



# 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.
14/570,091	12/15/2014	Brian D. Merry	60253US11; 67097-1681PUS8	1009
54549	7590	11/25/2019	EXAMINER	
CARLSON, GASKEY & OLDS/PRATT & WHITNEY 400 West Maple Road Suite 350 Birmingham, MI 48009			EDWARDS, LOREN C	
			ART UNIT	PAPER NUMBER
			3746	
			NOTIFICATION DATE	DELIVERY MODE
			11/25/2019	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):

ptodocket@cgolaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

*Ex parte* BRIAN D. MERRY and GABRIEL L. SUCIU

---

Appeal 2019-002753  
Application 14/570,091  
Technology Center 3700

---

Before MICHAEL L. HOELTER, BRETT C. MARTIN, and  
LISA M. GUIJT, *Administrative Patent Judges*.

HOELTER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>1</sup> appeals from the Examiner's decision to reject claims 22–26, which constitute all the claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

---

<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as “United Technologies Corporation.” Appeal Br. 1.

### CLAIMED SUBJECT MATTER

The disclosed subject matter “relates to a gas turbine engine bearing configuration for a shaft.” Spec. ¶ 2. Sole apparatus claim 22 is independent; is illustrative of the claims on appeal; and, is reproduced below.

22. A gas turbine engine comprising:

a core housing providing a core flow path;

a fan;

a shaft supporting a compressor section arranged within the core flow path, wherein the compressor section is fluidly connected to the fan, the compressor section comprising a first pressure compressor and a second pressure compressor upstream from the first pressure compressor, the second pressure compressor including multiple compressor stages; and first and second bearings supporting the shaft relative to the core housing and being arranged radially inward of and axially overlapping with at least some of the multiple compressor stages;

a gear train;

a combustor fluidly connected to the compressor section;

a turbine section fluidly connected to the combustor, the turbine section comprising:

three turbines including a low pressure turbine, the low pressure turbine configured to drive the fan, wherein the other two of the three turbines each are configured to drive one of the first and second compressors, and wherein the gear train is positioned between the low pressure turbine and the fan; and

wherein the gas turbine engine includes at least one of a low fan pressure ratio of less than 1.45 and a low pressure turbine pressure ratio that is greater than 5.

### EVIDENCE

Name	Reference	Date
Haworth et al. ("Haworth")	US 3,727,998	Apr. 17, 1973
Petrie et al. ("Petrie")	US 3,729,957	May 1, 1973
Rosen	US 3,747,343	July 24, 1973
Kasmarik et al. ("Kasmarik")	US 3,792,586	Feb. 19, 1974
Adamson et al. ("Adamson")	US 4,916,894	Apr. 17, 1990

### REJECTIONS

Claims 22–26 are rejected under 35 U.S.C. § 112(a) as failing to comply with the enablement requirement.

Claims 22–24 are rejected under 35 U.S.C. § 103 as unpatentable over Haworth, Ross, and Petrie.

Claims 25 is rejected under 35 U.S.C. § 103 as unpatentable over Haworth, Ross, Petrie, and Kasmarik.

Claims 26 is rejected under 35 U.S.C. § 103 as unpatentable over Haworth, Ross, Petrie, and Adamson.

### ANALYSIS

*The rejection of claims 22–26  
as failing to comply with the enablement requirement*

The Examiner addresses the limitation in independent claim 22 reciting “a low pressure turbine pressure ratio that is greater than 5.” Final Act. 6. Appellant contends that because “there is no upper bound[] defined for this range . . . the pressure ratio could theoretically approach infinity.” Final Act. 6–7. The Examiner states, “the specification fails to provide

explanations of how this would be achieved.” Final Act. 7. The Examiner further states, “the sheer breadth of the claims coupled with the lack of direction and working examples throughout the scope amounts to undue experimentation.”<sup>2</sup> Final Act. 8. “For these reasons, the scope of the claims are not enabled.” Final Act. 8.

