Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TADASHI TAKANO

Appeal No. 2002-0816
Application No. 09/442,895

HEARD: February 13, 2003

Before BARRETT, FLEMING, and LEVY, Administrative Patent Judges.
LEVY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-3 and 5-17[1], which are all of the claims pending in this application.

BACKGROUND

Appellants' invention relates to a rotary position sensor for a brushless DC motor (specification, page 2). An

[1] In response to an amendment (Paper No. 10, filed May 7, 2001) submitted subsequent to the final rejection, the examiner (Paper No. 11, mailed July 27, 2001) stated that the amendment would be entered for purposes of appeal. However, the amendment has not been physically entered into the record. We consider this to be a formalilty that can be addressed by the examiner subsequent to the appeal.

understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced as follows:

1. A rotating electrical machine having an outer housing carrying a stator, a rotor journaled within said outer housing for rotation about a rotor axis and cooperating with said stator, said stator being formed by a plurality of armatures having poles and surrounding radially extending armatures windings, a first plurality of circumferentially spaced permanent magnets carried on said rotor for cooperation with said armature, and a magnet carrier fixed for rotation with said rotor for cooperation with a detector fixed to said outer housing for controlling said armature windings, said magnet carrier carrying a second plurality of circumferentially spaced permanent magnets spaced axially from said first plurality of circumferentially spaced permanent magnets and disposed radially inwardly of a radial inner periphery of said armature windings.

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

Riggs et al. (Riggs)	4,311,933	Jan. 19, 1982
Stokes	4,792,712	Dec. 20, 1988
Shirakawa	4,982,125	Jan. 1, 1991
Shiraki et al. (Shiraki)	5,225,725	Jul. 6, 1993
Knappe	5,565,721	Oct. 15, 1996
Carrier et al. (Carrier)	5,717,268	Feb. 10, 1998

Claims 6-9 and 11-14 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Claims 1, 2, 5, 10, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Knappe and Carrier.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Knappe, Carrier, and Riggs.

Claims 6 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Knappe, Carrier, and Shiraki.

Claims 7-9 and 12-14 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Shirakawa, in view of Knappe, Carrier, Shiraki, and further in view of Riggs.

Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a) a unpatentable over Shirakawa in view of Knappe, Carrier, and further in view of Stokes.

Rather than reiterate the conflicting viewpoints advanced by the examiner and appellant regarding the above-noted rejections, we make reference to the examiner's answer (Paper No. 14, mailed December 4, 2001) for the examiner's complete reasoning in support of the rejections, and to appellant's brief (Paper No. 13, filed October 4, 2001) and reply brief (Paper No. 15, filed January 10, 2002) for appellant's arguments thereagainst. Only those arguments actually made by appellant have been considered in this decision. Arguments which appellant could have made but

chose not to make in the brief have not been considered. See 37 CFR 1.192(a).

OPINION

In reaching our decision in this appeal, 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, appellant's 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.

Upon consideration of the record before us, we affirm-in-part.

We turn first to the rejection of claims 6-9 and 11-14 under 35 U.S.C. § 112, second paragraph, as being indefinite. The examiner's position (answer, page 3) is that the term "type" in line 2 of claim 6 is indefinite. Appellant (reply brief, page 2) argues to the effect that there are different types of magnets, such as a horseshoe "type" magnet.

We find (specification, page 5) that rotor 14 comprises an inner shaft 28. Yoke 29, which is made of stamped sheets, is

mounted on shaft 28. Arcuately shaped permanent magnets 31 are received in slots 32 formed in the periphery of the yoke. As illustrated in figure 5, magnets 31 appear to be formed as sheets around the periphery of the yoke. In addition, appellant's specification discloses magnetic detector ring 33, which includes an annular, ring type magnet carrier 35. From the disclosure of magnets 31 being arcuately shaped and formed in slots 32, the depiction of the magnets 31 being in the form of sheets around the periphery of the yoke, and appellant's use of the term "type" to refer to the annular shape of the detector ring, we find that the phrase sheet "type" in referring to the shape of magnets 31 makes clear reference to magnets 31 in a manner consistent with the specification. Accordingly, we find claim 6, and dependent claims 7-9 and 11-14 to be definite within the meaning of 35 U.S.C. § 112, second paragraph. The rejection of claims 6-9 and 11-14 is therefore reversed.

