

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

94-1428,-1466

APPLIED MATERIALS, INC.,

Plaintiff/Cross-Appellant,

v.

ADVANCED SEMICONDUCTOR MATERIALS

AMERICA, INC. and EPSILON TECHNOLOGY, INC.,

d/b/a ASM EPITAXY,

Defendants-Appellants,

and

ADVANCED SEMICONDUCTOR INT. N.V.,

Defendant.

Matthew D. Powers, Weil, Gotshal & Manges, of Menlo Park, California, argued for plaintiff/cross-appellant. With him on the brief was Edward R. Reines.

Don W. Martens, Knobbe, Martens, Olson & Bear, of Newport Beach, California, argued for defendants-appellants. With him on the brief were Lowell Anderson, John B. Sganga, and Vito A. Canuso III. Also on the brief was Donald R. Dunner, Finnegan, Henderson, Farabow, Garrett & Dunner, of Washington, D.C.

Appealed from: U.S. District Court for the Northern District of California

Judge Ingram

United States Court of Appeals for the Federal Circuit

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DECIDED: October 24, 1996

Before ARCHER, Chief Judge, NEWMAN and MAYER, Circuit Judges.

Opinion for the court filed by Circuit Judge NEWMAN for Parts I and II; dissenting opinion as to Part I filed by Chief Judge ARCHER. For Part III, Chief Judge ARCHER and Circuit Judge MAYER each filed opinions concurring in the judgment of affirmance; dissenting opinion as to Part III filed by Circuit Judge NEWMAN.

NEWMAN, Circuit Judge.

Advanced Semiconductor Materials America, Inc. and Epsilon Technology, Inc., together doing business as ASM Epitaxy (herein "ASM"), appeal those portions of the decision of the United States District Court for the Northern District of California 1 sustaining the validity of United States Patent No. 4,496,609 (the '609 or McNeilly patent), and holding that United States Patent No. 4,728,389 (the '389 or Logar patent) is infringed by application of the doctrine of equivalents. Applied Materials, Inc., owner of the '609 and '389 patents, appeals the district court's holding that its United States Patent No. 4,081,313 (the '313 patent) is invalid and that the '389 patent is not literally infringed. The validity of the '389 patent was not contested. The ruling that the '609 patent is infringed is not appealed.

We affirm the decisions that the '609 patent is valid and that the '389 patent is not literally infringed, reverse the decision that the '389 patent is infringed under the doctrine of equivalents, and affirm the decision that the '313 patent is invalid. The case is remanded for appropriate further proceedings.

DISCUSSION

Both Applied Materials and ASM are manufacturers and sellers of devices used in the production of semiconductor integrated circuits by chemical vapor deposition (CVD). By the process of CVD thin layers of chemical materials such as silicon and silicon compounds are deposited upon a substrate by exposing the substrate at high temperatures to the vaporized material to be deposited, under controlled conditions in oven-like reactor chambers. Due to the extremely small size and complex detail of the circuits produced and the thinness of the layers deposited, the control of contaminants during CVD is of paramount importance. The inventions of the patents in suit are directed to improvements in the methods and apparatus of CVD for the purposes of reducing or eliminating contaminants and enhancing the quality of the deposition product.

I

THE '609 (McNEILLY) PATENT

The purity of the deposition is affected by contaminants emanating from or passing through the quartz walls of the deposition chamber, and by the migration of contaminants onto the substrate by gravity or static electricity. A known method of reducing the contamination that arises from the quartz walls is to keep the walls cool during the deposition. Since the CVD substrate is heated to very high temperatures during the deposition, generally over 1100 C, the heating of the substrate must be accomplished without heating the walls of the reaction chamber. The invention of the '609 patent is directed to an improved process for heating the substrate in a quartz reaction chamber, using radiant heat energy.

The prior CVD process of choice used radio frequency energy as the source of deposition heat. Since the quartz chamber walls transmit but do not absorb radio frequencies, the walls remain cool and contamination is reduced. The substrate does not absorb radio frequency energy, and is heated indirectly by placing it on a slab of graphite called a susceptor; the susceptor absorbs the radio frequency, converts it to heat, and heats the substrate by contact.

The invention of the '609 patent is the use of high intensity heat lamps and radiant energy to heat the substrate, instead of using radio frequency energy. The prior art recognized this general use of radiant energy, but stated that it was not effective at high deposition temperatures. McNeilly and co-workers discovered not only that radiant energy can be used at high temperatures, but that it resulted in unexpected advantages in that it produced more uniform heating of the substrate and superior circuitry. The district court observed that after initial skepticism the Applied Materials method, subject of the '609 patent, was recognized as superior by the industry, and that Applied Materials' reactor has displaced the radio frequency reactor as the CVD apparatus of choice.

Applied Materials charged ASM with infringement of the '609 patent by ASM's Epsilon One reactor. The district court rejected ASM's defenses of patent invalidity and unenforceability, and found that the '609 patent was infringed. ASM appeals the validity determination on two grounds: double patenting and obviousness. Other issues concerning the '609 patent are not appealed.

Double Patenting

ASM argues that the '609 patent is invalid for double patenting with United States Patents No. 3,623,712 (the '712 patent) and No. 4,047,496 (the '496 patent). These three patents all arose from the same parent application. The '712 and '496 patents claim the apparatus and the '609 patent claims the process for this use of radiant energy. Claim 1, the broadest claim of the '609 patent, is shown in the margin.

The question of whether the claims of the process patent are subject to double patenting with the claims of the apparatus patents arises only if these patents are not entitled to the benefit of 35 U.S.C. §121. ASM argues that Applied Materials lost this entitlement because during prosecution before the Patent and Trademark Office (PTO) the applicant enlarged the process claims beyond their scope at the time of imposition of a "restriction requirement." ASM states that this action removed all of the '609 claims from the benefit of §121, and requires that the '609 patent be either invalidated for double patenting or subjected to a terminal disclaimer. These issues relating to §121 are matters of statutory interpretation, to which we give plenary review on appeal.

The patent examiner imposed a restriction requirement on the McNeilly patent application as it was originally filed, in accordance with the first sentence of 35 U.S.C. §121:

§121 [1] If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions.

As required by administrative rule, in imposing the restriction requirement the examiner divided the claims into groups, *viz.* "an oven-type radiation heated reactor," "a reactor with means for introducing gaseous reactants," and "a gaseous epitaxial coating process." In response to the examiner's requirement that the applicant elect which invention he wished to continue prosecuting in the original application, McNeilly elected the radiation-heated reactor and duly prosecuted the other two inventions in separately filed divisional applications. The second sentence of §121 recognizes this procedure and provides that such divisional applications are entitled to the benefit of the original filing date:

§121 [2] If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title it shall be entitled to the benefit of the filing date of the original application.

The three patent applications issued as the '712 and '496 patents on the apparatus and the '609 patent on the process. We take note that the history of these patents shows several refilings, amendments, and continuations-in-part, as discussed in Applied Materials, Inc. v. Gemini Research Corp., 835 F.2d 279, 15 USPQ2d 1816 (Fed. Cir. 1988).

The process claims as presented in the original application and carried into the '609 divisional application were drawn to the deposition of epitaxial layers. During further prosecution the claims were amended to include chemical vapor deposition broadly, thus encompassing non-epitaxial deposition as well as epitaxial, as generally described in the specification. The district court observed that the PTO classification, a criterion of restriction requirements, was unchanged. ASM argues that this change in scope of the claims after the restriction requirement was initially imposed eliminates the benefit of the third sentence of §121:

§121 [3] A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them, if the divisional application is filed before the issuance of the patent on the other application.

ASM states that without the shield of §121 the '609 process patent is invalid for double patenting with the '712 and the '496 apparatus patents. ASM states that this shield is lost if there is any change in the scope of the claims, whether or not the PTO classification is unchanged.

The purpose of the rule against double patenting is to prevent an inventor from effectively extending the term of exclusivity by the subsequent patenting of variations that are not patentably distinct from the first-patented invention. See In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970) (discussing the judge-made law of double patenting). Thus a patentee can not obtain a later patent for the same invention that has already been patented. Nor can a patentee obtain a later patent for an obvious variant of the invention claimed in the earlier patent, unless the patentee disclaims the term of the later patent beyond the expiration of the earlier one. See Quad Environmental Technologies Corp. v. Union Sanitary District, 946 F.2d 870, 873, 20 USPQ2d 1392,

1394 (Fed. Cir. 1991); In re Longi, 759 F.2d 887, 892, 225 USPQ 645, 648 (Fed. Cir. 1985).

