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AMIN, TUROCY & WATSON, LLP
200 Park Avenue
Suite 300
Beachwood, OH 44122

EXAMINER	
SU, XIAOWEI	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MASAYA HAGIWARA and SHINYA SAKURADA

Appeal 2025-000752
Application 17/412,321
Technology Center 1700

Before JEFFREY T. SMITH, MICHAEL P. COLAIANNI, and JEFFREY B. ROBERTSON, *Administrative Patent Judges.*

ROBERTSON, *Administrative Patent Judge.*

DECISION ON APPEAL[1]

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[2] appeals from the Examiner's decision to reject claims 1–7, 9–12, and 14–17. Appeal Br. 8. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

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[1] This Decision includes citations to the following documents: Specification filed August 26, 2021 ("Spec."); Non-Final Office Action entered February 21, 2024 ("Non-Final Act."); Appeal Brief filed August 8, 2024 ("Appeal Br."); Examiner's Answer entered September 30, 2024 ("Ans."); and Reply Brief filed December 2, 2024 ("Reply Br.").

[2] "Appellant" refers to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Kabushiki Kaisha Toshiba. Appeal Br. 2. Appellant is reminded of its obligation to update its real party in interest information within 20 days of any change during the appeal. *See* 37 C.F.R. § 41.8(a).

CLAIMED SUBJECT MATTER

Appellant states the invention relates to a magnetic material. Spec. ¶ 2. Claim 1, reproduced below, illustrates the claimed subject matter (Appeal Br. 17 (Claims App.)):

> 1. A magnet material represented by a composition formula: $R_xD_yBe_sB_tA_bM_{100-x-y-t-b}$ (R is at least one element selected from the group consisting of rare-earth elements, D is at least one element selected from the group consisting of Nb, Ti, Zr, Ta, and Hf, A is at least one element selected from the group consisting of N, C, H, and P, and M is at least one element selected from the group consisting of Fe, Co, Ni, Cu, V, Cr, Mn, Al, Si, Ga, Ta, W and Mo, and when a total number of elements obtained by adding R, D, B, and M is set to 100, x is a number satisfying $4.0 < x \leq 11.0$, y is a number satisfying $0 \leq y \leq 7.5$, s is a number satisfying $0.0001 \leq s \leq 0.13$, and t is a number satisfying $0 < t < 12$, and b is a number satisfying $0 \leq b \leq 18$), the magnet material comprising a main phase having at least one crystal phase selected from a group consisting of a $ThMn_{12}$ type crystal phase and a $TbCu_7$ type crystal phase.

REFERENCES

The Examiner relies on the following references to reject the claims:

Name	Reference	Date
Hagiwara	US 2018/0061539 A1	Mar. 1, 2018
WO'312	WO 2017164312 A1[3]	Sept. 28, 2017
JP'774	JP 2020 155774 A[4]	Sept. 24, 2020

[3] Citations to English translation of record. Although the Examiner provides citations to WO'312 by paragraph number (*see* Non-Final Act. 4), the English translation contains no paragraph numbers or page numbers. We refer to WO'312 by page number as consecutively numbered from the first page of text of the English translation.

[4] Citations to English translation of record.

REJECTIONS

1. Claims 1–7, 9, 10, 12, and 14–17 are rejected under 35 U.S.C. § 103 as unpatentable over Hagiwara and WO'312. Non–Final Act. 4–5.
2. Claims 7 and 11 are rejected under 35 U.S.C. § 103 as unpatentable over Hagiwara, WO'312, and JP'774. Non–Final Act. 5–6.

OPINION

We review appealed rejections for reversible error based on the arguments and evidence Appellant provides for each issue Appellant identifies.[5] 37 C.F.R. § 41.37(c)(1)(iv); *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (*cited with approval in In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) ("[I]t has long been the Board's practice to require an applicant to identify the alleged error in the examiner's rejections.")). "After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument." *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

We confine our discussion to claim 1, which is sufficient to address the separate arguments made by Appellant with respect to the rejections on appeal. 37 C.F.R. § 41.37(c)(1)(iv).