We turn next to the rejection of claims 1, 2, 5, 10, and 15 under 35 U.S.C. § 103(a) as unpatentable over Shirakawa in view of Knappe and Carrier.

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, 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, 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. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985); 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). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole. See id.; In re Hedges, 783 F.2d 1038, 1039,

228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

The examiner takes the position (answer, page 4) that Shirakawa does not disclose "a magnet carrier fixed for rotation with said rotor and the magnet carrier carrying a second plurality of circumferentially spaced permanent magnets. Shirakawa uses no magnet carrier. Shirakawa just mounts the magnet (7) directly on the shaft (4)." In addition, the examiner (answer, page 11) acknowledges that Shirakawa does not show first and second pluralities of circumferentially spaced magnets. To overcome these deficiencies in Shirakawa, the examiner turns to Knappe for a teaching of a magnet carrier, and to Carrier for a teaching of pluralities of circumferentially spaced magnets having alternating N and S poles.

Appellant asserts (brief, page 4) that Knappe does show a magnet carrier, but that the carrier only carries a single magnet, and that Knappe and Shirakawa fail to disclose a plurality of circumferentially spaced magnets. Appellant further asserts (id.) that although Carrier shows a second plurality of circumferentially spaced magnets, in Carrier, the outer housing rotates around a fixed armature. Appellant additionally asserts

(id.) "[a]lso, it is submitted that if this teaching were substituted, then the claim language that calls for the magnet carrier to be disposed radially inwardly of the inner periphery of the armature windings would not be met because the permanent magnets and the sensing magnets are disposed radially outwardly of the winding. Thus, even if these three references were combined, and this combination is most respectfully traversed, the combination would not meet the claimed language because the second series of magnets would be disposed radially outwardly of the armature windings."

We find that Shirakawa (col. 1, lines 5 and 6) is directed to a brushless motor for use in a vehicle. As shown in prior art figure 2, the motor includes a stator core 1, a stator coil 2, a rotor 3 having a rotor shaft 4 on which a rotor core 5 and a main magnet 6 are coaxially fixedly mounted. A submagnet 7 is also fixedly mounted on rotor shaft 4 (col. 1, lines 7-13). As shown in the embodiment of figure 1, A Hall element 13 is supported by a holder plate 14 (col. 2, line 29). From this disclosure, we find that Shirakawa only shows individual magnets 6 and 7, and does not disclose plural sets of magnets, as recited in claim 1. We additionally find that Shirakawa does not disclose a magnet carrier for a second plurality of circumferentially spaced

magnets. However, we find that, as advanced by the examiner (answer, page 9) that second magnet 7 is axially spaced from main magnet 6, and that submagnet 7 is disposed radially inwardly from the radial inner periphery of the armature windings 2 because the outermost edges of submagnet 7 (figure 1) are closer to the center of the rotor shaft that the innermost edges of armature windings 2.

Turning to Knappe, we find the Knappe is directed to an electromotive drive in which the magnet body is a magnet wheel attached to the rotor shaft and producing a speed-proportional signal in a stator-side Hall probe (col. 1, lines 7-12). Knappe discloses that it was known to attach the magnet wheel directly to the rotor shaft by force fit and/or adhesive fit (col. 1, lines 16-22). Knappe recognizes (col. 1, lines 59-65) that "the magnet body is relatively brittle. Therefore tangentially and axially fixing the magnet body into position on the rotor shaft with a force fit such that the magnet body will reliably remain on the rotor shaft even after long and rough operation tends to crack the brittle magnet body. Fixing the magnet body into position on the rotor shaft with adhesive is not sufficiently reliable." Knappe further discloses (col. 2, lines 6-14) that "[t]hus, there exists a need to provide a relatively simple

