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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WENDELL W. ISOM, MARCELO RIBEIRO,
and ARMANDO ALEJANDRO GARCIA

Appeal 2019-003823
Application 13/746,020
Technology Center 3700

Before EDWARD A. BROWN, JAMES P. CALVE, and
WILLIAM A. CAPP, *Administrative Patent Judges*.

CAPP, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant¹ seeks our review under 35 U.S.C. § 134(a) of the final rejection of claims 11–21, 23, 24, and 26–31. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word “Appellant” to refer to “Applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies Praxair Technology, Inc. as the real party in interest. Appeal Br. 3.

THE INVENTION

Appellant's invention relates to methods for filling containers with pressurized fluids. Spec. ¶¶ 2–4. Claim 11, reproduced below, is illustrative of the subject matter on appeal.

11. A process for filling a cylinder with cryogenic fluid in a filling system comprising:

pumping a cryogenic liquid at an initial rate to an elevated pressure within a range of from 800 to 10,000 psia to produce an elevated pressure cryogenic liquid;

vaporizing a first portion of the elevated pressure cryogenic liquid to produce an elevated pressure gas;

bypassing vaporization of a second portion of the elevated pressure cryogenic liquid;

mixing the second portion of the elevated pressure cryogenic liquid with the elevated pressure gas and vaporizing the second portion of the elevated pressure cryogenic liquid by direct heat exchange with the elevated pressure gas to produce a controlled temperature elevated pressure gas having a temperature that is maintained higher than -40°F ;

passing the controlled temperature elevated pressure gas into the cylinder to form a filled gas; and

reducing the cryogenic liquid pumping initial rate to a reduced pumping rate based on a temperature rise in the cylinder to limit a temperature of the filled gas to not more than 120°F .

THE REJECTIONS

The Examiner relies upon the following as evidence in support of the rejections:

NAME	REFERENCE	DATE
Kooy	US 5,325,894	July 5, 1994
Notaro	US 5,934,081	Aug. 10, 1999
Matus	US 2005/0061791 A1	Mar. 24, 2005
Mercury Medical ²	Technical Information	Dec. 13, 2005
Turner	US 2007/0107465 A1	May 17, 2007
Farese	US 2009/0205745 A1	Aug. 20, 2009

The following rejections are before us for review:

1. Claims 11–15, 17–19, 21, 23, 24, and 26–31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Notaro and Farese.

2. Claim 16 is rejected under 35 U.S.C. § 103 as being unpatentable over Notaro, Farese, and Mercury Medical.

3. Claim 20 is rejected under 35 U.S.C. § 103 as being unpatentable over Notaro, Farese, and Matus.

4. Claim 24 is rejected under 35 U.S.C. § 103 as being unpatentable over Notaro, Farese, and Kooy.

5. Claim 26 is rejected under 35 U.S.C. § 103 as being unpatentable over Notaro, Farese, and Turner.

² Technical Information/Medical Gas Cylinders, Mercury Medical, www.mercurymed.com/catalogs/BDR_TechnicalInformatoin.pdf.

OPINION

*Unpatentability of Claims 11–15, 17–19, 21, 23, 24, and 26–31
over Notaro and Farese*

Appellant argues claims 11–15, 17–19, 21, 23, 24, and 26–31 as a group. Appeal Br. 12–17. We select claim 11 as representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that Notaro discloses the invention substantially as claimed except for reducing the pumping rate based on a temperature rise in the cylinder, for which the Examiner relies on Farese. Final Action 3–6. The Examiner concludes that it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Notaro by the teachings of Farese to achieve the claimed invention. *Id.* 5–6. According to the Examiner, a person of ordinary skill in the art would have done this to facilitate safe and expeditious filling of the cylinder. *Id.* 6.

Appellant argues that a person of ordinary skill would not have combined Notaro and Farese in the manner proposed by the Examiner. Appeal Br. 12. Appellant argues that Notaro and Farese provide redundant and “mutually exclusive” means of controlling filling rate. *Id.* at 15. Appellant cites *Kinetic Concepts, Inc., v. Smith & Nephew, Inc.*, 688 F.3d 1342 (Fed. Cir. 2012) for the proposition that where an advantage provided by one prior art reference is redundant with that of another prior art reference such that no further improvement is expected to be achieved by the combination, there is no reason for the combination other than hindsight. Appeal Br. 12. According to Appellant,

[O]ther than the need for redundant control, the Examiner fails to provide sufficient evidence or articulate technical reasoning to establish that the fill method of Notaro would be further

improved, enhanced or controlled by incorporating the reduced pump rate of Farese.

Id. at 14.

In response, the Examiner explains that the base reference, Notaro, teaches all of the features recited in claim 11 except for reducing the pumping rate based on a temperature rise in the cylinder. Ans. 5. The Examiner further explains that Farese is directed to filling a cylinder with a cryogenic fluid in which a first portion of liquid is vaporized while a second portion bypasses vaporization. *Id.* The two portions are then mixed and placed into direct heat exchange with one another to provide temperature control of the cryogenic fluid, which then fills the cylinder. *Id.* The Examiner finds that Farese recognizes that prior art methods of filling cylinders with cryogenic fluids suffer from overheating which delays the filling process. *Id.* at 6 (citing Farese ¶ 4). The Examiner further finds that Farese controls pumping rates based on temperature rise in the cylinder to facilitate temperature control and faster filling. *Id.* (citing Farese ¶ 12).

In response to Appellant's contention that the Notaro and Farese methods are merely redundant of each other, the Examiner disputes Appellant's allegations as a mischaracterization of the rejection. Ans. 6. The Examiner clarifies that the rejection relies on Notaro as teaching vaporizing and bypassing as a means of temperature control and Farese as teaching regulating pumping rates in addition to vaporizing and bypassing as a means of improving on prior art methods such as Notaro. *Id.* 6–7. The Examiner disputes Appellant's allegation that Notaro and Farese teach mutually exclusive design processes. *Id.* at 10. The Examiner reiterates and clarifies that Notaro and Farese both teach vaporizing and bypassing, but

that, in addition, Farese also controls pump rate based on temperature to provide even greater control. *Id.*

The notion that these references are independently effective to control temperature is true to the extent that Notaro is *sufficient* to control temperature while Farese teaches improvements to temperature control. Importantly, Farese expressly provides that pump rate control enables the benefit of even greater temperature control and more rapid filling than vaporizing and bypassing alone (as is performed in Notaro) . . . Farese evidences that pump rate control would improve upon the process of Notaro.

Id.

Notaro discloses a system for filling cylinders with gas. Notaro, Abstract. Notaro summarizes the underlying scientific principles involved in filling gas cylinders as follows.

In the filling of cylinders, as the gas flows from a storage vessel into the cylinder and the pressure within the cylinder increases, owing to the fixed volume of the cylinder, the temperature of the gas within the cylinder rises following the ideal gas law relation. It is important that the temperature of the gas within the cylinder not significantly exceed the ambient temperature. If it were to exceed the ambient temperature, then less gas can be put into any given cylinder at any given pressure and, as the gas contents of the cylinder settle to the ambient temperature, the cylinder becomes only partially filled and is delivered from the filling station to the use point with significantly less gas than could otherwise have been delivered.

Id. col. 1, ll. 32–44. Notaro then outlines one of the problems facing the art.

In order to avoid this problem of high gas temperature within the cylinder as the cylinder is being filled with pressurizing gas, practitioners fill cylinders at a slow rate, typically about 100 psi per minute, such that the heat increase caused by the increasing pressure within the cylinder roughly equals the heat dissipation rate from the cylinder walls to the environment. In this way the temperature of the cylinder contents does not significantly

exceed the ambient temperature. This procedure effectively addresses the cylinder partial charging problem, but it is time consuming and therefore costly and inefficient.

Id. col. 1, ll. 45–55. Notaro addresses the forgoing problem by vaporizing pressurized cryogenic liquid in admixture with pressurized gas to simultaneously produce the charging gas and control the temperature of the charging gas to enable a rapid filling rate. *Id.* Abstract, col. 2, ll. 1–12.

Farese is also directed to filling a vessel with compressed gas. Farese, Abstract. Farese explicitly recognizes the overheating problem in filling gas cylinders. *Id.* ¶ 4. Farese uses a variable speed pump or compressor to adjust the flow rate of the gas based on gas temperature. *Id.*, Fig. 2.

Appellant’s arguments in traverse of the rejection are not persuasive. The arguments are based on the underlying premise that Notaro and Farese teach mutually exclusive means of controlling the filling of gas cylinders. Appeal Br. 15. In essence, Appellant contends that one would not use Farese to improve Notaro because they each teach independently effective control means. However, we do not accept Appellant’s underlying premise and, therefore, Appellant’s resulting conclusion quickly falls to the ground.

Appellant’s reliance on the *Kinetic Concepts* case is misplaced for several reasons. In the first instance, *Kinetic Concepts* involved an appeal to the Federal Circuit of a District Court’s decision to grant a patent challenger’s motion for judgment as a matter of law (JMOL) of invalidity of obviousness which set aside a jury verdict upholding the validity of the claims at issue. *Kinetic Concepts*, 688 F.3d at 1346. During trial, the jury heard evidence from patentee’s expert that the prior art did not disclose all of the features of the claim at issue and that there was no reason to combine the references. *Id.* 1363–64, 1369. In reversing the District Court’s grant of

JMOL, the Federal Circuit determined that the court had to assume that the jury found the patentee's expert credible and persuasive in his opinion that the prior art reference did not disclose certain claimed features. *Id.* at 1363–64.

Because the jury concluded that S & N failed to establish that the patents were obvious, we must assume that the jury found Wake Forest's expert to be credible and persuasive on this point. In light of this assumption, there is substantial evidence to support the factual finding that the [prior art] reference does not disclose [the claimed feature].

Kinetic Concepts at 1364.

Furthermore, the *Kinetic Concepts* court also found that the patent challenger, who bore the burden of proving invalidity by clear and convincing evidence, failed to introduce evidence indicating why a person of ordinary skill in the art would combine the references to arrive at the claimed invention. *Id.* at 1366–67. In contrast, the Examiner here has articulated a reason to combine supported by rational underpinning sufficient to support the rejection, namely, to facilitate expeditious filling of the cylinder. Final Action 6.

Moreover, Appellant's redundancy theory appears to be based on the following language from *Kinetic Concepts*.

[B]oth of these references independently accomplish similar functions, namely, draining fluids. Because each device independently operates effectively, a person having ordinary skill in the art, who was merely seeking to create a better device to drain fluids from a wound, would have no reason to combine the features of both devices into a single device.

Id. at 1369. In contrast to the facts of *Kinetic Concepts* and consistent with the Examiner's findings in the instant case, Farese presents a means of improving previous filling methods such as Notaro.

Furthermore, the fact that Notaro may already perform adequately does not preclude a skilled artisan from seeking to improve upon it. An implicit motivation to combine exists when the improvement is technology-independent and the combination of references results in a product or process that is more desirable, for example, because it is faster or more efficient. *Dystar Textilfarben GmbH & Co, v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006).

Because the desire to enhance commercial opportunities by improving a product or process is universal—and even common-sensical—we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves.

Id.

Appellant next argues that the Examiner fails to provide sufficient evidence to establish that the fill method of Notaro would be improved by incorporating the pump rate of Farese. Appeal Br. 14. In so doing, Appellant misconstrues the allocation of the burden of proof in proceedings before the PTO. The PTO bears the initial burden of showing a prima facie case of obviousness. *In re Giannelli*, 739 F.3d 1375, 1379 (Fed. Cir. 2014). However, when a prima facie case of obviousness is made, the burden then shifts to Appellant to come forward with evidence and/or argument supporting patentability. *Id.* With respect to the Examiner's burden, the Examiner is deemed to be a person of scientific competence and, in such capacity, makes findings, informed by his or her scientific knowledge, as to the meaning of prior art references to persons of ordinary skill in the art and the motivation those references would provide to such persons. *In re Berg*, 320 F.3d 1310, 1315 (Fed. Cir. 2003). Absent legal error or contrary factual evidence, those findings can establish a prima facie case of obviousness. *Id.*

In the instant case, the Examiner finds that the teachings of Farese can be used to improve Notaro and supplies articulated reasoning with rational underpinning as to why a person of ordinary skill in the art would have made the combination. Final Action 6; *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)(requiring an obviousness conclusion to be based on explicit articulated reasoning with rational underpinning) cited with approval in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). The Examiner's findings and reasoning is enough to shift the burden to Appellant to rebut the Examiner's case. Apart from unsubstantiated attorney argument, Appellant fails to rebut the Examiner's case with evidence or persuasive technical reasoning. *Invitrogen Corp. v. Clontech Labs, Inc.*, 429 F.3d 1052, 1068 (Fed. Cir. 2005) (unsubstantiated attorney argument is no substitute for competent evidence).

Finally, Appellant argues that Notaro and Farese are incompatible because Farese reduces the pump rate only when temperature in the vessel exceeds 150 degrees F, whereas Notaro's method maintains gas contents in fill cylinders within a range of 60–90 degrees F. Appeal Br. 15. "Given that Notaro's filled gas contents never exceed 90F, there is no technical reason to adopt Farese's reduction of pump rate at higher than 150F." *Id.* at 16. In response, the Examiner points out, correctly, that the temperature ranges recited by Appellant in the Appeal Brief relate to non-limiting examples. Ans. 3. Appellant's incompatible temperature range argument thus fails to apprise us of the Examiner error.

In view of the foregoing discussion, we determine the Examiner's findings of fact are supported by a preponderance of the evidence and that the Examiner's legal conclusion of unpatentability is well-founded.

Accordingly, we sustain the Examiner's unpatentability rejection of claims 11–15, 17–19, 21, 23, 24, and 26–31 over Notaro and Farese.

*Unpatentability of Claims 16, 20, 24, and 26
over Combinations Based on Notaro and Farese*

These claims are rejected over Notaro and Farese in combination with various other references. Final Action 14–17. Appellant does not argue for their separate patentability apart from arguments presented with respect to claim 11, which we have previously considered. We sustain the Examiner's rejection of claims 16, 20, 24, and 26. *See* 37 C.F.R. § 41.37(c)(1)(iv) (not arguing a ground of rejection results in waiver).

CONCLUSION

In summary:

Claims Rejected	§	Reference(s)/Bases	Aff'd	Rev'd
11-15, 17-19, 21, 23, 24, 26–31	103	Notaro, Farese	11-15, 17-19, 21, 23, 24, 26–31	
16	103	Notaro, Farese, Mercury Medical	16	
20	103	Notaro, Farese, Matus	20	
24	103	Notaro, Farese, Kooy	24	
26	103	Notaro, Farese, Turner	26	
Overall Outcome			11-21, 23, 24, 26-31	

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).

AFFIRMED