However, when the existence of multiple patents is due to the administrative requirements imposed by the Patent and Trademark Office, 35 U.S.C. §121 provides that the inventor shall not be prejudiced by having complied with those requirements. Thus when two or more patents result from a PTO restriction requirement, whereby aspects of the original application must be divided into separate applications, §121 insulates the ensuing patents from the charge of double patenting. See Studiengesellschaft Koble mbH v. Northern Petrochemical Co., 784 F.2d 351, 354, 228 USPQ 837, 840 (Fed. Cir.), cert. dismissed, 478 U.S. 1028 (1986).

The district court held that the amendments to the process claims during subsequent prosecution of the divisional '609 application did not eliminate the benefit of §121 from the ensuing patent. A restriction requirement does not prohibit subsequent amendments to the claims. As discussed in Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n, 988 F.2d 1165, 1179, 26 USPQ2d 1018, 1029 (Fed. Cir. 1993), the examiner's demarcation among the separate inventions should be preserved. However, even if such consonance is lost, double patenting does not follow if the requirements of §121 are met or if the claims are in fact patentably distinct. See id. at 1179, 26 USPQ2d at 1029-30. In this case consonance was not violated, for the process claims remained in separate patents from the apparatus claims although the scope of the process claims was modified.

ASM argues that the restriction requirement might not have been imposed at all if the non-epitaxial process claims had been present initially. However, the benefit of §121 is not lost simply because it might not have been imposed. The purpose of §121 is to accommodate administrative convenience and to protect the patentee from technical flaws based on this unappealable examination practice. Thus the fourth sentence of §121 provides that failure to impose a restriction requirement is not grounds of patent invalidity:

§121 [4] The validity of a patent shall not be questioned for failure of the Commissioner to require the application to be restricted to one invention.

Section 121, viewed overall, assures that the technicalities of restriction practice are not elevated from their purpose of examination convenience to a potential taint on the validity of the ensuing patents. It was explained in the House and Senate Reports accompanying the 1952 Patent Act that §121 means that

neither of the resulting patents can be held invalid over the other merely because of their being divided in several patents.

S. Rep. No. 1979, 82d Cong., 2d Sess. 20, reprinted in 1952 USCCAN 2394, 2413; H. R. Rep. No. 1923, 82d Cong., 2d Sess. 20 (1952). Thus it is not material whether the imposition of the restriction requirement might have been avoided had different claims been presented initially, for the purpose of §121 is simply to safeguard patent validity from the vagaries of the restriction practice, not to change the practice.

The examiner raised no objection to the inclusion of non-epitaxial claims in the '609 process application after restriction. We affirm the district court's ruling that the '609 patent is not invalid for double patenting.

Obviousness

ASM states that the prior art renders the '609 patent invalid for obviousness, 35 U.S.C. §103. The district

court, after thorough analysis of the prior art in light of ASM's arguments, sustained the validity of the patent. ASM appeals that ruling.

ASM relies on the combination of United States Patent 3,408,982 to Capita and a 1966 text by C.F. Powell discussing chemical vapor deposition. The Capita patent describes conducting CVD using radio frequency heating. The Powell text describes the use of both radio frequency and radiant heating of CVD chambers. The district court, after extensive testimony by both sides, found that "Powell expressly suggests the use of lamps as a radiant heat source only for small scale, low temperature applications," referring to the conclusion of Applied Materials' expert that "nothing in Powell contemplated substitution of heat sources at all." Applied Materials v. ASM, 32 USPQ2d at 1875. The district court gave weight to the thinking of the art at the time of the invention, concluding that "[t]he teaching of the Powell reference is that RF [radio frequency] heating is preferred for the design of CVD reactors." Id. at 1876.

ASM places heavy reliance on a ruling of the Court of Customs and Patent Appeals during prosecution of the '609 application. In re McNeilly, No. 79-562 (CCPA Nov. 1, 1979) (unpublished), 612 F.2d 585 (table). The examiner had rejected the claims for obviousness based on the Capita patent in view of the Powell text, stating that this combination presented a prima facie case of obviousness. The PTO Board of Appeals affirmed, as did the CCPA. The applicant then returned to prosecution before the examiner, filed a continuation application, amended the claims, filed objective evidence of the commercial success of the radiant energy process compared with the radio frequency process, and further described the unexpected results of enhanced thermal stability, reduced crystallographic slip, and more uniform deposition layers. The examiner eventually allowed the claims.

When a patent has been examined and duly granted, judicial review must give due weight to the presumption of validity. 35 U.S.C. §282 ("A patent shall be presumed valid.") The presumption of validity is based on the presumption of administrative correctness of actions of the agency charged with examination of patentability. Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1139, 227 USPQ 543, 548 (Fed. Cir. 1985) (the government agency is presumed to have done its job). It was thus incumbent upon ASM to prove invalidity by clear and convincing evidence. The presentation at trial of additional evidence that was not before the PTO does not change the presumption of validity or the standard of proof, although the burden may be more or less easily carried because of the additional evidence.

ASM argues that the district court should have accepted the holding of the CCPA in In re McNeilly and declared the '609 patent invalid. However, in Applied Materials, Inc. v. Gemini Research Corp., 835 F.2d 279, 281, 15 USPQ2d 1816, 1818 (Fed. Cir. 1988), this court pointed out that the CCPA's decision in In re McNeilly did not give rise to an estoppel because new and material evidence was presented in the PTO during the continuation of examination after the CCPA decision. The PTO's decision to grant the patent was reached after consideration of all the evidence including the new evidence filed on return to examination. It thus became irrelevant, at this later stage, that less than all the evidence had at an earlier stage presented a prima facie case of obviousness.

Although ASM argues that the district court did not accord the opinion of the CCPA proper weight, it was pointed out in Applied Materials v. Gemini Research that the CCPA in In re McNeilly did not hold that the '609 invention was unpatentable for obviousness; the CCPA held that the examiner had made a prima facie case of obviousness on the evidence that was then of record. In Gemini Research this court held that summary judgment based on In re McNeilly was improperly granted. Thus the district court in the case at bar

correctly held that there was not collateral estoppel based on In re McNeilly.

ASM also argues that the CCPA's decision in In re McNeilly is "highly persuasive" that the invention is prima facie obvious, and that the district court should have accepted that premise and considered only whether that prima facie case was successfully rebutted. ASM argues that the objective evidence was insufficient to overcome the prima facie case of obviousness. However, the determination of obviousness, vel non, requires that all the evidence be considered together. As explained in In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984), "[i]f rebuttal evidence of adequate weight is produced, the holding of prima facie obviousness, being but a legal inference from previously uncontradicted evidence, is dissipated." The objective evidence of unobviousness is not evaluated for its "separate knockdown ability" against the "stonewall" of the prima facie case, In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976), but is considered together with all other evidence, in determining whether the invention as a whole would have been obvious to a person of ordinary skill in the field of the invention.

At trial to the district court, Applied Materials presented additional objective evidence of unobviousness including evidence that four major companies (Motorola, Western Electric, Texas Instruments, and Merck) had tried unsuccessfully to develop lamp-heated CVD reactors. There was evidence of the unsuccessful attempts of these and other companies to achieve the enhanced temperature uniformity and improved chemical deposition that were achieved using the '609 process. Witnesses described the "skepticism," "misgivings," and "disbelief" in the industry when Applied Materials achieved these superior results with a radiant heating process. The district court was required to consider this evidence along with the other evidence in determining whether, on the totality of the evidence, invalidity on the ground of obviousness had been proved by clear and convincing evidence.

ASM challenges the evidentiary value of the objective evidence of commercial success on the added ground that the claims are broader than Applied Materials' successful commercial embodiment. However, a patentee need not show that all possible embodiments within the claims were successfully commercialized in order to rely on the success in the marketplace of the embodiment that was commercialized.