arrangement to tangentially and axially fix a brittle magnet body on a shaft such that the magnet body will remain on the shaft even after long and rough operation, without exerting forces on the magnet body which could lead to cracking, such that the axial position of the magnet body can be adjusted." To overcome the disadvantages of the prior art, Knappe discloses (col. 4, lines 7-15) a magnet carrier in the form of a plastic bushing 4 which has been placed on the rotor shaft 2, and which carries the magnet body 3. Snap hooks 41, 42 of the plastic bushing extend through corresponding grooves 31, 32 in the magnet body 3 and engage the left end side of the magnet body 3 (col. 4, lines 12-14). Thus, we find that Knappe discloses attaching a bushing to the rotor shaft and attaching the magnet 3 to the bushing instead of attaching the magnet 3 directly to the rotor shaft. From the disclosure of Knappe, we find that an artisan would have been taught to have connected magnet 7 of Shirakawa to a magnet carrier instead of attaching magnet 7 directly to the rotor, as taught by Knappe.

Turning to Carrier, we find that Carrier relates to (col. 1, lines 5-8) an electric motor with a frequency generator for producing a signal indicative of motor speed. Rotor 10 includes an annular field magnet 28 that is rigidly attached to housing 22

by an adhesive. As illustrated in figure 1, arrangement 28 includes a number of adjacent circumferentially arranged field magnet segments for producing alternately polarized radially directed fields; i.e., each magnet segment is permanently magnetized with a polarity that is opposite from adjacent field magnet segments (col. 2, lines 36-44). Carrier further discloses (col. 2, lines 43-47) that "[t]hese magnet segments may be discrete elements, but are preferably formed in an integral cylindrical body of a hard magnetic material such as ceramic, as is well known in the art." The motor has a speed detecting means including an FG magnet arrangement 32, which includes N adjacent circumferentially arranged FG magnet segments for producing alternatively polarized axially directed fields, as illustrated in figure 1 (col. 3, lines 6-11). In addition (col. 3, lines 11-16) "[a]s in the case of the field magnet arrangement, the FG magnet arrangement may be formed of discrete magnet elements, but preferably the magnetic segments are formed in an integral body of hard magnetic material such as ceramic. The number N determines the maximum accuracy at which the rotor speed may be measured." From the disclosure of Carrier, we find that both the field magnet and the FG magnet 32 should be made of plural segments having alternating polarity, and that the larger the

number of FG segments, the more accurate the rotor speed may be determined. From these disclosures of Carrier, we find that an artisan would have been taught to make the circumferentially disposed magnets 6 and 7 of Shirakawa as plural segments having alternately polarized axially directed fields, i.e., each of the segments is magnetized with a polarity that is opposite from adjacent segments.

We are not persuaded by appellant's assertion, (brief, page 4) to the effect that the examiner has combined an excessive number of references, i.e., three references in an attempt to meet a "relatively simple structure." We agree with the examiner (answer, page 11) that "reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See In re Gorman, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991)."

In addition, we are unpersuaded by appellant's assertion (brief, page 4) that Carrier relates to a rather different type of machine, wherein the outer housing rotates about a fixed armature. We agree with the examiner (answer, page 11 and 12) that if combined, the spaced magnets 32 of Carrier would be disposed radially inwardly of the inner periphery of the armature windings, because the existing magnet 7 would be formed of a

plurality of segments that are magnetized with a polarity that is opposite to the polarity of adjacent magnet segments. From all of the above, we find that the examiner has established a prima facie case of obviousness of claim 1 that has not been successfully rebutted by appellant. Accordingly, the rejection of claim 1 under 35 U.S.C. § 103(a) is affirmed.

We turn next to claim 2. Appellant asserts (brief, pages 4 and 5) that although Knappe shows a magnetic carrier, that is made of non-magnetic material, Knappe does not show magnets embedded in the carrier. The examiner (answer, page 12) relies upon Knappe for a teaching of embedded magnets (figure 10) detachably connected to the carrier. Although Knappe shows magnet 3 embedded within magnet 3, Knappe does not disclose that the magnet carrier 4, 7, and 8, carries a plurality of magnets 3. However, Carrier teaches that both groups of circumferentially located magnets are made of plural segments that have opposing polarity. In addition, Carrier discloses (col. 2, lines 43-47) that "[t]hese magnet segments may be discrete elements, but are preferably formed in an integral cylindrical body of a hard magnetic material such as ceramic, as is well known in the art." From this teaching of Carrier, we find that an artisan would have been taught to embed the magnet sections in the magnet

arrangement 28. Accordingly, we affirm the rejection of claim 2 under 35 U.S.C. § 103(a).

