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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BARNABY S. WAINFAN

Appeal 2019-005444
Application 14/992,951
Technology Center 3600

Before JOHN C. KERINS, JAMES P. CALVE, and
WILLIAM A. CAPP, *Administrative Patent Judges*.

Opinion for the Board filed by CALVE, *Administrative Patent Judge*

Opinion Concurring filed by CAPP, *Administrative Patent Judge*

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the decision of the Examiner to reject claims 1–20. Appeal Br. 3. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] "Appellant" refers to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Northrop Grumman Systems Corporation as the real party in interest. Appeal Br. 3.

CLAIMED SUBJECT MATTER

Claims 1 and 13 are independent. Claim 1 is reproduced below.

> 1. An aircraft comprising:
>
> a first wing mounted on one side of the fuselage and a second wing mounted on an opposite side of the fuselage, each of the wings including a trailing edge having a flap pivotally mounted thereto; and
>
> a plurality of electric motor/propeller assemblies mounted to each of the flaps and being positioned when the flaps are extended so that propellers on the assemblies are oriented downward to provide power lift and increased aerodynamic lift,
>
> wherein the electric motor/propeller assemblies are configured to prevent airflow separation from the flaps when the flaps are in an extended position, and wherein the electric motor/propeller assemblies on the flap of the first wing are operable at different speeds than the electric motor/propeller assemblies on the flap of the second wing to provide different lift characteristics for the first wing than the second wing.

REJECTIONS[2]

Claims 1–20 are rejected under 35 U.S.C. § 112(a) as failing to comply with the enablement requirement.

Claims 1–6, 8–10, 12–16, and 18–20 are rejected under 35 U.S.C. § 103 as unpatentable over Rothhaar (US 2016/0288903 A1, pub. Oct. 6, 2016) and Taylor (US 2015/0014475 A1, pub. Jan 15, 2015).

Claims 7 and 17 are rejected under 35 U.S.C. § 103 as unpatentable over Rothhaar, Taylor, and Stuckl (US 2015/0183518 A1, pub. July 2, 2015).

Claim 11 is rejected under 35 U.S.C. § 103 as unpatentable over Rothhaar, Taylor, and Fredericks (US 9,475,579 B2, iss. Oct. 25, 2016).

[2] A rejection of claims 10, 11, and 20 for indefiniteness is withdrawn. Ans. 3.

ANALYSIS

Claims 1–20 for Lack of Enablement

The Examiner determines that the Specification does not enable the limitation "wherein the electric motor/propeller assemblies are configured to prevent airflow separation from the flaps when the flaps are in an extended position" in the claims. Non-Final Act. 3–5. The Examiner finds that the claims cover many configurations including parameters or factors such as the distance from propeller to the flap, flap deployment angle, motor power or speed, airflow around a wing, and cross-sectional shape of wings and flaps, but the Specification lacks direction as to how to use the factors to prevent airflow separation. *Id.* The Examiner finds "little predictability" in using these factors to prevent airflow separation, and determines that undue experimentation involving one or more, or all, of these factors would be required to determine what configurations fall within the scope of the claims, such that a skilled artisan could make and use the invention. *Id.* at 4–5 (applying *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988)); Ans. 4.

Appellant argues that the claims are enabled by drawings illustrating electric motor/propeller assemblies 42 mounted on flaps 22/24 at a trailing edge of wings 14/16, and discussions of the operation and configuration in the Specification. Appeal Br. 9. Appellant also argues that the Examiner is conflating claim breadth (lack of limitations on distances, flap angles, etc.) with lack of enablement, but breadth does not imply lack of enablement. *Id.*; Reply Br. 2. In addition, Appellant argues that Figure 2 shows an enabling disclosure of the electric propulsion motor integrated directly into the flap, immediately downstream, with the flaps deployed at an angle of about 30º, which is a typical angle for an aircraft in slow forward flight. Reply Br. 2–3.

> The Patent Laws provide the following guidance for enablement:
>
> > The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same . . . .

