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Paper No. 9
Entered: October 27, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GENERAL ELECTRIC COMPANY,
Petitioner,

v.

UNITED TECHNOLOGIES CORPORATION,
Patent Owner.

Case IPR2016-00952
Patent 9,121,412 B2

Before BENJAMIN D. M. WOOD, HYUN J. JUNG, and RICHARD E. RICE, *Administrative Patent Judges.*

JUNG, *Administrative Patent Judge.*

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

General Electric Company ("Petitioner") filed a Petition (Paper 1, "Pet."), requesting institution of an *inter partes* review of claims 1–5 and 7–11 of U.S. Patent No. 9,121,412 B2 (Ex. 1001, "the '412 patent"). United Technologies Corporation ("Patent Owner") timely filed a Preliminary Response (Paper 7, "Prelim. Resp."). Under 35 U.S.C. § 314, an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

Upon consideration of the Petition and the Preliminary Response and for the reasons explained below, we determine that Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims, and we institute an *inter partes* review of claims 1, 2, 4, 5, 7, 8, and 11 of the '412 patent.

A. Related Proceedings

The parties indicate that there are no related proceedings involving the '412 patent. Pet. 1; Paper 5, 1.

B. The '412 Patent (Ex. 1001)

The '412 patent relates to "an engine having a geared turbo fan architecture that is designed to efficiently operate with a high bypass ratio and a low pressure ratio." Ex. 1001, 1:14–17. Figure 1 of the '412 patent is reproduced below.

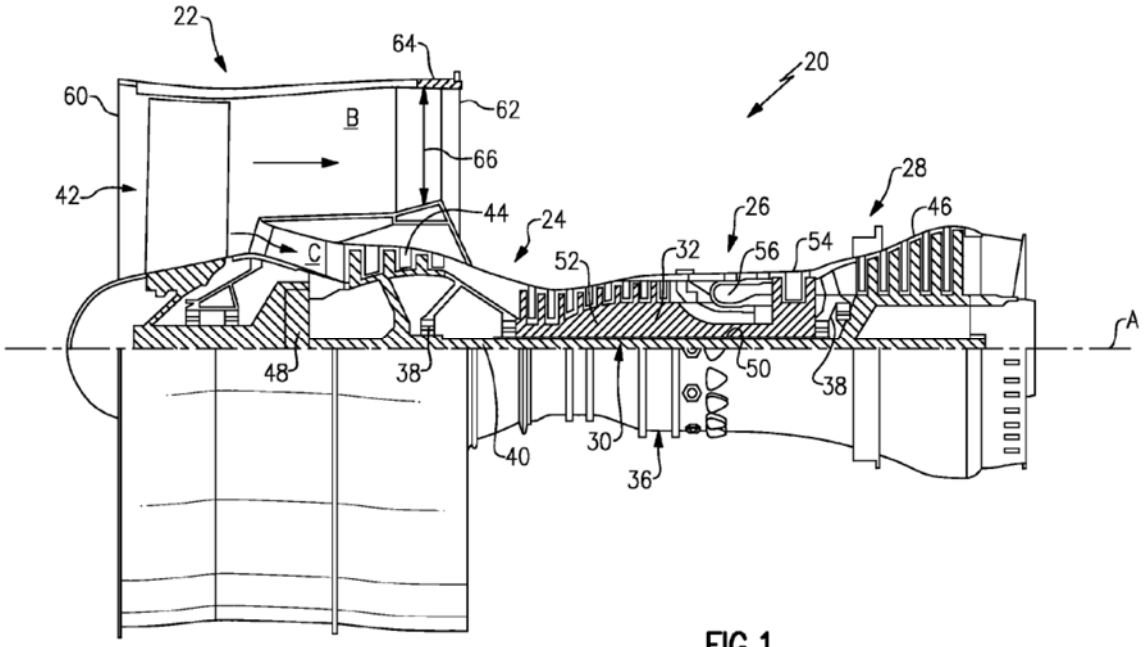

FIG. 1

Figure 1 is a schematic cross-section of a gas turbine engine. *Id.* at 2:4. Gas turbine engine 20 includes fan section 22, compressor section 24, combustor section 26, and turbine section 28. *Id.* at 2:11–14. Fan section 22 drives air along bypass flow passage B, and compressor section 24 drives air along core flow passage C. *Id.* at 2:18–21. Low speed spool 32 includes inner shaft 40 that is coupled to propulsor 42, low pressure compressor 44, and low pressure turbine 46. *Id.* at 2:28–30. Low pressure turbine 46 drives propulsor 42 through gear assembly 48, which allows low speed spool 30 to drive propulsor 42 at a different speed. *Id.* at 2:31–34.

