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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DONALD V. SMART

Appeal 2009-015036
Application 10/818,920
Technology Center 2800

Before ELENI MANTIS MERCADER, CARL W. WHITEHEAD, JR., and
BRADLEY W. BAUMEISTER, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

STATEMENT OF THE CASE

[Appellant's] invention relates to energy-efficient, laser-based methods and systems for processing target material. In particular, this invention relates to the use of a pulsed laser beam to ablate or otherwise alter a portion of a circuit element on a semiconductor substrate, and is particularly applicable to vaporizing metal, polysilicide and polysilicon links for memory repair. Further application can be found in laser-based micromachining and other repair operations, particularly when it is desired to ablate or modify a microscopic structure without damaging surrounding areas and structures, which often have non-homogeneous optical and thermal properties. Similarly, the material processing operations can be applied to other microscopic semiconductor devices, for instance microelectromechanical machines. Medical applications may also exist, such as microscopic tissue or cell ablation with miniature fiber optic probes.

(Spec. 1).

Appellant filed a preliminary amendment to draft “claims 100-169 . . . in view of three published application [sic]” filed by Sun² and asserted that these “new claims are directed to the same or substantially the same subject matter as at least some of the published claims of the published application [sic]” (Preliminary Amendment 16, filed Dec. 9, 2004). Appellant asserts that his assignee is entitled to an interference with the assignee of Sun's three applications (Second Preliminary Amendment 17, filed Jan. 6, 2006).

² The three published applications of Sun are (1) 10/322,347 (filed Dec. 17, 2002, published Aug. 14, 2004 as 2003/0151053) [Sun '053]; (2) 10/361,206 (filed Feb. 7, 2003, published Dec. 4, 2003 as 2003/0222330); and (3) 10/423,498 (filed Apr. 24, 2003, published Dec. 4, 2003 as 2003/0222324).

Over the course of prosecution, claims 100-169, as well as later added claims 170-173, were canceled and replaced by claims 174-325 (App. Br. 69-105).³ Subsequent to the filing of the initial Appeal Brief, “[c]aims 295, 298, 301, 303, 315, and 320 were canceled by examiner’s amendment” (Supp. Reply Br. 1 (referencing the Office communication mailed Dec. 23, 2008)) and various rejections were withdrawn.⁴

The following rejections remain: Claims 174-294, 296, 297, 299, 300, 302, 304-314, 316-319, and 321-325 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement (Ans. 5; Supp. Reply Br. 2). Claims 272, 273, 281-284, 287, 288, 290-294, 296, 300, 302, 304-308, 318, 319, and 321-325 stand rejected under 35 U.S.C. § 102(b) as being anticipated by James C. North & Walter W. Weick, *Laser Coding of Bipolar Read-Only Memories*, SC-11 IEEE J. Solid-State Circuits 500 (Aug. 1976) (hereinafter “North”) (Ans. 12; Supp. Reply Br. 2). Claims 272-274, 287, 288, 307, 308, and 325 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Batdorf (US 5,374,590 (issued Dec. 20, 1994) (Ans. 18, Supp. Reply Br. 2). Accordingly, Appellant appeals under 35 U.S.C. § 134(a) from the Examiner’s rejection

³ We refer to the following documents: the Revised Appeal Brief (App. Br.) filed April 3, 2008; the Examiner’s Answer (Ans.) mailed Dec. 23, 2008; the Reply Brief (Reply Br.) filed Feb. 23, 2009; the Supplemental Examiner’s Answer (Supp. Ans.) mailed Apr. 13, 2009; and the Supplemental Reply Brief (Supp. Reply Br.) filed June 12, 2009.

⁴ A provisional nonstatutory double patenting rejection of the appealed claims was withdrawn (Ans. 4). The appealed obviousness rejections under 35 U.S.C. § 103(a) (Supp. Reply Br. 2-3) have been withdrawn (Office communication, mailed Sep. 1, 2009).

of claims 174-294, 296, 297, 299, 300, 302, 304-314, 316-319, and 321-325
(Supp. Reply Br. 2).

We reverse.