All of the facts relevant to the issue of obviousness were before the district court, including the decision of the CCPA, the prosecution history in the PTO, and the evidence adduced at trial. After examining the evidence with the assistance of expert witnesses and advocates for both sides, the district court concluded that ASM had not met its burden of proving that a person skilled in this field would have been motivated by the teachings of the prior art to change from the radio frequency state- of-the-art process to a radiant heat process. No error of fact or law has been shown in that analysis. We affirm the district court's conclusion that the '609 patent is not invalid on the ground of obviousness.

II

THE '389 (LOGAR) PATENT

The '389 patent is directed to the reduction or elimination of static electricity during the CVD process. The elimination of static charges on the substrate and throughout the chamber results in purer deposition and fewer defects in the finished product, since static electricity is one of the mechanisms whereby contamination of the deposited layer occurs. The district court found that ASM's Epsilon One process did not literally infringe the '389 claims in suit, but that it was an infringement by application of the doctrine of equivalents.

A typical CVD process of the prior art, as described in the specification of the '389 patent, includes several "purge" steps in which the atmosphere in the chamber is replaced by other gases. The first purges occur after the substrate is loaded in the chamber and air is replaced with nitrogen and then hydrogen; the substrate is then heated and the circuitry etching and chemical vapor deposition steps are performed, with subsequent purges occurring whenever one atmosphere is replaced by another. Static electricity is generated during the initial "cold" purge steps of the process. As explained in the '389 specification, static charges are not a problem during subsequent purges of the chamber because after the initial steps the temperature of the chamber remains above about 180 C, the temperature above which static charges do not exist.

In the invention of the '389 patent, static charges during the initial "cold" purges are eliminated by operating the lamps at a low level during the initial gas flow steps. Claim 1 describes the energy level as a "relatively low flux intensity," and claim 4 describes the invention in terms of heating the substrate to between 180 C and the gas phase processing temperature:

1. In a cold purge process for preparing a reactor chamber for the gas phase formation of an epitaxial layer on a wafer positioned within the reactor chamber by communicating a flow of conditioning gas into the reactor chamber, the reactor chamber system including radiant energy lamp means for heating the chamber to effect said gas phase processing, the improvement comprising:

during said gas flow step, operating the radiant energy lamp means at a power level below that used for said gas phase processing heating to supply radiant energy at a relatively low flux intensity to substantially eliminate static-induced particle transport to the wafer.

4. An improved purge process for conditioning a cold semiconductor reactor chamber for gas phase processing of a wafer therein prior to heating the wafer for the gas phase processing, comprising flowing at least one purging gas through the chamber and, during said purging step, heating the wafer to a temperature between about 180 C. and below said gas phase processing temperature, for decreasing electrostatic attraction between the wafer and particulates.

The '389 specification describes this initial, gaseous purge as conducted at low lamp power, about six to ten percent of the deposition level. In ASM's Epsilon One reactor this initial purge is conducted above about 850 C. Although the Epsilon One purge temperature is still below the gas phase processing temperature, ASM's position is that it does not conduct a "cold" purge at all, but that its initial purge is really a "hot" purge and unrelated to the removal of static-induced contamination, as the claims in suit require, because such contamination does not form under the Epsilon One conditions. Thus ASM argues that although its initial purge steps ostensibly occur within the temperature limits stated in the claims, the other claim limitations of cold purge process, cold reactor chamber, and elimination of electrostatic particles, are not met literally or equivalently.

Literal Infringement

The '389 patent contemplates a CVD process sequence that starts with a cold reactor chamber, the chamber having been cooled in order to permit the operator to remove the coated substrates and insert uncoated ones. The '389 claims are directed to the removal of static attraction during the gaseous purge of the cooled chamber within which electrostatic contamination has formed. Although the parties dispute whether this requires treating at a "relatively low" temperature that is high enough to eliminate the static charges, or is accomplished solely by an infrared photon flux at low intensity, claim 1 appears to include both mechanisms,

while claim 4 is specific to heating the wafer above about 180 C. The '389 patent describes about 180 C as the temperature above which static electricity does not form or exist.

The ASM Epsilon One reactor process also conducts an initial purge with inert gases as the first step in the deposition cycle. However, this purge is conducted at about 850 C. Since in the Epsilon One reactor the substrates are removed and replaced mechanically, the chamber need not be cooled significantly to perform this step and does not acquire electrostatic contamination during the processing cycle. Thus although the Epsilon One process includes an initial gaseous purge below the deposition temperature, the temperature of this purge is stated to remain above 850 C. ASM argues that this can not reasonably be deemed a "cold purge process." ASM states that the problem solved by the '389 invention does not exist at the Epsilon One operating conditions, and that the '389 specification makes clear that the invention relates to a process wherein the chamber is cooled to ambient temperatures, permitting electrostatic contamination to form, in order to remove it by raising the temperature to above 180 C, but still at relatively low temperatures. ASM points out that the prior art shows the initial cold purging with inert gases, and that the sole "inventive" contribution of the '389 patent is removal of the electrostatic contamination that occurred below about 180 C. ASM states that under its operating conditions, which do not drop below 850 C during or between processing cycles, electrostatic contamination does not occur, and thus that it does not practice the invention of the '389 patent.

Applied Materials states that "cold purge" is a word of art for the initial gas purge step, and that "cold" is understood in this art as a relative term and means a temperature below the processing temperature. Applied Materials states that the claims require only that the initial gaseous purge is conducted below the processing temperature, and that ASM does so, literally. Applied Materials states that it is the claims that define the invention, and that it is incorrect to limit the claims to any specific temperature mentioned in the specification. Thus Applied Materials states that claim 1 reads literally on the Epsilon One process.

The construction of patent claims, as well as the meaning and scope of a disputed technical term or terms of art in a patent claim, are deemed to be questions of law and are determined de novo on appeal. Markman v. Westview Instruments, Inc., 52 F.3d 967, 34 USPQ2d 1321 (Fed. Cir. 1995) (en banc), aff'd, 116 S. Ct. 1384 (1996). Although this court requires that no deference be given to the testimony of experts, id. at 983, 34 USPQ2d at 1333 ("[w]hen legal 'experts' offer their conflicting views of how the patent should be construed, or where the legal expert's view of how the patent should be construed conflicts with the patent document itself, such conflict does not create a question of fact nor can the expert opinion bind the court or relieve the court of its obligation to construe the claims according to the tenor of the patent. This opinion testimony also does not change or affect the de novo appellate review standard for ascertaining the meaning of the claim language."), we take note that extensive expert testimony was adduced at trial.

The district court first considered Applied Materials' argument that since the phrase "cold purge" appears only in the preamble of claim 1, it does not limit the claims as applied to the accused process. The district court concluded that "cold purge" is indeed an element of the claims, and "establish[es] a limitation which the accused device must meet in order to literally infringe the '389 patent." We reach the same conclusion.

Whether a preamble stating the purpose and context of the invention constitutes a limitation of the claimed process is determined on the facts of each case in light of the overall form of the claim, and the invention as described in the specification and illuminated in the prosecution history. See In re Stencel, 828 F.2d 751, 754, 4 USPQ2d 1071, 1073 (Fed. Cir. 1987) (the preamble is interpreted in light of the invention as a

whole); Perkin-Elmer Corp. v. Computervision Corp., 732 F.2d 888, 896, 221 USPQ 669, 675 (Fed. Cir.), cert. denied, 469 U.S. 857 (1984) (the limitations stated in the preamble give meaning to the claim and can serve to define the invention). It is thus appropriate to determine whether the term in the preamble serves to define the invention that is claimed, or is simply a description of the prior art.

The term "cold purge" has its roots in the specification, which states that in a typical deposition process of the prior art "[b]oth the nitrogen prepurge and hydrogen purge are carried out `cold', that is, without heating." The specification explains that in the '389 process these initial purges are carried out at low radiant energy or low thermal energy. The district court found that "cold purge process" means temperatures below 180 C, and that the '389 invention was directed to the use of heat sufficiently high to remove electrostatic contamination in the initial purge steps, that is, heat above about 180 C, in a reactor whose operating conditions include temperatures below 180 C. "Cold purge" is interpreted in light of the problem the '389 patent solved: the elimination of electrostatic contamination during the initial purge step. The specification states:

During the use of the above outlined process sequence, electrostatic attraction is operative almost exclusively during the cold purging steps (steps 1 and 2). It is substantially non-existent when the susceptor/wafer is at an elevated temperature, such as for example above about 180 C.