We turn next to claim 5. Appellant asserts (brief, page 5) that in Shirakawa and Knappe, the detector magnet is disposed axially outside the of the armature windings. The examiner's position (answer, page 12) is that this feature is shown by Carrier (28 and 32). From our review of the prior art, we find that in Carrier, FG magnet 32 is outside the axial extent of armature windings 19, as clearly shown in figure 2. Accordingly, we find that the examiner has failed to establish a prima facie case of obviousness of claim 5. Accordingly, the rejection of claim 5 under 35 U.S.C. § 103(a) is reversed.

We turn next to claim 10. Appellant asserts (brief, page 5) that this feature of the embodiment of figures 8-10 is not found in the prior art. The examiner's position (answer, page 12) is that the claimed projections are met by 41, 42 of Knappe. We agree with the examiner. We find that Knappe discloses (col. 4, lines 11-14) that the plastic bushing 4 is pushed such that axially protruding snap hooks 41, 42 extend through corresponding grooves 31, 32 in the magnet body and engage the left end side of magnet body 3. Accordingly, we affirm the rejection of claim 10 under 35 U.S.C. § 103(a).

We turn next to claim 15. Appellant asserts (brief, page 5) that the two sensors of Knappe associate with a single magnet. The examiner's position (answer, page 12) is that Carrier shows three sensors 30A, 30B, and 30C which cooperate with the plurality of circumferential spaced magnets 32. We agree. Figure 1 of Carrier shows sensors 30A, 30B, and 30C disposed at different angular positions for detecting the radially directed poles of magnet 28. From this teaching of Carrier, we find that an artisan would have been motivated to use plural sensors along with the plural magnet segments of Carrier. Accordingly, the rejection of claim 15 under 35 U.S.C. § 103(a) is affirmed.

We turn next to the rejection of claim 3 under 35 U.S.C. § 103(a). As evidence of obviousness, the examiner additionally offers Riggs. Appellant asserts (brief, page 5) that Riggs does indeed show the claimed features of the second set of magnets being aligned with the first set of magnets, but asserts that Riggs "does not show this construction in connection with an arrangement wherein the rotor is fixed within a fixed outer housing but rather shows an arrangement wherein the rotor is the outer housing. Hence, the detector must be positioned in a different place from that claimed." The examiner's position (answer, pages 6, 7, and 12) is that although the magnets of

Riggs are in the outer type rotor, that it is well known in the art that a rotor can be made as either the outer type or the inner type.

We find that Riggs supports the position of the examiner, disclosing (col. 4, lines 17 and 18) that "[a]nother possible construction has the rotor within the stator." Because Riggs teaches that an alternate construction would be to have the rotor within the stator, we are not persuaded by appellant's argument that Riggs does not show the claimed structure in an arrangement wherein the rotor is fixed within an outer housing. Accordingly, we affirm the rejection of claim 3 under 35 U.S.C. § 103(a).

We turn next to claims 6 and 11. As evidence of obviousness, the examiner offers Shiraki, in addition to Shirakawa, Knappe, and Carrier. The examiner's position is that it would have been obvious to provide a protective coating on the magnets as taught by Shiraki (col. 7, lines 20-40). Appellant's position (brief, page 5) is that Shiraki relates to a linear motor which includes a plurality of windings, which do not surround radially projecting armature cores. Appellant argues that Shiraki does not disclose sheet type magnets that are affixed to the face of a magnet carrier that faces away from the

rotor, and that even though Shiraki may disclose protective coatings, Shiraki does not make up for the defects mentioned in the other claims.

We find that FG magnets 32 of Carrier are sheet "type" and are affixed to a face of magnet carrier that faces away from the rotor. As asserted by the examiner, Shiraki discloses (col. 7, lines 28-32) that to prevent the generation of dust or corrosion, the surface of the magnet is coated with a protection film. From this disclosure of Shiraki, we find that an artisan would have been taught to have provided a protective coating on the second set of magnets, as advanced by the examiner. The fact that Shiraki is directed to a linear motor does not detract from the teaching of providing the magnet with a protective coating to prevent dust and corrosion. From all of the above, we affirm the rejection of claim 6 and 11 under 35 U.S.C. § 103(a).