Engine 20 defines a design pressure ratio with regard to an inlet pressure at inlet 60 and an outlet pressure at outlet 62 of the bypass flow passage B. *Id.* at 2:51–55. The design pressure ratio can be between 1.1 and 1.35. *Id.* at 3:28–30.

Figure 2 of the ’412 patent is reproduced below.

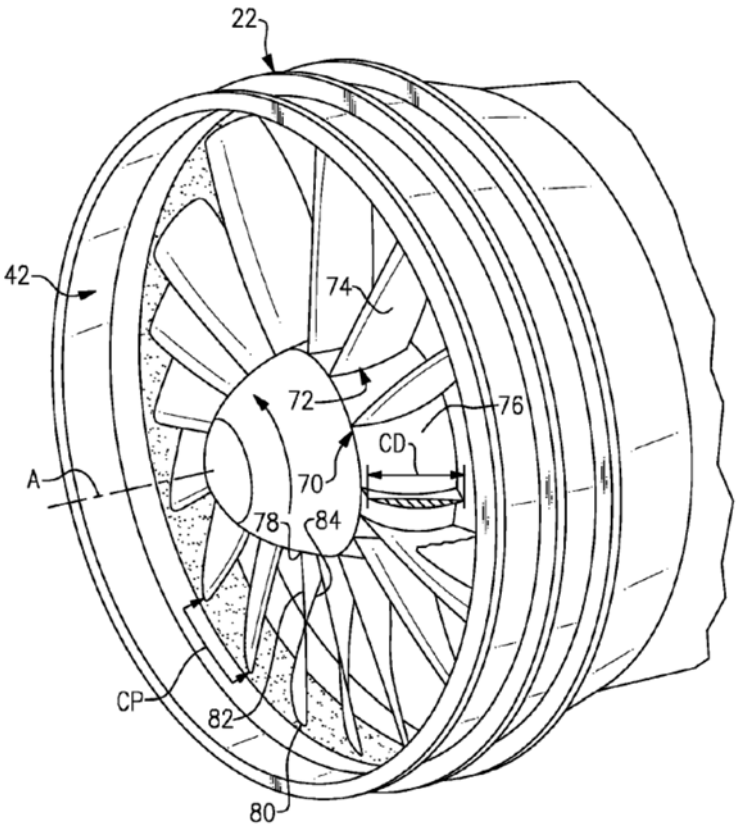

FIG.2

Figure 2 is a perspective view of a fan section. *Id.* at 2:5–6. Propulsor 42 includes rotor 70 having row 72 of blades 74 that extend from hub 76. *Id.* at 2:66–3:2. Blades 74 extend between root 78 and tip 80 and have leading edge 82 and trailing edge 84. *Id.* at 3:2–5. In Figure 2, a number ("N") of blades 74 is no more than 16 but can be 10–16. *Id.* at 3:16–21.

Also, a chord dimension ("CD") is a length between leading edge 82 and trailing edge 84 at tip 80 (*id.* at 3:5–7); a circumferential pitch ("CP") is equivalent to the arc distance between tips 80 of neighboring blades 74 (*id.* at 3:7–10); a solidity value is defined as a ratio ("R") of CD/CP (*id.* at 3:22–24); and propulsor 42 defines a ratio of N/R (*id.* at 3:37). The solidity value

can be between 0.6 and 1.1 (*id.* at 3:25–26), and the ratio N/R can be between 8 and 28 (*id.* at 3:37–38).

C. Illustrative Claim

Petitioner challenges claims 1–5 and 7–11 of the '412 patent. Of the challenged claims, claims 1 and 9 are independent. Patent Owner states that it has disclaimed claims 9 and 10. PO Resp. 26 (citing Ex. 2008). Claim 1 is reproduced below:

> 1. A gas turbine engine comprising:
> a spool;
> a turbine coupled to drive the spool;
> a propulsor coupled to be driven by said turbine through said spool;
> a gear assembly coupled between said propulsor and said spool such that rotation of said spool drives said propulsor at a different speed than said spool,
> wherein said propulsor includes a hub and a row of propulsor blades that extend from said hub, and said row includes a number (N) of said propulsor blades that is no more than 16, and the propulsor is located at an inlet of a bypass flow passage having a pressure ratio that is between 1.1 and 1.35 with regard to an inlet pressure and an outlet pressure of said bypass flow passage;
> wherein each of said propulsor blades extends radially between a root and a tip and in a chord direction between a leading edge and a trailing edge at the tip to define a chord dimension (CD), said row of propulsor blades defining a circumferential pitch (CP) with regard to said tips, wherein said row of propulsor blades has a solidity value (R) defined as CD/CP that is between 0.6 and 0.9, and a ratio of N/R is between 8 and 16 or between 18 and 28.

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