[5] We do not consider Appellant's request for rejoinder of certain claims (Appeal Br. 15), as such is not an appealable issue. *See* M.P.E.P. § 1201.

Rejection 1

The Examiner's Rejection

In rejecting claim 1 as obvious over Hagiwara and WO'312, the Examiner found that Hagiwara discloses a magnet having a $THMn_{12}$ main phase having a formula with elements including boron (B) in amounts overlapping those recited in claim 1, with the exception of beryllium (Be). Non-Final Act. 4. The Examiner found that WO'312 discloses a magnet analogous to the magnet disclosed in Hagiwara, and that WO'312 discloses that adding Be at 0–14 at% improves coercivity. *Id.*

The Examiner determined that it would have been obvious to add Be in an amount of 0–14 at% to improve coercivity as disclosed in WO'312, which overlaps the amount of Be recited in claim 1, thus rendering claim 1 obvious. Non-Final Act. 4.

Appellant's Arguments

Appellant argues that WO'312's "use of Be is not suitable for use in a magnetic material as recited in claim 1." Appeal Br. 9. Appellant argues that WO'312's range for Be and claim 1's range for Be are significantly different from one another. *Id.* at 10. Appellant contends that they have discovered that an appropriate amount of Be can allow for enhancing wettability between a chill roll and an alloy molten metal, relative to the amorphous ribbon, allowing for a homogenous amorphous ribbon to be obtained. *Id.* at 11. Appellant argues also that an appropriate amount of Be allows for the surprising result of making a microcrystal homogeneous after a heat treatment, resulting in both a high maximum magnetic energy product and a high coercive force. *Id.* at 11–14. Appellant argues that an

appropriate amount of boron can allow for obtaining an amorphous ribbon. *Id.* at 11.

Discussion

We are not persuaded by Appellant's arguments. Initially, Appellant does not sufficiently explain why Be as disclosed in WO'312 would be generally unsuitable for use in a magnet material as recited in claim 1. Appeal Br. 9. In addition, although Appellant contends that WO '312's range of 0.0 at% to 14.0 at% and claim 1's range of $0.0001 \leq s \leq 0.13$ are "significantly different" and "not commensurate," Appellant does not dispute the Examiner's position that WO'312's range overlaps claim 1's range, and therefore claim 1's range is prima facie obvious. *Id.* at 10; Non-Final Act. 4; *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) ("A *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art.").

Specifically, WO'312 discloses that

> In the rare earth permanent magnet according to the present embodiment, it is preferable to include an invading element X, and X is one or more elements selected from N, H, Be and C. The amount of X is preferably 0.0 at% or more and 14.0 at% or less. The coercive force can be improved by X penetrating into the crystal lattice of the main phase. This is because the crystal magnetic anisotropy is improved by the invasive element.

WO'312 p. 2.

Thus, as the Examiner found, WO'312 discloses that coercive force may be improved by adding Be in amounts that overlap those recited in claim 1.

As to the amount of B, Hagiwara discloses that the amount of B may be "0< d ≤18 atomic percent" and more preferably "0< d ≤14 atomic percent," which is nearly coextensive with the "0 < t < 12" amount recited in claim 1.[6] Hagiwara ¶¶ 27, 28.

As a result, we turn to Appellant's arguments on the amounts of Be and B recited in claim 1 and criticality thereof relative to the amounts of Be disclosed in WO'312 and amounts of B disclosed in Hagiwara. Appeal Br. 10–14. Appellant relies on the examples in the Specification for support. *Id.* at 12–14.[7] The only entered evidence Appellant relies on with respect to the alleged advantages for the amounts of B and Be recited in claim 1, is the specific coercive force and maximum magnetic energy product data for the bond magnets produced in the Specification's examples. We agree with the Examiner that the examples are insufficient to show unexpected results and establish criticality for the ranges of B and Be recited in claim 1. Ans. 6–9.