35 U.S.C. § 112(a). "Enablement requires that 'the specification teach those in the art to make and use the invention without undue experimentation.'" *Idenix Pharms. LLC v. Gilead Sci. Inc.*, 941 F.3d 1149, 1154 (Fed. Cir. 2019) (quoting *Wands*, 858 F.2d at 737). "Although not explicitly stated in section 112, to be enabling, the specification of a patent must teach those skilled in the art how to make and use the *full scope of the claimed invention* without 'undue experimentation.'" *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993) (emphasis added) (quoting *In re Vaeck*, 947 F.2d 488, 495 (Fed. Cir. 1991)).

"The enablement requirement ensures that the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims [therefore] [t]he scope of the claims must be less than or equal to the scope of the enablement." *Nat'l Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195–96 (Fed. Cir. 1999). "[T]he inquiry is not whether it was, or is, possible to make the full scope of the claimed device . . . . The inquiry is whether the patent's specification taught one of skill in the art how to make such a device without undue experimentation as of the patent's effective filing date." *Tr. of Boston Univ. v. Everlight Elecs. Co., Ltd.*, 896 F.3d 1357, 1363 (Fed. Cir. 2018). "That is not to say that the specification must expressly spell out every possible iteration of every claim" or what is well known in the art. *Id.* at 1364.

Here, at best, Appellant has enabled one species of configuration but has claimed a broad genus. Even if Appellant's Figures 1 and 2 describe a working example of the electric propulsion motor integrated directly into a flap immediately downstream of a flap deployed at an angle of about 30º (*see* Reply Br. 2–3), the scope of claims 1 and 13 is not limited to this example and configurations similar thereto. Indeed, Appellant essentially admits that the claims encompass many other factors that prevent airflow separation. Reply Br. 2 (arguing that the "other factors" discussed by the Examiner relate to *claim breadth* not lack of enablement); Appeal Br. 9 (same). None are addressed in the Specification.

The Specification does not explain how to configure any of these factors, or combinations of these factors, to prevent airflow separation.[3] *See Tr. Of Boston Univ.*, 896 F.3d at 1364–65 (holding that Boston University created an enablement problem by seeking a construction of a "non-single crystalline buffer layer" that included a purely amorphous layer and failing to establish that this feature was enabled); *Auto. Techs. Int'l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1282 (Fed. Cir. 2007) (holding the district court correctly determined the full scope of the claims was not enabled as "means responsive to the motion of said mass" included mechanical and electrical side impact sensors for performing the function of initiating an occupant protection apparatus, and the specification enabled only the mechanical side impact sensors, but "it did not enable electronic side impact sensors").

[3] Factors identified by the Examiner as requiring undue experimentation are (1) distance between propeller and flap, (2) flap deployment angle, (3) motor power or speed to deliver a particular propeller speed, (4) airflow around the wing, including airspeed and turbulence, (5) cross-sectional shape of the wing, and (6) cross-sectional shape of the flap. Non-Final Act. 5; Ans. 3–4.

We agree with the parties that claims 1 and 13 cover a broad genus of configurations that prevent airflow separation from the flaps besides placing motor/propeller assemblies on flaps. Claims 1 and 13 recite electric/motor propeller assemblies are "mounted to each of the flaps" or "mounted to a flap." Appeal Br. 22, 23 (Claims App.). To avoid rendering this limitation redundant, we interpret "configured to" in claims 1 and 13 to encompass other configurations or configurational aspects besides mounting to a flap, to include those discussed by the Examiner and not disavowed by Appellant.

The Specification explains "[b]y drawing air over the wings 14 and 16 using the propellers 46, the amount that the flaps 22 and 26 can be extended before the airflow separates at the corner is increased." Spec. ¶ 12. But, the Specification provides no configurations or guidelines for motor power, propeller speed, flap angle, air speed, flap distance, or other factors that can affect airflow separation. Such details are missing even for Figures 1 and 2.

We determine that the Specification does not enable a skilled artisan to configure the claimed assemblies to prevent airflow separation using the factors described above and other factors, without undue experimentation. Appellant has not established through argument or evidence that the factors are enabled in the Specification or otherwise well known in the art.

As our reviewing court has held in a similar context:

> To satisfy the plain language of § 112, ¶ 1, ALZA was required to provide an adequate enabling disclosure in the specification; it cannot simply rely on the knowledge of a person of ordinary skill to serve as a substitute for the missing information in the specification.

