



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,432	11/16/2012	Mohammad A. Heidari	09-0051-US-DIV	5066
63759	7590	11/23/2018	EXAMINER	
DUKE W. YEE YEE & ASSOCIATES, P.C. P.O. BOX 802333 DALLAS, TX 75380			CHANG, RICK KILTAE	
			ART UNIT	PAPER NUMBER
			3726	
			NOTIFICATION DATE	DELIVERY MODE
			11/23/2018	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptonotifs@yeeiplaw.com  
mgamez@yeeiplaw.com  
patentadmin@boeing.com

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

*Ex parte* MOHAMMAD A. HEIDARI  
and ADRIAN STANESCU<sup>1</sup>

---

Appeal 2018-000277  
Application 13/679,432  
Technology Center 3700

---

Before JAMES P. CALVE, WILLIAM A. CAPP, and SCOTT C. MOORE,  
*Administrative Patent Judges.*

CALVE, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Office Action finally rejecting claims 1, 3–13, and 24–29. Appeal Br. 9. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

---

<sup>1</sup> The Boeing Company is identified as the real party in interest (Appeal Br. 2) and also is the applicant pursuant to 37 C.F.R. § 1.46.

### CLAIMED SUBJECT MATTER

Claims 1, 24, and 27 are independent with claim 1 reproduced below.

1. An apparatus comprising:
  - a bearing housing, for an engine, that comprises:
    - a bearing section that comprises a first cylindrical shape that comprises a channel capable of receiving bearings;
    - a base that comprises: a second cylindrical shape, a ring, and a flange, such that the flange extends, toward the bearing section, substantially perpendicular from a surface of the ring, such that the surface faces the bearing section, and the bearing section and the base each being substantially aligned centrally along an axis of a shaft of the engine; and
    - a plurality of members, such that each member of the plurality of members extends between and directly connects the bearing section to the flange of the base, such that the each member of the plurality of members comprises: a length, a width, and a side, and a configuration for the plurality of members being selected from a number of configurations that comprise, for each member of the plurality of members, a cross-section that comprises an area configured to reduce a stress in each member, such that responsive to the stress a stiffness characteristic of each member increases such that a critical speed increases for the shaft of the engine.

Appeal Br. 16 (Claims App.).

### REJECTIONS

Claims 1, 3–13, and 24–29 are rejected under 35 U.S.C. § 102(b) as anticipated by Ommundson (US 6,439,772 B1, iss. Aug. 27, 2002).

Claims 7, 8, 12, and 13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Ommundson.

## ANALYSIS

### *Claims 1, 3–13, and 24–29 Anticipated by Ommundson*

Appellants argue claims 1, 3–13, and 24–29 as a group. Appeal Br. 9–14. We select claim 1 as representative, with claims 3–13 and 24–29 standing or falling with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that Ommundson teaches a bearing housing as recited in claim 1 including a bearing section (bearing assembly 46), a base (mounting flange 86) with a flange, and a plurality of members (springs 84) extending between the flange of base 86 and bearing section 46 as shown in Figure 5 of Ommundson. Final Act. 2–3.

Appellants argue that Figure 4 of Ommundson teaches an elliptically shaped race that teaches away from “a bearing section that comprises a first cylindrical shape” and “a base that comprises a second cylindrical shape” as recited in claim 1. Appeal Br. 10–12. Appellants also argue that teaching an elliptical bearing race is not identical to showing a bearing section and base with first and second cylindrical shapes. *Id.* at 12. Appellants further argue that neither Figure 3 nor Figure 5 shows these features, and Figure 5 does not show an axis for an engine shaft as claimed. *Id.* In addition, Appellants argue that Ommundson teaches offsetting a cylindrical shaped bearing race to facilitate the desired deflection and thus teaches away from “the bearing section and the base each being substantially aligned centrally along an axis of a shaft of the engine” as recited in claim 1. *Id.* at 13.

Appellants’ argument that Figure 4 of Ommundson does not disclose a cylindrically-shaped bearing section and base is not persuasive because the Examiner relies on Figure 5 of Ommundson to show these features, not the alternative, elliptical embodiment shown in Figure 4. Final Act. 2; Ans. 5.

