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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SERGEY V. FROLOV, MICHAEL CYRUS,
ALLAN J. BRUCE and JOHN P. MOUSSOURIS

Appeal 2020-001624
Application 15/075,098
Technology Center 3600

Before MURRIEL E. CRAWFORD, BRUCE T. WIEDER, and
BRADLEY B. BAYAT, *Administrative Patent Judges*.

BAYAT, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's decision to reject claims 1, 2, 4–22, and 25–28, which constitute all the claims before us for review.² We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as “SUNLIGHT PHOTONICS INC.” Appeal Br. 3.

² Claims 29 is withdrawn from consideration. *Id.* at 19.

CLAIMED SUBJECT MATTER

Appellant's invention relates to methods "for close formation flight, and in particular for flight control for organizing and maintaining close formation flight." Spec. ¶ 2.

Claims 1 and 22 are independent. Claim 1, reproduced below with added bracketed notations, is illustrative of the subject matter on appeal.

1. A method of operating aircraft for flight in a close formation, comprising:

[(a)] establishing a communication link between a first aircraft and a second aircraft;

[(b)] assigning to at least one of the first aircraft or the second aircraft, via the communication link, initial positions relative to one another in the close formation;

[(c)] providing flight control input for aligning the first and second aircraft in their respective initial positions;

[(d)] taking airflow measurements at the second aircraft for identifying a position of at least one vortex generated by at least one wingtip of the first aircraft from the airflow measurements taken at the second aircraft, wherein the first aircraft leads the second aircraft in the close formation; and

[(e)] providing at least one flight control input to adjust a relative position between the first aircraft and the second aircraft based on the identified position of the at least one vortex.

(Appeal Br. 13, Claims App.)

REJECTIONS

I. Claims 1, 2, 4–22, 25, 26, and 28 are rejected under 35 U.S.C. § 102(a)(1) as being anticipated by Whitehead et al. (US 2014/0214243 A1, pub. July 31, 2014) (“Whitehead”).

II. Claim 27 is rejected under 35 U.S.C. § 103 as unpatentable over Whitehead and Pillai et al. (US 9,104,201 B1, iss. Aug. 11, 2015) (“Pillai”).

OPINION

Anticipation by Whitehead

A determination that a claim is anticipated under 35 U.S.C. § 102(a)(1) requires that we compare the claim to the prior art reference and make factual findings that “each and every limitation is found either expressly or inherently in [that] single prior art reference.” *Celeritas Techs. Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1360 (Fed. Cir. 1998); *see also In re Crish*, 393 F.3d 1253, 1256 (Fed. Cir. 2004). We make factual findings as to whether steps (d) and (e) of independent claim 1 are found in Whitehead, which are the only limitations argued by Appellant.

Appellant argues that Whitehead fails to disclose step (d) of “taking airflow measurements at the second aircraft for identifying a position of at least one vortex generated by at least one wingtip of the first aircraft from the airflow measurements taken at the second aircraft, wherein the first aircraft leads the second aircraft in the close formation” and step (e) of “providing at least one flight control input to adjust a relative position between the first aircraft and the second aircraft based on the identified position of the at least one vortex.” *See* Appeal Br. 6. We are not persuaded.

Whitehead is directed to an apparatus for controlling the formation of a trailing aircraft relative to a vortex generated by a leading aircraft.

Whitehead, Abstract. Whitehead's apparatus includes a position module configured to determine a position of the vortex, a position of the trailing aircraft relative to the vortex, and a desired position of the trailing aircraft relative to the vortex. *Id.* ¶ 44 (cited Ans. 4). The positions determined by the position module are based directly or indirectly on the leading aircraft data, trailing aircraft data, and an estimate of wind conditions. *Id.* The position module includes a wind estimation module that estimates "the wind conditions based on a relationship between the velocity of the trailing aircraft **20** relative to the airmass in body frame, the inertial velocity of the trailing aircraft, and the velocity of the airmass" (*id.* ¶ 47), and the estimated wind conditions such as a wind velocity vector are used by the vortex position module to determine the position of the vortex generated by the leading aircraft. *Id.* ¶ 48; *see also id.*, Fig 4 (cited Ans. 4).