'389 patent, column 9, lines 17-22. The specification also states that the purpose of the invention is the removal of contamination caused by this electrostatic attraction. Claims 1 and 4 include this requirement.

The district court correctly placed the term "cold purge process" in the context of the state of the art when the '389 invention was made. This context requires construing the literal meaning of the claims as limited to the process wherein electrostatic contamination is formed and removed. The Epsilon One reactor does not meet this criterion. We affirm the court's ruling that claim 1 is not literally infringed.

The district court had previously held, on a motion for summary judgment, that claim 4 of the '389 patent is not literally infringed because it contains the limitation "for conditioning a cold semiconductor reactor chamber" in its preamble. Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc., No. C-91-20061-RMW(EAI) (N.D. Cal. Jan. 28, 1993). Applied Materials does not challenge this ruling on appeal.

The Doctrine of Equivalents

The district court found that claims 1 and 4 were infringed under the doctrine of equivalents. The court found that the initial purge steps of the Epsilon One reactor performed substantially the same function as that of the '389 initial purge and achieved the same result, in that static electricity was prevented from forming. The court found that the way the Epsilon One performed this function, by conducting the initial gaseous purge above the temperature at which static electricity can exist, was substantially the same as the way in which the '389 invention would, for in both cases static-induced contamination was eliminated by the application of heat. Concluding that the differences between the purge processes of the '389 invention and the Epsilon One reactor were insubstantial, the district court found infringement under the doctrine of equivalents.

Infringement may be found under the doctrine of equivalents although the claim limitations are not literally met, if the accused process is substantially the same as the patented process. Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 62 F.3d 1512, 35 USPQ2d 1641 (Fed. Cir. 1995) (en banc), cert. granted, 116 S. Ct. 1014 (1996). Guidance for the determination of equivalency is provided in Graver Tank & Mfg. Co. v.

Linde Air Prods. Co., 339 U.S. 605, 85 USPQ 328 (1950), the Court holding that equivalency may be found if the accused process performs substantially the same function as the patented process in substantially the same way to obtain the same result. The doctrine of equivalents enables the trier of fact to achieve a just result when the circumstances warrant, preventing "the unscrupulous copyist [from making] unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of law." Id. at 607, 85 USPQ at 330. The Court thus recognized that the claiming process is not perfect, and that judges are no less empowered to reach a just result in patent cases than in any other cause.

ASM argues that this finding of equivalency is clearly erroneous, and that there are substantial differences between the purge processes of the '389 patent and the Epsilon One. ASM argues that while both processes purge at temperatures at which static electricity does not form, in the Epsilon One reactor there is no static-induced contamination to remove. ASM refers to the '389 specification, which distinguished the initial gaseous purge and removal of the static electricity that is formed at ambient temperatures, with later process steps in which the higher heat within the reactor prevents electrostatic contamination:

Since the processing steps commencing with the ramp up (step 3) are either conducted at elevated temperatures or, in the case of the end nitrogen and hydrogen purges are conducted in a reactor in which there is considerable residual heat in the susceptor and elsewhere, electrostatic attraction is substantially eliminated by thermal energy.

'389 patent, column 9, lines 22-28.

ASM stresses that the invention of the '389 patent is directed to the removal of electrostatic contamination, and that the claims so require; and that the Epsilon One reactor operates at temperatures at which electrostatic contamination does not occur. Although patent claims are not ordinarily limited to the inventor's purpose, when that purpose is included in the claims it serves as a limitation of the claimed invention and should be met either literally or equivalently in order to satisfy the criteria of infringement. Thus although infringement is not avoided if the accused device performs an additional function beyond what is claimed, the device must nonetheless meet the requirements stated in the claim, literally or equivalently.

In this case the "cold purge process," understood in light of the description of the '389 invention, requires the function of removing the electrostatic contamination that is formed at low temperatures. That function is not performed in the Epsilon One. By mechanical loading and unloading of its chambers at 850 C, the Epsilon One process is conducted without the formation of electrostatic contamination. There is no interim cooling of the Epsilon One reactor to below about 180 C, and thus electrostatic attraction does not form and is not removed as claim 1 requires. This is not an insubstantial difference, Hilton Davis, 62 F.3d at 1518, 32 USPQ2d at 1645, and precludes infringement of claim 1 under the doctrine of equivalents.

Applied Materials points out that claim 4 does not contain the "cold purge process" limitation, but describes the initial purge as for "conditioning a cold semiconductor reactor chamber." However, as the district court correctly determined, a cold reaction chamber, as that term is used in the '389 patent, is one in which static electricity can form, i.e., one whose temperature is below about 180 C. The Epsilon One reactor is heated at about 850 C while new substrates are loaded. Claim 4, like claim 1, expressly requires "decreasing electrostatic attraction" during the purging step. We conclude that the differences between the Epsilon One process and the process of claim 4 are not insubstantial, for they do not perform this function literally or

equivalently. We conclude that the district court's finding of infringement by equivalency is clearly in error.

The ruling of infringement of the '389 patent in terms of the doctrine of equivalents is reversed.

III

THE '313 PATENT

Chief Judge Archer and Circuit Judge Mayer concur in affirming the judgment of invalidity of the '313 patent, thus the judgment is affirmed. Circuit Judge Newman dissents.

COSTS

No costs.

AFFIRMED IN PART, REVERSED IN PART, AND REMANDED

MOTION DISMISSED

94-1428, -1466

APPLIED MATERIALS, INC.,

Plaintiff/Cross-Appellant,

v.

ADVANCED SEMICONDUCTOR MATERIALS

AMERICA, INC. and EPSILON TECHNOLOGY, INC.,

d/b/a ASM EPITAXY,

Defendants-Appellants,

and

ADVANCED SEMICONDUCTOR INT. N.V.,

Defendant.

ARCHER, Chief Judge, concurring in the judgment of invalidity of the '313 patent and dissenting from the judgment of invalidity of the '609 patent.

I.

With regard to the '313 patent, the claims of the patent, in my view, are not enabled by the 1969 parent application for the '712 patent and are, therefore, not entitled to priority based on the filing date of that application. As a result, the priority date of the '313 patent is its filing date. Because it is undisputed that a sale of the claimed invention occurred more than one year prior to the filing date of the '313 patent, that

patent must be held invalid under 35 U.S.C. § 102(b).

Under 35 U.S.C. § 120 a claim in a continuation-in-part application that is directed solely to subject matter adequately disclosed under 35 U.S.C. § 112, first paragraph, in the parent application is entitled to claim priority from the filing date of the parent application. Transco Prods. Inc. v. Performance Contracting, Inc., 38 F.3d 551, 557 n.6, 32 USPQ2d 1077, 1082 n.6 (Fed. Cir. 1994). If the claim, however, recites a feature which was first introduced in the continuation-in-part application and was not adequately disclosed in the parent application, that claim in the continuation-in-part application is not entitled to the filing date of the parent application. Id., 32 USPQ2d at 1082 n.6.

One of the requirements of § 112, first paragraph, for an adequate disclosure is that the invention must be described in “such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains” to make and use the invention. § 112, 1; Kennecott Corp. v. Kyocera Int’l, Inc., 835 F.2d 1419, 1421, 5 USPQ2d 1194, 1196-97 (Fed. Cir. 1987). The issue of whether a disclosure is enabling is a matter of law. Lindenmann Mashinenfabrik GMBH v. American Hoist and Derrick Co., 730 F.2d 1452, 1463, 221 USPQ 481, 489 (Fed. Cir. 1984).

In this case, the district court determined that the ‘313 patent is entitled to the filing date of the 1969 application for the ‘712 patent. The court recognized that the ‘313 patent claimed a particular way to reduce crystallographic slip, specifically using “same side” lamp heating. In this process, the heating lamps are placed on the same side of the susceptor as the substrate to heat the substrate directly. The court noted that Figure 6 of the 1969 application shows “same side” lamp heating. Based solely on that figure, the court concluded that the 1969 application inherently enabled the ‘313 patent. The court made this determination even though the trial testimony was equivocal on whether operation of Figure 6 would produce a product free of crystallographic slip and despite its conclusion that using the reactor shown in Figure 6 in accordance with the 1969 application would not guarantee freedom from slip from all causes. Significantly, even one of the inventors could not testify that the operation of Figure 6 would necessarily produce a slip-free product.