PRINCIPLES OF LAW

“Adequate written description means that the applicant, in the specification, must ‘convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the [claimed] invention.’” *Agilent Techs., Inc. v. Affymetrix, Inc.*, 567 F.3d 1366, 1379 (Fed. Cir. 2009) (reh’g. en banc denied Sep. 18, 2009) (citation omitted).

“[W]hen a party challenges written description support for an interference count or the copied claim in an interference, *the originating disclosure provides the meaning of the pertinent claim language.*” *Robertson v. Timmermans*, 603 F.3d 1309, 1312 (Fed. Cir. 2010) (citations omitted). “[In] an interference in which claims copied from one party’s patent into the other party’s application [are] the subject of a motion for invalidity based on prior art[,] . . . the claims should be interpreted in light of their host disclosure, just as they would during *ex parte* prosecution.” *Id.*

THE 112, ¶ 1 REJECTION

All of the appealed claims are directed to either a method or an apparatus for selectively severing, or removing target material from, electrically conductive links in an integrated circuit such as those disposed on a semiconductor substrate. Each of the claims requires, *inter alia*, that this severing or material removal be carried out by applying at least two laser pulses to an individual link.

The Examiner finds that Appellant's Specification does not provide adequate written description of the claimed subject matter because the Specification does not support sequentially striking a link with "a set of two or more time-displaced laser output pulses" as recited in the claims (*e.g.*, Supp. Ans. 2). Further, the Examiner finds that the Specification does "not explicitly or implicitly convey the idea of using multiple pulses to process a link on the fly" (Ans. 35). The Examiner instead finds that the Specification discloses the concept of directing a chain of laser pulses to a semiconductor chip that contains a plurality of links, such "that each pulse hits a different link while to [sic] chip scans across the path of the beam" (Ans. 36). The Examiner further finds that the Specification's disclosed double pulses, as depicted in Appellant's Figures 3a, are not separate pulses that are applied to a link, but are instead pulses emitted from Appellant's seed laser (*see* Fig. 5) for the purpose of producing a specially shaping *single* laser pulse (Fig. 3b) within the laser amplifier (*see* Fig. 5), and that it is the latter, single flat-top shaped laser pulse that is applied to a given link (*e.g.*, Ans. 34-35).

In short, the Examiner's 112, 1st paragraph rejection of the claims is based, at least in part, upon the position that the copied claims must be interpreted as requiring that two or more separate and distinct pulses arrive at the link sequentially, and that it is not sufficient if two pulses from the seed laser (*see* Fig. 3a) are combined (such as depicted by Fig. 3b) and directed to the link as a single shaped pulse (Supp. Ans. 2-6). We disagree with this interpretation of the claims.

For the purpose of determining whether Appellant's Specification provides adequate written description, we look to the meaning of the

pertinent claim language as set forth in Sun's originating disclosures. *See Robertson*, 603 F.3d at 1312. Sun '053 discloses, for example:

A set (50) of laser pulses (52) is employed to sever a conductive link (22) in a memory or other IC chip. The duration of the set (50) is preferably shorter than 1,000 ns; and the pulse width of each laser pulse (52) within the set (50) is preferably within a range of about 0.1 ps to 30 ns. The set (50) can be treated as a single "pulse" by conventional laser positioning systems (62) to perform on-the-fly link removal without stopping whenever the laser system (60) fires a set (50) of laser pulses (52) at each link (22).

(Abst.). In the embodiment of Sun's Figure 3, "each laser pulse 52a can be generated with the same energy density to provide a pulse set 50a with a consistent 'flat-top' energy density profile" ([0042]). Further, Sun's "FIG. 8 shows a schematic diagram of another simplified alternative configuration of a laser system 110 for [sic] that employs an amplifier 112" ([0051]).

