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Miller, Matthias & Hull LLP/ The Boeing Company One North Franklin Street Suite 2350 Chicago, IL 60606			HUTCHENS, CHRISTOPHER D.	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ASHWANI K. CHAUDARY

Appeal 2018-000372
Application 14/276,534
Technology Center 3600

Before JAMES A. TARTAL, KENNETH G. SCHOPFER, and
ROBERT J. SILVERMAN, *Administrative Patent Judges*.

SILVERMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision rejecting claims 1, 2, 5–8, 10, 12–16, and 18–21. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies The Boeing Company as the real party in interest. Appeal Br. 2.

ILLUSTRATIVE CLAIM

1. A method of controlling a payload angle of a payload that is slung from an aerial vehicle comprising:

determining an angle of the payload relative to a body of the aerial vehicle;

ignoring the angle of the payload when the angle is less than a threshold angle in a range of three to five degrees;

generating an adjustment command corresponding to the angle of the payload when the angle is greater than the threshold range of three to five degrees; and

applying the adjustment command to cause a change in at least one of a pitch angle of the body and a roll angle of the body that accelerates the aerial vehicle in a direction of the angle of the payload.

REFERENCES

Name	Reference	Date
Smith et al. (“Smith”)	US 3,137,459	June 16, 1964
Hagerott et al. (“Hagerott”)	US 2014/0114505 A1	Apr. 24, 2014
Ahmed et al. (“Ahmed”)	US 9,146,557 B1	Sept. 29, 2015
Hamers et al. (“Hamers”)	EP 1 146 317 A1	Oct. 17, 2001

REJECTIONS²

I. Claims 1, 6, 8, 10, and 12–14 are rejected under 35 U.S.C. § 102(a)(1) as anticipated by Hamers.³

² The Final Office Action (page 2) rejected dependent claims 12 and 13 under 35 U.S.C. § 112(b). On June 9, 2017, the Examiner entered a claim amendment (submitted by the Appellant on May 2, 2017, in the paper entitled Supplemental Amendment Prior To Consideration of Appeal Brief), obviating this rejection.

³ The Final Office Action (page 3) includes claims 9 and 11 in this rejection. These claims are canceled.

II. Claim 2 is rejected under 35 U.S.C. § 103 as unpatentable over Hamers and Hagerott.

III. Claim 5 is rejected under 35 U.S.C. § 103 as unpatentable over Hamers, Hagerott, and Smith.

IV. Claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Hamers and Ahmed.

V. Claims 15, 16, and 18–21 are rejected under 35 U.S.C. § 103 as unpatentable over Hamers and Ahmed.

FINDINGS OF FACT

The findings of fact relied upon, which are supported by a preponderance of the evidence, appear in the following Analysis.

ANALYSIS

Claims 1, 2, and 5–7

The Appellant contends that Hamers fails to teach the limitation of independent claim 1 of “ignoring the angle of the payload when the angle is less than a threshold angle in a range of three to five degrees.” Appeal Br. 15–16.

According to the Examiner, Hamers’ paragraph 8 teaches the identified limitation, because Hamers employs automated control whenever the payload angle exceeds zero degrees. *See* Final Action 3; *see also* Answer 3–4. According to the Examiner:

The examiner has made the argument that Hamers teaches ignoring the angle of the payload when the angle is zero. As is well understood, the angle zero is equal to an angle that is less than a range of three to five degrees.

Id. at 3.

Yet, the claim limitation at issue requires the control system to ignore all payload angles that are less than the “threshold angle in a range of three to five degrees” — not only instances in which the angle is zero degrees. That is, the control system will not “apply the adjustment command” for payload angles that are less than the “threshold angle.” This construction is supported by paragraphs 37 and 46 and Figure 8 of the Specification.

Paragraph 46, for example, states:

If, at block 326, the magnitude of the payload angle is below the threshold value, the ‘yes’ branch may be taken to block 328 and the adjustment command may be set to zero, so that no changes are made to the input control signal.

Spec. ¶ 46. By contrast, the Hamers system would make adjustments for payload angles below such a lower threshold, so long as they are greater than zero, because Hamers adjusts for all such angular deviations greater than zero, per the Examiner’s reading of the reference. *See Answer 3; see also Final Action 3.*

Therefore, the Appellant persuades us of error in the rejection of independent claim 1, such that we do not sustain the rejection of claim 1 — along with dependent claim 6 (the rejection of which relies upon the Examiner’s analysis for claim 1) — under 35 U.S.C. § 102(a)(1). Further, because the Examiner relies upon the same analysis in the rejections of claim 2, 5, and 7, we do not sustain the rejection of these claims under 35 U.S.C. § 103.