The district court erred in its inherency analysis. “[I]t is not sufficient that a person following the disclosure might obtain the result set forth in the [claim]; it must invariably happen.” Gubelmann v. Gang, 408 F.2d 758, 766, 161 USPQ 216, 222 (CCPA 1969). In this case, nothing in the 1969 application or in the record before the court shows that a material without crystallographic slip would invariably result from operation of Figure 6.

The claims of the ‘313 patent are specifically directed to a method for heating substrate members formed of a single crystal material with “substantially no crystallographic slip.” An extensive disclosure concerning crystallographic slip and how to avoid it was added to the application for the ‘313 patent. For example, the new disclosure in the application for the ‘313 patent describes how thermal gradients and less than perfect contact between the substrate and the susceptor cause slip and it describes how these problems may be avoided. These features are specifically recited in claim 1. The ‘712 patent, on the other hand, does not even mention slip or crystallographic slip. While the original application shows generally same-side heating in Figure 6, it does not show or teach how to produce material with substantially no crystallographic slip. This method of producing no crystallographic slip is first disclosed in the ‘313 patent.

Because the claims of the ‘313 patent are all directed to new matter introduced in the continuation-in-part application which is not described or disclosed in the 1969 application, I conclude they are not entitled to the

benefit of the filing date of the 1969 application. Accordingly, the '313 patent should be held invalid under 35 U.S.C. § 102(b).

II.

The double patenting issue concerns two competing interests: protecting a patentee from the consequences of the Patent & Trademark Office's (PTO) restriction practice, Studiengesellschaft Kohle mbH v. Northern Petrochem. Co., 784 F.2d 351, 358, 228 USPQ2d 837, 842 (Fed. Cir. 1986) (Newman, J., concurring); and protecting the public from an unjustified extension of the patent term and, thus, the patentee's right to exclude. In re Kaplan, 789 F.2d 1574, 1579-80, 229 USPQ 678, 683 (Fed. Cir. 1986).

A restriction requirement is made during the prosecution of a patent application at the discretion of the Commissioner to avoid granting a patent for more than one invention. See 35 U.S.C. § 121 ("If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions."). The Commissioner has issued strict guidelines in the Manual of Patent Examining Procedure (MPEP) to the examining corps as to when a restriction is appropriate. See MPEP § 803.01 (6th Ed. 1995) ("Since requirements for restriction under Title 35 U.S.C. 121 are discretionary with the Commissioner, it becomes very important that the practice under this section be carefully administered."). The restriction requirement also preserves revenue to the PTO and ensures the integrity of the PTO's classification system. See 3 Donald S. Chisum, Patents § 12.01 at 12-2 (1995) ("Restriction is imposed to prevent subversion of the statutory fee structure for the application for and issuance of patents and to preserve the integrity of the system of examination and classification within the Patent and Trademark Office.").

While a restriction is made to ensure there is only one invention per patent, double patenting is concerned with the opposite problem, ensuring there is only one patent granted per invention. The policy underlying a double patenting rejection is an important policy because it precludes the improper extension of the statutory term of patent protection for an invention. This policy is likewise applicable to the judicially created doctrine of obviousness-type double patenting. Gerber Garment Technology, Inc. v. Lectra Sys., 916 F.2d 683, 686 16 USPQ2d 1436, 1439 (Fed. Cir. 1990) (Obviousness-type double patenting involves claims in two applications or patents that "were drawn to inventions so very much alike as to render one obvious in view of the other and to effectively extend the life of the patent that would have the earlier of the two issue dates."). For obviousness-type double patenting, this problem can sometimes be avoided for co-owned patents or applications through the use of a terminal disclaimer. In re Longi, 759 F.2d 887, 894, 225 USPQ 645, 649 (Fed. Cir. 1985)

Section 121 of Title 35 affords some protection against arguments of double patenting for a patent issued on a divisional application that was filed as a result of a restriction requirement. Specifically, the third sentence of § 121 provides:

A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on application filed as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them.

This court has ruled, however, that the protection of § 121 is only available for claims issued on a divisional application that are consonant with the examiner's restriction requirement. Gerber, 916 F.2d at 688, 16

USPQ2d at 1440. In Gerber the court stated:

Consonance requires that the line of demarcation between the “independent and distinct inventions” that prompted the restriction requirement be maintained. Though the claims may be amended, they must not be so amended as to bring them back over the line imposed in the restriction requirement. Where that line is crossed the prohibition of the third sentence of Section 121 does not apply.

Id., 16 USPQ2d at 1440.

In this case the claims as amended during prosecution of the divisional application crossed the examiner’s precise and unambiguous line of demarcation. Thus, these claims cannot claim the protection of 35 U.S.C. § 121. Because the claims have lost the immunity of § 121, the claims must be held invalid for obviousness-type double patenting. Without this protection, Applied concedes that the claims as issued are obvious over the apparatus claims of the parent application.

The trial court erred in determining that consonance was not lost because the patents remain separately classified. The grounds for restriction are not solely dependant on separate classification. Section 121 permits a restriction for “independent and distinct inventions,” which the PTO construes to mean that the sets of claims must be drawn to separately patentable inventions. See MPEP § 802.01 (stating that the term distinct means two or more disclosed subjects that while perhaps related, such as process and apparatus for its practice, “ARE PATENTABLE (novel and unobvious) OVER EACH OTHER (though they may each be unpatentable because of the prior art)”). The mere fact that there are separate apparatus and method claims in the same application is not grounds for a restriction. See Symbol Technologies, Inc. v. Opticon, Inc., 935 F.2d 1569, 1580, 19 USPQ2d 1241, 1249 (Fed. Cir. 1991) (determining that method and apparatus claims are not necessarily directed to separate inventions). The PTO correctly recognizes these may be just two different ways of claiming the same invention.

Therefore, under the PTO guidelines for restricting claims covering an apparatus and method of using the apparatus, the examiner must show one way distinctiveness. See MPEP § 806.05(e). That is, either the apparatus or method must be capable of being practiced without the other. Id. In addition, the examiner must give a reason why it would be a burden to examine both sets of claims; commonly, the reason will be that there are separate classifications requiring independent searches. Id. at § 803. If both criteria are met, then the examiner may issue a restriction requirement.

In this case the examiner issued a restriction requirement between two sets of apparatus claims and a set of method claims. The examiner restricted the method claims from the apparatus claims on the grounds that they were limited to a gaseous epitaxial deposition process while the apparatus claims were not. Specifically, the examiner stated that the method claims were distinct from the apparatus claims because the apparatus “could be used for non-epitaxial deposition” and that, as a result, a restriction was necessary. Applied has not shown that it ever challenged the examiner’s restriction or that the examiner’s grouping of the claims was incorrect.

After the restriction, Applied filed the method claims in a divisional application that issued as the ‘609 patent fourteen years after the issuance of the patent on the parent application. The method claims in the ‘609 patent, however, were not limited to an epitaxial deposition process. During the prosecution of the divisional application, the claims were amended to eliminate the epitaxial limitation. Thus, the very reason the examiner could and did require a restriction was eliminated. And, as Applied admits, but for the immunity of section 121, the method claims, which expire in 2002, are no longer patentable over the apparatus claims, which

expired in 1988.

The majority opinion recognizes that loss of consonance may result in double patenting but concludes that in this case “consonance was not violated, for the process claims remained in separate patents from the apparatus claims although the scope of the process claims was modified.” This is not the proper test and begs the very question we are asked to answer. Under this analysis no patent could ever be invalid for double patenting based on another patent because the claims would be in separate patents. Certainly that cannot be true. Indeed, in Gerber, this court held a patent that had been subject to a restriction requirement invalid for obviousness- type double patenting on the basis of the separate parent patent. 916 F.2d at 689, 16 USPQ2d at 1441.

I do not suggest that after a restriction has been imposed claims may never be modified. Rather, as Gerber and the language of § 121 instruct, the issue is whether the inventions claimed remain independent and distinct. As discussed above, in this case the very reason the examiner said the inventions were distinct — that the method claims were drawn to epitaxial deposition — was eliminated. The modification of the claims to cover non-epitaxial deposition resulted in consonance being lost.