We turn next to the rejection of claims 7-9 and 12-14 under 35 U.S.C. § 103(a). As evidence of obviousness, the examiner offers Riggs in addition to Shirakawa, Knappe, Carrier, and Shiraki. The examiner relies upon Riggs for a teaching of aligning the first and second sets of magnets. We make reference to our findings, supra, with respect to Riggs, and affirm the rejection of claim 7 and 12 for the same reasons as we affirmed

the rejection of claim 3, supra. With regard to claims 8 and 13, we find that Riggs discloses second set of magnets 20, 22, 24, and 26 to be axially disposed within the axial extent of the armature windings 30 in the direction of the rotor axis (figure 1). From this teaching of Riggs, and the teaching in Riggs that another possible construction has the rotor within the stator, we find that upon putting the rotor within the stator, that the plurality of second magnets would be within the axial extent of the armature windings. From the disclosure of Riggs, we therefore find that an artisan would have been motivated to make the second set of magnets within the axial extent of the armature windings, as taught by Riggs. Accordingly, we affirm the rejection of claims 8 and 13. In addition, we affirm the rejection of claims 9 and 14 under 35 U.S.C. § 103(a) because Carrier disclosed a detector plate 36 having a plurality of Hall sensors 30A, 30B, and 30C circumferentially spaced and positioned at one side of the armature. We consider Rigg’s Hall sensors to be surplusage.

We turn next to the rejection of claims 16 and 17 under 35 U.S.C. § 103(a). As evidence of obviousness, the examiner offers Stokes in addition to Shirakawa, Knappe, and Carrier. The examiner asserts (answer, page 9) that Stokes shows the magnet

carrier being bonded to the rotor 26 for the purpose of bonding the two components together; (see col. 5, lines 43-45). Appellant asserts (brief, page 6) that "[t]hese claims call for the magnetic carrier to be adhesively bonded to the rotor and that the magnet carrier face that carries the adhesive is that which faces the rotor so as to also affix the magnetic carrier to the rotor. The Stokes reference admittedly shows the adhesive bonding of permanent magnets to a shell but not to a face of the shell nor does it show bonding of the shell to the rotating element. Also the adhesive is utilized to bond a shell to the outer surface of the magnets and hence, does not form a protective coating." From our review of Stokes we agree with appellant that even though Stokes discloses preventing magnets from releasing particles or chips during rotation of the rotor, we find no suggestion of adhesively bonding the magnet carrier of Shirakawa to the rotor. Although Knappe teaches making the magnet carrier adjustable to allow alignment with the Hall sensors (col. 3, line 67 through col. 4, line 3) we find no teaching to attach the magnetic carrier of Shirakawa to the rotor and find that if the magnetic carrier was bonded to the rotor, two problems would result. The first is that the Hall sensors would be out of alignment. The second is that Carrier teaches that the extension 28A effects axial positioning of the FG magnet

arrangement and thus the FG coil, sufficiently far from the stator field to effect isolation (col. 3, lines 45-48). Accordingly, we find that the examiner has failed to establish a prima facie case of obviousness of claim 16. The rejection of claim 16 under 35 U.S.C. § 103(a) is therefore reversed. We reverse the rejection of claim 17 due to its dependency from claim 16.

CONCLUSION

To summarize, the decision of the examiner to reject claims 6-9 and 11-14 under 35 U.S.C. § 112, second paragraph, is reversed. The decision of the examiner to reject claims 1-3, and 6-15 under 35 U.S.C. § 103(a) is affirmed. The decision of the examiner to reject claims 5, 16, and 17 under 35 U.S.C. § 103(a) 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

LEE E. BARRETT Administrative Patent Judge	)
MICHAEL R. FLEMING Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
STUART S. LEVY Administrative Patent Judge	)

SSL/kis

ERNEST A. BEUTLER
ATTORNEY AT LAW
500 NEWPORT CENTER DRIVE
SUITE 945
NEWPORT BEACH, CA 92660