Interpreting the copied claim language of the present application in accordance with Sun's disclosure thus indicates that the individual laser pulses emitted by Appellant's seed laser may read on "a set of two or more⁵ time-displaced laser output pulses" (*e.g.*, claim 174). This is so even if these pulses are subsequently amplified and combined so as to form a specially-

⁵ Figures 3a and 3b of the present application depict only two short pulses that are combined to produce a desired pulse shape. However, Appellant's Specification is not limited to two-component pulses. Rather, the written portion of the Specification states "it is possible to generate a *series* of closely-spaced, short pulses which, when combined, produce a desired pulse shape as illustrated in Figures 3a and 3b" (Spec. 20) (emphasis added). The Examiner has not alleged that "a series" must be interpreted narrowly as being limited to only two-component pulses. As such, we understand the Specification as disclosing two *or more* time displaced laser pulses.

shaped flat-top pulse that strikes a link in the form of a single pulse (*see* FIGs. 5 and 3b).

To summarize, the Examiner's finding that the appealed claims lack adequate written description is based upon an improper interpretation of the claim language. Furthermore, a review of Sun '053 indicates that the improper interpretation was unduly narrow. Because the Examiner has not analyzed the claims according to an appropriate interpretation of the claims' various terms, the Examiner has not established that Appellant's Specification lacks adequate written description. Accordingly, we will not sustain the 112, 1st paragraph rejection of claims 174-294, 296, 297, 299, 300, 302, 304-314, 316-319, and 321-325.

THE 102 REJECTIONS

Each of the pending claims further sets forth either a method or apparatus with one of the two following steps or functionalities: (1) continuous movement of the laser beam relative to the link structure,⁶ or (2) sequentially directing the at least two laser pulses to the conductive link "on-the-fly."⁷ We understand Appellant to be interpreting these two alternative claim requirements of continuous relative movement and on-the-fly processing as being synonymous. *See, e.g.*, Reply Br. 5-28 (using the two

⁶ *See, e.g.*, claim 174 (*reciting* "coordinating laser output pulse generation and the relative movement imparted by the beam positioner such that the relative movement is continuous while the laser output pulses in the set sequentially strike the selected link structure so that the [laser pulse] . . . in the set severs the electrically conductive link").

⁷ *See, e.g.*, claim 273 (*reciting* "sequentially directing on-the-fly, based on the position data, the first and second laser pulses to a selected conductive link to sever the selected conductive link").

terms synonymously in arguing why Appellant's Specification contains adequate written description of the claimed subject matter). More specifically, Appellant cites paragraph (32) of the Declaration Under 37 C.F.R. § 1.132 of Donald Smart (filed December 28, 2006) as evidence that one of ordinary skill in the art at the time of the invention would have understood that "on-the-fly" in the present context "refers to moving with continuous motion across links to be processed" (App. Br. 60). Appellant distinguishes "on-the-fly" processing from "step-and-repeat processing" wherein "a link structure [is subjected] to laser exposure under *a stationary condition*" (*id.*).

On-The-Fly Processing

The Examiner does not dispute that North and Batdorf [the cited prior art references] fail to disclose moving a laser across links to be processed with continuous relative motion (Ans. 13, 18). The Examiner instead reasons, with respect to claims 272, 273, 287, 288, 305-308, 324, and 325, that since "Appellant has not specifically defined the phrase 'on-the-fly[,]' it can be considered that the laser pulses of North are directed to the link 'on-the-fly' since they are directed to the link one after the other, without making any adjustments in between the pulses" (*id.*). The Examiner takes the same position with respect to the rejection of claims 272-274, 287, 288, 307, 308, and 325 based upon Batdorf (Ans. 18-19).

To decide whether the anticipation rejections are proper, we apply a different standard for interpreting the meaning of the claim language than the standard we employed for the 112, 1st paragraph rejection, *supra*. Instead of looking to the originating disclosure of Sun, we now interpret the

claims in light of *Appellant's* disclosure as we would with any *ex parte* examination. See *Robertson*, 603 F.3d at 1312.

The first issue with respect to the anticipation rejections is whether the Examiner's broader definition of "on-the-fly processing" is reasonable. We find that it is not.