To support its conclusion that the examiner’s line of demarcation among the separate inventions was not violated, the majority relies on Texas Instruments Inc. v. United States Int’l Trade Comm’n, 988 F.2d 1165, 26 USPQ2d 1018 (Fed. Cir. 1993). In that case, the examiner’s groupings of the restricted claims was inconsistent with his written description of the groupings. When the validity of the patent resulting from the subsequent divisional application was challenged, we held that the actual restriction groupings, and not the written description of the groupings, controlled for purposes of determining whether subsequent amendments resulted in claims consonant with the restriction requirement. Id. at 1179, 26 USPQ2d at 1029. Because the claims as amended were consonant with the “grouping restriction actually imposed by the examiner,” the claims were protected under § 121 from allegations of double patenting. Id., 26 USPQ2d at 1029. That is not the situation presented by this case. Here, the examiner’s demarcation was clearly the epitaxial deposition method claims, and the examiner did not include claims directed to any matter outside that group.

While the examiner should have detected the loss of consonance, see Gerber, 916 F.2d at 685, 16 USPQ2d at 1438 (“Non-compliance with the consonance requirement is normally detected by the PTO examiner.”), the patentee is not shielded by § 121 merely because of the examiner’s failure. For the protections of § 121 to apply, Applied had to keep the claims within the scope of the restriction requirement. Gerber, 916 F.2d at 688, 16 USPQ2d at 1440 (explaining that in order to gain the benefits of § 121, the patent applicant “must have limited the claims in its divisional application to the non-elected invention or inventions”).

When Applied failed to maintain consonance with the restriction requirement by broadening its claims to cover non-epitaxial, as well as epitaxial, deposition methods, it sought to cover the same invention as claimed in its apparatus patent that expired in 1988. This double patenting improperly extends its patent right beyond the statutory term.

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Defendant.

MAYER, Circuit Judge, concurring in the judgment of invalidity of the '313 patent.

I believe that U.S. Patent No. 4,081,313 ('313 patent), a continuation-in-part of U.S. Patent No. 3,623,712 ('712 patent), failed to disclose the best mode for practicing the claimed invention. Inventors must update their best mode disclosure when filing a continuation-in-part which adds new matter pertinent to the best mode of practicing the invention claimed in the continuation-in-part. The inventors here did not do so, and the '313 patent is invalid.

In determining whether the '313 patent is invalid because of a sale that predated the filing date by more than one year, 35 U.S.C. § 102(b) (1994), the district court found that the '313 continuation-in-part application was enabled by the parent '712 patent and was entitled to the filing date of that patent. Applied Materials Inc. v. Advanced Semiconductor Materials Am., Inc., 32 USPQ2d 1865, 1879-80 (N.D. Cal. 1994). The district court then held that the '313 patent was invalid because the inventors added substantial new matter to the application but did not update the best mode for practicing the newly claimed invention. Id. at 1880- 82.

Relying on Transco Products Inc. v. Performance Contracting, Inc., 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994), Applied Materials argues here that the inventors were not obligated to update the best mode disclosure of the '313 patent because it was enabled by the '712 patent. This court adopts that position. But a continuation application, which was at issue in Transco, is fundamentally different from a continuation-in-part, which is at issue here.

To secure the benefit of the filing date of an earlier filed ("parent") application, 35 U.S.C. § 120 requires that the claimed invention be disclosed in the manner provided by the first paragraph of section 112, which requires 1) a written description of the invention, 2) enablement, and 3) disclosure of the best mode for practicing the invention. Each of these disclosures is separately required before the later application is entitled to the filing date of the parent. See Transco, 38 F.3d at 556-57, 32 USPQ2d at 1081-82 (“[S]ection 120 speaks of the first paragraph of section 112 as a whole.” “Section 120 does not exempt the best mode requirement from its reach, and therefore this court must accept the plain and precise language of section 120 as encompassing the same.”).

Although there may be some variation in the scope of the claimed subject matter, a continuation application is based solely on the disclosure of a parent application. See Manual of Patent Examining Procedure § 201.07

(6th Ed. 1995) (MPEP). By definition, a continuation adds no new matter and is akin to an amendment of a pending application. *Id.*; *Cf. Godfrey v. Eames*, 68 U.S. (1 Wall.) 317, 324-26 (1864). In addition to a continuation application, the Patent and Trademark Office also permits a continuation-in-part application which is only partially entitled to the benefit of section 120 because it contains new matter. MPEP § 201.08. "A [continuation-in-part] application can be entitled to different priority dates for different claims. Claims containing any matter introduced in the [continuation-in-part] are accorded the filing date of the [continuation-in-part] application. However, matter disclosed in the parent application is entitled to the benefit of the filing date of the parent application." *Waldemar Link, GmbH & Co. v. Osteonics Corp.*, 32 F.3d 556, 558, 31 USPQ2d 1855, 1857 (Fed. Cir. 1994).

Transco held that "an application is entitled to the benefit of the filing date of an earlier application as to common subject matter." 38 F.3d at 557, 32 USPQ2d at 1082. Applied to the best mode requirement, this narrow statement means that an applicant is not required to update the best mode disclosure for continuation applications, which, of course, add no new matter, or for inventions claimed in continuation-in-part applications that are otherwise entitled to the filing date of a parent application because they meet all requirements necessary to gain the benefit of the earlier filing date. However, *Transco's* general discussion of "continuing" applications should not be thought to apply the same requirements to both types of "continuing" applications without considering the important differences between them. Both continuations and continuations-in-part may be referred to as "continuing" applications for some purposes, but they are different in important respects.

The district court cited conflicting authority, *Johns-Manville Corp. v. Guardian Indus. Corp.*, 586 F. Supp. 1034, 221 USPQ 319 (E.D. Mich. 1983), *aff'd*, 770 F.2d 178 (Fed. Cir. 1985), and *Transco Products, Inc. v. Performance Contracting, Inc.*, 821 F. Supp. 537, 28 USPQ2d 1739 (N.D. Ill. 1993), subsequently reversed, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994), from which it determined "that resolution of the best mode issue in the instant case requires an inquiry as to whether the Continuation In Part Application contained the disclosures of material essential to successfully practice the invention and which significantly amended the disclosure of the parent in a fashion known to the inventors to constitute best mode for the practice of the invention." 32 USPQ2d at 1881. It found that the continuation-in-part that matured into the '313 patent specifically claimed the benefits of a method of preparing crystallographic wafers with minimal crystallographic slip. *Id.* at 1881-82. The court also found that the inventors knew of a preferred embodiment for practicing the method of the '313 patent before they filed their continuation-in-part application but failed to disclose it in the application.

The district court's analysis is sound. Whereas the '712 patent does not even contain the terms "slip" or "crystallographic slip," the '313 patent contains detailed information on how the claimed method heats a substrate formed of "a single crystal material with substantially no crystallographic slip." It is beyond dispute that this information constitutes new matter and was at least one reason that the application was filed as a continuation-in-part, rather than a continuation. There is also no dispute over the factual findings that the inventors knew of a best mode of practicing the newly claimed invention and that they did not disclose it. The only argument is whether the district court's finding that the '313 patent was enabled by the '712 patent is sufficient to absolve the inventors of any duty to update the best mode in their continuation-in-part application.

This court apparently overlooks that when the district court analyzed entitlement to the filing date of the parent it discussed only whether the '313 patent claims were enabled by the parent application, not whether

they met the best mode requirement. See 32 USPQ2d at 1879-80. Best mode is not the same as enablement. Chemcast Corp. v. Arco Indus., 913 F.2d 923, 926, 16 USPQ2d 1033, 1035 (Fed. Cir. 1990). Determining whether a patent complies with the best mode requirement involves two distinct factual inquiries that are different from what is required in determining whether the claimed invention is enabled. "First, it must be determined whether, at the time the patent application was filed, the inventor had a best mode of practicing the claimed invention." U.S. Gypsum Co. v. National Gypsum Co., 74 F.3d 1209, 1212, 37 USPQ2d 1388, 1390 (Fed. Cir. 1996). This "is wholly subjective and addresses whether the inventor must disclose any facts in addition to those sufficient for enablement." Id. (emphasis added). "A specification can be enabling yet fail to disclose an applicant's contemplated best mode." Chemcast, 913 F.2d at 928, 32 USPQ2d at 1037. If the inventor contemplated a best mode of practicing the claimed invention, the court must then determine whether the specification adequately disclosed it so that those having ordinary skill in the art could practice it. Id. The district court performed this analysis without error.