ALZA Corp. v. Andrx Pharms. LLC, 603 F.3d 935, 941 (Fed. Cir. 2010).

Accordingly, we determine that claims 1–20 are not enabled.

Claims 1–6, 8–10, 12–16, and 18–20
Unpatentable over Rothhaar and Taylor

Appellant argues the claims as a group except for claims 3 and 4. Appeal Br. 12–18. We select claim 1 as representative of the group and address arguments for claims 3 and 4. 37 C.F.R. § 41.37(c)(1)(iv) (2018).

Claims 1, 2, 5, 6, 8–10, 12–16, and 18–20

Regarding claim 1, the Examiner cites Rothhaar to teach rear-facing propeller units 630a, 630b mounted on flaps (control surfaces 620a, 620b) and oriented downward as the flaps are extended (Fig. 3B) to provide power and aerodynamic lift. Non-Final Act. 6. The Examiner finds that the units 630a, 630b are configured to increase circulation in a hover mode and during transition to forward flight to prevent airflow separation as claimed. *Id.* at 7.

The Examiner cites Taylor to teach aircraft electric motor/propeller assemblies 125, 130, 135, 140 operable at different speeds to control yaw. *Id.* The Examiner determines it would have been obvious to a skilled artisan to operate the electric motor/propeller assemblies of Rothhaar at different speeds on each wing flap, as Taylor teaches, "to give the aircraft a greater degree of control over yaw, thereby making it more stable." *Id.* at 7–8.

In response, Appellant argues the following:

> There is no disclosure by Rothhaar of operation in forward flight with flaps deployed, and clearly no disclosure of the propulsor (motor/propeller) being configured to prevent airflow separation from the flaps. . . . Furthermore, it can be seen from Rothhaar's figures, including a near 90° flap angle and a long extension shaft on the propulsor, that airflow optimization over the flap during flap-deployed forward flight is not a consideration in the Rothhaar configuration.

Appeal Br. 14.

The Examiner has the better position. Appellant represents that the configuration of the electric motor/propeller assemblies that prevents airflow separation is one involving the electric propulsion motor integrated directly into the flap with the propeller immediately downstream of the flap. Reply Br. 2–3, 4; Appeal Br. 9. We agree with the Examiner that Rothhaar teaches rearward-facing propeller units 330, 630a with propeller shafts 335 attached directly to flaps 320, 620a, 620b and propellers 330, 630a, 630b immediately downstream and configured to draw air over the flaps and wings. Rothhaar ¶¶ 39–43, 49, Figs. 3A, 3B, 6; *see* Spec. ¶ 12, Figs. 1, 2.

Rothhaar teaches that the propeller units are configured to increase air circulation over the wings and flaps during a *transition* from a hover flight mode (Fig. 3B) when the flaps are extended, as claimed, to a forward flight mode (Fig. 3A) when flaps are retracted. *Id.* ¶ 40. Rothhaar also aligns the propeller units with a downwash angle of the wing during the transition from a hover flight mode to a forward flight mode when flaps are extended. *Id.*

We agree with the Examiner that a skilled artisan would understand these teachings to mean that the propeller units are configured to prevent airflow separation from the flaps when the flaps are in an extended position as the aircraft transitions from a hover mode to a forward travel mode. The Examiner reasons that a transition from hover mode to forward travel mode would require the rear propeller units to increase circulation of air across the wings *and* flaps to increase aerodynamic lift to offset the loss of vertical lift as the angle of the propeller unit reduces from vertical lift to forward thrust. Ans. 9–10. We also agree that the transition from a hover mode to a forward travel mode occurs while the flaps are extended, and the flaps increase lift as the air is circulated over them as Rothhaar teaches to do. Rothhaar ¶ 40.

Appellant's arguments that Rothhaar does not include an extended flap configuration in forward flight where air circulates over the wings and trailing flaps to increase aerodynamic lift (Appeal Br. 14) is not persuasive. Flaps 320, 620a, 620b are extended in hover flight mode and start to *retract* as the aircraft moves forward in a flight mode. Rear-facing propellers 330, 630a, 630b increase air circulation over the flaps as they retract from the extended position during this transition. *See* Rothhaar ¶ 40, Figs. 3A, 3B, 6. Appellant's arguments do not address that Rothhaar teaches extended flaps in a hover flight mode (Fig. 3B) and propeller units increase air circulation over extended flaps as the aircraft begins forward flight. *Id.* Thus, Rothhaar prevents airflow separation as claimed. *Id.*; *see* Non-Final Act. 7; Ans. 7–9.

