to apply at least some of the reduction in regenerative braking torque as friction brake torque" as recited in claim 16.

In the examiner's view, the above-quoted limitations of claims 2 and 16 are readable on Cikanek. Specifically, the examiner (answer, pp. 5, 7 and 8) refers to (1) Cikanek's Figure 6A; (2) Cikanek's column 11, lines 65-68; (3) Cikanek's Figures 5A & 5B; and (4) Cikanek's column 13, lines 10-27.

We have reviewed the entire disclosure of Cikanek but fail to find therein any teaching of reducing, but not completely eliminating, the torque that is being applied to the drivetrain as regenerative braking torque when a wheel-condition-initiated triggering event occurs, and operating friction brakes of the vehicle to apply at least some of the reduction in regenerative braking torque as friction brake torque as recited in claims 2 and 16.

For the reasons set forth above, all the limitations of claims 2 and 16 are not disclosed in Cikanek. Accordingly, the decision of the examiner to reject claims 2 and 16 under 35 U.S.C. § 102(b) as being anticipated by Cikanek is reversed.

CONCLUSION

To summarize, the decision of the examiner to reject claim 3 under 35 U.S.C. § 112, first paragraph, is reversed; the decision of the examiner to reject claims 2 and 3

under 35 U.S.C. § 102(b) as being anticipated by Kidston is affirmed; and the decision of the examiner to reject claims 2 and 16 under 35 U.S.C. § 102(b) as being anticipated by Cikanek is reversed.

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

NEAL E. ABRAMS Administrative Patent Judge	)
JOHN P. McQUADE Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
JEFFREY V. NASE Administrative Patent Judge	)

FORD GLOBAL TECHNOLOGIES, LLC.
SUITE 600 - PARKLANE TOWERS EAST
ONE PARKLANE BLVD.
DEARBORN, MI 48126

JVN/jg