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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YI LI, JONATHAN RICHARD MEYER,
RUPERT PAUL KIRBY, and TIMOTHY JOHN MARTIN

Appeal 2018-009065
Application 14/262,783
Technology Center 2800

Before BRADLEY R. GARRIS, CATHERINE Q. TIMM, and
JAMES C. HOUSEL, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–13 and 17.² We have jurisdiction under 35 U.S.C. § 6(b).

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Protean Electric Limited. Br. 3.

² The Examiner has withdrawn the rejection of claim 14. Ans. 2. In addition, the Examiner states that remaining pending claims 16, 18, and 19 are not subject to rejection, but are objected to as being dependent upon a

We AFFIRM.³

STATEMENT OF THE CASE

The invention relates to an electric motor comprising a plurality of coil sets arranged to produce a magnetic field, each coil set comprising a plurality of coil subsets, wherein the motor also comprises a plurality of control devices, each of which is coupled to and controls current in a respective plurality of coil subsets of the coil sets to generate a magnetic field in each coil subset to have a substantially different magnetic phase to the other one or more coil subsets in the coil set. Spec. 4:10–19. Appellant discloses that this arrangement allows an electric motor to have a number of sub-motors that can operate independently of each other, via their respective control device, whereby the current flow in coil subsets of one coil set is independent of the current flow of another coil set, such that the coils of each coil subset can have a larger number of turns than for an equivalent motor in which all the respective coil subsets are connected in series as a single motor. *Id.* at 4:21–30. According to Appellant, the increased number of turns in each coil increases the overall motor inductance, allowing lower currents to be used in the coils of each subset, and smaller switching devices with faster switching speeds and lower switching losses. *Id.* at 4:30–36.

rejected base claim. Non-Final Act. 1, 7. Therefore, these claims are not before us on appeal.

³ Our Decision refers to the Specification (“Spec.”) filed Apr. 27, 2014, the Examiner’s Non-Final Office Action (“Non-Final Act.”) dated Oct. 6, 2017, Appellant’s Appeal Brief (“Br.”) filed Apr. 6, 2018, and the Examiner’s Answer (“Ans.”) dated June 14, 2018.

Claim 1, reproduced below from the Claims Appendix to the Appeal Brief, is illustrative of the subject matter on appeal. Paragraphing has been added to facilitate review.

1. An electric motor comprising
 - a stator having two coil sets arranged to produce a magnetic field of the motor,
 - each coil set comprising a plurality of coil sub-sets, wherein the two coil sets are without an electrical connection therebetween so that current flow in the coil sub-sets of one coil set is independent of current flow in the coil sub-sets of the other coil set; and
 - first and second control devices, wherein the first control device is coupled to the plurality of coil sub-sets for the first coil set and the second control device is coupled to the plurality of coil sub-sets for the second coil set,
 - wherein each control device includes a plurality of inverter switches and control logic for controlling the operation of the plurality of inverter switches for controlling current in the respective plurality of coil sub-sets to generate a magnetic field in each coil sub-set to have a substantially different magnetic phase to the other one or more coil sub-sets in the respective coil set,
 - wherein the first control device and the second control device are mounted on the stator adjacent to the respective plurality of coil sub-sets,
 - wherein the first control device and second control device are coupled via a communication interface to allow the first control device and the second control device to communicate.

REFERENCES

The Examiner relies on the following prior art references:

Ito	US 6,676,400 B2	Jan. 13, 2004
Maslov et al. (“Maslov”)	US 2004/0021437 A1	Feb. 5, 2004
Peterson et al. (“Peterson”)	US 2008/0174213 A1	July 24, 2008

REJECTIONS

On appeal, the Examiner maintains the following rejections:

1. Claims 1–3, 5, and 7–13 under 35 U.S.C. § 103(a) as unpatentable over Ito in view of Peterson;
2. Claims 4, 6, and 17 under 35 U.S.C. § 103(a) as unpatentable over Ito in view of Peterson, and further in view of Maslov.

ANALYSIS

Rejection 1

As stated above, the Examiner rejects claims 1–3, 5, and 7–13 under 35 U.S.C. § 103(a) as unpatentable over Ito in view of Peterson.

After review of the opposing positions articulated by Appellant and the Examiner, and the appeal record before us, we determine that Appellant's arguments are insufficient to identify reversible error in the Examiner's anticipation rejection. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011). Accordingly, we affirm the stated obviousness rejection for substantially the fact findings and the reasons set forth by the Examiner in the Examiner's Answer and the Non-Final Office Action. We offer the following for emphasis only.

Claim 1

The Examiner finds that Ito teaches a motor 51 having two sets of windings (coil sets), each set of windings comprising a plurality of independently controlled coils (coil subsets), and first and second control devices, wherein the first control device including first inverter 52 and controller 54 is connected to a first set of coils and the second control device including second inverter 53 and controller 55 is connected to a second set of coils. Non-Final Act. 4. The Examiner further finds that Ito teaches that

each controller controls operation of a plurality of switches in its respective inverter, wherein the control devices are coupled via communication wires to allow communication, for example, by using instruction signal S54. *Id.* However, the Examiner finds that Ito fails to teach that the control devices are mounted on the stator adjacent to their respective plurality of coil subsets. *Id.* For this feature, the Examiner finds that Peterson teaches an integrated motor and controller assembly comprising an electric motor having stator 26 including a plurality of windings (coils), rotor 32, and motor controller 14 having housing 38 mounted on motor housing 28. *Id.* at 5. The Examiner concludes that it would have been obvious to have mounted Ito's controllers onto the motor stator in order to obtain a more compact structure that is easy to assemble and transport. *Id.*

