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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHRISTOPHER W. STROCK

Appeal 2015-002076
Application 12/749,750
Technology Center 3700

Before MICHAEL L. HOELTER, ANNETTE R. REIMERS, and
JEFFREY A. STEPHENS, *Administrative Patent Judges*.

REIMERS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE¹

Christopher W. Strock (Appellant) appeals under 35 U.S.C. § 134(a) from the Examiner's decision to reject under 35 U.S.C. § 103(a) (1): claims 1, 2, and 4–7 as unpatentable over Eaton (US 4,759,957; iss. July 26, 1988), Salyer (US 3,897,221; iss. July 29, 1975), and Hermanek (US 6,410,159 B1;

¹ Appellant submitted an Amendment to the claims in the Response After Final Action. *See* Response After Final Act. 2–4 (filed Apr. 8, 2014). In the Advisory Action, the Examiner indicated that the proposed amendment “[would not] be entered.” Adv. Act. 1 (mailed Apr. 14, 2014). The claim set before us for review is the one submitted with the Appeal Brief. *See* Appeal Br. 5–8, Claims App.

iss. June 25, 2002); (2) claims 8, 12–18, and 21–24 as unpatentable over Sanders (US 6,899,339 B2; iss. May 31, 2005), Eaton, Salyer, and Hermanek^{2,3}; (3) claim 19 as unpatentable over Sanders, Eaton, Salyer, Hermanek, and Hopkins (US 7,955,049 B2; iss. June 7, 2011); and (4) claim 20 as unpatentable over Sanders, Eaton, Salyer, Hermanek, and Elbert (US 3,831,258; iss. Aug. 27, 1974). Claims 3 and 9–11 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

CLAIMED SUBJECT MATTER

The claimed subject matter relates to “an abradable seal for use in a gas turbine engine to protect tips of compressor blades.” Spec. para. 1, Fig.

1. Claims 1, 8, and 14 are independent.

Claim 1 is illustrative of the claimed subject matter and recites:

1. An abradable seal for a gas turbine engine comprising:
 - a metal alloy, wherein the metal alloy is MCrAlY, and M is a metal, Cr is chromium, Al is aluminum and Y is yttrium; and
 - a plurality of pores in the metal alloy, wherein the plurality of pores have a diameter of approximately 1 to 10 microns.

² The heading of rejection does not include claims 23 and 24, which are discussed in the body of the rejection. *See* Final Act. 5, 7. We consider this a typographical error. The Examiner includes claim 10 in the heading of the rejection. *See id.* at 5. Claim 10 has been canceled. *See* Amendment filed Dec. 20, 2013. We consider this a typographical error.

³ The Examiner states that “[c]laim 24 is objected to because claim 1 is not a method claim. Appropriate correction is required. Note that claim 24 will be treated as depending on claim 16 in this Office action.” Final Act. 3.

ANALYSIS

Obviousness over Eaton, Salyer, and Hermanek

Claims 1, 2, and 4–7

Independent claim 1 recites an abradable seal for a gas turbine engine including a plurality of pores “hav[ing] a diameter of approximately 1 to 10 microns.” Appeal Br. 5, Claims App.⁴ The Examiner relies on Salyer for this limitation. Final Act. 4. In particular, the Examiner finds that “Salyer teaches an abradable metal formed also by sintering powder metal mixed with a polymer fugitive filler; wherein the desired strength, pore size and bulk density of the abradable metal can be obtained by varying the concentration and amount of the initial filler powder.” *Id.* (citing Salyer, 6:64–67). The Examiner concludes that it would have been obvious to modify Eaton and Hermanek “with pore diameter of approximately 1 to 10 microns by varying the concentration and amount of the initial filler powder as taught by Salyer for the purpose of providing an abradable seal . . . to satisfy a design requirement.” *Id.*

Appellant contends that Salyer “does not disclose pores having a diameter of approximately 1 to 10 microns.” Reply Br. 1; *see also* Appeal Br. 3. According to Appellant, Salyer “discloses a powder metal that has a diameter of 3 microns. . . . However, [Salyer] does not disclose any numerical specifics or information regarding the correlation between the

⁴ Under the broadest reasonable interpretation, the phrase “a plurality of pores hav[ing] a diameter of approximately 1 to 10 microns” of claim 1 is interpreted as more than one pore has a diameter of approximately 1 to 10 microns. Upon review of the Specification, it is unclear whether the phrase “a plurality of pores” refers to all the pores or a subset of pores having a diameter of approximately 1 to 10 microns. *See e.g.*, Spec. paras. 5–7, 18.

diameter of the powder metal and the pore size.” Appeal Br. 3. Appellant contends that Salyer “only generally discloses that the size of a powder affects the resulting pore size. . . . Nothing in [Salyer] discloses that a 3 [micron] diameter powder metal would result in a pore size of 1 to 10 microns as claimed.” *Id.*

Having considered the respective contentions of Appellant and the Examiner, we determine that Appellant has the better position.

Salyer discloses that (1) “[p]orous metal structures with varying degree of bulk densities and pore sizes were produced and evaluated. . . . Pore size, as would be expected, was affected by the size and shape of the initial powder” (Salyer, 6:8–14; *see also* Final Act. 2; Ans. 8; Appeal Br. 3); and (2) “[b]y varying the concentration and the amounts of the initial filler powder it is possible to change the physical characteristics such as strength, pore size, and bulk density” (*id.* at 6:65–68; *see also* Final Act. 2–4; Ans. 8).