Claims 8, 10, and 12–14

Independent claim 8 recites:

8. An aerial vehicle that damps oscillation of a payload that is slung from the aerial vehicle, the aerial vehicle comprising:

- a body having lift elements;
- a payload attachment configured to attach the payload, the payload coupled to the payload attachment; and
- a controller configured to:
 - measure an angle of the payload relative to the body;
 - implement a forward control path that controls the orientation of the body;
 - implement a feedback function that processes the angle of the payload and, responsive to the angle of the payload being greater than a range of three to five degrees, adjust an orientation of the body in a direction of the angle of the payload; and
 - responsive to the angle of the payload being less than the range of three to five degrees, create a null-control zone wherein no adjustment to the orientation of the body is made.*

(Emphasis added). The limitation “responsive to the angle of the payload being less than the range of three to five degrees, create a null-control zone wherein no adjustment to the orientation of the body is made” is similar to the claim 1 limitation discussed above because the creation of a null-control zone at angles of less than a particular angle (in the range of three to five degrees) is akin to measuring the angle against a threshold angle (in the range of three to five degrees). Like the identified limitation of claim 1, the Examiner relies upon Hamers’ paragraph 8 as teaching this claim 8 limitation. *See* Final Action 5. Also, the Appellant’s argument, with regard to claim 8 (*see* Appeal Br. 17–18), is similar to and references the argument provided for claim 1, discussed above.

Our analysis provided with regard to claim 1 also reasonably applies to the identified similar limitation of claim 8, because the Examiner has not identified a controller in Hamers that is configured to create a null-control

zone at angles less than an angle in the range of three to five degrees. Accordingly, we do not sustain the rejection of claim 8, and of claims 10 and 12–14 depending therefrom, under 35 U.S.C. § 102(a)(1).

Claims 15, 16, and 18–21

Independent claim 15 recites:

15. A quadrotor configured to automatically compensate for changes in an angle of a payload that is slung from the quadrotor comprising:

four lift rotors;
a body coupling the four lift rotors;
a payload attachment; and
a controller configured to:

measure the angle of the payload relative to a plane through the four lift rotors;

when a threshold condition is present, generate an adjustment command responsive to the angle of the payload; and

apply the adjustment command to an input control signal to cause the quadrotor to accelerate in a direction of the angle of the payload, wherein the controller is further configured to *cap the adjustment command to a value corresponding to a saturation threshold angle when the angle of the payload exceeds the saturation threshold angle.*

(Emphasis added).

The Specification illuminates the meaning of the limitation emphasized above, in explaining the operation of the “saturation” functionality:

A saturation function 246 is a function that caps the magnitude of the adjustment command to a output signal that is equivalent to a saturation threshold angle. . . . All angles less

than the saturation threshold angle will be passed through unaltered. This may help prevent overcorrection that might cause instability in the quadrotor 102 should the operating environment include, for example, large wind gusts or tampering with a payload.

Spec. ¶ 38. Thus, per the identified limitation of claim 15, the controller will apply an adjustment command that corresponds to the payload angle; however, for payload angles that exceed the “saturation threshold angle,” the controller will not increase the adjustment, but will only apply the adjustment command corresponding to that of the “saturation threshold angle.” *See* Appeal Br. 22.

In the Final Office Action, the Examiner takes the position that Hamers’ paragraph 8 teaches claim 15’s limitation of capping the adjustment command to that corresponding to the “saturation threshold angle.” Final Action 10. The Final Office Action states that, per Hamers’ teaching, “*the adjustment command creates no response, or is capped, at zero degrees.*” *Id.* The Examiner’s Answer emphasizes, instead, paragraph 8’s disclosure of a “pilot” “suppress[ing]” the oscillation of a payload. Answer 4–5. Further, the Answer refers to other portions of Hamers, disclosing the use of a “warning” signal, when the payload oscillations reach a particular angle. *Id.* at 5 (citing Hamers ¶¶ 13, 15, 20, 21).

Yet, there is no disclosure, in the cited portions of Hamers, of capping the adjustment command at a level associated with a particular angle (the claimed “saturation threshold angle”). *See* Hamers ¶¶ 8, 13, 15, 20, 21; *see also* Reply Br. 21–22.

Therefore, we are persuaded of error in the rejection of independent claim 15, such that we do not sustain the rejection of claim 15 (and claims 16, and 18–21 depending therefrom) under 35 U.S.C. § 103.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 6, 8, 10, 12–14	102(a)(1)	Hamers		1, 6, 8, 10, 12–14
2	103	Hamers, Hagerott		2
5	103	Hamers, Hagerott, Smith		5
7	103	Hamers, Ahmed		7
15, 16, 18–21	103	Hamers, Ahmed		15, 16, 18–21
Overall Outcome				1, 2, 5–8, 10, 12–16, 18–21

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).

REVERSED