The best mode requirement serves to "restrain inventors from applying for patents while at the same time concealing from the public preferred embodiments of their invention which they have in fact conceived." Transco, 38 F.3d at 559, 32 USPQ2d at 1084 (citing In re Gay, 309 F.2d 769, 772, 135 USPQ 311, 315 (CCPA 1962)). If an inventor may file a patent application disclosing only part of an invention, and then file a continuation-in-part adding substantial new matter without disclosing the best mode of what was newly added, the public will be deprived of the full invention claimed in the continuation-in-part application. It would behoove inventors to disclose only minimal parts of their inventions, and then submit continuations-in-part to claim the rest. They could thereby hide the commercial value that resides in the best mode of practicing their inventions and gain the benefit of both the exclusionary right of the patent and the "quasi trade secret" of the best mode.

This case highlights the need for inventors to update a best mode disclosure when adding new matter. Although the disclosure of the '712 patent may have enabled one of ordinary skill in the art to practice the claimed process "with substantially no crystallographic slip," only the '313 continuation-in-part disclosed the advantages of the slip free process and specifically claimed it as the invention. In the interval, the inventors had developed a reactor that would optimize the advantages of this feature. To allow them to take advantage of the 1969 filing date almost 7 years later, add new matter to their application, and not require them to disclose the best mode of the newly claimed invention is a gross distortion of the bargain between the inventor and the public. See Bonito Boats Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 150-51, 9 USPQ2d 1847, 1852 (1989).

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NEWMAN, Circuit Judge, dissenting from the judgment of invalidity of the '313 patent.

I respectfully dissent from the judgment of my colleagues concerning the '313 patent, for their separate theories of invalidity are premised on the incorrect position that a continuation-in-part application is not entitled to the parent application's filing date, even when the claimed invention was enabled and the best mode requirement was met in the parent specification.

The '313 patent arose from the same parent application as did the '609 patent discussed supra. It is not disputed that the enablement and best mode requirements were met when the parent application was filed. The district court held that the inventor was required to update the subject matter, including the design details of the commercial reactor, when the continuation-in-part was filed. In the later- overruled district court decision in Transco Products, Inc. v. Performance Contracting, Inc., 821 F. Supp. 537, 28 USPQ2d 1739 (N.D. Ill. 1993), a continuation application had been filed in accordance with patent office Rule 60 (permitting expedited refiling when the specification is unchanged), and the court held that the subject matter required full updating upon the refiling. The Federal Circuit reversed, and in a thorough opinion the court explained the principles embodied in the statute. Transco Prods., Inc. v. Performance Contracting, Inc., 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994), cert. denied, 115 S. Ct. 1102 (1995). Judge Mayer in his concurring opinion now applies that reversed decision, distinguishing the Federal Circuit's discussion as *dictum*, as I shall discuss.

Chief Judge Archer in his concurring opinion holds that the original filing date was lost because the applicant included in the continuation-in-part claims the additional advantage of single-side heating, viz. reduced crystallographic slip. He would extinguish the parent filing date because an advantage of the patentee's method was not described in the parent specification. Thus there has been added to the patent practice of the Federal Circuit another useless pitfall, now punishing the patentee for disclosing in the continuation-in-part application an advantage of the method that was described and enabled in the parent specification. Both of the concurring opinions divest the continuation-in-part application of the benefit of the parent filing date, holding that it is insufficient that the parent specification enabled the invention that was common to the parent and the continuation-in-part, and that the best mode was described for that common invention as of its filing date. I can not agree.

In Transco the Federal Circuit explained that a rule that removed the benefit of the early filing for subject matter enabled therein would "subvert the patent system's goal of promoting the useful arts through encouraging early disclosure." 38 F.3d at 558, 32 USPQ2d at 1082. The court explained that 35 U.S.C. §120 establishes that when the application as initially filed complies with 35 U.S.C. §112, that filing date continues to apply to claims to that subject matter.

The court in Transco discussed the relationship of §120 and §112 when the subsequent application is a continuation-in-part, that is, when additional subject matter has been added to the specification. The court explained that claims enabled by the original application do not lose their enablement when additional text is added to the specification:

Any claim in a continuation-in-part application which is directed solely to subject matter adequately disclosed under 35 U.S.C. 112 in the parent application is entitled to the benefit of the filing date of the parent application. However, if a claim in a continuation-in-part application recites a feature which was not disclosed or adequately supported by a proper disclosure under 35 U.S.C. 112 in the parent application, but which was first introduced or adequately supported in the continuation-in-part application such a claim is entitled only to the filing date of the continuation-in-part application."

Transco, 38 F.3d at 557 n.6, 32 USPQ2d at 1082 n.6 (quoting the Manual of Patent Examining Procedure §201.11)

Thus this court in Transco explained that when the claims are entitled to the filing date of the parent application, they do not lose that entitlement when carried forward in a refiled application, whether that application is a Rule 60 "continuation" or a continuation-in-part. "The plain and unambiguous meaning of section 120 is that any application fulfilling the requirements therein 'shall have the same effect' as if filed on the date of the application upon which it claims priority." Transco, 38 F.3d at 556, 32 USPQ2d at 1081 (quoting 35 U.S.C. §120).

However, when claims in the continuation-in-part require the newly added matter for enablement, the best mode is measured as of the filing date governing those claims. See, e.g., In re Chu, 66 F.3d 292, 297, 36 USPQ2d 1089, 1093 (Fed. Cir. 1995) ("It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application . . ."); In re Hogan, 559 F.2d 595, 194 USPQ 527 (CCPA 1977) (different claims of continuation-in-part granted benefits of filing dates of different ancestral applications); Wagoner v. Barger, 463 F.2d 1377, 1380, 175 USPQ 85, 86-87 (CCPA 1972) ("The question in cases in which the parent application does not contain language contained in the claims of the later application is whether the language which is contained in the parent application is the legal equivalent of the claim language, in the sense that the 'necessary and only reasonable construction to be given the disclosure [in the parent application] by one skilled in the art,' Binstead v. Littmann, [242 F.2d 776 (CCPA 1957)], is the same as the construction which such person would give the claims of the later application.")

The district court did not hold that any of the information that it stated should have been added to the specification was needed to enable the claimed invention. The holding was to the contrary, the court stating that "There is no evidence that, if operated by one skilled in the art to whom elimination of slip was an important consideration, the Figure 6 reactor would not eliminate the slip caused by back side heating." Applied Materials, 32 USPQ2d at 1880. Cf. In re Gay, 309 F.2d 769, 771, 135 USPQ 311, 314 (CCPA 1962) ("Since we are of the opinion that as originally filed, appellant's specification would have indicated to one skilled in the art that all suggested container materials were to be substantially non-porous, we hold that the insertion of this limitation expressly into the specification and claims did not involve 'new matter.'")

The invention claimed in the '313 patent is directed to ovens in which the lamps are on the same side of the susceptor as the substrate (called "same side heating" in the district court's opinion). That configuration was

disclosed and enabled in the parent application. The applicant added some general explanatory text, but added neither a new invention nor broadened subject matter nor broadened claims.

There is not asserted to be any deficiency in either enablement or the best mode disclosure of the original application. The district court, like my colleagues on this panel, simply misstated the law in holding that "[a]ll of the features of the AMC-740 [the commercial reactor], whether they contributed to slip free performance or not, should have been disclosed." The district court did not limit this requirement to features related to same side heating. ASM in its brief, explaining the features that the district court had in mind (such as the oval shape of the reactor), does not mention anything related to same side heating. It appears that the district court had been persuaded that Applied Materials was required to include all subsequently developed aspects of its commercial apparatus, whether or not they were part of the invention claimed in the '313 patent. That is not the law. See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 941, 15 USPQ2d 1321, 1329 (Fed. Cir. 1990) (patent document not intended to be a production specification); In re Gay, 309 F.2d 769, 773, 135 USPQ 311, 316 (CCPA 1962) (the Board erred in requiring inclusion of the details of the product "as it is `being marketed."); Engel Indus., Inc. v. Lockformer Co., 946 F.2d 1528, 1532, 20 USPQ2d 1300, 1302 (Fed. Cir. 1991) (a patent is not a "production specification") (quoting In re Gay, 309 F.2d at 774, 135 USPQ at 316).