Appellant disagrees and references *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565 (Fed. Cir. 1991). Appeal Br. 3. “In *Scripps*, the Federal Circuit clearly held that open-ended ranges may be enabled even if the inherent limit is “not precisely known.” Appeal Br. 4 (referencing *Scripps*, 927 F.2d at 1572). Further, “[t]he *Scripps* decision is an instruction on how to apply the enablement test from [*I*n *re Wands*, 858 F.2d 731, 737-38 (Fed. Cir. 1988), which MPEP § 2164.01 directs Examiners to follow.” Reply Br. 2.

The Examiner also acknowledges *Wands* as setting forth the test for enablement, and focuses on a criteria described therein as to whether the experimentation needed to practice the invention is undue or unreasonable. *See* Final Act. 7 (“[t]hat standard is still the one to be applied”); *see also* Ans. 2, 3.

As noted above, the recited ratio in question is “a low pressure turbine pressure ratio that is greater than 5.” *See* Final Act. 6. Appellant’s Specification makes clear this “pressure ratio is pressure measured prior to inlet . . . as related to the pressure at the outlet” of the low pressure turbine. Spec. ¶ 27. Because this claim is directed to a measurement of a pressure at

---

<sup>2</sup> “[T]he breadth of the claims encompasses an infinite scope of operating ranges and the Applicant has provided no direction to achieve a large portion of the claimed scope.” Final Act. 7.

an inlet and an outlet, and their ratio being “greater than 5,” the Examiner does not make clear why the calculation of this ratio might involve undue experimentation. As noted above, the Examiner finds that this “ratio could theoretically approach infinity.” Final Act. 6–7. However, even if the Examiner is theoretically correct, it is still not readily apparent that the determination of this ratio between inlet and outlet pressures involves undue experimentation.<sup>3</sup>

Accordingly, and based on the record presented, we do not sustain the Examiner’s rejection of claim 22, or claims 23–26 which depend therefrom, as failing to comply with the enablement requirement.

*The rejection of claims 22–24  
as unpatentable over Haworth, Ross, and Petrie*

Appellant argues claims 22–24 together. *See* Appeal Br. 6–7. We select independent claim 22 for review, with claims 23 and 24 standing or falling with claim 22. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner primarily relies on Haworth for disclosing many of the limitations of claim 22, and on Rosen for disclosing the “fan and fan pressure ratio.” Final Act. 10, 11. Thereafter, the Examiner provides a reason for the combination of Haworth and Rosen. *See* Final Act. 11. The Examiner further acknowledges, “Haworth fails to specifically describe wherein the gas turbine comprises a gear train” and its recited location (i.e., “between the low pressure turbine and the fan”). Final Act. 12. The

---

<sup>3</sup> The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. *See In re Angstadt*, 537 F.2d 498, 504 (CCPA 1976).

Examiner relies on Petrie for such teachings, and also provides a reason for including the “arrangement of Petrie in the system of Haworth.” Final Act. 12.

Appellant contends, “there is no apparent way of incorporating Petrie’s gear train into Haworth’s inverting shaft.”<sup>4</sup> Appeal Br. 6. In response, the Examiner explains, “[a] layman would have easily conceived placing the gears of Petrie (31 and 34) in place of Haworth’s spline (24).” Ans. 4. As an alternative arrangement, the Examiner additionally states, “the layman would have reasonably envisioned modifying Haworth to include the gearing of Petrie downstream of Haworth’s spline (near No. 23 of Haworth's Fig. 2).” Ans. 4–5. Seeking still further clarification regarding the replacement of Haworth’s spline with Petrie’s gears, Appellant states, “the Examiner has not explained how a person of ordinary skill in the art could have implemented Petrie's gear train with Haworth's inverting shaft.” Reply Br. 3.

To be clear, we agree with the Examiner that both Haworth’s spline (and its associated components) and Petrie’s gearing (and its associated components) are involved in shaft rotation (*see* Haworth 2:10–13; Petrie 1:30–37), and Appellant’s argument does not apprise us of error in the Examiner’s determination that modifying Haworth with Petrie’s gearing

---

<sup>4</sup> “A skilled person would not have known how to construct an epicyclic gear train as taught by Petrie that could allow the fan drive shaft to change position unpredictably during operation as taught by Haworth.” Appeal Br. 6. Also, “[t]here is no evidence on the record that a skilled person would have known how to construct a gas turbine engine gear train capable of adapting to a turbine shaft with a dynamically changing axis of rotation.” Reply Br. 3.