Appellant argues that the combination of Ito and Peterson fails to teach that each control device: 1) is mounted on the stator adjacent to the respective plurality of coil subsets; and 2) controls current in the respective plurality of coil subsets to generate a magnetic field in each coil subset to have a substantially different magnetic phase to the other one or more coil subsets in the respective coil set. Br. 10. With regard to the first feature above, Appellant asserts that Peterson discloses an integrated assembly 10 having a single motor controller 14 mounted to an electric motor 12. *Id.* at 11. Appellant also contends that Peterson's controller is not mounted on the stator adjacent to coil subsets as required in claim 1. *Id.* Appellant asserts that Peterson's motor end housing 28 is attached between controller housing 38 and stator 26, and that housing 38 includes mounting portion 70 for engaging a base portion 46 of motor housing 28, such that motor housing 28

prevents motor controller 14 from being mounted onto stator 26 adjacent any coils that might be contained within the stator. *Id.*

We do not find Appellant's first argument persuasive of reversible error. As the Examiner responds (Ans. 4), claim 1 does not require that the control devices be directly mounted on the stator without any other structural element connected between the control devices and the stator. Peterson, Figure 2, shows that control device housing 38 is mounted on stator 26 via housing 28. Peterson, Fig. 2. Appellant does not contest or otherwise address this claim interpretation. In addition, although Peterson does not teach plural control devices, the Examiner did not rely on Peterson for this feature. Instead, the Examiner found, and Appellant does not dispute, that Ito teaches a plurality of motor coil control devices.

With regard to their second argument, Appellant contends that Peterson fails to disclose any coils at all and Ito fails to describe how the windings or coils, with each and every coil in the set of coils having a parallel winding in the same direction, can be used to generate magnetic fields in the coil subsets having substantially different magnetic phases to each other. Br. 12. Appellant asserts that Figure 9 depicts each coil set including three coil subsets, 74A, 74B, 74C, that are alternately wound such that each coil subset produces a magnetic field which is anti-parallel with its adjacent coil subsets for a given direction of current flow. *Id.* Appellant contends that Ito fails to describe how the parallel windings in the same direction can be used to generate substantially different magnetic phases in the coils of the coil subsets. *Id.* at 13.

We do not find Appellant's second argument persuasive of reversible error. We first note that Appellant discloses that coils 74A, 74B, 74C are

part of a single coil subset, and are not, as Appellant asserts, three individual coil subsets. *See* Spec. 13:33–14:29. Also, we note that the direction of the magnetic fields of coils 74A, 74C are the same which, if these coils were individual coil subsets, would appear to contradict the claim recitation that the magnetic field of each coil subset has a substantially different magnetic phase to the other coils of the subset. Thirdly, we note that these coils are disclosed to have different magnetic field direction to their adjacent coils in the same subset, which is not the same as the claim recitation that the coil subsets have a different magnetic phase to other subsets in a respective coil set. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) (rejecting appellant’s nonobviousness argument as based on limitation not recited in claim); *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) (“Many of appellant’s arguments fail from the outset because, as the solicitor has pointed out, they are not based on limitations appearing in the claims.”).

Moreover, as the Examiner finds (Ans. 5–6), Ito teaches an electric motor having two sets of three-phase windings U1/V1/W1, U2/V2/W2, wherein each set of windings provides a phase angle shift of 120°, and the control devises output control signals to generate three different phases in the respective windings of each coil set. Thus, Ito’s windings U1,V1,W1 are each coil subsets of coil set U1/V1/W1 and each have a different magnetic phase to the other coil subsets in this coil set. The Examiner, therefore, correctly found that Ito teaches the limitation that each control device includes a plurality of inverter switches and control logic for controlling the operation of the plurality of inverter switches for controlling current in the respective plurality of coil sub-sets to generate a magnetic field in each coil

sub-set to have a substantially different magnetic phase to the other one or more coil sub-sets in the respective coil set.

Accordingly, we sustain the Examiner's obviousness rejection of claim 1.

Claims 2, 3, 5, and 7-13

Appellant merely relies on the dependence of each claim on the limitations of claim 1, and does not separately advance any argument as to any of these claims. Br. 14. Accordingly, for the same reasons given above, we likewise sustain the Examiner's obviousness rejection of claims 2, 3, 5, and 7-13.

Rejection 2

As to the rejection of claims 4, 6, and 17 under 35 U.S.C. § 103(a) as unpatentable over Ito in view of Peterson, and further in view of Maslov, Appellant merely relies on the dependence of each claim subject to this rejection on the limitations of claim 1, and does not otherwise separately argue against this rejection. Br. 15. Accordingly, for the same reasons given above, we likewise sustain the Examiner's obviousness rejection of claims 4, 6, and 17.

DECISION

Upon consideration of the record, and for the reasons given above and in the Non-Final Office Action and the Examiner's Answer, the decision of the Examiner rejecting, under 35 U.S.C. § 103(a), claims 1-3, 5, and 7-13 as unpatentable over Ito in view of Peterson, and claims 4, 6, and 13 as unpatentable over Ito in view of Peterson and Maslov is *affirmed*.

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).

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1-3, 5, 7-13	§ 103(a); Ito, Peterson	1-3, 5, 7-13	
4, 6, 17	§ 103(a); Ito, Peterson, Maslov	4, 6, 17	
Overall Outcome		1-13, 17	

AFFIRMED