That is, as the Examiner points out, the examples include much narrower compositions, both in the particular elements used as well as in the amounts thereof all of which have an effect on coercivity, and as such the results are not commensurate in scope with the claims. Ans. 8 (discussing

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[6] Appellant makes a point of stating that JP'774 does not cure the alleged deficiency with respect to Be, but does not make the same statement with respect to B. *See* Appeal Br. 10–11. Indeed, JP'774 recognizes that the amount "0 ≤ t < 12 atomic percent" of B may be used to obtain an amorphous thin band by a single roll quenching method, which is expressly contrary to Appellant's statement that they "discovered" this relationship. JP'774 ¶ 22; Appeal Br. 11.

[7] We have not considered Appellant's additional results (Table A) as such results are untimely, and as the Examiner points out, have not been submitted in a timely filed declaration. Appeal Br. 14; Reply Br. 8–10; Ans. 9; *see* 37 C.F.R. §§ 41.37(c)(2), 41.41(b)(1).

Examples 1–22); *In re Dunn*, 349 F.2d 433, 439 (CCPA 1965) (holding Dunn's comparison inadequate because the cause and effect sought to be proven was lost in a welter of unfixed variables.). In this regard, the Specification discloses that the rare-earth element "provid[es] large magnetic anisotropy for the magnet material, and impart[s] high coercive force," the "D" element increases the coercive force of the magnetic material, the "M" element causes higher magnetization, and including Y as the "R" material "makes it possible to achieve both the high coercive force and the high magnetization." Spec. ¶¶ 24, 29, 31, 39. Hagiwara contains similar disclosures for rare earth elements and "M" elements. Hagiwara ¶¶ 22, 24. As such, Appellant's examples do not sufficiently demonstrate that the amount of Be and B within the ranges recited in the claims are critical through unexpected results.

In addition, the Specification provides similar results in the maximum magnetic energy product and coercivity in examples that both contain and do not contain B. Ans. 8 (citing Examples 20–22). Although Appellant argues that Comparative Examples 1–5 do not achieve both a "high" maximum magnetic energy product and high coercive force (Reply Br. 7), Appellant does not sufficiently explain why this is the case, as the values for maximum magnetic energy product and coercive force in at least one comparative example are similar to those in the examples. *Compare* Comparative Example 3 (Specific coercive force 570 kA/M and Maximum magnetic energy product 62 kJ/m^3) with Example 19 (Specific coercive force 570 kA/M and Maximum magnetic energy product 75 kJ/m^3) and Example 20 (Specific coercive force 590 kA/M and Maximum magnetic energy product 60 kJ/m^3). Spec. ¶ 85 (Table 1). Thus, there is no indication from the

examples that the maximum magnetic energy product and coercive force in Comparative Example 3 would not both be considered "high" values for maximum magnetic energy product and coercive force.

Further, there is only one comparative example (Comparative Example 4) in the Specification that has an amount of Be above the claimed range, where the amount of Be (1.5 at%) is not close to the upper limit of 0.13 at% recited in claim 1. A showing of unexpected results must present enough data points within the prior art range, but outside the claimed range, to establish that the unexpected property does not occur outside the claimed range. *In re Hill*, 284 F.2d 955, 958–59 (CCPA 1960).

Accordingly, we affirm the Examiner's rejection of claim 1, as well as claims 2–7, 9, 10, 12, and 14–17 dependent therefrom.

Rejection 2

Appellant does not separately argue claims 7 and 11, the subjects of Rejection 2. *See* Appeal Br. 8–15. Accordingly, we affirm the Examiner's rejection for similar reasons as discussed above for Rejection 1.

CONCLUSION

The Examiner's rejections are AFFIRMED.

DECISION SUMMARY

The following table summarizes our decision:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–7, 9, 10, 12, 14–17	103	Hagiwara, WO'312	1–7, 9, 10, 12, 14–17	
7, 11	103	Hagiwara, WO'312, JP'774	7, 11	
Overall Outcome			1–7, 9–12, 14–17	

TIME PERIOD FOR RESPONSE

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).

AFFIRMED