Therefore, given this similarity of Rothhaar's structure and function to the claimed electric motor/propeller assembly configuration, the Examiner had a sound basis to determine that Rothhaar inherently provides an airflow separation property as claimed by increasing the air circulation over the flaps and wings during a transition from hover to forward flight mode. Indeed, Appellant and the Specification both describe this configuration as placing propeller units downstream of flaps and using the propellers merely to draw air over the wings so the flaps can be extended without airflow separating at the corner and aerodynamic lift is increased. Reply Br. 2–3; Spec. ¶ 12.

Rothhaar therefore describes a configuration that corresponds to an embodiment described in the Specification and argued by Appellant to fall within the scope of claim 1 and its airflow separation prevention limitation. Where, as here, the Examiner has a sound basis for finding inherency, the burden shifts to Appellant to rebut that presumption. *See In re Schreiber*, 128 F.3d 1473, 1478 (Fed. Cir. 1997); MPEP ¶ 2112.

> [W]here the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on.

Id. at 1478 (quoting *In re Swinehart*, 439 F.2d 210, 213 (CCPA 1971)).

Appellant's attempt to distinguish Rothhaar use of a long boom to attach propeller units to flaps deployed at an angle of 90º for a hover mode, is not persuasive. Reply Br. 4. Claim 1 only requires electric the motor/ propeller assemblies to be "mounted to each of the flaps" without further limitation on this mounting. Rothhaar teaches this exact configuration. The motor/propeller assemblies also are recited as being "configured to prevent airflow separation from the flaps" in some unspecified manner.

In addition, the "configured" limitation does not require certain types of propellers or flap attachments, distances of propellers to the flaps, motor speeds, or other configuration. We cannot read such unclaimed features from the Specification into the claims. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004) ("[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.").

Even if we could limit "configured" to a particular dimension/size, the Specification does not disclose dimensions/sizes. Nor may the drawings be cited for such features. *See In re Wright*, 569 F.2d 1124, 1127 (CCPA 1977) ("Absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value.").

We agree with the Examiner that Rothhaar teaches propeller units 330, 630a, 630b attached *directly* to rear flaps 320, 620a, 620 by shafts 335 with blades adjacent to the rear flaps. Rothhaar ¶¶ 39, 49, Figs. 3A, 3B, 6. To the extent "configured" in claim 1 requires a direct attachment to the rear flap or propellers close to the rear flap, Rothhaar teaches such configuration as recited in claim 1 in much the same manner as is described in Appellant's Specification.

However Rothhaar's configuration is characterized, its propeller units are configured to prevent airflow separation by drawing air over the wings and flaps during transition. Rothhaar ¶ 40. Airflow over the flaps increases during a transition from a hover mode to a forward flight mode to provide increased aerodynamic lift as the hover mode decreases in a transition from Figures 3B to 3A and would be so understood by skilled artisans. Increased airflow over wings and flaps increases aerodynamic lift as the aircraft starts to move forward in a flight mode. Rothhaar teaches to maintain that extra lift by increasing air circulation over the wings *and* flaps. Appellant has not provided persuasive argument or evidence to the contrary.

Nor do we view a "long mounting boom," even if taught by Rothhaar, to teach away from the claimed aircraft as Appellant argues. Reply Br. 4. There is no indication Rothhaar criticizes, disparages, or discourages use of a shorter boom sufficient to teach away. *In re Brandt*, 886 F.3d 1171, 1178 (Fed. Cir. 2018) ("A prior art reference evidences teaching away if it 'criticize[s], discredit[s], or otherwise discourage[s] the solution claimed.'") (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)).

Accordingly, we sustain the rejection of claim 1 and claims 2, 5, 6, 8–10, 12–16, and 18–20, which fall with claim 1.

Claims 3 and 4

Claim 3 depends from claim 1 and recites that the aircraft further comprises "main cruise engines that provide thrust for the aircraft." Claim 4 depends from claim 3 and recites that "the engines are mounted to a leading edge of the wings." Appeal Br. 22 (Claims App.).