Ommundson discloses Figure 2 as a cross-section of “an exemplary embodiment rotor and bearing assembly.” Ommundson, 1:65–67. Figure 3 is a partial end view and Figure 5 is a side view of this bearing assembly shown in Figure 2. *Id.* at 2:1–10. Figures 2, 3, and 5 all illustrate bearing assembly 46 and base 86 as cylindrical shaped, as claimed. In this regard, Ommundson discloses that bearing assembly 46 has an annular-shaped outer race 54 that includes inner diameter 76 having recess 80 for receiving rolling elements 52 (bearings). Outer race 54 defines a substantially circular profile to receive rolling elements 52, which define a substantially circular cross-sectional profile when assembled as shown in Figure 3. *Id.* at 2:42–61, 3:66–4:6. Figures 2, 3, and 5 illustrate bearing assembly 46 forming a first cylindrical shape. Figure 3 also illustrates base flange 86 with a second cylindrical shape as claimed. Indeed, Appellants acknowledges that these elements are cylindrical. *Id.* at 12; *see* Ans. 5.

Figures 2, 3, and 5 also show bearing assembly 46 and base flange 86 “being substantially aligned centrally along an axis of a shaft of the engine” as claimed. As the Examiner correctly finds, Ommundson discloses both elements being aligned centrally along an axis of rotor shaft 42 in Figure 2. *See* Ommundson, 2:33–66, Fig. 3. Ommundson also discloses that rotor shaft 42 is substantially similar to rotor shaft 26 of gas turbine engine 10 illustrated in Figure 1. *Id.* at 2:35–36, Fig. 5; Ans. 5.

Appellants argue, however, that Ommundson does not disclose “the bearing section and the base each being substantially aligned centrally along an axis of a shaft of the engine” as claimed, because Ommundson’s Figure 3 shows the bearing outer race 54 as being offset radially from sump housing center 124. Appeal Br. 13; Reply Br. 2–3.

This argument is not persuasive because Ommundson teaches that the bearing assembly 46 is centered in damper sub-assembly 96 as the Examiner correctly finds. Ans. 6. In particular, bearing assembly 46 is centered in damper insert 98 so the center of damper insert 98 is substantially concentric with bearing assembly center 130 in Figure 3. *Id.* (citing Ommundson, 4:15–21). Thus, bearing section 46 is “substantially aligned centrally” with base flange 86 along axis 130, as claimed, because base flange 86 follows the circumference of damper insert 98 as shown in Figure 2 of Ommundson.

Appellants are correct that Ommundson discloses bearing assembly axis 130 and base flange 86 to be offset 134 from sump housing center 124, which is “substantially concentric” with a center of engine 10. Ommundson, 3:63–65, 4:7–12; Reply Br. 2–4. However, claim 1 only requires the bearing section and base to be “*substantially* aligned centrally along an axis of a shaft of the engine.” (Emphasis added). Words of approximation, such as “such as “generally” and “substantially,” are descriptive terms commonly used in patent claims to avoid a strict numerical boundary to the specified parameter. *Anchor Wall Sys. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1311 (Fed. Cir. 2003); *see also N. Am. Container, Inc. v. Plastipak Packaging, Inc.*, 415 F.3d 1335, 1346 (Fed. Cir. 2005) (“generally” and terms of approximation need not be construed with mathematical precision).

An ordinary meaning of “substantial” is “being largely but not wholly that which is specified.” Definition of substantial by Merriam-Webster at <http://www.merriam-webster.com/dictionary/substantial> (last viewed Nov. 6, 2018); *see also Clare v. Chrysler Grp. LLC*, 819 F.3d 1323, 1330 (Fed. Cir. 2016) (same). Appellants do not argue any other meaning or point to any disclosure in their Specification that contravenes this ordinary meaning.

Ommundson discloses that the offset 134 between axis 130 of bearing assembly 46/base 86 and axis 124 of the engine shaft is approximately *0.001 inches*. Ommundson, 4:12–14. Thus, bearing section 46 and base 86 are “substantially aligned” centrally with the engine shaft even if we interpret “alignment” to mean “concentric” as Appellants implicitly argue. Bearing section 46 and base 86 also are “substantially aligned” with the engine shaft because they extend in a spaced, parallel relation to the central engine shaft.

Finally, Appellants argue that Ommundson’s members lack “a cross-section that comprises an area configured to reduce a stress in each member, such that responsive to the stress a stiffness characteristic of each member increases such that a critical speed increases for the shaft of the engine” as recited in claim 1. Appeal Br. 10–12, 13. Appellants argue that this feature controls the stiffness of the bearing housing to allow control of the critical speed of the engine shaft, and Ommundson lacks such elements. *Id.* at 13.