The Examiner is correct that the Specification does not expressly define "on-the-fly processing." Nonetheless, Appellant's Specification does state, for example, that "timing . . . the laser pulse to correlate with the relative positions of the target and optical system is important because of the continuous motion required in order to obtain high processing speeds" (Spec. 22); "overcoming [a specified prior art limitation] would presently require the ultrafast laser system to produce multiple pulses for processing each target site which would slow the laser processing rate to an unacceptable level" (Spec. 6); and "it can also be advantageous to operate the laser at pulse repetition rates exceeding the material processing rate and utilize a computer controlled optical switch to select processing pulses, the computer being operatively connected to a beam position system used to position a focused laser beam for material processing" (Spec. 20). Read as a whole, Appellant's Specification supports Appellant's narrower definition – not the Examiner's broader one.

Extrinsic evidence also supports Appellant's contention that one of ordinary skill in the art would understand "on-the-fly processing" to be limited to Appellant's narrower interpretation requiring continuous relative motion, as opposed to also reading on a process where the laser position is stopped at each link so long as no calibration is carried out during the processing. Specifically, the Declaration of Donald Smart, *supra*, supports

Appellant's interpretation. So does Sun '053 (Abst. (“[t]he set (50) [of laser pulses] can be treated as a single ‘pulse’ by conventional laser position systems (62) to perform on-the-fly link removal without stopping whenever the laser system (60) fires a set (50) of laser pulses (52) at each link (22)”)). In contrast, the Examiner has not cited any authority supporting the conclusion that the broader interpretation is a reasonable one.

With respect to the laser system, or apparatus, which are disclosed in claims 305, 306, and 322-324, the Examiner additionally concludes that “the limitation ‘directing on-the-fly laser pulses to a selected conductive link’ is merely a recitation of intended use that does not structurally distinguish the claimed invention over the prior art” (Ans. 13, 17). Claim 305 is illustrative of such a laser system claim:

305. A laser system for severing a conductive link in an integrated circuit (IC), comprising:

a laser source operable to generate at least two laser pulses, the laser pulses including a first laser pulse and a second laser pulse; and

a beam positioning system operable to utilize position data representative of locations of one or more conductive links and to coordinate directing on-the-fly the laser pulses to a selected conductive link, *wherein the first and second laser pulses are sequentially directed to the selected conductive link, at least one of the first and second laser pulses removes a portion of link material, and the laser pulses sever the selected conductive link.*

(emphasis added).

We disagree with the Examiner that the wherein clause of the claim 305's last limitation is merely an intended use. We instead understand the wherein clause to be describing further conditions under which the beam positioning system is operable to perform the recited functions of utilizing

the position data and coordinating directing on-the-fly laser pulses to a selected link.

For these reasons, then, we do not sustain the anticipation rejection of claims 272, 273, 287, 288, 305-308, 322-325 over North. We likewise do not sustain the anticipation rejection of claims 272-274, 287, 288, 307, 308, and 325 based upon Batdorf.

Continuous relative movement

With respect to claims 281, 284, 290, 293, 294, 300, 302, 304, 318, 319, and 321, the Examiner finds that “[t]he limitation ‘wherein the selected conductive link and the beam are in relative movement while the laser pulses are directed to the selected conductive link’ is merely a recitation of intended use that does not structurally distinguish the claimed invention over the prior art” (Ans. 14). The Examiner more specifically reasons that “[t]he beam positioning system of North is capable of causing relative movement between the beam and the link while the pulses are applied. An extremely slow movement would still allow both pulses to be applied to the link” (*id.*). The Examiner also adopts this position with respect to claims 282 and 291 (Ans. 15); claims 283 and 292 (Ans. 16); and claim 296 (Ans. 17).

However, the Examiner has not pointed to any factual basis to support either (1) the conclusion that North is capable of relative movement while the pulses are applied, or (2) the conclusion that the components of the beam positioning system are capable of achieving the alleged “extremely slow” relative movement. Because a factual basis to support these assumptions is absent, we do not sustain the anticipation rejection of claims 281-284, 290-294, 296, 300, 302, 304, 318, 319, and 321 that is based upon North.

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DECISION

We do not sustain the Examiner's rejections with respect to all pending claims on appeal. Therefore, the Examiner's decision rejecting claims 174-294, 296, 297, 299, 300, 302, 304-314, 316-319, and 321-325 is reversed.

REVERSED

nlk

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