Prior to the uncertainties now raised by my concurring colleagues, each of whom imposes a different new obligation upon patent applicants, the law was that when the original specification is enabling, the best mode as to claims enabled by the original subject matter is measured as of the original filing date. When an application is refiled with newly added matter, the initial matter does not thereby lose its effective date, and claims that were initially enabled, and a specification that initially met the best mode requirement, do not lose their validity as to the common subject matter.

The district court erred in holding that Applied Materials was required to include in the continuation-in-part application all of the features of its commercial reactor, "whether they contributed to slip free performance or not." It is hard to imagine any continuation-in-part application that will not fail some judge's test and, as here, destroy the patent on a successful invention. This is of particular concern because should the United States adopt a first-to-file rule the pressures for early filing will increase, yet now the early filing date is increasingly vulnerable to loss. This simply entraps the inventor. The ultimate loser will be the public, for patent applications will not be refiled, and the innovation incentive will be diminished.

The district court found as fact that the claims of the '313 patent were entitled to the filing date of the parent application. This finding was made in rejecting ASM's defense that the patent was invalid because of sales activity after the initial filing date but a year before the continuation-in-part application was filed. No error has been shown in this finding, which resolves the issue on appeal. I dissent, respectfully, from the contrary findings of my colleagues on this panel.

Footnotes

1 Applied Materials, Inc. v. Advanced Semiconductor Materials America, Inc., 32 USPQ2d 1865 (N.D. Cal. 1994).

2 1. In a process for effecting chemical vapor deposition coating of a substrate in a reaction chamber, the steps of:

placing the substrate in the reaction chamber on a susceptor of substantially greater size than the substrate and adapted to absorb and conduct radiant heat energy,

transmitting radiant heat energy through a wall of the reaction chamber to the susceptor to heat the susceptor by absorption of the radiant heat energy without appreciable absorption of said energy by the chamber wall,

maintaining the substrate in contact with the susceptor to permit a transfer of heat between the susceptor and the substrate whereby the substrate is heated and maintained at a substantially uniform temperature throughout,

and introducing a gaseous reactant into the reaction chamber for contact with the heated substrate to form a film by chemical vapor deposition thereon.

3 An epitaxial layer is one that has the same crystallographic structure as the substrate upon which it is deposited.

4 Crystallographic slip occurs when thermal stresses within the substrate or coating cause adjacent layers of molecules to move relative to each other, thus disrupting the pattern of the deposition.

5 Applied Materials has moved this court to take judicial notice of an assertedly inconsistent position of ASM in related litigation concerning the '609 patent. In view of our decision upholding the validity of the '609 patent on the grounds presented, the question of judicial estoppel need not be considered in this case. The motion is dismissed as moot.

6 Because I conclude that the claims of the '313 patent are not enabled by the 1969 application, I do not reach the question of whether the best mode requirement of § 112, first paragraph, is satisfied.

7 Claim 1 is as follows:

1. A method for heating a plurality of substrate members

formed of a single crystal material with substantially no crystallographic slip in a process for the formation of semiconductor regions by epitaxial growth, said method comprising the steps of:

placing the substrate members in intimate contact with a susceptor body on one side of the same in a cool wall reaction chamber,

heating the substrate members and the susceptor body directly and simultaneously in an unfocused, substantially uniform field of radiant heat energy produced by a bank of high intensity radiant heat lamps located on the same side of the susceptor body as the substrate members,

whereby the substrate members are heated uniformly and without appreciable thermal gradients by a combination of direct radiation from the heat lamps and heat transfer from the susceptor body, and

introducing a gaseous reactant into the reaction chamber to effect deposition of a chemical vapor coating on the substrate members.

8 The patentees admitted during the prosecution of the '609 patent that the process of the '609 patent is the

method of using the apparatus covered by United States Patent Nos. 3,623,712 and 4,047,496.

9 Provided other requirements not at issue here are met, "[a]n application for patent for an invention disclosed in the manner provided by the first paragraph of [35 U.S.C. § 112] in an application previously filed in the United States . . . shall have the same effect, as to such invention, as though filed on the date of the prior application." 35 U.S.C. § 120 (1994).

10 The most specific newly added references to the absence of crystallographic slip and to single crystal films occur in the '313 patent at column 1, lines 35-40 and 53-55; column 2, lines 38-45 and 55-61; column 3, lines 5-9 and 13-16; column 4 lines 3-5 and 24-27; column 5, lines 16- 20; column 6, lines 5-7; column 10, lines 38-46; and column 11, line 19, through column 12, line 16.

11 Judge Mayer observes that in *Transco* this discussion is dictum. It is simply a statement of existing law, the *Transco* court citing P.J. Federico, "Commentary on the New Patent Act," 35 U.S.C.A. §1 (1954), pp. 31-33, and quoting the Manual of Patent Examining Procedure.

1. In a process for effecting chemical vapor deposition coating of a substrate in a reaction chamber, the steps of: placing the substrate in the reaction chamber on a susceptor of substantially greater size than the substrate and adapted to absorb and conduct radiant heat energy, transmitting radiant heat energy through a wall of the reaction chamber to the susceptor to heat the susceptor by absorption of the radiant heat energy without appreciable absorption of said energy by the chamber wall, maintaining the substrate in contact with the susceptor to permit a transfer of heat between the susceptor and the substrate whereby the substrate is heated and maintained at a substantially uniform temperature throughout, and introducing a gaseous reactant into the reaction chamber for contact with the heated substrate to form a film by chemical vapor deposition thereon. An epitaxial layer is one that has the same crystallographic structure as the substrate upon which it is deposited. Crystallographic slip occurs when thermal stresses within the substrate or coating cause adjacent layers of molecules to move relative to each other, thus disrupting the pattern of the deposition. Applied Materials has moved this court to take judicial notice of an assertedly inconsistent position of ASM in related litigation concerning the '609 patent. In view of our decision upholding the validity of the '609 patent on the grounds presented, the question of judicial estoppel need not be considered in this case. The motion is dismissed as moot. Because I conclude that the claims of the '313 patent are not enabled by the 1969 application, I do not reach the question of whether the best mode requirement of § 112, first paragraph, is satisfied. Claim 1 is as follows: 1. A method for heating a plurality of substrate members formed of a single crystal material with substantially no crystallographic slip in a process for the formation of semiconductor regions by epitaxial growth, said method comprising the steps of: placing the substrate members in intimate contact with a susceptor body on one side of the same in a cool wall reaction chamber, heating the substrate members and the susceptor body directly and simultaneously in an unfocused, substantially uniform field of radiant heat energy produced by a bank of high intensity radiant heat lamps located on the same side of the susceptor body as the substrate members, whereby the substrate members are heated uniformly and without appreciable thermal gradients by a combination of direct radiation from the heat lamps and heat transfer from the susceptor body, and introducing a gaseous reactant into the reaction chamber to effect deposition of a chemical vapor coating on the substrate members. The patentees admitted during the prosecution of the '609 patent that the process of the '609 patent is the method of using the apparatus covered by United States Patent Nos. 3,623,712 and 4,047,496. Provided other requirements not at issue here are met, "[a]n application for patent for an invention disclosed in the manner provided by the first paragraph of [35 U.S.C. § 112] in an application previously filed in the United States . . . shall have the same effect, as to such

invention, as though filed on the date of the prior application." 35 U.S.C. § 120 (1994). The most specific newly added references to the absence of crystallographic slip and to single crystal films occur in the '313 patent at column 1, lines 35-40 and 53-55; column 2, lines 38-45 and 55-61; column 3, lines 5-9 and 13-16; column 4 lines 3- 5 and 24-27; column 5, lines 16-20; column 6, lines 5-7; column 10, lines 38-46; and column 11, line 19, through column 12, line 16. Judge Mayer observes that in Transco this discussion is dictum. It is simply a statement of existing law, the Transco court citing P.J. Federico, "Commentary on the New Patent Act," 35 U.S.C.A. §1 (1954), pp. 31-33, and quoting the Manual of Patent Examining Procedure.