Whatever else this limitation encompasses,<sup>2</sup> it encompasses members with a cross-sectional area that increases members’ stiffness, as Appellants assert. *Id.* at 5 (claimed subject matter), 11 (citing Spec. ¶¶ 44–47), 13 (citing Spec. ¶ 131). We adopt this interpretation to resolve this dispute.

---

<sup>2</sup> This limitation could mean that the cross sectional area of each member is configured to reduce a stress in each member somehow and this reduced stress effectively makes each member stiffer because it is subjected to less stress thereby to increase a stiffness characteristic of each member. This limitation also could mean that the cross sectional area of each member is configured to increase the stiffness of each member so each member can withstand greater stress without deflection and damage to the engine. This limitation also could mean that the cross sectional area is configured to reduce stress in each member and this reduced stress somehow increases a stiffness characteristic of each member. Claim 1 does not recite what the stress is reduced in relation to or what the stiffness is increased in relation to.

Appellants disclose that the stiffness of the bearing housing influences the critical speed of the shaft, which is the speed at which high amplitude vibrations occur. Spec. ¶ 131. Controlling stiffness this way may guide the critical speed of the shaft beyond the engine's normal operating range. *Id.*

The Specification discloses various embodiments that increase the cross-sectional area of the members *and* reduce stress in the members to increase stiffness of the bearing housing. Spec. ¶ 45. The embodiments use various configurations of the members to control the stiffness of the bearing housing and to control the stress in the members that extend between the bearing section and base of the bearing housing. *Id.* ¶ 46. The configuration of the bearing housing (and its members) is selected to provide the desired amount of stiffness for the housing *and* the desired amount of stress for the plurality of members of the bearing housing. *Id.* ¶¶ 124, 125.

Appellants disclose that these objectives are achieved by configuring the members that extend between the base and bearing section to be “at least one of” the following: (1) members extending at an angle from the bearing section to the base; (2) members having a curve relative to the central axis; and (3) members having a width that increases and decreases along the length of the members to form a bowtie shape. *Id.* ¶¶ 47, 124, Figs. 13–21.

We agree with the Examiner that Ommundson discloses members 84 with angled, curved, and bowtie configurations that Appellants disclose will decrease stress in, and increase the stiffness of, the members as claimed. *See* Final Act. 4–5 (citing Fig. 5); Appeal Br. 5 (citing Spec. ¶¶ 125, 129–131). Figure 5 of Ommundson shows angled springs 84 of increasing/decreasing width along their length that form a bowtie shape. Springs 84 also curve relative to the central axis of bearing assembly 46 in Figures 2 and 5.

Thus, the Examiner had a sound basis for finding that Ommundson's bearing housing members (springs 84) provide stiffness and stress features as claimed because Ommundson's springs 84 have the configurations that Appellants disclose as providing those claimed features/functions.

Appellants do not explain why Ommundson's springs 84 lack these characteristics when they are configured as Appellants disclose. *See In re Schreiber*, 128 F.3d 1473, 1478 (Fed. Cir. 1997) (when the Patent Office has reason to believe that a functional limitation that is asserted to be critical to establishing novelty may be an inherent characteristic of the prior art, it can require an applicant to prove that the subject matter disclosed in the prior art does not possess that claimed characteristic); Appeal Br. 10–14.

Thus, we sustain the rejection of claims 1, 3–13, and 24–29.

*Claims 7, 8, 12, and 13 Unpatentable over Ommundson*

Because we sustain the Examiner's rejection of claims 7, 8, 12, and 13 as anticipated by Ommundson, the issue of whether Ommundson renders these claims obvious is mooted. We further note that Appellants' arguments (Appeal Br. 14–15) do not address the Examiner's findings that Ommundson teaches channels for balls/rollers as recited in claims 7 and 8 and a bearing housing for an aircraft engine as recited in claims 12 and 13. *See* Final Act. 3; *see also* Ommundson, 1:5–8, 2:42–61, Figs. 1–3, 5.

DECISION

We affirm the rejection of claims 1, 3–13, and 24–29 as anticipated by Ommundson.

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).

Appeal 2018-000277  
Application 13/679,432

AFFIRMED