Step (d) of claim 1 requires taking airflow measurements at the second aircraft for identifying a position of at least one vortex generated by at least one wingtip of the first aircraft. Appellant's Specification discloses that the claimed "airflow measurements at the second aircraft, for sensing a first vortex generated by a wingtip of the first aircraft . . . may include at least one of airflow velocity vector, airflow speed, airflow direction, air pressure, air temperature, or an aircraft angle of attack at the second aircraft." Spec. ¶ 170 (cited Appeal Br. 4). As such, Whitehead's description of estimating wind conditions based on the velocity of the trailing aircraft for determining the position of the vortex generated by the leading aircraft, anticipates step (d) of claim 1.

We are not persuaded that Whitehead’s disclosure is limited to “airflow measurements taken by the lead aircraft and non-airflow measurements taken by a second aircraft are used to identify a position of a vortex.” Appeal Br. 8; *see also* Reply Br. 4–5. As discussed, Whitehead describes using estimated wind conditions (e.g., the velocity of the trailing aircraft) to determine the position of the vortex. *See also* Whitehead ¶ 47 (measured angle of attack of trailing aircraft); *cf.* Spec. ¶ 170 (“aircraft angle of attack at the second aircraft”).

Further, Whitehead discloses that “[t]he desired aircraft position module **220** is configured to determine a position of the trailing aircraft **20** relative to the vortex **30** that will achieve a desired aerodynamic and operational benefit from the updraft **40** generated by the vortex **30**.” *Id.* ¶ 49. And, “[t]he desired aircraft position module **220** generates a desired aircraft position **222** representing the desired position determined by the desired aircraft position module.” *Id.* According to Whitehead, “the desired aircraft position module **220** generates the desired aircraft position **222** based on the vortex position **212** and input from a pilot controlling the flight of the trailing aircraft **20**.” *Id.* (“For example, the pilot may be alerted to the vortex position **212**, and manually enter the desired aircraft position **222** in the form of position commands or coordinates.”). The performance of step (e) in claim 1 does not require any computer implementation, and, as such, may be performed manually by a pilot. Whitehead’s pilot provides a flight control input in the form of coordinates to adjust a relative position between the first aircraft and the second aircraft based on the identified vortex position, as required by step (e) of claim 1.

Accordingly, we sustain the rejection of independent claim 1 as anticipated by Whitehead, and independent claim 22, which is disputed by relying on the arguments presented for claim 1. Appeal Br. 10; Reply Br. 8. For the same reasons, we also sustain the rejection of claims 2, 4–21, 25, 26, and 28 as anticipated by Whitehead, which are argued based on their dependency on the independent claims. *See id.*

Obviousness over Whitehead & Pillai

Appellant’s argument contesting the rejection of dependent claim 27 as unpatentable over Whitehead and Pillai fails to apprise us of error, because Appellant merely asserts that the steps of the claim are not taught by the prior art. *See* Appeal Br. 11. Appellant has failed to dispute the Examiner’s findings with any particularity by pointing out specific errors or distinctions over Whitehead and Pillai. In the absence of a more detailed explanation, we are not persuaded of error on the part of the Examiner. Accordingly, we sustain the rejection of claim 27 under 35 U.S.C. § 103.

CONCLUSION

The rejection under 35 U.S.C. § 102(a)(1) is affirmed.

The rejection under 35 U.S.C. § 103 is affirmed.

Claims Rejected	35 U.S.C. §	References(s)/Basis	Affirmed	Reversed
1, 2, 4–22, 25, 26, 28	102(a)(1)	Whitehead	1, 2, 4–22, 25, 26, 28	
27	103	Whitehead, Pillai	27	
Overall Outcome			1, 2, 4–22, 25–28	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED