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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/459,575                      07/24/2006                      Wei Ti Lee                      010421.02/MDP/COPPER/PJT                      1616

44257                      7590                      03/08/2013  
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EXAMINER
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CHANDRA, SATISH

ART UNIT	PAPER NUMBER
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1716

MAIL DATE	DELIVERY MODE
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03/08/2013

PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE  
THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* WEI TI LEE,  
Ted Guo, Steve H. Chiao, and Alan A. Ritchie

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Appeal 2011-005289  
Application 11/459,575  
Technology Center 1700

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Before BEVERLY A. FRANKLIN, MARK NAGUMO, and  
CHRISTOPHER L. CRUMBLEY, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

**A. Introduction<sup>1</sup>**

Wei Ti Lee, Ted Guo, Steve H. Chiao, and Alan A. Ritchie (“Lee”) timely appeal under 35 U.S.C. § 134(a) from the final rejection<sup>2</sup> of claims 1, 2, 5-10, 12-15, 21, and 22, which are all of the pending claims. We have jurisdiction. 35 U.S.C. § 6. We reverse.

The subject matter on appeal relates to gas line systems for chemical vapor deposition apparatuses. The invented gas line systems are said to minimize the nucleation of contaminating particles (Spec. 4 [0008]), which are said to cause problems in sub-quarter micron multilevel metallization, a key technology in the next generation of very large scale integration (VSLI) (*id.* at 2 [0003]). Particles are said to form when precursors, e.g., gaseous aluminum compounds, are trapped in dead spaces such as in tee-fittings (*id.* at 2 [0005] and at 9 [0027]), and when the gaseous precursors nucleate at rough spots, such as on weldments (*id.* at 2 [0006] and at 9 [0027]). The 575 Specification teaches that these problems may be alleviated by using multi-way valves instead of tee-fittings (*id.* at 9 [0027]) and by electropolishing the internal surfaces of the multi-way valves and inner surfaces of weldments (*id.* at 6 [0017]). Each output of the multi-way valves is welded to a flange connector. Moreover, there must be at least one

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<sup>1</sup> Application 11/459,575, *Gas Line Weldment Design and Process for CVD Aluminum*, filed 24 July 2006, claiming the benefit of a provisional application filed 27 July 2005. The specification is referred to as the “575 Specification,” and is cited as “Spec.” The real party in interest is listed as Applied Materials, Inc. (Appeal Brief, filed 30 September 2010 (“Br.”), 3.)

<sup>2</sup> Office action mailed 19 May 2010 (“Final Rejection”; cited as “FR”).

“linear” gas line (i.e., the line must be straight, to ease the insertion of electropolishing electrodes in the center of the gas lines (*id.* at 9 [0027])). The ends of the linear gas lines are welded to flange connectors, and all such welds and the interior of the gas lines are electropolished. The Specification further discloses that “two electropolished linear gas lines may be joined by one electropolished valve at angle, such as an angle of approximately 90°” (Spec. 7 [0020]), thus providing a way to reduce or eliminate the presence of tee-fittings in the system.

Claim 1 is representative for all but one of the rejections and reads:

A system of gas lines for a processing chamber, *consisting essentially of*:

[A] one or more electropolished three-way valves *comprising* outputs, wherein

each output of each electropolished three-way valve is welded to a flange connector; and

[B] one or more electropolished linear gas lines, wherein each of the electropolished linear gas lines *comprises*:

a first end; a second end; a first flange connector welded to the first end; and a second flange connector welded to the second end,

[C] wherein either the first flange connector or the second flange connector of each of the one or more electropolished linear gas lines is connected to one of the flange connectors welded to the one or more electropolished three-way valves.

(Claims App., Br. 28; emphasis, indentation, and bracketed labels added.)

Separately rejected and argued claim 21 reads:

A chamber having a system of gas lines, *consisting essentially of*:

[A] a processing chamber having a flange connector coupled thereto;

[B] one or more electropolished three-way valves, *comprising*:

a first electropolished three-way valve having outputs, each output of the first electropolished three-way valve welded to a flange connector,

wherein one of the flange connectors of the first electropolished three way valve is coupled to the flange connector of the processing chamber; and

a second electropolished three-way valve having outputs, each output of the second electropolished three-way valve welded to a flange connector, wherein one of the flange connectors of the second electropolished three-way valve is coupled to one of the flange connectors of the first electropolished three-way valve; and

[C] one or more electropolished linear gas lines, wherein each of the electropolished linear gas lines *comprises*:

a first end; a second end; a first flange connector welded to the first end; and a second flange connector welded to the second end,

wherein either the first flange connector or the second flange connector of each of the one or more electropolished linear gas lines is connected to one of the flange connectors welded to the first or second electropolished three-way valves.

(Claims App., Br. 31-32; emphasis, indentation, and bracketed labels added.)

The Examiner maintains the following grounds of rejection:<sup>3</sup>

- A. Claims 1, 5-10, and 12-14 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Sato,<sup>4</sup> Ohmi,<sup>5</sup> and Maichel.<sup>6</sup>
- B. Claim 2 stands rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Sato, Ohmi, Maichel, and Yamaga.<sup>7</sup>
- C. Claims 1 and 5 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Ohmi and Maichel.
- D. Claim 2 stands rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Ohmi, Maichel, Yamaga, and Kim.<sup>8</sup>
- E. Claims 1 and 5-10 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Ohmi, Isshiki,<sup>9</sup> and Maichel.
- F. Claims 2 and 12-14 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Ohmi, Isshiki, Maichel, Stall,<sup>10</sup> and Kim.