We acknowledge the Examiner’s position that Salyer “disclose[s] at least a relationship between the diameter of the metal powder [particle] and the resulting pore diameter” and a skilled artisan “can vary the pore size of an abradable seal.” Ans. 8; *see also* Final Act. 2–3. However, the Examiner fails to provide sufficient evidence or technical reasoning as to how the diameter of the metal powder [particle] and the resulting pore diameter of Salyer are related. Although Salyer discloses that pore size is “affected by the size and shape of the initial powder [particle]” and the pore size can be changed due to “varying the concentration and the amounts of the initial filler powder [particle],” the cited portions of Salyer are silent as to particular pore diameters or the specific relationship between the size of the metal powder (particle) and the resulting pore size. *See* Salyer, 6:8–14, 65–

68; *see also* Final Act. 2–4; Appeal Br. 3. Given that Salyer is silent as to particular pore diameters or the specific relationship between the size of the metal powder (particle) and the resulting pore size, the Examiner fails to provide sufficient findings to show that “varying the concentration and amount of the initial filler powder [particle] as taught by Salyer” necessarily results in “pore diameter of approximately 1 to 10 microns” (*see* Final Act. 2–4; *see also* Ans. 8–9; Appeal Br. 3).⁵

Moreover, the Examiner’s position that “an initial metal powder [particle] of 3 microns in diameter *could possibly* yield a pore diameter between 1 and 10 microns depend[ing] on the concentration of the initial metal powder [particle] according to Salyer’s teaching” is speculative. Ans. 9 (emphasis added). “Inherency. . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991). Given that Salyer is silent as to particular pore diameters or the specific relationship between the size of the metal powder (particle) and the resulting pore size, the Examiner’s conclusion that “varying the concentration and amount of the initial filler powder [particle] as taught by Salyer” necessarily results in “pore diameter of approximately 1 to 10 microns” is not supported in the record by underlying factual evidence. *See* Final Act. 4; *see also* Appeal Br. 3. Rejections based on 35 U.S.C. § 103 must rest on a factual basis. In

⁵ We note that, although Salyer elsewhere teaches percent porosity resulting from various combinations of filler and metal powders (*see, e.g.*, Salyer Tables 2–4), the Examiner does not rely on these teachings to show Salyer’s materials necessarily include one with pores having a diameter of approximately 1 to 10 microns.

making such a rejection, the Examiner has the initial duty of supplying the requisite factual basis and may not, because of doubts that the invention is patentable, resort to speculation, unfounded assumptions, or hindsight reconstruction to supply deficiencies in the factual basis. *In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967).

The Examiner also finds that selecting the pore size from 1 to 10 microns is a mere design choice. Final Act. 3; Ans. 8–9. In the Answer, the Examiner further takes the position that “a person in the art would be able to estimate the average diameter of the pore based on the diameter of the powder metal [particle]. Based on this, one can estimate the pore diameter when the powder metal [particle] is not tightly packed through trial and error.” Ans. 7; *see also id.* at 8 (the Examiner’s illustration of “the situation when the powder metal is tightly packed”); Reply Br. 1. However, as correctly pointed out by Appellant, Salyer “does not disclose how tightly packed the powder metal [particle] is.” Reply Br. 1. Even assuming *arguendo* that “one can estimate the pore diameter when the powder metal [particle] is not tightly packed through trial and error” as the Examiner posits (*see* Ans. 7; *see also* Reply Br. 1), the Examiner fails to provide sufficient evidence or technical reasoning for why the particular pore diameter of approximately 1 to 10 microns would have been selected. *See* Ans. 7–8; *see also* Reply Br. 1–2.

Based on the foregoing reasons, the Examiner fails to establish by a preponderance of the evidence that the combined teachings of Eaton, Salyer, and Hermanek disclose the device of claim 1. Accordingly, we do not sustain the Examiner’s rejection of independent claim 1 and its dependent claims 2 and 4–7 as unpatentable over Eaton, Salyer, and Hermanek.

Obviousness over Sanders, Eaton, Salyer, and Hermanek
Claims 8, 12–18, and 21–24

Independent claims 8 and 14 call for a device and a method, respectively, each of which includes a limitation directed to a plurality of pores “hav[ing] a diameter of approximately 1 to 10 microns.” Appeal Br. 6, Claims App. The Examiner relies on the same unsupported findings and conclusions for claims 8 and 14 as discussed above for claim 1. *See* Final Act. 5–6. Thus, the Examiner’s findings and conclusions with respect to Salyer are deficient for claims 8 and 14 as well.

Accordingly, for reasons similar to those discussed above for claim 1, we do not sustain the Examiner’s rejection of independent claims 8 and 14 and their respective dependent claims 12, 13, 15–18, and 21–24 as unpatentable over Sanders, Eaton, Salyer, and Hermanek.

Obviousness over Sanders, Eaton, Salyer, Hermanek and either
Hopkins or Elbert
Claims 19 and 20

Each of claims 19 and 20 depends from claim 14. Appeal Br. 7, Claims App. The Examiner relies on the same unsupported findings and conclusions for claims 19 and 20 as discussed above for claims 1 and 14. *See* Final Act. 7–8. Thus, the Examiner’s findings and conclusions with respect to Salyer are deficient for claims 19 and 20 as well.

Accordingly, for reasons similar to those discussed above for claims 1 and 14, we do not sustain the Examiner’s rejections of dependent claim 19 as unpatentable over Sanders, Eaton, Salyer, Hermanek, and Hopkins and dependent claim 20 as unpatentable over Sanders, Eaton, Salyer, Hermanek,

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and Elbert.

DECISION

We REVERSE the decision of the Examiner to reject claims 1, 2, 4–8,
and 12–24.

REVERSED