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.
13/665,901	10/31/2012	James Edward Simpson	261477-1	7803

6147 7590 11/08/2018

GENERAL ELECTRIC COMPANY
GPO/GLOBAL RESEARCH
901 Main Avenue
3rd Floor
Norwalk, CT 06851

EXAMINER
VOLZ, ELIZABETH J

ART UNIT	PAPER NUMBER
3733	

NOTIFICATION DATE	DELIVERY MODE
11/08/2018	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):

haeckl@ge.com
gpo.mail@ge.com
Lori.e.rooney@ge.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JAMES EDWARD SIMPSON[1]

Appeal 2018-001991
Application 13/665,901
Technology Center 3700

Before MICHAEL L. HOELTER, JAMES P. CALVE, and ALYSSA A. FINAMORE, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Office Action finally rejecting claims 4, 5, 10, 12–14, 16–27, and 29–32. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

---

[1] General Electric Company is identified as the real party in interest and also is the applicant pursuant to 37 C.F.R. § 1.46. Appeal Br. 2.

CLAIMED SUBJECT MATTER

Claims 4, 5, 10, and 16 are independent. Claim 4 is shown below.

> 4. A cryogenic tank for containing a cryogenic fluid therein, the cryogenic tank comprising:
>
> a shell having an interior side, an exterior side, and an internal volume that is bounded by the interior side, the shell being configured to contain the cryogenic fluid within the internal volume, the shell having a shape that includes at least two elongated lobes that are defined by partial cylinders that intersect each other, the partial cylinders of the at least two lobes extending lengths along central longitudinal axes that are offset from each other, the at least two lobes comprising opposite domes that extend at opposite ends of the length of the corresponding partial cylinder; and
>
> an internal reinforcement frame comprising a web of elongate frame members that extend within the internal volume of the shell, the frame members extending along the interior side of the shell such that lengths of the frame members extend along paths that follow the profile of the interior side of the shell, wherein the internal reinforcement frame is configured to distribute loads exerted on the shell along at least three different directions, wherein the frame members of the reinforcement frame comprise formers and stringers, the lengths of the formers peripherally surrounding the central longitudinal axes of the partial cylinders, the lengths of the stringers extending along the central longitudinal axes of the partial cylinders, the stringers and formers overlapping each other, wherein the shell has a volume efficiency of at least approximately 57% and the internal reinforcement frame have a mass efficiency of between approximately 6.25 Gal/lbm and 7.75 Gal/lbm.

REJECTIONS

Claims 4, 5, 10, 12–14, and 29–32 are rejected under 35 U.S.C. § 103(a) as unpatentable over Becker (US 3,314,567, iss. Apr. 18, 1967).

Claims 16–27 are rejected under 35 U.S.C. § 103(a) as unpatentable over Becker and Burkdoll (US 3,454,245, iss. July 8, 1969).

ANALYSIS

Claims 4, 5, 10, 12–14, and 29–32 Unpatentable over Becker

The Examiner finds that Becker discloses a cryogenic tank for containing a cryogenic fluid, and the tank has all of the structures required by independent claims 4, 5, and 10 to include a shell configured to contain the cryogenic fluid with at least two elongated lobes defined as partial cylinders, and an internal reinforcement frame. Final Act. 2–5; Ans. 9.

The Examiner finds that Becker does not teach a volume efficiency of at least approximately 57% or a mass efficiency of between approximately 6.26 Gal/lbm and 7.75 Gal/lbm, as recited in claims 4, 5, and 10. Final Act. 3–5. However, the Examiner determines these efficiencies would have been obvious to a person of ordinary skill "since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. MPEP 2144.05(III)." *Id.* at 3, 4, 5. The Examiner also reasons that Becker must have a volume efficiency and a mass efficiency because they are described as ratios in the Specification; "[t]herefore, one of ordinary skill in the art would be able to find the optimal value to be used." *Id.* at 10; Ans. 9–10. In addition, the Examiner finds that Appellant has not described the criticality of the claimed ranges in the Specification. Final Act. 11; Ans. 11.

Appellant argues that the Examiner has not provided evidence that the general conditions of the claim are disclosed in the prior art, or that the prior art recognizes the claimed efficiencies as result-effective variables that can achieve a recognized result such that an optimum range can be determined by routine experimentation. Appeal Br. 6–8. Appellant also argues that "the Office Action presents ZERO evidence that either the volume efficiency or the mass efficiency is a result-effective variable." *Id.* at 8. We agree.