The Examiner finds that Rothhaar teaches an embodiment with main cruise engines mounted to leading edges of wings and an embodiment with the assemblies attached to flaps at trailing edges but lacks an embodiment with both configurations. Non-Final Act. 8. The Examiner determines that it would have been obvious to a skilled artisan to add main cruise engines to the leading edge of the wings to allow the leading edge engines to provide horizontal thrust even when the flaps are deployed thus providing forward thrust to ease the transition from a lift mode to a forward travel mode. *Id.*

Appellant argues that the Examiner's assertion is conclusory and uses impermissible hindsight. Appeal Br. 18. This argument does not address the Examiner's reason for modifying Rothhaar and thus is not persuasive of Examiner error in that regard. *See In re Berg*, 320 F.3d 1310, 1315 (Fed. Cir. 2003) ("As persons of scientific competence in the fields in which they work, examiners and administrative patent judges on the Board are responsible for making findings, informed by their scientific knowledge, as to the meaning of prior art references to persons of ordinary skill in the art and the motivation those references would provide to such persons. Absent legal error or contrary factual evidence, those findings can establish a prima facie case of obviousness."); *In re Cree, Inc.*, 818 F.3d 694, 702 n.3 (Fed. Cir. 2016) (holding appellant's hindsight argument was addressed by showing that a proper motivation to combine the references in fact existed).

The Examiner proposes to make Rothhaar faster and more efficient. *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006). Appellant's arguments fail to apprise us of error in this regard. *See In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011).

Accordingly, we sustain the rejection of claims 3 and 4.

Claims 7, 11, and 17
Unpatentable over Rothhaar, Taylor, and Stuckl/Fredericks

Appellant argues that the teaching in Stuckl of features in claims 7 and 17 and in Fredericks of features in claim 11 do not cure the insufficiency of Rothhaar and Taylor as to the underlying rejection of claims 1 and 13 from which these claims depend, respectively. *See* Appeal Br. 19, 20. Because we sustain the rejection of claims 1 and 13 as discussed above, these arguments are not persuasive, and we also sustain the rejections of claims 7, 11, and 17.

CONCLUSION

Claims Rejected	**35 U.S.C. §**	**Reference(s)/ Basis**	**Affirmed**	**Reversed**
1–20	112(a)	Enablement	1–20	
1–6, 8–10, 12–16, 18–20	103	Rothhaar, Taylor	1–6, 8–10, 12–16, 18–20	
7, 17	103	Rothhaar, Taylor, Stuckl	7, 17	
11	103	Rothhaar, Taylor, Fredericks	11	
Overall Outcome			1–20	

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)(iv).

AFFIRMED

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BARNABY S. WAINFAN

Appeal 2019-005444
Application 14/992,951
Technology Center 3600

Before JOHN C. KERINS, JAMES P. CALVE, and
WILLIAM A. CAPP, *Administrative Patent Judges*.

OPINION CONCURRING

CAPP, *Administrative Patent Judge*

I concur in the result reached by the majority, both as to the non-enablement and obviousness grounds of rejection.

I write separately to clarify that my reason for joining in the non-enablement grounds of decision rests on Appellant's use of the word "prevent" with respect to airflow separation from the flaps when the flaps are in an extended position. "Prevent" denotes that absolutely no airflow separation will occur if the invention is practiced as claimed. I agree that Appellant does not enable a complete prevention of all airflow separation from the flaps when the flaps are in an extended position.

Appellant's Specification teaches that: "[b]y drawing air over the wings 14 and 16 using the propellers 46, the amount that the flaps 22 and 26 can be extended before airflow separates at the corners is increased." Spec.

¶ 12. Had Appellant claimed that airflow separation was reduced, as opposed to "prevented," I would have been inclined to reach a different result, as a person of ordinary skill in the art would understand that drawing air over the wings with flap mounted propellers would reduce airflow separation and that the amount or degree of such reduction could be explored by undue experimentation.

Nevertheless, because I agree that the Specification does not enable a practitioner to "prevent" airflow separation, I concur in the result to affirm the Examiner's non-enablement rejection. Otherwise, I am fully in accord with sustaining the Examiner's prior art rejection.