THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte
ROBERT W. FIORDALICE, STANLEY M. FILIPIAK,
JOHNSON O. OLOWOLAFE, and HISAO KAWASAKI

Appeal No. 1998-0178
Application No. 08/254,854

ON BRIEF

Before THOMAS, JERRY SMITH, and FLEMING, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 24 and 26-30, which constitute all the claims remaining in the application.

The invention pertains to a semiconductor device having an intermetallic region. More particularly, the intermetallic region includes a titanium-aluminum compound and contains no elemental (unreacted) titanium.

Representative claim 24 is reproduced as follows:

24. A semiconductor device comprising:
a substrate;
a patterned first metal layer overlying the substrate, wherein the patterned first metal layer includes aluminum;
an insulating layer including an opening that overlies the patterned first metal layer;
a via structure that lies adjacent to the patterned first metal layer and lies at least partially within the opening, wherein:
the via structure includes a titanium-aluminum compound; and
the via structure does not include a layer of elemental titanium; and
a patterned second metal layer overlying the via structure.

The examiner relies on the following reference:

Fujii et al. (Fujii) 5,312,775 May. 17, 1994
(effective filing date Jan. 21, 1992)

Claims 24 and 26-30 stand rejected under 35 U.S.C. § 112, second paragraph, for failing to particularly point out and distinctly claim the invention. Claims 24 and 26-30 also stand rejected under 35 U.S.C. § 102(a) as being anticipated by the disclosure of Fujii.

Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner, the arguments in support of the rejections and the evidence of anticipation relied upon by the examiner as support for the prior art rejection. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that claims 24 and 26-30 particularly point out the invention in a manner which complies with 35 U.S.C. § 112. We are also of the view that the disclosure of Fujii does not fully meet the invention as set forth in claims 24 and 26-30. Accordingly, we reverse.

We consider first the rejection of claims 24 and 26-30 under the second paragraph of 35 U.S.C. § 112. The examiner's rejection states the following:

> Claim 24 is indefinite in that it first recites that the via structure includes a "titanium-aluminum compound", and then recites that it "does not include titanium". The compound must include titanium, therefore line 11 contradicts that which has been claimed [final rejection, page 2].

In responding to appellants' arguments with respect to this rejection, the examiner stated:

> The phrase "*the via structure does not include a layer of elemental titanium*" tends to define the invention in terms of what it is not, rather than pointing out the invention. This is a negative limitation that renders the claim indefinite [answer, page 4].

Appellants argue that elemental titanium means unreacted titanium, and there is no conflict between the claimed presence of a titanium-aluminum compound and the lack of elemental titanium [brief, page 4]. Appellants also argue that negative limitations are not per se indefinite or

unpatentable [id.]. Appellants argue that the claimed invention is perfectly clear when it is interpreted in light of and consistent with the specification [reply brief].

The general rule is that a claim must set out and circumscribe a particular area with a reasonable degree of precision and particularity when read in light of the disclosure as it would be by the artisan. In re Moore, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971). Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed in light of the specification. Seattle Box Co., v. Industrial Crating & Packing, Inc., 731 F.2d 818, 826, 221 USPQ 568, 574 (Fed. Cir. 1984).

We agree with appellants' arguments with respect to both points raised by the examiner. First, appellants are correct that there is no inconsistency between a titanium-aluminum compound and the lack of elemental titanium. The artisan would understand claim 24 to recite that there is no unreacted titanium, that is elemental titanium, in the device. Second, the examiner's objection per se to the negative limitation in claim 24 does not properly consider the question

of whether the scope of claim 24 is clear. The examiner seems to understand exactly what is claimed in claim 24, but simply objects to the form of the claim. It is sometimes possible to describe things most accurately and succinctly by what they are not. We agree with appellants that the artisan having considered the specification of this application would have no difficulty ascertaining the scope of the invention recited in claims 24 and 26-30. Therefore, the rejection of claims 24 and 26-30 under the second paragraph of 35 U.S.C. § 112 is not sustained.

We now consider the rejection of claims 24 and 26-30 under 35 U.S.C. § 102(a) as anticipated by the disclosure of Fujii. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388
(Fed. Cir.); cert. dismissed, 468 U.S. 1228 (1984);

W.L. Gore and Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

The examiner purports to read the invention of claim 24 on the disclosure of Fujii [final rejection, pages 2-3]. Appellants argue that Fujii clearly discloses a titanium layer 101 within contact holes 6 of the insulating film 5 whereas the claim specifically recites that the structure does not include a layer of elemental titanium. Appellants accuse the examiner of ignoring this claim language. The examiner responds that the titanium layer 101 in Fujii is not elemental (unreacted) titanium because titanium layer 101 reacts with aluminum to form a titanium-aluminum compound and reacts with silicon to form a titanium-silicon compound [answer, page 6].

Although the examiner is correct that part of the titanium layer 101 in Fujii reacts with aluminum connection 4 to form a titanium-aluminum compound region 206, the examiner is incorrect to conclude that Fujii does not include a layer of elemental titanium as required in claim 24. The titanium layer 101 only reacts with the aluminum at the interface between them. The strip of material labeled as 101 in Fujii

remains as elemental titanium even after the titanium reactions occur. Although the via itself (the opening) may not have elemental titanium in Fujii, the “via structure” includes the sidewalls which form the opening, including the sidewall formed by layer 101. Thus, the via structure of Fujii does include a layer of elemental titanium 101 as shown in the drawings. Since claim 24 forbids such a layer of elemental titanium, claim 24 is not anticipated by the disclosure of Fujii. Therefore, we do not sustain the rejection of claim 24 as anticipated by Fujii. Since claims 26-30 all depend from claim 24, we also do not sustain the rejection of these claims as anticipated by Fujii.

In summary, we have not sustained the rejection of claims 24 and 26-30 under either 35 U.S.C. § 112 or § 102(a). Therefore, the decision of the examiner rejecting claims 24 and 26-30 is reversed.

REVERSED

JAMES D. THOMAS Administrative Patent Judge	)	
JERRY SMITH Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
MICHAEL R. FLEMING Administrative Patent Judge	)	

js/rwk

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