“would in no way affect how Haworth’s invention functions apart from rotating the fan shaft 22 of Haworth at a different speed than the low pressure turbine shaft 11.” Ans. 4. In other words, the Examiner is addressing another way of coupling, and thereby transferring rotational force between, Haworth’s shafts, and Appellant has not explained why this is not obvious, in view of the prior art as relied on by the Examiner. Where “a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

Additionally, the Examiner is not required to provide in-depth, detailed instructions regarding the machinations involved in changing the manner by which a shaft is driven, as Appellant apparently seeks. Instead, the Supreme Court only requires that “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Appellant is not persuasive that the Examiner failed at this endeavor.

Further, Appellant states that the Examiner’s assertion that “the proposed modification would ‘behave identically’ to Haworth’s spline” is faulty. Reply Br. 3 (referencing Ans. 4). To be clear, Haworth is directed to bearings that support a shaft, and which continue to do so even if the shaft becomes unbalanced. *See Haworth* 1:13–34. The Examiner, however, addresses how Haworth’s shaft is rotated (i.e., replacing a spline with gearing) and finds that “[t]he mesh at the splined connection of [Haworth] (24) would behave identically to a mesh between gears and therefore such a

modification would not destroy the function of [Haworth].” Ans. 4. In other words, we do not find adequate support for Appellant’s assertion that Haworth’s spline is able to continue to “mesh” after the shaft becomes unbalanced, but not Petrie’s gearing.

Appellant further states that the combination of Haworth and Petrie “does not change the fact that the proposed modification would need to forgo either Petrie’s or Haworth’s benefits to operate.” Reply Br. 3. However, there is no indication that Haworth’s spline interconnecting Haworth’s shafts becomes inoperable in the event of an imbalanced condition (which the bearings are designed to accommodate). Thus, in substituting the one for the other, we are not persuaded that Petrie’s gearing would become inoperable when Haworth’s spline does not under the same conditions. Accordingly, we are not persuaded by Appellant’s contention that “the proposed modification would need to forgo either Petrie’s or Haworth’s benefit.” Reply Br. 3.

Appellant also asserts, “Petrie would cease to function as intended if any component unexpectedly moved to a new axis of rotation.” Reply Br. 3. However, it is Haworth that is being modified, not Petrie. Further, as addressed above, Appellant does not explain how movement of Petrie’s drive to a new axis of rotation would cause it to malfunction when movement of Haworth’s spline to a new axis of rotation would not.

Accordingly, and based on the record presented, we sustain the Examiner’s rejection of claims 22–24 as being obvious in view of Haworth, Ross, and Petrie.

*The rejections of (a) claim 25 as unpatentable over Haworth, Ross, Petrie, and Kasmarik; and, (b) claim 26 as unpatentable over Haworth, Ross, Petrie, and Adamson*

Appellant does not separately argue either rejection of either dependent claim. Instead, Appellant contends, “[n]either Kasmarik nor Adamson cure the deficiencies noted above with respect to the § 103 rejection of claim 22.” Reply Br. 7. As we are not persuaded of any error in the rejection of claim 22 (*see above*), we likewise sustain the Examiner’s rejections of claims 25 and 26.

### CONCLUSION

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
22–26	112(a)	Enablement		22–26
22–24	103	Haworth, Ross, Petrie	22–24	
25	103	Haworth, Ross, Petrie, Kasmarik	25	
26	103	Haworth, Ross, Petrie, Adamson	26	
<b>Overall Outcome<sup>5</sup></b>			22–26	

No 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**

---

<sup>5</sup> 37 C.F.R. § 41.50(a)(1) states, “[t]he affirmance of the rejection of a claim on any of the grounds specified constitutes a general affirmance of the decision of the examiner on that claim.”