Before a variable can be optimized through routine experimentation to render obvious a claimed feature, the variable must be shown to be result-effective. *See In re Urbanski*, 809 F.3d 1237, 1242 (Fed. Cir. 2016) ("Board properly found that both Gross and Wong recognize that reaction time and degree of hydrolysis are result-effective variables that can be varied in order to adjust the properties of the hydrolyzed fiber in a predictable manner."). "A recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective." *In re Applied Materials*, 692 F.3d 1289, 1297 (Fed. Cir. 2012) (holding the claimed polishing pad groove dimensions were shown as result effective variables because prior art taught that their modification changed the polishing rate and pad performance); *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977) (reversing a rejection where the parameter to be optimized was not recognized as a result-effective variable because "[i]t is impossible to recognize, from the [prior art] experiment . . . that 'treatment capacity' is a function of 'tank volume' or the tank volume-to-contractor area ratio. Recognition of this functionality is essential to the obviousness of conducting experiments to determine the value of the 'tank volume' ratio which will maximize treatment capacity.").

Absent a showing that a feature is recognized as a result-effective variable, an applicant does not have to show the criticality of that feature. *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) (explaining "a prima facie case of obviousness may be rebutted where the results of optimizing a variable, which was known to be result effective, (are) unexpectedly good.'" (quoting *Antonie*, 559 F.2d at 620)); *see Applied Materials*, 692 F.3d at 1297 (ranges that are obvious to optimize as result-effective variables may be patentable if the ranges are critical and produce a new and unexpected result).

The Examiner has not established that the claimed volume and mass efficiencies would have been obvious to achieve by routine experimentation because the Examiner has not shown that Becker teaches these efficiencies as result-effective variables.[2] Final Act. 3–5. Therefore, Appellant is not required to establish the criticality of the claimed volume or mass efficiency. *Boesch*, 617 F.2d at 276; *Urbanski*, 809 F.3d at 1242–43 (Where reaction time and degree of hydrolysis were shown to be result-effective variables that can be varied to adjust the properties of hydrolyzed fiber in a predictable manner to render obvious the claimed reaction time and hydrolysis ranges, Urbanski failed to show that those ranges were critical or produced a new and unexpected result as compared to the prior art.); *see also E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 966, 1006 (Fed. Cir. 2018) (If the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation, but the presumption may be rebutted where a modification to a parameter produces a new and unexpected result different in kind and not merely in degree from results of the prior art *or* the parameter is not recognized as result-effective.).

---

[2] "Volume efficiency" compares the internal volume of a tank used to store fluid to the space needed to contain the tank. Spec. ¶ 17. "Mass efficiency" compares the internal volume of a tank to the tank's weight. *Id.* Various parameters of the cryogenic tanks can be used to achieve a predetermined volume efficiency or mass efficiency, or increase the efficiencies. *Id.* ¶ 78. As the number of lobes increases, the volume efficiency of a tank generally increases, but the mass efficiency of the tank decreases. *Id.* ¶ 81. Thus, an optimal volume efficiency may yield a suboptimal mass efficiency. Becker designs tanks of sheet metal to fit tapered ship hulls, but does not expressly teach mass or volume efficiencies. Becker, 3:11–35, 4:25–54, Figs. 12, 13. To the extent Becker inherently may disclose mass and volume efficiencies, the Examiner has not shown that Becker teaches to use these efficiencies to effect some property/result so that the efficiencies are result effective.

Accordingly, we do not sustain the rejection of independent claims 4, 5, and 10, or their dependent claims 12–14, and 29–32.

Claims 16–27 Unpatentable over Becker and Burkdoll

Claim 16 recites an aircraft having an airframe and a cryogenic tank according to claim 10. Appeal Br. 14 (Claims App.). The Examiner's reliance on Burkdoll to teach an aircraft and airframe (Final Act. 7) does not overcome the deficiencies of Becker as to claim 10. Thus, we do not sustain the rejection of claim 16 or claims 17–27, which depend therefrom.

DECISION

We reverse the rejections of claims 4, 5, 10, 12–14, 16–27, and 29–32.

REVERSED