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<sup>3</sup> Examiner's Answer mailed 21 December 2011 ("Ans.").

<sup>4</sup> Mitsuo Sato et al., *Method of Fabricating a Compound Semiconductor Having a Plurality of Layers Using a Flow Compensation Technique*, U.S. Patent 5,866,198 (1999).

<sup>5</sup> Tadashihiro Ohmi et al., *Gas Supply Piping Device for a Process Apparatus*, U.S. Patent 5,313,982 (1994).

<sup>6</sup> Jeffrey L. Maichel and Thomas A. Sovilla, U.S. Patent Application Publication 2005/0022867 A1 (3 February 2005).

<sup>7</sup> Kenichi Yamaga et al., U.S. Patent 5,484,484 (1996).

<sup>8</sup> Yeong-Kwan Kim et al., U.S. Patent Application Publication 2005/0048635 A1 (3 February 2005).

<sup>9</sup> Osamu Isshiki et al., U.S. Patent 5,498,849 (1996).

<sup>10</sup> Richard A. Stall et al., U.S. Patent 5,544,618 (1996).

- G. Claim 15 stands rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Ohmi, Isshiki, Maichel, Stall, Kim, and Sato.
- H. Claims 21 and 22 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Ohmi, Isshiki, Maichel, and Stall.

**B. Discussion**

Findings of fact throughout this Opinion are supported by a preponderance of the evidence of record.

Lee argues that the Examiner erred in construing the transitional phrase “consisting essentially of” as not excluding tee-fittings that the Examiner concedes are disclosed as parts of the systems of gas lines described by Sato and by Ohmi, the principal references in the rejections.<sup>11</sup>

The transitional phrase “consisting essentially of” has long been understood to “open[] the claims to the inclusion of ingredients which would *not* materially affect the *basic* and *novel* characteristics of appellant’s compositions as defined in the balance of the claim.” *In re Janakirama-Rao*, 317 F.2d 951, 954 (CCPA 1963). As subsequent decisions have made clear, the specification must be consulted to determine whether the applicant “defined the scope of the phrase ‘consisting essentially of’ for purposes of

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<sup>11</sup> The remainder of Lee’s arguments, which take up several pages, amounts to a recitation of the claims and a general denial that the references disclose or suggest the claimed subject matter. Such generalized argument amounts to nothing more than an invitation to analyze the references and find that one or more required elements or required relations between elements is missing, and does not amount to an argument for separate patentability of the claim. 37 C.F.R. § 41.37(c)(1)(vii) (2011).

its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention.”

*PPG Indus. Inc. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1354 (Fed. Cir. 1998).

Independent claims 1 and 9, and the respective dependent claims, cover a system of gas lines for a processing chamber. The system of gas lines consists essentially of at least one electropolished three-way valve and a gas line, with specified minimum connections between the valve and the line. While it is true that the valve and the linear gas lines recited in parts [A] and [B] of claim 1, and in parts [B] and [C] of claim 21, respectively, include the open transitional phrase “comprising,” we must look to the 575 Specification to determine whether Lee described an invention that excludes tee fittings because they would materially change the basic and novel characteristics of that invention.

The Examiner does not dispute that Sato and Ohmi, one or the other of which is the principal reference in every rejection, includes multiple tee-fittings in the system of gas lines. The Examiner argues that it would have been obvious to electropolish welds in the tee-fittings, following the teachings of Ohmi to do so to minimize particle production in the apparatus. (E.g., Ans. 8.) While the evidence of record supports this argument, the Examiner has not addressed the teachings of the 575 Specification outlined *supra*, that another purpose of the invention is to eliminate tee-fittings by replacing them with multi-way valves. The Specification teaches (Spec. 8 [0021]) that the replacement reduces the amount of dead space that may trap precursors, and allows more effective purging of any precursors

that are trapped in the lines. Indeed, the Specification specifically identifies tee-fittings as a locus of undesirable deposition in prior art gas line designs (*id.* at 3 [0005]), and specifically states that “in other embodiments of the invention, multi-way valves are used instead of tee fittings” (*id.* at 9 [0027]).

Thus, the “basic and novel characteristics” of the claimed invention include not only electropolishing interior surfaces, including weldments, but also eliminating tee-fittings by replacing them with multi-way valves. Read as a whole, in light of the Specification, the introductory “consisting essentially of” limitation must be applied to the three-way valve and the linear gas line as well as to other elements not recited in the claims. In view of the disclosure that “two electropolished linear gas lines may be joined by one electropolished valve at angle, such as an angle of approximately 90°” (Spec. 7 [0020]), it is clear that not only does Lee intend the term “linear” to mean straight and uncurved, but also, “unbranched.” Thus, the tee-fittings described by Sato and by Ohmi are excluded from the “linear gas lines” recited in the claims by the definition of the term.

Because the Examiner has not relied on the additional references to remediate these deficiencies of Sato or Ohmi, we conclude that Lee has demonstrated harmful error in all the rejections.

### **C. Order**

We REVERSE the rejections of claims 1, 2, 5-10, 12-15, 21 and 22.

REVERSED

Appeal 2011-005289  
Application 11/459,575

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